REPORT TO

NEXTDC LIMITED

ON

SURFACE WATER AND GROUNDWATER CONDITION ASSESSMENT

FOR

PROPOSED DATA STORAGE CENTRE

AT

16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Date: 13 May 2024
Ref: E36628BRrpt3

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E36628BRrpt3	Draft Report	10 May 2024
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Abbreviations

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Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Total Suspended Solids	**TSS**
United States Environmental Protection Agency	**USEPA**
Volatile Organic Compounds	**VOC**
Work Health and Safety	**WHS**
Western Sydney International	**WSI**

Units

Kilometres	**km**
Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Metres (cubic)	**m^3**
Metres per second	**m/sec**
Micrograms per litre	**µg/L**
Microsiemens per centimetre	**µS/cm**
Milligrams per litre	**mg/L**
Millivolts	**mV**
Nephelometric Turbidity Unit	**NTU**
Parts per million	**ppm**

1 INTRODUCTION

This surface and groundwater condition assessment has been prepared by JK Environments (JKE) on behalf of NEXTDC Limited to accompany a detailed State Significant Development Application (SSDA) for the S4 data centre development at 16 Johnston Crescent, Horsley Park, NSW (SSD-63741210). The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2 attached in the appendices.

The application seeks consent for construction and operation of a data centre development and includes site preparation works, bulk earthworks and infrastructure, and construction of the buildings, ancillary facilities, and associated site works.

Specifically, the Project comprises the redevelopment of the site as summarised below:

- Site preparation works, including earthworks, excavation and retaining walls;
- Construction and operation of a data centre development, comprising:
  - (5x) data centre buildings with the following maximum heights:
    - 'Hyperscale 1 Typical Building' = 39 metres;
    - 'Hyperscale 2 Typical Building' = 39 metres;
    - 'Enterprise Building' = 32 metres.
- Vehicle access via Johnston Crescent; and
- On-site car parking and loading within at-grade hardstand areas.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 27 October 2023 issued for the SSDA (SSD-63741210). Specifically, this report has been prepared to respond to the SEARs Requirement issued below.

Table 1-1: SEARs Compliance

Item	Description of Requirement	Section Reference (this Report)
13. Ground and Water Conditions	• Provide a surface and groundwater impact assessment that assesses potential impacts on: ○ Surface water resources (quality and quantity) including related infrastructure, hydrology, depended ecosystems, drainage lines, downstream assets and watercourses; and ○ Groundwater resources in accordance with the *Groundwater Guidelines.*	The assessment of surface and groundwater impacts is presented throughout this report. Conclusions and recommendations are presented in Section 5 of this report.

JKE understand that this report accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act), in support of the SSDA for the proposed development.

JKE previously prepared a desktop acid sulfate soil (ASS), salinity and surface and groundwater assessment[1] and an intrusive dryland salinity and ASS assessment[2] for this site in 2024. The relevant information presented in these reports have been included in the relevant sections of this report, were appropriate.

1.1 The Site

The site is located at 16, Johnston Crescent, Horsley Park within the Fairfield Local Government Area (LGA). The site is legally described as Lot 305 in Deposited Plan 1275011.

An aerial photograph of the site is provided in the following Figure (Figure A). The site comprises vacant land which has been cleared of vegetation and does not contain any existing built form structures. Bulk earthworks approved under DA-893-2013 have been completed on the site.

The site will be well serviced by infrastructure. The signalised intersection of Lenore Drive and Old Wallgrove Road at Eastern Creek is approximately 2 kilometres to the north, providing access to Wallgrove Road and the Westlink M7 Motorway to the east and Erskine Park Road and Mamre Road to the west. Each of these roads provides access to the M4 Motorway to the north and M5 Motorway to the south. A utilities and site services report will accompany the EIS.

The site is located approximately 35 kilometres west of the Sydney Central Business District (CBD), 17 kilometres west of the Parramatta CBD and 10 kilometres north-east of the future Western Sydney International (WSI) airport.

The site is within a developing employment precinct, including the ESR Horsley Logistics Park, Oakdale Central, Oakdale South and Horsley Park Employment Precinct. It is also close to other established and emerging employment-generating precincts, including Eastern Creek to the north, Huntingwood to the north- east, Wetherill Park and Mamre Road West to the north-west and Wetherill Park to the east.

[1] JKE, (2024). *Report to NextDC Limited on Desktop Acid Sulfate Soil, Salinity and Surface and Groundwater Assessment for Proposed Data Storage Centre at 16 Johnston Crescent, Horsley Park, NSW.* (Ref: E36628BRrpt) (referred to as Desktop Report)

[2] JKE, (2024). *Report to NextDC Limited on Dryland Salinity and Acid Sulfate Soil Assessment for Proposed Data Centre at 16 Johnston Crescent, Horsley Park, NSW*. (Ref: E36628BRrpt2) (referred to as Salinity and ASS report)

Figure A - Source: Nearmap (2023)

1.2 Proposed Development Details

The proposed development includes the staged construction of five data storage centre buildings, associated internal roadways, and a substation. The preliminary bulk earthworks plan indicate that cut and fill of depths up to approximately 5m will be required, though excavations and filling will typically be less (generally 0.5m to 2m). The plans indicate the south and east of the site will generally be lowered (i.e. cut), whilst the north and west (including the existing sediment basin) will be raised (i.e. filled).

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

1.3 Scope of Work

The assessment was undertaken generally in accordance with a JKE proposal (Ref: EP60162BRrev1) of 5 March 2024 and the consultancy agreement between JKE and TTW (NSW) Pty Ltd (acting on behalf of the client) of 14 March 2024. The scope of word included the following:

- Review of previous investigation reports prepared for the site (provided by the client);
- Review of surface and groundwater conditions including: hydrology; hydro-geology; receiving water bodies; occurrence of groundwater; groundwater quality; groundwater dependent ecosystems (GDE); inflow dependent ecosystems (IDE);
- Review of drainage lines, downstream groundwater users and watercourses in the immediate vicinity of the site;

- Review of surface water and groundwater conditions at the site including: surface water flow; groundwater flow; groundwater permeability; surface and groundwater quality; groundwater contamination conditions; and other parameters; and
- Preparation of this report identifying the surface and groundwater conditions at the site and potential impacts associated with the proposed development.

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

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

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

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

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

2 SITE INFORMATION

2.1 Previous Investigations

2.1.1 Remediation Validation Report

A remediation validation report was prepared for the site by ERM Services Australia (ERM) in 2023[6]. The validation report has been reviewed for salinity, ASS and filling-related information and summarised below.

The validation report indicated that the site and the wider development area had been previously subject to extensive excavation and earthworks, with little resemblance to the previous natural soil landscape. The geological and soil information summarised within the validation report indicated that the site was underlain by the Blacktown Soil landscape, which is associated with known dryland salinity and dispersive hazards. The ASS information indicated that the site was located in an area of no known occurrences of ASS. Further, no visual indicators of ASS and Potential (PASS) conditions were observed during the course of the validation works.

Based on the summaries provided within the validation report, approximately 114,100m^3 of site-won material was used as fill within the subject site. Additionally, approximately 88,900m^3 of clay, shale and sandstone was imported from approved properties for use within retaining walls and general fill. No ASS or salinity data for the imported and/or site won soils was reported in the validation report.

As part of the validation works, groundwater monitoring was undertaken. Three monitoring wells were installed within the subject site boundaries. The groundwater monitoring indicated the following:

- The standing water level (SWL) recorded in the monitoring wells ranged from approximately 77.7mAHD to 78.7mAHD;
- The pH of the groundwater (measured with field equipment) ranged from pH 6.78 to pH 7.8;
- The electrical conductivity of the groundwater (measured with field equipment) ranged from 8,434µS/cm to 18,105 µS/cm;
- The chloride concentrations of the groundwater reported by the laboratory ranged from 2,980mg/L to 6,620mg/L; and
- Sulfur odours were encountered from the groundwater during several monitoring events.

2.1.2 Earthworks Summary

An earthworks summary report was prepared for the site by Douglas Partners (DP) in 2023[7]. The summary report included earthworks undertaken at the site between January 2021 to October 2023 inclusive. The site was stripped to remove vegetation, highly organic topsoil and uncontrolled fill. The stripped surface was variable, comprising previously placed and compacted fill, silty clay, and/or siltstone bedrock.

The fill material used to raise the site to the desired levels were sourced from site-won material from excavations within the greater development area, and clay, sandstone and siltstone imported from approved

[6] ERM, (2023). *Validation Report, Stage 3B, 16 Johnston Crescent, Horsley Park NSW 2175.* (Ref: 0449086_S011426, dated 2 November 2023)
[7] DP, (2023). *Earthworks Summary Report. Proposed Commercial Subdivision. Stage 3B, CSR Quarry, Horsley Park*. (Ref: 76582.22, dated 31 October 2023)

properties in Willoughby and Merrylands, NSW. Based on the provided summary, 63,738m^3 of material was imported. The balance of the fill was obtained from on-site excavations within the wider development area.

JKE note that no salinity and/or ASS data were presented within the earthworks summary report.

2.1.3 Ecologist Correspondence

JKE were provided with a copy of email communications between Ecological Australia (the project ecologist at the time of remediation works) and Calibre Group (the project manager at the time of remediation works), dated 22 July 2020. The email communication confirmed that clearing of Cumberland Plain Woodland within the north-west of the site, and along the eastern and south-eastern boundaries would be permitted in accordance with the conditions of approval for the project.

Based on the site inspection conducted for this assessment, these areas were subsequently cleared.

2.1.4 Biodiversity Development Assessment Report Waiver

A Biodiversity Development Assessment Report Waiver (BDAR) was prepared by Narla Environmental in 2024[8]. The waiver was subsequently granted by the Department of Planning, Housing and Infrastructure (DPHI) in 2024[9].

Narla Environmental noted that the SSDA was for the development of the data centre and all associated works, and that all previous demolition and vegetation removal works (including civil/earth works) were completed as part of the remediation works discussed previously in this report.

Narla Environmental concluded that the development would result in no impact on any native vegetation, and that it was not expected that the proposed development would impact upon biodiversity values.

Though DPHI granted a waiver to prepare a BDAR, the grant noted that an assessment of the biodiversity impacts of the proposed development would be required in accordance with the SEARs.

JKE note that Narla Environmental stated that all civil and earthworks were completed as part of the previous remediation works completed at the site. However, JKE understand that earthworks, including cut and fill activities, will be required to develop the proposed data centre. The potential impacts of the earthworks on the surface water and groundwater conditions are assessed within this report.

[8] Narla Environmental, (2024). *Request for a Biodiversity Development Assessment Report (BDAR) Waiver for the proposed NEXT DC S4 Stage 1 Phase 1*. (Ref: NEXT DC Shiraz 4, Horsley Park BDAR Waiver, issued in draft, dated 29 January 2024).

[9] DPHI, (2024). *Request to waive requirement to prepare a Biodiversity Development Assessment Report – NEXTDC Data Centre Horsley Park – SSD-63741210* (Ref: SSD-63741210, dated 29 February 2024).

2.2 Site Identification and Description

Table 2-1: Site Identification

Site Address:	16 Johnston Crescent, Horsley Park, NSW
Lot & Deposited Plan:	Lot 305 in DP1275011
Current Land Use:	Vacant
Proposed Land Use:	Data Centre
Local Government Area:	Fairfield City Council
Current Zoning:	IN1 – General Industrial
Site Area (Ha) (approx.):	8.206
RL (AHD in m) (approx.):	82-86
Geographical Location (decimal degrees) (approx.):	Latitude: -33.828417 Longitude: 150.829011
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2
Groundwater Contour Plan:	Figure 3

2.3 Site Location, Topography and Regional Setting

The site is located in a predominantly industrial area of Horsley Park. The site is bound by Johnston Crescent to the west, and a closed section of Burley Road to the north. The site is located approximately 550m to the west of Reddy Creek. An ephemeral tributary of Ropes Creek was mapped approximately 120m to the west of the site. However, this tributary was not identified during the inspection of the surrounds and filling of the surrounds was observed.

The regional topography is characterised by undulating terrain and low hills. The site itself has been cut into the southern face of a low hill. The site appeared to have been levelled to account for the slope and accommodate the existing development.

2.4 Site Inspection

A walkover inspection of the site was undertaken by JKE on 18 March 2024. The inspection was limited to accessible areas of the site. Selected site photographs obtained during the inspection are attached in the appendices.

At the time of the inspection, the site was vacant (undeveloped) land and was generally level. The site was void of buildings, though keystone block retaining walls were observed along the northern, eastern and western site boundaries. The retaining walls ranged from approximately 0.5m to 8.5m in height. No evidence of salt wicking was observed on the face of the retaining walls. However, it is acknowledged that earthworks were completed relatively recently and longer-term impacts are unknown.

The site was accessed via an unsealed driveway and ramp which ran parallel to the southern boundary, extending east for Johnston Crescent.

A large man-made water detention basin was located in the north-west of the site. Drainage channels were located along the eastern, northern and southern site boundaries, which flowed into the detention basin. The drainage channels were generally lined with sandstone spalls, cobbles and boulders, though some areas were clay-lined. Surface water was observed in the sediment basin and appeared turbid based on visual observations. Measurements of the volume and quality of the surface water were not undertaken. Minor ponding of water was also observed within parts of the drainage channels and was associated with recent rainfall events.

A vegetated embankment was observed in the south-east of the site. Vegetation comprised of low-grasses had also been planted along the high-side of the northern retaining wall. Sprinkler and hose systems were observed throughout the vegetated areas. The vegetation appeared to comprise of low grasses which had been planted relatively recently and was not fully established.

A fenced area marked as 'Environmental Protection Area' was observed at the crest of the south-eastern embankment with remnant Cumberland wood-plain forest beyond.

2.5 Surrounding Land Use

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

- North – A closed road (Burley Road), with overgrown vegetation and commercial warehouses beyond;
- South – vacant (undeveloped) commercial/industrial land, with commercial warehouses beyond;
- East – A high-voltage power cable easement, with rural residential properties beyond; and
- West – Johnston Crescent, with vacant (undeveloped) commercial/industrial land beyond.

2.6 Regional Geology and Soil Landscape

Regional geological and soil landscape information was reviewed for the assessment. The information was sourced from the Lotsearch report attached in the appendices. The report indicates that the site is underlain by Bringelly Shale of the Wianamatta Group, which typically consists of shale, carbonaceous claystone, claystone, laminite, lithic sandstone, and rare coal.

Soil landscape information presented in the Lotsearch report indicated that the site is located within the Blacktown soil landscape. Blacktown soils are characterised by moderate erodibility with some higher local occurrences, low dispersivity and localised areas of moderate salinity.

2.7 Dryland Salinity Potential of Western Sydney

The site is located within the area of Western Sydney included in the Salinity Potential Map prepared by the Department of Infrastructure, Planning and Natural Resources (DIPNR). Based upon interpretation from the geological formations and soil groups presented on the map, the site is located in a region of moderate to high salinity potential.

The moderate classification is attributed to scattered areas of scalding and indicator vegetation, in areas where concentrations have not been mapped. Saline areas may occur in this zone, which have not been identified or may occur if risk factors change adversely.

Areas of high potential occur where soil, geology, topography and groundwater conditions predispose a site to salinity. These areas most commonly occur on lower slopes and drainage systems where water accumulation is high. These areas are most likely to occur in lower slopes, foot slopes, floodplains and creek lines where run-off is high, resulting in seasonally high water tables and soil saturation.

JKE note that the site has also been filled with clay, siltstone and sandstone sourced from other developments within Greater Sydney, including from properties in Willoughby, Merrylands and Castle Hill, along with site-won materials.

Review of the Salinity Potential Map indicates that Castle Hill is mapped in an area of very low to moderate salinity potential and Merrylands is mapped in an area of moderate salinity potential. Willoughby is not located within the mapped boundaries of the Salinity Potential Map.

Reference should be made to the Salinity and ASS report for further information.

2.8 Acid Sulfate Soil (ASS) Risk and Management

The site is not located in an ASS risk area according to the risk maps prepared by the Department of Land and Water Conservation (DLWC). ASS information presented in the Lotsearch report indicated that the site is located in an area classed as extremely low probability of ASS occurrence.

Reference should be made to the Salinity and ASS report for further information.

2.9 Summary of Site History

A review of historical information presented in the provided reports (discussed in Section 2.1) and the historical aerial photographs presented in the Lotsearch report was undertaken for the assessment. The review identified the following:

- Prior to the 1960s, the site was predominantly vacant and grassed. The site was likely used for agricultural (grazing) purposes;
- Extensive earthworks (quarrying) and brick production activities were visible from the 1960s to 2020; and
- The site was filled to the current condition between 2021 and 2023.

3 REVIEW OF SURFACE WATER AND GROUNDWATER CONDITIONS

3.1 Surface Water Conditions

Surface water drainage across the site is expected to flow in sympathy with the overall topography and drainage channels, and eventuate in the man-made detention basin located in the north-west corner of the site. The detention basin is not considered to be a naturally occurring water body.

A review of the historical aerial photographs presented in the Lotsearch report indicate that prior to the extensive development of the site circa 1961, there were no naturally occurring water bodies on the subject site. The closest surface water body is Reddy Creek, located approximately 550m to the east of the site. This is up-gradient from the site and is not considered to be a potential receptor.

An ephemeral tributary of Ropes Creek is mapped approximately 120m to the west of the site. However, the tributary was not identified during the inspection of the immediate surrounds. Evidence of filling was observed in the surrounds within the vicinity of the mapped ephemeral tributary.

Excess surface water has the potential to flow towards the west and north-west.

3.2 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.

Subsurface conditions at the site are generally expected to consist of low to moderate permeability (residual) soils overlying shallow bedrock. Filling has historically occurred at the site, and in some areas, to considerable depths. However, the information reviewed and the boreholes drilled for this assessment identified that fill typically comprised of clay, shale and sandstone rock (i.e. residual soil profiles), and some gravel. Abstraction and use of groundwater at the site or in the immediate surrounds under these conditions is considered to be low. The use of groundwater is not proposed as part of the development. There is a reticulated water supply in the area and human consumption of groundwater is not expected to occur.

Considering the local topography, surrounding land features and existing site information, groundwater beneath the site is anticipated to flow towards the north-west of the site.

The closest named surface water body is Reddy Creek, located approximately 550m to the east of the site.

3.3 Registered Groundwater Bores

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

- The nearest registered bore was located approximately 800m to the west of the site. This included four nested wells;

- All of the bores were registered for monitoring purposes;
- There were no nearby bores (i.e. within 2km) registered for domestic or irrigation uses;
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of approximately 1mBGL, underlain by siltstone and sandstone bedrock. The SWL reported for the nested wells was approximately 2.89mBGL; and
- The reported salinity concentrations for groundwater in the nearest bores ranged from 1,970mg/L to 22,900mg/L.

3.4 Other Groundwater Users

A review of information pertaining to other groundwater users presented in the Lotsearch report was undertaken. The review identified an above ground water tank located approximately 530m to the north of the site, off Old Wallgrove Road. As the tank is above ground and based on its distance from the site, the tank is not considered to be a receptor.

3.5 Groundwater Dependent Ecosystems (GDE)

Areas with 'high' potential for GDE were mapped to the south-east of the site, along the site boundary. The areas were associated with terrestrial vegetation located within undulating to low hilly country, mainly on shale. The aquifer geology was identified as consolidated sedimentary geology. Based on the direction of groundwater flow (discussed further in Section 3.9), the GDE are mapped up-gradient of the site.

The proposed development includes cut and fill across the site, generally to depths of approximately 0.5m to 2mBGL. Localised deeper excavation, up to depths of approximately 4-5mBGL are proposed within the western section of the site. However, based on the groundwater modelling and the information reviewed for this report, the proposed development is not expected to intercept the groundwater table. It is also noted that the site has previously been cleared of vegetation within the site boundaries and that extensive earthworks (cut and fill) have previously been undertaken within the site.

Considering the above, and the information reviewed for this assessment, the proposed development is considered unlikely to impact on the GDE.

In the event that the proposed development details change, the potential for impacts to GDE must be reviewed.

3.6 Inflow Dependent Ecosystems (IDE)

Areas with 'high' likelihood for IDE were mapped to the south-east of the site, along the site boundary The areas were associated with terrestrial vegetation located within undulating to low hilly country, mainly on shale. The aquifer geology was identified as consolidated sedimentary geology. Based on the direction of groundwater flow (discussed further in Section 3.9), the IDE are mapped up-gradient of the site. It is noted that vegetation within the site was cleared in accordance with the previous development approval for the project and extensive earthworks (cut and fill) have previously been undertaken within the site.

The proposed development includes cut and fill across the site, generally to depths of approximately 0.5m to 2mBGL. Localised deeper excavation, up to depths of approximately 4-5mBGL are proposed within the western section of the site. However, the proposed development is not expected to intercept the groundwater table.

Considering the above, and the information reviewed for this assessment, the proposed development is considered unlikely to impact on the IDE.

In the event that the proposed development details change, the potential for impacts to IDE must be reviewed.

3.7 Ramsar Wetlands

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

3.8 Ecological Sensitive Areas

An area of ecological constraint associated with the Grassy Woodlands of the Cumberland Shale Plains Woodland is mapped along the northern and south-eastern site boundaries, within a protected area. However, all vegetation has previously been removed from the site, with native plantings subsequently included along the northern and south-eastern boundaries, to form a buffer/protection zone.

Considering the proposed development, depth to groundwater, and ecological information reviewed for this report, including the Narla Environmental report and the DPHI waiver, impacts to the ecological constraints are not expected to occur.

3.9 Groundwater Occurrence

As part of the JKE investigation, a total of three groundwater monitoring standpipe piezometers were installed in boreholes BH1 (MW1), BH2 (MW2), and BH15 (MW15), to supplement the existing monitoring wells installed by ERM in 2023 in S3-06, S3-07 and S3-08. The well locations are shown on Figure 2 attached in the appendices.

The wells were positioned to gain baseline information on groundwater conditions. Considering the topography and the location of the nearest down-gradient water body, MW15 was considered to be in the up-gradient areas of the site and would be expected to provide an indication of groundwater flowing from the south-east and east. MW1, MW2 and S3-07 were considered to be in the down-gradient areas of the site and would be expected to provide an indication of groundwater flowing across the site and beyond the down-gradient site boundary. S3-08 was considered to be located in the cross-gradient area of the site and would be expected to provide an indication of regional ambient (background) conditions. S3-06 was considered to be located in the intermediate area of the site.

The JKE standpipe piezometers were typically installed as per the following methodology:

- 50mm diameter Class 18 PVC (machine slotted screen) was installed in the lower section of the well to intersect groundwater;
- 50mm diameter Class 18 PVC casing was installed in the upper section of the well (screw fixed);
- A 2mm sand filter pack was used around the screen section for groundwater infiltration;
- A hydrated bentonite seal/plug was used on top of the sand pack to seal the well; and
- A concrete plug was installed at the surface to limit the inflow of surface water, with approximate 1m stick up and enviro-cap to seal the well top.

The monitoring well installation details are summarised in the table below. The installation details for the wells are also presented on the borehole logs attached in the appendices. The well heights were based on the GPS information obtained using a differential GPS. The RLs in AHD are provided in the table below.

Table 3-1: Standpipe Installation Details

Borehole / Well Number	Reduced Level of Ground Surface (mAHD)[1]	Installation Depth (mBGL)[2]	Slotted Screen Interval (mBGL)	Material in screened section (refer to logs for detailed description)	Sample collected for Testing
BH/MW1	83.9m	12	3 - 12	Silty clay fill / Siltstone	Yes
BH/MW2	83.1m	12	3 - 12	Silty clay fill / Siltstone	Yes
BH/MW15	84.5m	9.5	3 - 9.5	Siltstone	Yes
S3-06	84.0m	17^	11 – 17^	Siltstone	Yes
S3-07	82.6m	12.6^	9.6 - 12.6^	Siltstone	Yes
S3-08	83.7m	9.9^	6.9 – 9.9^	Siltstone	Yes

Notes:

1 – mAHD obtained from the GPS

2 – mBGL: metre below ground level

^ - JKE field records indicate the wells were installed to deeper depths. The installation and slotted intervals are based on ERM borehole logs

Groundwater measurements were made on subsequent visits on 21, 25 and 27 March 2024. A summary of the SWL is outlined in the table below:

Table 3-2: Summary of Groundwater Levels

Monitoring Well	Surface Level (mAHD)	Standing Water Level Depth (mBGL)		
		21 March 2024	25 March 2024	27 March 2024
MW1	83.9	10.31	8.87	9.62
MW2	83.1	6.10	5.89	5.94
MW15	84.5	5.60	5.49	5.53
S3-06	84.0	5.82	6.75	5.82
S3-07	82.6	4.64	4.61	4.63
S3-08	83.7	5.18	5.17	5.17

Data loggers were installed by JK Geotechnics (JKG) on behalf of JKE on 20 March 2024 into MW1, MW2, MW15, S3-06, S3-07 and S3-08 to undertake 3 months of monitoring. JKG returned to site on 10 April 2024 and subsequently on 1 May 2024 to download the initial datasets. The table below summarises the results

of the data logger monitoring. Reference should be made to the figures attached in the appendices for charts showing the groundwater levels and rainfall.

Table 3-3: Summary of Groundwater Levels with Data Loggers

Monitoring Well	Basic Statistics			
	Lowest Level (mAHD)	Average (mAHD)	Median (mAHD)	Highest Level (mAHD)
MW1	RL74.0m	RL75.8m	RL76.1m	RL76.3m
MW2	RL77.5m	RL77.6m	RL77.6m	RL77.7m
MW15	RL78.6m	RL78.8m	RL78.7m	RL79.1m
S3-06	RL78.1m	RL78.2m	RL78.2m	RL78.4m
S3-07	RL77.9m	RL78.0m	RL78.0m	RL78.1m
S3-08	RL78.3m	RL78.5m	RL78.4m	RL78.7m

The groundwater appears to have a general gradient down to the west with the highest groundwater levels recorded in MW15 and S3-08 in the southern and north-eastern portions of the site. The groundwater level also appears to be relatively unresponsive to rainfall events during the 6-week period of monitoring.

Based on the groundwater monitoring data, the groundwater level appears to vary from approximately RL79.1m over the south-eastern extent of the site grading down to RL76.3m over the south-western extent. Based on the preliminary bulk earthworks plan, the earthworks are expected to be above the groundwater level across the site.

3.10 Groundwater Permeability

The groundwater was measured to be within the siltstone bedrock which is expected to be of very low permeability. Based on the results of groundwater pump-out tests undertaken by JKG between 20 and 21 March 2024, a conservative coefficient of permeability for the siltstone bedrock of between 4.6 x 10^{-6}m/sec and 5.1 x 10^{-9}m/sec was calculated.

It is noted that though earthworks are proposed, the proposed earthworks are generally limited in depth to approximately 0.5-2m below existing levels (localised deeper excavation to approximately 5m) and the proposed development is not expected to intersect the groundwater table.

Should the development details change to include deeper excavation, the potential for groundwater inflow will need to be reassessed.

4 GROUNDWATER AND SURFACE WATER QUALITY

An assessment of groundwater and surface water quality has been undertaken by JKE for the purpose of this assessment. Only one round of sampling and analysis has been completed. The surface water sample was collected from the man-made detention basin located in the north-west of the site.

4.1 Screening Criteria

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

- Groundwater Investigation Levels for 95% protection of freshwater species were adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[10]. The 99% trigger values were adopted where required to account for bioaccumulation. Low and moderate reliability trigger values were also adopted for some contaminants where high-reliability trigger values don't exist; and
- The Australian Drinking Water Guidelines 2011 (updated 2021)[11] multiplied by a factor of 10 to assess potential risks associated with incidental/recreational-type exposure to groundwater during excavation works.

The screening criteria are referred to as Site Assessment Criteria (SAC). Reference should be made to the results summary tables Table G1 and Table G2 attached in the appendices for the specific criteria.

4.2 Groundwater Monitoring Well Installation, Development and Sampling

4.2.1 Monitoring Well Development and Sampling

The monitoring wells were developed on 21 March 2024, and again on 25 March 2024 using a submersible electrical pump. Due to the hydrogeological conditions, groundwater inflow into most of the wells (MW1, MW2, MW15 and S3-06) was relatively low, therefore the wells were pumped until they were effectively dry. The remaining wells (S3-07 and S3-08) were pumped until greater than three bore volumes had been removed. The field monitoring records and calibration data are attached in the appendices.

During development, the pump was flushed between monitoring wells with potable water (single-use tubing was used for each well). The pump tubing was discarded after each sampling event and replaced therefore no decontamination procedure was considered necessary.

The monitoring wells were allowed to recharge for approximately two days after the second round of development. Groundwater samples were obtained on 27 March 2024. Prior to sampling, the monitoring wells were checked for the presence of Light Non-Aqueous Phase Liquids (LNAPLs) using an inter-phase probe electronic dip meter. The monitoring well head space was checked for volatile organic compounds (VOCs) using a calibrated photo-ionisation detector (PID) unit. The samples were obtained using a combination of

[10] 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)

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

low flow sampling equipment (a peristaltic pump and a bladder pump). During sampling, the following parameters were monitored using calibrated field instruments:

- SWL using an electronic dip meter; and
- pH, temperature, electrical conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) using a YSI Multi-probe water quality meter.

Steady state conditions were considered to have been achieved when the difference in the pH measurements was less than 0.2 units, the difference in conductivity was less than 10%, and when the SWL was not in drawdown. Due to the hydrogeological conditions, steady state conditions could not be achieved in all of the wells.

Groundwater samples were obtained directly from the single use PVC tubing and placed in the sample containers. Duplicate samples were obtained by alternate filling of sample containers. This technique was 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 was transported to JKE in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal.

The samples were preserved with reference to the analytical requirements and placed in an insulated container with ice or ice bricks. On completion of the fieldwork, the samples were temporarily stored in a fridge at the JKE office, before being delivered in the insulated sample container to a National Association of Testing Authorities (NATA) registered laboratory for analysis under standard Chain of Custody (COC) procedures.

4.3 Surface Water Sampling

A surface water sample was collected from the on-site detention basin (Dam 1) on 27 March 2024. The surface water sample was obtained using a dedicated polyethylene bailer. The following parameters were monitored using calibrated units prior to sampling:

- pH, temperature, EC, DO and Eh using a YSI Multi-probe water quality meter.

The surface water sample was obtained directly from the bailer and placed in the sample containers. The sample was preserved with reference to the analytical requirements and placed in an insulated container with ice or ice bricks. On completion of the fieldwork, the samples were 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 Analysis of Groundwater and Surface Water Samples

The surface water and groundwater samples were analysed for the following:

- Alkalinity (bicarbonate, carbonate, hydroxide and total), acidity, EC, pH, Eh and DO;

- Turbidity, total dissolved solids (TDS), total suspended solids (TSS), total organic carbon (TOC) and sodium absorption ratio (SAR);
- Ionic balance, which includes major anions and the cation suite (including hardness);
- Metals including Aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), lithium (Li), manganese (Mn), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silica (dissolved SiO_2), silver (Ag), strontium (Sr), uranium (U), vanadium (V), zinc (Zn);
- Nutrient suite, including Ammonia (NH_3), nitrate (NO_3), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P) and reactive phosphorus (P);
- Chloride and sulphate;
- Faecal coliforms and Escherichia (E) coli; and
- Polycyclic aromatic hydrocarbons (PAHs); total recoverable hydrocarbons (TRH); and monocyclic aromatic hydrocarbons (BTEX).

Quality analysis/quality control (QA/QC) samples (including intra-laboratory and inter-laboratory duplicates, trip spike and trip blank samples) were also obtained.

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

4.5 Summary of Field Results

A summary of the field screening results is presented in the following table:

Table 4-1: Summary of Field Screening

Aspect	Details
Groundwater Depth & Flow	SWL measured during groundwater sampling in the monitoring wells installed at the site ranged from approximately 4.63mBGL (S3-07) to 9.62mBGL (MW1). A contour plot was prepared for the groundwater levels as shown on Figure 3 attached in the appendices. Groundwater flow generally occurs in a down-gradient direction perpendicular to the groundwater elevation contours. The contour plot indicates that groundwater generally flows towards the west and north-west. Reference should be made to Section 3.9 for more updated groundwater RLs recorded using data loggers.
Groundwater Field Parameters	Field measurements recorded during sampling of groundwater were as follows: • pH ranged from 6.74 to 7.22; • EC ranged from 6,731µS/cm to 16,894µS/cm; • Eh ranged from 82.1mV to 145.2mV; and • DO ranged from 1.19mg/L to 3.81mg/L. The PID readings in the monitoring well headspace recorded during sampling ranged from 0ppm in S3-06 to 2.0ppm in MW2. All groundwater samples were analysed for TRH, BTEX and naphthalene.

Aspect	Details
Surface Water Field Parameters	Field measurements recorded during immediately prior to sampling of surface water were as follows: • pH - 8.88; • EC - 607µS/cm; • Eh - 34.7mV; and • DO - 8.68mg/L.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) was not detected using the interphase probe during groundwater sampling, or visibly identified using a dedicated bailer.

4.5.1 Summary of Analytical Results

4.5.1.1 Laboratory Results

Reference should be made to the attached Table G1 and G2 for a summary of the laboratory results compared to the screening criteria presented in Section 4.1. The following results were above the SAC:

- The copper and zinc concentrations exceeded the ecological concentrations exceeded the ecological SAC in all of the groundwater samples analysed for the assessment;
- The cadmium and nickel concentrations in MW1 exceeded the ecological SAC;
- The aluminium concentration in MW15 exceeded the ecological SAC;
- The nickel concentration in S3-08 exceeded the ecological SAC;
- The ammonia concentrations in MW15 and S3-06 exceeded the ecological SAC;
- The cadmium, chromium, copper, lead, nickel, zinc and aluminium concentrations exceeded the ecological SAC in the surface water sample collected from Dam 1; and
- Detections of Faecal Coliforms and E. Coli were noted in samples MW15 and Dam 1. The detections in Dam 1 were relatively high.

4.5.1.2 Assessment of Data Quality

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

- Standard sampling procedures (SSP) were complied with. The SSP is attached in the appendices;
- Representative groundwater samples were analysed for a broad range of potential contaminants;
- Field indicators were used as a screening tool;
- Samples were analysed by a NATA registered laboratory. Laboratory quality control/quality assurance (QA/QC) samples were analysed and were generally within the acceptance criteria adopted by the laboratory;
- During the investigation, one trip blank TB-W1 was placed in the esky during sampling and transported back to the laboratory. With the exception of TRH F2, all of the results were less than the PQLs. The laboratory noted that the TRH F2 result was due to a single peak with no hydrocarbon profile, consistent with the use of plastic containers. Therefore, cross contamination between samples that may have significance for data validity did not occur;

- The results for the trip spike TS-W1 sample ranged from 106% to 118% and indicated that field preservation methods were appropriate;
- Two intra-laboratory duplicate samples (GWDUP1 and GWDUP2) were analysed. All relative percentage difference (RPD) results were acceptable; and
- Due to a clerical error, the duplicate sample intended to be analysed as an inter-laboratory duplicate was not dispatched to the secondary laboratory. Instead, the sample was analysed as an intra-laboratory duplicate sample. Given the objectives of the assessment, the analytical results and the fact that the sample was still analysed as a blind replicate sample, this oversight is considered to be minor and does not adversely affect the useability of the dataset.

5 DISCUSSION AND RECOMMENDATIONS

5.1 Review of Surface Water Conditions

The assessment included a review of the surface water conditions. Natural surface water bodies such as creeks, dams, lake and/or ponds were not identified onsite or in the immediate surrounds during the inspection. A man-made detention basin is located in the north-west corner of the site, with man-made surface water drainage channels generally around the perimeter of the site, connecting to the detention basin.

A review of the site and regional topography indicates that the site is located within undulating terrain and low hills, with the site itself cut into the southern face of a low hill. The site is located approximately 550m to the west of Reddy Creek, and an ephemeral tributary of Ropes Creek is mapped approximately 120m to the west of the site. However, the tributary was not identified during the inspection and evidence of filling was observed in the surrounds. Extensive earthworks have historically occurred at the site.

Considering the site is currently unpaved, there is potential for surface water infiltration to occur at the site which may impact on the groundwater levels. This is discussed further in Section 5.2. It is noted however that the underlying soils and rock are of low permeability and that excess surface water flow would be expected to eventuate within the on-site detention basin.

The assessment indicated that the surface water within Dam 1 was impacted by heavy metals and microbial organisms including Faecal Coliforms and E. Coli. The surface water sample encountered heavy metal concentrations (specifically, cadmium, chromium, copper, lead, nickel, zinc and aluminium) above the SAC, as shown on Figure 3 attached in the appendices. Treatment of the surface water will be required prior to dewatering of the detention basin. Treatment may also be required prior to reuse on the site (such as for dust suppression purposes). This is discussed in greater detail in Section 5.5.

5.2 Review of Groundwater Conditions

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

- The proposed development includes excavation to depths of approximately 0.5m to 2m, with localised deeper excavation (up to approximately 5m). The localised deeper excavation is associated with the proposed vehicular access in the west of the site and connection to the existing roadway. Based on the groundwater monitoring data, the groundwater level appears to vary from approximately RL79.1m over the south-eastern extent of the site grading down to RL76.3m over the south-western extent. The bulk excavation for the proposed development is expected to be above the groundwater level;
- The groundwater is saline and is non-aggressive towards buried concrete and steel. It is noted that JKE has prepared a Salinity Management Plan (SMP) for the proposed development. Management measures outlined in the SMP are to be implemented during construction;
- The proposed development includes bulk earthworks (cut and fill). Considering multiple lines of evidence, the bulk earthworks are considered unlikely to impact in the GDE and IDE mapped along the south-eastern boundary. Should the development change from the proposed details, JKE recommend

engaging an ecologist to undertake an ecological assessment to identify potential impacts of the proposed development on the GDE and IDE. Any recommendations outlined in the ecologist's report should be implemented;

- A review of the ecological information indicates that the site formerly contained Grassy Woodlands of the Cumberland Shale Plain Woodland, which were cleared during previously approved works. The Grassy Woodlands were also mapped along the northern and south-eastern site boundaries, within a protected area. Considering multiple lines of evidence, the proposed development is considered unlikely to impact of the ecological constraints. Should the development change from the proposed details, JKE recommend engaging an ecologist to undertake an ecological assessment to identify potential impacts of the proposed development on the woodland. Any recommendations outlined in the ecologist's report should be implemented;
- The assessment indicated that groundwater was impacted by selected heavy metals, ammonia and microbial organisms. The groundwater samples encountered heavy metal concentration above the SAC as shown on Figure 3 attached in the appendices. The minor elevations can be attributed to regional background concentrations and the underlying geology at the site (i.e. weathered siltstone bedrock);
- The proposed development is considered unlikely to intersect the groundwater table. In the unlikely event that dewatering of the groundwater is required, treatment of the groundwater will be necessary prior to discharge; and
- Should the proposed development details change to likely intersect the groundwater table, a detailed assessment and analysis of likely groundwater inflows into excavations will need to be undertaken.

5.3 Groundwater Seepage and Dewatering During Construction

Groundwater seepage is not expected to occur and temporary dewatering is not anticipated to be required during the proposed development. If a rain event occurs during the development, this water should be managed appropriately on-site in accordance with the construction contractor's soil and water management plan. This water should not be pumped to stormwater of sewer unless a prior application is made and this is approved by the relevant authorities.

