REPORT TO

HAMMONDCARE

ON

SALINITY INVESTIGATION

FOR

PROPOSED HOSPITAL REDEVELOPMENT

AT

NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Date: 2 November 2022
Ref: E35312BRrpt3

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Executive Summary

HammondCare ('the client') commissioned JK Environments (JKE) to undertake a salinity investigation for the proposed hospital redevelopment at Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW. This salinity investigation report is to be submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSD-45121248) for the redevelopment of part of the wider site for the purposes of delivering additional community health services, seniors housing, as well as upgraded palliative care facilities that will contribute to the broader operation of 'Neringah Hospital.' The extent of the development area is shown on the figures attached in the appendices.

Specifically, this SSDA seeks approval for the following:

- Site preparation works comprising:
    - Demolition of the Neringah Hospital building, kiosk, and existing at-grade carparks;
    - Clearing of nominated vegetation on the proposed development areas;
    - Bulk earthworks including basement excavation; and
    - Remediation works where necessary across the site.
- Construction and use of an integrated seniors housing and health services facility across two buildings ranging from 4-5 storeys above ground, comprising:
    - 2 basement levels containing minimum of 130 car parking spaces and service dock;
    - 12 residential aged care facility beds (extension to existing Stage 1 provision);
    - 18 palliative care hospice beds (Schedule 3 health services facility);
    - Community healthcare services, including outpatient palliative care, centre for positive ageing and Hammond at Home;
    - 57 seniors housing dwellings; and
    - On-site administration, amenities and ancillary operations space.
- Ground level and on-building landscaping works, including the provision of a through site pedestrian link connecting Archdale Park and Balcombe Park;
- Public domain works, specifically, regrading of part of the pedestrian walkway known as 'Archdale Walk' to provide accessible connection; and
- Extension and augmentation of infrastructure and services required including new site signage.

This report has been prepared to respond to the Secretary's Environmental Assessment Requirements (SEARs) for SSD-45121248 that were issued on 24 June 2022. A table referencing responses has been provided below.

SEAR	Relevant section of report
13. Ground and Water Conditions Provide an assessment of salinity and acid sulfate soil (ASS) impacts.	This report relates to the assessment of salinity conditions at the site. The results of the assessment are presented in Section 6. The conclusions of the assessment are presented in Section 8. The assessment of ASS impacts is presented in a separate report (E35312BRrpt2).

The primary aim of the assessment was to characterise the broad scale dryland salinity conditions at the site in the context of the proposed development works. The assessment objectives were to:

- Assess the current conditions within the development area via a walkover inspection;
- Assess the soil and groundwater salinity conditions via implementation of a sampling and analysis program; and
- Assess the requirements for developing a salinity management plan (SMP) for the proposed development.

The scope of work included a review of site information, a walkover inspection of the development area, soil sampling from four locations and groundwater sampling from four monitoring wells installed within the development area as shown on Figure 2. The site information reviewed for the investigation indicated that the site was not located within a previously mapped dryland salinity risk area. No visual indications of adverse saline conditions (such as scalding or significant vegetation dieback/stress) were observed during the investigation.

The investigation identified the following salinity conditions within the development area:
- The soils are classed as extremely acidic to strongly alkaline;
- The soils are classed as non-saline;
- The soils are generally non-sodic;
- The soils are moderately aggressive towards buried concrete;
- The soils are not aggressive towards buried steel;
- The groundwater is moderately aggressive towards buried concrete; and
- The groundwater is mildly aggressive towards buried steel.

Based on the results of this investigation, JKE is of the opinion that a SMP is not required for the proposed development. The aggressivity results of the soils, rock and groundwater outlined in this report should be reviewed and incorporated into the design of the proposed development by the project team (civil, structural and landscaping).

As part of the building design, considerations should be made for implementing the following:
- Appropriate damp proof course (DPC) and moisture barriers should be used as outlined in the document 'Western Sydney Salinity Code of Practice, June 2003' (WSROC) and other relevant building codes and industry standards;
- Where required under the relevant building codes and standards, exposure class masonry must be used below the DPC, including for strip footings. This is especially important in areas where landscaping is located adjacent to built structures. An appropriate mortar and mixing ratio must be used with exposure class masonry. Admixtures for waterproofing and/or corrosion prevention should be used where necessary; and
- Care should be taken to check that the infrastructure design process considers the existing patterns of surface and subsurface water movement through the site during both dry and wet periods.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of this report.

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ABBREVIATIONS

Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Below Ground Level	**BGL**
Borehole	**BH**
Cation Exchange Capacity	**CEC**
Calcium	**Ca**
Cement, Concrete and Aggregates Australia	**CCAA**
Chain of Custody	**COC**
Damp Proof Course	**DPC**
Department of Planning and Environment	**DPE**
Department of Land and Water Conservation	**DLWC**
Dissolved Oxygen	**DO**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
Local Government Authority	**LGA**
Map Grid of Australia	**MGA**
Magnesium	**Mg**
National Association of Testing Authorities	**NATA**
Potassium	**K**
Polyvinyl Chloride	**PVC**
Practical Quantitation Limit	**PQL**
Redox Potential	**Eh**
Site Assessment Criteria	**SAC**
Secretary's Environmental Assessment Requirements	**SEARs**
Standard Penetration Test	**SPT**
State Significant Development	**SSD**
Salinity Management Plan	**SMP**
Standing Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Sodium	**Na**
Western Sydney Regional Organisation of Councils	**WSROC**

Units

deci Siemens per Metre	**dS/m**
Electrical Conductivity	**EC**
Exchangeable Sodium Percentage (Sodicity)	**ESP%**
Litres	**L**
Metres	**m**
Metres Below Ground Level	**mBGL**
Millivolts	**mV**
Millilitres	**ml**
Milliequivalents	**meq**
Milligrams per Litre	**mg/L**
Milligrams per Kilogram	**mg/kg**
ohm Centimetres	**ohm.cm**
Parts Per Million	**ppm**
micro Siemens per Centimetre	**µS/cm**

1 INTRODUCTION

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This salinity investigation report is to be submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSD-45121248) for the redevelopment of part of the wider site at 4-12 Neringah Avenue South, Wahroonga for the purposes of delivering additional community health services, seniors housing, as well as upgraded palliative care facilities that will contribute to the broader operation of 'Neringah Hospital.' The extent of the site is shown below. The extent of the development area is shown on the figures attached in the appendices.

Figure A: Outline of the site, with the portion of the site subject to the SCC shaded dark red (R4 zone)

Specifically, this SSDA seeks approval for the following:

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  - Demolition of the Neringah Hospital building, kiosk, and existing at-grade carparks;
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Background information on salinity is included in the appendices.

1.1 Proposed Development Details

The proposed development details are outlined in Section 1 above. Based on the information provided to JKE, we understand that the finished floor level of the lowest basement level is proposed to be at RL 192.920mAHD. Excavation to a maximum depth of approximately 14m below ground level (BGL) are anticipated to accommodate the basement levels.

Selected plans issued for the preparation of this report are attached in the appendices.

1.2 Aim and Objectives

The primary aim of the assessment was to characterise the broad scale dryland salinity conditions at the site in the context of the proposed development works. The assessment objectives were to:

[1] JKE, (2022b). *Report to HammondCare on Acid Sulfate Soil Assessment for Proposed Hospital Redevelopment at Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW.* (Ref: E35312BRrpt2) (referred to as ASS Report)

- Assess the current conditions within the development area via a walkover inspection;
- Assess the soil and groundwater salinity conditions via implementation of a sampling and analysis program; and
- Assess the requirements for developing a salinity management plan (SMP) for the proposed development.

1.3 Scope of Work

The assessment was undertaken generally in accordance with a JKE proposal (Ref: EP56645BR) of 27 May 2022 and written acceptance in the form of a purchase order (PO No: 72359) issued by the client on 27 July 2022. The scope of work included the following:

- Review site information including topography, soils maps, salinity risk maps, regional geology and hydro-geology in the vicinity of the site;
- A walkover inspection of the development area to identify obvious visual indicators of dryland salinity or potential problem areas;
- Assess the soil and groundwater salinity conditions via implementation of a sampling and analysis program;
- Interpretation of the analytical results based on established assessment criteria;
- Preparation of a report presenting the results of the investigation; and
- Recommendation for the requirement of a SMP for the proposed development.

The assessment was designed and the report was prepared with reference to regulations/guidelines outlined in the table below. Individual guidelines/documents are also referenced within the text of the report.

Table 1-2: Guidelines

Guidelines/Regulations/Documents
Site Investigations for Urban Salinity (2002[2])
Salinity Code of Practice (2004)[3]
Managing Urban Stormwater – Soil and Construction (4th ed.) (2004)[4]
Salinity Potential in Western Sydney Map (2002[5])
Piling – Design and Installation AS2159-2009 (2009)[6]
Industry Guide T56: Residential Slabs and Footings in Saline Environments (2018[7])

[2] Department of Land and Water Conservation (DLWC), (2002). *Site Investigations for Urban Salinity,* (referred to as DLWC 2002)

[3] Western Sydney Regional Organisation of Councils (WSROC) and Department of Infrastructure, Planning and Natural Resources (DIPNR), (2003 amended 2004). *Western Sydney Salinity Code of Practice* (referred to as Salinity Code of Practice)

[4] NSW Government/Landcom, (2004). *Managing Urban Stormwater – Soil and Construction*, (4th ed.) (referred to as Blue Book)

[5] DIPNR, (2002). *1:100,000 Map – Salinity Potential in Western Sydney*, (referred to as Salinity Potential Map)

[6] Standards Australia, (2009). *Piling – Design and Installation, AS2159-2009* (referred to as AS2159-2009)

[7] Cement, Concrete and Aggregates Australia (CCAA), (2018). Industry Guide *T56: Residential Slabs and Footings in Saline Environments* (referred to as CCAA 2018)

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Site Address:	Part of 4-12 Neringah Avenue South, Wahroonga, NSW
Lot & Deposited Plan:	Lot 1 in DP960051, Lot 1 in DP19937, Lot 52 in DP2666 and Lot 1 in DP585805
Current Land Use:	Hospital (palliative care)
Proposed Land Use:	Hospital and Seniors Living
Local Government Authority (LGA):	Ku-ring-gai Council
Development Area (m^2):	5,700
RL (AHD in m) (approx.):	195-207
Geographical Location (decimal degrees) (approx.):	Latitude: -33.717627 Longitude: 151.114568

2.2 Site Location and Regional Setting

The site is located in a predominantly residential area of Wahroonga. The site is bounded by Neringah Avenue South to the east. The site is located approximately 750m to the south of Cockle Creek.

2.3 Topography

The site is located within undulating regional topography which generally falls to the north and north-east at a slope of approximately 5°. The site itself falls to the north and north-east in line with the regional topography. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development

2.4 Site Inspection

A walkover inspection of the development area was undertaken by JKE on 26 July 2022. The inspection was limited to accessible areas of the site and was focussed on assessing the site conditions relevant to salinity-related factors only.

At the time of the inspection, a 2-4 storey building (main hospital building) was located within the central and northern sections of the development area, and a single-storey building (kiosk) was located in the south-eastern section of the development area. No obvious visible indications of salt damage (i.e salt wicking, decayed mortar joins) were observed during a cursory inspection of the buildings.

The southern section of the development area was vacant and grass covered. Large trees and smaller shrubs were also observed in this area, generally near the kiosk and the western site boundary. Based on a cursory inspection, the vegetation appeared healthy with no visible evidence of stress or die-back. Grass coverage was generally good, with the exception of some areas beneath large trees. No visible indications of saline conditions (such as scalding) were observed.

2.5 Surrounding Land Use

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

- North – Residential properties (predominantly high-density residential) with basement parking;
- South – Sydney Water reservoir;
- East – Neringah Avenue South, with medium to high-density residential properties beyond; and
- West – Woonona Cottage and HammondCare Wahroonga (nursing home) within the wider site boundary.

3 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology and Soils

Regional geological information presented in the Lotsearch report (attached in the appendices) indicated that the site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to light grey shale and laminite.

Soil landscape information presented in the Lotsearch report indicated that the site is located within Glenorie and West Pennant Hills soil landscapes. Glenorie soils are characterised by moderate erodibility with high erodibility in some cases, and localised dispersivity and salinity. West Pennant Hills soils are characterised by high to extreme erosion potential on steep slopes.

3.2 Dryland Salinity Mapping

Salinity hazard mapping information presented in the Lotsearch report indicated that the site is not located within a dryland salinity risk area.

3.3 Acid Sulfate Soil Risk and Planning

A review of the acid sulfate soil (ASS) risk map prepared by Department of Land and Water Conservation (1997)[8] indicated that the site is located in an area of 'no known occurrence'. Information presented in the Lotsearch report indicated that site is classed as having low probability of ASS occurrence.

A review of the Ku-ring-gai Council Local Environment Plan (LEP) 2015 indicates that the site is located in an area identified as Risk Class 5 land. Works in a Risk Class 5 area that could pose an environmental risk in terms of ASS include works within 500m of adjacent Class 1, 2, 3, and/or 4 land which are likely to lower the water table below 1m AHD on the adjacent land. JKE note that no Risk Class 1, 2, 3 or 4 land is located within 500m of the site. Reference should be made to Appendix D for further information regarding ASS risk classes.

An ASS assessment was undertaken in conjunction with this salinity investigation. The ASS assessment concluded that ASS and/or potential ASS (PASS) conditions were not encountered. Reference should be made to the ASS report for further details.

3.4 Hydrogeology

Hydrogeological information presented in the Lotsearch report indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. There was a total of 14 registered bores within the report buffer of 2,000m. Three of the registered bores were located within approximately 200m of the site. The drillers' logs were available for two of the bores, which indicated fill and/or clay soils to depths of approximately 5mBGL to 11mBGL, underlain by shale and sandstone bedrock. The monitoring wells were cased to depths of approximately 35.5mBGL, therefore the water quality information reported related to a deeper confined aquifer.

[8] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130S1, Ed 2)*

The Wianamatta Formation is characterised by very low permeability, low storage and high groundwater salinity as a consequence of the depositional environment during the middle Triassic period. This typically renders the shale groundwater unsuitable for any use due to low yield and poor quality. A perched groundwater table condition may occur in the residual soils overlying the Shale at some locations especially during prolonged wet conditions. This occurs due to the relatively higher permeability of soil at the soil-rock interface. Due to the shorter residence time, the perched water is typically less saline than flows within the bedrock.

3.5 Receiving Water Bodies and Surface Water Run-off

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is Cockle Creek located approximately 750m to the north of the site. Due to the distance from the site, this water body is not considered to be a potential receptor that could be impacted by direct migration.

Surface water run-off would be expected to flow northerly in sympathy with the local topography. Within sealed portions of the site, surface water flows would be expected to enter on-site stormwater drainage which is presumed to connect to the local stormwater infrastructure.

4 SAMPLING AND ANALYSIS PLAN

The sampling and analysis for this investigation was conducted generally in accordance with the Sampling, Analysis and Quality Plan (SAQP)[9] prepared for the site (attached in the appendices). The SAQP is summarised below:

- Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2;
- Soil samples were obtained from four boreholes (BH102, BH107, BH109 and BH114) generally spread across the development area, as shown on Figure 2 in the appendices;
- Soil samples were obtained using a drill rig equipped with spiral flight augers, between 29 July and 1 August 2022;
- Four groundwater monitoring wells were installed in BH102 (MW102), BH107 (MW107), BH109 (MW109) and BH114 (MW114);
- The monitoring well construction details are documented on the respective borehole logs attached in the appendices;
- The monitoring wells were developed on 4 August 2022 using a submersible electric pump. MW102, MW107 and MW109 were pumped until effectively dry. MW114 was pumped to the extent achievable. This is discussed further in Section 4.1;
- The monitoring wells were allowed to recharge for approximately four days after development. Groundwater samples were obtained from all monitoring wells using low flow sampling techniques on 8 August 2022;
- The field monitoring records and calibration data are attached in the appendices; and
- The relative surface levels of the monitoring wells were interpolated from spot height measurements on the provided survey plan.

4.1 Deviations to SAQP

- The intention was to develop each of the monitoring wells until either steady state conditions were encountered, or the well was pumped effectively dry. Due to equipment failure, the development of MW114 did not meet either of these objectives; and
- Due to site-imposed constraints and hydrogeological conditions, MW109 and MW114 were sampled whilst the SWLs were in drawdown. All other monitored field parameters were stabilised prior to commencing sampling.

Reference should be made to the SAQP attached in the appendices for further information. The above deviations to the SAQP are not likely to impact on the findings of the assessment.

[9] JKE, (2022). *Report to HammondCare on Sampling, Analysis and Quality Plan (SAQP) for Environmental Investigations at Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW*. (Ref: E35312BRrpt) (Referred to as SAQP).

4.2 Laboratory Analysis

Samples were analysed by Envirolab Services Pty Ltd (NATA accreditation number 2901). Reference should be made to the laboratory reports (Ref: 302203 and 302645) attached in the appendices for further details of the analytical methods.

4.3 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 4-1: Analytical Schedule

Analyte	Fill Samples	Natural Soil Samples	Natural Bedrock Samples	Groundwater Samples
pH	5	6	11	4
Electrical Conductivity (EC)	5	6	11	4
Resistivity	5	6	11	-
EC extract (ECe) (determined by texture)	5	6	11	-
Sulphate	5	6	11	4
Chloride	5	6	11	4
Cation Exchange Capacity (CEC)	6	2	-	-

5 SITE ASSESSMENT CRITERIA (SAC)

5.1 Soil Salinity and Plant Growth

The electrical conductivity (EC) of a 1:5 soil:water extract is commonly used as an indicator of soil salinity conditions as the reading is directly related to the electrolyte (salt) concentration of the extract. In order to compare the laboratory data with published salinity classes, the results are converted to equivalent saturated paste (ECe) using texture adjustment values presented in DLWC 2002.

The following table provides a summary of plant response with reference to salinity:

Table 5-1: Plant Response to Soil Salinity

ECe (dS/m)	Salinity Class	Plant Response[1]
<2	Non-saline	Salinity effects mostly negligible
2-4	Slightly saline	Yields of very sensitive crops may be affected
4-8	Moderately saline	Yield of many crops affected
8-16	Very saline	Only tolerant crops yield satisfactorily
>16	Highly saline	Only a few very tolerant crops yield satisfactorily

Note:

1 - Plant Response to Salinity Class has been adopted from DLWC 2002

5.2 Soil pH and Plant Growth

Soil pH is a measure of the acidity or alkalinity of the soils and values have been assessed as an indicator of soil fertility with respect to plant growth. The optimal pH for plant growth is between 5.5 and 7. Beyond this range, effective revegetation of exposed soil following disturbance is increasingly difficult and the potential for erosion is considered to increase.

Highly alkaline soils are commonly associated with saline and sodic soil conditions and can limit the ability of plants to take up water and nutrients. Highly acidic soils exhibit aluminium toxicity toward plants and can limit the ability of plants to take up other essential nutrients including molybdenum.

Interpretation of soil pH with respect to plant growth is undertaken using the ratings published in Bruce and Rayment (1982[10]) presented below:

[10] Bruce, R.C. and Rayment, G.E., (1982). *Analytical Methods and Interpretations used by the Agricultural Chemistry Branch for Soil and Land Use Surveys,* (referred to as Bruce and Rayment 1982)

Table 5-2: Plant Response to Soil pH

pH	Rating
<4.5	Extremely acidic
4.5-5.0	Very strongly acidic
5.1-5.5	Strongly acidic
5.6 – 7.3	Optimal plant growth
7.4-7.8	Mildly alkaline
7.9-8.4	Moderately alkaline
8.5-9.0	Strongly alkaline
>9.1	Very strongly alkaline

5.3 Cation Exchange Capacity (CEC) in Soil

The ability of soils to attract, retain and exchange cations (positively charged ions) is estimated by the calculated CEC value. CEC represents the major controlling factor in stability of clay soil structure, nutrient availability for plant growth, soil pH and the reaction of the soil to chemical applications (fertilisers, conditioners etc.).

High CEC soils have a greater capacity to retain nutrients, however, deficient soils require greater applications of nutrients to correct imbalances. Low CEC soils have a reduced capacity to retain nutrients and may result in leaching of nutrients from the soil in the event of excess nutrient applications.

Metson (1961[11]) developed a set of ratings for effective CEC and the most abundant cations. These are summarised below (values are in meq/100g):

Table 5-3: CEC Rating

Rating	eCEC	Exch Na	Exch K	Exch Ca	Exch Mg
Very low	<6	0-0.1	0-0.2	0-2	0-0.3
Low	6-12	0.1-0.3	0.2-0.3	2-5	0.3-1
Moderate	12-25	0.3-0.7	0.3-0.7	5-10	1-3
High	25-40	0.7-2	0.7-2	10-20	3-8
Very high	>40	>2	>2	>20	>8

[11] Metson, A.J, (1961). *Methods of Chemical Analysis for Soil Survey Samples* (referred to as Metson 1961)

5.3.1 Ratio of Exchangeable Calcium to Magnesium

To maintain soil structure there should be a ratio of around 4:1 to 6:1 calcium to magnesium for a balanced soil (Eckert 1987[12]). At ratios of less than 4:1 calcium is considered to be deficient, whilst at ratios of greater than 6:1 are considered to be magnesium deficient.

5.4 Exchangeable Sodium Percentage or Sodicity (ESP%)

Exchangeable sodium is an important soil stability and salinity parameter. Excessive exchangeable sodium leads to unstable soils, increased runoff, potential salinity, dispersivity and water logging problems.

Normally the sodium content is expressed as a percentage of the CEC as other cations counteract the negative effects of sodium (known as ESP% and termed sodicity). The effect of the exchangeable sodium (exchangeable sodium percentage, ESP) varies with other soil factors such as the type of clay, the relative quantity of magnesium and the quantity of organic matter. However, Charman & Murphy (2000[13]) indicate that a soil is generally considered sodic if the ESP exceeds 6% and extremely sodic if the ESP exceeds 15%.

5.5 Groundwater Salinity

EC values in groundwater are dependent on numerous factors and can vary with changes in temperature and pH conditions. Suttar (1990[14]) has classed water into different types based on EC values as outlined in the table below.

Table 5-4: EC Ranges in Water

Water Type	EC (µS/cm)
Deionised Water	0.5 – 3
Pure Rainwater	<15
Freshwater Rivers	0 – 800
Marginal River Water	800 – 1600
Brackish Water	1600 – 4800
Saline Water	>4800
Seawater	51,500
Industrial Waters	100 – 10,000

[12] Eckert, D.J, (1987) .*Soil Test Interpretation: Basic Cation Saturation Ratios and Sufficiency Levels* (referred to as Eckert 1987)
[13] Charman, P.E.V and Murphy, B.W (eds), (2000).*Soils: Their Management and Properties,* (referred to as Charman and Murphy 2000)
[14] Suttar, S., (1990). *Ribbons of Blue Handbook, Scitech*, Victoria (referred to as Suttar 1990)

5.6 Recommendations for Concrete Slabs and Footings in Saline Soils

In the absence of endorsed recommendations for buildings in saline environments, reference is made to the CCAA 2018. The guide provides recommendations on the minimum concrete grade/strength required for slabs and footings in saline soils. Reference should be made to the CCAA 2018 publication for further information:

Table 5-5: Minimum Concrete Grade for Slabs and Footings in Saline Soils

ECe (dS/m)	Salinity Class	Concrete Grade[1]
<2	Non-saline	N20
2-4	Slightly saline	N20
4-8	Moderately saline	N25
8-16	Very saline	N32
>16	Highly saline	≥N40

Note:

1 - Concrete Grade for Salinity Class has been adopted from CCAA 2018

5.7 Recommendations for Durability with Reference to AS2159-2009

In designing for durability, reference should be made to the requirements listed in the AS2159-2009. The exposure classification for concrete and steel piles and foundations is outlined in the following tables.

Table 5-6: Exposure Classification for Concrete Piles

Exposure Conditions				Exposure Classification	
Sulphate (expressed as SO_4)		pH	Chlorides in Groundwater (ppm)	Soil Conditions A[1]	Soil Conditions B[2]
In Soil (ppm)	In Groundwater (ppm)				
<5,000	<1,000	>5.5	<6,000	Mild	Non-aggressive
5,000-10,000	1,000-3,000	4.5-5.5	6,000-12,000	Moderate	Mild
10,000-20,000	3,000-10,000	4-4.5	12,000-30,000	Severe	Moderate
>20,000	>10,000	<4	>30,000	Very severe	Severe

Notes:

1 - High permeability soils (eg sands and gravels) which are in groundwater

2 – Low permeability soils (eg silts and clays) or all soils above groundwater

Table 5-7: Exposure Classification for Steel Piles

Exposure Conditions				**Exposure Classifications**	
pH	**Chlorides**		**Resistivity (ohm.cm)**	**Soil Conditions A[1]**	**Soil Conditions B[2]**
	In Soil (ppm)	**In Groundwater (ppm)**			
>5	<5,000	<1,000	>5,000	Non-aggressive	Non-aggressive
4-5	5,000-20,000	1,000-10,000	2,000-5,000	Mild	Non-aggressive
3-4	20,000-50,000	10,000-20,000	1,000-2,000	Moderate	Mild
<3	>50,000	>20,000	<1,000	Severe	Moderate

Notes:

1 - High permeability soils (eg sands and gravels) which are in groundwater

2 – Low permeability soils (eg silts and clays) or all soils above groundwater

6 INVESTIGATION RESULTS

6.1 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the table below. For completeness, the summary below includes details from all boreholes drilled for the concurrent detailed site contamination investigation (DSI) undertaken by JKE as outlined in the SAQP. Reference should be made to the borehole logs attached in the appendices for further details.

Table 6-1: Summary of Subsurface Conditions

Profile	Description (metres below ground level - mBGL)
Pavement	Asphaltic concrete pavement was encountered in BH101 to BH103 and BH107 to BH109 and ranged in thickness from approximately 10mm to 100mm.
Fill	Fill material was encountered at the surface or beneath the pavement in all boreholes and extended to depths of approximately 0.15mBGL (BH104 and BH105) to 1.2mBGL (BH108 and BH114). BH106 was terminated in the fill at a maximum depth of approximately 0.5mBGL. The fill typically comprised of: silty sand; and silty and/or sandy clay. The fill contained inclusions of: gravel; ash; slag; mulch; and building rubble (glass, ceramic, plastic, rubber, tile, concrete, brick and fibre cement fragments [FCF]). No stained or odorous soils were encountered during the investigation.
Natural Soil	Residual silty clay was encountered beneath the fill in all boreholes (except for BH106). BH101, BH103, BH104, BH108, BH110 to BH113 and BH115 were terminated in the residual soils at depths of approximately 0.8mBGL to 2.4mBGL.
Bedrock	Siltstone bedrock was encountered in BH102, BH105, BH107, BH109 and BH114 beneath the residual soils at depths of approximately 1mBGL (BH105) to 4mBGL (BH114). The bedrock was extremely weathered on first contact, becoming distinctly weathered at depths of approximately 5.5mBGL (BH114) to 8mBGL (BH107 and BH109).
Groundwater	Groundwater seepage was encountered in BH102, BH107, BH109, BH114 and BH115 at depths of approximately 2mBGL to 7.5mBGL. On completion of drilling, groundwater SWLs in BH102, BH107, BH109 and BH114 were measured to be approximately 3.6mBGL to 7.5mBGL. BH115 was dry on completion of drilling. All other boreholes remained dry on completion of drilling and a short time after.

6.2 Laboratory Results

A summary of the results is presented below. Reference should be made to the report tables attached in the appendices for more information.

Table 6-2: Summary of Laboratory Results

Analyte	Results
EC & ECe	The EC results ranged from 22µS/m to 230µS/m. All of the ECe results were <2dS/m.
Resistivity	Resistivity values were calculated based on the EC values. The resistivity values for the soil samples ranged from 4,348ohm.cm to 45,455ohm.cm.

Analyte	Results
pH	The results of the analysis ranged from 4.1 to 8.7.
CEC	The results of the analysis ranged from: • CEC – 4.6meq/100g to 55meq/100g; • Exchangeable Na – below the laboratory PQL of <0.1meq/100g to 0.1meq/100g; • Exchangeable K – 0.1meq/100g to 0.4meq/100g; • Exchangeable Ca – 3.1meq/100g to 55meq/100g; and • Exchangeable Mg – 0.3meq/100g to 1.3meq/100g.
Sulphate	The results ranged from 21mg/kg to 340mg/kg.
Chloride	The results ranged from below the laboratory PQL of 10mg/kg to 140mg/kg.
Groundwater	The results of the analysis ranged from: • pH – 4.0 to 5.6; • EC – 520µS/cm to 1,400µS/cm; • Chloride - 41mg/L to 300mg/L; and • Sulphate - 60mg/L to 200mg/L.

Note:

Na – Sodium, K – Potassium, Ca – Calcium, Mg – Magnesium

7 RESULTS INTERPRETATION

The laboratory results are compared to the relevant SAC in the attached report tables. Interpretation of the results against the SAC is provided in the following table.

Table 7-1: Interpretation of Laboratory Results

Parameter	Notes
Soil Salinity and Plant Growth	All of the ECe results were <2dS/m and the soils were classed as non-saline.
Soil pH and Plant Growth	The soil pH results ranged from 4.1 to 8.7 and are classed as extremely acidic to strongly alkaline. The majority of the surficial soils were generally within the moderately alkaline range for plant growth. The acidic conditions generally increased with depth. The proposed excavations will generally expose acidic soils and may require treatment with lime or gypsum in order to make the soils suitable for plant growth.
CEC in Soil	The CEC values ranged from 4.6meq/100g to 55meq/100g in the very low to high range. The majority of the samples were within the very low to low range which is typical of the soil formation encountered at the site and are generally indicative of the low levels of organic matter within the soils.
Ratio of Calcium to Magnesium	The results indicate that the soils have more calcium than magnesium. The CEC of the soil is generally very low to low. Lime and gypsum can be used to stabilise the soil which will improve soil structure for both engineering and fertility purposes.
ESP%	The ESP% values of the samples ranged from 0.2% to 2.2%. The majority of the ESP results were below the 5% threshold and were classed as non-sodic.
Groundwater Salinity	The laboratory results indicate that the groundwater is generally non-saline and within the 'freshwater rivers to marginal river water' water type.
Concrete Slabs and Footings in Saline Soils (CCAA 2018)	The proposed earthworks are anticipated to expose soils and bedrock generally classed as non-saline. The CCAA 2018 recommended concrete grade for slabs and footings in non-saline soils is N20. Reference should also be made to AS2159-2009 for minimum concrete strengths and reinforcement cover for concrete piles/foundations.
Soil Conditions for Exposure Classification (AS2159-2009)	The boreholes drilled for the investigation have indicated that the subsurface conditions at the site generally comprise of low permeability soils (i.e. silts and clays). Based on this, the exposure classification outlined under 'Soil Conditions B' has been adopted for the investigation.
Exposure Classification for Concrete Piles/Foundations (AS2159-2009)	The soil pH and sulphate results indicate that the soils are moderately aggressive towards buried concrete. The groundwater pH, sulphate and chloride results indicate that the groundwater is moderately aggressive towards buried concrete. The results should be assessed by the project design team as applicable for the proposed development.

Parameter	Notes
Exposure Classification for Steel Piles/Foundations (AS2159-2009)	The soil resistivity, pH and chloride results indicate that the soils are not aggressive towards buried steel. The groundwater pH and chloride results indicate that the groundwater is mildly aggressive towards buried steel. The results should be assessed by the project design team as applicable for the proposed development.

8 CONCLUSIONS AND RECOMMENDATIONS

The investigation identified the following salinity conditions within the development area:

- The soils are classed as extremely acidic to strongly alkaline;
- The soils are classed as non-saline;
- The soils are generally non-sodic;
- The soils are moderately aggressive towards buried concrete;
- The soils are non-aggressive towards buried steel;
- The groundwater is moderately aggressive towards buried concrete; and
- The groundwater is mildly aggressive towards buried steel.

Based on the results of this investigation, JKE is of the opinion that a SMP is not required for the proposed development. The aggressivity results of the soils, rock and groundwater outlined in this report should be reviewed and incorporated into the design of the proposed development by the project team (civil, structural and landscaping).

As part of the building design, considerations should be made for implementing the following:

- Appropriate damp proof course (DPC) and moisture barriers should be used as outlined in the WSROC document '*Western Sydney Salinity Code of Practice, June 2003'* and other relevant building codes and industry standards;
- Where required under the relevant building codes and standards, exposure class masonry must be used below the DPC, including for strip footings. This is especially important in areas where landscaping is located adjacent to built structures. An appropriate mortar and mixing ratio must be used with exposure class masonry. Admixtures for waterproofing and/or corrosion prevention should be used where necessary; and
- Care should be taken to check that the infrastructure design process considers the existing patterns of surface and subsurface water movement through the site during both dry and wet periods.

JKE consider that the report objectives outlined in Section 1.2 have been addressed.

9 LIMITATIONS

The report limitations are outlined below:

- Salinity is a natural phenomenon and can change over time based on site conditions and climatic variations. Changes to existing drainage patters can also impact the salinity at the site. The results outlined in this report are a snap shot of conditions present at the time of the investigation and is bound to change over time;
- JKE accepts no responsibility for any unidentified salinity 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;
- JKE accepts no responsibility for non-compliance of salinity management recommends outlined in this report;
- 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;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- 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 salinity sources or may have been impacted by adverse salinity conditions, except where specifically stated in the report;
- JKE accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- 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 land use. JKE should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a salinity viewpoint, and vice versa;
- 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.

Important Information About This Report

These notes have been prepared by JKE to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors

This report has been prepared in response to specific project requirements as stated in the JKE proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

JKE will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by JKE to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions

Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater salinity concentrations may also vary over time through migration and accumulation of salts, importation of materials, construction and landscaping. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data

Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of salinity, the likely impact on the proposed development and appropriate management measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations

The assessment is designed to identify major salinity risks at the site. Implementing the management recommends can minimise the risks. No assessment can identify all risks as salinity is a natural phenomenon which can change over time. Even a rigorous professional assessment may not detect all potential salinity impacts on a site. Salinity may be present in areas that were not surveyed or sampled, or may accumulate in areas which showed no signs of salinity when sampled.

Misinterpretation of Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site management or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

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:	NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW
Project No: E35312BR	Figure No: 1

JKEnvironments

PLOT DATE: 25/07/2022 2:59:44 PM DWG FILE: K:\5C EIS JOBS\35000'S\E35312BR WAHROONGA\CAD\E35312BR.DWG

LEGEND

- APPROXIMATE DEVELOPMENT AREA BOUNDARY
- APPROXIMATE SITE BOUNDARY
- BH(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
- BH/MW(Fill Depth) BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
- BH(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (EIS, 2010)
- APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND STORAGE TANK (UST)
- APPROXIMATE ALIGNMENT OF SEWER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Project No: E35312BR

Figure No: 2

JKEnvironments

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Appendix B: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS FOR SALINITY TABLES

Abbreviations used in the Tables:

Ca	Calcium
CEC	Cation Exchange Capacity
DO	Dissolved Oxygen
EC	Electrical Conductivity
ECe	Extract Electrical Conductivity
Eh	Redox Potential
ESP	Exchangeable Sodium Percentage (Each Na/CEC)
K	Potassium
Mg	Magnesium
Na	Sodium
SWL	Standing Water Level

Units used in the Tables

°C	Degrees Celsius
dS/m	deciSiemens per metre
m	meters
meq/100g	milliequivalents per 100 grams
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mV	millivolts
ohm.cm	ohm centimetre
µS/cm	microSiemens per centimetre

Notes on Specific Tables

SUMMARY OF SOIL LABORATORY RESULTS - EC and ECe

- The salinity Class has been adopted from 'Site Investigations for Urban Salinity' DLWC 2002.

SUMMARY OF RESISTIVITY CALCULATION ON SOIL EC RESULTS

- The resistivity values have been calculated on the laboratory EC values.
- The classification has been derived from the Australian Standard 2159-2009 Piling Design and Installation (Table 6.5.2 [A] & [C])
- Table 6.5.2 [A] of Australian Standard 2159-2009 recommends using a Moderate Exposure Classification for Steel Piles in Fresh Water - Soft Running Water

SUMMARY OF SOIL LABORATORY RESULTS - pH

- The pH Classification has been derived from the Australian Standard 2159-2009 Piling Design and Installation (Tables 6.4.2 [C] & 6.5.2 [C])
- Table 6.5.2 [A] of Australian Standard 2159-2009 recommends using a Moderate Exposure Classification for Steel Piles in Fresh Water - Soft Running Water

SUMMARY OF SOIL LABORATORY RESULTS - SULFATE & CHLORIDES

- The classification has been derived from the Australian Standard 2159-2009 Piling Design and Installation (Table 6.5.2 [A] & [C])

SUMMARY OF SOIL LABORATORY RESULTS - CEC & ESP

- The Sodicity rating has been adopted from the publication 'Site Investigations for Urban Salinity' DLWC 2002

SUMMARY OF GROUNDWATER LABORATORY RESULTS

- The classification has been derived from the Australian Standard 2159-2009 Piling Design and Installation (Table 6.5.2 [A] & [C]) .
- Table 6.4.2 [A] recommends using a Mild Exposure Classification for Concrete Piles in Fresh Water - Treat as in Soil Condition 'A'.
- Table 6.5.2 [A] recommends using a Moderate Exposure Classification for Steel Piles in Fresh Water - Soft Running Water.

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TABLE A
SUMMARY OF SOIL LABORATORY RESULTS - EC and ECe

Borehole Number	Sample Depth (m)	Sample Description	EC (µS/cm)	ECe (dS/m)	Salinity Class
BH102	0.01-0.1	Fill: Silty Sand	150	<2	NON SALINE
BH102	0.8-1	Silty Clay	97	<2	NON SALINE
BH102	1.8-2.0	Silty Clay	85	<2	NON SALINE
BH102	2.8-3	Siltstone	39	<2	NON SALINE
BH102	8.8-9	Siltstone	120	<2	NON SALINE
BH107	0.3-0.5	Fill: Silty Sandy Clay	170	<2	NON SALINE
BH107	1.5-1.95	Silty Clay	48	<2	NON SALINE
BH107	2.3-2.5	Silty Clay	72	<2	NON SALINE
BH107	3.8-4	Siltstone	22	<2	NON SALINE
BH107	5.8-6	Siltstone	33	<2	NON SALINE
BH107	7.3-7.5	Siltstone	83	<2	NON SALINE
BH109	0.5-0.7	Fill: Silty Sand	78	<2	NON SALINE
BH109	1-1.2	Silty Clay	62	<2	NON SALINE
BH109	3-3.3	Siltstone	30	<2	NON SALINE
BH109	5.8-6	Siltstone	68	<2	NON SALINE
BH109	8-8.2	Siltstone	41	<2	NON SALINE
BH114	0-0.1	Fill: Silty Clay	120	<2	NON SALINE
BH114	0.5-0.95	Fill: Silty Clay	230	<2	NON SALINE
BH114	1.3-1.5	Silty Clay	65	<2	NON SALINE
BH114	9.8-10	Siltstone	74	<2	NON SALINE
BH114	10.8-11	Siltstone	94	<2	NON SALINE
BH114	13.8-14	Siltstone	130	<2	NON SALINE
Text1					
Total Number of Samples			22	22	-
Minimum Value			22	<PQL	-
Maximum Value			230	<PQL	-

ECe Values (dS/m)	Salinity Class
<2	NON SALINE
2 to 4	SLIGHTLY SALINE
4 to 8	MODERATELY SALINE
8 to 16	VERY SALINE
>16	HIGHLY SALINE

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TABLE B
SUMMARY OF RESISTIVITY CALCULATION ON SOIL EC RESULTS

Borehole Number	Sample Depth (m)	Sample Description	EC (µS/cm)	Resistivity (ohm.cm)	Classification Condition B
BH102	0.01-0.1	Fill: Silty Sand	150	6,667	Non Aggressive
BH102	0.8-1	Silty Clay	97	10,309	Non Aggressive
BH102	1.8-2.0	Silty Clay	85	11,765	Non Aggressive
BH102	2.8-3	Siltstone	39	25,641	Non Aggressive
BH102	8.8-9	Siltstone	120	8,333	Non Aggressive
BH107	0.3-0.5	Fill: Silty Sandy Clay	170	5,882	Non Aggressive
BH107	1.5-1.95	Silty Clay	48	20,833	Non Aggressive
BH107	2.3-2.5	Silty Clay	72	13,889	Non Aggressive
BH107	3.8-4	Siltstone	22	45,455	Non Aggressive
BH107	5.8-6	Siltstone	33	30,303	Non Aggressive
BH107	7.3-7.5	Siltstone	83	12,048	Non Aggressive
BH109	0.5-0.7	Fill: Silty Sand	78	12,821	Non Aggressive
BH109	1-1.2	Silty Clay	62	16,129	Non Aggressive
BH109	3-3.3	Siltstone	30	33,333	Non Aggressive
BH109	5.8-6	Siltstone	68	14,706	Non Aggressive
BH109	8-8.2	Siltstone	41	24,390	Non Aggressive
BH114	0-0.1	Fill: Silty Clay	120	8,333	Non Aggressive
BH114	0.5-0.95	Fill: Silty Clay	230	4,348	Non Aggressive
BH114	1.3-1.5	Silty Clay	65	15,385	Non Aggressive
BH114	9.8-10	Siltstone	74	13,514	Non Aggressive
BH114	10.8-11	Siltstone	94	10,638	Non Aggressive
BH114	13.8-14	Siltstone	130	7,692	Non Aggressive
Total Number of Samples			22	22	-
Minimum Value			22	4,348	-
Maximum Value			230	45,455	-

Classification is based on Soil condition 'B' - low permeability soils (e.g. silts & clays) or all soils above groundwater.

Resistivity Values (ohm.cm)	Classification for Steel Piles
>5,000	Non-Aggressive
2,000 - 5,000	Non-Aggressive
1,000 - 2,000	Mildly Aggressive
<1,000	Moderately Aggressive

TABLE C
SUMMARY OF SOIL LABORATORY RESULTS - pH

Borehole Number	Sample Depth (m)	Sample Description	pH	Classification for Concrete Piles Condition B	Classification for Steel Piles Condition B
BH102	0.01-0.1	Fill: Silty Sand	8.2	Non-Aggressive	Non-Aggressive
BH102	0.8-1	Silty Clay	4.5	Moderately Aggressive	Non-Aggressive
BH102	0.8-1	LAB DUPLICATE	4.5	Moderately Aggressive	Non-Aggressive
BH102	1.8-2.0	Silty Clay	4.9	Mildly Aggressive	Non-Aggressive
BH102	2.8-3	Siltstone	5	Mildly Aggressive	Non-Aggressive
BH102	8.8-9	Siltstone	4.6	Mildly Aggressive	Non-Aggressive
BH107	0.3-0.5	Fill: Silty Sandy Clay	4.2	Moderately Aggressive	Non-Aggressive
BH107	1.5-1.95	Silty Clay	4.1	Moderately Aggressive	Non-Aggressive
BH107	1.5-1.95	LAB DUPLICATE	4.1	Moderately Aggressive	Non-Aggressive
BH107	2.3-2.5	Silty Clay	4.5	Moderately Aggressive	Non-Aggressive
BH107	3.8-4	Siltstone	4.8	Mildly Aggressive	Non-Aggressive
BH107	5.8-6	Siltstone	4.9	Mildly Aggressive	Non-Aggressive
BH107	7.3-7.5	Siltstone	4.5	Moderately Aggressive	Non-Aggressive
BH109	0.5-0.7	Fill: Silty Sand	5.9	Non-Aggressive	Non-Aggressive
BH109	1-1.2	Silty Clay	4.2	Moderately Aggressive	Non-Aggressive
BH109	3-3.3	Siltstone	4.4	Moderately Aggressive	Non-Aggressive
BH109	5.8-6	Siltstone	4.5	Moderately Aggressive	Non-Aggressive
BH109	8-8.2	Siltstone	4.5	Moderately Aggressive	Non-Aggressive
BH114	0-0.1	Fill: Silty Clay	8.1	Non-Aggressive	Non-Aggressive
BH114	0-0.1	LAB DUPLICATE	8	Non-Aggressive	Non-Aggressive
BH114	0.5-0.95	Fill: Silty Clay	8.7	Non-Aggressive	Non-Aggressive
BH114	1.3-1.5	Silty Clay	4.5	Moderately Aggressive	Non-Aggressive
BH114	9.8-10	Siltstone	4.7	Mildly Aggressive	Non-Aggressive
BH114	10.8-11	Siltstone	5.4	Mildly Aggressive	Non-Aggressive
BH114	13.8-14	Siltstone	7	Non-Aggressive	Non-Aggressive
Total Number of Samples			25	-	-
Minimum Value			4.1	-	-
Maximum Value			8.7	-	-

Classification is based on Soil condition 'B' - low permeability soils (e.g. silts & clays) or all soils above groundwater.

	Classification for Concrete Piles	pH Value	Classification for Steel Piles
>5.5	Non-Aggressive	>5	Non-Aggressive
4.5 - 5.5	Mildly Aggressive	4.0 - 5.0	Non-Aggressive
4 - 4.5	Moderately Aggressive	3.0 - 4.0	Mildly Aggressive
<4	Severely Aggressive	<3	Moderately Aggressive

TABLE D
SUMMARY OF SOIL LABORATORY RESULTS - SULPHATE & CHLORIDES

Borehole Number	Sample Depth (m)	Sample Description	Chloride (mg/kg)	Sulphate (mg/kg)	Classification for Concrete Piles Sulfate - Condition B	Classification for Steel Piles Chloride - Condition B
BH102	0.01-0.1	Fill: Silty Sand	<10	73	Non-Aggressive	Non-Aggressive
BH102	0.8-1	Silty Clay	40	93	Non-Aggressive	Non-Aggressive
BH102	0.8-1	LAB DUPLICATE	40	92	Non-Aggressive	Non-Aggressive
BH102	1.8-2.0	Silty Clay	20	99	Non-Aggressive	Non-Aggressive
BH102	2.8-3	Siltstone	10	38	Non-Aggressive	Non-Aggressive
BH102	8.8-9	Siltstone	140	22	Non-Aggressive	Non-Aggressive
BH107	0.3-0.5	Fill: Silty Sandy Clay	20	340	Non-Aggressive	Non-Aggressive
BH107	1.5-1.95	Silty Clay	<10	83	Non-Aggressive	Non-Aggressive
BH107	1.5-1.95	LAB DUPLICATE	<10	100	Non-Aggressive	Non-Aggressive
BH107	2.3-2.5	Silty Clay	<10	120	Non-Aggressive	Non-Aggressive
BH107	3.8-4	Siltstone	<10	21	Non-Aggressive	Non-Aggressive
BH107	5.8-6	Siltstone	<10	36	Non-Aggressive	Non-Aggressive
BH107	7.3-7.5	Siltstone	20	100	Non-Aggressive	Non-Aggressive
BH109	0.5-0.7	Fill: Silty Sand	<10	51	Non-Aggressive	Non-Aggressive
BH109	1-1.2	Silty Clay	<10	80	Non-Aggressive	Non-Aggressive
BH109	3-3.3	Siltstone	<10	29	Non-Aggressive	Non-Aggressive
BH109	5.8-6	Siltstone	<10	93	Non-Aggressive	Non-Aggressive
BH109	8-8.2	Siltstone	10	45	Non-Aggressive	Non-Aggressive
BH114	0-0.1	Fill: Silty Clay	<10	25	Non-Aggressive	Non-Aggressive
BH114	0-0.1	LAB DUPLICATE	<10	22	Non-Aggressive	Non-Aggressive
BH114	0.5-0.95	Fill: Silty Clay	10	190	Non-Aggressive	Non-Aggressive
BH114	1.3-1.5	Silty Clay	20	61	Non-Aggressive	Non-Aggressive
BH114	9.8-10	Siltstone	29	78	Non-Aggressive	Non-Aggressive
BH114	10.8-11	Siltstone	44	91	Non-Aggressive	Non-Aggressive
BH114	13.8-14	Siltstone	62	82	Non-Aggressive	Non-Aggressive
Total Number of Samples			25	25	-	-
Minimum Value			<PQL	21	-	-
Maximum Value			140	340	-	-

Classification is based on Soil condition 'B' - low permeability soils (e.g. silts & clays) or all soils above groundwater.

Sulfate Values	Classification for Concrete Piles	Chloride Values	Classification for Steel Piles
<5,000	Non-Aggressive	<5,000	Non-Aggressive
5,000 - 10,000	Mildly Aggressive	5,000 - 20,000	Non-Aggressive
10,000 - 20,000	Moderately Aggressive	20,000 - 50,000	Mildly Aggressive
>20,000	Severely Aggressive	>50,000	Moderately Aggressive

TABLE E
SUMMARY OF SOIL LABORATORY RESULTS - CEC & ESP

Borehole Number	Sample Depth (m)	Sample Description	Exchangeable Ca	Exchangeable K	Exchangeable Mg	Exchangeable Na	CEC	ESP	Ca:Mg
			(meq/100g)					%	
BH102	0.01-0.1	Fill: Silty Sand	22	0.4	0.5	0.1	23	0.4%	44.0:1
BH102	0.8-1	Silty Clay	3.1	0.2	1.2	0.1	4.6	2.2%	2.58:1
BH107	0.07-0.3	Fill: Silty Sand	55	0.1	0.3	<0.1	55	0.2%	183.33:1
BH107	0.3-0.5	Fill: Silty Sandy Clay	5.3	0.2	0.9	<0.1	6.5	1.5%	5.89:1
BH107	0.3-0.5	LAB DUPLICATE	5.8	0.3	1	<0.1	7.2	1.4%	5.8:1
BH109	0.5-0.7	Fill: Silty Sand	7.8	0.3	1.3	0.1	9.5	1.1%	6.0:1
BH109	0.7-0.95	Silty Clay	6.2	0.2	1.1	0.1	7.6	1.3%	5.64:1
BH114	0-0.1	Fill: Silty Clay	28	0.2	0.8	<0.1	29	0.3%	35.0:1
BH114	0.5-0.95	Fill: Silty Clay	36	0.4	0.6	<0.1	37	0.3%	60.0:1
Total Number of Samples			9	9	9	9	9	9	9
Minimum Value			3.1	0.1	0.3	<PQL	4.6	0.2%	2.58 :1
Maximum Value			55	0.4	1.3	0.1	55	2.2%	183.33 :1

ESP Value	Sodicity Rating
< 5%	Non-Sodic
5% to 15%	Sodic
> 15%	Highly Sodic

TABLE F
SUMMARY OF GROUNDWATER LABORATORY RESULTS

Sample Reference	Field Measurements						Laboratory Results				Classification for Concrete Piles Soil Condition B	Classification for Steel Piles Soil Condition B
	SWL (m)	pH	EC (µS/cm)	Temp (°C)	Eh (mV)	DO (mg/L)	pH	EC (µS/cm)	Sulfate (mg/L)	Chloride (mg/L)		
MW102	2.44	4.1	930	17	63.1	2.5	4.0	1,100	60	300	Moderately Aggressive	Mildly Aggressive
MW107	3.83	4.5	365	15.1	22.7	1.2	4.7	520	150	51	Mildly Aggressive	Non-Aggressive
MW109	2.62	4.3	408	14.4	31.9	1.9	4.5	560	170	41	Moderately Aggressive	Non-Aggressive
MW114	4.71	5.7	1,147	17.5	23.2	0.6	5.6	1,400	200	260	Non-Aggressive	Non-Aggressive
Total Number of Samples	4	4	4	4	4	4	4	4	4	4	-	-
Minimum Value	2.44	4.1	365	14.4	22.7	0.6	4.0	520	60	41	-	-
Maximum Value	4.71	5.7	1,147	17.5	63.1	2.5	5.6	1,400	200	300	-	-

Exposure Classification for Concrete Piles

Classification is based on Soil condition 'B' - low permeability soils (e.g. silts and clays) or all soils above groundwater.

pH	Sulfate (mg/L)	Chloride (mg/L)	Classification B
> 5.5	<1,000	<6,000	Non-Aggressive
4.5 - 5.5	1,000 - 3,000	6,000 - 12,000	Mildly Aggressive
4.0 - 4.5	3,000 - 10,000	12,000 - 30,000	Moderately Aggressive
< 4	>10,000	>30,000	Severely Aggressive

Exposure Classification for Steel Piles

Classification is also based on Soil condition 'B' - low permeability soils (e.g. silts and clays) or all soils above groundwater.

pH	Chloride (mg/L)	Classification B
> 5	<1,000	Non-Aggressive
4.0 - 5.0	1,000 - 10,000	Non-Aggressive
3.0 - 4.0	10,000 - 20,000	Mildly Aggressive
<3	>20,000	Moderately Aggressive

Appendix C: Lotsearch Environmental Risk and Planning Report

LOTSEARCH ENVIRO PROFESSIONAL

Date: 12 Aug 2022 10:11:39

Reference: LS035239 EP

Address: Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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	17/06/2022	17/06/2022	Quarterly	-	-	-	-
Topographic Data	NSW Department of Customer Service - Spatial Services	25/06/2019	25/06/2019	Annually	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	01/08/2022	07/07/2022	Monthly	1000m	0	0	2
Contaminated Land Records of Notice	Environment Protection Authority	18/07/2022	18/07/2022	Monthly	1000m	0	0	0
Former Gasworks	Environment Protection Authority	03/06/2022	14/07/2021	Quarterly	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	23/06/2022	13/07/2012	Annually	1000m	0	0	2
EPA PFAS Investigation Program	Environment Protection Authority	01/08/2022	14/07/2021	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	01/08/2022	01/08/2022	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	01/08/2022	01/08/2022	Monthly	2000m	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	01/08/2022	01/08/2022	Monthly	2000m	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	06/06/2022	06/06/2022	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	18/07/2022	18/07/2022	Monthly	1000m	0	0	2
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	18/07/2022	18/07/2022	Monthly	1000m	0	0	1
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	18/07/2022	18/07/2022	Monthly	1000m	0	0	4
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	150m	2	5	35
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	150m	-	13	17
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500m	0	0	144
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500m	-	0	0
Points of Interest	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	1	4	63
Tanks (Areas)	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	0	1	1
Tanks (Points)	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	0	1	3
Major Easements	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	0	0	26
State Forest	Forestry Corporation of NSW	25/02/2021	14/02/2021	Annually	1000m	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	10/02/2022	31/12/2021	Annually	1000m	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	Annually	1000m	1	1	1
Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018	NSW Department of Planning, Industry and Environment	28/03/2022	23/02/2018	Annually	1000m	0	0	0
National Groundwater Information System (NGIS) Boreholes	Bureau of Meteorology; Water NSW	24/01/2022	24/01/2022	Annually	2000m	0	0	14

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
NSW Seamless Geology Single Layer: Rock Units	Department of Regional NSW	17/02/2022	01/05/2021	Annually	1000m	1	1	2
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	1
Soil Landscapes of Central and Eastern NSW	NSW Department of Planning, Industry and Environment	14/10/2020	27/07/2020	Annually	1000m	2	2	5
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning, Industry and Environment	26/05/2022	06/05/2022	Monthly	500m	1	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000m	1	1	1
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	19/08/2021	05/08/2021	Quarterly	1000m	0	0	0
Current Mining Titles	NSW Department of Industry	01/08/2022	01/08/2022	Monthly	1000m	0	0	0
Mining Title Applications	NSW Department of Industry	01/08/2022	01/08/2022	Monthly	1000m	0	0	0
Historic Mining Titles	NSW Department of Industry	01/08/2022	01/08/2022	Monthly	1000m	12	12	12
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning, Industry and Environment	15/11/2021	07/12/2018	Monthly	1000m	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning, Industry and Environment	15/11/2021	05/11/2021	Monthly	1000m	1	12	64
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	1	1	1
State Heritage Register - Curtilages	NSW Department of Planning, Industry and Environment	19/08/2021	25/06/2021	Quarterly	1000m	0	2	6
Environmental Planning Instrument Local Heritage	NSW Department of Planning, Industry and Environment	26/05/2022	01/04/2022	Monthly	1000m	0	9	196
Bush Fire Prone Land	NSW Rural Fire Service	08/08/2022	28/07/2022	Weekly	1000m	0	0	2
Remnant Vegetation of the Cumberland Plain	NSW Office of Environment & Heritage	07/10/2014	04/08/2011	Unknown	1000m	1	1	7
Ramsar Wetlands of Australia	Australian Government Department of Agriculture, Water and the Environment	28/03/2022	19/03/2020	Annually	1000m	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	14/08/2017	15/05/2017	Annually	1000m	0	0	0
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000m	0	0	0
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	08/08/2022	08/08/2022	Weekly	10000m	-	-	-

Site Diagram

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Legend

- Site Boundary
- Internal Parcel Boundaries

Total Area: 6441m²

Total Perimeter: 356m

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.

