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# Groundwater Impact Assessment

**Proposed Mixed Use Development – Lots 4-5, 6-7 and 8 Buchan Avenue, Edmondson Park NSW 2174**

UPG Edmondson Parkland Pty Ltd

**Project No. 25302**
Version 2

27 February 2026

Reditus Consulting Pty Ltd
ABN: 34 631 168 502

# Groundwater Impact Assessment

## Proposed Mixed Use Development

### Lots 4-5, 6-7, and 8 Buchan Avenue, Edmondson Park NSW 2174

**Prepared for UPG Edmondson Parkland Pty Ltd**

## DOCUMENT CONTROL



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# Executive Summary

This Groundwater Impact Assessment is submitted to the Department of Planning, Housing and Infrastructure (DPHI) on behalf UPG Edmondson Parkland Pty Ltd (UPG) (the Applicant), to support a State Significant Development Application (SSDA) and Concurrent Rezoning Report for the construction of a new multi stage residential project at Lots 4-5, 6-7, and 8 Buchan Avenue, Edmondson Park (known as Sites 3, 4 and 5) (the site).

The proposed development comprising a mix of shop-top housing, residential flat buildings (RFB), co-living housing and affordable housing, together with public domain improvements including a new publicly accessible plaza, a public library and through-site pedestrian links.

The primary objectives of the Groundwater Impact Assessment are to:

- Provide details on the hydrological and hydrogeological setting of the site and a summary of key environmental factors relevant to construction and ongoing management of the proposed development.
- Provide details of the proposed development layout and construction design.
- Predict preliminary dewatering extraction volumes required for the development works during construction.
- Determine the potential impacts of the dewatering activity to groundwater dependent ecosystems (GDEs), springs, water supply works and potential for subsidence impacts on nearby structures or infrastructure (through assessment against the Minimal Impact thresholds detailed under the NSW DPI (2012) Aquifer Interference Policy, WMA 2000, and the NSW DPE (2022) Groundwater Impact Assessment Criteria.
- Provide management and mitigation strategies to minimise adverse environmental impacts as a result of construction and ongoing operation of the development.
- Include an assessment of licencing considerations for the project.

The findings of this report include characterisation of the existing environment at the site, a review of the of potential impacts to the groundwater environment from the proposed development, review of relevant legislation and policy relating to the development and mitigation measures for the identified impacts.

A summary of the findings of this assessment include:

- The groundwater impacts associated with the basement excavations for Site 3 and Site 5 have been assessed based on the inflow calculations and probable drawdown expectations during the construction phase and operational phase of the development.
  - The assessment found that dewatering activities are considered to be of Minimal Impact to the water table, water pressure and water quality.
- Other potential impacts to groundwater include potential chemical spillages, increase in hardstand areas, increase in potentially contaminating activities such as vehicle movement, incorrect soil stabilisation and other construction related impacts.

All identified potential impacts are considered to be manageable with appropriate mitigation measures that include:

- Appropriately designed deep soil, landscaping buffers and stormwater detention to mitigate impacts associated with increases in impervious surfaces.
- Extraction rates, drawdown and water quality monitoring requirements incorporated into a DMP
  - Minimise depths of excavation below the groundwater table during basement construction
  - Reduce the dewatering time period during basement excavations.
- All water to be discharged during basement construction dewatering to comply with adopted discharge water quality criteria (DWQC).
- Storage of hazardous liquids and refuelling operations to take place in bunded areas to reduce chance of spillage causing impacts

A summary of the impacts and mitigation measures are presented below.

| RISK | POTENTIAL IMPACTS | LIKELIHOOD | MITIGATION MEASURES |
| --- | --- | --- | --- |
| Impervious Areas | Increase overland flow during rain events has potential to transport contaminants and sediments into surface water bodies reduce recharge into aquifers. | Possible | Provide adequate deep soil and permeable landscape areas as vegetation buffer strips. Incorporation were possible, of permeable pavements and appropriate design of stormwater detention. |
| Dewatering | Impacts to surrounding GDEs and water supply bores within the vicinity of the basement construction caused by drawdown during dewatering activities | Unlikely | Extraction rates, drawdown and water quality monitoring requirements incorporated into a Dewatering Management Plan (DMP).<br>DMP and Water Supply Works Approval required to be obtained for the development prior to dewatering commencing.<br>Minimise depths of excavation below groundwater table during basement construction. |
| Stormwater discharge | Contamination of receiving water body (Maxwells Creek and the Georges River) and associated water courses down-stream of excavation as a result of discharging water to the stormwater network during dewatering | Unlikely | Extraction rates, drawdown and water quality monitoring requirements incorporated into a dewatering management plan (DMP)<br>All construction groundwater to be discharged during basement construction dewatering is to be appropriately treated and to comply with adopted discharge water quality criteria (DWQC) |
| Chemical spills | Contaminate the underlying groundwater via seepage into the ground or surface water via run-off into receiving waterbodies | Unlikely | Storage of hazardous liquids and refuelling operations to take place in bunded areas to reduce chance of spillage causing impacts<br>Incorporate water quality monitoring plan into CEMP that will constantly monitor water quality of receiving water bodies during construction works. |

# 1 Introduction

This Groundwater Impact Assessment is submitted to the Department of Planning, Housing and Infrastructure (DPHI) on behalf UPG Edmondson Parkland Pty Ltd (UPG) (the Applicant), to support a State Significant Development Application (SSDA) and Concurrent Rezoning Report for the construction of a new multi stage residential project at Lots 4-5, 6-7, and 8 Buchan Avenue, Edmondson Park (known as Sites 3, 4 and 5) (the site). The proposed development comprises a mix of shop-top housing, residential flat buildings (RFB), co-living housing and affordable housing, together with public domain improvements including a new publicly accessible plaza, a public library and through-site pedestrian links.

The project has been identified by the NSW Housing Delivery Authority (HDA) as a key development to accelerate the delivery of well-located, diverse and affordable housing across Greater Sydney, with the HDA playing a coordinating role across government agencies to unlock complex sites through strategic planning, infrastructure coordination and streamlined assessment pathways. On 19 February 2025, the HDA recommended that the proposed development on Sites 4 and 5 (6–7 and 8 Buchan Avenue, Edmondson Park), as outlined in EOI application 232588 dated 17 January 2025, be declared State Significant Development (SSD) under section 4.36(3) of the Environmental Planning and Assessment Act 1979, followed by a similar recommendation on 2 June 2025 for Site 3 (4–5 Buchan Avenue, Edmondson Park) as described in EOI application 246574 dated 14 March 2025. These recommendations were formalised through the Minister's issuance of State Significant Development Declaration Order (No. 9) 2025 on 12 June 2025, with the proposals to be facilitated by a concurrent amendment to the State Environmental Planning Policy (Precincts – Western Parkland City) 2021.

# 2 The Proposal

## 2.1 Rezoning Proposal

To facilitate the proposed development described in **Section 2.2**, a Rezoning Proposal is sought to seek the following amendments to the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* (Precincts SEPP):

- Amend the Height of Buildings Map to apply a suite of maximum building heights across the site, ranging from 52m – 135 m;
- Amend the Floor Space Ratio Map to apply maximum FSRs of 3.7:1 - 5.4:1 across the site;
- Remove the requirement for a Development Control Plan for the site;
- Permit development for the purposes of 'commercial premises' on Site 5.

## 2.2 Stage Significant Development Application

The proposed amendments to the Precincts SEPP, as outlined above, will facilitate the following development, sought via a concurrent SSDA. Specifically, the proposed works sought under the SSDA include:

- Construction of fourteen residential towers (ranging in height between 6 to 40 storeys) over five podiums (ranging in height between 2-5 storeys), comprising:
  - Mixed use podiums in Site 5.
  - Public library in Site 3.
  - A total of 1,805 residential apartments located above in a combination of build-to-sell and co-living formats.
- Basement car parking.
- Associated landscaping and public domain improvements, including a new publicly accessible plaza, public library and through-site links.

It is noted that the project will commit to providing 15% of the GFA as affordable housing for a minimum of 15 years, to be managed by a registered Community Housing Provider (CHP).

For a detailed description of the proposed development, refer to the Environmental Impact Statement (EIS) prepared by Beam Planning, and the Architectural Drawings prepared by Plus Architecture.

As groundwater will be intercepted and require dewatering during construction of the basement carparks, the proposed development is considered to be an aquifer inference activity requiring assessment and authorisation under the Water Management Act (WMA) 2000 (within a Water Sharing Plan zone, regulated by WaterNSW).

# 3 The Site

The combined site is located at 4-5, 6-7, and 8 Buchan Avenue, Edmondson Park, and is legally described as Lots 4, 5, 6, 7 and 8 in DP1275478. The site has a total area of approximately 3.1 hectares, with a primary street frontage of approximately 298 m to Buchan Avenue, and a secondary street frontage of approximately 186 m to Horrie Road. The combined site is owned by UPG Edmondson Parkland Pty Ltd.

The site is located approximately 330 m from the Edmondson Park Train Station and directly adjacent to a future high school (currently under construction). The site is also approximately 400 m northwest of Frasers Ed Square Town Centre, placing it in a highly accessible and active urban precinct. The site and its surroundings are currently undeveloped presenting a significant opportunity for coordinated and well-integrated urban development.

It is noted that earthworks, subdivision, and the construction of the major and minor roads surrounding the site has been undertaken under previous development consents.

**Figure 1** below provides an aerial image of the site and **Figure 2** shows the site location plan.


**Figure 1.** Aerial view of the site

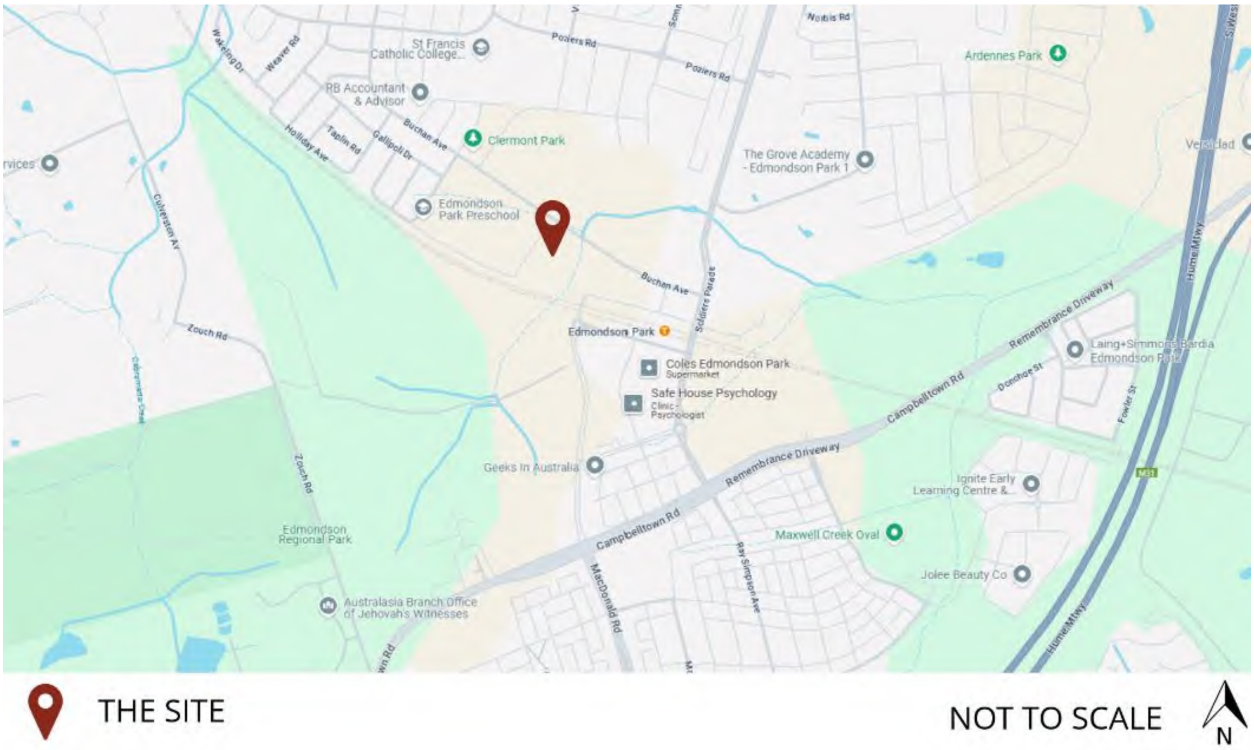



**Figure 2.** Site location plan

**Table 1.** Site Identification Details

| ITEM | DETAIL |
|---|---|
| **Street Address** | Site 3 – Lot 4 and 5 Buchan Avenue, Edmondson Park<br>Site 4 – Lot 6 and 7 Buchan Avenue, Edmondson Park<br>Site 5 – Lot 8 Buchan Avenue, Edmondson Park |
| **Lot and Deposited Plan** | Site 3 – Lot 4; DP 1275478; and Lot 5; DP 1275478<br>Site 4 – Lot 6 & 7 and DP 1275478<br>Site 5 – Lot 8 and DP 1275478 |
| **Local Government Area** | Liverpool City Council |
| **Site Area** | Site 3 – 11,641 $m^2$<br>Site 4 – 8,220 $m^2$<br>Site 5 – 12,090 $m^2$ |
| **Basement Excavation Area** | Site 3 – Approximately 9,825 $m^2$<br>Site 5 – Approximately 9,049 $m^2$ |
| **Water Sharing Plan** | Greater Metropolitan Region Groundwater Sources 2023 |
| **Groundwater Source** | Sydney Basin Central Groundwater Source |

# 4 Relevant SEARs/Rezoning Requirements

This Groundwater Impact Assessment addresses the following relevant Secretary's Environmental Assessment Requirements (SEARs) set out in **Table 2** below.

**Table 2.** Relevant SEARs

| SEARS REQUIREMENT | RESPONSE |
|---|---|
| **12. Ground and Groundwater Conditions**<br>Where required provide a Groundwater Impact Assessment in accordance with relevant Groundwater Guidelines. If the proposed development is on land identified as having high salinity or acid sulfate soil potential in an EPI provide a Salinity Management Plan or Acid Sulfate Soil Management Plan that includes appropriate management measures and strategies. | A Groundwater Impact Assessment (this report) has been prepared in accordance with relevant Groundwater Guidelines including the DPE (2022) *Minimum Groundwater Modelling Requirements for SSD/SSI Projects* |

# 5 Methodology

## 5.1 Objectives

The primary objectives of the Groundwater Impact Assessment are to:

- Provide details on the hydrological and hydrogeological setting of the site and a summary of key environmental factors relevant to construction and ongoing management of the proposed development.
- Provide details of the proposed development layout and construction design.
- Predict preliminary dewatering extraction volumes required for the development works during construction.
- Determine the potential impacts of the dewatering activity to groundwater dependent ecosystems (GDEs), springs, water supply works and potential for subsidence impacts on nearby structures or infrastructure (through assessment against the Minimal Impact thresholds detailed under the NSW DPI (2012) Aquifer Interference Policy, WMA 2000, and the NSW DPE (2022) Groundwater Impact Assessment Criteria.
- Provide management and mitigation strategies to minimise adverse environmental impacts as a result of construction and ongoing operation of the development.
- Include an assessment of licencing considerations for the project.

## 5.2 Scope of Works

To meet the objectives of the Groundwater Impact Assessment, the following scope of works was undertaken:

- A desktop site assessment, including review of previous reports where available.
- A review of relevant groundwater policy, legislation, regulations, and guidelines.
- Review of construction proposal details that may impact on surface water and groundwater receptors, such as dewatering and the proposed dewatering methodology.
- Data analysis and interpretation of rising head (slug test) data and water quality data collected from the site.
- Develop conceptual flow model to replicate the proposed excavation activity. This was completed using a steady-state analytical groundwater flow model for best-case (less likely), most likely, and upper-case (less likely) scenarios, allowing prediction of groundwater inflow volumes and groundwater drawdown extent resulting from the proposed basement excavations and construction design:
  - Completion of analytical equations to derive groundwater extraction volumes using a range of representative aquifer parameters from published literature values and site-specific data.
  - Estimate volume of groundwater required to be removed during the dewatering process and assess the likely impacts of the dewatering activities on other groundwater users/receptors against the Minimal Impact thresholds detailed in the NSW DPE (2022) Groundwater Impact Assessment Criteria.
- Groundwater quality sampling event using low-flow sampling techniques for six (6) newly installed wells (Sample locations presented on **Figure 3, Appendix A**) were analysed for the following suite:
  - Alkalinity (bicarbonate, carbonate, hydroxide and total), electrical conductivity (EC), pH, redox potential (Eh), total dissolved solids (TDS), total hardness, temperature, dissolved oxygen (DO).
  - Turbidity* (NTU), total suspended solids* (TSS), total organic carbon* (TOC), sodium absorption ratio* (SAR)
  - Sulfate ($SO_4$), chloride (Cl), carbonates ($CO_3$), bromide (Br), fluoride (F)
  - Major Cations and Anions (including ionic balance)
  - 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)

- Ammonia (NH3), nitrate (NO3), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P), reactive phosphorus (P)
  - Faecal coliforms, faecal streptococci, Escherichia coli
  - Benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs) and total recoverable hydrocarbons (TRH).
- Discussion of the potential impacts to groundwater associated with the proposed development and outline mitigation measures and management plans required for management of impacts.
- Preparation of a Groundwater Impact Assessment (Site Hydrogeological Report) in general accordance with the NSW DPI (January 2022) *Guidelines for Groundwater Documentation for SSD/SSI Projects - Technical guideline*; and the NSW DPI (October 2022) *Minimum requirements for building site groundwater investigations and reporting;* and the NSW DPI (2023) *Groundwater Impact Assessment Criteria*.

A list of publicly available data sources used for the desktop review as part of this assessment is provided in **Table 3** below.

**Table 3.** Summary of publicly available data sources

| DATA DESCRIPTION | SOURCE |
|---|---|
| Groundwater users including Water Access Licence (WAL) holders including stock and domestic users | WaterNSW Water Register website (https://waterregister.waternsw.com.au/water-register-frame) |
| Registered bore data | WaterNSW real time data website (https://realtimedata.waternsw.com.au/water.stm)<br><br>Bureau of Meteorology Australian Groundwater Explorer (http://www.bom.gov.au/water/groundwater/explorer/) |
| Groundwater dependent ecosystem's location and data | Bureau of Meteorology Groundwater Dependent Ecosystems Atlas (http://www.bom.gov.au/water/groundwater/gde/) |
| Surrounding contaminated site locations | The NSW Environmental Protection Authority (EPA) list of contaminated sites (https://www.epa.nsw.gov.au/your-environment/contaminated-land/notified-and-regulated-contaminated-land/list-of-notified-sites)<br><br>The NSW Environmental Protection Authority (EPA) contaminated land record website (https://app.epa.nsw.gov.au/prclmapp/searchregister.aspx)<br><br>The NSW Environmental Protection Authority (EPA) Protection of the Environment Operations Act (POEO) public register website (https://app.epa.nsw.gov.au/prpoeoapp/) |
| Regional geology data and mapping | NSW Seamless Geology |

## 5.3 Limitations

This report is based on the Scope of Work outlined above in **Section 5.2**. Reditus prepared this report in a manner consistent with the normal level of care and expertise exercised by members of the environmental and hydrogeological assessment profession.

This report relates only to the objectives stated and does not relate to any other work undertaken for the Client (UPG Edmondson Parkland Pty Ltd). It is a report based on the information reported in previous environmental and geotechnical assessments by others, and data made available to Reditus. These conditions stated in this report may change with time and space.

All conclusions regarding the property area are the professional opinions of Reditus, subject to the qualifications in the report. Whilst normal assessments of data reliability have been made, Reditus assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Reditus, or developments resulting from situations outside the scope of this project. The client acknowledges that this report is for the exclusive use of the client.

All groundwater models include some degree of uncertainty in their predictions as they are, by necessity, simplifications of complex real-world systems. Whilst every effort is made to ensure that the primary model reflects the 'best case – less likely', 'most likely' case and 'upper case – less likely' understanding of site conditions, this cannot be guaranteed, and any model result presented as a single number should be viewed with a degree of caution.

Factors which significantly affect the groundwater model and impact assessment results include dewatering rate, dewatering design, dewatering period, aquifer characteristics and degree of aquifer variability (including hydraulic conductivity, specific yield/ Storativity, porosity, recharge, heterogeneity).

A suitability qualified geotechnical consultant will be required to determine the potential settlement impacts caused by the potential drawdown as a result of the proposed dewatering activities. Detailed geotechnical considerations are beyond the scope of this assessment

# 6 Legislative context

## 6.1 NSW Legislation

### 6.1.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the primary legislation governing land use planning and development assessment in NSW. It provides a comprehensive legal framework for the management, development, and conservation of both natural and built environments. The Act aims to ensure that development is carried out in a sustainable manner, balancing economic growth with environmental protection.

Key components of the Act include the establishment of planning instruments such as local environmental plans (LEPs), development control plans (DCPs), and state environmental planning policies (SEPPs). These instruments guide decision-making processes and set out the rules and standards for development. The Act also outlines the procedures for development assessment, including the requirements for development applications, public participation, and the consideration of environmental impacts.

This project has been declared an SSD under the State Environmental Planning Policy (State and Regional Development) 2011 and as such, this groundwater impact assessment has been conducted.

### 6.1.2 PROTECTION OF THE ENVIRONMENT OPERATIONS (POEO) ACT 1997

The POEO Act 1997 and its associated schedules and regulations are directly relevant to SSDs. In particular, the Act includes requirements prohibiting the pollution of waters, preventing or minimising air and noise pollution, regarding maintenance and operation plant in a proper and efficient condition/manner, and for minimising and managing wastes.

The Act also requires notification to the NSW Environmental Protection Authority (EPA) and Council, when a pollution incident occurs that causes or threatens material harm to the environment (including discharges above the set limits to the stormwater and where any unacceptable impact to the receiving waters is identified).

### 6.1.3 NSW WATER QUALITY OBJECTIVES (2006)

The NSW Water Quality Objectives are the agreed environmental values and long-term goals for NSW's surface waters. They set out:

- The community's values and uses for our rivers, creeks, estuaries and lakes (i.e., healthy aquatic life, water suitable for recreational activities like swimming and boating, and drinking water).
- A range of water quality indicators to help us assess whether the current condition of our waterways supports those values and uses.