The above conclusions must be reviewed if there are any changes to the proposed development.

5.4 Surface Water Dewatering During Construction

An existing water detention basin (Dam 1) is located within the north-western portion of the site. It is noted that the proposed development does not include a detention basin within the site. Therefore, the basin will need to be dewatered and the surface water managed accordingly. The water will likely require treatment prior to reuse on-site and/or off-site disposal. This is discussed further in Section 5.5.

Should this basin be considered for use during the construction phase for the proposed development, the construction contractor must confirm that the basin has been constructed correctly and is of the appropriate volume capacity to serve the intended purpose.

5.5 Surface Water Quality and Treatment

The assessment has identified that the surface water at the site is impacted by selected metals and microbial organisms. Additional testing of surface water is recommended to assess the quality and provide recommendations for treatment and/or reuse (such as dust suppression) during the construction works.

A specialist contractor must be contacted to design an appropriate water treatment program to facilitate the disposal and/or reuse of the collected surface water. The treatment program would likely entail various treatment processes including flocculation which may reduce concentrations of heavy metals which are likely to be at least partly associated with sediment particles in the water.

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

The relevant consent authorities should be contacted to clarify the requirements to obtain disposal approval to stormwater, if this option is to be considered.

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

6 LIMITATIONS

The report limitations are outlined below:

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

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/J&K 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

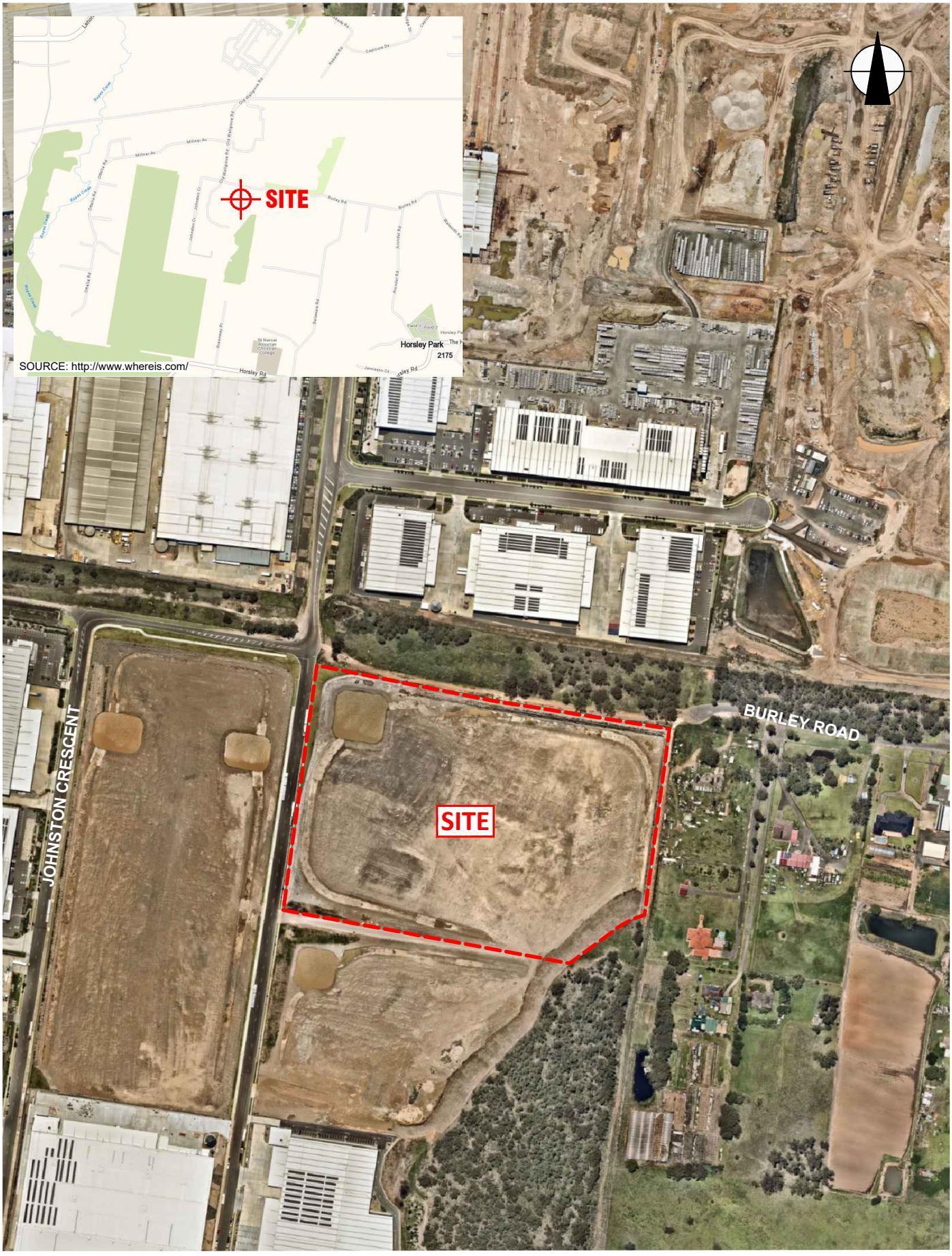
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other 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: Report Figures



AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

LEGEND

SITE BOUNDARY

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

Title: **SITE LOCATION PLAN**

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Project No: E36628BR

Figure No: 1

JKEnvironments

PLOT DATE: 14/08/2024 11:52:17 AM DWG FILE: K:\SC EIS JOBS\36000'S\E36628BR HORSLEY PARK\CAD\E36628BR.DWG

LEGEND

APPROXIMATE SITE BOUNDARY	
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
S3-06	GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (ERM, 2023)

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 15 30 45 60 75

SCALE 1:1500 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Project No: E36628BR

Figure No: 2

JKEnvironments

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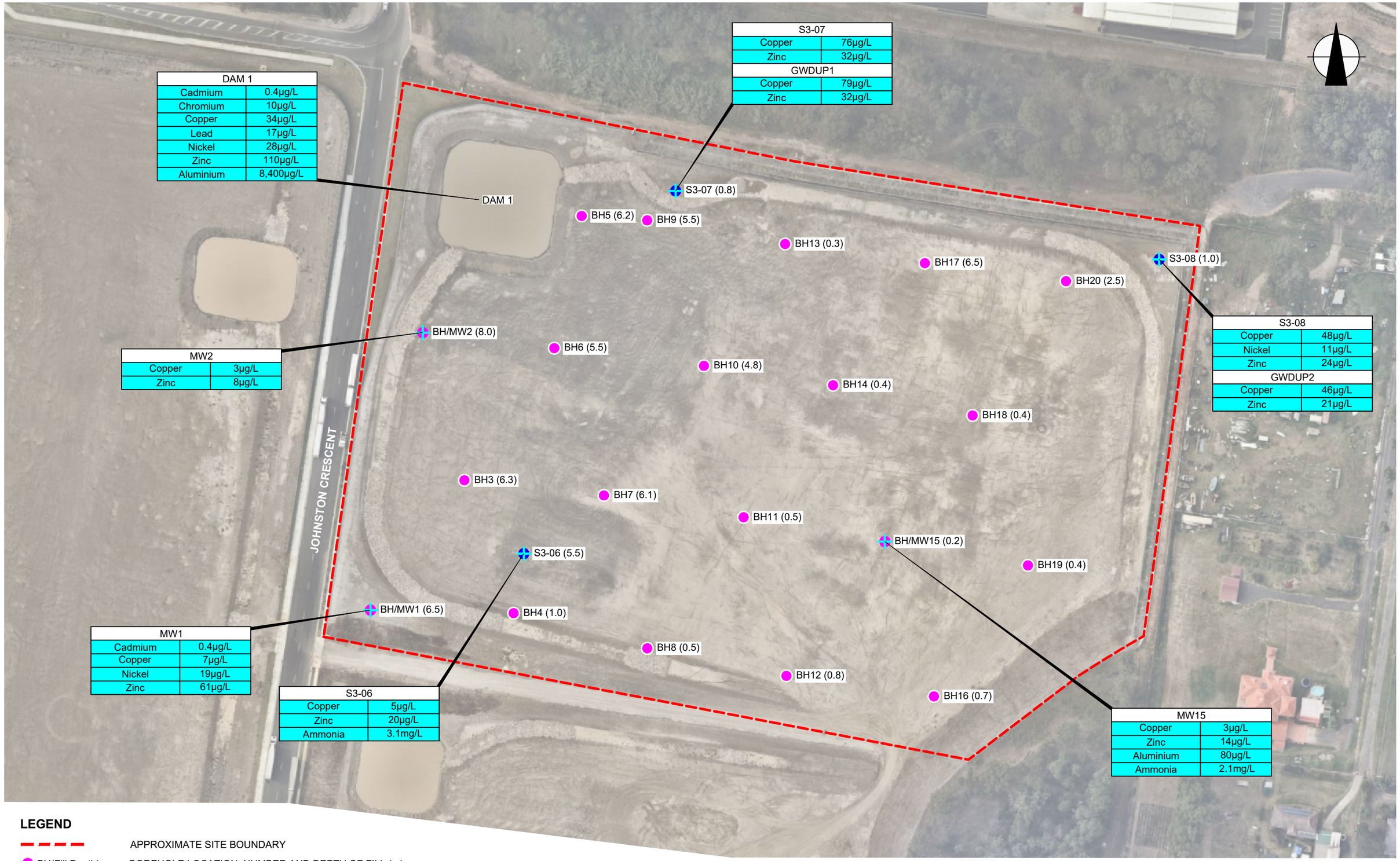

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH/MW(Fill Depth) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- S3-06 — GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (ERM, 2023)

SAMPLE ID	-
CHEMICAL	CONCENTRATION (µg/L)

GROUNDWATER SAMPLE EXCEEDANCE

GROUNDWATER CONTAMINATION ABOVE SAC

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 15 30 45 60 75
SCALE 1:1500 @A3 METRES

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

Title: **SAC EXCEEDANCE PLAN**

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Project No: E36628BR

Figure No: 3

JKEnvironments

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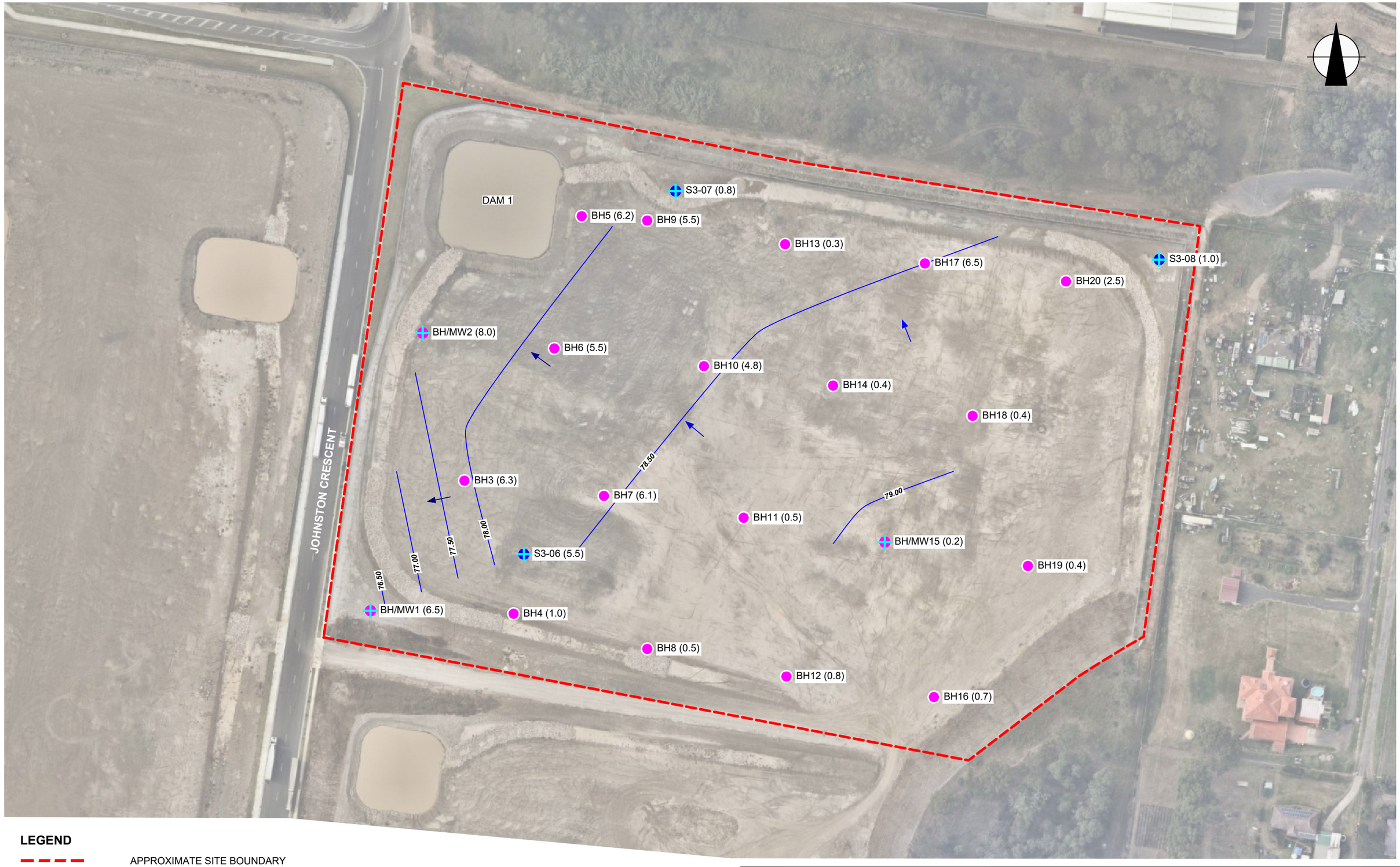

LEGEND

APPROXIMATE SITE BOUNDARY	
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
S3-06	GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (ERM, 2023)
78.0	GROUNDWATER CONTOUR INTERVALS (m)
	INFERRED GROUNDWATER FLOW DIRECTION

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 15 30 45 60 75

SCALE 1:1500 @A3 METRES

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

Title: **GROUNDWATER CONTOUR PLAN**

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Project No: E36628BR

Figure No: 4

JKEnvironments

PLOT DATE: 7/05/2024 10:45:58 AM DWG FILE: K:\5C EIS JOBS\36000\SIE36628BR HORSLEY PARK\CAD\E36628BR.DWG

Appendix B: Site Information

Proposed Development Plans

DRAFT

DATE	No.	REVISION HISTORY	DRW	CHK	QA
20/12/2023	1	70% SSDA	HDR	AT	HDR

NOTE:
1. ALL DRAWINGS TO BE READ IN CONJUNCTION WITH ASSOCIATED SPECIFICATION
2. DO NOT SCALE FROM DRAWINGS
3. CONFIRM ALL MEASUREMENTS ON SITE
4. CHECK ON SITE PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES
5. ENSURE COORDINATION WITH OTHER TRADES ON SITE.
6. ASL = ABOVE SLAB LEVEL

PRINCIPAL CONSULTANTS

Architect HDR

Structural TTW

PRINCIPAL CONTRACTOR

CLIENT

NEXTDC
GPO Box 3219
Brisbane QLD 4001
T: +61 7 3177 4777

PROJECT ARCHITECT

Document Author Project Number
10335877

Key Plan

Site: S4 | Stage: | NEXTDC Project Number:

Project Address:
321-325 BURLEY ROAD, HORSLEY PARK, NSW 2175 AUSTRALIA

Project Name:
NEXTDC DATA CENTRE

Drawing title
SITE ANALYSIS / SITE SURVEY PLAN

Drawing Status:
STATE SIGNIFICANT DEVELOPMENT APPLICATION (SSDA)

Drawn: Author	Date: 20/12/2023
CHK: Checker	Date: 20/12/2023
Scale: 1 : 2000	Sheet: A1
File Name:	
Drawing Number: AR-0000-DRG-NXT-0060	Rev: 1

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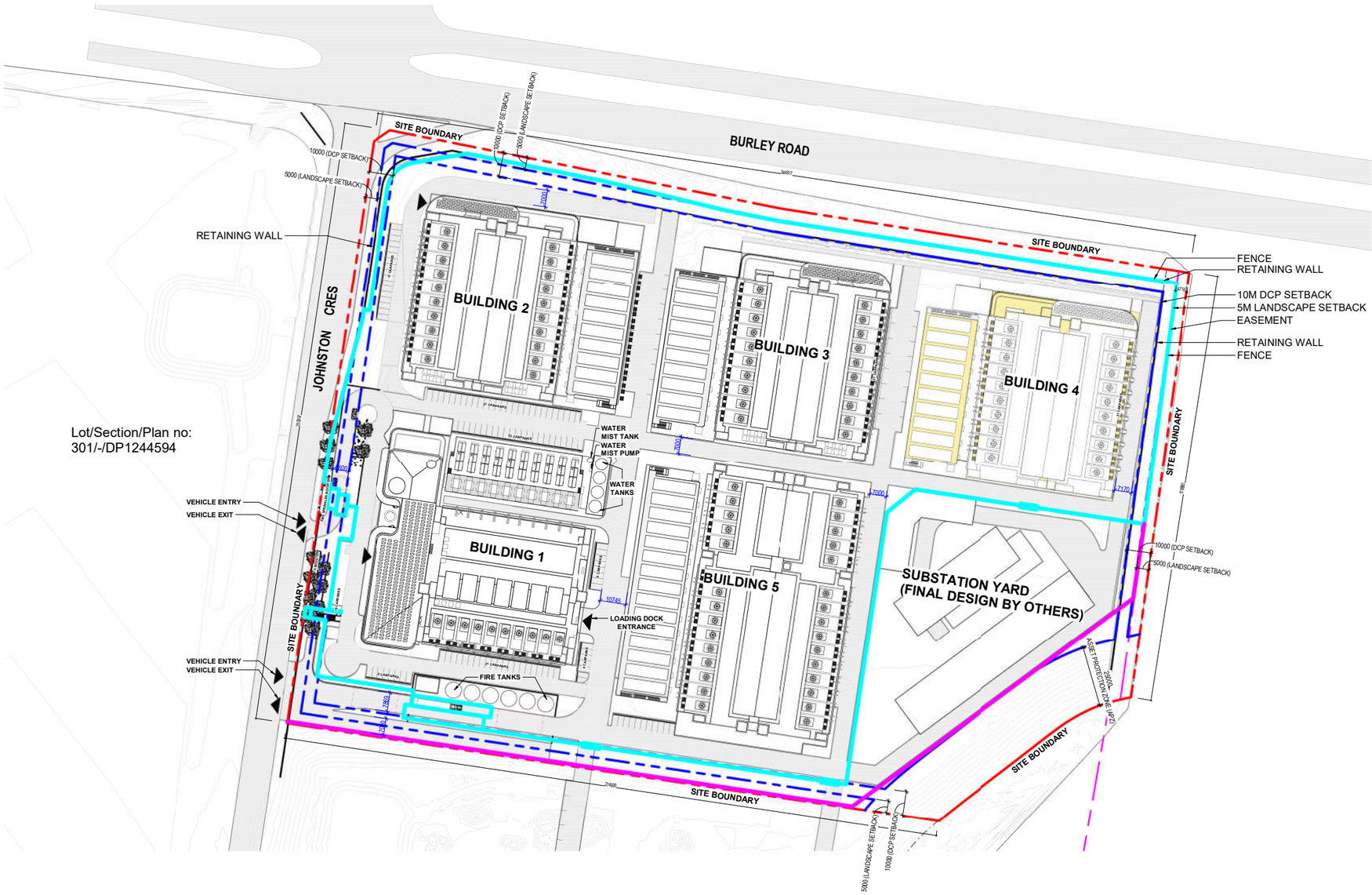

Lot/Section/Plan no:
301/-/DP1244594

1 PROPOSED SITE PLAN
1 : 1000

LEGEND:
- 2.4M HIGH PALISADE FENCE
- 2.4M HIGH WELDED MESH FENCE
- 1.8M HIGH TEMPORARY HOARDING

Parking Schedule

PARKING LOCATION	# OF SPOTS
BLD 01	90
BLD 02	52
BLD 03	16
BLD 04	16
BLD 05	43
PARKING LOT	70
Grand total: 287	

DRAFT

DATE	No.	REVISION HISTORY	DRW	CHK	QA
20/12/2023	1	70% SSDA	HDR	AT	HDR

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Drawing title
PROPOSED SITE PLAN

Drawing Status:
STATE SIGNIFICANT DEVELOPMENT APPLICATION (SSDA)

Drawn: Author	Date:	20/12/2023
CHK: Checker	Date:	20/12/2023
Scale: As indicated	Sheet: A1	File Name:
Drawing Number: AR-0000-DRG-NXT-0062		Rev: 1

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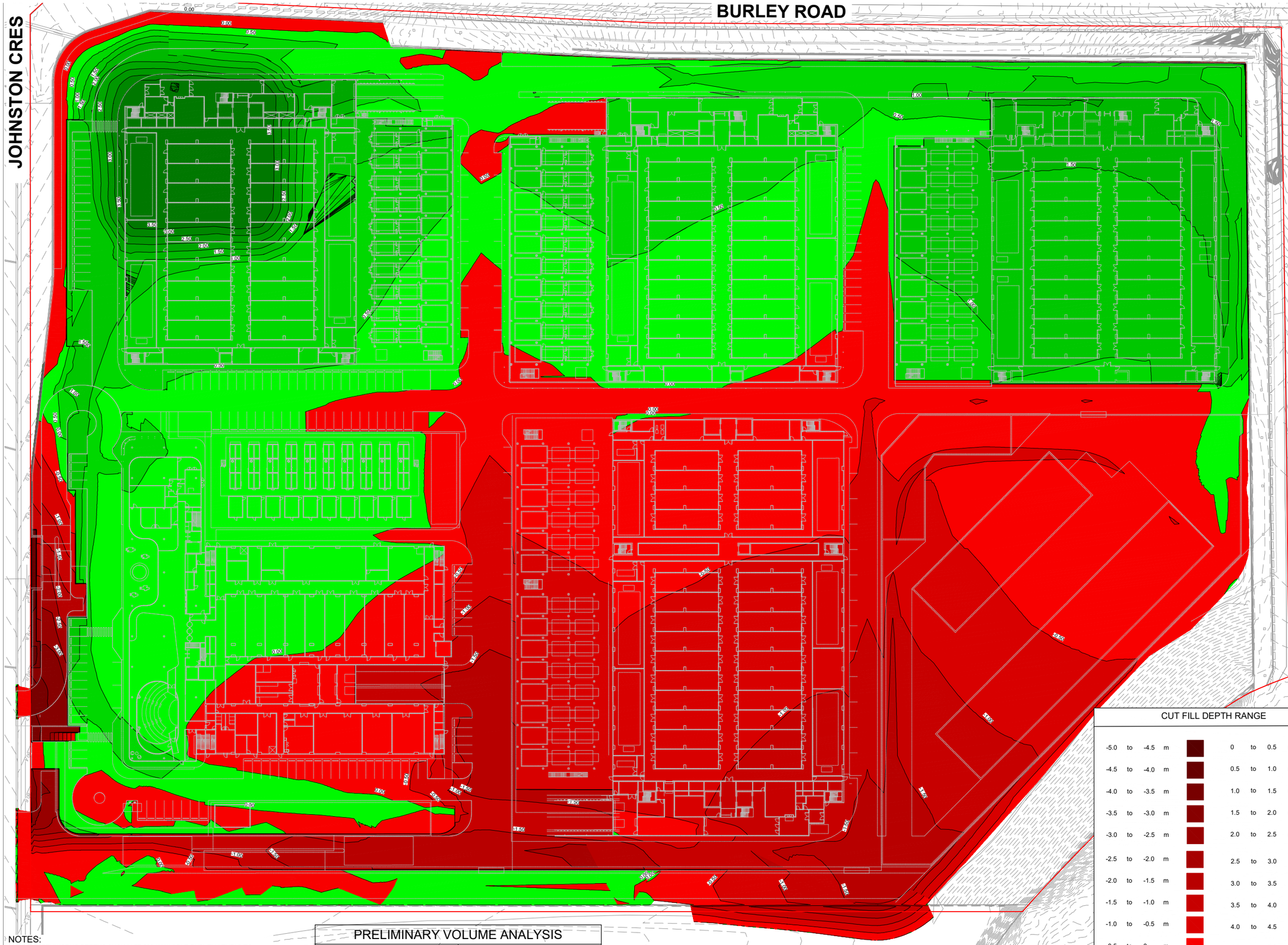

PRELIMINARY VOLUME ANALYSIS

	VOLUME (M³)
CUT	-37,150
FILL	22,190
BALANCE	-14,960

NOTES:
1. BULK EARTHWORKS DEPTHS SHOWN FROM AVAILABLE SURVEY LEVELS TO FINISHED DESIGN SURFACE LEVELS
2. VOLUME CALCULATION ASSUMED 300mm SETDOWN FOR ALL PROPOSED PAVEMENTS, SLABS AND LANDSCAPING AREAS, TO BE CONFIRMED AT DETAILED DESIGN STAGE.
3. BULK EARTHWORKS DEPTHS AND VOLUMES SHOWN ARE PRELIMINARY ONLY AND SUBJECT TO CHANGE AT DETAILED DESIGN STAGE
4. NOT TO BE USED FOR TENDER OR DETAILED EXCAVATION. CONTRACTOR TO UNDERTAKE THEIR OWN VERIFICATION OF CUT FILL VOLUMES.

CUT FILL DEPTH RANGE

-5.0	to	-4.5	m		0	to	0.5	m
-4.5	to	-4.0	m		0.5	to	1.0	m
-4.0	to	-3.5	m		1.0	to	1.5	m
-3.5	to	-3.0	m		1.5	to	2.0	m
-3.0	to	-2.5	m		2.0	to	2.5	m
-2.5	to	-2.0	m		2.5	to	3.0	m
-2.0	to	-1.5	m		3.0	to	3.5	m
-1.5	to	-1.0	m		3.5	to	4.0	m
-1.0	to	-0.5	m		4.0	to	4.5	m
-0.5	to	0	m		4.5	to	5.0	m

PRELIMINARY

No.	REVISION HISTORY	DRW	CHK	QA
1	PRELIMINARY	JH	GC	GC

NOTE:
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PRINCIPAL CONSULTANTS

Architect: HDR
Services: AURECON
Structural: TTW

PRINCIPAL CONTRACTOR

CLIENT

NEXTDC
GPO Box 3219
Brisbane QLD 4001
T: +61 7 3177 4777

[Contractor / Consultant / Document Author]

TTW Structural Civil Traffic Façade
612 6285 1766 | Level 5, 224 Bunda St, Canberra City, ACT 2601

Document Author Project Number

Key Plan

Site: | Stage: | NEXTDC Project Number:

Project Address:
16 JOHNSTON CRESCENT,
HORSLEY PARK, NSW 2175
AUSTRALIA

Project Name:
NEXT DC DATA CENTRE

Drawing title
BULK EARTHWORKS
CUT/FILL PLAN (ULTIMATE)

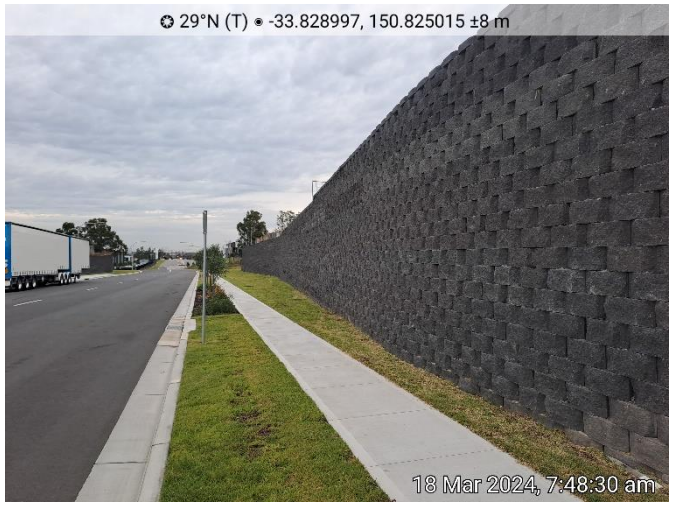
Drawing Status:
STATE SIGNIFICANT DEVELOPMENT APPLICATION (SSDA)

Drawn	JH/SS	Date 2/02/2024
CHK	GC	Date 2/02/2024

Scale: 1:500 | Sheet: A1 | File Name:

Drawing Number	Rev
S4-CI-NXT-DRG-0000-1000	1

Selected Site Photographs



Photograph 1: Retaining wall along Johnston Crescent

Photograph 2: Retaining wall along Burley Road

Photograph 3: General site condition

Photograph 4: North-west of site showing drainage channel

Photograph 5: Sediment basin in north-west of site

Photograph 6: Sediment basin and drainage channel

Photograph 7: Newly planted vegetation along northern site boundary

Photograph 8: Newly planted vegetation with conservation area beyond

Lotsearch Environmental Risk and Planning Report

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 12 Mar 2024 11:07:24

Reference: LS053720 EP

Address: 16 Johnston Crescent, Horsley Park, NSW 2175

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	04/01/2024	04/01/2024	Quarterly	-	-	-	-
Topographic Data	NSW Department of Customer Service - Spatial Services	22/08/2022	22/08/2022	Annually	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	29/02/2024	09/02/2024	Monthly	1000m	0	0	0
Contaminated Land Records of Notice	Environment Protection Authority	26/02/2024	26/02/2024	Monthly	1000m	0	0	0
Former Gasworks	Environment Protection Authority	24/01/2024	14/07/2021	Quarterly	1000m	0	0	0
Notices under the POEO Act 1997	Environment Protection Authority	17/01/2024	17/01/2024	Monthly	1000m	1	1	2
National Waste Management Facilities Database	Geoscience Australia	26/05/2022	07/03/2017	Annually	1000m	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	20/09/2023	07/09/2020	Annually	1000m	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	04/03/2024	21/11/2032	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	06/03/2024	06/03/2024	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	06/03/2024	06/03/2024	Monthly	2000m	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	06/03/2024	06/03/2024	Monthly	2000m	0	0	0
Defence Controlled Areas	Department of Defence	12/01/2024	12/01/2024	Quarterly	2000m	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	24/01/2024	02/09/2022	Quarterly	2000m	0	0	0
National Unexploded Ordnance (UXO)	Department of Defence	12/01/2024	12/01/2024	Quarterly	2000m	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	13/11/2023	15/12/2022	Annually	1000m	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	04/03/2024	04/03/2024	Monthly	1000m	5	6	13
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	04/03/2024	04/03/2024	Monthly	1000m	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	04/03/2024	04/03/2024	Monthly	1000m	4	4	4
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	150m	0	0	0
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	150m	-	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500m	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500m	-	0	0
Points of Interest	NSW Department of Customer Service - Spatial Services	13/11/2023	13/11/2023	Quarterly	1000m	0	0	4
Tanks (Areas)	NSW Department of Customer Service - Spatial Services	13/11/2023	13/11/2023	Quarterly	1000m	0	0	0
Tanks (Points)	NSW Department of Customer Service - Spatial Services	13/11/2023	13/11/2023	Quarterly	1000m	0	0	1
Major Easements	NSW Department of Customer Service - Spatial Services	31/01/2024	31/01/2024	Quarterly	1000m	0	1	4
State Forest	Forestry Corporation of NSW	12/12/2023	11/12/2023	Annually	1000m	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	16/02/2023	31/12/2022	Annually	1000m	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	06/02/2024	19/08/2019	Annually	1000m	1	1	1

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018	NSW Department of Planning, Industry and Environment	09/05/2023	23/02/2018	Annually	1000m	0	0	0
National Groundwater Information System (NGIS) Boreholes	Bureau of Meteorology; Water NSW	18/04/2023	13/07/2022	Annually	2000m	0	0	8
NSW Seamless Geology Single Layer: Rock Units	Department of Regional NSW	06/12/2023	31/05/2023	Annually	1000m	1	1	3
NSW Seamless Geology – Single Layer: Trendlines	Department of Regional NSW	06/12/2023	31/05/2023	Annually	1000m	0	0	0
NSW Seamless Geology – Single Layer: Geological Boundaries and Faults	Department of Regional NSW	06/12/2023	31/05/2023	Annually	1000m	0	0	0
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Annually	1000m	0	0	0
Atlas of Australian Soils	Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES)	12/01/2024	17/02/2011	Annually	1000m	2	2	3
Soil Landscapes of Central and Eastern NSW	NSW Department of Planning, Industry and Environment	12/12/2023	27/07/2020	Annually	1000m	1	1	3
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning, Industry and Environment	02/02/2024	01/09/2023	Monthly	500m	0	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	12/01/2024	21/02/2013	Annually	1000m	1	1	1
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	Annually	1000m	1	1	1
Dryland Salinity Potential of Western Sydney	NSW Department of Planning, Industry and Environment	12/05/2017	01/01/2002	Annually	1000m	1	1	3
Mining Subsidence Districts	NSW Department of Customer Service - Subsidence Advisory NSW	24/01/2024	24/01/2024	Quarterly	1000m	0	0	0
Current Mining Titles	NSW Department of Industry	06/03/2024	06/03/2024	Monthly	1000m	1	1	2
Mining Title Applications	NSW Department of Industry	06/03/2024	06/03/2024	Monthly	1000m	0	0	0
Historic Mining Titles	NSW Department of Industry	06/03/2024	06/03/2024	Monthly	1000m	9	10	15
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning, Industry and Environment	02/02/2024	08/09/2023	Monthly	1000m	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning, Industry and Environment	02/02/2024	19/01/2024	Monthly	1000m	1	3	25
Commonwealth Heritage List	Australian Government Department of the Agriculture, Water and the Environment	20/10/2023	13/04/2022	Annually	1000m	0	0	0
National Heritage List	Australian Government Department of the Agriculture, Water and the Environment	20/10/2023	13/04/2022	Annually	1000m	0	0	0
State Heritage Register - Curtilages	NSW Department of Planning, Industry and Environment	24/01/2024	24/11/2023	Quarterly	1000m	0	0	0
Environmental Planning Instrument Local Heritage	NSW Department of Planning, Industry and Environment	02/02/2024	19/01/2024	Monthly	1000m	0	0	0
Bush Fire Prone Land	NSW Rural Fire Service	26/02/2024	20/11/2023	Monthly	1000m	2	3	3
NSW Native Vegetation Type Map	NSW Department of Planning and Environment	26/05/2023	12/12/2022	Quarterly	1000m	2	2	4
Ramsar Wetlands of Australia	Australian Government Department of Agriculture, Water and the Environment	09/05/2023	01/11/2022	Annually	1000m	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	28/10/2022	26/10/2022	Annually	1000m	1	1	4
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	28/10/2022	26/10/2022	Annually	1000m	1	1	7
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	29/11/2023	29/11/2023	Weekly	10000m	-	-	-

Site Diagram

16 Johnston Crescent, Horsley Park, NSW 2175

Legend

- Site Boundary
- Internal Parcel Boundaries

Total Area: 82038m²

Total Perimeter: 1.14km

Scale: 0 25 50 100 Meters

Data Source Aerial Imagery:
© Aerometrex Pty Ltd

Disclaimers:

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

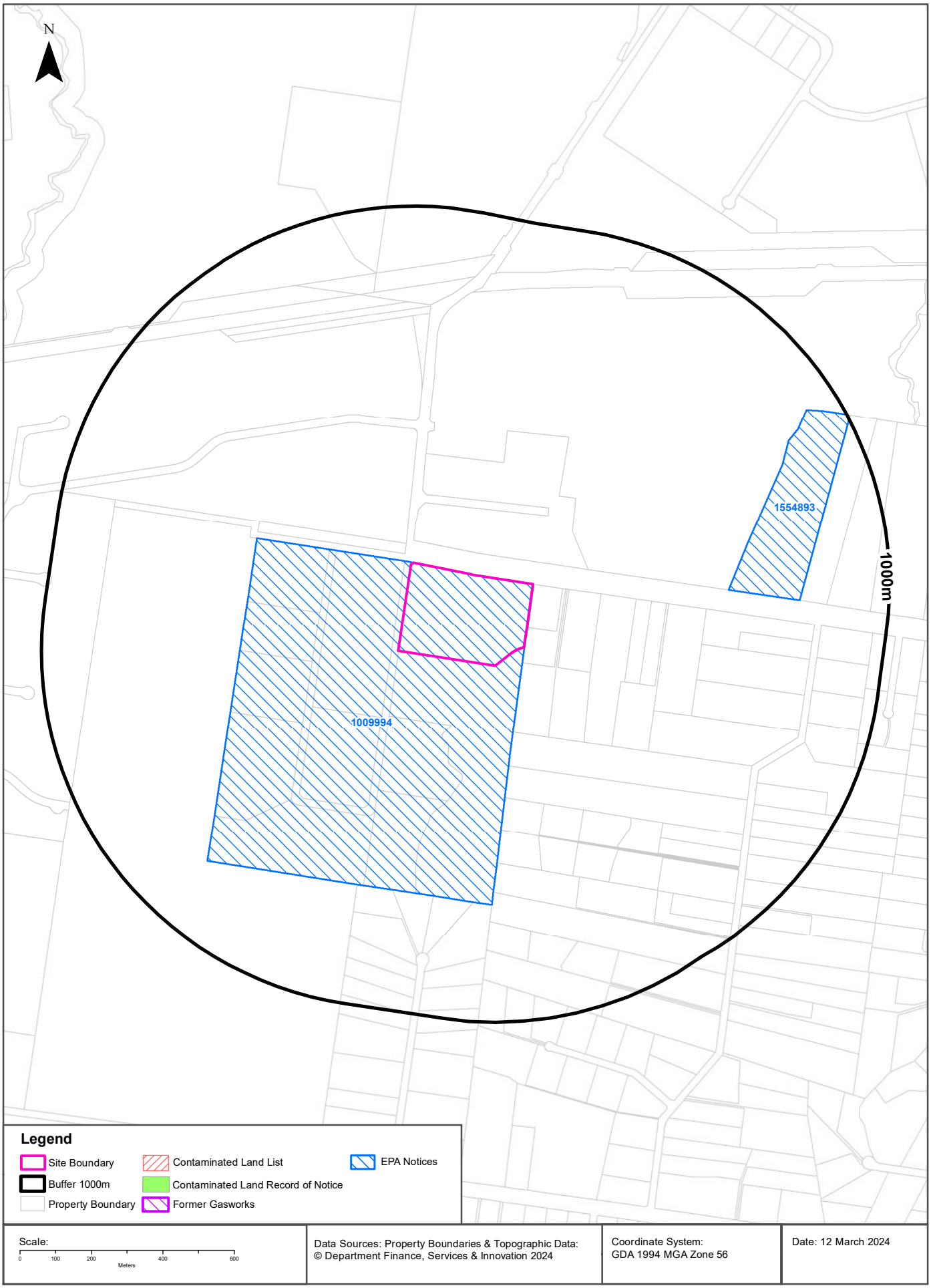
Parcels that make up a small percentage of the total site area have not been labelled for increased legibility.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 March 2024

Contaminated Land

16 Johnston Crescent, Horsley Park, NSW 2175



Contaminated Land

16 Johnston Crescent, Horsley Park, NSW 2175

List of NSW contaminated sites notified to EPA

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

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

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

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

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land

16 Johnston Crescent, Horsley Park, NSW 2175

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

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

Contaminated Land Records of Notice Data Source: Environment Protection Authority

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

Former Gasworks

Former Gasworks within the dataset buffer:

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

Former Gasworks Data Source: Environment Protection Authority

Contaminated Land

16 Johnston Crescent, Horsley Park, NSW 2175

EPA Notices

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

Number	Type	Name	Address	Status	Issued Date	Act	Offence	Offence Date	Loc Conf	Dist	Dir
1009994	s.91 Clean Up Notice	CSR LIMITED	327 BURLEY ROAD, HORSLEY PARK, NSW 2175	Issued	27/07/2001				Premise Match	0m	On-site
1554893	s.91 Clean Up Notice	ANTHONY GAUCI	198-222 Burley Road, HORSLEY PARK, NSW 2175	Issued	03/08/2017				Premise Match	547m	East

NSW EPA Notice Data Source: Environment Protection Authority

Waste Management & Liquid Fuel Facilities

16 Johnston Crescent, Horsley Park, NSW 2175

National Waste Management Site Database

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

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist	Direction
N/A	No records in buffer											

National Liquid Fuel Facilities

National Liquid Fuel Facilties within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist	Direction
N/A	No records in buffer										

PFAS Investigation & Management Programs

16 Johnston Crescent, Horsley Park, NSW 2175

EPA PFAS Investigation Program

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

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

EPA PFAS Investigation Program: Environment Protection Authority

Defence PFAS Investigation Program

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

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

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

Defence PFAS Management Program

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

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

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

Airservices Australia National PFAS Management Program

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

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

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites and Unexploded Ordnance

16 Johnston Crescent, Horsley Park, NSW 2175

Defence Controlled Areas (DCA)

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

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

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

Defence 3 Year Regional Contamination Investigation Program (RCIP)

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

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

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

National Unexploded Ordnance (UXO)

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

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

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

EPA Other Sites with Contamination Issues

16 Johnston Crescent, Horsley Park, NSW 2175

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

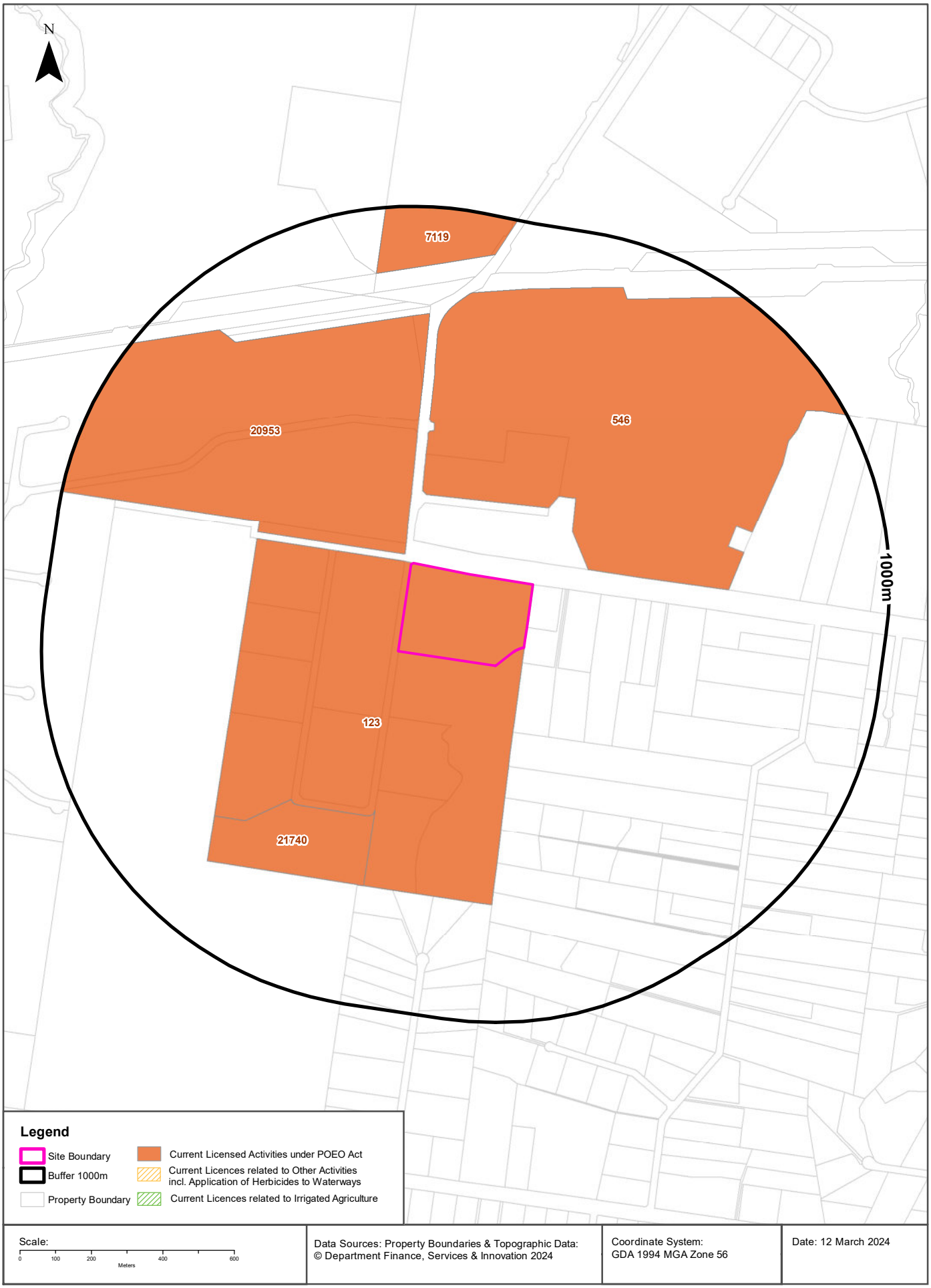
Sites within the dataset buffer:

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

16 Johnston Crescent, Horsley Park, NSW 2175



EPA Activities

16 Johnston Crescent, Horsley Park, NSW 2175

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
123	PGH BRICKS & PAVERS PTY LIMITED	CSR BUILDING PRODUCTS, HORSLEY PARK	327 BURLEY ROAD, HORSLEY PARK, NSW 2175	HORSLEY PARK	Ceramic waste generation	Premise Match	0m	On-site
123	PGH BRICKS & PAVERS PTY LIMITED	CSR BUILDING PRODUCTS, HORSLEY PARK	327 BURLEY ROAD, HORSLEY PARK, NSW 2175	HORSLEY PARK	Land-based extractive activity	Premise Match	0m	On-site
123	PGH BRICKS & PAVERS PTY LIMITED	CSR BUILDING PRODUCTS, HORSLEY PARK	327 BURLEY ROAD, HORSLEY PARK, NSW 2175	HORSLEY PARK	Mining for minerals	Premise Match	0m	On-site
123	PGH BRICKS & PAVERS PTY LIMITED	CSR BUILDING PRODUCTS, HORSLEY PARK	327 BURLEY ROAD, HORSLEY PARK, NSW 2175	HORSLEY PARK	Ceramics production	Premise Match	0m	On-site
123	PGH BRICKS & PAVERS PTY LIMITED	CSR BUILDING PRODUCTS, HORSLEY PARK	327 BURLEY ROAD, HORSLEY PARK, NSW 2175	HORSLEY PARK	Crushing, grinding or separating	Premise Match	0m	On-site
20953	RB (HYGIENE HOME) AUSTRALIA PTY LTD		WAREHOUSE 3B, 3 OAKDALE CLOSE, HORSLEY PARK, NSW 2175		General chemicals storage	Premise Match	35m	North West
546	THE AUSTRAL BRICK CO PTY LTD	AUSTRAL BRICK, PLANTS 1, 2 & 3.	738-780 WALLGROVE ROAD	HORSLEY PARK	Ceramic waste generation	Premise Match	158m	North East
546	THE AUSTRAL BRICK CO PTY LTD	AUSTRAL BRICK, PLANTS 1, 2 & 3.	738-780 WALLGROVE ROAD	HORSLEY PARK	Crushing, grinding or separating	Premise Match	158m	North East
546	THE AUSTRAL BRICK CO PTY LTD	AUSTRAL BRICK, PLANTS 1, 2 & 3.	738-780 WALLGROVE ROAD	HORSLEY PARK	Land-based extractive activity	Premise Match	158m	North East
546	THE AUSTRAL BRICK CO PTY LTD	AUSTRAL BRICK, PLANTS 1, 2 & 3.	738-780 WALLGROVE ROAD	HORSLEY PARK	Mining for minerals	Premise Match	158m	North East
546	THE AUSTRAL BRICK CO PTY LTD	AUSTRAL BRICK, PLANTS 1, 2 & 3.	738-780 WALLGROVE ROAD	HORSLEY PARK	Ceramics production	Premise Match	158m	North East
21740	JALCO AUSTRALIA PTY. LIMITED		8 JOHNSTON CRESCENT, HORSLEY PARK, NSW 2175		Chemical production	Premise Match	450m	South West
7119	NSW ELECTRICITY NETWORKS OPERATIONS PTY LIMITED	TRANSGRID	200 OLD WALLGROVE ROAD	EASTERN CREEK	Waste storage - hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	Premise Match	820m	North

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

16 Johnston Crescent, Horsley Park, NSW 2175

EPA Activities

16 Johnston Crescent, Horsley Park, NSW 2175

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
N/A	No records in buffer							

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
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
5150	FAIRFIELD CITY COUNCIL	WATERWAYS OF FAIRFIELD CITY COUNCIL - FAIRFIELD NSW 2165	Surrendered	17/08/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site

Former Licensed Activities Data Source: Environment Protection Authority

Historical Business Directories

16 Johnston Crescent, Horsley Park, NSW 2175

Business Directory Records 1950-1991
Premise or Road Intersection Matches

Potentially contaminative business activities extracted from Universal Business Directories from years 1991, 1986, 1982, 1970, 1961 & 1950, mapped to a premise or road intersection within the dataset buffer:

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

Business Directory Records 1950-1991
Road or Area Matches

Potentially contaminative business activities extracted from Universal Business Directories from years 1991, 1986, 1982, 1970, 1961 & 1950, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

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

Historical Business Directories

16 Johnston Crescent, Horsley Park, NSW 2175

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
N/A	No records in buffer						

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 2023

16 Johnston Crescent, Horsley Park, NSW 2175

Aerial Imagery 2020

16 Johnston Crescent, Horsley Park, NSW 2175

Aerial Imagery 2016

16 Johnston Crescent, Horsley Park, NSW 2175

Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 12 March 2024
0 40 80 120 160 Meters	© Aerometrex Pty Ltd	GDA 1994 MGA Zone 56	

Aerial Imagery 2011

16 Johnston Crescent, Horsley Park, NSW 2175

Aerial Imagery 2007

16 Johnston Crescent, Horsley Park, NSW 2175

Scale: 0 40 80 120 160 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 March 2024

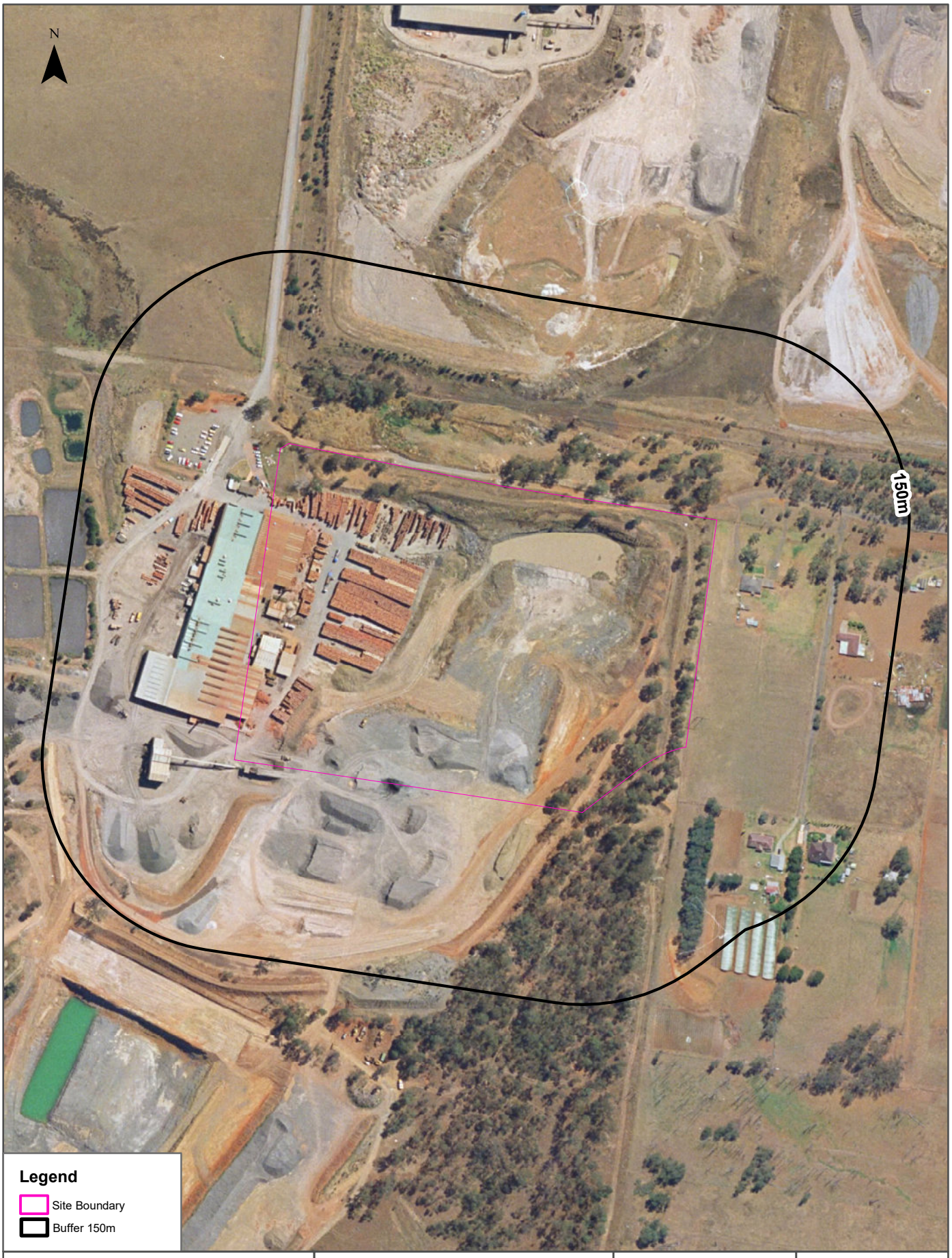
Aerial Imagery 2000

16 Johnston Crescent, Horsley Park, NSW 2175

Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 12 March 2024
0 40 80 120 160 Meters	© Aerometrex Pty Ltd	GDA 1994 MGA Zone 56	

Aerial Imagery 1994

16 Johnston Crescent, Horsley Park, NSW 2175



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

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 March 2024

Aerial Imagery 1991

16 Johnston Crescent, Horsley Park, NSW 2175

Aerial Imagery 1986

16 Johnston Crescent, Horsley Park, NSW 2175

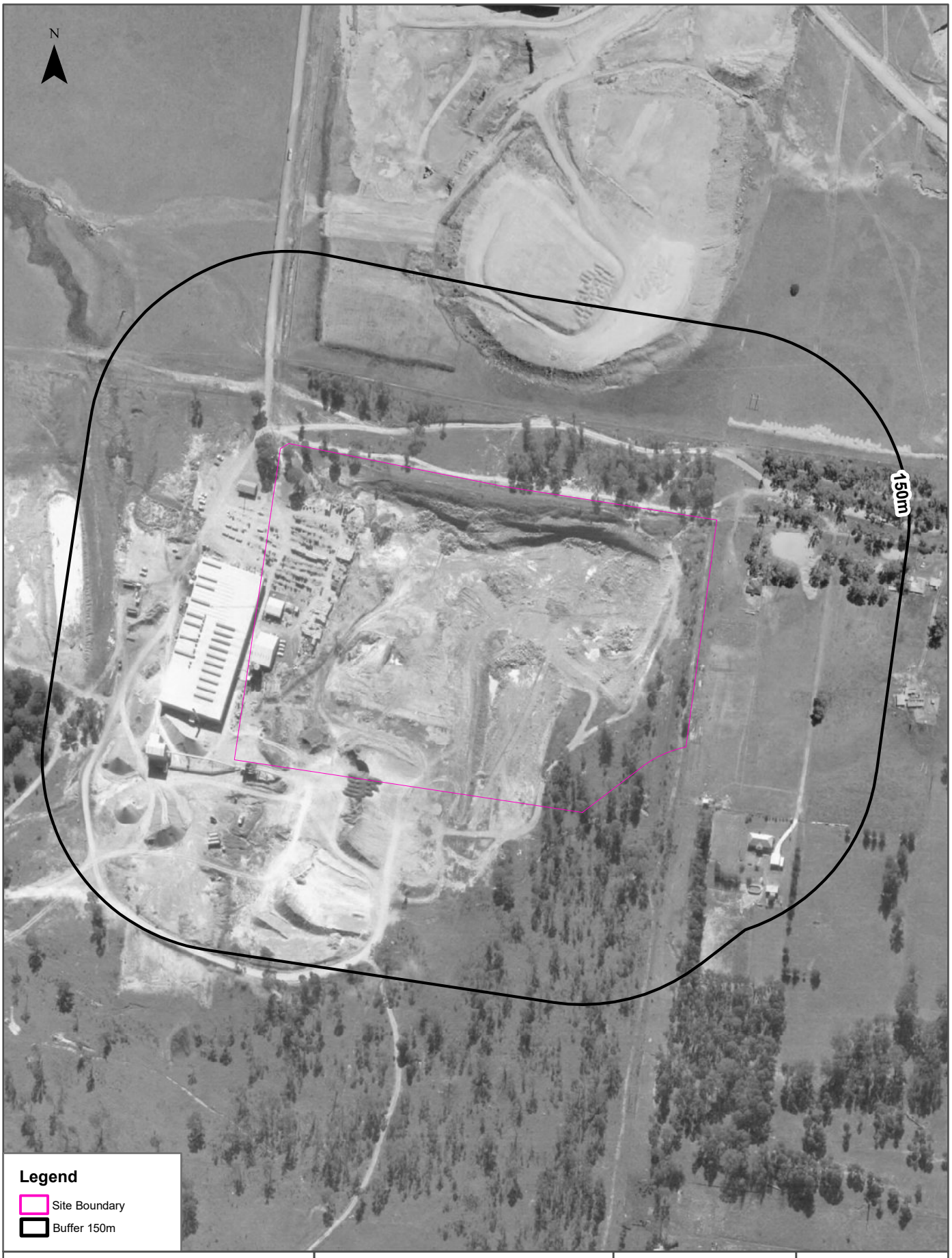
Scale: 0 40 80 120 160 Meters	Data Sources: Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 March 2024

Aerial Imagery 1982

16 Johnston Crescent, Horsley Park, NSW 2175

Aerial Imagery 1978

16 Johnston Crescent, Horsley Park, NSW 2175



Scale: 0 40 80 120 160 Meters	Data Sources: Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 March 2024

Aerial Imagery 1970

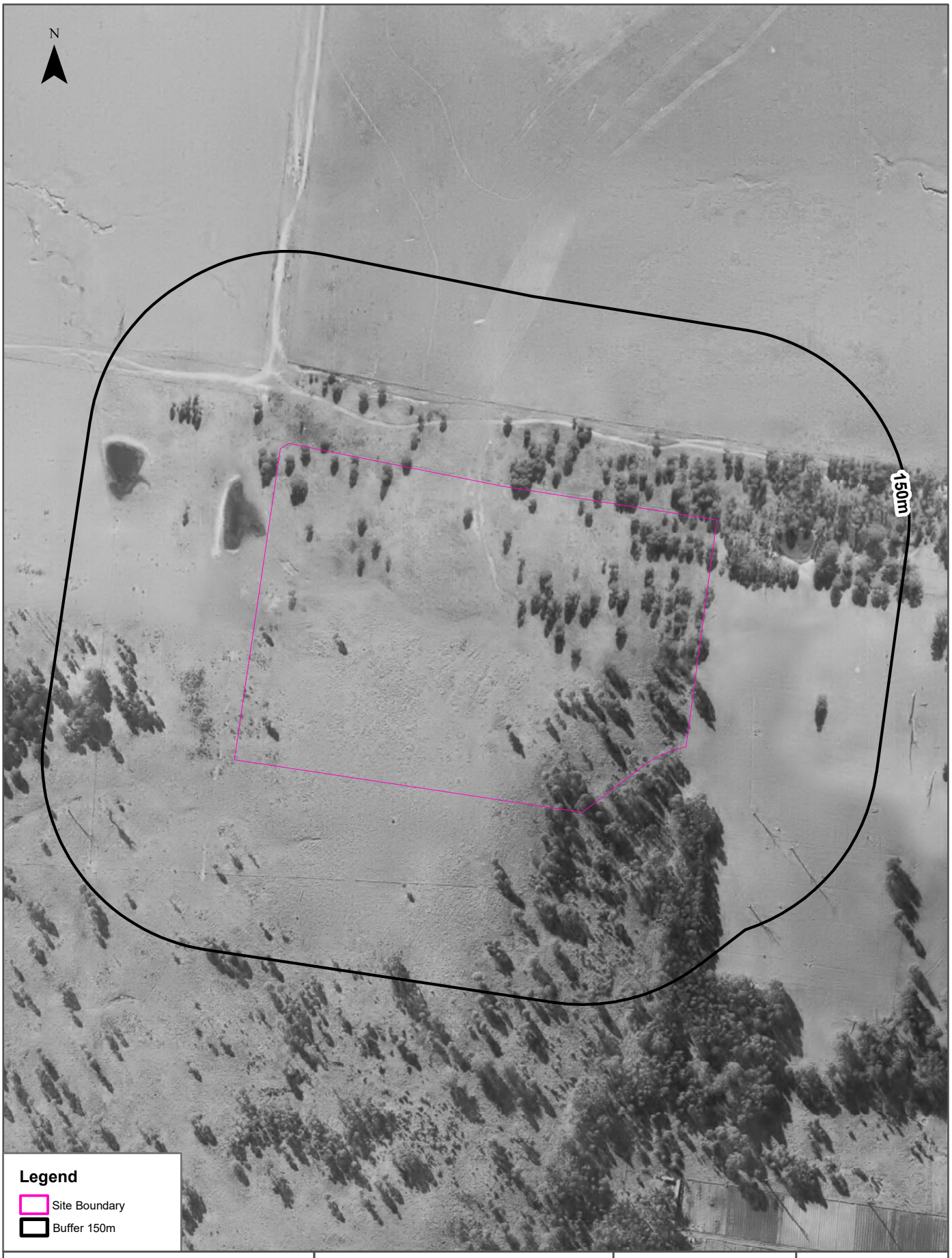
16 Johnston Crescent, Horsley Park, NSW 2175

Aerial Imagery 1965

16 Johnston Crescent, Horsley Park, NSW 2175

Aerial Imagery 1961

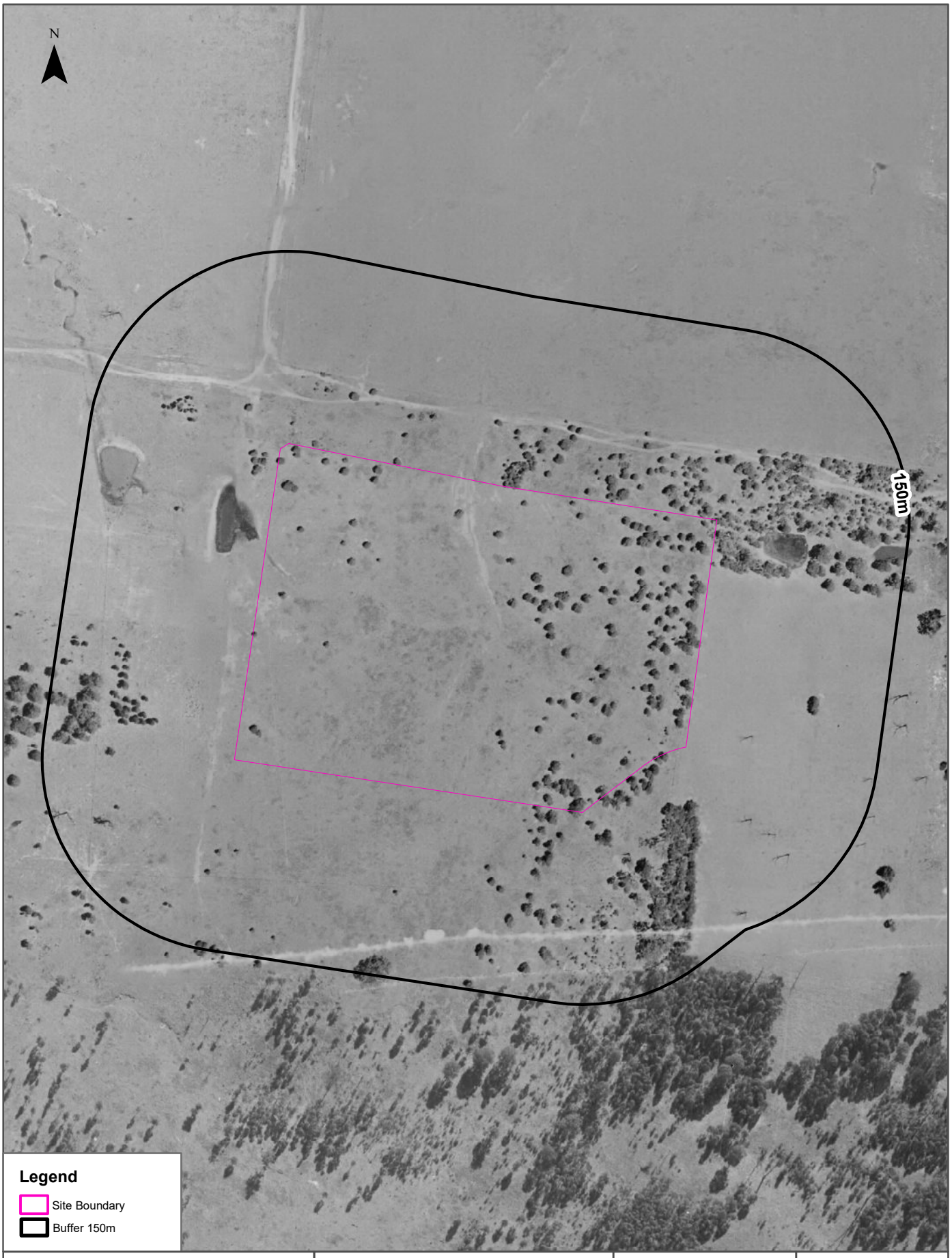
16 Johnston Crescent, Horsley Park, NSW 2175



Scale: 0 40 80 120 160 Meters	Data Sources: Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 March 2024

Aerial Imagery 1955, 1956

16 Johnston Crescent, Horsley Park, NSW 2175

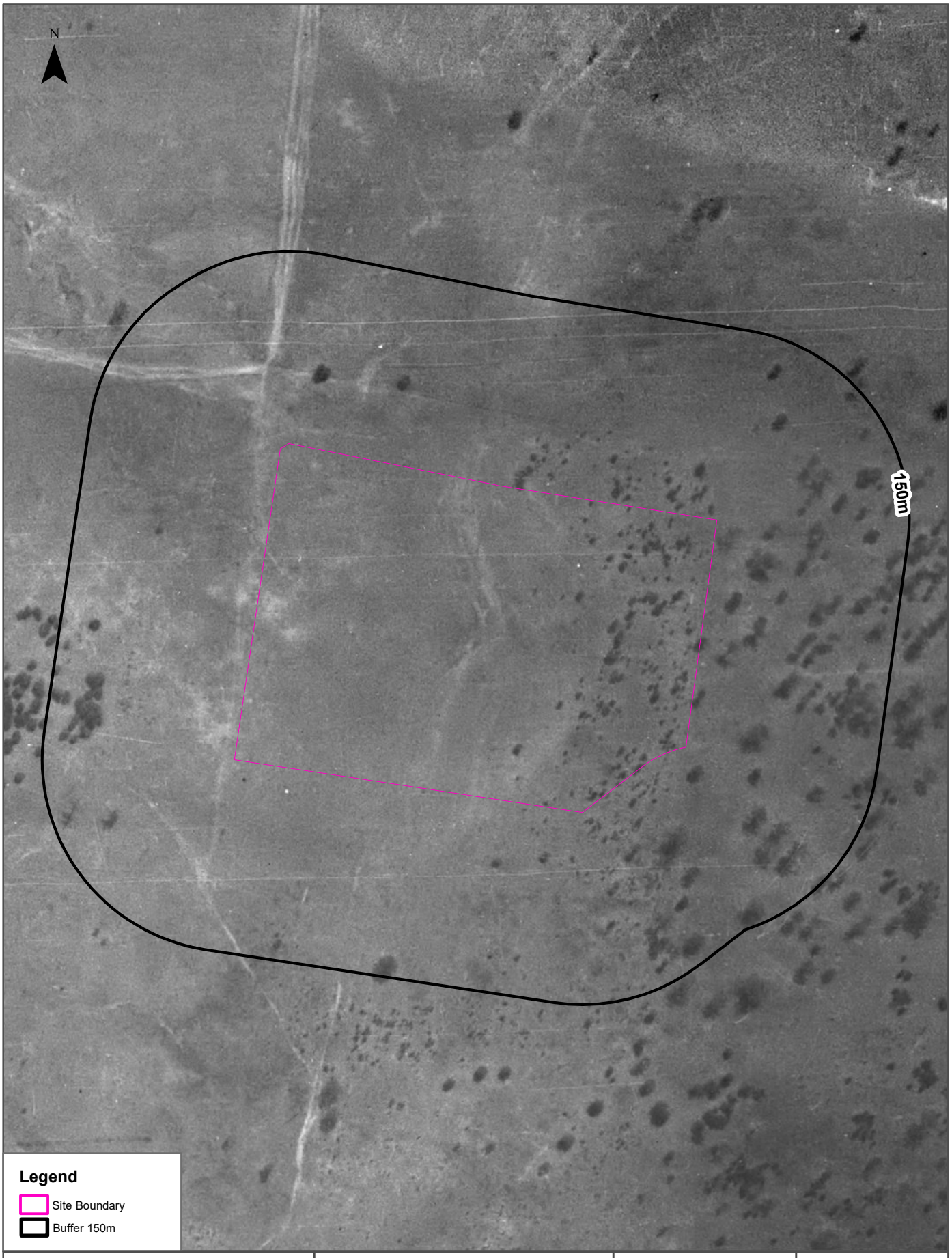


Aerial Imagery 1949

16 Johnston Crescent, Horsley Park, NSW 2175

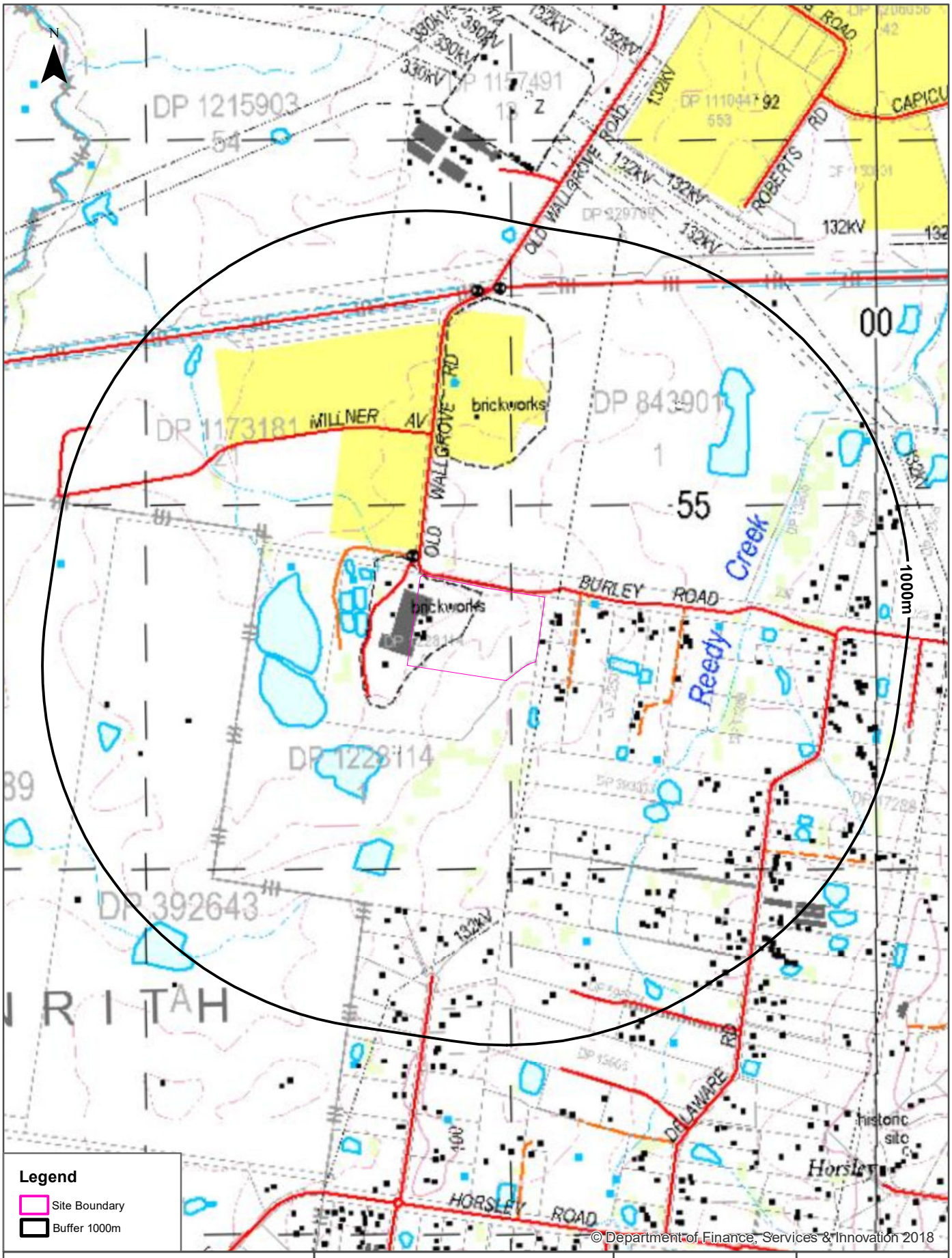
Aerial Imagery 1930

16 Johnston Crescent, Horsley Park, NSW 2175



Topographic Map 2015

16 Johnston Crescent, Horsley Park, NSW 2175



Legend

- Site Boundary
- Buffer 1000m

Scale: 0 160 320 480 640 Meters

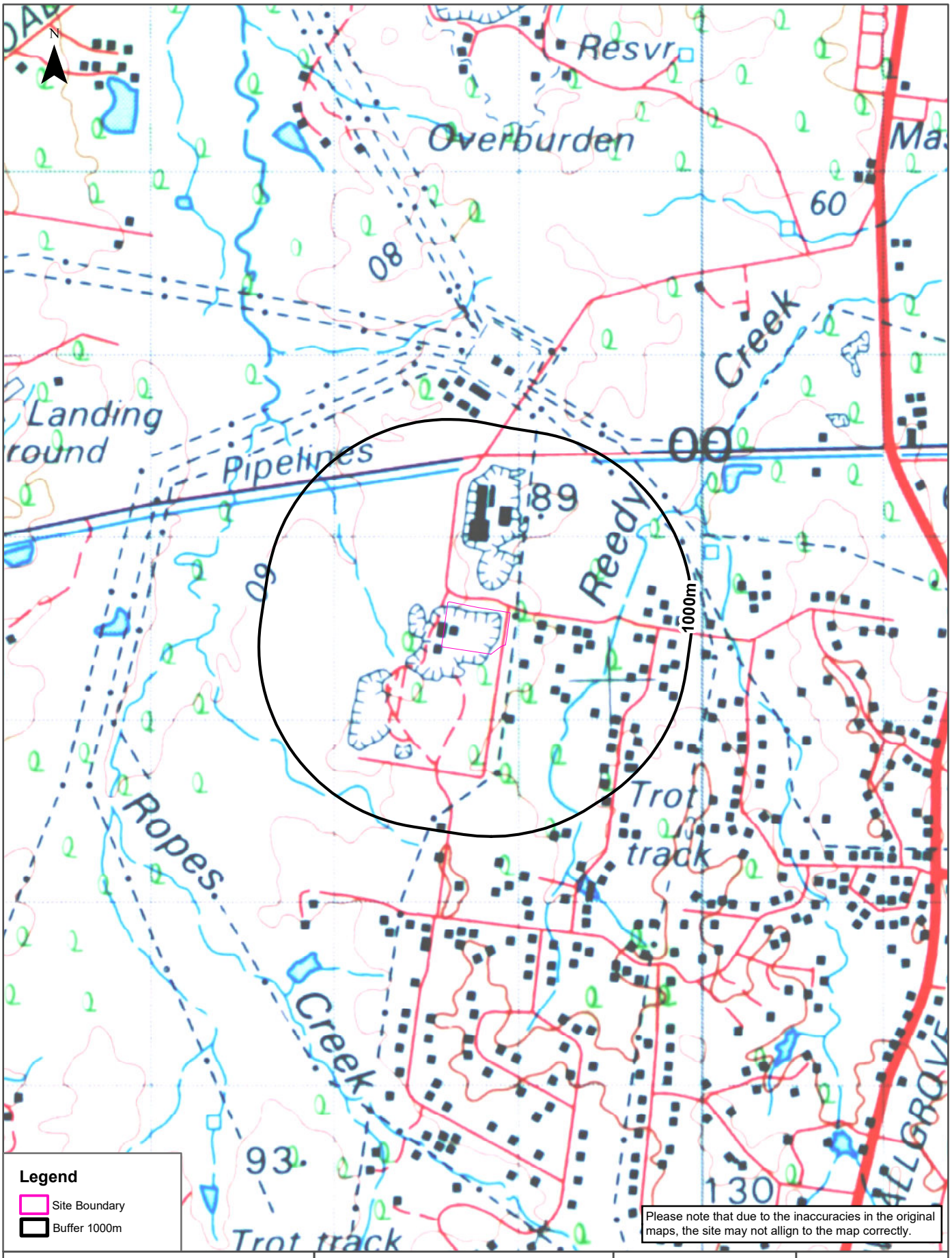
Data Sources: Topographic Map Data
© NSW Land and Property Information