Scale: 0 15 30 Meters

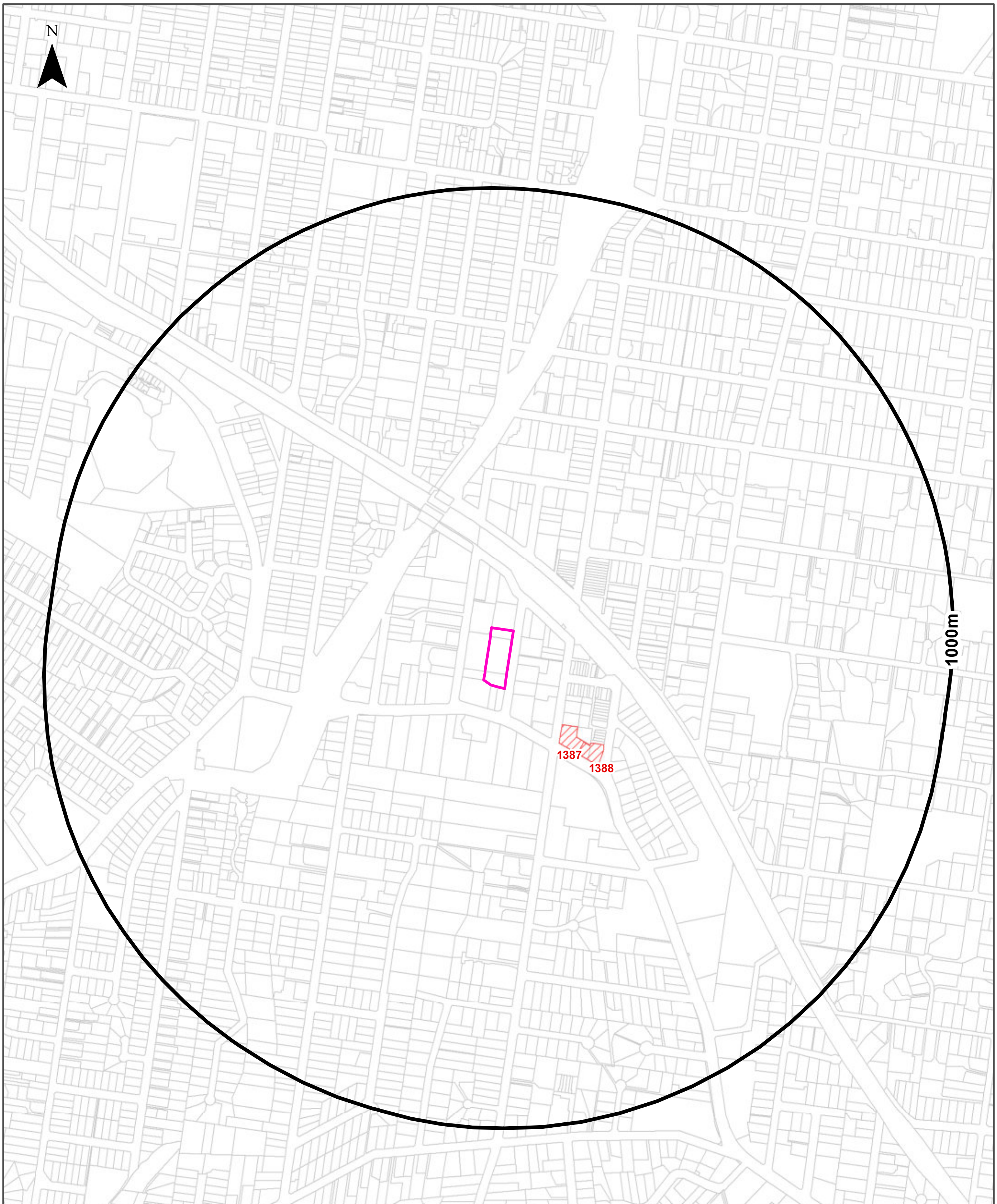
Data Source Aerial Imagery: © Aerometrex Pty Ltd

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 August 2022

Contaminated Land

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary
- Contaminated Land List
- Contaminated Land Record of Notice
- Former Gasworks

Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Contaminated Land

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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
1387	Coles Express Wahroonga	1601 Pacific Highway	Wahroonga	Service Station	Regulation under CLM Act not required	Current EPA List	Premise Match	153m	South East
1388	7-Eleven Service Station	1579 Pacific Highway	Wahroonga	Service Station	Regulation under CLM Act not required	Current EPA List	Premise Match	216m	South East

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

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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

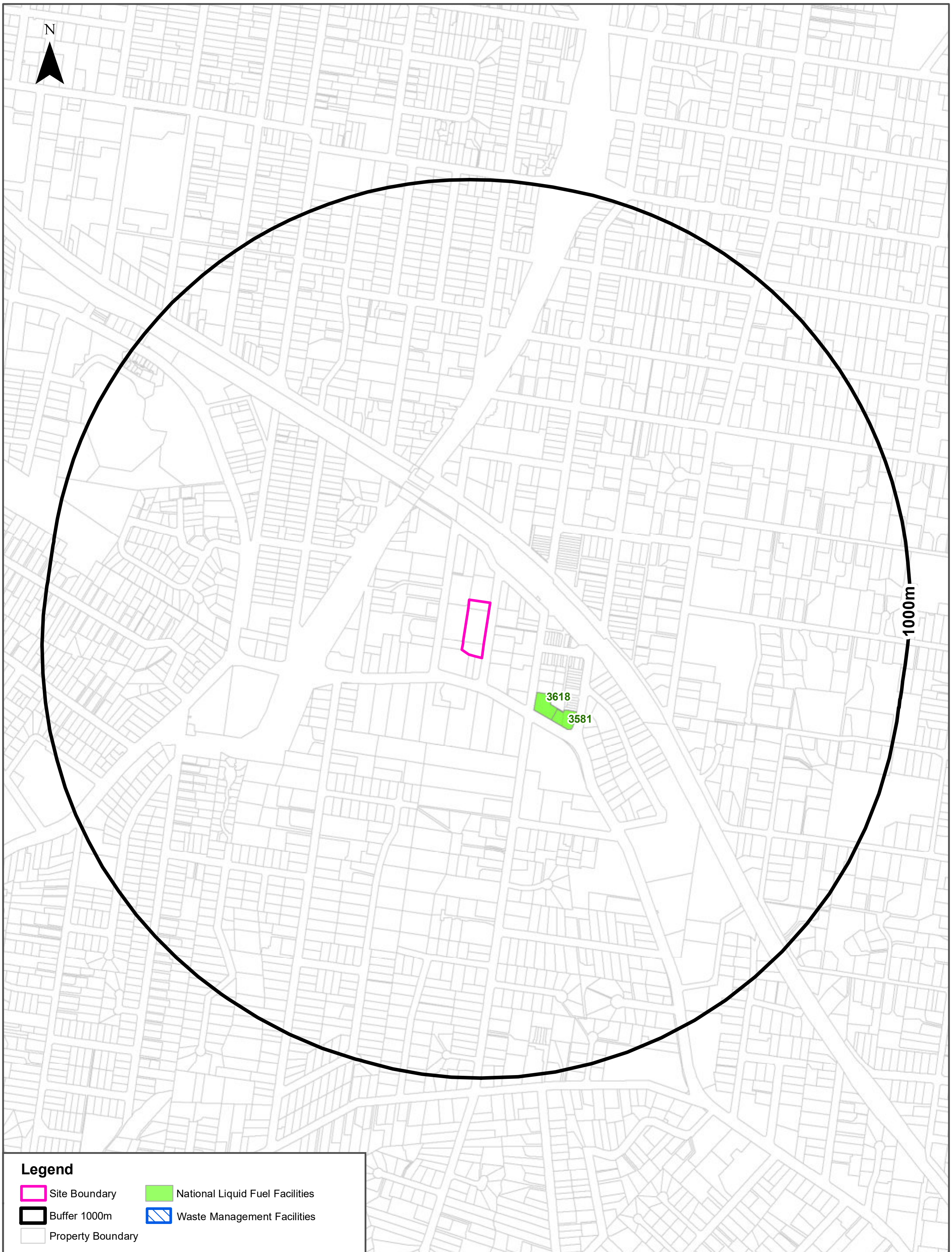
Former Gasworks within the dataset buffer:

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

Former Gasworks Data Source: Environment Protection Authority

Waste Management & Liquid Fuel Facilities

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 August 2022

Waste Management & Liquid Fuel Facilities

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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											

Waste Management Facilities Data Source: Geoscience Australia

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
3618	Shell	Coles Express Wahroonga	1601 Pacific Highway	Wahroonga	Petrol Station	Operational		25/07/2011	Premise Match	153m	South East
3581	7-Eleven Pty Ltd	Wahroonga	1579 Pacific Highway	Wahroonga	Petrol Station	Operational		13/07/2012	Premise Match	216m	South East

National Liquid Fuel Facilities Data Source: Geoscience Australia

PFAS Investigation & Management Programs

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Defence 3 Year Regional Contamination Investigation Program

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

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

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

EPA Other Sites with Contamination Issues

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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

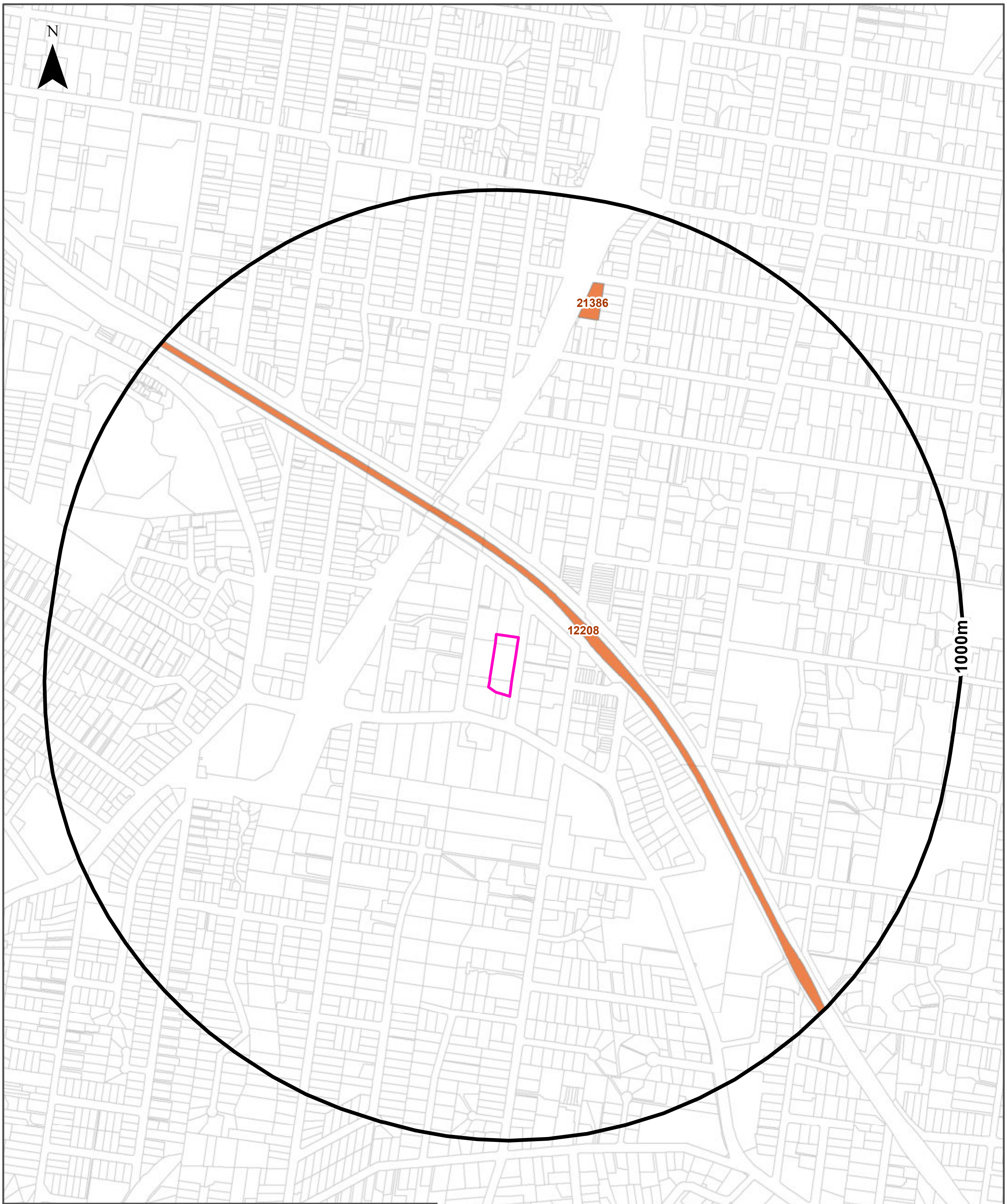
Sites within the dataset buffer:

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

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary
- Current Licensed Activities under POEO Act
- Current Licences related to Other Activities incl. Application of Herbicides to Waterways
- Current Licences related to Irrigated Agriculture

Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

EPA Activities

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Licensed Activities under the POEO Act 1997

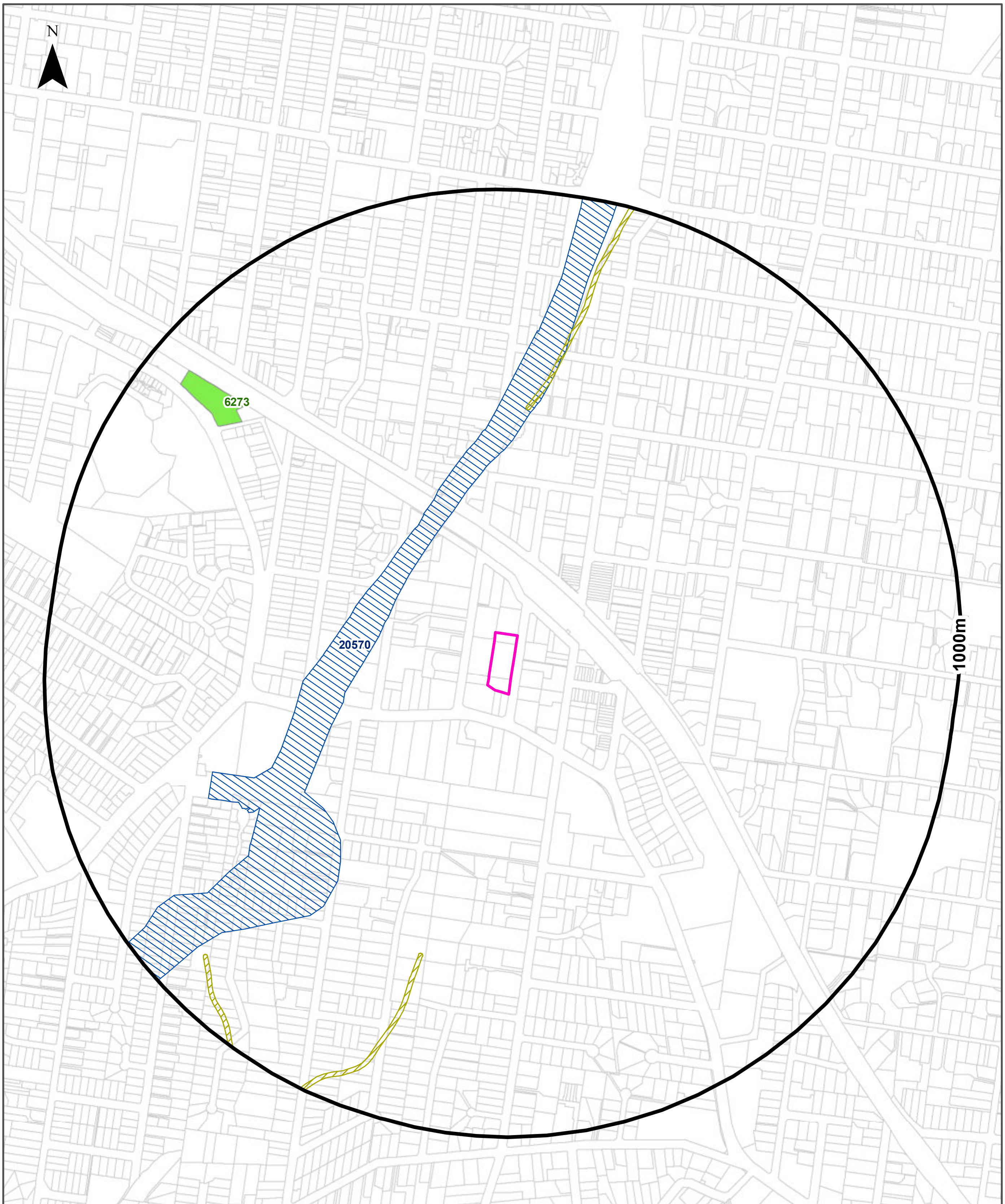
Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
12208	SYDNEY TRAINS		SYDNEY TRAINS, HAYMARKET, NSW 1238		Railway systems activities	Network of Features	114m	North East
21386	TOLLAUST PTY LTD		EATON ROAD, WEST PENNANT HILLS, NSW 2125		Road tunnel emissions	Premise Match	735m	North

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary
- Delicensed Activities still Regulated by EPA
- Former Licensed/Regulated Activities (revoked or surrendered)
- Surrendered Licences related to Other Activities on Waterways incl. Application of Herbicides

Scale: 0 100 200 400 600 Meters	Property Boundary Data Source: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

EPA Activities

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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
6273	MCCARROLL'S OF MOSS VALE PTY LTD	PHIL MCCARROLL TOYOTA	42-54 PACIFIC HIGHWAY	WAITARA	Hazardous, Industrial or Group A Waste Generation or Storage	Premise Match	745m	North West

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
20570	LENDLEASE BUILDING PTY LIMITED	NorthConnex Project, BETWEEN WINDSOR ROAD, BAULKHAM HILLS and M2 MOTORWAY, PENNANT HILLS AND M1 MOTORWAY., WAHROONGA, NSW 2076, WAHROONGA	Surrendered	03/06/2015	Crushing, grinding or separating; Road construction	Premise Match	233m	West
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	508m	South
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	508m	South
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	508m	South

Former Licensed Activities Data Source: Environment Protection Authority

Historical Business Directories

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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 30 60 90 120 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 August 2022

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

Historical Business Directories

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Business Directory Records 1950-1991
Premise or Road Intersection Matches

Universal Business Directory records from years 1991, 1986, 1982, 1978, 1975, 1970, 1965, 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
1	Homes & Institutions	Neringah Horne of Peace (C. of Eng.), 8 Neringah Ave., Wahroonga	100580	1965	Premise Match	0m	On-site
	HOMES & INSTITUTIONS	Neringah Home of Peace (C. of Eng.), 8 Neringah Ave., Wahroonga	324496	1961	Premise Match	0m	On-site
2	BUILDERS & CONTRACTORS-(M.M.B.A.)	Edleston, F 5 Bundarra Ave. WAHROONGA	277062	1961	Premise Match	70m	West
3	Schools/Colleges - Private/Public	Abbotsleigh C. of E. School for Girls., 1666 Pacific Highway. Wahroonga	142772	1965	Premise Match	80m	South
	SCHOOLS/COLLEGES-PRIVATE/PUBLIC	Abbotsleigh C. of E. School for Girls, 1666 Pacific Highway., Wahroonga	248253	1961	Premise Match	80m	South
4	HOMES &/OR INSTITUTIONS.	Rosetta Agst Memorial Centre., 1660 Pacific H'way., Wahroonga. 2076	42364	1975	Premise Match	101m	South
	HOMES & INSTITUTIONS (H490)	Rosetta Agst Memorial Home., 1660 Pacific Highway., Wahroonga	316619	1970	Premise Match	101m	South
	HOMES & INSTITUTIONS (H490)	Rosetta Agst Memorial Home., 1660 Pacific Highway., Wahroonga	316618	1970	Premise Match	101m	South
	Homes & Institutions	Rosetta Agst Memorial Home, 1660 Pacific Hghwy, Wahroonga	100597	1965	Premise Match	101m	South
	HOMES & INSTITUTIONS	"Rosetta Agst" Memorial Home, 1660 Pacific Highway., Wahroonga	324413	1961	Premise Match	101m	South
5	Real Estate Agents	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	97284	1991	Premise Match	141m	South East
	AUCTIONEERS REAL ESTATE	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	4388	1986	Premise Match	141m	South East
	BUSINESS AGENTS &/OR BROKERS.	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	9339	1986	Premise Match	141m	South East
	REAL ESTATE AGENTS.	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	79332	1986	Premise Match	141m	South East
	AUCTIONEERS - REAL ESTATE.(A8430)	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076.	3912	1982	Premise Match	141m	South East
	BUSINESS AGENTS &/OR BROKERS. (B7920)	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076.	10256	1982	Premise Match	141m	South East
	REAL ESTATE AGENTS. (R2555)	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076.	68832	1982	Premise Match	141m	South East
	AUCTIONEERS-REAL ESTATE.	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	3696	1978	Premise Match	141m	South East
	BUSINESS AGENTS &/OR BROKERS.	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	8634	1978	Premise Match	141m	South East
	REAL ESTATE AGENTS &/OR VALUERS.	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	61540	1978	Premise Match	141m	South East
	BUSINESS AGENTS &/OR BROKERS.	Cruickshank & Co., 26 Railway Ave., Wahroonga 2076	9724	1975	Premise Match	141m	South East
	AUCTIONEERS-REAL ESTATE	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	3467	1975	Premise Match	141m	South East
	PROPERTY MANAGEMENT.	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	70585	1975	Premise Match	141m	South East
	REAL ESTATE AGENTS &/OR VALUERS.	Cruickshank & Co., 26 Railway Ave., Wahroonga. 2076	72199	1975	Premise Match	141m	South East
	BUILDERS &/OR BUILDING CONTRACTORS.	Wahroonga Building Co., 26 Railway Ave., Wahroonga. 2076	8698	1975	Premise Match	141m	South East
	REAL ESTATE AGENTS/VALUERS(R205)	Cruickshank & Co., 26 Railway Ave., WAHROONGA	355192	1970	Premise Match	141m	South East

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
6	GROCERS-RETAIL.	Franklins Wahroonga, 19 Railway Ave., Wahroonga. 2076	40802	1986	Premise Match	141m	East
	GROCERS - RETAIL. (G7850)	Franklins, 19 Railway Ave., Wahroonga. 2076.	37676	1982	Premise Match	141m	East
	GROCERS-RETAIL	Franklins, 19 Railway Ave., Wahroonga. 2076	33897	1978	Premise Match	141m	East
	GROCERS-RETAIL	Franklins., 19 Railway Ave., Wahroonga. 2076	39418	1975	Premise Match	141m	East
	HIRE CAR SERVICES	Wahroonga Auto Repairs, 21 Railway Ave., Wahroonga	324300	1961	Premise Match	141m	East
	HIRE CAR SERVICES	Wahroonga Taxi Service, 21 Railway Ave., Wahroonga	62338	1950	Premise Match	141m	East
	MOTOR GARAGES &/OR ENGINEERS	Wahroonga Taxi Service, 21 Railway Ave., Wahroonga	84518	1950	Premise Match	141m	East
	MOTOR SERVICE STATIONS-PETROL, Etc.	Wahroonga Taxi Service, 21 Railway Ave., Wahroonga	86493	1950	Premise Match	141m	East
	TAXIS	Wahroonga Taxi Service, 21 Railway Ave., Wahroonga	107522	1950	Premise Match	141m	East

Business Directory Records 1950-1991
Road or Area Matches

Universal Business Directory records from years 1991, 1986, 1982, 1978, 1975, 1970, 1965, 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
7	ACCOUNTANTS & AUDITORS	Burns, R. B., 34 Woonona Ave., Wahroonga	264746	1961	Road Match	50m
8	RESTAURANTS. (R5180)	Fox & Hounds Bar & Steak House, Pacific H'way., Wahroonga. 2076.	70862	1982	Road Match	54m
	BOAT, LAUNCH &/OR YACHT SALES &/OR SERVICE	Waves Marine of Waitara, Pacific H'way., Waitara. 2077.	6839	1975	Road Match	54m
	MEDICAL PRACTITIONERS	Beazley, R. N., 1627 Pacific Highway., Wahroonga	334536	1961	Road Match	54m
	MEDICAL PRACTITIONERS	Hunter, J. G., 1596 Lane Cove Rd., Wahroonga	335496	1961	Road Match	54m
	MOTOR TOWING SERVICES	Automotive Towing Co., Pearces Corner, Pacific Highway., Wahroonga	86888	1950	Road Match	54m
	MEDICAL PRACTITIONERS	Beazley, R. N., 1627 Pacific Highway., Wahroonga	72417	1950	Road Match	54m
9	MEDICAL PRACTITIONERS (M216)	Welsh, A. M., 14 Warwilla Ave., Wahroonga	328551	1970	Road Match	61m
	Medical Practitioners	Welsh, A. M., 14 Warwilla Ave., Wahroonga	112924	1965	Road Match	61m
	CARPENTERS	Anderson, A. B., 24 Warwilla Ave,. Wahroonga	284059	1961	Road Match	61m
	CARPENTERS & JOINERS	Anderson, A. B., 24 Warwilla Ave., Wahroonga	17814	1950	Road Match	61m
	MUSIC TEACHERS	Dresden, J., Warwilla Ave., Wahroonga	87413	1950	Road Match	61m
	MEDICAL PRACTITIONERS	Welsh, D. A “Sherwood”.,14 Warwilla Ave., Wahroonga	74051	1950	Road Match	61m
10	WINE & SPIRIT MERCHANTS-RETAIL	Home, P. E., 70 Coonanbarra Rd., Wahroonga	113522	1950	Road Match	121m
11	BUTCHERS-RETAIL	Cook, S. & Son, Railway Ave., Wahroonga	280101	1961	Road Match	141m
12	CARRIERS & CARTAGE CONTRACTORS	Jones, Roy, Millewa Ave., Wahroonga	19126	1950	Road Match	143m
	CARRIERS & CARTAGE CONTRACTORS	Mullane, J., Millewa Ave., Wahroonga	19449	1950	Road Match	143m

Dry Cleaners, Motor Garages & Service Stations

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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 80 160 240 320 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 August 2022

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

Historical Business Directories

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Dry Cleaners, Motor Garages & Service Stations 1948-1993
Premise or Road Intersection Matches

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

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

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
1	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Taxi Service., 21 Railway Ave., Wahroonga	43885	1953	Premise Match	141m	East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Taxi Service., 21 Railway Ave., Wahroonga	32381	1952	Premise Match	141m	East
	MOTOR GARAGES &/OR ENGINEERS	Wahroonga Taxi Service, 21 Railway Ave., Wahroonga	84518	1950	Premise Match	141m	East
	MOTOR SERVICE STATIONS-PETROL, Etc.	Wahroonga Taxi Service, 21 Railway Ave., Wahroonga	86493	1950	Premise Match	141m	East
	MOTOR SERVICE STATIONS-PETROL, ETC.	Wahroonga Taxi Service., 21 Railway Ave Wahroonga	26858	1948-49	Premise Match	141m	East
2	MOTOR GARAGES & SERVICE STATIONS.	Wahroonga Auto Port, 1601 Pacific Hghwy, Wahroonga. 2076	64185	1988	Premise Match	153m	South East
	MOTOR GARAGES & SERVICE STATIONS.	Wahroonga Auto Port, 1601 Pacific H'way., Wahroonga. 2076	65679	1986	Premise Match	153m	South East
	MOTOR GARAGES & SERVICE STATIONS.	Wahroonga Auto Port, 1601 Pacific Way, Wahroonga. 2076	45801	1985	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Wahroonga Auto Port, 1601 Pacific Hghwy, Wahroonga. 2076	34362	1984	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Wahroonga Auto Port., 1601 Pacific H'way Wahroonga 2076	21805	1983	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Wahroonga Auto Port, 1601 Pacific H'way., Wahroonga. 2076.	57805	1982	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Wahroonga Auto Port., 1601 Pacific H Way., Wahroonga 2076	8375	1981	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Wahroonga Auto Port., 1601 Pacific H'way., Wahroonga. 2076	59064	1980	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Wahroonga Auto Port., 1601 Pacific Highway., Wahroonga. 2076.	46561	1979	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Wahroonga Auto Port, 1601 Pacific H'way, Wahroonga. 2076	51047	1978	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Wahroonga Auto Port., 1601 Pacific H'way., Wahroonga 2076	35148	1976	Premise Match	153m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Auto Port., 1601 Pacific H'way., Wahroonga. 2076	59728	1975	Premise Match	153m	South East

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
2	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Auto Port., 1601 Pacific Hghwy., Wahroonga	13184	1972	Premise Match	153m	South East
3	DRY CLEANERS, PRESSERS & DYERS	Jeeves (1938) Pty. Ltd 66 Coonanbarra Rd., Wahroonga	35310	1950	Premise Match	192m	North East
	DRY CLEANERS, PRESSERS & DYERS.	Jeeves Pty. Ltd., 66 Coonanbarra Rd Wahroonga	17206	1948-49	Premise Match	192m	North East
4	DRY CLEANERS, PRESSERS &/OR DYERS.	Wattle Dry Cleaners., 21 Redleaf Ave., Wahroonga 2076	23877	1976	Premise Match	207m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS.	Wattle Dry Cleaners, 21 Redleaf Ave., Wahroonga. 2076	24401	1975	Premise Match	207m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS	Wattle Dry Cleaners., 21 Redleaf Ave Wahroonga	55099	1971	Premise Match	207m	South East
	DRY CLEANERS,PRESSERS /DYERS (D710)	Wattle Dry Cleaners., 21 Redleaf Ave., Wahroonga	292568	1970	Premise Match	207m	South East
	DRY CLEANERS, PRESSERS/ DYERS	Wattle Dry Cleaners., 21 Redleaf Ave Wahroonga	37375	1969	Premise Match	207m	South East
	DRY CLEANERS, PRESSERS/DYERS	Wattle Dry Cleaners., 21 Redleaf Ave Wahroonga	20828	1968	Premise Match	207m	South East
	DRY CLEANERS, PRESSERS/ DYERS	Wattle Dry Cleaners., 21 Redleaf Ave., Wahroonga	6385	1967	Premise Match	207m	South East
	DRY CLEANERS, PRESSERS/ DYERS	Wattle Dry Cleaners., 21 Redleaf Ave Wahroonga	55431	1966	Premise Match	207m	South East
	DRY CLEANERS, PRESSERS/ DYERS.	Wattle Dry Cleaners., 21 Redleaf Rd Wahroonga	43211	1964	Premise Match	207m	South East
5	MOTOR GARAGES & SERVICE STATIONS.	Esso Wahroonga Servicentre, 1579 Pacific Hwy., Wahroonga. 2076	18949	1993	Premise Match	230m	South East
	Motor Garages & Service Stations	Esso Wahroonga Servicentre, 1579 Pacific H'way., Wahroonga 2076	97336	1991	Premise Match	230m	South East
	MOTOR GARAGES & SERVICE STATIONS.	Esso Wahroonga Servicentre, 1579 Pacific Hghwy, Wahroonga. 2076	11589	1990	Premise Match	230m	South East
	MOTOR GARAGE & SERVICE STATIONS.	Esso Wahroonga Servicentre, 1579 Pacific Hghwy, Wahroonga. 2076	65052	1989	Premise Match	230m	South East
	MOTOR GARAGES & SERVICE STATIONS.	Esso Wahroonga Servicentre, 1579 Pacific Hghwy, Wahroonga. 2076	59270	1988	Premise Match	230m	South East
	MOTOR GARAGES & SERVICE STATIONS.	Esso Servicentre Wahroonga, 1579 Pacific H'way., Wahroonga. 2076	64670	1986	Premise Match	230m	South East
	MOTOR GARAGES & SERVICE STATIONS.	Esso Servicentre Wahroonga., 1579 Pacific Hghwy, Wahroonga. 2076	39668	1985	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Esso Servicentre Wahroonga., 1579 Pacific Hghwy, Wahroonga. 2076	28245	1984	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Esso Servicentre Wahroonga., 1579 Pacific H'way., Wahroonga 2076	14669	1983	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Esso Servicentre Wahroonga, 1579 Pacific H'way., Wahroonga. 2076.	56733	1982	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Esso Servicenter., 1579 Pacific H'way., Wahroonga 2076	29963	1976	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Esso Servicenter., 1579 Pacific H'way., Wahroonga. 2076	58836	1975	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Esso Servicenter., 1579 Pacific Hghwy., Wahroonga 2076	13181	1972	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	62834	1971	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS(M6S6)	Sutherland, James Pty. Ltd., 1579 Pacific Highway., WAHROONGA	338692	1970	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy Wahroonga	50828	1969	Premise Match	230m	South East

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
5	MOTOR GARAGES & ENGINEERS.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy, Wahroonga	47282	1969	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	30709	1968	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	36916	1968	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	11131	1967	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	20380	1967	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	1881	1966	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS.	Sutherland, James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	60857	1966	Premise Match	230m	South East
	Motor Service Stations - Petrol, Oil, Etc.	Sutherland, James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	126219	1965	Premise Match	230m	South East
	Motor Garages & Engineers	Sutherland, James Pty. Ltd., 1579 Pacific Highway. Wahroonga	123491	1965	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS	Sutherland, James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	48765	1964	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Sutherland, James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	52476	1964	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	33555	1962	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	42851	1962	Premise Match	230m	South East
	MOTOR SERVICE STATIONS—PETROL, OIL, Etc.	Sutherland James Pty.Ltd, 1579 Princes Hghwy., WAHROONGA	351146	1961	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS	Sutherland, James Pty. Ltd., 1579 Pacific Hghwy., WAHROONGA	348244	1961	Premise Match	230m	South East
	MOTOR GARAGES & ENGINEERS.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	20067	1959	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL,. OIL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	24629	1959	Premise Match	230m	South East
	MOTOR GARAGE/ENGINEERS.	Silver Bros. Pty Ltd., 1579 Pacific Hghwy., Wahroonga	4954	1958	Premise Match	230m	South East
	MOTOR GARAGE/ENGINEERS.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahrnga	5052	1958	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahrnga	9862	1958	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Silver Bros. Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	61477	1956	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, ETC.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahrnga	66	1956	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Sutherland James Pty. Ltd., 1579 Pacific Hghwy., Wahroa	61546	1956	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Silver Bros. Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	54094	1954	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Silver Bros. Pty. Ltd., 1579 Pacific Hghwy., Wahroonga	40677	1953	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Silver Bros., 1579 Pacific Hghwy., Wahroonga	32236	1952	Premise Match	230m	South East
	MOTOR SERVICE STATIONS-PETROL, Etc.	Silver Bros., 1579 Pacific Hghwy., Wahroonga	86387	1950	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS	Silver Bros., 1579 Pacific Highway., Wahroonga	84363	1950	Premise Match	230m	South East
	MOTOR GARAGES &/OR ENGINEERS.	Silver Bros., 1579 Pacific Hghwy., Wahroonga	22860	1948-49	Premise Match	230m	South East

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
5	MOTOR SERVICE STATIONS-PETROL, ETC.	Silver Bros., 1579 Pacific Hghwy., Wahroonga	26778	1948-49	Premise Match	230m	South East
6	DRY CLEANERS & PRESSERS.	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga. 2076	53013	1988	Premise Match	231m	South East
	DRY CLEANERS & PRESSERS.	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga. 2076	25239	1986	Premise Match	231m	South East
	DRY CLEANERS & PRESSERS.	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga. 2076	34455	1985	Premise Match	231m	South East
	DRY CLEANERS & PRESSERS.	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga. 2076	21900	1984	Premise Match	231m	South East
	DRY CLEANERS & PRESSERS.	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga 2076	8488	1983	Premise Match	231m	South East
	DRY CLEANERS & PRESSERS.(D8500)	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga. 2076.	23768	1982	Premise Match	231m	South East
	DRY CLEANERS & PRESSERS.	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga. 2076	63254	1981	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS.	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga. 2076	46686	1980	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS.	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga. 2076.	35285	1979	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga. 2076	20714	1978	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS.	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga 2076	23424	1976	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS.	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga. 2076	23948	1975	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS.	Bentley Dry Cleaners., 39 Redleaf Ave Wahroonga	2806	1972	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS &/OR DYERS	Bentley Dry Cleaners., 39 Redleaf Ave Wahroonga	50950	1971	Premise Match	231m	South East
	DRY CLEANERS,PRESSERS /DYERS (D710)	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga	292216	1970	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS/ DYERS	Bentley Dry Cleaners., 39 Redleaf Ave Wahroonga	37025	1969	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS/DYERS	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga	20493	1968	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS/ DYERS	Bentley Dry Cleaners., 39 Redleaf Ave Wahroonga	1998	1967	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS/ DYERS	Bentley Dry Cleaners., 39 Redleaf Ave., Wahroonga	52582	1966	Premise Match	231m	South East
	Dry Cleaners, Pressers/Dyers	Bentley Dry Cleaners, 39 Redleaf Ave., Wahroonga	76091	1965	Premise Match	231m	South East
	DRY CLEANERS, PRESSERS/ DYERS.	Bentley Dry Cleaners., 39 Redleaf Ave Wahroonga	42949	1964	Premise Match	231m	South East
7	Motor Garages & Service Stations	BP Wahroonga Service Station, 2 Redleaf Ave, Wahroonga 2076	66581	1991	Premise Match	262m	East
	MOTOR GARAGES & SERVICE STATIONS.	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076	11223	1990	Premise Match	262m	East
	MOTOR GARAGE & SERVICE STATIONS.	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076	64657	1989	Premise Match	262m	East
	MOTOR GARAGES & SERVICE STATIONS.	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076	53780	1988	Premise Match	262m	East
	MOTOR GARAGES & SERVICE STATIONS.	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076	64248	1986	Premise Match	262m	East
	MOTOR GARAGES & SERVICE STATIONS.	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076	39251	1985	Premise Match	262m	East

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
7	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076	27858	1984	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076	65750	1983	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	BP Wahroonga Service Station, 2 Redleaf Ave., Wahroonga. 2076.	56320	1982	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Wahroonga Service Station., 2 Redleaf Ave., Wahroonga. 2076	63999	1981	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Wahroonga Service Station., 2 Redleaf Ave., Wahroonga. 2076	51503	1980	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Service Station., 2 Redleaf Ave., Wahroonga. 2076.	41086	1979	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Service Station, 2 Redleaf Ave., Wahroonga. 2076	49622	1978	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Service Station., 2 Redleaf Ave., Wahroonga 2076	25337	1976	Premise Match	262m	East
	MOTOR SERVICE STATIONS - PETROL, OIL	BP Service Station., 2 Redleaf Ave., Wahroonga. 2076	61559	1975	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	BP Wahroonga Service Station., 2-4 Redleaf Ave Wahroonga	13180	1972	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	BP Wahroonga Service Station., 2-4 Redleaf Ave Wahroonga	62833	1971	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave., Wahroonga	62837	1971	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS(M6S6)	BP Wahroonga Service Station., 2-4 Redleaf Ave., WAHROONGA	337412	1970	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS(M6S6)	Wahroonga Garage., 2-4 Redleaf Ave., WAHROONGA	338830	1970	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	BP Wahroonga Service Station., 2-4 Redleaf Ave Wahroonga	47281	1969	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	47285	1969	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS	BP Wahroonga Service Station., 2-4 Redleaf Ave., Wahroonga	30708	1968	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	30712	1968	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	BP Wahroonga Service Station., 2-4 Redleaf Ave Wahroonga	11130	1967	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	11134	1967	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	BP Wahroonga Service Station., 2-4 Redleaf Ave Wahroonga	60856	1966	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	60860	1966	Premise Match	262m	East
	Motor Garages & Engineers	BP Wahroonga Service Station, 2-4 Redleaf Ave. Wahroonga	123490	1965	Premise Match	262m	East
	Motor Garages & Engineers	Wahroonga Garage, 2-4 Redleaf Ave. Wahroonga	123494	1965	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	48768	1964	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	33558	1962	Premise Match	262m	East

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
7	MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	42853	1962	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS	Wahroonga Garage, 2-4 Redleaf Ave., WAHROONGA	348378	1961	Premise Match	262m	East
	MOTOR SERVICE STATIONS—PETROL, OIL, Etc.	Wahroonga Garage, 2-4 Redleaf Ave., WAHROONGA	351250	1961	Premise Match	262m	East
	MOTOR GARAGES & ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	20070	1959	Premise Match	262m	East
	MOTOR SERVICE STATIONS-PETROL,. OIL, ETC.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	24631	1959	Premise Match	262m	East
	MOTOR GARAGE/ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	9227	1958	Premise Match	262m	East
	MOTOR SERVICE STATIONS-PETROL, ETC.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	9897	1958	Premise Match	262m	East
	MOTOR SERVICE STATIONS-PETROL, ETC.	Wahroonga Garage, 2-4 Redleaf Ave., Wahroonga	93	1956	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Garage., 2-4 Redleaf Ave Wahroonga	61639	1956	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Garage., 2-6 Redleaf Ave., Wahroonga	54267	1954	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Garage., 2-6 Redleaf Ave Wahroonga	43884	1953	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Garage., 2-6 Red Leaf Ave Wahroonga	32380	1952	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS	Wahroonga Garage, 2-6 Redleaf Ave., Wahroonga	84517	1950	Premise Match	262m	East
	MOTOR SERVICE STATIONS-PETROL, Etc.	Wahroonga Garage, 2-6 Redleaf Ave., Wahroonga	86492	1950	Premise Match	262m	East
	MOTOR SERVICE STATIONS-PETROL, ETC.	Wahroonga Garage., 2-6 Redleaf Ave Wahroonga	26857	1948-49	Premise Match	262m	East
	MOTOR GARAGES &/OR ENGINEERS.	Wahroonga Garage., 2-6 Redleaf Ave., Wahroonga	22993	1948-49	Premise Match	262m	East

Dry Cleaners, Motor Garages & Service Stations 1948-1993
Road or Area Matches

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

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

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

Aerial Imagery 2022

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Aerial Imagery 2016

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Aerial Imagery 2011

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Legend

Site Boundary

Buffer 150m

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Aerial Imagery 2005

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Aerial Imagery 2000

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Aerial Imagery 1994

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 10 August 2022

Aerial Imagery 1991

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Legend

Site Boundary

Buffer 150m

Scale: 0 25 50 75 100 Meters	Data Sources: Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Aerial Imagery 1986

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Legend

- Site Boundary
- Buffer 150m

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 10 August 2022

Aerial Imagery 1982

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Sources: Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Aerial Imagery 1978

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Legend

Site Boundary

Buffer 150m

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 10 August 2022

Aerial Imagery 1970

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Data Sources: Aerial Imagery:
© NSW Department of Customer Service

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 August 2022

Aerial Imagery 1965

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 10 August 2022

Aerial Imagery 1961

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Legend

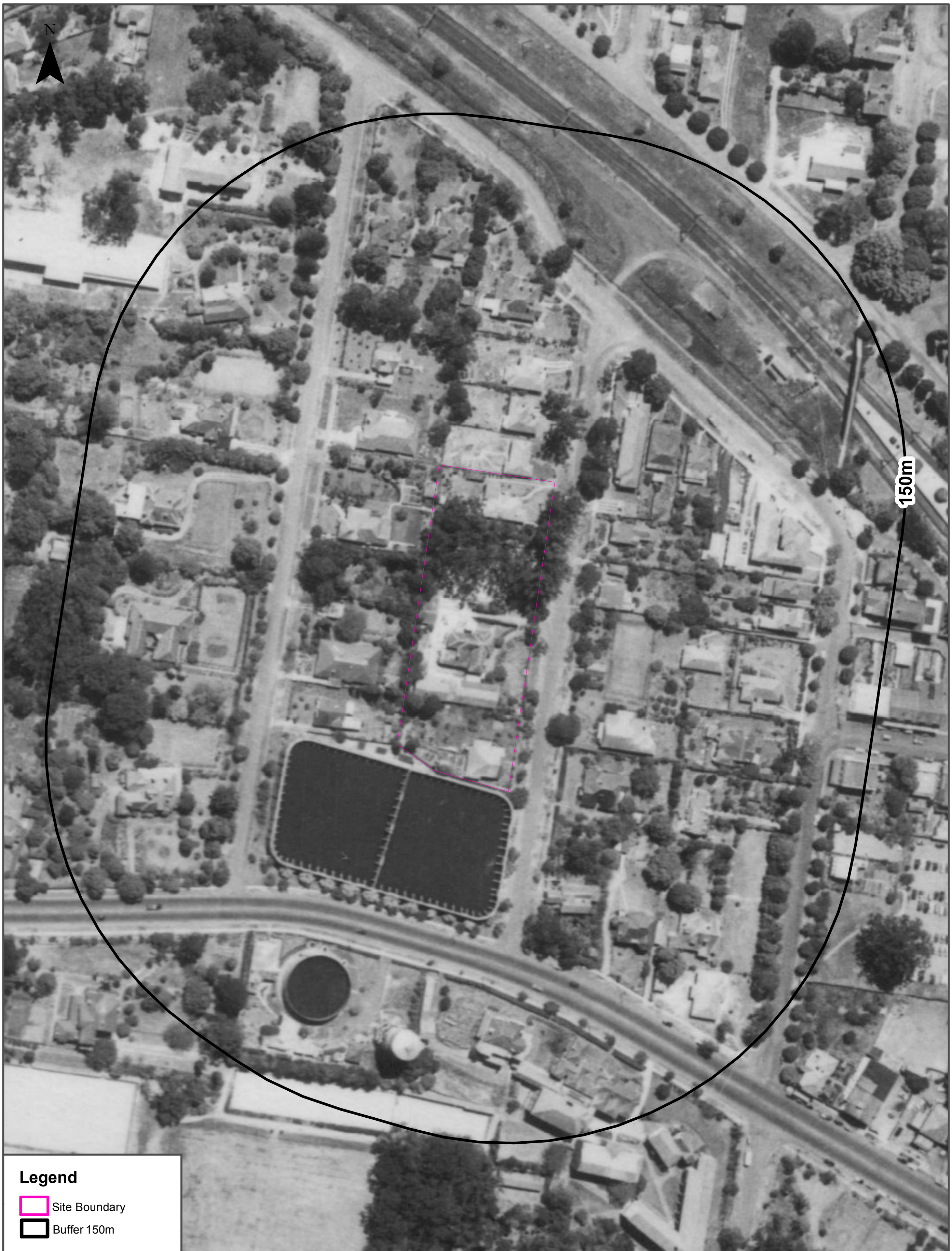
Site Boundary

Buffer 150m

Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 10 August 2022

Aerial Imagery 1955

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale:
0 25 50 75 100
Meters

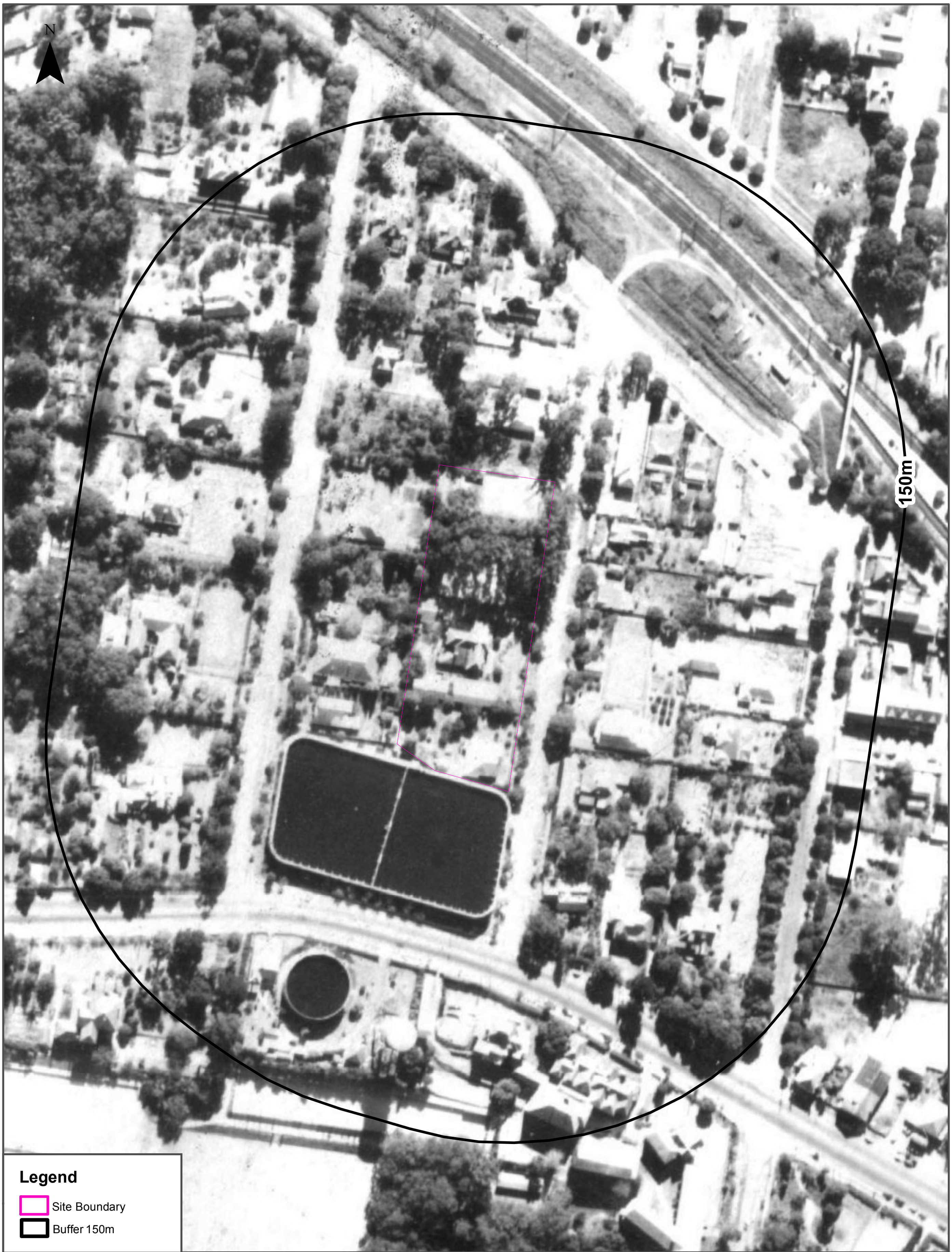
Data Source Aerial Imagery:
© NSW Department of Customer Service

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 August 2022

Aerial Imagery 1951

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale: 0 25 50 75 100 Meters

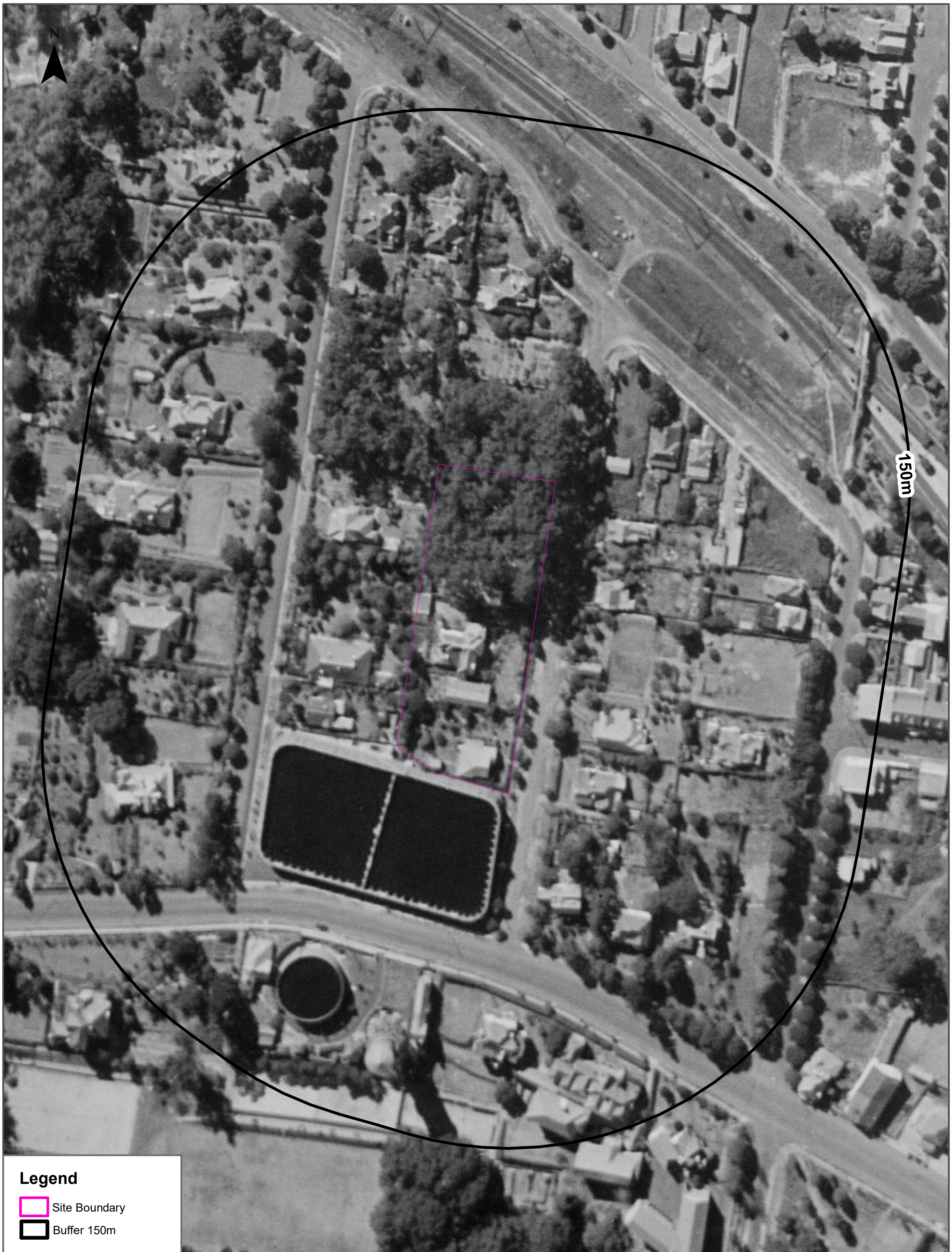
Data Source Aerial Imagery:
© NSW Department of Customer Service

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 August 2022

Aerial Imagery 1943

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale: 0 25 50 75 100 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

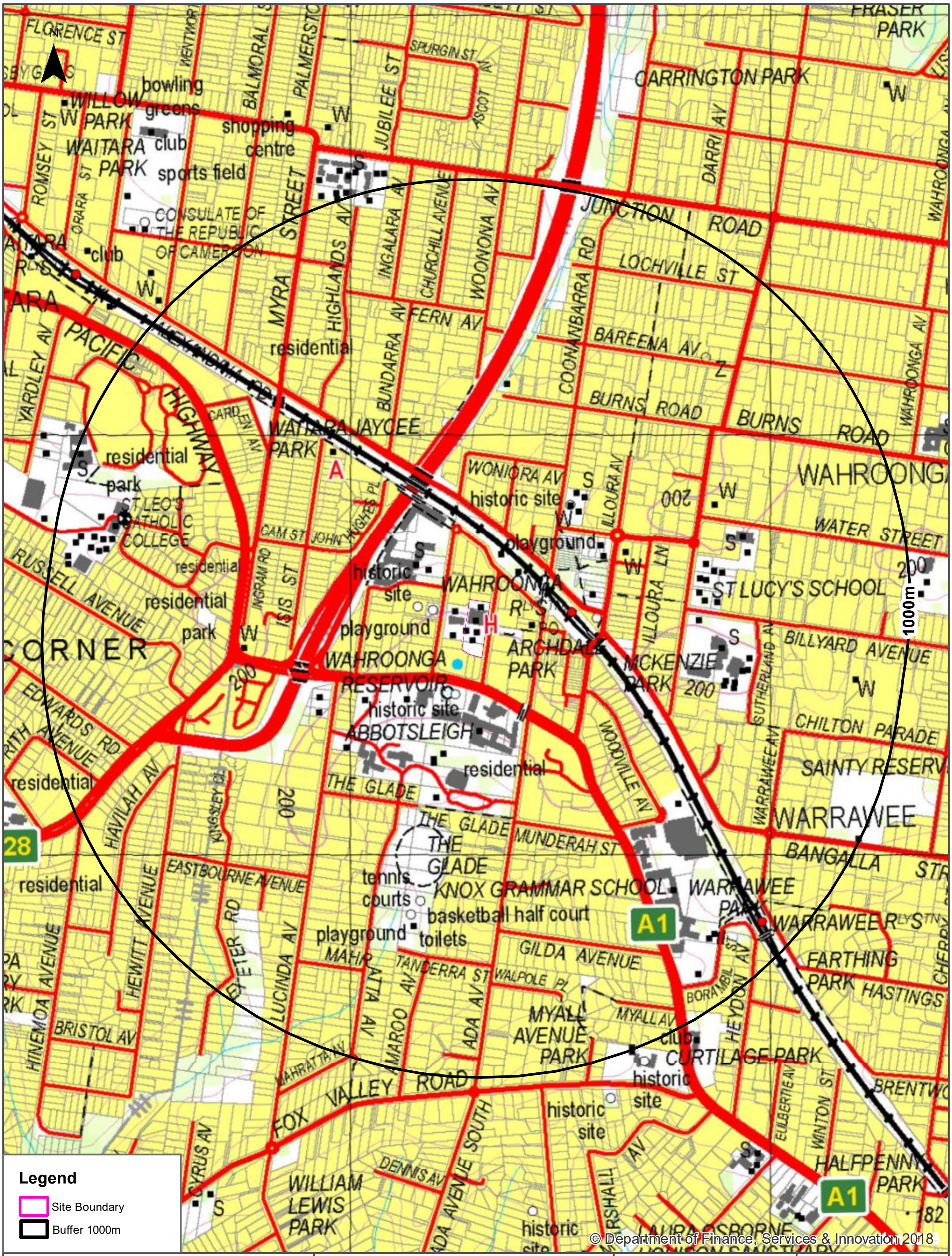
Aerial Imagery 1930

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 25 50 75 100 Meters	Data Sources: Aerial Imagery: © Geoscience Australia	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Topographic Map 2015

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale: 0 140 280 420 560 Meters	Data Sources: Topographic Map Data © NSW Land and Property Information	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Historical Map 1975

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 290 580 870 1,160 Meters	Data Sources: NATMAP 1:100,000 Topographic Maps Geoscience Australia	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Historical Map c.1942

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Scale: 0 290 580 870 1,160 Meters

Data Sources: Australia 1:63360
Produced by Australian Section Imperial General Staff

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 August 2022

Historical Map c.1920

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Legend

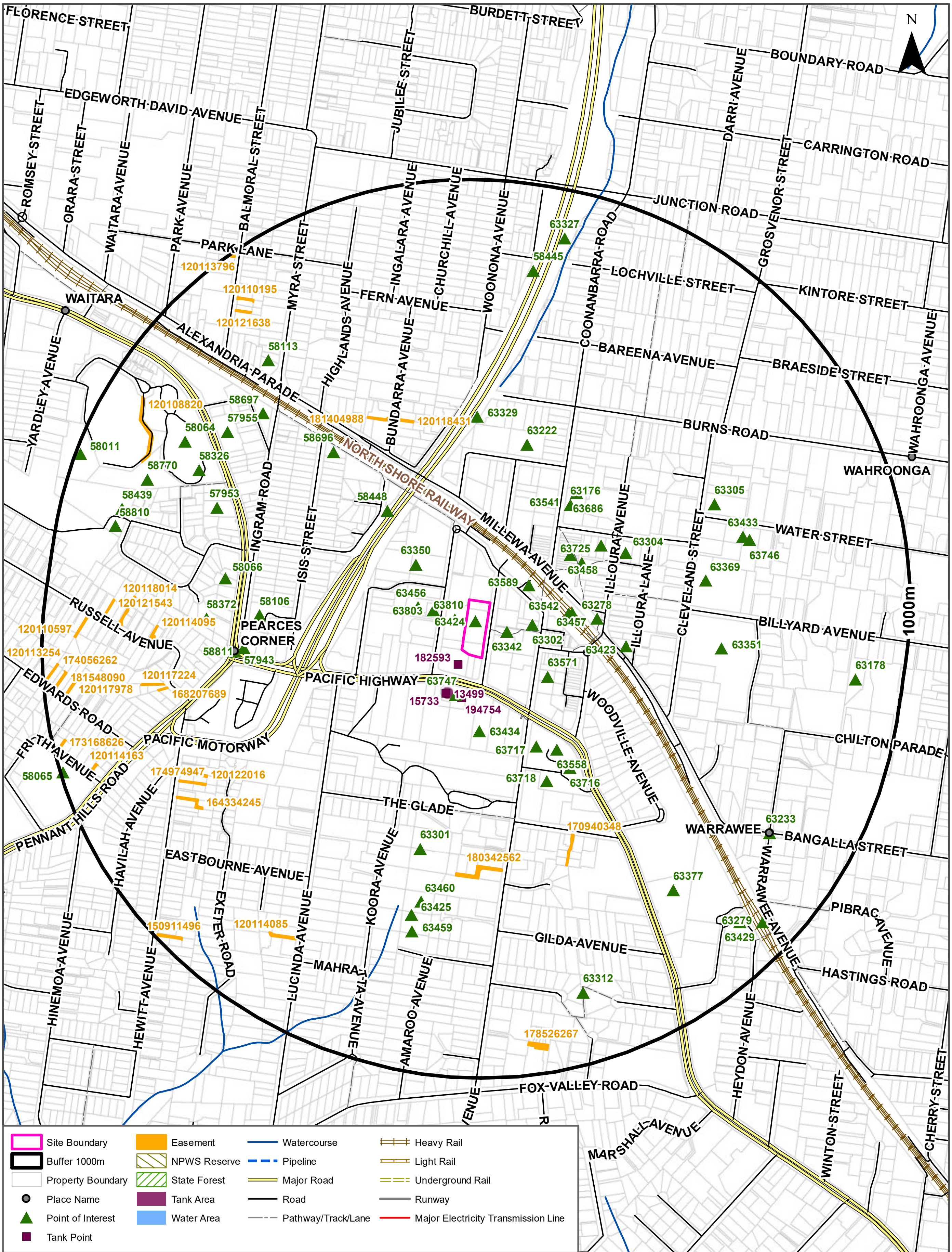
- Site Boundary
- Buffer 1000m

Please note that due to the inaccuracies in the original maps, the site may not allign to the map correctly.