The flow contours indicate the groundwater at the site is expected to move northeast towards Maxwells Creek and The Georges River. Aquatic ecosystems, visual amenity, secondary contact recreation, primary contact recreation and aquatic foods have been described as the relevant water quality objectives for the use of the receiving water body.

### 6.1.4 LIVERPOOL CITY COUNCIL/NSW DEPARTMENT OF PLANNING, HOUSING AND INFRASTRUCTURE – DEWATERING DISCHARGE APPROVAL/PERMIT

A permit from Council is generally required for any dewatering of groundwater. As this is a state significant development, the Water Supply Works approval will be applied for through the NSW Department of Planning, Housing and Infrastructure – Planning Secretary’s Environmental Assessment Requirements. Once granted, and the SSD has been determined, Council approval will be sought for discharge to the stormwater system.

Council generally requires groundwater to be discharged must be compliant with the General Terms of Approval/Controlled Activity permit issued by WaterNSW (if applicable), Landcom’s ‘Managing Urban Stormwater: Soils and Construction’ (2004) (Blue Book), Council’s Compliance and Enforcement Policy, and legislation including Protection of the Environment Operations Act 1997 and Contaminated Lands Act 1997.

All approvals, water discharges and monitoring results are to be documented and kept on site. Copies of all records shall be provided to the appropriate regulatory authority, including Council, upon request.

### 6.1.5 WATER ACT 1912 AND WATER MANAGEMENT ACT 2000

Dewatering for construction purposes is classified as an aquifer interference activity under the NSW Aquifer Interference Policy 2012.

WaterNSW are responsible for waters work approvals under the provisions of the Water Management Act 2000 (WMA) which includes regulation of all aquifer interference activities within Water Sharing Plan management areas. WaterNSW also are responsible for water works approvals for all groundwater extraction in areas outside Water Sharing Plan management areas, as well as State Significant Development.

While minor aquifer interference activities works are generally exempt from the full extent of the WMA 2000, an application for “Approval for Water Supply Works and/or Water Use” (previously known as a Dewatering Licence) is required, regardless of the total volume of groundwater extracted is expected to exceed <3 ML per year. A Water Access License (WAL), or written approval from WaterNSW/NRAR if no licence is required, must be obtained prior to commencement.

Further information on the aquifer interference policy and licencing requirements are available from the WaterNSW website.

Reditus note that if/once approval has been provided, an application for a “new water access licence with a zero share component” may be required to be completed and a suitable groundwater entitlement may also need to be obtained from the market to account for the groundwater take within the same groundwater source (in this case, Sydney Basin Nepean Groundwater Source, under the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources (2023). This will need to be obtained within three months of granting of the Zero Access Licence.

Works or activities that intersect or interfere with groundwater systems and where take is incidental to the primary purpose of the activity, or where there is no take, are managed as aquifer interference activities. Aquifer interference activities taking 3 ML or less of groundwater per year are exempt from requiring a Water Access Licence (WAL).

## 6.2 Policies and Guidelines

### 6.2.1 NSW AQUIFER INTERFERENCE POLICY 2012

The purpose of the NSW Aquifer Interference Policy 2012 is to explain the role and requirements of the Minister administering the WMA in the water licensing and assessment processes for aquifer interference activities under the WMA and other relevant legislative frameworks. The NSW Aquifer Interference Policy 2012:

1. Clarifies the requirements for obtaining water licences for aquifer interference activities under NSW water legislation; and
2. Establishes and objectively defines considerations in assessing and providing advice on whether more than minimal impacts might occur to a key water-dependent asset.

The proposed development will result in aquifer interference under the NSW Aquifer Interference Policy (2012) as groundwater will be removed from at least one aquifer. Accordingly, groundwater licensing may be required.

#### Licencing of water taken through aquifer interference

A water licence is required under the WMA (unless an exemption applies, or water is being taken under a basic landholder right) where any act by a person carrying out an aquifer interference activity causes:

- The removal of water from a water source; or
- The movement of water from one part of an aquifer to another part of an aquifer; or
- The movement of water from one water source to another water source, such as:
  - from an aquifer to an adjacent aquifer; or
  - from an aquifer to a river/lake; or
  - from a river/lake to an aquifer.

A licence for the removal of water from a water source may be required for the development.

### 6.2.2 WATER SHARING PLANS (WSPS)

WSPs are being progressively developed for rivers and groundwater systems across NSW following the introduction of the Water Management Act 2000. WSPs made under the WMA are being prepared as Minister's plans under Section 50 of the Act. These plans protect the health of our rivers and groundwater while also providing water users with perpetual access licences, equitable conditions, and increased opportunities to trade water through separation of land and water.

WSPs provide a legislative basis for sharing water between the environment and consumptive purposes. Under the WMA, a plan for the sharing of water must protect each water source and its dependent ecosystems and must protect basic landholder rights.

The site is located within the following WSP:

- Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources (2023) – Sydney Basin Central Groundwater Source.

#### Water sharing plan for the Greater Metropolitan region groundwater sources (2023) – Sydney Basin Central Groundwater Source

The Sydney Basin Central Groundwater Source is bounded by the main arm of the Hawkesbury River to the north and by the Nepean River to the west and south. Much of Sydney's population is within this groundwater source (with a total area of 3,757.59 $km^2$), and bores are evenly distributed across the area. The geology consists of sedimentary sandstone and siltstone formations with intervening coal seams.

The Sydney Basin is an elongate structural sedimentary basin consisting of Carboniferous to Triassic age rocks. The Basin is geologically bounded by fractured rocks of the Lachlan Fold Belt to the west and New England Fold Belt to the east.

Private bore yields are typically low at around 0.1–1 L/s but higher bore yields up to 20 L/s are associated with fracture zones which allow for improved groundwater flow. Extraction is often self-regulating with yields being limited by the connection between fractures in the rock. In many cases a bore will be pumped dry before any significant impact can be seen on dependent ecosystems or other water users.

The Sydney Basin Central Groundwater Source is recharged primarily from rainfall. The valley floors with overlying Quaternary alluvium are areas for groundwater discharge with water levels within monitoring bores observed to be sub-artesian to artesian.

The long-term average annual extraction limit (LTAAEL) is 45,915 ML/yr. There was 91% (41,783 ML/yr) unassigned volume of water from the Sydney Basin Central management area based on the 2020-2021 entitlements.

### 6.2.3 NSW WATER QUALITY AND RIVER FLOW OBJECTIVES

The NSW Water Quality Objectives are the agreed environmental values and long-term goals for NSW's surface waters. They set out:

- the community's values and uses for our rivers, creeks, estuaries and lakes (i.e. healthy aquatic life, water suitable for recreational activities like swimming and boating, and drinking water); and
- a range of water quality indicators to help us assess whether the current condition of our waterways supports those values and uses.

Water Quality Objectives have been agreed for Fresh and Estuarine surface waters and Marine Water Quality Objectives.

The Objectives are consistent with the agreed national framework for assessing water quality set out in the ANZECC 2000 Guidelines. These guidelines provide an agreed framework to assess water quality in terms of whether the water is suitable for a range of environmental values (including human uses). The Water Quality Objectives provide environmental values for NSW waters and the ANZECC 2000 Guidelines provide the technical guidance to assess the water quality needed to protect those values.

The River Flow Objectives are the agreed high-level goals for surface water flow management. They identify the key elements of the flow regime that protect river health and water quality for ecosystems and human uses.

## 6.3 Relevant National and NSW EPA Endorsed Guidelines

Approval for the disposal of groundwater to stormwater will be regulated by Council.

The adopted water quality guidelines for discharge waters are the:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018).
- ANZECC/ARMCANZ (2000) Default Trigger Values (TVs) for Physical and Chemical Stressors (used in the absence of ANZG 2018 criteria).
- Guidelines for Managing Risks in recreational Water (NHMRC 2008) / Drinking Water Criteria (NHMRC updated 2022).

Use of the 95% protection level (for the ANZG 2018 Guidelines) is based on an assumption that the surrounding watercourses are moderately disturbed ecosystems (as receiving road and stormwater runoff from adjacent urbanised environment). In the absence of ANZG (2018) DGVs, the ANZECC (2000) trigger values (TVs) were adopted. The freshwater criterion were adopted due to the conditions of the groundwater at the site and the receiving site.

# 7 Existing Environment

## 7.1 Land Use

The proposed development area consists of Site 3, Site 4 and Site 5 and is located within an area of mixed use. The land is currently vacant and is zoned R1 – General Residential as per the State Environmental Planning Policy (Precincts—Western Parkland City) 2021.

The surrounding land use and current zoning includes the following:

- **North**: Vacant land, followed by low-density residential use and St Francis Catholic College, zoned R1 – General Residential.
- **East**: Bushland and an unnamed creek (second order), zoned RE1 – Public Recreation, followed by vacant land and parking for Edmondson Park train station, zoned B4 – Mixed Use.
- **South**: Sydney Trains rail corridor (zoned SP2 – Infrastructure) followed by sparsely vegetated vacant land, zoned C1 – National Parks and Nature Reserves.
- **West**: Vacant land followed by Edmondson Park Public School and low-density residential properties, zoned R1 – General Residential.

## 7.2 Climate

Based on daily rainfall data from the nearest operational Bureau of Meteorology (BoM) weather station (Station No. 066161 – Holsworthy Aerodrome) located approximately 9 km to the south-east of the site, average annual rainfall is 890.0 mm/year. (BoM, 2026). Groundwater recharge rate (i.e. the percentage of rainfall that infiltrates into the ground and replenishes the groundwater system) at the site is expected to be approximately 10% based on regional mapping of diffuse groundwater recharge (Lee, et al., 2024). Therefore, diffuse groundwater recharge during an average rainfall year is expected to be 89.0 mm/year.

## 7.3 Topography

Site 3 slopes southeast and ranges from approximately 65.5 m Australian Height Datum (AHD) at the northwestern corner of the site to 57.35 mAHD at the southeastern corner of the site.

Site 5 slopes north-east and ranges from approximately 59.42 mAHD at the southwestern corner of the site to 55.91 at the northeastern corner of the site.

Site 3 and Site 5, including 2m topographical contours are presented in **Figure 2**, **Appendix A**.

## 7.4 Geology

### 7.4.1 REGIONAL GEOLOGY

The Penrith 1:100,000 Series Geological Map Sheet indicates the site is underlain by Bringelly Shale of the Wianamatta Group, which is described as shale, carbonaceous claystone, laminate, lithic sandstone, and rare coal.

### 7.4.2 SOIL LANDSCAPE

The soil landscape was mapped as *Blacktown-Residual* soils by the NSW Office of Environment and Heritage (OAH, 2020) accessed via eSPADE 2.0 on 10 February 2026.

### 7.4.3 SITE-SPECIFIC GEOLOGY

Site-specific geology has been determined through intrusive investigation works completed at the site by EI Australia in December 2025. The generalised site stratigraphy established from the intrusive investigations across Site 3, Site 4 and Site 5 is presented in **Table 4** below.

**Table 4.** Generalised Site Stratigraphy Summary

| LAYER | DEPTH (MBGL) | THICKNESS (M) | DESCRIPTION |
|---|---|---|---|
| **Fill** | Surface | 1.0 to 3.0 | Variable fill, comprising of sandy clay, silty clay, gravelly silty sand, various amounts of angular to sub angular gravels, rootlets, and plastic fragments. |
| **Residual Soil** | 1.0 to 3.0 | 1 to 4.32 | Silty clay and sandy clay, low to medium plasticity. Stiff to hard. Observed in BH5 and BH7M to BH10 only. |
| **Extremely to Highly Weathered Shale** | 1.0 to 5.32 | 1.1 to 6.6 | Extremely to highly weathered shale, very low strength |
| **Highly Weathered/ Moderately Weathered Shale** | 4.45 to 7.0 | 1.55 to 5.0 | Highly weathered to moderately weathered shale, low to medium strength. Observed in BH2M, BH3M, BH7M and BH8M. |
| **Slightly Weathered to Fresh Shale** | 6.25 to 12.0 | 2.7 to 3.9 | Slightly weathered shale, medium to high strength. Observed in BH1M, BH3M, BH7M and BH8M. |
| **Slightly Weathered to Fresh Sandstone** | 6.3 to 15.9 | - | Slightly weathered sandstone, high strength, with occasional medium or very high strength layers. This unit is underlain by medium to high strength shale with sandstone laminations. Observed in BH7M to BH10. |

#### 7.4.4 ACID SULFATE SOILS

Acid sulfate soils (ASS) occur predominantly on coastal land with elevations generally below 5 m Australian Height Datum (AHD). These soils also occur further inland in saline seepage areas, rivers, lake beds and irrigation channels. Where present, drawdown of the local water table can expose ASS to oxidising conditions creating acidity and mobilising metals at potentially harmful concentrations.

Review of the NSW Government Department of Planning, Industry, and Environment eSPADE v2.2 website (DCCEEW, 2026) shows the site is located in area of "No known occurrence".

Based on a review of the publicly available information and reported site conditions, ASS is not considered to be a risk at the site.

## 7.5 Hydrogeology

A review of Hydrogeology map of Australia (Geoscience Australia) indicates that site aquifers are porous aquifers of low to moderate yield.

The groundwater system within Site 3 and Site 5 is described as a semi-confined/confined groundwater system within weathered and fractured shale of middle Triassic Bringelly Shale.

The site is located within the administrative boundary of the **Sydney Basin Central Groundwater Source**, which is managed under the WM Act through the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023.

### 7.5.1 GROUNDWATER MONITORING WELLS

A total of six (6) groundwater monitoring wells have been installed at the site by EI Australia. Monitoring wells BH1M, BH2M and BH3M were installed at Site 3 and BH7M, BH8M and BH9M were installed at Site 5. The groundwater well locations are presented in **Figure 2**, **Appendix A** and a summary of the groundwater monitoring well construction details are provided in **Table 5** below.

**Table 5.** Groundwater Monitoring Well Construction Details

| SITE | WELL ID | DATE INSTALLED | EASTING | NORTHING | TOP OF CASING (mAHD) | DEPTH OF WELL | | SCREEN MATERIAL |
|---|---|---|---|---|---|---|---|---|
| | | | | | | (mbgl) | (mAHD) | |
| **Site 3** | BH1M | 02.12.2025 | 301690 | 6239614 | 63.38 | 15.0 | 48.38 | Shale |
| | BH2M | 03.12.2025 | 301757 | 6239639 | 63.40 | 10.22 | 53.18 | Shale |
| | BH3M | 03.12.2025 | 301795 | 6239585 | 59.29 | 10.27 | 49.02 | Shale |
| **Site 5** | BH7M | 04.12.2025 | 301883 | 6239440 | 56.71 | 12.0 | 44.71 | Shale |
| | BH8M | 08.12.2025 | 301822 | 6239379 | 58.21 | 9.50 | 48.71 | Shale |
| | BH8M | 08.12.2025 | 301804 | 6239310 | 59.72 | 10.0 | 49.72 | Sandstone and Shale |

### 7.5.2 GROUNDWATER ELEVATIONS

A summary of the manual groundwater measurements recorded at the Site 3 and Site 5 are presented in **Table 6** and **Table 7** including a summary of the maximum, minimum, geometric mean and median groundwater elevation measurements.

**Table 6.** Manual Groundwater Elevation Measurements – Site 3

| WELL ID | DATE | TOC (RL mAHD) | DEPTH OF WELL (mbTOC / mAHD) | DEPTH TO WATER (mbTOC) | GROUNDWATER ELEVATION (RL mAHD) |
|---|---|---|---|---|---|
| **BH1M** | 12.12.2025 | 63.38 | 15.0 / 48.38 | 5.84 | 57.54 |
| | 05.02.2025 | | 8.03 / 55.35 | 5.58 | 57.80 |
| **BH2M** | 12.12.2025 | 63.40 | 10.22 / 53.18 | DRY | - |
| | 05.02.2025 | | | DRY | - |
| **BH3M** | 12.12.2025 | 59.29 | 10.27 / 49.02 | 5.94 | 53.35 |
| | 05.02.2025 | | 6.92 / 52.37 | 4.67 | 54.62 |
| | | | **Minimum:** | 4.67 | 53.35 |
| | | | **Maximum:** | 5.94 | 57.80 |
| | | | **Mean:** | 5.48 | 55.80 |
| | | | **Median:** | 5.71 | 56.08 |

**Table 7.** Manual Groundwater Elevation Measurements – Site 5

| WELL ID | DATE | TOC (RL mAHD) | DEPTH OF WELL (mbTOC / mAHD) | DEPTH TO WATER (mbTOC) | GROUNDWATER ELEVATION (RL mAHD) |
|---|---|---|---|---|---|
| **BH7M** | 12.12.2025 | 56.71 | 12 / 44.71 | 4.16 | 52.55 |
| | 05.02.2025 | | 11.25 / 45.46 | 4.20 | 52.51 |
| **BH8M** | 12.12.2025 | 58.21 | 9.50 / 48.71 | 3.45 | 54.76 |
| | 05.02.2025 | | 9.31 / 48.90 | 3.95 | 54.26 |
| **BH9M** | 12.12.2025 | 59.72 | 10.0 / 49.72 | 5.82 | 53.90 |
| | 05.02.2025 | | 10.50 / 49.22 | 5.56 | 54.17 |
| | | | **Minimum:** | 3.45 | 52.51 |
| | | | **Maximum:** | 5.82 | 54.76 |
| | | | **Mean:** | 4.44 | 53.68 |
| | | | **Median:** | 4.18 | 54.03 |

### 7.5.3 DATA LOGGERS

Data loggers were installed by Reditus to monitor groundwater elevation at monitoring well locations BH1M, BH2M, BH3M, BH7M, BH8M and BH9M. The data loggers recorded groundwater elevation measurements every 3 hours for a period from 23 December 2025 to 4 February 2026. Standing groundwater levels (SWL, mAHD), overlain with the recorded rainfall during this period (Holsworthy Aerodrome AWS 066161) have been plotted in **Figure 3** below.

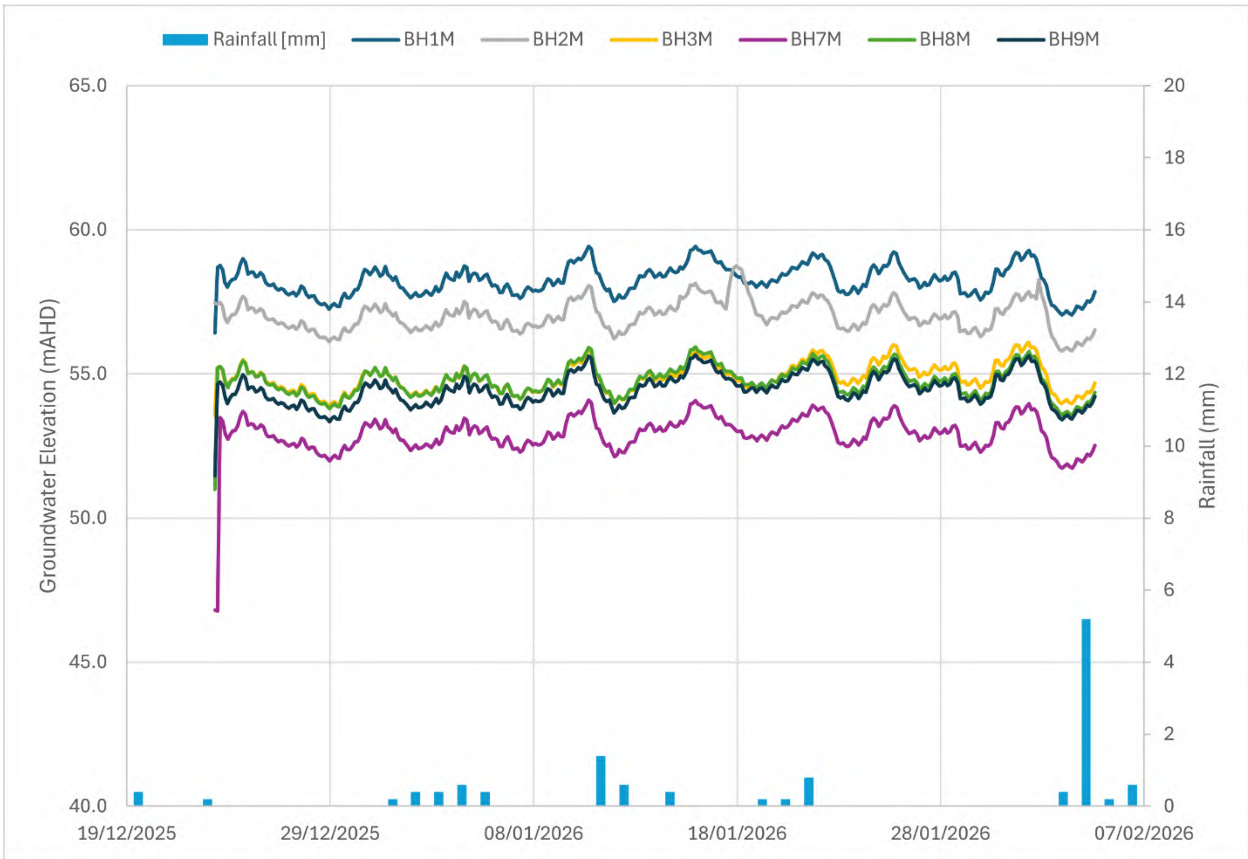



**Figure 3.** Hydrographs for groundwater monitoring data collected between 23 December 2025 and 4 February 2026.

### 7.5.4 GROUNDWATER FLOW DIRECTION

Groundwater level gauging and surveyed top of casing data was obtained from the wells at Site 3 and Site 5 during the Reditus site visit on 4 February 2026.

This data was used to infer the groundwater flow direction across Site 3 and Site 5. Groundwater contour and flow direction data has been presented in **Figure 3, Appendix A.** Based on the groundwater contours, groundwater at Site 5 is inferred to flow in a northeast direction.

### 7.5.5 SITE-SPECIFIC HYDRAULIC CONDUCTIVITY

Rising head slug testing data was obtained from Site 3 (BH1M and BH3M) and Site 5 (BH7M, BH8M and BH9M) with the analysis completed using the computational software AQTESOLV. It is noted that there was not enough water in BH2M to complete a slug test. The outputs for each test are presented in **Appendix D.** These tests were completed to measure the change in hydraulic head overtime and to determine the aquifer characteristics of the well. The selected wells were spaced across the edges of the basement boundary and were completed on wells that had depths similar to the inferred base of excavation so that estimation of water volumes captured during the construction phase could be made.