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 March 2024

Historical Map 1975

16 Johnston Crescent, Horsley Park, NSW 2175



Scale: 0 330 660 990 1,320 Meters

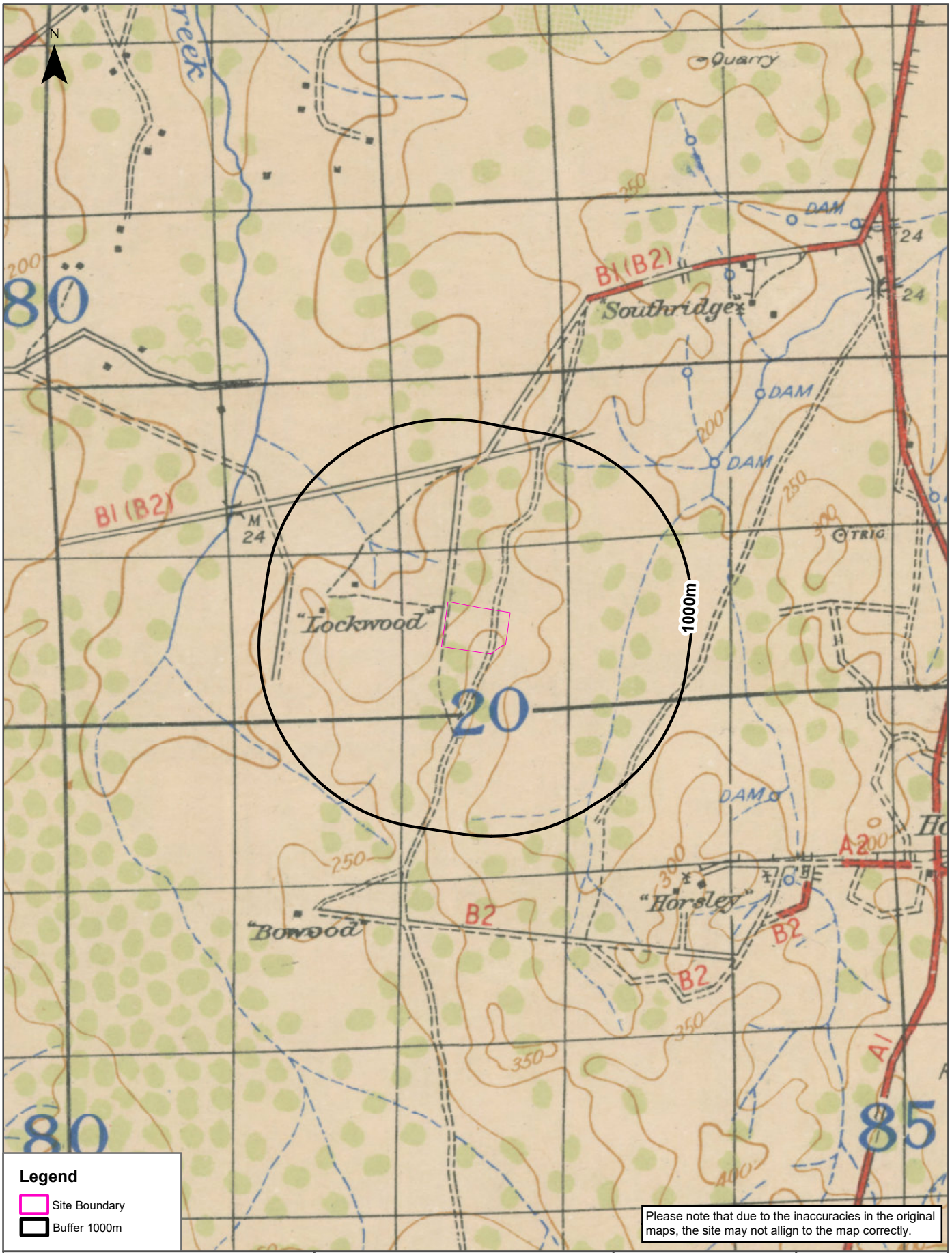
Data Sources: NATMAP 1:100,000
Topographic Maps Geoscience Australia

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 March 2024

Historical Map c.1942

16 Johnston Crescent, Horsley Park, NSW 2175



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:	Data Sources: Australia 1:63360 Produced by Australian Section Imperial General Staff	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 March 2024

0 330 660 990 1,320 Meters

Historical Map c.1929

16 Johnston Crescent, Horsley Park, NSW 2175

Scale: 0 330 660 990 1,320 Meters

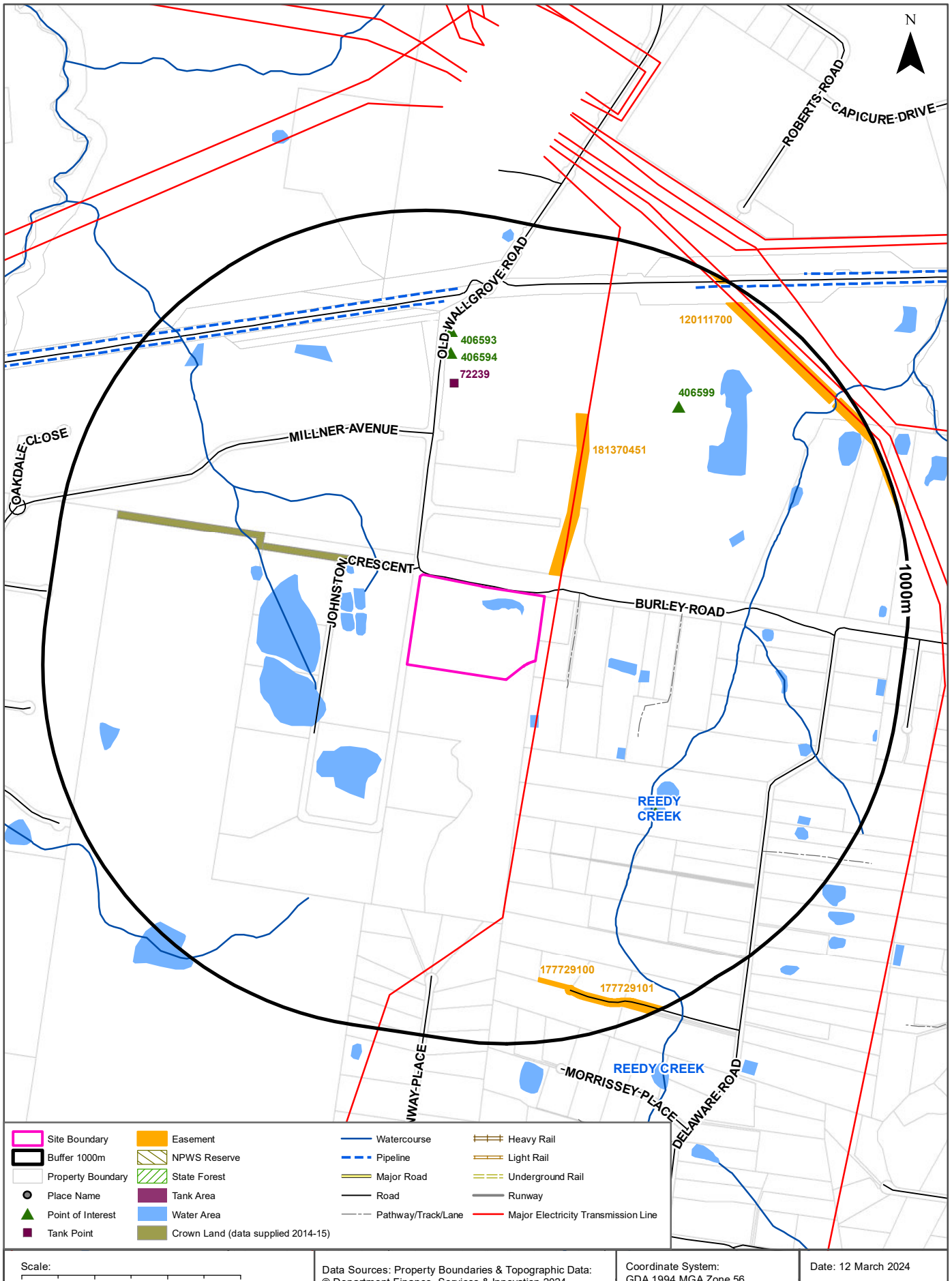
Data Sources: Australia 1:63360
Produced by Australian Section Imperial General Staff

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 March 2024

Topographic Features

16 Johnston Crescent, Horsley Park, NSW 2175



Topographic Features

16 Johnston Crescent, Horsley Park, NSW 2175

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
385572	Manmade Waterbody	REEDY CREEK	530m	South East
406594	Parking Area	Parking Area	615m	North
406599	Quarry - Open Cut	Quarry - Open Cut	638m	North East
406593	Parking Area	Parking Area	673m	North

Topographic Features

16 Johnston Crescent, Horsley Park, NSW 2175

Tanks (Areas)

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

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

Tanks (Points)

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

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
72239	Water	Feature on Previous LPI Tank Area Supply		08/09/2000	532m	North

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
181370451	Primary	Electricity	30.48m	63m	North East
177729100	Primary	Right of way	10 metre	824m	South
177729101	Primary	Right of way	20 m & variable	858m	South
120111700	Primary	Undefined		925m	North East

Topographic Features

16 Johnston Crescent, Horsley Park, NSW 2175

State Forest

What State Forest exist within the dataset buffer?

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

National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

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

Elevation Contours (m AHD)

16 Johnston Crescent, Horsley Park, NSW 2175

Hydrogeology & Groundwater

16 Johnston Crescent, Horsley Park, NSW 2175

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

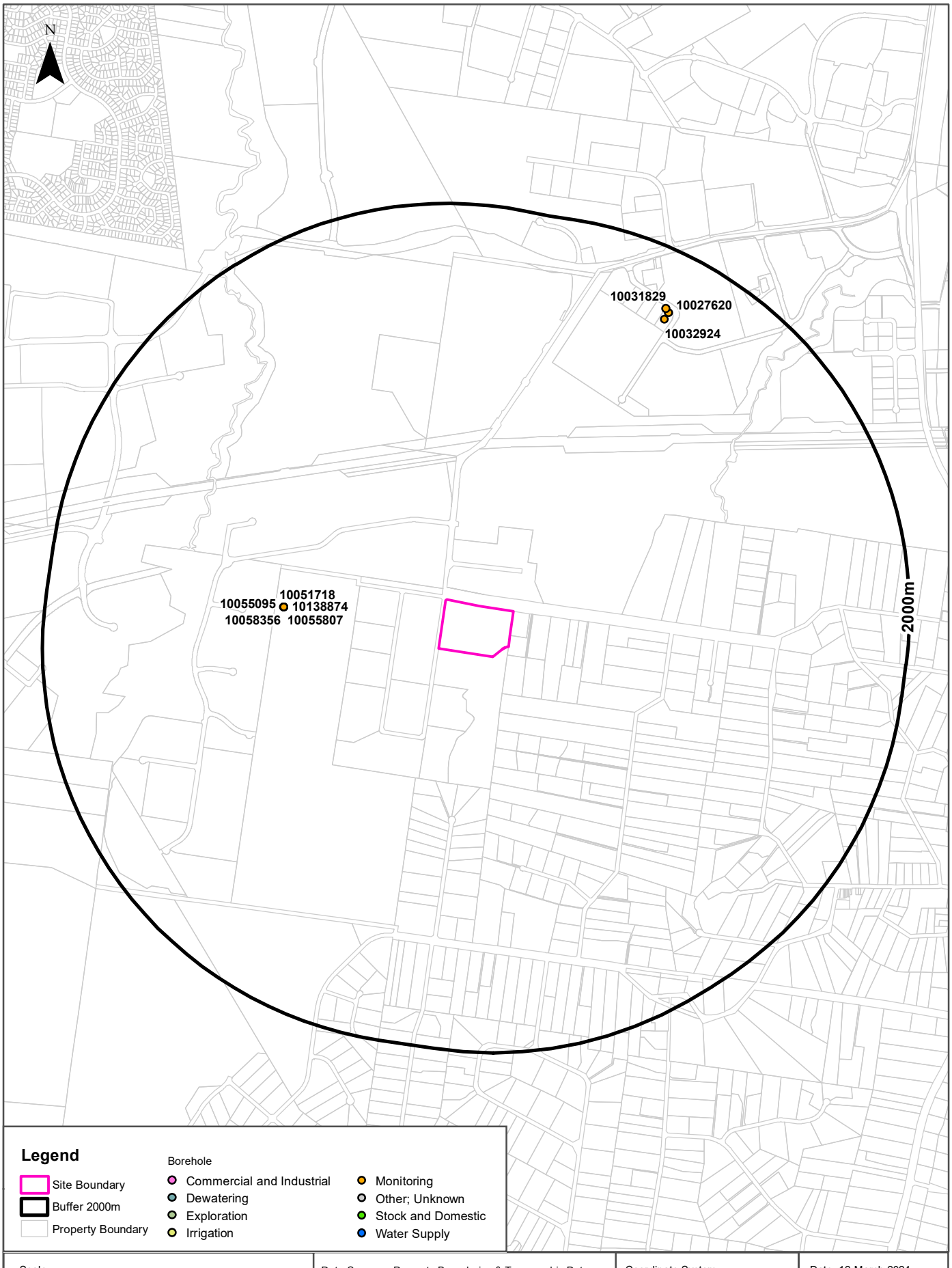
Temporary water restrictions relating to the Botany Sands aquifer within the dataset buffer:

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

16 Johnston Crescent, Horsley Park, NSW 2175



Hydrogeology & Groundwater

16 Johnston Crescent, Horsley Park, NSW 2175

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
10051718	GW100290	Monitoring	Functional	21/10/1994	80.00		AHD	1970			803m	West
10055095	GW100447	Unknown	Functional	11/11/1996			AHD	22900	0.100	2.89	803m	West
10055807	GW100447	Unknown	Functional	11/11/1996			AHD	22900	0.100	2.89	803m	West
10058356	GW100447	Monitoring	Functional	11/11/1996	29.60		AHD	22900	0.100	2.89	803m	West
10138874	GW100447	Unknown	Functional	11/11/1996			AHD	22900	0.100	2.89	803m	West
10032924	GW114926	Monitoring	Functional	08/07/2015	13.50		AHD				1659m	North East
10027620	GW114927	Monitoring	Functional	08/07/2015	18.00		AHD				1699m	North East
10031829	GW114928	Monitoring	Functional	10/10/2011	11.50		AHD				1711m	North East

Hydrogeology & Groundwater

16 Johnston Crescent, Horsley Park, NSW 2175

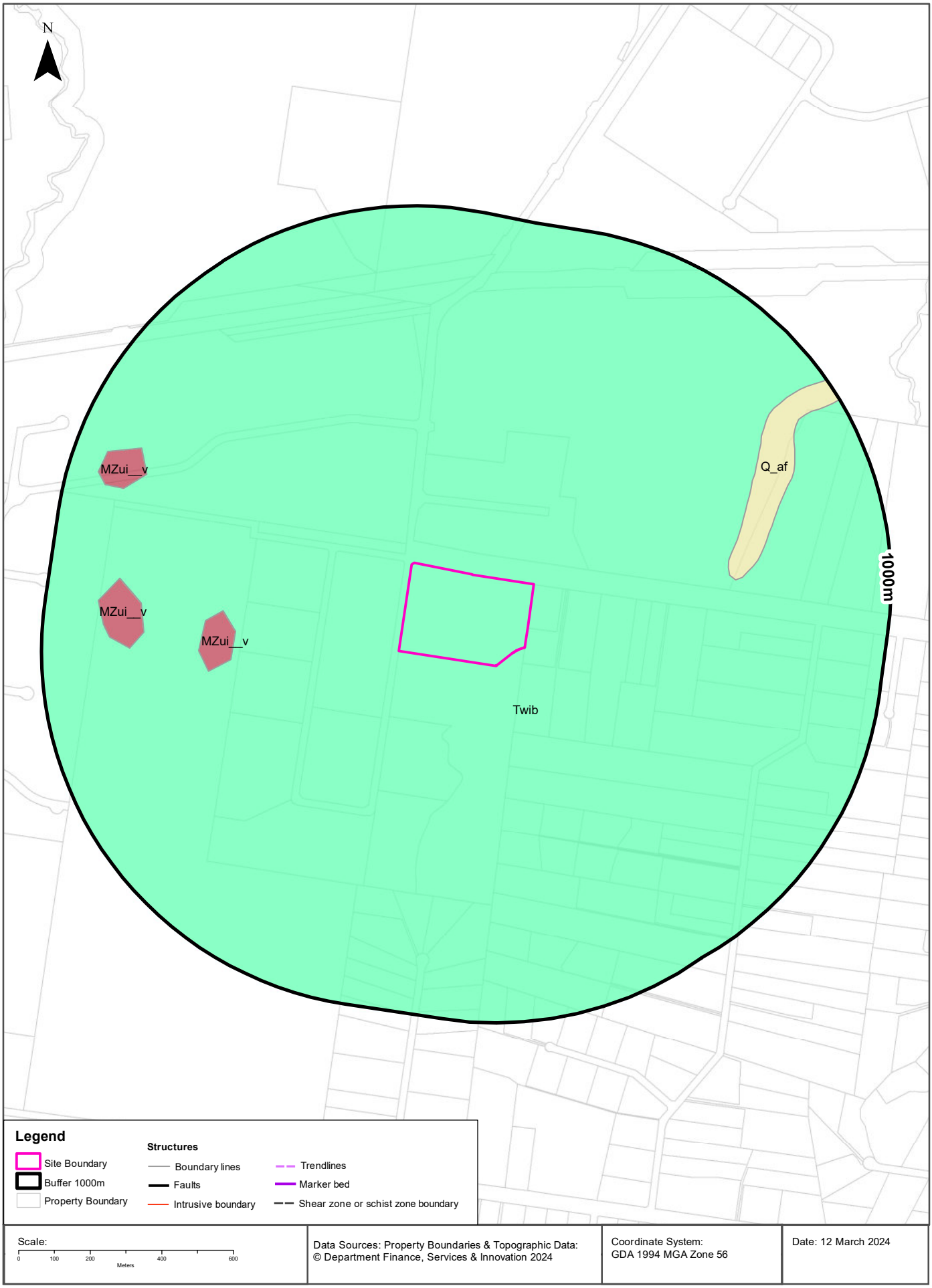
Driller's Logs

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

NGIS Bore ID	Drillers Log	Distance	Direction
10051718	0.00m-1.00m FILL DOLERITE GRAVEL 1.00m-2.00m CLAY/ BLUE/ GREY 2.00m-4.00m SANDSTONE/ BROWN / YELLOW 4.00m-10.00m INTERBEDDED SILTSTONE / SANDSTONE 10.00m-12.00m SILTSTONE / DARK GREY 12.00m-15.00m SILTSTONE / SHALE & CLAY INTERBEDS 15.00m-17.00m SILTSTONE AND SHALE 17.00m-23.00m SILTSTONE MASSIVE 23.00m-53.00m SILTSTONE & SHALE INTERBEDDED 53.00m-54.00m SANDSTONE & SHALE INTERBEDDED 54.00m-57.00m SHALE & SILTSTONE INTERBEDDED 57.00m-61.00m SANDSTONE,SHALE,SILTSTONE INTERBEDDED 61.00m-63.00m SHALE, CARBONACEOUS 63.00m-64.00m SHALE, SILTSTONE, SANDSTONE: INTERBEDDED 64.00m-65.00m SHALE: CARBOINACEOUS 65.00m-68.00m SILTSTONE, SHALE: INTERBEDDED 68.00m-69.00m SHALE: CARBONACEOUS 69.00m-70.00m SHALE AND SILTSTONE :INTERBEDDED 70.00m-71.00m SHALE, SILTSTONE , SANDSTONE INTERBEDDED 71.00m-75.00m SHALE & SILTSTONE INTERBEDDED 75.00m-76.00m SHALE, CLAY, SILTSTONE INTERBEDDED 76.00m-80.00m SHALE, SILTSTONE: INTERBEDDED	803m	West
10055095	0.00m-1.00m CLAY 1.00m-29.60m SILTSTONE/SHALE	803m	West
10055807	0.00m-1.00m CLAY 1.00m-29.60m SILTSTONE/SHALE	803m	West
10058356	0.00m-1.00m CLAY 1.00m-29.60m SILTSTONE/SHALE	803m	West
10138874	0.00m-1.00m CLAY 1.00m-29.60m SILTSTONE/SHALE	803m	West
10032924	0.00m-0.15m FILL 0.15m-1.70m SILTY CLAY RED BROWN, L.PLASTICITY 1.70m-2.20m SILTY CLAY DARK BROWN 2.20m-3.00m SHALE, LIGHT BROWN 3.00m-4.70m SHALE LIGHT BROWN HARD 4.70m-6.80m SHALE GREY BROWN 6.80m-12.00m SHALE, DARK GREY,DRY 12.00m-13.50m SHALE, DARK GREY, WET	1659m	North East
10027620	0.00m-2.70m SILTY CLAY,RED BROWN MOTTLED L.PLASTICITY 2.70m-2.90m SILTY CLAY GRADING INTO EATHERED SHALE 2.90m-12.00m SHALE,WEATHERED BEDROCK,DARK GREY,DRY 12.00m-18.00m AS ABOVE BUT HARD.	1699m	North East
10031829	0.00m-0.15m FILL 0.15m-0.35m SILTY CLAY,LIGHT BROWN L/M PLASTICITY 0.35m-3.20m SHALE GREY BROWN 3.20m-6.30m AS ABOVE BUT SOFTER 6.30m-9.50m SHALE, DARK GREY,HARD, DRY 9.50m-11.50m AS ABOVE BUT WET.	1711m	North East

Geology

16 Johnston Crescent, Horsley Park, NSW 2175



Geology

16 Johnston Crescent, Horsley Park, NSW 2175

Geological Units

What are the Geological Units within the dataset buffer?

Unit Code	Unit Name	Description	Unit Stratigraphy	Age	Dominant Lithology	Distance
Twib	Bringelly Shale	Shale, carbonaceous claystone, laminite, lithic sandstone, rare coal.	\Wianamatta Group\ \Bringelly Shale\\	Middle Triassic (base) to Middle Triassic (top)	Shale	0m
MZui__v	Ungrouped Mesozoic igneous units - breccia	Volcanic breccia, varying amounts of sedimentary breccia, and basalt.	\Ungrouped Mesozoic igneous units\ \Ungrouped Mesozoic igneous units - breccia\\	Jurassic (base) to Cretaceous (top)	Undifferentiated breccia	460m
Q_af	Alluvial floodplain deposits	Silt, very fine- to medium-grained lithic to quartz-rich sand, clay.	\Alluvium\\Alluvial floodplain deposits\\	Quaternary (base) to Now (top)	Clastic sediment	546m

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

16 Johnston Crescent, Horsley Park, NSW 2175

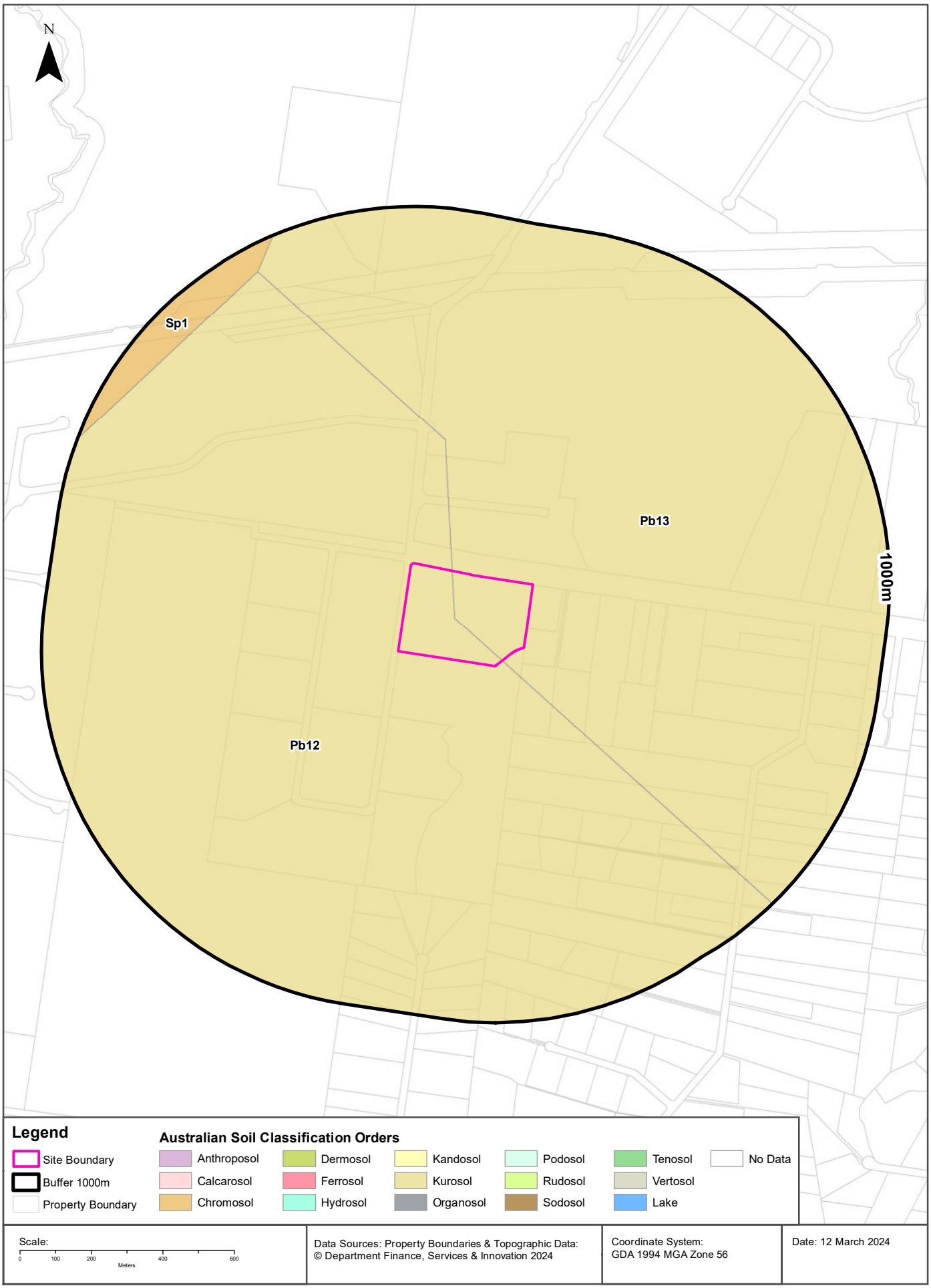
Naturally Occurring Asbestos Potential

Naturally Occurring Asbestos Potential within the dataset buffer:

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

Atlas of Australian Soils

16 Johnston Crescent, Horsley Park, NSW 2175



Soils

16 Johnston Crescent, Horsley Park, NSW 2175

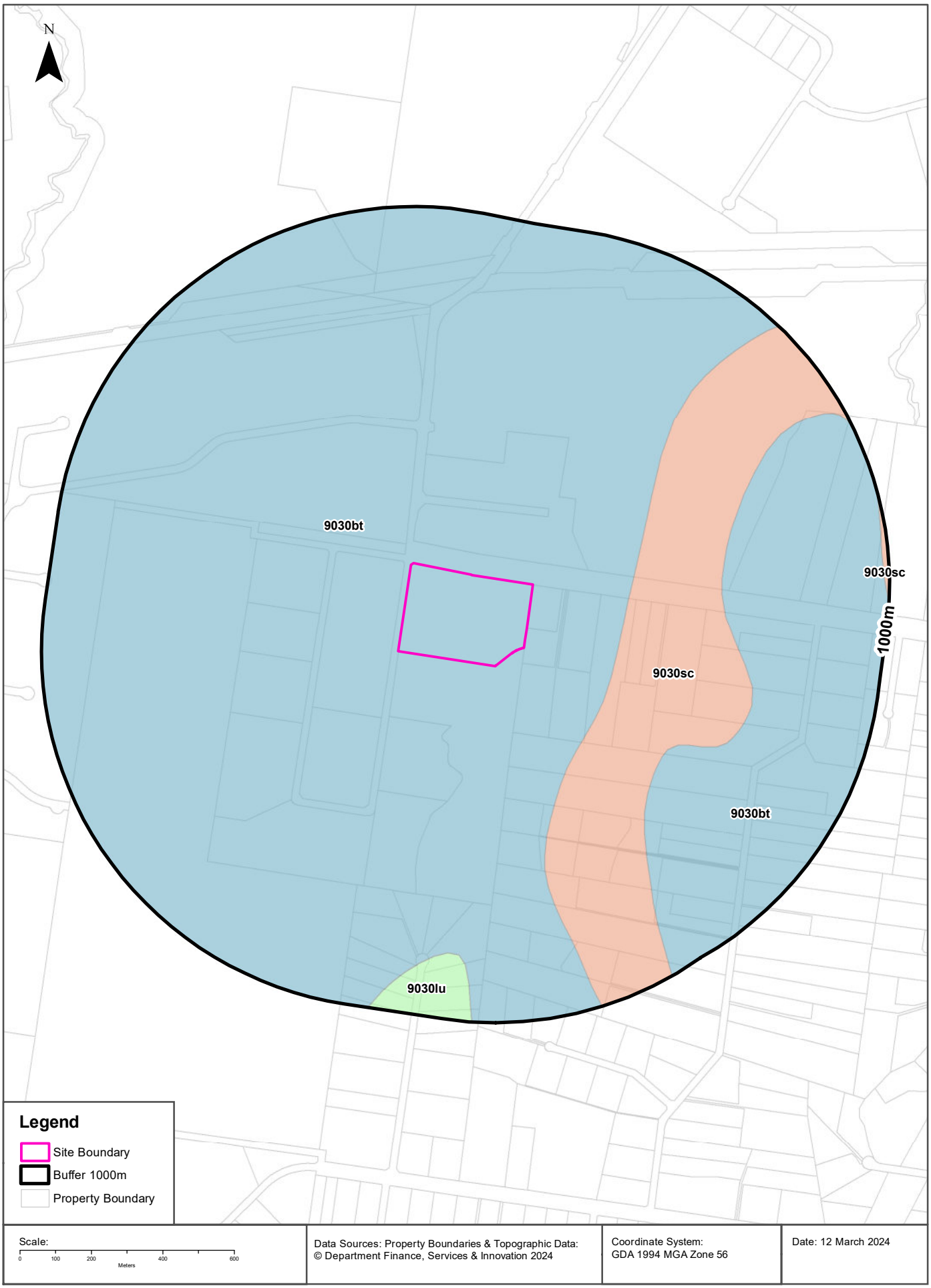
Atlas of Australian Soils

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

Map Unit Code	Soil Order	Map Unit Description	Distance	Direction
Pb12	Kurosol	Gently rolling to rounded hilly country with some steep slopes and broad valleys: chief soils are hard acidic red soils (Dr2.21) with hard neutral and acidic yellow mottled soils (Dy3.42 and Dy3.41) on lower slopes and in valleys. Associated are small areas of various soils including (Gn3.54) on some ridges, (Dr3.31) on some slopes; (Dr2.23) in saddles and some mid-slope positions, and some low- lying swampy areas of (Uf6) soils and (Uc1.2) soils with peaty surfaces. Small areas of other soils such as (Db1.2) are likely throughout.	0m	On-site
Pb13	Kurosol	Ridge and valley country of gently undulating ridge tops and steep side slopes often with slumping, also rounded hilly to steep hilly areas and relatively narrow valleys: chief soils are hard acidic red soils (Dr2.21) with hard acidic yellow mottled soils (Dy3.41); in places some ironstone gravels occur in both these soils. Associated are hard neutral and alkaline red soils (Dr2.22 and Dr2.23) in saddles and some mid-slope positions; (Dy3.42 and Dy3.43) soils, usually in depressions; and small areas of undescribed soils in wet soaks and valley areas. Small areas of other soils are likely throughout.	0m	On-site
Sp1	Chromosol	Gently undulating plain usually with a surface scatter of ironstone gravel: chief soils are hard acidic yellow soils (Dy2.61) on flat-topped ridges and higher situations generally and hard acidic yellow mottled soils (Dy3.41) or (Dy3.81) in lower-lying situations. They all commonly contain ironstone gravel through the profile. Associated are (Dy5.41) or (Dy5.81) soils, containing ironstone gravels; and shallow (Gn2.1) gravelly soils also with indurated materials below the solum. Iron-cemented and/or silica-cemented strata have been recorded in many areas below the soils. As mapped, areas of units X9, Pb12, and Tb35 may be included.	896m	North West

Soil Landscapes of Central and Eastern NSW

16 Johnston Crescent, Horsley Park, NSW 2175



Soils

16 Johnston Crescent, Horsley Park, NSW 2175

Soil Landscapes of Central and Eastern NSW

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

Soil Code	Name	Distance	Direction
9030bt	Blacktown	0m	On-site
9030sc	South Creek	255m	East
9030lu	Luddenham	815m	South

Acid Sulfate Soils

16 Johnston Crescent, Horsley Park, NSW 2175

Environmental Planning Instrument - Acid Sulfate Soils

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

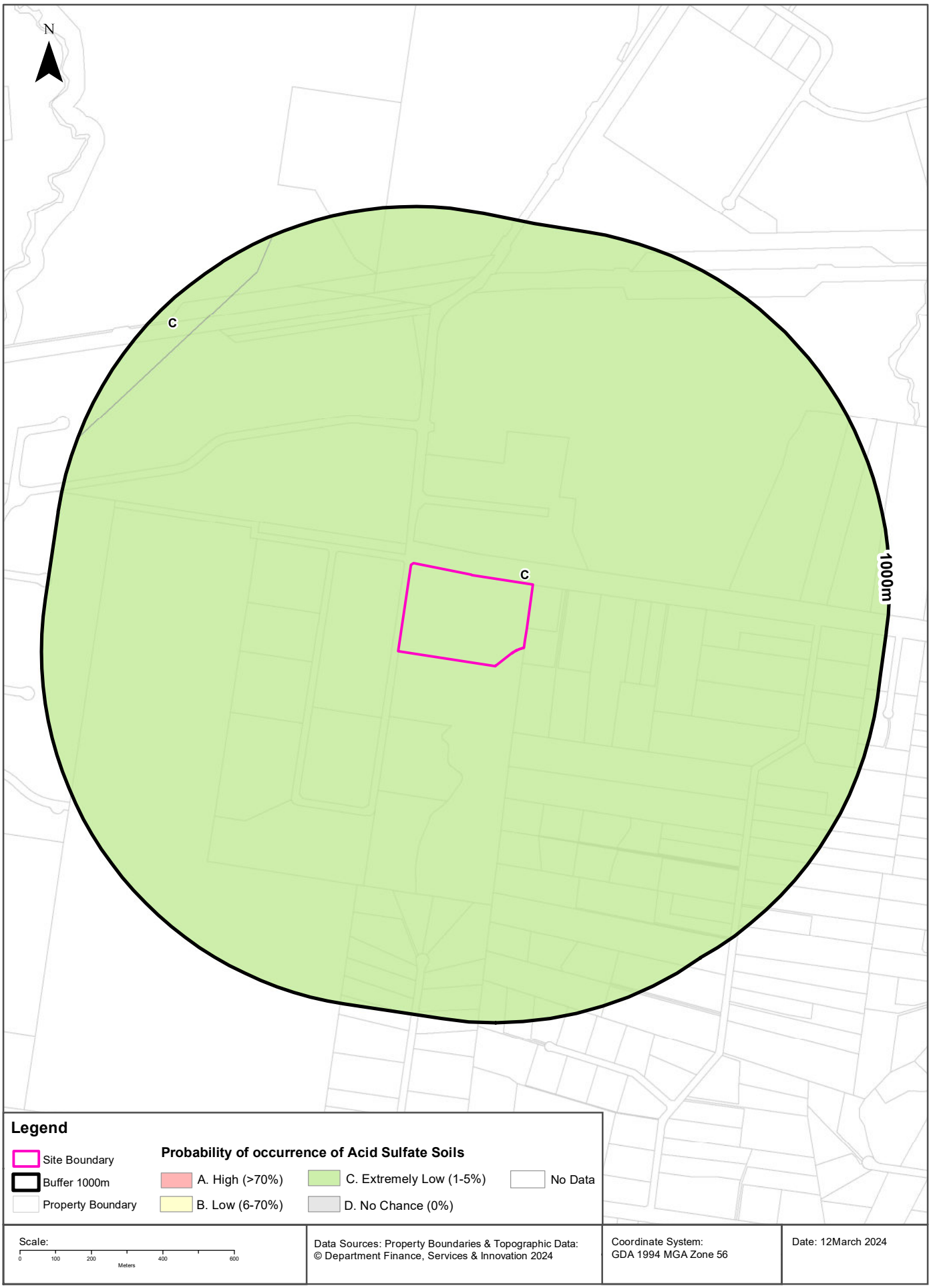
Soil Class	Description	EPI Name
N/A		

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

Soil Class	Description	EPI Name	Distance	Direction
N/A				

Atlas of Australian Acid Sulfate Soils

16 Johnston Crescent, Horsley Park, NSW 2175



Acid Sulfate Soils

16 Johnston Crescent, Horsley Park, NSW 2175

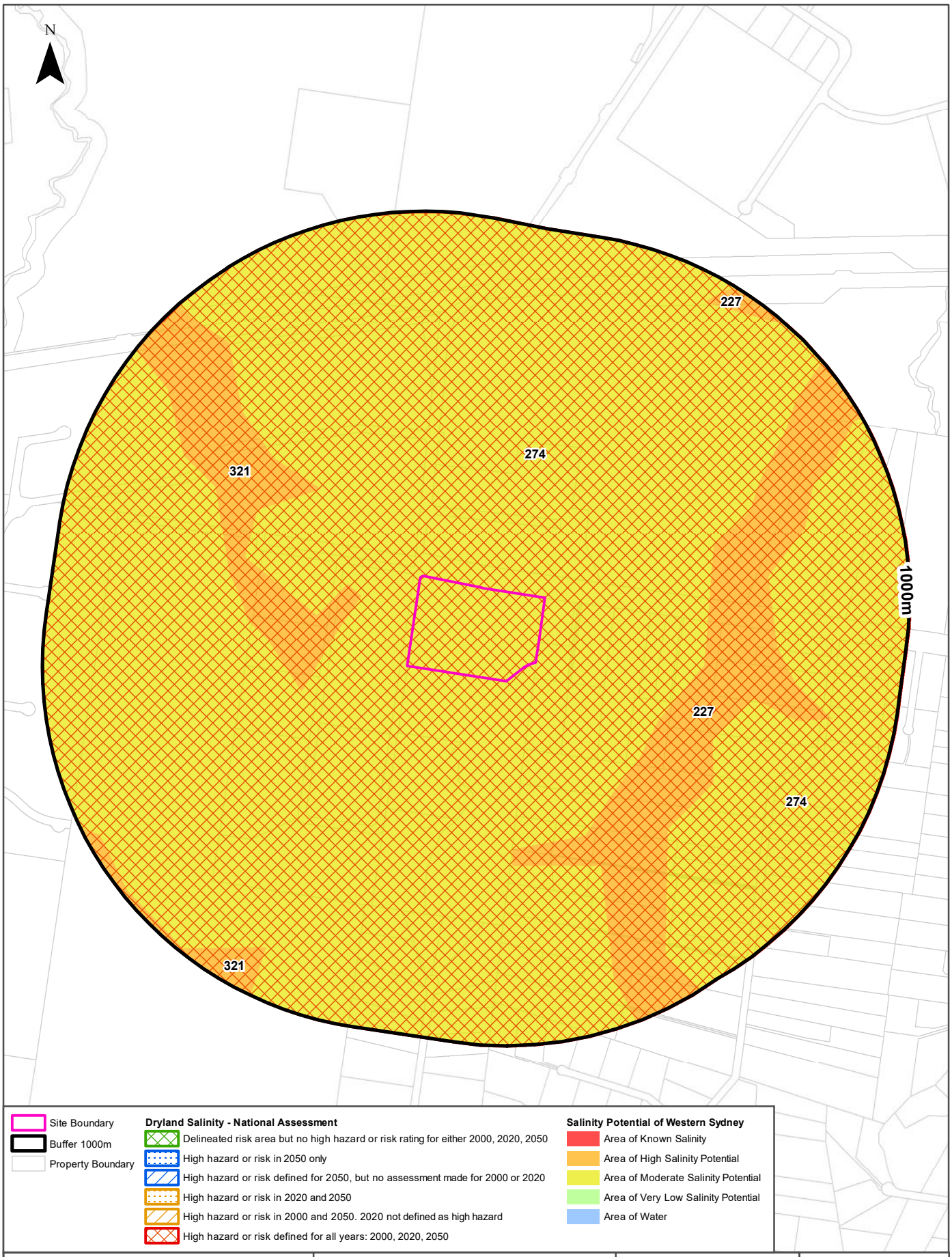
Atlas of Australian Acid Sulfate Soils

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

Class	Description	Distance	Direction
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m	On-site

Dryland Salinity

16 Johnston Crescent, Horsley Park, NSW 2175



Scale:	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2024	Coordinate System: GDA 1994 MGA Zone 56	Date: 12 March 2024

0 100 200 400 600
Meters

Dryland Salinity

16 Johnston Crescent, Horsley Park, NSW 2175

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

Yes

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

Yes

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
High hazard or risk	High hazard or risk	High hazard or risk	0m	On-site

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.