Scale: 0 – 290 – 580 – 870 – 1,160 Meters	Data Sources: Australia 1:63360 Produced by Australian Section Imperial General Staff	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Topographic Features

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale:

0 100 200 400 600
Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2022

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 August 2022

Topographic Features

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
63424	General Hospital	NERINGAH HOSPITAL	0m	On-site
63810	Nursing Home	HAMMONDCARE-WAHROONGA	27m	North West
63342	Park	ARCHDALE PARK	49m	East
63803	Picnic Area	BALCOMBE PARK	81m	North West
63747	Historic Site	WAHROONGA RESERVOIR ELEVATED WS 0124	101m	South
63589	Parking Area	Parking Area	101m	North East
63302	Post Office	WAHROONGA POST OFFICE	107m	East
63456	Historic Site	THE BRIARS	118m	West
63350	Primary School	ABBOTSLEIGH JUNIOR SCHOOL	152m	North West
63571	Parking Area	Parking Area	163m	South East
63434	High School	ABBOTSLEIGH	173m	South
63542	Historic Site	WAHROONGA RAILWAY STATION GROUP	189m	East
63278	Railway Station	WAHROONGA RAILWAY STATION	197m	East
63458	Park	PLAYGROUND	222m	North East
63303	Park	WAHROONGA PARK	238m	North East
63717	Retirement Village	ROSETTA PARK	247m	South East
63457	Monument	WAHROONGA WAR MEMORIAL	257m	East
63558	Retirement Village	REDLEAF SERVICED APARTMENTS	281m	South East
58448	Roadside Emergency Telephone	421	288m	North West
63725	Community Medical Centre	WAHROONGA COMMUNITY HEALTH CENTRE	297m	North East
63176	Place Of Worship	ST JOHNS UNITING CHURCH	301m	North East
63541	Historic Site	ST JOHNS UNITING CHURCH HALL AND MANSE	301m	North East
63718	Community Home	THOMAS AND ROSETTA AGST AGED CARE FACILITY	331m	South East
63686	Primary School	KNOX GRAMMAR SCHOOL WAHROONGA PREPARATORY CAMPUS	333m	North East
63716	Retirement Village	NORTHCOTT HOUSE	335m	South East
63423	Park	MCKENZIE PARK	336m	East
63304	Place Of Worship	PRESBYTERIAN CHURCH	344m	North East
63222	Retirement Village	THE WONIORA	386m	North
63329	Roadside Emergency Telephone	422	436m	North
63301	Sports Field	THE GLADE	477m	South
58696	Ambulance Station	WAHROONGA AMBULANCE STATION	478m	North West

Map Id	Feature Type	Label	Distance	Direction
58106	Retirement Village	ST ERMES COURT	488m	West
63369	Special School	ST LUCY'S SCHOOL	516m	East
58811	Place Of Worship	ANGLICAN CHURCH	519m	West
57943	Urban Place	PEARCES CORNER	541m	West
63351	Primary School	KNOX GRAMMAR PREPARATORY SCHOOL	561m	East
58066	Nursing Home	OPAL NETHERBY	583m	West
63305	Place Of Worship	ANGLICAN CHURCH	583m	North East
63460	Sports Court	BASKETBALL HALF COURT	597m	South
58372	Park	Park	612m	West
63433	Primary School	PROUILLE CATHOLIC PRIMARY SCHOOL	622m	East
63425	Sports Court	TENNIS COURTS	633m	South
63746	Primary School	ST LUCY'S PROUILLE CATHOLIC PRIMARY CAMPUS	635m	East
57953	Nursing Home	WAHROONGA NURSING HOME	639m	North West
58697	Park	WAITARA JAYCEE PARK	662m	North West
63459	Park	PLAYGROUND	671m	South
57955	Nursing Home	WAHROONGA HOUSE	701m	North West
58326	Retirement Village	MCQUOIN PARK RETIREMENT VILLAGE	714m	North West
63377	High School	KNOX GRAMMAR SCHOOL	716m	South East
58113	Community Home	TALLWOODS CORNER AGED CARE SERVICE	744m	North West
58064	Nursing Home	CATHOLIC HEALTHCARE MCQUOIN PARK	774m	North West
58445	Roadside Emergency Telephone	423	796m	North
63233	Suburb	WARRAWEE	802m	South East
58770	Park	Park	818m	North West
63312	Park	MYALL AVENUE PARK	832m	South
58439	High School	BROKEN BAY CROSS CAMPUS COURSE CENTRE	855m	West
58810	High School	ST LEO'S CATHOLIC COLLEGE	861m	West
63429	Park	WARRAWEE PARK	878m	South East
63327	Roadside Emergency Telephone	424	886m	North
63178	Place Of Worship	CATHOLIC CHURCH	887m	East
63279	Railway Station	WARRAWEE RAILWAY STATION	918m	South East
58011	Primary School	OUR LADY OF THE ROSARY CATHOLIC PRIMARY SCHOOL	990m	North West
58065	Nursing Home	UNITING BOWDEN BRAE NORMANHURST	994m	West

Topographic Features

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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
15733	Water	Operational	WAHROONGA RESERVOIR	04/08/2018	91m	South West

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
182593	Water	Operational		04/08/2018	35m	South West
194754	Water	Operational		01/05/2020	104m	South
13499	Water	Feature on Previous LPI Tank Area Supply		25/08/2000	107m	South West

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
120118431	Primary	Undefined		442m	North
181404988	Primary	Right of way	3.5m	470m	North West
170940348	Primary	Right of way	Variable	471m	South East
180342562	Primary	Right of way	Var	494m	South
120122016	Primary	Undefined		676m	South West
174974947	Primary	Right of way	3.5m	688m	South West
168207689	Primary	Right of way	3metres wide	705m	West
120117224	Primary	Undefined		713m	West
164334245	Primary	Right of way	3.655m and var	722m	South West
120114095	Primary	Undefined		726m	West
120118014	Primary	Undefined		787m	West

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120114085	Primary	Undefined		789m	South West
120121543	Primary	Undefined		836m	West
120108820	Primary	Undefined		836m	North West
120121638	Primary	Undefined		859m	North West
120110195	Primary	Undefined		875m	North West
120110597	Primary	Undefined		892m	West
120114163	Primary	Undefined		909m	West
120117978	Primary	Undefined		918m	West
178526267	Primary	Right of way	Variable	921m	South
181548090	Primary	Right of way	variable	942m	West
150911496	Primary	Right of way	4 WIDE	956m	South West
174056262	Primary	Right of way	3.6m	961m	West
173168626	Primary	Right of way	3.5	967m	West
120113796	Primary	Undefined		988m	North West
120113254	Primary	Right of way		997m	West

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

Topographic Features

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

State Forest

What State Forest exist within the dataset buffer?

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

State Forest Data Source: © NSW Department of Finance, Services & Innovation (2018)

National Parks and Wildlife Service Reserves

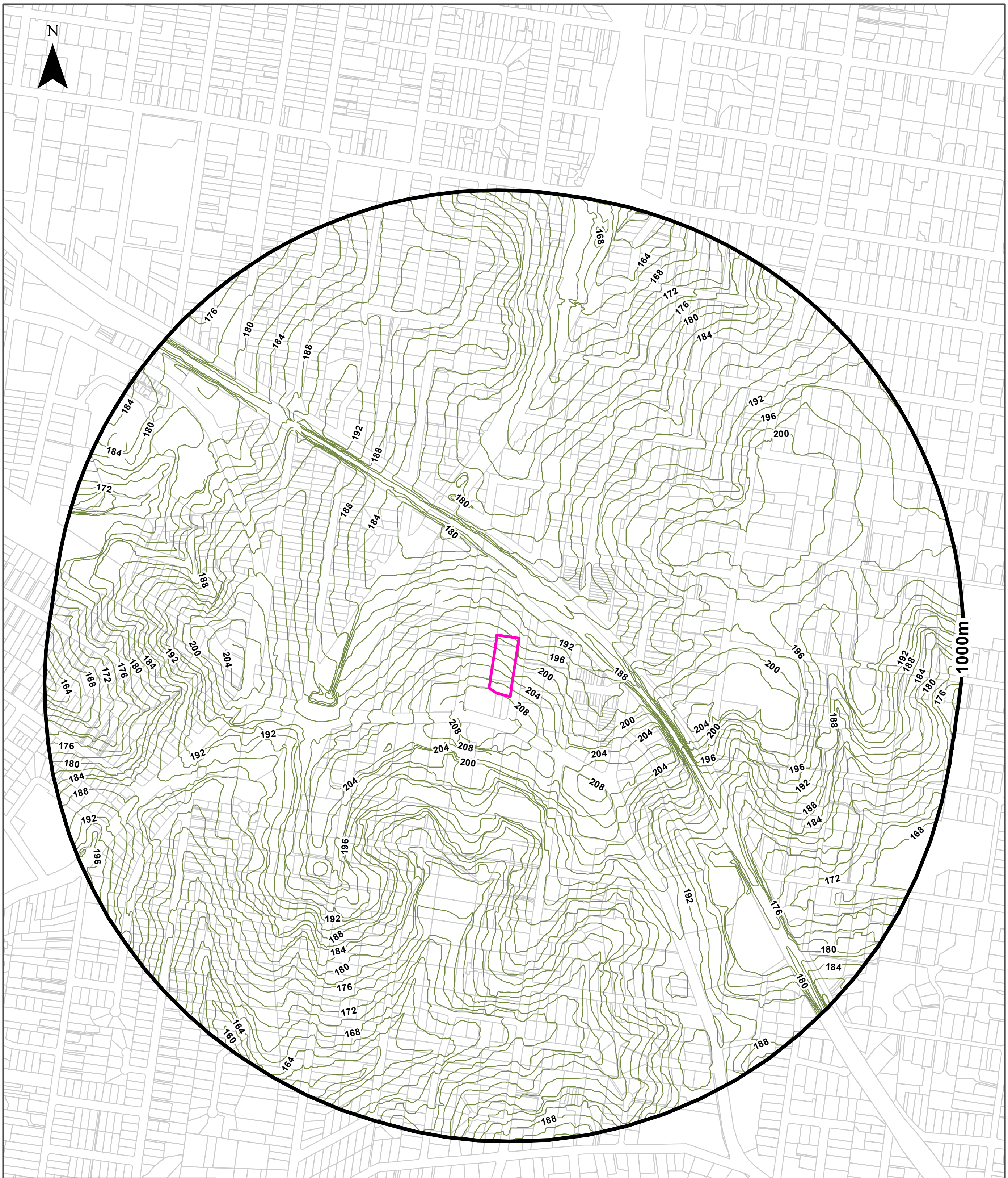
What NPWS Reserves exist within the dataset buffer?

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

NPWS Data Source: © NSW Department of Finance, Services & Innovation (2018)

Elevation Contours (m AHD)

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

- Elevation Contour (m AHD)
- Site Boundary
- Buffer 1000m
- Property Boundary

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.

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 August 2022

Hydrogeology & Groundwater

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Hydrogeology

Description of aquifers within the dataset buffer:

Description	Distance	Direction
Porous, extensive aquifers of low to moderate productivity	0m	On-site

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

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018

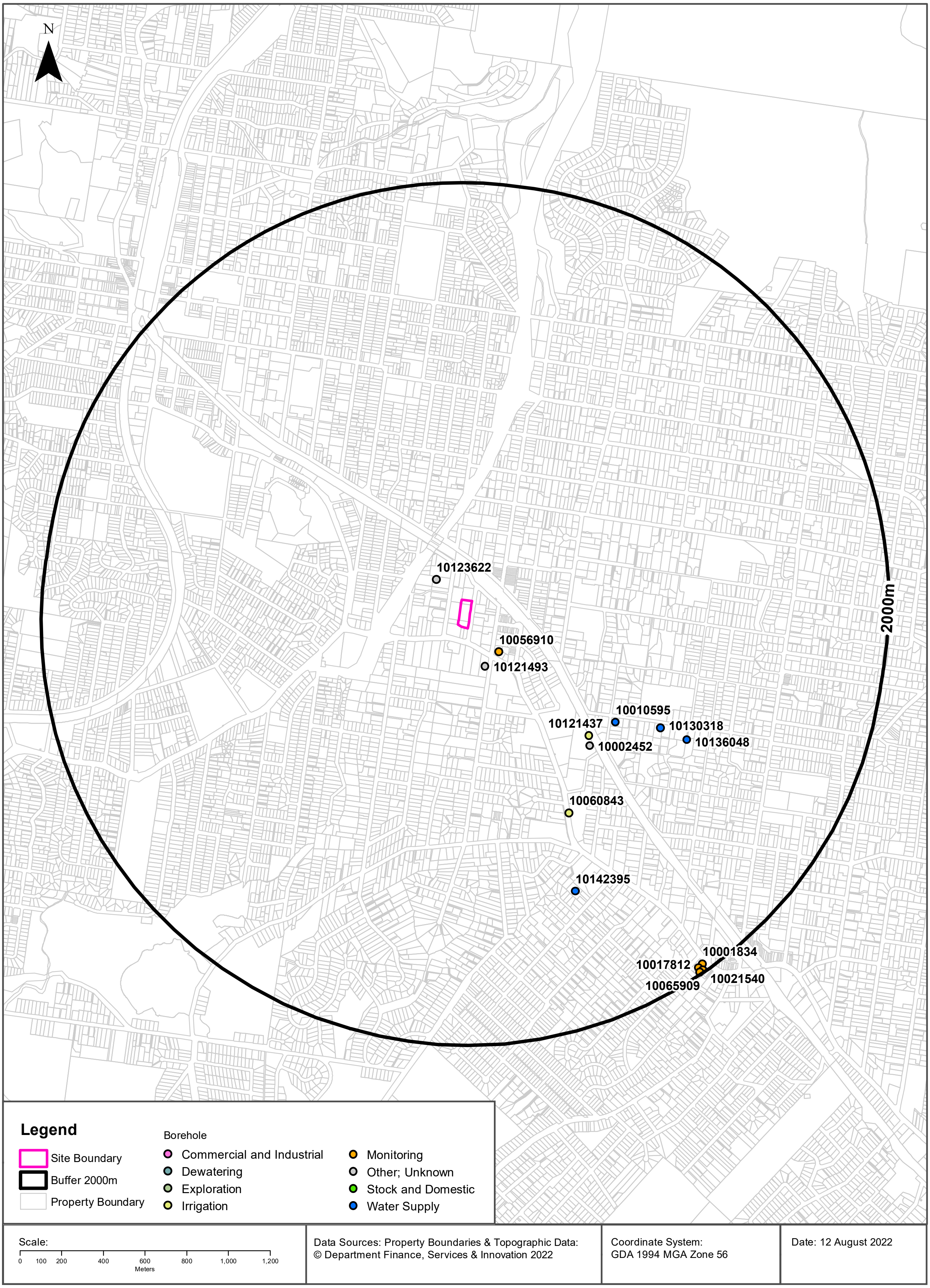
Temporary water restrictions relating to the Botany Sands aquifer within the dataset buffer:

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

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 August 2022

Hydrogeology & Groundwater

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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
10123622	GW107088	Other	Unknown	11/01/2005	162.00		AHD	670	1.000	78.50	153m	North West
10056910	GW114987	Monitoring	Functional	17/08/2011	10.00		AHD			1.87	188m	South East
10121493	GW107089	Other	Unknown	13/01/2005	216.00		AHD	470	0.100	65.00	200m	South
10121437	GW053989	Irrigation	Unknown	01/08/1982	92.00		AHD		0.300	8.00	776m	South East
10002452	GW111303	Other	Functioning	12/12/1989	165.00		AHD		0.380		812m	South East
10010595	GW022935	Water Supply	Unknown	01/12/1965	26.80		AHD	V.Salty			840m	South East
10060843	GW016949	Irrigation	Unknown	01/01/1958	11.70		AHD	Very Poor			1009m	South East
10130318	GW106518	Water Supply	Functioning	23/09/2004	150.00		AHD	600	0.800	42.00	1040m	South East
10136048	GW105743	Water Supply	Functioning	03/02/2004	150.50		AHD	465	1.100	70.00	1180m	South East
10142395	GW102946	Water Supply	Unknown	15/03/2000	186.50		AHD	843			1363m	South
10001834	GW114725	Monitoring	Functional	13/01/2011	10.30		AHD				1963m	South East
10017812	GW114728	Monitoring	Functional	24/01/2011	10.00		AHD				1968m	South East
10065909	GW114727	Monitoring	Functional	15/01/2011	12.50		AHD				1988m	South East
10021540	GW114726	Monitoring	Functional	14/01/2011	12.50		AHD				1989m	South East

Hydrogeology & Groundwater

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Driller's Logs

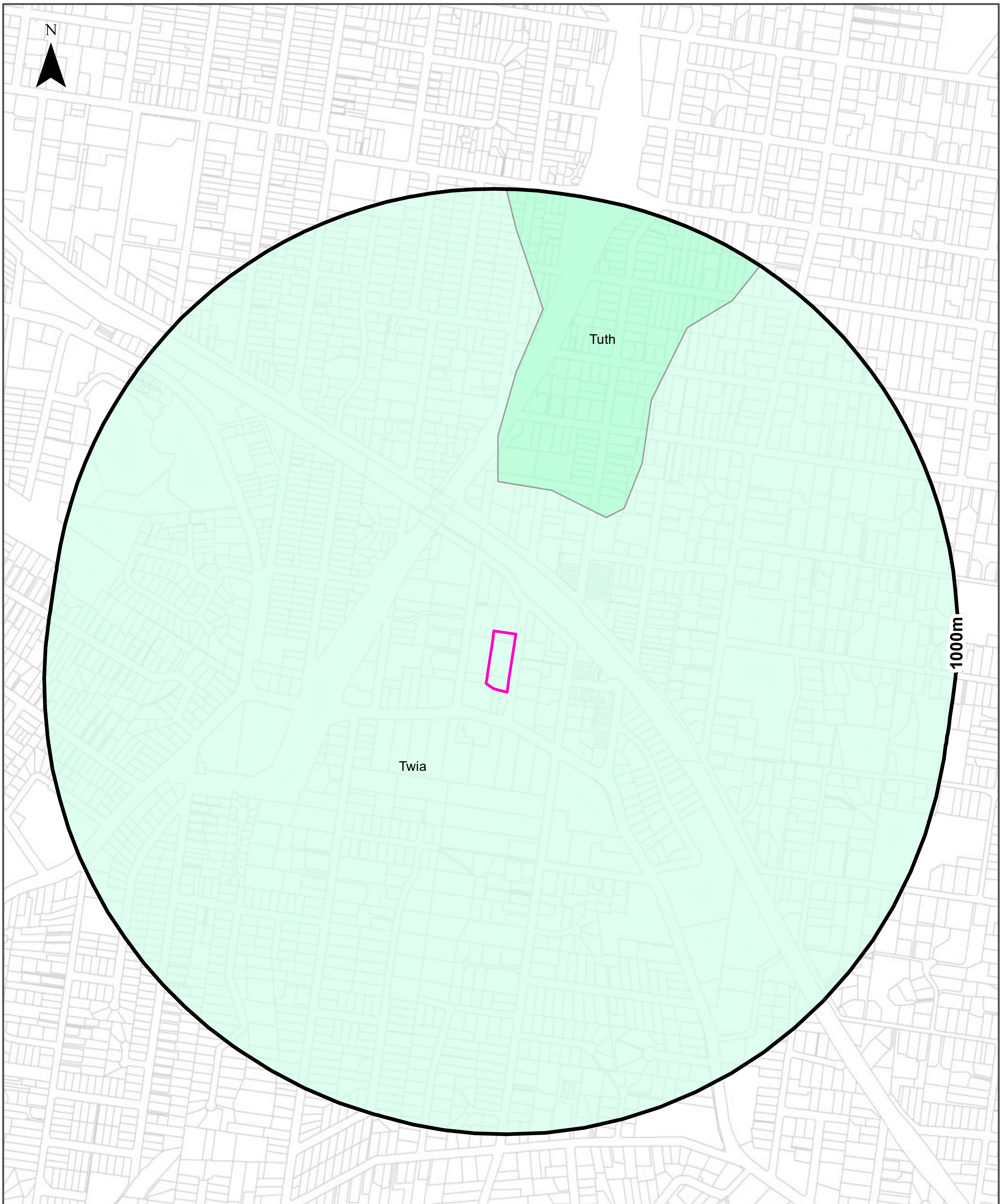
Drill log data relevant to the boreholes within the dataset buffer:

NGIS Bore ID	Drillers Log	Distance	Direction
10123622	0.00m-5.50m CLAY BROWN 5.50m-11.00m CLAY WHITE 11.00m-40.00m SANDSTONE L/GREY 40.00m-43.00m SANDSTONE,SHALE BEDDING 43.00m-47.50m SANDSTONE GREY 47.50m-48.30m SANDSTONE QUARTZ 48.30m-61.00m SANDSTONE GREY 61.00m-63.50m SANDSTONE,D/GREY 63.50m-67.50m SANDSTONE GREY 67.50m-68.00m SANDSTONE,FINE QUARTZ 68.00m-113.00m SANDSTONE GREY 113.00m-113.50m SANDSTONE,QUARTZ 113.50m-145.00m SANDSTONE GREY 145.00m-147.00m SANDSTONE QUARTZ 147.00m-153.00m SANDSTONE GREY 153.00m-154.00m SANDSTONE FINE QUARTZ 154.00m-157.00m SANDSTONE GREY 157.00m-157.20m SANDSTONE FRACTURED 157.20m-162.00m SANDSTONE GREY	153m	North West
10121493	0.00m-1.00m FILL 1.00m-5.00m CLAY BROWN 5.00m-21.00m SHALE 21.00m-57.00m SANDSTONE GREY 57.00m-58.00m SANDSTONE F/QUARTZ 58.00m-71.00m SANDSTONE GREY 71.00m-72.00m SANDSTONE ,SHALE BEDDING 72.00m-74.00m SHALE HARD 74.00m-121.50m SANDSTONE GREY 121.50m-123.50m SANDSTONE F/QUARTZ 123.50m-125.00m SANDSTONE GREY 125.00m-126.00m SANDSTONE QUARTZ 126.00m-175.00m SANDSTONE GREY 175.00m-175.30m SANDSTONE, QUARTZ 175.30m-181.00m SANDSTONE GREY 181.00m-181.50m SANDSTONE QUARTZ 181.50m-191.00m SANDSTONE GREY 191.00m-192.00m SANDSTONE QUARTZ 192.00m-200.00m SANDSTONE GREY 200.00m-201.50m SANDSTONE F/QUARTZ 201.50m-216.00m SANDSTONE GREY	200m	South
10121437	0.00m-3.10m Made Ground 3.10m-4.80m Clay 4.80m-6.20m Clay Sandy Soft Water Supply 6.20m-8.50m Clay Consolidated 8.50m-11.50m Shale 11.50m-74.30m Sandstone Grey Some Shale 74.30m-75.90m Shale 75.90m-80.80m Sandstone Grey 80.80m-82.00m Sandstone Grey Open Water Supply 82.00m-83.10m Shale 83.10m-92.00m Sandstone Grey	776m	South East
10002452	0.00m-2.00m TOPSOIL 2.00m-3.00m SHALE / CLAY 3.00m-12.00m SANDSTONE SOFT 12.00m-16.00m SHALE 16.00m-19.00m SHALE HARD,ROCK 19.00m-165.00m SANDSTONE HARD	812m	South East
10010595	0.00m-0.15m Made Ground 0.15m-4.57m Clay 4.57m-7.31m Clay White 7.31m-9.14m Shale Soft 9.14m-18.28m Sandstone Shale Bands Water Supply 18.28m-26.82m Sandstone White Hard Water Supply	840m	South East
10060843	0.00m-1.21m Topsoil 1.21m-2.13m Clay 2.13m-11.73m Shale	1009m	South East

NGIS Bore ID	Drillers Log	Distance	Direction
10130318	0.00m-0.50m soil 0.50m-3.00m caly 3.00m-21.00m shale 21.00m-72.00m sandstone, white 72.00m-84.00m sandstone, shale 84.00m-102.00m sandstone 102.00m-109.00m shale, hard 109.00m-127.00m sandstone, shale 127.00m-132.00m sandstone, quartz 132.00m-147.00m sandstone, shale bands 147.00m-150.00m sandstone, shale	1040m	South East
10136048	0.00m-0.80m clay 0.80m-15.50m shale, black 15.50m-22.00m siltstone 22.00m-36.50m sandstone, grey and siltsone bands 36.50m-56.00m sandstone, grey light grey 56.00m-57.00m sandstone, light grey and quartz 57.00m-60.50m sandstone, light grey and qartz 60.50m-81.00m sandstone, grey light grey 81.00m-82.00m sandstone, light grey ad quartz 82.00m-110.50m sandstone, grey 110.50m-116.00m sandstone, dark grey light brown 116.00m-117.50m sandstone, grey 117.50m-132.50m sandstone, grey 132.50m-135.50m sandstone light grey 135.50m-138.50m sandstone, light grey and quartz 138.50m-145.00m quartz 145.00m-150.50m sandstone, grey	1180m	South East
10142395	0.00m-7.00m FILL 7.00m-10.00m WEATHERED SHALE 10.00m-13.00m WEATHERED SANDSTONE 13.00m-38.00m SANDSTONE M.G. 38.00m-40.00m SANDSTONE QUARTZ 40.00m-67.00m SANDSTONE M.G. 67.00m-69.50m HARD SHALE 69.50m-82.00m SANDSTONE M.G. 82.00m-84.50m SANDSTONE AND SHALE 84.50m-92.00m SANDSTONE M.G. 92.00m-95.00m SHALE AND SANDSTONE 95.00m-95.50m QUARTZ 95.50m-98.00m SANDSTONE M.G. 98.00m-113.50m SANDSTONE M.G. 113.50m-115.00m SANDSTONE AND QUARTZ 115.00m-154.00m SANDSTONE M.G. 154.00m-157.00m SANDSTONE AND QUARTZ 157.00m-160.50m SANDSTONE M.G. 160.50m-163.00m SANDSTONE AND QUARTZ 163.00m-165.00m SANDSTONE M.G. 165.00m-167.00m SANDSTONE AND QUARTZ 167.00m-169.00m SANDSTONE M.G. 169.00m-171.00m SANDSTONE QUARTZ 171.00m-172.50m SANDSTONE M.G. 172.50m-173.00m HARD SHALE 173.00m-178.00m SANDSTONE F/G 178.00m-179.00m SANDSTONE AND QUARTZ 179.00m-186.50m HARD SHALE	1363m	South
10001834	0.00m-0.10m CONCRETE 0.10m-0.20m SAND MEDIUM,COLOR YELLOW 0.20m-1.00m SANDY CLAY FINE GRAINED,STIFF,BLACK BROWN 1.00m-1.50m SAND,FINE GRAINED DRY,PINK 1.50m-2.20m SILTY CLAY,LIMESTONE SOFT MOIST 2.20m-2.40m CLAY VERY STIFF,DRY,RED,YELLOW 2.40m-10.30m SHALE,STIFF,MOIST,RED GREY	1963m	South East
10017812	0.00m-0.10m CONCRETE 0.10m-0.20m SANDY GRAVEL WITH MINOR CLAY 0.20m-1.80m SANDY CLAY FINE SOFT DRY ,YELLOWISH BROWN 1.80m-2.00m SHALE WEATHERED 2.00m-2.50m SAND DRY MEDIUM GREEN REEDISH BROWN 2.50m-3.60m SAND DRY MEDIUM yellow 3.60m-6.20m CLAY VERY STIFF REDDISH BROWN 6.20m-10.00m CLAY VERY STIFF WITH REDDISH BROWN	1968m	South East
10065909	0.00m-0.10m CONCRETE 0.10m-0.15m GRAVEL WITH SAND BLACK COLOR 0.15m-2.00m SANDY CLAY VERY SOFT,GREENISH BROWN COLOR 2.00m-3.40m SAND FINE GRAINED, YELLOW 3.40m-5.00m CLAY MINOR SHALE BROWN GREY 5.00m-8.00m CLAY FINE GRAINED,MOIST RED WITH MINOR GREY 8.00m-12.50m CLAY,DINE GRAINED SATURATED TO MOIST GREY WITH MINOR RED	1988m	South East
10021540	0.00m-0.01m CONCRETE 0.01m-0.02m SANDSTONE 0.02m-2.00m SANDY CLAY,DARK BROWN 2.00m-3.00m SILTY CLAY,STIFF,DRY WHITE RED 3.00m-12.50m SILTY CLAY,STIFF,DRY,LOW PLASTICITY,WHITE RED	1989m	South East

Geology

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

Site Boundary
Buffer 1000m
Property Boundary

Structures

Boundary lines
Faults
Intrusive boundary
Trendlines
Marker bed
Shear zone or schist zone boundary

Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Geology

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Geological Units

What are the Geological Units within the dataset buffer?

Unit Code	Unit Name	Description	Unit Stratigraphy	Age	Dominant Lithology	Distance
Twia	Ashfield Shale	Black to light grey shale and laminite.	/Wianamatta Group//Ashfield Shale//	Middle Triassic (base) to Middle Triassic (top)	Shale	0m
Tuth	Hawkesbury Sandstone	Medium- to coarse-grained quartz sandstone with minor shale and laminite lenses.	/Ungrouped Triassic units//Hawkesbury Sandstone//	Anisian (base) to Anisian (top)	Sandstone	327m

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				

Geological Data Source: Statewide Seamless Geology v2.1, Department of Regional NSW

Naturally Occurring Asbestos Potential

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Naturally Occurring Asbestos Potential

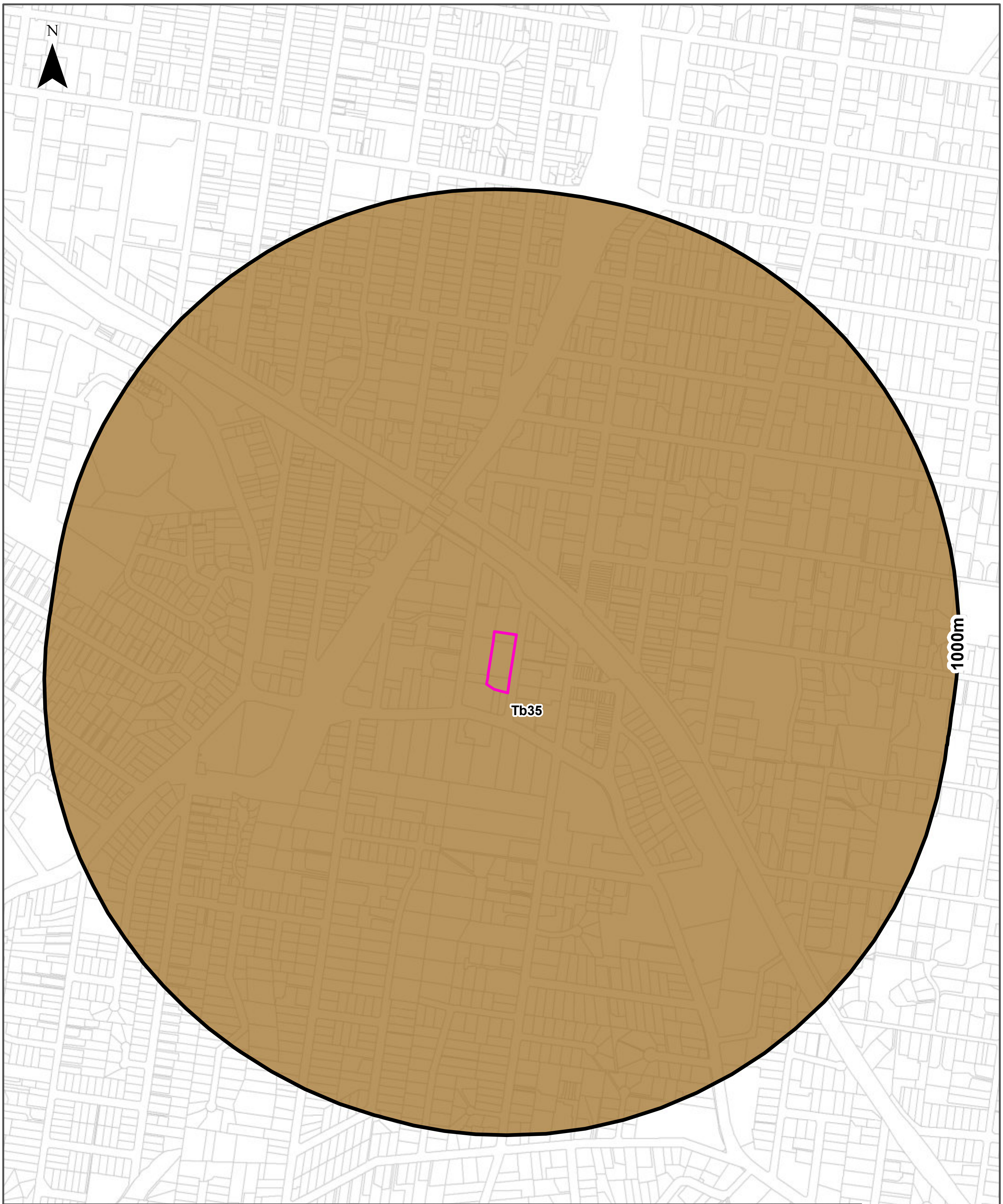
Naturally Occurring Asbestos Potential within the dataset buffer:

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

Naturally Occurring Asbestos Potential Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Atlas of Australian Soils

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary

Australian Soil Classification Orders

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

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2022

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 August 2022

Soils

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Atlas of Australian Soils

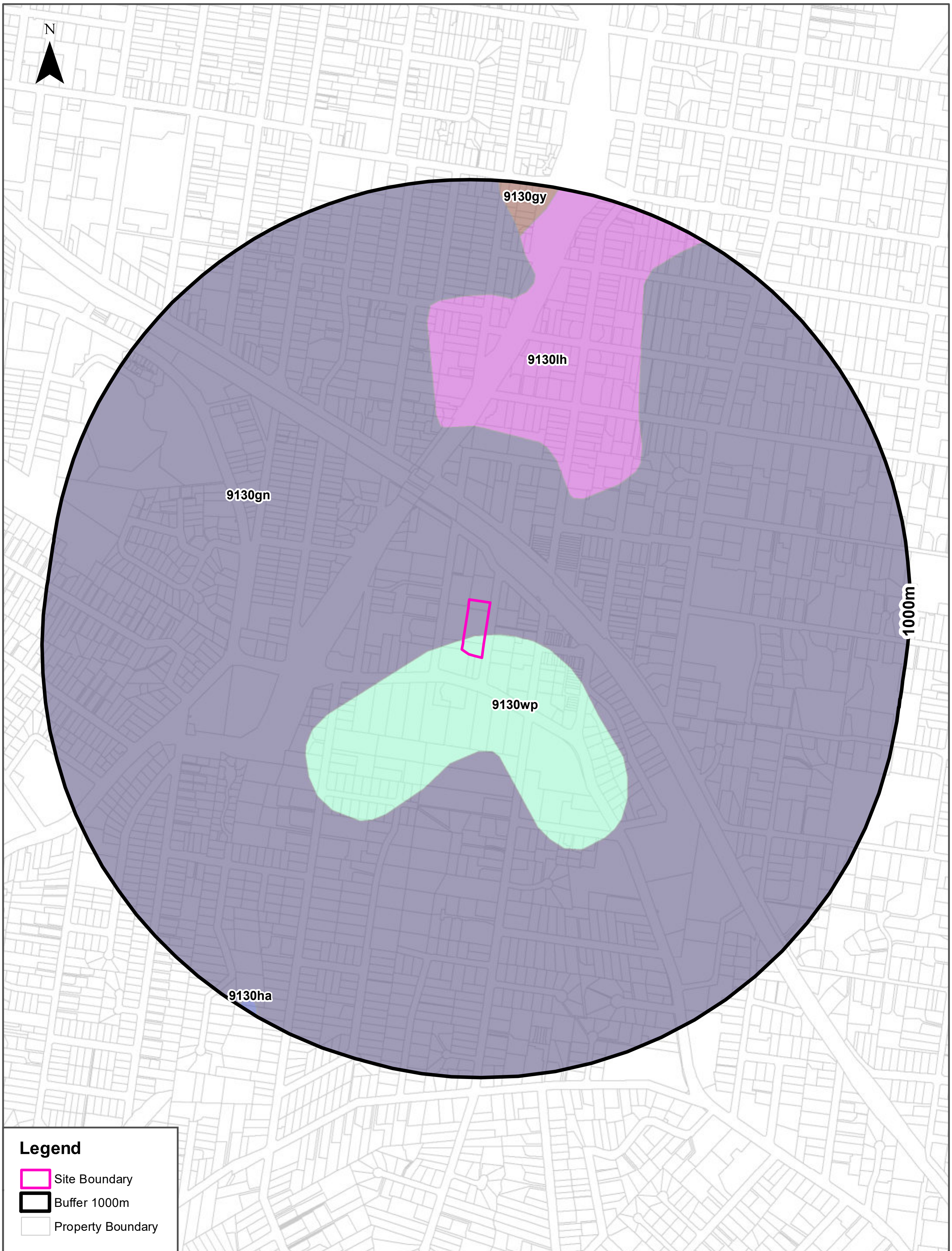
Soil mapping units and Australian Soil Classification orders within the dataset buffer:

Map Unit Code	Soil Order	Map Unit Description	Distance	Direction
Tb35	Sodosol	Dissected plateau remnants--flat to undulating ridge tops with moderate to steep side slopes: chief soils are hard acidic yellow and yellow mottled soils (Dy3.41), (Dy2.21), and (Dy2.41) and hard acidic red soils (Dr2.21); many shallow profiles occur and profile thickness varies considerably over short distances. Associated are: (Gn3.54), (Gn3.14), and possibly other (Gn3) soils; (Db1.2) soils on some ridges; (Dy5.81) soils in areas transitional to unit Mb2; soils common to unit Mb2; and eroded lateritic remnants. Small areas of other soils are likely. Flat ferruginous shale or sandstone fragments are common on and/or in and/or below the soils of this unit.	0m	On-site

Atlas of Australian Soils Data Source: CSIRO

Soil Landscapes of Central and Eastern NSW

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Soils

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Soil Landscapes of Central and Eastern NSW

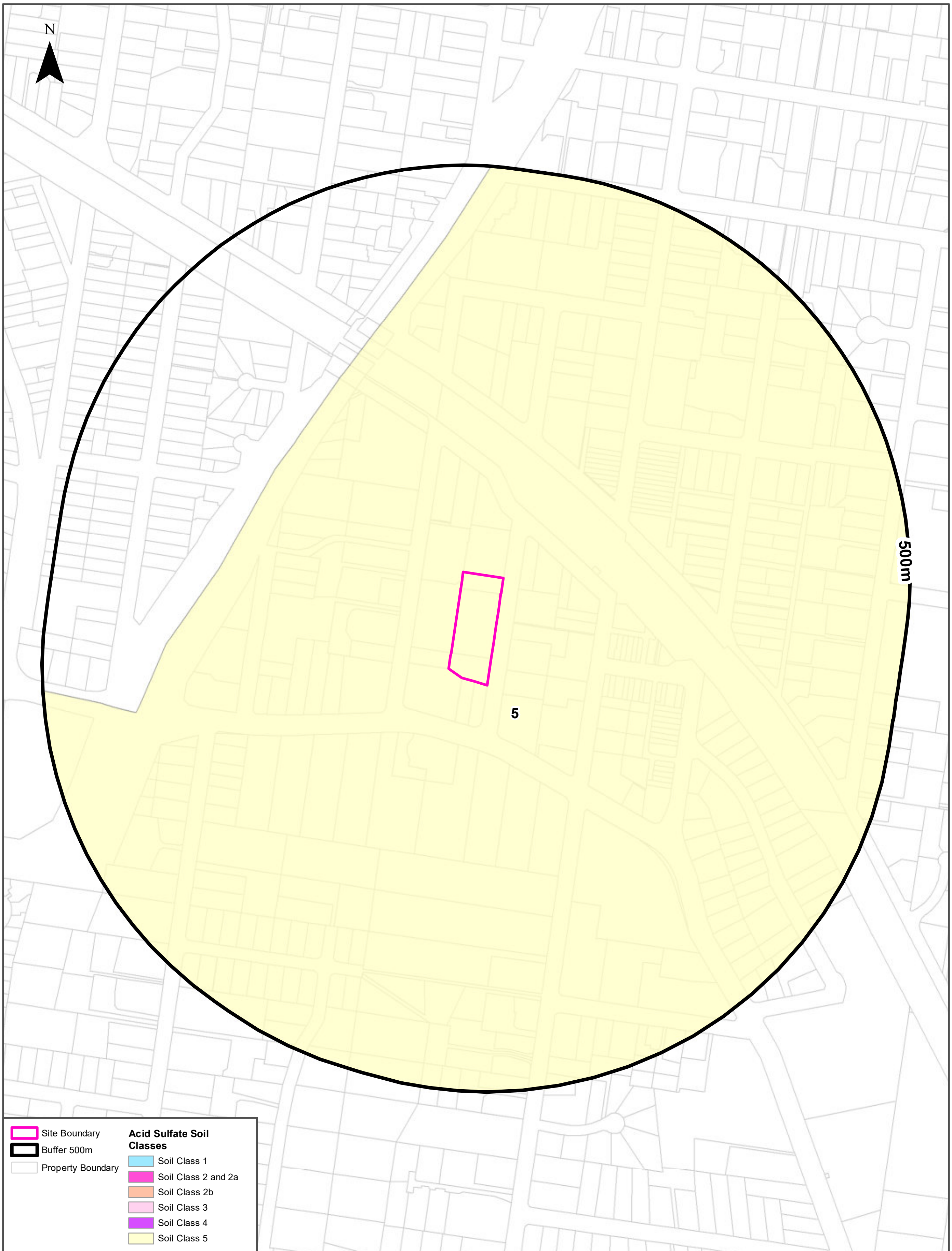
Soil Landscapes of Central and Eastern NSW within the dataset buffer:

Soil Code	Name	Distance	Direction
9130gn	Glenorie	0m	On-site
9130wp	West Pennant Hills	0m	On-site
9130lh	Lucas Heights	318m	North
9130gy	Gymea	873m	North
9130ha	Hawkesbury	959m	South West

Soil Landscapes of Central and Eastern NSW: NSW Department of Planning, Industry and Environment

Acid Sulfate Soils

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Scale: 0 100 200 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Acid Sulfate Soils

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Environmental Planning Instrument - Acid Sulfate Soils

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

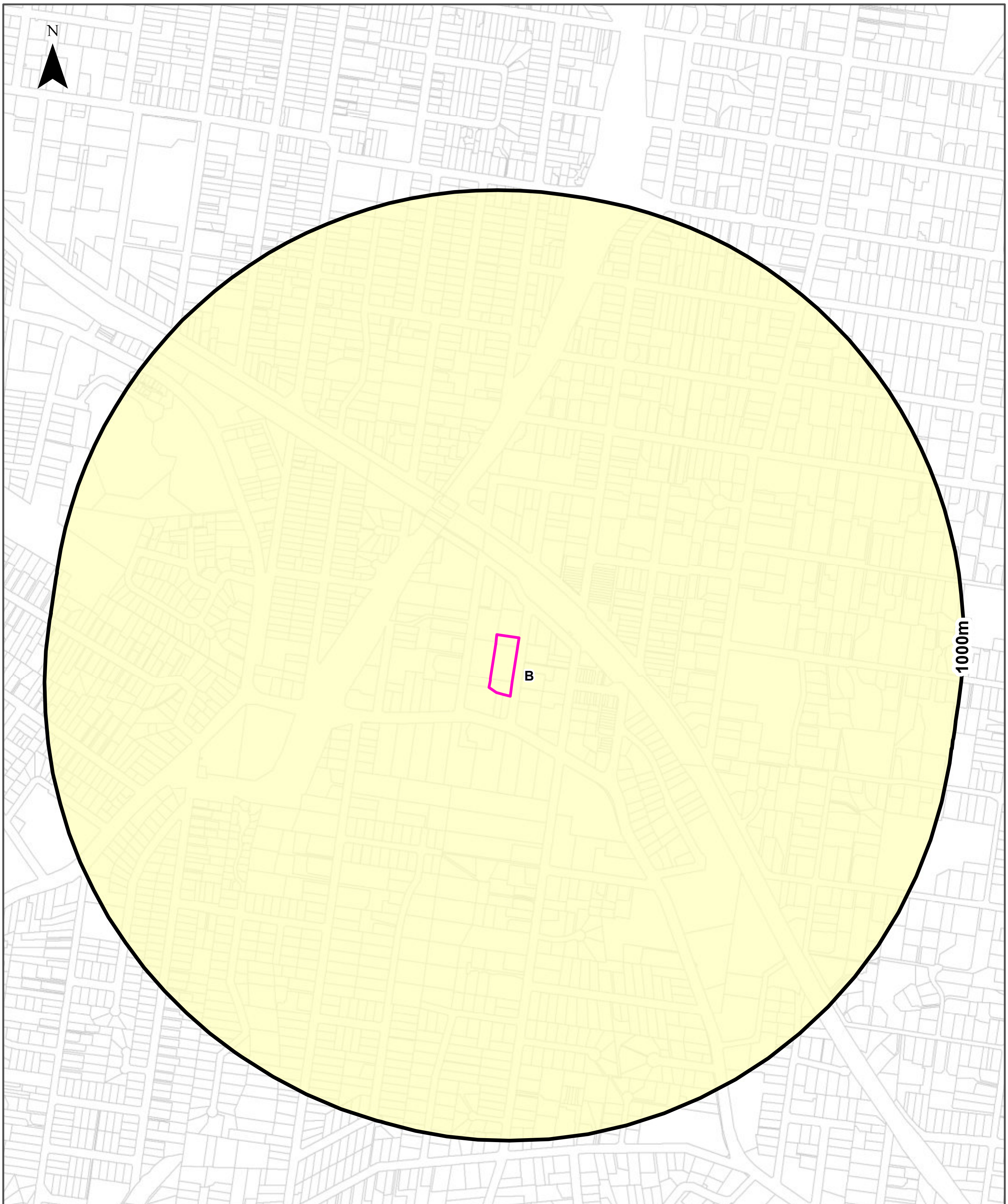
Soil Class	Description	EPI Name
5	Works within 500 metres of adjacent Class 1, 2, 3, or 4 land that is below 5 metres AHD and by which the watertable is likely to be lowered below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land, present an environmental risk	Ku-ring-gai Local Environmental Plan 2015

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

Soil Class	Description	EPI Name	Distance	Direction
None				

Atlas of Australian Acid Sulfate Soils

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

Site Boundary
Buffer 1000m
Property Boundary

Probability of occurrence of Acid Sulfate Soils

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

Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12August 2022

Acid Sulfate Soils

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Atlas of Australian Acid Sulfate Soils

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

Class	Description	Distance	Direction
B	Low Probability of occurrence. 6-70% chance of occurrence.	0m	On-site

Atlas of Australian Acid Sulfate Soils Data Source: CSIRO

Dryland Salinity

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Mining Subsidence Districts

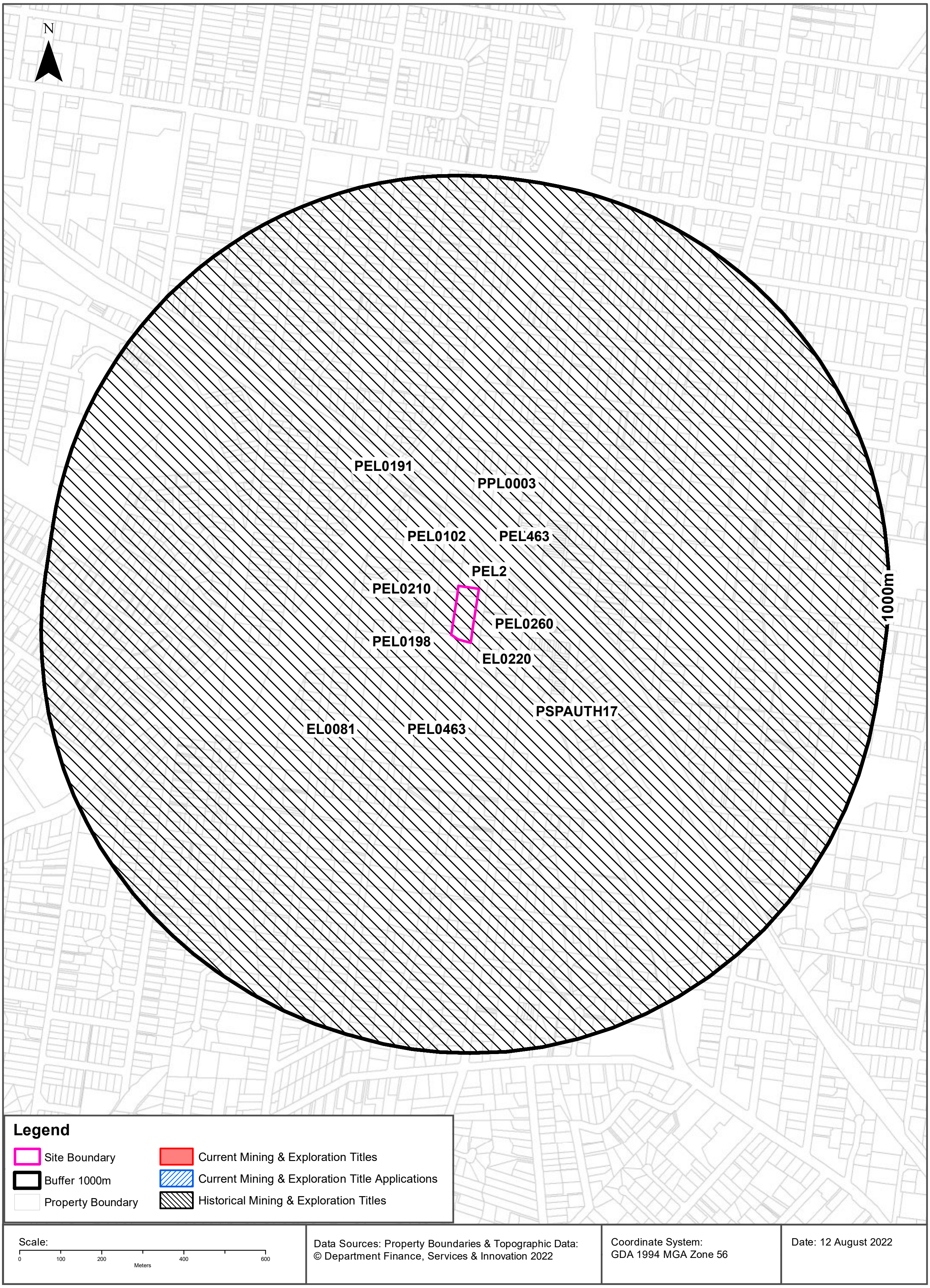
Mining Subsidence Districts within the dataset buffer:

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

Mining Subsidence District Data Source: © Land and Property Information (2016)

Mining & Exploration Titles

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2022

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 August 2022

Mining

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Historical Mining & Exploration Titles

Historical Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Start Date	End Date	Resource	Minerals	Dist	Dir
EL0081	CONTINENTAL OIL CO OF AUSTRALIA LIMITED	01 Feb 1967	01 Feb 1968	MINERALS		0m	On-site
PEL0210	THE AUSTRALIAN GAS LIGHT COMPANY (AGL), NORTH BULLI COLLIERIES PTY LTD			PETROLEUM	Petroleum	0m	On-site
PEL2	AGL UPSTREAM INVESTMENTS PTY LIMITED			MINERALS		0m	On-site
PEL0463	DART ENERGY (APOLLO) PTY LTD	22/10/2008	6/03/2015	PETROLEUM	Petroleum	0m	On-site
PPL0003	AUSTRALIAN OIL AND GAS CORPORATION LTD			PETROLEUM	Petroleum	0m	On-site
EL0220	METALS INVESTIGATION CORPORATION PTY LIMITED	01 Jan 1969	01 May 1973	COAL	Coal	0m	On-site
PEL463	DART ENERGY (APOLLO) PTY LTD			MINERALS		0m	On-site
PEL0191	NORTHWEST OIL AND MINERALS CO NL			PETROLEUM	Petroleum	0m	On-site
PEL0198	JOHN STREVENS (TERRIGAL) NL			PETROLEUM	Petroleum	0m	On-site
PEL0260	NORTH BULLI COLLIERIES PTY LTD, AGL PETROLEUM OPERATIONS PTY LTD, THE AUSTRALIAN GAS LIGHT CO.	9/09/1981	8/03/1993	PETROLEUM	Petroleum	0m	On-site
PSPAUTH17	MACQUARIE ENERGY PTY LTD	8/03/2007	7/03/2008	PETROLEUM	Petroleum	0m	On-site
PEL0102	AUSTRALIAN OIL AND GAS CORPORATION LTD			PETROLEUM	Petroleum	0m	On-site

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

State Environmental Planning Policy

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

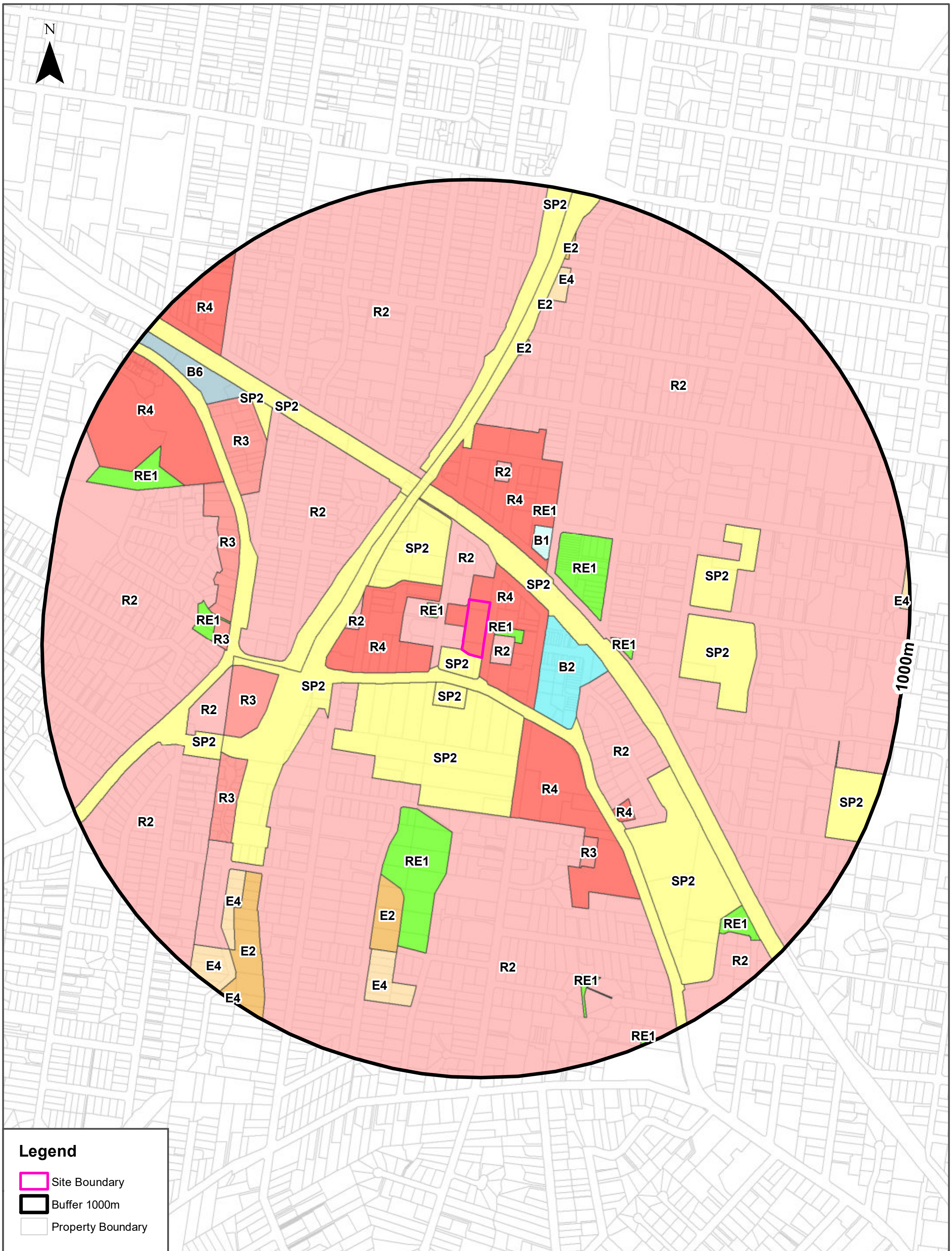
State Significant Precincts

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

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2022
Planning: NSW Crown Copyright - Planning & Environment

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 August 2022

Environmental Planning Instrument

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Land Zoning

What EPI Land Zones exist within the dataset buffer?