AQTESOLV solutions were based on the Bouwer-Rice and Hvorslev Method for slug tests in an unconfined aquifer. Estimates of hydraulic conductivity were calculated and are summarised in **Table 8** and **Table 9** below.

**Table 8.** Estimates of Hydraulic Conductivity – Site 3

| WELL ID | DATE | HYDRAULIC CONDUCTIVITY (M/DAY) BOUWER-RICE 1976 SOLUTION (UNCONFINED AQUIFER) | HYDRAULIC CONDUCTIVITY (M/DAY) HVORSLEV 1951 SOLUTION (UNCONFINED AQUIFER) |
|---|---|---|---|
| **BH1M** | 04.02.2026 | $3.2 \times 10^{-3}$ | $4.69 \times 10^{-3}$ |
| **BH3M** | 04.02.2026 | $9.09 \times 10^{-4}$ | $1.24 \times 10^{-3}$ |
| **Minimum:** | | $9.09 \times 10^{-4}$ | |
| **Maximum:** | | $4.69 \times 10^{-3}$ | |
| **Mean:** | | $2.03 \times 10^{-3}$ | |
| **Median:** | | $2.22 \times 10^{-3}$ | |

**Table 9.** Estimates of Hydraulic Conductivity – Site 5

| WELL ID | DATE | HYDRAULIC CONDUCTIVITY (M/DAY) BOUWER-RICE 1976 SOLUTION (UNCONFINED AQUIFER) | HYDRAULIC CONDUCTIVITY (M/DAY) HVORSLEV 1951 SOLUTION (UNCONFINED AQUIFER) |
|---|---|---|---|
| **BH7M** | 04.02.2026 | $4.12 \times 10^{-3}$ | $6.60 \times 10^{-3}$ |
| **BH8M** | 04.02.2026 | $8.85 \times 10^{-4}$ | $1.15 \times 10^{-3}$ |
| **BH9M** | 04.02.2026 | $1.41 \times 10^{-3}$ | $1.73 \times 10^{-3}$ |
| **Minimum:** | | $8.85 \times 10^{-4}$ | |
| **Maximum:** | | $6.60 \times 10^{-3}$ | |
| **Mean:** | | $2.02 \times 10^{-3}$ | |
| **Median:** | | $1.57 \times 10^{-3}$ | |

The above estimates of hydraulic conductivity are noted to be within the range for fractured Shale in literature values (Fitts, C.R. 2013 Groundwater Science (2nd ed. Academic Press).

### 7.5.6 GROUNDWATER QUALITY

Groundwater quality sampling in accordance with the minimum requirements has been undertaken by Reditus in February 2026, however, the laboratory analytical results from the groundwater sampling event are still pending at the time of preparing this report. Further discussion of any potential impacts of groundwater quality on the proposed development will be addressed in future groundwater reporting for site.

### 7.5.7 GROUNDWATER USERS

A search of the WaterNSW Registered Groundwater Bore Database (https://realtimedata.waternsw.com.au/water.stm) identified two (2) groundwater bores within a 2 km radius of the site.

Review of the registered bores found that all bores were for domestic/stock purposes. All bores targeted the deeper bedrock aquifer with depths of bores ranging from 222 to 303 m. The standing water levels (SWLs) ranged between 11.0 and 13.0 mbgl. Summary of the registered bores is presented in **Table 10** below.

**Table 10.** Summary of Registered Bores

| BORE ID | USE | DEPTH OF BORE (M) | STANDING WATER LEVEL (MBGL) | DISTANCE/DIRECTION |
|---|---|---|---|---|
| GW115531 | Stock/Domestic | 222 | 11 | Approx. 1.02 km southwest |
| GW105200 | Domestic | 303 | 13 | Approx. 1.45 km west |

### 7.5.8 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater dependent ecosystems (GDEs) are a diverse and important component of biological diversity. The term GDE takes into account ecosystems that use groundwater as part of their survival strategies. GDEs can potentially include wetlands, vegetation, mound springs, river base flows, cave ecosystems, playa lakes and saline discharges, springs, mangroves, river pools, billabongs and hanging swamps and near-shore marine ecosystems.

The groundwater dependence of ecosystems can range from complete to partial reliance on groundwater, such as might occur during droughts. The degree and nature of groundwater dependence will influence the extent to which they are affected by changes to the groundwater system, both in quality and quantity.

Many land and water use activities within a catchment can affect groundwater dependent ecosystem function and viability. It is important to manage these land and water use activities within a regulatory and licensing framework. Risk assessment guidelines for groundwater dependent ecosystems have been developed to operate within the regulatory and licensing framework provided by the Water Management Act 2000 and Water Sharing Plans (WSPs). The guidelines are based on an assessment of various ecological and risk factors that are important to decisions on allowing a proposed activity or development.

WSPs have been developed for groundwater systems in NSW to preserve water resources by establishing rules for sharing water between different types of water uses. The site is located within the **Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023 – Sydney Basin Central Groundwater Source**.

No high-priority GDEs are located within a 500 m radius of the site. The nearest high-priority GDE is located over 5 km from the site (i.e., Sydney Enriched Sandstone Moist Forest), beyond the influence of any proposed dewatering at the site.

Two (2) medium priority GDEs are located approximately 480 m southwest and 750 m east of the site (i.e., Cumberland Blue Box Riverflat Forest and Coastal Valleys Swamp Oak Riparian Forest). These are beyond the influence of any proposed dewatering at the site.

## 7.6 Contaminated Sites

A search was undertaken on 10 February 2026 of the NSW EPA Contaminated Land Register and the NSW EPA List of Notified Sites under the Contaminated Land Management Act (1997). The search did not identify any properties within a 1 km radius that were listed or registered as contaminated sites.

A search was undertaken on 10 February 2026 of Environmental Protection Notices and Licences under the NSW EPA Protection of the Environment Operations Act (1997). The search did not identify any notices or licences for the site or surrounding properties within a 1 km radius.

# 8 Proposed Development

## 8.1 Development Details

The most recent relevant development plans, are provided as **Appendix B**, and include the following Architectural Drawings:

- Plus Studio (26 February 2026) Site 3 – General Floor Plan – Basement 01
- Plus Studio (26 February 2026) Site 3 – General Floor Plan – Lower Ground
- Plus Studio (26 February 2026) Site 5 – General Floor Plan – Basement 03
- Plus Studio (26 February 2026) Site 5 – General Floor Plan – Basement 02
- Plus Studio (26 February 2026) Site 5 – General Floor Plan – Basement 01

It is understood that the proposed development includes the construction of three (3) different sites; Site 3, Site 4 and Site 5. A summary of the proposed development is provided below:

**Table 11.** Proposed Development Descriptions

| SITE | DESCRIPTION |
|---|---|
| **Site 3** | Multi-storey residential apartment buildings overlying a two-level basement. |
| **Site 4** | Multi-storey residential apartment buildings with no basement levels. |
| **Site 5** | Multi-storey mixed-use apartment buildings overlying a three-level basement |

The lowest reduced level (mAHD) of Site 3 basement's finished floor level (FFL) is 55.0 mAHD. The bulk excavation level (BEL) is assumed to be approximately 0.5 m below the basement FFL. Therefore, the lowest BEL of the primary basement is assumed to be 54.5 mAHD, which will require excavation depths of up to approximately 10.5 m below the existing ground levels at the site.

The lowest reduced level (mAHD) of Site 5 basement's finished floor level (FFL) is 45.05 mAHD. The bulk excavation level (BEL) is assumed to be approximately 0.5 m below the basement FFL. Therefore, the lowest BEL of the primary basement is assumed to be 44.55 mAHD, which will require excavation depths of up to approximately 11-13 m below the existing ground levels at the site.

Given the expected minimal groundwater inflows from the low permeability fractured and weathered shale water bearing zones of the Bringelly Shale geology it is understood the basements are proposed to be constructed as 'Drained Basements' with traditional sub-slab drainage systems and vertical strip drains behind the basement walls.

A summary of the proposed basement excavation parameters is provided in **Table 12** below.

**Table 12.** Summary of Proposed Excavation Parameters

| ITEM | SITE 3 | SITE 5 |
|---|---|---|
| **Basement Excavation Footprint Area ($m^2$) [1]** | Approximately 9,825 $m^2$ | Approximately 9,049 $m^2$ |
| **Site Surface Elevation** | Site 3 slopes south east and ranges from approximately 65.5 m Australian Height Datum (AHD) at the north western corner of the site to 57.35 mAHD at the south eastern corner of the site. | Site 5 slopes north-east and ranges from approximately 59.42 mAHD at the south western corner of the site to 55.91 at the north eastern corner of the site |
| **Basement Finished Floor Level (FFL)** | 55.00 RL mAHD | 45.05 RL mAHD |
| **Bulk Excavation Level (BEL)[2]** | 54.50 RL mAHD | 44.55 RL mAHD |

[1] Determined from the outline of the entire basement carpark.

[2] Assumed to be 0.5 m below the basement FFLs.

# 9 Groundwater Impact Assessment

## 9.1 Dewatering Requirements

Based on the groundwater data sourced from this assessment, the highest groundwater elevation at Site 3 was reported to be RL 59.43 mAHD at BH1 which is located in the southwestern corner of Site 3. The depth of excavation for the basement carpark is proposed to be RL 55.00 mAHD, with an assumed Bulk Excavation Level (BEL) for the site of 0.5 m below the proposed depth of excavation (RL 54.50 mAHD). Based on the above the basement excavation will intercept the groundwater.

The highest groundwater elevation for Site 5 was reported to be RL 55.94 mAHD at BH7M which is located in the northeastern corner of Site 5. The depth of excavation for the three (3) level basement carpark is proposed to be RL 45.05 mAHD with an assumed BEL of RL 44.55 mAHD. Based on the above the basement excavation will intercept the groundwater

Dewatering will be required during the construction phase of the basements, and ongoing operation, as it is assumed at the design stage that the development includes ‘drained’ basement designs. Analytical modelling has been conducted to assess the potential impacts of dewatering during the construction phase and operation phase of the site. Should the basement designs change to a tanked basement, then impacts to groundwater as a result of dewatering during the operational phase are removed.

## 9.2 Groundwater Inflow Modelling

### 9.2.1 SITE CHARACTERISATION SUMMARY

Based on the intrusive investigation completed by EI Australia in December 2025, the generalised subsurface profile at the site is comprised of fill material, residual material (to a max. depth of 3.0 mbgl); overlying shale (from between 1.0 – 15.9 mbgl onwards).

The groundwater standing levels manually recorded onsite by Reditus on 5 February 2026 and from data loggers ranged between 59.43 mAHD and 53.56 mAHD at Site 3 and 55.94 mAHD and 51.73 mAHD at Site 5.

Based on the maximum standing water level of 59.43 mAHD at Site 3 and the BEL of RL 54.50 mAHD, there is likely to be 4.93 m of groundwater which will be encountered and require dewatering during development works at the site.

Given the maximum standing water level of 55.94 mAHD at Site 5 and a BEL of RL 44.55 mAHD, it is anticipated that approximately 11.39 m of groundwater will be encountered and require dewatering during development works at the site.

### 9.2.2 CONCEPTUAL FLOW MODEL

A conceptual model is a description of the site, site works, and groundwater systems presented both as text and graphically. This description can then be approximated using an analytical solution to allow prediction of groundwater behaviour.

The groundwater drawdown estimate comprises two key components to be considered:

**a)** The component of groundwater present within the aquifer matrix, which will be removed as part of the excavation process (pore water).

**b)** The component of inflow into the excavation from the surrounding aquifer (walls and base) during the dewatering activity.

The conceptual flow models developed for this assessment are “steady state” models – a snapshot in time representing average conditions. This snapshot was completed based on conservative assumptions of the excavation depth, which estimate the greatest groundwater inflow. Note that a more detailed analysis can be provided through a three-dimensional flow model (beyond the scope of the current assessment).

Conceptually, the drained basement design will not limit any groundwater inflow into the excavation void and is assumed to be in direct connection with the surrounding Fractured Shale Unconfined Aquifer.

To estimate the groundwater extracted present within the aquifer matrix, which will be removed as part of the excavation process, the porosity of the matrix is multiplied by the saturated excavation volume. The saturated excavation volume was calculated by determining the difference between the conservative standing groundwater level and the BEL, multiplied by the approximate excavation area for the basement.

To estimate the groundwater inflow volumes, Reditus used the Marinelli and Niccoli (2000) steady-state analytical solution. This solution provides a convenient means for estimating groundwater inflows into excavations and is considered applicable to use as a conservative assessment for the proposed drained basement design.

The analytical method of Marinelli and Niccoli (2000) requires a simplification of the hydrogeological environment and was used to provide a broad range of potential drawdown and groundwater inflow. The equations calculate groundwater inflow from the aquifer based on the conceptual model.

The conceptual flow model was approximated by analytical models, which are divided into two zones separated by a conceptual no-flow boundary where horizontal flow will occur level with the excavation base:

- **Zone 1** – exists above the base of the excavation and represents lateral flow to the excavation via the surrounding walls and drainage layer.
- **Zone 2** – extends from the bottom of the excavation downward and considers vertical upward groundwater inflow through the excavation base into the void and drainage layer.

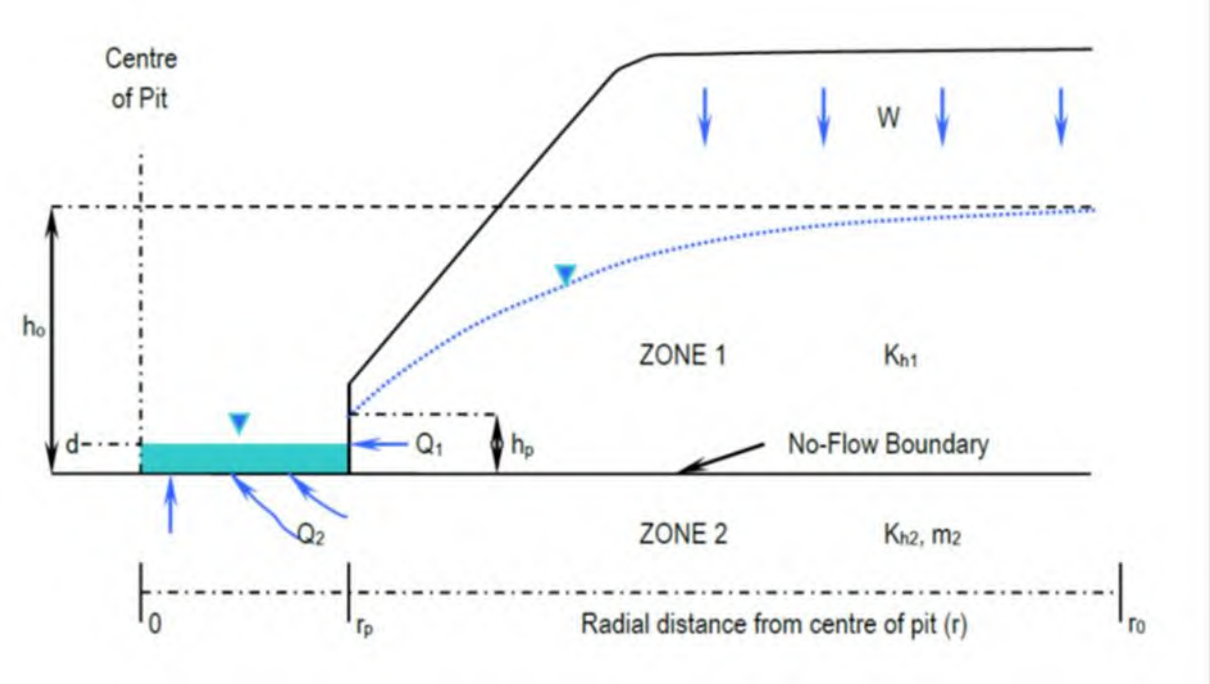



**Figure 4.** Conceptual Model of the Analytical Solution

The analytical solution for Zone 1 considered steady state, unconfined, horizontal radial flow, with uniformly distributed recharge at the water table. This represents the volume of water laterally flowing into the excavation through the excavation walls.

The analytical solution for Zone 2 is based on steady-state flow to one side of a circular disk sink of constant and uniform drawdown. The circular disk sink represents the volume of water needing to be removed to dewater the site to the target dewatering level of RL 54.50 mAHD at Site 3 and RL 44.55 mAHD at Site 5.

For the development of the conceptual flow model for the proposed excavation, the circular disk sink was assumed to encompass the approximate area of the excavation footprint. The total excavation is approximated as a single large well and as such the circular disk sink was assigned a radius of based on the footprint of the proposed excavation.

An average annual rainfall of 890 mm of rain was registered at the nearest weather station (Station No. 066161 – Holsworthy Aerodrome) over the period of 2012 to 2026. These statistics have been used as the average annual rainfall for inflow calculations. These statistics from the Australian Government Bureau of Meteorology (BoM) have been used as the average annual rainfall for inflow calculations. This converted to an assumed average daily rainfall of 0.00244 m/day.

### 9.2.3 SUMMARY OF AQUIFER PARAMETERS

The hydraulic conductivity of the porous rock will be restricted by the connectivity and extent of the bedding layers and joints or faults, as well as the degree of connection to the drainage layer.

Site specific test data of the fractured and weathered shale has provided an estimate of the hydraulic conductivity (summarised in **Table 13** and **Table 14** below), which has been used to predict groundwater inflow volumes. These values are presented as representative averages over the area of the site, and localised natural variation up to an order of magnitude is to be expected in parts of the site.

**Table 13.** Summary of Hydraulic Conductivity Values – Site 3

| | | HYDRAULIC CONDUCTIVITY (m/day) |
|---|---|---|
| **Fractured/weathered Shale** | Minimum | $9.09 \times 10^{-3}$ |
| | Maximum | $4.69 \times 10^{-3}$ |
| | Average | $2.03 \times 10^{-3}$ |
| | Median | $2.22 \times 10^{-3}$ |

**Table 14.** Summary of Hydraulic Conductivity Values – Site 5

| | | HYDRAULIC CONDUCTIVITY (m/day) |
|---|---|---|
| **Fractured/weathered Shale** | Minimum | $8.85 \times 10^{-4}$ |
| | Maximum | $6.60 \times 10^{-3}$ |
| | Average | $2.02 \times 10^{-3}$ |
| | Median | $1.57 \times 10^{-3}$ |

Site specific porosity values were not measured. As such, representative porosity values were adopted from literature sources. Given groundwater storage of the aquifer is likely confined to secondary porosity features (fractures), a porosity value 1% was assumed for the fractured sandstone unit.

### 9.2.4 MODEL SCENARIOS

All groundwater models include some degree of uncertainty in their predictions as they are, by necessity, simplifications of complex real-world systems. Whilst every effort is made to ensure that the primary model reflects the best-case, most-likely case and upper-case (less likely) understanding of site conditions, this cannot be guaranteed, and any model result presented as a single number should be viewed with a degree of caution.

Factors which affect the dewatering rate, groundwater take and extent of drawdown within the steady state model include dewatering rate, dewatering design, dewatering period, aquifer characteristics and degree of aquifer variability (including hydraulic conductivity, specific yield/Storativity, porosity, recharge, heterogeneity).

It is considered impractical to determine these factors by pumping tests and further analytical assessment, based on the relatively small scale of the development and the likely relatively low risk of impact to groundwater in the shallow water bearing zone in the top of the low yielding porous aquifer.

Typical representative values were used in the model. Assessment of the range of typical values and their effects on the model predictions were made to allow sound management decisions using **Best Case (Less Likely)**, **Most Likely, and Upper-Case (Less Likely)** scenarios.

**Table 15.** Analytical Model Scenarios – Site 3

| SCENARIO | DESCRIPTION |
|---|---|
| **Best Case** | Minimum hydraulic conductivity used for both Zone 1 and Zone 2:<br>• $9.09 \times 10^{-4}$ m/day<br>The average of the SWLs of the recorded data from wells BH1M, BH2M and BH3M was used to determine an initial groundwater level of 56.71 RL mAHD |
| **Most Likely** | Geometric Mean hydraulic conductivity used for both Zone 1 and Zone 2:<br>• $2.03 \times 10^{-3}$ m/day<br>The average of the maximum SWLs of the recorded data from wells BH1M, BH2M and BH3M was used to determine an initial groundwater level of 58.1 RL mAHD |
| **Upper Case** | Maximum hydraulic conductivity used for both Zone 1 and Zone 2:<br>• $4.69 \times 10^{-3}$ m/day<br>The maximum SWL of the logger data from wells BH1M, BH2M and BH3M was then used to determine an initial groundwater level of 59.43 RL mAHD |

**Table 16.** Analytical Model Scenarios – Site 5

| SCENARIO | DESCRIPTION |
|---|---|
| **Best Case** | Minimum hydraulic conductivity used for both Zone 1 and Zone 2:<br>• $8.85 \times 10^{-4}$ m/day<br>The average of the SWLs of the recorded data from wells BH7M, BH8M and BH9M was used to determine an initial groundwater level of 54.06 RL mAHD |
| **Most Likely** | Geometric Mean hydraulic conductivity used for both Zone 1 and Zone 2:<br>• $2.02 \times 10^{-3}$ m/day<br>The average of the maximum SWLs of the recorded data from wells BH7M, BH8M and BH9M was used to determine an initial groundwater level of 55.23 RL mAHD |
| **Upper Case** | Maximum hydraulic conductivity used for both Zone 1 and Zone 2:<br>• $6.60 \times 10^{-3}$ m/day<br>The maximum SWL of the logger data from wells BH7M, BH8M and BH9M was then used to determine an initial groundwater level of 55.94 RL mAHD |

### 9.2.5 ANALYTICAL MODEL EQUATIONS

#### Groundwater Matrix Take Volume

The following equation was utilised to estimate the groundwater volume present in the aquifer matrix directly removed through excavations:

$$V = \emptyset \times m \tag{1}$$

$$m = (H_0 - BEL) \times A \tag{2}$$

where:

V = groundwater volume present in the aquifer matrix directly removed through excavation (m3).