Dryland Salinity Potential of Western Sydney

Dryland Salinity Potential of Western Sydney within the dataset buffer?

Feature Id	Classification	Description	Distance	Direction
274	MODERATE	Area of Moderate Salinity Potential	0m	On-site
321	HIGH	Area of High Salinity Potential	154m	West
227	HIGH	Area of High Salinity Potential	369m	East

Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage

Mining

16 Johnston Crescent, Horsley Park, NSW 2175

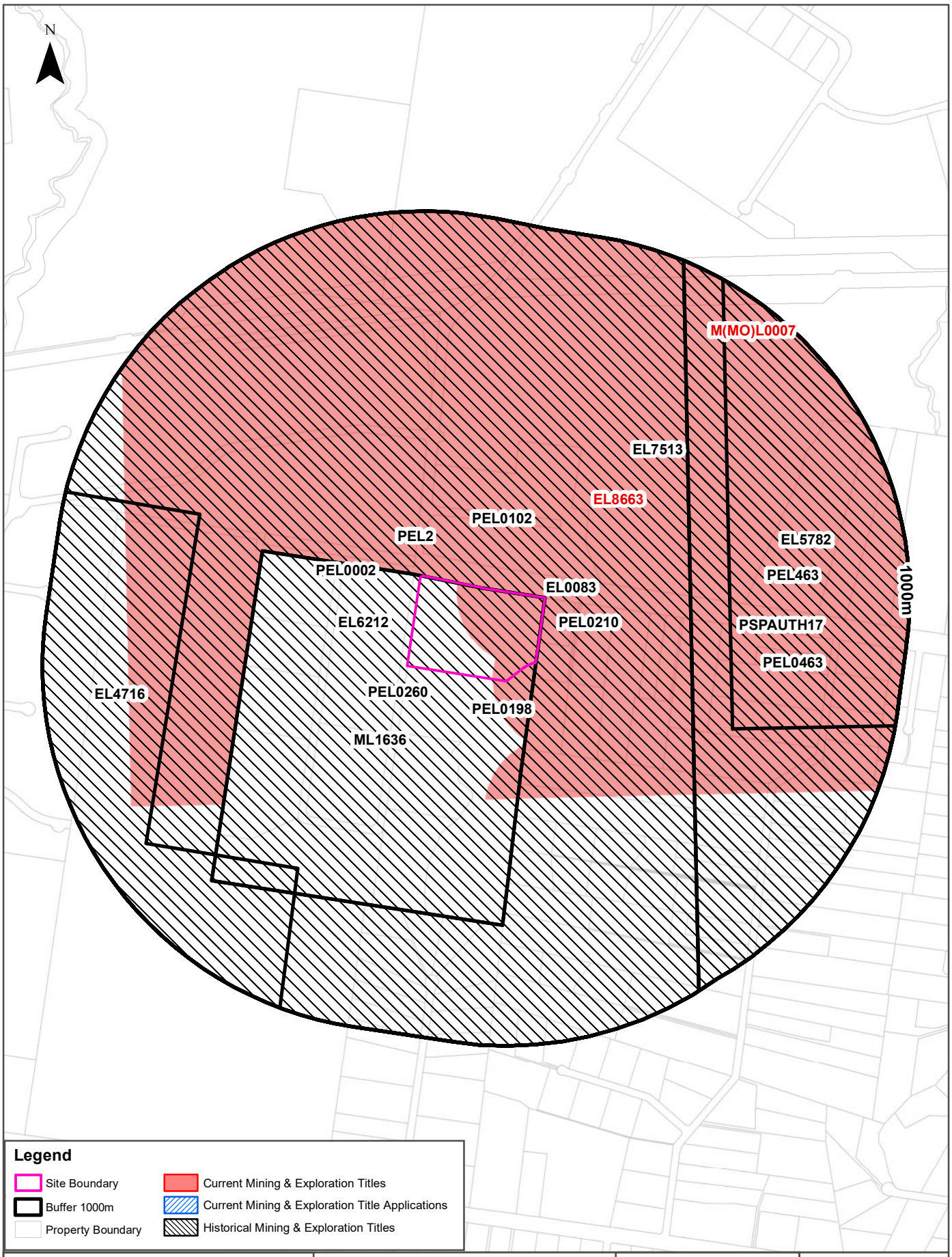
Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

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

Mining & Exploration Titles

16 Johnston Crescent, Horsley Park, NSW 2175



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2024

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 March 2024

Mining

16 Johnston Crescent, Horsley Park, NSW 2175

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
EL8663	THE AUSTRAL BRICK CO PTY LTD	23/10/2017	23/10/2026	20231222	EXPLORING	MINERALS	Group 5	0m	On-site
M (MO)L0007	THE AUSTRAL BRICK CO PTY LTD	04/04/2018	04/04/2039	20230210	MINING	MINERALS	Clay/Shale, Kaolin, Structural Clay	924m	North East

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

16 Johnston Crescent, Horsley Park, NSW 2175

Historical Mining & Exploration Titles

Historical Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Start Date	End Date	Resource	Minerals	Dist	Dir
EL0083	CONTINENTAL OIL CO OF AUSTRALIA LIMITED	19670201	19680201	MINERALS		0m	On-site
ML1636	CSR BUILDING PRODUCTS LIMITED	20090921	20190227	MINERALS		0m	On-site
PEL0102	AUSTRALIAN OIL AND GAS CORPORATION LTD			PETROLEUM	Petroleum	0m	On-site
PEL0260	NORTH BULLI COLLIERIES PTY LTD, AGL PETROLEUM OPERATIONS PTY LTD, THE AUSTRALIAN GAS LIGHT CO.	19810909	19930803	PETROLEUM	Petroleum	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	20000120	20001108	MINERALS		0m	On-site
PEL0198	JOHN STREVENS (TERRIGAL) NL			PETROLEUM	Petroleum	0m	On-site
EL6212	HOT ROCK ENERGY PTY LTD,LONGREACH OIL LIMITED	20040304	20130303	MINERALS	Geothermal	0m	On-site
PEL0002	AGL UPSTREAM INVESTMENTS PTY LIMITED	19950503	20150607	PETROLEUM	Petroleum	0m	On-site
EL7513	GRADIENT ENERGY LIMITED	20100407	20110415	MINERALS	Geothermal	0m	North East
PEL463	DART ENERGY (APOLLO) PTY LTD	20081022	20130227	MINERALS		399m	East
PSPAUTH17	MACQUARIE ENERGY PTY LTD	20070803	20080703	PETROLEUM	Petroleum	399m	East
PEL0463	DART ENERGY (APOLLO) PTY LTD	20091010	20150603	PETROLEUM	Petroleum	399m	East
EL5782	THE AUSTRAL BRICK CO PTY LTD	20001005	20020222	MINERALS	Clay shale, Brick clay	507m	East
EL4716	JACFIN PTY LIMITED	19941110	19961109	MINERALS	Breccia, Aggregate	625m	West

State Environmental Planning Policy

16 Johnston Crescent, Horsley Park, NSW 2175

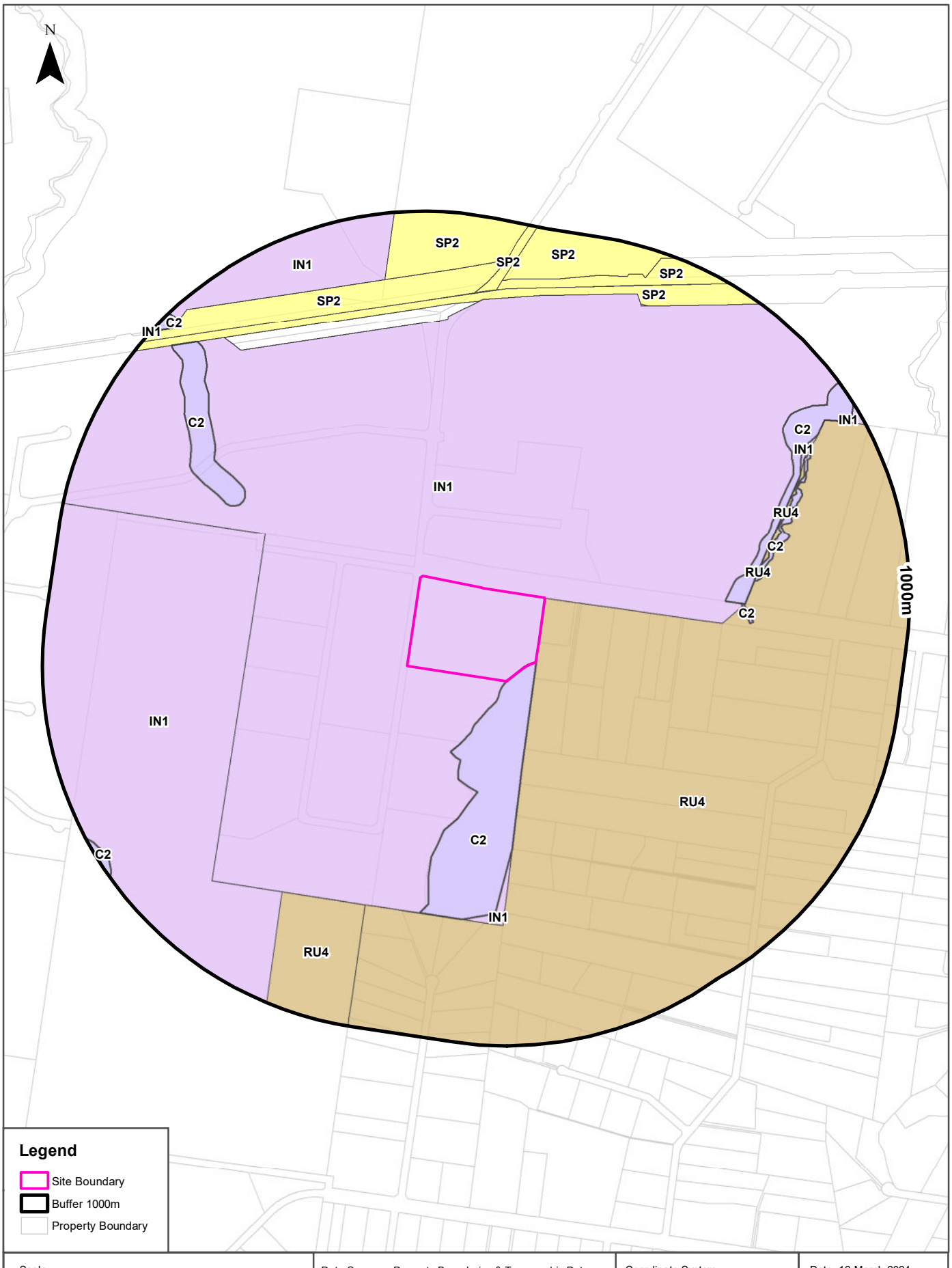
State Significant Precincts

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

16 Johnston Crescent, Horsley Park, NSW 2175



Environmental Planning Instrument

16 Johnston Crescent, Horsley Park, NSW 2175

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
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	17/08/2022	17/08/2022	17/08/2022	State Environmental Planning Policy (Biodiversity and Conservation) Amendment (Strategic Conservation Planning) 2022	0m	On-site
RU4	Primary Production Small Lots		Fairfield Local Environmental Plan 2013	28/04/2023	28/04/2023	17/11/2023	Map Amendment No 5	0m	South East
C2	Environmental Conservation		State Environmental Planning Policy (Industry and Employment) 2021	17/08/2022	17/08/2022	17/08/2022	State Environmental Planning Policy (Biodiversity and Conservation) Amendment (Strategic Conservation Planning) 2022	0m	South
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		439m	West
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		460m	South
C2	Environmental Conservation		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		494m	North East
C2	Environmental Conservation		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		530m	North West
C2	Environmental Conservation		Fairfield Local Environmental Plan 2013	28/04/2023	28/04/2023	17/11/2023	Map Amendment No 5	536m	East
C2	Environmental Conservation		Fairfield Local Environmental Plan 2013	28/04/2023	28/04/2023	17/11/2023	Map Amendment No 5	574m	East
RU4	Primary Production Small Lots		Fairfield Local Environmental Plan 2013	28/04/2023	28/04/2023	17/11/2023	Map Amendment No 5	582m	East
RU4	Primary Production Small Lots		Fairfield Local Environmental Plan 2013	28/04/2023	28/04/2023	17/11/2023	Map Amendment No 5	595m	East
RU4	Primary Production Small Lots		Penrith Local Environmental Plan 2010	24/06/2016	24/06/2016	30/06/2023	State Environmental Planning Policy (Western Sydney Employment Area) Amendment 2016	664m	South West
SP2	Infrastructure	Water Supply System	Fairfield Local Environmental Plan 2013	28/04/2023	28/04/2023	17/11/2023	Map Amendment No 5	728m	North
SP2	Infrastructure	Water Supply System	Blacktown Local Environmental Plan 2015	21/04/2023	26/04/2023	03/11/2023	Map Amendment No 2	747m	North West

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		774m	North East
SP2	Infrastructure	Local Road	Blacktown Local Environmental Plan 2015	21/04/2023	26/04/2023	03/11/2023	Map Amendment No 2	790m	North
SP2	Infrastructure	Water Supply System	Blacktown Local Environmental Plan 2015	21/04/2023	26/04/2023	03/11/2023	Map Amendment No 2	810m	North East
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		819m	North West
SP2	Infrastructure	Electricity Transmission & Distribution	Blacktown Local Environmental Plan 2015	21/04/2023	26/04/2023	03/11/2023	Map Amendment No 2	820m	North
SP2	Infrastructure	Electricity Transmission & Distribution	Blacktown Local Environmental Plan 2015	21/04/2023	26/04/2023	03/11/2023	Map Amendment No 2	837m	North
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		859m	North East
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	02/12/2021	01/03/2022	17/08/2022		960m	North East
C2	Environmental Conservation		State Environmental Planning Policy (Industry and Employment) 2021	17/08/2022	17/08/2022	17/08/2022	State Environmental Planning Policy (Biodiversity and Conservation) Amendment (Strategic Conservation Planning) 2022	964m	North West
C2	Environmental Conservation		State Environmental Planning Policy (Industry and Employment) 2021	17/08/2022	17/08/2022	17/08/2022	State Environmental Planning Policy (Biodiversity and Conservation) Amendment (Strategic Conservation Planning) 2022	972m	South West
IN1	General Industrial		State Environmental Planning Policy (Industry and Employment) 2021	17/08/2022	17/08/2022	17/08/2022	State Environmental Planning Policy (Biodiversity and Conservation) Amendment (Strategic Conservation Planning) 2022	995m	North West

Heritage

16 Johnston Crescent, Horsley Park, NSW 2175

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
N/A	No records in buffer							

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
N/A	No records in buffer							

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
N/A	No records in buffer								

Heritage Data Source: NSW Crown Copyright - Planning & Environment

Natural Hazards - Bush Fire Prone Land

16 Johnston Crescent, Horsley Park, NSW 2175

Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2024. Property Boundaries: © Department Finance, Services & Innovation 2024

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 March 2024

Natural Hazards

16 Johnston Crescent, Horsley Park, NSW 2175

Bush Fire Prone Land

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

Bush Fire Prone Land Category	Distance	Direction
Vegetation Category 1	0m	On-site
Vegetation Buffer	0m	On-site
Vegetation Category 2	5m	North East

Ecological Constraints - Vegetation & Ramsar Wetlands

16 Johnston Crescent, Horsley Park, NSW 2175

Site Boundary
ReportBuffer
Property Boundary
Ramsar Wetland

Native Vegetation

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

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2024

Coordinate System: GDA 1994 MGA Zone 56

Date: 12 March 2024

Ecological Constraints

16 Johnston Crescent, Horsley Park, NSW 2175

Native Vegetation

What native vegetation exists within the dataset buffer?

Map ID	Vegetation Formation	Plant Community Type and Vegetation Formation	Vegetation Class	Dist	Dir
2849527	Grassy Woodlands	(Grassy Woodlands) Cumberland Shale Plains Woodland	Coastal Valley Grassy Woodlands	0m	On-site
2963952	Not classified	(Not classified) Not classified	Not classified	0m	On-site
2849677	Forested Wetlands	(Forested Wetlands) Cumberland Red Gum Riverflat Forest	Coastal Floodplain Wetlands	391m	East
3153881	Forested Wetlands	(Forested Wetlands) Coastal Valleys Swamp Oak Riparian Forest	Coastal Floodplain Wetlands	799m	North West

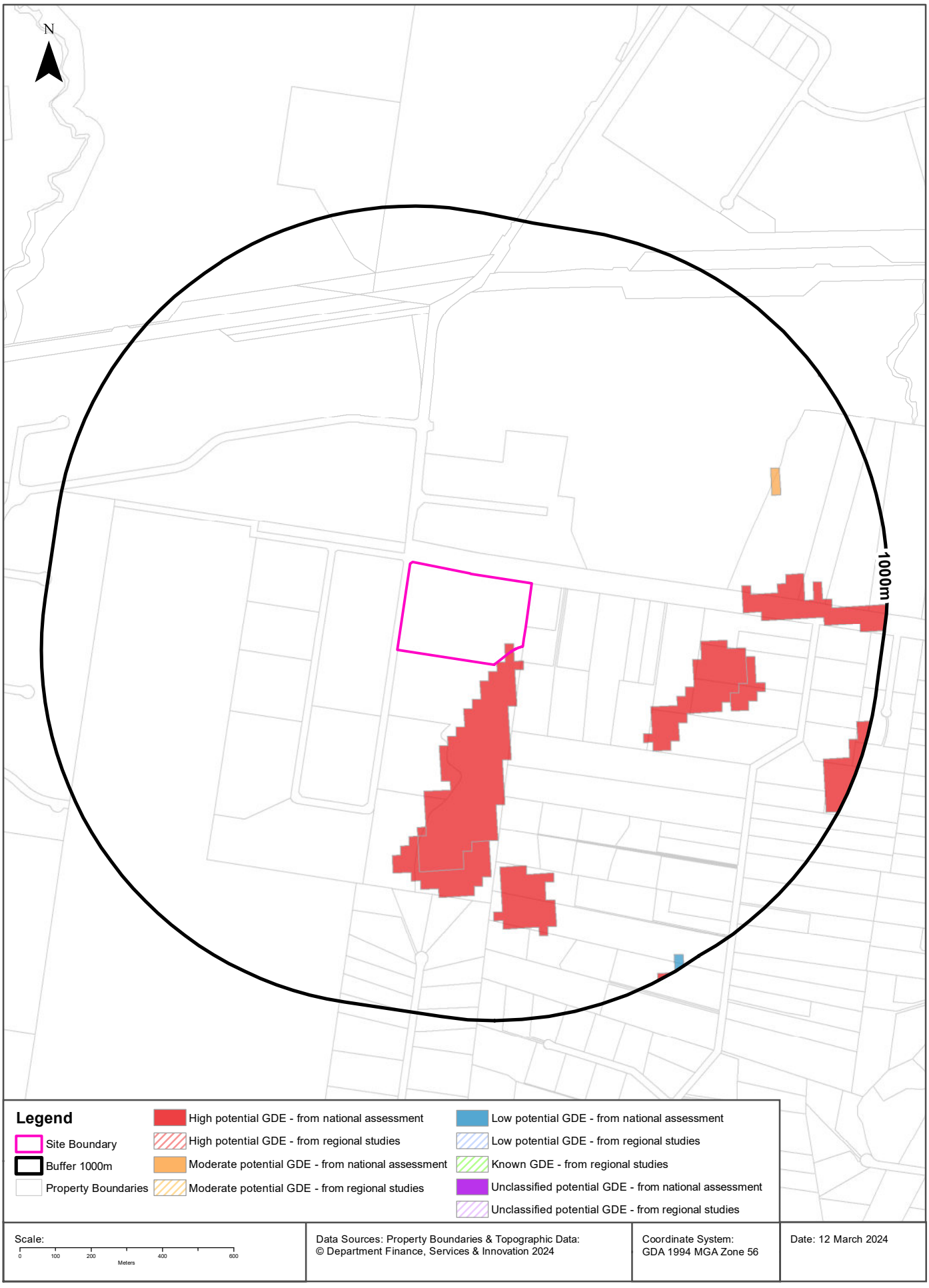
Ramsar Wetlands

What Ramsar Wetland areas exist within the dataset buffer?

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

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

16 Johnston Crescent, Horsley Park, NSW 2175



Ecological Constraints

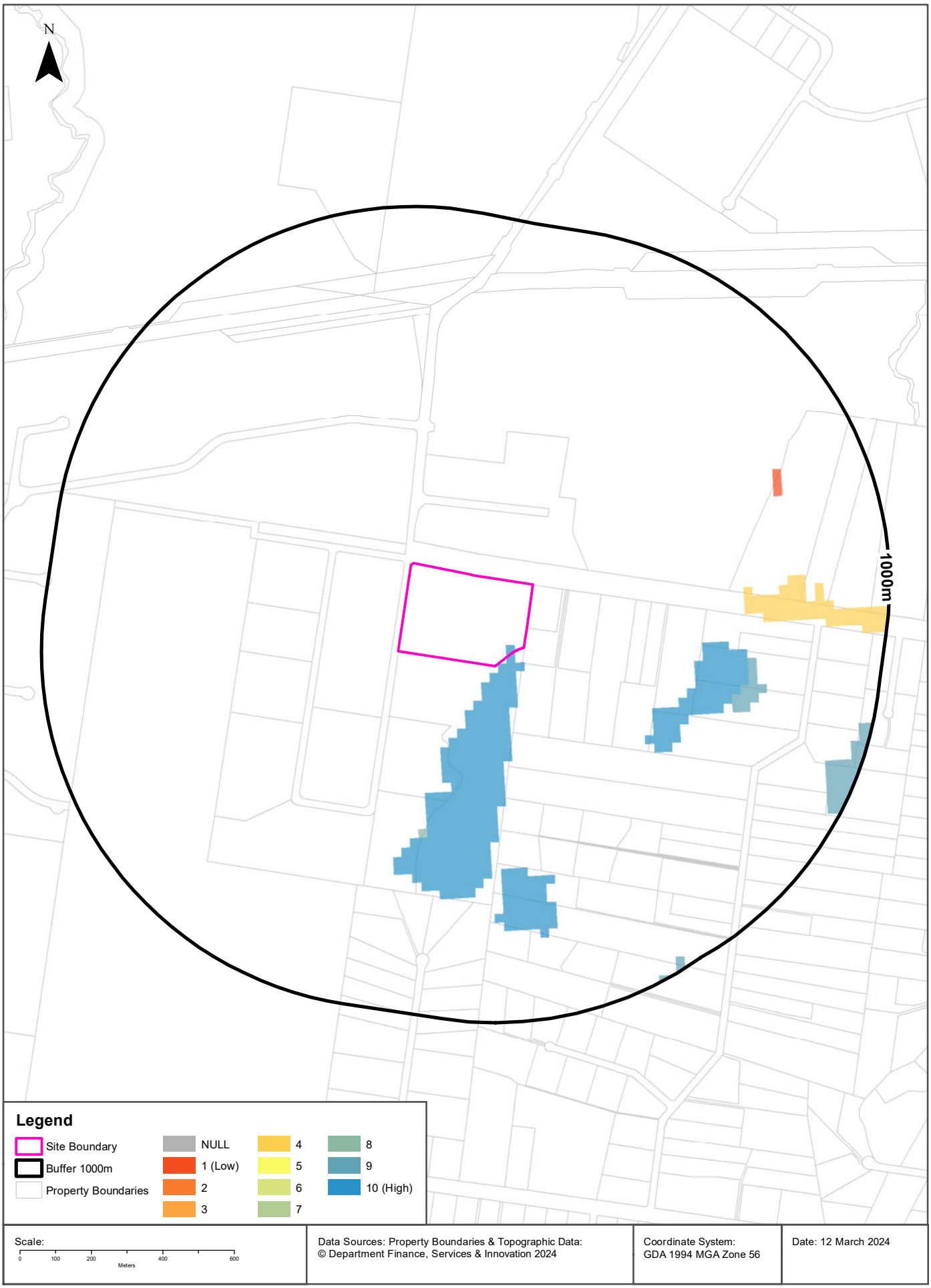
16 Johnston Crescent, Horsley Park, NSW 2175

Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Terrestrial	High potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m	On-site
Terrestrial	High potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	395m	East
Terrestrial	Moderate potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	718m	North East
Terrestrial	Low potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	958m	South East

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

16 Johnston Crescent, Horsley Park, NSW 2175



Ecological Constraints

16 Johnston Crescent, Horsley Park, NSW 2175

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Terrestrial	10	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m	On-site
Terrestrial	10	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	395m	East
Terrestrial	8	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	479m	South
Terrestrial	4	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	588m	East
Terrestrial	9	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	595m	East
Terrestrial	1	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	718m	North East
Terrestrial	9	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	898m	East

Ecological Constraints

16 Johnston Crescent, Horsley Park, NSW 2175

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	Litoria aurea	Green and Golden Bell Frog	Endangered	Not Sensitive	Vulnerable	
Animalia	Aves	Anseranas semipalmata	Magpie Goose	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Category 2	Critically Endangered	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ardenna pacifica	Wedge-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Burhinus grallarius	Bush Stone-curlew	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Category 3	Endangered	
Animalia	Aves	Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo (inland subspecies)	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	Vulnerable	Category 2	Vulnerable	
Animalia	Aves	Chthonicola sagittata	Speckled Warbler	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
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	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Geophaps scripta scripta	Squatter Pigeon (southern subspecies)	Critically Endangered	Not Sensitive	Vulnerable	
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Lathamus discolor	Swift Parrot	Endangered	Not Sensitive	Critically Endangered	
Animalia	Aves	Lophochroa leadbeateri	Major Mitchell's Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	Category 3	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Neophema pulchella	Turquoise Parrot	Vulnerable	Category 3	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	Onychoprion fuscata	Sooty Tern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Oxyura australis	Blue-billed Duck	Vulnerable	Not Sensitive	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	Pezoporus wallicus wallicus	Eastern Ground Parrot	Vulnerable	Category 3	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	Rostratula australis	Australian Painted Snipe	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Stagonopleura guttata	Diamond Firetail	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Stictonetta naevosa	Freckled Duck	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	Critically Endangered	Not Sensitive	Vulnerable	
Animalia	Aves	Todiramphus chloris	Collared Kingfisher	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Tringa nebularia	Common Greenshank	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Gastropoda	Meridolum corneovirens	Cumberland Plain Land Snail	Endangered	Not Sensitive	Not Listed	
Animalia	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Not Sensitive	Endangered	
Animalia	Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Phascolarctos cinereus	Koala	Endangered	Not Sensitive	Endangered	
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	Antaresia stimsoni	Stimson's Python	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Aspidites ramsayi	Woma	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Caretta caretta	Loggerhead Turtle	Endangered	Not Sensitive	Endangered	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Reptilia	Chelonia mydas	Green Turtle	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Hemiaspis damelii	Grey Snake	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	Strophurus elderi	Jewelled Gecko	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Tiliqua occipitalis	Western Blue-tongued Lizard	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Uvidicolus sphyrurus	Border Thick-tailed Gecko	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Acacia pubescens	Downy Wattle	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Allocasuarina glareicola		Endangered	Not Sensitive	Endangered	
Plantae	Flora	Argyrotegium nitidulum	Shining Cudweed	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Callistemon linearifolius	Netted Bottle Brush	Vulnerable	Category 3	Not Listed	
Plantae	Flora	Cynanchum elegans	White-flowered Wax Plant	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Dichanthium setosum	Bluegrass	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Dillwynia tenuifolia		Endangered Population, Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Dillwynia tenuifolia		Vulnerable	Not Sensitive	Not Listed	
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	Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Grevillea parviflora subsp. parviflora	Small-flower Grevillea	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Isotoma fluviatilis subsp. fluviatilis		Not Listed	Category 3	Extinct	
Plantae	Flora	Macadamia integrifolia	Macadamia Nut	Not Listed	Not Sensitive	Vulnerable	
Plantae	Flora	Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Marsdenia viridiflora subsp. viridiflora	Native Pear	Endangered Population	Not Sensitive	Not Listed	
Plantae	Flora	Persoonia nutans	Nodding Geebung	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Pilularia novae-hollandiae	Austral Pillwort	Endangered	Category 3	Not Listed	
Plantae	Flora	Pimelea curviflora var. curviflora		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Pimelea spicata	Spiked Rice-flower	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Pterostylis saxicola	Sydney Plains Greenhood	Endangered	Category 2	Endangered	
Plantae	Flora	Pultenaea parviflora		Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Pultenaea pedunculata	Matted Bush-pea	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Senna acclinis	Rainforest Cassia	Endangered	Not Sensitive	Not Listed	

Data does not include NSW category 1 sensitive species.

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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 C: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

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

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

	PQL Envirolab Services	ANZG 2018 Fresh Waters	SAMPLES											
			MW1	MW1 [LAB_DUP]	MW2	MW2 [LAB_DUP]	MW15	S3-06	S3-07	S3-08	Dam1	Dam1 [LAB_DUP]	GWDUP1	GWDUP2
Inorganic Compounds and Parameters														
pH	-	6.5 - 8.5	**6.7**	NA	**7.2**	NA	**7.5**	**7.3**	**7.4**	**6.9**	**7.7**	NA	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**14000**	NA	**8200**	NA	**8100**	**15000**	**6600**	**17000**	**270**	NA	NA	NA
Turbidity (NTU)	-	NSL	NT	NA	**120**	**120**	**710**	**0.8**	**6.3**	**11**	**710**	NA	NA	NA
Redox Potential (Eh)	-	NSL	**234**	**221**	**197**	**NA**	**186**	**197**	**195**	**236**	**196**	NA	NA	NA
Total Dissolved Solids (TDS) (mg/L)	5	NSL	**9100**	**9200**	**5000**	NA	**5000**	**9000**	**3900**	**12000**	**380**	NA	NA	NA
Total Suspended Solids (TSS) (mg/L)	5	NSL	**1800**	NA	**190**	NA	**1400**	<5	**8**	**27**	**310**	**330**	NA	NA
Total Organic Carbon (TOC) (mg/L)	1	NSL	**3**	NA	**2**	NA	**3**	**1**	**3**	**2**	**2**	NA	NA	NA
Dissolved Oxygen (mg/L)	0.1	NSL	**7.9**	**7.8**	**8.3**	NA	**8.1**	**7.9**	**7.7**	**6.6**	**7.3**	NA	NA	NA
Total Hardness (mg/L)	3	NSL	**1800**	**1800**	**700**	NA	**360**	**1200**	**570**	**2700**	**39**	NA	NA	NA
Silica (SiO_2) (mg/L)	0.1	NSL	**14**	**14**	**11**	NA	**13**	**10**	**8.8**	**10**	**2.8**	NA	NA	NA
Phosphorus (mg/L)	0.05	NSL	**0.2**	NA	<0.05	NA	**0.2**	<0.05	<0.05	<0.05	**0.2**	**0.2**	NA	NA
Metals and Metalloids														
Arsenic (As III)	1	24	<1	<1	<1	NA	**3**	**1**	<1	**4**	**5**	**5**	<1	**4**
Cadmium	0.1	0.2	**0.4**	**0.4**	<0.1	NA	<0.1	<0.1	<0.1	<0.1	**0.4**	**0.4**	<0.1	<0.1
Chromium (total)	1	3.3	<1	<1	<1	NA	<1	<1	<1	<1	**10**	**10**	<1	<1
Copper	1	1.4	**7**	**8**	**3**	NA	**3**	**5**	**76**	**48**	**34**	**34**	**79**	**46**
Lead	1	3.4	<1	<1	<1	NA	<1	<1	<1	<1	**17**	**18**	<1	<1
Total Mercury (inorganic)	0.05	0.06	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05
Nickel	1	11	**19**	**20**	**2**	NA	**2**	**3**	**2**	**11**	**28**	**27**	**2**	**10**
Zinc	1	8	**61**	**63**	**8**	NA	**14**	**20**	**32**	**24**	**110**	**110**	**32**	**21**
Aluminium	10	55	<10	<10	<10	NA	**80**	<10	<10	<10	**8400**	**8100**	NA	NA
Antimony	1	NSL	<1	<1	<1	NA	<1	<1	<1	<1	<1	<1	NA	NA
Barium	1	NSL	**140**	**140**	**41**	NA	**100**	**18000**	**84**	**46**	**160**	**170**	NA	NA
Boron	20	940	**50**	**40**	<20	NA	**30**	<20	**70**	<20	<20	<20	NA	NA
Beryllium	0.05	NSL	<0.5	<0.5	<0.5	NA	<0.5	<0.5	1	<0.5	**1**	**1**	NA	NA
Cobalt	1	NSL	**5**	**6**	**2**	NA	<1	**2**	**1**	**6**	**22**	**21**	NA	NA
Iron	10	NSL	<10	<10	<10	NA	**20**	**40**	<10	**20**	**10000**	**10000**	NA	NA
Lithium	1	NSL	**140**	**140**	**66**	NA	**99**	**180**	**72**	**82**	**6**	**7**	NA	NA
Manganese	5	1900	**1000**	**1100**	**490**	NA	**83**	**680**	**510**	**650**	**260**	**250**	NA	NA
Molybdenum	1	NSL	**2**	**2**	<1	NA	**3**	**3**	**2**	**1**	**2**	**2**	NA	NA
Selenium	1	5	<1	<1	<1	NA	<1	<1	<1	<1	**3**	**3**	NA	NA
Silver	1	0.05	<1	<1	<1	NA	<1	<1	<1	<1	<1	<1	NA	NA
Strontium	1	NSL	**8900**	**8900**	**1900**	NA	**4700**	**13000**	**3900**	**5300**	**89**	**87**	NA	NA
Uranium	0.5	NSL	**7.8**	**7.8**	**3.9**	NA	**0.8**	<0.5	**1.2**	**2.3**	**0.8**	**0.8**	NA	NA
Vanadium	1	NSL	**1**	**1**	<1	NA	**1**	<1	<1	**1**	**20**	**20**	NA	NA
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)														
Benzene	1	950	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
Toluene	1	180	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
Ethylbenzene	1	80	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
m+p-xylene	2	75	<2	<2	<2	NA	<2	<2	<2	<2	<2	NA	<2	<2
o-xylene	1	350	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
Total xylenes	2	NSL	<2	<2	<2	NA	<2	<2	<2	<2	<2	NA	<2	<2
Total Recoverable Hydrocarbons (TRHs)														
TRH F1	10	NSL	<10	<10	<10	NA	<10	<10	<10	<10	<10	NA	<10	<10
TRH F2	50	NSL	<50	<50	<50	NA	<50	<50	<50	<50	<50	NA	<50	<50
TRH F3	100	NSL	<100	<100	<100	NA	<100	<100	<100	<100	<100	NA	<100	<100
TRH F4	100	NSL	<100	<100	<100	NA	<100	<100	<100	<100	<100	NA	<100	<100
Polycyclic Aromatic Hydrocarbons (PAHs)														
Naphthalene	0.2	16	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Anthracene	0.1	0.01	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	NA	<0.2	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Anions and Cations														
Calcium (mg/L)	0.5	NSL	**140**	**140**	**43**	NA	**47**	**150**	**52**	**210**	**7.8**	NA	NA	NA
Potassium (mg/L)	0.5	NSL	**31**	**31**	**13**	NA	**26**	**34**	**18**	**25**	**2**	NA	NA	NA
Sodium (mg/L)	0.5	NSL	**2500**	**2600**	**1600**	NA	**1700**	**3000**	**1200**	**3000**	**33**	NA	NA	NA
Magnesium (mg/L)	0.5	NSL	**360**	**360**	**140**	NA	**60**	**190**	**110**	**520**	**5**	NA	NA	NA
Hydroxide Alkalinity (as CaCO3) (mg/L)	5	NSL	<5	NA	<5	NA	<5	<5	<5	<5	<5	NA	NA	NA
Bicarbonate Alkalinity (as CaCO3) (mg/L)	5	NSL	**930**	NA	**1000**	NA	**35**	**450**	**760**	**520**	**33**	NA	NA	NA
Carbonate Alkalinity (as CaCO3) (mg/L)	5	NSL	**150**	NA	**260**	NA	<5	**37**	**150**	**21**	<5	NA	NA	NA
Total Alkalinity (as CaCO3) (mg/L)	5	NSL	**1100**	NA	**1300**	NA	**35**	**480**	**910**	**540**	**33**	NA	NA	NA
Sulphate (mg/L)	1	NSL	**470**	NA	**590**	NA	**210**	**2**	**130**	**500**	**47**	NA	NA	NA
Chloride (mg/L)	1	NSL	**3700**	NA	**1700**	NA	**1900**	**4700**	**1500**	**5100**	**28**	NA	NA	NA
Ionic Balance (%)	-	NSL	**4**	NA	**-1**	NA	**15**	**4**	**0**	**5**	**-3**	NA	NA	NA
Sodium Adsorption Ratio (SAR)	0.01	NSL	**26**	**27**	**27**	NA	**38**	**38**	**21**	**25**	**2.2**	NA	NA	NA
Nutrients														
Ammonia (mg/L) (pH dependent)	0.005	0.9	**0.098**	NA	**0.027**	**0.032**	**2.7**	**3.1**	**0.32**	**0.13**	**0.017**	NA	NA	NA
Nitrate (mg/L)	0.005	NSL	**0.51**	NA	<0.005	<0.005	<0.005	**0.007**	<0.005	**0.17**	**0.71**	NA	NA	NA
Nitrite (mg/L)	0.005	NSL	**0.006**	NA	<0.005	<0.005	<0.005	**0.29**	<0.005	<0.005	<0.005	NA	NA	NA
Nitrogen Oxides (NOX) (mg/L)	0.005	NSL	**0.51**	NA	<0.005	**0.006**	**0.006**	**0.3**	<0.005	**0.2**	**0.71**	NA	NA	NA
Total Nitrogen (mg/L)	0.1	NSL	**0.6**	NA	<0.1	[NT]	**3.2**	**3.6**	**0.4**	**0.3**	**1**	**1**	NA	NA
Phosphate (mg/L)	0.005	NSL	<0.005	NA	<0.005	<0.005	<0.005	<0.005	**0.007**	**0.03**	<0.005	NA	NA	NA
Microbiological Organisms														
Faecal Coliforms (MPN/100mL)	1	NSL	NR	NA	<1000 NBO	NA	**20**	<10	**<1000**	<10	**2400**	NA	NA	NA
E Coli (MPN/100mL)	1	NSL	NR	NA	<1000 NBO	NA	**20**	<10	**<1000**	<10	**2400**	NA	NA	NA