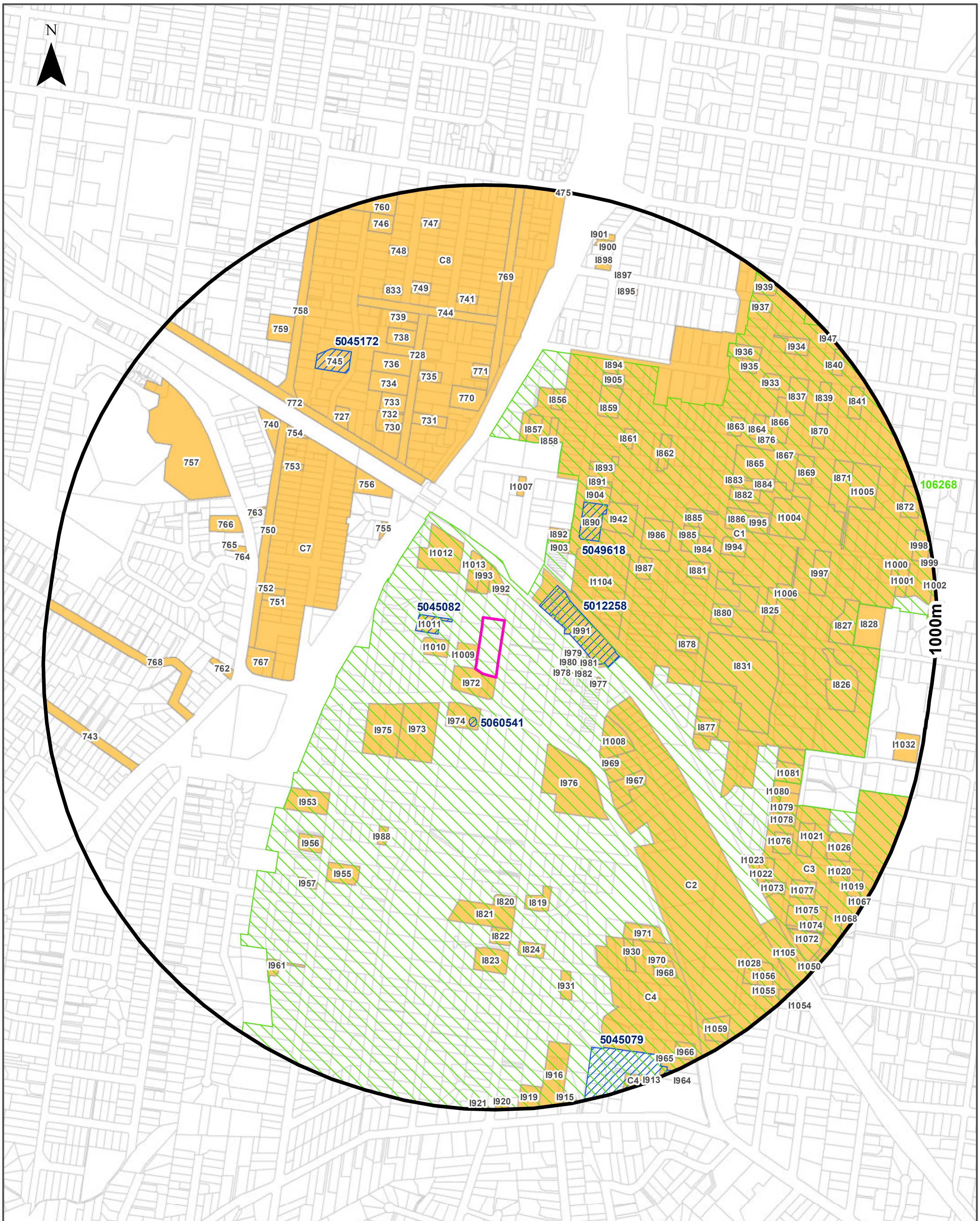
Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
R4	High Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		0m	On-site
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	18/06/2021	28/06/2021	05/11/2021	Amendment No 21	0m	North West
SP2	Infrastructure	Water Supply System	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		0m	South West
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		20m	East
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		20m	South East
SP2	Infrastructure	Classified Road	Ku-ring-gai Local Environmental Plan 2015	18/06/2021	28/06/2021	05/11/2021	Amendment No 21	44m	South West
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		70m	West
R4	High Density Residential		Ku-ring-gai Local Environmental Plan 2015	18/06/2021	28/06/2021	05/11/2021	Amendment No 21	70m	West
SP2	Infrastructure	Educational Establishment	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		73m	North West
SP2	Infrastructure	Water Supply System	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		80m	South
SP2	Infrastructure	Educational Establishment	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		80m	South
SP2	Infrastructure	Railway Infrastructure	Ku-ring-gai Local Environmental Plan 2015	18/06/2021	28/06/2021	05/11/2021	Amendment No 21	81m	South East
B2	Local Centre		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		141m	South East
R4	High Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		143m	North
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	18/06/2021	28/06/2021	05/11/2021	Amendment No 21	151m	East
B1	Neighbourhood Centre		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		163m	North East
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		169m	North East
R4	High Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		175m	South East
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		240m	North East
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		244m	South East
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		251m	West
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	18/06/2021	28/06/2021	05/11/2021	Amendment No 21	259m	South
SP2	Infrastructure	Road	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		261m	West
SP2	Infrastructure	Railway	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		286m	North West
R2	Low Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		287m	North West
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		290m	North
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		296m	East
R2	Low Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		310m	North

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Road	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		320m	North
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		388m	South
R3	Medium Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		440m	West
SP2	Infrastructure	Educational Establishment	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		471m	East
SP2	Infrastructure	Educational Establishment	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		475m	East
R4	High Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		477m	South East
SP2	Infrastructure	Educational Establishment	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		487m	South East
R3	Medium Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		489m	South East
R2	Low Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		547m	West
RE1	Public Recreation		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		554m	West
R3	Medium Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		554m	West
R3	Medium Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		563m	North West
E2	Environmental Conservation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		564m	South
R2	Low Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		564m	West
R3	Medium Density Residential		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		573m	South West
E2	Environmental Conservation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		593m	North
SP2	Infrastructure	Railway	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		613m	North West
R2	Low Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		633m	South West
R4	High Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		649m	North West
B6	Enterprise Corridor		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		713m	North West
E2	Environmental Conservation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		714m	North
E2	Environmental Conservation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		716m	South West
E4	Environmental Living		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		729m	South
RE1	Public Recreation		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		731m	North West
E4	Environmental Living		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		735m	North
E4	Environmental Living		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		737m	South West
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		789m	South
R4	High Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021		829m	North West
E2	Environmental Conservation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		838m	North
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		843m	South East
R2	Low Density Residential		Ku-ring-gai Local Environmental Plan 2015	18/06/2021	28/06/2021	05/11/2021	Amendment No 21	865m	South East
SP2	Infrastructure	Educational Establishment	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		872m	South East
E4	Environmental Living		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		903m	South West
E4	Environmental Living		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		975m	East

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RE1	Public Recreation		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		976m	South
E4	Environmental Living		Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	05/11/2021		987m	South West

Heritage Items

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

Property Boundary	Site Boundary	Commonwealth Heritage List	State Heritage Items
	Buffer 1000m	National Heritage List	EPI Heritage Items

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2022
Heritage - NSW Crown Copyright - Planning & Environment

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 August 2022

Heritage

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

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

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
106268	National Trust Urban Conservation Areas of Kur-ring-gai	Pacific Hwy Wahroonga NSW	1/13/020/0060	Historic	Nominated place		0m	On-site

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

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
5045082	Briars, The	14 Woonona Avenue Wahroonga	KU-RING-GAI	02/04/1999	00274	667	70m	West
5012258	Wahroonga Railway Station group	North Shore railway, Wahroonga	KU-RING-GAI	02/04/1999	01280	2451	88m	East
5060541	Wahroonga Reservoir (Elevated) (WS 0124)	1678 Pacific Highway and Woonona Avenue Wahroonga	KU-RING-GAI	18/11/1999	01352	2970	103m	South
5049618	St John's Uniting Church, Hall and Manse	61-65 Coonanbarra Road Wahroonga	KU-RING-GAI	19/09/2003	01670	1914	259m	North East
5045172	Highlands	9 Highlands Avenue Wahroonga	HORNSBY	02/04/1999	00034	97	648m	North West
5045079	Mahratta and Site	1526 Pacific Highway Wahroonga	KU-RING-GAI	02/04/1999	00708	1712	883m	South

Heritage Data Source: NSW Crown Copyright - Office of Environment & Heritage

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
I972	Sydney Water Reservoir - Wahroonga	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	0m	South West
I1009	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	0m	West
I993	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	54m	North
I992	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	59m	North
I1013	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	63m	North
I1011	Dwelling House "The Briars"	Item - General	State	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	70m	West
I1010	Dwelling House "Warrina"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	70m	West
I974	Sydney Water Reservoir - Wahroonga	Item - General	State	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	80m	South
C1	Wahroonga Conservation Area	Conservation Area - General	Local	Ku-ring-gai Local Environmental Plan 2015	23/10/2015	23/10/2015	24/06/2022	82m	North East
I991	Wahroonga Railway Station Group	Item - General	State	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	113m	East
I973	"Vindin House" in Abbotsleigh College	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	114m	South West
I1012	Poole House	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	115m	North West
I980	Commercial Building	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	156m	East
I979	Commercial Building	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	162m	East
I978	Commercial Building	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	169m	East
I1104	Wahroonga Park	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	169m	North East
I982	Federation Queen Anne Style Terrace Shops	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	175m	East
I975	"Lynton House" in Abbotsleigh College	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	184m	South West
I903	Coonanbarra Shops	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	192m	North East
I976	Dwelling House "Estha"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	195m	South East
I981	Inter-war Shops	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	198m	East
I892	Shops	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	211m	North East
I977	Red Leaf Chambers	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	231m	East
I890	St John's Uniting Church, Hall & Manse	Item - General	State	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	259m	North East

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I1008	Dwelling house "Redleaf" and grounds	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	268m	South East
C2	Heydon Avenue, Warrawee and Woodville Avenue, Wahroonga Conservation Area	Conservation Area - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	268m	South East
I1007	Woniora Avenue Cottages Group	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	290m	North
755	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	299m	North West
I969	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	308m	South East
I942	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	308m	North East
I987	Presbyterian Church and Hall	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	319m	North East
I904	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	330m	North East
C8	Wahroonga North Heritage Conservation Area	Conservation Area - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	331m	North
772	Street trees and bushland	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	338m	North West
C7	Wahroonga Heritage Conservation Area	Conservation Area - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	339m	North West
756	'Roselands'	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	348m	North West
I986	Dwelling house "Cedar Bank"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	356m	North East
I967	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	357m	South East
I891	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	368m	North East
728	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	395m	North
I878	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	400m	East
I893	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	402m	North East
I988	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	416m	South West
I857	Dwelling house "Meryon"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	417m	North
I858	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	419m	North
I881	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	433m	East
I985	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	438m	North East
I953	Dwelling house "Bolton Grange"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	443m	South West

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
731	Garden	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	446m	North
752	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	463m	West
751	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	463m	West
767	St. Paul's Church (Pearce's Corner) and grounds	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	464m	West
730	Garden and fence	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	465m	North West
I984	Dwelling House "Lucania"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	470m	North East
I885	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	471m	North East
I831	Dwelling house "Ewan House" (formerly Innisfail), Lodge, Lanterned Pavillion	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	471m	East
I877	Dwelling house "Ashby"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	471m	East
I880	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	475m	East
770	'Cherrygarth' and garden	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	478m	North
732	Tree and fence	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	485m	North
I861	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	490m	North East
I819	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	494m	South
I862	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	494m	North East
I820	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	501m	South
I856	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	503m	North
733	'Landskrona''garde n	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	508m	North
769	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	510m	North
750	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	513m	North West
I821	Dwelling house "Pevensey"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	521m	South
I994	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	522m	East
I859	Dwelling house "Hazeldean"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	523m	North East
I956	Dwelling House "Cullingral"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	523m	South West

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I955	Dwelling house "Matakana"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	528m	South West
727	House and fence	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	535m	North West
753	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	538m	North West
734	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	543m	North
771	'Neringala' and garden	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	550m	North
735	Garden	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	551m	North
I886	St Andrews Church	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	554m	North East
762	Garden	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	560m	West
763	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	562m	North West
764	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	562m	West
765	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	567m	West
I822	Dwelling house "Patlin"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	576m	South
754	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	580m	North West
736	Garden	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	583m	North
766	'Strathnoon'	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	589m	North West
I882	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	590m	North East
I905	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	594m	North East
I825	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	596m	East
I995	St Andrew's Church Manse	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	596m	North East
I883	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	609m	North East
I957	Dwelling House "Mansfield"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	609m	South West
I824	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	611m	South
740	Trees in playground	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	613m	North West
I894	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	618m	North East

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I884	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	621m	North East
I823	Dwelling house "Carinya"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	624m	South
I865	Dwelling house "Craignairn"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	624m	North East
I1006	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	632m	East
I971	Dwelling house "Rosemorran"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	640m	South East
I1004	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	642m	North East
738	House and garden	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	644m	North
745	'Highlands House' and garden	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	648m	North West
757	Mercy Family Life Centre,garden and trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	649m	North West
C4	Mahratta Conservation Area	Conservation Area - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	649m	South East
768	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	655m	West
758	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	663m	North West
I930	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	671m	South East
I863	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	671m	North East
744	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	673m	North
C3	Warrawee Conservation Area	Conservation Area - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	674m	South East
I1081	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	678m	South East
I1080	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	691m	South East
I931	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	693m	South
I1079	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	694m	South East
739	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	698m	North
I1023	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	702m	South East
I867	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	703m	North East
I1078	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	705m	South East

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I997	Dwelling house "Oakland"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	707m	East
I864	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	708m	North East
741	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	724m	North
I876	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	727m	North East
I1076	Dwelling House "Wichita"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	737m	South East
I826	Dwelling house "Berith Park"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	738m	East
I1022	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	739m	South East
I866	Dwelling house Farleigh	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	741m	North East
I869	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	741m	North East
I970	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	743m	South East
I827	Dwelling house "Amberleigh Manor"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	751m	East
749	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	756m	North
I968	Dwelling house "Illilliwa"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	761m	South East
833	House	Item - General	Local	Hornsby Local Environmental Plan 2013	19/09/2014	19/09/2014	30/07/2021	769m	North
I1073	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	772m	South East
759	'Tenterfield' and garden	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	774m	North West
I1021	Dwelling house "Audley"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	779m	South East
I961	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	789m	South West
I935	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	794m	North East
I1005	Dwelling house "Greystanes"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	795m	North East
I871	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	795m	North East
I936	Dwelling house "Nirvana"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	800m	North East
I895	Timber Cottages Group	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	801m	North
I933	Dwelling house "Edelstein"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	802m	North East

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
743	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	807m	West
I828	Dwelling house "Kiriwan"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	808m	East
I837	Dwelling house "Yarrowbrae"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	810m	North East
I870	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	815m	North East
I1077	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	828m	South East
I1105	Warrawee Railway Station Group	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	837m	South East
I897	Timber Cottages Group	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	840m	North
I916	Dwelling house "Rothiemore"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	849m	South
I1026	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	853m	South East
748	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	853m	North
I898	Timber Cottages Group	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	855m	North
I1075	Dwelling House "Maiala"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	857m	South East
I839	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	866m	North East
I1028	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	874m	South East
I1074	Dwelling House "Rowardennan" (formerly Lyndon Lodge)	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	884m	South East
I1072	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	889m	South East
I900	Timber Cottages Group	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	892m	North
I1020	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	893m	South East
I1000	Dwelling House "The Gatehouse"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	895m	East
I1056	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	895m	South East
I934	Dwelling house "The Grange"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	896m	North East
I1001	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	903m	East
747	House and garden	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	905m	North
I901	Timber Cottages Group	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	907m	North

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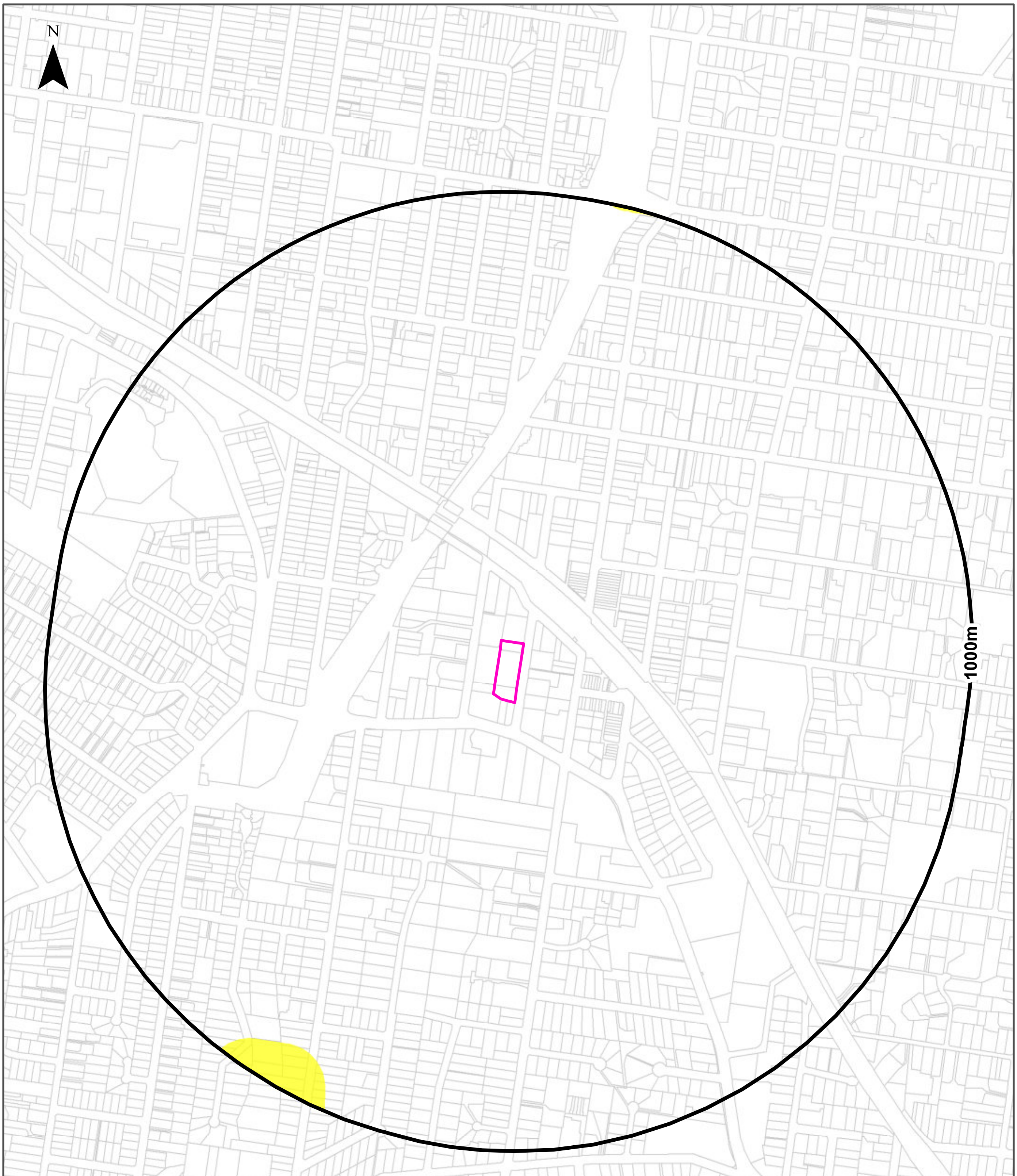
746	House	Item - General	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	911m	North
I937	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	915m	North East
I841	Dwelling house "Yarranbah"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	922m	North East
I1059	Dwelling House "Inglewood"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	925m	South East
I1055	Dwelling house "Chantreys"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	929m	South East
I1019	Dwelling house "Cobbins"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	931m	South East
I1032	Dwelling house "Amberley"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	935m	East
I966	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	939m	South East
I919	Dwelling house "Somerset"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	942m	South
I872	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	946m	East
I840	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	947m	North East
I998	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	951m	East
760	Waitara Public School,grounds (excluding buildings)	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	951m	North
I939	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	952m	North East
I965	Dwelling house "Yaamba"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	955m	South East
I913	Mahratta	Item - General	State	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	962m	South
I920	West Tarring	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	969m	South
I1068	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	971m	South East
I915	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	973m	South
I1054	Dwelling House "Reaycroft"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	973m	South East
I1002	Rippon Grange house, grounds and associated buildings	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	975m	East
I964	Dwelling House "Mahratta"	Item - General	State	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	976m	South
I921	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	21/10/2016	21/10/2016	24/06/2022	981m	South
I1050	Dwelling House "Wirepe"	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	983m	South East

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I1067	Dwelling house "Virginia Lodge" (formerly Roseland)	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	984m	South East
I999	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	991m	East
I947	Dwelling house	Item - General	Local	Ku-ring-gai Local Environmental Plan 2015	05/03/2015	02/04/2015	24/06/2022	991m	North East
475	Street trees	Item - Landscape	Local	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	30/07/2021	1000m	North

Natural Hazards - Bush Fire Prone Land

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary

Bush Fire Prone Land Category

- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3
- Vegetation Buffer

Scale: 0 100 200 400 600 Meters	Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2022. Property Boundaries: © Department Finance, Services & Innovation 2022	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 August 2022

Natural Hazards

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

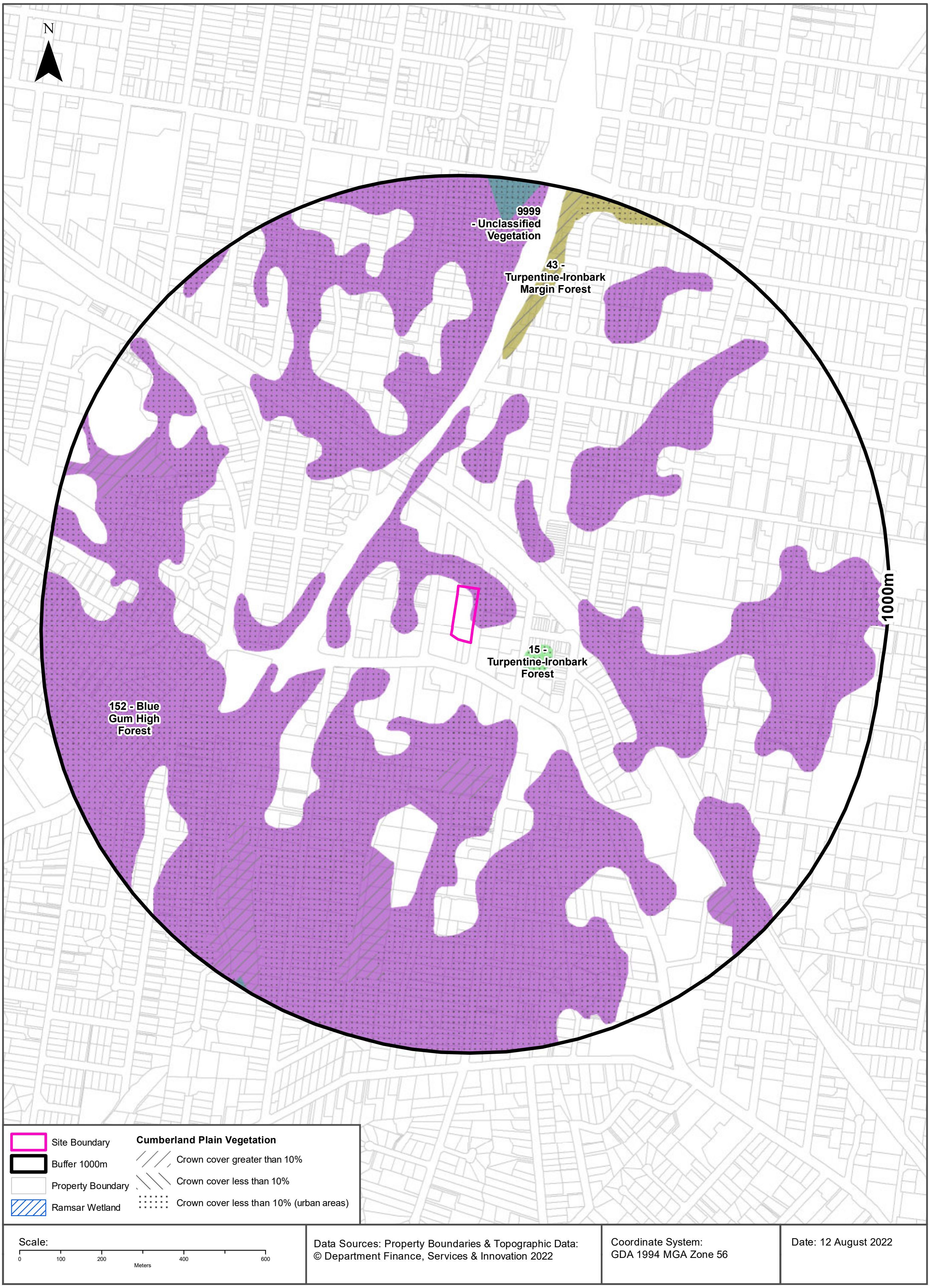
Bush Fire Prone Land

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

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	896m	South West
Vegetation Category 1	996m	South West

Ecological Constraints - Vegetation & Ramsar Wetlands

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076



Data Sources: Property Boundaries & Topographic Data:
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Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 August 2022

Ecological Constraints

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Remnant Vegetation of the Cumberland Plain

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

Description	Crown Cover	Distance	Direction
152 - Blue Gum High Forest	Crown cover less than 10% (urban areas)	0m	On-site
15 - Turpentine-Ironbark Forest	Crown cover less than 10% (urban areas)	134m	South East
152 - Blue Gum High Forest	Crown cover greater than 10%	279m	South
43 - Turpentine-Ironbark Margin Forest	Crown cover greater than 10%	562m	North
9999 - Unclassified Vegetation	Crown cover less than 10% (urban areas)	882m	North
43 - Turpentine-Ironbark Margin Forest	Crown cover less than 10% (urban areas)	926m	North
9999 - Unclassified Vegetation	Crown cover greater than 10%	977m	South West

Remnant Vegetation of the Cumberland Plain : NSW Office of Environment and Heritage

Ramsar Wetlands

What Ramsar Wetland areas exist within the dataset buffer?

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

Ramsar Wetlands Data Source: © Commonwealth of Australia - Department of Agriculture, Water and the Environment

Ecological Constraints

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
N/A	No records in buffer					

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology

Ecological Constraints

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
N/A	No records in buffer					

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology

Ecological Constraints

Neringah Hospital, 4-12 Neringah Avenue South, Wahroonga, NSW 2076

NSW BioNet Atlas

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

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Amphibia	Litoria aurea	Green and Golden Bell Frog	Endangered	Not Sensitive	Vulnerable	
Animalia	Amphibia	Pseudophryne australis	Red-crowned Toadlet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Not Sensitive	Critically Endangered	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ardenna carneipes	Flesh-footed Shearwater	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Ardenna tenuirostris	Short-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris ferruginea	Curlew Sandpiper	Endangered	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Category 3	Endangered	
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Endangered Population, Vulnerable	Category 3	Endangered	
Animalia	Aves	Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo (inland subspecies)	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Cecropis daurica	Red-rumped Swallow	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	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	Falco hypoleucos	Grey Falcon	Endangered	Category 2	Not Listed	
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haematopus fuliginosus	Sooty Oystercatcher	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haematopus longirostris	Pied Oystercatcher	Endangered	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	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Lathamus discolor	Swift Parrot	Endangered	Category 3	Critically Endangered	
Animalia	Aves	Limicola falcinellus	Broad-billed Sandpiper	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Menura alberti	Albert's Lyrebird	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Neophema pulchella	Turquoise Parrot	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Nettapus coromandelianus	Cotton Pygmy-Goose	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Ninox connivens	Barking Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Numenius minutus	Little Curlew	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Onychoprion fuscata	Sooty Tern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pachycephala olivacea	Olive Whistler	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	Petroica phoenicea	Flame Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pluvialis squatarola	Grey Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Polytelis swainsonii	Superb Parrot	Vulnerable	Category 3	Vulnerable	
Animalia	Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	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	Rhipidura fuliginosa	New Zealand Fantail (Lord Howe Is. subsp.)	Extinct	Not Sensitive	Extinct	
Animalia	Aves	Stagonopleura guttata	Diamond Firetail	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Thalasseus bergii	Crested Tern	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto tenebricosa	Sooty Owl	Vulnerable	Category 3	Not Listed	
Animalia	Gastropoda	Pommerhelix duralensis	Dural Land Snail	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Not Sensitive	Vulnerable	
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	Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Macropus parma	Parma Wallaby	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Mammalia	Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petauroides volans	Greater Glider	Not Listed	Not Sensitive	Vulnerable	
Animalia	Mammalia	Petaurus australis	Yellow-bellied Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Phascolarctos cinereus	Koala	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Pseudomys gracilicaudatus	Eastern Chestnut Mouse	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Pseudomys novaehollandiae	New Holland Mouse	Not Listed	Not Sensitive	Vulnerable	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Vespadelus troughtoni	Eastern Cave Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Aspidites ramsayi	Woma	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Chelonia mydas	Green Turtle	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Dermochelys coriacea	Leatherback Turtle	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	Myuchelys bellii	Western Sawshelled Turtle, Bell's Turtle	Endangered	Not Sensitive	Vulnerable	
Animalia	Reptilia	Uvidicolus sphyrurus	Border Thick-tailed Gecko	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Varanus rosenbergi	Rosenberg's Goanna	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Acacia bynoeana	Bynoe's Wattle	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Acacia clunies-rossiae	Kanangra Wattle	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Acacia pubescens	Downy Wattle	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Ancistrachne maidenii		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Argyrotegium nitidulum	Shining Cudweed	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Caladenia tessellata	Thick Lip Spider Orchid	Endangered	Category 2	Vulnerable	
Plantae	Flora	Callistemon linearifolius	Netted Bottle Brush	Vulnerable	Category 3	Not Listed	
Plantae	Flora	Cryptostylis hunteriana	Leafless Tongue Orchid	Vulnerable	Category 2	Vulnerable	
Plantae	Flora	Darwinia biflora		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Darwinia peduncularis		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Davidsonia jerseyana	Davidson's Plum	Endangered	Category 2	Endangered	
Plantae	Flora	Deyeuxia appressa		Endangered	Not Sensitive	Endangered	
Plantae	Flora	Dillwynia tenuifolia		Endangered Population, Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Diuris bracteata		Endangered	Category 2	Extinct	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Epacris purpurascens var. purpurascens		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Epacris sparsa	Sparse Heath	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus camfieldii	Camfield's Stringybark	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus leucoxylon subsp. pruinosa	Yellow Gum	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Eucalyptus nicholii	Narrow-leaved Black Peppermint	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus scoparia	Wallangarra White Gum	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Galium australe	Tangled Bedstraw	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Genoplesium baueri	Bauer's Midge Orchid	Endangered	Category 2	Endangered	
Plantae	Flora	Genoplesium plumosum	Tallong Midge Orchid	Critically Endangered	Category 2	Endangered	
Plantae	Flora	Grammitis stenophylla	Narrow-leaf Finger Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Grevillea caleyi	Caley's Grevillea	Critically Endangered	Category 3	Critically Endangered	
Plantae	Flora	Grevillea hilliana	White Yiel Yiel	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Haloragodendron lucasii		Endangered	Not Sensitive	Endangered	
Plantae	Flora	Hibbertia spanantha	Julian's Hibbertia	Critically Endangered	Category 2	Critically Endangered	
Plantae	Flora	Hibbertia superans		Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Isotoma fluviatilis subsp. fluviatilis		Not Listed	Not Sensitive	Extinct	
Plantae	Flora	Kunzea rupestris		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Lasiopetalum joyceae		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Leptospermum deanei		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Lindsaea incisa	Slender Screw Fern	Endangered	Category 3	Not Listed	
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	Melaleuca biconvexa	Biconvex Paperbark	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Melaleuca deanei	Deane's Paperbark	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Microtis angusii	Angus's Onion Orchid	Endangered	Category 2	Endangered	
Plantae	Flora	Persoonia hirsuta	Hairy Geebung	Endangered	Category 3	Endangered	
Plantae	Flora	Persoonia marginata	Clandulla Geebung	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Persoonia mollis subsp. maxima		Endangered	Not Sensitive	Endangered	
Plantae	Flora	Persoonia pauciflora	North Rothbury Persoonia	Critically Endangered	Category 3	Critically Endangered	
Plantae	Flora	Pimelea curviflora var. curviflora		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Prostanthera marifolia	Seaforth Mintbush	Critically Endangered	Category 3	Critically Endangered	
Plantae	Flora	Pterostylis nigricans	Dark Greenhood	Vulnerable	Category 2	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Rhizanthella slateri	Eastern Australian Underground Orchid	Vulnerable	Category 2	Endangered	
Plantae	Flora	Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	Not Sensitive	Critically Endangered	
Plantae	Flora	Senecio behrianus		Extinct	Not Sensitive	Endangered	
Plantae	Flora	Syzygium paniculatum	Magenta Lilly Pilly	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Tetratheca glandulosa		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Tetratheca juncea	Black-eyed Susan	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Thelymitra atronitida	Black-hooded Sun Orchid	Critically Endangered	Category 2	Not Listed	
Plantae	Flora	Wilsonia backhousei	Narrow-leafed Wilsonia	Vulnerable	Not Sensitive	Not Listed	

Data does not include NSW category 1 sensitive species.

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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

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Appendix D: Background on Salinity

Background on Salinity

A. General Information on Salinity

Salinity is the accumulation and concentration of salt at or near the ground surface or within surface water bodies. Salt is naturally present in the landscape through deposition of salt from the ocean in coastal areas and through weathering of bedrock that contains salt, accumulated during deposition of original sediments in a prehistoric marine environment. The salts are commonly soluble chlorides, sulphates or carbonates of sodium and magnesium.

In Sydney, salinity issues are typically associated with the Wianamatta Group shales and their derived soil landscapes. The natural vegetation of western Sydney is dominated by large isolated trees with deep root systems that remove subsurface moisture. Slow rates of percolation through the relatively impermeable clay soil and uptake of a large proportion of rainfall by the trees results in limited recharge of the groundwater system by rainfall. The depth to groundwater has developed a natural equilibrium and there is little tendency for salt contained in the groundwater or subsoils to rise to the surface.

B. Salinity and Urban Development

Salinity becomes a problem in urban areas when changes in the land use result in changes to the way water moves through the environment. This can result in vegetation die-back, decrease in water quality and damage to urban infrastructure.

Removal of deep rooted tree species during development and replacement with urban infrastructure, houses and industrial developments reduces the mechanism for the removal of subsurface moisture.

The development of urban salinity is commonly associated with changes in the hydrological cycle through the environment (rainfall, surface run-off, water infiltration and groundwater system). An increase in the quantity of water reaching the groundwater table as a result of vegetation clearance, irrigation of parklands, leaking water infrastructure and changes in drainage patterns, can cause a relatively rapid rise in the groundwater table. Earthworks that include excavation of natural soil profiles and exposure of more saline subsurface soils or shale bedrock may also result in an increase in salt concentrations at the ground surface.

Construction of roads, pipelines and buildings commonly results in removal of topsoil leading to exposure of the subsoils and interception of surficial and shallow subsurface drainage. In addition, over-irrigation of urban gardens, leaking water infrastructure and concentrated drainage patterns can result in increased water movement through the subsoil to the groundwater system leading to a relatively rapid rise in the groundwater table.

A rise in groundwater levels and impediments to subsurface drainage patterns can transport salt formerly stored in the bedrock to the surficial soil profile. This may result in salt encrustation of exposed soils, building foundations, roads, drainage infrastructure and corrosion of metal, concrete and other building materials. Increasing salt concentrations in surficial soils (and consequently in surface waters) may also result in die-off of the existing vegetation, further reducing the hydrological load on the groundwater system and resulting in further groundwater table rises.

C. Potential Salinity Impacts on Urban Development

Some of the adverse impacts that can arise from saline conditions include:

- Salt scalds caused by a rise in the subsoil moisture content that mobilises salt to the ground surface;
- Salt scalds caused by modification of former drainage patterns which leads to the day lighting of subsurface seepage (either perched water or groundwater) in areas lower in the catchment, either at breaks in the slope or within drainage lines;
- A rise in groundwater table or accumulation of salt rich seepage leading to corrosion of subsurface facilities including concrete structures, metal pipework, cables, foundations, underground services, etc;
- Rising damp, where salt rich moisture is drawn into building and pavement materials by capillary action leading to deterioration of brick, mortar and concrete;
- Structural cracking, damage or building collapse which may occur as a result of shifting and or sinking foundations;
- Plant die-back associated with a rise in groundwater table level that mobilises excess salt to the plant root zone; and
- Subsurface water discharge and subsequent pollution of streams and drainage channels.

D. Soils and Groundwater Planning Strategy in Western Sydney

The aim of the DLWC 2002 document is to provide a framework for the sustainable development and management of new developments in the western region of Sydney. In relation to salinity management, the development should be designed and constructed such that there is no significant increase in the water table level and no adverse salinity impacts.

The proposed development controls that relate to soils and groundwater issues are summarised below:

1. A water management strategy should be prepared to address the following:
    - Reduction of potable water usage onsite;
    - Development of best practice measures for stormwater reuse for open space irrigation;
    - Reduction of potable water demand;
    - Reduction of adverse impacts on local groundwater regimes;
    - Reduction of change in local flow regimes; and
    - Preparation of water maintenance and a monitoring management system.
2. A salinity management plan should be prepared that includes a groundwater management strategy related to:
    - Adoption of small landscaped areas to reduce irrigation requirements;
    - Use of native and other low water requirement plants;
    - Use of mulch cover (not in drainage lines);
    - Use of low flow watering facilities for landscaped areas;
    - Implementation of a tree planting program, especially in high recharge areas, of native, deep rooted, large growing species to assist retention of the groundwater at existing levels;

- Retention of existing native tree cover where possible; and
- Not permitting infiltration pits or tanks to disperse surface water.

3. An assessment of soil and rock conditions at the site, including erosion, expansive and dispersive soil conditions, and plant growth potential should be undertaken.
4. Use of the Blue Book (2004) as a guide to prepare soil and water management plans. The approved plan and subsequent works are to be supervised by appropriately qualified experienced personnel.

Appendix E: Proposed Development Plans

STATE SIGNIFICANT DA: WAHROONGA STAGE 2

FOR HAMMONDCARE

PALLIATIVE CARE AND RESIDENTIAL CARE FACILITY AND SELF-CONTAINED DWELLINGS
AT 4-12 NERINGAH AVE S, WAHROONGA NSW 2076

DEVELOPMENT SUMMARY	
SITE AREA	**10,770m²**
WOONONA COTTAGE AREA (R2 ZONE)	*1,794m²*
DEVELOPMENT AREA (R4 ZONE)	**8,976m²**
MAXIMUM FSR FOR R4 ZONE	1:1.3
MAXIMUM FSR (INCL. VERTICAL VILLAGE BONUS)	**1:1.8**
MAXIMUM GFA FOR DEVELOPMENT AREA (BASED ON FSR)	16,157m²
EXISTING GFA (WAHROONGA RAC)	3,736m²
MAXIMUM NEW GFA	**12,421m²**
TOTAL NEW GFA	**11,015m²**
GFA - PALLIATIVE CARE	1,600m²
GFA - RESIDENTIAL CARE	950m²
GFA - SELF-CONTAINED DWELLINGS	6,600m²
GFA - AMENITY (COMMUNITY + NEIGHBOURHOOD)	1,215m²
GFA - CIRCULATION + SERVICES	650m²
FSR (INCL. EXISTING GFA)	**1.64**
DEEP SOIL PLANTING AREA	1,650m² (15%)
INDICATED ON PROPOSED SITE PLAN	

ACCOMMODATION SUMMARY	
PALLIATIVE CARE	18 BEDS (2 HOUSES OF 9 BEDS)
RESIDENTIAL CARE	12 BEDS (1 HOUSE OF 12 BEDS)
SELF-CONTAINED DWELLINGS	57 DWELLINGS
NORTH BUILDING	22
SOUTH BUILDING	35

CAR PARK SUMMARY	
SITE TOTAL	145
BASEMENT 02	60
BASEMENT 01	54
LOWER GROUND	31

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VIEW OF NERINGAH HOSPITAL FROM PARK ACROSS NERINGAH AVENUE SOUTH

WOONONA HOUSE

SYDNEY WATER RESERVOIR BRICK WALL

5 STOREY APARTMENT BUILDING

5 STOREY APARTMENT BUILDING (FIRST THREE SHOWN IN IMAGE)

4 STOREY APARTMENT BUILDING

NORTH

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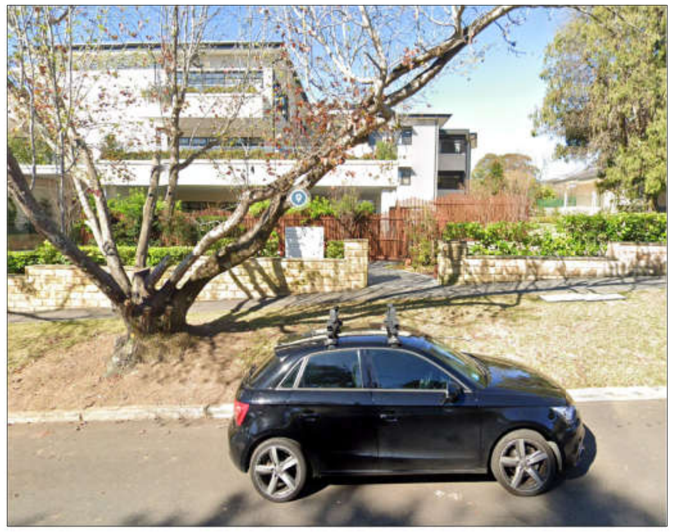
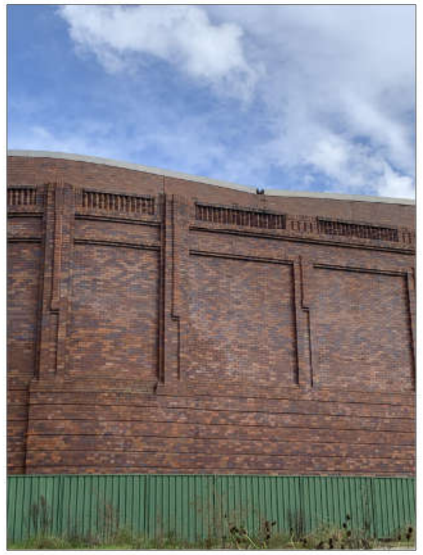
VIEW FROM SITE TO ARCHDALE PARK



ACCESS TO WAHROONGA STAGE 1 OFF WOONONA AVENUE



VIEW FROM SITE TO SYDNEY WATER RESERVOIR

LEGEND - SITE ANALYSIS

SYMBOL	DESCRIPTION
→	VIEWS
→	BEST SOLAR ASPECT
→	PREVAILING BREEZE

ABBREVIATIONS	
GAS	GAS LINE
S	SEWER LINE
WM	WATER MAIN
TEL	TELSTRA

NORTH

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DRAWING TITLE:
EXISTING SITE PLAN & SITE ANALYSIS

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LEGEND - SITE & LANDSCAPE PLAN

SYMBOL	DESCRIPTION
	SITE BOUNDARY
	EXISTING TREE
	PROPOSED TREE/ LANDSCAPE PLANTING

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PROPOSED SITE PLAN

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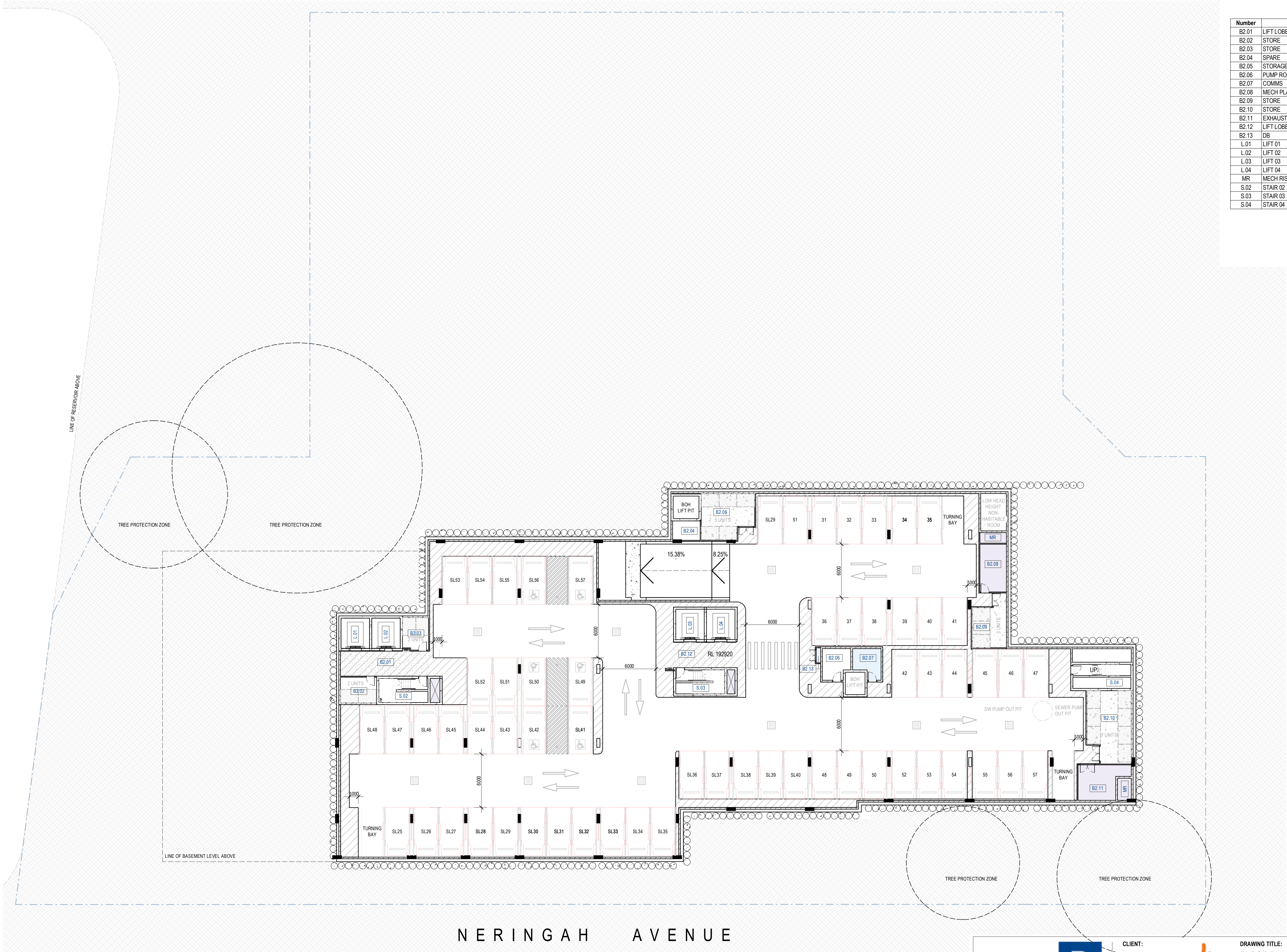

Number	Name
B2.01	LIFT LOBBY
B2.02	STORE
B2.03	STORE
B2.04	SPARE
B2.05	STORAGE
B2.06	PUMP ROOM
B2.07	COMMS
B2.08	MECH PLANT
B2.09	STORE
B2.10	STORE
B2.11	EXHAUST FAN ROOM
B2.12	LIFT LOBBY
B2.13	DB
L.01	LIFT 01
L.02	LIFT 02
L.03	LIFT 03
L.04	LIFT 04
MR	MECH RISER
S.02	STAIR 02
S.03	STAIR 03
S.04	STAIR 04

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FLOOR PLAN - BASEMENT 2

DATE: OCT 2022 **SCALE:** 1 : 200 @ A1
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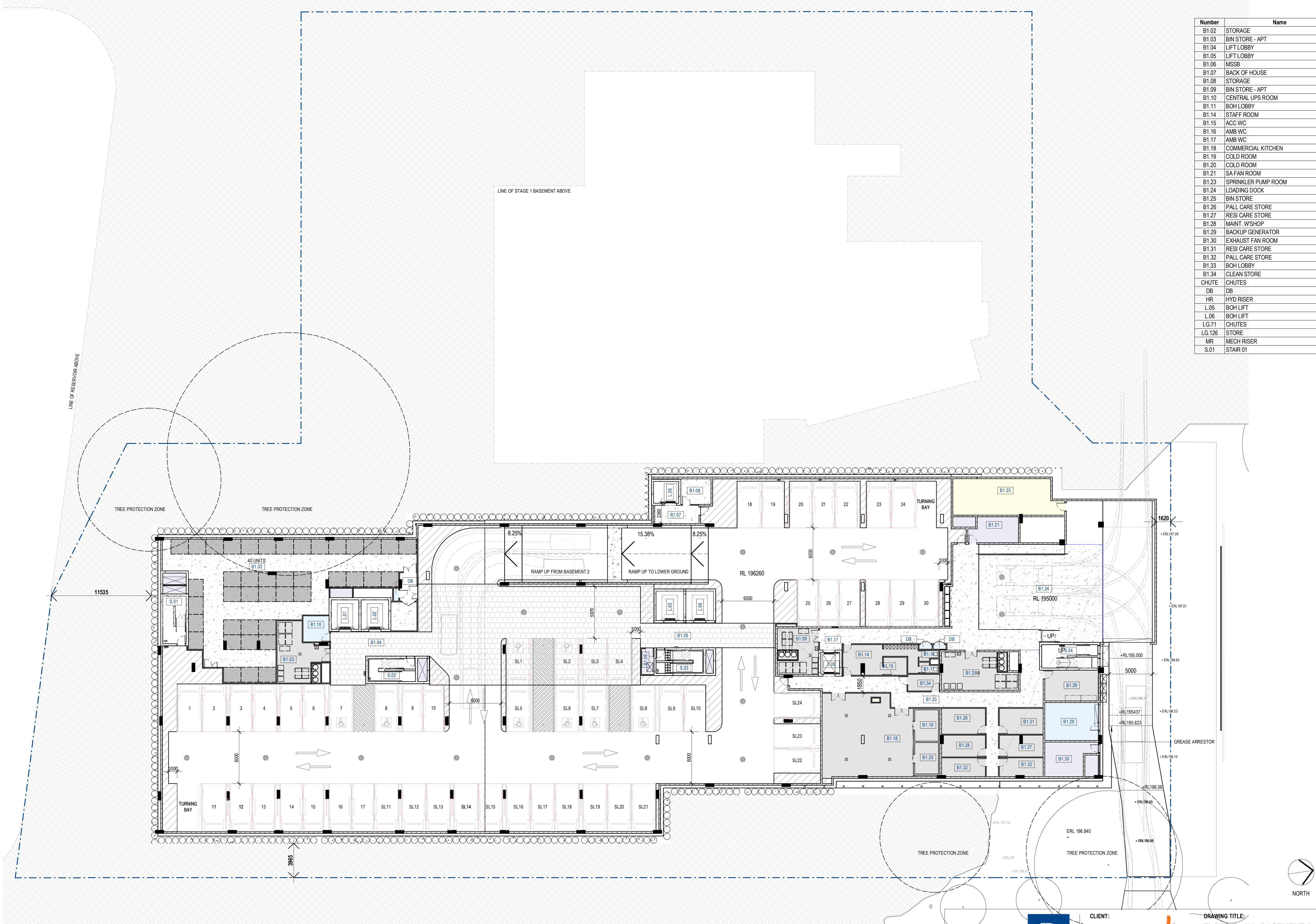

Number	Name
B1.02	STORAGE
B1.03	BIN STORE - APT
B1.04	LIFT LOBBY
B1.05	LIFT LOBBY
B1.06	MSSB
B1.07	BACK OF HOUSE
B1.08	STORAGE
B1.09	BIN STORE - APT
B1.10	CENTRAL UPS ROOM
B1.11	BOH LOBBY
B1.14	STAFF ROOM
B1.15	ACC WC
B1.16	AMB WC
B1.17	AMB WC
B1.18	COMMERCIAL KITCHEN
B1.19	COLD ROOM
B1.20	COLD ROOM
B1.21	SA FAN ROOM
B1.23	SPRINKLER PUMP ROOM
B1.24	LOADING DOCK
B1.25	BIN STORE
B1.26	PALL CARE STORE
B1.27	RESI CARE STORE
B1.28	MAINT. W'SHOP
B1.29	BACKUP GENERATOR
B1.30	EXHAUST FAN ROOM
B1.31	RESI CARE STORE
B1.32	PALL CARE STORE
B1.33	BOH LOBBY
B1.34	CLEAN STORE
CHUTE	CHUTES
DB	DB
HR	HYD RISER
L.05	BOH LIFT
L.06	BOH LIFT
LG.71	CHUTES
LG.126	STORE
MR	MECH RISER
S.01	STAIR 01

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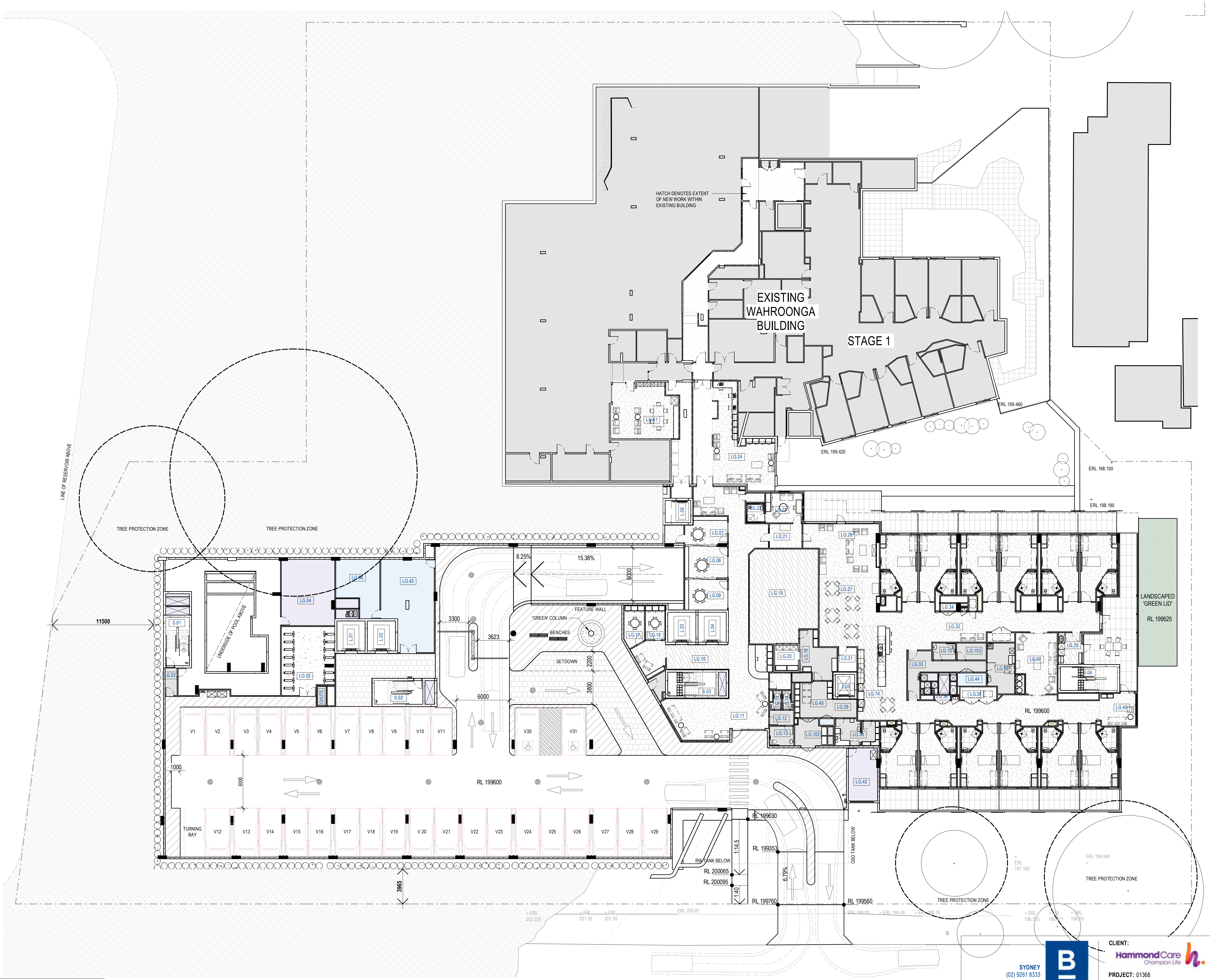