ϕ = matrix porosity

m = volume of saturated aquifer matrix to be excavated

$H_0$ = initial water table elevation (RLm)

BEL = basement excavation level (RLm)

A = area of excavation

### Groundwater Inflow Take Volume

The steady state inflow rate into the disk sink is given by the following equations[2]:

**Zone 1**:

$$Q_1 = W\pi\left(r_o^2 - r_p^2\right) \tag{3}$$

$$h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}}\left[r_0^2 ln\left(\frac{r_o}{r_p}\right) - \frac{\left(r_0^2 - r_p^2\right)}{2}\right]} \tag{4}$$

**Zone 2**:

$$Q_2 = 4r_p\left(\frac{K_{h2}}{m_2}\right)(h_0 - d) \tag{5}$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}} \tag{6}$$

where:

Q = groundwater flux ($m^3$/day)

$K_{h1}$ = horizontal hydraulic conductivity (m/day) at Zone 1

$K_{h2}$ = horizontal hydraulic conductivity (m/day) at Zone 2

$K_{v2}$ = vertical hydraulic conductivity (m/day) at Zone 2

$m_2$ = vertical hydraulic conductivity anisotropy parameter

d = depth of water (above target dewatering level) within final excavation (m) (*assumed to be 0 at final excavation depth*)

$r_p$ = radius from centre of excavation (circular disk sink) (m)

$r_o$ = drawdown radius from centre of excavation (iterative calculation)

$h_0$ = initial saturated thickness above base of excavation (m)

$h_p$ = saturated thickness above the base of excavation at the excavation wall (rp), which is assumed 0 m

W = rainfall recharge rate (assumed % of the mean daily rainfall)

## Groundwater Drawdown Extent

The following equations were used to calculate the groundwater drawdown resulting from the groundwater take into the excavation[2]:

$$H_{1(r)} = H_0 - h_0 + \sqrt{h_p^2 + \frac{W}{K_{h1}}\left[r_o^2 \ln\left(\frac{r}{r_p}\right) - \frac{\left(r^2 - r_p^2\right)}{2}\right]} \quad (7)$$

where:

$H_{1(r)}$ = hydraulic head elevation (m) at a radial distance (r) from excavation centre

$H_0$ = initial groundwater elevation (mRL)

$h_0$ = initial saturated thickness above base of excavation (m)

r = radial distance from excavation centre (m)

z = vertical depth below the excavation bottom (assumed to be 0 m)

W = rainfall recharge rate (assumed % of the mean daily rainfall)

$K_{h1}$ = horizontal hydraulic conductivity (m/day) at Zone 1

### 9.2.6 MODEL ASSUMPTIONS AND INPUT PARAMETERS

## Assumptions

The analytical solution was based on the following assumptions, after Marinelli and Niccoli (2000):

- Steady state, unconfined, horizontal radial flow, with uniformly distributed recharge at the water table.
- The excavation walls are approximated as a circular cylinder.
- Groundwater flow is horizontal. The Dupuit-Forchheimer approximation (McWhorter and Sunada 1977) is used to account for changes in saturated thickness due to depression of the water table.
- The static (pre-excavation) water table is approximately horizontal.
- Uniform distributed recharge occurs across the site as a result of surface infiltration. All recharge within the radius of influence (cone of depression) of the pit assumed to be captured by the excavation. A 10% recharge rate due to surface water infiltration through the deep soil zones around the perimeter of the basement excavation.
- Groundwater flow toward the pit is axially symmetric.
- Hydraulic head is initially uniform (hydrostatic) throughout Zone 2. Initial head is equal to the elevation of the initial water table in Zone 1.
- The disk sink has a constant hydraulic head equal to the elevation of the "pit lake water surface". If the pit is completely dewatered, the disk sink head is equal to the elevation of the pit bottom – in this case the target dewatering level.
- Flow to the disk sink is three dimensional and axially symmetric.
- Materials within Zone 2 are anisotropic, and the principal coordinate directions for hydraulic conductivity are horizontal and vertical. It has been assumed that horizontal permeability is greater than vertical permeability by a factor of 10.

## Parameters

The parameters used to estimate the groundwater removal (excavation and inflow) within the analytical solution for the basement carpark and lower basement at the site are provided in **Table 17** and **Table 18** below.

**Table 17.** Groundwater Inflow Analytical Model Input Parameters – Site 3

| PARAMETER | UNIT | BEST CASE | MOST LIKELY | UPPER CASE |
|---|---|---|---|---|
| **Excavation Matrix Storage** | | | | |
| **Effective Porosity (ϕ)** | - | 0.01% | 0.01% | 0.01% |
| **Bulk Excavation Level (BEL)** | RL mAHD | 54.50 | 54.50 | 54.50 |
| **Excavation Area** | $m^2$ | 9,825 | 9,825 | 9,825 |
| **Zone 1** | | | | |
| $r_p$ | m | 55.92 | 55.92 | 55.92 |
| $r_o$ | m | 60.2 | 66.20 | 76.50 |
| **W** | m/day | $2.44 \times 10^{-4}$ (10% of average annual rainfall) | $2.44 \times 10^{-4}$ (10% of average annual rainfall) | $2.44 \times 10^{-4}$ (10% of average annual rainfall) |
| $h_0$* | m | 2.2428 | 3.6673 | 4.9498 |
| $h_p$** | m | 0 | 0 | 0 |
| $K_{h1}$ | m/day | $9.09 \times 10^{-4}$ | $2.03 \times 10^{-3}$ | $4.69 \times 10^{-3}$ |
| **Zone 2** | | | | |
| $K_{h2}$ | m/day | $9.09 \times 10^{-4}$ | $2.03 \times 10^{-3}$ | $4.49 \times 10^{-3}$ |
| $K_{v2}$ | m/day | $9.09 \times 10^{-4}$ | $2.03 \times 10^{-3}$ | $4.49 \times 10^{-3}$ |
| **d** | RL m | 0 | 0 | 0 |

**Table 18.** Groundwater Inflow Analytical Model Input Parameters – Site 5

| PARAMETER | UNIT | BEST CASE | MOST LIKELY | UPPER CASE |
|---|---|---|---|---|
| **Excavation Matrix Storage** | | | | |
| **Effective Porosity (ϕ)** | - | 0.01% | 0.01% | 0.01% |
| **Bulk Excavation Level (BEL)** | RL mAHD | 44.55 | 44.55 | 44.55 |
| **Excavation Area** | $m^2$ | 9,049 | 9,049 | 9,049 |

| PARAMETER | UNIT | BEST CASE | MOST LIKELY | UPPER CASE |
|---|---|---|---|---|
| **Zone 1** | | | | |
| $r_p$ | m | 53.67 | 53.67 | 53.67 |
| $r_o$ | m | 70.95 | 82.50 | 106.20 |
| **W** | m/day | $2.44 \times 10^{-4}$ (10% of average annual rainfall) | $2.44 \times 10^{-4}$ (10% of average annual rainfall) | $2.44 \times 10^{-4}$ (10% of average annual rainfall) |
| $h_0$* | m | 9.5130 | 10.7893 | 11.3686 |
| $h_p$** | m | 0 | 0 | 0 |
| $K_{h1}$ | m/day | $8.85 \times 10^{-4}$ | $2.02 \times 10^{-3}$ | $6.60 \times 10^{-3}$ |
| **Zone 2** | | | | |
| $K_{h2}$ | m/day | $8.85 \times 10^{-4}$ | $2.02 \times 10^{-3}$ | $6.60 \times 10^{-3}$ |
| $K_{v2}$ | m/day | $8.85 \times 10^{-4}$ | $2.02 \times 10^{-3}$ | $6.60 \times 10^{-3}$ |
| **d** | RL m | 0 | 0 | 0 |

### 9.2.7 SUMMARY OF ANALYTICAL MODEL RESULTS

#### Estimate of Groundwater Matrix Take Volumes

The groundwater matrix removal was estimated using equation 1 and equation 2, with predictions provided in **Table 19** below.

**Table 19.** Prediction of Groundwater Volume Removed within the Excavation Matrix

| DEWATERING AREA | GROUNDWATER VOLUME REMOVED FROM MATRIX (ML) | | |
|---|---|---|---|
| | BEST CASE (LESS LIKELY) | MOST LIKELY | UPPER CASE (LESS LIKELY) |
| **Site 3** | 0.22 | **0.35** | 0.48 |
| **Site 5** | 0.86 | **0.97** | 1.03 |

#### Prediction of Groundwater Inflow Volumes

The annual groundwater inflow was estimated using equation 3, 4, 5 & 6, with predictions provided in **Table 20** below, assuming a 12-month dewatering program and continued dewatering during the site operation phase.

**Table 20.** Prediction of Annual Groundwater Inflow Volumes

| DEWATERING AREA | GROUNDWATER INFLOW (ML) – ZONE 1 & ZONE 2 | | |
|---|---|---|---|
| | BEST CASE (LESS LIKELY) | MOST LIKELY | UPPER CASE (LESS LIKELY) |
| **Site 3** | 0.30 | **0.95** | 2.65 |
| **Site 5** | 1.26 | **2.79** | 8.24 |

### Summary of 'Most Likely' Total Predicted Groundwater Take Volumes

Based on the initial 12-months of dewatering for Site 3 and Site 5 (including both the initial matrix storage removed via excavation and the groundwater inflow over the 12-month period) the following total groundwater extraction volumes for the proposed basement carparks at Site 3 and Site 5 was predicted and is presented in **Table 21** below.

**Table 21.** 'Most Likely'' Predicted Groundwater Take Volumes

| DEWATERING AREA | PREDICTED MATRIX TAKE (ML) | PREDICTED ANNUAL GROUNDWATER INFLOW TAKE (ML/YR) | TOTAL GROUNDWATER TAKE DURING CONSTRUCTION (ML) |
|---|---|---|---|
| **Site 3** | 0.35 | 0.95 | **1.30** |
| **Site 5** | 0.97 | 2.79 | **3.75** |

**Table 22.** Summary of Predicted Groundwater Take During and Post Construction at Site 3 ('Most Likely' Scenario)

| PERIOD | PREDICTED GROUNDWATER TAKE |
|---|---|
| **Maximum Potential Annual Take During Construction** (includes groundwater inflows and matrix removals for the basement for Site 3 over a 12-month period) | **1.30 ML** |
| **Post Construction – Long Term Groundwater Inflow** (Steady-state groundwater inflows from permanent/ongoing Drained Basement Design for both basements) | **0.95 ML/year** |

**Table 23** Summary of Predicted Groundwater Take During and Post Construction at Site 5 ('Most Likely' Scenario)

| PERIOD | PREDICTED GROUNDWATER TAKE |
|---|---|
| **Maximum Potential Annual Take During Construction** (includes groundwater inflows and matrix removals for the basement of Site 5 over a 12-month period) | **3.75 ML** |
| **Post Construction – Long Term Groundwater Inflow** (Steady-state groundwater inflows from permanent/ongoing Drained Basement Design) | **2.79 ML/year** |

It is noted that the predicted groundwater takes detailed in Table 22 and Table 23 above are considered conservative in nature given the basement excavation footprint for Site 3 was determined from the outline of basement level 2 which is larger than the upper basement. Additionally, the basement excavation footprint for Site 5 was determine by the largest basement level (level 3).**

### 9.2.8 PREDICTION OF DRAWDOWN DISTANCE

As part of the dewatering assessment, the extent of groundwater drawdown was estimated at regular distance intervals from the edge of the circular disk sinks (approximate excavation edge) Drawdown reaches 0 m at the following radial distance from the edge of the approximate excavation edge:

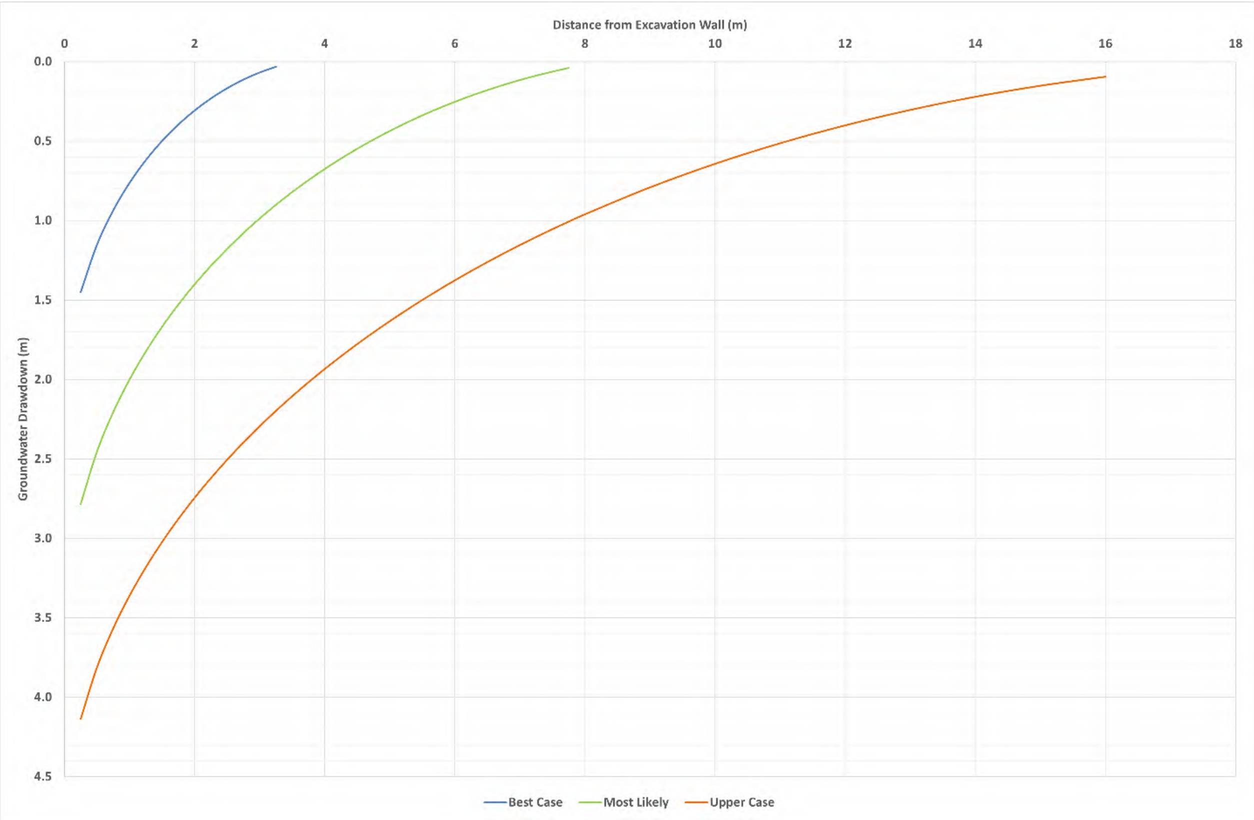
#### Site 3

- Best Case (Less Likely): 3.5 m
- Most Likely: 8 m
- Upper Case (Less Likely): 16 m

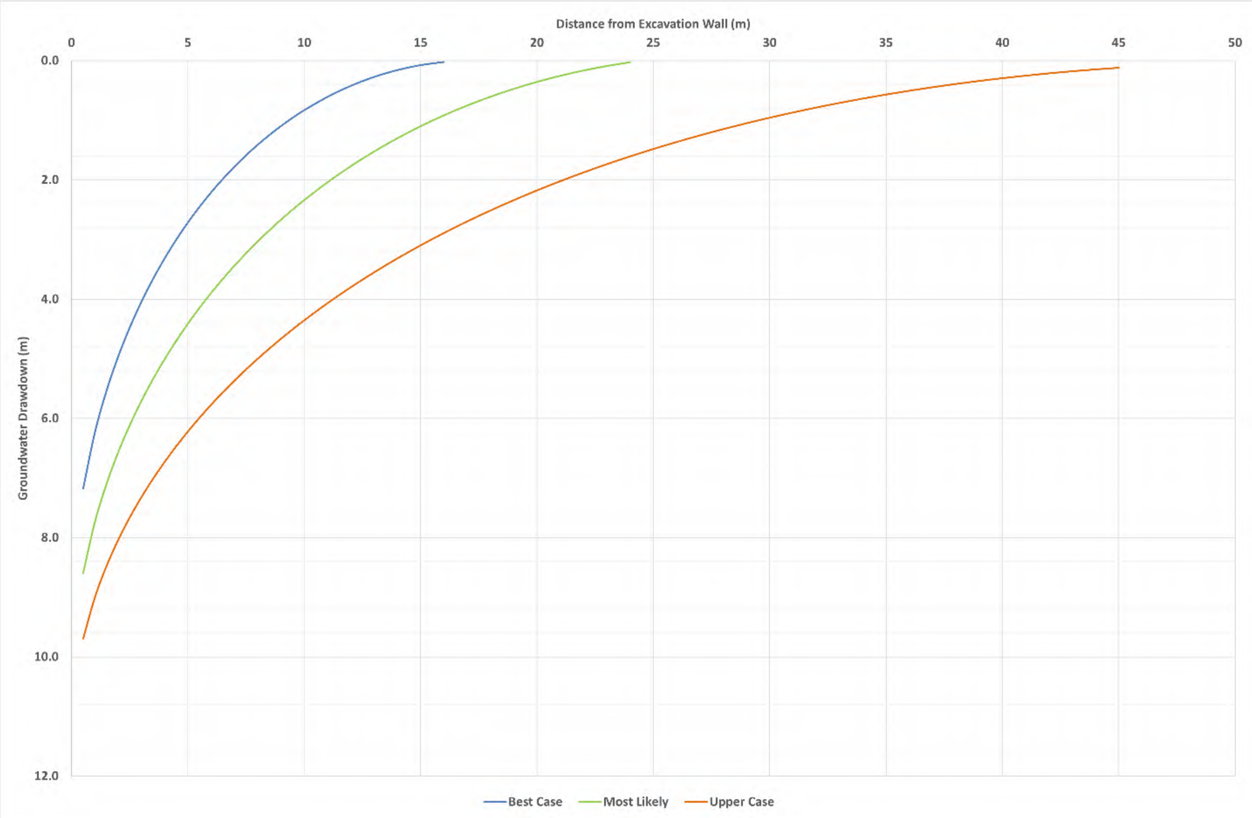
#### Site 5

- Best Case (Less Likely): 16 m
- Most Likely: 24 m
- Upper Case (Less Likely): 45 m

The estimated drawdown at distance from the excavation/basement walls have been provided in **Graph 1** and **Graph 2** below. It is noted that drawdown will equilibrate back to pre-construction conditions following construction if design is changed to a tanked basement.




**Graph 1.** Extent of Drawdown from Basement/Excavation Wall – Site 3




**Graph 2.** Extent of Drawdown from Basement/Excavation Wall – Site 5

It is the professional experience of Reditus that the groundwater levels in porous rock can vary naturally by several metres or more during prolonged periods of dry or wet weather. Accordingly, a temporary drop in the water table of 1 m or less is considered unlikely to result in off-site geotechnical settlement impacts, particularly within rock.

There is potential that drawdown outside the site may be sufficient to induce settlement in overlying buildings unless an appropriate DMP is implemented. A suitability qualified geotechnical consultant will be required to determine the potential settlement impacts caused by the potential drawdown as a result of the proposed dewatering activities.

**Detailed geotechnical considerations are beyond the scope of this assessment.**

## 9.3 Aquifer Interference Policy

The Aquifer Interference Policy includes a set of minimal impact considerations for assessing the impacts of all aquifer interference activities, including those regulated under the WMA 2000, the Water Act 1912 and those decided under other legislation. The NSW DPE (2022) Groundwater Impact Assessment Criteria provides a framework for the Minimal Impact threshold criteria.

Aquifer interference approvals are not to be granted unless the Minister is satisfied that adequate arrangements are in force to ensure that no more than minimal harm will be done to any water source, or its dependent ecosystems, as a consequence of its being interfered with in the course of the activities to which the approval relates.

Whilst aquifer interference approvals are not required to be granted, the minimal harm test under the WMA is not activated for the assessment of impacts. Therefore, this Policy establishes and objectively defines minimal impact considerations as they relate to water-dependent assets and these considerations will be used as the basis for providing advice to the Minister.

All NSW groundwater sources have been categorised as being either highly productive or less productive, based on the general character of the water source meeting or not meeting the criteria of 1500 mg/L total dissolved solids and a bore yield rate of greater than 5 L/s. This categorisation applies to a whole groundwater source as it is defined in a water sharing plan, not to the specific groundwater conditions at a particular location. The minimal impact considerations for the highly productive groundwater sources are different to those for the less productive groundwater sources.

Thresholds for minimal impact considerations have been developed for each groundwater source in NSW. Within the WMA, Table 1 – Minimal Impact Considerations for Aquifer Interference Activities are categorised into type of groundwater sources and are presented in Table 24 below. The thresholds relate to impacts on groundwater table and pressure, and to groundwater and surface water quality.

**Table 24.** Highly and Less Productive Groundwater Source Types

| HIGHLY PRODUCTIVE | LESS PRODUCTIVE |
|---|---|
| • Alluvial<br>• Coastal Sands<br>• Porous Rock<br>– Great Artesian Basin - Eastern Recharge and Southern Recharge.<br>– Great Artesian Basin – Surat, Warrego and Central<br>– other porous rock<br>• Fractured Rock | • Alluvial<br>• **Porous Rock**<br>• **Fractured Rock** |

The proposed development is considered to be located in a 'Less Productive' groundwater source as yields are less than 5 L/s and total dissolved solids are likely >1,500 mg/L.

An assessment of the 'Minimal Impact Considerations' summary is provided in **Table 25** below.

**Table 25.** Groundwater Impact Assessment Summary

| | |
|---|---|
| AQUIFER GROUNDWATER SOURCE | Porous and fractured rock groundwater sources, excluding all GAB groundwater sources |
| CATEGORY | Semi-Confined/Confined System (Less Productive) |
| IMPACT ASSESSMENT CRITERIA | **1.** Cumulative extraction over a ten-year period must not cause the recovered water level (metres below ground level) to drop below 25% of the *Relative Total Available Drawdown* at:<br>**a.** a distance of 200 metres from any production water supply works including the applicant's bores (e.g., bores on an approval linked to an access licence).<br>**b.** any other water supply work (i.e., at any basic landholder rights bores).<br>**2.** Additional drawdown over a ten-year period cannot exceed 10% of the *Total Available Drawdown* to a maximum of 3 metres at any 3rd-party water supply works. |
| ASSESSMENT RESULTS | There are no registered groundwater supply bores within a 1 km radius of either Site 3 or Site 5.<br>**Given the predicted drawdown radius of influence for the 'Most Likely' scenario is <10 m at Site 3 and <25 m at Site 5, the proposed dewatering works and drained basement designs are not considered likely to impact (cumulative or additional) any third-party water supply works.** |

## 9.4 Construction Phase

### 9.4.1 DEWATERING

Dewatering will be required during the construction of the basement carparks at both Site 3 and Site 5. A review of the analytical modelling results against the NSW DPE (2023) *Groundwater Impact Assessment Criteria,* NSW DPI (2012) AIP and WMA 200, presented in **Table 25** above, found the following impact assessment results:

- No registered groundwater supply bores within a 1 km radius of either Site 3 or Site 5.
- No high priority GDEs or high priority culturally significant sites within the vicinity of the project.
- The predicted drawdown radius of influence for the 'Most Likely' scenario is <10 m at Site 3 and <25 m at Site 5.