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

TABLE G2
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO HUMAN CONTACT GILs
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	Recreational (10 x NHMRC ADWG)	SAMPLES											
			MW1	MW1 [LAB_DUP]	MW2	MW2 [LAB_DUP]	MW15	S3-06	S3-07	S3-08	Dam1	Dam1 [LAB_DUP]	GWDUP1	GWDUP2
Inorganic Compounds and Parameters														
pH	-	6.5 - 8.5	**6.7**	NA	**7.2**	NA	**7.5**	**7.3**	**7.4**	**6.9**	**7.7**	NA	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**14000**	NA	**8200**	NA	**8100**	**15000**	**6600**	**17000**	**270**	NA	NA	NA
Turbidity (NTU)	-	NSL	NT	NA	**120**	**120**	**710**	**0.8**	**6.3**	**11**	**710**	NA	NA	NA
Redox Potential (Eh)	-	NSL	**234**	**221**	**197**	**NA**	**186**	**197**	**195**	**236**	**196**	NA	NA	NA
Total Dissolved Solids (TDS) (mg/L)	5	NSL	**9100**	**9200**	**5000**	NA	**5000**	**9000**	**3900**	**12000**	**380**	NA	NA	NA
Total Suspended Solids (TSS) (mg/L)	5	NSL	**1800**	NA	**190**	NA	**1400**	<5	**8**	**27**	**310**	**330**	NA	NA
Total Organic Carbon (TOC) (mg/L)	1	NSL	**3**	NA	**2**	NA	**3**	**1**	**3**	**2**	**2**	NA	NA	NA
Dissolved Oxygen (mg/L)	0.1	NSL	**7.9**	**7.8**	**8.3**	NA	**8.1**	**7.9**	**7.7**	**6.6**	**7.3**	NA	NA	NA
Total Hardness (mg/L)	3	NSL	**1800**	**1800**	**700**	NA	**360**	**1200**	**570**	**2700**	**39**	NA	NA	NA
Silica (SiO_2) (mg/L)	0.1	NSL	**14**	**14**	**11**	NA	**13**	**10**	**8.8**	**10**	**2.8**	NA	NA	NA
Phosphorus (mg/L)	0.05	NSL	**0.2**	NA	<0.05	NA	**0.2**	<0.05	<0.05	<0.05	**0.2**	**0.2**	NA	NA
Metals and Metalloids														
Arsenic (As III)	1	100	<1	<1	<1	NA	**3**	**1**	<1	**4**	**5**	**5**	<1	**4**
Cadmium	0.1	20	**0.4**	**0.4**	<0.1	NA	<0.1	<0.1	<0.1	<0.1	**0.4**	**0.4**	<0.1	<0.1
Chromium (total)	1	500	<1	<1	<1	NA	<1	<1	<1	<1	**10**	**10**	<1	<1
Copper	1	20000	**7**	**8**	**3**	NA	**3**	**5**	**76**	**48**	**34**	**34**	**79**	**46**
Lead	1	100	<1	<1	<1	NA	<1	<1	<1	<1	**17**	**18**	<1	<1
Total Mercury (inorganic)	0.05	10	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05
Nickel	1	200	**19**	**20**	**2**	NA	**2**	**3**	**2**	**11**	**28**	**27**	**2**	**10**
Zinc	1	30000	**61**	**63**	**8**	NA	**14**	**20**	**32**	**24**	**110**	**110**	**32**	**21**
Aluminium	10	NSL	<10	<10	<10	NA	**80**	<10	<10	<10	**8400**	**8100**	NA	NA
Antimony	1	30	<1	<1	<1	NA	<1	<1	<1	<1	<1	<1	NA	NA
Barium	1	20000	**140**	**140**	**41**	NA	**100**	**18000**	**84**	**46**	**160**	**170**	NA	NA
Boron	20	40000	**50**	**40**	<20	NA	**30**	<20	**70**	<20	<20	<20	NA	NA
Beryllium	0.05	600	<0.5	<0.5	<0.5	NA	<0.5	<0.5	1	<0.5	**1**	**1**	NA	NA
Cobalt	1	NSL	**5**	**6**	**2**	NA	<1	**2**	**1**	**6**	**22**	**21**	NA	NA
Iron	10	NSL	<10	<10	<10	NA	**20**	**40**	<10	**20**	**10000**	**10000**	NA	NA
Lithium	1	NSL	**140**	**140**	**66**	NA	**99**	**180**	**72**	**82**	**6**	**7**	NA	NA
Manganese	5	5000	**1000**	**1100**	**490**	NA	**83**	**680**	**510**	**650**	**260**	**250**	NA	NA
Molybdenum	1	500	**2**	**2**	<1	NA	**3**	**3**	**2**	**1**	**2**	**2**	NA	NA
Selenium	1	100	<1	<1	<1	NA	<1	<1	<1	<1	**3**	**3**	NA	NA
Silver	1	1000	<1	<1	<1	NA	<1	<1	<1	<1	<1	<1	NA	NA
Strontium	1	NSL	**8900**	**8900**	**1900**	NA	**4700**	**13000**	**3900**	**5300**	**89**	**87**	NA	NA
Uranium	0.5	200	**7.8**	**7.8**	**3.9**	NA	**0.8**	<0.5	**1.2**	**2.3**	**0.8**	**0.8**	NA	NA
Vanadium	1	NSL	**1**	**1**	<1	NA	**1**	<1	<1	**1**	**20**	**20**	NA	NA
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)														
Benzene	1	10	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
Toluene	1	8000	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
Ethylbenzene	1	3000	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
m+p-xylene	2	NSL	<2	<2	<2	NA	<2	<2	<2	<2	<2	NA	<2	<2
o-xylene	1	NSL	<1	<1	<1	NA	<1	<1	<1	<1	<1	NA	<1	<1
Total xylenes	2	6000	<2	<2	<2	NA	<2	<2	<2	<2	<2	NA	<2	<2
Total Recoverable Hydrocarbons (TRHs)														
TRH F1	10	NSL	<10	<10	<10	NA	<10	<10	<10	<10	<10	NA	<10	<10
TRH F2	50	NSL	<50	<50	<50	NA	<50	<50	<50	<50	<50	NA	<50	<50
TRH F3	100	NSL	<100	<100	<100	NA	<100	<100	<100	<100	<100	NA	<100	<100
TRH F4	100	NSL	<100	<100	<100	NA	<100	<100	<100	<100	<100	NA	<100	<100
Polycyclic Aromatic Hydrocarbons (PAHs)														
Naphthalene	0.2	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Phenanthrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluoranthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	NA	<0.2	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Anions and Cations														
Calcium (mg/L)	0.5	NSL	**140**	**140**	**43**	NA	**47**	**150**	**52**	**210**	**7.8**	NA	NA	NA
Potassium (mg/L)	0.5	NSL	**31**	**31**	**13**	NA	**26**	**34**	**18**	**25**	**2**	NA	NA	NA
Sodium (mg/L)	0.5	NSL	**2500**	**2600**	**1600**	NA	**1700**	**3000**	**1200**	**3000**	**33**	NA	NA	NA
Magnesium (mg/L)	0.5	NSL	**360**	**360**	**140**	NA	**60**	**190**	**110**	**520**	**5**	NA	NA	NA
Hydroxide Alkalinity (as CaCO3) (mg/L)	5	NSL	<5	NA	<5	NA	<5	<5	<5	<5	<5	NA	NA	NA
Bicarbonate Alkalinity (as CaCO3) (mg/L)	5	NSL	**930**	NA	**1000**	NA	**35**	**450**	**760**	**520**	**33**	NA	NA	NA
Carbonate Alkalinity (as CaCO3) (mg/L)	5	NSL	**150**	NA	**260**	NA	<5	**37**	**150**	**21**	<5	NA	NA	NA
Total Alkalinity (as CaCO3) (mg/L)	5	NSL	**1100**	NA	**1300**	NA	**35**	**480**	**910**	**540**	**33**	NA	NA	NA
Sulphate (mg/L)	1	NSL	**470**	NA	**590**	NA	**210**	**2**	**130**	**500**	**47**	NA	NA	NA
Chloride (mg/L)	1	NSL	**3700**	NA	**1700**	NA	**1900**	**4700**	**1500**	**5100**	**28**	NA	NA	NA
Ionic Balance (%)	-	NSL	**4**	NA	**-1**	NA	**15**	**4**	**0**	**5**	**-3**	NA	NA	NA
Sodium Adsorption Ratio (SAR)	0.01	NSL	**26**	**27**	**27**	NA	**38**	**38**	**21**	**25**	**2.2**	NA	NA	NA
Nutrients														
Ammonia (mg/L)	0.005	NSL	**0.098**	NA	**0.027**	**0.032**	**2.7**	**3.1**	**0.32**	**0.13**	**0.017**	NA	NA	NA
Nitrate (mg/L)	0.005	500000	**0.51**	NA	<0.005	<0.005	<0.005	**0.007**	<0.005	**0.17**	**0.71**	NA	NA	NA
Nitrite (mg/L)	0.005	30000	**0.006**	NA	<0.005	<0.005	<0.005	**0.29**	<0.005	<0.005	<0.005	NA	NA	NA
Nitrogen Oxides (NOX) (mg/L)	0.005	NSL	**0.51**	NA	<0.005	**0.006**	**0.006**	**0.3**	<0.005	**0.2**	**0.71**	NA	NA	NA
Total Nitrogen (mg/L)	0.1	NSL	**0.6**	NA	<0.1	[NT]	**3.2**	**3.6**	**0.4**	**0.3**	**1**	**1**	NA	NA
Phosphate (mg/L)	0.005	NSL	<0.005	NA	<0.005	<0.005	<0.005	<0.005	**0.007**	**0.03**	<0.005	NA	NA	NA
Microbiological Organisms														
Faecal Coliforms (MPN/100mL)	1	NA	NR	NA	<1000 NBO	NA	**20**	<10	**<1000**	<10	**2400**	NA	NA	NA
E Coli (MPN/100mL)	1	NA	NR	NA	<1000 NBO	NA	**20**	<10	**<1000**	<10	**2400**	NA	NA	NA

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

TABLE Q1
GROUNDWATER QA/QC SUMMARY

		TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene	Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD	*10*	*50*	*100*	*100*	*1*	*1*	*1*	*2*	*1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*0.1*	*1*	*1*	*1*	*0.05*	*1*	*1*
Intra	S3-07	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	76	<1	<0.05	2	32
laboratory	GWDUP1	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	79	<1	<0.05	2	32
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	77.5	nc	nc	2	32
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	4%	nc	nc	0%	0%
Intra	S3-08	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	4	<0.1	<1	48	<1	<0.05	11	24
laboratory	GWDUP2	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	4	<0.1	<1	46	<1	<0.05	10	21
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	4	nc	nc	47	nc	nc	10.5	22.5
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	nc	nc	4%	nc	nc	10%	13%
Field	TB-W1	<10	54	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<1	<1	<0.05	<1	<1
Blank	27/03/2024																																
Trip	TS-W1	-	-	-	-	106%	111%	118%	115%	115%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spike	27/03/2024																																

Result outside of QA/QC acceptance criteria Value

Appendix D: Borehole Logs

JKE Borehole Logs

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW1** **1/2**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.9m

Date: 18/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L. & O.B./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Sandy clay, low to medium plasticity, grey, fine to medium grained sand, trace of igneous gravel.	w<PL			
				■		N = SPT 4/100mm REFUSAL				FILL: Silty clay, low to medium plasticity, grey.				
		■		■			1							
		■		■		N = 28 11,8,20				FILL: Silty clay, medium to high plasticity, light brown, trace of igneous and sandstone gravel.	w≈PL			
				■			2							
		■		■		N = 16 5,7,9	3							
		■		■										
				■			4							
		■		■		N > 15 9,10,5/ 0mm REFUSAL								
		■		■			5							
		■		■										
				■		N > 4 5,4/50mm REFUSAL	6			as above, but trace of ash.				
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, trace of siltstone bands.	XW			BRINGELLY SHALE
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW1** **2/2**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.9m

Date: 18/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L. & O.B./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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, low to medium plasticity, trace of siltstone bands.	XW			
						N = SPT 11/ 100mm REFUSAL	8			SILTSTONE: grey brown.	DW			LOW TO MODERATE 'TC' BIT RESISTANCE
ON 25/3/24 ▼							9							
ON 27/3/24 ▼														
ON 21/3/24 ▼							10							
							11							GROUNDWATER MONITORING WELL INSTALLED TO 12.0m. CLASS 18
							12			END OF BOREHOLE AT 12.0m				MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 12.0m TO 3.0m. CASING 3.0m TO 0m. 2mm SAND FILTER PACK 12. 0m TO 2.5m.BENTONITE SEAL 2.5m TO 1.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW2** **1/2**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.1m

Date: 18/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L. & O.B./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine grained, grey, fine to medium grained igneous gravel.	D			
						N = 20 4,14,6				FILL: Sandy clay, medium to high plasticity, brown.	w>PL			
							1							
		■		■		N = 16 8,7,9				FILL: Silty clay, low to medium plasticity, grey, trace of sand.	w<PL			
							2							
				■		N = 16 6,7,9	3							
		■		■			4							
						N = 41 7,17,24				FILL: Silty clay, low to medium plasticity, grey, trace igneous and ironstone gravel, and sand.				
		■		■			5							
▼ BETWEEN 21/3/24 AND 27/3/24						N > 12 4,12/ 150mm REFUSAL	6			FILL: Silty clay, low to medium plasticity, grey, trace of igneous, ironstone and sandstone gravel, sand and ash.				
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW2** **2/2**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.1m

Date: 18/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L. & O.B./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		■		■		N > 11 6,11/ 150mm REFUSAL	8			FILL: Silty clay, low to medium plasticity, grey, trace of igneous, ironstone and sandstone gravel, sand and ash.				
		■		■					-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, brown, trace of siltstone bands.	XW			BRINGELLY SHALE LOW 'TC'BIT RESISTANCE
		■		■		N = SPT 10/75mm REFUSAL	9			SILTSTONE: grey brown.	DW			
		■		■			10							
		■		■			11			as above, but grey.				GROUNDWATER MONITORING WELL INSTALLED TO 12.0m. CLASS 18
							12			END OF BOREHOLE AT 12.0m				MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 12.0m TO 3.0m. CASING 3.0m TO 0m. 2mm SAND FILTER PACK 12. 0m TO 1.9m. BENTONITE SEAL 1.9m TO 0.5m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH3** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.7m

Date: 19/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel.	D			
						N = 24 8,10,14	1			FILL: Silty clay, low to medium plasticity, grey, trace of sandstone gravel.	w<PL			
						N = 30 8,13,17	2							
						N = 16 6,7,9	3			FILL: Silty clay, medium to high plasticity, brown, trace of igneous gravel.	w≈PL			
						N = 12 3,3,9	4			FILL: Silty clay, medium to high plasticity, brown, trace of igneous and sandstone gravel, and ash				
							5			as above, but with trace of metal fragments.				
						N > 13 5,13/ 50mm REFUSAL	6		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
							7			END OF BOREHOLE AT 7.0m				

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH4**

1/1

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.1m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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						N = 16 7,9,7	0			FILL: Silty clay, low to medium plasticity, brown, trace of siltstone gravel.	w<PL			
						N = 27 5,13,14	1		CI-CH	Silty CLAY: medium to high plasticity, grey mottled red and orange.	w<PL			RESIDUAL
							2		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
							3							
							4							
							5			END OF BOREHOLE AT 4.5m				
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH5** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 82.8m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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						N = 14 3,6,8	0			FILL: Silty clay, low to medium plasticity, brown, trace of siltstone and sandstone gravel.	w<PL			
						N = 21 9,6,15	1							
							2							
						N = 17 5,10,7	3							
										FILL: Silty clay, medium to high plasticity, brown, trace of ironstone and igneous gravel.	w≈PL			
						N = 13 4,5,8	4							
										FILL: Silty clay, medium to high plasticity, brown, trace of igneous gravel and ash.				
							5							
						N > 6 2,6/50mm REFUSAL	6							
							7		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
										END OF BOREHOLE AT 7.0m				

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ENVIRONMENTAL LOG

Log No. **BH6** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.4m

Date: 19/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Clayey sand, fine to medium grained, brown, trace of siltstone gravel.	D			
						N = 21 3,13,8	1			FILL: Clayey sand, fine to medium grained, brown, trace of sandstone gravel.	D			
						N = 17 9,7,10	2			FILL: Silty clay, low to medium plasticity, grey, trace of ironstone and siltstone gravel.	w<PL			
						N = 29 6,13,16	3							
							4							
						N = 17 6,8,9	5			FILL: Silty clay, medium to high plasticity, brown.	w≈PL			
							6		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, brown, trace of siltstone bands.	XW			BRINGELLY SHALE
							7			END OF BOREHOLE AT 7.0m				

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH7** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.0m

Date: 19/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel.	D			
						N = 28 6,9,19	1			FILL: Silty clay, low to medium plasticity, brown.	w<PL			
						N = 25 6,8,17	2			FILL: Silty clay, medium plasticity, brown, trace of igneous and sandstone gravel.	w≈PL			
						N = 22 4,11,11	3							
						N = 25 4,12,13	4							
							5			FILL: Silty clay, medium to high plasticity, brown, trace of igneous gravel.				
						N = SPT 9/100mm REFUSAL	6		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
							7			END OF BOREHOLE AT 7.0m				

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH8** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.5m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel, trace of igneous and sandstone gravel.	D			
		■		■					-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, with siltstone bands.	XW			BRINGELLY SHALE
							1			END OF BOREHOLE AT 0.6m				MODERATE 'TC' BIT RESISTANCE 'TC' BIT REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **BH9** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 82.9m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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		■		■		N > 1 4,1/50mm REFUSAL	0			FILL: Silty clay, low to medium plasticity, grey, trace of fine to medium grained sand.	w<PL			
						N = 31 4,16,15	1			FILL: Silty clay, medium to high plasticity, brown, trace of siltstone gravel.				
						N = 14 3,2,12	2			FILL: Silty clay, medium to high plasticity, brown, trace of igneous and siltstone gravel and ash.				
						N = 14 6,7,7	3							
							4							
							5							
							6		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
							7			END OF BOREHOLE AT 6.5m				

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ENVIRONMENTAL LOG

Log No. **BH10** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.6m

Date: 19/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained silstone, trace of sandstone gravel.	D			
						N = 27 5,12,15	1			FILL: Silty clay, low to medium plasticity, grey, trace of siltstone gravel.	w<PL			
						N = 24 2,11,13	2							
						N = 8 1,3,5	3			FILL: Silty clay, medium to high plasticity, brown, trace of siltstone gravel.	w≈PL			
						N = 20 3,11,9	4							
							5		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
							6			END OF BOREHOLE AT 6.0m				
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH11** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.4m

Date: 19/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel.	D			
							1		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE MODERATE TO HIGH 'TC' BIT RESISTANCE
							2			SILTSTONE: grey.	DW			
							3							
							4							
							5			END OF BOREHOLE AT 4.5m				
							6							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH12** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 85.0m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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		■		■		N > 16 5,13,3/ 0mm REFUSAL	0			FILL: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel.	D			
		■		■						FILL: Silty clay, medium to high plasticity, brown, trace of igneous and siltstone gravel.	w≈PL			
		■		■			1		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
		■		■			2							
										END OF BOREHOLE AT 2.5m				'TC' BIT REFUSAL
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH13** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.2m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel.	D			
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
		■		■			1			SILTSTONE: grey and brown.	DW			
		■		■			2							
				■										
		■		■			3							
				■										
		■		■			4							
										END OF BOREHOLE AT 4.5m				
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH14** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.9m

Date: 19/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel.	D			
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE MODERATE 'TC' BIT RESISTANCE
							1			SILTSTONE: grey.	DW			
							2							
							3							
							4							
										END OF BOREHOLE AT 4.5m				
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH15** **1/2**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.5m

Date: 18/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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, low to medium plasticity, brown, trace of igneous and sandstone gravel and sand.	w≈PL			
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE MODERATE TO HIGH 'TC' BIT RESISTANCE
							1			SILTSTONE: grey.	DW			HIGH RESISTANCE
							2							LOW TO MODERATE RESISTANCE
							3							HIGH RESISTANCE BAND
							4							MODERATE RESISTANCE
BETWEEN 21/3/24 AND 27/3/24							5							HIGH RESISTANCE BAND
							6							MODERATE RESISTANCE
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH15** **2/2**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.5m

Date: 18/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							8			SILTSTONE: grey.	DW			
▶							9							MODERATE RESISTANCE
							10			END OF BOREHOLE AT 9.5m				HIGH RESISTANCE 'TC' BIT REFUSAL GROUNDWATER MONITORING WELL INSTALLED TO 9.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 9.5m TO 3.0m. CASING 3.0m TO 0m. 2mm SAND FILTER PACK 9.5m TO 2.5m. BENTONITE SEAL 2.5m TO 0.4m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							11							
							12							
							13							
							14							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH16** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 85.4m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel, trace of siltstone gravel.	D			
				■		N > 6 3,6/50mm REFUSAL					w<PL			
										FILL: Silty clay, low to medium plasticity, brown, trace of siltstone gravel.	XW			BRINGELLY SHALE
		■		■			1		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.				
							2			END OF BOREHOLE AT 2.1m				'TC' BIT REFUSAL
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH17**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.4m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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						N = 17 2,7,10	0			FILL: Silty clay, low to medium plasticity, brown, trace of siltstone gravel.	w<PL			
						N = 29 6,14,15	1							
							2							
						N = 20 3,10,10	3							
							4			FILL: Silty clay, medium to high plasticity, brown, trace of igneous and siltstone gravel.	w≈PL			
						N = 16 3,10,6	5			FILL: Silty clay, medium plasticity, brown, trace of igneous gravel and ash.				
						N > 7 5,4,3/ 100mm	6							
						REFUSAL	7		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH17** **2/2**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 83.4m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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, low to medium plasticity, grey, trace of siltstone bands.	XW			
										END OF BOREHOLE AT 7.5m				

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH18** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.1m

Date: 19/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel, trace of siltstone gravel.	D			
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone gravel.	XW			BRINGELLY SHALE MODERATE 'TC' BIT RESISTANCE
							1							
							2			SILTSTONE: grey and brown.				
							3							
							4							
										END OF BOREHOLE AT 4.5m				
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH19**

1/1

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 84.6m

Date: 20/3/24 **Datum:** AHD

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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: Gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel.	D			
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
							1							
							2			SILTSTONE: grey and brown.	DW			
							3							
										END OF BOREHOLE AT 3.1m				'TC' BIT REFUSAL
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH20** **1/1**

Client: NEXTDC LIMITED

Project: PROPOSED DATA STORAGE CENTRE

Location: 16 JOHNSTON CRESCENT, HORSLEY PARK, NSW

Job No.: E36628BR **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 20/3/24 **Datum:** -

Plant Type: JK500 **Logged/Checked by:** J.T.L./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES 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						N = 20 2,8,12	0			FILL: Silty clay, low to medium plasticity, brown, trace of siltstone gravel.	w<PL			
							1			as above, but trace of sand.				
						N = 18 6,10,8				FILL: Silty clay, medium to high plasticity, brown.	w≈PL			
							2			FILL: Silty clay, low to medium plasticity, brown.	w<PL			
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey, trace of siltstone bands.	XW			BRINGELLY SHALE
							3							
							4							
										END OF BOREHOLE AT 4.5m				
							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:

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

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

NOTES:

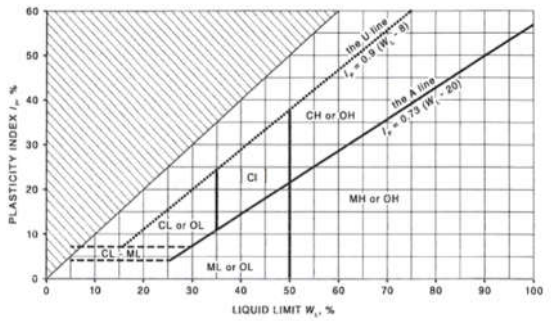
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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

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

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

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



LOG SYMBOLS

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

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

Classification of Material Weathering

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

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

Rock Material Strength Classification

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

ERM Borehole Logs

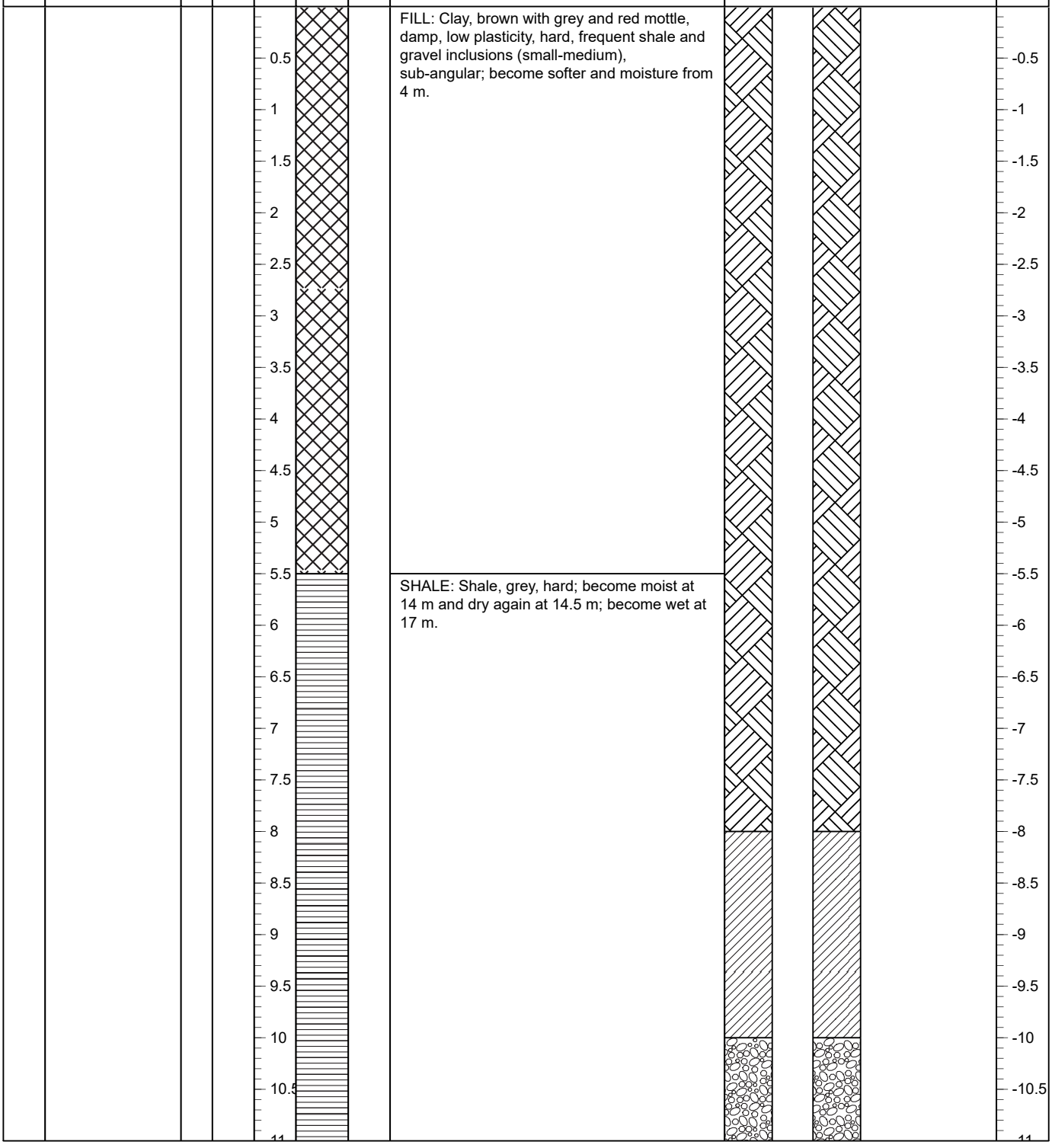
GROUNDWATER LOG S3-06W

PROJECT NUMBER 0449086-S3.mdb	**DRILLING DATE** 8/05/2023 - 9/05/2023	**COORDINATES** ,
PROJECT NAME Horsley Park	**TOTAL DEPTH** 20.7	**COORD SYS**
CLIENT CSR	**DIAMETER** mm	**COMPLETION**
ADDRESS	**CASING**	**SURFACE ELEVATION**
LICENCE NO.	**SCREEN**	**WELL TOC**

COMMENTS

LOGGED BY JE
CHECKED BY

PID	Samples	Analysed	% Recovery	Depth (m)	Graphic Log	Moisture	Material Description	Well Diagram	Elevation (m)
				0 to 5.5			FILL: Clay, brown with grey and red mottle, damp, low plasticity, hard, frequent shale and gravel inclusions (small-medium), sub-angular; become softer and moisture from 4 m.		0 to -5.5
				5.5 to 20.7			SHALE: Shale, grey, hard; become moist at 14 m and dry again at 14.5 m; become wet at 17 m.		-5.5 to -20.7



GROUNDWATER LOG S3-06W

PID	Samples	Analysed	% Recovery	Depth (m)	Graphic Log	Moisture	Material Description	Well Diagram	Elevation (m)
				11.5					-11.5
				12					-12
				12.5					-12.5
				13					-13
				13.5					-13.5
				14					-14
				14.5					-14.5
				15					-15
				15.5					-15.5
				16					-16
				16.5					-16.5
				17			▽		-17
				17.5					-17.5
				18					-18
				18.5					-18.5
				19					-19
				19.5					-19.5
				20					-20
				20.5					-20.5
				21			Termination Depth at:20.7 m Terminated at 20.7 m, target depth reached, collapsed back to 11 m, redrilled using SFA to 18.5 m, collapsed back to 17 m.		-21
				21.5					-21.5
				22					-22
				22.5					-22.5
				23					-23
				23.5					-23.5
				24					-24

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GROUNDWATER LOG S3-07W

PROJECT NUMBER 0449086-S3.mdb	**DRILLING DATE** 10/05/2023 - 10/05/2023	**COORDINATES** ,
PROJECT NAME Horsley Park	**TOTAL DEPTH** 12.8	**COORD SYS**
CLIENT CSR	**DIAMETER** mm	**COMPLETION**
ADDRESS	**CASING**	**SURFACE ELEVATION**
LICENCE NO.	**SCREEN**	**WELL TOC**

COMMENTS

LOGGED BY JE
CHECKED BY

PID	Samples	Analysed	% Recovery	Depth (m)	Graphic Log	Moisture	Material Description	Well Diagram	Elevation (m)
				0.5			FILL: Silty clay, brown, dry, hard, non-plastic, no o/s, frequent rock/gravel inclusions(small-medium size, sub-angular)		-0.5
				1			SHALE: Shale, grey/brown, very hard, no o/s, become darker grey from 10 m, and moist at 10.8 m		-1
				1.5					-1.5
				2					-2
				2.5					-2.5
				3					-3
				3.5					-3.5
				4					-4
				4.5					-4.5
				5					-5
				5.5					-5.5
				6					-6
				6.5					-6.5
				7					-7
				7.5					-7.5
				8					-8
				8.5					-8.5
				9					-9
				9.5					-9.5
				10					-10
				10.5					-10.5
				11					-11

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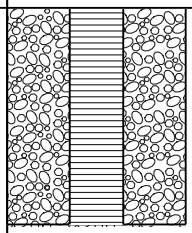
GROUNDWATER LOG S3-07W

PID	Samples	Analysed	% Recovery	Depth (m)	Graphic Log	Moisture	Material Description	Well Diagram	Elevation (m)
				11.5					-11.5
				12					-12
				12.5					-12.5
				13			Termination Depth at:12.8 m Terminated at 12.8 m, raget depth reached, collapsed back to 12.6 m.		-13
				13.5					-13.5
				14					-14
				14.5					-14.5
				15					-15
				15.5					-15.5
				16					-16
				16.5					-16.5
				17					-17
				17.5					-17.5
				18					-18
				18.5					-18.5
				19					-19
				19.5					-19.5
				20					-20
				20.5					-20.5
				21					-21
				21.5					-21.5
				22					-22
				22.5					-22.5
				23					-23
				23.5					-23.5
				24					-24

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GROUNDWATER LOG S3-08W

PROJECT NUMBER 0449086-S3.mdb	**DRILLING DATE** 9/05/2023 - 10/05/2023	**COORDINATES** 299072, 6254737
PROJECT NAME Horsley Park	**TOTAL DEPTH** 9.9	**COORD SYS**
CLIENT CSR	**DIAMETER** 200 mm	**COMPLETION**
ADDRESS	**CASING**	**SURFACE ELEVATION**
LICENCE NO.	**SCREEN**	**WELL TOC**

COMMENTS

LOGGED BY JE
CHECKED BY

PID	Samples	Analysed	% Recovery	Depth (m)	Graphic Log	Moisture	Material Description	Well Diagram	Elevation (m)
				0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5			FILL: Clay, brown with grey and tan mottle, low plasticity, soft, damp, frequent rock (small, sub-angular) and shale (medium size, angular) inclusions, hard at 0.3 m. SHALE: Weathered shale, grey, stiff, hard		-0.5, -1, -1.5, -2, -2.5, -3, -3.5, -4, -4.5, -5, -5.5, -6, -6.5, -7, -7.5, -8, -8.5, -9, -9.5
				10, 10.5			Termination Depth at:9.9 m Terminated at 9.9 m.		-10, -10.5

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Appendix E: Laboratory Reports & CoC Documents

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www.envirolab.com.au

CERTIFICATE OF ANALYSIS 347659

Client Details

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

Sample Details

Your Reference	**E366288R Horsley Park**
Number of Samples	11 Water
Date samples received	28/03/2024
Date completed instructions received	28/03/2024

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	08/04/2024
Date of Issue	08/04/2024

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Results Approved By
Diego Bigolin, Inorganics Supervisor
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Greta Petzold, Operation Manager
Loren Bardwell, Development Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference	UNITS	MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	01/04/2024	01/04/2024	01/04/2024	01/04/2024	01/04/2024
Date analysed	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
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	%	103	103	106	105	104
Surrogate Toluene-d8	%	100	99	101	101	101
Surrogate 4-Bromofluorobenzene	%	104	105	105	105	103

vTRH(C6-C10)/BTEXN in Water						
Our Reference		347659-6	347659-7	347659-8	347659-9	347659-10
Your Reference	UNITS	S3-08	Dam1	GWDUP1	GWDUP2	TB-W1
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	30/03/2024	30/03/2024	30/03/2024	30/03/2024	30/03/2024
Date analysed	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
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	102	102	102	96
Surrogate Toluene-d8	%	98	97	100	97	96
Surrogate 4-Bromofluorobenzene	%	106	99	100	100	97

vTRH(C6-C10)/BTEXN in Water		
Our Reference		347659-11
Your Reference	UNITS	TS-W1
Date Sampled		27/03/2024
Type of sample		Water
Date extracted	-	30/03/2024
Date analysed	-	02/04/2024
Benzene	µg/L	106%
Toluene	µg/L	111%
Ethylbenzene	µg/L	118%
m+p-xylene	µg/L	115%
o-xylene	µg/L	115%
Surrogate Dibromofluoromethane	%	101
Surrogate Toluene-d8	%	102
Surrogate 4-Bromofluorobenzene	%	102

svTRH (C10-C40) in Water						
Our Reference		347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference	UNITS	MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Date analysed	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
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	%	78	79	71	84	87

svTRH (C10-C40) in Water						
Our Reference		347659-6	347659-7	347659-8	347659-9	347659-10
Your Reference	UNITS	S3-08	Dam1	GWDUP1	GWDUP2	TB-W1
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Date analysed	-	02/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024
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	54
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50	54
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	%	86	79	84	88	88

PAHs in Water						
Our Reference		347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference	UNITS	MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Date analysed	-	03/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024
Naphthalene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1	<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	%	85	80	74	91	89

PAHs in Water						
Our Reference		347659-6	347659-7	347659-8	347659-9	347659-10
Your Reference	UNITS	S3-08	Dam1	GWDUP1	GWDUP2	TB-W1
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Date analysed	-	03/04/2024	03/04/2024	03/04/2024	03/04/2024	03/04/2024
Naphthalene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1	<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	%	90	85	87	90	87

Miscellaneous Inorganics						
Our Reference	UNITS	347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference		MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	28/03/2024	28/03/2024	28/03/2024	28/03/2024	28/03/2024
Date analysed	-	28/03/2024	28/03/2024	28/03/2024	28/03/2024	28/03/2024
pH	pH Units	6.7	7.2	7.5	7.3	7.4
Electrical Conductivity	µS/cm	14,000	8,200	8,100	15,000	6,600
Total Suspended Solids	mg/L	1,800	190	1,400	<5	8
Total Dissolved Solids (grav)	mg/L	9,100	5,000	5,000	9,000	3,900
Turbidity	NTU	NT	120	710	0.8	6.3
Sodium Adsorption Ratio	-	26	27	38	38	21
Total Organic Carbon	mg/L	3	2	3	1	3
Phosphate as P in water	mg/L	<0.005	<0.005	<0.005	<0.005	0.007
Dissolved Oxygen*	mg/L	7.9	8.3	8.1	7.9	7.7
Redox Potential*	mV	234	197	186	197	195
Ammonia as N in water	mg/L	0.098	0.027	2.7	3.1	0.32
Nitrate as N in water	mg/L	0.51	<0.005	<0.005	0.007	<0.005
Nitrite as N in water	mg/L	0.006	<0.005	<0.005	0.29	<0.005
NOx as N in water	mg/L	0.51	<0.005	0.006	0.3	<0.005
Total Nitrogen in water	mg/L	0.6	<0.1	3.2	3.6	0.4
TKN in water	mg/L	0.1	<0.1	3.2	3.3	0.4
Organic Nitrogen as N	mg/L	<0.2	<0.2	0.5	<0.2	<0.2
Silica (Reactive - SiO_2)	mg/L	14	11	13	10	8.8

Miscellaneous Inorganics			
Our Reference		347659-6	347659-7
Your Reference	UNITS	S3-08	Dam1
Date Sampled		27/03/2024	27/03/2024
Type of sample		Water	Water
Date prepared	-	28/03/2024	28/03/2024
Date analysed	-	28/03/2024	28/03/2024
pH	pH Units	6.9	7.7
Electrical Conductivity	µS/cm	17,000	270
Total Suspended Solids	mg/L	27	310
Total Dissolved Solids (grav)	mg/L	12,000	380
Turbidity	NTU	11	710
Sodium Adsorption Ratio	-	25	2.2
Total Organic Carbon	mg/L	2	2
Phosphate as P in water	mg/L	0.03	<0.005
Dissolved Oxygen*	mg/L	6.6	7.3
Redox Potential*	mV	236	196
Ammonia as N in water	mg/L	0.13	0.017
Nitrate as N in water	mg/L	0.17	0.71
Nitrite as N in water	mg/L	<0.005	<0.005
NOx as N in water	mg/L	0.2	0.71
Total Nitrogen in water	mg/L	0.3	1.0
TKN in water	mg/L	0.1	0.3
Organic Nitrogen as N	mg/L	<0.2	0.3
Silica (Reactive - SiO_2)	mg/L	10	2.8

All metals in water - total			
Our Reference	UNITS	347659-7	347659-10
Your Reference		Dam1	TB-W1
Date Sampled		27/03/2024	27/03/2024
Type of sample		Water	Water
Date prepared	-	02/04/2024	02/04/2024
Date analysed	-	02/04/2024	02/04/2024
Silver-Total	µg/L	<1	[NA]
Aluminium-Total	µg/L	8,400	[NA]
Arsenic-Total	µg/L	5	<1
Boron-Total	µg/L	<20	[NA]
Barium-Total	µg/L	160	[NA]
Beryllium-Total	µg/L	1	[NA]
Cadmium-Total	µg/L	0.4	<0.1
Cobalt-Total	µg/L	22	[NA]
Chromium-Total	µg/L	10	<1
Copper-Total	µg/L	34	<1
Iron-Total	µg/L	10,000	[NA]
Mercury-Total	µg/L	<0.05	<0.05
Manganese-Total	µg/L	260	[NA]
Molybdenum-Total	µg/L	2	[NA]
Nickel-Total	µg/L	28	<1
Lead-Total	µg/L	17	<1
Antimony-Total	µg/L	<1	[NA]
Selenium-Total	µg/L	3	[NA]
Uranium-Total	µg/L	0.8	[NA]
Vanadium-Total	µg/L	20	[NA]
Zinc-Total	µg/L	110	<1
Lithium-Total	µg/L	6	[NA]
Strontium-Total	µg/L	89	[NA]

All metals in water-dissolved						
Our Reference		347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference	UNITS	MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Date analysed	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Silver-Dissolved	µg/L	<1	<1	<1	<1	<1
Aluminium-Dissolved	µg/L	<10	<10	80	<10	<10
Arsenic-Dissolved	µg/L	<1	<1	3	1	<1
Boron-Dissolved	µg/L	50	<20	30	<20	70
Barium-Dissolved	µg/L	140	41	100	18,000	84
Beryllium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	1
Cadmium-Dissolved	µg/L	0.4	<0.1	<0.1	<0.1	<0.1
Cobalt-Dissolved	µg/L	5	2	<1	2	1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	7	3	3	5	76
Iron-Dissolved	µg/L	<10	<10	20	40	<10
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Manganese-Dissolved	µg/L	1,000	490	83	680	510
Molybdenum-Dissolved	µg/L	2	<1	3	3	2
Nickel-Dissolved	µg/L	19	2	2	3	2
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Antimony-Dissolved	µg/L	<1	<1	<1	<1	<1
Selenium-Dissolved	µg/L	<1	<1	<1	<1	<1
Uranium-Dissolved	µg/L	7.8	3.9	0.8	<0.5	1.2
Vanadium-Dissolved	µg/L	1	<1	1	<1	<1
Zinc-Dissolved	µg/L	61	8	14	20	32
Lithium-Dissolved	µg/L	140	66	99	180	72
Strontium-Dissolved	µg/L	8,900	1,900	4,700	13,000	3,900

All metals in water-dissolved				
Our Reference		347659-6	347659-8	347659-9
Your Reference	UNITS	S3-08	GWDUP1	GWDUP2
Date Sampled		27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water
Date prepared	-	02/04/2024	02/04/2024	02/04/2024
Date analysed	-	02/04/2024	02/04/2024	02/04/2024
Silver-Dissolved	µg/L	<1	[NA]	[NA]
Aluminium-Dissolved	µg/L	<10	[NA]	[NA]
Arsenic-Dissolved	µg/L	4	<1	4
Boron-Dissolved	µg/L	<20	[NA]	[NA]
Barium-Dissolved	µg/L	46	[NA]	[NA]
Beryllium-Dissolved	µg/L	<0.5	[NA]	[NA]
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1
Cobalt-Dissolved	µg/L	6	[NA]	[NA]
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	48	79	46
Iron-Dissolved	µg/L	20	[NA]	[NA]
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Manganese-Dissolved	µg/L	650	[NA]	[NA]
Molybdenum-Dissolved	µg/L	1	[NA]	[NA]
Nickel-Dissolved	µg/L	11	2	10
Lead-Dissolved	µg/L	<1	<1	<1
Antimony-Dissolved	µg/L	<1	[NA]	[NA]
Selenium-Dissolved	µg/L	<1	[NA]	[NA]
Uranium-Dissolved	µg/L	2.3	[NA]	[NA]
Vanadium-Dissolved	µg/L	1	[NA]	[NA]
Zinc-Dissolved	µg/L	24	32	21
Lithium-Dissolved	µg/L	82	[NA]	[NA]
Strontium-Dissolved	µg/L	5,300	[NA]	[NA]

Ion Balance						
Our Reference		347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference	UNITS	MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	28/03/2024	28/03/2024	28/03/2024	28/03/2024	28/03/2024
Date analysed	-	28/03/2024	28/03/2024	28/03/2024	28/03/2024	28/03/2024
Calcium - Dissolved	mg/L	140	43	47	150	52
Potassium - Dissolved	mg/L	31	13	26	34	18
Sodium - Dissolved	mg/L	2,500	1,600	1,700	3,000	1,200
Magnesium - Dissolved	mg/L	360	140	60	190	110
Hardness	mgCaCO 3 /L	1,800	700	360	1,200	570
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	930	1,000	35	450	760
Carbonate Alkalinity as $CaCO_3$	mg/L	150	260	<5	37	150
Total Alkalinity as $CaCO_3$	mg/L	1,100	1,300	35	480	910
Sulphate, SO4	mg/L	470	590	210	2	130
Chloride, Cl	mg/L	3,700	1,700	1,900	4,700	1,500
Ionic Balance	%	4.0	-1.0	15	4.0	0

Ion Balance			
Our Reference		347659-6	347659-7
Your Reference	UNITS	S3-08	Dam1
Date Sampled		27/03/2024	27/03/2024
Type of sample		Water	Water
Date prepared	-	28/03/2024	28/03/2024
Date analysed	-	28/03/2024	28/03/2024
Calcium - Dissolved	mg/L	210	7.8
Potassium - Dissolved	mg/L	25	2
Sodium - Dissolved	mg/L	3,000	33
Magnesium - Dissolved	mg/L	520	5
Hardness	mgCaCO 3 /L	2,700	39
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	520	33
Carbonate Alkalinity as $CaCO_3$	mg/L	21	<5
Total Alkalinity as $CaCO_3$	mg/L	540	33
Sulphate, SO4	mg/L	500	47
Chloride, Cl	mg/L	5,100	28
Ionic Balance	%	5.0	-3.0

Metals in Waters - Total						
Our Reference		347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference	UNITS	MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Date analysed	-	02/04/2024	02/04/2024	02/04/2024	02/04/2024	02/04/2024
Phosphorus - Total	mg/L	0.2	<0.05	0.2	<0.05	<0.05

Metals in Waters - Total			
Our Reference		347659-6	347659-7
Your Reference	UNITS	S3-08	Dam1
Date Sampled		27/03/2024	27/03/2024
Type of sample		Water	Water
Date prepared	-	02/04/2024	02/04/2024
Date analysed	-	02/04/2024	02/04/2024
Phosphorus - Total	mg/L	<0.05	0.2

Microbiologocal Testing						
Our Reference		347659-1	347659-2	347659-3	347659-4	347659-5
Your Reference	UNITS	MW1	MW2	MW15	S3-06	S3-07
Date Sampled		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Type of sample		Water	Water	Water	Water	Water
Date of testing	-	29/03/2024	29/03/2024	29/03/2024	29/03/2024	29/03/2024
E. coli	cfu/100mL	**	<1000 NBO	20 mpn/100mL	<10	<1000
Faecal Coliforms	cfu/100mL	**	<1000 NBO	20 mpn/100mL	<10	<1000

Microbiologocal Testing			
Our Reference		347659-6	347659-7
Your Reference	UNITS	S3-08	Dam1
Date Sampled		27/03/2024	27/03/2024
Type of sample		Water	Water
Date of testing	-	29/03/2024	29/03/2024
E. coli	cfu/100mL	<10	2,400 mpn/100mL
Faecal Coliforms	cfu/100mL	<10	2,400 mpn/100mL

Method ID	Methodology Summary
Ext-008	Subcontracted to Sonic Food & Water Testing. NATA Accreditation No. 4034.
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-022	Turbidity - measured nephelometrically using a turbidimeter, in accordance with APHA latest edition, 2130-B.
Inorg-035	Analysed using an electrode. Please note that the results for water analyses are indicative only, samples are ideally analysed on collection.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on APHA latest edition NO2- B. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-062	TKN - determined colourimetrically based on APHA latest edition 4500 Norg. Alternatively, TKN can be derived from calculation (Total N - NOx).
Inorg-079	TOC determined using a TOC analyser using the combustion method. Dissolved requires filtering prior to determination. Analysis using APHA latest edition 5310B.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Inorg-112	Dissolved Oxygen using membrane electrode. Note this analysis should ideally be carried out immediately after sampling.
INORG-120	Reactive Silica (SiO2) determined colorimetrically. Waters samples are filtered on receipt prior to analysis.
Metals-020	Determination of various metals by ICP-AES.

Method ID	Methodology Summary
Metals-020	Calcium and Magnesium analysed by ICP-AES and SAR calculated.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms (e.g. FeO, PbO, ZnO) are determinined stoichiometrically from the base metal concentration.
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.

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	-			01/04/2024	1	01/04/2024	04/04/2024		01/04/2024	[NT]
Date analysed	-			02/04/2024	1	02/04/2024	05/04/2024		02/04/2024	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	106	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	106	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	102	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	106	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	107	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	107	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	104	1	103	104	1	99	[NT]
Surrogate Toluene-d8	%		Org-023	100	1	100	100	0	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	103	1	104	99	5	103	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	10	30/03/2024	04/04/2024		[NT]	[NT]
Date analysed	-			[NT]	10	02/04/2024	05/04/2024		[NT]	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	[NT]	10	<10	<10	0	[NT]	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	[NT]	10	<10	<10	0	[NT]	[NT]
Benzene	µg/L	1	Org-023	[NT]	10	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-023	[NT]	10	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	[NT]	10	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	[NT]	10	<2	<2	0	[NT]	[NT]
o-xylene	µg/L	1	Org-023	[NT]	10	<1	<1	0	[NT]	[NT]
Naphthalene	µg/L	1	Org-023	[NT]	10	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	[NT]	10	96	105	9	[NT]	[NT]
Surrogate Toluene-d8	%		Org-023	[NT]	10	96	102	6	[NT]	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	[NT]	10	97	101	4	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	347659-2
Date extracted	-			02/04/2024	1	02/04/2024	02/04/2024		02/04/2024	02/04/2024
Date analysed	-			02/04/2024	1	02/04/2024	02/04/2024		02/04/2024	02/04/2024
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	100	131
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	106	136
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	100	111
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	100	131
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	106	136
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	100	111
Surrogate o-Terphenyl	%		Org-020	70	1	78	85	9	129	79

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			02/04/2024	1	02/04/2024	02/04/2024		02/04/2024	[NT]
Date analysed	-			03/04/2024	1	03/04/2024	03/04/2024		03/04/2024	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	89	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	76	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	77	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	82	1	85	90	6	95	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	347659-2
Date prepared	-			28/03/2024	1	28/03/2024	28/03/2024		28/03/2024	28/03/2024
Date analysed	-			28/03/2024	1	28/03/2024	28/03/2024		28/03/2024	28/03/2024
pH	pH Units		Inorg-001	[NT]	1	6.7	[NT]		101	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	14000	[NT]		101	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	1800	[NT]		100	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	9100	9200	1	103	[NT]
Turbidity	NTU	0.1	Inorg-022	<0.1	1	NT	[NT]		98	[NT]
Sodium Adsorption Ratio	-	0.01	Metals-020	<0.01	1	26	27	4	100	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	3	[NT]		103	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	<0.005	[NT]		113	[NT]
Dissolved Oxygen*	mg/L	0.1	Inorg-112	<0.1	1	7.9	7.8	1	[NT]	[NT]
Redox Potential*	mV		Inorg-035	[NT]	1	234	221	6	81	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.098	[NT]		103	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.51	[NT]		101	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.006	[NT]		99	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.51	[NT]		101	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	0.6	[NT]		104	80
TKN in water	mg/L	0.1	Inorg-062	<0.1	1	0.1	[NT]		[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	<0.2	1	<0.2	[NT]		[NT]	[NT]
Silica (Reactive - SiO_2)	mg/L	0.1	INORG-120	<0.1	1	14	14	0	88	90

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	347659-3
Date prepared	-			[NT]	2	28/03/2024	28/03/2024		[NT]	28/03/2024
Date analysed	-			[NT]	2	28/03/2024	28/03/2024		[NT]	28/03/2024
pH	pH Units		Inorg-001	[NT]	2	7.2	[NT]		[NT]	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	[NT]	2	8200	[NT]		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	2	190	[NT]		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	2	5000	[NT]		[NT]	[NT]
Turbidity	NTU	0.1	Inorg-022	[NT]	2	120	120	0	[NT]	[NT]
Sodium Adsorption Ratio	-	0.01	Metals-020	[NT]	2	27	[NT]		[NT]	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	[NT]	2	2	[NT]		[NT]	100
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	2	<0.005	<0.005	0	[NT]	[NT]
Dissolved Oxygen*	mg/L	0.1	Inorg-112	[NT]	2	8.3	[NT]		[NT]	[NT]
Redox Potential*	mV		Inorg-035	[NT]	2	197	[NT]		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	2	0.027	0.032	17	[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	2	<0.005	<0.005	0	[NT]	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	[NT]	2	<0.005	<0.005	0	[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	[NT]	2	<0.005	0.006	18	[NT]	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	2	<0.1	[NT]		[NT]	[NT]
TKN in water	mg/L	0.1	Inorg-062	[NT]	2	<0.1	[NT]		[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	[NT]	2	<0.2	[NT]		[NT]	[NT]
Silica (Reactive - SiO_2)	mg/L	0.1	INORG-120	[NT]	2	11	[NT]		[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	7	28/03/2024	28/03/2024		[NT]	[NT]
Date analysed	-			[NT]	7	28/03/2024	28/03/2024		[NT]	[NT]
pH	pH Units		Inorg-001	[NT]	7	7.7	[NT]		[NT]	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	[NT]	7	270	[NT]		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	7	310	330	6	[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	7	380	[NT]		[NT]	[NT]
Turbidity	NTU	0.1	Inorg-022	[NT]	7	710	[NT]		[NT]	[NT]
Sodium Adsorption Ratio	-	0.01	Metals-020	[NT]	7	2.2	[NT]		[NT]	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	[NT]	7	2	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	7	<0.005	[NT]		[NT]	[NT]
Dissolved Oxygen*	mg/L	0.1	Inorg-112	[NT]	7	7.3	[NT]		[NT]	[NT]
Redox Potential*	mV		Inorg-035	[NT]	7	196	[NT]		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	7	0.017	[NT]		[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	7	0.71	[NT]		[NT]	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	[NT]	7	<0.005	[NT]		[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	[NT]	7	0.71	[NT]		[NT]	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	7	1.0	1.0	0	[NT]	[NT]
TKN in water	mg/L	0.1	Inorg-062	[NT]	7	0.3	[NT]		[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	[NT]	7	0.3	[NT]		[NT]	[NT]
Silica (Reactive - SiO_2)	mg/L	0.1	INORG-120	[NT]	7	2.8	[NT]		[NT]	[NT]

QUALITY CONTROL: All metals in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			02/04/2024	7	02/04/2024	02/04/2024		02/04/2024	[NT]
Date analysed	-			02/04/2024	7	02/04/2024	02/04/2024		02/04/2024	[NT]
Silver-Total	µg/L	1	Metals-022	<1	7	<1	<1	0	114	[NT]
Aluminium-Total	µg/L	10	Metals-022	<10	7	8400	8100	4	85	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	7	5	5	0	113	[NT]
Boron-Total	µg/L	20	Metals-022	<20	7	<20	<20	0	109	[NT]
Barium-Total	µg/L	1	Metals-022	<1	7	160	170	6	105	[NT]
Beryllium-Total	µg/L	0.5	Metals-022	<0.5	7	1	1	0	117	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	7	0.4	0.4	0	108	[NT]
Cobalt-Total	µg/L	1	Metals-022	<1	7	22	21	5	109	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	7	10	10	0	106	[NT]
Copper-Total	µg/L	1	Metals-022	<1	7	34	34	0	109	[NT]
Iron-Total	µg/L	10	Metals-022	<10	7	10000	10000	0	108	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	7	<0.05	[NT]		100	[NT]
Manganese-Total	µg/L	5	Metals-022	<5	7	260	250	4	102	[NT]
Molybdenum-Total	µg/L	1	Metals-022	<1	7	2	2	0	104	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	7	28	27	4	107	[NT]
Lead-Total	µg/L	1	Metals-022	<1	7	17	18	6	106	[NT]
Antimony-Total	µg/L	1	Metals-022	<1	7	<1	<1	0	105	[NT]
Selenium-Total	µg/L	1	Metals-022	<1	7	3	3	0	105	[NT]
Uranium-Total	µg/L	0.5	Metals-022	<0.5	7	0.8	0.8	0	106	[NT]
Vanadium-Total	µg/L	1	Metals-022	<1	7	20	20	0	107	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	7	110	110	0	108	[NT]
Lithium-Total	µg/L	1	Metals-022	<1	7	6	7	15	104	[NT]
Strontium-Total	µg/L	1	Metals-022	<1	7	89	87	2	103	[NT]

QUALITY CONTROL: All metals in water-dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	347659-2
Date prepared	-			02/04/2024	1	02/04/2024	02/04/2024		[NT]	02/04/2024
Date analysed	-			02/04/2024	1	02/04/2024	02/04/2024		[NT]	02/04/2024
Silver-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	[NT]	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	[NT]	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	[NT]	[NT]
Boron-Dissolved	µg/L	20	Metals-022	<20	1	50	40	22	[NT]	[NT]
Barium-Dissolved	µg/L	1	Metals-022	<1	1	140	140	0	[NT]	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	0.4	0.4	0	[NT]	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	5	6	18	[NT]	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	[NT]	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	7	8	13	[NT]	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	[NT]	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	[NT]	88
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	1000	1100	10	[NT]	[NT]
Molybdenum-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	[NT]	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	19	20	5	[NT]	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	[NT]	[NT]
Antimony-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	[NT]	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	[NT]	[NT]
Uranium-Dissolved	µg/L	0.5	Metals-022	<0.5	1	7.8	7.8	0	[NT]	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	[NT]	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	61	63	3	[NT]	[NT]
Lithium-Dissolved	µg/L	1	Metals-022	<1	1	140	140	0	[NT]	[NT]
Strontium-Dissolved	µg/L	1	Metals-022	<1	1	8900	8900	0	[NT]	[NT]

QUALITY CONTROL: All metals in water-dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	02/04/2024	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	02/04/2024	[NT]
Silver-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Boron-Dissolved	µg/L	20	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	117	[NT]
Barium-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	97	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	111	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Copper-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	109	[NT]
Iron-Dissolved	µg/L	10	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	95	[NT]
Molybdenum-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	97	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Lead-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Antimony-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	94	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	97	[NT]
Uranium-Dissolved	µg/L	0.5	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Lithium-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	95	[NT]
Strontium-Dissolved	µg/L	1	Metals-022	[NT]	[NT]	[NT]	[NT]	[NT]	95	[NT]

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	347659-2
Date prepared	-			28/03/2024	1	28/03/2024	28/03/2024		28/03/2024	28/03/2024
Date analysed	-			28/03/2024	1	28/03/2024	28/03/2024		28/03/2024	28/03/2024
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	140	140	0	98	88
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	31	31	0	96	97
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	2500	2600	4	100	#
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	360	360	0	101	109
Hardness	mgCaCO 3 /L	3	Metals-020	<3	1	1800	1800	0	[NT]	[NT]
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	930	[NT]		[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	150	[NT]		[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	1100	[NT]		[NT]	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	1	470	[NT]		[NT]	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	3700	[NT]		[NT]	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	4.0	[NT]		[NT]	[NT]

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	28/03/2024	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	28/03/2024	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	[NT]	[NT]	[NT]	[NT]	[NT]	96	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	[NT]	[NT]	[NT]	[NT]	[NT]	105	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	[NT]	[NT]	[NT]	[NT]	[NT]	108	[NT]
Chloride, Cl	mg/L	1	Inorg-081	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Metals in Waters - Total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			02/04/2024	7	02/04/2024	02/04/2024		02/04/2024	[NT]
Date analysed	-			02/04/2024	7	02/04/2024	02/04/2024		02/04/2024	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	7	0.2	0.2	0	110	[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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

TRH Water(C10-C40) NEPM - The positive result in the blank/rinsate sample is due to a single peak with no hydrocarbon profile that is consistent with the use of plastic containers.

Microbiology analysed by Sonic Food & Water Testing. Report No. W2407841
NBO: The presence of competing background organisms in the sample may have reduced the count.
The time between collection and the commencement of testing should not exceed 24 hours. Samples tested outside this time may have their results compromised
** A result cannot be reported as a most probable number has been obtained that is not included in the table, as per the standard.

Ion Balance - # Percent recovery is not applicable due to the high concentration of the element/s in the sample/s. 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	E366288R Horsley Park
Envirolab Reference	347659
Date Sample Received	28/03/2024
Date Instructions Received	28/03/2024
Date Results Expected to be Reported	08/04/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	11 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11
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:

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

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	pH	Electrical Conductivity	Total Suspended Solids	Total Dissolved Solids(grav)	Turbidity	Sodium Adsorption Ratio	Total Organic Carbon	Phosphate as P in water	Dissolved Oxygen*	Redox Potential*	Ammonia as N in water	Nitrate as N in water	Nitrite as N in water	NOx as N in water	Total Nitrogen in water	TKN in water	Organic Nitrogen as N	Silica (Reactive - SiO2)	All metals in water - total	All metals in water-dissolved	Calcium - Dissolved	Potassium - Dissolved	Sodium - Dissolved	Magnesium - Dissolved	Hardness	Hydroxide Alkalinity (OH-) as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulphate, SO4	Chloride, Cl	Ionic Balance	Metals in Waters -Total	Microbiologocal Testing
MW1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW15	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S3-06	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S3-07	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S3-08	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dam1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GWDUP1	✓	✓	✓																				✓														
GWDUP2	✓	✓	✓																				✓														
TB-W1	✓	✓	✓																			✓															
TS-W1	✓																																				

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

Additional Info

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

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

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

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

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	JKE Job Number: E36628BR	JKEnvironments
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		Attention: Craig Ridley
Attention: Aileen	Page: 1 of 1	

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

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Alkalinity suite	EC, pH, reddox, DO	Turbidity	TDS, TSS, TOC, SAR	Ionic balance, including hardness	Combo#3 [Dissolved]	Additional metals: Al, Ag, Sb, Ba, Be, B, Co, Fe, Li, Mn, Mo, Se, Sr, U, V	Silica (reactive) dissolved silica	Nutrient suite	Faecal coliforms + Escherichia (E) coli	Chloride & Sulphate	Combo#3 [Total]	BTEX
27/03/2024	1	MW1	##	0.3	Groundwater	X	X	X	X	X	X	X	X	X	X	X		
27/03/2024	2	MW2	##	2	Groundwater	X	X	X	X	X	X	X	X	X	X	X		
27/03/2024	3	MW15	##	0.3	Groundwater	X	X	X	X	X	X	X	X	X	X	X		
27/03/2024	4	S3-06	##	0	Groundwater	X	X	X	X	X	X	X	X	X	X	X		
27/03/2024	5	S3-07	##	0.3	Groundwater	X	X	X	X	X	X	X	X	X	X	X		
27/03/2024	6	S3-08	##	0.3	Groundwater	X	X	X	X	X	X	X	X	X	X	X		
27/03/2024	7	Dam1	##	-	Surface Water	X	X	X	X	X		X	X	X	X	X	X	
27/03/2024	8	GWDUP1	#3	-	Duplicate						X							
27/03/2024	9	GWDUP2	#3	-	Duplicate						X							
27/03/2024	10	TB-W1	#3	-	Trip Blank												X	
27/03/2024	11	TS-W1	V	-	Trip Spike													X

Remarks (comments/detection limits required):	Sample Containers:
	## Each sample includes: x2 amber bottles, x2 HCl preserved glass vials, x2 unpreserved plastic bottles, x2 nitric acid preserved bottles (1 is field filtered), x1 sulphuric acid preserved bottle and x1 sterile container

Relinquished By: CR	Date: 28/03/2024	Time:	Received By:	Date:

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

Job No: 347659
Date Received: 28/03/2024
Time Received: 10:30
Received By:
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

11°C

Appendix F: Fieldwork Documents

Field Calibration Records and Groundwater Development & Sampling Field Sheets

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	TTW
Project:	Proposed Development
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW
Job Number:	E36628BR

PID

Make: Honeywell	Model: MiniRAE Lite.	Unit: PID 3.	Date of last factory calibration: 13/02/24
Date of calibration: 19/03/24		Name of Calibrator: VR	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100.4 ppm		Error in measured reading: ± 0.4 ppm	
Measured reading Acceptable (Yes/No): Yes			

PID

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

PID

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

PID

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

PID

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

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	TTW		
Project:	Proposed Development		
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW		
Job Number:	E36628BR		
DISSOLVED OXYGEN			
Make: YSI	Model: 4		
Date of calibration: 21/3/24	Name of Calibrator: OB		
Span value: 70% to 130%			
Measured value: 97%			
Measured reading Acceptable (Yes/No): Yes			
pH			
Make: YSI	Model: 4		
Date of calibration: 21/3/24	Name of Calibrator: OB		
Buffer 1: Theoretical pH = 7.01± 0.01	Expiry date: 03/24	Lot No: TK100123	
Buffer 2: Theoretical pH = 4.01± 0.01	Expiry date: 03/24	Lot No: CD030223	
Measured reading of Buffer 1: 7.05			
Measured reading of Buffer 2: 4.01			
Slope:	Measured reading Acceptable (Yes/No): Yes		
EC			
Make: YSI	Model: 4		
Date: 21/3/24	Name of Calibrator: OB	Temperature: 21 °C	
Calibration solution: Rowe Scientific	Expiry date: 06/24	Lot No: RE091222	
Theoretical conductivity at temperature (see solution container): 1337 µS/cm			
Measured conductivity: 1276 µS/cm	Measured reading Acceptable (Yes/No): Yes		
REDOX			
Make: YSI	Model: 4		
Date of calibration: 21/3/24	Name of Calibrator: OB		
Calibration solution: HANNA	Expiry date: 09/18	Lot No: 9289	
Theoretical redox value: 240mV			
Measured redox reading: 241.0 mV	Measured reading Acceptable (Yes/No): Yes		

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	MW1
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	12

WELL FINISH DETAILS

	Gatic Cover ☑	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	New Pump	SWL – Before (m):	10.31
Date:	21/3/24	Time – Before:	15:35
Undertaken By:	OB	SWL – After (m):	11.85
Total Vol. Removed:	8	Time – After:	15.17
PID Reading (ppm):	0.7		

Comments:

data logger out 15:34 in 15:57

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1	20.4	7.7	9304	7.13	78.0
5	20.6	9.9	9407	7.07	79.2
8	20.5	4.5	9319	7.11	83.2
	well pumped effectively dry				

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

YSI Used: 4 m-M silt load / turbidity, brown, low recharge

Tested By:	OB	**Remarks:**
Date Tested:	21/3/24	- 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:	CAL	- Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Date:	19/4/24	

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	MW2
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	12

WELL FINISH DETAILS

Gatic Cover ☒ Standpipe ☐ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dev Pump	SWL – Before (m):	6.10
Date:	21/3/24	Time – Before:	12:26
Undertaken By:	OB	SWL – After (m):	11.60
Total Vol. Removed:	60	Time – After:	13:09
PID Reading (ppm):	0.2		

Comments:

Data logger out 12:26 in 13:16

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1	20.5	2.8	5573	7.12	63.7
5	20.7	0.2	5522	6.97	65.9
10	20.9	1.8	5397	6.94	67.3
15	20.7	0.5	5274	6.98	67.9
20	21.0	2.3	5477	6.96	69.7
25	21.1	1.0	5717	6.94	74.3
30	21.1	3.0	5664	6.94	76.7
35	21.2	3.4	6001	6.93	79.1
40	21.3	3.9	6657	6.91	82.0
45	20.9	0.7	5570	6.92	91.0
50	20.8	2.5	5565	6.93	91.2
55	20.8	1.6	5585	6.92	90.9
60	20.6	3.1	5684	7.07	87.8
	well pumped effectively dry				
very hard	High silt load @ to bailer		very bottom		
	>3 well volumes pumped				

SWL 10.00

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

YSI Used: 4 H silt load, turbidity, brown, 1-m recharge

Tested By:	OB
Date Tested:	21/3/24
Checked By:	CL
Date:	28/4/24

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

12 - 6.10 = 5.90 × 3 = 17.70 × 3 = 53.1

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	MW15
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	9.5

WELL FINISH DETAILS

	Gatic Cover ☑	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dev Pump	SWL – Before (m):	5.60
Date:	21/3/24	Time – Before:	14:56
Undertaken By:	OB	SWL – After (m):	9.10
Total Vol. Removed:	20L	Time – After:	15:20
PID Reading (ppm):	1.5		

Comments:

Data logger out 14:55

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1	21.1	7.3	6636	7.48	86.3
5	21.0	2.3	6565	7.51	7.4
10	21.6	3.7	6618	7.36	17.1
15	22.2	3.9	6237	7.45	0.0
20	21.1	2.6	6320	7.25	-10.9
	well pumped effectively dry				
very	heavy silt load last 0.5m				

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

YSI Used: 4 H silt load + turbidity. dark brown. low recharge

Tested By:	OB
Date Tested:	21/3/24
Checked By:	CH
Date:	19/4/24

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

42.56 = 6.4 × 3 = 19.2 × 3 = 57.6

9.5 − 5.6 = 3.9 × 3 = 35.1

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	53-06
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	20

Standpipe 0.81m

WELL FINISH DETAILS

Gatic Cover ☐ Standpipe ☒ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Pow Pump	SWL – Before (m):	5.82
Date:	21/3/24	Time – Before:	11:30
Undertaken By:	OB	SWL – After (m):	19.22
Total Vol. Removed:	60L	Time – After:	12:11
PID Reading (ppm):	0.0		

data logger out 11:30 in 12:16

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1	21.4	1.0	8819	7.10	231.6
5	20.7	5.8	8750	6.92	213.0
10	21.3	5.1	9046	6.91	96.6
15	21.1	5.7	8897	6.91	61.5
20	21.1	2.7	9007	6.95	59.4
25	20.5	4.0	9169	6.97	36.5
30	20.6	4.0	9180	6.97	18.2
35	20.6	3.7	9291	7.08	-1.3
40	20.6	3.5	9281	7.06	-8.3
45	20.6	2.4	9357	7.11	-7.0
50	20.5	1.5	9260	7.09	-3.7
55	20.2	2.6	9174	7.14	-1.0
60	20.1	2.7	9110	7.13	0.1
	well pumped effectively dry				

much silter from 30L

SWL = 18.00 m

SWL = 18.98 m

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

YSI Used: 4 1 silt load + turbidity to 25L 1-m recharge
4 silt load + turbidity from 30L grey brown

Tested By:	21/3/24	**Remarks:**
Date Tested:	OB	- 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:	18/4/24	

20
- 5.82
14.18 × 3 = 42.54 × 3 = 127

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	53-07
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	14

standpipe 0.73m

WELL FINISH DETAILS

Gatic Cover ☐	Standpipe ☒	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dev Pump	SWL – Before (m):	4.64
Date:	21/3/24	Time – Before:	13:24
Undertaken By:	03	SWL – After (m):	5.49
Total Vol. Removed:	100 L	Time – After:	13:58
PID Reading (ppm):	0.0		

data logger out 13:23 in 14:00

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1	19.7	2.8	3926	7.31	88.8
5	19.2	0.5	8826	7.15	89.0
10	18.9	0.2	5129	7.03	43.7
15	18.9	0.1	5415	7.01	4.6
20	18.9	0.1	5486	7.01	-2.7
25	18.8	0.2	5172	7.04	-6.4
30	18.8	8.1	5314	7.03	-13.4
35	18.5	7.7	3866	7.10	-19.2
40	18.8	0.2	5370	7.05	-19.4
45	19.1	0.6	4731	7.12	12.1
50	19.0	6.7	1663	7.10	9.0
55	18.9	0.2	4991	7.06	6.8
60	19.0	0.1	5122	7.06	0.8
65	19.4	5.2	4231	7.15	95.7
70	19.0	2.3	4874	7.07	52.7
75	18.9	1.6	5076	7.05	58.3
80	18.9	1.4	5103	7.05	49.0
85	18.8	0.9	5235	7.04	21.0
90	18.9	0.5	5111	7.04	11.3
95	18.8	0.2	5185	7.04	2.8
100	18.8	0.1	5200	7.02	-4.7
>	3 well	volume	pumped		

SWL 5.39

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

YSI Used: 4

1-m silt load + turbidity, H recharge, grey brown

Tested By:	03
Date Tested:	21/3/24
Checked By:	
Date:	

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

14 - 1.64 : 9.37 x 3 = 28.11 x 3 = 84.33

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	BH3 - 08
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	11

WELL FINISH DETAILS

	Gatic Cover ☐	Standpipe ☒	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dev Pump	SWL – Before (m):	5.18
Date:	21/3/24	Time – Before:	14.17
Undertaken By:	OB	SWL – After (m):	5.18
Total Vol. Removed:	60L	Time – After:	14.40
PID Reading (ppm):	0.0		

standpipe 0.82

data logger out 14.16 in 14:40

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1	19.7	3.2	10847	6.71	103.0
5	19.7	2.2	11035	6.61	104.8
10	19.7	1.5	11091	6.61	101.8
15	19.6	1.0	11094	6.61	104.6
20	19.6	0.9	11111	6.61	104.5
SWL 6.18 25	19.6	0.8	11217	6.62	86.8
30	19.6	1.0	11233	6.62	89.2
35	19.6	0.9	11275	6.62	90.7
SWL 5.30 40	19.6	1.2	11209	6.63	92.5
45	19.5	0.7	11304	6.62	89.4
50	19.5	0.8	11302	6.62	90.1
55	19.6	0.8	11279	6.62	91.2
SWL 5.19 60	19.6	1.2	11272	6.63	93.2
steady	state	achieved			
	> 3	well volumes	pumped		

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

YSI Used: 4

1-m silt load + turbidity, grey. H recharge

Tested By:	OB
Date Tested:	21/3/24
Checked By:	CR
Date:	18/4/24

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

11 - 5.18 = 5.82 x 3 = 52.38

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	TTW		
Project:	Proposed Development		
Location:	~~Stage 3B~~, 16 Johnston Crescent, HORSLEY PARK, NSW		
Job Number:	E36628BR		
DISSOLVED OXYGEN			
Make: YSI	Model: 4		
Date of calibration: 25/3/24	Name of Calibrator: OB		
Span value: 70% to 130%			
Measured value: 97%			
Measured reading Acceptable (Yes/No): Yes			
pH			
Make: YSI	Model: 4		
Date of calibration: 25/3/24	Name of Calibrator: OB		
Buffer 1: Theoretical pH = 7.01± 0.01	Expiry date: 03/24	Lot No: TM100123	
Buffer 2: Theoretical pH = 4.01± 0.01	Expiry date: 03/24	Lot No: CD030223	
Measured reading of Buffer 1: 7.05			
Measured reading of Buffer 2: 4.03			
Slope:	Measured reading Acceptable (Yes/No): Yes		
EC			
Make: YSI	Model: 4		
Date: 25/3/24	Name of Calibrator: OB	Temperature: 23 °C	
Calibration solution: Revo Scientific	Expiry date: 06/24	Lot No: PE091227	
Theoretical conductivity at temperature (see solution container): 1359 µS/cm			
Measured conductivity: 1382 µS/cm	Measured reading Acceptable (Yes/No): Yes		
REDOX			
Make: YSI	Model: 4		
Date of calibration: 25/3/24	Name of Calibrator: OB		
Calibration solution: HANNA	Expiry date: 09/28	Lot No: 9289	
Theoretical redox value: 240mV			
Measured redox reading: 235.7 mV	Measured reading Acceptable (Yes/No): Yes		

JKEnvironments

Client:	TTW	**Job No.:**	E36628BR
Project:	Proposed Development	**Well No.:**	MW1
Location:	~~Stage 3B~~, 16 Johnston Crescent, HORSLEY PARK, NSW	**Depth (m):**	12

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Peristaltic Pump	**SWL – Before (m):**	8.87
Date:	25/3/24	**Time – Before:**	13:28
Undertaken By:	OB	**SWL – After (m):**	11.75
Total Vol. Removed:	15L	**Time – After:**	13:47
PID Reading (ppm):	0.6		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0.5	21.6	5.1	11486	7.14	83.0
5	20.6	3.5	12255	6.91	80.5
10	20.5	3.3	12585	6.90	89.6
15	20.5	3.6	12655	6.96	92.0
	well pumped dry		slightly	dry	

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

YSI Used: 4

m-ll silt load. brown. low recharge

Tested By:	OB	**Remarks:**
Date Tested:	25/3/24	- Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Checked By:	CR	
Date:	18/4/24	

data logger out 13:27

in 13:51

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	mw2
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	12

WELL FINISH DETAILS

	Gatic Cover ☑	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	New Pump	SWL – Before (m):	5.89
Date:	25/3/24	Time – Before:	09:29
Undertaken By:	OB	SWL – After (m):	11.15
Total Vol. Removed:	70L	Time – After:	10:28
PID Reading (ppm):	1.4		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0.5	20.4	4.0	7196	6.89	84.9
5	20.7	1.9	7175	6.84	85.8
10	20.7	2.6	7212	6.89	85.9
15	20.6	2.3	6967	6.95	84.2
20	21.0	3.1	7169	6.91	81.8
25	21.1	3.1	7197	6.91	84.6
30	20.7	3.1	7160	6.94	83.9
35	20.9	0.8	7265	6.90	87.C
40	20.8	0.8	7283	6.90	87.C
45	20.8	2.1	7277	6.90	87.1
50	20.8	2.2	7565	6.92	88.1
55	21.0	2.7	7319	6.93	86.8
60	21.1	3.3	7376	6.92	86.8
65	21.1	1.9	7360	6.92	87.6
70	20.9	1.2	7424	6.91	89.C
		well pumped			
		effectively dry			

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

YSI Used: 4 m-fl silt loam, brown, 1-m recharge

Tested By:	OB
Date Tested:	25/3/24
Checked By:	CR
Date:	18/4/24

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

data logger out 09:26

in 10:29

6 11 x 3 = 18 33 x 3 = 51.99

JKEnvironments

Client:	TTW	**Job No.:**	E36628BR
Project:	Proposed Development	**Well No.:**	MW15
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	**Depth (m):**	9.5

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Pump	**SWL – Before (m):**	5.49
Date:	25/3/24	**Time – Before:**	12:43
Undertaken By:	OB	**SWL – After (m):**	9.12
Total Vol. Removed:	15L	**Time – After:**	14:09
PID Reading (ppm):	2.6		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0.5	22.8	2.2	8494	7.38	87.4
5	21.7	2.2	8021	7.37	79.6
10	21.3	0.4	7718	7.24	46.3
15	21.6	1.7	7773	7.31	14.9
20					
	well pumped effectively dry				
WAITED 45MINUTES FOR RECHARGE					
25	21.1	6.9	7900	7.16	57.4
30	21.5	6.6	7896	7.18	44.1
35	21.1	6.4	7632	7.25	16.4
	well pumped effectively dry				