Number	Name
B1.02	STORAGE
B1.03	BIN STORE - APT
B1.04	LIFT LOBBY
B1.05	LIFT LOBBY
B1.06	MSSB
B1.07	BACK OF HOUSE
B1.08	STORAGE
B1.09	BIN STORE - APT
B1.10	CENTRAL UPS ROOM
B1.11	BOH LOBBY
B1.14	STAFF ROOM
B1.15	ACC WC
B1.16	AMB WC
B1.17	AMB WC
B1.18	COMMERCIAL KITCHEN
B1.19	COLD ROOM
B1.20	COLD ROOM
B1.21	SA FAN ROOM
B1.23	SPRINKLER PUMP ROOM
B1.24	LOADING DOCK
B1.25	BIN STORE
B1.26	PALL CARE STORE
B1.27	RESI CARE STORE
B1.28	MAINT. W'SHOP
B1.29	BACKUP GENERATOR
B1.30	EXHAUST FAN ROOM
B1.31	RESI CARE STORE
B1.32	PALL CARE STORE
B1.33	BOH LOBBY
B1.34	CLEAN STORE
CHUTE	CHUTES
DB	DB
HR	HYD RISER
L.05	BOH LIFT
L.06	BOH LIFT
LG.71	CHUTES
LG.126	STORE
MR	MECH RISER
S.01	STAIR 01

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FLOOR PLAN - LOWER GROUND

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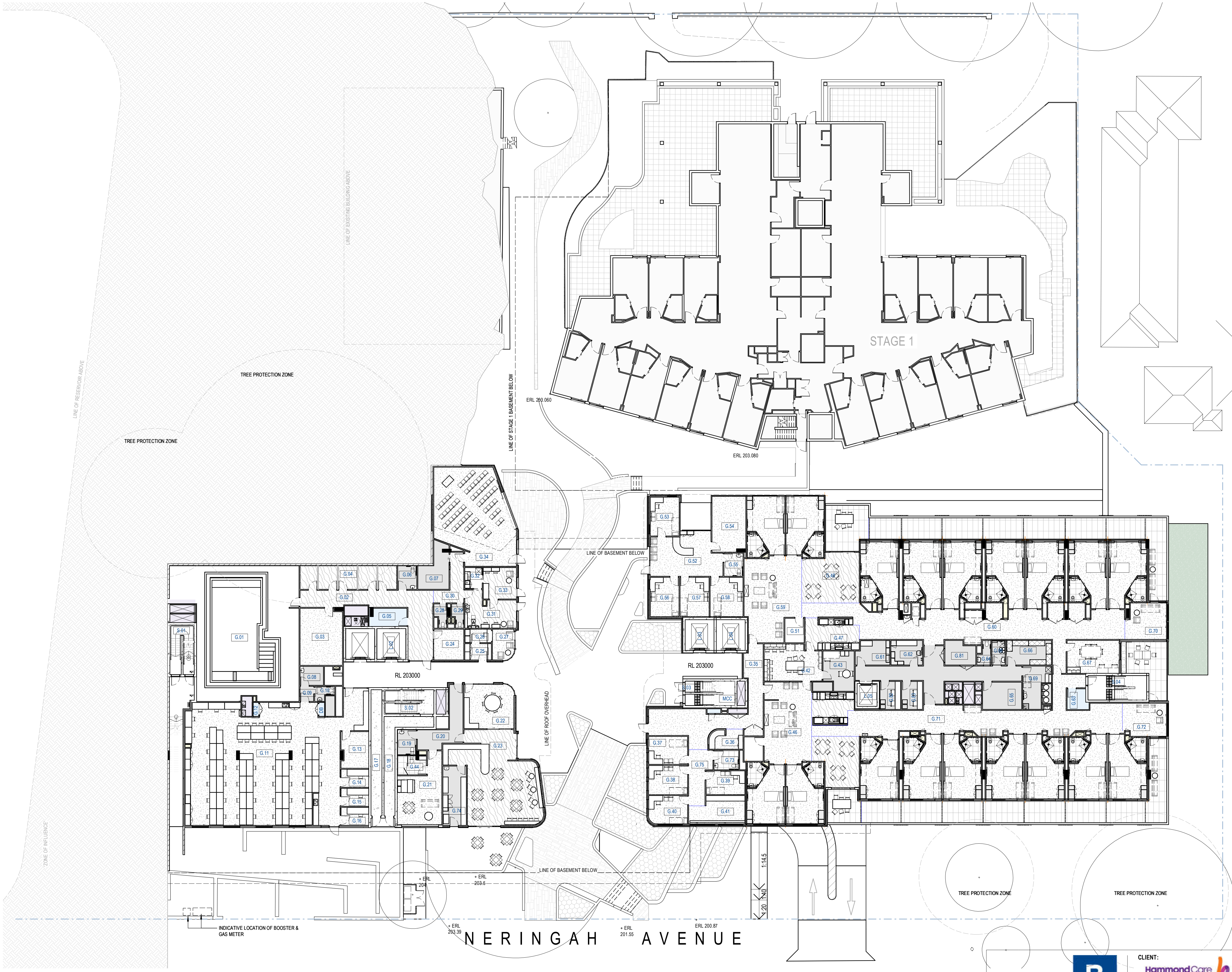

Number	Name
B	BEDROOM
DB	DB
E	ENS
G.01	POOL
G.02	COMMUNITY
G.03	GYM
G.04	CHANGE ROOM
G.05	COMMS
G.06	ACC WC
G.07	CLEANER / STORE
G.08	ACC WC
G.09	AIRLOCK
G.10	AMB WC
G.11	ADMIN
G.12	MCC CPD
G.13	MTG
G.14	QUIET
G.15	QUIET
G.16	QUIET
G.17	FIRE TUNNEL
G.18	FIRE TUNNEL
G.19	FIRE TUNNEL
G.20	BOH CORRIDOR
G.21	OVERNIGHT STAY
G.22	MTG
G.23	CAFE
G.24	GROUP THERAPY
G.25	MAIL
G.26	STAFF ROOM
G.27	CONCIERGE
G.28	WC
G.29	WC
G.30	BOH
G.31	SALON
G.32	STORE
G.33	BARBER
G.34	CHAPEL
G.35	ENTRY LOBBY
G.36	CONCIERGE
G.37	CONS
G.38	CONS
G.39	CONS
G.40	CONS
G.41	KITCHENETTE & LOUNGE
G.42	HUDDLE
G.43	N.U.M.
G.44	OVERNIGHT STAY - BATHROOM
G.45	KITCHEN
G.46	LIVING
G.47	KITCHEN
G.48	DINING
G.49	BEDROOM
G.50	ENS
G.51	DIN. WC
G.52	RECEPTION & WAITING
G.53	CONS
G.54	GROUP THERAPY
G.55	ACC WC
G.56	CONS
G.57	CONS
G.58	CONS
G.59	LIVING
G.60	CORRIDOR
G.61	CLEAN
G.62	MEDS
G.63	COMMS
G.64	STAFF WC
G.65	PHARMACY
G.66	GENERAL STORE
G.67	STAFF (MDT)
G.68	CLEANER
G.69	DIRTY
G.70	SITTING
G.71	CORRIDOR
G.72	SITTING
G.73	ACC WC
G.74	BOX ST.
G.75	CORRIDOR
G.76	BOH
G.77	DINING WC
G.78	DINING
G.79	STORAGE
G.80	STORAGE
G.81	EQUIPMENT STORE
G.82	JR DR
G.83	DR
G.84	KITCHEN
G.85	STORE
HR	HYD RISER
MCC	MCC CPD
MR	MECH RISER
S	STORAGE

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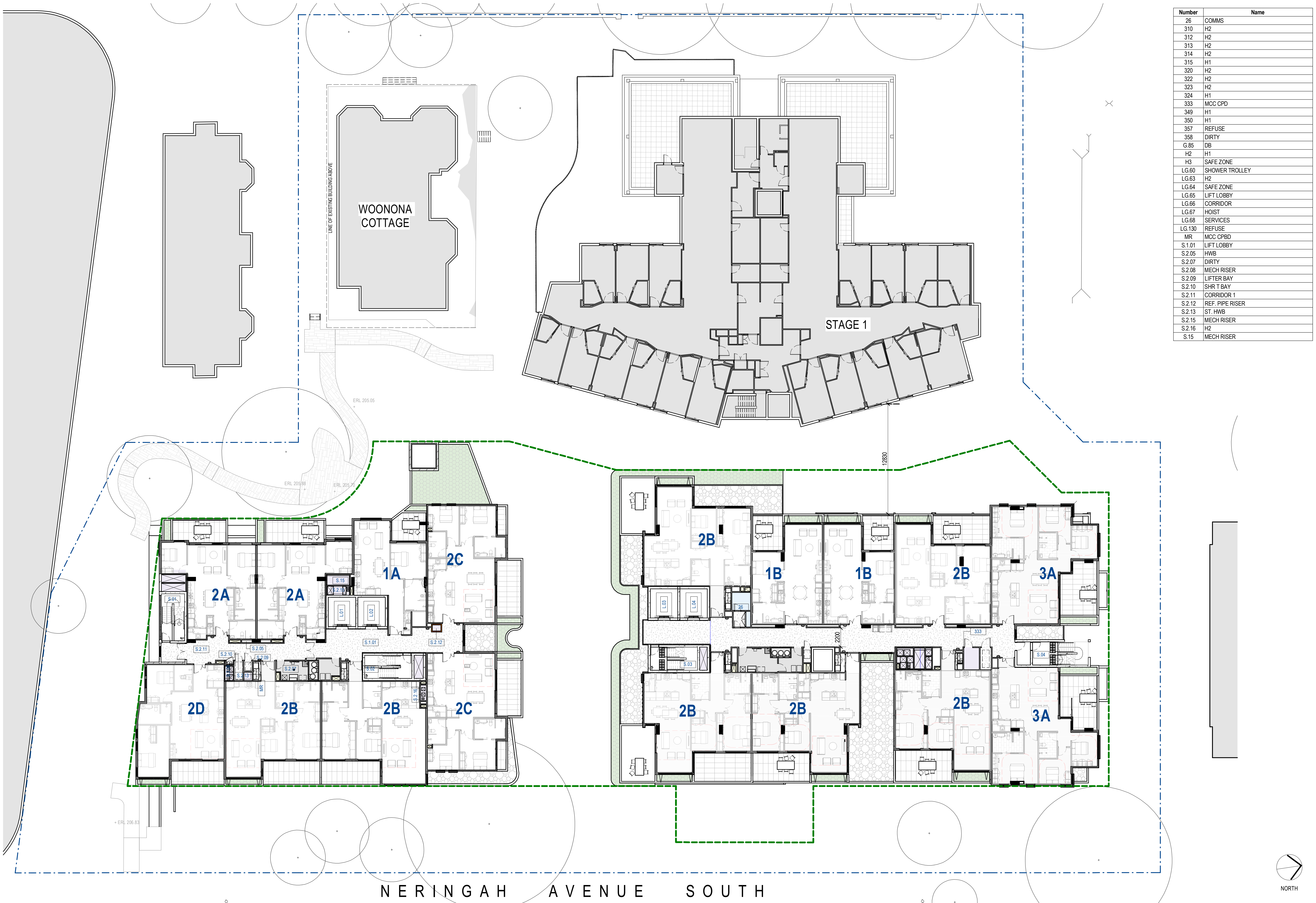

Number	Name
26	COMMS
310	H2
312	H2
313	H2
314	H2
315	H1
320	H2
322	H2
323	H2
324	H1
333	MCC CPD
349	H1
350	H1
357	REFUSE
358	DIRTY
G.85	DB
H2	H1
H3	SAFE ZONE
LG.60	SHOWER TROLLEY
LG.63	H2
LG.64	SAFE ZONE
LG.65	LIFT LOBBY
LG.66	CORRIDOR
LG.67	HOIST
LG.68	SERVICES
LG.130	REFUSE
MR	MCC CPBD
S.1.01	LIFT LOBBY
S.2.05	HWB
S.2.07	DIRTY
S.2.08	MECH RISER
S.2.09	LIFTER BAY
S.2.10	SHR T BAY
S.2.11	CORRIDOR 1
S.2.12	REF. PIPE RISER
S.2.13	ST. HWB
S.2.15	MECH RISER
S.2.16	H2
S.15	MECH RISER

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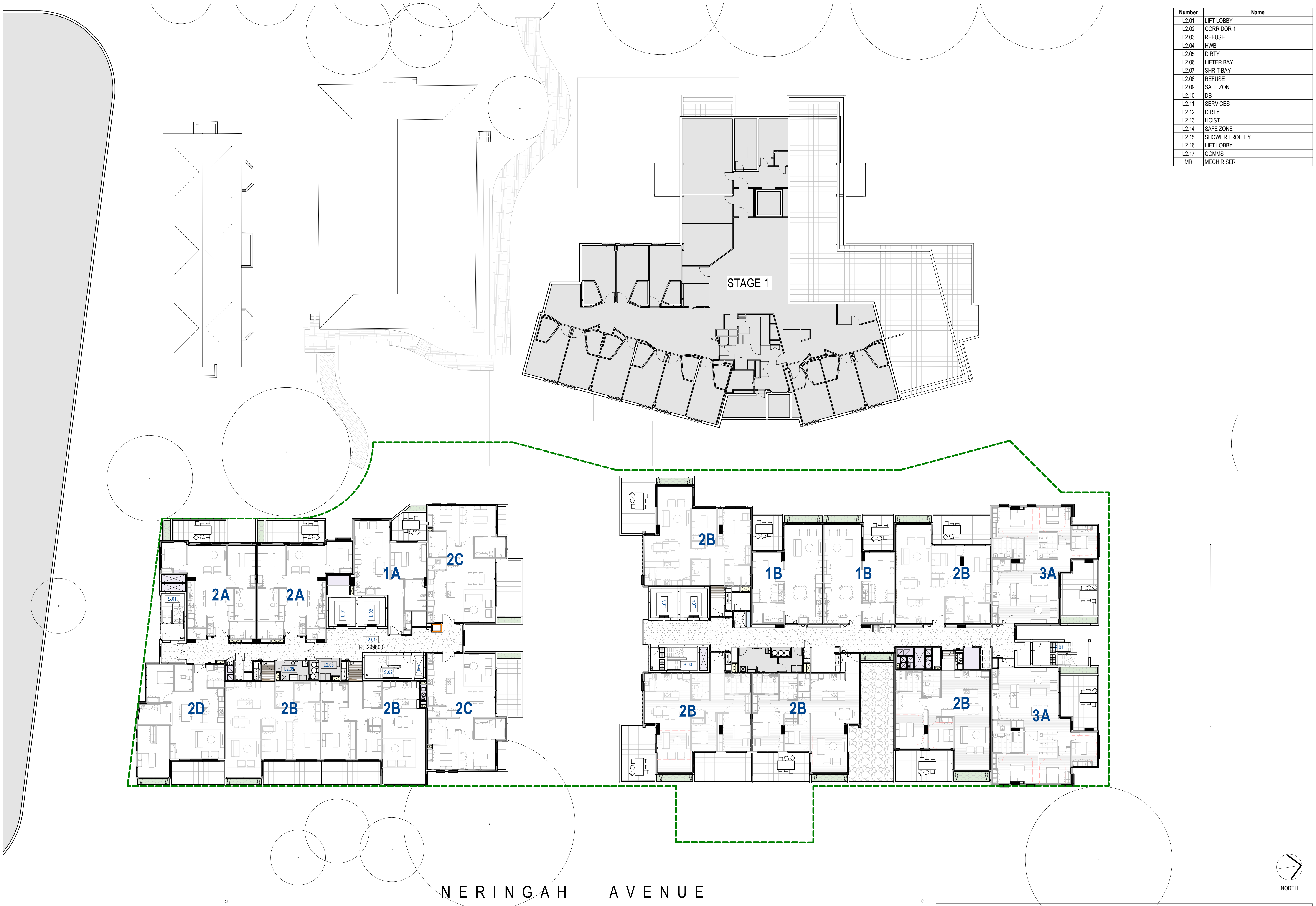

Number	Name
L2.01	LIFT LOBBY
L2.02	CORRIDOR 1
L2.03	REFUSE
L2.04	HWB
L2.05	DIRTY
L2.06	LIFTER BAY
L2.07	SHR T BAY
L2.08	REFUSE
L2.09	SAFE ZONE
L2.10	DB
L2.11	SERVICES
L2.12	DIRTY
L2.13	HOIST
L2.14	SAFE ZONE
L2.15	SHOWER TROLLEY
L2.16	LIFT LOBBY
L2.17	COMMS
MR	MECH RISER

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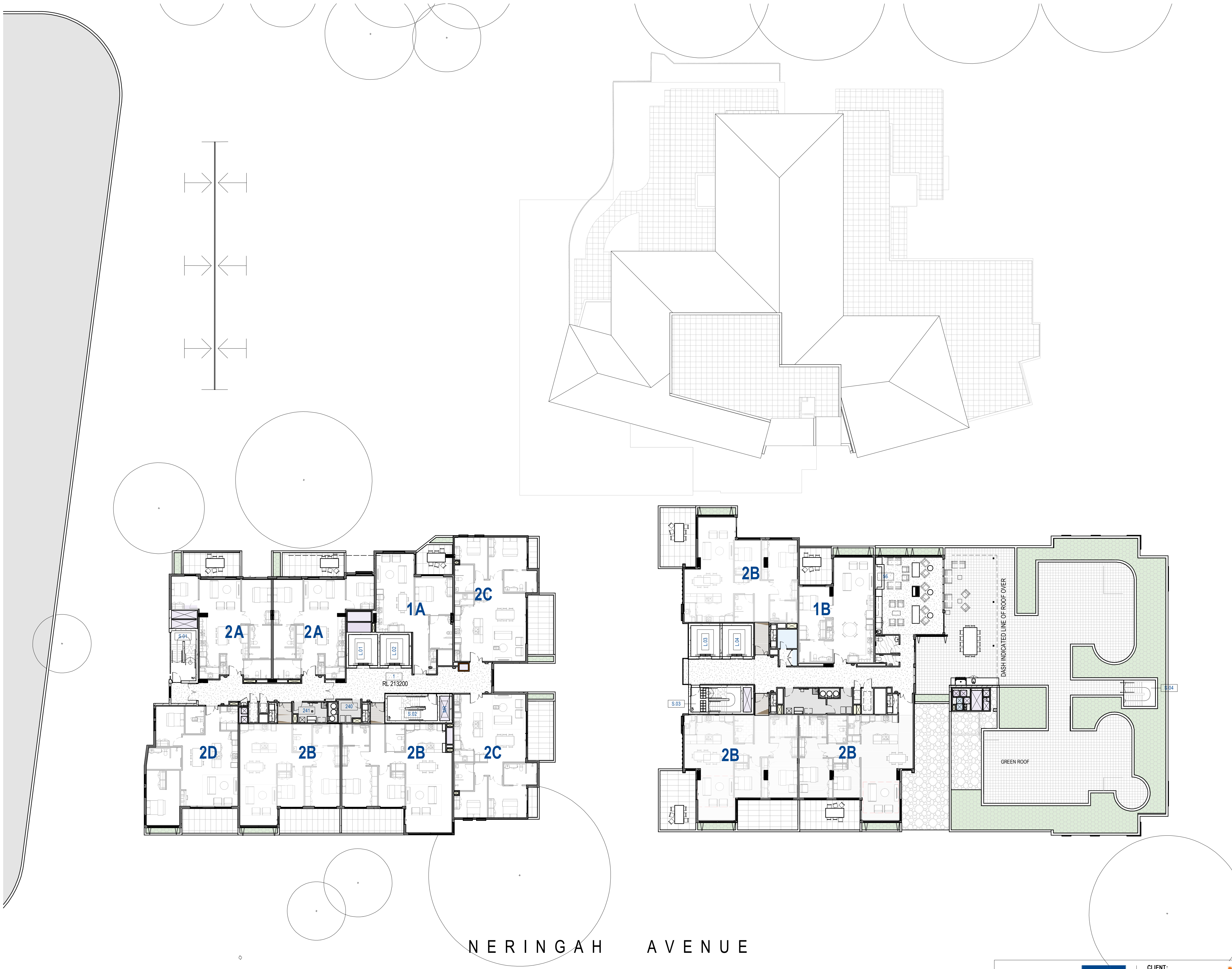

Number	Name
1	LIFT LOBBY
56	COMMUNITY
235	CORRIDOR 1
240	REFUSE
241	DIRTY
242	HWB
243	LIFTER BAY
244	SHR T BAY
258	MECH RISER
259	MECH RISER
267	MECH RISER
338	MECH PLANT
361	REFUSE
H5	SAFE ZONE
LG.113	HOIST
LG.114	DIRTY
LG.116	DB
LG.117	SERVICES
LG.119	SHOWER TROLLEY
LG.120	ACC WC
LG.121	AMB WC
LG.124	LIFT LOBBY
LG.125	CORRIDOR

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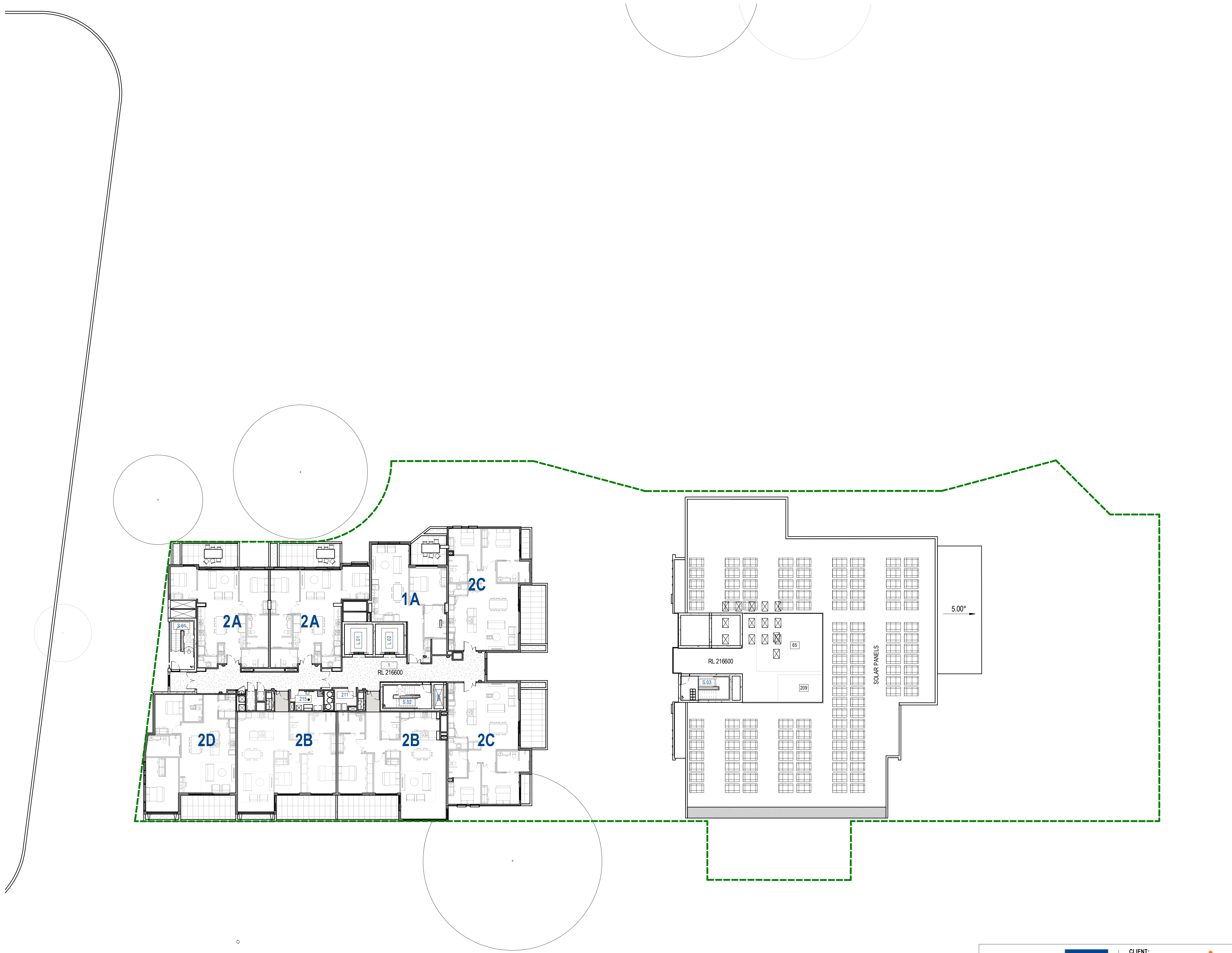
DRAWING TITLE:
FLOOR PLAN - LEVEL 3

DATE: OCT 2022 SCALE: 1 : 200 @ A1
CHECKED: BF DRAWING: REVISION:
DRAWN: RW, JC DG-03-07 P10

Number	Name
1	LIFT LOBBY
62	VERT. CIRCULATION
65	PLANT
209	HOT WATER PLANT
211	REFUSE
215	DIRTY
227	HWB
231	LIFTER BAY
237	CORRIDOR 1
239	SHR T BAY
260	MECH RISER
261	MECH RISER
268	MECH RISER
H6	SAFE ZONE



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WAHROONGA STAGE 2
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DRAWING TITLE:
FLOOR PLAN - LEVEL 4

DATE: OCT 2022 SCALE: 1 : 200 @ A1
CHECKED: BF DRAWING: DG-03-08 REVISION: P10
DRAWN: RW, JC

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

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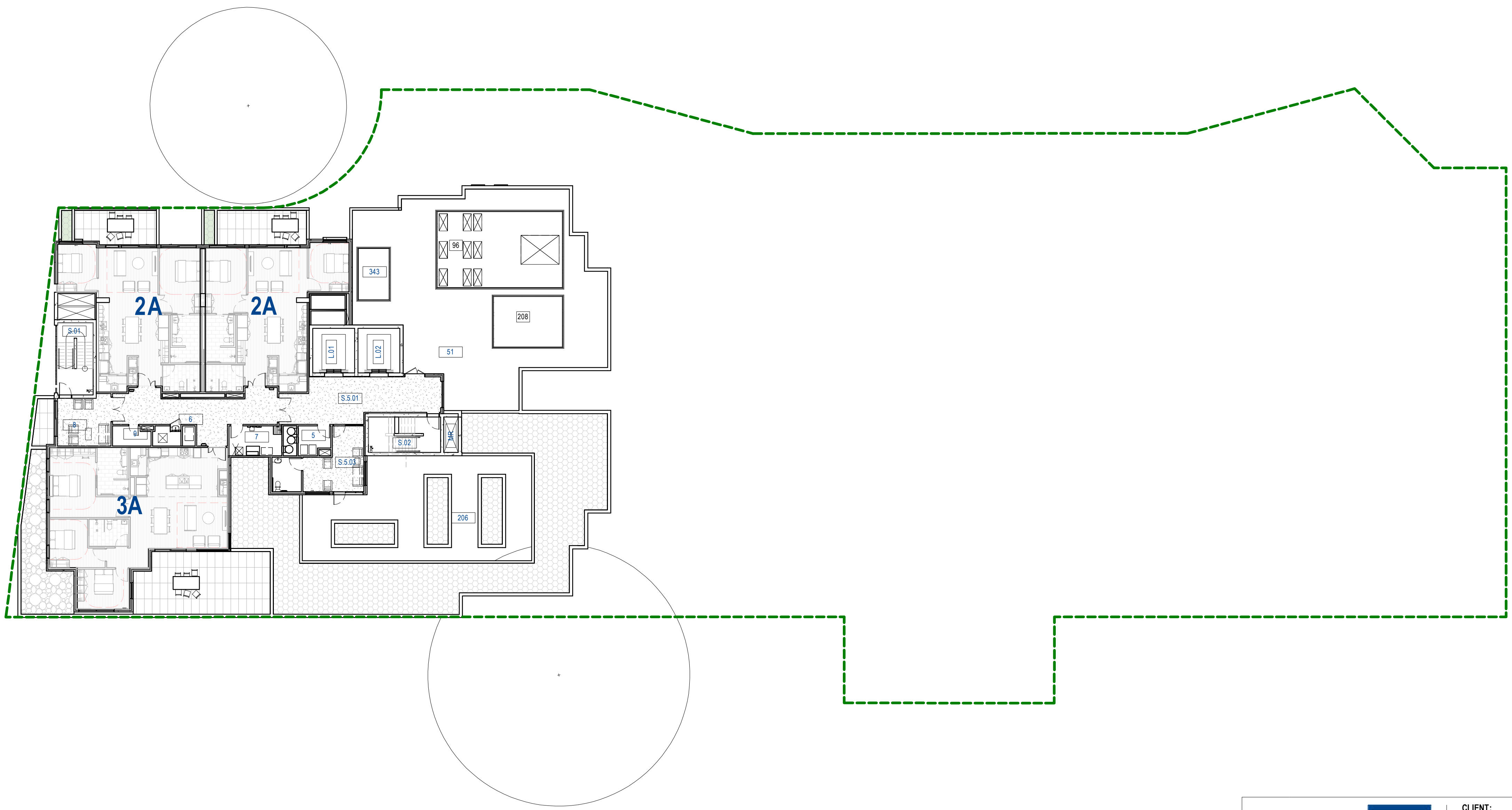
5	REFUSE
6	CORRIDOR 1
7	DIRTY
8	FIREWORK LOUNGE
9	AMB WC
51	PLANT AREA
76	LIFTER BAY
96	MECH PLANT
206	GREEN ROOF
208	HOT WATER PLANT
343	EXHAUST FAN ENCLOSURE
H8	ACC WC
MR	MECH RISER
S.5.01	LIFT LOBBY
S.5.03	OPEN LOUNGE



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CLIENT: HammondCare Champion Life

PROJECT: 01368
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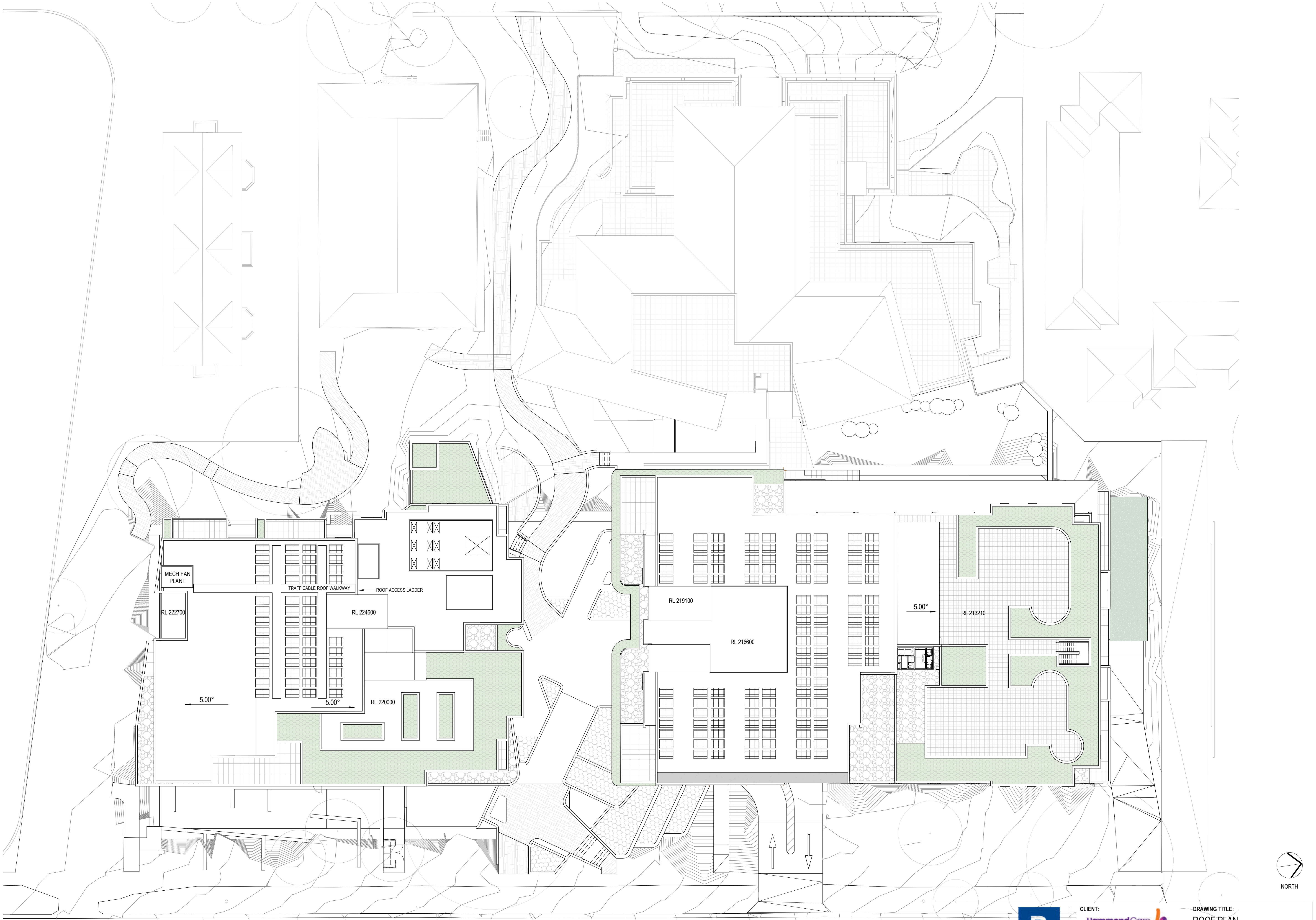
DRAWING TITLE:
FLOOR PLAN - LEVEL 5

DATE: OCT 2022 SCALE: 1 : 200 @ A1
CHECKED: BF DRAWING: REVISION:
DRAWN: RW, JC DG-03-09 P10



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CLIENT: HammondCare Champion Life

PROJECT: 01368
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WAHROONGA NSW 2076

DRAWING TITLE:
ROOF PLAN

DATE: OCT 2022 SCALE:
CHECKED: BF DRAWING: DG-03-10 REVISION: P4
DRAWN: RW, JC, SB

LEGEND - EXISTING & DEMOLITION PLAN	
SYMBOL	DESCRIPTION
	ITEM TO BE DEMOLISHED
	SITE BOUNDARY
	TREE PROTECTION ZONE
	EXISTING TREE (LOW IMPORTANCE) - TO BE RETAINED
	EXISTING TREE (MODERATE IMPORTANCE) - TO BE RETAINED
	EXISTING TREE (HIGH IMPORTANCE) - TO BE RETAINED
	EXISTING TREE - TO BE REMOVED

NORTH

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PROJECT: 01368
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4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
EXISTING & DEMOLITION SITE PLAN

DATE: OCT. 2022 **SCALE:** 1 : 300 @ A1
CHECKED: BF **DRAWING:** DG-04-01 **REVISION:** P12
DRAWN: RW, JC

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NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

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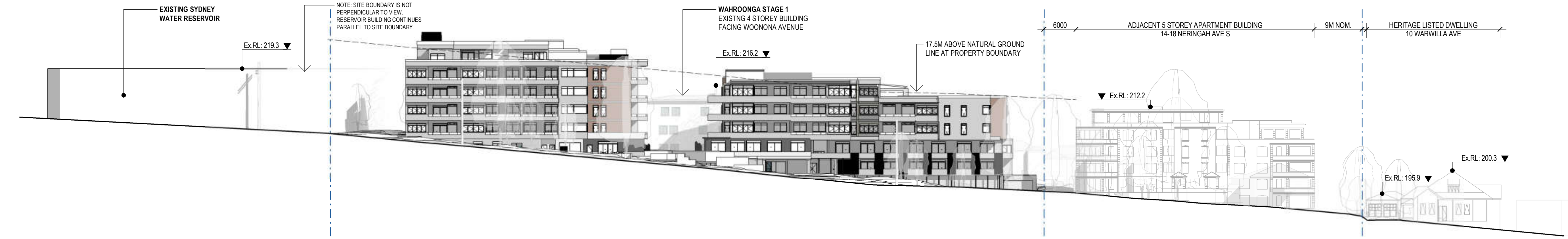
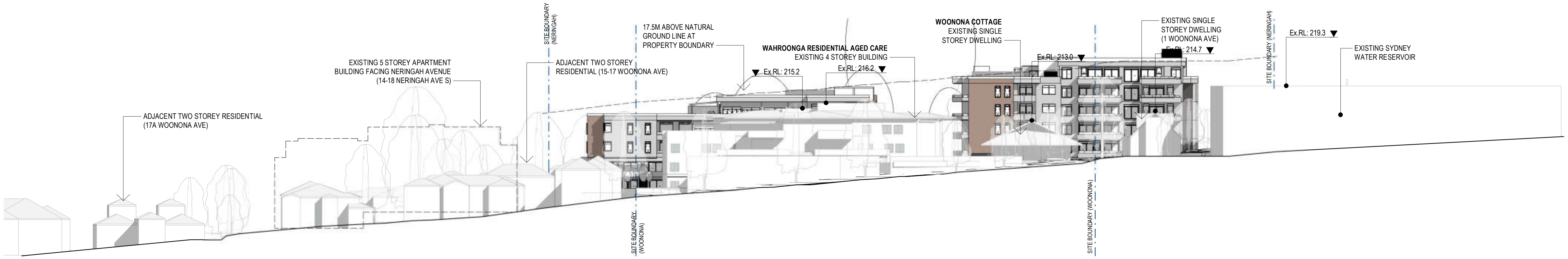
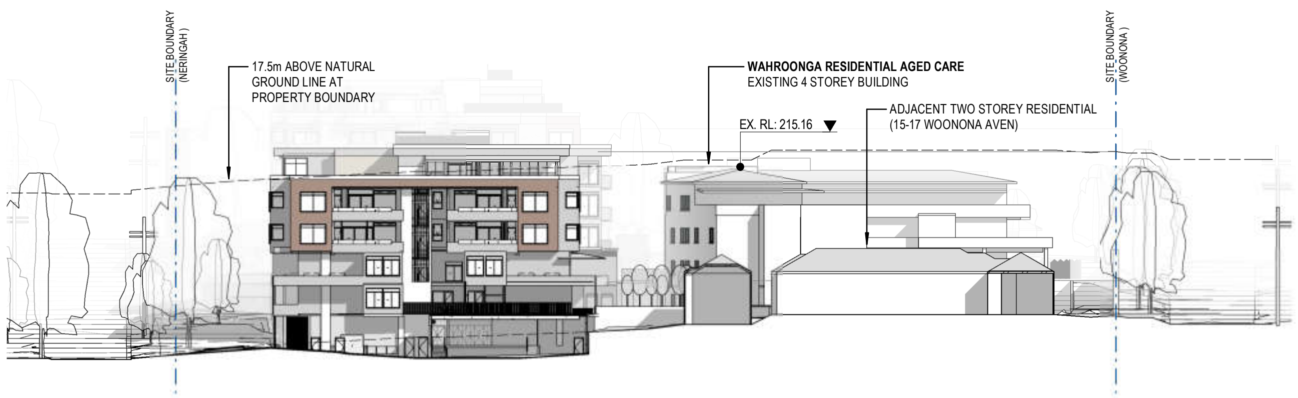


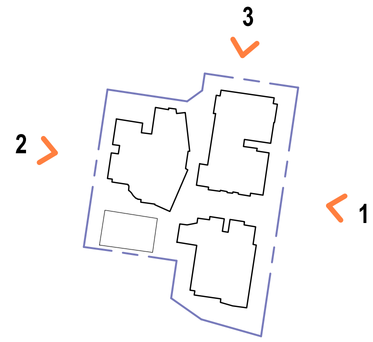
1 SITE ELEVATION - NERINGAH AVENUE SOUTH
1 : 400



2 SITE ELEVATION - WOONONA AVENUE
1 : 400



3 SITE ELEVATION - NORTH
1 : 400



LEGEND - SECTION / ELEVATION

SYMBOL	DESCRIPTION
WW.##	Window Wall Number: Refer to 1:50 Window Wall Elevations for Setout Window Assemblies, Glazed Walls & Partitions.
W.R.##	Window Number (Room Number) - Refer Elevations & Schedules.
D.R.##	Door Number (Room Number) - Refer Schedules.
000 / 00000 SIMILAR	Number of Detail Sheet Number of Detail
000 / 00000 SIMILAR	Detail Number of Section / Elevation Sheet Number of Section / Elevation

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CLIENT: HammondCare Champion Life

PROJECT: 01368
WAHROONGA STAGE 2
4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
SITE ELEVATIONS

DATE: OCT. 2022 SCALE: As indicated @ A1
CHECKED: BF DRAWING: DG-20-00 REVISION: P12
DRAWN: RW, JC

C:_Revit Projects\1368_Wahroonga Stage 2_RVT2020_Central_jonathanc@bmarch.com.au.rvt
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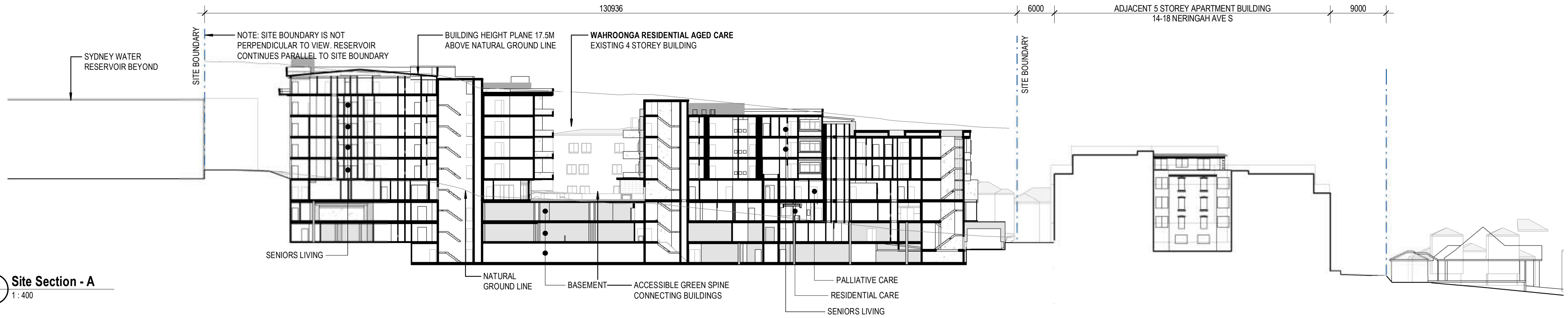
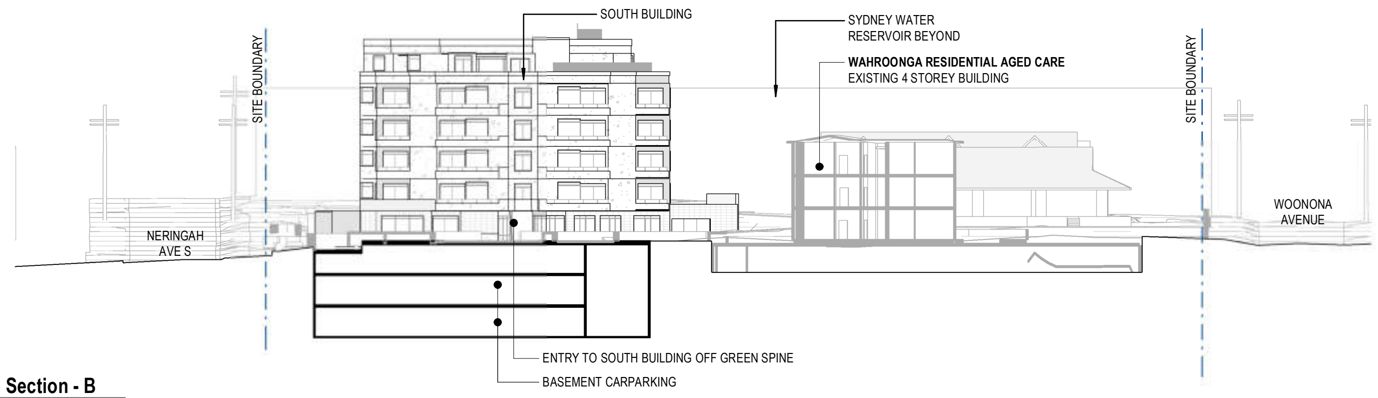
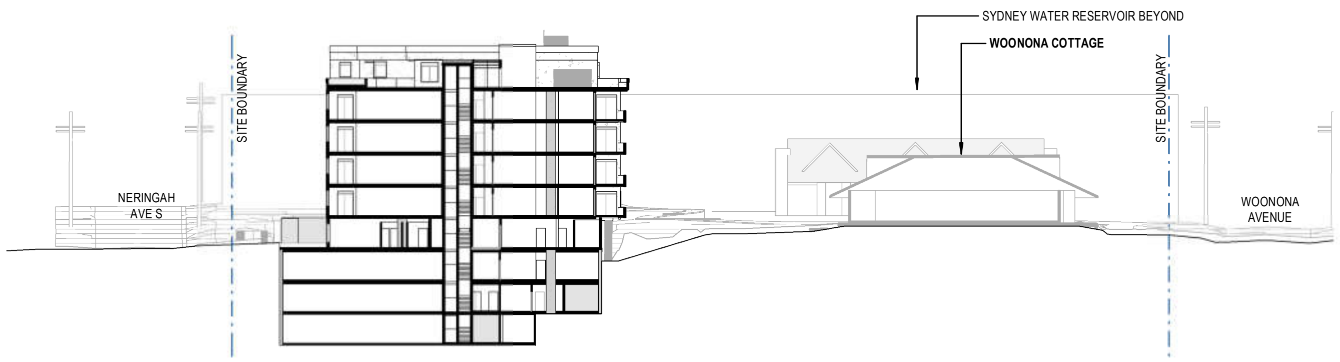
NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)



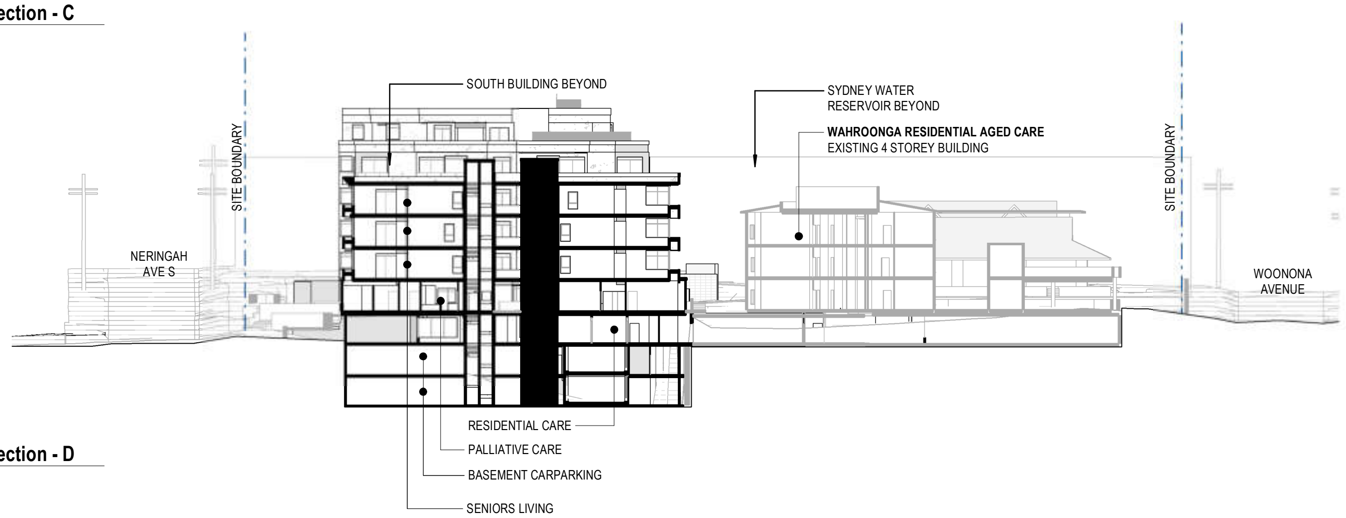
A Site Section - A
1 : 400



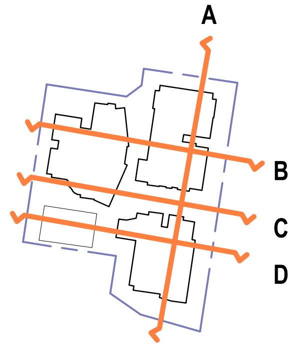
B Site Section - B
1 : 400



C Site Section - C
1 : 400



D Site Section - D
1 : 400



LEGEND - SECTION / ELEVATION

SYMBOL	DESCRIPTION
WW.##	Window Wall Number: Refer to 1:50 Window Wall Elevations for Setout Window Assemblies, Glazed Walls & Partitions.
W.R.##	Window Number (Room Number) - Refer Elevations & Schedules.
D.R.##	Door Number (Room Number) - Refer Schedules.
000 / 00000 SIMILAR	Number of Detail Sheet Number of Detail
000 / 00000 SIMILAR	Detail Number of Section / Elevation Sheet Number of Section / Elevation

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4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
SITE SECTIONS

DATE: OCT. 2022	SCALE: As indicated @ A1		
CHECKED: BF	DRAWING:	REVISION:	
DRAWN: RW, JC	DG-30-00	P13	

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19/10/2022 6:30:48 PM

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

Appendix F: Borehole Logs

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH101** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** PUSHTUBE / SPIRAL AUGER **R.L. Surface:** ≈ 198.5m

Date: 28/7/22 **Datum:** AHD

Plant Type: EZI PROBE **Logged/Checked by:** A.D./T.H.

Groundwater Record	Samples (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
						FILL: Clayey sand, fine to medium grained, light brown, trace of igneous and ironstone gravel, and glass.	M			SCREEN: 3.03kg 0.05-0.2m NO FCF
							w≈PL			
					CI-CH	FILL: Silty clay, medium to high plasticity, brown, trace of igneous and ironstone gravel, ash and root fibres.	w≈PL			SCREEN: 3.98kg 0.2-0.5m NO FCF
			1			Silty CLAY: medium to high plasticity, yellow brown mottled red, trace of ironstone gravel, and root fibres.				RESIDUAL
						as above, but grey mottled red.				
						END OF BOREHOLE AT 1.4m				
			2							
			3							
			4							
			5							
			6							
			7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH102**

1/2

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 197.5m

Date: 1/8/22 **Datum:** AHD

Plant Type: JK400 **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0		-	ASPHALTIC CONCRETE: 10mm.t	M			SCREEN: 5.4kg 0.01-0.1m NO FCF
						FILL: Silty sand, fine to medium grained, brown, trace of igneous and sandstone gravel.	w≈PL			SCREEN: 3.4kg 0.1-0.5m NO FCF
					CI-CH	FILL: Silty clay, medium to high plasticity, brown, trace of igneous and ironstone gravel, and ash.	w≈PL			
			1			Silty CLAY: medium to high plasticity, orange brown, trace of ironstone gravel, and root fibres.				RESIDUAL
		N = 18 4,8,10				as above, but grey.				
4/8/22			2							
8/8/22					-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey.	XW			ASHFIELD SHALE LOW 'TC' BIT RESISTANCE
		N > 7 4,7/50mm REFUSAL	3				DW			
			4							
			5							
			6							
						SILTSTONE: dark grey.	SW			MODERATE RESISTANCE
			7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH102**

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 197.5m

Date: 1/8/22 **Datum:** AHD

Plant Type: JK400 **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	PFAS	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
										SILTSTONE: dark grey.	SW			
▼														
							8							
							9			END OF BOREHOLE AT 9.0m				GROUNDWATER MONITORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.0m TO 8.0m. CASING 0m TO 2.0m. 2mm SAND FILTER PACK 1.8m TO 8.0m. BENTONITE SEAL 1.2m TO 1.8m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							10							
							11							
							12							
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH103**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** HAND AUGER **R.L. Surface:** ≈ 196.7m

Date: 28/7/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Clayey sand, fine to medium grained, light brown, trace of igneous and ironstone gravel.	w≈PL			SCREEN: 14.3kg 0.05-0.2m NO FCF
										SCREEN: 12.13kg 0.2-0.6m NO FCF
						FILL: Silty clay, medium to high plasticity, brown, trace of igneous and ironstone gravel, sand and root fibres.	w≈PL			
			1		CI-CH	Silty CLAY: medium to high plasticity, red brown, trace of ironstone gravel.				RESIDUAL
						END OF BOREHOLE AT 1.0m				HAND AUGER REFUSAL
			2							
			3							
			4							
			5							
			6							
			7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH104** 1/1

SDUP5: 0-0.1m

Client: HAMMONDCARE
Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL
Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** HAND AUGER **R.L. Surface:** ≈ 199.4m
Date: 28/7/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clay, medium to high plasticity, brown, trace of igneous gravel, sand, tile fragments, bark mulch and root fibres.	w≈PL			SCREEN: 10.5kg 0-0.15m NO FCF
					CI-CH	Silty CLAY: medium to high plasticity, grey mottled red and orange, trace of ironstone gravel and root fibres.	w≈PL			RESIDUAL
			1			END OF BOREHOKE AT 0.8m				
			2							
			3							
			4							
			5							
			6							
			7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH105** 1/1

Environmental logs are not to be used for geotechnical purposes

SDUP4: 0-0.1m

Client: HAMMONDCARE
Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL
Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** PUSHTUBE / SPIRAL AUGER **R.L. Surface:** ≈ 199.3m
Date: 28/7/22 **Datum:** AHD
Plant Type: EZI PROBE **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clay, medium to high plasticity, brown, trace of ironstone and sandstone gravel, sand and root fibres.	w≈PL			GRAS COVER SCREEN: 11.52kg 0-0.15m NO FCF
					CI-CH	Silty CLAY: medium to high plasticity, grey mottled yellow and red brown, trace of ironstone gravel and root fibres.	w≈PL			RESIDUAL
			1		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, with ironstone gravel bands.	XW			ASHFIELD SHALE
						END OF BOREHOLE AT 1.2m				
			2							
			3							
			4							
			5							
			6							
			7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH106** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** HAND AUGER **R.L. Surface:** ≈ 198.6m

Date: 4/8/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** E.W./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	PFAS	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sandy clay, low to medium plasticity, dark brown, trace of sandstone gravel and roots.	w<PL			SCREEN: 10.46kg 0-0.1m NO FCF
										FILL: Silty clay, medium to high plasticity, red brown mottled grey, trace of sandstone gravel.	w≈PL			INSUFFICENT RETURN FOR BULK SCREEN
							1			END OF BOREHOLE AT 0.5m				HAND AUGER REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH107**

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 202.5m

Date: 1/8/22 **Datum:** AHD

Plant Type: JK400 **Logged/Checked by:** H.W./T.H.

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		0		ASPHALTIC CONCRETE: 70mm.t				
			-	FILL: Silty sand, fine to medium grained, grey, with igneous gravel.	D			SCREEN: 2.5kg 0.07-0.3m NO FCF
	N = 9 4,4,5		CI-CH	FILL: Silty sandy clay, low to medium plasticity, brown, fine to medium grained sand, trace of ironstone gravel.	w≈PL			SCREEN: 4.77kg 0.3-0.5m NO FCF
		1		Silty CLAY: medium to high plasticity, red brown, trace of ironstone gravel.	w≈PL			RESIDUAL
	N = 26 7,12,14	2						
				as above, but grey and red brown.				
	N > 5 17,5/ 50mm	3		Extremely Weathered siltstone:silty CLAY, medium to high plasticity, grey.	XW			ASHFIELD SHALE
4/8/22 ▼								
▼ 8/8/22		4						
ON COMPLETION ▼	N = 29 10,12,17	5						
		6		as above, but brown.	DW			MODERATE 'TC' BIT RESISTANCE
		7						

Samples: ES, ASS, ASB, PFAS, DB

JKEnvironments

ENVIRONMENTAL LOG

Log No.
BH107
2/2

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL
Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 202.5m
Date: 1/8/22 **Datum:** AHD
Plant Type: JK400 **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	PFAS	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
										Extremely Weathered siltstone:silty CLAY, medium to high plasticity, brown.	DW			
							8			SILTSTONE: dark grey.	SW			HIGH RESISTANCE
							9 10 11 12 13 14			END OF BOREHOLE AT 8.2m				'TC' BIT REFUSAL GROUNDWATER MONITORING WELL INSTALLED TO 8.2m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.0m TO 8.2m. CASING 0m TO 2.0m. 2mm SAND FILTER PACK 1.8m TO 8.2m. BENTONITE SEAL 1.0m TO 1.8m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH108**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** PUSHTUBE / SPIRAL AUGER **R.L. Surface:** ≈ 202m

Date: 28/7/22 **Datum:** AHD

Plant Type: EZI PROBE **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 100mm.t				
					-	FILL: Silty sand, fine to medium grained, light grey mottled yellow brown, trace of igneous and sandstone gravel.	M			INSUFFICIENT RETURN FOR BULK SCREEN
						FILL: Silty sand, fine to medium grained, yellow brown, trace of igneous and sandstone gravel and metal slag.	w≈PL			SCREEN: 4.03kg 0.3-1.2m NO FCF
			1		CI-CH	FILL: Silty clay, medium to high plasticity, brown, trace of igneous and sandstone gravel and ash.	w≈PL			RESIDUAL
						Silty CLAY: medium to high plasticity, grey mottled red brown, trace of ironstone gravel.				
			2			END OF BOREHOE AT 2.0m				
			3							
			4							
			5							
			6							
			7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH109**

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 201.5m

Date: 1/8/22 **Datum:** AHD

Plant Type: JK400 **Logged/Checked by:** H.W./T.H.