As such, dewatering activities are considered to be of **Minimal Impact** to the water table, water pressure and water quality.

Two (2) bores are located within 2 km of the site, with the closest bore being approximately 1.02 km southwest of the site and therefore located outside of the upper-case (less likely) scenario for potential drawdown at both Site 3 and Site 5.

No high-priority GDEs are located within a 500 m radius of the site. The nearest high-priority GDE is located over 5 km from the site (i.e., Sydney Enriched Sandstone Moist Forest), beyond the influence of any proposed dewatering at the site.

### 9.4.2 POLLUTANTS AND CHEMICAL CONTAMINATION

The proposed development will involve construction phase works which have the potential to impact groundwater through increased pollutant generation activities that may infiltrate into the aquifer below the site. Potential pollutant generation may include:

- Leaching of heavy metals from construction materials.
- Chemical spillages including hydrocarbons from fluids associated with construction machinery. To reduce the potential for material leaching and chemical spills during construction a site specific Construction Environmental Monitoring Plan (CEMP) should be developed for the project prior to construction works commencing.

### 9.4.3 IMPERVIOUS AREAS

The proposed development will increase the impervious areas during the construction phase through compaction of soils from plant movement, and as a result of on-going operation through an increase in hardstand areas, particularly in the footprint of the proposed basement carparks. This may cause a reduction in infiltration and recharge into the aquifer below the site.

## 9.5 Operational Phase

### 9.5.1 DEWATERING

As the basements at Site 3 and Site 5 will incorporate a 'drained basement' design, ongoing dewatering will be required. Annual dewatering rates are presented in **Table 22**and **Table 23**, and dewatering impacts are considered to be consistent with impacts encountered during the construction phase. As such, minimal impacts from ongoing dewatering are considered. It is noted that should design be changed to incorporate a drained basement, operation impacts to groundwater as a result will be removed.

Based on the upper-case (less likely) scenario for estimated drawdown, the operational phase dewatering for the proposed drained basement is unlikely to impact any of the local registered bores.

Water quality of the discharge waters will need to be treated with a permanent water treatment system and monitoring to confirm the quality of the discharge water. This will need to be detailed within the DMP and Groundwater Works Access Licence required to be obtained for the development.

### 9.5.2 IMPERVIOUS AREAS

With reference to the proposed development, it Is expected that there will be an increase in impervious (hardstand) areas, particularly in the footprint of the basement carparks. The likely impacts from the increase in hardstand includes reduced infiltration and recharge into the underlying aquifer. This can potentially have negative long-term inclusion of landscaped areas within the proposed development.

# 10 Cumulative Impacts

Assessment of potential cumulative impacts for the proposed development includes review of surrounding land use and zoning, as well as developments and proposals that have the potential to cause cumulative impacts to the local groundwater regime.

As specified in **Section 7.1**, the surrounding land use and current zoning includes the following:

- **North**: Vacant land, followed by low-density residential use and St Francis Catholic College, zoned R1 – General Residential.
- **East**: Bushland and an unnamed creek (second order), zoned RE1 – Public Recreation, followed by vacant land and parking for Edmondson Park train station, zoned B4 – Mixed Use.
- **South**: Sydney Trains rail corridor (zoned SP2 – Infrastructure) followed by sparsely vegetated vacant land, zoned C1 – National Parks and Nature Reserves.
- **West**: Vacant land followed by Edmondson Park Public School and low-density residential properties, zoned R1 – General Residential.

The vacant and cleared land surrounding the site indicates the potential for other development works to occur within the vicinity of the site, which could cause cumulative impacts, particularly if ongoing dewatering activities (i.e., drained basements) are also proposed. However, given no registered water supply works were identified within a 1 km radius of the site (see **Section 7.5.7**) it is therefore assumed there are no current ongoing dewatering activities (i.e., drained basements) or other groundwater extraction within a 1 km radius of the site which could cause cumulative impacts to the local groundwater regime.

# 11 Mitigation and Management Measures

An assessment of potential impacts to groundwater during the construction and operational phase of the development, including mitigation measures are presented in **Table 26** below.

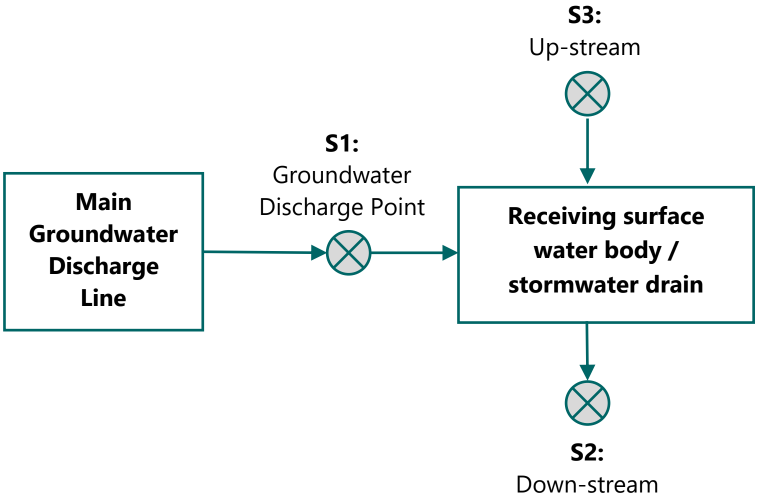
**Table 26.** Potential Risks to Groundwater and Mitigation Measures

| RISK | IMPACT TYPE | PHASE | POTENTIAL IMPACTS | MITIGATION MEASURES |
|---|---|---|---|---|
| Impervious Areas | Groundwater | Construction / Operation | Increase overland flow during rain events has potential to transport contaminants and sediments into surface water bodies reduce recharge into aquifers. | Provide adequate deep soil and permeable landscape areas as vegetation buffer strips. Incorporation, were possible, of permeable pavements and appropriate design of stormwater detention |
| Dewatering | Groundwater | Construction / Operation | Impacts to surrounding GDEs and water supply bores within the vicinity of the basement construction caused by drawdown during dewatering activities | Extraction rates, drawdown and water quality monitoring requirements incorporated into a Dewatering Management Plan (DMP).<br>DMP and Water Supply Works Approval required to be obtained for the development prior to dewatering commencing.<br>Minimise depths of excavation below groundwater table during basement construction |
| Stormwater discharge | Groundwater | Construction / Operation | Contamination of receiving water body (Maxwells Creek and the Georges River) and associated water courses down-stream of excavation as a result of discharging water to the | Extraction rates, drawdown and water quality monitoring requirements incorporated into a dewatering management plan (DMP)<br>All construction groundwater to be discharged during basement construction dewatering is to be appropriately treated and to comply with adopted discharge water quality criteria (DWQC) |
| Chemical spills | Groundwater | Construction / Operation | Contaminate the underlying groundwater via seepage into the ground or surface water via run-off into receiving waterbodies | Storage of hazardous liquids and refuelling operations to take place in bunded areas to reduce chance of spillage causing impacts<br>Incorporate water quality monitoring plan into CEMP that will constantly monitor water quality of receiving water bodies |

### 11.1.1 DEWATERING MANAGEMENT AND MONITORING MEASURES

Monitoring of the discharge water is to be completed in accordance with a future DMP. Construction phase groundwater monitoring is to be completed by a suitably qualified person, using calibrated equipment to collect and analyse samples that are representative of the water to be discharge from the basement excavation works. Results will be compared to discharge water quality criteria. Council will be notified if any results indicate an adverse impact to the environment.

Water quality samples will be collected from the following locations as presented in the flow chart below.




The future DMP will establish the monitoring frequency and staging of monitoring requirements. This is to include initial assessment/trial run period, construction dewatering discharge monitoring period, identification of roles and responsibilities, inspection requirements, contingencies for non-compliance and records and reporting to be held throughout the life of the construction project.

### 11.1.2 DEWATERING IMPACT MEASURES AND MITIGATION

The potential impacts to groundwater via drawdown of the water table during basement excavation include impact to groundwater users and GDEs. Based on the analytical model discussed in **Section 9.3**, dewatering activities are considered to be of Minimal Impact to the water table, water pressure and water quality. Assessment of the impacts discussed from drawdown have been provided in **Section 9.4** and indicate that any potential impacts are considered minimal. However, it would be considered prudent to include mitigation and management measures for the identified potential impacts. The future DMP would include strategies to manage potential impacts during both construction, and ongoing operation, including:

- Staging of construction works which would include assessment of drawdown impacts to assess if the construction works are adversely impacting the environment.
- Monitoring of groundwater elevations surrounding the basement excavation during the construction period.
- Outlining mitigation and management measures in the instance that groundwater discharge quantities exceed the expected discharge quantity which would include ceasing of dewatering activities.
- Although it is expected that the water table will stabilise, climatic conditions, including prolonged wet and dry periods can have significant impacts to groundwater levels. Operational long-term dewatering for the life of the development will be required for the proposed drained basement. Implementation of filtration systems that will allow constant management of groundwater discharge is required to ensure that the water being collected in the basement sump meets the discharge water quality criteria before being discharge to the stormwater system and ultimately the Georges River. Discussion, recommendations and implementation of the systems required for drained basement groundwater discharge will be presented in future DMP. Should a tanked basement be incorporated, then impact measures and mitigation will not be required for the ongoing operation.

### 11.1.3 POLLUTION OF GROUNDWATER

To appropriately manage the impacts of pollutants and sediments on surface water and groundwater during the construction works. A Construction Environment Management Plan (CEMP) is to be implemented. The CEMP will address the potential risks and impacts to the receiving water body associated with hazardous chemical spillages, loose soil and increased run-off from increased hardstand areas, and will develop adequate mitigation measures that would typically include:

- Bunding of storage areas that contain hazardous goods
- Staging of construction works to minimise impacts
- Implement adequate site drainage to prevent ponding of water in active areas that can potentially mobilise contaminants and seep into groundwater or via overland flow into surface water bodies.
- Soil management plans to appropriately manage revegetation and proper compaction of soils to reduce sedimentation impact to receiving water bodies.
- Implement stormwater management designs that appropriately manage potentially contaminated surface water run-off.

Construction related risks such as earthworks, spills and stockpiling of soils will be generally managed in accordance with the Blue Book (Landcom 2004/DECC, 2008).

## 11.2 Reporting

Appropriate management systems will include the reporting and recording of monitoring outcomes, significant water quality impacts and associated intervention measures should occur as frequently as once a month for the construction period and the operational period of the development, or when necessary, such in the instance that an incident was to occur. The requirements, roles and responsibilities of the principal contractors including reporting responsibilities to the relevant government bodies will be discussed in further detail in future DMP.

# 12 Conclusion

The findings of this report include characterisation of the existing environment at the site, a review of the of potential impacts to the groundwater environment from the proposed development, review of relevant legislation and policy relating to the development and mitigation measures for the identified impacts.

A summary of the findings of this assessment include:

- The groundwater impacts associated with the basement excavations for Site 3 and Site 5 have been assessed based on the inflow calculations and probable drawdown expectations during the construction phase and operational phase of the development.
  - The assessment found that dewatering activities are considered to be of Minimal Impact to the water table, water pressure and water quality.
- Other potential impacts to groundwater include potential chemical spillages, increase in hardstand areas, increase in potentially contaminating activities such as vehicle movement, incorrect soil stabilisation and other construction related impacts.

All identified potential impacts are considered to be manageable with appropriate mitigation measures that include:

- Appropriately designed deep soil, landscaping buffers and stormwater detention to mitigate impacts associated with increases in impervious surfaces.
- Extraction rates, drawdown and water quality monitoring requirements incorporated into a DMP
  - Minimise depths of excavation below the groundwater table during basement construction
  - Reduce the dewatering time period during basement excavations.
- All water to be discharged during basement construction dewatering to comply with adopted discharge water quality criteria (DWQC).
- Storage of hazardous liquids and refuelling operations to take place in bunded areas to reduce chance of spillage causing impacts

# 13 References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- NSW DPI – Office of Water (2012) Aquifer Interference Policy.
- NSW DPE (2023) Groundwater Impact Assessment Criteria.
- NSW DPIE (2022) Minimum Requirements for Building Site Groundwater Investigations and Reporting.

# A

## Figures


| Map |
|---|
| 25302_rp01_f01_siteloc_v01 |
| **Date of Export** |
| 13/02/2026 |

| Author | Approver |
|---|---|
| TG | RC |

**Data Source**

Metromap, Google Maps, Open Street Map, NSW Government

## Legend

- Site Boundaries
- Surface Water

**Watercourses**

- Rivers
- Stream (Perennial)
- Stream (Non-Perennial)
- Unnamed Stream (Non-Perennial)
- Other Channels

**Figure 1 - Site Location**

Sites 3, 4 and 5, Edmondson Park NSW

25302 - RP01 - Groundwater Impact Assessment

Urban Property Group


| Map | |
|---|---|
| 25302_rp01_f02_sitelay_v01 | |
| **Date of Export** | **Map Scale (approx. at A3)** |
| 13/02/2026 | 1:1,400 |
| **Author** | **Approver** |
| TG | RC |
| **Data Source** | |
| Metromap, Google Maps, Open Street Map, Geoscience Australia | |

**Legend**

- Site Boundaries
- Basement Boundaries
- Monitoring Well Locations
- NSW Contours - 2m

**Figure 2 - Site Layout**

Sites 3, 4 and 5, Edmondson Park NSW

25302 - RP01 - Groundwater Impact Assessment

Urban Property Group

REDITUS


| Map | |
|---|---|
| 25302_rp01_f03_contours_v01 | |
| Date of Export | Map Scale (approx. at A3) |
| 16/02/2026 | 1:1,400 |
| Author | Approver |
| TG | RC |
| Data Source | |
| Metromap, Google Maps, Open Street Map, Geoscience Australia | |

**Legend**

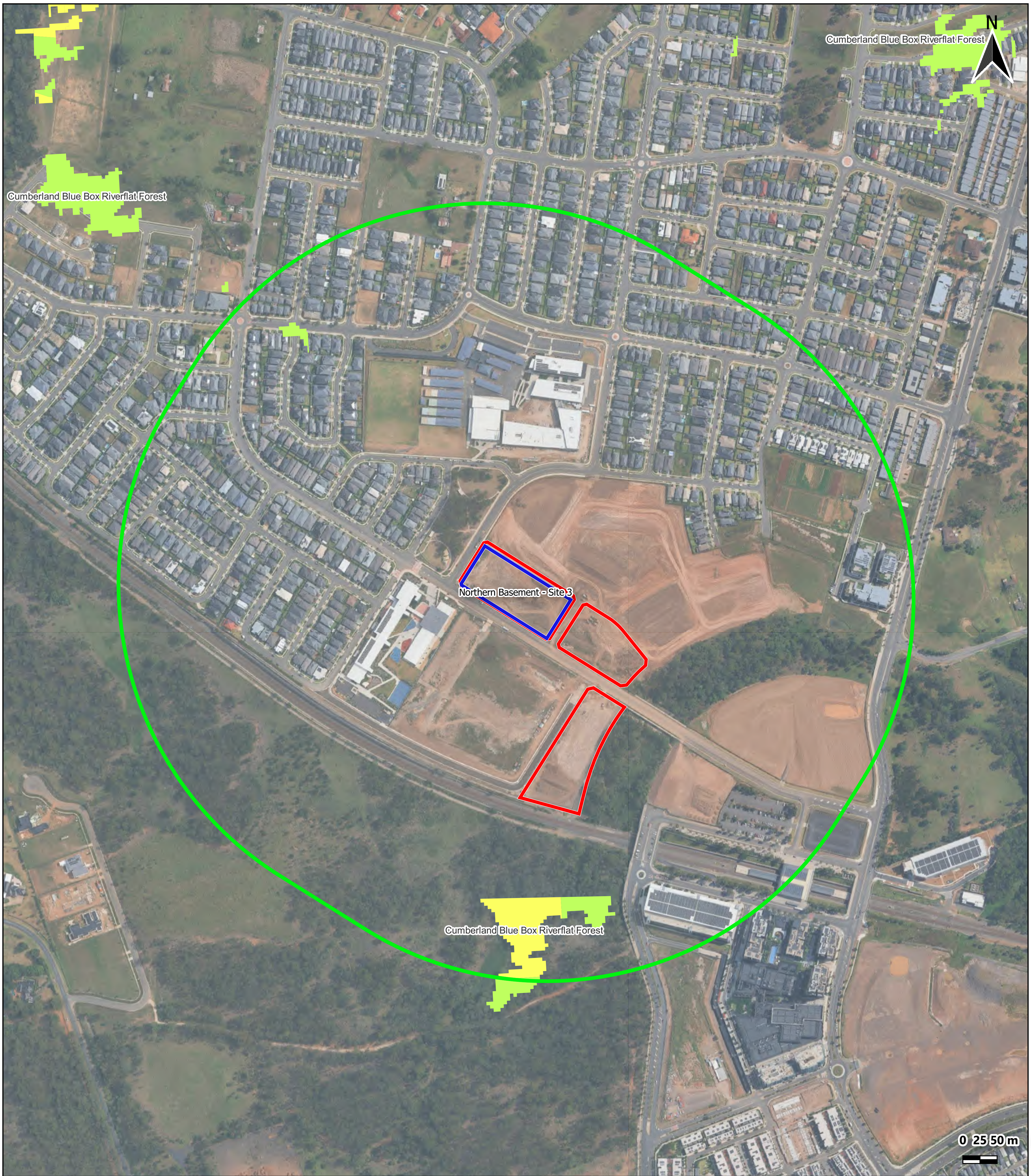
- Monitoring Well Locations
- Basement Boundaries
- Site Boundaries
- Groundwater Elevation Contours
- Groundwater Flow Direction

**Figure 3 - Contours**

Sites 3, 4 and 5, Edmondson Park NSW

25302 - RP01 - Groundwater Impact Assessment

Urban Property Group




| Map | |
|---|---|
| 25302_rp01_f04A_risk&rec_v01 | |
| **Date of Export** | **Map Scale (approx. at A3)** |
| 16/02/2026 | 1:5,600 |
| **Author** | **Approver** |
| TG | RC |
| **Data Source** | |
| Metromap, Google Maps, Open Street Map, Geoscience Australia | |

## Legend

- Site Boundaries
- Northern Basement - Site 3 Boundary
- Northern Basement - 500m Buffer

**Sydney Metro_GDE_HEVAE**

- Very High
- High
- Medium
- Low
- Very Low

**Third Party Bores**

- Production Bore
- BLR Bore
- Dewatering
- Mining
- Monitoring Bore
- Test Bore
- Unknown Use

**Figure 4A - Receptors and Risks**

Sites 3, 4 and 5, Edmondson Park NSW

25302 - RP01 - Groundwater Impact Assessment

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| Map | |
|---|---|
| 25302_rp01_f04B_risk&rec_v01 | |
| **Date of Export** | **Map Scale (approx. at A3)** |
| 16/02/2026 | 1:5,600 |
| **Author** | **Approver** |
| TG | RC |
| **Data Source** | |
| Metromap, Google Maps, Open Street Map, Geoscience Australia | |

## Legend

- Site Boundaries
- Southern Basement - Site 5 Boundary
- Southern Basement - 500m Buffer

**Sydney Metro_GDE_HEVAE**

- Very High
- High
- Medium
- Low
- Very Low

**Third Party Bores**

- Production Bore
- BLR Bore
- Dewatering
- Mining
- Monitoring Bore
- Test Bore
- Unknown Use