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

YSI Used: 4 m-H silt load, brown & dark brown, low recharge

Tested By:	OB
Date Tested:	25/3/24
Checked By:	CR
Date:	9/4/24

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

datm logger out 12:42
in 13:13
out 13:58
in 14:14

4.51 x 3 = 13.53 x 3 =

JKEnvironments

standpipe 0.78m

Client:	TTW	**Job No.:**	E36628BR
Project:	Proposed Development	**Well No.:**	53-06
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	**Depth (m):**	20

WELL FINISH DETAILS

	Gatic Cover ☐	Standpipe ☒	Other (describe) ☐

data logger out 08:13 In 09:15

WELL DEVELOPMENT DETAILS

Method:	new pump	**SWL – Before (m):**	6.75
Date:	25/3/24	**Time – Before:**	08:15
Undertaken By:	CB	**SWL – After (m):**	19.33
Total Vol. Removed:	65L	**Time – After:**	09:10
PID Reading (ppm):	0.0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0.75	20.5	1.3	10399	6.98	218.6
5	20.6	0.3	10570	6.87	89.9
10	20.2	1.8	10950	6.93	24.5
15	20.1	0.6	10910	6.94	13.7
20	20.3	0.8	10999	6.91	23.4
25	20.4	1.7	11143	6.98	4.2
30	20.4	1.1	11227	6.97	10.3
35	20.3	1.0	11198	7.04	5.1
40	20.3	0.8	11273	7.09	11.2
45	20.4	1.5	11415	7.07	32.4
50	20.3	1.3	11460	7.15	37.1
55	20.4	0.8	11562	7.29	37.6
60	20.4	1.3	11623	7.28	40.4
65	20.2	0.9	11670	7.28	39.9
	well pumped effectively dry				

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

YSI Used: 4 m-ll silt load, brown, 1-m recharge

Tested By:	CB
Date Tested:	25/3/24
Checked By:	
Date:	18/4/24

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:	TTW	**Job No.:**	E36628BR
Project:	Proposed Development	**Well No.:**	53 · 04
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	**Depth (m):**	14

5·33
0·72m
1·61

data logger out 10:16 in 11.30

WELL FINISH DETAILS

	Gatic Cover ☐	Standpipe ☒	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Geo Pump	**SWL – Before (m):**	1·61
Date:	25/3/24	**Time – Before:**	10:49
Undertaken By:	OA	**SWL – After (m):**	5·01
Total Vol. Removed:	100L	**Time – After:**	11:28
PID Reading (ppm):	0·2		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
5	20·7	8·3	5152	7·12	98·8
10	19·2	7·7	5157	7·10	78·1
15	19·0	6·9	7815	6·92	11·1
20	19·0	6·6	7909	6·92	2·7
25	19·9	0·2	8560	6·92	-4·1
30	18·9	0·1	8476	6·92	-8·2
35	18·8	0·1	8479	6·92	-12·9
40	18·9	0·5	8270	6·93	-14·4
45	19·2	0·3	6716	7·03	6·4
50	19·0	0·1	6771	7·01	0·1
55	18·9	0·1	7313	6·98	-12·6
60	18·9	0·1	7310	6·98	-13·2
65	19·1	0·1	5919	7·07	3·1
70	19·0	0·1	6949	6·99	-5·2
75	19·0	0·1	7053	6·99	-11·2
80	19·0	0·1	7037	6·99	-14·11
85	19·2	0·2	5812	7·05	1·9
90	19·1	0·1	6515	7·01	-1·9
95	19·0	0·1	6789	7·00	-7·4
100	19·0	0·1	6857	6·99	-11·9
	> 3 well	volumes	pumped		

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

YSI Used: A

1 - M silt load, grey m - H odour

Tested By:	OA	**Remarks:**
Date Tested:	25/3/24	- 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:	18/4/24	

9.39 × 3 = 28.17 × 3 = 845l

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	53-08
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	11

standpipe 0.83m

WELL FINISH DETAILS

	Gatic Cover ☐	Standpipe ☒	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Pow Pump	SWL – Before (m):	5.17
Date:	25/3/24	Time – Before:	11:57
Undertaken By:	OR	SWL – After (m):	5.17
Total Vol. Removed:	60L	Time – After:	12:26
PID Reading (ppm):	0.7		

data logger out 11:55 in 12:28

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0.5	23.1	2.4	15210	6.75	107.1
5	19.8	1.8	14118	6.63	106.5
10	19.8	0.9	14210	6.63	104.7
15	19.7	0.5	14198	6.63	104.7
20	19.7	0.5	14201	6.63	104.6
25	19.7	1.9	14319	6.62	100.8
30	19.7	1.9	14319	6.63	101.8
35	19.7	1.8	14316	6.63	103.1
40	19.7	1.9	14327	6.63	102.7
45	19.6	0.3	14270	6.62	81.1
50	19.6	0.4	14269	6.63	85.0
55	19.6	0.4	14261	6.63	82.6
60	19.6	0.3	14163	6.63	82.9
	steady state achieved				

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

YSI Used: 4 low silt load. light grey, H recharge

Tested By:	OR	**Remarks:**
Date Tested:	25/3/24	- 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:	18/4/24	

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	TTW
Project:	Proposed Development
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW
Job Number:	E36628BR

PID

Make: MINIRAE RAE	Model: MINIRAE	Unit: 2	Date of last factory calibration:
Date of calibration: 25 . 3 . 24		Name of Calibrator: OB	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100 . 3 ppm		Error in measured reading: ± 0 . 3 ppm	
Measured reading Acceptable (Yes/No): Yes			

PID

Make:	Model:	Unit: 2	Date of last factory calibration:
Date of calibration: 26/3/24		Name of Calibrator: OB	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100 . 6 ppm		Error in measured reading: ± 0 . 6 ppm	
Measured reading Acceptable (Yes/No): Yes			

PID

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

PID

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

PID

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

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	TTW		
Project:	Proposed Development		
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW		
Job Number:	E36628BR		
DISSOLVED OXYGEN			
Make: YSI	Model: 1		
Date of calibration: 27/3/24	Name of Calibrator: OB		
Span value: 70% to 130%			
Measured value: 96.%			
Measured reading Acceptable (Yes/No): YES			
pH			
Make: YSI	Model: 1		
Date of calibration: 27/3/24	Name of Calibrator: OB		
Buffer 1: Theoretical pH = 7.01± 0.01	Expiry date: 03/24	Lot No: DK100123	
Buffer 2: Theoretical pH = 4.01± 0.01	Expiry date: 03/24	Lot No: CD030223	
Measured reading of Buffer 1: 7.19			
Measured reading of Buffer 2: 4.21			
Slope:	Measured reading Acceptable (Yes/No): YES		
EC			
Make: YSI	Model: 1		
Date: 27/3/24	Name of Calibrator: OB	Temperature: 24 °C	
Calibration solution: Royal Scientific	Expiry date: 06/24	Lot No: TE091222	
Theoretical conductivity at temperature (see solution container): 1386 µS/cm			
Measured conductivity: 1471 µS/cm	Measured reading Acceptable (Yes/No): YES		
REDOX			
Make: YSI	Model: 1		
Date of calibration: 27/3/24	Name of Calibrator: OB		
Calibration solution: HANNA	Expiry date: 09/28	Lot No: 9289	
Theoretical redox value: 240mV			
Measured redox reading: 221.4 mV	Measured reading Acceptable (Yes/No): YES		

JKEnvironments

Client:	TTW	**Job No.:**	E36628BR
Project:	Proposed Development	**Well No.:**	MW1
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	**Depth (m):**	12

WELL FINISH

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

WELL PURGE DETAILS:

Method:	Micropurge	**SWL – Before:**	9.62
Date:	27/3/24	**Time – Before:**	14:15
Undertaken By:	OB	**Total Vol Removed:**	~2.2L
Pump Program No:	CPM1 38:2	**PID (ppm):**	0.3

D7 OUT 14.40 IN 16:09

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
15:25 (0)	9.63	0.50		25.9	4.10	14071	7.12	103.0
15:28 (3)	9.63	0.65		26.1	4.18	14075	7.01	103.1
15:31 (6)	9.63	0.80		25.5	3.93	14003	6.87	106.9
15:34 (9)	9.63	1.00		24.5	3.81	14036	6.81	109.6
			steady state achieved - start sampling					

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

x 1 microbial

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, 2 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic

YSI used: 1 (Hire YSI) low recharge, m-H silt load, brown

Tested By: Oisin Butler	**Remarks:**
Date Tested: 27/3/24	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 24/4/24	

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	MW2
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	12

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	5.94
Date:	27/3/24	Time – Before:	09.12
Undertaken By:	OB	Total Vol Removed:	~1-2 L
Pump Program No:	low	PID (ppm):	2.0

DL OUT 09:11 IN 10:20

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
09:23 (0)	5.98	0.5		20.3	4.36	8355	7.12	90.8
09:26 (3)	5.98	0.7		20.6	3.63	8349	7.13	90.5
09:29 (6)	5.98	0.9		21.1	2.56	8351	7.08	88.9
09:32 (9)	5.98	1.1		20.9	2.43	8355	7.07	82.1
	steady state achieved - start sampling							

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

x1 microbial

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, 2 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic

YSI used: 1 (Hire YSI) low silt load, 1-m recharge

Tested By: Oisin Butler	**Remarks:**
Date Tested: 27/3/24	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 18/4/24	

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	MW15
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	9.5

WELL FINISH

Y	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	5.53
Date:	27/3/24	Time – Before:	12:53
Undertaken By:	OB	Total Vol Removed:	~2.5L
Pump Program No:	Low	PID (ppm):	0.3

DL
OUT
12:51
IN
14:20

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
13:03 (0)	5.54	0.5		24.0	2.65	8476	7.32	92.6
13:06 (3)	5.56	0.8	(pump slowed)	24.4	2.44	8470	7.32	92.2
13:09 (6)	5.57	1.0		24.5	2.22	8428	7.27	91.7
13:12 (9)	5.57	1.2		24.6	1.36	8364	7.22	88.8
13:15 (12)	5.57	1.4		24.8	1.19	8344	7.22	88.4
	steady state achieved - start sampling							

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

x / microbial

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, 2 x HNO3 plastic, / x H2SO4 plastic, / x unpreserved plastic

YSI used: / (Hire YSI) 1-m silt load, grey; 1-m recharge

Tested By: Oisin Butler	**Remarks:**
Date Tested: 27/3/24	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 18/4/24	

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	53.06
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	20

WELL FINISH

	Gatic Cover	x	Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	5.82
Date:	27/3/24	Time – Before:	07:58
Undertaken By:	OB	Total Vol Removed:	~2.4L
Pump Program No:	Low	PID (ppm):	0.0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
08:16 (0)	5.83	0.50		21.1	2.12	15199	7.00	133.6
08:19 (3)	5.85	0.70		21.1	2.13	15184	7.02	130.6
08:22 (6)	5.86	0.90		21.2	2.35	15173	7.02	125.7
08:25 (9)	5.86	1.1		21.5	1.95	15260	7.02	118.9
08:28 (12)	5.86	1.3		21.8	1.60	15304	7.01	119.4
	steady	state	achieved - start sampling					

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

x1 micro

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, 2 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic

YSI used: 1 (Hire YSI) low silt load, 1-m recharge

Tested By: Oisin Butler	**Remarks:**
Date Tested: 27/3/24	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 18/4/24	

spare 0.78m

VL 047 07:36 M 09.06

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	53-07
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	14

SPIPE 0.73m

WELL FINISH

	Gatic Cover		Standpipe		Other (describe)
		X			

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	1.63
Date:	27/3/24	Time – Before:	10:41
Undertaken By:	OB	Total Vol Removed:	~2.1 L
Pump Program No:	Low	PID (ppm):	0.3

DL OUT 10:40 IN 11:30

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
10:50 (0)	1.64	0.3		22.9	2.16	6644	7.28	156.4
10:53 (3)	1.64	0.5		23.3	2.40	6659	7.29	154.1
10:56 (6)	1.64	0.7		23.3	2.14	6712	7.24	149.4
10:59 (9)	1.64	0.9		23.0	1.39	6731	7.13	145.2
		steady	state achieved - start sampling					

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

GW DUP 1

Sampling Containers Used: 4 x glass amber, 4 x BTEX vials, 3 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic, x 1 microbial

YSI used: 1 (Hire YSI) low silt load, m-H recharge

Tested By: Oisin Butler	**Remarks:**
Date Tested: 27/3/24	- Steady state conditions
Checked By: CR	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 19/4/24	

JKEnvironments

Client:	TTW	**Job No.:**	E36628BR
Project:	Proposed Development	**Well No.:**	53-08
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	**Depth (m):**	11

SPIKE 0.83m

WELL FINISH

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

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	5.17
Date:	27/3/24	**Time – Before:**	11:56
Undertaken By:	OB	**Total Vol Removed:**	~ 2.6L
Pump Program No:	Low	**PID (ppm):**	0.3

DL OUT 11:48 IN 12.40

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
12:00 (0)	5.17	0.5		22.4	2.56	16656	6.78	120.9
12:03 (3)	5.21	0.9	(pump slowed)	23.1	2.65	16759	6.81	121.8
12:06 (6)	5.21	1.2	"	23.5	2.16	16800	6.78	122.1
12:09 (9)	5.21	1.5	"	23.9	1.88	16894	6.74	121.9
			"					
			"					
			"					
			"					
			"					
			"					
	steady state		achieved - start sampling					

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

GW Pump

x 1 microbial

Sampling Containers Used: 4 x glass amber, 4 x BTEX vials, 3 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic

YSI used: 1 (Have YSI) Low silt load, H recharge

Tested By: Oisin Butler	**Remarks:**
Date Tested: 27/3/24	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10%
Checked By: CR	10% and SWL stable/not in drawdown
Date: 19/4/24	

JKEnvironments

Client:	TTW	Job No.:	E36628BR
Project:	Proposed Development	Well No.:	PAM 1
Location:	Stage 3B, 16 Johnston Crescent, HORSLEY PARK, NSW	Depth (m):	–

WELL FINISH

	Gatic Cover		Standpipe	x	Other (describe)

PAM / Drainage Pit

WELL PURGE DETAILS:

Method:	Grab Bailer	SWL – Before:	–
Date:	27/3/24	Time – Before:	–
Undertaken By:	OB	Total Vol Removed:	~ 1.5 L
Pump Program No:	–	PID (ppm):	–

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
–	–	0.33		20.2	8.68	607	8.88	31.7

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

x 1 microbiol

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, 2 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic

YSI used: 1 (Hive YSI) m-H silt load. light brown

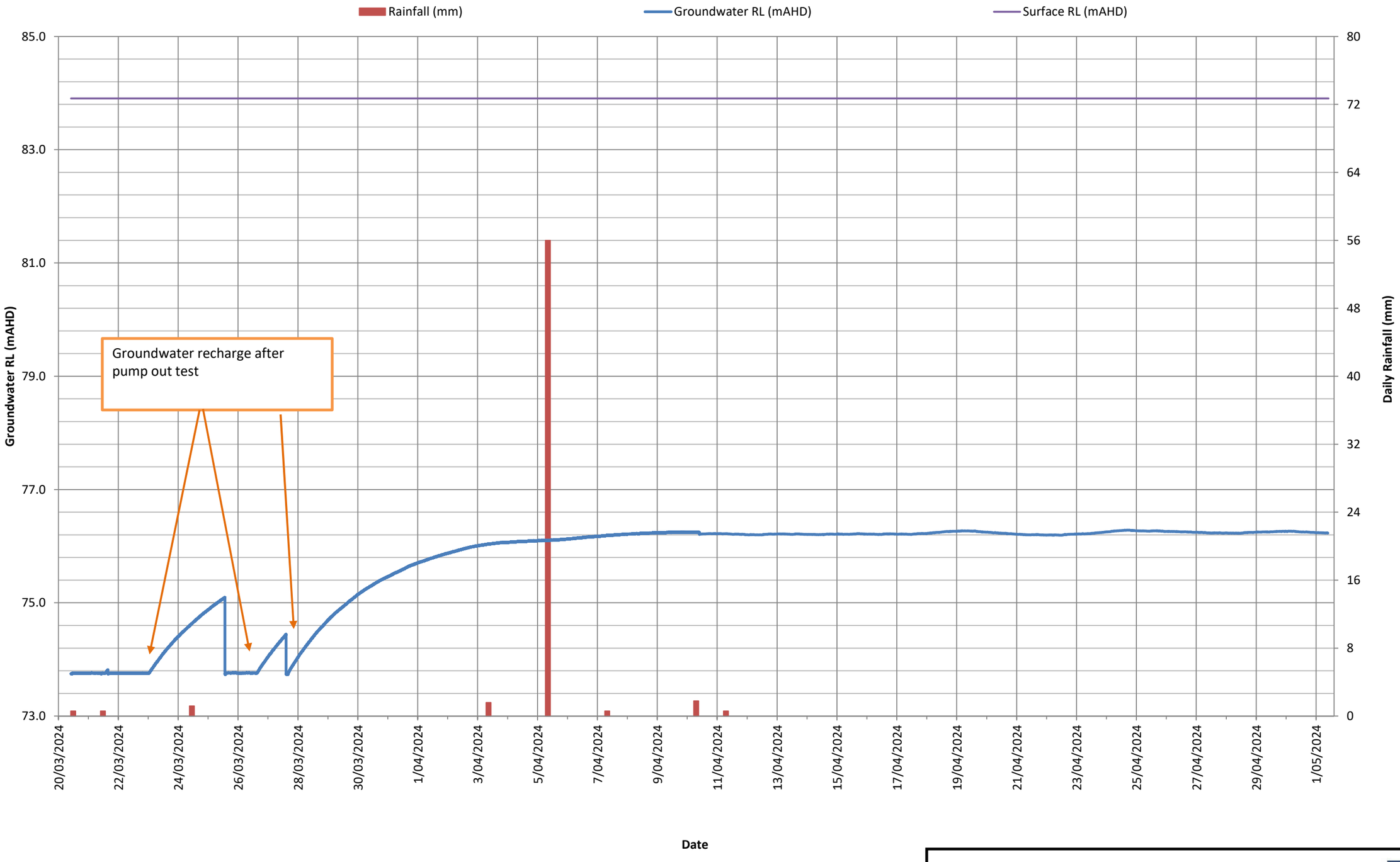
Tested By: Oisin Butler	**Remarks:**
Date Tested: 27/3/24	- Steady state conditions
Checked By: CM	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 18/4/24	

Rainfall vs Groundwater SWL

File Name: 34951SY BH1 GW v Rainfall
Date Printed: 6/05/2024

Groundwater Level and Daily Rainfall -v- Time Plot

BH1



Rainfall data fromHorsley Park Equestrian Centre AWS, Station No. 67119

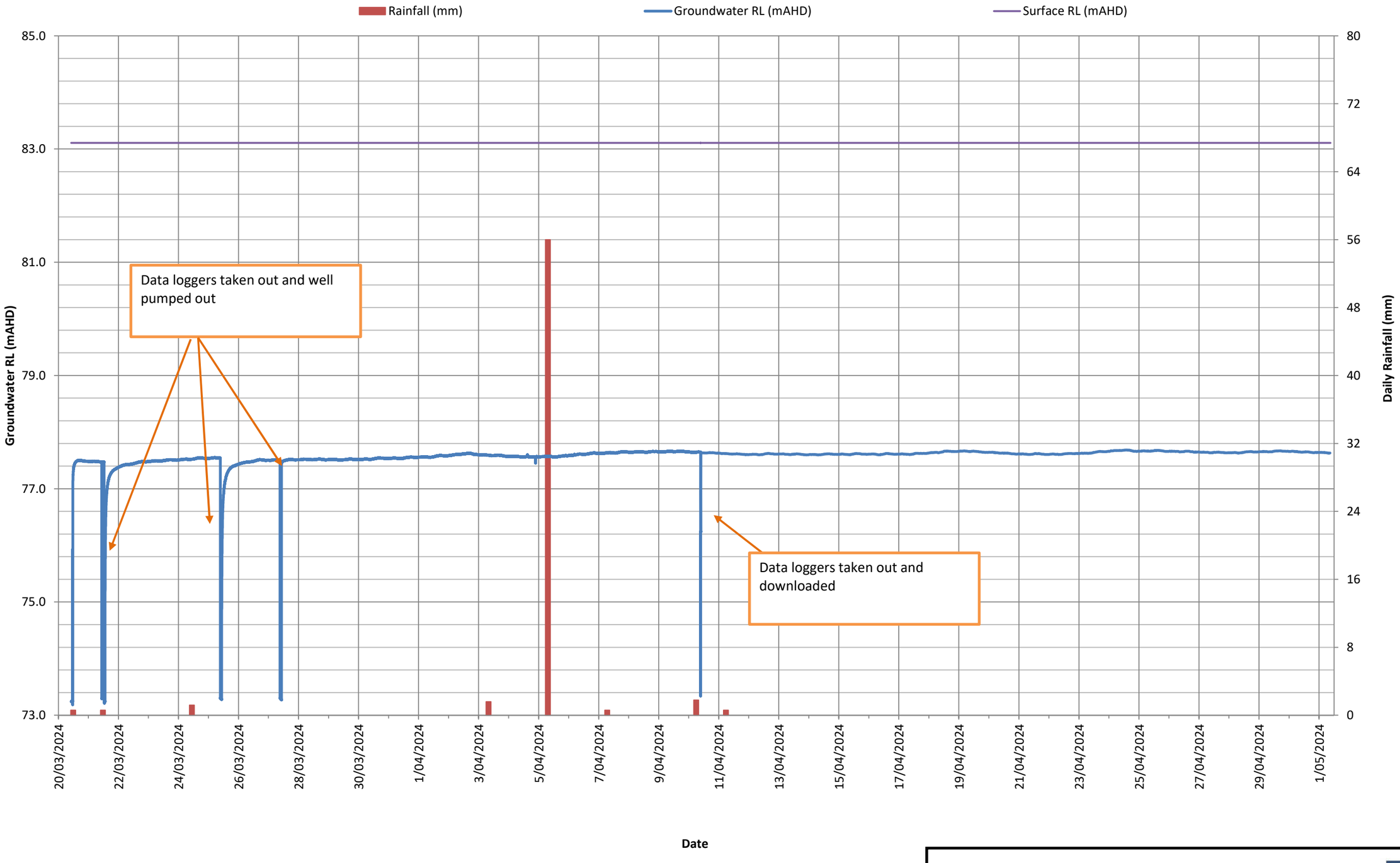
JKGeotechnics

Report No. E36628BR Figure No. 4

File Name: 34951SY BH2 GW v Rainfall
Date Printed: 6/05/2024

Groundwater Level and Daily Rainfall -v- Time Plot

BH2



Rainfall data fromHorsley Park Equestrian Centre AWS, Station No. 67119

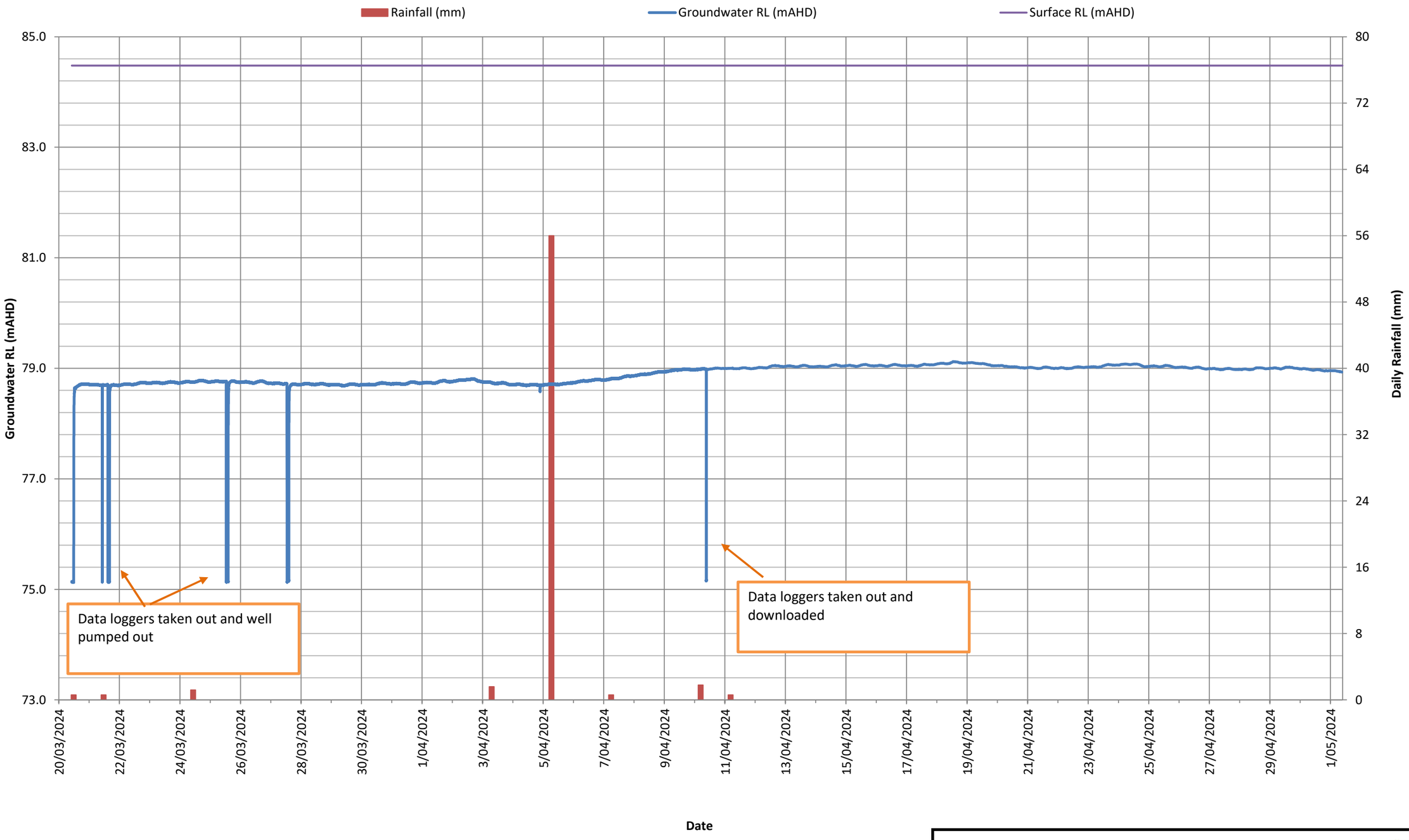
JKGeotechnics

Report No. E36628BR Figure No. 5

File Name: 34951SY BH15 GW v Rainfall
Date Printed: 6/05/2024

Groundwater Level and Daily Rainfall -v- Time Plot

BH15



Rainfall data from Horsley Park Equestrian Centre AWS, Station No. 67119

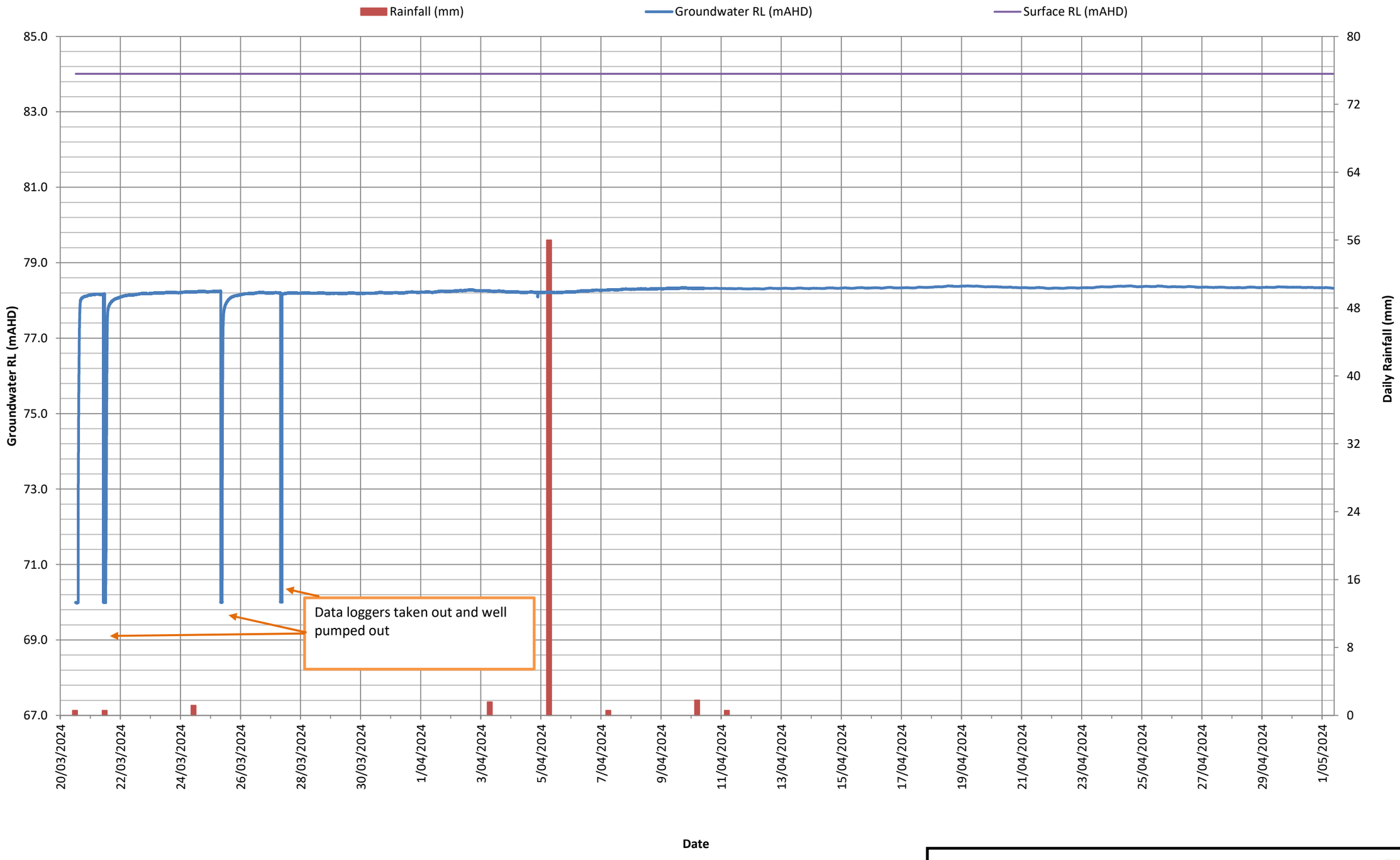
JKGeotechnics

Report No. E36628BR Figure No. 6

File Name: 34951SY S3-06 GW v Rainfall
Date Printed: 6/05/2024

Groundwater Level and Daily Rainfall -v- Time Plot

S3-06



Rainfall data from Horsley Park Equestrian Centre AWS, Station No. 67119

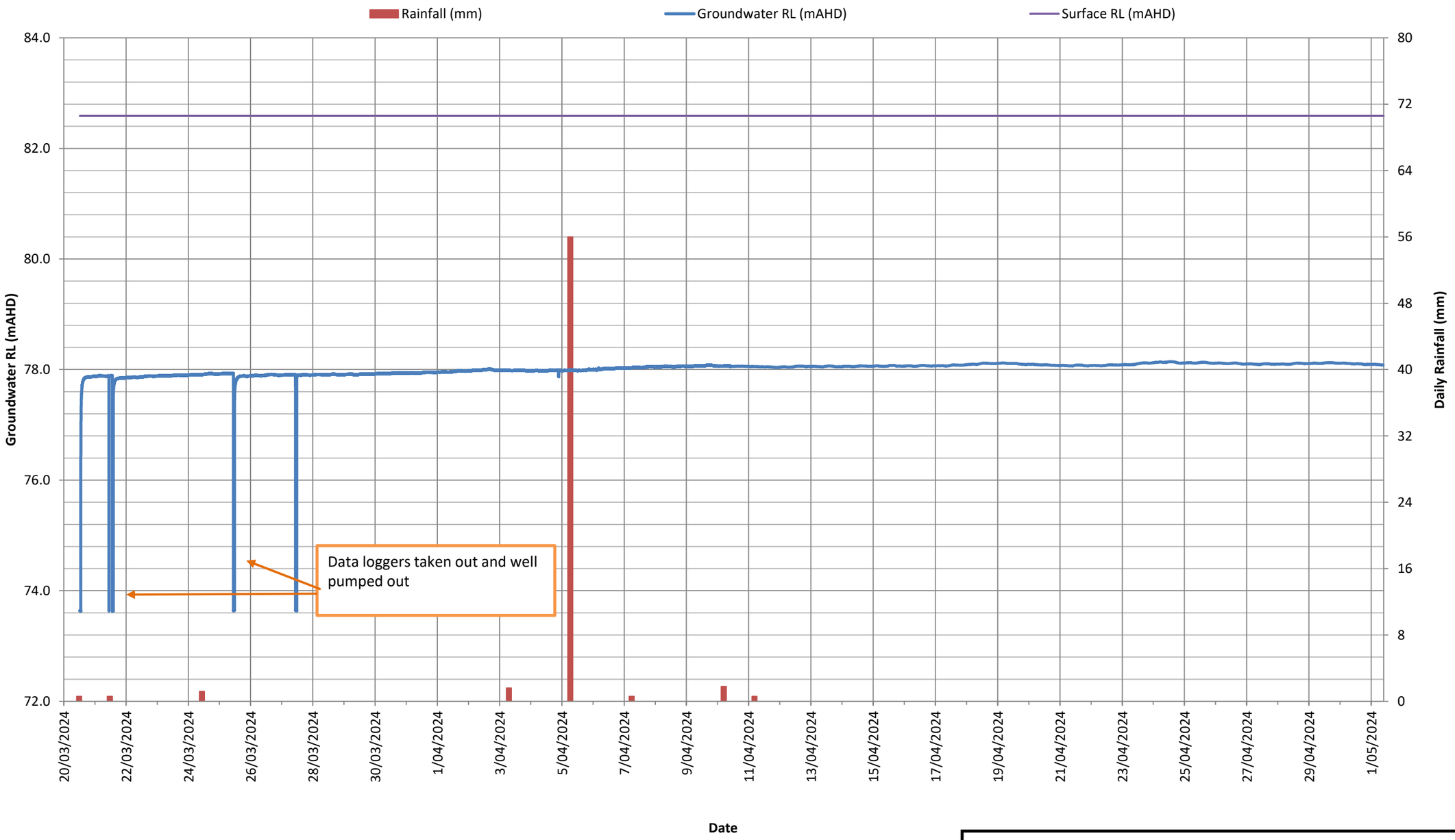
JKGeotechnics

Report No. E36628BR Figure No. 7

File Name: 34951SY S3-07 GW v Rainfall
Date Printed: 6/05/2024

Groundwater Level and Daily Rainfall -v- Time Plot

S3-07



Rainfall data from Horsley Park Equestrian Centre AWS, Station No. 67119

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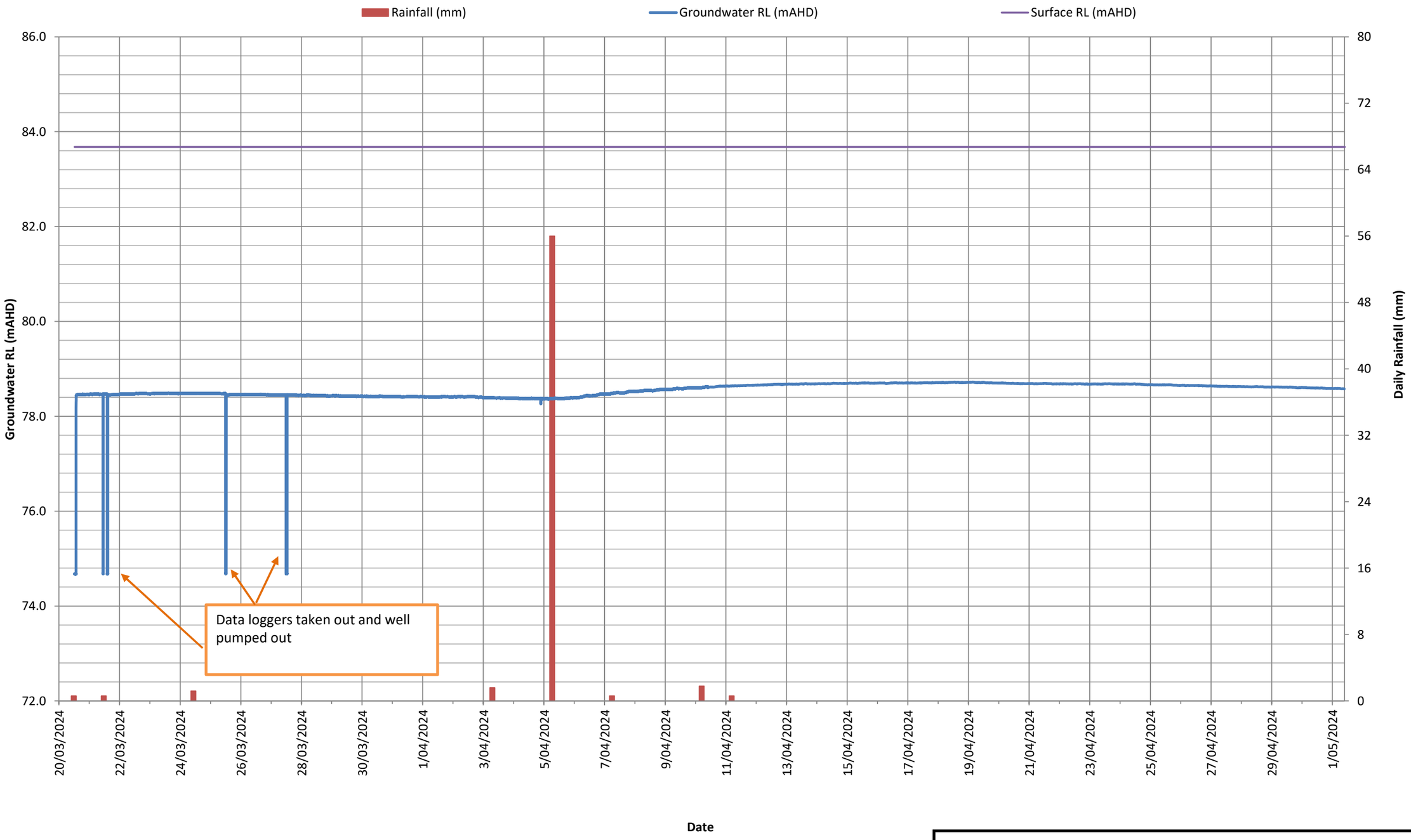
Report No. E36628BR Figure No. 8

File Name: 34951SY S3-08 GW v Rainfall
Date Printed: 6/05/2024

Groundwater Level and Daily Rainfall -v- Time Plot

S3-08



Rainfall data fromHorsley Park Equestrian Centre AWS, Station No. 67119

JKGeotechnics

Report No. E36628BR Figure No. 9

Appendix G: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE (SSP)

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

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

A. Groundwater Sampling

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

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

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

- Groundwater sampling forms.

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

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

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

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[12] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991)[13].

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

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

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

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

B. Precision

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

C. Accuracy

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

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

D. Representativeness

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

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

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

E. Completeness

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

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

F. Comparability

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

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

G. Blanks

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

H. Matrix Spikes

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

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

I. Surrogate Spikes

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

J. Duplicates

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

$$\frac{\text{(D1 – D2) x 100}}{\{(D1 + D2)/2\}}$$