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		0	-	ASPHALTIC CONCRETE: 40mm.t	M			SCREEN: 2.02kg 0.04-0.1m NO FCF
				FILL: Silty sand, fine to medium grained, brown and yellow brown, trace of sandstone gravel, clay nodules and ash.	w>PL			SCREEN: 5.25kg 0.1-0.3m NO FCF
	N = 5 2,3,2		CI-CH	FILL: Silty clay, medium to high plasticity, grey, trace of sand, ironstone gravel and ash.	w≈PL			SCREEN: 4.75kg 0.3-0.7m NO FCF
		1		Silty CLAY: medium to high plasticity, orange brown mottled yellow brown, trace of ironstone gravel.				RESIDUAL
	N = 20 7,10,10			as above, but grey mottled red.				
4/8/22		2						
8/8/22	N > 19 8,19/ 150mm REFUSAL	3						
			-	Extremely Weathered siltstone: silty CLAY, medium to high plasticity, brown	XW			ASHFIELD SHALE LOW 'TC' BIT RESISTANCE
		4						
ON COMPLETION		5						
	N > 9 13,9/ 50mm REFUSAL	6			DW			
		7						

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH109** 2/2

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL
Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 201.5m
Date: 1/8/22 **Datum:** AHD
Plant Type: JK400 **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	PFAS	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
										Extremely Weathered siltstone: silty CLAY, medium to high plasticity, dark grey.	DW			
							8			SILTSTONE: grey.	SW			MODERATE TO HIGH RESISTANCE
										END OF BOREHOLE AT 8.2m				GROUNDWATER MONITORING WELL INSTALLED TO 8.2m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.0m TO 8.2m. CASING 0m TO 2.0m. 2mm SAND FILTER PACK 1.8m TO 8.2m. BENTONITE SEAL 1.0m TO 1.8m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							9							
							10							
							11							
							12							
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH110** 1/1

SDUP3: 0-0.1m

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** PUSHTUBE / SPIRAL AUGER **R.L. Surface:** ≈ 203.5m

Date: 28/7/22 **Datum:** AHD

Plant Type: EZI PROBE **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION			0			FILL: Silty clay, medium to high plasticity, red brown mottled grey and orange, trace of igneous, ironstone and sandstone gravel, sand, tile and concrete fragments, plastic, bark mulch and root fibres.	w≈PL			MULCH COVER SCREEN: 10.3kg 0-0.1m NO FCF
			1		CI-CH	Silty CLAY: medium to high plasticity, grey mottled red brown, trace of ironstone gravel and root fibres.	w≈PL			SCREEN: 11.05kg 0.1-0.6m NO FCF RESIDUAL
			2 3 4 5 6 7			END OF BOREHOLE AT 1.4m				

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH111** 1/1

SDUP6: 0-0.1m

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** HAND AUGER **R.L. Surface:** ≈ 203m

Date: 28/7/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	PFAS	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty clay, medium to high plasticity, brown, trace of igneous, ironstone and sandstone gravel, sand, ceramic, glass and plastic fragments, and root fibres.	w≈PL			GRASS COVER
														SCREEN: 10.2kg 0-0.1m NO FCF
									CI-CH	Silty CLAY: medium to high plasticity, grey mottled red, trace of ironstone gravel.	W≈PL			SCREEN: 10.11kg 0.1-0.2m NO FCF
							1			END OF BOREHOLE AT 0.8m				RESIDUAL
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH112**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** HAND AUGER **R.L. Surface:** ≈ 203m

Date: 28/7/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES: ES / ASS / ASB / PFAS / DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clay, medium to high plasticity, brown, trace of igneous and sandstone gravel, plastic and root fibres.	w≈PL			GRASS COVER SCREEN: 10.64kg 0-0.1m NO FCF
			1		CI-CH	Silty CLAY: medium to high plasticity, red brown mottled grey, trace of ironstone gravel.	w≈PL			SCREEN: 10.3kg 0.1-0.7m NO FCF RESIDUAL
			2			END OF BOREHOLE AT 1.3m				
			3							
			4							
			5							
			6							
			7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH113** 1/1

SDUP2: 0-0.1m

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** PUSHTUBE / SPIRAL AUGER **R.L. Surface:** ≈ 205.7m

Date: 28/7/22 **Datum:** AHD

Plant Type: EZI PROBE **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sandy clay, low to medium plasticity, brown, fine to medium grained sand, trace of igneous, ironstone and sandstone gravel, concrete, tile and glass fragments, bark mulch and root fibres.	w≈PL			MULCH COVER SCREEN: 10.1kg 0-0.1m NO FCF
					CI-CH	Silty CLAY: medium to high plasticity, yellow brown mottled red, trace of ironstone gravel and root fibres.	w≈PL			SCREEN: 14.6kg 0.1-0.7m NO FCF RESIDUAL
			1			as above, but grey mottled red and orange.	w<PL			
						END OF BOREHOLE AT 1.4m				
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Log No. **BH114** 1/2

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 205.6m

Date: 29/7/22 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** T.F./T.H.

Groundwater Record	Samples (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		N = 11 8,6,5	0		FILL: Silty clay, low plasticity, dark grey, grey and brown, with igneous, ironstone and sandstone gravel, trace of concrete and tile fragments, rubber, ash and root fibres.	w>PL			GRASS COVER APPEARS MODERATELY TO WELL COMPACTED SCREEN: 11.52kg 0-0.1m NO FCF SCREEN: 10.22kg 0.1-1.0m NO FCF
			1		FILL: Silty clay, low plasticity, grey brown, trace of igneous and ironstone gravel.			200 180 140	HP TESTING ON DISTURBED SAMPLE
				CH	Silty CLAY: high plasticity, light grey mottled orange and red, trace of ironstone gravel.	w>PL w<PL	St-VSt Hd	450 520 520 420	RESIDUAL HP TESTING ON DISTURBED SAMPLE
ON COMPLETION			2–3						
4/8/22 8/8/22			4	-	Extremely Weathered siltstone: silty CLAY, light grey, medium plasticity, with occasional ironstone gravel bands.	XW	Hd		ASHFIELD SHALE VERY LOW 'TC' BIT RESISTANCE
			5.5		SILTSTONE: light grey and grey, with occasional ironstone gravel bands and, medium to high plasticity, grey brown, silty clay bands.	DW	VL		LOW RESISTANCE WITH VERY LOW RESISTANCE BANDS
			7						

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ENVIRONMENTAL LOG

Log No. **BH114** 2/2

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL
Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 205.6m
Date: 29/7/22 **Datum:** AHD
Plant Type: JK305 **Logged/Checked by:** T.F./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
▶						SILTSTONE: light grey and grey, with occasional ironstone gravel bands and, medium to high plasticity, grey brown, silty clay bands.	DW	VL		
			8			SILTSTONE: grey.	DW	L		LOW RESISTANCE
			9							GROUNDWATER MONITORING WELL INSTALLED TO 14.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 14.0m TO 8.0m. CASING 8.0m TO 0m. 2mm SAND FILTER PACK 14.0m TO 7.8m. BENTONITE SEAL 7.8m TO 6.8m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
			10							
			11				SW	L-M		
			12					M		LOW TO MODERATE RESISTANCE
			13							MODERATE RESISTANCE
			14			END OF BOREHOLE AT 14.0m				

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH115**

1/1

SDUP15: 0-0.1m

Client: HAMMONDCARE

Project: PROPOSED REDEVELOPMENT OF NERINGAH HOSPITAL

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Job No.: E35312BR **Method:** PUSHTUBE / SPIRAL AUGER **R.L. Surface:** ≈ 205.8m

Date: 28/7/22 **Datum:** AHD

Plant Type: EZI PROBE **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, PFAS, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			FILL: Silty clay, low to medium plasticity, brown, trace of sand, ironstone and sandstone gravel, brick and tile fragments and root fibres.	w≈PL			GRASS COVER SCREEN: 11.4kg 0-0.1m NO FCF SCREEN: 9.8kg 0.1-0.8m NO FCF
			1		CI-CH	Silty CLAY: medium to high plasticity, yellow brown mottled red brown, trace of ironstone gravel.	w≈PL			RESIDUAL
▶			2			as above, but grey.	w>PL			
						END OF BOREHOLE AT 2.4m				
			3							
			4							
			5							
			6							
			7							

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:

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

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:

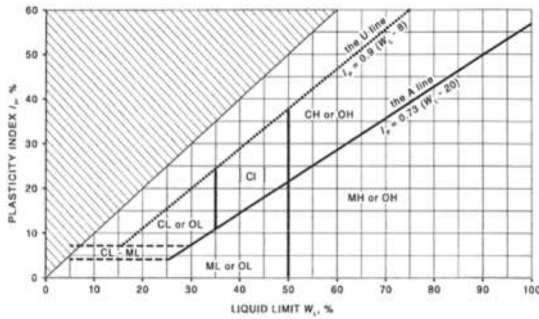
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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.
	C	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.

Log Column	Symbol	Definition	Density Index (I_D) Range (%)	SPT 'N' Value Range (Blows/300mm)
Density Index/ Relative Density (Cohesionless Soils)	VL	VERY LOOSE	≤ 15	0 – 4
	L	LOOSE	> 15 and ≤ 35	4 – 10
	MD	MEDIUM DENSE	> 35 and ≤ 65	10 – 30
	D	DENSE	> 65 and ≤ 85	30 – 50
	VD	VERY DENSE	> 85	> 50
	( )	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

<table>
<tr><th>Term</th><th></th><th>Abbreviation</th><th></th><th>Definition</th></tr>
<tr><td colspan="2">Residual Soil</td><td colspan="2">RS</td><td>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.</td></tr>
<tr><td colspan="2">Extremely Weathered</td><td colspan="2">XW</td><td>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.</td></tr>
<tr><td>Highly Weathered</td><td rowspan="2">Distinctly Weathered (Note 1)</td><td>HW</td><td rowspan="2">DW</td><td>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.</td></tr>
<tr><td>Moderately Weathered</td><td>MW</td><td>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.</td></tr>
<tr><td colspan="2">Slightly Weathered</td><td colspan="2">SW</td><td>Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.</td></tr>
<tr><td colspan="2">Fresh</td><td colspan="2">FR</td><td>Rock shows no sign of decomposition of individual minerals or colour changes.</td></tr>
</table>

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)	Guide to Strength: 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 G: Laboratory Reports & COC Documents

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CERTIFICATE OF ANALYSIS 302203

Client Details

Client	JK Environments
Attention	C Ridley
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35312BR, Wahroonga**
Number of Samples	101 Soil, 1 Material, 1 Water
Date samples received	03/08/2022
Date completed instructions received	03/08/2022

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	11/08/2022
Date of Issue	11/08/2022

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Analysed by Asbestos Approved Analyst: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
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Giovanni Agosti, Group Technical Manager
Hannah Nguyen, Metals Supervisor
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Steven Luong, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		302203-1	302203-2	302203-4	302203-5	302203-20
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.05-0.2	0.2-0.5	0.01-0.1	0.1-0.5	0.05-0.2
Date Sampled		28/07/2022	28/07/2022	1/08/2022	1/08/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	72	89	91	88	92

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		302203-21	302203-23	302203-24	302203-25	302203-27
Your Reference	UNITS	BH103	BH104	BH104	BH105	BH107
Depth		0.2-0.5	0-0.15	0.2-0.5	0-0.1	0.07-0.3
Date Sampled		28/07/2022	28/07/2022	28/07/2022	28/07/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	79	88	87	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		302203-28	302203-43	302203-44	302203-47	302203-48
Your Reference	UNITS	BH107	BH108	BH108	BH109	BH109
Depth		0.3-0.5	0.1-0.2	0.2-0.3	0.04-0.1	0.5-0.7
Date Sampled		1/08/2022	28/07/2022	28/07/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	82	87	85	79	83

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		302203-55	302203-62	302203-65	302203-67	302203-70
Your Reference	UNITS	BH109	BH110	BH111	BH112	BH113
Depth		3.8-4	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	83	138	91	89

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		302203-73	302203-75	302203-92	302203-95	302203-98
Your Reference	UNITS	BH114	BH114	BH115	SDUP1	SDUP5
Depth		0-0.1	0.5-0.95	0-0.1	-	-
Date Sampled		29/07/2022	29/07/2022	29/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	91	92	81	89

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		302203-100	302203-102
Your Reference	UNITS	TB-S1	TS-SI
Depth		-	-
Date Sampled		28/07/2022	28/07/2022
Type of sample		Soil	Soil
Date extracted	-	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	10/08/2022
Benzene	mg/kg	<0.2	97%
Toluene	mg/kg	<0.5	96%
Ethylbenzene	mg/kg	<1	100%
m+p-xylene	mg/kg	<2	100%
o-Xylene	mg/kg	<1	101%
Naphthalene	mg/kg	<1	[NT]
Total +ve Xylenes	mg/kg	<1	[NT]
Surrogate aaa-Trifluorotoluene	%	95	100

svTRH (C10-C40) in Soil						
Our Reference		302203-1	302203-2	302203-4	302203-5	302203-20
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.05-0.2	0.2-0.5	0.01-0.1	0.1-0.5	0.05-0.2
Date Sampled		28/07/2022	28/07/2022	1/08/2022	1/08/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	11/08/2022	10/08/2022	11/08/2022	10/08/2022	11/08/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	110	<100	130
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	110	<50	130
Surrogate o-Terphenyl	%	86	76	89	81	91

svTRH (C10-C40) in Soil						
Our Reference		302203-21	302203-23	302203-24	302203-25	302203-27
Your Reference	UNITS	BH103	BH104	BH104	BH105	BH107
Depth		0.2-0.5	0-0.15	0.2-0.5	0-0.1	0.07-0.3
Date Sampled		28/07/2022	28/07/2022	28/07/2022	28/07/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	11/08/2022	11/08/2022	10/08/2022	10/08/2022	11/08/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	130
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	410
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	540
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	390
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	520
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	920
Surrogate o-Terphenyl	%	90	92	76	85	92

svTRH (C10-C40) in Soil						
Our Reference		302203-28	302203-43	302203-44	302203-47	302203-48
Your Reference	UNITS	BH107	BH108	BH108	BH109	BH109
Depth		0.3-0.5	0.1-0.2	0.2-0.3	0.04-0.1	0.5-0.7
Date Sampled		1/08/2022	28/07/2022	28/07/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	11/08/2022	10/08/2022	11/08/2022	10/08/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	260	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	260	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	230	<100
TRH >C_{34} -C_{40}	mg/kg	<100	130	<100	370	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	130	<50	610	<50
Surrogate o-Terphenyl	%	81	82	87	82	78

svTRH (C10-C40) in Soil						
Our Reference		302203-55	302203-62	302203-65	302203-67	302203-70
Your Reference	UNITS	BH109	BH110	BH111	BH112	BH113
Depth		3.8-4	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	10/08/2022	10/08/2022	11/08/2022	11/08/2022	11/08/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	100	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	140	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	140	<50
Surrogate o-Terphenyl	%	86	78	78	90	82

svTRH (C10-C40) in Soil						
Our Reference		302203-73	302203-75	302203-92	302203-95	302203-98
Your Reference	UNITS	BH114	BH114	BH115	SDUP1	SDUP5
Depth		0-0.1	0.5-0.95	0-0.1	-	-
Date Sampled		29/07/2022	29/07/2022	29/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	89	76	76	84	94

PAHs in Soil						
Our Reference		302203-1	302203-2	302203-4	302203-5	302203-20
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.05-0.2	0.2-0.5	0.01-0.1	0.1-0.5	0.05-0.2
Date Sampled		28/07/2022	28/07/2022	1/08/2022	1/08/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.05	0.05	<0.05	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Total +ve PAH's	mg/kg	0.76	<0.05	0.05	<0.05	0.77
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	77	73	77	81	81

PAHs in Soil						
Our Reference		302203-21	302203-23	302203-24	302203-25	302203-27
Your Reference	UNITS	BH103	BH104	BH104	BH105	BH107
Depth		0.2-0.5	0-0.15	0.2-0.5	0-0.1	0.07-0.3
Date Sampled		28/07/2022	28/07/2022	28/07/2022	28/07/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.08	<0.05	<0.05	<0.05	0.09
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Total +ve PAH's	mg/kg	0.4	<0.05	<0.05	<0.05	0.61
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	81	87	80	82	79

PAHs in Soil						
Our Reference		302203-28	302203-43	302203-44	302203-47	302203-48
Your Reference	UNITS	BH107	BH108	BH108	BH109	BH109
Depth		0.3-0.5	0.1-0.2	0.2-0.3	0.04-0.1	0.5-0.7
Date Sampled		1/08/2022	28/07/2022	28/07/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.08	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	0.80	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	74	69	71	78	74

PAHs in Soil						
Our Reference		302203-55	302203-62	302203-65	302203-67	302203-70
Your Reference	UNITS	BH109	BH110	BH111	BH112	BH113
Depth		3.8-4	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.1	0.3	0.2
Pyrene	mg/kg	<0.1	<0.1	0.1	0.3	0.2
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.2	0.2
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.1	0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.09	0.2	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.1	0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	0.4	1.4	1.0
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	69	73	76	80	77

PAHs in Soil						
Our Reference		302203-73	302203-75	302203-92	302203-95	302203-98
Your Reference	UNITS	BH114	BH114	BH115	SDUP1	SDUP5
Depth		0-0.1	0.5-0.95	0-0.1	-	-
Date Sampled		29/07/2022	29/07/2022	29/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	0.2	0.2	<0.1
Pyrene	mg/kg	0.2	<0.1	0.2	0.2	<0.1
Benzo(a)anthracene	mg/kg	0.2	<0.1	0.1	0.2	<0.1
Chrysene	mg/kg	0.1	<0.1	0.1	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.2	0.09	0.1	0.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.95	0.09	0.77	0.86	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	75	76	76	71	85

Organochlorine Pesticides in soil						
Our Reference		302203-1	302203-4	302203-20	302203-23	302203-25
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.05-0.2	0.01-0.1	0.05-0.2	0-0.15	0-0.1
Date Sampled		28/07/2022	1/08/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	77	74	75	86	79

Organochlorine Pesticides in soil						
Our Reference		302203-27	302203-43	302203-47	302203-62	302203-65
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.07-0.3	0.1-0.2	0.04-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	1/08/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	78	67	74	71	72

Organochlorine Pesticides in soil						
Our Reference		302203-67	302203-70	302203-73	302203-92	302203-95
Your Reference	UNITS	BH112	BH113	BH114	BH115	SDUP1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	-
Date Sampled		28/07/2022	28/07/2022	29/07/2022	29/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.1	0.4	1.3	0.2	0.3
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	77	72	72	72	67

Organophosphorus Pesticides in Soil						
Our Reference		302203-1	302203-4	302203-20	302203-23	302203-25
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.05-0.2	0.01-0.1	0.05-0.2	0-0.15	0-0.1
Date Sampled		28/07/2022	1/08/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	77	74	75	86	79

Organophosphorus Pesticides in Soil						
Our Reference		302203-27	302203-43	302203-47	302203-62	302203-65
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.07-0.3	0.1-0.2	0.04-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	1/08/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	78	67	74	71	72

Organophosphorus Pesticides in Soil						
Our Reference		302203-67	302203-70	302203-73	302203-92	302203-95
Your Reference	UNITS	BH112	BH113	BH114	BH115	SDUP1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	-
Date Sampled		28/07/2022	28/07/2022	29/07/2022	29/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	77	72	72	72	67

PCBs in Soil						
Our Reference		302203-1	302203-4	302203-20	302203-23	302203-25
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.05-0.2	0.01-0.1	0.05-0.2	0-0.15	0-0.1
Date Sampled		28/07/2022	1/08/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	77	74	75	86	79

PCBs in Soil						
Our Reference		302203-27	302203-43	302203-47	302203-62	302203-65
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.07-0.3	0.1-0.2	0.04-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	1/08/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	78	67	74	71	72

PCBs in Soil				
Our Reference		302203-70	302203-92	302203-95
Your Reference	UNITS	BH113	BH115	SDUP1
Depth		0-0.1	0-0.1	-
Date Sampled		28/07/2022	29/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil
Date extracted	-	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	72	72	67

Total PCBs in Soil			
Our Reference		302203-67	302203-73
Your Reference	UNITS	BH112	BH114
Depth		0-0.1	0-0.1
Date Sampled		28/07/2022	29/07/2022
Type of sample		Soil	Soil
Date extracted	-	05/08/2022	05/08/2022
Date analysed	-	09/08/2022	09/08/2022
Total PCB (Aroclor 1016-1260)	mg/kg	0.3	0.6
Surrogate TCMX	%	77	72

Acid Extractable metals in soil						
Our Reference		302203-1	302203-2	302203-4	302203-5	302203-20
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.05-0.2	0.2-0.5	0.01-0.1	0.1-0.5	0.05-0.2
Date Sampled		28/07/2022	28/07/2022	1/08/2022	1/08/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	9	11	24	17	14
Copper	mg/kg	11	1	12	1	11
Lead	mg/kg	16	13	23	18	12
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	6	1	17	3	9
Zinc	mg/kg	27	14	64	11	19

Acid Extractable metals in soil						
Our Reference		302203-21	302203-23	302203-24	302203-25	302203-27
Your Reference	UNITS	BH103	BH104	BH104	BH105	BH107
Depth		0.2-0.5	0-0.15	0.2-0.5	0-0.1	0.07-0.3
Date Sampled		28/07/2022	28/07/2022	28/07/2022	28/07/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Arsenic	mg/kg	<4	<4	4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	3	14	9	47
Copper	mg/kg	3	8	5	16	39
Lead	mg/kg	13	6	19	19	9
Mercury	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Nickel	mg/kg	3	1	2	6	15
Zinc	mg/kg	11	21	17	34	47

Acid Extractable metals in soil						
Our Reference		302203-28	302203-43	302203-44	302203-47	302203-48
Your Reference	UNITS	BH107	BH108	BH108	BH109	BH109
Depth		0.3-0.5	0.1-0.2	0.2-0.3	0.04-0.1	0.5-0.7
Date Sampled		1/08/2022	28/07/2022	28/07/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Arsenic	mg/kg	5	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	19	4	7	15	20
Copper	mg/kg	<1	4	5	17	2
Lead	mg/kg	13	2	8	7	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	2	3	7	3
Zinc	mg/kg	3	2	15	25	7

Acid Extractable metals in soil						
Our Reference		302203-55	302203-62	302203-65	302203-67	302203-70
Your Reference	UNITS	BH109	BH110	BH111	BH112	BH113
Depth		3.8-4	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Arsenic	mg/kg	<4	<4	10	5	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	5	14	16	17	15
Copper	mg/kg	7	16	9	72	10
Lead	mg/kg	18	22	160	110	32
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	2	2	10	2
Zinc	mg/kg	<1	18	82	150	60

Acid Extractable metals in soil						
Our Reference		302203-73	302203-75	302203-92	302203-95	302203-98
Your Reference	UNITS	BH114	BH114	BH115	SDUP1	SDUP5
Depth		0-0.1	0.5-0.95	0-0.1	-	-
Date Sampled		29/07/2022	29/07/2022	29/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Arsenic	mg/kg	4	4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	15	14	11	3
Copper	mg/kg	23	37	21	15	8
Lead	mg/kg	71	71	80	61	6
Mercury	mg/kg	<0.1	0.1	0.1	0.1	<0.1
Nickel	mg/kg	3	4	3	3	1
Zinc	mg/kg	140	140	150	92	24

Moisture						
Our Reference		302203-1	302203-2	302203-4	302203-5	302203-20
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.05-0.2	0.2-0.5	0.01-0.1	0.1-0.5	0.05-0.2
Date Sampled		28/07/2022	28/07/2022	1/08/2022	1/08/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	06/08/2022	06/08/2022	06/08/2022	06/08/2022	06/08/2022
Moisture	%	7.6	19	19	18	18

Moisture						
Our Reference		302203-21	302203-23	302203-24	302203-25	302203-27
Your Reference	UNITS	BH103	BH104	BH104	BH105	BH107
Depth		0.2-0.5	0-0.15	0.2-0.5	0-0.1	0.07-0.3
Date Sampled		28/07/2022	28/07/2022	28/07/2022	28/07/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	06/08/2022	06/08/2022	06/08/2022	06/08/2022	06/08/2022
Moisture	%	15	3.0	20	20	6.0

Moisture						
Our Reference		302203-28	302203-43	302203-44	302203-47	302203-48
Your Reference	UNITS	BH107	BH108	BH108	BH109	BH109
Depth		0.3-0.5	0.1-0.2	0.2-0.3	0.04-0.1	0.5-0.7
Date Sampled		1/08/2022	28/07/2022	28/07/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	06/08/2022	06/08/2022	06/08/2022	06/08/2022	06/08/2022
Moisture	%	21	8.3	18	10	22

Moisture						
Our Reference		302203-55	302203-62	302203-65	302203-67	302203-70
Your Reference	UNITS	BH109	BH110	BH111	BH112	BH113
Depth		3.8-4	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	06/08/2022	06/08/2022	06/08/2022	06/08/2022	06/08/2022
Moisture	%	12	18	19	22	22

Moisture						
Our Reference		302203-73	302203-75	302203-92	302203-95	302203-98
Your Reference	UNITS	BH114	BH114	BH115	SDUP1	SDUP5
Depth		0-0.1	0.5-0.95	0-0.1	-	-
Date Sampled		29/07/2022	29/07/2022	29/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	06/08/2022	06/08/2022	06/08/2022	06/08/2022	06/08/2022
Moisture	%	14	16	18	8.0	14

Moisture		
Our Reference		302203-101
Your Reference	UNITS	TB-S2
Depth		-
Date Sampled		28/07/2022
Type of sample		Soil
Date prepared	-	05/08/2022
Date analysed	-	06/08/2022
Moisture	%	0.3

Asbestos ID - soils NEPM - ASB-001						
Our Reference		302203-2	302203-20	302203-23	302203-25	302203-43
Your Reference	UNITS	BH101	BH103	BH104	BH105	BH108
Depth		0.2-0.5	0.05-0.2	0-0.15	0-0.1	0.1-0.2
Date Sampled		28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Sample mass tested	g	347.33	639.05	260	620	205.9
Sample Description	-	Brown coarse-grained soil & rocks	Brown fine-grained soil & rocks	Brown coarse-grained soil & debris	Brown coarse-grained soil & rocks	Beige fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001						
Our Reference		302203-62	302203-65	302203-66	302203-67	302203-70
Your Reference	UNITS	BH110	BH111	BH111	BH112	BH113
Depth		0-0.1	0-0.1	0.2-0.6	0-0.1	0-0.1
Date Sampled		28/07/2022	28/07/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Sample mass tested	g	554.83	617.37	593.83	662.52	659.13
Sample Description	-	Brown clayey soil & rocks	Brown coarse-grained soil & rocks	Brown clayey soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001			
Our Reference		302203-92	302203-95
Your Reference	UNITS	BH115	SDUP1
Depth		0-0.1	-
Date Sampled		29/07/2022	28/07/2022
Type of sample		Soil	Soil
Date analysed	-	10/08/2022	10/08/2022
Sample mass tested	g	628.46	464
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–
FA and AF Estimation*	g	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001

PFAS in Soils Extended						
Our Reference		302203-1	302203-4	302203-20	302203-23	302203-25
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.05-0.2	0.01-0.1	0.05-0.2	0-0.15	0-0.1
Date Sampled		28/07/2022	1/08/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Perfluorobutanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	µg/kg	0.4	0.3	2.4	0.7	2.4
Perfluorodecanesulfonic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorobutanoic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluoropentanoic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	0.2
Perfluorohexanoic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Perfluoroheptanoic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Perfluorooctanoic acid PFOA	µg/kg	0.3	<0.1	0.5	0.1	0.8
Perfluorononanoic acid	µg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Perfluorodecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluoroundecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorododecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotridecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotetradecanoic acid	µg/kg	<5	<5	<5	<5	<5
4:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
6:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
10:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorooctane sulfonamide	µg/kg	<1	<1	<1	<1	<1
N-Methyl perfluorooctane sulfonamide	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctanesulfon amide	µg/kg	<1	<1	<1	<1	<1
N-Me perfluorooctanesulfonamid oethanol	µg/kg	<1	<1	<1	<1	<1
N-Et perfluorooctanesulfonamid oethanol	µg/kg	<5	<5	<5	<5	<5
MePerfluorooctanesulf- amid oacetic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EtPerfluorooctanesulf amid oacetic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate $^{13}C_8$ *PFOS*	%	87	89	87	101	88
Surrogate $^{13}C_2$ *PFOA*	%	104	99	105	107	100
Extracted ISTD $^{13}C_3$ *PFBS*	%	96	101	99	83	89
Extracted ISTD $^{18}O_2$ *PFHxS*	%	92	91	91	81	91
Extracted ISTD $^{13}C_4$ *PFOS*	%	103	104	103	82	101

PFAS in Soils Extended						
Our Reference		302203-1	302203-4	302203-20	302203-23	302203-25
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.05-0.2	0.01-0.1	0.05-0.2	0-0.15	0-0.1
Date Sampled		28/07/2022	1/08/2022	28/07/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Extracted ISTD $^{13}C_4$ *PFBA*	%	92	94	92	82	89
Extracted ISTD $^{13}C_3$ *PFPeA*	%	88	88	88	80	88
Extracted ISTD $^{13}C_2$ *PFHxA*	%	91	89	88	79	87
Extracted ISTD $^{13}C_4$ *PFHpA*	%	89	90	89	80	87
Extracted ISTD $^{13}C_4$ *PFOA*	%	95	93	93	82	89
Extracted ISTD $^{13}C_5$ *PFNA*	%	97	98	99	88	92
Extracted ISTD $^{13}C_2$ *PFDA*	%	94	76	95	78	86
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	108	100	103	57	91
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	111	106	110	70	93
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	106	103	105	75	100
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	90	95	98	92	91
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	97	96	98	101	99
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	119	64	123	90	103
Extracted ISTD $^{13}C_8$ *FOSA*	%	101	91	98	68	94
Extracted ISTD d_3 *N MeFOSA*	%	93	87	92	59	86
Extracted ISTD d_5 *N EtFOSA*	%	95	91	93	65	89
Extracted ISTD d_7 *N MeFOSE*	%	91	93	94	67	89
Extracted ISTD d_9 *N EtFOSE*	%	95	93	95	65	91
Extracted ISTD d_3 *N MeFOSAA*	%	115	98	115	88	101
Extracted ISTD d_5 *N EtFOSAA*	%	113	101	121	54	91
Total Positive PFHxS & PFOS	µg/kg	0.4	0.3	2.4	0.7	2.4
Total Positive PFOS & PFOA	µg/kg	0.6	0.3	2.9	0.8	3.2
Total Positive PFAS	µg/kg	0.6	0.3	3.1	0.8	3.7

PFAS in Soils Extended						
Our Reference		302203-27	302203-43	302203-47	302203-62	302203-65
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.07-0.3	0.1-0.2	0.04-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	1/08/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Perfluorobutanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	µg/kg	1.2	<0.1	<0.1	0.3	1.0
Perfluorodecanesulfonic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	0.2
Perfluorobutanoic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluoropentanoic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorohexanoic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanoic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanoic acid PFOA	µg/kg	0.2	<0.1	<0.1	<0.1	0.1
Perfluorononanoic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluoroundecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorododecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotridecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotetradecanoic acid	µg/kg	<5	<5	<5	<5	<5
4:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
6:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
10:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorooctane sulfonamide	µg/kg	<1	<1	<1	<1	<1
N-Methyl perfluorooctane sulfonamide	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctanesulfon amide	µg/kg	<1	<1	<1	<1	<1
N-Me perfluorooctanesulfonamid oethanol	µg/kg	<1	<1	<1	<1	<1
N-Et perfluorooctanesulfonamid oethanol	µg/kg	<5	<5	<5	<5	<5
MePerfluorooctanesulf- amid oacetic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EtPerfluorooctanesulf amid oacetic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate $^{13}C_8$ *PFOS*	%	95	90	101	91	98
Surrogate $^{13}C_2$ *PFOA*	%	97	99	101	103	100
Extracted ISTD $^{13}C_3$ *PFBS*	%	95	100	95	90	98
Extracted ISTD $^{18}O_2$ *PFHxS*	%	86	92	90	86	92
Extracted ISTD $^{13}C_4$ *PFOS*	%	93	102	93	92	93

PFAS in Soils Extended						
Our Reference		302203-27	302203-43	302203-47	302203-62	302203-65
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.07-0.3	0.1-0.2	0.04-0.1	0-0.1	0-0.1
Date Sampled		1/08/2022	28/07/2022	1/08/2022	28/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Extracted ISTD $^{13}C_4$ *PFBA*	%	85	95	91	89	92
Extracted ISTD $^{13}C_3$ *PFPeA*	%	83	89	89	87	88
Extracted ISTD $^{13}C_2$ *PFHxA*	%	83	90	87	85	89
Extracted ISTD $^{13}C_4$ *PFHpA*	%	84	91	90	83	88
Extracted ISTD $^{13}C_4$ *PFOA*	%	90	93	94	91	93
Extracted ISTD $^{13}C_5$ *PFNA*	%	89	94	94	90	96
Extracted ISTD $^{13}C_2$ *PFDA*	%	91	93	92	93	95
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	98	96	103	107	62
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	107	101	106	100	77
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	102	104	105	101	99
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	82	93	97	92	90
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	84	90	100	100	100
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	96	103	104	95	110
Extracted ISTD $^{13}C_8$ *FOSA*	%	94	101	99	92	88
Extracted ISTD d_3 *N MeFOSA*	%	93	94	92	86	77
Extracted ISTD d_5 *N EtFOSA*	%	95	95	97	87	85
Extracted ISTD d_7 *N MeFOSE*	%	96	92	96	89	85
Extracted ISTD d_9 *N EtFOSE*	%	99	96	96	88	90
Extracted ISTD d_3 *N MeFOSAA*	%	93	106	107	98	99
Extracted ISTD d_5 *N EtFOSAA*	%	102	101	105	105	60
Total Positive PFHxS & PFOS	µg/kg	1.2	<0.1	<0.1	0.3	1.0
Total Positive PFOS & PFOA	µg/kg	1.4	<0.1	<0.1	0.3	1.1
Total Positive PFAS	µg/kg	1.4	<0.1	<0.1	0.3	1.4

PFAS in Soils Extended						
Our Reference		302203-67	302203-70	302203-73	302203-92	302203-95
Your Reference	UNITS	BH112	BH113	BH114	BH115	SDUP1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	-
Date Sampled		28/07/2022	28/07/2022	29/07/2022	29/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Perfluorobutanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorohexanesulfonic acid - PFHxS	µg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanesulfonic acid	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	µg/kg	7.8	0.3	1.1	2.1	1.7
Perfluorodecanesulfonic acid	µg/kg	3.0	<0.2	<0.2	<0.2	<0.2
Perfluorobutanoic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluoropentanoic acid	µg/kg	0.4	<0.2	<0.2	<0.2	<0.2
Perfluorohexanoic acid	µg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanoic acid	µg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanoic acid PFOA	µg/kg	0.5	<0.1	0.1	0.2	0.2
Perfluorononanoic acid	µg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluoroundecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorododecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotridecanoic acid	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotetradecanoic acid	µg/kg	<5	<5	<5	<5	<5
4:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
6:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
10:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorooctane sulfonamide	µg/kg	<1	<1	<1	<1	<1
N-Methyl perfluorooctane sulfonamide	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctanesulfon amide	µg/kg	<1	<1	<1	<1	<1
N-Me perfluorooctanesulfonamid oethanol	µg/kg	<1	<1	<1	<1	<1
N-Et perfluorooctanesulfonamid oethanol	µg/kg	<5	<5	<5	<5	<5
MePerfluorooctanesulf- amid oacetic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EtPerfluorooctanesulf amid oacetic acid	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate $^{13}C_8$ *PFOS*	%	93	95	102	91	91
Surrogate $^{13}C_2$ *PFOA*	%	105	101	99	99	102
Extracted ISTD $^{13}C_3$ *PFBS*	%	91	81	93	89	86
Extracted ISTD $^{18}O_2$ *PFHxS*	%	88	77	89	85	88
Extracted ISTD $^{13}C_4$ *PFOS*	%	90	84	87	93	90

PFAS in Soils Extended						
Our Reference		302203-67	302203-70	302203-73	302203-92	302203-95
Your Reference	UNITS	BH112	BH113	BH114	BH115	SDUP1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	-
Date Sampled		28/07/2022	28/07/2022	29/07/2022	29/07/2022	28/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Extracted ISTD $^{13}C_4$ *PFBA*	%	88	77	89	88	84
Extracted ISTD $^{13}C_3$ *PFPeA*	%	85	75	84	83	82
Extracted ISTD $^{13}C_2$ *PFHxA*	%	85	77	85	84	80
Extracted ISTD $^{13}C_4$ *PFHpA*	%	86	79	86	84	81
Extracted ISTD $^{13}C_4$ *PFOA*	%	86	80	92	90	86
Extracted ISTD $^{13}C_5$ *PFNA*	%	95	86	94	96	94
Extracted ISTD $^{13}C_2$ *PFDA*	%	89	78	89	88	88
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	56	81	86	89	91
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	72	83	96	99	98
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	92	79	97	94	95
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	85	82	88	89	84
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	92	104	92	103	100
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	107	113	95	138	124
Extracted ISTD $^{13}C_8$ *FOSA*	%	84	68	84	84	86
Extracted ISTD d_3 *N MeFOSA*	%	69	66	81	77	77
Extracted ISTD d_5 *N EtFOSA*	%	80	61	79	82	78
Extracted ISTD d_7 *N MeFOSE*	%	85	68	82	80	82
Extracted ISTD d_9 *N EtFOSE*	%	84	62	81	80	82
Extracted ISTD d_3 *N MeFOSAA*	%	96	85	98	107	105
Extracted ISTD d_5 *N EtFOSAA*	%	66	88	86	106	103
Total Positive PFHxS & PFOS	µg/kg	7.9	0.3	1.1	2.1	1.7
Total Positive PFOS & PFOA	µg/kg	8.3	0.3	1.2	2.3	1.9
Total Positive PFAS	µg/kg	12	0.3	1.2	2.3	1.9

PFAS in Soils Extended		
Our Reference		302203-101
Your Reference	UNITS	TB-S2
Depth		-
Date Sampled		28/07/2022
Type of sample		Soil
Date prepared	-	08/08/2022
Date analysed	-	08/08/2022
Perfluorobutanesulfonic acid	µg/kg	<0.1
Perfluoropentanesulfonic acid	µg/kg	<0.1
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.1
Perfluoroheptanesulfonic acid	µg/kg	<0.1
Perfluorooctanesulfonic acid PFOS	µg/kg	<0.1
Perfluorodecanesulfonic acid	µg/kg	<0.2
Perfluorobutanoic acid	µg/kg	<0.2
Perfluoropentanoic acid	µg/kg	<0.2
Perfluorohexanoic acid	µg/kg	<0.1
Perfluoroheptanoic acid	µg/kg	<0.1
Perfluorooctanoic acid PFOA	µg/kg	<0.1
Perfluorononanoic acid	µg/kg	<0.1
Perfluorodecanoic acid	µg/kg	<0.5
Perfluoroundecanoic acid	µg/kg	<0.5
Perfluorododecanoic acid	µg/kg	<0.5
Perfluorotridecanoic acid	µg/kg	<0.5
Perfluorotetradecanoic acid	µg/kg	<5
4:2 FTS	µg/kg	<0.1
6:2 FTS	µg/kg	<0.1
8:2 FTS	µg/kg	<0.2
10:2 FTS	µg/kg	<0.2
Perfluorooctane sulfonamide	µg/kg	<1
N-Methyl perfluorooctane sulfonamide	µg/kg	<1
N-Ethyl perfluorooctanesulfon amide	µg/kg	<1
N-Me perfluorooctanesulfonamid oethanol	µg/kg	<1
N-Et perfluorooctanesulfonamid oethanol	µg/kg	<5
MePerfluorooctanesulf- amid oacetic acid	µg/kg	<0.2
EtPerfluorooctanesulf amid oacetic acid	µg/kg	<0.2
Surrogate $^{13}C_8$ *PFOS*	%	95
Surrogate $^{13}C_2$ *PFOA*	%	102
Extracted ISTD $^{13}C_3$ *PFBS*	%	106
Extracted ISTD $^{18}O_2$ *PFHxS*	%	95
Extracted ISTD $^{13}C_4$ *PFOS*	%	102

PFAS in Soils Extended		
Our Reference		302203-101
Your Reference	UNITS	TB-S2
Depth		-
Date Sampled		28/07/2022
Type of sample		Soil
Extracted ISTD $^{13}C_4$ *PFBA*	%	98
Extracted ISTD $^{13}C_3$ *PFPeA*	%	96
Extracted ISTD $^{13}C_2$ *PFHxA*	%	94
Extracted ISTD $^{13}C_4$ *PFHpA*	%	95
Extracted ISTD $^{13}C_4$ *PFOA*	%	99
Extracted ISTD $^{13}C_5$ *PFNA*	%	103
Extracted ISTD $^{13}C_2$ *PFDA*	%	99
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	101
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	105
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	107
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	95
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	99
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	106
Extracted ISTD $^{13}C_8$ *FOSA*	%	107
Extracted ISTD d_3 *N MeFOSA*	%	96
Extracted ISTD d_5 *N EtFOSA*	%	101
Extracted ISTD d_7 *N MeFOSE*	%	103
Extracted ISTD d_9 *N EtFOSE*	%	104
Extracted ISTD d_3 *N MeFOSAA*	%	110
Extracted ISTD d_5 *N EtFOSAA*	%	102
Total Positive PFHxS & PFOS	µg/kg	<0.1
Total Positive PFOS & PFOA	µg/kg	<0.1
Total Positive PFAS	µg/kg	<0.1

Misc Inorg - Soil						
Our Reference		302203-4	302203-6	302203-9	302203-12	302203-19
Your Reference	UNITS	BH102	BH102	BH102	BH102	BH102
Depth		0.01-0.1	0.8-1	1.8-2.0	2.8-3	8.8-9
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
pH 1:5 soil:water	pH Units	8.2	4.5	4.9	5.0	4.6
Chloride, Cl 1:5 soil:water	mg/kg	<10	40	20	10	140
Sulphate, SO4 1:5 soil:water	mg/kg	73	93	99	38	22
Resistivity in soil*	ohm m	68	100	120	260	81

Misc Inorg - Soil						
Our Reference		302203-28	302203-31	302203-33	302203-36	302203-39
Your Reference	UNITS	BH107	BH107	BH107	BH107	BH107
Depth		0.3-0.5	1.5-1.95	2.3-2.5	3.8-4	5.8-6
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
pH 1:5 soil:water	pH Units	4.2	4.1	4.5	4.8	4.9
Chloride, Cl 1:5 soil:water	mg/kg	20	<10	<10	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	340	83	120	21	36
Resistivity in soil*	ohm m	57	210	140	460	300

Misc Inorg - Soil						
Our Reference		302203-41	302203-48	302203-50	302203-54	302203-57
Your Reference	UNITS	BH107	BH109	BH109	BH109	BH109
Depth		7.3-7.5	0.5-0.7	1-1.2	3-3.3	5.8-6
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
pH 1:5 soil:water	pH Units	4.5	5.9	4.2	4.4	4.5
Chloride, Cl 1:5 soil:water	mg/kg	20	<10	<10	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	100	51	80	29	93
Resistivity in soil*	ohm m	120	130	160	340	150

Misc Inorg - Soil						
Our Reference		302203-61	302203-73	302203-75	302203-77	302203-87
Your Reference	UNITS	BH109	BH114	BH114	BH114	BH114
Depth		8-8.2	0-0.1	0.5-0.95	1.3-1.5	9.8-10
Date Sampled		1/08/2022	29/07/2022	29/07/2022	29/07/2022	29/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
Date analysed	-	10/08/2022	10/08/2022	10/08/2022	10/08/2022	10/08/2022
pH 1:5 soil:water	pH Units	4.5	8.1	8.7	4.5	4.7
Chloride, Cl 1:5 soil:water	mg/kg	10	<10	10	20	29
Sulphate, SO4 1:5 soil:water	mg/kg	45	25	190	61	78
Resistivity in soil*	ohm m	240	81	44	150	140

Misc Inorg - Soil			
Our Reference		302203-88	302203-91
Your Reference	UNITS	BH114	BH114
Depth		10.8-11	13.8-14
Date Sampled		29/07/2022	29/07/2022
Type of sample		Soil	Soil
Date prepared	-	10/08/2022	10/08/2022
Date analysed	-	10/08/2022	10/08/2022
pH 1:5 soil:water	pH Units	5.4	7.0
Chloride, Cl 1:5 soil:water	mg/kg	44	62
Sulphate, SO4 1:5 soil:water	mg/kg	91	82
Resistivity in soil*	ohm m	110	77

Texture and Salinity*						
Our Reference		302203-4	302203-6	302203-9	302203-12	302203-19
Your Reference	UNITS	BH102	BH102	BH102	BH102	BH102
Depth		0.01-0.1	0.8-1	1.8-2.0	2.8-3	8.8-9
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Electrical Conductivity 1:5 soil:water	µS/cm	150	97	85	39	120
Texture Value	-	9.0	7.0	7.0	7.0	8.0
Texture	-	CLAY LOAM	MEDIUM CLAY	MEDIUM CLAY	MEDIUM CLAY	LIGHT MEDIUM CLAY
ECe	dS/m	<2	<2	<2	<2	<2
Class	-	NON SALINE	NON SALINE	NON SALINE	NON SALINE	NON SALINE

Texture and Salinity*						
Our Reference		302203-28	302203-31	302203-33	302203-36	302203-39
Your Reference	UNITS	BH107	BH107	BH107	BH107	BH107
Depth		0.3-0.5	1.5-1.95	2.3-2.5	3.8-4	5.8-6
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Electrical Conductivity 1:5 soil:water	µS/cm	170	48	72	22	33
Texture Value	-	8.0	7.0	7.0	7.0	7.0
Texture	-	LIGHT MEDIUM CLAY	MEDIUM CLAY	MEDIUM CLAY	MEDIUM CLAY	MEDIUM CLAY
ECe	dS/m	<2	<2	<2	<2	<2
Class	-	NON SALINE	NON SALINE	NON SALINE	NON SALINE	NON SALINE

Texture and Salinity*						
Our Reference		302203-41	302203-48	302203-50	302203-54	302203-57
Your Reference	UNITS	BH107	BH109	BH109	BH109	BH109
Depth		7.3-7.5	0.5-0.7	1-1.2	3-3.3	5.8-6
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Electrical Conductivity 1:5 soil:water	µS/cm	83	78	62	30	68
Texture Value	-	8.5	7.0	7.0	7.0	7.0
Texture	-	LIGHT CLAY	MEDIUM CLAY	MEDIUM CLAY	MEDIUM CLAY	MEDIUM CLAY
ECe	dS/m	<2	<2	<2	<2	<2
Class	-	NON SALINE	NON SALINE	NON SALINE	NON SALINE	NON SALINE

Texture and Salinity*						
Our Reference		302203-61	302203-73	302203-75	302203-77	302203-87
Your Reference	UNITS	BH109	BH114	BH114	BH114	BH114
Depth		8-8.2	0-0.1	0.5-0.95	1.3-1.5	9.8-10
Date Sampled		1/08/2022	29/07/2022	29/07/2022	29/07/2022	29/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Electrical Conductivity 1:5 soil:water	μS/cm	41	120	230	65	74
Texture Value	-	8.0	7.0	7.0	8.0	8.0
Texture	-	LIGHT MEDIUM CLAY	MEDIUM CLAY	MEDIUM CLAY	LIGHT MEDIUM CLAY	LIGHT MEDIUM CLAY
ECe	dS/m	<2	<2	<2	<2	<2
Class	-	NON SALINE	NON SALINE	NON SALINE	NON SALINE	NON SALINE

Texture and Salinity*			
Our Reference		302203-88	302203-91
Your Reference	UNITS	BH114	BH114
Depth		10.8-11	13.8-14
Date Sampled		29/07/2022	29/07/2022
Type of sample		Soil	Soil
Date prepared	-	08/08/2022	08/08/2022
Date analysed	-	08/08/2022	08/08/2022
Electrical Conductivity 1:5 soil:water	μS/cm	94	130
Texture Value	-	8.0	8.0
Texture	-	LIGHT MEDIUM CLAY	LIGHT MEDIUM CLAY
ECe	dS/m	<2	<2
Class	-	NON SALINE	NON SALINE

CEC						
Our Reference		302203-4	302203-6	302203-27	302203-28	302203-48
Your Reference	UNITS	BH102	BH102	BH107	BH107	BH109
Depth		0.01-0.1	0.8-1	0.07-0.3	0.3-0.5	0.5-0.7
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
Date analysed	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
Exchangeable Ca	meq/100g	22	3.1	55	5.3	7.8
Exchangeable K	meq/100g	0.4	0.2	0.1	0.2	0.3
Exchangeable Mg	meq/100g	0.5	1.2	0.3	0.9	1.3
Exchangeable Na	meq/100g	0.1	0.1	<0.1	<0.1	0.1
Cation Exchange Capacity	meq/100g	23	4.6	55	6.5	9.5

CEC				
Our Reference		302203-49	302203-73	302203-75
Your Reference	UNITS	BH109	BH114	BH114
Depth		0.7-0.95	0-0.1	0.5-0.95
Date Sampled		1/08/2022	29/07/2022	29/07/2022
Type of sample		Soil	Soil	Soil
Date prepared	-	11/08/2022	11/08/2022	11/08/2022
Date analysed	-	11/08/2022	11/08/2022	11/08/2022
Exchangeable Ca	meq/100g	6.2	28	36
Exchangeable K	meq/100g	0.2	0.2	0.4
Exchangeable Mg	meq/100g	1.1	0.8	0.6
Exchangeable Na	meq/100g	0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	7.6	29	37

sPOCAS field test						
Our Reference		302203-4	302203-5	302203-6	302203-7	302203-8
Your Reference	UNITS	BH102	BH102	BH102	BH102	BH102
Depth		0.01-0.1	0.1-0.5	0.8-1	1.3-1.5	1.5-1.95
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
pH_F (field pH test)	pH Units	6.5	6.5	6.5	6.5	6.5
pH_{FOX} (field peroxide test)	pH Units	6.4	4.4	3.2	3.2	4.3
Reaction Rate*	-	Low reaction	Low reaction	Low reaction	Low reaction	Volcanic reaction

sPOCAS field test						
Our Reference		302203-9	302203-10	302203-19	302203-27	302203-28
Your Reference	UNITS	BH102	BH102	BH102	BH107	BH107
Depth		1.8-2.0	2-2.2	8.8-9	0.07-0.3	0.3-0.5
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
pH_F (field pH test)	pH Units	6.7	6.5	6.4	6.9	6.5
pH_{FOX} (field peroxide test)	pH Units	4.1	3.8	2.6	6.0	6.4
Reaction Rate*	-	High reaction	Low reaction	Low reaction	Volcanic reaction	Low reaction

sPOCAS field test						
Our Reference		302203-29	302203-30	302203-31	302203-34	302203-37
Your Reference	UNITS	BH107	BH107	BH107	BH107	BH107
Depth		0.5-0.95	1-1.2	1.5-1.95	2.8-3	4.5-4.95
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
pH_F (field pH test)	pH Units	6.5	6.5	6.6	6.7	7.1
pH_{FOX} (field peroxide test)	pH Units	6.0	5.0	3.8	3.9	3.7
Reaction Rate*	-	Low reaction	Low reaction	Low reaction	Low reaction	Low reaction

sPOCAS field test						
Our Reference		302203-42	302203-48	302203-50	302203-51	302203-52
Your Reference	UNITS	BH107	BH109	BH109	BH109	BH109
Depth		8-8.2	0.5-0.7	1-1.2	1.5-1.95	2.3-2.5
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
pH_F (field pH test)	pH Units	6.7	6.9	6.4	6.2	6.5
pH_{FOX} (field peroxide test)	pH Units	2.3	4.1	3.7	3.7	3.7
Reaction Rate*	-	Low reaction	Extreme reaction	Low reaction	High reaction	Low reaction

sPOCAS field test						
Our Reference		302203-53	302203-54	302203-57	302203-61	302203-74
Your Reference	UNITS	BH109	BH109	BH109	BH109	BH114
Depth		2.8-3	3-3.3	5.8-6	8-8.2	0.3-0.5
Date Sampled		1/08/2022	1/08/2022	1/08/2022	1/08/2022	29/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
pH_F (field pH test)	pH Units	6.5	6.4	6.4	6.8	6.9
pH_{FOX} (field peroxide test)	pH Units	3.5	3.5	3.2	2.7	6.3
Reaction Rate*	-	Low reaction	Low reaction	Low reaction	Low reaction	Extreme reaction

sPOCAS field test						
Our Reference		302203-76	302203-77	302203-78	302203-80	302203-81
Your Reference	UNITS	BH114	BH114	BH114	BH114	BH114
Depth		0.8-1	1.3-1.5	1.8-2	2.8-3	3.8-4
Date Sampled		29/07/2022	29/07/2022	29/07/2022	29/07/2022	29/07/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
Date analysed	-	05/08/2022	05/08/2022	05/08/2022	05/08/2022	05/08/2022
pH_F (field pH test)	pH Units	6.8	6.6	6.5	6.9	6.7
pH_{FOX} (field peroxide test)	pH Units	5.9	3.4	3.2	3.9	4.1
Reaction Rate*	-	High reaction	Low reaction	Low reaction	Low reaction	Medium reaction

sPOCAS field test			
Our Reference		302203-82	302203-91
Your Reference	UNITS	BH114	BH114
Depth		4.8-5	13.8-14
Date Sampled		29/07/2022	29/07/2022
Type of sample		Soil	Soil
Date prepared	-	05/08/2022	05/08/2022
Date analysed	-	05/08/2022	05/08/2022
pH_F (field pH test)	pH Units	6.6	6.4
pH_{FOX} (field peroxide test)	pH Units	3.7	4.5
Reaction Rate*	-	Low reaction	Extreme reaction

Asbestos ID - materials		
Our Reference		302203-99
Your Reference	UNITS	BH111-FCF1
Depth		0.1-0.2
Date Sampled		28/07/2022
Type of sample		Material
Date analysed	-	05/08/2022
Mass / Dimension of Sample	-	20x15x6mm
Sample Description	-	Beige fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected
Trace Analysis	-	[NT]

BTEX in Water		
Our Reference		302203-103
Your Reference	UNITS	FR
Depth		-
Date Sampled		1/08/2022
Type of sample		Water
Date extracted	-	05/08/2022
Date analysed	-	06/08/2022
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	101
Surrogate toluene-d8	%	95
Surrogate 4-BFB	%	102

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** #2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. 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 at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity (non NATA). Resistivity (calculated) may not correlate with results otherwise obtained using Resistivity-Current method, depending on the nature of the soil being analysed.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. Based on section H, Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.