**Figure 4B - Receptors and Risks**

Sites 3, 4 and 5, Edmondson Park NSW

25302 - RP01 - Groundwater Impact Assessment

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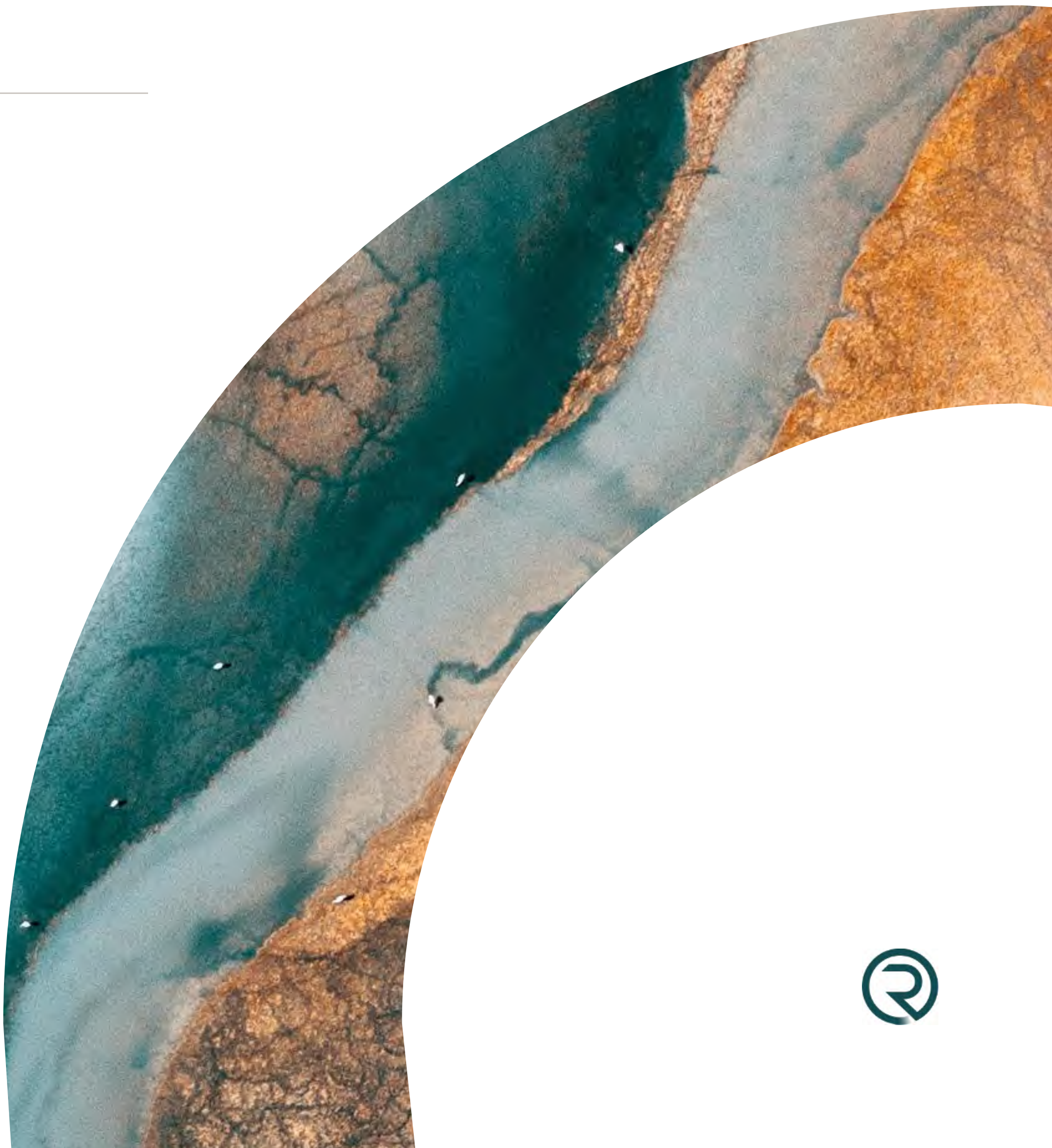
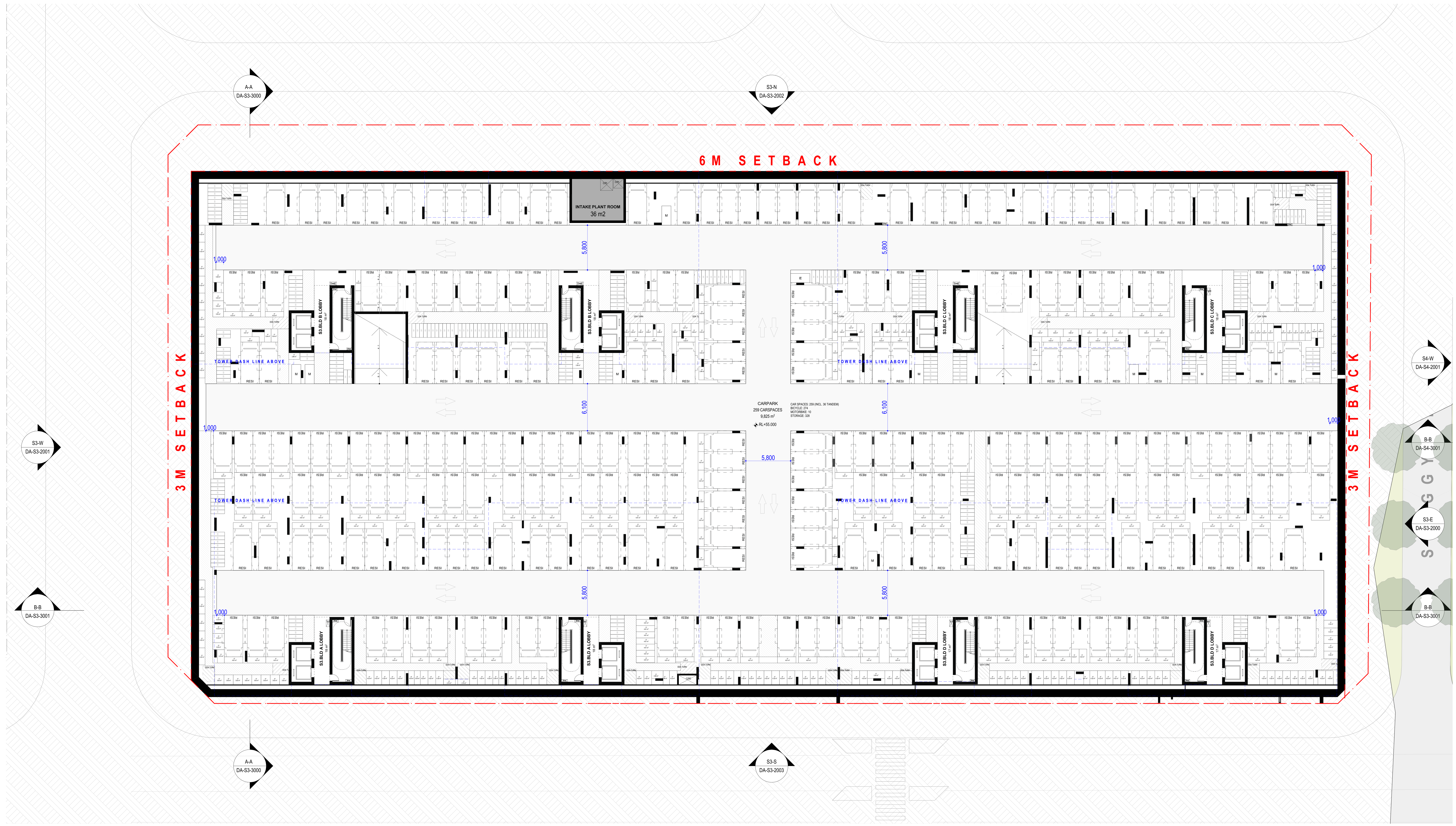
# B

## Development Plans & Survey






01 BASEMENT 01
SCALE: 1:250@A1

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| A | DC | MB | FOR SUBMISSION | 19/12/2025 |
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| MB | DC | |

DRAWING TITLE
**GENERAL FLOOR PLAN - BASEMENT 01**

| PROJECT NUMBER | STAGE |
|---|---|
| 20794 | DA |

| DRAWING NUMBER | REVISION |
|---|---|
| DA-S3-0098 | B |


01 LOWER GROUND
SCALE: 1:250@A1

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PROJECT NUMBER
20794

STAGE
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DRAWING NUMBER
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01 BASEMENT 03
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PROJECT NUMBER
20794

STAGE
DA

DRAWING NUMBER
DA-S5-0097

REVISION
B


01 BASEMENT 02
SCALE: 1:250@A1

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**GENERAL FLOOR PLAN - BASEMENT 02**

PROJECT NUMBER
20794

STAGE
DA

DRAWING NUMBER
DA-S5-0098

REVISION
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01 BASEMENT 01
SCALE: 1:250@A1

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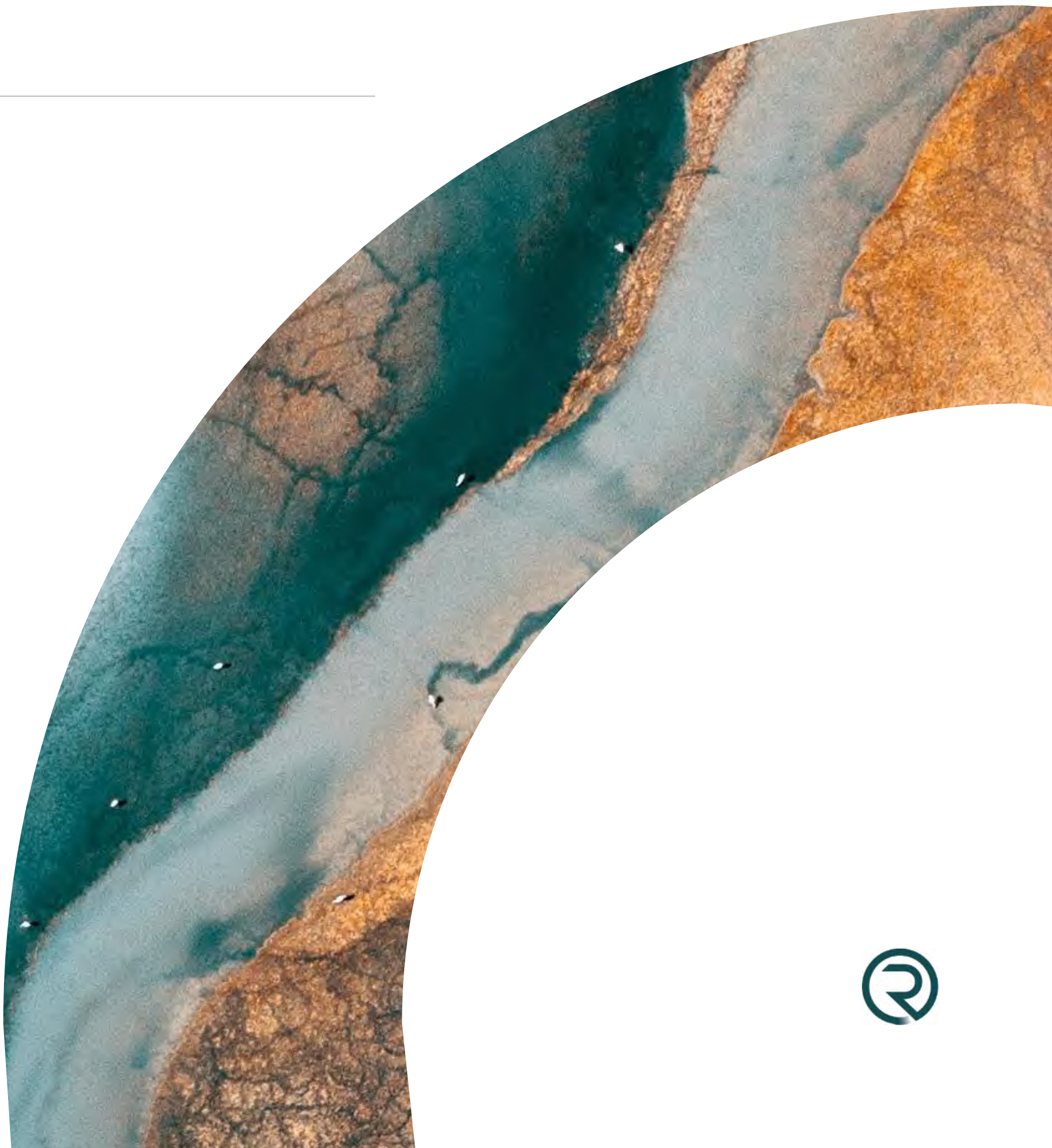
DRAWING TITLE
**GENERAL FLOOR PLAN - BASEMENT 01**

| PROJECT NUMBER | STAGE |
|---|---|
| 20794 | DA |

| DRAWING NUMBER | REVISION |
|---|---|
| DA-S5-0099 | B |

# C

## Borehole & Monitoring Well Logs



# MONITORING WELL LOG

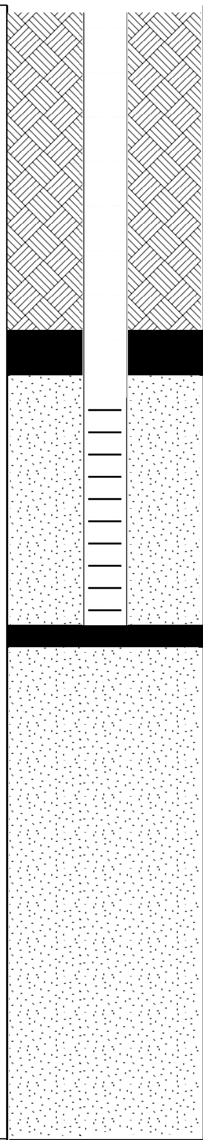
**BH ID: BH1M**

| | | | |
|---|---|---|---|
| **Location** | Lot 4 to 8 Buchan Avenue, Edmonson Park NSW | **Started** | 02 December 2025 |
| **Client** | UPG Edmondson Parkland Pty Ltd | **Completed** | 02 December 2025 |
| **Job No.** | E26949.G03 | **Logged By** | DC — **Date** 02 December 2025 |
| **Sheets** | 1 of 1 | **Review By** | SK — **Date** 29 January 2026 |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Contractor** | Geosense Drilling Engineers | **Surface RL** | ≈63.70 m (AHD) | **Northing** | 6239623.6 (MGA 2020 Zone 56) |
| **Plant** | Comacchio Geo 205 | **Inclination** | 90° | **Easting** | 301685.1 (MGA 2020 Zone 56) |

| WATER | SAMPLES & FIELD TESTS | DEPTH (m) | RL (m AHD) | MATERIAL DESCRIPTION | MOISTURE CONDITION |
|---|---|---|---|---|---|
| | | 0.00 | 63.70 | FILL: Sandy CLAY: low plasticity, brown, sand is fine to medium grained, with fine grained, angular to sub-angular gravels and rootlets. | M < PL |
| | BH1M_0.50-0.95<br>SPT 0.50-0.95<br>5,7,13 N=20 | 0.30 | 63.40 | FILL: Silty CLAY: orange mottled grey, trace angular to subangular gravels. | |
| | BH1M_1.50-1.60<br>SPT 1.50-1.60<br>8/100 mm HB N=R | 1.60 | 62.10 | SHALE: brown, highly weathered, very low strength. | - |
| | | 3.00 | 60.70 | From 3.00m, grey. | |
| | | 6.00 | 57.70 | NO CORE: 750mm thick | |
| 03/12/2025 ▼ | | 6.75 | 56.95 | SHALE: dark grey. | |
| | | 8.20 | 55.50 | SHALE: dark grey, with grey sandstone laminae, bedded at 0°. | |
| | | 14.11 | 49.59 | SANDSTONE: fine to medium grained, grey, massive. | |
| | | 14.52 | 49.18 | SHALE: dark grey, with grey sandstone laminae, bedded at 0°. | |
| | | 15 | 48.70 | Terminated at 15.00m. Target Depth Reached. | |

| BACKFILL DETAILS | STANDPIPE DETAILS |
|---|---|
| Cuttings 0.10m - 4.30m | Well Stickup =-0.10m (RL 63.60m) |
| Bentonite 4.30m - 4.90m | 0.10m - 5.20m PVC casing (50mm Ø) |
| Sand 4.90m - 8.20m | 5.20m - 8.20m PVC screen (50mm Ø) |
| Bentonite 8.20m - 8.50m | |
| Sand 8.50m - 15.00m | |



This log should be read in conjunction with EI Australia's accompanying explanatory notes.

# MONITORING WELL LOG

BH ID: BH2M

| | | | |
|---|---|---|---|
| **Location** | Lot 4 to 8 Buchan Avenue, Edmonson Park NSW | **Started** | 03 December 2025 |
| **Client** | UPG Edmondson Parkland Pty Ltd | **Completed** | 03 December 2025 |
| **Job No.** | E26949.G03 | **Logged By** | DC — **Date** 03 December 2025 |
| **Sheets** | 1 of 1 | **Review By** | SK — **Date** 29 January 2026 |
| **Drilling Contractor** | Geosense Drilling Engineers | **Surface RL** | ≈62.70 m (AHD) |
| **Northing** | 6239632.0 (MGA 2020 Zone 56) | | |
| **Plant** | Comacchio Geo 205 | **Inclination** | 90° |
| **Easting** | 301778.1 (MGA 2020 Zone 56) | | |

| WATER | SAMPLES & FIELD TESTS | DEPTH (m) | RL (m AHD) | MATERIAL DESCRIPTION | MOISTURE CONDITION | BACKFILL DETAILS | STANDPIPE DETAILS |
|---|---|---|---|---|---|---|---|
| 08/12/2025 | BH2_0.50-0.95<br>SPT 0.50-0.95<br>5,8,11 N=19<br>BH2_1.50-1.95<br>SPT 1.50-1.95<br>1,3,5 N=8 | 0.00 | 62.70 | FILL: Sandy CLAY: brown mottled orange, sand is fine to medium grained, with fine grained, angular to sub-angular gravels and rootlets. | D | Grout 0.10m - 3.00m | Well Stickup =-0.10m (RL 62.60m)<br>0.10m - 4.0m PVC casing (50mm Ø) |
| | BH2_2.50-2.70 | 2.00 | 60.70 | SHALE: brown, very low strength, highly weathered. | - | | |
| | | 3.00 | 59.70 | From 3.00m, grey. | | Bentonite 3.00m - 3.50m<br>Sand 3.50m - 7.00m | |
| | | 5.30 | 57.40 | SHALE: grey. | | | 4.0m - 7.0m PVC screen (50mm Ø) |
| | | 6.31 | 56.39 | NO CORE: 140mm thick | | | |
| | | 6.45 | 56.25 | SHALE: grey. | | Bentonite 7.00m - 7.30m | |
| | | 7.40 | 55.30 | NO CORE: 290mm thick | | | |
| | | 7.69 | 55.01 | SHALE: grey. | | Sand 7.30m - 10.22m | |
| | | 8.78 | 53.92 | NO CORE: 220mm thick | | | |
| | | 9.00 | 53.70 | SHALE: grey. | | | |
| | | | 52.48 | Terminated at 10.22m. Target Depth Reached. | | | |

# MONITORING WELL LOG

BH ID: BH3M

| | | | | | |
|---|---|---|---|---|---|
| **Location** | Lot 4 to 8 Buchan Avenue, Edmonson Park NSW | **Started** | 03 December 2025 | | |
| **Client** | UPG Edmondson Parkland Pty Ltd | **Completed** | 03 December 2025 | | |
| **Job No.** | E26949.G03 | **Logged By** | DC | **Date** | 03 December 2025 |
| **Sheets** | 1 of 1 | **Review By** | SK | **Date** | 29 January 2026 |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Contractor** | Geosense Drilling Engineers | **Surface RL** | ≈57.50 m (AHD) | **Northing** | 6239553.5 (MGA 2020 Zone 56) |
| **Plant** | Comacchio Geo 205 | **Inclination** | 90° | **Easting** | 301802.6 (MGA 2020 Zone 56) |

| WATER | SAMPLES & FIELD TESTS | DEPTH (m) | GRAPHIC LOG | RL (m AHD) | MATERIAL DESCRIPTION | MOISTURE CONDITION |
|---|---|---|---|---|---|---|
| | | 0.00 | | 57.50 | FILL: Sandy CLAY: brown mottled orange, sand is fine to medium grained, with angular to sub-angular gravels and rootlets. | D |
| | | 1.00 | | 56.50 | SHALE: brown, very low strength, highly weathered. | - |
| | | 2.50 | | 55.00 | From 2.50m, grey. | |
| | | 4.70 | | 52.80 | SHALE: dark grey, with sandstone laminations, bedded at 0° and 5°. | |
| 08/12/2025 ▼ | | | | | | |
| | | 10.27 | | 47.23 | Terminated at 10.27m. Target Depth Reached. | |

**BACKFILL DETAILS**

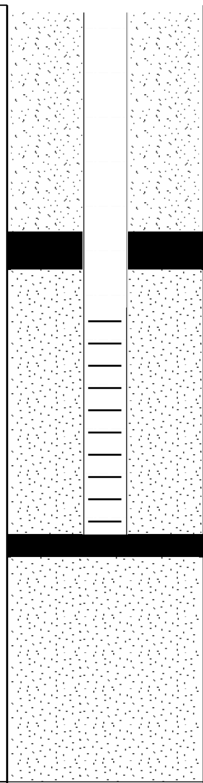
Grout 0.10m - 3.00m

Bentonite 3.00m - 3.50m

Sand 3.50m - 7.00m

Bentonite 7.00m - 7.30m

Sand 7.30m - 10.27m



**STANDPIPE DETAILS**

Well Stickup =-0.10m (RL 57.40m)

0.10m - 4.0m PVC casing (50mm Ø)

4.0m - 7.0m PVC screen (50mm Ø)

# MONITORING WELL LOG

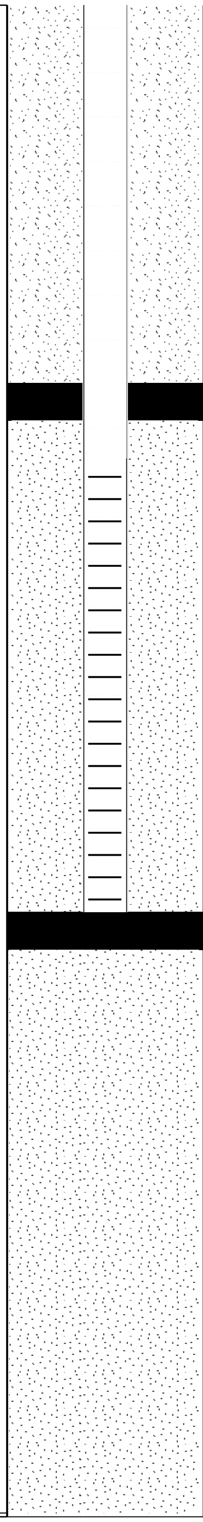
BH ID: BH7M

| | | | |
|---|---|---|---|
| **Location** | Lot 4 to 8 Buchan Avenue, Edmonson Park NSW | **Started** | 04 December 2025 |
| **Client** | UPG Edmondson Parkland Pty Ltd | **Completed** | 04 December 2025 |
| **Job No.** | E26949.G03 | **Logged By** | DC **Date** 04 December 2025 |
| **Sheets** | 1 of 2 | **Review By** | SK **Date** 29 January 2026 |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Contractor** | Geosense Drilling Engineers | **Surface RL** | ≈55.90 m (AHD) | **Northing** | 6239439.6 (MGA 2020 Zone 56) |
| **Plant** | Comacchio Geo 205 | **Inclination** | 90° | **Easting** | 301906.7 (MGA 2020 Zone 56) |

| WATER | SAMPLES & FIELD TESTS | DEPTH (m) | RL (m AHD) | MATERIAL DESCRIPTION | MOISTURE CONDITION |
|---|---|---|---|---|---|
| | BH7M_0.50-0.95<br>SPT 0.50-0.95<br>5,6,10 N=16<br><br>BH7M_1.50-1.95<br>SPT 1.50-1.95<br>1,5,7 N=12 | 0.00 | 55.90 | FILL: Sandy CLAY: brown mottled orange, sand is fine to medium grained, fine grained, angular to sub-angular gravels, plastic and rootlets. | M < PL |
| | BH7M_3.00-3.45<br>SPT 3.00-3.45<br>4,5,9 N=14 | 3.00 | 52.90 | Silty CLAY: medium plasticity, orange, trace of fine grained, angular to sub-angular gravels. | |
| | BH7M_4.50-4.95<br>SPT 4.50-4.95<br>7,10,18 N=28 | 4.00 | 51.90 | From 4.00m, orange mottled grey. | |
| | | 5.00 | 50.90 | SHALE: brown, very low strength, highly weathered. | - |
| | | 7.00 | 48.90 | SHALE: brown/grey, bedded at 0°–5°. | |
| | | 9.40 | 46.50 | SANDSTONE: fine to medium grained, grey. | |
| | | 9.64 | 46.26 | SHALE: brown/grey, bedded at 0°–5°. | |
| 09/12/2025 | | 10.58 | 45.32 | NO CORE: 570mm thick | |
| | | 11.15 | 44.75 | SHALE: brown/ grey. | |
| | | 12.00 | 43.90 | From 12.00m, dark grey, with sandstone laminae, bedded at 0°–5°. | |
| | | 14.34 | 41.56 | NO CORE: 290mm thick | |
| | | 14.63 | 41.27 | SHALE: dark grey, with grey sandstone laminae, bedded at 0°–5°. | |
| | | 15.90 | 40.00 | SANDSTONE: fine to medium grained, grey, indistinctly bedded. | |
| | | 19.95 | | Terminated at 19.95m. Target Depth Reached. | |

| BACKFILL DETAILS | STANDPIPE DETAILS |
|---|---|
| Grout 0.00m - 5.00m | Well Stickup =0.0m (RL 55.90m) |
| Bentonite 5.00m - 5.50m | 0.0m - 6.0m PVC casing (50mm Ø) |
| Sand 5.50m - 12.00m | 6.0m - 12.0m PVC screen (50mm Ø) |
| Bentonite 12.00m - 12.50m | |
| Sand 12.50m - 19.95m | |



# MONITORING WELL LOG

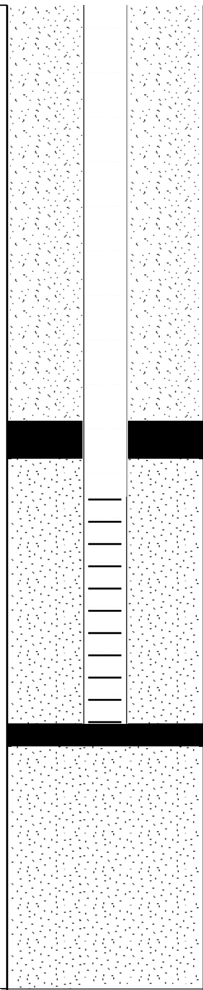
BH ID: BH8M

| | | | | | |
|---|---|---|---|---|---|
| **Location** | Lot 4 to 8 Buchan Avenue, Edmonson Park NSW | **Started** | 08 December 2025 | | |
| **Client** | UPG Edmondson Parkland Pty Ltd | **Completed** | 08 December 2025 | | |
| **Job No.** | E26949.G03 | **Logged By** | DC | **Date** | 08 December 2025 |
| **Sheets** | 1 of 1 | **Review By** | SK | **Date** | 29 January 2026 |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Contractor** | Geosense Drilling Engineers | **Surface RL** | ≈57.50 m (AHD) | **Northing** | 6239390.5 (MGA 2020 Zone 56) |
| **Plant** | Comacchio Geo 205 | **Inclination** | 90° | **Easting** | 301821.3 (MGA 2020 Zone 56) |

| WATER | SAMPLES & FIELD TESTS | DEPTH (m) | RL (m AHD) | MATERIAL DESCRIPTION | MOISTURE CONDITION |
|---|---|---|---|---|---|
| | | 0.00 | 57.50 | FILL: Sandy CLAY: brown, sand is medium to coarse grained, with angular to sub-angular gravels and plastic. | M < PL |
| | | 1.50 | 56.00 | Silty CLAY: low to medium plasticity, orange mottled grey. | M < PL |
| | | 2.50 | 55.00 | SHALE: brown, very low stregth, highly weathered. | - |
| | | 4.00 | 53.50 | NO CORE: 450mm thick | |
| 09/12/2025 | | 4.45 | 53.05 | SHALE: brown/ grey. | |
| | | 6.67 | 50.83 | From 6.67m, dark grey/ brown, with grey sandstone laminae, bedded at 0°-10°. | |
| | | 9.40 | 48.10 | SANDSTONE: fine to medium grained, pale grey, indistinctly bedded at 0°-5°. | |
| | | 11.97 | 45.53 | SHALE: grey, bedded at 0°–5°. | |
| | | 13 | 44.50 | Terminated at 13.00m. Target Depth Reached. | |

| BACKFILL DETAILS | STANDPIPE DETAILS |
|---|---|
| | Well Stickup =0.0m (RL 57.50m) |
| Grout 0.00m - 5.50m | 0.0m - 6.50m PVC casing (50mm Ø) |
| Bentonite 5.50m - 6.00m | |
| Sand 6.00m - 9.50m | 6.50m - 9.50m PVC screen (50mm Ø) |
| Bentonite 9.50m - 9.80m | |
| Sand 9.80m - 13.00m | |



# MONITORING WELL LOG

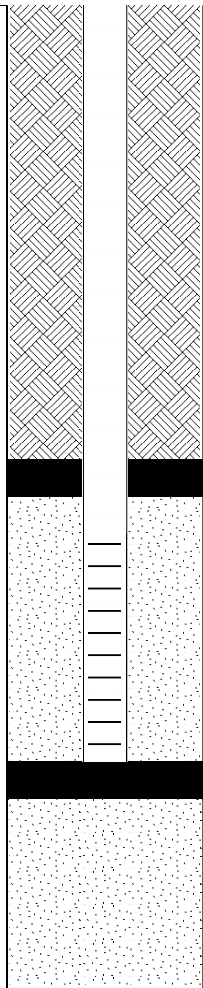
BH ID: BH9M

| | | | |
|---|---|---|---|
| **Location** | Lot 4 to 8 Buchan Avenue, Edmonson Park NSW | **Started** | 08 December 2025 |
| **Client** | UPG Edmondson Parkland Pty Ltd | **Completed** | 08 December 2025 |
| **Job No.** | E26949.G03 | **Logged By** | DC **Date** 08 December 2025 |
| **Sheets** | 1 of 1 | **Review By** | SK **Date** 29 January 2026 |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Contractor** | Geosense Drilling Engineers | **Surface RL** | ≈58.20 m (AHD) | **Northing** | 6239301.4 (MGA 2020 Zone 56) |
| **Plant** | Comacchio Geo 205 | **Inclination** | 90° | **Easting** | 301835.6 (MGA 2020 Zone 56) |

| WATER | SAMPLES & FIELD TESTS | DEPTH (m) | RL (m AHD) | MATERIAL DESCRIPTION | MOISTURE CONDITION |
|---|---|---|---|---|---|
| | BH9M_0.50-0.95<br>SPT 0.50-0.95<br>6,8,11 N=19<br>BH9M_1.50-1.95<br>SPT 1.50-1.95<br>5,6,9 N=15 | 0.00 | 58.20 | FILL: Silty CLAY: brown, trace of fine to medium grained sand, fine to medium grained angular to sub-angular gravels, rootlets and plastic. | M < PL - M |
| | BH9M_3.00-3.45<br>SPT 3.00-3.45<br>10,11,15 N=26<br>BH9M_4.50-4.95<br>SPT 4.50-4.95<br>6,12,16 N=28 | 3.00 | 55.20 | Silty CLAY: low to medium plasticity, orange mottled grey. | M > PL |
| | BH9M_5.80-6.00 | 5.20 | 53.00 | SHALE: brown/red, very low stregth, highly weathered. | - |
| | | 6.30 | 51.90 | SANDSTONE: fine to medium grained, grey, indistinctly bedded to massive. | |
| | | 9.59 | 48.61 | SHALE: dark grey, bedded at 0°–5°. | |
| | | 13 | 45.20 | Terminated at 13.00m. Target Depth Reached. | |

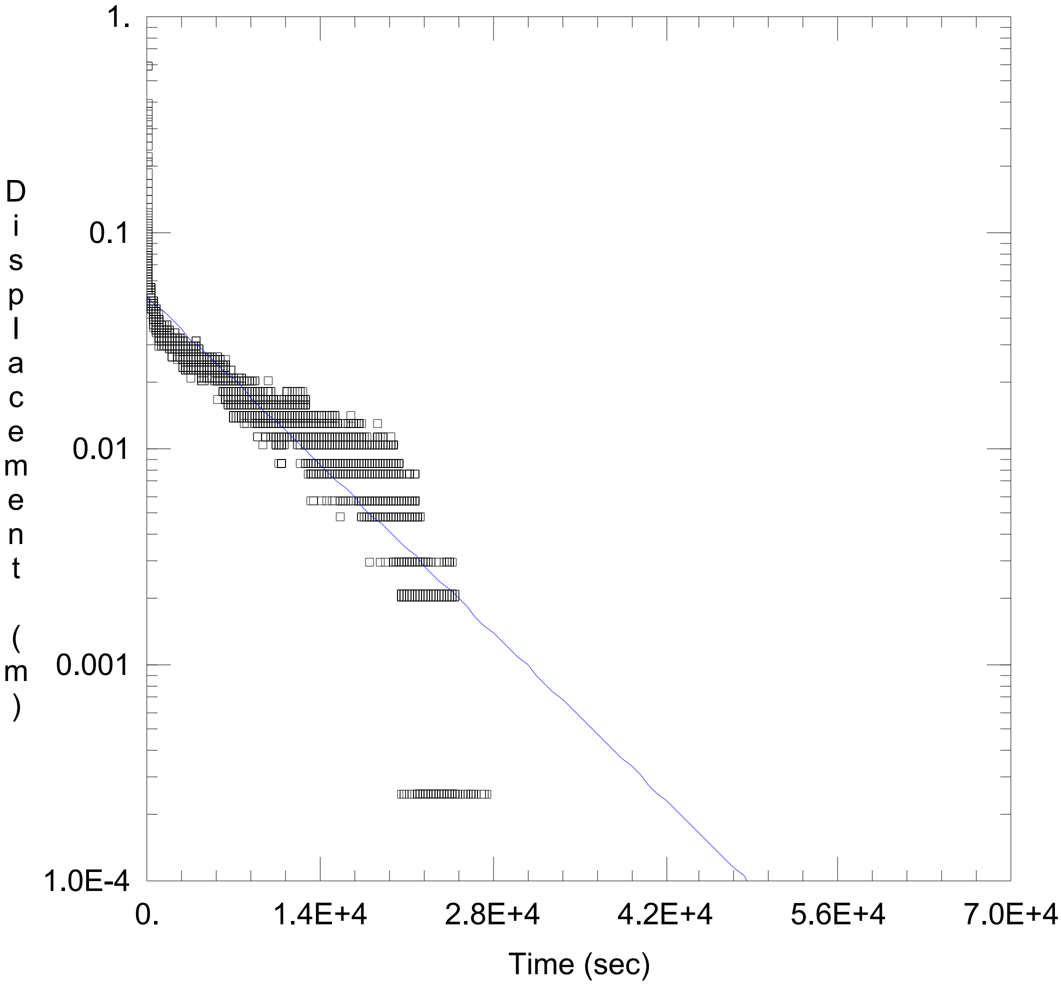
| BACKFILL DETAILS | STANDPIPE DETAILS |
|---|---|
| Cuttings 0.00m - 6.00m | Well Stickup =0.0m (RL 58.20m) |
| Bentonite 6.00m - 6.50m | 0.0m - 7.0m PVC casing (50mm Ø) |
| Sand 6.50m - 10.00m | 7.0m - 10.0m PVC screen (50mm Ø) |
| Bentonite 10.00m - 10.50m | |
| Sand 10.50m - 13.00m | |



This log should be read in conjunction with EI Australia's accompanying explanatory notes.

# D

## Rising Head Test Analysis




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 11:45:58

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH1M
Test Well: BH1M

## AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

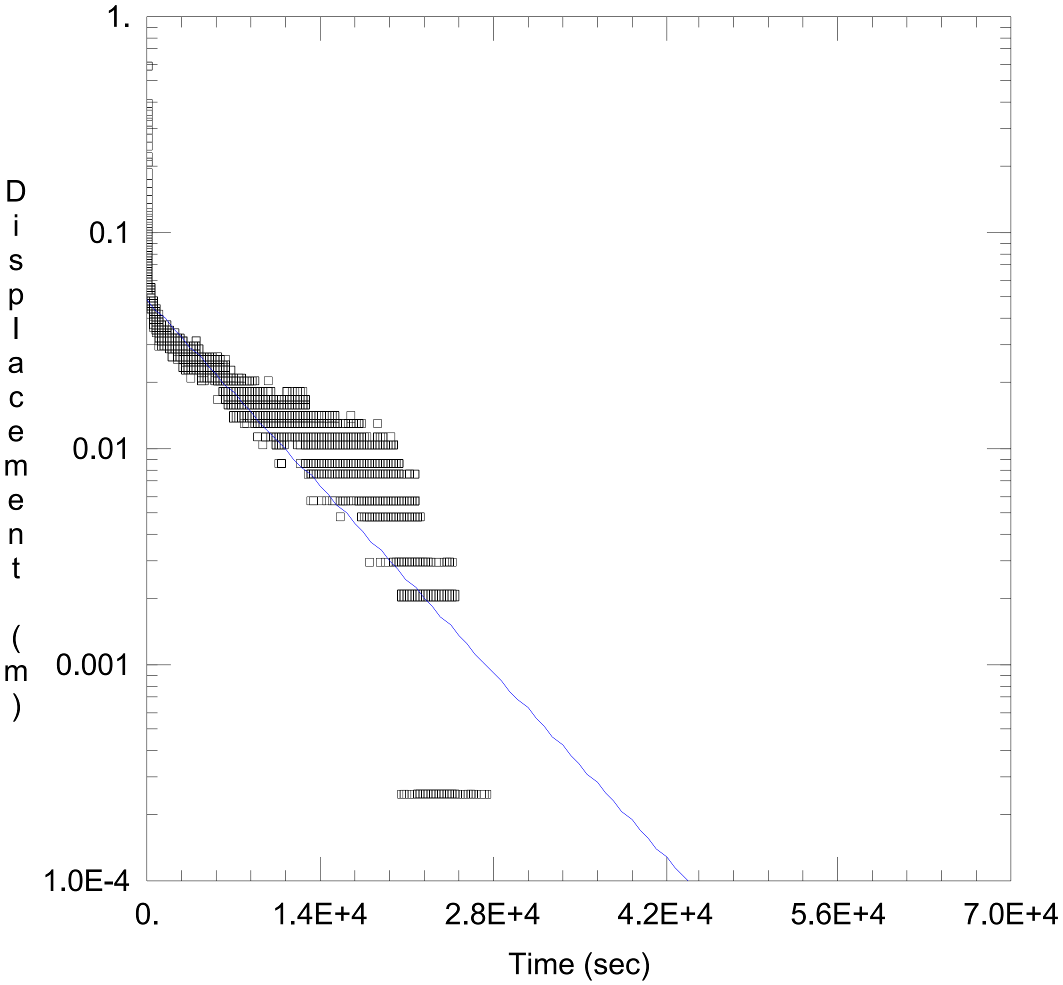
## WELL DATA (BH1M)

Initial Displacement: 0.59 m Static Water Column Height: 2.51 m
Total Well Penetration Depth: 8.2 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.0032 m/day y0 = 0.05073 m




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 11:47:58

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH1M
Test Well: BH1M

## AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

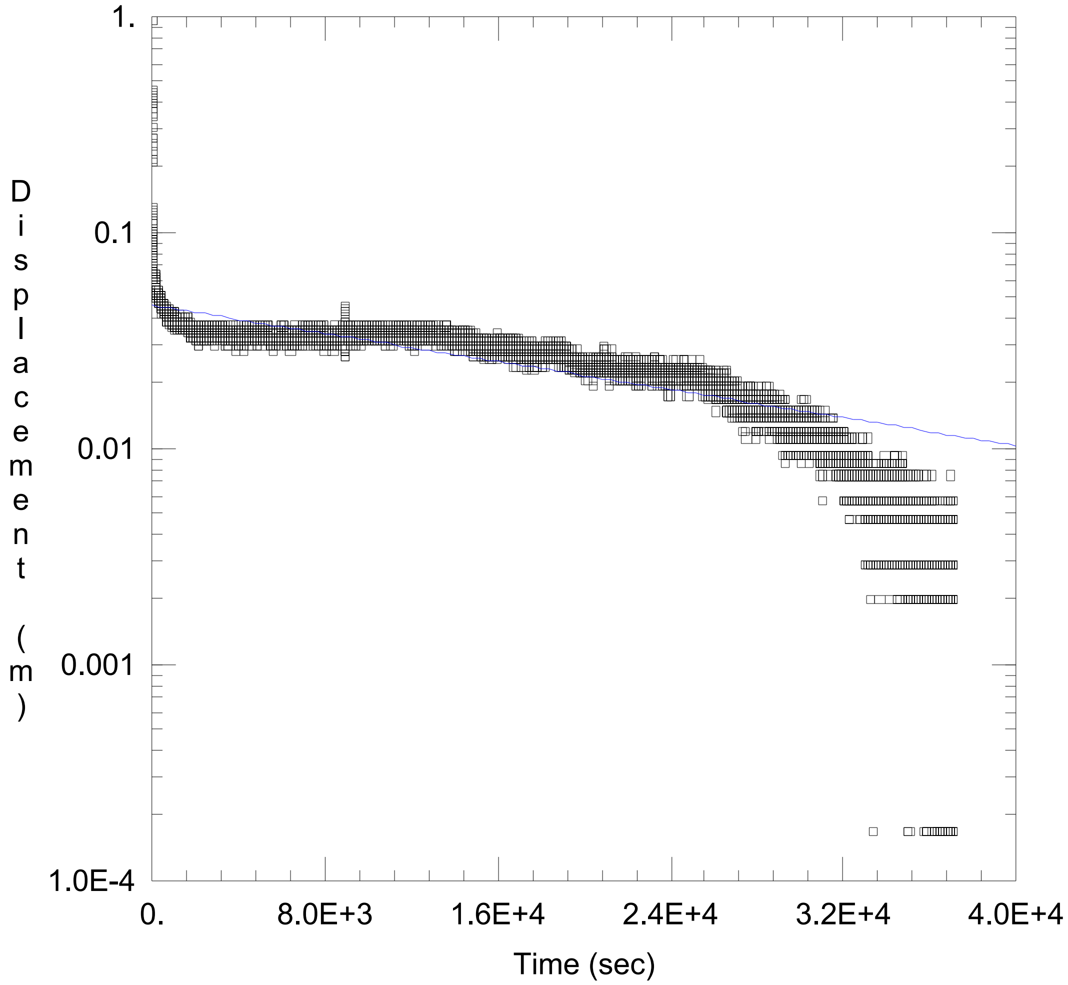
## WELL DATA (BH1M)

Initial Displacement: 0.59 m Static Water Column Height: 2.51 m
Total Well Penetration Depth: 8.2 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.004689 m/day y0 = 0.04833 m




WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 12:09:03

PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH3M
Test Well: BH3M

AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

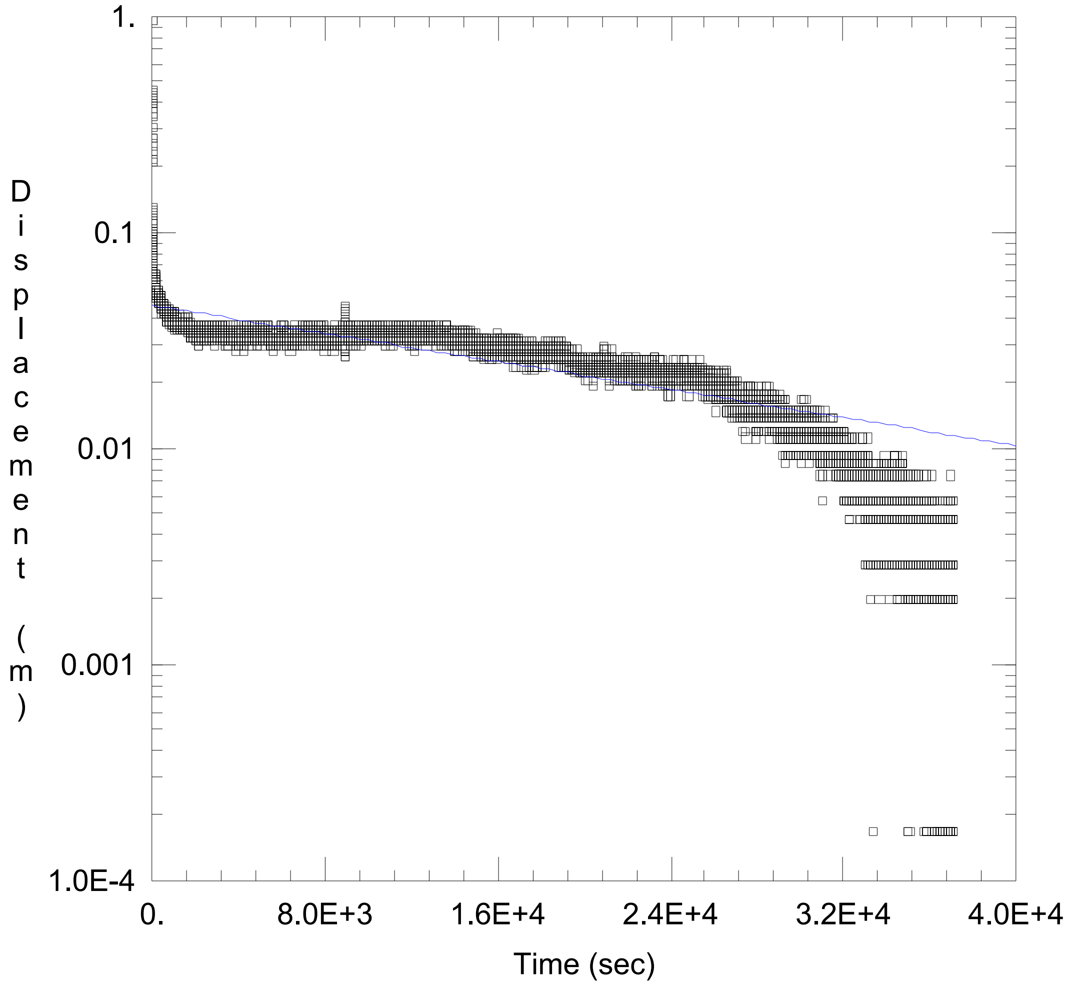
WELL DATA (BH3M)

Initial Displacement: 0.961 m Static Water Column Height: 2.307 m
Total Well Penetration Depth: 7. m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.075 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.0009089 m/day y0 = 0.04584 m