Method ID	Methodology Summary
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-123	Determined using a "Texture by Feel" method.
Metals-020	Determination of various metals by ICP-AES.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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-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. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
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. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing 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.
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. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	302203-4
Date extracted	-			05/08/2022	1	05/08/2022	05/08/2022		05/08/2022	05/08/2022
Date analysed	-			10/08/2022	1	10/08/2022	10/08/2022		10/08/2022	10/08/2022
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	107	108
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	107	108
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	106	113
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	102	105
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	103	100
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	112	110
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	112	111
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	95	1	72	89	21	90	92

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-10	[NT]
Date extracted	-			[NT]	20	05/08/2022	05/08/2022		05/08/2022	[NT]
Date analysed	-			[NT]	20	10/08/2022	10/08/2022		10/08/2022	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	20	<25	<25	0	112	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	20	<25	<25	0	112	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	20	<0.2	<0.2	0	116	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	20	<0.5	<0.5	0	107	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	20	<1	<1	0	105	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	20	<2	<2	0	116	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	20	<1	<1	0	117	[NT]
Naphthalene	mg/kg	1	Org-023	[NT]	20	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	20	92	90	2	98	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	302203-4
Date extracted	-			05/08/2022	1	05/08/2022	05/08/2022		05/08/2022	05/08/2022
Date analysed	-			10/08/2022	1	11/08/2022	11/08/2022		10/08/2022	11/08/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	102	107
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	107	114
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	86	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	102	107
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	107	114
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	86	#
Surrogate o-Terphenyl	%		Org-020	78	1	86	88	2	124	93

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-10	[NT]
Date extracted	-			[NT]	20	05/08/2022	05/08/2022		05/08/2022	[NT]
Date analysed	-			[NT]	20	11/08/2022	11/08/2022		10/08/2022	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	20	<50	<50	0	102	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	20	<100	<100	0	96	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	20	<100	110	10	67	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	20	<50	<50	0	102	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	20	<100	120	18	96	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	20	130	170	27	67	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	20	91	94	3	78	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	302203-4
Date extracted	-			05/08/2022	1	05/08/2022	05/08/2022		05/08/2022	05/08/2022
Date analysed	-			09/08/2022	1	09/08/2022	09/08/2022		09/08/2022	09/08/2022
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	86
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	81	83
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	84
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	91
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	0.2	0.2	0	86	90
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	0.2	0.2	0	91	93
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	0.1	0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	0.1	<0.1	0	87	85
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	0.1	0.1	0	86	96
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	71	1	77	88	13	76	80

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-10	[NT]
Date extracted	-			[NT]	20	05/08/2022	05/08/2022		05/08/2022	[NT]
Date analysed	-			[NT]	20	09/08/2022	09/08/2022		09/08/2022	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	72	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	75	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	72	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	84	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	20	0.2	0.2	0	82	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	20	0.2	0.2	0	89	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	20	0.1	0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	75	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	20	0.1	0.1	0	84	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	20	0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	20	81	76	6	75	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	302203-4
Date extracted	-			05/08/2022	1	05/08/2022	05/08/2022		05/08/2022	05/08/2022
Date analysed	-			09/08/2022	1	09/08/2022	09/08/2022		09/08/2022	09/08/2022
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	86
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	89	85
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	83	85
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	87	81
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	88
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	83
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	72	88
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	90
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	92
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	69	1	77	83	8	75	76

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-10	[NT]
Date extracted	-			[NT]	20	05/08/2022	05/08/2022		05/08/2022	[NT]
Date analysed	-			[NT]	20	09/08/2022	09/08/2022		09/08/2022	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	74	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	78	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	73	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	81	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	82	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	86	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	82	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	86	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	84	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	20	75	72	4	67	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	302203-4
Date extracted	-			05/08/2022	1	05/08/2022	05/08/2022		05/08/2022	05/08/2022
Date analysed	-			09/08/2022	1	09/08/2022	09/08/2022		09/08/2022	09/08/2022
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	90
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	79	80
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	77	77
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	114
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	92
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	76	78
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	90
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	69	1	77	83	8	75	76

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-10	[NT]
Date extracted	-			[NT]	20	05/08/2022	05/08/2022		05/08/2022	[NT]
Date analysed	-			[NT]	20	09/08/2022	09/08/2022		09/08/2022	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	109	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	76	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	71	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	106	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	84	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	76	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	88	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	20	75	72	4	67	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	302203-4
Date extracted	-			05/08/2022	1	05/08/2022	05/08/2022		05/08/2022	05/08/2022
Date analysed	-			09/08/2022	1	09/08/2022	09/08/2022		09/08/2022	09/08/2022
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	111	140
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	69	1	77	83	8	75	76

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-10	[NT]
Date extracted	-			[NT]	20	05/08/2022	05/08/2022		05/08/2022	[NT]
Date analysed	-			[NT]	20	09/08/2022	09/08/2022		09/08/2022	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	20	<0.1	<0.1	0	106	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	[NT]	20	75	72	4	67	[NT]

QUALITY CONTROL: Total PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	
Date extracted	-			05/08/2022	[NT]	[NT]	[NT]	[NT]	05/08/2022	[NT]
Date analysed	-			09/08/2022	[NT]	[NT]	[NT]	[NT]	09/08/2022	[NT]
Total PCB (Aroclor 1016-1260)	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Surrogate TCMX	%		Org-021	69	[NT]	[NT]	[NT]	[NT]	75	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	302203-4
Date prepared	-			[NT]	1	09/08/2022	09/08/2022		09/08/2022	09/08/2022
Date analysed	-			[NT]	1	10/08/2022	10/08/2022		10/08/2022	10/08/2022
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	100	86
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	98	83
Chromium	mg/kg	1	Metals-020	<1	1	9	8	12	99	88
Copper	mg/kg	1	Metals-020	<1	1	11	14	24	97	104
Lead	mg/kg	1	Metals-020	<1	1	16	11	37	98	115
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	97	103
Nickel	mg/kg	1	Metals-020	<1	1	6	5	18	102	77
Zinc	mg/kg	1	Metals-020	<1	1	27	24	12	105	#

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	20	09/08/2022	09/08/2022		09/08/2022	[NT]
Date analysed	-			[NT]	20	10/08/2022	10/08/2022		10/08/2022	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	20	<4	<4	0	103	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	20	<0.4	<0.4	0	100	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	20	14	14	0	101	[NT]
Copper	mg/kg	1	Metals-020	[NT]	20	11	9	20	100	[NT]
Lead	mg/kg	1	Metals-020	[NT]	20	12	13	8	101	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	20	<0.1	<0.1	0	88	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	20	9	10	11	105	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	20	19	20	5	114	[NT]

QUALITY CONTROL: PFAS in Soils Extended					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	302203-4
Date prepared	-			08/08/2022	1	08/08/2022	08/08/2022		08/08/2022	08/08/2022
Date analysed	-			08/08/2022	1	08/08/2022	08/08/2022		08/08/2022	08/08/2022
Perfluorobutanesulfonic acid	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	96	95
Perfluoropentanesulfonic acid	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	94	98
Perfluorohexanesulfonic acid - PFHxS	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	100	102
Perfluoroheptanesulfonic acid	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	99	101
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	<0.1	1	0.4	0.4	0	95	100
Perfluorodecanesulfonic acid	µg/kg	0.2	Org-029	<0.2	1	<0.2	<0.2	0	95	98
Perfluorobutanoic acid	µg/kg	0.2	Org-029	<0.2	1	<0.2	<0.2	0	99	94
Perfluoropentanoic acid	µg/kg	0.2	Org-029	<0.2	1	<0.2	<0.2	0	103	105
Perfluorohexanoic acid	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	99	100
Perfluoroheptanoic acid	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	99	98
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	<0.1	1	0.3	0.2	40	102	105
Perfluorononanoic acid	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	105	99
Perfluorodecanoic acid	µg/kg	0.5	Org-029	<0.5	1	<0.5	<0.5	0	98	100
Perfluoroundecanoic acid	µg/kg	0.5	Org-029	<0.5	1	<0.5	<0.5	0	105	103
Perfluorododecanoic acid	µg/kg	0.5	Org-029	<0.5	1	<0.5	<0.5	0	97	101
Perfluorotridecanoic acid	µg/kg	0.5	Org-029	<0.5	1	<0.5	<0.5	0	109	107
Perfluorotetradecanoic acid	µg/kg	5	Org-029	<5	1	<5	<5	0	104	106
4:2 FTS	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	87	91
6:2 FTS	µg/kg	0.1	Org-029	<0.1	1	<0.1	<0.1	0	95	98
8:2 FTS	µg/kg	0.2	Org-029	<0.2	1	<0.2	<0.2	0	101	108
10:2 FTS	µg/kg	0.2	Org-029	<0.2	1	<0.2	<0.2	0	99	123
Perfluorooctane sulfonamide	µg/kg	1	Org-029	<1	1	<1	<1	0	103	100
N-Methyl perfluorooctane sulfonamide	µg/kg	1	Org-029	<1	1	<1	<1	0	109	112
N-Ethyl perfluorooctanesulfon amide	µg/kg	1	Org-029	<1	1	<1	<1	0	100	101
N-Me perfluorooctanesulfonamid oethanol	µg/kg	1	Org-029	<1	1	<1	<1	0	105	102
N-Et perfluorooctanesulfonamid oethanol	µg/kg	5	Org-029	<5	1	<5	<5	0	97	99
MePerfluorooctanesulf- amid oacetic acid	µg/kg	0.2	Org-029	<0.2	1	<0.2	<0.2	0	107	111
EtPerfluorooctanesulf amid oacetic acid	µg/kg	0.2	Org-029	<0.2	1	<0.2	<0.2	0	108	111
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	96	1	87	100	14	90	103
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	98	1	104	100	4	102	102

QUALITY CONTROL: PFAS in Soils Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	302203-4
Extracted ISTD $^{13}C_3$ *PFBS*	%		Org-029	102	1	96	98	2	104	100
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	96	1	92	96	4	98	94
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	104	1	103	93	10	104	91
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	98	1	92	94	2	99	95
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	96	1	88	91	3	94	86
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	97	1	91	90	1	96	88
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	98	1	89	91	2	98	91
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	100	1	95	96	1	98	93
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	102	1	97	100	3	98	100
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	99	1	94	96	2	98	86
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	104	1	108	100	8	104	97
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	104	1	111	106	5	107	107
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	105	1	106	104	2	108	101
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	98	1	90	95	5	102	88
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	108	1	97	100	3	103	97
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	108	1	119	116	3	111	80
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	105	1	101	100	1	102	90
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	98	1	93	93	0	97	87
Extracted ISTD d_5 *N EtFOSA*	%		Org-029	100	1	95	97	2	99	90
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	99	1	91	96	5	99	92

QUALITY CONTROL: PFAS in Soils Extended					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	302203-4
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	102	1	95	98	3	102	94
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	111	1	115	103	11	106	92
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	100	1	113	105	7	98	99

QUALITY CONTROL: PFAS in Soils Extended					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	20	08/08/2022	08/08/2022		[NT]	[NT]
Date analysed	-			[NT]	20	08/08/2022	08/08/2022		[NT]	[NT]
Perfluorobutanesulfonic acid	µg/kg	0.1	Org-029	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Perfluoropentanesulfonic acid	µg/kg	0.1	Org-029	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/kg	0.1	Org-029	[NT]	20	<0.1	0.2	67	[NT]	[NT]
Perfluoroheptanesulfonic acid	µg/kg	0.1	Org-029	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	[NT]	20	2.4	2.6	8	[NT]	[NT]
Perfluorodecanesulfonic acid	µg/kg	0.2	Org-029	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
Perfluorobutanoic acid	µg/kg	0.2	Org-029	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
Perfluoropentanoic acid	µg/kg	0.2	Org-029	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
Perfluorohexanoic acid	µg/kg	0.1	Org-029	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
Perfluoroheptanoic acid	µg/kg	0.1	Org-029	[NT]	20	<0.1	0.1	0	[NT]	[NT]
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	[NT]	20	0.5	0.9	57	[NT]	[NT]
Perfluorononanoic acid	µg/kg	0.1	Org-029	[NT]	20	0.1	<0.1	0	[NT]	[NT]
Perfluorodecanoic acid	µg/kg	0.5	Org-029	[NT]	20	<0.5	<0.5	0	[NT]	[NT]
Perfluoroundecanoic acid	µg/kg	0.5	Org-029	[NT]	20	<0.5	<0.5	0	[NT]	[NT]
Perfluorododecanoic acid	µg/kg	0.5	Org-029	[NT]	20	<0.5	<0.5	0	[NT]	[NT]
Perfluorotridecanoic acid	µg/kg	0.5	Org-029	[NT]	20	<0.5	<0.5	0	[NT]	[NT]
Perfluorotetradecanoic acid	µg/kg	5	Org-029	[NT]	20	<5	<5	0	[NT]	[NT]
4:2 FTS	µg/kg	0.1	Org-029	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
6:2 FTS	µg/kg	0.1	Org-029	[NT]	20	<0.1	<0.1	0	[NT]	[NT]
8:2 FTS	µg/kg	0.2	Org-029	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
10:2 FTS	µg/kg	0.2	Org-029	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
Perfluorooctane sulfonamide	µg/kg	1	Org-029	[NT]	20	<1	<1	0	[NT]	[NT]
N-Methyl perfluorooctane sulfonamide	µg/kg	1	Org-029	[NT]	20	<1	<1	0	[NT]	[NT]
N-Ethyl perfluorooctanesulfon amide	µg/kg	1	Org-029	[NT]	20	<1	<1	0	[NT]	[NT]
N-Me perfluorooctanesulfonamid oethanol	µg/kg	1	Org-029	[NT]	20	<1	<1	0	[NT]	[NT]
N-Et perfluorooctanesulfonamid oethanol	µg/kg	5	Org-029	[NT]	20	<5	<5	0	[NT]	[NT]
MePerfluorooctanesulf- amid oacetic acid	µg/kg	0.2	Org-029	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
EtPerfluorooctanesulf amid oacetic acid	µg/kg	0.2	Org-029	[NT]	20	<0.2	<0.2	0	[NT]	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	[NT]	20	87	94	8	[NT]	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	[NT]	20	105	103	2	[NT]	[NT]

QUALITY CONTROL: PFAS in Soils Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Extracted ISTD $^{13}C_3$ *PFBS*	%		Org-029	[NT]	20	99	96	3	[NT]	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	[NT]	20	91	91	0	[NT]	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	[NT]	20	103	97	6	[NT]	[NT]
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	[NT]	20	92	91	1	[NT]	[NT]
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	[NT]	20	88	89	1	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	[NT]	20	88	88	0	[NT]	[NT]
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	[NT]	20	89	89	0	[NT]	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	[NT]	20	93	92	1	[NT]	[NT]
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	[NT]	20	99	98	1	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	[NT]	20	95	99	4	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	[NT]	20	103	102	1	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	[NT]	20	110	110	0	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	[NT]	20	105	103	2	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	[NT]	20	98	89	10	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	[NT]	20	98	104	6	[NT]	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	[NT]	20	123	121	2	[NT]	[NT]
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	[NT]	20	98	92	6	[NT]	[NT]
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	[NT]	20	92	89	3	[NT]	[NT]
Extracted ISTD d_5 *N EtFOSA*	%		Org-029	[NT]	20	93	90	3	[NT]	[NT]
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	[NT]	20	94	87	8	[NT]	[NT]

QUALITY CONTROL: PFAS in Soils Extended					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	[NT]	20	95	92	3	[NT]	[NT]
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	[NT]	20	115	112	3	[NT]	[NT]
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	[NT]	20	121	123	2	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	302203-9
Date prepared	-			10/08/2022	6	10/08/2022	10/08/2022		10/08/2022	10/08/2022
Date analysed	-			10/08/2022	6	10/08/2022	10/08/2022		10/08/2022	10/08/2022
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	6	4.5	4.5	0	100	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	6	40	40	0	96	93
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	6	93	92	1	91	#
Resistivity in soil*	ohm m	1	Inorg-002	<1	6	100	100	0	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	31	10/08/2022	10/08/2022		10/08/2022	[NT]
Date analysed	-			[NT]	31	10/08/2022	10/08/2022		10/08/2022	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	31	4.1	4.1	0	100	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	31	<10	<10	0	96	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	31	83	100	19	89	[NT]
Resistivity in soil*	ohm m	1	Inorg-002	[NT]	31	210	190	10	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	73	10/08/2022	10/08/2022		[NT]	[NT]
Date analysed	-			[NT]	73	10/08/2022	10/08/2022		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	73	8.1	8.0	1	[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	73	<10	<10	0	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	73	25	22	13	[NT]	[NT]
Resistivity in soil*	ohm m	1	Inorg-002	[NT]	73	81	80	1	[NT]	[NT]

QUALITY CONTROL: Texture and Salinity*					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/08/2022	[NT]	[NT]	[NT]	[NT]	08/08/2022	[NT]
Date analysed	-			08/08/2022	[NT]	[NT]	[NT]	[NT]	08/08/2022	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: Texture and Salinity*					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	08/08/2022	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	08/08/2022	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	302203-6
Date prepared	-			11/08/2022	28	11/08/2022	11/08/2022		11/08/2022	11/08/2022
Date analysed	-			11/08/2022	28	11/08/2022	11/08/2022		11/08/2022	11/08/2022
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	28	5.3	5.8	9	102	#
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	28	0.2	0.3	40	91	103
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	28	0.9	1.0	11	102	127
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	28	<0.1	<0.1	0	99	105

QUALITY CONTROL: sPOCAS field test					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			05/08/2022	[NT]	[NT]	[NT]	[NT]	05/08/2022	[NT]
Date analysed	-			05/08/2022	[NT]	[NT]	[NT]	[NT]	05/08/2022	[NT]
pH_F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH_{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	05/08/2022	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	05/08/2022	[NT]
pH_F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	89	[NT]
pH_{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: BTEX in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			05/08/2022	[NT]	[NT]	[NT]	[NT]	05/08/2022	[NT]
Date analysed	-			06/08/2022	[NT]	[NT]	[NT]	[NT]	06/08/2022	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	101	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate Dibromofluoromethane	%		Org-023	98	[NT]	[NT]	[NT]	[NT]	104	[NT]
Surrogate toluene-d8	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	101	[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.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

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.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

MISC_INORG_DRY:# Percent recovery is not applicable due to the high concentration of the analyte/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Acid Extractable Metals in Soil:
Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Note: All samples analysed as received. However, sample 302203-2 is below the minimum recommended 500mL sample volume as per National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.

TRH Soil C10-C40 NEPM - # Percent recovery for the matrix spike is not possible to report as the high concentration of analytes in sample 302203-4ms have caused interference.

CEC_S:
Low spike recovery was obtained for this sample. The sample was re-digested and re-spiked and the low recovery was confirmed. This is due to matrix interferences. However, an acceptable recovery was obtained for the LCS.

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SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	C Ridley

Sample Login Details	
Your reference	E35312BR, Wahroonga
Envirolab Reference	302203
Date Sample Received	03/08/2022
Date Instructions Received	03/08/2022
Date Results Expected to be Reported	11/08/2022

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	101 Soil, 1 Material, 1 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	9
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
Nil

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:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	PFAS in Soils Extended	Misc Inorg - Soil	Texture and Salinity*	CEC	sPOCAS field test	Asbestos ID - materials	BTEX in Water	On Hold
BH101-0.05-0.2	✓	✓	✓	✓	✓	✓	✓		✓							
BH101-0.2-0.5	✓	✓	✓				✓	✓								
BH101-1.1-1.4																✓
BH102-0.01-0.1	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			
BH102-0.1-0.5	✓	✓	✓				✓						✓			
BH102-0.8-1										✓	✓	✓	✓			
BH102-1.3-1.5													✓			
BH102-1.5-1.95													✓			
BH102-1.8-2.0										✓	✓		✓			
BH102-2-2.2													✓			
BH102-2.3-2.5																✓
BH102-2.8-3										✓	✓					
BH102-3-3.2																✓
BH102-3.8-4																✓
BH102-4.8-5																✓
BH102-5.8-6																✓
BH102-6.8-7																✓
BH102-7.8-8																✓
BH102-8.8-9										✓	✓		✓			
BH103-0.05-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH103-0.2-0.5	✓	✓	✓				✓									
BH103-0.8-1																✓
BH104-0-0.15	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH104-0.2-0.5	✓	✓	✓				✓									
BH105-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH105-0.2-0.6																✓
BH107-0.07-0.3	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓			
BH107-0.3-0.5	✓	✓	✓				✓			✓	✓	✓	✓			
BH107-0.5-0.95													✓			
BH107-1-1.2													✓			
BH107-1.5-1.95										✓	✓		✓			
BH107-1.8-2																✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	PFAS in Soils Extended	Misc Inorg - Soil	Texture and Salinity*	CEC	sPOCAS field test	Asbestos ID - materials	BTEX in Water	On Hold
BH107-2.3-2.5										✓	✓					
BH107-2.8-3													✓			
BH107-3-3.2																✓
BH107-3.8-4										✓	✓					
BH107-4.5-4.95													✓			
BH107-4.8-5																✓
BH107-5.8-6										✓	✓					
BH107-6.8-7																✓
BH107-7.3-7.5										✓	✓					
BH107-8-8.2													✓			
BH108-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH108-0.2-0.3	✓	✓	✓				✓									
BH108-0.3-0.5																✓
BH108-1.2-1.4																✓
BH109-0.04-0.1	✓	✓	✓	✓	✓	✓	✓		✓							
BH109-0.5-0.7	✓	✓	✓				✓			✓	✓	✓	✓			
BH109-0.7-0.95												✓				
BH109-1-1.2										✓	✓		✓			
BH109-1.5-1.95													✓			
BH109-2.3-2.5													✓			
BH109-2.8-3													✓			
BH109-3-3.3										✓	✓		✓			
BH109-3.8-4	✓	✓	✓				✓									
BH109-4.8-5																✓
BH109-5.8-6										✓	✓		✓			
BH109-6-6.2																✓
BH109-6.8-7																✓
BH109-7.8-8																✓
BH109-8-8.2										✓	✓		✓			
BH110-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH110-0.4-0.6																✓
BH110-0.8-1																✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	PFAS in Soils Extended	Misc Inorg - Soil	Texture and Salinity*	CEC	sPOCAS field test	Asbestos ID - materials	BTEX in Water	On Hold
BH111-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH111-0.2-0.6								✓								
BH112-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH112-0.2-0.5																✓
BH112-0.7-1																✓
BH113-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH113-0.2-0.4																✓
BH113-0.7-1																✓
BH114-0-0.1	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓				
BH114-0.3-0.5													✓			
BH114-0.5-0.95	✓	✓	✓				✓			✓	✓	✓				
BH114-0.8-1													✓			
BH114-1.3-1.5										✓	✓		✓			
BH114-1.8-2													✓			
BH114-2.3-2.5																✓
BH114-2.8-3													✓			
BH114-3.8-4													✓			
BH114-4.8-5													✓			
BH114-5.8-6																✓
BH114-6.8-7																✓
BH114-7.8-8																✓
BH114-8.8-9																✓
BH114-9.8-10										✓	✓					
BH114-10.8-11										✓	✓					
BH114-11.8-12																✓
BH114-12.8-13																✓
BH114-13.8-14										✓	✓		✓			
BH115-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓							
BH115-0.2-0.4																✓
BH115-0.8-1																✓
SDUP1	✓	✓	✓	✓	✓	✓	✓	✓	✓							
SDUP3																✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	PFAS in Soils Extended	Misc Inorg - Soil	Texture and Salinity*	CEC	sPOCAS field test	Asbestos ID - materials	BTEX in Water	On Hold
SDUP4																✓
SDUP5	✓	✓	✓				✓									
BH111-FCF1-0.1-0.2														✓		
TB-S1	✓															
TB-S2									✓							
TS-SI	✓															
FR															✓	

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 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35312BR Date Results Required: STANDARD Page: 1 of 5	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Craig Ridley cridley@jkenvironments.com.au

Location:	Wahroonga	Sample Preserved in Esky on Ice
Sampler:	AD/NF	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 3	Combo 6	Asbestos (500ml)	PFAS Routine	Asbestos	BTEX	Sulfate, chloride, pH, EC, resistivity	ECe	CEC	ASS Field Test (pH F and pH FOX)		
28/07/2022	1	BH101	0.05-0.2	G, P1	0	F: SAND		X		X								
28/07/2022	2	BH101	0.2-0.5	G, A, P1	0	F: CLAY	X		X									
28/07/2022	3	BH101	1.1-1.4	G, A, P1	0	CLAY												
1/08/2022	4	BH102	0.01-0.1	G2, P1, P2	0	F: SAND		X		X			X	X	X	X		
1/08/2022	5	BH102	0.1-0.5	G2, P1, P2	0	F: CLAY	X									X		
1/08/2022	6	BH102	0.8-1	G, P1, P2	0	CLAY							X	X	X	X		
1/08/2022	7	BH102	1.3-1.5	G, P2	0	CLAY										X		
1/08/2022	8	BH102	1.5-1.95	G2, P2	0	CLAY										X		
1/08/2022	9	BH102	1.8-2.0	G, P2	0	CLAY							X	X		X		
1/08/2022	10	BH102	2-2.2	P2	0	CLAY										X		
1/08/2022	11	BH102	2.3-2.5	G	0	SILTSTONE												
1/08/2022	12	BH102	2.8-3	G	0	SILTSTONE							X	X				
1/08/2022	13	BH102	3-3.2	G	0	SILTSTONE												
1/08/2022	14	BH102	3.8-4	G	0	SILTSTONE												
1/08/2022	15	BH102	4.8-5	G	0	SILTSTONE												
1/08/2022	16	BH102	5.8-6	G	0	SILTSTONE												
1/08/2022	17	BH102	6.8-7	G	0	SILTSTONE												
1/08/2022	18	BH102	7.8-8	G	0	SILTSTONE												
1/08/2022	19	BH102	8.8-9	G, P2	0	SILTSTONE							X	X		X		
28/07/2022	20	BH103	0.05-0.2	G, A, P1	0	F: SAND		X	X	X								
28/07/2022	21	BH103	0.2-0.5	G, A, P1	0	F: CLAY	X											
28/07/2022	22	BH103	0.8-1	G, A, P1	0	CLAY												
28/07/2022	23	BH104	0-0.15	G, A, P1	0	F: CLAY		X	X	X								
28/07/2022	24	BH104	0.2-0.5	G, A, P1	0	CLAY	X											
28/07/2022	25	BH105	0-0.1	G, A, P1	0	F: CLAY		X	X	X								

Remarks (comments/detection limits required):		Sample Containers: G - 250mg Glass Jar V - BTEX Vial A - Ziplock Asbestos Bag H - HNO3 Wash PVC P1 - PFAS Jar P2 - Plastic Bag		
Relinquished By:	Date: 03-02-22	Time: 12PM	Received By: Closeman	Date: 03/08/22

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

Job No: 302203

Date Received: 03/08/22
Time Received: 1200
Received By: CR
Temp: Cool/Ambient 09°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35312BR Date Results Required: STANDARD Page: 2 of 5	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Craig Ridley cridley@jkenvironments.com.au

Location: Wahroonga

Sampler: AD/NF

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 3	Combo 6	Asbestos (500ml)	PFAS Routine	Asbestos	BTEX	Sulfate, chloride, pH, EC, resistivity	ECe	CEC	ASS Field Test (pH F and pH FOX)		
28/07/2022	26	BH105	0.2-0.6	G, A, P1	0	CLAY												
1/08/2022	27	BH107	0.07-0.3	G2, P1, P2	0	F: SAND		X		X					X	X		
1/08/2022	28	BH107	0.3-0.5	G2, P1, P2	0	F: CLAY	X						X	X	X	X		
1/08/2022	29	BH107	0.5-0.95	G2, P1, P2	0	CLAY										X		
1/08/2022	30	BH107	1-1.2	P2	0	CLAY										X		
1/08/2022	31	BH107	1.5-1.95	G2, P2	0	CLAY							X	X		X		
1/08/2022	32	BH107	1.8-2	G, P2	0	CLAY												
1/08/2022	33	BH107	2.3-2.5	G, P2	0	CLAY							X	X				
1/08/2022	34	BH107	2.8-3	G, P2	0	CLAY										X		
1/08/2022	35	BH107	3-3.2	G	0	CLAY												
1/08/2022	36	BH107	3.8-4	G, P2	0	SILTSTONE							X	X				
1/08/2022	37	BH107	4.5-4.95	G, P2	0	SILTSTONE										X		
1/08/2022	38	BH107	4.8-5	G	0	SILTSTONE												
1/08/2022	39	BH107	5.8-6	G	0	SILTSTONE							X	X				
1/08/2022	40	BH107	6.8-7	G	0	SILTSTONE												
1/08/2022	41	BH107	7.3-7.5	G	0	SILTSTONE							X	X				
1/08/2022	42	BH107	8-8.2	G, P2	0	SILTSTONE										X		
28/07/2022	43	BH108	0.1-0.2	G, A, P1	0	F: SAND		X	X	X								
28/07/2022	44	BH108	0.2-0.3	G, A	0	F: SAND	X											
28/07/2022	45	BH108	0.3-0.5	G, A	0	F: CLAY												
28/07/2022	46	BH108	1.2-1.4	G, A	0	CLAY												
1/08/2022	47	BH109	0.04-0.1	G2, P1, P2	0	F: SAND		X		X								
1/08/2022	48	BH109	0.5-0.7	G2, P1, P2	0	F: CLAY	X						X	X	X	X		
1/08/2022	49	BH109	0.7-0.95	G2, P1, P2	0	CLAY									X			
1/08/2022	50	BH109	1-1.2	G, P2	0	CLAY							X	X		X		

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar V - BTEX Vial
A - Ziplock Asbestos Bag H - HNO3 Wash PVC
P1 - PFAS Jar P2 - Plastic Bag

Relinquished By:	Date: 03-02-22	Time: 12PM	Received By:	Date:
VB			CRoseman	03/08/22

302203

SAMPLE AND CHAIN OF CUSTODY FORM

TO:	JKE Job Number:	FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35312BR Date Results Required: STANDARD Page: 3 of 5	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Craig Ridley cridley@jkenvironments.com.au

Location:	Wahroonga	Sample Preserved in Esky on Ice
Sampler:	AD/NF	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 3	Combo 6	Asbestos (500mL)	PFAS Routine	Asbestos	BTEX	Sulfate, chloride, pH, EC, resistivity	ECe	CEC	ASS Field Test (pH F and pH FOX)		
1/08/2022	51	BH109	1.5-1.95	G, P2	0	CLAY										X		
1/08/2022	52	BH109	2.3-2.5	G, P2	0	CLAY										X		
1/08/2022	53	BH109	2.8-3	G, P2	0	CLAY										X		
1/08/2022	54	BH109	3-3.3	G, P2	0	CLAY							X	X		X		
1/08/2022	55	BH109	3.8-4	G	0	SILTSTONE	X											
1/08/2022	56	BH109	4.8-5	G	0	SILTSTONE												
1/08/2022	57	BH109	5.8-6	G, P2	0	SILTSTONE							X	X		X		
1/08/2022	58	BH109	6-6.2	G	0	SILTSTONE												
1/08/2022	59	BH109	6.8-7	G	0	SILTSTONE												
1/08/2022	60	BH109	7.8-8	G	0	SILTSTONE												
1/08/2022	61	BH109	8-8.2	G, P2	0	SILTSTONE							X	X		X		
28/07/2022	62	BH110	0-0.1	G, A, P1	0	F: CLAY		X	X	X								
28/07/2022	63	BH110	0.4-0.6	G, A, P1	0	F: CLAY												
28/07/2022	64	BH110	0.8-1	G, A, P1	0	CLAY												
28/07/2022	65	BH111	0-0.1	G, A, P1	0	F: CLAY		X	X	X								
28/07/2022	66	BH111	0.2-0.6	G, A, P1	0	CLAY			X									
28/07/2022	67	BH112	0-0.1	G, A, P1	0	F: CLAY		X	X	X								
28/07/2022	68	BH112	0.2-0.5	G, A, P1	0	F: CLAY												
28/07/2022	69	BH112	0.7-1	G, A, P1	0	CLAY												
28/07/2022	70	BH113	0-0.1	G, A, P1	0	F: CLAY		X	X	X								
28/07/2022	71	BH113	0.2-0.4	G, A, P1	0	F: CLAY												
28/07/2022	72	BH113	0.7-1	G, A, P1	0	CLAY												
29/07/2022	73	BH114	0-0.1	G2, P1, P2	0	F: CLAY		X		X			X	X	X			
29/07/2022	74	BH114	0.3-0.5	G2, P1, P2	0	F: CLAY										X		
29/07/2022	75	BH114	0.5-0.95	G	0	F: CLAY	X						X	X	X			

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar V - BTEX Vial A - Ziplock Asbestos Bag H - HNO3 Wash PVC P1 - PFAS Jar P2 - Plastic Bag		
Relinquished By:	Date: 03-02-22	Time: 12PM	Received By: Closeman	Date: 03/08/22

302203

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35312BR Date Results Required: STANDARD Page: 4 of 5	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Craig Ridley cridley@jkenvironments.com.au

Location:	Wahroonga	Sample Preserved in Esky on Ice
Sampler:	AD/NF	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 3	Combo 6	Asbestos (500mL)	PFAS Routine	Asbestos	BTEX	Sulfate, chloride, pH, EC, resistivity	ECe	CEC	ASS Field Test (pH F and pH FOX)		
29/07/2022	76	BH114	0.8-1	G2, P1, P2	0	F: CLAY										X		
29/07/2022	77	BH114	1.3-1.5	G2, P1, P2	0	CLAY							X	X		X		
29/07/2022	78	BH114	1.8-2	G2, P2	0	CLAY										X		
29/07/2022	79	BH114	2.3-2.5	G, P2	0	CLAY												
29/07/2022	80	BH114	2.8-3	G, P2	0	CLAY										X		
29/07/2022	81	BH114	3.8-4	G, P2	0	CLAY										X		
29/07/2022	82	BH114	4.8-5	G, P2	0	SILTSTONE										X		
29/07/2022	83	BH114	5.8-6	G	0	SILTSTONE												
29/07/2022	84	BH114	6.8-7	G	0	SILTSTONE												
29/07/2022	85	BH114	7.8-8	G	0	SILTSTONE												
29/07/2022	86	BH114	8.8-9	G	0	SILTSTONE												
29/07/2022	87	BH114	9.8-10	G	0	SILTSTONE							X	X				
29/07/2022	88	BH114	10.8-11	G	0	SILTSTONE							X	X				
29/07/2022	89	BH114	11.8-12	G	0	SILTSTONE												
29/07/2022	90	BH114	12.8-13	G	0	SILTSTONE												
29/07/2022	91	BH114	13.8-14	G, P2	0	SILTSTONE							X	X		X		
29/07/2022	92	BH115	0-0.1	G, A, P1	0	F: CLAY		X	X	X								
29/07/2022	93	BH115	0.2-0.4	G, A, P1	0	F: CLAY												
29/07/2022	94	BH115	0.8-1	G, A, P1	0	CLAY												
28/07/2022	95	SDUP1	-	G, A, P1	-	DUPLICATE		X	X	X								
28/07/2022	—	SDUP2	-	G, A, P1	-	DUPLICATE		X	X	X		SEND TO VIC						
28/07/2022	96	SDUP3	-	G, A, P1	-	DUPLICATE												
28/07/2022	97	SDUP4	-	G, A, P1	-	DUPLICATE												
28/07/2022	98	SDUP5	-	G	-	DUPLICATE	X											
28/07/2022	—	SDUP6	-	G	-	DUPLICATE	X					SEND TO VIC						

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar V - BTEX Vial A - Ziplock Asbestos Bag H - HNO3 Wash PVC P1 - PFAS Jar P2 - Plastic Bag		
Relinquished By: VB	Date: 03-02-22	Time: 12PM	Received By: CRoseman	Date: 03/08/22

302203

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 302645

Client Details

Client	JK Environments
Attention	C Ridley
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35312BR, Wahroonga**
Number of Samples	8 Water
Date samples received	09/08/2022
Date completed instructions received	09/08/2022

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	16/08/2022
Date of Issue	16/08/2022

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
Hannah Nguyen, Metals Supervisor
Josh Williams, Organics and LC Supervisor
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

VOCs in water						
Our Reference		302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference	UNITS	MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	12/08/2022	12/08/2022	12/08/2022	12/08/2022	12/08/2022
Date analysed	-	12/08/2022	12/08/2022	12/08/2022	12/08/2022	12/08/2022
Dichlorodifluoromethane	µg/L	<10	<10	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1
Chloroform	µg/L	<1	<1	<1	<1	<1
2,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1
Benzene	µg/L	<1	<1	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1

VOCs in water						
Our Reference		302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference	UNITS	MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Bromoform	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
Styrene	µg/L	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
o-xylene	µg/L	<1	<1	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1	<1	<1
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1	<1	<1
n-propyl benzene	µg/L	<1	<1	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1	<1	<1	<1
Tert-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
n-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	100	100	100	100	100
Surrogate toluene-d8	%	93	94	94	95	95
Surrogate 4-BFB	%	105	105	104	106	106

vTRH(C6-C10)/BTEXN in Water						
Our Reference		302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference	UNITS	MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	12/08/2022	12/08/2022	12/08/2022	12/08/2022	12/08/2022
Date analysed	-	12/08/2022	12/08/2022	12/08/2022	12/08/2022	12/08/2022
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	100	100	100	100	100
Surrogate toluene-d8	%	93	94	94	95	95
Surrogate 4-BFB	%	105	105	104	106	106

vTRH(C6-C10)/BTEXN in Water				
Our Reference		302645-6	302645-7	302645-8
Your Reference	UNITS	TB-W1	TS-W1	FR1-IP
Date Sampled		08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water
Date extracted	-	12/08/2022	15/08/2022	12/08/2022
Date analysed	-	12/08/2022	16/08/2022	13/08/2022
TRH C_6 - C_9	µg/L	<10	[NA]	<10
TRH C_6 - C_{10}	µg/L	<10	[NA]	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	[NA]	<10
Benzene	µg/L	<1	94%	<1
Toluene	µg/L	<1	89%	<1
Ethylbenzene	µg/L	<1	94%	<1
m+p-xylene	µg/L	<2	89%	<2
o-xylene	µg/L	<1	87%	<1
Naphthalene	µg/L	<1	[NA]	<1
Surrogate Dibromofluoromethane	%	102	109	97
Surrogate toluene-d8	%	94	105	94
Surrogate 4-BFB	%	105	97	104

svTRH (C10-C40) in Water						
Our Reference		302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference	UNITS	MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
Date analysed	-	12/08/2022	12/08/2022	12/08/2022	12/08/2022	12/08/2022
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	72	100	100	78	83

svTRH (C10-C40) in Water			
Our Reference		302645-6	302645-8
Your Reference	UNITS	TB-W1	FR1-IP
Date Sampled		08/08/2022	08/08/2022
Type of sample		Water	Water
Date extracted	-	11/08/2022	11/08/2022
Date analysed	-	12/08/2022	12/08/2022
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50
Surrogate o-Terphenyl	%	78	85

PAHs in Water - Low Level						
Our Reference		302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference	UNITS	MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
Date analysed	-	12/08/2022	12/08/2022	12/08/2022	12/08/2022	12/08/2022
Naphthalene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
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	<0.1	<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	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	68	90	90	75	80

PAHs in Water - Low Level			
Our Reference		302645-6	302645-8
Your Reference	UNITS	TB-W1	FR1-IP
Date Sampled		08/08/2022	08/08/2022
Type of sample		Water	Water
Date extracted	-	11/08/2022	11/08/2022
Date analysed	-	12/08/2022	12/08/2022
Naphthalene	µg/L	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	72	85

HM in water - dissolved						
Our Reference	UNITS	302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference		MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
Date analysed	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
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	4	2	3	1	5
Lead-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	3	3	<1	14	<1
Zinc-Dissolved	μg/L	26	31	12	70	13

HM in water - dissolved			
Our Reference	UNITS	302645-6	302645-8
Your Reference		TB-W1	FR1-IP
Date Sampled		08/08/2022	08/08/2022
Type of sample		Water	Water
Date prepared	-	11/08/2022	11/08/2022
Date analysed	-	11/08/2022	11/08/2022
Arsenic-Dissolved	μg/L	<1	<1
Cadmium-Dissolved	μg/L	<0.1	<0.1
Chromium-Dissolved	μg/L	<1	<1
Copper-Dissolved	μg/L	<1	<1
Lead-Dissolved	μg/L	<1	<1
Mercury-Dissolved	μg/L	<0.05	<0.05
Nickel-Dissolved	μg/L	<1	<1
Zinc-Dissolved	μg/L	<1	3

PFAS in Waters Trace Extended						
Our Reference		302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference	UNITS	MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
Date analysed	-	11/08/2022	11/08/2022	11/08/2022	11/08/2022	11/08/2022
Perfluorobutanesulfonic acid	µg/L	0.0071	0.0057	0.003	<0.0004	0.003
Perfluoropentanesulfonic acid	µg/L	0.004	0.004	0.001	<0.001	<0.001
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0054	0.029	0.0046	<0.0002	0.0045
Perfluoroheptanesulfonic acid	µg/L	<0.001	0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonic acid PFOS	µg/L	0.0008	0.0077	0.0041	<0.0002	0.0042
Perfluorodecanesulfonic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorobutanoic acid	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentanoic acid	µg/L	0.02	0.025	0.007	<0.002	0.007
Perfluorohexanoic acid	µg/L	0.020	0.018	0.0071	<0.0004	0.0073
Perfluoroheptanoic acid	µg/L	0.0058	0.0061	0.003	<0.0004	0.003
Perfluorooctanoic acid PFOA	µg/L	0.0059	0.013	0.0072	<0.0002	0.0070
Perfluorononanoic acid	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorodecanoic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
4:2 FTS	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 FTS	µg/L	0.001	0.001	<0.0004	<0.0004	<0.0004
8:2 FTS	µg/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
10:2 FTS	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	<0.02	<0.02	<0.02	<0.01	<0.02
N-Methyl perfluorooctane sulfonamide	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	µg/L	<0.02	<0.01	<0.01	<0.05	<0.01
N-Et perfluorooctanesulfonamid oethanol	µg/L	<0.2	<0.1	<0.1	<0.5	<0.1
MePerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EtPerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Surrogate $^{13}C_8$ *PFOS*	%	108	110	110	99	101
Surrogate $^{13}C_2$ *PFOA*	%	109	104	106	117	100
Extracted ISTD $^{13}C_3$ *PFBS*	%	83	76	85	89	86
Extracted ISTD $^{18}O_2$ *PFHxS*	%	91	77	85	113	81
Extracted ISTD $^{13}C_4$ *PFOS*	%	86	69	79	95	75
Extracted ISTD $^{13}C_4$ *PFBA*	%	88	97	95	91	95

PFAS in Waters Trace Extended						
Our Reference		302645-1	302645-2	302645-3	302645-4	302645-5
Your Reference	UNITS	MW102	MW107	MW109	MW114	WDUP1
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water	Water
Extracted ISTD $^{13}C_3$ PFPeA	%	49	60	71	67	70
Extracted ISTD $^{13}C_2$ PFHxA	%	72	75	85	111	83
Extracted ISTD $^{13}C_4$ PFHpA	%	84	77	90	133	83
Extracted ISTD $^{13}C_4$ PFOA	%	84	80	88	107	87
Extracted ISTD $^{13}C_5$ PFNA	%	103	86	98	110	98
Extracted ISTD $^{13}C_2$ PFDA	%	95	88	93	131	91
Extracted ISTD $^{13}C_2$ PFUnDA	%	98	86	84	121	85
Extracted ISTD $^{13}C_2$ PFDoDA	%	94	84	84	122	83
Extracted ISTD $^{13}C_2$ PFTeDA	%	99	97	80	100	75
Extracted ISTD $^{13}C_2$ 4:2FTS	%	131	113	127	166	124
Extracted ISTD $^{13}C_2$ 6:2FTS	%	141	118	140	#	133
Extracted ISTD $^{13}C_2$ 8:2FTS	%	162	120	150	#	141
Extracted ISTD $^{13}C_8$ FOSA	%	38	48	42	76	43
Extracted ISTD d_3 N MeFOSA	%	93	94	97	89	93
Extracted ISTD d_5 N EtFOSA	%	99	97	100	92	94
Extracted ISTD d_7 N MeFOSE	%	94	93	97	89	91
Extracted ISTD d_9 N EtFOSE	%	92	97	96	88	95
Extracted ISTD d_3 N MeFOSAA	%	96	94	89	160	91
Extracted ISTD d_5 N EtFOSAA	%	112	109	100	154	107
Total Positive PFHxS & PFOS	μg/L	0.0062	0.037	0.0087	<0.0002	0.0087
Total Positive PFOS & PFOA	μg/L	0.0067	0.020	0.011	<0.0002	0.011
Total Positive PFAS	μg/L	0.070	0.11	0.037	<0.0002	0.036

PFAS in Waters Trace Extended		
Our Reference		302645-6
Your Reference	UNITS	TB-W1
Date Sampled		08/08/2022
Type of sample		Water
Date prepared	-	11/08/2022
Date analysed	-	11/08/2022
Perfluorobutanesulfonic acid	μg/L	<0.0004
Perfluoropentanesulfonic acid	μg/L	<0.001
Perfluorohexanesulfonic acid - PFHxS	μg/L	<0.0002
Perfluoroheptanesulfonic acid	μg/L	<0.001
Perfluorooctanesulfonic acid PFOS	μg/L	<0.0002
Perfluorodecanesulfonic acid	μg/L	<0.002
Perfluorobutanoic acid	μg/L	<0.002
Perfluoropentanoic acid	μg/L	<0.002
Perfluorohexanoic acid	μg/L	<0.0004
Perfluoroheptanoic acid	μg/L	<0.0004
Perfluorooctanoic acid PFOA	μg/L	<0.0002
Perfluorononanoic acid	μg/L	<0.001
Perfluorodecanoic acid	μg/L	<0.002
Perfluoroundecanoic acid	μg/L	<0.002
Perfluorododecanoic acid	μg/L	<0.005
Perfluorotridecanoic acid	μg/L	<0.01
Perfluorotetradecanoic acid	μg/L	<0.05
4:2 FTS	μg/L	<0.001
6:2 FTS	μg/L	<0.0004
8:2 FTS	μg/L	<0.0004
10:2 FTS	μg/L	<0.002
Perfluorooctane sulfonamide	μg/L	<0.01
N-Methyl perfluorooctane sulfonamide	μg/L	<0.05
N-Ethyl perfluorooctanesulfon amide	μg/L	<0.1
N-Me perfluorooctanesulfonamid oethanol	μg/L	<0.05
N-Et perfluorooctanesulfonamid oethanol	μg/L	<0.5
MePerfluorooctanesulf- amid oacetic acid	μg/L	<0.002
EtPerfluorooctanesulf- amid oacetic acid	μg/L	<0.002
Surrogate $^{13}C_8$ PFOS	%	99
Surrogate $^{13}C_2$ PFOA	%	108
Extracted ISTD $^{13}C_3$ PFBS	%	84
Extracted ISTD $^{18}O_2$ PFHxS	%	104
Extracted ISTD $^{13}C_4$ PFOS	%	83
Extracted ISTD $^{13}C_4$ PFBA	%	114

PFAS in Waters Trace Extended		
Our Reference		302645-6
Your Reference	UNITS	TB-W1
Date Sampled		08/08/2022
Type of sample		Water
Extracted ISTD $^{13}C_3$ *PFPeA*	%	86
Extracted ISTD $^{13}C_2$ *PFHxA*	%	108
Extracted ISTD $^{13}C_4$ *PFHpA*	%	115
Extracted ISTD $^{13}C_4$ *PFOA*	%	103
Extracted ISTD $^{13}C_5$ *PFNA*	%	101
Extracted ISTD $^{13}C_2$ *PFDA*	%	113
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	103
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	107
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	70
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	135
Extracted ISTD$^{13}C_2$ *6:2FTS*	%	153
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	#
Extracted ISTD $^{13}C_8$ *FOSA*	%	71
Extracted ISTD d_3 *N MeFOSA*	%	98
Extracted ISTD d_5 *N EtFOSA*	%	105
Extracted ISTD d_7 *N MeFOSE*	%	98
Extracted ISTD d_9 *N EtFOSE*	%	100
Extracted ISTD d_3 *N MeFOSAA*	%	128
Extracted ISTD d_5 *N EtFOSAA*	%	121
Total Positive PFHxS & PFOS	µg/L	<0.0002
Total Positive PFOS & PFOA	µg/L	<0.0002
Total Positive PFAS	µg/L	<0.0002

Miscellaneous Inorganics					
Our Reference		302645-1	302645-2	302645-3	302645-4
Your Reference	UNITS	MW102	MW107	MW109	MW114
Date Sampled		08/08/2022	08/08/2022	08/08/2022	08/08/2022
Type of sample		Water	Water	Water	Water
Date prepared	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022
Date analysed	-	09/08/2022	09/08/2022	09/08/2022	09/08/2022
pH	pH Units	4.0	4.7	4.5	5.6
Electrical Conductivity	µS/cm	1,100	520	560	1,400
Chloride, Cl	mg/L	300	51	41	260
Sulphate, SO4	mg/L	60	150	170	200

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. 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 at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
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.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
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. 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.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			12/08/2022	2	12/08/2022	15/08/2022		12/08/2022	[NT]
Date analysed	-			12/08/2022	2	12/08/2022	16/08/2022		12/08/2022	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	102	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	2	<1	<1	0	98	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	93	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	93	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	90	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	93	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	93	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	96	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	[NT]	[NT]
Styrene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
o-xylene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	97	2	100	105	5	96	[NT]
Surrogate toluene-d8	%		Org-023	95	2	94	96	2	98	[NT]
Surrogate 4-BFB	%		Org-023	106	2	105	101	4	100	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			12/08/2022	2	12/08/2022	15/08/2022		12/08/2022	[NT]
Date analysed	-			12/08/2022	2	12/08/2022	16/08/2022		12/08/2022	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	2	<10	<10	0	98	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	2	<10	<10	0	98	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	94	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	95	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	94	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	94	[NT]
o-xylene	µg/L	1	Org-023	<1	2	<1	<1	0	94	[NT]
Naphthalene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	97	2	100	105	5	96	[NT]
Surrogate toluene-d8	%		Org-023	95	2	94	96	2	98	[NT]
Surrogate 4-BFB	%		Org-023	106	2	105	101	4	100	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			11/08/2022	5	11/08/2022	11/08/2022		11/08/2022	[NT]
Date analysed	-			12/08/2022	5	12/08/2022	12/08/2022		11/08/2022	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	5	<50	<50	0	90	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	5	<100	<100	0	92	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	5	<100	<100	0	86	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	5	<50	<50	0	90	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	5	<100	<100	0	92	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	5	<100	<100	0	86	[NT]
Surrogate o-Terphenyl	%		Org-020	77	5	83	93	11	90	[NT]

QUALITY CONTROL: PAHs in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			11/08/2022	5	11/08/2022	11/08/2022		11/08/2022	[NT]
Date analysed	-			12/08/2022	5	12/08/2022	12/08/2022		12/08/2022	[NT]
Naphthalene	µg/L	0.2	Org-022/025	<0.2	5	<0.2	<0.2	0	63	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	63	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	65	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	76	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	65	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	65	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	66	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	5	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	76	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	86	5	80	87	8	77	[NT]

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	302645-2
Date prepared	-			11/08/2022	1	11/08/2022	11/08/2022		11/08/2022	11/08/2022
Date analysed	-			11/08/2022	1	11/08/2022	11/08/2022		11/08/2022	11/08/2022
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	97	95
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	102	98
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	90	94
Copper-Dissolved	µg/L	1	Metals-022	<1	1	4	4	0	97	99
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	97	99
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	101	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	3	3	0	98	99
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	26	26	0	104	96

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	302645-2
Date prepared	-			11/08/2022	1	11/08/2022	11/08/2022		11/08/2022	11/08/2022
Date analysed	-			11/08/2022	1	11/08/2022	11/08/2022		11/08/2022	11/08/2022
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	1	0.0071	0.0069	3	104	99
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	0.004	0.004	0	106	103
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	1	0.0054	0.0052	4	101	94
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	100	104
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	1	0.0008	0.0008	0	102	96
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	85	86
Perfluorobutanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.02	<0.02	0	100	94
Perfluoropentanoic acid	µg/L	0.002	Org-029	<0.002	1	0.02	0.020	0	101	81
Perfluorohexanoic acid	µg/L	0.0004	Org-029	<0.0004	1	0.020	0.020	0	101	81
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	<0.0004	1	0.0058	0.0055	5	102	97
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	1	0.0059	0.0054	9	103	109
Perfluorononanoic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	100	97
Perfluorodecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	99	102
Perfluoroundecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	98	101
Perfluorododecanoic acid	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	107	104
Perfluorotridecanoic acid	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	107	117
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	89	110
4:2 FTS	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	100	111
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	1	0.001	0.001	0	98	113
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	1	<0.0004	<0.0004	0	100	95
10:2 FTS	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	106	98
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	<0.01	1	<0.02	<0.02	0	111	106
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	107	118
N-Ethyl perfluorooctanesulfon amide	µg/L	0.1	Org-029	<0.1	1	<0.1	<0.1	0	104	106
N-Me perfluorooctanesulfonamid oethanol	µg/L	0.05	Org-029	<0.05	1	<0.02	<0.02	0	107	113
N-Et perfluorooctanesulfonamid oethanol	µg/L	0.5	Org-029	<0.5	1	<0.2	<0.2	0	105	114
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	110	109
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	101	99
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	107	1	108	111	3	100	98
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	103	1	109	98	11	101	104

QUALITY CONTROL: PFAS in Waters Trace Extended					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	302645-2
Extracted ISTD $^{13}C_3$ *PFBS*	%		Org-029	86	1	83	68	20	86	80
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	95	1	91	70	26	92	87
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	85	1	86	74	15	91	87
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	102	1	88	88	0	103	#
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	92	1	49	43	13	92	64
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	97	1	72	62	15	97	84
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	97	1	84	69	20	97	87
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	95	1	84	69	20	92	87
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	100	1	103	83	22	99	97
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	98	1	95	85	11	98	92
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	95	1	98	89	10	100	94
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	90	1	94	89	5	95	92
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	64	1	99	88	12	76	98
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	110	1	131	102	25	114	115
Extracted ISTD$^{13}C_2$ *6:2FTS*	%		Org-029	112	1	141	109	26	118	124
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	121	1	162	129	23	115	133
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	59	1	38	30	24	42	29
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	92	1	93	93	0	91	93
Extracted ISTD d_5 *N EtFOSA*	%		Org-029	97	1	99	97	2	96	93
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	94	1	94	92	2	93	97

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	302645-2
Extracted ISTD d_9 N EtFOSE	%		Org-029	90	1	92	94	2	96	92
Extracted ISTD d_3 N MeFOSAA	%		Org-029	88	1	96	91	5	91	94
Extracted ISTD d_5 N EtFOSAA	%		Org-029	94	1	112	107	5	97	104

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	302645-2
Date prepared	-			09/08/2022	1	09/08/2022	09/08/2022		09/08/2022	09/08/2022
Date analysed	-			09/08/2022	1	09/08/2022	09/08/2022		09/08/2022	09/08/2022
pH	pH Units		Inorg-001	[NT]	1	4.0	[NT]		98	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	1100	[NT]		102	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	300	310	3	99	85
Sulphate, SO4	mg/L	1	Inorg-081	<1	1	60	77	25	92	#

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.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

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.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

MISC_INORG:# Percent recovery is not applicable due to the high concentration of the analyte/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Dissolved Metals: no filtered, preserved sample was received for #6, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.
Note: there is a possibility some elements may be underestimated.

FOSA, EtFOSA, MeFOSE, EtFOSE Extracted Internal Standard is outside of global acceptance criteria (50-150%) for (LCS and/or MB) but within analyte specific acceptance criteria.

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

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	C Ridley

Sample Login Details	
Your reference	E35312BR, Wahroonga
Envirolab Reference	302645
Date Sample Received	09/08/2022
Date Instructions Received	09/08/2022
Date Results Expected to be Reported	16/08/2022

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	8 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	14
Cooling Method	Ice
Sampling Date Provided	YES

Comments
Nil

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	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Low Level	HM in water - dissolved	PFAS in Waters Trace Extended	pH	Electrical Conductivity	Chloride, Cl	Sulphate, SO4
MW102	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW107	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW109	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW114	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WDUP1	✓	✓	✓	✓	✓	✓				
TB-W1		✓	✓	✓	✓	✓				
TS-W1		✓								
FR1-IP		✓	✓	✓	✓					

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

Additional Info

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 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: Date Results Required: Page:	E35312BR STANDARD 1 of 1	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Craig Ridley Cridley@jkenvironments.com.au

Location: Wahroonga

Sampler: AD

Sample Preserved in Esky on Ice

Tests Required

	Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Combo 2	Combo 3L	VOCs	pH / EC	8 Metals	PAHs	TRH/BTEX	BTEX	Hardness	PFAS (Trace, Extended)	Chloride / Suphate	
1	8/08/2022		MW102	G1x2, PFASx2, Vx4, H	1.5	Water		X	X	X						X	X	
2	8/08/2022		MW107	G1x2, PFASx2, Vx4, H	0	Water		X	X	X						X	X	
3	8/08/2022		MW109	G1x2, PFASx2, Vx4, H	0.4	Water		X	X	X						X	X	
4	8/08/2022		MW114	G1x2, PFASx2, Vx4, H	5.9	Water		X	X	X						X	X	
5	8/08/2022		WDUP1	G1x2, PFASx2, Vx4, H	–	Duplicate		X	X							X		
	8/08/2022		WDUP2	G1x2, PFASx2, Vx4, H	–	Duplicate		X	X							X		
6	8/08/2022		TB-W1	G1x2, PFAS, Vx2, H	–	Trip Blank		X								X		
7	8/08/2022		TS-W1	V	–	Trip Spike								X				
8	8/08/2022		FR1-IP	G1x2, Vx2, H	–	Rinsate		X										
			** SEND WDUP2 TO VIC **															

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 302645
Date Received: 9.8.22
Time Received: 1200
Received By: VC
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):	Sample Containers:
All analysis PQLs to ANZECC (2000) Detection Limits Please	G1 - 500ml Amber Glass Bottle PFAS - 250mL PVC (no liner) V - BTEX Vial H - HNO3 Wash PVC PVC - HDPE Plastic Bottles

Relinquished By:	Date:	Time:	Received By:	Date:
[signature]	09/08/22	1200 ~~10:30am~~	VC	09/08/22

Appendix H: Groundwater Field Records

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	Hammond Care
Project:	Proposed Redevelopment of Neringah Hospital
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW
Job Number:	E35312BR

PID

Make: Honeywell	Model: Minirae Lite	Unit: Hire	Date of last factory calibration:
Date of calibration: 2/8/22		Name of Calibrator: EL	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100.0 ppm		Error in measured reading: ±	ppm
Measured reading Acceptable (Yes/No):			

PID

Make: MiniRae Lite Plus	Model: PGM-7300	Unit: ~~[illegible]~~ PID3	Date of last factory calibration: 22/07/22
Date of calibration: 05/08/22		Name of Calibrator: AD	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100.3 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):			

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	Hammond Care		
Project:	Proposed Redevelopment of Neringah Hospital		
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW		
Job Number:	E35312BR		
DISSOLVED OXYGEN			
Make: YSI 5		Model: Professional Plus	
Date of calibration: 9/8/22		Name of Calibrator: FW	
Span value: 70% to 130%			
Measured value: 98%			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI 5		Model: Professional Plus	
Date of calibration: 9/8/22		Name of Calibrator: FW	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 06/23	Lot No: 384001
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 04/23	Lot No: 380832
Measured reading of Buffer 1: 7.14			
Measured reading of Buffer 2: 4.08			
Slope:		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI 5		Model: Professional Plus	
Date: 4/8/22	Name of Calibrator: FW		Temperature: °C
Calibration solution: Conductivity Standard		Expiry date: 05/23	Lot No: 381243
Theoretical conductivity at temperature (see solution container): 1224 µS/cm			
Measured conductivity: 1222 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI 5		Model: Professional Plus	
Date of calibration: 4/8/22		Name of Calibrator: FW	
Calibration solution: 240mV		Expiry date: 01/27	Lot No: 73527
Theoretical redox value: 240mV			
Measured redox reading: 231.4 mV		Measured reading Acceptable (Yes/No):	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	Hammond Care		
Project:	Proposed Redevelopment of Neringah Hospital		
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW		
Job Number:	E35312BR		
DISSOLVED OXYGEN			
Make: YSI 5		Model:	
Date of calibration: 08/08/22		Name of Calibrator: AD	
Span value: 70% to 130%			
Measured value: 107%			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI 5		Model:	
Date of calibration: 08/08/22		Name of Calibrator: AD	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 06/23	Lot No: 384001
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 09/23	Lot No: 386479
Measured reading of Buffer 1: 6.93			
Measured reading of Buffer 2: 4.04			
Slope:		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI5		Model:	
Date: 08/08/22	Name of Calibrator: AD		Temperature: 12.9 °C
Calibration solution: conductivity standard		Expiry date: 06/23	Lot No: 381243
Theoretical conductivity at temperature (see solution container): 1089 µS/cm			
Measured conductivity: 1172 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI 5		Model:	
Date of calibration: 08/08/22		Name of Calibrator: AD	
Calibration solution: ORP Test Solution		Expiry date: 01/27	Lot No: 7352
Theoretical redox value: 240mV			
Measured redox reading: 247.4 mV		Measured reading Acceptable (Yes/No):	

JKEnvironments

Client:	Hammond Care	**Job No.:**	E35312BR
Project:	Proposed Redevelopment of Neringah Hospital	**Well No.:**	BH114W107
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	**Depth (m):**	8.0m

(8-2.27)÷3 =17.19L

WELL FINISH DETAILS

Gatic Cover ☒ Standpipe ☐ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Development	**SWL – Before (m):**	2.27m
Date:	4/8/22	**Time – Before:**	9:59
Undertaken By:	EW	**SWL – After (m):**	-
Total Vol. Removed:	26	**Time – After:**	10:16
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1L	18.1	8.7	1110	5.05	75.1
3	19.4	6.8	1141	4.71	74.7
5	19.3	6.7	1166	4.71	75.6
7	19.0	6.5	1079	4.76	75.2
9	18.7	6.1	1011	4.79	74.9
11	18.9	5.7	1095	4.71	74.5
13	19.1	5.2	1009	4.63	72.7
15	19.2	4.5	985	4.52	72.3
17	19.4	3.8	1115	4.32	73.3
20	19.6	4.6	647	4.55	67.8
25	19.6	4.6	686	4.68	64.3
26	19.5	4.3	689	4.59	61.6

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

YSI Used: 5 Very Low recharge, well purged effectively dry

Tested By:	EW
Date Tested:	4/8/22
Checked By:	CR
Date:	24/8/22

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:	Hammond Care	**Job No.:**	**E35312BR**
Project:	Proposed Redevelopment of Neringah Hospital	**Well No.:**	MW107
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	**Depth (m):**	8.2

WELL FINISH DETAILS

	Gatic Cover ☒	**Standpipe** ☐	**Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	~~[illegible]~~ Development	**SWL – Before (m):**	3.65
Date:	4/8/22	**Time – Before:**	11:41
Undertaken By:	EW	**SWL – After (m):**	~
Total Vol. Removed:	15L	**Time – After:**	12.02
PID Reading (ppm):	0.6		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2	19.3	2.8	590	4.53	43.6
4	19.7	2.9	591	4.73	41.8
6	19.5	2.6	591	4.75	41.1
8	19.4	2.6	587	4.60	41.3
10	19.4	2.1	584	4.47	41.2
12	19.3	1.6	572	4.40	40.9
~~14~~ 15	19.8	0.9	582	4.83	39.5

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

YSI Used: 5 High SiH load, well purged dry

Tested By:	EW
Date Tested:	4/8/22
Checked By:	CR
Date:	24/8/22

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:	Hammond Care	**Job No.:**	E35312BR
Project:	Proposed Redevelopment of Neringah Hospital	**Well No.:**	BH/MW104
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	**Depth (m):**	8.2m

WELL FINISH DETAILS

Gatic Cover ☒ Standpipe ☐ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dedgpnot	**SWL – Before (m):**	2.46
Date:	4/8/22	**Time – Before:**	10:42
Undertaken By:	EW	**SWL – After (m):**	-
Total Vol. Removed:	14	**Time – After:**	11:20
PID Reading (ppm):	0.0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2	18.5	2.2	222.1	4.51	40.7
4	18.4	2.4	413.8	4.55	40.5
6	18.0	2.7	418.2	4.62	40.1
8	17.7	3.0	396.3	4.55	40.5
10	17.9	2.3	395.5	4.51	41.3
12	18.3	1.9	414.5	4.49	41.2
14	18.4	2.4	408	4.5	40.8

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

YSI Used: 5 High Silt load, low recharge. Well pumped dry

Tested By:	EW	**Remarks:**
Date Tested:	4/8/22	- 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
Checked By:	CR	- Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Date:	24/8/22	

JKEnvironments

Client:	Hammond Care	**Job No.:**	**E35312BR**
Project:	Proposed Redevelopment of Neringah Hospital	**Well No.:**	MW114
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	**Depth (m):**	14m

WELL FINISH DETAILS

Gatic Cover ☒ **Standpipe** ☐ **Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Development	**SWL – Before (m):**	5.31
Date:	4/8/22	**Time – Before:**	12:28
Undertaken By:	EW	**SWL – After (m):**	8.16
Total Vol. Removed:	10	**Time – After:**	13:15
PID Reading (ppm):	3.5		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2 L	18.7	1.3	~~0.9~~ 1035	~~1091~~ 5.0	27.2
4	18.7	1.0	1089	5.67	27.2
6	18.8	1.1	1081	5.63	27.2
8	18.9	1.2	1084	5.62	27.0
10	18.8	2.6	1103	5.68	37.3
- Pump	failure @	8.16m			

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

YSI Used: 5 High Silt load

Tested By:	EW	**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
Date Tested:	4/8/22	
Checked By:	CR	
Date:	24/4/22.	