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 12:09:57

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH3M
Test Well: BH3M

## AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

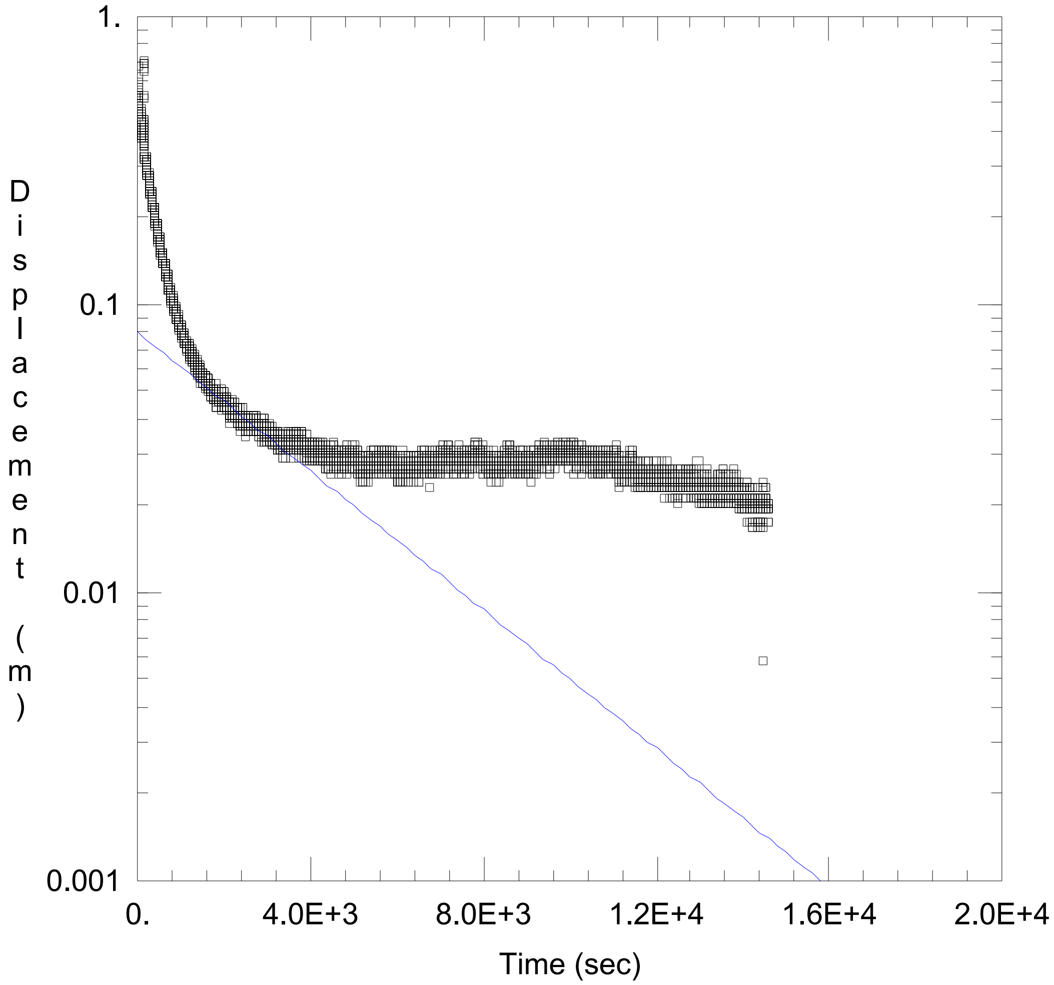
## WELL DATA (BH3M)

Initial Displacement: 0.961 m Static Water Column Height: 2.307 m
Total Well Penetration Depth: 7. m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.001238 m/day y0 = 0.04583 m




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 12:57:58

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH7M
Test Well: BH7M

## AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA (BH7M)

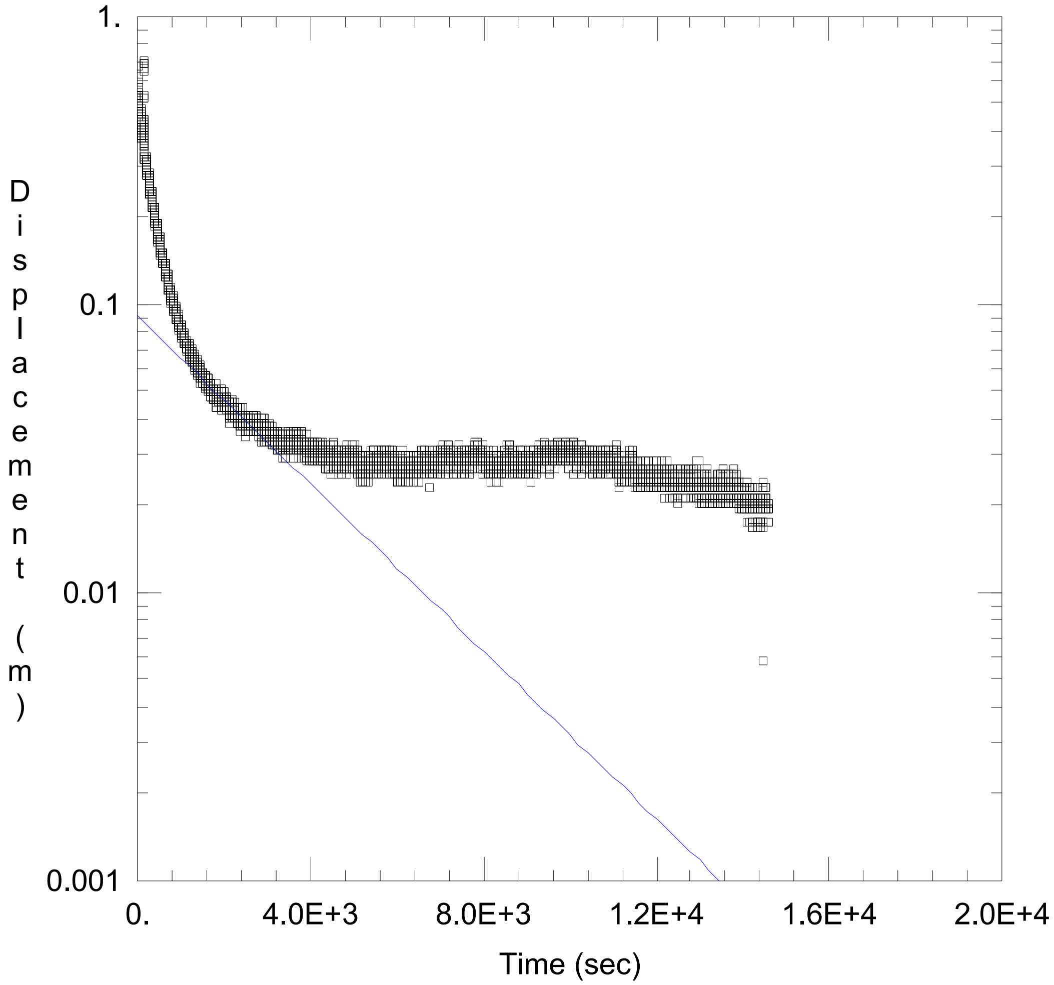
Initial Displacement: 0.5457 m
Total Well Penetration Depth: 12. m
Casing Radius: 0.025 m

Static Water Column Height: 7.06 m
Screen Length: 6. m
Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.004122 m/day y0 = 0.07994 m




WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 12:59:39

PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH7M
Test Well: BH7M

AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

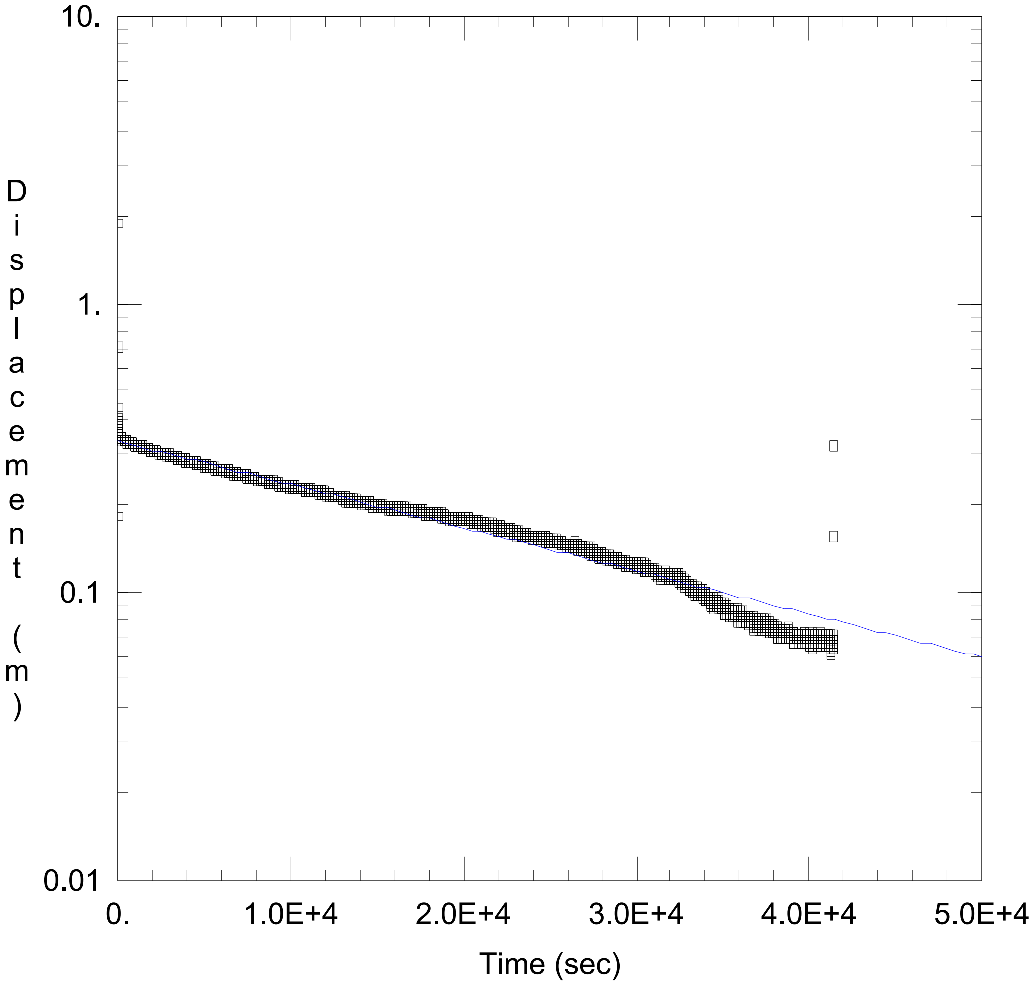
WELL DATA (BH7M)

Initial Displacement: 0.5457 m Static Water Column Height: 7.06 m
Total Well Penetration Depth: 12. m Screen Length: 6. m
Casing Radius: 0.025 m Well Radius: 0.075 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.0066 m/day y0 = 0.09081 m




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 | Time: 13:17:57

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH8M
Test Well: BH8M

## AQUIFER DATA

Saturated Thickness: 20. m | Anisotropy Ratio (Kz/Kr): 1.

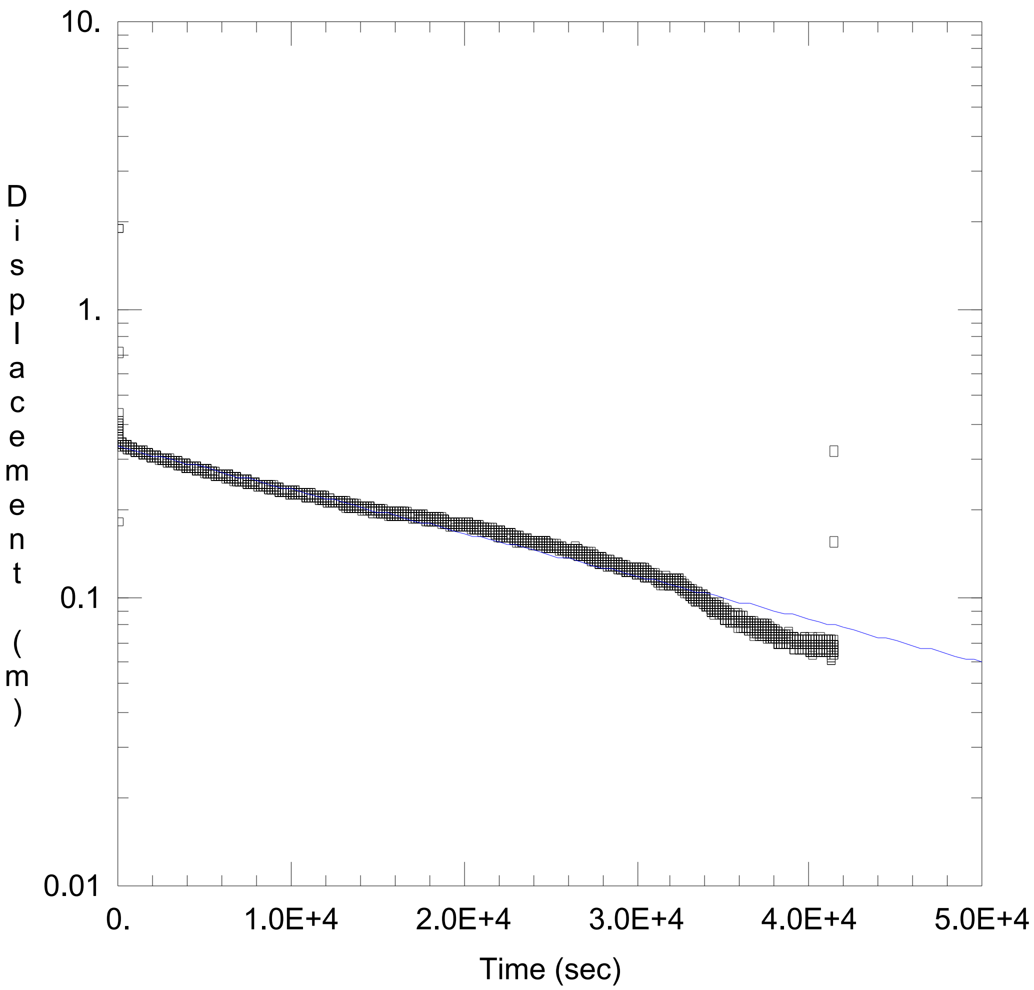
## WELL DATA (BH8M)

Initial Displacement: 1.895 m | Static Water Column Height: 5.46 m
Total Well Penetration Depth: 9.5 m | Screen Length: 3. m
Casing Radius: 0.025 m | Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined | Solution Method: Bouwer-Rice

K = 0.0008848 m/day | y0 = 0.3344 m




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 13:18:51

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH8M
Test Well: BH8M

## AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

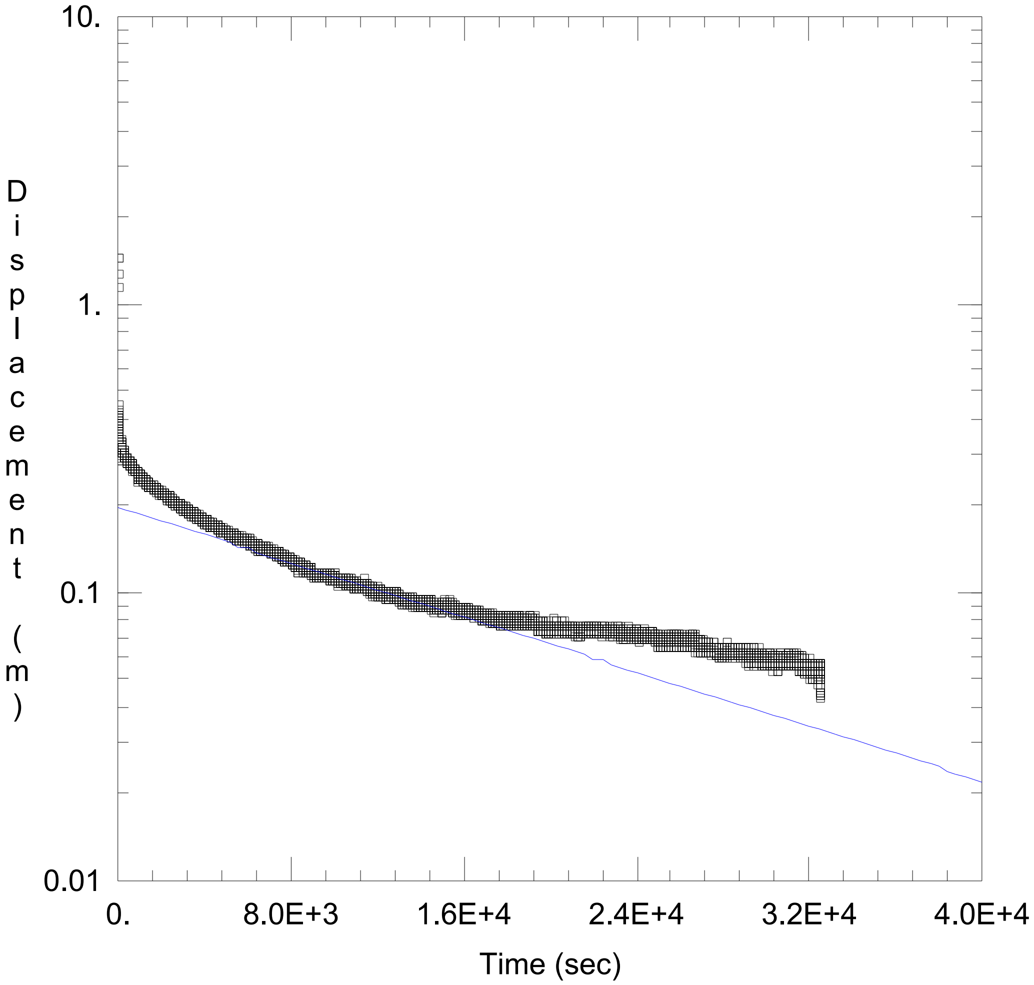
## WELL DATA (BH8M)

Initial Displacement: 1.895 m Static Water Column Height: 5.46 m
Total Well Penetration Depth: 9.5 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.001148 m/day y0 = 0.3345 m




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 | Time: 13:31:34

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH9M
Test Well: BH9M

## AQUIFER DATA

Saturated Thickness: 20. m | Anisotropy Ratio (Kz/Kr): 1.

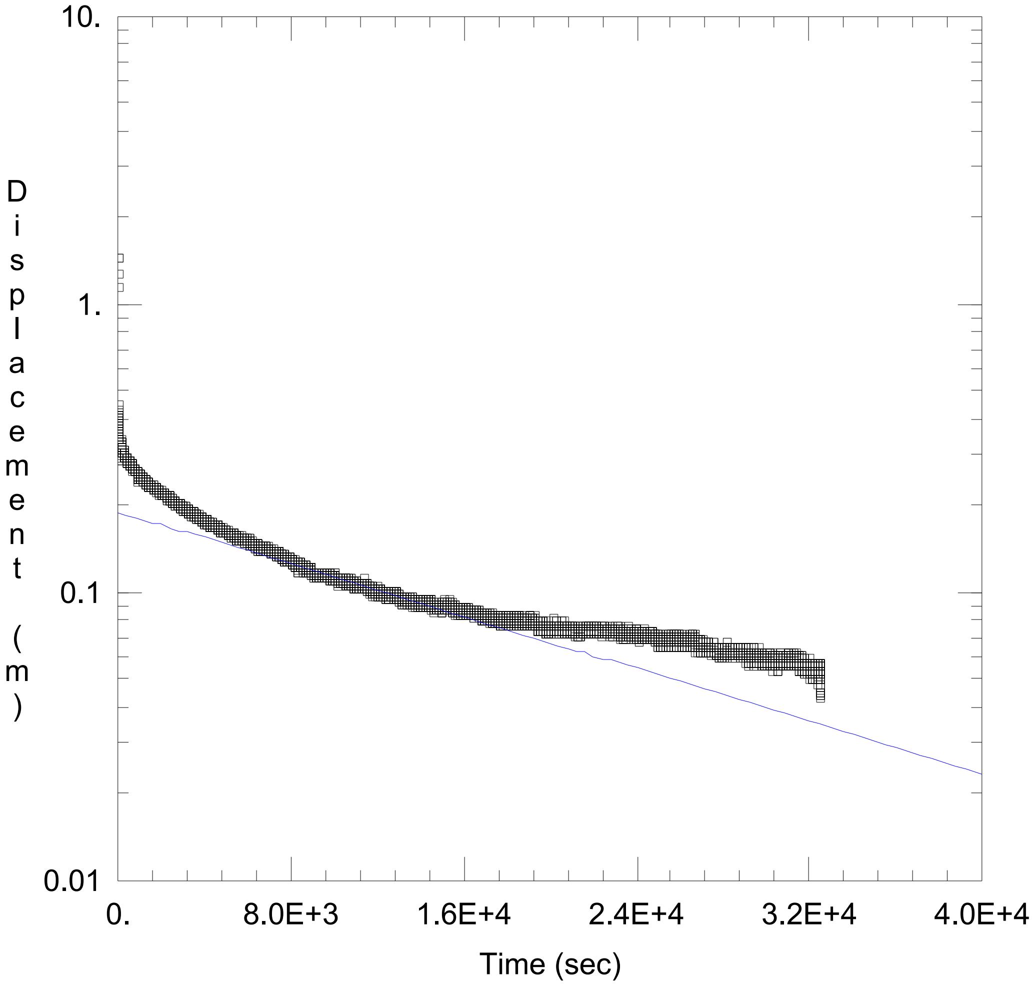
## WELL DATA (BH9M)

Initial Displacement: 1.459 m | Static Water Column Height: 4.995 m
Total Well Penetration Depth: 10. m | Screen Length: 3. m
Casing Radius: 0.025 m | Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined | Solution Method: Bouwer-Rice

K = 0.00141 m/day | y0 = 0.1967 m




## WELL TEST ANALYSIS

Data Set:
Date: 02/11/26 Time: 13:32:59

## PROJECT INFORMATION

Company: Reditus
Project: 25302
Location: BH9M
Test Well: BH9M

## AQUIFER DATA

Saturated Thickness: 20. m
Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA (BH9M)

Initial Displacement: 1.459 m
Static Water Column Height: 4.995 m
Total Well Penetration Depth: 10. m
Screen Length: 3. m
Casing Radius: 0.025 m
Well Radius: 0.075 m

## SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.001734 m/day
y0 = 0.1905 m

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