JKEnvironments

Client:	Hammond Care	Job No.:	E35312BR
Project:	Proposed Redevelopment of Neringah Hospital	Well No.:	MW102
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	Depth (m):	8m

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	2.44
Date:	08/08/22	Time – Before:	12:22
Undertaken By:	AD	Total Vol Removed:	9L
Pump Program No:	Low speed	PID (ppm):	1.5

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
12:34	2.62	0.5		17.3	4.1	869	4.20	30.7
12:38	2.74	1.0		17.6	3.3	897	4.12	34.4
12:42	2.84	1.5		18.0	3.1	893	4.10	40.1
12:46	2.94	2.0		17.9	3.0	899	4.08	43.7
12:50	3.02	2.5		17.9	3.0	903	4.08	45.8
12:54	3.10	3.0		17.7	2.9	903	4.09	48.6
12:58	3.14	3.5		17.5	2.9	898	4.08	50.0
1:02	3.19	4.0		16.8	2.7	893	4.10	52.9
1:06	3.21	4.2		16.8	2.8	892	4.10	53.5
1:10	3.23	4.4		16.7	2.7	892	4.11	54.6
1:14	3.24	4.6		16.9	2.7	897	4.11	54.2
1:18	3.25	4.8		16.9	2.7	902	4.10	54.6
1:22	3.27	5.0		17.0	2.9	907	4.11	56.1
1:26	3.33	5.5		17.5	2.8	917	4.11	58.9
1:30	3.39	6.0		18.7	2.7	954	4.13	61.4
1:34	3.44	6.5		18.8	2.7	956	4.13	62.0
1:38	3.47	7.0		19.0	2.6	959	4.12	64.5
1:42	3.49	7.1		18.6	2.4	958	4.12	62.4
1:46	3.49	7.2		18.0	2.4	944	4.12	61.5
1:50	3.50	7.3		17.4	2.4	930	4.11	61.6
1:54	3.50	7.4		17.1	2.4	927	4.10	62.0
1:58	3.50	7.5		17.0	2.5	930	4.09	63.1
			Started 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, 1 x HNO3 plastic, x H2SO4 plastic, 2 x ~~unpreserved plastic~~ PFAS

YSI used: 5

Tested By: Alexis Diodati	**Remarks:**
Date Tested: 08/08/22	- Steady state conditions
Checked By: CM	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 24/8/22	

JKEnvironments

Client:	Hammond Care	**Job No.:**	E35312BR
Project:	Proposed Redevelopment of Neringah Hospital	**Well No.:**	MW107
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	**Depth (m):**	8.2m

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	3.83
Date:	08/08/22	**Time – Before:**	10:21am
Undertaken By:	AD	**Total Vol Removed:**	9L
Pump Program No:	Lowspeed	**PID (ppm):**	0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
10:30	4.09	1.0		16.4	2.4	357.6	4.67	27.0
10:34	4.20	1.5		16.6	1.7	358.7	4.62	26.4
10:38	4.29	2.0		16.6	1.7	359.0	4.61	26.1
10:42	4.31	2.5		15.8	1.6	352.1	4.60	25.7
10:46	4.33	3.0		15.6	1.4	351.9	4.59	25.2
10:50	4.35	3.5		15.7	1.4	356.6	4.58	24.8
10:54	4.34	3.8		15.0	1.5	354.5	4.56	23.9
10:58	4.34	4.0		15.0	1.5	354.2	4.55	23.9
11:02	4.34	4.2		14.9	1.4	356.9	4.55	23.3
11:06	4.34	4.4		15.0	1.2	364.4	4.54	22.9
11:10	4.34	4.6		15.1	1.2	365.1	4.53	22.7
			Started 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, 1 x HNO3 plastic, x H2SO4 plastic, 2 x ~~unpreserved plastic~~ PFAS

YSI used: 5 WDUP2

Tested By: Alexis Diodati	**Remarks:**
Date Tested: 08/08/22	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10%
Date: 24/8/22	10% and SWL stable/not in drawdown

JKEnvironments

Client:	Hammond Care	Job No.:	E35312BR
Project:	Proposed Redevelopment of Neringah Hospital	Well No.:	MW109
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	Depth (m):	8.2m

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	2.62m
Date:	08/08/22	Time – Before:	7:57am
Undertaken By:	AD	Total Vol Removed:	14L
Pump Program No:	Low speed	PID (ppm):	0.4

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
8:08	2.75	0.5		14.0	4.3	414.5	4.82	54.9
8:12	2.89	1.5		16.0	2.8	425.4	4.52	52.1
8:16	3.03	2.0		16.1	2.5	425.6	4.47	49.7
8:20	3.11	2.5		15.7	2.5	421.2	4.46	48.2
8:24	3.20	3.0		15.5	2.4	418.8	4.44	45.6
8:28	3.27	3.5		15.4	2.3	418.1	4.42	43.6
8:32	3.35	4.0		15.6	2.8	419.3	4.41	41.6
8:36	3.40	4.5		15.6	2.3	417.9	4.40	40.5
8:40	3.47	5.0		15.3	2.2	414.8	4.38	38.8
8:44	3.52	5.5		15.7	2.2	416.9	4.37	37.7
8:48	3.56	6.0		15.5	2.1	412.5	4.36	36.0
8:52	3.60	6.5		15.5	2.1	413.5	4.34	35.7
8:56	3.65	7.0		16.1	2.0	419.7	4.33	35.3
9:00	3.74	7.5		16.3	2.0	422.4	4.32	34.8
9:04	3.84	8.0		16.3	1.9	422.0	4.30	34.2
9:08	3.87	8.2		16.0	1.9	420.6	4.30	33.8
9:12	3.83	8.5		15.4	1.7	412.8	4.28	33.3
9:16	3.82	9.0		15.2	1.7	411.6	4.27	32.7
9:20	3.82	9.5		15.0	1.7	413.6	4.27	32.3
9:24	3.78	10.0		14.1	2.1	406.0	4.29	31.9
9:28	3.76	10.5		14.4	1.9	408.4	4.27	31.9
			Started 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, 1 x HNO3 plastic, x H2SO4 plastic, 2 x PFAS ~~unpreserved plastic~~

YSI used: 5

WDUP1

Tested By: Alexis Diodati	**Remarks:**
Date Tested: 08/08/22	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10%
Date: 24/8/22	10% and SWL stable/not in drawdown

JKEnvironments

Client:	Hammond Care	**Job No.:**	**E35312BR**
Project:	Proposed Redevelopment of Neringah Hospital	**Well No.:**	MW114
Location:	Neringah Hospital, 4-12 Neringah Avenue South, WAHROONGA, NSW	**Depth (m):**	14m

WELL FINISH

X	**Gatic Cover**		**Standpipe**		**Other (describe)**

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	4.71m
Date:	08/08/22	**Time – Before:**	3:00
Undertaken By:	AD	**Total Vol Removed:**	9.5L
Pump Program No:	Low speed	**PID (ppm):**	5.9

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
3:06	4.99	0.5		18.1	1.5	1140	5.71	35.0
3:10	5.35	1.0		18.1	0.7	1238	5.63	32.4
3:14	5.73	2.0		18.2	0.5	1262	5.62	28.9
3:18	5.98	2.5		18.4	0.5	1259	5.63	27.0
3:22	6.24	3.0		18.5	0.5	1259	5.63	25.5
3:26	6.38	3.5		18.4	0.5	1258	5.63	25.4
3:30	6.48	4.0		18.4	0.7	1259	5.63	25.3
3:34	6.57	4.5		18.3	0.7	1256	5.64	25.2
3:38	6.71	5.0		18.2	0.8	1249	5.64	24.8
3:42	6.88	5.1		18.1	0.7	1239	5.64	24.3
3:46	6.96	5.2		18.0	0.8	1234	5.64	24.5
3:50	7.03	5.3		17.9	0.7	1229	5.64	24.7
3:54	7.10	5.4		17.8	0.7	1219	5.65	24.6
3:58	7.17	5.5		17.8	0.6	1211	5.65	24.7
4:02	7.25	5.6		17.6	0.7	1170	5.65	24.8
4:06	7.31	5.7		17.5	0.6	1168	5.66	24.2
4:10	7.40	6.0		17.0	0.5	1144	5.66	23.9
4:14	7.70	7.0		17.5	0.5	1147	5.67	23.3
4:18	7.97	8.0		17.5	0.6	1147	5.68	23.2
			Started 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,** 1 **x HNO3 plastic, x H2SO4 plastic,** 2 **x** ~~unpreserved plastic~~ PFAS

YSI used: 5

Tested By: Alexis Diodati	**Remarks:**
Date Tested: 08/08/22	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10%
Date: 24/8/22.	10% and SWL stable/not in drawdown

- Started sampling early, facilities manager needed to leave, wasn't permitted on site without him present

Patrick

Appendix I: Sampling, Analysis and Quality Plan

APPENDIX I

TO

HAMMONDCARE

ON

SAMPLING, ANALYSIS AND QUALITY PLAN (SAQP)

FOR

ENVIRONMENTAL INVESTIGATIONS

AT

NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA NSW

Date: 2 November 2022

Ref: E35312BRrptRev1

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DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E35312BRrpt	Final Report	22 August 2022
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This Report (which includes all attachments and annexures) has been prepared by JKE for the Client, and is intended for the use only by that Client.

This Report has been prepared pursuant to a contract between JKE and the Client and is therefore subject to:

a) JKE's proposal in respect of the work covered by the Report;
b) The limitations defined in the client's brief to JKE; and
c) The terms of contract between JKE and the Client, including terms limiting the liability of JKE.

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 which, if given, will be deemed to be upon the same terms, conditions, restrictions and limitations as apply by virtue of (a), (b), and (c) above.

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Appendix A: Figures
Appendix B: Report Explanatory Notes
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Abbreviations

Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Additional Site Investigation	**ASI**
Acid Sulfate Soil	**ASS**
Acid Sulfate Soil Management Plan	**ASSMP**
Below Ground Level	**BGL**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Dial Before You Dig	**DBYD**
Department of Land and Water Conservation	**DLWC**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Environmental Investigation Services	**EIS**
Environment Protection Authority	**EPA**
Ecological Screening Level	**ESL**
Health Investigation Level	**HILs**
Health Screening Level	**HSL**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
JK Geotechnics	**JKG**
Laboratory 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**
National Environmental Management Plan	**NEMP**
National Health and Medical Research Council	**NHMRC**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Polychlorinated Biphenyls	**PCBs**
Per- and Polyfluoroalkyl Substances	**PFAS**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Preliminary Site Investigation	**PSI**
Quality Assurance	**QA**
Quality Control	**QC**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Planning Secretary’s Environment Assessment Requirements	**SEARs**

Salinity Management Plan	**SMP**
Source, Pathway, Receptor	**SPR**
Standard Penetration Test	**SPT**
State Significant Development Application	**SSDA**
Standing Water Level	**SWL**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Petroleum Hydrocarbons	**TPH**
Total Recoverable Hydrocarbons	**TRH**
Time Weighted Average	**TWA**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Volatile Organic Compounds	**VOC**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millilitres	**ml or mL**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Milligrams per Litre	**mg/L**
Parts Per Million	**ppm**
% Volume per Volume	**%V/V**
Percentage	**%**

1 INTRODUCTION

HammondCare ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI), an Acid Sulfate Soil (ASS) assessment and a salinity investigation for the proposed hospital redevelopment at 4-12 Neringah Avenue South, Wahroonga, NSW. This report outlines the Sampling, Analysis and Quality Plan (SAQP) for the investigations. This report has been revised to include the amended development details.

This SAQP is to be submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSD-45121248) for the redevelopment of part of the site at 4-12 Neringah Avenue South, Wahroonga for the purposes of delivering additional community health services, seniors housing, as well as upgraded palliative care facilities that will contribute to the broader operation of 'Neringah Hospital.' The extent of the site is shown on Figure A below. The extent of the development area is shown on the figures attached in the appendices.

Figure A: Outline of the site, with the portion of the site subject to the SCC shaded dark red (R4 zone)

Specifically, this SSDA seeks approval for the following:

- Site preparation works comprising:
  - Demolition of the Neringah Hospital building, kiosk, and existing at-grade carparks;
  - Clearing of nominated vegetation on the proposed development areas;
  - Bulk earthworks including basement excavation; and
  - Remediation works where necessary across the site.

- Construction and use of an integrated seniors housing and health services facility across two buildings ranging from 4-5 storeys above ground, comprising:
  - 2 basement levels containing minimum of 130 car parking spaces and service dock;
  - 12 residential aged care facility beds (extension to existing Stage 1 provision);
  - 18 palliative care hospice beds (Schedule 3 health services facility);
  - Community healthcare services, including outpatient palliative care, centre for positive ageing and Hammond at Home;
  - 57 seniors housing dwellings; and
  - On-site administration, amenities and ancillary operations space.
- Ground level and on-building landscaping works, including the provision of a through site pedestrian link connecting Archdale Park and Balcombe Park;
- Public domain works, specifically, regrading of part of the pedestrian walkway known as 'Archdale Walk' to provide accessible connection; and
- Extension and augmentation of infrastructure and services required including new site signage.

This report has been prepared to respond to the Secretary's Environmental Assessment Requirements (SEARs) for SSD-45121248 that were issued on 24 June 2022. A table referencing responses has been provided below.

SEAR	Relevant section of report
13. Ground and Water Conditions Provide an assessment of salinity and acid sulfate soil (ASS) impacts.	This report outlines the sampling, analysis and quality requirements for the ASS and salinity investigations.
17. Contamination and Remediation Assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development.	This report outlines the sampling, analysis and quality requirements for the DSI.

1.1 Proposed Development Details

Based in the development plans issued to JKE, we understand that the proposed development includes major earthworks (cut/fill) over the majority of the site to achieve the development levels. The maximum cut is anticipated to be approximately 14m below ground level (BGL).

1.2 Aims and Objectives

The primary aims of the investigations include: identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make an assessment of the soil and groundwater contamination conditions; establish the potential for risks associated with dryland salinity and whether management is necessary; and establish the potential for acid sulfate soils (ASS) to be disturbed and whether a management plan is required.

A secondary aim is to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during the proposed development works.

The DSI objectives are to:

- Provide an appraisal of the past site use(s) based on a review of historical records;
- Assess the current site conditions and use(s) via a site walkover inspection;
- Identify potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Assess the soil and groundwater contamination conditions via implementation of a sampling and analysis program;
- Assess the potential risks posed by contamination to the receptors identified in the Conceptual Site Model (CSM);
- Provide a preliminary waste classification for the in-situ soil;
- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint);
- Assess whether further intrusive investigation and/or remediation is required;
- Assess whether an ASS management plan (ASSMP) is required for the proposed development; and
- Assess whether a salinity management plan (SMP) is required.

The ASS assessment and salinity investigation results will be issued under separate report covers.

1.3 Scope of Work

This SAQP has been prepared generally in accordance with a JKE proposal (Ref: EP56645BR) of 27 May 2022 and written acceptance from the client in the form of a purchase order dated 26 July 2022.

The scope of work included review of the previous environmental reports prepared for the site and preparation of an SAQP with regards to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[1], guidelines made under or with regards to the Contaminated Land Management Act (1997)[2], State Environmental Planning Policy (Resilience and Hazards) 2021[3] (formerly known as SEPP55), NSW DLWC Site Investigations for Urban Salinity (2002)[4] and the National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual (2018)[5].

A list of reference documents/guidelines is included in the appendices.

---

[1] National Environment Protection Council (NEPC), (2013). *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013).* (referred to as NEPM 2013)

[2] Contaminated Land Management Act 1997 (NSW) (referred to as CLM Act 1997)

[3] *State Environmental Planning Policy (Resilience and Hazards) 2021* (NSW) (referred to as SEPP Resilience and Hazards 2021)

[4] NSW DLWC, (2002). *Site Investigations for Urban Salinity.* (referred to as DLWC Salinity Guidelines 2002)

[5] Sullivan. L, Ward. N, Toppler. N, and Lancaster. G, (2018). *National Acid Sulfate Soil Guidance: National acid sulfate soils sampling and identification methods manual*. (Referred to as National ASS guidance 2018)

2 SITE INFORMATION

2.1 Background

2.1.1 Preliminary Site Investigation (PSI)

A Preliminary Site Investigation (PSI) was undertaken for the wider hospital property by Environmental Investigation Services (EIS, now JKE) in 2010[6]. The scope of the PSI included a review of various historical documents; a site walkover inspection and soil sampling from 12 boreholes drilled for the concurrent geotechnical investigation. Five boreholes (BH1 to BH6 inclusive) were within the current proposed development areas.

The site history information indicated that the site was likely used as a hospital since at least the 1970s. Prior to the 1970s, the site was likely used for residential purposes, and possibly activities associated with the church and the Red Cross Society.

During the site inspection, a suspected underground storage tank (UST) was identified beneath the driveway in the central-east section of the site (to the south of the main hospital building). No records relating to the UST were available for review.

Selected soil samples were analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (Benzene, toluene, ethylbenzene, xylenes - BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs), and asbestos.

The investigation identified asbestos in one fill soil sample collected from BH1. All other soil results were below the site assessment criteria (SAC).

The EIS PSI concluded that the site could be made suitable for the proposed development (alterations/additions and continued hospital use), subject to the following:

- An additional investigation was to be undertaken in the vicinity of the suspected UST;
- An asbestos consultant was to be engaged prior to any works in the vicinity of BH1; and
- A hazardous building materials (HAZMAT) survey was to be prepared prior to demolition.

2.1.2 Additional Environmental Site Assessment

EIS undertook an additional environmental site assessment in 2012[7]. The purpose of the assessment was to assess whether the UST was present beneath the driveway in the central-east section of the site, and to inspect an area where subsurface asbestos was detected during the EIS PSI (i.e. vicinity of BH1).

[6] Environmental Investigation Services, (2010). *Report to HammondCare on stage 1 Preliminary Environmental Site Assessment for Proposed Hospital Redevelopment at Neringah Hospital, 3-9 Woonona Avenue South and 2-12 Neringah Avenue South, Wahroonga, NSW.* (Ref: E24031Krpt, dated June 2010). (Referred to as EIS PSI)

[7] Environmental Investigation Services, (2012). *Additional Environmental Site Assessment. Proposed Hospital Redevelopment. Neringah Hospital; 3-9-Woonona Avenue South, Wahroonga, NSW.* (Ref: E24031Klet2, dated 28 May 2012). (Referred to as EIS AESA).

A ground-penetrating radar (GPR) survey of the suspected UST was undertaken by a specialist sub-contractor. The scan confirmed the presence of the suspected UST. The UST was estimated to be approximately 4.6m long and 2.5m wide. The depth was not able to be determined.

EIS considered the risk of exposure to asbestos in soils in the vicinity of BH1 to be very low. This was based on the surface of this area being concrete paved, and that no development was planned in the vicinity of BH1 (i.e. the soil would remain undisturbed). EIS recommended:

- The building maintenance sections were notified of the presence of asbestos in soil in the vicinity of BH1;
- The pavement and/or soil in the vicinity of BH1 was not disturbed, unless necessary; and
- If the area is to be disturbed, a qualified asbestos consultant must be engaged to provide a work plan and appropriate asbestos clearance.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner:	HammondCare
Site Address:	Part of 4-12 Neringah Avenue South, Wahroonga, NSW
Lot & Deposited Plan:	Lot 1 in DP960051, Lot 1 in DP19937, Lot 52 in DP2666 and Lot 1 in DP585805
Current Land Use:	Hospital (palliative care)
Proposed Land Use:	Hospital and Seniors housing
Local Government Authority (LGA):	Ku-ring-gai Council
Current Zoning:	R4: High-Density Residential
Development Area (m^2) (approx.):	5,700
RL (AHD in m) (approx.):	195 - 207
Geographical Location (decimal degrees) (approx. centre of site):	Latitude: -33.717627 Longitude: 151.114568
Site Location Plan:	Figure 1
Proposed Sample Location Plan:	Figure 2

2.3 Site Description Summary

The site is located in a predominantly residential area of Wahroonga. The site is bounded by Neringah Avenue South to the east. The site is located approximately 750m to the south of Cockle Creek.

The site is located within undulating regional topography which generally falls to the north and north-east at a slope of approximately 5°. The site itself falls to the north and north-east in line with the regional topography. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

A walkover inspection of the development area was undertaken by JKE on 26 July 2022 for preparation of the SAQP. An internal inspection of the buildings was not undertaken. At the time of the inspection, a 2-4 storey building (main hospital building) was located within the central and northern sections of the development area, and a single-storey building (kiosk) was located in the south-eastern section of the development area.

The main hospital building was of brick and concrete construction with fibre cement in-fill panels. The building appeared to be in generally good condition. The kiosk was located to the south of the main hospital building and was of sandstone block and concrete construction with fibre cement in-fill panels. Based on a cursory inspection, the kiosk appeared to be in reasonable condition. A brick-paved courtyard and formed gardens were to the north and east of the kiosk and appeared to be in good condition.

Asphaltic concrete (AC) and concrete paved carparks were observed to the north and south of the main hospital building, with driveways connecting to Neringah Avenue South to the east. A third concrete driveway provided vehicular access to the central courtyard of the main hospital and loading dock. The southern carpark and loading dock areas were in good condition, with minimal cracking observed. The northern carpark was in fair condition, with visible evidence of subsidence and potholes. No stains were observed on the paved surfaces.

The southern section of the development area was vacant and grass covered. Large trees and smaller shrubs were also observed in this area, generally near the kiosk and the western site boundary. Based on a cursory inspection, the vegetation appeared healthy with no visible evidence of stress or die-back.

A back-up generator was located adjacent to the north of the main hospital building. The generator was located on a raised concrete platform. JKE were advised by the facility manager that the fuel storage for the generator was built into the generator. No stains or evidence of leaks/spills were observed on the concrete platform. A second generator was located to the south of the site, within the wider property boundary. The generator was self-contained and appeared to be considerably newer that the generator in the north of the development area.

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

- North – Residential properties (predominantly high-density residential) with basement parking;
- South – Sydney Water reservoir;
- East – Neringah Avenue South, with medium to high-density residential properties beyond; and
- West – Woonona Cottage and HammondCare Wahroonga (nursing home) within the wider site boundary.

JKE did not observe any land uses in the immediate surrounds that were identified as potential off-site contamination sources for the site.

2.4 Underground Services

The 'Dial Before You Dig' (DBYD) plans were reviewed for the SAQP in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. A sewer main was located within the wider hospital property boundary, adjacent to the west of the development area. The sewer main ran in a north/south direction and extended beyond the southern and northern boundaries. The backfill around this service could act as a preferential pathway for contamination migration.

2.5 Summary of Geology and Hydrogeology

2.5.1 Regional Geology

Regional geological information reviewed for the EIS PSI indicated that the site is underlain by Ashfield Shale, which typically consists of black to dark grey shale and laminate.

2.5.2 Hydrogeology and Groundwater

Hydrogeological information reviewed for the EIS PSI identified six registered bores within 1km of the site. One bore was located approximately 90m to the north-west and down-gradient of the site and was registered for recreation purposes. The other bores were located up-gradient of the site.

Previous investigations undertaken at the site indicated that the subsurface conditions consisted of relatively low permeability (residual) soils overlying shallow bedrock. The potential for viable groundwater abstractions and use of groundwater under these conditions is considered to be low. There is reticulated water supply in the area and consumption of groundwater is not expected to occur. Use of groundwater is not proposed as part of the development.

Considering the local topography and surrounding land features, JKE would generally expect groundwater to flow towards the north.

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is Cockle Creek located approximately 750m to the north of the site. Due to the distance from the site, this water body is not considered to be a potential receptor that could be impacted by direct migration.

2.5.3 Acid Sulfate Soil

A review of the acid sulfate soil (ASS) risk map prepared by Department of Land and Water Conservation (1997)[8] indicated that the site is not located within a risk area.

An ASS assessment will be undertaken to satisfy the SEARs conditions.

[8] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130S1, Ed 2)*

2.6 Summary of Site History

The historical information presented in the EIS PSI indicated that the site was historically used for various hospital activities (i.e. activities associated with patient care) since at least the early 1970s. Prior to the 1970s, the site was likely used for residential purposes and possibly for activities associated with the church and the Red Cross Society.

A further review of site history information will be undertaken for the DSI.

3 CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and the review of site history information. Reference should also be made to the figures attached in the appendices.

3.1 Potential Contamination Sources and Contaminants of Potential Concern

The potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC) are presented in the following table:

Table 3-1: Potential (and/or known) Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. The EIS PSI identified filling beneath paved areas to depths of approximately 0.4mBGL to 1.1mBGL. Previous investigations at the site by JKE/EIS indicated deep filling within the south-west and west of the site to a maximum depth of 5.3mBGL. The depth of fill was generally less than 1mBGL in other areas of the site.	Heavy metals, petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), BTEX, PAHs,, OCPs, OPPs, PCBs, and asbestos. The EIS PSI encountered asbestos in fill soil within the central-east of the site (to the east of the main hospital building).
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings / structures on site.	Asbestos, lead and PCBs
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals and OCPs
Fuel storage – The EIS PSI identified at least one suspected UST. It is likely that the UST was used to store petrol and/or diesel. Leaks/spills or releases of stored fuel may have historically occurred.	Lead, TRH, BTEX, PAHs and Per-and Polyfluoroalkyl Substances (PFAS)

3.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 3-2: Conceptual Site Model

Potential mechanism for contamination	Potential mechanisms for contamination include: • Fill material – importation of impacted material and use of site generated waste as fill (such as incinerator waste), 'top-down' impacts (e.g. placement of fill, leaching from surficial material etc), or sub-surface release (e.g. impacts from buried material); • Use of pesticides – 'top-down' and spills (e.g. during normal use, application and/or improper storage); • On-site fuel storage – 'top-down' impacts and spills (during normal use, refilling), or sub-surface release (leaks from UST infrastructure); and • Hazardous building materials – 'top-down' (e.g. demolition resulting in surficial impacts in unpaved areas).
Affected media	Soil and groundwater have been identified as potentially affected media.
Receptor identification	Human receptors include site occupants/users (predominantly adults and aged, though may include child visitors), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users in a predominantly high-density residential setting, groundwater users and recreational water users within Cockle Creek. Ecological receptors include terrestrial organisms and plants within unpaved areas (including on-site landscaped areas), and freshwater ecology in Cockle Creek.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene, and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Potential exposure pathways for ecological receptors include primary contact and ingestion. Exposure during future site use could occur via direct contact with soil in unpaved areas such as gardens, inhalation of airborne asbestos fibres during soil disturbance, or inhalation of vapours within enclosed spaces such as buildings and basements. Exposure to groundwater is unlikely to occur in Cockle Creek through direct migration, however groundwater has the potential to enter the creek via the stormwater system (which is expected to discharge into the creek) in a drained basement scenario.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the proposed building (from soil contamination and/or volatilisation of contaminants from groundwater); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; and • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation.
Presence of preferential pathways for contaminant movement	A sewer main was located within the wider hospital property boundary, adjacent to the west of the site. The sewer main ran in a north/south direction and extended beyond the southern and northern boundaries. The backfill around this service could act as a preferential pathway for contamination migration.

4 SAMPLING, ANALYSIS AND QUALITY PLAN

4.1 Data Quality Objectives (DQO)

Data Quality Objectives (DQOs) have been developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2. The DQOs were prepared with reference to the process outlined in Schedule B2 of NEPM (2013). The seven-step DQO approach for this project is outlined in the following sub-sections.

4.1.1 Step 1 - State the Problem

The CSM identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Investigation data is required to characterise the development area, assess the potential risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required. This information will be considered by the project team in the design and delivery of the project as well as by the consent authority in exercising its planning functions in relation to the approval of the development consent and issue of construction/occupancy certificates.

A waste classification is required prior to off-site disposal of excavated soil/bedrock. An assessment of the potential for ASS and saline conditions to be encountered is required to determine whether management of ASS and/or salinity is required for the proposed development.

4.1.2 Step 2 - Identify the Decisions of the Study

The objectives of the assessment are outlined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Did the inspection, or does the historical information identify potential contamination sources/AEC within the development area?
- Are any results above the SAC?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is remediation required?
- Are the soil and groundwater characterisation sufficient to provide adequate confidence that remediation is/is not required?
- Is the development area suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?
- Does the proposed development require an ASSMP?
- Does the proposed development require a SMP?

4.1.3 Step 3 - Identify Information Inputs

The primary information inputs required to address the decisions outlined in Step 2 include the following:

- Existing relevant environmental data from previous reports;
- Existing site information from the PSI, including the PSI site observations and site history documentation;
- Site information, including observations and site history documentation;
- Sampling of potentially affected media, including soil, groundwater and fibre cement fragments (FCF);

- Observations of sub-surface variables such as soil type, photo-ionisation detector (PID) concentrations, odours and staining, and groundwater physiochemical parameters;
- Laboratory analysis of soils, FCF and groundwater for the CoPC identified in the CSM; and
- Field and laboratory QA/QC data.

4.1.4 Step 4 - Define the Study Boundary

The sampling was confined to the development area boundaries as shown in Figure 2 and was limited vertically to maximum nominated sampling depths of approximately 14mBGL (spatial boundary). The sampling was completed between July and August 2022 (temporal boundary).

4.1.5 Step 5 - Develop an Analytical Approach (or Decision Rule)

4.1.5.1 Tier 1 Screening Criteria

4.1.5.1.1 Soil

Soil data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013) and the Health Investigation Levels (HIL) presented in Table 2 of the HEPA PFAS National Environmental Management Plan (2020)[9]. HILs will be based on land use type B which is applicable to ‘residential with minimal opportunities for soil access’ exposure scenarios. The Health Screening Levels (HSL) will be based on land use Type A-B which is applicable to ‘low-high density residential’ exposure scenarios. HSLs for hydrocarbons will be derived conservatively using a sand soil type and a depth interval of 0-1m. Conservative screening criteria has been selected given the sensitive receptors (i.e. aged and hospital patients) at the site.

HSLs for direct soil contact will be adopted based on the values presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[10]. Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) will also be considered following evaluation of human health and ecological risks, and risks to groundwater.

Regarding the ecological screening criteria, the Ecological Investigation Levels (EIL) will be derived using the Ecological Investigation Level Calculation Spreadsheet (NEPC, 2010)[11] accessed from the NEPM (2013) Toolbox. Inputs into the calculations will include site specific physiochemical data for soil pH, clay content, Cation Exchange Capacity (CEC) and organic carbon. Selected samples will be analysed, with the lowest value for each parameter adopted for the calculation. The ecological SAC will be applied to the top 2m of soil in accordance with the recommendations of the NEPM (2013).

In regard to PFAS, the soil data will be compared to the ecological soil guideline values for direct exposure as presented in Table 3 of the PFAS NEMP (2020). A modified guideline value of 0.14mg/kg will be adopted for indirect exposure given that the extensive hard surface coverings and the proposed development configuration would likely result in an immaterial impact on food chain transfer to secondary consumers.

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[9] Heads of EPAs Australia and New Zealand, (2020). *PFAS National Environmental Management Plan Version 2.0*. (referred to as PFAS NEMP)

[10] Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care), (2011). Technical Report No. 10 - *Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document*

[11] National Environment Protection Council, (2010). *Ecological Investigation Level Calculation Spreadsheet*

Waste classification data is to be assessed in accordance with the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014)[12].

Where appropriate, data will be assessed against valid statistical parameters to characterise the data population. This may include calculation and application of mean values and/or 95% upper confidence limit (UCL) values for the data set, with regards to the NEPM (2013) framework and other relevant guidelines made under the CLM Act 1997. UCLs are considered acceptable where the UCL is below the SAC, the standard deviation of the data is less than 50% of the SAC and none of the individual concentrations are more than 250% of the SAC.

4.1.5.1.2 Groundwater

Groundwater data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[13]. Environmental values identified include aquatic ecosystems and human-health risks in use (e.g. recreation, irrigation) and non-use scenarios (e.g. exposure to volatile contamination above groundwater contaminant plumes).

The guideline values presented in the NHMRC Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy (2011)[14] are to be multiplied by a factor of 10 to assess potential risks associated with incidental/recreational-type exposure to groundwater (e.g. within down-gradient water bodies).

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species are to be adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[15]. The 99% trigger values are to be utilised, where required, to account for bioaccumulation. Low and moderate reliability trigger values are also to be adopted for some contaminants where high-reliability trigger values do not exist. PFAS data will be compared to the 99% trigger values for fresh waters presented in Table 5 of the PFAS NEMP (2020), to account for bioaccumulation.

4.1.5.2 Quality Assurance/Quality Control (QA/QC)

Field QA/QC will include analysis of inter-laboratory duplicates (minimum of 5% of primary samples), intra-laboratory duplicates (minimum of 5% of primary samples), and trip spike (for volatiles), trip blank (for selected organic and inorganic compounds) and rinsate (for selected organic and inorganic compounds) samples (one for each medium sampled to assess the adequacy of field practices).

The suitability of the laboratory data is to be assessed against the laboratory QA/QC criteria which will be outlined in the laboratory reports. These criteria are developed and implemented in accordance with the

[12] NSW EPA, (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

[13] NSW Department of Environment and Conservation, (2007). *Guidelines for the Assessment and Management of Groundwater Contamination.*

[14] National Health and Medical Research Council (NHMRC), (2018). *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011, Version 3.5 Updated August 2018* (referred to as ADWG 2011)

[15] 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)

laboratory's National Association of Testing Authorities, Australia (NATA) accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence are reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory will be undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, the most conservative concentration reported are to be adopted.

4.1.5.3 Appropriateness of Practical Quantitation Limits (PQLs)

The PQLs of the analytical methods are to be considered in relation to the SAC to confirm that the PQLs are less than the SAC. In cases where the PQLs are greater than the SAC, a discussion of this will be provided.

4.1.6 Step 6 – Specify Limits on Decision Errors

To limit the potential for decision errors, a range of quality assurance processes are adopted. A quantitative assessment of the potential for false positives and false negatives in the analytical results will be undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For the DSI, the null hypothesis will be adopted which is that, there is considered to be a complete source-pathway-receptor (SPR) linkage for the CoPC identified in the CSM unless this linkage can be proven not to (or unlikely to) exist.

Data Quality Indicators (DQI) for field and laboratory QA/QC samples are defined below. An assessment of the DQI's is to be made in relation to precision, accuracy, representativeness, completeness and comparability.

Field Duplicates
Acceptable targets for precision of field duplicates will be 30% or less, consistent with NEPM (2013). RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the concentrations used to calculate the RPD (i.e. RPD exceedance where concentrations are close to the PQL are typically not as significant as those where concentrations are reported at least five or 10 times the PQL), sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Trip Blanks and Rinsates
Acceptable targets for field blank and rinsate samples in this report will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to typical background concentrations in soils and published drinking water guidelines for waters.

Trip Spikes
Acceptable targets for trip spike samples will be 70% to 130%.

Laboratory QA/QC

The suitability of the laboratory data will be assessed against the laboratory QA/QC criteria. These criteria are developed and implemented in accordance with the laboratory's NATA accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

A summary of the typical limits is provided below:

RPDs

- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes

- 70-130% recovery acceptable for metals and inorganics; and
- 60-140% recovery acceptable for organics.

Surrogate Spikes

- 60-140% recovery acceptable for general organics.

Method Blanks

- All results less than PQL.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence will be reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is to be undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, we will adopt the most conservative concentration reported.

4.1.7 Step 7 - Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the objectives. Adjustment of the investigation design can occur following consultation or feedback from project stakeholders. For this investigation, the design will be optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data will be collected. The sampling plan and methodology are outlined in the following sub-sections.

4.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for the DSI is outlined in the table below:

Table 4-1: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	Samples for the DSI will be collected from 15 boreholes as shown on Figure 2 attached in Appendix A. This number of locations meets than the minimum sampling density for hotspot identification as outlined in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995)[16]. The number of locations corresponds to a sampling density of approximately one sample per 380m2. JKE note that at the time of preparing this report, the NSW EPA released the updated sampling guidelines titled NSW EPA Sampling design part 1 – application (August 2022)[17]. The recommended sampling density in the updated guidelines remains unchanged for the development area. Samples will be collected from four boreholes (BH102, BH107, BH109 and BH114 inclusive) for ASS and salinity analysis. This number of locations met the minimum sampling density outlined in National ASS Guidance (2018) and the initial site investigation for moderately intensive construction outlined in DLWC Salinity Guidelines (2002) based on the development area.
Sampling Plan	The sampling locations are placed on a systematic plan with a grid spacing of approximately 20m between sampling locations. A systematic plan is considered suitable to identify hotspots to a 95% confidence level and calculate UCLs for specific data populations. The boreholes will generally be limited to depths of approximately 1-2mBGL. Four boreholes will be extended to depths of up to approximately 6-14mBGL or prior refusal for the installation of groundwater monitoring wells.
Set-out and Sampling Equipment	Sampling locations will be set out using taped measurements from existing site features. The sampling locations will be checked for underground services by an external contractor prior to sampling. The relative surface levels of the borehole locations will be interpolated from spot height measurements outlined on the provided survey plan. Samples will be collected using a drill rig equipped with spiral flight augers, and hand tools as required. Soil samples from the boreholes drilled using the drill rig will be obtained using a Standard Penetration Test (SPT) split-spoon sampler, or directly from the auger when conditions do not allow the use of the SPT Sampler. Auger sampling will be utilised for field screening for asbestos quantification.
Sample Collection and Field QA/QC	All locations will be logged to an appropriate standard in accordance with NEPM (2013) and all samples were documented on the logs. Contamination samples (except for PFAS analysis) will be placed in glass jars with plastic caps and Teflon seals with minimal headspace. Samples for PFAS analysis will be placed in laboratory provided plastic jars with plastic caps (no Teflon). Samples for asbestos analysis will placed in zip-lock plastic bags. ASS samples and salinity samples will be placed in plastic bags and sealed with twist ties with minimal headspace. During sampling, soil at selected depths will be split into primary and duplicate samples for field QA/QC analysis. The splitting procedure includes alternate filling of the jars with soil.

[16] NSW EPA, (1995). *Contaminated Sites Sampling Design Guidelines.* (referred to as EPA Sampling Design Guidelines 1995)
[17] NSW EPA, (2022), Sampling design part 1 – application, Contaminated Land Guidelines (referred to as EPA Sampling design guidelines 2022)

Aspect	Input
	Homogenisation of duplicate samples will not occur to minimise the potential for the release of volatile organic compounds.
Field Screening	A portable PID fitted with a 10.6mV lamp will be used to screen the samples for the presence of VOCs. This will be undertaken on soil samples using the soil sample headspace method (i.e. from partly filled zip-lock plastic bags following equilibration of the headspace gases). PID calibration records will be maintained throughout the project. The field screening for asbestos quantification from the boreholes includes the following: • A representative bulk sample (approximately 10L sample, to the extent achievable based on sample return) is to be collected from fill at approximately 1m intervals, or from each distinct fill profile. The bulk sample intervals will be recorded on the borehole logs; • Each bulk sample will be weighed using an electronic scale; • Each bulk sample will be passed through a sieve with a 7.1mm aperture and inspected for the presence of FCF. Any soil clumps/nodules were to be disaggregated. If cohesive soils (i.e. stiff clays) are encountered, the bulk sample will be placed on a contrasting support (i.e. blue tarpaulin) and inspected for the presence of FCF; • The condition of FCF or any other suspected asbestos materials was noted on the field records; and • If observed, any FCF in the bulk sample were collected, placed in a zip-lock bag and assigned a unique identifier. Calculations for asbestos content will be undertaken based on the requirements outlined in Schedule B1 of NEPM (2013).
Decontamination and Sample Preservation	Sampling personnel will use disposable nitrile gloves during sampling activities. Re-usable sampling equipment will be decontaminated using potable water (with rags and scrubbing brush), followed by a rinse with potable water. Detergents (such as Decon90) will not be utilised during the decontamination process as they may result in interference during PFAS analysis. Soil samples will be preserved by immediate storage in an insulated sample container with ice. On completion of the fieldwork, the samples may be stored temporarily in fridges in the JKE warehouse before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

4.3 Groundwater Sampling Plan and Methodology

The groundwater sampling plan and methodology is outlined in the table below:

Table 4-2: Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Four groundwater wells will be installed in BH102 (MW102), BH107 (MW107), BH109 (MW109), and BH114 (MW114), as shown on Figure 2 in Appendix A. Considering the topography and the location of the nearest down-gradient water body, MW114 is considered to be in the up-gradient of the site and are expected to provide an indication of groundwater flowing onto (beneath) the site. MW107 is considered to be in the intermediate area of the site and is expected to provide an indication of groundwater flowing beneath the site. MW102 is considered to be in the down-gradient of the site and is expected to provide an

Aspect	Input
	indication of groundwater flowing off-site. MW109 is targeted to the down-gradient location of the abandoned UST.
Monitoring Well Installation Procedure	The monitoring well construction details are to be documented on the corresponding borehole log. The wells will be installed to maximum depth of approximately 6mBGL to 14mBGL based on site conditions and generally constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) installed in the lower section of the well to intersect groundwater; • 50mm diameter Class 18 PVC casing installed in the upper section of the well (screw fixed); • A 2mm sand filter pack around the screen section for groundwater infiltration; • A hydrated bentonite seal/plug on top of the sand pack to seal the well; and • A gatic cover installed at the surface with a concrete plug to limit the inflow of surface water. The well construction is considered to be appropriate for screening purposes to assess general aquifer conditions with regards to the recommended monitoring well installation requirements in Schedule B2 of NEPM 2013.
Monitoring Well Development	The monitoring wells will be developed using a submersible electrical pump with single-use tubing. A calibrated water quality meter will be used to measure pH, EC, DO, Eh and temperature. Development is to occur until steady state conditions are achieved. For the DSI, steady state conditions are defined as the pH measurements over a one-minute time interval varying by less than 0.2 units, the difference in EC over the same period varying by less than 10%, and the SWL not being in drawdown. In the event that groundwater in-flow is relatively slow, the development will continue until the wells are effectively dry.
Groundwater Sampling	Prior to sampling, the monitoring wells will be checked for the presence of Light Non-Aqueous Phase Liquids (LNAPLs) using an inter-phase probe electronic dip meter. The monitoring well head space will also be checked for VOCs using a calibrated PID unit. Samples will be obtained using a peristaltic pump, after purging to achieve steady state conditions. Where steady state conditions cannot be achieved, the wells will be sampled whilst the SWL is in drawdown. Groundwater samples will be obtained directly from the single use tubing and placed in the sample containers. Duplicate samples are to be obtained by alternate filling of sample containers. This technique will be adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc. Groundwater removed from the wells during development and sampling will be transported to JKE in jerry cans and stored in holding drums prior to collection by a licensed wastewater contractor for off-site disposal.
Decontaminant and Sample Preservation	The inter-phase probe electronic dip meter will be decontaminated between monitoring wells using potable water (with rags and scrubbing brush), followed by a rinse with potable water. Detergents (such as Decon 90) will not be utilised during the decontamination process as they may result in interference during PFAS analysis. The groundwater sampling process utilises a peristaltic pump and single-use tubing, therefore no decontamination procedure for the sampling is considered necessary. The samples will be preserved with reference to the analytical requirements and placed in an insulated container with ice. On completion of the fieldwork, the samples may be temporarily stored in a fridge at the JKE office, before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

4.4 Laboratory Analysis and Analytical Rationale

Samples are to be analysed by an appropriate, NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013. The laboratory details are provided in the table below:

Table 4-3: Laboratory Details

Samples	Laboratory
All primary samples and field QA/QC samples including (intra-laboratory duplicates, trip blanks, trip spikes and field rinsates)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)

For the DSI, an allowance has been made for the following analysis:

- Up to 30 selected soil samples for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH; and BTEX;
- Up to 15 selected soil samples for: OCP; OPP; PCBs; and PFAS;
- Up to 15 selected soil samples (500mL) for asbestos using laboratory quantification (gravimetric) methods;
- Up to five selected FCF, if found on or in soil, analysed for asbestos;
- Up to 22 selected soil/rock samples will be analysed for pH, electrical conductivity (EC), resistivity (calculated from EC results), sulphate and chloride and soil texture;
- Up to 10 selected soil samples will be analysed for cation exchange capacity (CEC);
- Up to three targeted soil samples will be analysed for pH; CEC; and clay content for the calculation of EILs for selected metals;
- Targeted toxicity characteristic leachate procedure (TCLP) analysis for selected metals, PAHs and PFAS for waste classification purposes;
- Up to 32 selected soil samples for ASS characteristics using the pH field test (pH_f and pH_{fox}) methods;
- Up to eight selected soil samples for ASS using the chromium reducible sulfur (S_{cr}) acid base accounting method; and
- Up to four groundwater samples for: heavy metals; TRH/BTEX; low level PAHs; trace levels of PFAS; VOCs; pH; EC; sulphate; and chloride.

The soil analysis will generally target the fill soils and the first contact of natural soils. Deeper samples may be analysed based on the results of the shallow soils and site observations. A staged approach to soil sample analysis has been undertaken to allow for targeting areas based on the results of the initial analysis round.

ASS analysis will be targeted to natural soils. Salinity analysis will include representative samples to assess the encountered fill and natural soil profiles, and underlying rock formations, to a depth of approximately 14mBGL.

4.5 Reporting Requirements

A DSI report is to be prepared presenting the results of the investigation, in accordance with the NSW EPA Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (2020)[18]. Stand-alone salinity and ASS reports will be prepared presenting the results of the investigation, in accordance with the relevant guidelines previously discussed in this SAQP.

[18] NSW EPA, (2020). *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines*

5 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;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the PSI; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- 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 accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- 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 land use. JKE should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- 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.

Important Information About This Report

These notes have been prepared by JKE to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors

This report has been prepared in response to specific project requirements as stated in the JKE proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

JKE will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by JKE to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions

Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data

Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations

Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Assessments by Design Professionals
Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely
Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

Appendix A: Figures

APPENDIX I

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

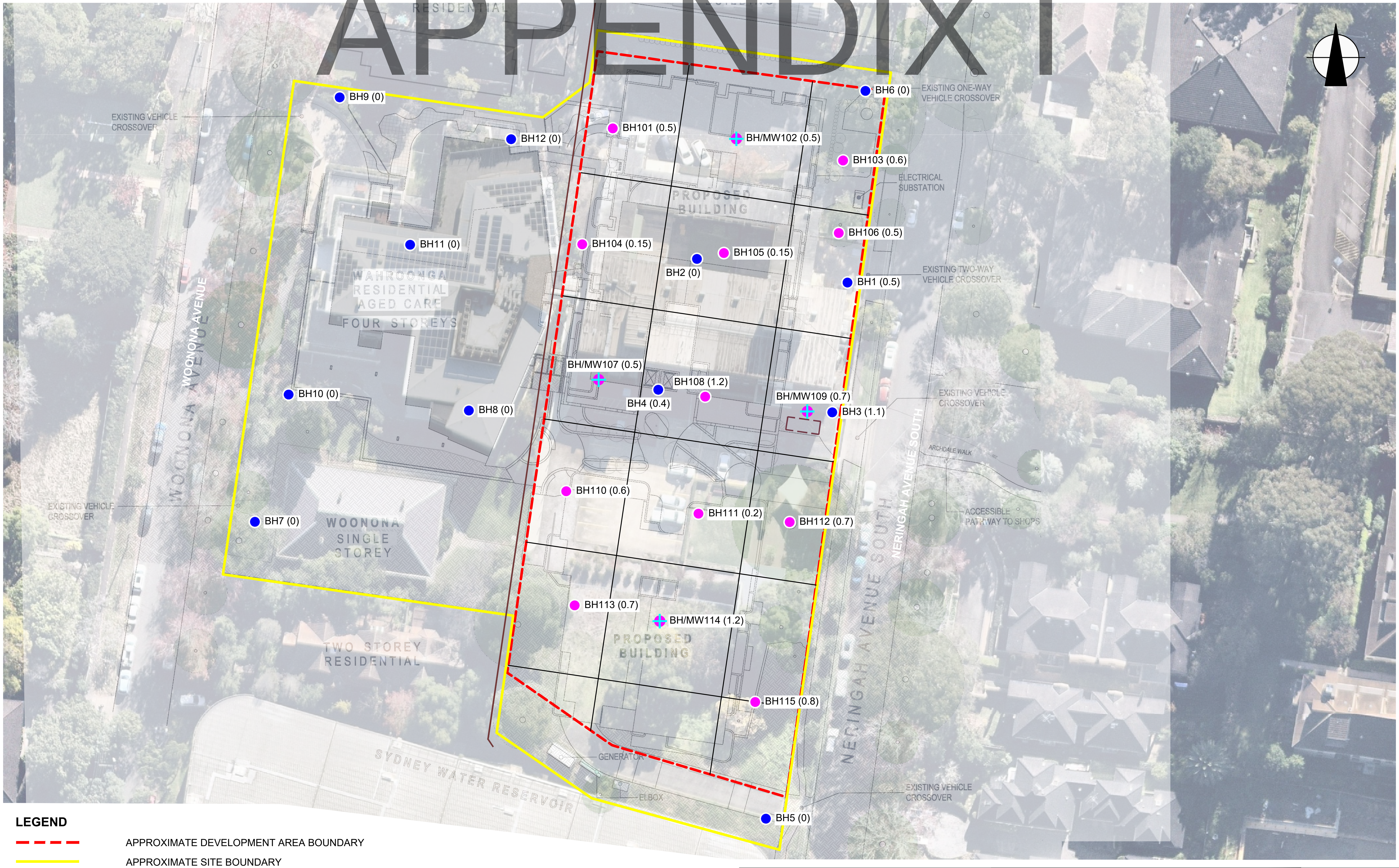
This plan should be read in conjunction with the Environmental report.

Title:	**SITE LOCATION PLAN**
Location:	NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW
Project No: E35312BR	Figure No: 1

JKEnvironments

PLOT DATE: 25/07/2022 2:59:44 PM DWG FILE: K:\5C EIS JOBS\35000'S\E35312BR WAHROONGA\CAD\E35312BR.DWG

APPENDIX I



LEGEND

(red dashed line)	APPROXIMATE DEVELOPMENT AREA BOUNDARY
(yellow line)	APPROXIMATE SITE BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (EIS, 2010)
(dashed box)	APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND STORAGE TANK (UST)
(brown line)	APPROXIMATE ALIGNMENT OF SEWER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: NERINGAH HOSPITAL, 4-12 NERINGAH AVENUE SOUTH, WAHROONGA, NSW

Project No: E35312BR

Figure No: 2

JKEnvironments

PLOT DATE: 23/08/2022 9:02:42 AM DWG FILE: K:\5C EIS JOBS\35000'S\E35312BR WAHROONGA\CAD\E35312BR.DWG

Appendix B: Report Explanatory Notes

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)[19] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[20]. The NEPM (2013) is consistent with these documents.

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 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).

C. Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured (i.e. the proximity of an averaged result to the true value, where all random errors have been statistically removed). 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. Accuracy is typically reported as percent recovery.

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.

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;

[19] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)
[20] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

- 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 (e.g. 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, transport 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%.

$$\frac{(\text{Spike Sample Result} - \text{Sample Result}) \times 100}{\text{Concentration of Spike Added}}$$

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:

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

Appendix C: Guidelines and Reference Documents

Acid Sulfate Soils Management Advisory Committee (ASSMAC), (1998). Acid Sulfate Soils Manual

Australian and New Zealand Environment Conservation Council (ANZECC), (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality

Canadian Council of Ministers of the Environment, (1999). Canadian soil quality guidelines for the protection of environmental and human health: Benzo(a)Pyrene (1997)

CRC Care, (2011). Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document

Contaminated Land Management Act 1997 (NSW)

Department of Land and Water Conservation, (1997). 1:25,000 Acid Sulfate Soil Risk Map Series

Department of Land and Water Conservation, (2002). Site Investigations for Urban Salinity

Heads of EPAs Australia and New Zealand, (2020). PFAS National Environmental Management Plan Version 2.0.

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

National Health and Medical Research Council (NHMRC), (2018). National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011

NSW Department of Environment and Conservation, (2007). Guidelines for the Assessment and Management of Groundwater Contamination

NSW EPA, (1995). Contaminated Sites Sampling Design Guidelines

NSW EPA, (2014). Waste Classification Guidelines - Part 1: Classifying Waste

NSW EPA, (2015). Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997

NSW EPA, (2017). Guidelines for the NSW Site Auditor Scheme, 3rd Edition

NSW EPA, (2020). Consultants Reporting on Contaminated Land, Contaminated Land Guidelines

NSW EPA, (2022), Sampling design part 1 – application, Contaminated Land Guidelines

National Environment Protection Council (NEPC), (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

Olszowy, H., Torr, P., and Imray, P., (1995). Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission

Protection of the Environment Operations Act 1997 (NSW)

State Environmental Planning Policy Resilience and Hazards 2021 (NSW)

Sullivan. L, Ward. N, Toppler. N, and Lancaster. G, (2018). National Acid Sulfate Soil Guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT

World Health Organisation (WHO), (2008). Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality

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Western Australia Department of Health, (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia