

Surface Water and Groundwater Impact Assessment

Proposed Mixed Use Development

CCQ2, 26-30 Mann Street, Gosford NSW 2250

Project No. 25304
Version 1

10 February 2026

Reditus Consulting Pty Ltd
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Surface Water and Groundwater Impact Assessment

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Executive Summary

This Surface Water and Groundwater Impact Assessment has been prepared by Reditus Consulting on behalf of UPG Waterfront Pty Ltd (the Applicant) to accompany a concurrent rezoning and State Significant Development Application (SSDA) at 26-30 Mann Street, Gosford, also known as 'Central Coast Quarter' (the site).

The site is located on the Stage 2 component of the Central Coast Quarter site in Gosford City Centre, within the Central Coast Local Government Area (LGA). The Stage 2 site is legally described as Lots 3 and 4 in Deposited Plan 1319239.

SSD-90960208 seeks consent for the detailed design, construction and operation of a mixed-use development comprising:

- Construction of two towers (36 and 42 storeys in height) above a retail podium (including pavilion building), comprising:
 - Retail, residential and hotel gross floor area (GFA).
 - 394 apartments, comprising the following mix:
 - 298 market apartments.
 - 96 affordable housing apartments to be managed by a CHP for 15 years (equating to approximately 20% of the residential GFA).
 - 152 hotel keys (eastern tower).
- Five parking levels, with vehicular access from Vaughan Avenue.
- Storage areas and services.
- Communal open space and deep soil planting (including retention of the Port Jackson Fig).
- Publicly accessible through site links, including stairs, walkways public art and landscaping.
- Provision of utilities and services infrastructure, as required.

To facilitate the built form proposed under SSD-90960208, concurrent amendments are sought to the *State Environmental Planning Policy (Precincts – Regional) 2021* (Regional SEPP) pursuant to the concurrent SEPP Amendment process facilitated by the HDA planning pathway.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 20 August 2025 issued for the SSDA (SSD-90960208). Specifically, this report has been prepared to respond to the SEARS requirement issued below.

ITEM	DESCRIPTION OF REQUIREMENT	SECTION REFERENCE
13. Ground and Water Conditions	• Provide a Surface and Groundwater Impact Assessment that assesses potential impacts on - Surface water resources (quality and quantity) including related infrastructure, hydrology, dependent ecosystems, drainage lines, downstream assets and watercourses - Groundwater resources in accordance with the <i>Groundwater Guidelines</i>	Impact Assessment sections of this report (Sections 7 to 10)

Given the proposed SSD excavation will extend into the groundwater table, dewatering will be required. As such, the proposed development is an aquifer inference activity, requiring regulatory authorisation under the Water Management Act (WMA) 2000, within a Water Sharing Plan zone, identified as the North Coast Fractured and Porous Rock Groundwater Sources 20 16, Sydney Basin–North Coast Groundwater Source.

The primary objectives of the Surface Water and 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.
- Determine the potential impacts to surface water resources (quality and quantity) including related infrastructure, hydrology, dependent ecosystems, drainage lines, downstream assets and watercourses.
- Predict 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 (2023) 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.

The findings of this report include characterisation of the existing environment at the site, a review of the of potential impacts to the surface water and groundwater environment from the proposed development, review of relevant legislation and policy relating to the development and mitigating measures for the identified impacts. The report considers the impacts that have the potential to adversely affect the surface water and groundwater in the context of the construction phase and the operational phase of the development.

Surface water run-off from the site is expected to flow into the local stormwater network, which is likely to flow to the south-west, discharging into Brisbane Water and ultimately the Pacific Ocean. Based on groundwater quality data collected at the site to date, groundwater discharged as part of the proposed dewatering activities will likely require treatment to meet the adopted discharge water quality guidelines.

The groundwater impacts associated with the basement excavation have been primarily assessed based on the modelled inflow calculations and probable drawdown expectations during the construction phase and operational phase of the development. Given the absence of Groundwater Dependant Ecosystems (GDEs) within the estimated drawdown extent of the proposed drained basement, impacts to these receptors were considered low risk. It is noted that there is a production water supply work (GW201893) within 123 m of the site boundary, and 25% of the relative total available drawdown for the bore was 18 m. Although the site is within 200 m of the water supply work, the relative total available drawdown simulated at the site was less than 12 m and therefore minimal impacts to the bore are anticipated. Additionally, based on the publicly available groundwater licence information it is unclear if GW201893 holds a current water supply works approval issued under the Water Management Act 2000.

Based on the results from the numerical groundwater model completed for the site, the predicted long-term steady-state groundwater take was **3.05 ML/year**, whilst the predicted groundwater take during the construction phase (year 1) was **8.95 ML/year**. Reditus consider that the predicted groundwater inflows can be effectively managed under a 'partially drained basement' design, with the estimated inflows and drawdown meeting the relevant impact assessment criteria of 'Minimal Impact' under the AIP 2012 and WMA 2000.

It is noted that a Water Access Licence (WAL) and Water Supply Works Approval will likely be required for the construction phase and ongoing operational phase dewatering activities given the expected inflow volumes exceed the 3 ML/year exemption limit.

Other potential impacts to surface water and groundwater during both the construction and operational phase of the proposed development including potential chemical spillages, increase in hardstand areas, increase in potentially contaminating activities such as vehicle movement, incorrect soil stabilisation and other construction related impacts and are considered to be manageable with appropriate mitigation measures and management plans.

- Publicly accessible through site links, including stairs, walkways public art and landscaping.
- Provision of utilities and services infrastructure, as required.

To facilitate the built form proposed under SSD-90960208, concurrent amendments are sought to the *State Environmental Planning Policy (Precincts – Regional) 2021* (Regional SEPP) pursuant to the concurrent SEPP Amendment process facilitated by the HDA planning pathway.

Given the proposed SSD excavation will extend into the groundwater table, dewatering will be required. As such, the proposed development is an aquifer inference activity, requiring regulatory authorisation under the Water Management Act (WMA) 2000, within a Water Sharing Plan zone, identified as the North Coast Fractured and Porous Rock Groundwater Sources 20 16, Sydney Basin–North Coast Groundwater Source.

This report must be read in conjunction with the limitations outlined in **Section 13** of this report.

1.1 Response to SEARs

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 20 August 2025 issued for the SSDA (SSD-90960208). Specifically, this report has been prepared to respond to the SEARS requirement issued below.

Table 1 SEARs Compliance

ITEM	DESCRIPTION OF REQUIREMENT	SECTION REFERENCE
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1.2 Objectives

The primary objectives of the Surface Water and 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.
- Determine the potential impacts to surface water resources (quality and quantity) including related infrastructure, hydrology, dependent ecosystems, drainage lines, downstream assets and watercourses.
- Predict 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 (2023) 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 conditions for the project.

1.3 Scope of Works

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

- Review of proposed development drawings, excavation and construction plans.
- Review of applicable legislation, policy and guidelines.
- Establish existing environmental conditions from publicly available and site-specific data.
- Review of the proposed design features near waterways and surface water bodies.
- Completion of a qualitative assessment of the potential water quality impacts considering the following:
 - the existing water quality environment.
 - the potential pollutants and impacts to the water quality environment from construction and operation activities.
 - the effectiveness of the identified mitigation measures; and
 - any residual impacts post-mitigation and the likely performance against the water quality objectives.
- Analysis and interpretation of groundwater level data, rising head (slug test) data and water quality data collected from the site.
- Discussion of the potential impacts to surface water and groundwater associated with the proposed development based on the predictions of groundwater inflows and offsite drawdown extent from the Groundwater Modelling Report (Reditus 2025) and outline mitigation measures and management plans required for management of impacts.
- Preparation of a Surface Water and 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*.

2 Methodology

2.1 General

The assessment of potential surface water and groundwater related impacts arising from the proposed development have been implemented as follows:

- Review of legislation, policies and guidelines relevant to surface water and groundwater impacts for the proposal as outlined in **Section 3**.
- Characterisation of the existing environment including:
 - Climate, topography, hydrology, geology, hydrogeology, water quality and sensitive receiving environments in order to review the potential impacts to surface and groundwater arising from the proposed development
- Review of numerical groundwater modelling results to predict potential groundwater inflows and radius of drawdown influence at the boundaries of the basement excavation in the Groundwater Modelling Report (Reditus 2025)
- Assessment of potential groundwater related impacts to satisfy the minimal impact considerations of the NSW Aquifer Interference Policy (AIP) and NSW DPI (2023) *Groundwater Impact Assessment Criteria*
- Water quality assessment of surface and groundwater
- Recommendations for monitoring and management of identified impacts and risks, including mitigation measures as appropriate.
- The specific methodologies used for these components are described in the following sections.

2.2 Desktop Assessment

The desktop assessment undertaken in this report involved review of the existing environment within the proposed development boundary in order to assess potential impacts to flow (quantity) and quality of surface water and groundwater during the construction and ongoing operation as a result of the development.

The desktop assessment included review of background information, previous reports and proposed development information including:

- Sensitive environmental receptors near the proposed development including drainage lines, downstream receptors and watercourses, and groundwater dependant ecosystems (GDEs).
- Publicly available water quality information.
- Review of relevant legislation and guidelines.
- Review of the proposed basement footprint and the development at large.
- Publicly available and site-specific groundwater data.

2.2.1 PUBLICLY AVAILABLE DATA SOURCES

A list of publicly available data sources used for the desktop review as part of this assessment is provided in **Table 2** below.

Table 2. Summary of publicly available data sources

DATA DESCRIPTION	SOURCE
Groundwater users including Water Access License (WAL) holders and basic landholder rights bores	WaterNSW Water Register website (https://waterregister.watarnsw.com.au/water-register-frame)
Registered bore data	- WaterNSW real time data website (https://realtimedata.watarnsw.com.au/water.stm) - 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) - The NSW Environmental Protection Authority (EPA) contaminated land record website (https://app.epa.nsw.gov.au/prclmapp/searchregister.aspx) - 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	Gosford-Lake Macquarie Special 1:100,000 Geological Map Sheet 9131 & part 9231 (3rd Edition, 1966)
Key Fish Habitats (KFH) and Freshwater Threatened Species	The NSW Department of Primary Industries (DPI) Fisheries NSW Spatial Data Portal (https://webmap.industry.nsw.gov.au/Html5viewer/index.html?viewer=Fisheries_Data_Portal)

2.2.2 REVIEW OF PREVIOUS INVESTIGATIONS

A review of relevant information relating to surface water and groundwater from previous investigations is summarised in **Table 3** below.

Table 3. Summary of previous investigations

ITEM	DETAIL
GEOTECHNICAL INVESTIGATION (JKG, 2025A)	
Document Information	Geotechnical Investigation for Proposed Mixed Use Development – CCQ2, 26-30 Mann Street, Gosford NSW Dated 25 August 2025
Prepared By	JK Geotechnics Pty Limited
Prepared for	Urban Property Group
Information Related to Surface Water and Groundwater	The geotechnical investigation subsurface investigation found that the site was underlain by fill material to depths of between 0.5-2.0 m below ground level (bgl) followed by alluvial/residual soils encountered to depths of between 3.0 and 7.0 mbgl. A layer of extremely weathered sandstone was encountered between depths of 5.2 and 10.7 mbgl, with sandstone bedrock encountered as shallow as 4.8 mbgl and ranged to 11.5 mbgl. During the geotechnical drilling investigation, groundwater monitoring wells were installed at borehole locations BH1, BH3, BH4 and BH5 within bedrock material. Additional shallow monitoring wells were installed within alluvial and residual soils adjacent to BH1 and BH4 (BH1A and BH4A). A pump out test was conducted by removing water from the monitoring wells on 11 August 2025 and placing data loggers in each well. The groundwater level data was then collected on 15 August 2025 to allow for assessment of water level recovery. Groundwater levels were manually measured on 11 and 15 August 2025 which can be seen in Section 4.5.2 below. Permeability testing (Hydraulic conductivity calculations) were completed using the time-lag method. Results of permeability coefficient estimates (K) are presented in Section 4.5.5 below.
SITE HYDROLOGY REPORT (JKG, 2025B)	
Document Information	Site Hydrology Report for Proposed Mixed Use Development – CCQ2, 26-30 Mann Street, Gosford NSW Dated 29 September 2025
Prepared By	JK Geotechnics Pty Limited
Prepared for	Urban Property Group
Information Related to Surface Water and Groundwater	Based on the groundwater level data and calculated coefficients of permeability (K) presented in the Geotechnical Investigation (JK Geotechnics 2025a), a hydrogeological model was adopted for the seepage analysis. The 3D model had an area of 400m x 400m with a thickness of 50m with the proposed excavation in the middle. The adopted groundwater level of RL 1.5m to RL 2.0m was generated across the model area with the adopted bulk excavation level for the basement as RL 9.5m. Horizontal permeability was equal to vertical permeability in the soil profile, whilst vertical permeability was equal to the horizontal permeability times a factor of 0.1. The

ITEM	DETAIL
	retention system was modelled as a secant pile shoring wall with a thickness of 1m and a permeability of 1×10^{-11} m/s. The predicted total inflow was provided for several case scenarios. In scenario 2 (case 2), the shoring wall was modelled at the toe of the bulk excavation level (RL -9.5m) which found that the total inflow was 10.47 ML/day. Under scenario 3 (case 3), the shoring wall was modelled to be embedded 2.5m below the bulk excavation level, i.e. at RL -12.0m which found that the total inflow was 5.74 ML/day.
DRYLAND SALINITY AND ACID SULFATE SOILS ASSESSMENT (JKE, 2025)	
Document Information	Dryland Salinity and Acid Sulfate Soil Assessment for Proposed Mixed-Use Development – CCQ2 at 26-30 Mann Street, Gosford, NSW Dated 6 December 2024
Prepared By	JK Environments
Prepared for	UPG Waterfront Pty Ltd
Information Related to Surface Water and Groundwater	The dryland salinity and acid sulfate soil assessment included an intrusive investigation of the site to characterise Potential Acid Sulfate Soil (PASS) and dryland salinity conditions. As part of the ASS investigation the following analytical schedule was completed: 16 samples of fill and 24 of natural soil were analysed for pH_f (field pH) and pH_{fox} (field peroxide) for laboratory analysis determination. - Four samples of fill and 12 samples of natural soils were analysed for the ASS analytical suite. The results of the ASS investigation found a low potential for PASS and AASS a to be disturbed as part of the proposed development, as there were no visible or olfactory indications of PASS or AASS, and the analytical results did not identify significant concentrations of oxidisable sulfur. The findings of the salinity assessment found the following: - The soils are classed as strongly acidic to strongly alkaline, and are generally classed as slightly saline, sodic, moderately aggressive towards buried concrete and mildly aggressive towards buried steel. - The groundwater is classed as saline, mildly aggressive towards buried concrete and non-aggressive towards buried steel. As a result of the investigation, no Acid Sulfate Management Plan or Salinity Management Plan is considered to be necessary for the development.

3 Legislative Context

3.1 NSW Legislation

3.1.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

Conditions of consent in relation to dewatering are likely to be prescribed by the Council in the Development Consent and NSW DPE General Terms of Approval for the works issued under the Environmental Planning and Assessment Act (1979). A copy of the approval must be kept on location at all times.

3.1.2 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).

3.1.3 NSW WATER QUALITY OBJECTIVES (2006)

The NSW Water Quality Objectives (WQOs) are the community's agreed values and uses (environmental values) and long-term goals for all waterways and catchments in NSW. The WQOs set out the following:

- The community's values and uses for 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 assess whether the current condition of our waterways supports those values and uses.

The WQOs are consistent with the agreed national framework for assessing water quality set out in the Australian & New Zealand Guidelines for Fresh & Marine Water Quality (ANZG 2018). 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 WQOs provide environmental values for NSW waters and the ANZG 2018 Guidelines provide the technical guidance to assess the water quality needed to protect those values.

The groundwater flow contours indicate that groundwater at the site is expected to move south-west towards Brisbane Water, which discharges to Broken Bay and the Pacific Ocean, approximately 11.5 km south of the site.

The ultimate receiving environment of Brisbane Waters is classified as an estuary environment per the WQOs and includes the following environmental values:

- Aquatic ecosystems, visual amenity, secondary contact recreation, primary contact recreation and aquatic foods

3.1.4 STATE ENVIRONMENTAL PLANNING POLICY (PRECINCTS-REGIONAL) 2021

The site is located within the State Environmental Planning Policy (Precincts-Regional) 2021 which came into force on 1 March 2022 and replaces / consolidates the State Environmental Planning Policy (Gosford City Centre) 2018 (SEPP GCC) along with other SEPP's. However, it is noted that no policy changes have been made. All savings and transitional provisions of the repealed SEPPs are still in force despite their repeal. The SEPP (Gosford City Centre) 2018 is the principle environmental planning instrument (EPI) that applies to the site.

It is expected that Council consent for groundwater interference activities will not be required as the development is considered to be a State Significant Development.

3.1.5 NSW DEPARTMENT OF PLANNING, HOUSING AND INFRASTRUCTURE – DEWATERING DISCHARGE APPROVAL/PERMIT

As this is an SSD, 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 may be required 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.

3.1.6 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 if 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 not licence is required, must be obtained prior to commencement. As the anticipated groundwater take is >3 ML/year (see **Section 6.2**), Reditus note that a WAL will likely be required.

The following information must be provided in support of the "Approval for Water Supply Works and/or Water Use" application:

- A copy of a valid planning consent for the project.
- A copy of the written authorisation for the disposal of the extracted groundwater (to be prepared by Central Coast Council following review of the DMP).
- A Dewatering Management Plan (DMP), which clearly and concisely set out:
 - Current groundwater levels, preferably based on at least three repeat measurements from at least three monitoring bores and should be used to develop a water table map for the site and its near environs, be accompanied by an interpretation of the groundwater flow direction from these data, and an assessment of the likely level to which groundwater might naturally rise during the life of the building.
 - Predictions of total volume of groundwater to be extracted during the life of the approval (or during the construction period) – the method of calculation and the basis for parameter estimates and any assumptions used to derive the volume are to be clearly documented. Details of how dewatering volumes are to be measured, and of the maximum depth of the proposed dewatering system.
 - Predicted duration of dewatering at the property, noting that temporary water supply works approvals are generally issued for no more than 24 months.
 - Details of how dewatering volumes are to be measured, e.g., by calibrated flow meter or other suitable method, and of the maximum depth of the proposed dewatering system.
 - Details of any predicted impacts or particular issues, e.g., proximity of groundwater dependent ecosystems springs; or water supply losses by neighbouring groundwater users; or potential subsidence impacts on nearby structures or infrastructure.
 - Details of monitoring proposed during the dewatering program. These should be designed to inform and facilitate the protection of any identified potential impacts.

- Details of ambient groundwater quality conditions beneath the property and of any proposed treatment to be applied to pumped water prior to disposal – at a minimum, treatment must be undertaken to remove contaminants, manage pH levels, reduce suspended solids and turbidity to acceptable levels and ensure that dissolved oxygen levels are compatible with ambient quality requirements in receiving waters. Groundwater cannot be re-injected into an aquifer without the specific approval of, and licensing by, WaterNSW.
- Details of how reporting will occur during and following the dewatering program, to confirm that predicted quantities and quality objectives were met.
- Description of the method of dewatering and related construction including any proposal to use temporary piling or support walls and the relative depths thereof.

Further information on the aquifer interference policy and licensing 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 – North Coast Groundwater Source, under the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016. 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 WAL.

3.1.7 WATER SHARING PLANS (WSPS)

WSPs are being progressively developed for rivers and groundwater systems across NSW following the introduction of the Water Management Act (WMA) 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 North Coast Fractured and Porous Rock Groundwater Sources 2016 – Sydney Basin– North Coast Groundwater Source.

Water sharing plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016 – Sydney Basin – North Coast Groundwater Source

The water sharing plan applies to groundwater sources known as the North Coast Fractured and Porous Groundwater Sources within the Central Coast Water Management Area, Hawkesbury Nepean Water Management Area, Hunter Water Management Area, Lower North Coast Water Management Area, Mid North Coast Water Management Area, Northern Rivers Water Management Area, and Upper North Coast Water Management Area

The Sydney Basin-North Coast Groundwater Source extends from the Hawkesbury River in the south, the Goulburn River National Park in the north-west to Gosford and Newcastle on the East Coast. The long-term average annual extraction limit (LTAAEL) of the Sydney Basin-North Coast Groundwater Source is 90,000 ML/yr (2022).

3.1.8 FISHERIES MANAGEMENT ACT 1994

The *NSW Fisheries Management Act 1994* provides the legislative framework for the sustainable management and conservation of fisheries resources in New South Wales. The Act aims to balance the needs of the fishing industry with the protection of aquatic ecosystems, ensuring that resources are available for present and future generations. It sets out regulations for commercial and recreational fishing, aquaculture activities, and provisions for Aboriginal cultural fishing.

Key objectives of the FM Act include protecting key fish habitats (KFH) and the conservation of threatened species, populations and ecological communities of fish and marine vegetation. A review of DPIE KFH mapping indicated that

surrounding waterways are composed of KFH, refer to **Section 4.4.2**. No threatened species have been mapped within the waterways surrounding the site.

3.2 Policies and Guidelines

3.2.1 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 intercepted and removed from at least one aquifer. Accordingly, groundwater licensing may be required.

Licensing 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.

3.2.2 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.

3.2.3 HEALTHY RIVERS COMMISSION INQUIRY

The Healthy Rivers Commission was established in 1995 (under section 23 of the Pollution Control Act 1970) by the NSW Government as one element of water reforms. The Commissioner for Healthy Rivers is to make recommendations to Government on:

- suitable objectives for water quality, flows and other goals central to achieving ecologically sustainable development in a realistic time frame.
- the known or likely views of stakeholder groups on the recommended objectives
- the economic and environmental consequences of the recommended objectives
- and strategies, instruments and changes in management practices needed to implement the recommended objectives.

The Commission does this through conducting independent public Inquiries for selected rivers. The Inquiries assist the community to consider, in detail, the options that are available in terms of river health and the use of river resources for commercial and recreational purposes.

The interim environmental objectives described on the EPA website will apply until the NSW Government either:

- adopts the longer-term objectives resulting from recommendations by the Healthy Rivers Commission, or
- approves a river management plan for the catchment through the Ministers for Land and Water Conservation and for the Environment. In this case, the environmental objectives would apply for the duration of the plan, subject to review and audit.

At the time the interim environmental objectives were approved by the Government (September 1999) the Healthy Rivers Commission (HRC) had completed or substantially completed public inquiries for the Hawkesbury-Nepean River catchment. Interim environmental objectives are not provided for the Hawkesbury-Nepean River catchment.

3.2.4 AUSTRALIAN GUIDELINES FOR URBAN STORMWATER MANAGEMENT (2000)

The Australian Guidelines for Urban Stormwater Management (2000) aim to provide a nationally consistent approach for managing urban stormwater in an ecologically sustainable manner. The approaches represent current best practice in stormwater planning and management in Australia. In particular, the guidelines will help managers to identify objectives for stormwater management (including protecting social, environmental and economic values) and to integrate management activities at the catchment, waterway, and local development level.

The tools and approaches in the guidelines assist managers to undertake integrated storm water management planning in accordance with the values and conditions of the local environment, while integrating these activities into the catchment context.

3.2.5 MANAGING URBAN STORMWATER – SOILS AND CONSTRUCTION VOLUME 1 (2004)

The Managing Urban Stormwater: Soils and Construction Volume 1 (2004) guidelines are an important element of the NSW Governments' urban stormwater program which aims to improve the health, ecology and amenity of urban streams, rivers estuaries and beaches through better management of stormwater.

The guidelines will help mitigate the impacts of land disturbance activities on soils, landforms and receiving waters by focusing on erosion and sediment control. The aims are to:

- Reduce pollution to downstream areas and receiving waters.
- Reduce land degradation.
- Raise an awareness of ecologically sustainable development (ESD) principles and their application to development.

It is expected that management of stormwater will be required for the proposed development as the construction and operational activities have the potential to generate erosion and sediment impacts to the receiving water body.

3.3 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 environment.

4 Environmental Setting

4.1 Climate

Historical rainfall data from 1957 to 2025 was obtained from the SILO enhanced climate database (QLD DES, 2021). Based on the historical rainfall data, the average annual rainfall is 1,341.1 mm/year.

Groundwater recharge via rainfall is likely to be significant contributor to the groundwater system. As such, this rainfall data set allows assessment of the measured and predicted groundwater levels at the Site, as well as providing indicative prediction of a likely groundwater level response in the absence of measured/observed groundwater levels.

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 relatively low (approximately 2.5%) due to the high density urban surrounds of the site, where the majority of rainfall would be captured by the stormwater system. Therefore, diffuse groundwater recharge during an average rainfall year is expected to be 34 mm/year.

A summary of the long-term average rainfall and evapotranspiration trends is provided in **Table 4** and visualised in Figure 2 below.

Table 4 Monthly Average Rainfall/Evaporation (mm)

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Average Rainfall	132.0	167.2	170.0	126.3	113.8	129.6	72.5	77.3	66.0	89.5	98.2	98.7
Average evapotranspiration rate	120.9	102.4	60.3	30.5	19.1	20.3	35.1	61.4	95.2	120.1	143.6	147.0
Net water balance	11.1	64.8	109.7	95.8	94.7	109.3	37.5	15.9	-29.2	-30.6	-45.4	-48.4
Climatic condition	Wetting	Wetting	Wetting	Wetting	Wetting	Wetting	Wetting	Drying	Drying	Drying	Drying	Drying

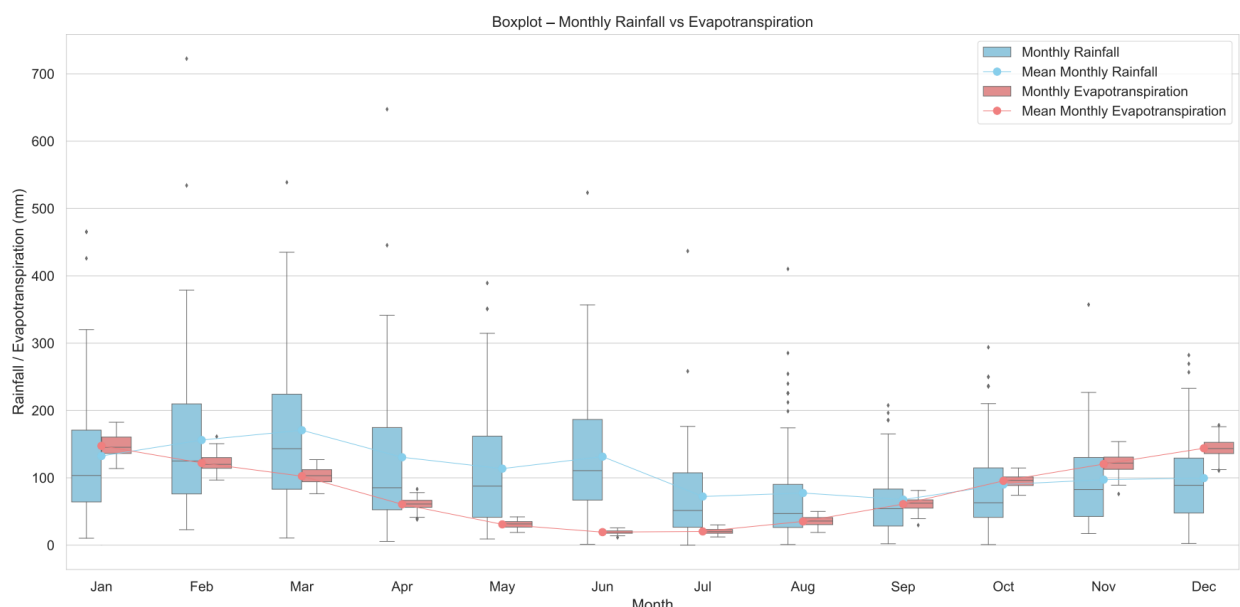


Figure 2 Monthly rainfall/evapotranspiration boxplot

A review of monthly rainfall trends indicate that rainfall amounts are generally higher in the Summer and Autumn months and lower during Winter and Spring. Due to seasonal temperature variation, evapotranspiration rates are typically higher in Spring and Summer. Groundwater recharge potential is expected to be higher during months with

higher rainfall amounts, and lower evapotranspiration rates. Figure 3 indicates that groundwater recharge potential is highest in February to September (where mean monthly rainfall exceeds mean monthly evapotranspiration).

It is apparent that the monthly average rainfall and evapotranspiration rates create an approximately balance of wetting and drying conditions throughout the year. Therefore, it is expected that longer-term periods of 'drier than average' and 'wetter than average' conditions would have a stronger influence on groundwater recharge and subsequent variation in groundwater levels.

Cumulative residual rainfall, known as residual mass, provides a strong indication of long-term rainfall trends relevant to groundwater fluctuation, as it better matches the temporal time scale of groundwater recharge behaviour than measurements of total rainfall over a period of time. Figure 3 provides a plot of cumulative residuals of monthly rainfall from mean monthly rainfall. This plot provides an indication of the groundwater recharge potential, which in turn provides an indication of the state of groundwater storage in aquifers that are strongly influenced by rainfall, interpreted as follows:

- A positive slope indicates a wetter than average period and this is associated with high groundwater recharge potential
- A negative slope indicates a drier than average period and this is associated with low groundwater recharge potential
- A section with both positive and negative slopes indicates a period of (generally) "average" rainfall and is associated with groundwater recharge potential

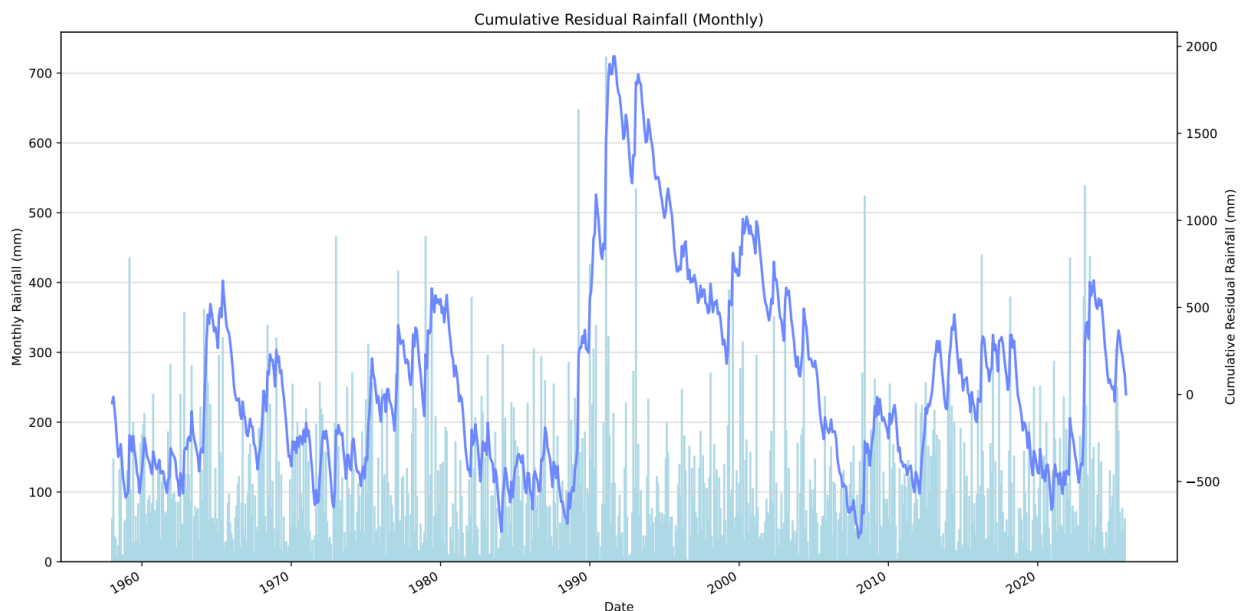


Figure 3 Cumulative Monthly Residual Rainfall from 1957 to 2025

It is apparent from Figure 3 that since the significantly 'drier than average' period occurred during 2025 during which groundwater elevation data was monitored. Therefore, it is likely that the groundwater levels (discussed in Section 4.5.2) are likely to be representative of 'drier' groundwater conditions.

4.2 Topography

In accordance with the site survey plans provided (Veris, 2019), the majority of the site is relatively flat with an approximate elevation of between 2.6 to 3.0 m Australian Height Datum (AHD). The eastern and south-eastern portion of the site is steeply inclined from the road elevation (Mann Street and Vaughan Avenue) of approximately 8.6 mAHd grading westerly to approximately 2.7 mAHd within the site. Topographic elevation contours are presented in **Figure 3, Appendix A**.

The eastern portion of the site sits at the base of a steeply inclined area that generally slopes towards the west towards Brisbane Water located approximately 110m south-west of the site.

Brisbane Water is an estuary which has its confluence with Narara and Coorumbine Creeks approximately 1.25km west of the site. Brisbane Water discharges to Broken Bay and the Pacific Ocean approximately 11.5 km south of the site. Brisbane Water has a total catchment area of approximately 165 km² and is expected to have a tidal influence of approximately ± 0.4 m.

4.3 Hydrology

4.3.1 REGIONAL DRAINAGE CATCHMENTS

Brisbane Water is incorporated by the Hawkesbury-Nepean River Catchment. The catchment extends from Yarramundi in the west to Wisemans Ferry in the north-west to the coastal outlets of the Hawkesbury River and the mouth of Brisbane Waters on the east coast. The catchment has an area of 21,400 square kilometres, over 70 per cent of the catchment consists of mountainous terrain, with about 10 per cent of flat terrain. The south terrain, around 10 per cent of the total catchment, comprises undulating plateau type country. The maximum elevation is about 1,290 metres.

4.3.2 WATERWAYS

There are a number of waterways surrounding the site. These waterways are discussed in below in **Table 5** regards to Strahler stream classification system, hydrological and water quality characteristics, and KFHs as well as determination of sensitive receiving environment classification (SRE). The waterways around the site are managed under the Water Sharing Plan for the Central Coast Unregulated and Alluvial Water Sources.



Table 5 Waterways within close proximity to the Site and determination of SRE

WATERWAY	DISTANCE FROM SITE	STRAHLER STREAM ORDER	KFH	WATERWAY TYPE	OTHER RELEVANT FEATURES	SRE DETERMINATION
Brisbane Water	Approximately 100m south-west	3	Yes	Estuary	Brisbane Waters used for recreational purposes including swimming and fishing	High
Narara Creek	Approximately 1.6km north-west	3	Yes	Perennial Creek	Unlikely to be used for recreational purposes	Moderate
Coorumbine Creek	Approximately 2.0km west	3	Yes	Perennial Creek	Unlikely to be used for recreational purposes	Moderate
Bradys Gully	Approximately 1.8 km north	2	No	Non-perennial Creek	Unlikely to be used for recreational purposes	Low
Wingello Creek	Approximately 2.8 km north	2	No	Perennial Creek	Unlikely to be used for recreational purposes	Low
Erina Creek	Approximately 2.0 km east	3	Yes	Perennial Creek	Unlikely to be used for recreational purposes	Moderate

4.3.3 FLOODING ASSESSMENT

As the site is located near to the Brisbane Water surface water body, review of the potential for flooding of the site has been completed. A publicly available document titled Brisbane Water Foreshore Flood Study (Cardno 2013) was prepared for Gosford City Council and the Department of Environment and Climate Change in July 2013.

The objective of the study was to determine the water levels in Brisbane Water for the full range of flood and ocean events that can occur due to various natural physical processes. In order to determine the flooding extent of Brisbane Waters, a hydrological Model was developed.

The results of the flood study found that the site is not within either a low or high hazard extent as seen in Figure 4 below.

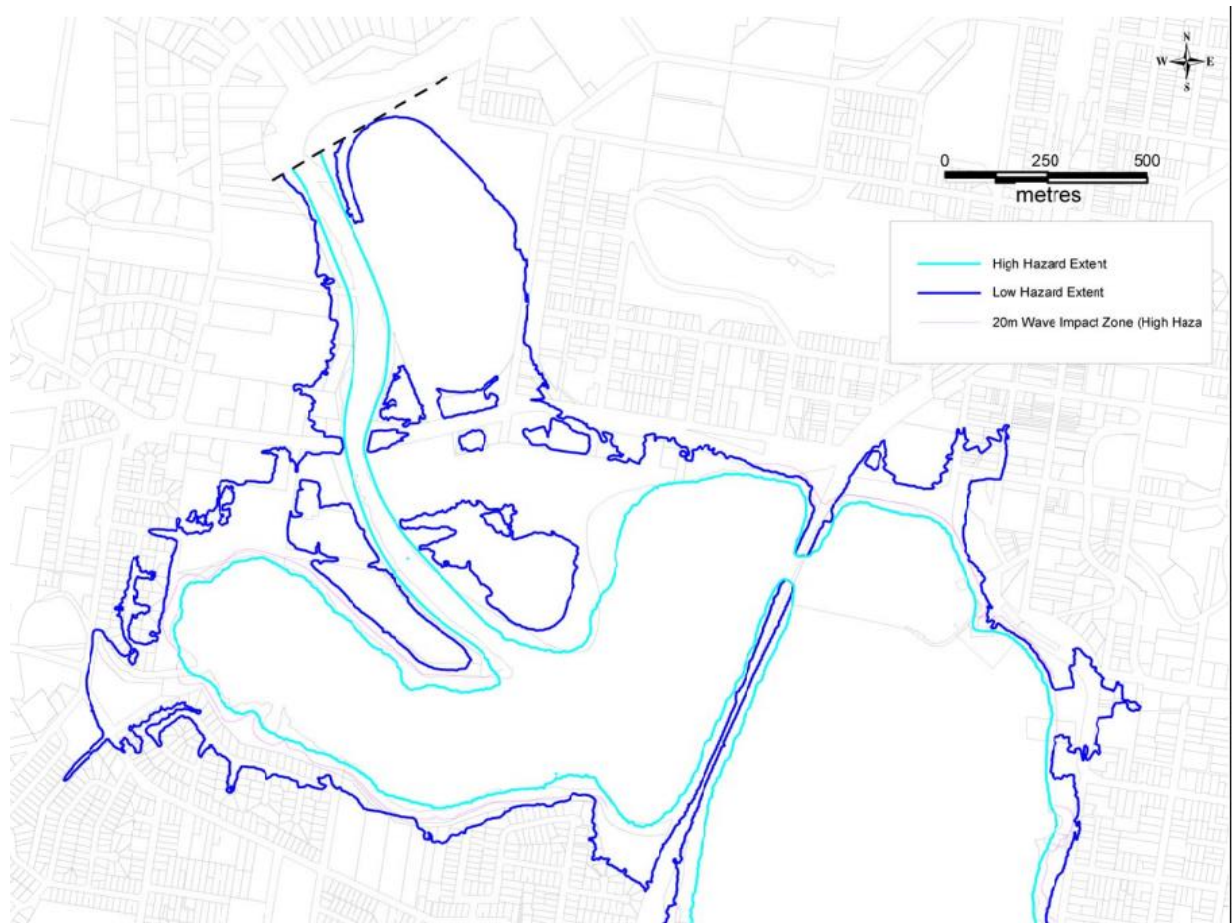


Figure 4 Results of flooding assessment of Brisbane Waters near the site (Cardno 2013)

4.3.4 SURFACE WATER QUALITY

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) completed an Estuary Report Card for years 2024-2025 at Brisbane Waters. The aim of the report card was to assess the ecological health of Brisbane Water in order to track changing conditions through report card grading and to continue to grow long-term datasets to support management of the system.

The results found that for Zone 1 (nearest Brisbane Water zone to the site) key indicators of surface water health were in the 93rd percentile for turbidity, chlorophyll-a, overall water quality and overall ecological health. The key parameters for determining the surface water quality included chlorophyll-a concentration, turbidity, dissolved oxygen, salinity, pH (of between 7.5-8.0), electrical conductivity, and fluorescent dissolved organic matter.

No surface water quality data from Brisbane Waters was available at the time of this assessment.

4.4 Geology

4.4.1 REGIONAL GEOLOGY

The Gosford-Lake Macquarie 1:100,000 Geological Series Sheet 9131 and part sheet 9231 indicated that the site is underlain by Middle Triassic aged Terrigal Formation rock of the Narrabeen Group and the Quaternary aged gravel and sands. The lithology of the Terrigal Formation is described as interbedded laminate, shale and fine to coarse grained quartz to quartz-lithic sandstone with minor claystone. The regional geological mapping is provided in **Figure 4, Appendix A**.

4.4.2 SITE SPECIFIC GEOLOGY

A series of intrusive investigation works have been completed at the site by various consultants as outlined in **Section 2.2.2**. The generalised site stratigraphy based on the findings of these investigations is summarised in **Table 6** below.

Table 6 Site-specific geology summary

STRATIGRAPHIC LAYER	GENERALISED DESCRIPTION	AVERAGE THICKNESS (M)
Unconsolidated Fill	Fill (variable thickness of 0.5 to 2.0 m) generally comprising sandy fill and sandy clay fill. Occasionally some silty and/or clayey fill was encountered above the alluvial soils. Silty sand was described as fine to medium grained, brown with trace igneous gravels and clay. Clays were described as low plasticity and grey/brown.	1.1
Alluvial/Residual Sand and Clay	Alluvial soils were encountered at the majority of locations. The upper layer of the alluvial soils generally comprised of soft and firm clayey silt, loose sand and clayey sand encountered at <3m, whilst sandy clay and silty clay of stiff to very stiff strength (increasing strength with depth) was encountered below. Sands, sandy clays and silty clays were generally low to high plasticity, fine to medium grained sand, grey to orange/brown with occasional ironstone gravels.	6.0
Terrigal Formation Sandstone	Extremely to highly weathered sandstone (variable thickness of 1.0 to 4.8 m) was encountered at most locations and was generally noted as being made up of stiff to hard silty and sandy clays located at the transition between alluvial sediments and bedrock. The material was described as grey/brown and mottled orange-red with trace sand. Fresh to moderately weathered sandstone (encountered between approximately 7 to 15 mBGL, thickness not measured, medium grained, grey with laminated orange-red.	-

4.4.3 ACID SULFATE SOILS

Acid sulfate soils (ASS) occur predominantly on coastal land with elevations generally below 5 mAHD. 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.

Based on reviews of the Australian Soil Resource Information System and the NSW Government Acid Sulfate Soils Risk Map, the site is located within a disturbed terrain risk area at elevations ranging from 2-4 mAHD. Furthermore, a review of the NSW DPE State Environmental Planning Policy (SEPP) (Gosford City Centre) 2018 Acid Sulfate Soils Map Sheet (ASS_001), the site lies within primarily Class 2 land with land along the eastern boundary mapped as Class 5

land. It is noted that development consent is required for the carrying out of works in Class 2 land for works below the natural ground surface and works by which the water table is likely to be lowered.

Analysis of potential acid sulfate soils (PASS) and actual acid sulfate soils (AASS) was investigated in the Dryland Salinity and Acid Sulfate Soils Assessment (JK Environments, 2025). The findings of the investigation indicate that there was low potential for PASS or AASS to be disturbed during the proposed development and that an ASSMP was not considered necessary for the proposed development.

4.5 Hydrogeology

The site is located within the Brisbane Water Watersource, which is managed under the WMA 2000 through the Water Sharing Plan for the Central Coast Unregulated and Alluvial Water Sources 2022.

A review of Hydrogeology map of Australia (Geoscience Australia) indicates the aquifer type beneath the site are porous, extensive with low-moderate productivity.

4.5.1 GROUNDWATER MONITORING WELLS

Twenty-one (21) groundwater monitoring wells have been installed during previous investigations at the site. Three (3) monitoring wells (BH001-BH003) was installed by Cardno in September 2015 during the Preliminary Geotechnical Assessment and an additional two (2) monitoring wells (BH6 and BH7) were installed in May 2022 during the Geotechnical Investigation. Five (5) groundwater monitoring wells (BH1, BH2, BH5-7) were installed by Coffey in February 2018 by Coffey during the Geotechnical and Environmental Assessment. Two (2) groundwater monitoring wells (MW01 and MW02) were installed at the site by Stantec in October 2024 during additional Geotechnical Investigation. Three (3) groundwater monitoring wells (MW01, MW02 and MW03) were installed at the site by El Australia in April 2025 during the Hydrogeological Report and DMP. And most recently, six (6) groundwater monitoring wells including four deeper wells (BH1, BH3-BH5) and two shallow wells (BH1A and BH4A) were installed by JK Geotechnics in August 2025 during the most recent Geotechnical Investigation.

The groundwater monitoring well locations are provided in **Figure 2, Appendix A**, and the borehole logs are provided in **Appendix C**.

Groundwater monitoring wells installed at the site are summarised in **Table 7** below.

Table 7 Summary of groundwater monitoring wells at the site

LOCATION ID	DATE	DRILLED BY	NORTHING	EASTING	APPROX. TOC ELEVATION (mAHD)	SCREEN TOP (mbTOC)	SCREEN BOTTOM (mbTOC)	STRATIGRAPHIC UNIT
BH002	21-Sep-15	Cardno	6299805	345767	3.0	-	6.4 ¹	Alluvium & Residual Soils
BH003			6299806	345721	3.0	2.6	5.6	Alluvium & Residual Soils
BH004			6299762	345724	3.0	-	4.6 ¹	Alluvium & Residual Soils
BH6	31-May-22		6299836	345701	2.7	-	14.91 ¹	Alluvium & Residual Soils / Terrigal Formation Sandstone
BH7			6299823	345717	2.7	-	13.29 ¹	Alluvium & Residual Soils / Terrigal Formation Sandstone
BH1	22-Feb-18	Coffey	6299817	345756.31	2.5		8.7 ¹	Alluvium & Residual Soils
BH2	23-Feb-18		6299809.1	345719.85	2.7		15.06 ¹	Alluvium & Residual Soils
BH5	28-Feb-18		6299825	345711.0	2.3		15.0 ¹	Alluvium & Residual Soils / Terrigal Formation Sandstone
BH6	1-Mar-18		6299796.4	345761.69	4.0		16.0 ¹	Alluvium & Residual Soils / Terrigal Formation Sandstone
BH7	2-Mar-18		6299759.9	345710.5	2.5		8.6 ¹	Alluvium & Residual Soils / Terrigal Formation Sandstone
MW01	17-Oct-24	Stantec	3457372 ²	6299766 ²	2.7	2.5	14.92	Alluvium & Residual Soils / Terrigal Formation Sandstone
MW02	18-Oct-24		3457092 ²	6299792 ²	2.7	2.5	12.1	Alluvium & Residual Soils / Terrigal Formation Sandstone
MW01	1-Apr-25	EI Australia	345747 ²	6299835 ²	2.9	9.0	12.0	Terrigal Formation Sandstone
MW02			345691 ²	6299803 ²	2.48	5.0	8.0	Alluvium & Residual Soils / Terrigal Formation Sandstone
MW03			345763 ²	6299767 ²	4.25	9.0	12.0	Terrigal Formation Sandstone
BH1	30-Jul-25	JK Geotechnics	345696 ²	6299803 ²	2.7	10.3	16.3	Terrigal Formation Sandstone
BH1A	30-Jul-25		345696 ²	6299803 ²	2.7	0.5	3.0	Alluvium & Residual Soils
BH3	31-Jul-25		345717 ²	6299755 ²	2.5	9.23	16.23	Terrigal Formation Sandstone
BH4	31-Jul-25		345730 ²	6299795 ²	2.7	10.05	16.05	Terrigal Formation Sandstone
BH4A	31-Jul-25		345730 ²	6299795 ²	2.7	1.5	4.5	Alluvium & Residual Soils
BH5	30-Jul-25		345751 ²	6299767 ²	3.1	9.3	16.3	Terrigal Formation Sandstone

Notes:

- 1: assumed depth based on borelogs
2: inferred from georeferenced image

4.5.2 GROUNDWATER ELEVATIONS

Manual Measurements

A summary of the groundwater monitoring wells, and manual measurements recorded is provided in Table 8 below.

Table 8 Manual Groundwater Elevation Measurements

WELL ID	GAUGED BY	DATE	DEPTH OF WELL (MBTOC / MAHD)	DEPTH TO WATER (MBTOC)	DEPTH TO WATER (RL MAHD)
BH002	Cardno	21-Sep-15	6.4 / -3.4	2.2	0.8
		22-Sep-15		0.9	2.1
BH003		22-Sep-15	5.6 / -2.6	1.3	1.7
BH004		21-Sep-15	4.6 / -1.6	2.2	0.8
BH6		31-May-22	14.91 / -12.21	1.8	0.9
BH7		31-May-22	13.29 / -10.59	2.2	0.5
BH1	Coffey	22-Feb-18	8.7 / -6.2	5.2	2.7
BH2		23-Feb-18	15.06 / -12.36	4.0	-1.3
BH5		28-Feb-18	15.0 / -12.7	2.5	0.2
BH6		01-Mar-18	16.0 / -12.0	1.7	2.3
BH7		02-Mar-18	8.6 / -6.1	2.0	0.5
		06-Aug-19		2.1	0.4
MW01	Stantec	18-Oct-24	14.92 / -12.22	4.8	-2.1
		08-Nov-24		4.5	-1.8
MW02		18-Oct-24	12.1 / -9.5	4.0	-1.4
		08-Nov-24		3.7	-1.1
BH1	JK Geotechnics	11-Aug-25	16.3 / -13.6	1.3	1.4
		15-Aug-25		1.2	1.5
BH1A		11-Aug-25	3.0 / -0.3	1.4	1.3
		15-Aug-25		1.5	1.2
BH3		11-Aug-25	16.23 / -13.73	1.5	1.0
		15-Aug-25		0.9	1.6
BH4		11-Aug-25	16.05 / -13.35	1.1	1.6
		15-Aug-25		1.1	1.6
BH4A		11-Aug-25	4.5 / -1.8	0.7	2.0
		15-Aug-25		0.8	2.0
BH5		11-Aug-25	16.3 / -13.2	1.5	1.6
		15-Aug-25		1.4	1.7
MW01	El Australia		12.0 / -9.1	0.6	2.3
MW02		09-Apr-25	8.0 / -5.5	1.8	0.7
MW03			12.0 / -7.8	0.7	2.3
			Minimum:	0.6	-2.1
			Maximum:	5.2	2.7
			Mean:	2.02	0.94
			Median:	1.5	1.3

TOC – top of casing

RL mAHD – Reduced level metres Australian Height Datum

mbTOC – metres below top of casing

mbgl – metres below ground level

4.5.3 DATA LOGGERS

Long-term monitoring of on-site groundwater levels was conducted by JK Geotechnics (2025). Groundwater elevation measurements were collected over 108 days (approximately 3 months), between 15 August 2025 to 27 November 2025 for BH1, BH1A, BH3, BH4, BH4A and BH5.

Standing groundwater levels (SWL, mAHD), overlain with the recorded rainfall during this period (Gosford AWS 061425) have been plotted in Figure 5 below.

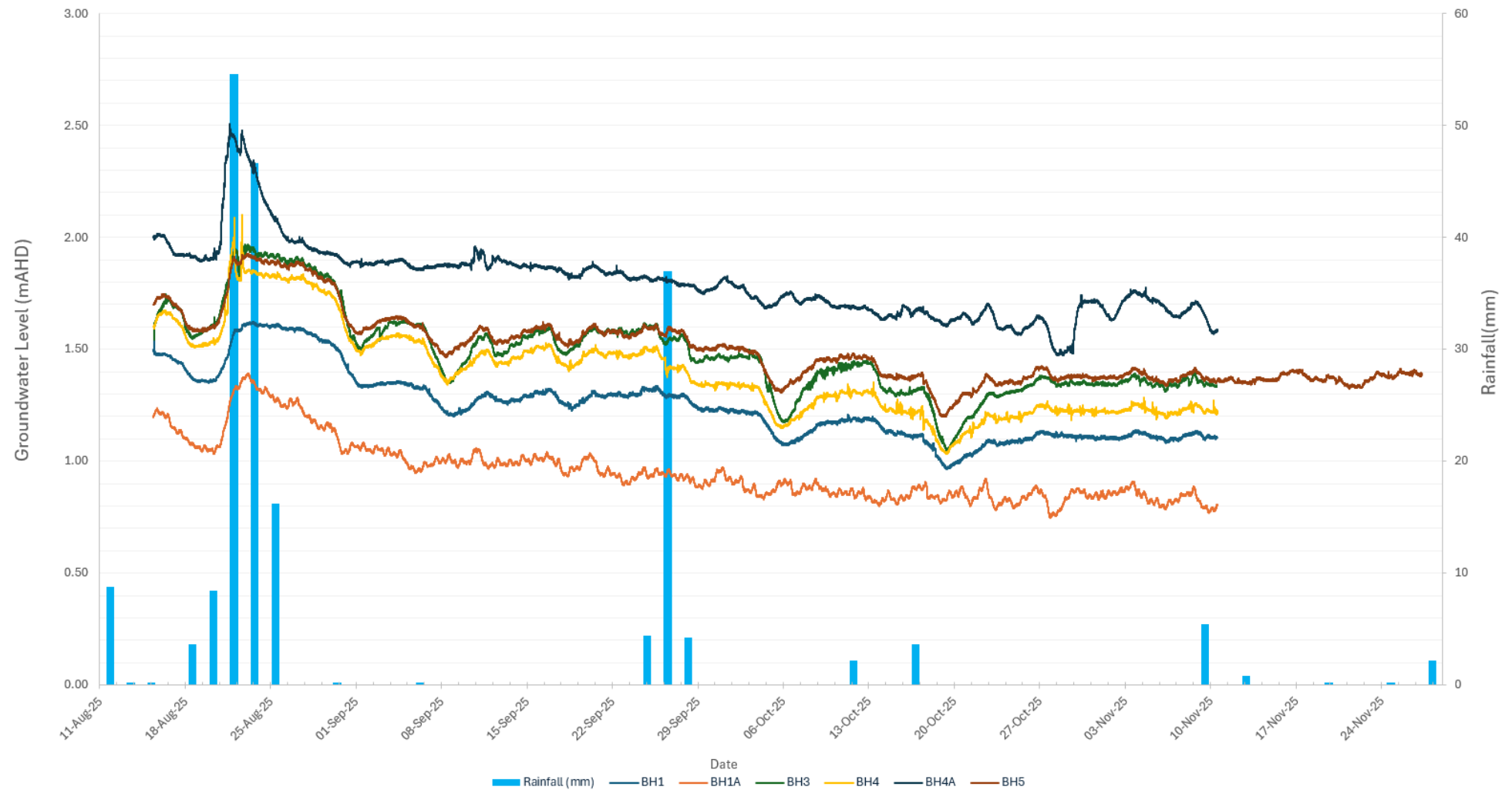


Figure 5 Long-term Groundwater Elevation Measurements and Rainfall over 108-day period (approximately 3 months)

The following key findings were reported from the long-term groundwater elevation monitoring:

- Groundwater elevations of all monitoring wells responded immediately to rainfall indicating that the alluvial/residual and the deeper sandstone are unconfined with relatively fast infiltration rates.
- Standing water levels of the shallow monitoring wells (BH1A and BH4A) fluctuated between approximately 2.5 mAHD and 0.78 mAHD.
- Standing water levels within the deeper monitoring wells (BH1, BH3 to BH5) fluctuated between approximately 2.16 mAHD and 0.97 mAHD.
- The maximum standing water levels were recorded over the three-month monitoring period as follows (refer to Graph 1 above):
 - BH1A: 1.33 mAHD.
 - BH4A: 2.5 mAHD.
 - BH1: 1.61 mAHD
 - BH3: 1.61 mAHD
 - BH4: 1.61 mAHD
 - BH5: 1.61 mAHD
 - The average of the maximum levels within the shallow wells is 5.12 mbTOC. The average of the maximum levels within the deep wells is 13.25 mbTOC.

4.5.4 INFERRED FLOW DIRECTION

Local or perched groundwater at the site is expected to flow westwards, towards Brisbane Waters, conforming with the local topography.

Based on gauged groundwater standing levels and surveyed top of casing data for BH1, BH3, BH4 and BH5 from 11 August 2025, groundwater is inferred to flow east to west towards Brisbane Waters. Groundwater contour and flow direction data has been presented on **Figure 5, Appendix A**.

4.5.5 HYDRAULIC CONDUCTIVITY

Variable head testing was completed by JK Geotechnics (2025b) from five (5) on site groundwater monitoring wells. Analysis of variable head test data was completed by Reditus in order to obtain hydraulic conductivity values. Variable head tests were also completed by EI (2025) during the Groundwater Seepage and Dewatering Management Plan. Outputs generated by Reditus from computational software presented in **Appendix D**.

Estimates for hydraulic conductivity completed by Reditus were developed using both the Bouwer-Rice and Hvorslev methods. The average hydraulic conductivity measured at each location was calculated and are summarised in **Table 9** below.

Table 9. Estimates of Hydraulic Conductivity

WELL ID	ESTIMATES COMPLETED BY	INTERPRETED HYDRAULIC CONDUCTIVITY (m/day)
Alluvium & Residual Soils		
BH1A	Reditus	2.02x10 ⁻²
BH4A		5.62x10 ⁻³
BH1A	JK Geotechnics	2.07x10 ⁻¹
BH4A		4.84x10 ⁻²
BH103M	El Australia	2.59x10 ⁻²
Average		2.62x10 ⁻²
Terrigal Formation Sandstone		
BH1	Reditus	5.90x10 ⁻⁴
BH4		7.87x10 ⁻⁴
BH5		9.34x10 ⁻⁴
BH1	JK Geotechnics	2.16x10 ⁻²
BH3		5.88x10 ⁻³
BH4		2.76x10 ⁻²
BH5		2.42x10 ⁻²
BH101M	El Australia	8.04x10 ⁻⁴
BH103M		4.06x10 ⁻³
Average		2.47x10 ⁻³

The above estimates of hydraulic conductivity are noted to be generally consistent with literature values for clay, silt, silty sand and sandstone (Fitts, C.R. 2013 Groundwater Science (2nd ed. Academic Press)).

4.5.6 PHYSIOCHEMICAL PROPERTIES

A groundwater sampling event was undertaken by El Australia (DMP, 2025) on 9 April 2025 on monitoring wells MW01-MW03. Field water quality parameters dissolved oxygen (DO), pH, EC, temperature and Reduction/Oxidation potential (Redox) were measured with the recorded results presented in **Table 10** below.

Table 10. Groundwater Physiological Parameters (El, 2025)

Well ID	pH	TEMP (°C)	EC (μS/cm)	DO (mg/L)	REDOX (mV)	COMMENTS
MW01	5.63	18.61	1,075	6.61	215.6	Clear, low turbidity, no odour or sheen
MW02	5.70	19.78	888	2.56	210.4	Clear, low turbidity. No odour or sheen
MW03	5.12	19.97	585	8.86	222.1	Slightly turbid, brown, no odour.

* 199mV have been added to redox field values to adjust to Standard Hydrogen Electrode (SHE) results.

Based on the physicochemical parameters recorded during the groundwater monitoring event the following observations have been made:

- pH indicates a slightly to moderately acidic environment in the groundwater underlying the site.
- Electrical conductivity readings indicate a fresh to moderately fresh groundwater.
- Dissolved oxygen indicates low levels of dissolved oxygen in the groundwater.
- ORP indicates weakly oxidising environment is present in the groundwater.

4.5.7 GROUNDWATER QUALITY SAMPLING RESULTS

Collection and analysis of groundwater samples from monitoring wells MW01 to MW03 was completed by EI Australia (DMP, 2025) on 9 April 2025. The groundwater monitoring well locations are presented in **Figure 2, Appendix A**, a summary of the groundwater sampling results is provided below.

2025 EI Groundwater Sample Results

Laboratory analytical results of the groundwater sampling event were assessed against the discharge water quality criteria (ANZG (2018) 95% marine species protection). The groundwater samples were submitted to the NATA accredited laboratories SGS (primary laboratory) and Envirolab (secondary laboratory) for the analysis of:

- Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene (BTEXN) – all samples
- Total Petroleum Hydrocarbons (TPH) and Total Recoverable Hydrocarbons (TRH) – all samples
- Polycyclic Aromatic Hydrocarbons (PAHs) – all samples
- Volatile Organic Compounds (VOCs) – all samples
- OCPs and OPPs – MW02 only
- Nine Priority Heavy Metals - dissolved (including aluminium, cadmium, copper, lead, mercury, nickel and zinc) and total arsenic and chromium – all samples
- Additional Heavy Metals – dissolved (including antimony, boron, barium, beryllium, cobalt, iron, lithium, manganese, molybdenum, selenium, silica, silver, strontium, uranium and vanadium) – MW02 only
- Inorganics including hardness, alkalinity (bicarbonate, carbonate, hydroxide and total), ammonia, chloride, ionic balance, nitrate, nitrogen (total oxidized and total), phosphorus (total and reactive), sodium and sulphate – MW02 only
- Microbiological organisms including faecal coliforms, faecal streptococci, E.coli – MW02 only
- PFAS – MW02 only

All samples were reported below the adopted criteria with the exception of:

- Turbidity at all samples (ranged from 21 to 190 NTU) exceeding the discharge water quality criteria of 10 NTU
- pH at all samples (ranged from 5.12 to 2.9) exceeded the discharge water quality criteria of 6.5-8.4.
- Zinc at all samples (ranged from 54 to 65 µg/L) exceeded the discharge water quality criteria of 8 µg/L.
- Cobalt at MW02 (3 µg/L) exceeded the discharge water quality criteria of 1 µg/L
- Iron at MW02 (32,000 µg/L) exceeded the discharge water quality criteria of 3,000 µg/L
- Manganese at MW02 (710 µg/L) exceeded the discharge water quality criteria of 80 µg/L
- Uranium at MW02 (2 µg/L) exceeded the discharge water quality criteria of 0.5 µg/L.

Currently all data collected from the site supports that the underlying groundwater is acidic and has high heavy metals concentrations and does not meet the minimum threshold for discharge to stormwater. Reditus advise that the groundwater is treated to raise the pH and filter for metals to an acceptable level at a minimum prior to discharge.

4.5.8 LOCAL GROUNDWATER USERS

A review of Bureau of Meteorology's Australian Groundwater Explorer indicated that there are five (5) registered bores within a 1 km radius of the site. Three (3) bores were installed for monitoring purposes one (1) bore was installed for Irrigation, and one (1) for irrigation however has since been cancelled.

The monitoring bores are located cross-gradient to the site, whereas the irrigation bores are located cross- to up-gradient from the site. As such, the currently licenced extraction bore within 1 km of the site is considered unlikely to receive groundwater which has migrated from the site. The monitoring bores reported sandstone depths at 1.5 mbgl, and standing water levels at 3.0 mbgl.

The closest bore (GW201893) is located 140 m northwest of the site and reported water bearing zones between 30.0 and 36.0 mbgl, and 42.0 to 54.0 mbgl, with a yield of 1.5 L/s. Based on the drillers logs for GW201679, the Terrigal Formation aquifer is at least 72 , thick in the region. A summary of the five registered bores located within a 1.0 km radius of the site is presented in Table 11 below and the locations are illustrated in **Figure 6, Appendix A**.

Table 11 Summary of Registered Groundwater Bores

BORE ID	USE	DEPTH OF BORE	STANDING WATER LEVEL (MBGL)	DISTANCE / DIRECTION
GW200838	Monitoring	7.5	3	Approx. 990 m west
GW200840	Monitoring	8	3	Approx. 990 m west
GW200839	Monitoring	7.5	3	Approx. 990 m west
GW201679	Irrigation (Cancelled)	102	-	Approx. 210 m northwest
GW201893	Irrigation	78	-	Approx. 140 m northwest

4.5.9 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.

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. The site is located within the following WSP:

- Sydney Basin – North Coast Groundwater Source which is managed under the WMA 2000 through the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016

According to the NSW DCCEE High Ecological Value Aquatic Ecosystems Map (HEVAE, 2018), there are two high priority GDEs located within 1km radius of the site. The GDEs are presented on **Figure 6, Appendix A** and include the following:

- Grey Mangrove-River Mangrove Forest, located approximately 550m and 980m west of the site.
- Coastal Creekflat Layered Grass – Sedge Swamp Forest, located along the Brisbane Water waterfront between 550 and 1 km from the site.

4.6 Contaminated Sites

A search was undertaken (December 2025) of the NSW EPA Contaminated Land Register and the NSW EPA List of Notified Sites under the Contaminated Land Management Act (1997), which identified the following:

- The site is not listed on the NSW EPA record of notices under Section 60 of the Contaminated Land Management Act (1997).
- There was one (1) site within a 1 km radius of the site that are listed on the NSW EPA List of Notified Sites under the Contaminated Land Management Act (1997), these are detailed within **Table 12** below.

Table 12. NSW EPA List of Notified Sites

NAME	ADDRESS	DISTANCE FROM SITE	CONTAMINATING ACTIVITY	MANAGEMENT CLASS
Adcock Memorial Park	Adcock Memorial Park, Central Coast Highway, West Gosford NSW	~1km West	Landfill	Regulation under CLM Act not required.

- A search of records held under the Protection of the Environment Operations Act (1997) identified that the site does not contain an Environmental Protection License nor was the site listed on the Contaminated Land Record of Notices.
- A search of records held under the Protection of the Environment Operations Act (1997) identified the following site which located within a 1 km radius of the site on the Contaminated Land Record of Notices:
 - Garnet Adcock Memorial Park, Central Coast Highway, West Gosford NSW (approximately 1km west of the site) for contamination of groundwater and surface water at the site with substances significant enough to warrant regulation under the Contaminated Land Management Act 1997. Substances of concern include ammonia, PFAS and hazardous ground gases including methane and carbon dioxide. Issued in May 2020 and still in force.
 - Considering the location of the site listed on the Contaminated Land Record of Notices (across Brisbane Water surface water body from the site), it is very unlikely that potentially contaminating activities would influence the status of the soil or groundwater at the subject site.

5 Proposed Development

5.1 Development Details

It is understood that SSD-90960208 seeks consent for the detailed design, construction and operation of a mixed-use development comprising:

- Construction of two towers (36 and 42 storeys in height) above a retail podium (including pavilion building), comprising:
 - Retail, residential and hotel gross floor area (GFA).
 - 394 apartments, comprising the following mix:
 - 298 market apartments.
 - 96 affordable housing apartments to be managed by a CHP for 15 years (equating to approximately 20% of the residential GFA).
 - 152 hotel keys (eastern tower).
- Five parking levels, with vehicular access from Vaughan Avenue.
- Storage areas and services.
- Communal open space and deep soil planting (including retention of the Port Jackson Fig).
- Publicly accessible through site links, including stairs, walkways public art and landscaping.
- Provision of utilities and services infrastructure, as required

Draft design drawings are presented in **Appendix B**. The finished floor level (FFL) at ground level is RL 3.0 mAHD. The finished floor level (FFL) of basement 04 is RL -9.0 mAHD, and the bulk excavation level (BEL) is assumed to be 0.5 m deeper than the FFL, and therefore the BEL of the level 04 basement is RL -9.5 mAHD. The BEL of the 04 -level basement will require excavation depths of up to approximately 12.5 m below the existing ground levels at the site.

The basement is proposed to be constructed as a 'partially-drained basement' and it is anticipated that traditional sub-slab drainage systems will be used during construction. The basement walls are proposed to be constructed via secant pile shoring to reduce lateral inflows of groundwater, with a termination depth RL -10.5 mAHD (1.0 m below the BEL)

A summary of the proposed basement excavation parameters is provided in **Table 13** below. The basement layout is illustrated in **Figure 2, Appendix A** with a snapshot provided in Figure 6 below.

Table 13 Summary of Proposed Excavation Parameters

ITEM	DESCRIPTIONS
Basement Excavation Footprint Area¹ (m²)	Approximately 5,000 m ²
Ground Surface Elevations	The site is generally flat and ranging between 2.6 to 3.0 m AHD, with the exception of the east and southeastern portion of the site steeply inclined from the road elevation of approximately RL 8.6 mAHD. As such, site follows a minor grade towards the west, with the majority of the site being relatively flat.
Bulk Excavation Level (BEL)	<u>Basement Carpark Level 4</u> : RL -9.5 mAHD

¹ Determined from DKO Furtado Sullivan (2025) Drawing Basement 4 Capping Beam and Shoring Plan



Figure 6 Basement layout and BEL

5.2 Basement Construction Methodology

The proposed construction methodology is of a “partially-drained basement” design, which is typically constructed consisting of a sub-slab drainage system. The basement floor is understood to consist of slab-on-grade, strip, or pad footings on the underlying sandstone bedrock.

Given the presence of underlying sandstone bedrock at the site (discussed in Section 4.3), the proposed shoring is likely to consist of secant-pile wall retention system keyed into approximately 1.0 m below the BEL. As such, the secant piles will be installed to a depth of RL -10.5 mAHD. The secant piles will allow for reduces lateral inflows into the basement excavation.

5.3 Dewatering Extraction Rate and Duration

Dewatering is proposed to commence following the competition of shoring walls and during excavation. Groundwater is proposed to be extracted using internal drainage sump and pump dewatering system during construction (refer to [Figure 7](#) below).

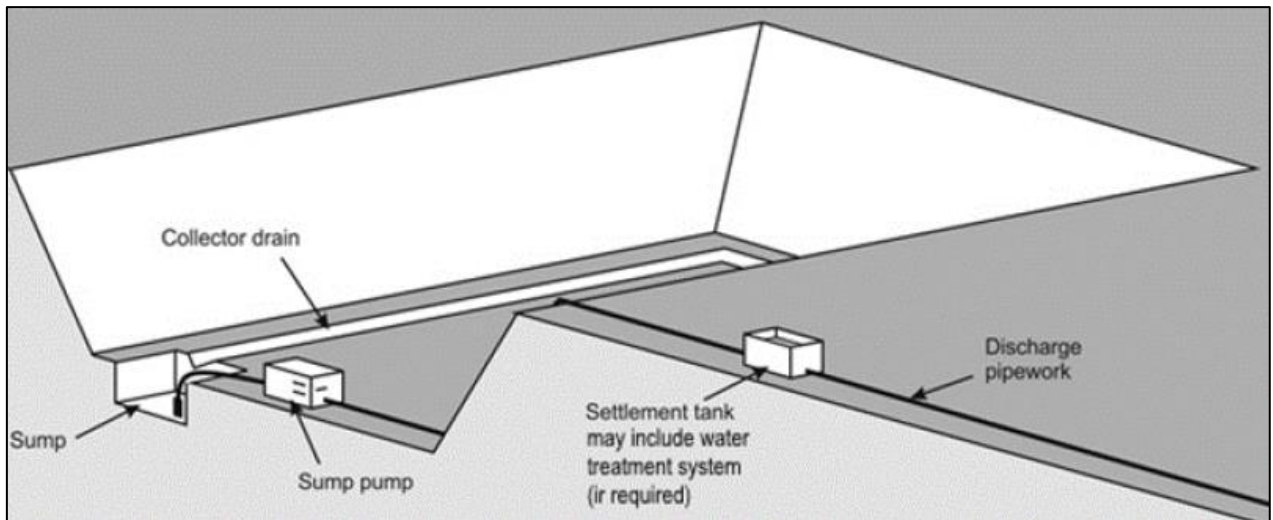


Figure 7 Conceptual layout of a sump and pump dewatering system

From an environmental perspective, construction methods to minimise the ingress of groundwater are recommended (such as grout injection into water bearing fractures), as it is effective in:

- Mitigating the risk of environmental impacts associated with drawdown of the water table, and the potential settlement of unconsolidated soils.
- Reducing the volume of extracted groundwater to be discharged (typically) off-site, which often requires treatment and has the potential to adversely impact the receiving environment.

Irrespective of the method, the dewatering depth shall be minimised to the extent practicable to reduce the volume of water to be extracted and to limit groundwater drawdown.

The duration to complete the necessary excavation works and basement construction is assumed to be approximately 12 months. Dewatering is likely to be required to operate 24 hours a day / seven days a week to maintain the water table at operational levels during construction and operation of the drained basement.

To minimise interruptions to the project and unnecessary expenditure, it is recommended that extraction pumps that can cater for low to high flow rates rather than mobilising multiple pumps that may not be required if lower flows are encountered.

5.4 Surface Water Interference Activities

5.4.1 SOILS

The proposed development will involve earth work activities including demolition of existing buildings, land clearing, and basement bulk excavation works which will disturb soils across the majority of the site. Soil disturbance during construction works has the potential to impact surface water quality by potentially contaminating surface water run-off during rainfall that will likely flow into the local stormwater network, which is inferred to discharge into Brisbane Water and ultimately the Pacific Ocean, or, due to the proximity to the water body, directly to Brisbane Water via overland flow.

5.4.2 POLLUTANTS AND CHEMICAL CONTAMINATION

The proposed development will involve construction phase works which have the potential to impact surface water through increased pollutant generation sourced from operational activities that may include:

- Leaching of heavy metals from construction materials during rainfall events
- Chemical spillages including hydrocarbons from fluids associated with construction machinery and materials which can flow into the local stormwater network and surface water bodies during rainfall events
- Dust and airborne pollutants being generated during construction and earthworks which can settle in surface water bodies.

These activities also have the potential to impact groundwater quality via seepage into the ground, however it is more likely that contaminants would be transported via surface run-off into the local stormwater network and receiving water bodies.

5.4.3 IMPERVIOUS AREAS

The proposed development will increase the impervious areas which will likely increase the runoff volumes around the site and has the potential to alter the groundwater recharge rates on site. Change in run-off volumes and groundwater recharge have the potential to impact surface water and groundwater quality.

6 Summary of Predicted Groundwater Inflow and Take

6.1 Numerical Groundwater Model

As detailed in the Groundwater Modelling Report (Reditus, 2025), a three-dimensional finite difference numerical groundwater model, using Groundwater Vistas software, was selected to simulate groundwater inflows and drawdown extent for the proposed drained basement. This type of numerical groundwater model was selected as it is capable of reproducing groundwater flow into drain cells reflecting constant-head groundwater extraction depth from the drained basement area and defined depths, permitting the geospatial characteristics of the basement location/depth relative to the Site hydrogeological profile/layers.

The model was constructed using information gathered during the sub-surface geological and hydrogeological investigations completed at the site to date.

Further details including the hydrogeological conceptual site model (H-CSM), model design and construction, model calibration results and model sensitivity and uncertainties is provided in the Groundwater Modelling Report (Reditus 2025).

6.2 Groundwater Inflows

The groundwater model predicted groundwater inflow rates is provided in **Table 14** below.

Table 14 Predicted Steady-state Groundwater Inflow Rates Under Drained Basement Design

SCENARIO	GROUNDWATER TAKE
	LONG-TERM OPERATION
Scenario 1: Operational partially drained basement	3.05 ML/year

The predicted groundwater inflow rates are based on modelled predictions, and these values required to be validated during excavation to verify inflows and required storage tank sizes. It should be noted that simulated groundwater inflow rates (m³/day) may not be representative in the early time steps following commencement of dewatering, as the model applies the drain cells instantaneously at the bulk excavation level, whereas dewatering would occur progressively during excavation before bulk excavation is reached. However, the cumulative groundwater take is representative as it reflects the total groundwater volume removed from storage and the aquifer matrix, providing a reliable basis for assessing overall groundwater take.

Table 15 Predicted Groundwater Take (Transient) During Construction and Long-Term Operation

DURING CONSTRUCTION AND LONG-TERM OPERATION	INFLOW RATE (ML/YEAR)
Year 1 (Construction)	8.95
Year 2 (Operational)	3.98
Year 3 (Operational)	3.79
Year 5 (Operational)	3.59
Year 10 (Operational)	3.37
Year 20 (Operational)	3.21
Year 50 (Operational)	3.09
Year 100 (Operational) – Steady State	3.05

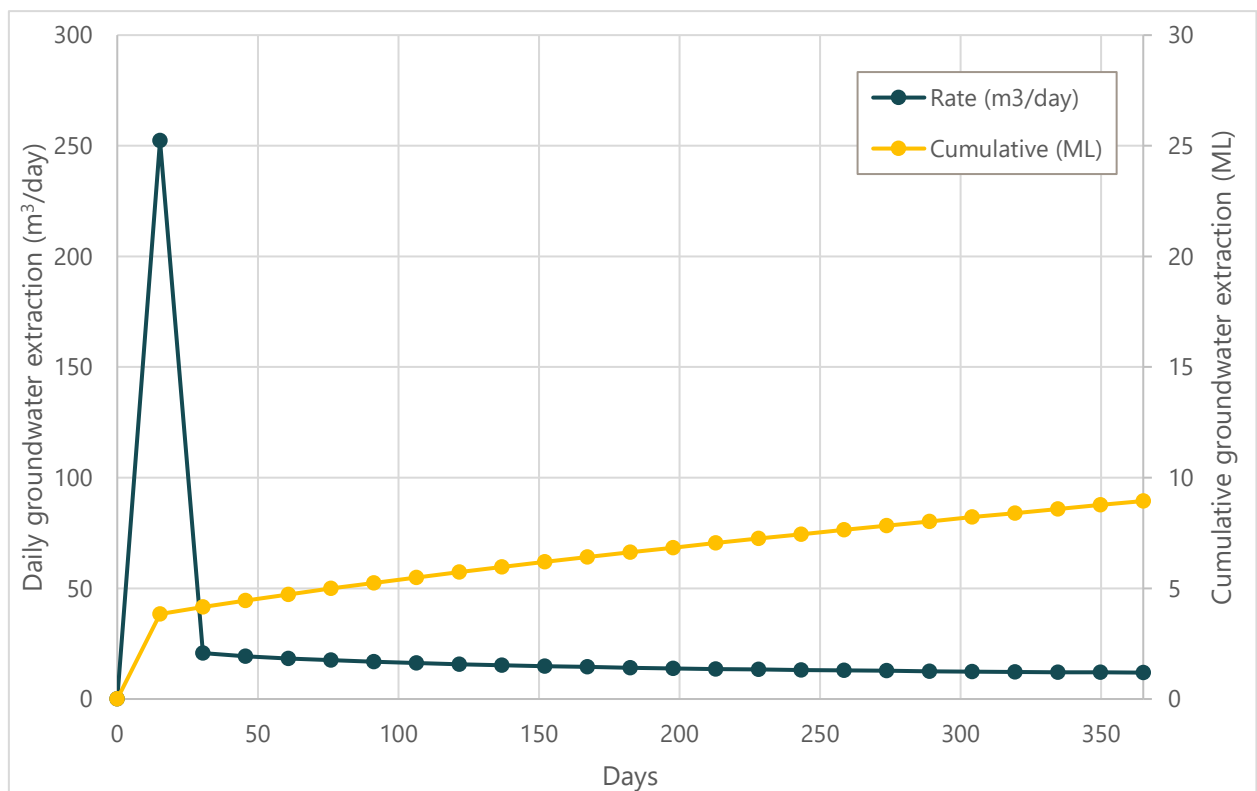


Figure 8 Predicted Groundwater Take (Transient) During Construction and Long-Term Operation

The groundwater inflow and required dewatering rate declines as the site is dewatered which is typical of prolonged pumping of groundwater as stored water is removed from the system.

Based on the findings of the groundwater model for the Groundwater Take and Impact Assessment, Reditus predicts a groundwater take of 8.95 ML/year during construction of the basement (i.e. excavation and establishment of the basement drainage system). After construction (i.e. operation) of the drained basement groundwater take will reduce to 3.05 ML/year over time.

6.3 Groundwater Drawdowns

The predicted long-term drawdown in the Alluvial / Residual Clay (Layer 2) and the Terrigal Formation (Layer 4) from drained basement operation were <1.0 m beyond 160 m and 170 m, respectively, of the basement walls. Groundwater drawdown for Layer 2 and Layer 4 Sandstone are illustrated in Figure 9 and Figure 10.

Given that the majority of the predicted drawdowns are within the Terrigal Formation, with much less drawdown in the Alluvium / Residual Clay, the potential for these drawdowns to induce settlement in overlying buildings is considered to be low. **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.**

Whilst every effort has been made to make accurate predictions in the dewatering volumes and off-site effects, it is strongly recommended that water levels be monitored regularly in the dewatered area and in surrounding properties during construction dewatering to ensure that local variations in hydraulic properties in the aquifer do not result in unacceptable groundwater depression.

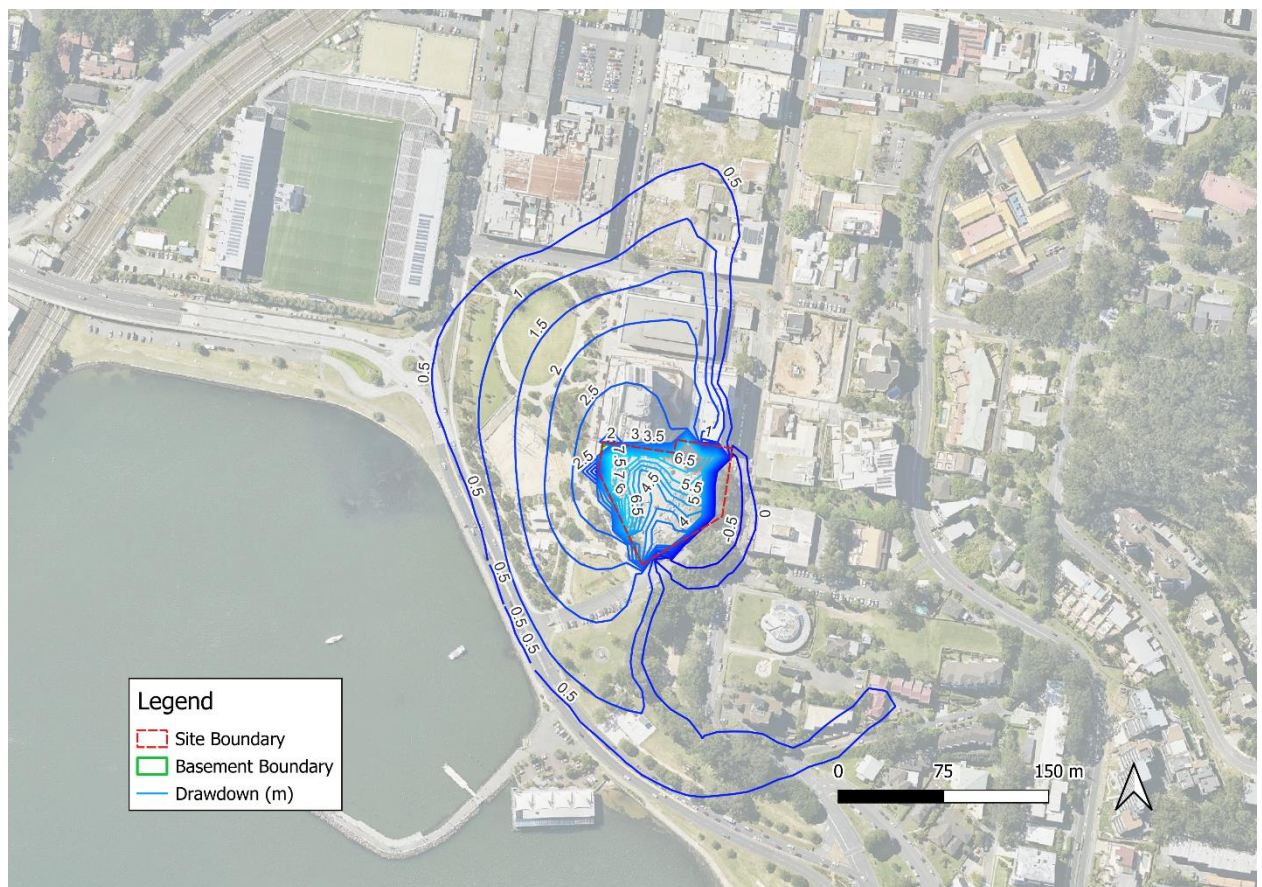


Figure 9 Predicted steady-state groundwater drawdown contours – Layer 2

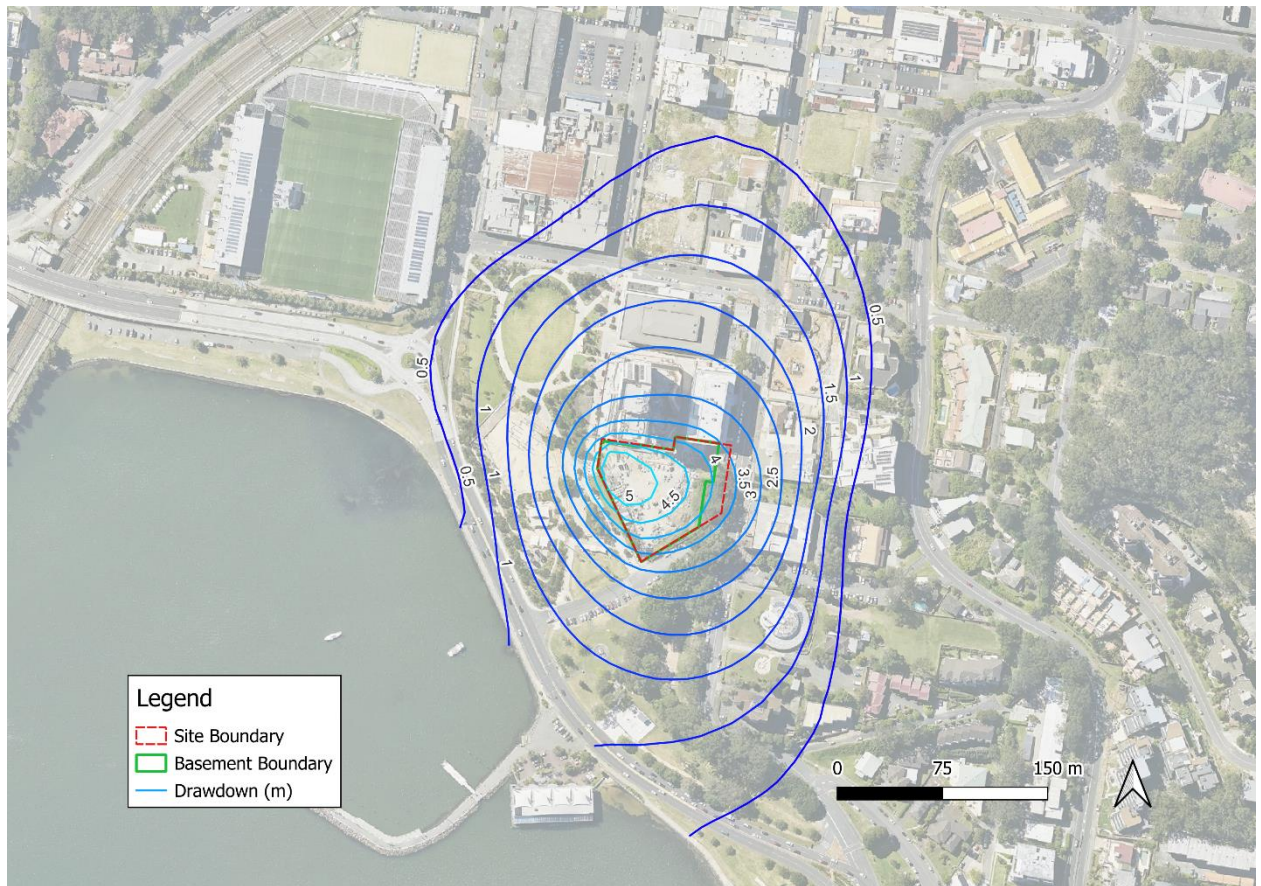


Figure 10 Predicted steady-state groundwater drawdown contours – Layer 4

7 Groundwater Impact Assessment

7.1 Minimal Impact Considerations

The WMA 2000 includes the concept of ensuring “no more than minimal harm” for both the granting of water access licences and the granting of aquifer interference approvals.

The NSW 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 (2023) 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 2000 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.

The proposed basement drainage design will take water from the Sydney Basin – North Coast Groundwater Source. The Terrigal Formation aquifer is considered a “Less Productive” fractured rock aquifer based on the relatively low number of registered water supply bores and expected low yields (<5 L/s).

Thresholds for minimal impact considerations have been developed for each groundwater source in NSW. The thresholds relate to impacts on groundwater table and pressure, and to groundwater and surface water quality.

A summary of the groundwater impact assessment completed for the applicable Sydney Basin – North Coast Groundwater Source is provided in Table 16 below.

Based on the results of the groundwater impact assessment, the proposed partially drained basement water take activities are considered to be of **Minimal Impact** under the NSW DPI (2012) Aquifer Interference Policy, Water Management Act 2000 and the NSW DPE (2023) Groundwater Impact Assessment Criteria.

Table 16 Groundwater Impact Assessment Summary

POROUS AND FRACTURED ROCK GROUNDWATER SOURCES: SYDNEY BASIN-NORTH COAST GROUNDWATER SOURCE	
CATEGORY: LESS PRODUCTIVE / UNCONFINED SYSTEM	
IMPACT ASSESSMENT CRITERIA	ASSESSMENT RESULTS
1. Cumulative drawdown over a ten-year period must not cause drawdown to exceed 0.1 metres from the current recovered water level, at any: a) GDE identified in the Water Sharing Plan b) High priority culturally significant site	No high priority culturally significant sites have been identified in the groundwater model domain, therefore drawdowns exceeding 0.1m at these sites are not expected. The closest high priority GDE to the site is located approximately 540 m to the west of the site. Groundwater drawdown reaches <0.1 m approximately 210 m west of the site and therefore has minimal impact on the GDE.
2. Cumulative extraction over a ten-year period must not cause drawdown to exceed 10% of the Total Available Drawdown to a maximum of 2 metres at any: a) 3rd or higher order connected surface water source b) Vegetation GDE identified in the Water Sharing Plan	The proposed partially drained basement is not expected to cause the water level in the Sydney Basin-North Coast Groundwater Source to drop below 10% of the Total Available Drawdown (TAD) at either a 3rd order or higher connected surface water source or Vegetation GDE, based on the following: - The TAD of the groundwater source was estimated assuming a unit thickness of 72m¹ in the study area, of which 10% of the TAD equates to 7.2 m drawdown. Therefore, the maximum value of 2 m applies. - The predicted steady-state drawdown in the Sydney Basin-North Coast Groundwater Source in the Alluvial / Residual Clay (layer 2) was <2 m within 82 m of the basement and 95 m within the Terrigal Formation Sandstone (Layer 4). - There are no connected surface water sources or vegetation GDEs identified within the predicted extents of drawdown >2 m.
3. 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: a) a distance of 200 metres from any production water supply works b) any other water supply work (e.g. at any basic landholder rights bores).	The proposed partially drained basement is not expected to cause the water level in the Sydney Basin-North Coast Groundwater Source to drop below 25% of the relative Total Available Drawdown (TAD) at either a 200 m distance of a production bore, nor at any other water supply work, based on the following: - The Relative TAD of the groundwater source was estimated assuming a unit thickness of 72 m¹ in the study area. Of which, 25% of the relative TAD equates to 18 m drawdown. - Drawdown to the northwest, towards GW201893 is <1.0 m within 123 m of the site boundary. As such, cumulative drawdown does not exceed the 25% relative TAD at any water supply work. - Additionally, based on the publicly available groundwater licence information it is unclear if GW201893 holds a current water supply works approval issued under the Water Management Act 2000.
4. Additional drawdown over a ten-year period cannot exceed 10% of the Total Available Drawdown to a maximum of 2 metres at any 3rd - party water supply work	The proposed partially drained basement is not expected to cause the water level in the Sydney Basin-North Coast Groundwater Source to drop below 10% of the TAD at a third-party water supply work based on the following: - The TAD of the groundwater source was estimated assuming a unit thickness of 72 m¹ in the study area, of which 10% of the TAD equates to 7.2 m drawdown. Therefore, the maximum value of 2 m applies. - The predicted steady-state drawdown in the Sydney Basin-North Coast Groundwater Source in the Alluvial / Residual Clay (layer 2) was <2 m within 82 m of the basement and 95 m within the Terrigal Formation Sandstone (Layer 4). There are no 3rd party water supply works identified within the predicted extents of drawdown > 2m.

Notes: 1 – Based on bore GW107757

8 Construction Impact Assessment

8.1 Construction Impacts / Risk Assessment

Assessment of surface water and groundwater potential impacts, associated risks during construction works and mitigation measures is presented in **Table 17** below.

Table 17. Potential Construction Risks and Mitigation Measures

RISK	IMPACT TYPE	POTENTIAL IMPACTS	MITIGATION MEASURES
Construction activities that disturb soils from excavation, dust suppression and land clearing works	Surface water	Pollute receiving waterbodies (local stormwater network and Brisbane Water) with increased sediment mobilisation, especially during rain events	Soil and water management plans incorporated in a Construction Environmental Management Plan (CEMP) to manage risk.
Stockpiling of soils and sandstone during basement construction works	Surface water	Pollute the receiving water bodies with increased sediments from improper stockpiling and containment of materials	Erosion and sediment control measures in accordance with Blue Book (DECC, 2008).
Chemical spills	Surface water and groundwater	Contaminate surface water via run-off into receiving waterbodies or underlying groundwater via seepage into the ground	Storage of hazardous liquids and refuelling operations to take place in bunded areas to reduce chance of spillage causing impacts
Intercepting and dewatering of groundwater during basement construction	Groundwater	Impacts to potential surrounding GDEs, and water supply bores within the vicinity of the basement construction caused by drawdown during dewatering activities	Minimise groundwater ingress during dewatering activities (such as grout injection into water bearing fractures). Minimise depths of excavation below groundwater table during basement construction.
Discharge of groundwater during construction dewatering	Surface water	Contamination of receiving water body (stormwater network and Brisbane Water) and associated water courses down-stream of the groundwater discharge point	All water to be discharged during basement construction dewatering to comply with adopted discharge water quality criteria (DWQC) and Council requirements (if necessary))
Construction of access tracks which can reduce rainwater infiltration and increase runoff into waterbodies	Surface water	Increase run-off during rain events has potential to transport contaminants and sediments into surface water bodies	Minimise area to be repurposed as access tracks where possible.

RISK	IMPACT TYPE	POTENTIAL IMPACTS	MITIGATION MEASURES
Impacts on GDEs and local registered bores	Groundwater and surface water	Impact to local high priority GDEs and groundwater users from drawdown impact of basement excavation	Impacts to GDEs and local groundwater users as a result of construction activities have not been identified in the numerical modelling and impact assessment.

8.2 Surface Water Impacts

8.2.1 WATER QUALITY IMPACTS

The construction activities associated with the proposed development that have the potential to impact the receiving water body water quality include:

- Accidental spills of chemicals, oils, grease and hydrocarbons from plant equipment used during construction works.
- Heavy metals from plant equipment during construction works.
- Erosion and sedimentation caused by mobilised soils from exposed areas and stockpiles.

8.2.2 FLOW REGIME

It is considered that there is a very low potential for the proposed development, including any groundwater extraction during the basement construction phase, to adversely affect the natural flow regime of nearby surface water bodies (Brisbane Water). Surface water bodies in the vicinity of the site are tidally influenced estuarine systems and therefore experience regular tidal exchange, resulting in continuous bidirectional flow on a daily basis.

Given the dominant influence of tidal processes on surface water levels and flows, it is not expected that the development would result in any measurable or sustained change to surface water flow regimes.

8.3 Groundwater Impacts

8.3.1 WATER QUALITY IMPACTS

The pollutants identified that have the potential to impact the groundwater quality during the construction phase works of the proposed development include:

- Accidental spills of chemicals, oils, grease and hydrocarbons from plant equipment used during construction works which can leach into the groundwater.
- Heavy metals from plant equipment during construction works leaching into the groundwater.
- Dewatering during construction phase basement excavation works.

Dewatering groundwater during basement construction can impact the water quality of receiving water body, associated water courses and environmental receptors. Based on groundwater quality results discussed in **Section 4.5.7**, the water to be discharge to stormwater during the construction phase of the development will require treatment to adhere to relevant guidelines and the following criteria at a minimum:

- Concentration of suspended solids must not exceed 50 mg/L.
- The pH of the water must be between 6.5 and 8.4.
- The water must contain no visible oil or grease.
- The turbidity of the water must not exceed 10 NTU.
- The water must not contain any substance known to be toxic to aquatic life.

Based on the results of the groundwater sampling undertaken at the site to date, the quality of the water that is to be discharged during construction phase dewatering will require management in order to meet the above criteria which can be addressed in a Dewatering Management Plan (DMP).

Currently all data collected from the site supports that the underlying groundwater is acidic and does not meet the minimum threshold for discharge to stormwater. Reditus advise that the groundwater is treated to raise the pH to an acceptable level prior to discharge.

8.3.2 GROUNDWATER DRAWDOWN IMPACTS

As discussed in **Section 7** and the assessment of minimal impact considerations in accordance with the AIP (2012) and NSW DPE (2023) Groundwater Impact Assessment Criteria (**Table 16**), the predicted steady-state drawdown in the Sydney Basin-North Coast Groundwater Source in the Alluvial / Residual Clay (layer 2) was <2 m within 82 m of the basement and 95 m within the Terrigal Formation Sandstone (Layer 4). It is noted that drawdown during the construction phase (year 1) is expected to be lower than the long-term (steady-state) drawdown.

Additionally, no drawdown impacts to high priority GDEs or high priority culturally significant sites were identified in the groundwater model drawdown extent. Drawdown to the northwest, towards GW201893 is <1.0 m within 120 m of the site boundary in the Alluvial / Residual Clay (layer 2) and the Terrigal Formation Sandstone (Layer 4).

9 Operational Impact Assessment

9.1 Operational Impacts / Risk Assessment

Assessment of surface water and groundwater potential impacts and associated risks during the operation phase of the development as well as the mitigation measures is presented in **Table 18** below.

Table 18. Operational Phase Impacts, Risks and Mitigation Measures

RISK	IMPACT TYPE	POTENTIAL IMPACTS	MITIGATION MEASURES
Increase in hardstand areas across the site	Surface water and groundwater	Increase the potential pollution generation and surface water runoff Decrease in groundwater recharge	Limit hardstand to areas that it is required.
Increase vehicle movement and parking	Groundwater	Fuel and oil spillages potentially contaminating the underlying groundwater via seepage into the ground	Basement hardstand likely to prevent any potential seepage into the ground
Soils stabilised incorrectly and failed revegetation leading to loose soils across site	Surface water	Soils and sediments become mobile and pollute local stormwater network and receiving surface water bodies	Ensure soils are stabilised and revegetation is effective by implementing revegetation management measures and soil erosion management plans Soil management including revegetation and soil compaction will form part of the CEMP
Discharge of groundwater during operational phase dewatering	Surface water and groundwater	Contamination of stormwater network and receiving surface water bodies	All water to be discharged during operational phase dewatering to comply with adopted discharge water quality criteria (DWQC) to be outlined within the future/updated site DMP.
Impacts on GDEs and local registered bores	Surface water and groundwater	Impact to GDEs and groundwater users from drawdown impact of basement excavation	Impacts to GDEs and local groundwater users as a result of construction activities have not been identified in the numerical modelling and impact assessment.

9.2 Surface Water Impacts

9.2.1 WATER QUALITY IMPACTS

The operational phase activities associated with the proposed development that have the potential to impact the local stormwater network and receiving surface water body water quality include:

- Spills or litter generated from major maintenance activities
- Erosion and sedimentation caused by mobilised soils from exposed areas.

9.2.2 FLOW REGIME

It is considered that there is a very low potential for the proposed development, including any groundwater extraction during the operational phase, to adversely affect the natural flow regime of nearby surface water bodies (Brisbane Waters). Surface water bodies in the vicinity of the site are tidally influenced estuarine systems and therefore experience regular tidal exchange, resulting in continuous bidirectional flow on a daily basis.

Given the dominant influence of tidal processes on surface water levels and flows, it is not expected that the development would result in any measurable or sustained change to surface water flow regimes.

9.3 Groundwater Impacts

9.3.1 WATER QUALITY IMPACTS

The pollutants identified that have the potential to impact the groundwater quality during the operational phase works of the proposed development include:

- Dewatering during operational phase of the proposed 'drained basement'.

Continued dewatering of groundwater can impact the water quality of receiving water body, associated water courses and environmental receptors. Based on groundwater quality results discussed in **Section 4.5.7**, the water to be discharge to stormwater during the ongoing operational phase of the development will require treatment to adhere to the following criteria at a minimum:

- Concentration of suspended solids must not exceed 50 mg/L.
- The pH of the water must be between 6.5 and 8.5.
- The water must contain no visible oil or grease.
- The turbidity of the water must not exceed 25 NTU.
- The water must not contain any substance known to be toxic to aquatic life.

Based on the results of the groundwater sampling undertaken at the site to date, the quality of the water that is to be discharged by continued dewatering will require management in order to meet the above criteria which can be addressed in a future Long-term Dewatering Management Plan (LTDMP).

Currently all data collected from the site supports that the underlying groundwater is acidic and has high TSS concentrations and does not meet the minimum threshold for discharge to stormwater. Reditus advise that the groundwater is treated to raise the pH and filter the TSS to an acceptable level prior to discharge.

9.3.2 GROUNDWATER DRAWDOWN IMPACTS

As discussed in **Section 7** and the assessment of minimal impact considerations in accordance with the AIP (2012) and NSW DPE (2023) Groundwater Impact Assessment Criteria (**Table 16**), the predicted steady-state drawdown in the Sydney Basin-North Coast Groundwater Source in the Alluvial / Residual Clay (layer 2) was <2 m within 82 m of the basement and 95 m within the Terrigal Formation Sandstone (Layer 4). It is noted that drawdown during the construction phase (year 1) is expected to be lower than the long-term (steady-state) drawdown.

Additionally, no drawdown impacts to high priority GDEs or high priority culturally significant sites were identified in the groundwater model drawdown extent. Drawdown to the northwest, towards GW201893 is <1.0 m within 120 m of the site boundary in the Alluvial / Residual Clay (layer 2) and the Terrigal Formation Sandstone (Layer 4).

10 Cumulative Impacts

Assessment of potential cumulative impacts for the proposed development includes review of surrounding land zoning, as well as developments and proposals that have the potential to increase the risk to surface water and groundwater at the site.

Review of the State Environmental Planning Policy (Gosford City Centre) 2018 land zoning map indicates the surrounding land is zoned as follows:

- **North:** Mixed Use (B4) then Commercial Core (B3) and Public Recreation (RE3), with the Instructure Facility (SP2 Rail) Railway corridor to the north-west of the site.
- **South:** Public Recreation (RE3), Infrastructure Facility (SP2 Road) followed by Recreational Waterways (W2) comprising Brisbane Water.
- **East:** Mixed Use (B4) then Instructure Facility (SP2 Road) and General Residential (R1) with small areas of Public Recreation (RE3).
- **West:** Public Recreation (RE3), Infrastructure Facility (SP2 Road) followed by Recreational Waterways (W2) comprising Brisbane Water.

The Mixed Use (B4) and Commercial Core (B3) land zoning north and east of the site will allow for other significant developments to occur within the vicinity of the site, which could have cumulative impacts, particularly if ongoing dewatering activities are also proposed. Additionally, **Table 19** below identifies current and potential future projects that have either been approved, or under construction, and their cumulative impact considerations.

It is noted that all projects listed below are either beyond the expected maximum drawdown extent from the site or do not involve the construction of a drained basement.

The biggest risk for surface water and groundwater cumulative impacts from the proposed development relates to the proposed ongoing dewatering activities at the site (i.e., proposed 'drained basement'). Given no other significant drained basements have been identified within the vicinity of the site, cumulative impacts are considered to be low risk and minimal.

Table 19 Identified development projects

REFERENCE	DEVELOPMENT DESCRIPTION	STATUS	DIRECTION
SSD-78031991	'Gosford Alive' by Bathla 136-146 and 148 Donnison Street, Gosford	Concept SSD: Approved Detailed Design: SEARs issued November 2024	470 m northeast
SSD-10321	Residential Development 89 John Whiteway Drive, Gosford	Approved	400 m east
DA 46256/2014	Mixed-Use Development 'The Archibald' by ALAND 108 Donnison and 110-118 Mann Street, Gosford	Approved <i>Construction completed mid-2025</i>	400 m north
DA/46209/2014	Mixed use development 27-37 Mann Street & 125 Georgiana Terrace, Gosford	Modification F approved 5 August 2025 <i>Under construction</i>	80 m northeast
DA/47046/2015	Mixed use development 114 Georgiana Terrace and 50 & 70 Mann Street, Gosford	Modification B approved 16 September 2025	140 m north

11 Mitigation and Management Measures

11.1 Construction Phase

11.1.1 DEWATERING MANAGEMENT AND MEASURES

Monitoring of the discharge water is to be completed in accordance with the 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.

11.1.2 DRAWDOWN IMPACT MEASURES AND MITIGATION

Potential impacts to surface water and groundwater as a result of drawdown of the water table during basement excavation and construction dewatering activities has been discussed previously in **Section 1**.

Mitigation and management measures for the identified potential impacts are to be included in an updated / future DMP or as part of future Groundwater Management Plan (GMP). The DMP / GMP would include strategies to manage potential impacts, including:

- Monitoring of groundwater elevations surrounding the basement excavation during the construction period including off-site drawdown monitoring.
- Outlining mitigation and management measures in the instance that groundwater discharge quantities exceed the expected discharge quantity which would include ceasing of dewatering activities.

11.1.3 POLLUTION OF SURFACE WATER AND 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 run-off 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 Operational Phase

11.2.1 DEWATERING MANAGEMENT AND MEASURES

Operational long-term dewatering for the life of the development will be required for the proposed partially 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 the receiving surface water environment. Discussion, recommendations and implementation of the systems required for drained basement groundwater discharge, investigation and management will be presented in a future site Long Term Dewatering Management Plan (LTDMP).

11.2.2 DRAWDOWN IMPACT MEASURES AND MITIGATION

The impacts associated with drawdown during the operational phase of the development are to be managed via long-term monitoring of groundwater levels over the life of the development. Although it is expected that the water table will stabilise, climatic conditions including prolonged wet or dry periods can have significant impacts to groundwater levels. The change in water level caused by climatic conditions and the basement carpark could potentially create a cumulative effect on the groundwater level. Mitigation measures for the operational phase drawdown impacts will be presented in the future site LTDMP.

11.2.3 POLLUTION OF SURFACE WATER AND GROUNDWATER

Operational phase risk of potential pollution to surface water and groundwater is considered to be minimal. However, potential risks including risks associated with mobilisation of dissolved metals leaching in groundwater and surface waters will be addressed in the future site LTDMP.

11.3 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 the 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 surface water and groundwater environment from the proposed development, review of relevant legislation and policy relating to the development and mitigating measures for the identified impacts. The report considers the impacts that have the potential to adversely affect the surface water and groundwater in the context of the construction phase and the operational phase of the development.

Surface water run-off from the site is expected to flow into the local stormwater network, which is likely to flow to the south-west, discharging into Brisbane Water and ultimately the Pacific Ocean. No water quality data is available for the potential surface water run-off or the receiving environment. Based on groundwater quality data collected at the site to date, groundwater discharged as part of the proposed dewatering activities will likely require treatment to meet the minimum threshold for discharge to stormwater.

The groundwater impacts associated with the basement excavation have been primarily assessed based on the modelled inflow calculations and probable drawdown expectations during the construction phase and operational phase of the development. Given the absence of groundwater users (registered water supply works) or Groundwater Dependant Ecosystems (GDEs) within the estimated drawdown extent of the proposed drained basement, impacts to these receptors were considered low risk.

Based on the results from the numerical groundwater model completed for the site, the predicted long-term steady-state groundwater take was **3.05 ML/year**, whilst the predicted groundwater take during the construction phase (year 1) was **8.95 ML/year**. Reditus consider that the predicted groundwater inflows can be effectively managed under a 'partially-drained basement' design, with the estimated inflows and drawdown meeting the relevant impact assessment criteria of 'Minimal Impact' under the AIP 2012 and WMA 2000.

It is noted that a Water Access Licence (WAL) and Water Supply Works Approval will likely be required for the construction phase and ongoing operational phase dewatering activities given the expected inflow volumes exceed the 3 ML/year exemption limit.

Other potential impacts to surface water and groundwater during both the construction and operational phase of the proposed development including potential chemical spillages, increase in hardstand areas, increase in potentially contaminating activities such as vehicle movement, incorrect soil stabilisation and other construction related impacts and are considered to be manageable with appropriate mitigation measures and management plans.

13 Limitations

The report or document does not purport to provide legal advice and any conclusions or recommendations made should not be relied upon as a substitute for such advice.

The report does not constitute a recommendation by Reditus for the client (UPG Waterfront Pty Ltd c/o Urban Property Group Pty Ltd) or any other party to engage in any commercial or financial transaction and any decision by the client or other party to engage in such activities is strictly a matter for the client.

The report relies upon data, surveys, measurements and results taken at or under the site at particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the client. Furthermore, the report has been prepared solely for use by the client and Reditus accepts no responsibility for its use by other parties. The client agrees that Reditus' report or associated correspondence will not be used or reproduced in full or in part for promotional purposes and cannot be used or relied upon by any other individual, party, group or company in any prospectus or offering. Any individual, party, group or company seeking to rely this report cannot do so and should seek their own independent advice.

No warranties, express or implied, are made. Subject to the scope of work undertaken, Reditus assessment is limited strictly to identifying typical environmental conditions associated with the subject property based on the scope of work and testing undertaken and does not include and evaluation of the structural conditions of any buildings on the subject property or any other issues that relate to the operation of the site and operational compliance of the site with state or federal laws, guidelines, standards or other industry recommendations or best practice. Scope of work undertaken for assessments are agreed in advance with the client and may not necessarily comply with state or federal laws or industry guidelines for the type of assessment conducted.

Additionally, unless otherwise stated Reditus did not conduct soil, air or wastewater analyses including asbestos or perform contaminated sampling of any kind. Nor did Reditus investigate any waste material from the property that may have been disposed off the site, or undertake an assessment or review of related site waste management practices.

The results of this assessment are based upon (if undertaken as part of the scope work) a site inspection conducted by Reditus personnel and/or information from interviews with people who have knowledge of site conditions and/or information provided by regulatory agencies. All conclusions and recommendations regarding the property are the professional opinions of the Reditus personnel involved with the project, subject to the qualifications made above.

While 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/assessment.

Reditus is not engaged in environmental auditing and/or reporting of any kind for the purpose of advertising sales promoting, or endorsement of any client's interests, including raising investment capital, recommending investment decisions, or other publicity purposes. 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.

Information relating to soil, groundwater, waste, air or other matrix conditions in this document is considered to be accurate at the date of issue. Surface, subsurface and atmospheric conditions can vary across a particular site or region, which cannot be wholly defined by investigation. As a result, it is unlikely that the results and estimations presented in this report will represent the extremes of conditions within the site that may exist. Subsurface conditions including contaminant concentrations can change in a limited period of time and typically have a high level of spatial heterogeneity.

From a technical perspective, there is a high degree of uncertainty associated with the assessment of subsurface, aquatic and atmospheric environments. They are prone to be heterogeneous, complex environments, in which small subsurface features or changes in geologic conditions or other environmental anomalies can have substantial impact on water, air and chemical movement.

Major uncertainties can also occur with source characterisation, assessment of chemical fate and transport in the environment, assessment of exposure risks and health effects, and remedial action performance. These factors make uncertainty an inherent feature of potentially impacted sites. Technical uncertainties are characteristically several orders of magnitude greater at impacted sites than for other kinds of projects.

Reditus' professional opinions are based upon its professional judgment, experience, and training. These opinions are also based upon data derived from the limited testing and analysis described in this report or reports reviewed. It is possible that additional testing and analysis might produce different results and/or different opinions or other opinions. Reditus has limited its investigation(s) to the scope agreed upon with its client. Reditus believes that its opinions are reasonably supported by the testing and analysis that has been undertaken (if any), and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at this time. Other opinions and interpretations may be possible. That standard of care may change and new methods and practices of exploration, testing and analysis may develop in the future, which might produce different results.

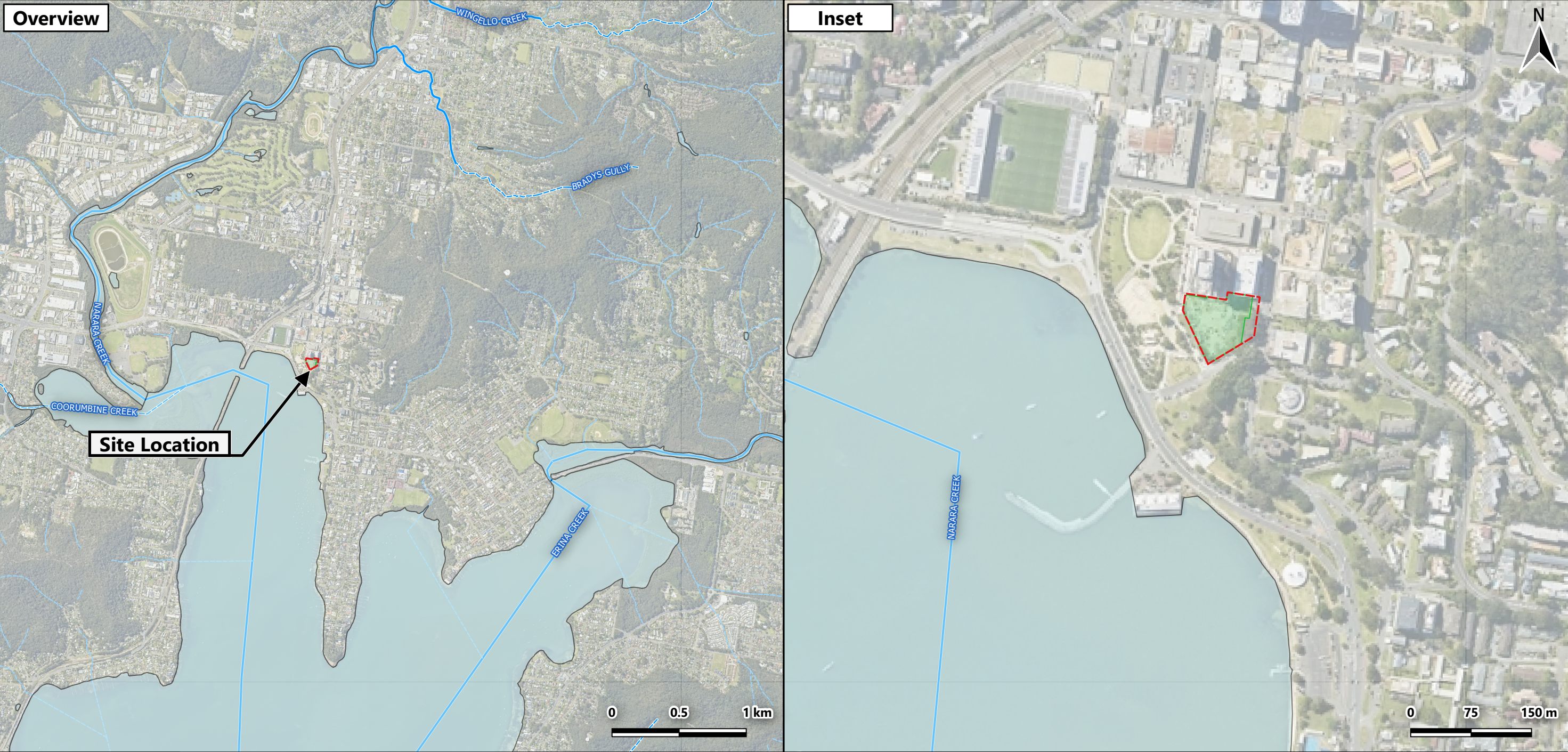
14 References

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A

Figures





Map	
25304_rp02_F1_v01	
Date of Export	
10/02/2026	
Author	Approver
TG	SM
Data Source	
Metromap, Google Maps, Open Street Map, Geoscience Australia	

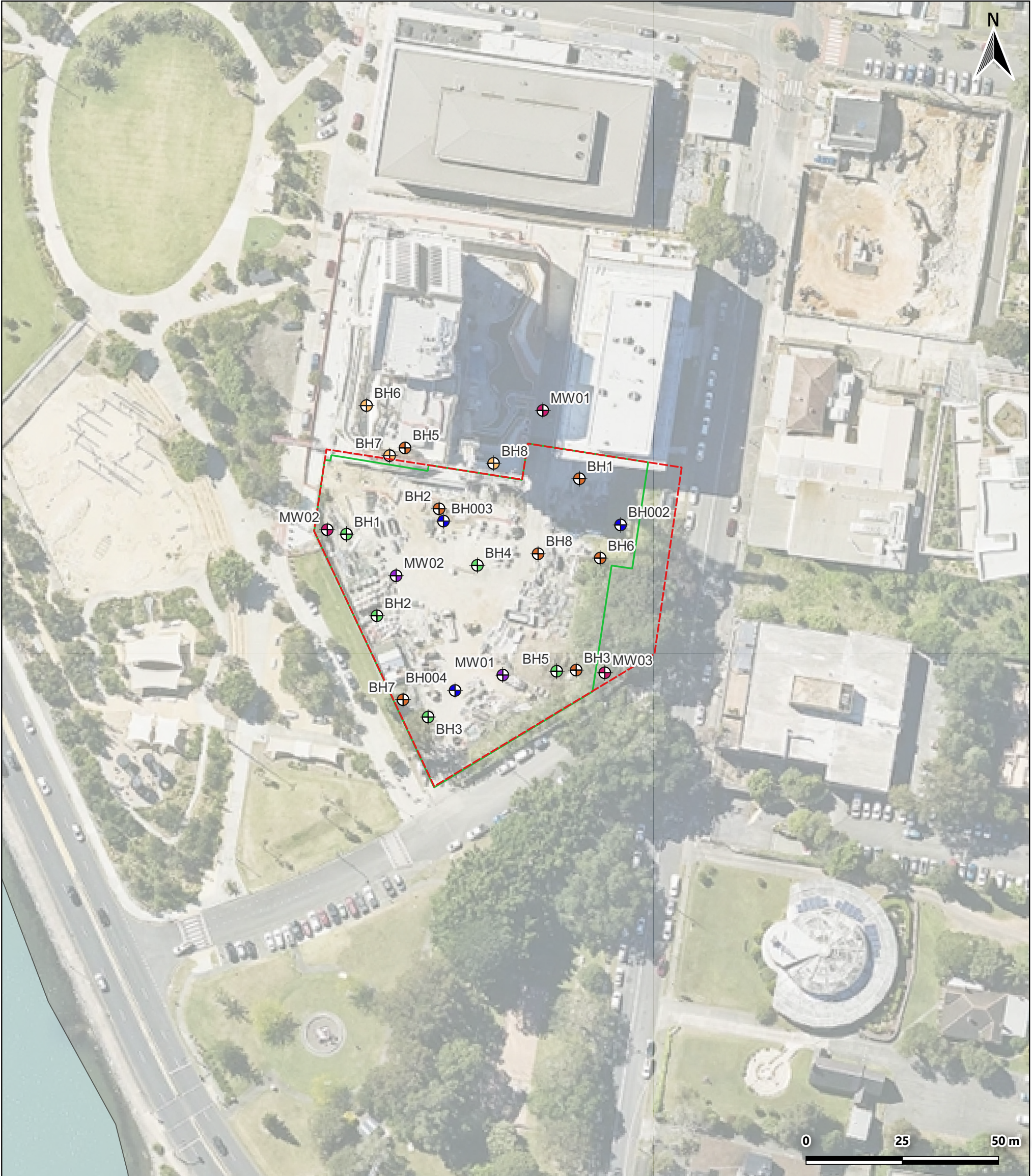
Legend
Site Boundary
Surface Water Features
Rivers
Stream (Perennial)
Stream (Non-Perennial)
Unnamed Stream (Non-Perennial)
Other Channels
Surface water bodies

Figure 1 - Site Location

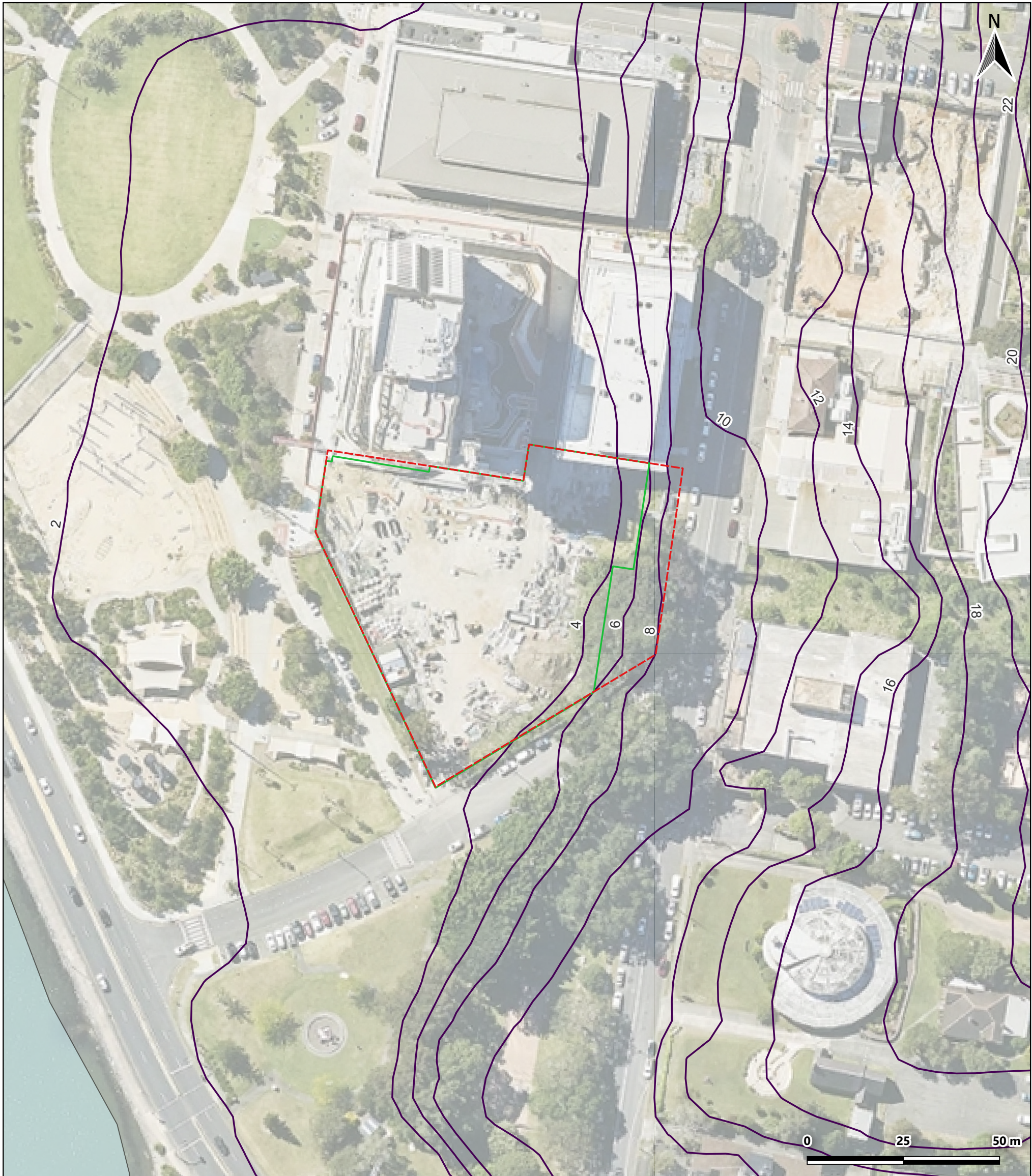
26-30 Mann Street, Gosford, NSW, 2250

25304 - Surface Water and Groudwnwater Impact Assessment

UPG Waterfront Pty Ltd

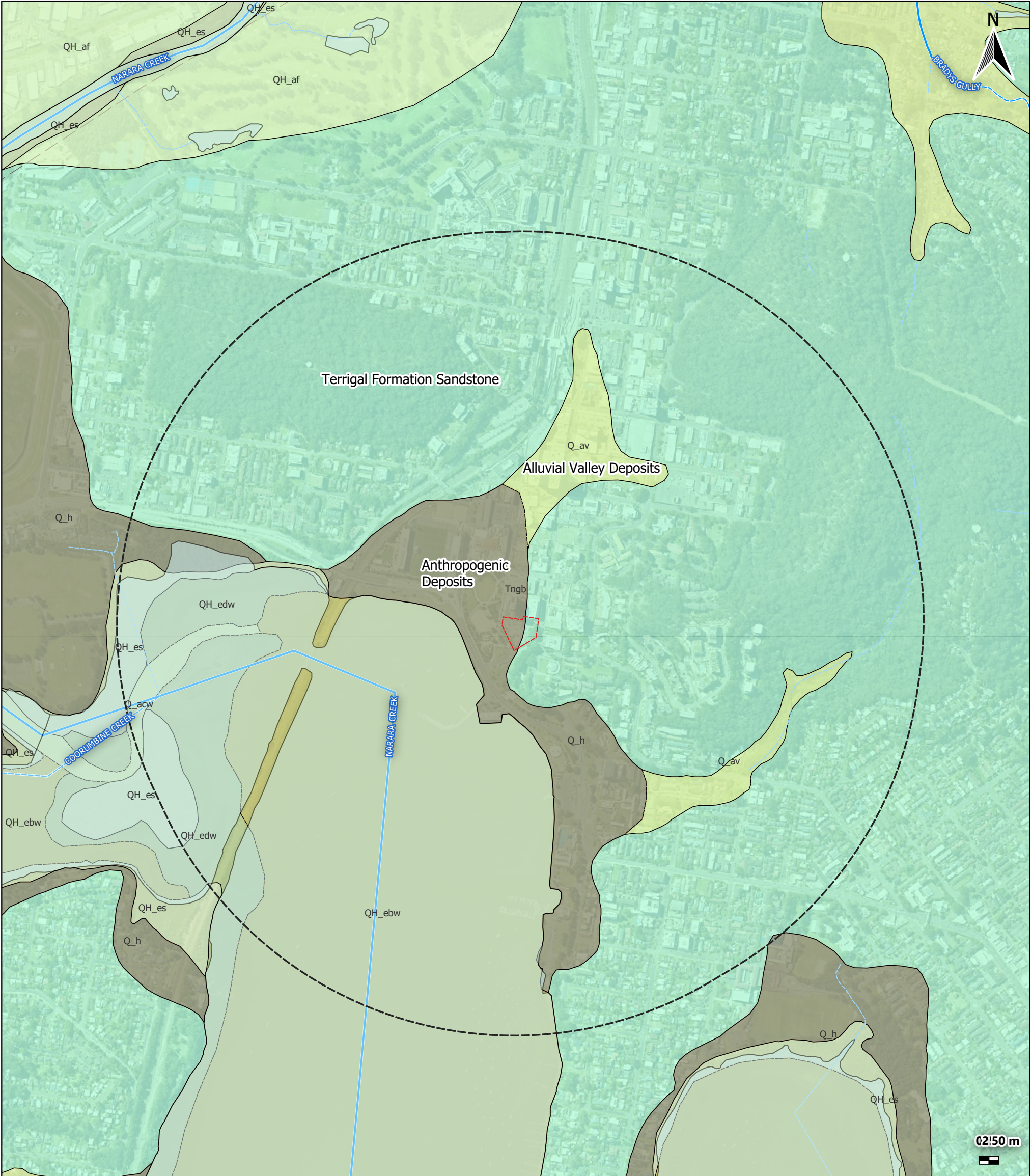


Map 25304_rp02_f06_v01		Legend Site Boundary Basement Boundary Surface Water Boreholes Cardno (2015) Cardno (2022) Coffey (2019) EI (2025) JK (2025) Stantec (2024)
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Map 25304_rp02_f06_v01		Legend Site Boundary Basement Boundary Surface Water
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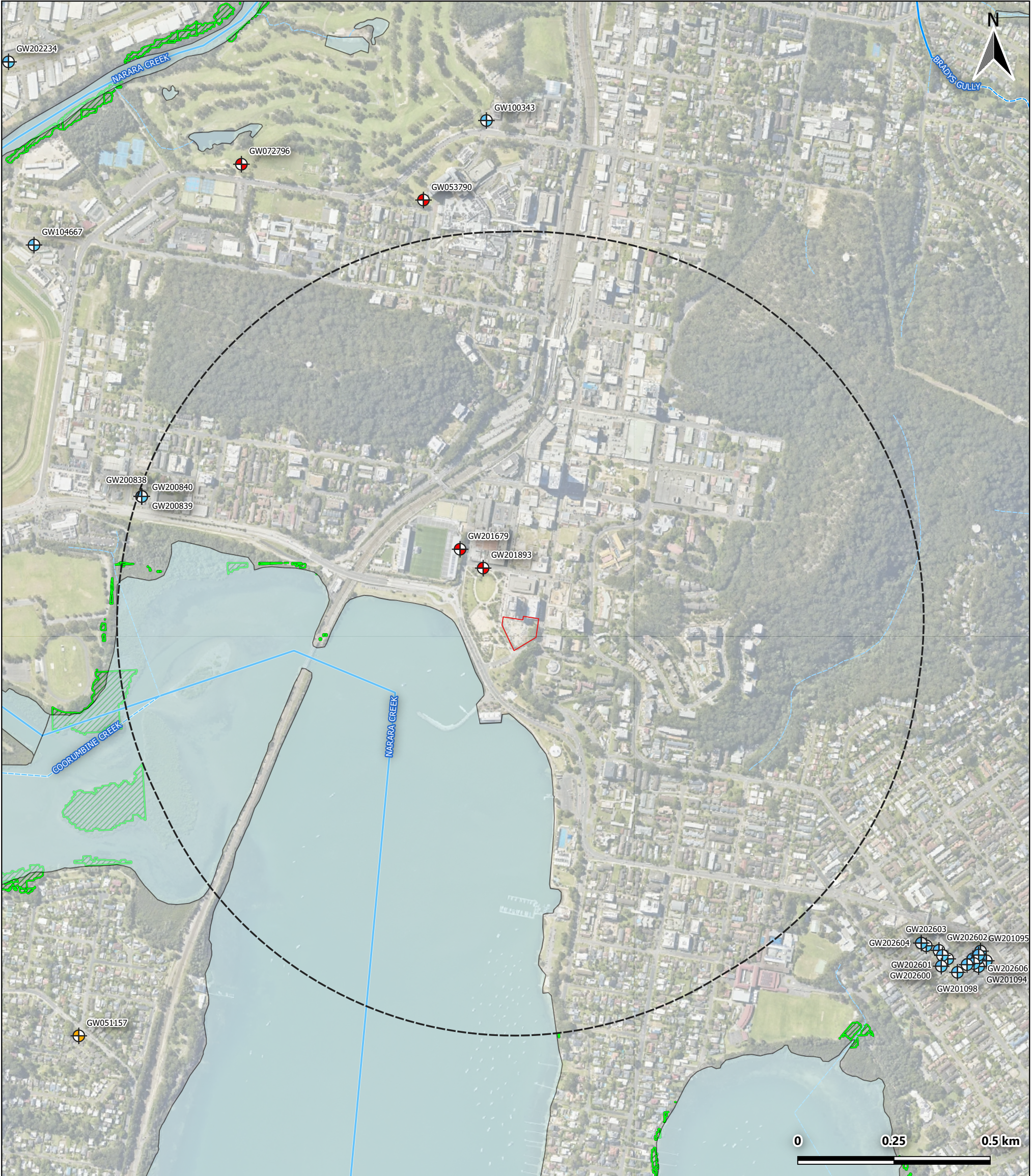
2m contours (mAHD)



Map 25304_rp02_f04_v01		Legend Site Boundary 1 km buffer Rock Units Q_acw Q_av Q_avf Q_h QH_af QH_ebw QH_edw QH_es	Figure 4 - Geology 26-30 Mann Street, Gosford, NSW, 2250 25304 - Surface Water and Groundwater Impact Assessment UPG Waterfront Pty Ltd
Date of Export 18/12/2025	Map Scale (approx. at A3) 1:10,000		
Author TG	Approver SM		
Data Source Metromap, Google Maps, Open Street Map, Geoscience Australia			



Map 25304_rp02_f06_v01		Legend Site Boundary Basement Boundary Groundwater Elevation Contours (mAHd) Boreholes JK (2025)	Figure 5 - Groundwater Elevation Contours	
Date of Export 10/02/2026	Map Scale (approx. at A3) 1:600		26-30 Mann Street, Gosford, NSW, 2250	
Author TG	Approver SM		25304 - Surface Water and Groundwater Impact Assessment	
Data Source Metromap, Google Maps, Open Street Map, Geoscience Australia			UPG Waterfront Pty Ltd	

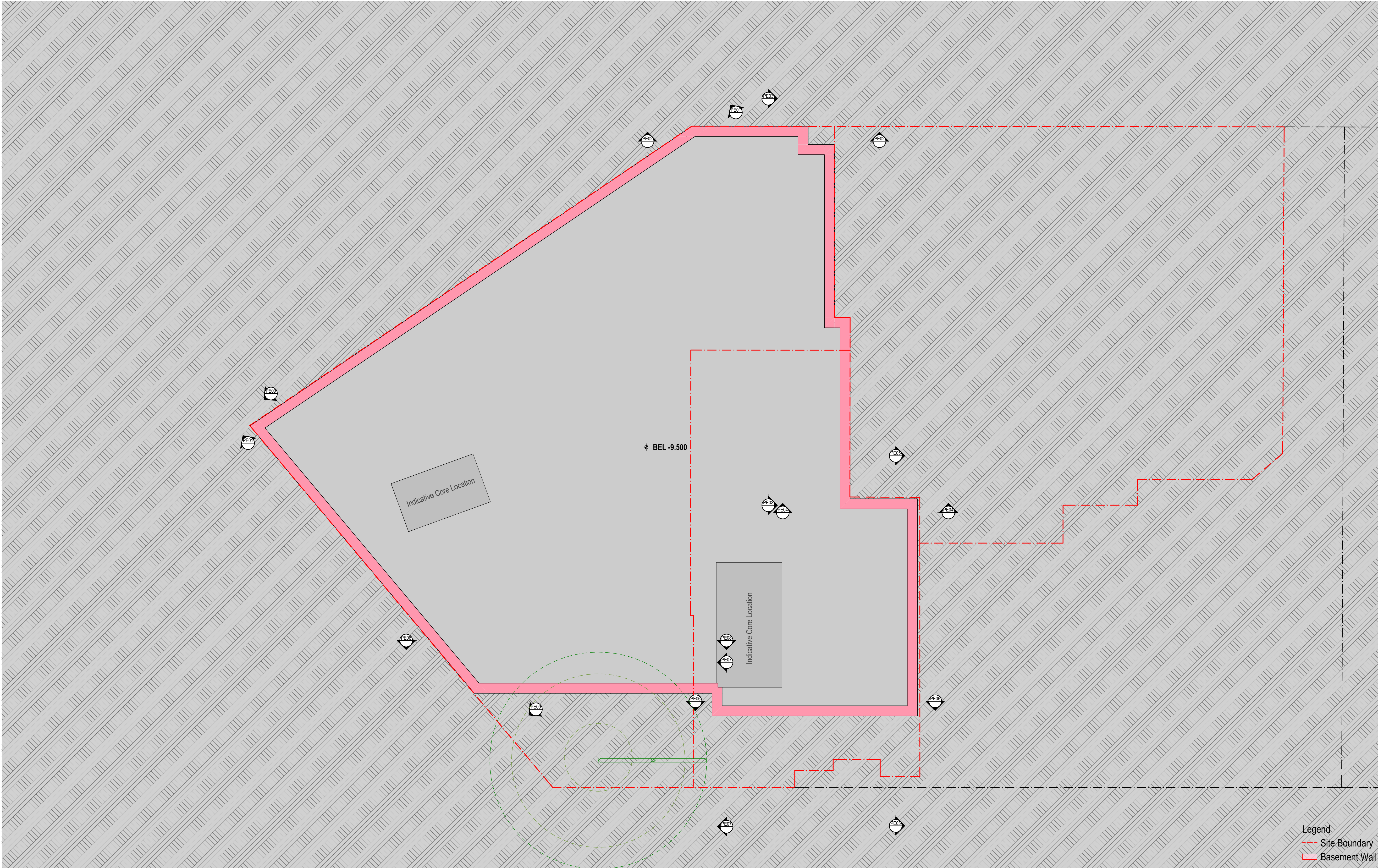


Map 25304_rp02_f06_v01		Legend Site Boundary 1 km buffer Registered Groundwater Bores Production Bore BLR Bore Monitoring Bore Groundwater Dependant Ecosystems High Priority	
Date of Export 18/12/2025	Map Scale (approx. at A3) 1:10,000	Figure 6 - Registered Groundwater Bores and Groundwater Dependant Ecosystems 26-30 Mann Street, Gosford, NSW, 2250	
Author TG	Approver SM	25304 - Groundwater Model and Impact Assessment	
Data Source Metromap, Google Maps, Open Street Map, Geoscience Australia		UPG Waterfront Pty Ltd	

B

Development Plans





Rev	Date	By	Chk	Description
01	11/12/2024	DN		For Submission
02	13/05/2025	DN		Amended Submission
P01	21/10/2025	JC	DN, AC	Issue For Coordination
03	27/10/2025	JC	AC	Issue for S4.55
04	31/10/2025	JC	AC	Issue for S4.55

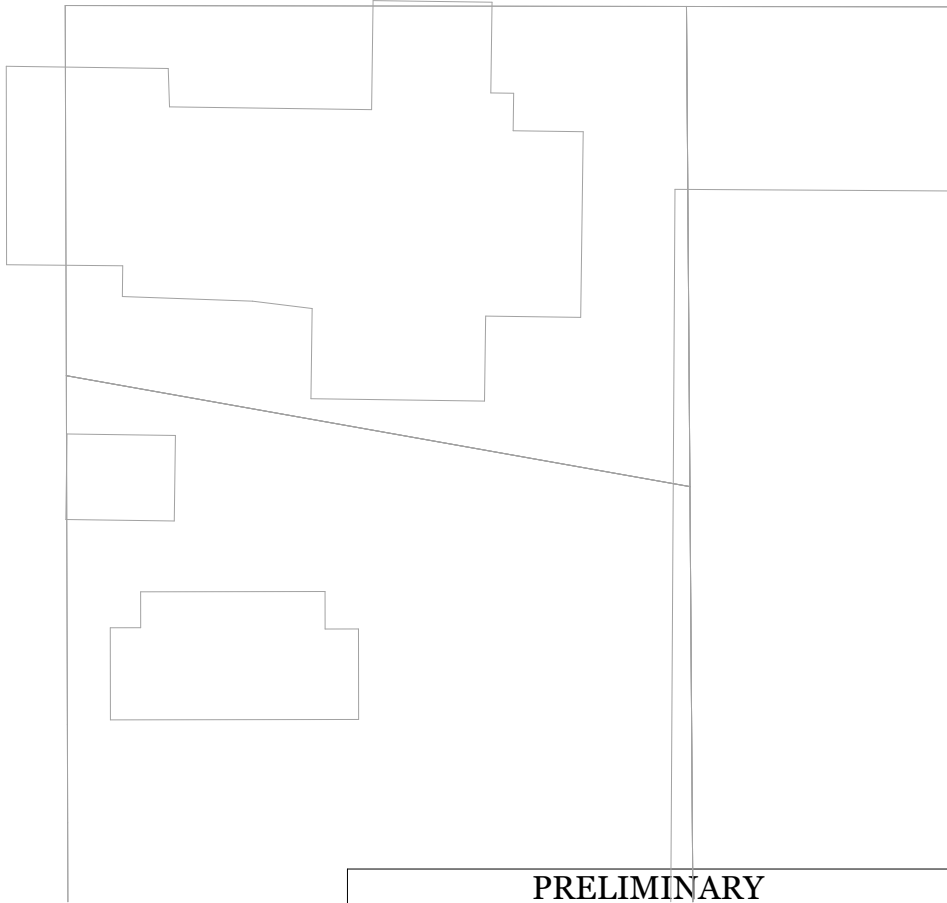
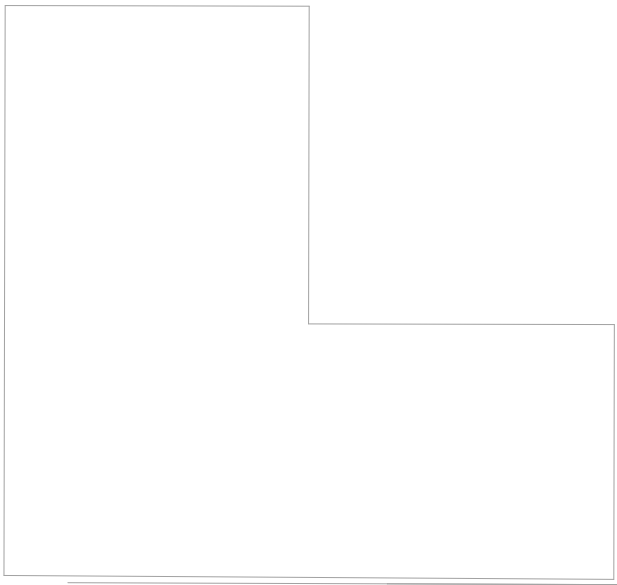
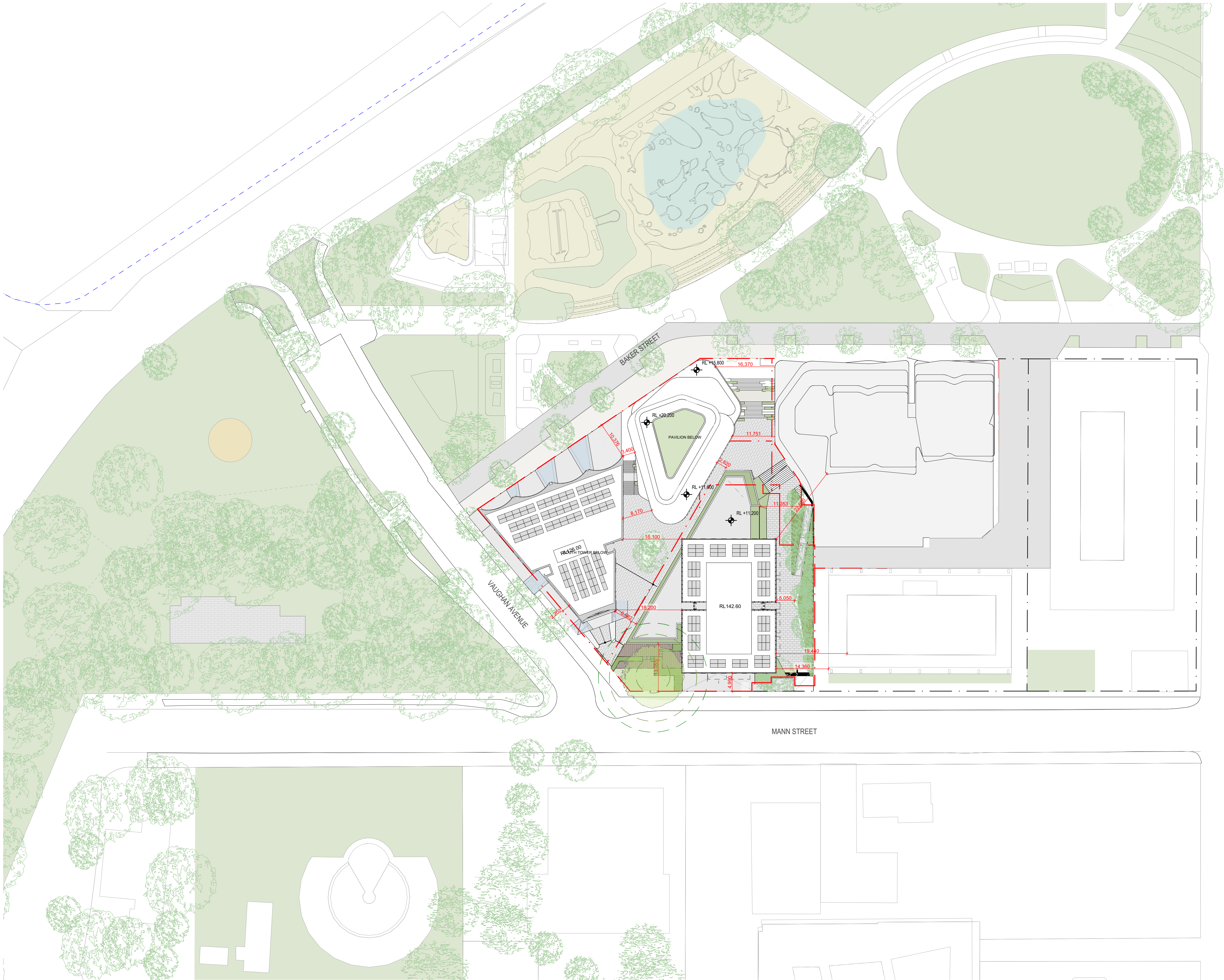


FOR DEVELOPMENT APPLICATION

Drawing Name
**Basement 4 Capping Beam &
Shoring Plan**

Drawing Scale
Drawing No.
DA1020

1:250 @ A1
Revision
04



- All works to be in accordance with authority & statutory approvals.
- Refer to site survey for all information relating to existing site conditions.
- All Boundary information to be confirmed by registered surveyor before commencing works on site.
- Refer to Arborist Report and Landscape Documentation for all information relating to trees and their retention/removal, and all landscape work.
- Drawings to be read in conjunction with all Specifications and Schedules; all specialist consultant documentation (BASIX, NRM/BS, Section U Certificates).
- Minor changes to building form & configuration may be required after Development Consent.
- Do not scale from drawing; figured dimensions only to be used.
- Building Contractor to verify all dimensions before commencing work.

Rev	Date	By	Chk	Description
01	11/12/2025	DN	LBC	Frozen Set Coordination

Auckland
Brisbane
Ho Chi Minh
Melbourne
Perth
Sydney

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DKO FURTADO SULLIVAN

Project Name
Project Number
Project Address

Central Coast Quater S2
13122
26-30 Mann Street
Gosford NSW 2250

Country

Australia



Drawing Name
Drawing No.
A-DA-1002

1:500@A1

@ A1
Revision
01

PRELIMINARY

C

Bore Logs



BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER / CASING ADVANCER **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
ON 15/8/25							2			FILL: Silty sand, fine to medium grained, brown, trace of fine to medium grained igneous gravel, clay fines and root fibres.	M			GRAVEL COVER APPEARS POORLY COMPACTED
					N = 6 6,3,3		1							
							1			FILL: Silty clay, low plasticity, dark grey, trace of fine to medium grained sandstone gravel, and root fibres.	w>PL			POSSIBLY ALLUVIAL
					N = 3 1,2,1		2							
							0		SP	SAND: fine to medium grained, grey, trace of clay fines and silt.	W	(L)		ALLUVIAL
							3							
					N = 10 4,4,6		-1		CL	Sandy CLAY: low plasticity, grey, fine to medium grained sand, with silt, trace of root fibres.	w>PL	VSt	260 300 210	
							4							
					N = 15 4,7,8		-2		CI-CH	Silty CLAY: medium to high plasticity, grey, trace of fine grained sand.		VSt - Hd	360 400 410	
							5							
							-3		CL-CI	Sandy CLAY: low to medium plasticity, light grey and orange brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel, and root fibres.				
							6							
					N = 18 3,7,11		-4						510 400 310	

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER / CASING ADVANCER **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 25 6, 12, 13	-5			CL-CI	Sandy CLAY: low to medium plasticity, light grey and orange brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel, and root fibres.	w>PL	VSt - Hd		ALLUVIAL
							8		CI	Silty CLAY: medium plasticity, light grey, with fine grained sand, trace of fine to medium grained ironstone gravel.		Hd	500 500 600	
					N > 20 14, 20/ 150mm REFUSAL	-6	9			as above, but orange brown, light grey and red brown, with fine to medium grained ironstone gravel.			>600 >600 550	
						-7	10			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 16.3m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 10.3m TO 16.3m. CASING 0.1m TO 10.3m. 2mm SAND FILTER PACK 10.1m TO 16.3m. BENTONITE SEAL 8.0m TO 10.1m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER. SECONDARY GROUNDWATER MONITORING WELL INSTALLED TO 3.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 0m TO 3.0m. 2mm SAND FILTER PACK 0.5m TO 3.0m. BENTONITE SEAL 0.5m TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						-8	11							
						-9	12							
						-10	13							
						-11								

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50) VL-0.1 L-0.3 M-1 H-3 VH-10 EH	DEFECT DETAILS		Formation
									SPACING (mm) 600 200 60 20	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness Specific General	
					START CORING AT 9.30m						
					NO CORE 0.46m						
90% RETURN			-7								
			10		SANDSTONE: fine to medium grained, orange brown and red brown, with iron indurated bands.	HW	L - M	0.80		(9.80m) J, 90°, Ir, R, Fe Ct (9.90m) Jh, 80°, St (10.10m) J, 90°, Ir, R, Cn (10.19m) Be, 0°, P, R, Fe Ct (10.30m) XWS, 0°, 30 mm.t	Terrigal Formation
			-8		SANDSTONE: fine to medium grained, light brown, grey and red brown, bedded at 0-10°.	MW		0.20		(10.49m) Be, 5°, P, R, Fe Vn (10.58m) Be, 5°, P, R, Fe Ct (10.60m) Be, 0°, P, R, Fe Ct (10.68m) J, 40°, P, R, Cn (10.77m) J, 90°, C, R, Cn (10.85m) J, 30°, Ir, R, Cn	
			11				0.40				
							0.20			(11.18m) XWS, 0°, 15 mm.t (11.26m) Be, 15°, P, R, Clay Ct (11.34m) Be, 0°, P, R, Fe Sn	
			-9				0.90			(11.48m) Be, 0°, P, R, Clay Ct (11.54m) Be, 0°, P, R, Clay Ct	
			12				0.50				
							0.10			(12.02m) Be, 5°, P, R, Clay Ct (12.10m) Be, 10°, P, R, Clay Ct	
							0.80			(12.24m) Be, 10°, P, R, Clay Ct (12.32m) Be, 10°, P, R, Clay Ct (12.36m) Be, 10°, P, R, Clay Ct	
			-10			HW	H	1.3		(12.39-13.15m) J x 2, 90°, P/Ir, R, Fe Ct	
			13					3.8			
						NO CORE 0.65m					
		-11									
			14		SANDSTONE: fine to medium grained, light brown, red brown and grey, bedded at 5-15°.	SW	M	0.30		(13.95m) Jh, 80°, P (14.07m) Be, 0°, P, R (14.53m) J, 30°, P, R, Cn	Terrigal Formation
							0.40				
			-12				0.30			(15.33m) J, 35°, C, R, Fe Ct (15.42m) J, 70°, C, R, Fe Ct	
			15				0.60				
		-13									

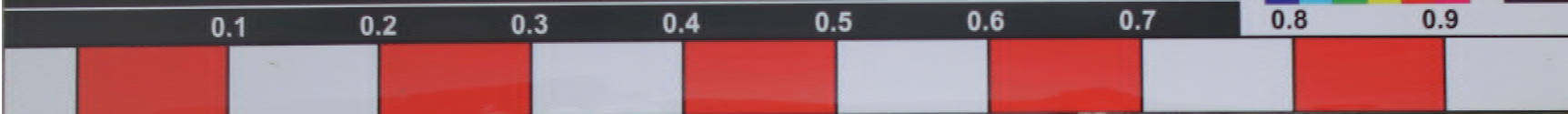
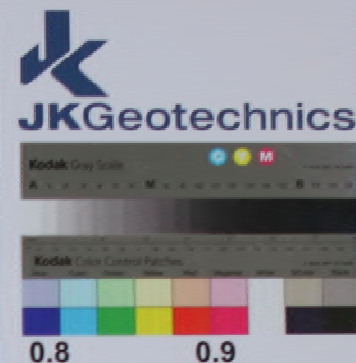
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 1

DEPTH: 9.30-16.00m



37790P BH1 START CORING AT 9.30m

9 → CORE LOSS 0.46m



13 CORE LOSS 0.65m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
										DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	General	
					SANDSTONE: fine to medium grained, light grey, bedded at 0-10°.	FR	M	0.20 0.30 0.40	600 200 60 20	(16.50m) CS, 0°, 70 mm.t (16.62m) J, 60°, P, S, Cn (16.95m) J, 90°, P, R, Fe Ct		Terrigal Formation
		-14	17		SILTSTONE: dark grey, with fine grained sandstone bands, bedded at 0-10°.							
					SANDSTONE: fine grained, light grey, with siltstone bands and lenses, bedded at 0-10°.		M - H	3.0 0.80		(17.74m) J, 90°, C, R, Fe Sn		
		-15	18				H	1.5		(18.59m) Be, 0°, P, S, Clay Ct (18.63m) Ji, 60°, St		
		-16	19					2.4 1.0		(19.26m) Be, 0°, P, S, Clay Ct		
		-17	20					2.5 3.3				
		-18	21					2.2				
		-19	22		SANDSTONE: fine grained, light grey, with grey siltstone and carbonaceous laminae.		VH	5.2 3.5 3.7				
		-20										

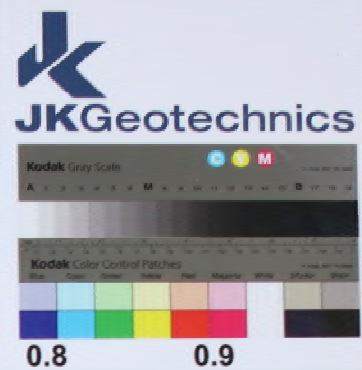
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 1

DEPTH: 16.00 - 24.00 m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
										DESCRIPTION		
										Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness		
										Specific	General	
90% RETURN		-21			SANDSTONE: fine grained, light grey, with grey siltstone and carbonaceous laminae. (continued)	FR	VH	3.5	600	(23.75m) Ji, 80°, Ir		Terrigal Formation
		24					H	2.1	200			
		-22					H - VH	1.0	60			
		25						5.0	20			
		-23			END OF BOREHOLE AT 25.12 m			5.1	600	(24.75m) J/Ji, 70°, Ir, R, Cn		
		26						1.6	200			
		-24							60			
		27							20			
		-25										
		28										
		-26										
		29										
		-27										

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 1

DEPTH: 24.00 - 25.12 m



JK Geotechnics

Kodak Gray Scale

A 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Kodak Color Control Patches



0.1

0.2

0.3

0.4

0.5

0.6

0.7

0.8

0.9

24

25

← END OF BOREHOLE AT 25.12m

BOREHOLE LOG

Client: URBAN PROPERTY GROUP

Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P

Method: SPIRAL AUGER /
CASING ADVANCER

R.L. Surface: ~2.7 m

Date: 30/7/25

Datum: AHD

Plant Type: JK400

Logged/Checked By: J.L.O./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 11 4,5,6		2			FILL: Clayey silty sand, fine to medium grained, brown, trace of fine to coarse grained igneous gravel, and slag.	M			GRAVEL COVER APPEARS WELL COMPACTED
							1			FILL: Sandy clay, low plasticity, brown and grey brown, fine to medium grained sand, trace of fine to medium grained ironstone and sandstone gravel, and root fibres.	w<PL		400 380 320	
					N = 2 2,1,1		1		ML	FILL: Silty sandy clay, low plasticity, dark grey and brown, fine to medium grained sand, trace of root fibres.	w>PL	S	110 90 70	
							2		SC	Sandy SILT: low plasticity, dark grey, with clay fines.	W	(L)		TOO FRIABLE FOR HP TESTING
										Clayey SAND: fine to medium grained, grey, trace of silt fines.				
					N = 12 3,4,8		3		CL	Sandy CLAY: low plasticity, grey, fine to medium grained sand, trace of silt fines.	w>PL	VSt	340 320 390	
							4							COMMENCE WASHBORING AT 3.0m AFTER SPT
					N = 18 4,6,12		2		CI-CH	Silty CLAY: medium to high plasticity, light grey and brown.		Hd	390 400 370 470 480 520	
							5			Silty CLAY: medium to high plasticity, light grey.				
					N = 16 18,10,6		6		CL	Sandy CLAY: low plasticity, light grey and red brown, fine to medium grained sand, trace of fine to coarse grained ironstone gravel.		VSt - Hd	430 370 360	
							4							

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER / CASING ADVANCER **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK400 **Logged/Checked By:** J.L.O./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N=SPT 10/ 10mm REFUSAL	-5	8		CL	Sandy CLAY: low plasticity, light grey and red brown, fine to medium grained sand, trace of fine to coarse grained ironstone gravel. <i>(continued)</i> Sandy CLAY: low plasticity, light brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel.	w>PL	VSt - Hd		TOO FRIABLE FOR HP TESTING
					N=SPT 10/ 100mm REFUSAL	-9	9		CL-CI	Silty CLAY: low to medium plasticity, grey and light brown, with extremely weathered fabric.	w~PL	Hd	>600 >600	
						-10	10			REFER TO CORED BOREHOLE LOG				
						-11	11							
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						-100								

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP

Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P

Core Size: NMLC

R.L. Surface: ~2.7 m

Date: 30/7/25

Inclination: VERTICAL

Datum: AHD

Plant Type: JK400

Bearing: N/A

Logged/Checked By: J.L.O./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
										DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	General	
			-7		START CORING AT 9.80m							
			10		SANDSTONE: fine to medium grained, grey, with siltstone laminae, bedded at 0-5°.	MW	H	*1.1		(9.88m) Be, 0°, P, R, Clay Ct (9.95m) Be, 0°, P, R, Clay Ct (9.98m) Be, 0°, P, R, Clay Ct		
					NO CORE 0.11m	MW	H	*1.2		(10.20m) Be, 0°, P, R, Clay Ct (10.23m) J, 68°, P, R, Cn (10.25m) Be, 0°, P, R, Clay Vn		
			-8		SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.					(10.50m) Be, 63 - 90°, C, R, Fe Ct, and Clay, Ct (10.52m) J, 75°, P, R, Fe Vn, and Clay, Ct (10.57m) J, 50°, P, R, Fe Sn (10.65m) J, 90°, P, R, Clay Ct (10.71m) Be, 5°, P, R, Clay Ct (10.86m) Be, 0°, P, R, Clay Ct		
			11		SANDSTONE: fine to coarse grained, light grey, with occasional siltstone lenses, bands and laminae, bedded at 0-5°.			*2.1 *2.6				
			-9		SANDSTONE: fine to coarse grained, light brown, bedded at 0-5°.			*1.3		(11.29m) CS, 5°, 7 mm.t (11.36m) Be, 0°, P, R, Clay, 3 mm.t (11.49m) CS, 0°, 21 mm.t		
			12		SANDSTONE: fine to medium grained, light grey, with occasional carbonaceous laminae, bedded at 0-5°.	FR		*1.0		(11.64m) J, 20°, P, R, Fe Vn (11.67m) Be, 0°, P, R, Fe Vn (11.68m) Be, 0°, P, R, Cn (11.77m) J, 30°, P, R, Cn (11.83m) Be, 0°, P, R, Cn (11.86m) J, 35°, P, R, Cn (11.87m) J, 40°, P, R, Fe Vn (11.89m) Be, 0°, P, R, Fe Vn (11.90m) J, 40°, P, R, Fe Vn (11.94m) J x 2, 58°, P, R, Fe Ct (12.00m) J, 72°, P, R, Fe Ct		
			-10					*0.90				
			13		SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.			*1.2				
			-11					*1.4		(13.80m) J, 30°, P, R, Cn (13.82m) J, 40°, P, R, Cn (13.85m) J, 40°, P, R, Clay Vn (13.87m) Be, 5°, P, R, Clay Vn		
			14					*1.4				
			-12					*1.6				
			15					*1.4				
			-13					*1.3		(15.47m) Be, 0°, P, R, Clay Ct		

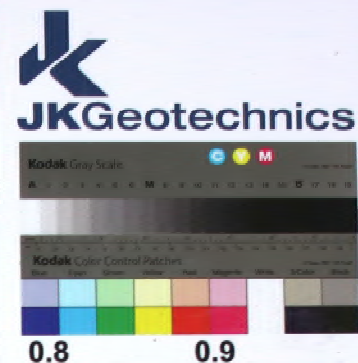
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

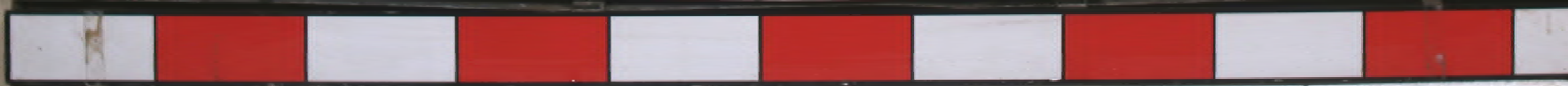
DATE: 08/08/2025

LOCATION ID: BH2

DEPTH: 9.80m to 16.00m



37790P BH2 START CORING AT 9.80m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK400 **Bearing:** N/A **Logged/Checked By:** J.L.O./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS		Formation
									SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	
100% RETURN								VL-0.1 L-0.3 M-1 H-3 VH-10 EH	600 200 60 20	Specific General	
					SANDSTONE: fine to medium grained, light grey, with occasional carbonaceous laminae, bedded at 0-5°.	FR	H	1.7 1.7			
					END OF BOREHOLE AT 16.42 m						
		-14	17								
		-15	18								
		-16	19								
		-17	20								
		-18	21								
		-19	22								
		-20									

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

DATE: 11/08/2025

LOCATION ID: BH2

DEPTH: 16.00m - 16.42m



JK Geotechnics

Kodak Gray Scale

A 1 2 3 4 5 M 6 7 8 9 10 11 12 13 14 15 B 16 17 18

Kodak Color Control Patches



0.8

0.9

0.1

0.2

0.3

0.4

0.5

0.6

0.7

16

EOH AT 16.42m

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER **R.L. Surface:** ~2.5 m
Date: 31/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
ON 15/8/25							2		-	CONCRETE: 200mm.t				8mm DIA. REINFORCEMENT, 70mm TOP COVER
					N = 10 4,6,4		1			FILL: Clayey gravel, fine to medium grained, sub-angular igneous gravel, grey, trace of fine to medium grained sand.	M			APPEARS POORLY COMPACTED
							1			FILL: Clayey silty sand, fine to medium grained, grey brown and brown, trace of fine to medium grained sandstone gravel, roots and root fibres.				
					N = 2 1,1,1		2			FILL: Sandy silt, low plasticity, dark grey, trace of root fibres.	w>PL			POSSIBLY ALLUVIAL
							2		CL	Sandy CLAY: low plasticity, grey and yellow brown.	w>PL	S - F	30 40 50	ALLUVIAL HP TESTING ON REMOULDED SAMPLE
							0		CL-CI	Silty CLAY: low to medium plasticity, light grey mottled red brown and light brown, with fine to medium grained sand.		VSt		
					N = 10 3,4,6		3						310 330 330	
							-1							
							4							
					N = 18 5,8,10		-2		CI	Silty CLAY: medium plasticity, red brown mottled grey and light brown, with fine to medium grained ironstone gravel, trace of fine to medium grained sand.		Hd	400 410 420	
							5							
							-3		-	Extremely Weathered sandstone: silty CLAY, medium plasticity, light grey and light brown, trace of fine to medium grained sand, and ironstone bands.	XW	Hd		TERRIGAL FORMATION
					N > 22 11,22/ 150mm REFUSAL		6						>600 >600 >600	
							-4							

Borehole No.
3
2 / 4

Client: URBAN PROPERTY GROUP Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT Location: 26-30 MANN STREET, GOSFORD, NSW														
Job No.: 37790P			Method: SPIRAL AUGER				R.L. Surface: ~2.5 m							
Date: 31/7/25			Datum: AHD											
Plant Type: JK500			Logged/Checked By: C.A.R./P.W.											
Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
										Extremely Weathered sandstone: silty CLAY, medium plasticity, light grey and light brown, trace of fine to medium grained sand, and ironstone bands. REFER TO CORED BOREHOLE LOG	XW	Hd		GROUNDWATER MONITORING WELL INSTALLED TO 16.23m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 9.23m TO 16.23m. CASING 0.10m TO 9.23m. 2mm SAND FILTER PACK 8.70m TO 16.23m. BENTONITE SEAL 7.30m TO 8.70m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.

JK 9.02.4 LIB.GLB Log JK AUGERHOLE - MASTER 37790P GOSFORD.GPJ <<DrawingFile>> 22/08/2025 15:37 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Proj: JK 9.01.0 2018-03-20

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.5 m
Date: 31/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components START CORING AT 7.07m	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
										DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	General	
								VL-0.1 L M H T VH-10 EH	600 200 60 20			
			-5		SANDSTONE: fine to medium grained, light brown, bedded at 0-10°.	MW	L	0.080		(7.14m) J, 90°, Ir, R, Clay Ct (7.27m) J, 80°, C, R, Fe Ct		
			8				M - H	1.5 1.6		(7.48m) Be, 5°, P, S, Clay FILLED, 4 mm.t (7.52m) Ji, 90°, St		
			-6		SANDSTONE: fine to medium grained, grey, with siltstone bands and lenses, and occasional quartz gravel, bedded at 0-15°.	FR		1.2		(7.94m) J, 70°, P, R, Fe Sn (8.21m) Be, 10°, P, R, Fe Sn		
			-9					0.90 2.0 1.8		(8.55m) Be, 10°, P, R, Clay Ct		
			10					2.0		(9.80m) J, 70°, Ir, R, Fe Ct		
			-8					1.5		(10.82m) J, 25°, P, R, Cn		
			11					0.90		(11.11m) J/Ji, 90°, Ir, S, Cn		
			-9					0.90		(11.85m) CS, 0°, 25 mm.t		
			12		SANDSTONE: fine to coarse grained, light grey, occasional quartz gravel, bedded at 0-5°.			1.4		(12.58m) J, 30°, P, R, Cn		
			-10					1.2		(13.23m) Be, 0°, P, R, Cn		
			13		SANDSTONE: fine to medium grained, light grey and grey, bedded at 0-10°.			0.90				
			-11					1.5				

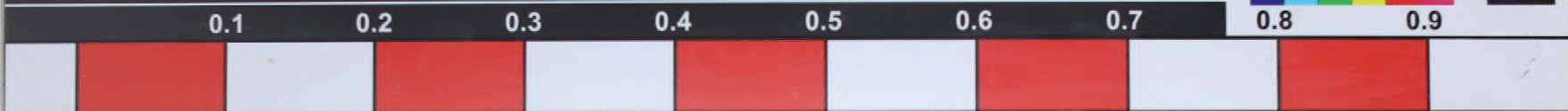
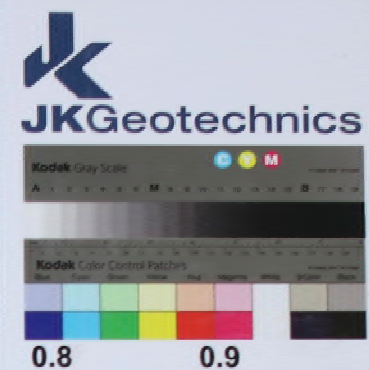
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

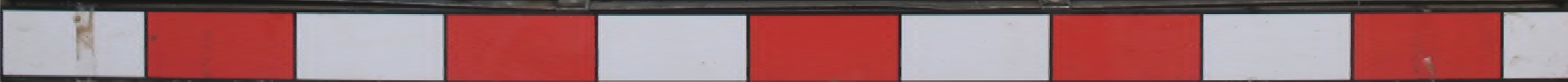
DATE: 08/08/2025

LOCATION ID: BH3

DEPTH: 7.07m - 14.00m



37790P BH3 START CORING AT 7.07m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.5 m
Date: 31/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS		Formation
									SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	
								VL-0.1 L-0.3 M-1 H-3 VH-10 EH	600 200 60 20	Specific General	
90% RETURN		-12			SANDSTONE: fine to medium grained, light grey and grey, with occasional dark grey laminae, bedded at 0-10°.	FR	H	1.3			Terrigal Formation
		15						1.1			
		-13						0.90			
		16						1.0			
					END OF BOREHOLE AT 16.23 m			0.90			
		-14									
		17									
		-15							600 200 60 20		
		18									
		-16									
		19									
		-17									
		20									
		-18									

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

DATE: 08/08/2025

LOCATION ID: BH3

DEPTH: 14.00 to 16.23 m



JK Geotechnics

Kodak Grey Scale



Kodak Color Control Patches



0.8

0.9

0.1

0.2

0.3

0.4

0.5

0.6

0.7

14

15

16

← END OF BOREHOLE AT 16.23m

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER **R.L. Surface:** ~2.7 m
Date: 31/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
ON 15/8/25							2		-	CONCRETE: 100mm.t FILL: Sandy gravel, fine to medium grained, sub-angular igneous gravel, grey, fine to medium grained sand. FILL: Silty sand, fine to medium grained, brown grey, trace of fine to medium grained igneous gravel.	M			NO REINFORCEMENT OBSERVED APPEARS MODERATELY COMPACTED
					N = 14 5,7,7		1			FILL: Sandy silt, low plasticity, dark grey, fine to medium grained sand, trace of root fibres.	w>PL			POSSIBLY ALLUVIAL
							1							
					N = 5 2,3,2		2		CL	Sandy CLAY: low plasticity, grey, fine to medium grained sand.	w>PL	St	160 160 180	ALLUVIAL GROUNDWATER MONITORING WELL INSTALLED TO 16.05m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 10.05m TO 16.05m. CASING 0.10m TO 10.05m. 2mm SAND FILTER PACK 9.40m TO 16.05m. BENTONITE SEAL 7.40m TO 9.40m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							3		CI	Silty CLAY: medium plasticity, grey and yellow brown, trace of fine to medium grained ironstone gravel, fine grained sand, and root fibres.		St - VSt	180 210 190	
					N = 9 4,3,6		-1					Hd		SECONDARY GROUNDWATER MONITORING WELL INSTALLED TO 4.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.5m TO 4.5m. CASING 0.1m-1.5m. 2mm SAND FILTER PACK 4.5m TO 0.8m. BENTONITE SEAL 0.8m TO 0.1m. COMPLETED WITH A CONCRETED GATIC COVER.
							4							
					N = 30 7,13,17		-2						500 >600 520	
							5		-	SANDSTONE: fine to medium grained, grey, with extremely weathered bands and ironstone gravel.	DW	VL		TERRIGAL FORMATION
							-3							
							6							
							-4			REFER TO CORED BOREHOLE LOG				

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 31/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components START CORING AT 6.10m	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
										Specific	General	
					NO CORE 0.17m							
					SANDSTONE: fine to medium grained, light brown, orange brown and light grey, bedded at 0-10°.	HW	VL - L	0.10 0.070				
							L - M	0.30 0.30			(7.22m) CS, 0°, 90 mm.t	
							M - H	0.60			(7.76m) CS, 0°, 110 mm.t	
								1.7			(8.10-8.46m) Jh/Ji, 80°, Ir	
											(8.61m) Be, 0°, P, S, Clay Ct	
											(8.78m) J, 90°, P, R, Fe Sn	
											(8.90m) Be, 0°, P, R, Clay FILLED, 3 mm.t	
											(8.98m) J, 90°, P, R, Fe Sn	
					SANDSTONE: fine grained, grey, with siltstone lenses and occasional quartz gravel, bedded at 0-10°.	SW	L - M	0.040 0.10			(9.22m) Ji, 45°, C	
											(9.34m) Be, 0°, P, S, Clay Ct	
											(9.39m) J, 80°, St, R, Fe Ct	
											(9.44-9.82m) Ji, 80°, P	
											(9.98m) J x 3, 90°, P, R, Fe Ct	
											(10.10m) Jh, 80°, P	
											(10.26m) J, 70°, C, S, Clay Ct	
											(10.46m) Ji, 45°, C	
											(10.62m) Ji, 90°, P	
											(10.75m) Ji, 90°, P	
											(10.92m) Be, 5°, P, R, Clay Ct	
											(11.04m) Be, 0°, P, R, Fe Ct	
											(11.18m) Jh, 90°, St	
											(11.28m) CS, 0°, 70 mm.t	
											(11.35m) XWS, 0°, 70 mm.t	
					NO CORE 0.13m						(11.55m) CS, 0°, 40 mm.t	
					SANDSTONE: fine to medium grained, light brown and light grey, with occasional quartz gravel, bedded at 0-10°.	MW	M	1.4 0.70			(12.15m) Jh, 90°, P	
											(12.20m) Cr, 0°, 50 mm.t	
					NO CORE 0.15m							
					SANDSTONE: fine grained, light brown and light grey, with occasional quartz gravel, bedded at 0-10°.	MW	M				(12.60m) J, 70°, Ir, R, Fe Ct	
											(12.83m) J, 70°, P, R, Cn	

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

PROJECT No: 37790P

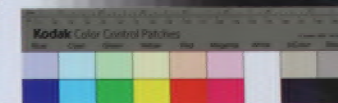
DATE: 13/08/2025

LOCATION ID: 4

DEPTH: 6.10 - 13.00 m



JK Geotechnics



0.8 0.9

0.1

0.2

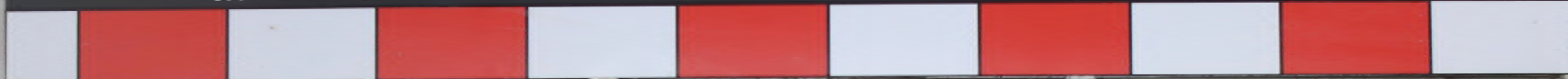
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0.4

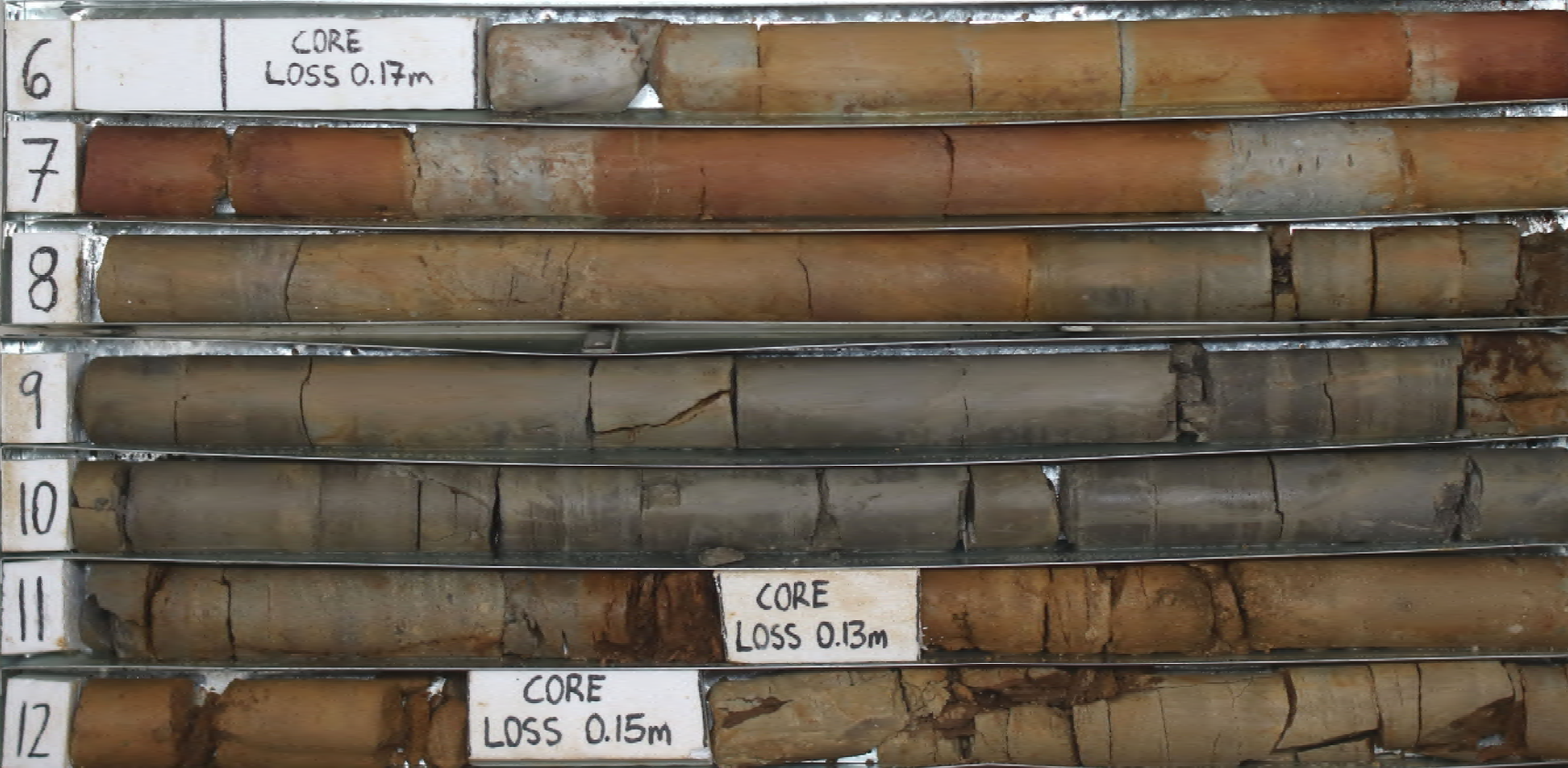
0.5

0.6

0.7



37790P BH4 START CORING AT 6.10m



Borehole No.
4
3 / 3

Client: URBAN PROPERTY GROUP Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT Location: 26-30 MANN STREET, GOSFORD, NSW											
Job No.: 37790P				Core Size: NMLC				R.L. Surface: ~2.7 m			
Date: 31/7/25				Inclination: VERTICAL				Datum: AHD			
Plant Type: JK500				Bearing: N/A				Logged/Checked By: C.A.R./P.W.			
Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50) VL-0.1 L -0.3 M -1 H -3 VH-10 EH	DEFECT DETAILS		Formation
									SPACING (mm) 600 200 60 20	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness SpecificGeneral	
0% RETURN			-11		SANDSTONE: fine grained, light brown and light grey, with occasional quartz gravel, bedded at 0-10°. (continued)	MW	M			(13.10m) XWS, 5°, 15 mm.t	Terrigal Formation
			(13.47m) Be, 5 - 10°, P, R, Fe Ct								
70% RETURN			-12							(13.77m) Be, 10°, P, R, Fe Sn	
			(13.98m) J, 80°, P, R, Fe Ct								
			-15							(14.30m) Be, 5 - 10°, P, R, Fe Ct	
			(14.43m) Be, 5 - 10°, P, R, Fe Ct								
			-16							(14.55m) Be, 5 - 10°, P, R, Fe Ct	
			(14.92m) Be, 10°, P, R, Fe Ct								
			-13							(15.35m) Be, 5°, P, R, Fe Ct	
			-14		END OF BOREHOLE AT 16.06 m						
			-17								

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 4

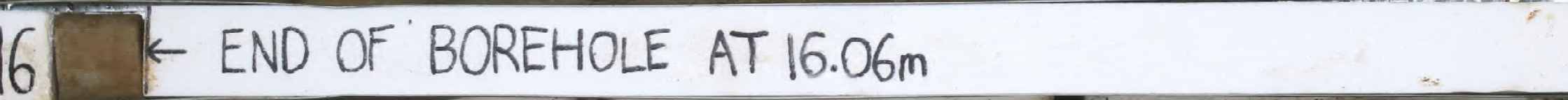
DEPTH: 13.00 - 16.06 m



Kodak Gray Scale
A 1 2 3 4 5 M 6 7 8 9 10 11 12 13 14 15 B 16 17 18



0.8 0.9



BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER **R.L. Surface:** ~3.1 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK400 **Logged/Checked By:** J.L.O./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
ON 15/8/25						3				FILL: Silty sand, fine to medium grained, brown and grey brown, with clay fines, trace of fine to medium grained igneous and ironstone gravel, organics and root fibres.	W			GRASS COVER APPEARS POORLY COMPACTED POSSIBLY ALLUVIAL
					N = 2 1,0,2					FILL: Sandy silt, low plasticity, dark grey, fine to medium grained sand, trace of clay fines.	w>PL	50 40 40		
						2								
					N = 9 3,4,5				CL	Silty CLAY: low to medium plasticity, light grey, trace of fine grained sand.	w>PL	St	100 200 170	ALLUVIAL
						1			CL-CI	Silty CLAY: low to medium plasticity, light grey mottled light brown, trace of fine to medium grained sand.				
					N = 28 6,11,17	0				as above, but with fine to coarse grained ironstone gravel and fine to medium grained sand.		Hd	>600 >600 >600	
					N=SPT 6/ 50mm REFUSAL	-1						VSt	250 260	SPT REFUSAL ON IRONSTONE GRAVEL
						-2				REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 16.3m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 9.3m TO 16.3m. CASING 0.1m TO 9.3m. 2mm SAND FILTER PACK 8.8m TO 16.3m. BENTONITE SEAL 6.7m TO 8.8m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						-3								

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** HQ **R.L. Surface:** ~3.1 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK400 **Bearing:** N/A **Logged/Checked By:** J.L.O./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS				Formation
									DESCRIPTION				
									Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness				
0% RETURN		100% RETURN						SPACING (mm)		Specific	General		
		-1			START CORING AT 4.70m								
					NO CORE 0.11m								
		-2	5		SANDSTONE: fine to medium grained, grey and light brown, bedded at 0-5°.	HW MW	VL VL - L						

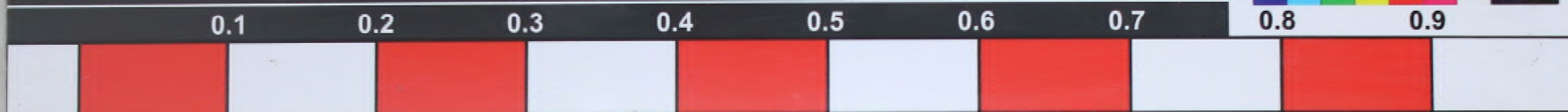
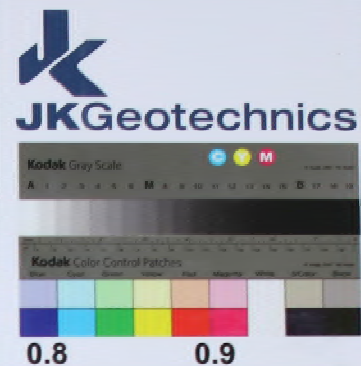
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

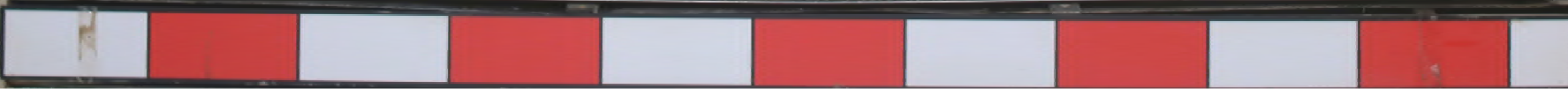
DATE: 08/08/2025

LOCATION ID: BH5

DEPTH: 4.70m - 11.00m



37790P BH5 START CORING AT 4.7m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** HQ **R.L. Surface:** ~3.1 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK400 **Bearing:** N/A **Logged/Checked By:** J.L.O./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS		Formation
									SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	
		-8			SANDSTONE: fine grained, light grey, with siltstone seams and laminae, bedded at 0-10°. (continued)	FR	H				
			12								
		-9									
			13		SANDSTONE: fine to coarse grained, light grey and light brown, with occasional quartz gravel, bedded at 5-15°.	SW					
		-10									
			14		SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.	FR					
		-11									
			15								
		-12									
			16								
		-13			as above, but brown.	SW					
			17		END OF BOREHOLE AT 16.30 m						
		-14									

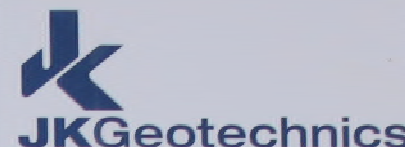
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

DATE: 08/08/2025

LOCATION ID: BH5

DEPTH: 11.00m to 16.30m



0.1

0.2

0.3

0.4

0.5

0.6

0.7

0.8

0.9

11

12

13

14

15

16

← END OF BOREHOLE AT 16.30m

BOREHOLE LOG

CLIENT : Government Property NSW
PROJECT : Preliminary Geotechnical Assessment
LOCATION : 20 Mann Street, Gosford

HOLE NO : BH002
PROJECT REF : 80516860
SHEET : 1 OF 1

RIG TYPE : 4WD mounted drill rig METHOD : Solid Flight Auger CONTRACTOR : Fico Group DRILLER :
DATE STARTED : 21/9/15 DATE COMPLETED : 21/9/15 DATE LOGGED : 21/9/15 LOGGED BY : AM CHECKED BY : AM
LOCATION : See Drawing for location EASTING : 345767 NORTHING : 6299805 RL : 3m

DRILLING				MATERIAL			
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING CONSISTENCY / RELATIVE DENSITY ROCK STRENGTH
ADV	free standing water level	0.50m	2	0.0		0.20m TOPSOIL; Silty SAND, fine to coarse grained, dark brown-black, with organics, trace root fibre	M
		0.80m		0.50m		Silty SAND, fine to coarse grained, dark brown	M MD
		1.00m		1.0		Silty SAND, fine to coarse grained, brown-black, highly organic	
		SPT 1, 0, 0 N=0		1.5m			MC > PL S
		2.50m		2.0			
		SPT 5, 6, 10 N=16		2.30m		Sandy CLAY, medium to high plasticity, pale grey	MC > PL VSt - H
		2.95m		3.0		as above, but low to medium plasticity, trace gravel	
		4.00m		4.0			MC = PL VSt - H
		SPT 8, 12, 14 N=26		5.0		CLAY, medium to high plasticity, pale grey, trace silt	MC < PL H
		4.45m		6.0		SANDSTONE, fine to medium grained, pale grey mottled red	XW VL
		5.50m	-3	6.00m		Borehole BH002 terminated at 6.40 m	
		SPT 7, 15, 21 N=36		6.40m		Refusal on sandstone	
		5.95m		7.0			
				8.0			
				9.0			
				10.0			

MOISTURE & GROUNDWATER	SAMPLES & FIELD TESTS	CONSISTENCY	RELATIVE DENSITY	ROCK STRENGTH	ROCK WEATHERING
D - Dry M - Moist W - Wet OMC - Optimum MC PL - Plastic Limit Water seepage/inflow Water level	U - Undisturbed Sample D - Disturbed Sample ES - Environmental sample B - Bulk Disturbed Sample SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard	VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense	EL - Extremely low VL - Very low L - Low M - Medium H - High VH - Very high EH - Extremely high	RS - Residual soil XW - Extremely weathered DW - Distinctly weathered SW - Slightly weathered FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO LTD

BOREHOLE LOG

CLIENT : Government Property NSW
PROJECT : Preliminary Geotechnical Assessment
LOCATION : 20 Mann Street, Gosford

HOLE NO : BH003
PROJECT REF : 80516860
SHEET : 1 OF 1

RIG TYPE : 4WD mounted drill rig METHOD : Solid Flight Auger CONTRACTOR : Fico Group DRILLER :
DATE STARTED : 21/9/15 DATE COMPLETED : 21/9/15 DATE LOGGED : 21/9/15 LOGGED BY : AM CHECKED BY : AM
LOCATION : See Drawing for location EASTING : 345721 NORTHING : 6299806 RL : 3m

DRILLING				MATERIAL																				
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations	WELL													
AD/V	free standing water level	1.00m SPT 3, 2, 1 N=3 1.45m	2	0.0			FILL; Clayey SAND, fine to coarse grained, brown, with gravel, trace ceramics and bricks fragment	M		Alluvium	free standing water level @ 1.28m observed on 22/09/2015													
				0.50m			Clayey SAND, fine to coarse grained, brown-dark brown	M - W	MD															
				1.30m			Silty CLAY, medium to high plasticity, highly organic, dark brown-black, with organics	W	VL															
				1.80m			Silty SAND, fine to coarse grained, pale grey, with clay	W	VL - MD															
				AD/V			free standing water level	3.50m SPT 5, 8, 12 N=20 3.95m	1	2.0			Sandy CLAY, medium to high plasticity, pale grey-grey, trace gravel			Residual								
										2.50m														
										3.0														
										4.0														
										AD/V			free standing water level	6.00m SPT 16/70mm HB N=R 6.07m	-1	4.0				MC > PL	VSt			
																5.0								
6.0																								
7.0																								
AD/V	free standing water level	6.00m SPT 16/70mm HB N=R 6.07m	-2		5.0														as above, but colour change to red mottled orange	MC = PL	VSt			
					6.0																			
				7.0																				
				8.0																				
				AD/V	free standing water level		6.00m SPT 16/70mm HB N=R 6.07m	-3	6.0										Borehole BH003 terminated at 6.00 m					
									7.0										Refusal					
									8.0	on sandstone														
									9.0															
									AD/V	free standing water level			6.00m SPT 16/70mm HB N=R 6.07m	-4	7.0									
															8.0									
9.0																								
10.0																								
AD/V	free standing water level	6.00m SPT 16/70mm HB N=R 6.07m	-5			8.0																		
						9.0																		
				10.0																				
				11.0																				
				AD/V	free standing water level	6.00m SPT 16/70mm HB N=R 6.07m	-6	9.0																
								10.0																
								11.0																
								12.0																

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
Water seepage/inflow
Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO LTD

BOREHOLE LOG

CLIENT : Government Property NSW
PROJECT : Preliminary Geotechnical Assessment
LOCATION : 20 Mann Street, Gosford

HOLE NO : BH004
PROJECT REF : 80516860
SHEET : 1 OF 1

RIG TYPE : 4WD mounted drill rig METHOD : Solid Flight Auger CONTRACTOR : Fico Group DRILLER :
DATE STARTED : 21/9/15 DATE COMPLETED : 21/9/15 DATE LOGGED : 21/9/15 LOGGED BY : AM CHECKED BY : AM
LOCATION : See Drawing for location EASTING : 345724 NORTHING : 6299762 RL : 3m

DRILLING				MATERIAL			
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING CONSISTENCY / ROCK STRENGTH STRUCTURE & Other Observations
	free standing water level 	1.00m SPT 2, 2, 1 N=3 1.45m 2.50m B 3.40m 3.50m SPT 5, 9, 12 N=21 3.95m	0.0 2 1 0 -1 -2 -3 -4 -5 -6 10.0	0.0		SPRAYED SEAL	Fill
				0.04m		FILL; Gravelly Clayey SAND, dark grey-green, angular gravel, with clay,	M
				0.80m		Silty CLAY, medium to high plasticity, dark brown-black, high organic content	MC > PL S - F
				1.0		Clayey SAND, fine to coarse grained, green-grey	W L - MD
				1.70m			
				2.0			
				2.50m		Sandy CLAY, medium to high plasticity, pale grey mottled red orange	MC > PL St
				3.0			
				4.0			
				4.40m		SANDSTONE, fine to medium grained, pale grey mottled orange-red	XW EL
				4.60m		Borehole BH004 terminated at 4.60 m	
				5.0		Refusal on sandstone	
				6.0			
				7.0			
				8.0			
				9.0			
				10.0			

MOISTURE & GROUNDWATER	SAMPLES & FIELD TESTS	CONSISTENCY	RELATIVE DENSITY	ROCK STRENGTH	ROCK WEATHERING
D - Dry M - Moist W - Wet OMC - Optimum MC PL - Plastic Limit - Water seepage/inflow - Water level	U - Undisturbed Sample D - Disturbed Sample ES - Environmental sample B - Bulk Disturbed Sample SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard	VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense	EL - Extremely low VL - Very low L - Low M - Medium H - High VH - Very high EH - Extremely high	RS - Residual soil XW - Extremely weathered DW - Distinctly weathered SW - Slightly weathered FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO LTD

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH1**

sheet: 1 of 2

project no. **SYDGE214942**date started: **22 Feb 2018**

date completed: **22 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345.756.31: N: 6.299.817.01 (MGA94)

surface elevation: 2.50 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT. Track mounted

drilling fluid: Water

hole diameter : 100 mm

[illegible]

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH1**

sheet: 2 of 2

project no. **SYDGE214942**

date started: **22 Feb 2018**

date completed: **22 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,756.31; N: 6,299,817.01 (MGA94)

surface elevation: 2.50 m (AHD)

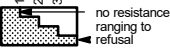
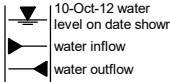
angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

drilling information						material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T							CL	Sandy CLAY: medium plasticity, pale grey, spotted red, with fine grained sand, trace of extremely weathered rock. (continued)	W	H		RESIDUAL SOIL
			SPT 20 30/50mm N*=R	-6								
					9.0			Borehole BH1 terminated at 8.70 m				
					-7							
					10.0							
					-8							
					11.0							
					-9							
					12.0							
					-10							
					13.0							
					-11							
					14.0							
					-12							
					15.0							
					-13							

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube	support M mud N nil C casing penetration  water  10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit WI liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V hit

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
D dry
M moist
W wet
Wp plastic limit
WI liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH2**

sheet: 1 of 2

project no. **SYDGE214942**

date started: **22 Feb 2018**

date completed: **23 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,719.85; N: 6,299,809.19 (MGA94) surface elevation: 2.70 m (AHD) angle from horizontal: 90°
drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information					material substance									
method & support	1 penetration	2	3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
PT					E					FILL: Gravelly SAND: fine to medium grained, dark brown-black, with fine to medium angular gravel, trace of low to medium plasticity clay.	M			FILL PID: 3.7ppm
					E					FILL: SAND: fine to medium grained, brown-dark brown, trace of silt and fine gravel.	M			PID: 3.8ppm
					E									PID: 6.5ppm
					SPT 3, 1, 1 N*=2	1.0			SC	CLAYEY SAND: fine grained, grey, medium plasticity clay, organic odour, trace of organics and root fibres.	M - W	VL		ALLUVIUM
					E									PID: 4.9ppm
					SPT 3, 5, 4 N*=9	2.0			CH	Silty CLAY: medium to high plasticity, pale grey-dark grey, trace of root fibres and fine white gravel.	M	St		
					E									
					SPT 2, 4, 7 N*=11	3.0			CH	Silty CLAY: medium to high plasticity, grey mottled orange-red, trace of fine grained sand, root fibres and fine pale gravel.				
					SPT 2, 4, 7 N*=11	4.0			CL	Sandy CLAY: medium to high plasticity, pale grey, white sotted orange, with fine grained sand, trace of root fibres and silt.				RESIDUAL SOIL
					SPT 2, 4, 7 N*=11	5.0								
					SPT 18, 21, 30 N*=51	6.0			SC	SAND: fine grained, pale grey, streaked red, medium plasticity clay.		H		

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing penetration water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit WL liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH2**

sheet: 2 of 2

project no. **SYDGE214942**

date started: **22 Feb 2018**

date completed: **23 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,719.85; N: 6,299,809.19 (MGA94)

surface elevation: 2.70 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

drilling information					material substance							
method & support	1 penetration	2 water	3 samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
PT			SPT 20, 30 N*=R	-6	9.0		CL	Sandy CLAY: medium to high plasticity, orange-brown mottled red, pale grey, fine to medium grained sand.	M	H		RESIDUAL SOIL
				10.0	CH		CLAY: high plasticity, pale grey, spotted brown, trace of fine to coarse gravel. 10.5 to 11.2 m: very soft spot encountered	F - St				
				11.0	SC		CLAYEY SAND: fine to coarse grained, pale brown-orange mottled pale grey, with medium plasticity clay. 11.9 m: hard material encountered	H				
				12.0	CL		Silty CLAY: medium to high plasticity, pale grey mottled pale brown, with silt, trace of fine sub-rounded grey gravel, medium strength.	St - VSt				
				13.0	SC		CLAYEY SAND: fine to medium grained, pale grey, with medium plasticity clay, trace of sandstone.	H				
				13.05 to 13.4 m: soft material								
				14.0	SC		SAND: fine to coarse grained, pale brown-orange, trace of sandstone.					
				15.0								
Borehole BH2 terminated at 15.06 m												

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH3**

sheet: 1 of 3

project no. **SYDGE214942**

date started: **23 Feb 2018**

date completed: **23 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,755.46; N: 6,299,767.29 (MGA94)

surface elevation: 4.00 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter: 100 mm

drilling information					material substance										
method & support	1 penetration	2 water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations			
PT	1	2	3	Not Encountered	1.0		ML	TOPSOIL: Silty CLAY: low to medium plasticity, brown, pale brown, trace of organics and root fibres.	D - M		100 200 300 400	TOPSOIL			
								0.8 m: grading to brown-dark brown							
								SPT 4, 5, 7 N*=12				SC	CLAYEY SAND: fine to medium grained, dark brown, trace of fine grained sand.	MD	ALLUVIUM
								E							
								E							
								SPT 4, 6, 7 N*=13							
								E							
								E							
								SPT 3, 5, 6 N*=11							
								0							
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, dark brown mottled red-dark grey.	M	St	RESIDUAL SOIL										
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	Sandy CLAY: medium to high plasticity, dark brown, grading to brown, pale brown, fine to medium grained sand, trace of silt.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of silt, sand and root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
0															
SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
E															
E															
SPT 3, 5, 6 N*=11															
E															
E															
SPT 3, 5, 6 N*=11															
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SPT 3, 5, 6 N*=11															
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SPT 2, 4, 6 N*=10	CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres.													
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Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH3**

sheet: 2 of 3

project no. **SYDGE214942**

date started: **23 Feb 2018**

date completed: **23 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,755.46; N: 6,299,767.29 (MGA94)

surface elevation: 4.00 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

drilling information				material substance			rock mass defects										
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is(50)			samples, field tests & Is(50) (MPa)	core run & RQD	defect spacing (mm)				additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)	
							VL	L	M			H	VH	30	100	300	1000
			-3	1.0													
			-2	2.0													
			-1	3.0													
			-0	4.0													
			-1	5.0													
			-2	6.0													
			-3	7.0	started coring at 6.70m SANDSTONE: fine grained, orange-red stained brown-grey, laminated, iron staining present. 7.00 m: colour changes to pale grey-white, with iron stains SANDSTONE: fine grained, pale grey-grey, bedded, trace of iron stains.	XW XW DW		a=0.47 d=0.05 a=1.62 d=1.56	13% 84%	JT, 45°, PL, RO, CO SM, PL, SO, CO, 30 mm JT, 85°, IR, RO, CO - Fe							
method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube				support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown		graphic log / core recovery core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)		weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high		defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided planarity PL planar CU curved UN undulating ST stepped IR Irregular coating CN clean SN stained VN veneer CO coating							

Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH3**

sheet: 3 of 3

project no. **SYDGE214942**

date started: **23 Feb 2018**

date completed: **23 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,755.46; N: 6,299,767.29 (MGA94)

surface elevation: 4.00 m (AHD)

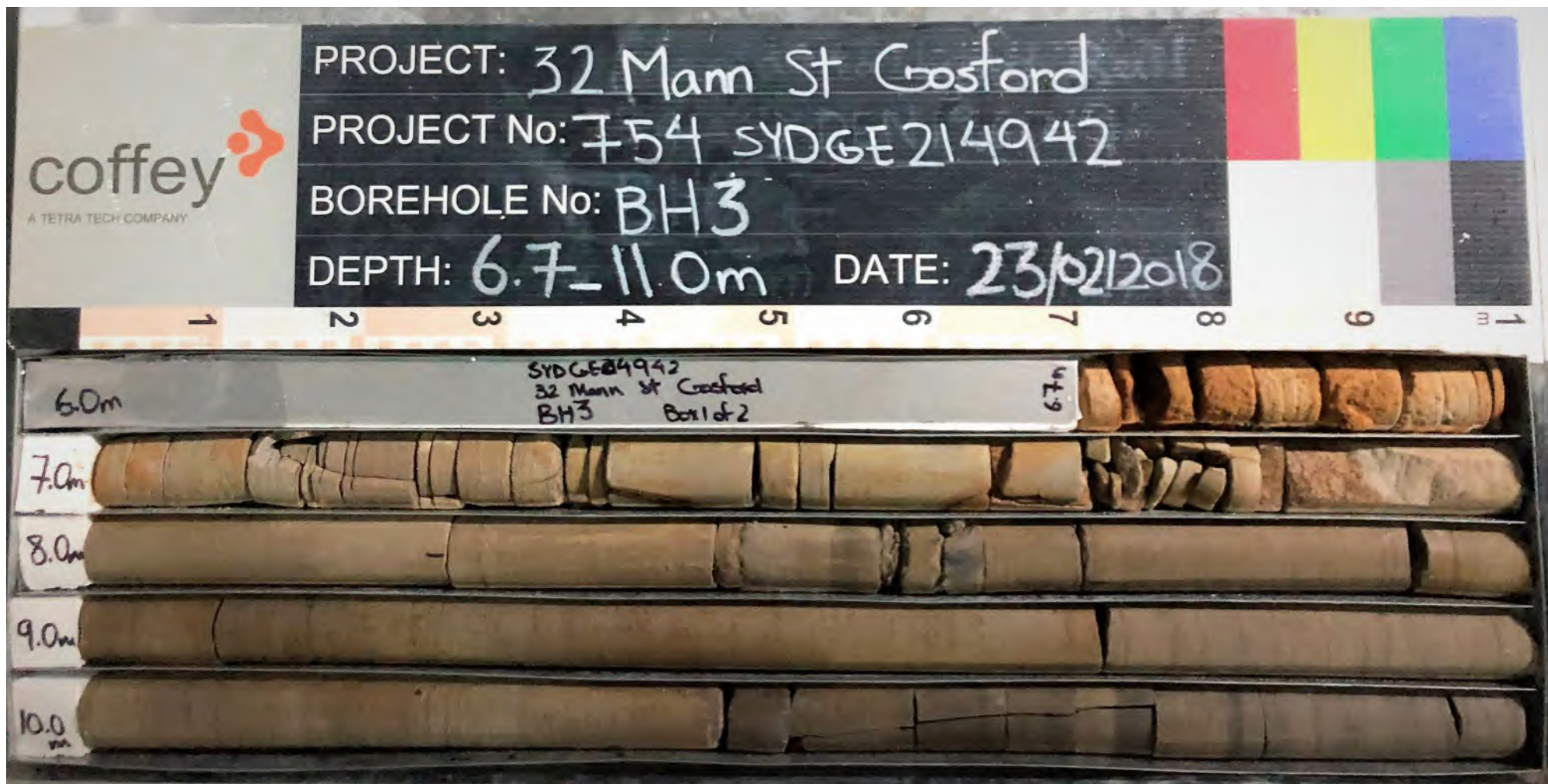
angle from horizontal: 90°

drill model: Geoprobe 7822DT. Track mounted

drilling fluid: Water

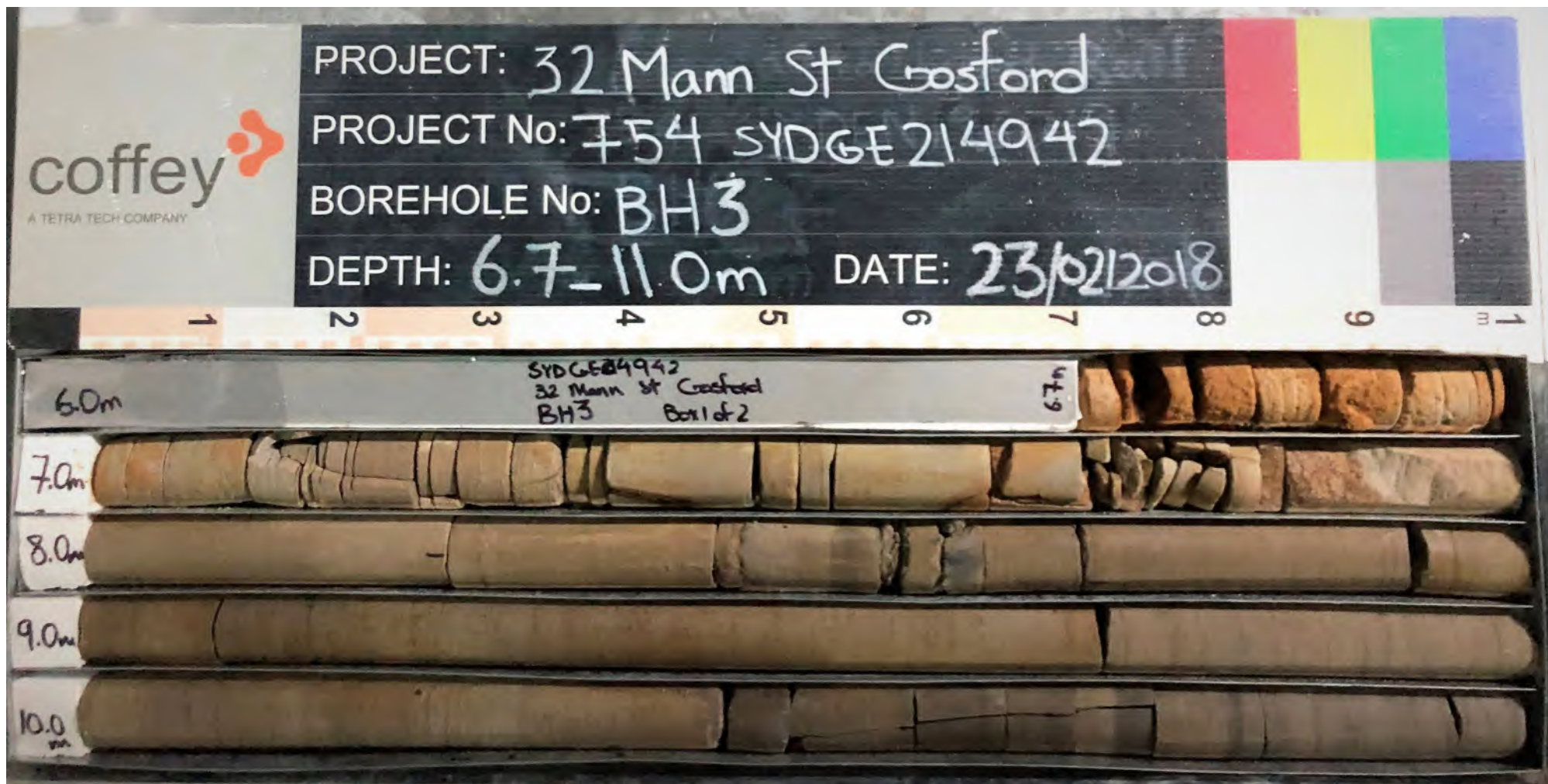
hole diameter : 100 mm

drilling information				material substance				rock mass defects						
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is(50) X = axial; O = diametral a = axial; d = diametral	samples, field tests & Is(50) (MPa)	core run & RQD	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)			
							VL L M H VH EH		core run & RQD	30 100 300 1000 3000	particular	general		
Not Encountered	W				SANDSTONE: fine grained, pale grey-grey, bedded, trace of iron stains. (continued)	SW			84%		PT, UN, RO, CN SM, PL, SO, CO SM, PL, SO, CO	Defects are: PT, 0 - 5°, PL, RO - SO, CN - CO, unless otherwise described		
					CLAYSTONE: grey, laminated, with interbeds of sandstone.	SW - DW SW					a=2.22 d=1.86		PT, UN, SO, CN PT, UN, SO, CN	
					SANDSTONE: fine grained, pale grey, interlaminated with grey siltstone.						a=1.73 d=2.05			
					SANDSTONE: fine grained, grey, bedded.						a=2.10 d=1.50			
					10.44 to 10.49 m: claystone, dark grey laminated						a=1.24 d=0.77			
					CLAYSTONE: dark grey, interlaminated with siltstone.						a=1.71 d=1.40			
					SILTSTONE: grey, interlaminated with claystone.						a=0.45 d=0.06			
					SANDSTONE: fine grained, pale grey-grey, bedded.						DW - XW		a=0.84 d=0.50	PT, UN, SO, CN
					SILTSTONE: grey-dark grey, interlaminated with claystone.								a=1.37 d=0.94	PT, IR, SO, CN PT, UN, SO, CN PT, UN, SO, CO SM, SO, CO PT, UN, RO, CO PT, CU, SO, CN
					SANDSTONE: fine to medium grained, grey stained red-orange, bedded, trace of gravel.								PT, 0°, UN, SO - RO, CN	
													PT, CU, SO - RO, CN PT, UN, SO - RO, CN	
					Borehole BH3 terminated at 15.10 m									
method & support				support		graphic log / core recovery		weathering & alteration*		defect type		planarity		
AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube				C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown		core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)		RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high		PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided		CN clean SN stained VN veneer CO coating		



BH3 6.70 - 11.00 m

drawn	LP	 A TETRA TECH COMPANY	client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH3		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 1
original size	A4				rev:	



BH3 6.70 - 11.00 m

drawn	LP	 A TETRA TECH COMPANY	client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH3		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 1
original size	A4				rev:	

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH5**

sheet: 1 of 3

project no. **SYDGE214942**

date started: **28 Feb 2018**

date completed: **28 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,711.00; N: 6,299,825.00 (MGA94) surface elevation: 2.70 m (AHD) angle from horizontal: 90°
drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information					material substance							
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
PT CASING ADT W	1							FILL: Gravelly SILTY SAND: fine to coarse grained, brown-red, trace ceramics fragments.	M		100	FILL PID: 0.6ppm
	2						CL	Sandy CLAY: medium to high plasticity, grey-brown, trace of organics with fine to coarse grained sand.		S	200	ALLUVIUM PID: 2.0ppm PID: 0.8ppm
	3		SPT 3, 2, 1 N*=3		1.0		CH	Silty CLAY: medium to high plasticity, dark brown-black, trace of root fibres.			300	
					2.0		SC	CLAYEY SAND: fine to coarse grained, pale grey, medium to high plasticity clay.	W	L	400	
			SPT 1, 2, 3 N*=5		3.0							PID: 1.3ppm
					4.0		CL	Sandy CLAY: medium to high plasticity, grey mottled orange.		St		RESIDUAL SOIL
			SPT 2, 5, 6 N*=11		5.0							
					6.0		CH	5.4 m: colour change to red mottled orange-grey CLAY: medium to high plasticity, grey-pale grey, spotted orange, trace of silt and fine grained sand.				
			SPT 3, 3, 7 N*=10		7.0					VSt		
					8.0							
		SPT 6, 8, 10 N*=18		9.0					VSt			

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. B blank bit T TC bit V V bit	support M mud C casing penetration water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit WL liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH5**

sheet: 2 of 3

project no. **SYDGE214942**

date started: **28 Feb 2018**

date completed: **28 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,711.00; N: 6,299,825.00 (MGA94)

surface elevation: 2.70 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter: 100 mm

drilling information						material substance								
method & support	penetration			water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
method & support W ↓	1	2	3						CH	CLAY: medium to high plasticity, grey-pale grey, spotted orange, trace of silt and fine grained sand. (continued)	W	VSt - H	100 200 300 400	RESIDUAL SOIL
					SPT 6, 7, 13 N*=20	-6	9.0			9.3 m: started getting really hard Borehole BH5 continued as cored hole				
						-7	10.0							
						-8	11.0							
						-9	12.0							
						-10	13.0							
						-11	14.0							
						-12	15.0							
						-13								

method		support		samples & field tests		soil group symbol & soil description		consistency / relative density	
AD	auger drilling*	M	mud	B	bulk disturbed sample	based on AS 1726:2017		VS	very soft
AS	auger screwing*	C	casing	D	disturbed sample			S	soft
HA	hand auger			E	environmental sample			F	firm
W	washbore			SS	split spoon sample			St	stiff
PT	push tube			U##	undisturbed sample ##mm diameter			VSt	very stiff
				HP	hand penetrometer (kPa)			H	hard
				N	standard penetration test (SPT)			Fb	friable
				N*	SPT - sample recovered			VL	very loose
				Nc	SPT with solid cone			L	loose
				VS	vane shear; peak/remoulded (kPa)			MD	medium dense
				R	refusal			D	dense
				HB	hammer bouncing			VD	very dense

penetration		water	
	no resistance ranging to refusal		10-Oct-12 water level on date shown
	water inflow		water outflow

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
PT push tube

* bit shown by suffix
e.g.
AD/T blank bit
B TC bit
T V bit

support
M mud
C casing

penetration
no resistance ranging to refusal
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
D dry
M moist
W wet
Wp plastic limit
WI liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH5**

sheet: 3 of 3

project no. **SYDGE214942**

date started: **28 Feb 2018**

date completed: **28 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,711.00; N: 6,299,825.00 (MGA94)

surface elevation: 2.70 m (AHD)

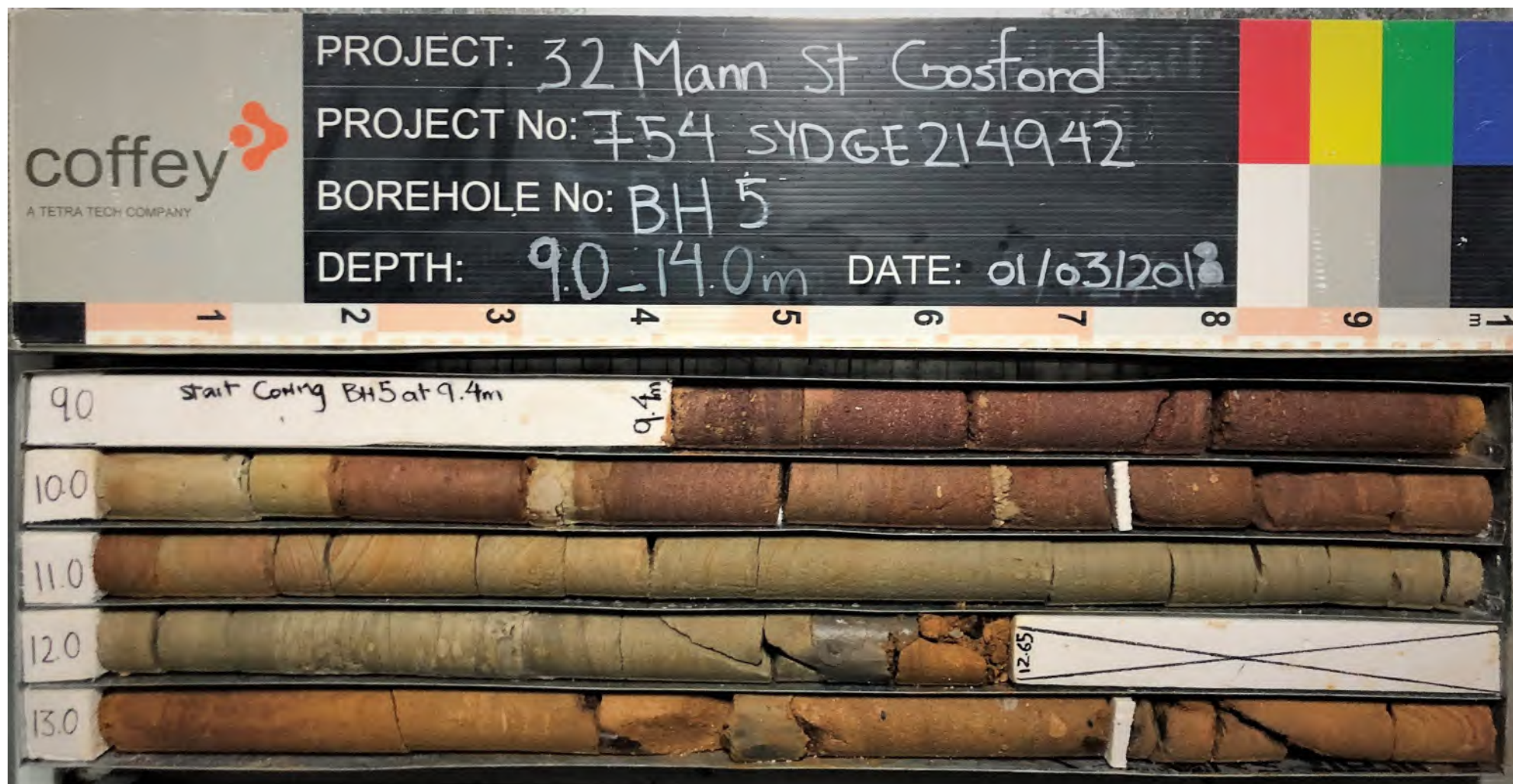
angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

drilling information				material substance				rock mass defects					
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 X = axial; O = diametral a = axial; d = diametral	samples, field tests & Is(50) (MPa) d = diametral	core run & RQD	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)		
											particular	general	
			-6 9.0		started coring at 9.40m								
NMLC			-7 10.0		SANDSTONE: fine to coarse grained, red, iron stained, bedded, trace of fine gravel (quartz).	XW		a=0.61 d=0.61	84%		PT, 0°, PL, RO, CN JT, 20°, UN, RO, CN SM, 0°, PL, SO, CO, 100 mm SM, 0°, PL, SO, CO, 30 mm	Defects are: PT, 0 - 5° PL, SO, CN, unless otherwise described	
			-8 11.0		SANDSTONE: fine to medium grained, pale grey, laminated orange-red.	DW	a=0.65 d=0.95	51%		PT, 0°, UN, RO, CN CS, 0°, PL, RO, CO PT, 5°, UN, RO, CN PT, 0°, CU, SO, CN PT, 0°, CU, SO, CN			
			-9 12.0		SANDSTONE: fine to medium grained, grey, bedded.	SW	a=0.35 d=0.07			PT, 0°, UN, SO, CN SM, 0°, PL, SO, CO, 20 mm SM, 5°, PL, SO, CO, 30 mm PT, 2°, IR, SO, CN JT, 70°, IR, RO, CN, 100 mm SM, 5°, PL, SO, CO, 30 mm SZ, IR, CN, 70 mm			
			-10 13.0	NO CORE: 0.35 m						PT, 3°, UN, SO, SN JT, 60°, PL, RO, CN, 130 mm JT, 75°, UN, RO, CN, 120 mm			
			-11 14.0		SANDSTONE: fine to medium grained, red-orange.	XW	a=0.49 d=0.38	12%		Fractured zone JT, 75°, PL, SO, SN, 130 mm SM, 0°, PL, SO, CO, 60 mm			
		-12 15.0		SANDSTONE: fine grained, grey, bedded.	SW	a=0.58 d=0.10			PT, 0 - 5° UN - IR, RO, CN SM, 0°, PL, SO, CO, 20 mm				
		-13		SANDSTONE: dark grey, interbedded sandstone.		a=0.52 d=0.43			SM, 0°, PL, SO, CO, 30 mm				
					Borehole BH5 terminated at 15.00 m								
method & support				support		graphic log / core recovery		weathering & alteration*		defect type		planarity	
AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLC NMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube				C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss 25uL water pressure test result (lugeons) for depth interval shown		core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)		RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high		PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided		PL planar CU curved UN undulating ST stepped IR Irregular coating CN clean SN stained VN veneer CO coating	



BH5 9.00 - 14.00 m

drawn	LP	 A TETRA TECH COMPANY	client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH5		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 1
original size	A4				rev:	



BH5 14.00 - 15.00 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH5		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 2
original size	A4				rev:	

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH6**

sheet: 1 of 3

project no. **SYDGE214942**

date started: **01 Mar 2018**

date completed: **01 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,761.69; N: 6,299,796.39 (MGA94)

surface elevation: 4.00 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

[illegible]

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH6**

sheet: 2 of 4

project no. **SYDGE214942**

date started: **01 Mar 2018**

date completed: **01 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,761.69; N: 6,299,796.39 (MGA94)

surface elevation: 4.00 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

drilling information				material substance			rock mass defects												
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is(50)					samples, field tests & Is(50) (MPa)	core run & RQD	defect spacing (mm)				additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)	
							VL	L	M	H	VH			a = axial; d = diametral	30	100	300	1000	3000
		-3	1.0				VL	L	M	H	VH								
		-2	2.0				VL	L	M	H	VH								
		-1	3.0				VL	L	M	H	VH								
		-0	4.0				VL	L	M	H	VH								
		-1	5.0				VL	L	M	H	VH								
		-2	6.0				VL	L	M	H	VH								
		-3	7.0		started coring at 6.90m Silty CLAY: medium to high plasticity, pale grey-white, with orange-red banding (XW sandstone/siltstone). 7.00 to 7.10 m: ironstone, fine to medium grained sand, red-dark red-black	XW							6%						
method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube				support C casing M mud N none water  10/10/12, water level on date shown  water inflow  complete drilling fluid loss  partial drilling fluid loss  water pressure test result (lugeons) for depth interval shown		graphic log / core recovery  core recovered (graphic symbols indicate material)  no core recovered core run & RQD  barrel withdrawn RQD = Rock Quality Designation (%)		weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high				defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided				planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating			

Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH6**

sheet: 3 of 4

project no. **SYDGE214942**

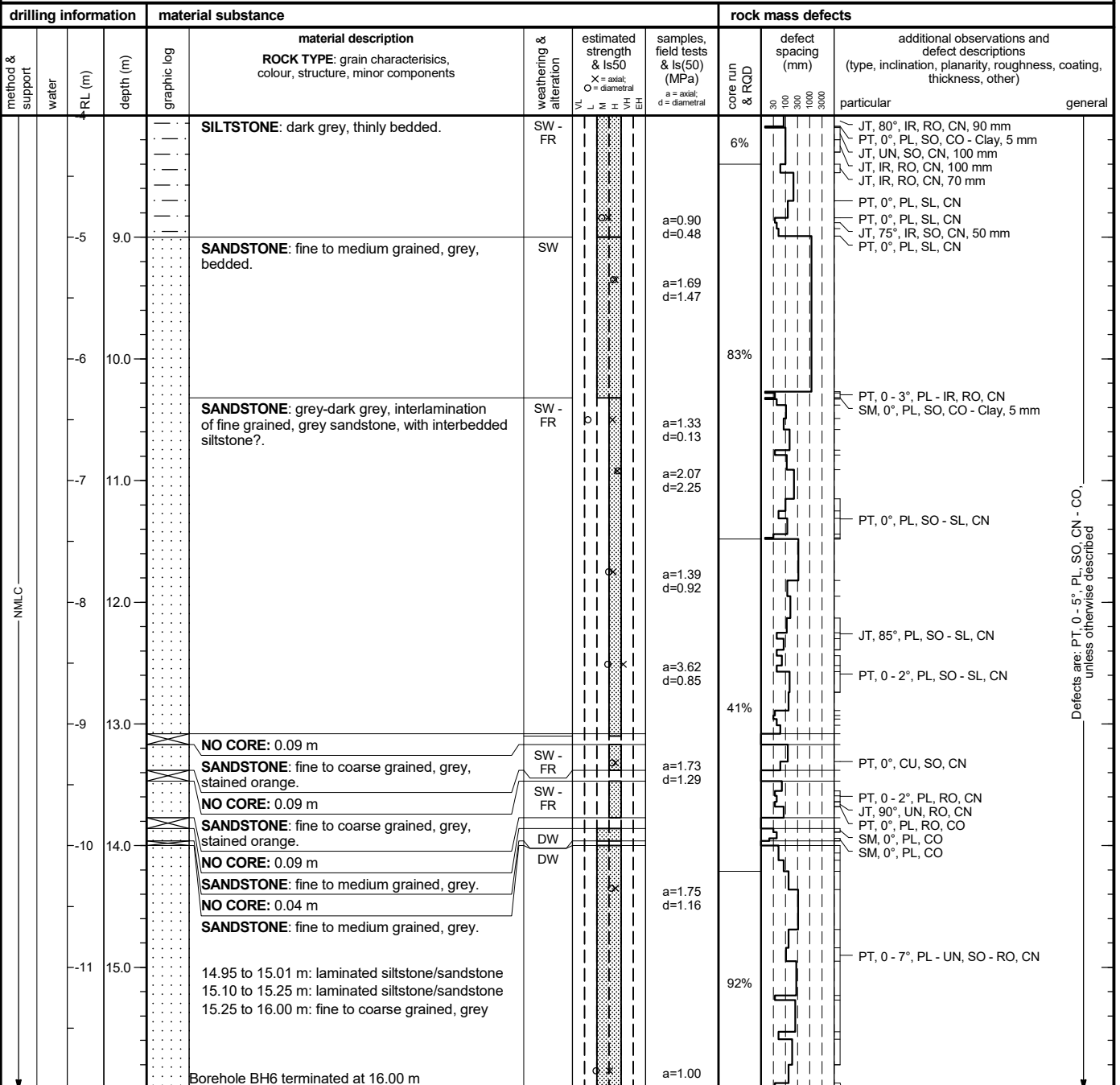
date started: **01 Mar 2018**

date completed: **01 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,761.69; N: 6,299,796.39 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm



method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLC NMLC core (51.9 mm) NQ wireline core (47.6 mm) HQ wireline core (63.5 mm) PQ wireline core (85.0 mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH6**

sheet: 4 of 4

project no. **SYDGE214942**

date started: **01 Mar 2018**

date completed: **01 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,761.69; N: 6,299,796.39 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance				rock mass defects			
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is(50) X = axial O = diametral a = axial d = diametral	samples, field tests & Is(50) (MPa)	core run & RQD	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)
		12.0						d=0.28			particular SM, 7°, UN, SO, CO, 3 mm SM, 5°, UN, SO, CO, 1 mm
		13.0	17.0								
		14.0	18.0								
		15.0	19.0								
		16.0	20.0								
		17.0	21.0								
		18.0	22.0								
		19.0	23.0								

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLC NMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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BH6 6.90 - 11.00 m

drawn	LP	 A TETRA TECH COMPANY	client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH6		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 1
original size	A4				rev:	



BH6 11.00 - 16.00 m

drawn	LP		client: St Hilliers		
approved	AM		project: Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title: CORE PHOTOGRAPH BH6		
scale	N.T.S.		project no: SYDGE214942	fig no: FIGURE 2	rev:
original size	A4				

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH7**

sheet: 1 of 3

project no. **SYDGE214942**

date started: **02 Mar 2018**

date completed: **02 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,710.50; N: 6,299,759.90 (MGA94)

surface elevation: 2.50 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

drilling information						material substance									
method & support	1 penetration	2 penetration	3 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations	
PT	1 2 3				E					FILL: Gravelly SAND: fine to coarse grained, dark brown, fine to medium angular gravel, trace of clay and ceramics.	M			FILL PID: 2.5ppm	
					2					FILL: Gravelly SAND: fine to coarse grained, pale brown-orange, medium to coarse angular gravel.					
					SPT 2, 1, 1 N*=2	1.0	CL	Sandy CLAY: medium to high plasticity, dark brown, with fine grained sand, trace of silt.		VS	ALLUVIUM				
					E	1				PID: 1.6ppm					
					SPT 1, 1, 4 N*=5	2.0	SC	SAND: fine to medium grained, grey, trace of low to medium plasticity clay.		VL	RESIDUAL SOIL				
					E	2	CL	Sandy CLAY: medium to high plasticity, grey, with fine to medium grained sand, trace of silt, root fibres and organics. 2.5 m: colour change to grey mottled red-orange	W	F	PID: 2.2ppm				
					E	3.0	CH	CLAY: medium to high plasticity, grey, mottled orange, red.	M		PID: 1.5ppm				
					SPT 3, 3, 4 N*=7	4.0									
					E	5.0	CL	Sandy CLAY: low plasticity, pale grey-white mottled red-orange, fine to coarse grained sand, trace of extremely weathered ironstone gravel.		St - VSt					
					SPT 9, 10, 16, N*=26	-3				H					
AD/T	4 5 6														
method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit						support M mud C casing penetration no resistance ranging to refusal water 10-Oct-12 water level on date shown water inflow water outflow			samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing			soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit WI liquid limit		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH7**

sheet: 2 of 3

project no. **SYDGE214942**

date started: **02 Mar 2018**

date completed: **02 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,710.50; N: 6,299,759.90 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter : 100 mm

drilling information					material substance									
method & support	penetration			water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T ↓	1	2	3			-6			CL	Sandy CLAY: low plasticity, pale grey-white mottled red-orange, fine to coarse grained sand, trace of extremely weathered ironstone gravel. <i>(continued)</i>	M	H	100 200 300 400	RESIDUAL SOIL
										Borehole BH7 continued as cored hole				
						9.0								
						-7								
						10.0								
						-8								
						11.0								
						-9								
						12.0								
						-10								
						13.0								
						-11								
						14.0								
						-12								
						15.0								
						-13								

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit WI liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH7**

sheet: 3 of 3

project no. **SYDGE214942**

date started: **02 Mar 2018**

date completed: **02 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,710.50; N: 6,299,759.90 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance				rock mass defects			
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is(50) X = axial O = diametral a = axial d = diametral	samples, field tests & Is(50) (MPa) a = axial d = diametral	core run & RQD	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)
		-6			started coring at 8.60m						
			9.0		SANDSTONE: fine grained, pale grey, iron stained, interbedded with dark grey siltstone.	SW		a=0.63 d=0.61			PT, 0°, IR, RO, CN, 10 mm PT, 0°, PL, RO, CN PT, 0°, PL, SL, CN
					SILTSTONE: dark grey, iron stained, interbedded with dark grey sandstone.			a=2.32 d=1.66			PT, 0°, IR, RO, CO - Clay PT, 0°, PL, SL, CN
			10.0		SANDSTONE: fine grained, pale grey, iron stained, bedded.						JT, 87° - 90°, PL, SO, CN PT, 0 - 5°, PL - UN, SO - RO, CN CS, 0°, PL, SO, 20 mm
									69%		
			11.0					a=0.56 d=0.59			PT, 0 - 5°, PL - UN, SO - SL, CN
					SANDSTONE: fine to coarse grained, pale grey, iron stained, massive, trace of gravel.			a=1.18 d=1.58			PT, 0 - 5°, PL - UN, SO, CN PT, 0 - 5°, PL - UN, SO, CN
			12.0					a=1.49 d=1.53			SM, 0°, PL, SO, CO
					SILTSTONE: dark grey, interlaminated with fine grained sandstone.	FR		a=1.91 d=1.32			
			13.0		SANDSTONE: fine to coarse grained, pale grey, highly iron stained bedded.			a=1.20 d=1.84			JT, 75°, IR, SO - RO, CN
									83%		
			14.0					a=0.97 d=0.99			
						HW		a=1.19 d=1.56			PT, 0 - 7°, IR, SO - RO, CN
			15.0						100%		
					Borehole BH7 terminated at 15.20 m						
			-13								

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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BH7 8.60 - 13.00 m

drawn	LP		client: St Hilliers		
approved	AM		project: Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title: CORE PHOTOGRAPH BH7		
scale	N.T.S.		project no: SYDGE214942	fig no: FIGURE 1	rev:
original size	A4				



BH7 13.00 - 15.20 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH7		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 2
original size	A4				rev:	

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH8**

sheet: 1 of 2

project no. **SYDGE214942**

date started: **06 Mar 2018**

date completed: **06 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,745.57; N: 6,299,797.53 (MGA94)

surface elevation: 2.50 m (AHD)

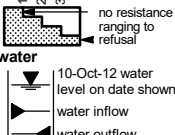
angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter: 100 mm

drilling information					material substance							
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
PT 												

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. B blank bit T TC bit V V bit	support M mud C casing penetration  no resistance ranging to refusal 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit WL liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
---	--	--	---	--

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID. **BH8**

sheet: 2 of 2

project no. **SYDGE214942**

date started: **06 Mar 2018**

date completed: **06 Mar 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,745.57; N: 6,299,797.53 (MGA94)

surface elevation: 2.50 m (AHD)

angle from horizontal: 90°

drill model: Geoprobe 7822DT, Track mounted

drilling fluid: Water

hole diameter : 100 mm

drilling information					material substance									
method & support	penetration			water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T	1	2	3						CL	Sandy CLAY: medium to high plasticity, grey.	M	H	100 200 300 400	RESIDUAL SOIL
						-6				Borehole BH8 terminated at 8.57 m Refusal				
							9.0							
							-7							
							10.0							
							-8							
							11.0							
							-9							
							12.0							
							-10							
							13.0							
							-11							
							14.0							
							-12							
							15.0							
							-13							

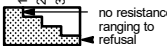
method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube	support M mud N nil C casing penetration no resistance ranging to refusal water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
---	---	--	--	--

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
PT push tube

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing

penetration

no resistance ranging to refusal
water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
D dry
M moist
W wet
Wp plastic limit
WI liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH6
FILE / JOB NO : 304100748
SHEET : 1 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345701.000, N: 6299836.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrisite CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 30/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING						MATERIAL								
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations			
DRILLING & CASING	WATER													
AD/T	F	31/05/22		SPT 1, 1, 1 N=2	0.0			FILL: GRAVELLY CLAYEY SAND: dark grey, dark brown, fine to medium grained sand, low to medium plasticity clay, fine to coarse grained gravel			FILL			
					2.7									
					0.40m		SP	SAND: dark brown-yellow, dark grey, fine to medium grained sand, with low to medium plasticity clay	M	VL	ALLUVIUM			
					1.0									
					1.7									
					1.50m		SPT 3, 4, 5 N=9	2.0		SC	CLAYEY SAND: grey, fine to medium grained sand, low to medium plasticity clay	W	L	3.00: PP = 250, 300 kPa
					0.7									
					1.95m	2.20m								
					3.00m		CI-CH	3.30m	SILTY CLAY: pale grey, medium to high plasticity, with fine to medium grained sand	w > PL	St			
					3.45m									
					4.0		SP	4.10m	SAND: pale grey, fine to medium grained sand, trace low to medium plasticity clay	W	MD	4.50: PP = 300, 350 kPa		
					-1.3									
4.50m		CI-CH	4.70m	SANDY CLAY: pale grey to grey, medium to high plasticity, fine to medium grained sand	w > PL	VSt	RESIDUAL SOIL							
4.95m														
6.0		CI-CH	6.35m	SANDY CLAY: dark brown-red, mottled pale grey, medium to high plasticity, fine to medium grained sand	w > PL	St - VSt								
-3.3														
6.00m		SC	7.50m	CLAYEY SAND: pale grey, dark brown-red, fine to medium grained sand, medium to high plasticity clay, trace ironstone gravel	W	MD								
6.45m														
7.0		CI-CH	7.95m											
-4.3														

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH6
FILE / JOB NO : 304100748
SHEET : 2 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345701.000, N: 6299836.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrsitie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 30/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations	
DRILLING & CASING	WATER											
AD/T		F		9.00m SPT 2, 4, 9 N=13	8.0 -5.3		SC	CLAYEY SAND: pale grey, dark brown-red, fine to medium grained sand, medium to high plasticity clay, trace ironstone gravel (continued)	W	MD	RESIDUAL SOIL	
					9.0 -6.3							
							H		9.45m	9.25m	CI-CH	SANDY CLAY: pale grey, mottled pale brown-red, medium to high plasticity, fine to medium grained sand, with ironstone gravel
		10.0 -7.3	10.52m									
							Continued as Cored Drill Hole					
					11.0 -8.3							
					12.0 -9.3							
					13.0 -10.3							
					14.0 -11.3							
					15.0 -12.3							
					16.0 -13.3							

See Explanatory Notes for

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



CORED DRILL HOLE LOG

HOLE NO : BH6

FILE / JOB NO : 304100748

SHEET : 3 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345701.000, N: 6299836.000 (56 MGA94)

SURFACE ELEVATION : 2.700 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Chrisitie CE180

MOUNTING : Track

CONTRACTOR : BG Drilling

DRILLER : DM

DATE STARTED : 30/05/22

DATE COMPLETED : 31/05/22

DATE LOGGED : 31/05/22

LOGGED BY : AT

CHECKED BY : TH

CASING DIAMETER :

BARREL (Length) : 3.00 m BIT : STEP

BIT CONDITION : Fair

DRILLING				MATERIAL				FRACTURES			
PROGRESS	LOSS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	Weathering	ESTIMATED STRENGTH Is(50)	NATURAL FRACTURE (mm)	VISUAL	ADDITIONAL DATA	
DRILLING & CASING	WATER	(CORE LOSS RUN %)			ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)		● Axial ○ Diametral EL -0.04 VL -0.12 L -0.35 M -1.18 H -3.53 VH -1.76 EH	20 40 100 300 1000		(joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other	
			8.0								
			9.0								
			10.0								
			10.52m		START CORING AT 10.52m						
			10.77m		SILTY CLAY: pale grey to grey, medium to high plasticity, with fine to medium grained sand						
			11.0		CORE LOSS 0.70m (10.77-11.47) CORE LOSS						
			11.47m								
			11.86m		SILTY CLAY: pale grey, pale brown-red, medium to high plasticity						
			12.0		SANDSTONE: dark brown-red, medium to coarse grained, iron stained	HW				BP 0° CN IR RF	
			12.45m		SANDSTONE: pale grey, pale red, fine to medium grained, thinly laminated, iron stained	MW				IS Clayey Sand	
			13.0							HB JT 70 - 80° CN IR RF JT 90° CN IR RF IS Clayey Sand BP 0° CN PR RF JT 70 - 80° CN IR RF BP 0° CN IR RF BP 0° CN PR RF JT 45° CN PR RF	
			13.17m		SANDSTONE: pale grey, fine to medium grained, thinly laminated						
			13.64m		SANDSTONE: pale grey, pale brown, fine to medium grained, iron stained						
			14.0							BP 0° CN IR RF BP 5 - 10° CN IR RF BP 0° CN PR RF BP 10° CN PR RF	
			14.91m		BOREHOLE BH6 TERMINATED AT 14.91 m Target depth					BP 0° CN IR RF DB	
			15.0								
			16.0								

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD





now



TITLE:

Borehole Core Photographs – BH6
Geotechnical Investigation – St Hilliers - Gosford North Tower

PROJECT NO:

304100748

TEST DATE:

31/05/2022

INCLINATION:

-90 degree

CORED LENGTH: **BOX 1 OF 1**
10.52 m to 14.91 m

DRILL RIG:

Christie CE180

CONTRACTOR:

BG Drilling

LOGGED BY:

Ahmad Turani

CHECKED BY:

Bikesh Deoju



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH7
FILE / JOB NO : 304100748
SHEET : 1 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345717.000, N: 6299823.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrisitie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 31/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING						MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations		
DRILLING & CASING	WATER												
↑ 													

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH7
FILE / JOB NO : 304100748
SHEET : 2 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345717.000, N: 6299823.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrisite CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 31/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING						MATERIAL					
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER										
AD/T ↓		F		9.00m	8.0 -5.3	</					

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



CORED DRILL HOLE LOG

HOLE NO : BH7

FILE / JOB NO : 304100748

SHEET : 3 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345717.000, N: 6299823.000 (56 MGA94)

SURFACE ELEVATION : 2.700 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Chrisitie CE180

MOUNTING : Track

CONTRACTOR : BG Drilling

DRILLER : DM

DATE STARTED : 31/05/22

DATE COMPLETED : 31/05/22

DATE LOGGED : 31/05/22

LOGGED BY : AT

CHECKED BY : TH

CASING DIAMETER :

BARREL (Length) : 3.00 m BIT : STEP

BIT CONDITION : Fair

DRILLING				MATERIAL				FRACTURES			
PROGRESS	WATER	CORE LOSS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	Weathering	ESTIMATED STRENGTH Is(50)	NATURAL FRACTURE (mm)	VISUAL	ADDITIONAL DATA
DRILLING & CASING						ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)		Axial Diametral EL -0.04 VL -0.12 L -0.35 M -1.18 H -3.53 VH -11.76 EH	20 40 100 300 1000		(joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
				8.0							
				9.0							
				10.0							
				10.24m		START CORING AT 10.24m					
				10.39m		CORE LOSS 0.15m (10.24-10.39) CORE LOSS					
				10.71m		SANDY CLAY: pale grey, medium to high plasticity, fine to medium grained sand					
				11.0		CORE LOSS 0.52m (10.71-11.23) CORE LOSS					
				11.23m		SANDSTONE: brown to pale brown, grey, fine to medium grained, iron stained	HW				
				11.70m		CORE LOSS 0.07m (11.70-11.77) CORE LOSS					
				11.77m		SANDSTONE: pale grey, pale brown, fine to medium grained, thinly laminated, iron stained	HW to MW				
				12.0							
				13.0							
				13.29m		BOREHOLE BH7 TERMINATED AT 13.29 m Target depth					
				14.0							
				15.0							
				16.0							

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD





now



TITLE:

Borehole Core Photographs – BH7
Geotechnical Investigation – St Hilliers - Gosford North Tower

PROJECT NO:

304100748

TEST DATE:

31/05/2022

INCLINATION:

-90 degree

CORED LENGTH: **BOX 1 OF 1**
10.24 m to 13.29 m

DRILL RIG:

Christie CE180

CONTRACTOR:

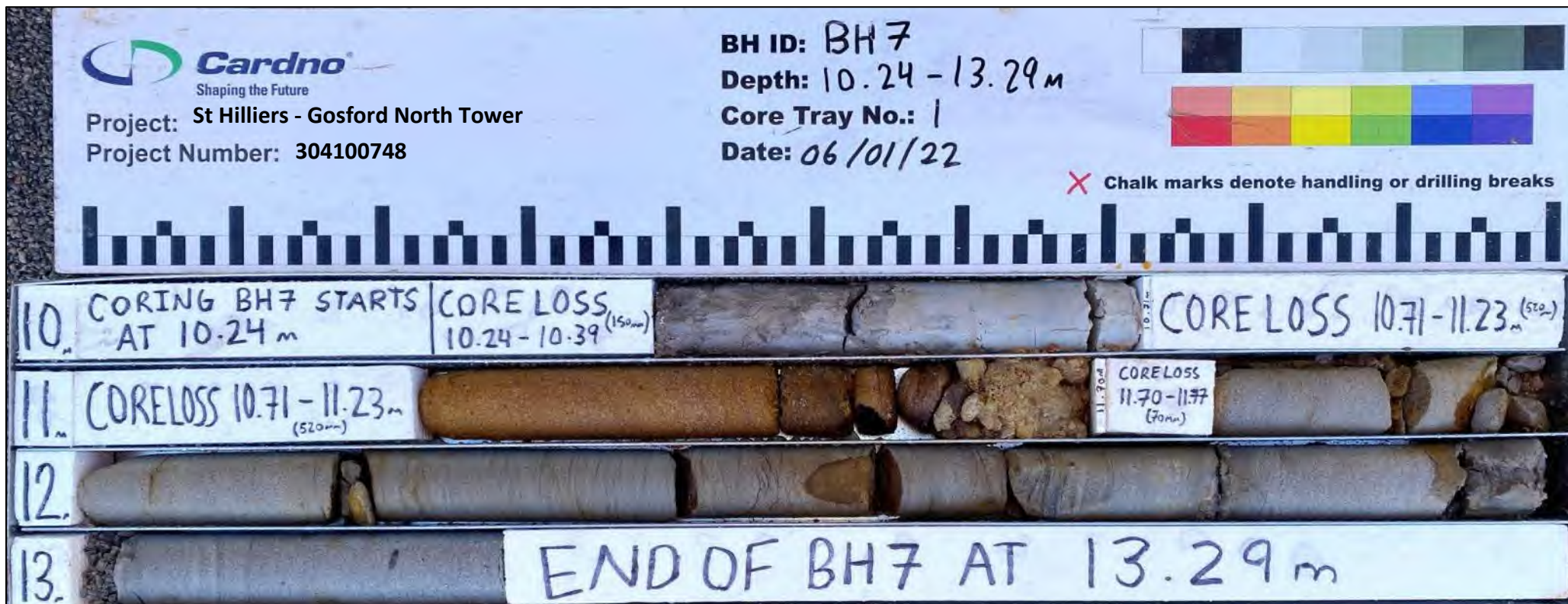
BG Drilling

LOGGED BY:

Ahmad Turani

CHECKED BY:

Bikesh Deoju



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH8
FILE / JOB NO : 304100748
SHEET : 1 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345734.000, N: 6299821.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrisite CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 01/06/22 DATE COMPLETED : 01/06/22 DATE LOGGED : 01/06/22 LOGGED BY : AT CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations	
DRILLING & CASING	WATER											
ADT		F	01/06/22		0.0			FILL: GRAVELLY CLAYEY SAND: dark brown, dark grey, fine to medium grained sand, low to medium plasticity clay, fine to coarse grained, sub-angular to angular gravel	M		FILL	
					2.7							
					1.0							
					1.7							
					1.40m							
					2.0		SC	CLAYEY SAND: dark grey, fine to medium grained sand, low to medium plasticity clay, trace fine to medium grained gravel	M	L	ALLUVIUM	
					0.7		2.40m					
					3.0		SP	SAND: grey to pale grey, fine to medium grained sand, with low to medium plasticity clay	W	F		
					-0.3		3.40m					
					3.45m		CI-CH	SANDY CLAY: pale grey, medium to high plasticity, fine to medium grained sand	w > PL	F - St		
					4.0		CI-CH	SILTY CLAY: pale grey to grey, pale brown-red, medium to high plasticity, with fine to medium grained sand	w > PL	St - VSt	RESIDUAL SOIL	
					-1.3		5.0	5.10m	SANDY CLAY: pale grey, pale brown, medium to high plasticity, fine to medium grained sand	w > PL	St - VSt	6.00: PP = 300,350 kPa
					-2.3		6.0	6.30m	CLAYEY SAND: pale grey, fine to medium grained sand, medium to high plasticity clay	W	VSt	
					-3.3		6.45m	SC				
					7.0		CI-CH	SANDY CLAY: pale grey, mottled pale brown-red, medium to high plasticity, fine to medium grained sand	w > PL	VSt		
-4.3	8.0											
-5.3												

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH8
FILE / JOB NO : 304100748
SHEET : 2 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345734.000, N: 6299821.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrisitie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 01/06/22 DATE COMPLETED : 01/06/22 DATE LOGGED : 01/06/22 LOGGED BY : AT CHECKED BY : TH

DRILLING					MATERIAL						
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER										
AD/T ↓		F			8.0 -5.3		CI-CH	8.20m SANDY CLAY: pale grey, mottled pale brown-red, medium to high plasticity, fine to medium grained sand (continued)	w > PL	VSt	RESIDUAL SOIL 9.00: PP = 500 kPa
				CI-CH	SANDY CLAY: dark brown-red, medium to high plasticity, fine to medium grained sand, with ironstone gravel						
		H		9.00m SPT 1, 6, 24 HB N=R	9.0 -6.3			9.30m: colour becoming pale grey, pale brown, dark red	w > PL	VSt - H	
				9.45m							
					10.0 -7.3			10.25m			
								Continued as Cored Drill Hole			
					11.0 -8.3						
					12.0 -9.3						
					13.0 -10.3						
					14.0 -11.3						
					15.0 -12.3						
					16.0 -13.3						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



CORED DRILL HOLE LOG

HOLE NO : BH8

FILE / JOB NO : 304100748

SHEET : 3 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345734.000, N: 6299821.000 (56 MGA94)

SURFACE ELEVATION : 2.700 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Chrsitie CE180

MOUNTING : Track

CONTRACTOR : BG Drilling

DRILLER : DM

DATE STARTED : 01/06/22

DATE COMPLETED : 01/06/22

DATE LOGGED : 01/06/22

LOGGED BY : AT

CHECKED BY : TH

CASING DIAMETER :

BARREL (Length) : 3.00 m BIT : STEP

BIT CONDITION : Fair

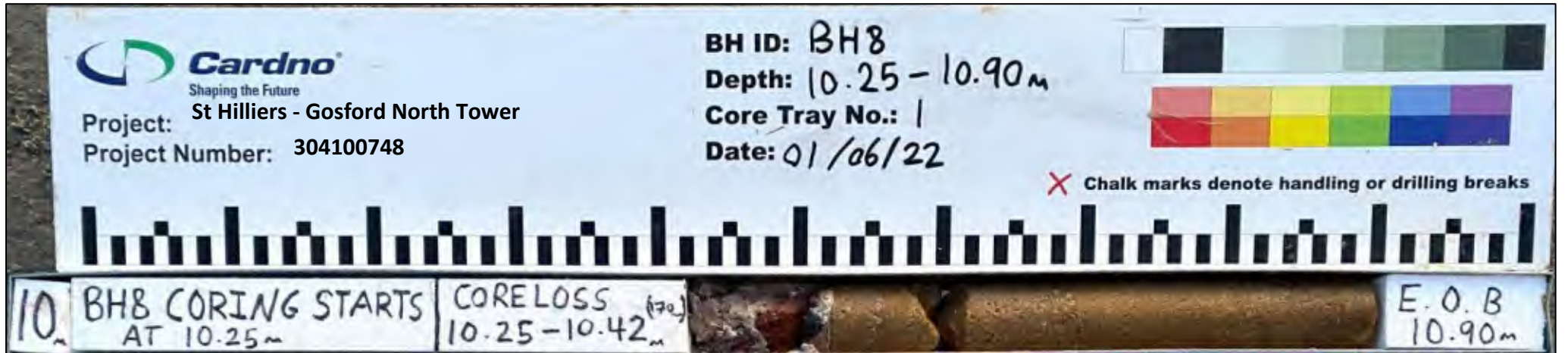
DRILLING				MATERIAL				FRACTURES			
PROGRESS	DRILLING & CASING	WATER	CORE LOSS (% RUN %)	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50)	NATURAL FRACTURE (mm)	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					8.0						
					9.0						
					10.0						
					10.25m		START CORING AT 10.25m				
					10.42m		CORE LOSS 0.17m (10.25-10.42)				
					10.90m						
					11.0		BOREHOLE BH8 TERMINATED AT 10.90 m Target depth				
					12.0						
					13.0						
					14.0						
					15.0						
					16.0						

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



 now 	TITLE: Borehole Core Photographs – BH8 Geotechnical Investigation – St Hilliers - Gosford North Tower			
	PROJECT NO: 304100748	TEST DATE: 01/06/2022	INCLINATION: -90 degree	CORED LENGTH: BOX 1 OF 1 10.25 m to 10.90 m
	DRILL RIG: Christie CE180	CONTRACTOR: BG Drilling	LOGGED BY: Ahmad Turani	CHECKED BY: Bikesh Deoju



Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 1 of 5

Hole No: MW01

Position: Refer to site plan

Angle from Horizontal: 90°

Surface Elevation:

Rig Type: Comacchio Geo 300

Driller: RM

Casing Diameter: HQ

Contractor: Stratacore

Date Started: 17/10/24

Date Completed: 17/10/24

Logged By: TB

Checked By:

Drilling			Water	Sampling & Testing	Depth (m)	Material Description						Monitoring Well Details
Method	Resistance	Casing		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations	
125mm AD/T	F	HQ					0.10m	FILL: Sandy GRAVEL: fine to coarse, angular, grey-brown	M		FILL	
									M			
			SPT 0.50 - 0.95 m 2, 0, 2 N=2	0.5			0.60m	FILL: Clayey SAND: fine to medium grained, dark grey and brown, trace fine gravel				
			SPT 1.00 - 1.45 m 0, 2, 2 N=4	1.0				Clayey SILT: low to medium plasticity, dark grey-black, with fine grained sand, occasional sandier zones			ALLUVIUM	
			SPT 2.00 - 2.45 m 0, 1, 3 N=4	2.0								
							2.20m	Silty CLAY: medium to high plasticity, pale grey mottled brown, with fine to medium grained sand, trace fine to medium, subrounded gravel	M (<LL)	S - F		

METHOD

EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION

VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER

Water Level on Date shown
 water inflow
 water outflow

FIELD TESTS

SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)

SAMPLES

B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE

D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY

VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY

VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

Hole No: MW01

Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 2 of 5

Position: Refer to site plan

Angle from Horizontal: 90°

Surface Elevation:

Rig Type: Comacchio Geo 300

Driller: RM

Casing Diameter: HQ

Contractor: Stratacore

Date Started: 17/10/24

Date Completed: 17/10/24

Logged By: TB

Checked By:

Drilling			Sampling & Testing		Material Description						Monitoring Well Details	
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density		STRUCTURE & Other Observations
125mm AD/T	F	HQ	4.8 mbgl, 18/10/24	SPT 5.00 - 5.15 m 10 HB N=R	5.0		CL-CI	Silty CLAY; low to medium plasticity, pale grey mottled orange, extremely weathered siltstone (continued)	M (<PL)	VSt	EXTREMELY WEATHERED	
	F-H			SPT 6.00 - 6.01 m 5/10mm HB N=R	6.0			SANDSTONE, fine to coarse grained, pale grey and brown, extremely to highly weathered, poorly cemented			WEATHERED ROCK	
					6.5							
					7.0							
					7.20m			Continued as Cored Drill Hole				
					7.5							
					8.0							
					8.5							
METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller				PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow		FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)			SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content		SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense	
Refer to explanatory notes for details of abbreviations and basis of descriptions				STANTEC AUSTRALIA PTY LTD								

Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
 Project: Central Coast Quarter Stage 2
 Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 3 of 5

Position: Refer to site plan Angle from Horizontal: 90° Surface Elevation:

Rig Type: Comacchio Geo 300 Mounting: Track Driller: RM

Casing Diameter: HQ Bit Type: TC-Bit Bit Condition: Contractor: Stratacore

Date Started: 17/10/24 Date Completed: 17/10/24 Logged By: TB Checked By:

Coring				Depth (m)	Material Description				Defect Description				Monitoring Well Details	
Method	Fluid	TCR (%)	RQD (%)		RL (m AHD)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength	Average Natural Defect Spacing (mm)	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other		
									Is(50) MPa					

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer		WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)		ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered		DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break		PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Slockensided POL Polished		COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Qz Quartz	
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 4 of 5

Position: Refer to site plan

Angle from Horizontal: 90°

Surface Elevation:

Rig Type: Comacchio Geo 300

Mounting: Track

Driller: RM

Casing Diameter: HQ

Bit Type: TC-Bit

Bit Condition:

Contractor: Stratacore

Date Started: 17/10/24

Date Completed: 17/10/24

Logged By: TB

Checked By:

Coring					Material Description				Defect Description				Monitoring Well Details
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength $I_{s(50)}$ MPa ● Axial ○ Diametral VL 0.1 L M T VEH 10	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other	
NMLC	0% Water Loss	100	89		9.10m		Interlaminated SANDSTONE/SILTSTONE, fine to medium grained, pale grey and dark grey, weakly bedded/laminated at 0-10°	SW - F				9.00 m: HB	
					9.5							9.17 m: SZ, 0°, >=10 mm	
		100	86		9.79m		SANDSTONE, fine to coarse grained, pale grey, minor fine to medium subrounded gravel clasts, massive					9.25 m: HB	
					9.95m		Interlaminated SANDSTONE/SILTSTONE, fine to medium grained, pale grey and dark grey, weakly bedded/laminated at 0-10°					9.32 m: HB	
		100	86		10.0							9.40 m: DB	
					10.5							9.44 m: DB	
		100	86		11.0							9.54 m: HB	
					11.24m		SANDSTONE, fine to medium grained, pale grey, slightly bedded at 0-5°					9.95 m: DB	
		100	86		11.49m		Interlaminated SANDSTONE/SILTSTONE, fine to medium grained, pale grey and dark grey, weakly bedded/laminated at 0-10°					10.00 m: BP, 10°, PR, S, CN	
					12.0							10.04 m: BP, 0 - 5°, PR, S, CN	
NMLC	0% Water Loss	100	86		12.24m		SANDSTONE, fine to medium grained, pale grey, slightly bedded at 0-5°	XW				10.56 m: HB	
					12.5							10.67 m: DB	
		100	86		12.5			MW				10.74 m: DB	
					13.0							10.79 m: HB	
		100	86		13.0			SW - F				10.81 m: HB	
					13.0							10.94 m: BP, 5 - 10°, UN, S, CN	
		100	86		13.0			HW - MW				11.00 m: HB	
					13.0							11.02 m: BP, 0 - 5°, UN, SL, CN	
		100	86		13.0							11.22 m: HB	
					13.0							11.23 m: BP, 0 - 5°, UN, S, CN	
NMLC	0% Water Loss	100	86		13.0							11.47 m: DB	
					13.0							11.67 m: HB	
		100	86		13.0							11.70 m: HB	
					13.0							11.77 m: BP, 0 - 5°, PR, S, CN	
		100	86		13.0							11.85 m: DB	
					13.0							11.91 m: HB	
		100	86		13.0							11.95 m: HB	
					13.0							12.08 m: BP, 5°, UN, S, CN	
		100	86		13.0							12.15 m: BP, 10°, PR, S, CN	
					13.0							12.40 - 12.45 m: SM, =45 mm	
NMLC	0% Water Loss	100	86		13.0							12.45 - 12.48 m: SZ, 10°, =35 mm	
					13.0							12.53 m: JT, 40°, PR, C	
		100	86		13.0							12.55 m: BP, 10°, PR, RF, SN	
					13.0							12.57 m: BP, 0°, PR, RF, SN	
		100	86		13.0							12.67 m: BP, 5°, PR, RF, SN	
					13.0							12.73 m: JT, 35°, PR, RF, SN	
		100	86		13.0							12.82 m: BP, 5 - 10°, UN, RF, SN	
					13.0							12.87 m: JT, 50°, PR, RF, SN	
		100	86		13.0							12.91 m: HB	
					13.0							13.00 m: JT, 40°, UN, RF, CN	
		100	86		13.0							13.18 m: BP, 5°, IR, RF, CN	

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
Water inflow
Water outflow
ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremely High
VH Very High
H High
M Medium
L Low
VL Very Low
ROCK WEATHERING
FR Fresh
SW Slightly Weathered
DW Distinctly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered

DEFECT TYPE
JT Joint
SZ Sheared zone
BP Bedding Parting
SM Seam
FL Foliation
VN Vein
CL Cleavage
CS Crushed Seam
FZ Fracture Zone
DL Drift Lift
HB Handing Break
DB Drilling Break

PLANARITY
CU Curved
DIS Discontinuous
IR Irregular
PR Planar
ST Stepped
UN Undulose
ROUGHNESS
VR Very Rough
RF Rough
S Smooth
SL Slockensided
POL Polished

COATING
CN Clean
SN Stained
VNR Veneer (thin or patchy)
CT Coating (up to 1mm)
INFILL MATERIALS
X Carbonaceous
MU Unidentified mineral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

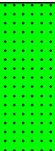
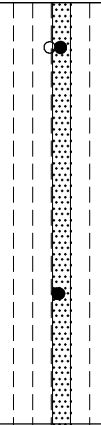
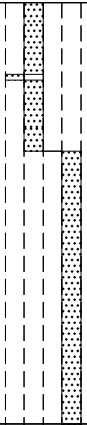
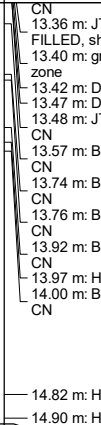
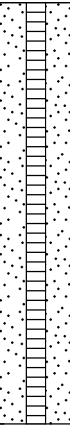
Job No: 304001328
Sheet: 5 of 5

Position: Refer to site plan
Angle from Horizontal: 90°
Surface Elevation:

Rig Type: Comacchio Geo 300
Mounting: Track
Driller: RM

Casing Diameter: HQ
Bit Type: TC-Bit
Bit Condition:
Contractor: Stratacore

Date Started: 17/10/24
Date Completed: 17/10/24
Logged By: TB
Checked By:

Coring					Material Description					Defect Description					Monitoring Well Details
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength $I_{s(50)}$ MPa ● Axial ○ Diametral VL 0.1 L 0.3 M 1 T 3 VH 10 EH	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other			
NMLC ↓	0% Water LOSS	100	72		14.0		13.47m: rock structure becoming bedded at 0-10° and fine to medium grained SANDSTONE, fine to coarse grained pale grey minor orange-red staining about defects, massive (<i>continued</i>) 14.00m: rock structure becoming massive and fine to coarse grained	F				CN 13.36 m: JT, 75°, PR, RF, FILLED, sheared 13.40 m: gravelly seam / zone 13.42 m: DB 13.47 m: DB 13.48 m: JT, 40°, PR, RF, CN 13.57 m: BP, 0 - 5°, PR, RF, CN 13.74 m: BP, 0 - 5°, UN, S, CN 13.76 m: BP, 0 - 5°, UN, S, CN 13.92 m: BP, 0 - 5°, UN, S, CN 13.97 m: HB 14.00 m: BP, 0 - 5°, UN, S, CN 14.82 m: HB 14.90 m: HB			
					15.0		TERMINATED AT 14.92 m								
					15.5										
					16.0										
					16.5										
					17.0										
					17.5										

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer		WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)		ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered		DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break		PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Slockensided POL Polished		COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Qz Quartz	
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Refer to explanatory notes for details of abbreviations and basis of descriptions

CLIENT: Urban Property
PROJECT: Central Coast Quarter Stage 2
LOCATION: 26-30 Mann Street, Gosford, NSW
PROJECT NO.: 304001328

BOREHOLE ID: MW01
CORED DEPTH: 7.20m - 14.92 m
CORE TRAYS: 2
DATE CORED: 17/10/2024



Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 1 of 4

Hole No: MW02

Position: Refer to site plan

Angle from Horizontal: 90°

Surface Elevation:

Rig Type: Comacchio Geo 300

Driller: RM

Casing Diameter: HW

Contractor: Stratacore

Date Started: 18/10/24

Date Completed: 18/10/24

Logged By: TB

Checked By:

Drilling			Water	Sampling & Testing	Depth (m)	Material Description						Monitoring Well Details
Method	Resistance	Casing		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations	
AD/T	F	HW					FILL: Sandy GRAVEL: fine to coarse, angular, grey			FILL		
					0.15m	FILL: Clayey SAND: fine to medium grained, brown, trace fine to medium gravel	D - M					
				SPT 0.50 - 0.95 m 5, 5, 6 N=11	0.5		0.50m: increasing gravel fraction, some minor pockets of clay					
				SPT 1.00 - 1.45 m 2, 3, 2 N=5	1.0							
						1.30m	Clayey SILT: low plasticity, black, with fine grained sand, some root fibres	M (<LL)	F	ALLUVIUM		
						1.70m						
					SPT 2.00 - 2.45 m 0, 3, 5 N=8	2.0		SAND: fine to medium grained, brown, with clay, trace fine to medium gravel	W	L		
							Sandy CLAY: low to medium plasticity, pale grey, fine to medium grained sand, some root fibres			RESIDUAL SOIL		
				SPT 3.00 - 3.45 m 4, 6, 8 N=14	3.0							
						</						

Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 2 of 4

Position: Refer to site plan

Angle from Horizontal: 90°

Surface Elevation:

Rig Type: Comacchio Geo 300

Driller: RM

Casing Diameter: HW

Contractor: Stratacore

Date Started: 18/10/24

Date Completed: 18/10/24

Logged By: TB

Checked By:

Drilling			Water	Sampling & Testing	Depth (m)	Material Description						Monitoring Well Details	
Method	Resistance	Casing				Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations		
AD/T	F	HW				4.60m	Silty CLAY: low to medium plasticity, pale grey mottled brown, extremely weathered siltstone	M (≈PL)	St	RESIDUAL SOIL			
									EXTREMELY WEATHERED				
				SPT 5.00 - 5.45 m 5, 12, 15 N=27	5.0			5.20m		M (<PL)		VSt	
					5.5			Clayey SAND: fine to medium grained, pale grey, extremely weathered sandstone					
				SPT 6.00 - 6.45 m 6, 7, 9 N=16	6.0			6.00m: becoming fine to coarse grained	D - M	MD - D			
F-H					6.5								
				SPT 7.00 - 7.15 m 13 HB N=R	7.0			7.00m			WEATHERED ROCK		
					7.5								
				SPT 8.50 - 8.68 m 20, 11/30mm HB N=R	8.5								

METHOD

EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION

VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER

Water Level on Date shown
 water inflow
 water outflow

FIELD TESTS

SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak,
R=Residual (uncorrected kPa)

SAMPLES

B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE

D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY

VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY

VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

Hole No: MW02

Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 3 of 4

Position: Refer to site plan

Angle from Horizontal: 90°

Surface Elevation:

Rig Type: Comacchio Geo 300

Driller: RM

Casing Diameter: HW

Contractor: Stratacore

Date Started: 18/10/24

Date Completed: 18/10/24

Logged By: TB

Checked By:

Drilling			Sampling & Testing		Material Description						Monitoring Well Details	
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density		STRUCTURE & Other Observations
AD/T	F-H	HW		SPT 10.00 - 10.27 m 19, 20/120mm HB N=R	9.5 10.0 10.5			SANDSTONE, fine to medium grained, grey-pale grey mottled orange-red, extremely to highly weathered, probable interbedded siltstone inclusions (continued)			WEATHERED ROCK	
					10.70m			Continued as Cored Drill Hole				
					11.0 11.5 12.0 12.5 13.0							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
 Water Level on Date shown
 water inflow
 water outflow

FIELD TESTS
SPT - Standard Penetration Test
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PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford

Job No: 304001328

Sheet: 4 of 4

Position: Refer to site plan Angle from Horizontal: 90° Surface Elevation:
Rig Type: Comacchio Geo 300 Mounting: Track Driller: RM
Casing Diameter: HW Bit Type: Bit Condition: Contractor: Stratacore
Date Started: 18/10/24 Date Completed: 18/10/24 Logged By: TB Checked By:

Coring					Material Description					Defect Description					Monitoring Well Details
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength $I_{s(50)}$ MPa ● - Axial ○ - Diametral VL 0.1 L 0.3 M 1 H 3 V 10 EH	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other			
					9.5										
					10.0										
					10.5										
↑ HQ ↓ 0% Water LOSS		79	86		10.70m		START CORING AT 10.70m								
					10.79m		SANDSTONE, fine to coarse grained, grey-dark grey and brown, massive	MW					10.70 m: DB		
					10.87m		SILTSTONE, grey, slightly laminated	MW				10.70: TC-Bit refusal			
							SANDSTONE, fine to coarse grained, grey-dark grey and brown, massive	MW				10.79 m: BP, 0°, IR, S, SN			
												10.87 m: BP, 0°, IR, S, SN			
					11.0							11.00 m: HB			
												11.05 m: DB			
												11.07 m: DB			
												11.24 m: JT, 20°, UN, RF, VNR			
												11.27 m: JT, 15 - 25°, UN, RF, VNR			
					11.5		CORE LOSS 0.30m (11.38-11.68)						11.27 - 11.38 m: possibly weathered / gravelly seam (material loss evident)		
					11.68m								11.68 m: DB		
					12.0		SANDSTONE, fine to medium grained, grey-dark grey and brown, massive	MW - SW					11.86 m: JT, 80°, PR, C		
					12.10m		12.00m: becoming slightly laminated / bedded						11.95 m: JT, 75°, PR, RF, VNR		
							TERMINATED AT 12.10 m						12.06 m: HB		
					12.5										
					13.0										

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer		WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)		ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered		DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break		PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Slockensided POL Polished		COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Qz Quartz	
--	--	---	--	---	--	---	--	--	--	--	--

Refer to explanatory notes for details of abbreviations and basis of descriptions

CLIENT: Urban Property
PROJECT: Central Coast Quarter Stage 2
LOCATION: 26-30 Mann Street, Gosford, NSW
PROJECT NO.: 304001328

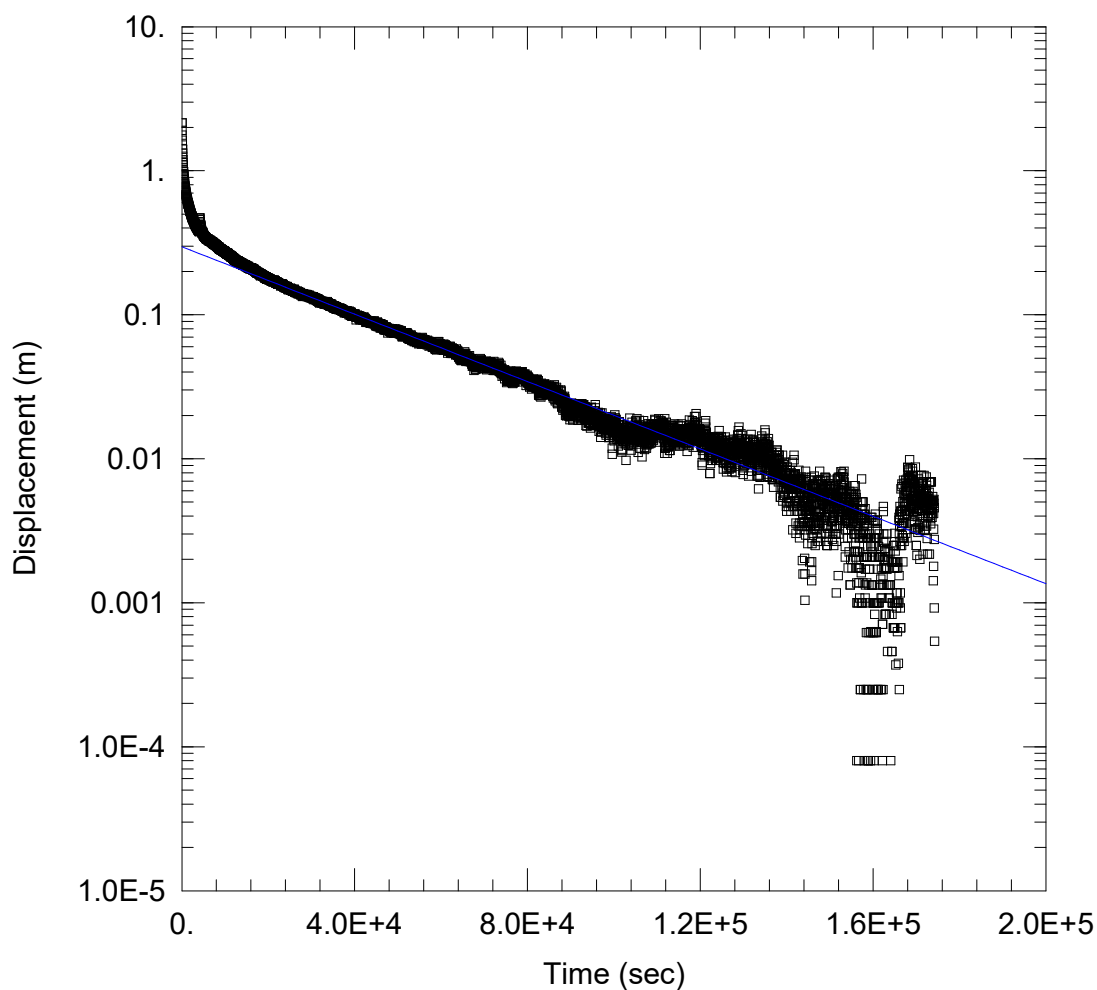
BOREHOLE ID: MW02
CORED DEPTH: 10.70m - 12.10 m
CORE TRAYS: 1
DATE CORED: 18/10/2024



D

Rising Head Test Analysis





WELL TEST ANALYSIS

Data Set: C:\...\BH1 - RHT1.aqt

Date: 12/05/25

Time: 10:25:38

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 9. m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH1)

Initial Displacement: 2.152 m

Total Well Penetration Depth: 16.5 m

Casing Radius: 0.025 m

Static Water Column Height: 9. m

Screen Length: 6. m

Well Radius: 0.0575 m

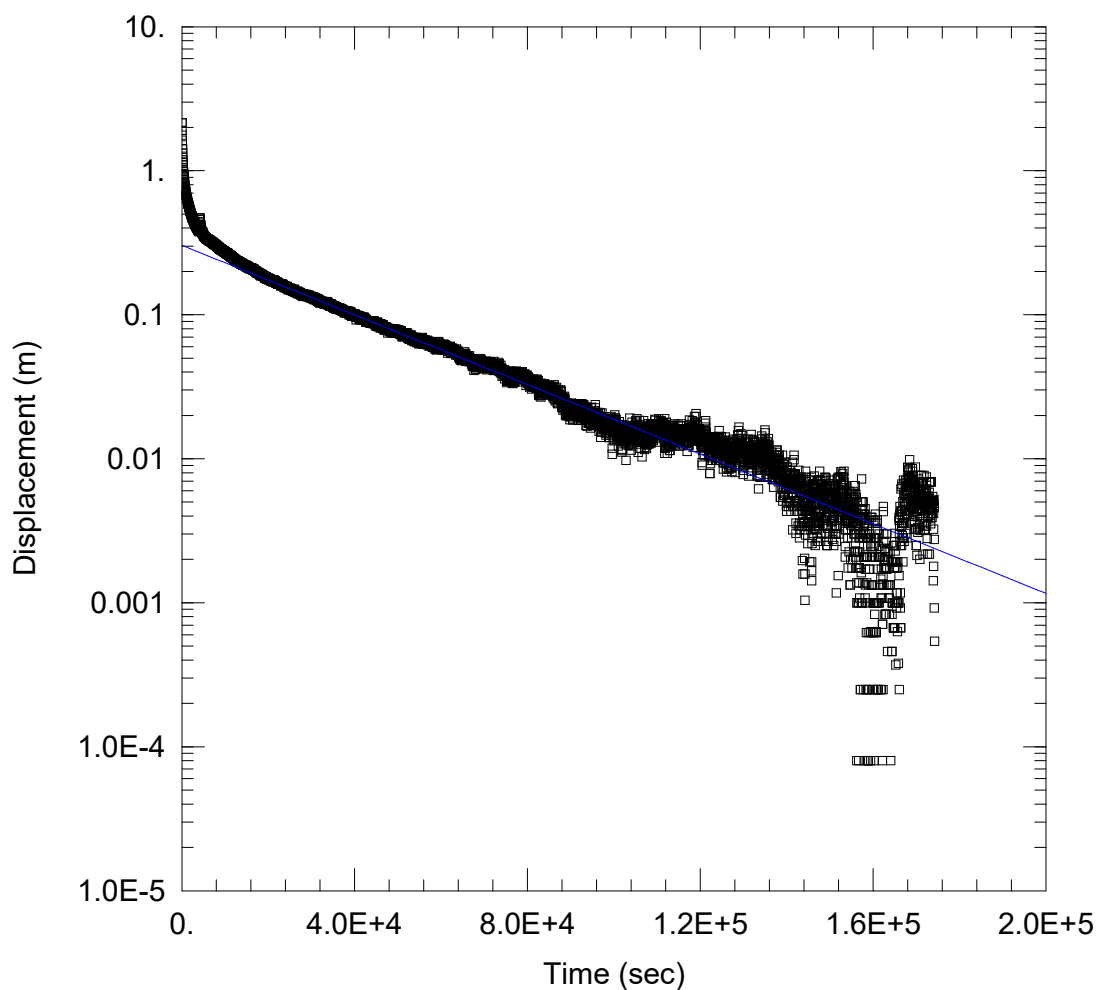
SOLUTION

Aquifer Model: Unconfined

$K = 0.0005113$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.2968$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH1 - RHT1.aqt

Date: 12/05/25

Time: 10:25:59

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 9. m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH1)

Initial Displacement: 2.152 m

Total Well Penetration Depth: 16.5 m

Casing Radius: 0.025 m

Static Water Column Height: 9. m

Screen Length: 6. m

Well Radius: 0.0575 m

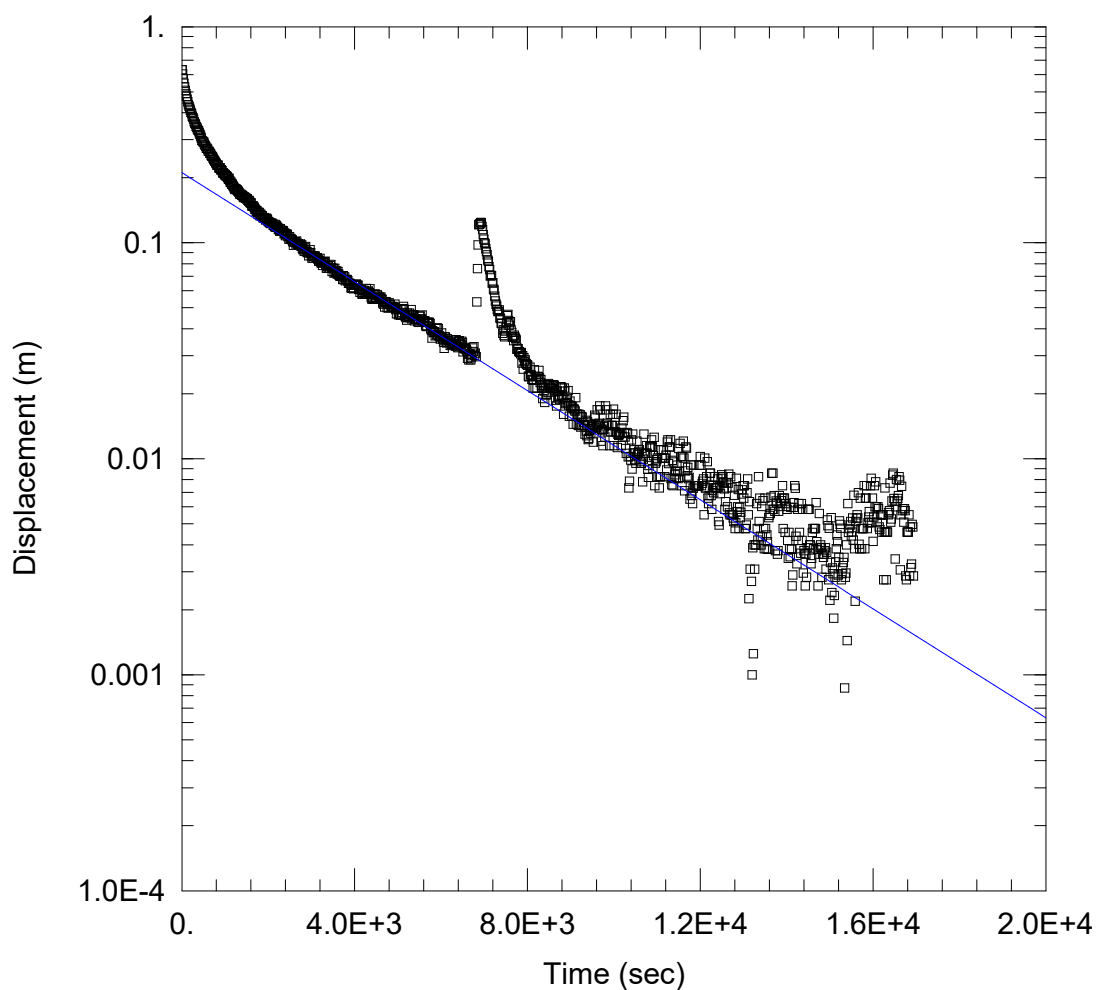
SOLUTION

Aquifer Model: Unconfined

$K = 0.0006688$ m/day

Solution Method: Hvorslev

$y_0 = 0.3038$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH1A - RHT1.aqt

Date: 12/05/25

Time: 10:28:53

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 1.5 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH1A)

Initial Displacement: 0.6326 m

Total Well Penetration Depth: 3. m

Casing Radius: 0.025 m

Static Water Column Height: 1.5 m

Screen Length: 2.5 m

Well Radius: 0.0575 m

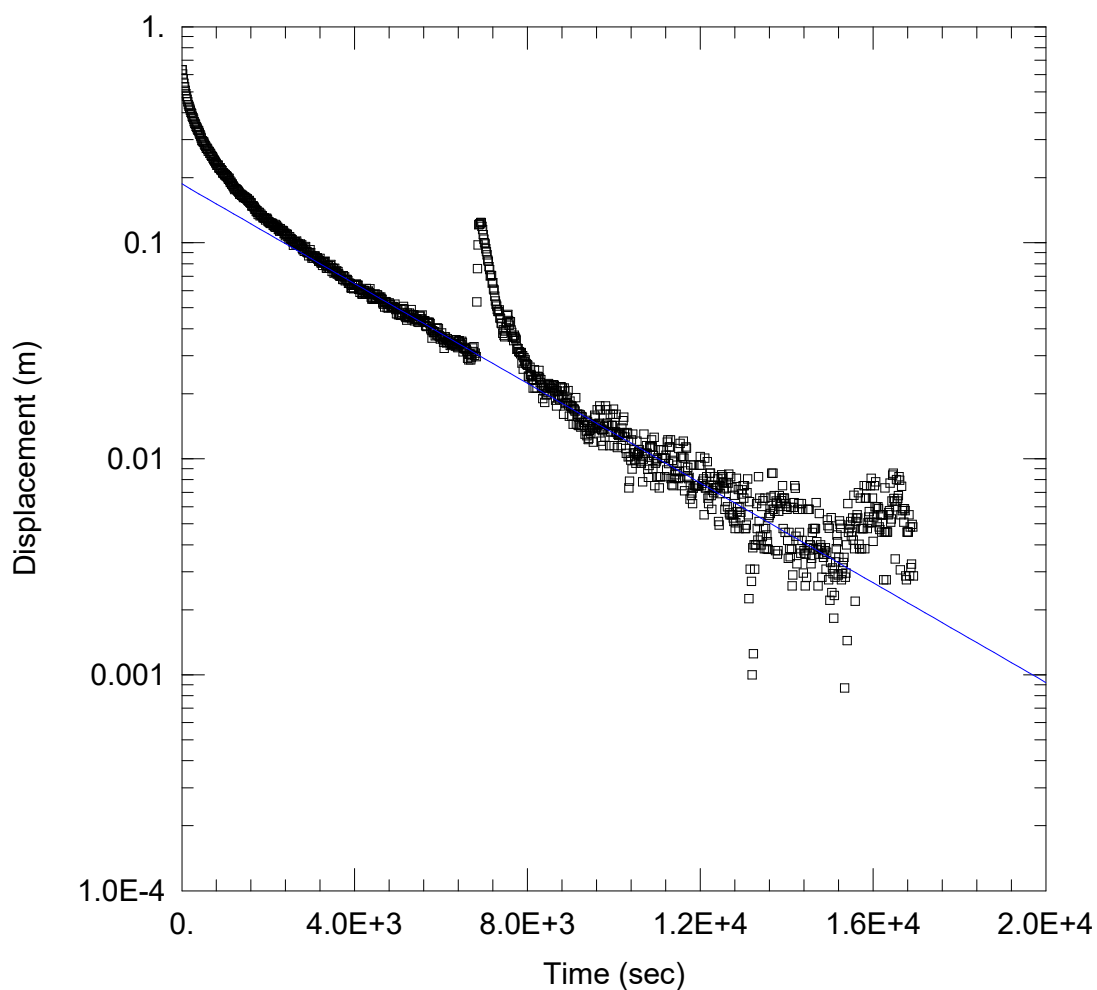
SOLUTION

Aquifer Model: Unconfined

$K = 0.01499$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.2115$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH1A - RHT1.aqt

Date: 12/05/25

Time: 10:29:39

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 1.5 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH1A)

Initial Displacement: 0.6326 m

Total Well Penetration Depth: 3. m

Casing Radius: 0.025 m

Static Water Column Height: 1.5 m

Screen Length: 2.5 m

Well Radius: 0.0575 m

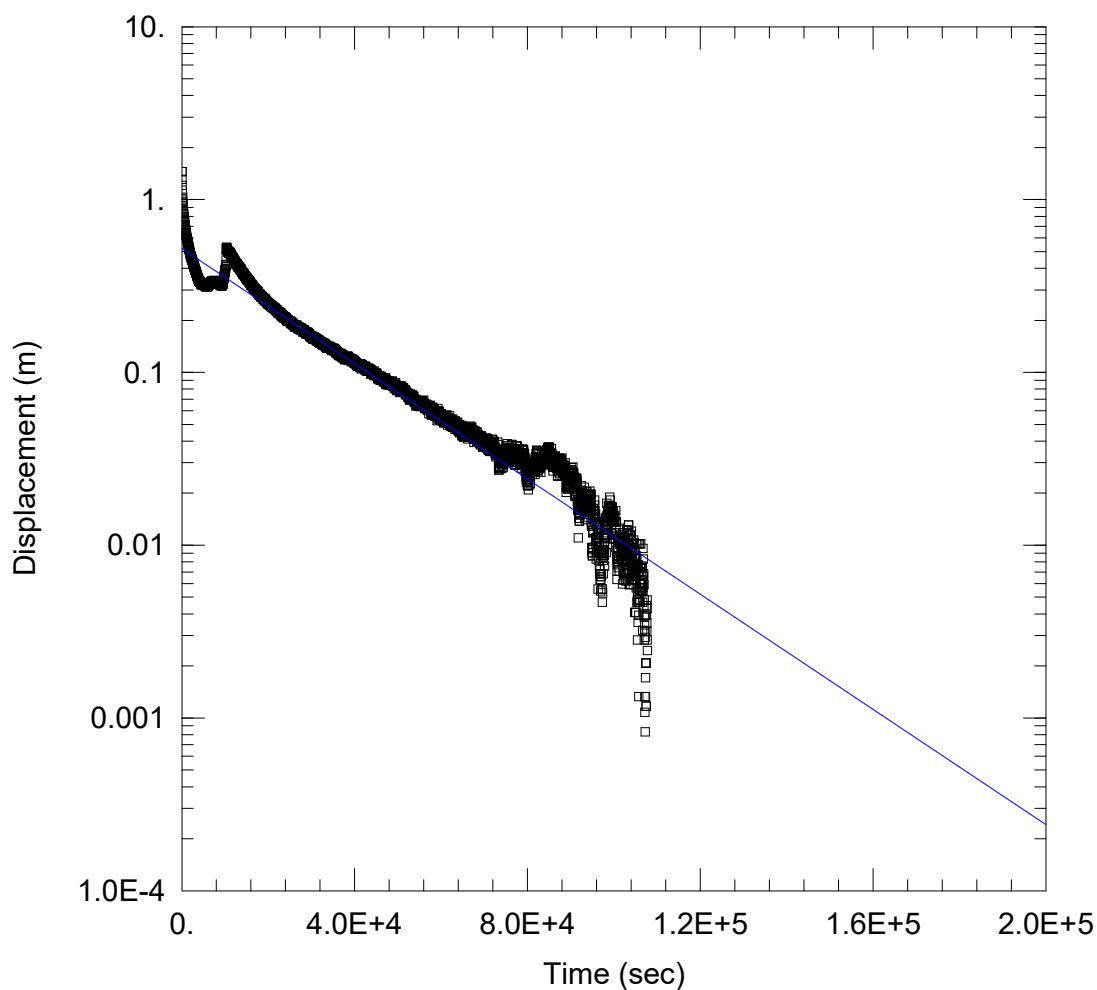
SOLUTION

Aquifer Model: Unconfined

$K = 0.02534$ m/day

Solution Method: Hvorslev

$y_0 = 0.1873$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH4 - RHT1.aqt

Date: 12/05/25

Time: 10:22:18

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 14.95 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH4)

Initial Displacement: 1.454 m

Total Well Penetration Depth: 16.5 m

Casing Radius: 0.025 m

Static Water Column Height: 14.95 m

Screen Length: 6. m

Well Radius: 0.0575 m

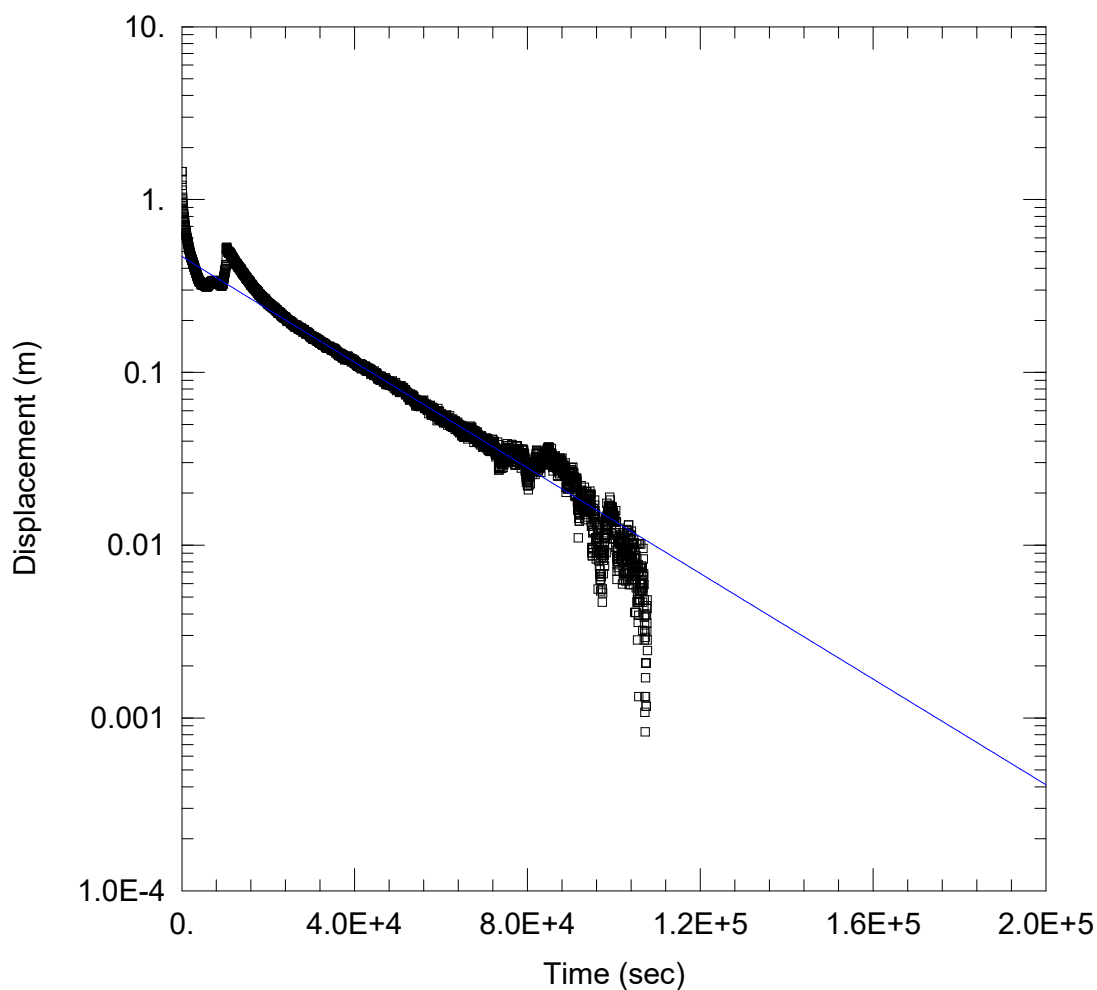
SOLUTION

Aquifer Model: Unconfined

$K = 0.0007283$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.5214$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH4 - RHT1.aqt

Date: 12/05/25

Time: 10:22:40

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 14.95 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH4)

Initial Displacement: 1.454 m

Total Well Penetration Depth: 16.5 m

Casing Radius: 0.025 m

Static Water Column Height: 14.95 m

Screen Length: 6. m

Well Radius: 0.0575 m

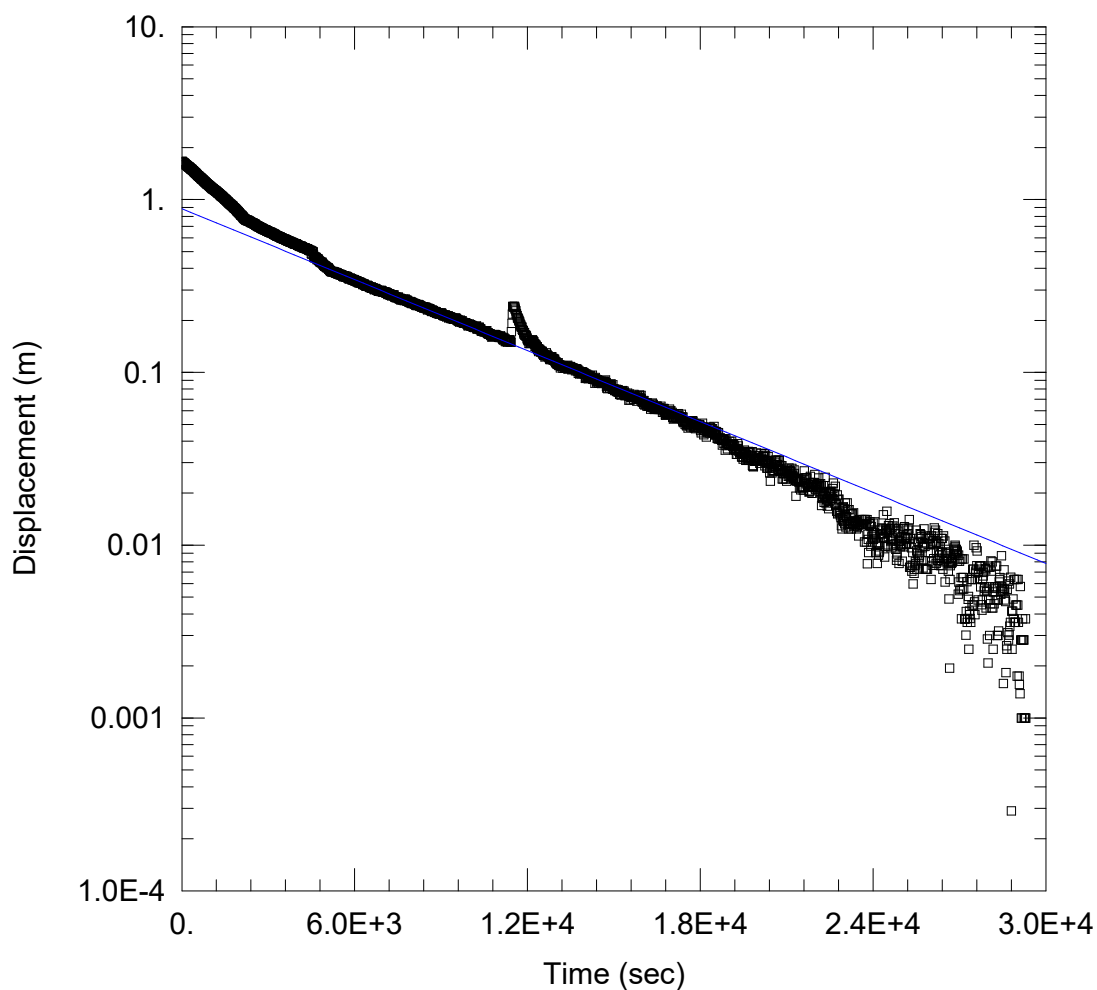
SOLUTION

Aquifer Model: Unconfined

K = 0.0008456 m/day

Solution Method: Hvorslev

y0 = 0.4677 m



WELL TEST ANALYSIS

Data Set: C:\...\BH4A - RHT1.aqt

Date: 12/05/25

Time: 10:33:29

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 3.7 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH4A)

Initial Displacement: 1.666 m

Total Well Penetration Depth: 4.5 m

Casing Radius: 0.025 m

Static Water Column Height: 3.7 m

Screen Length: 3. m

Well Radius: 0.0575 m

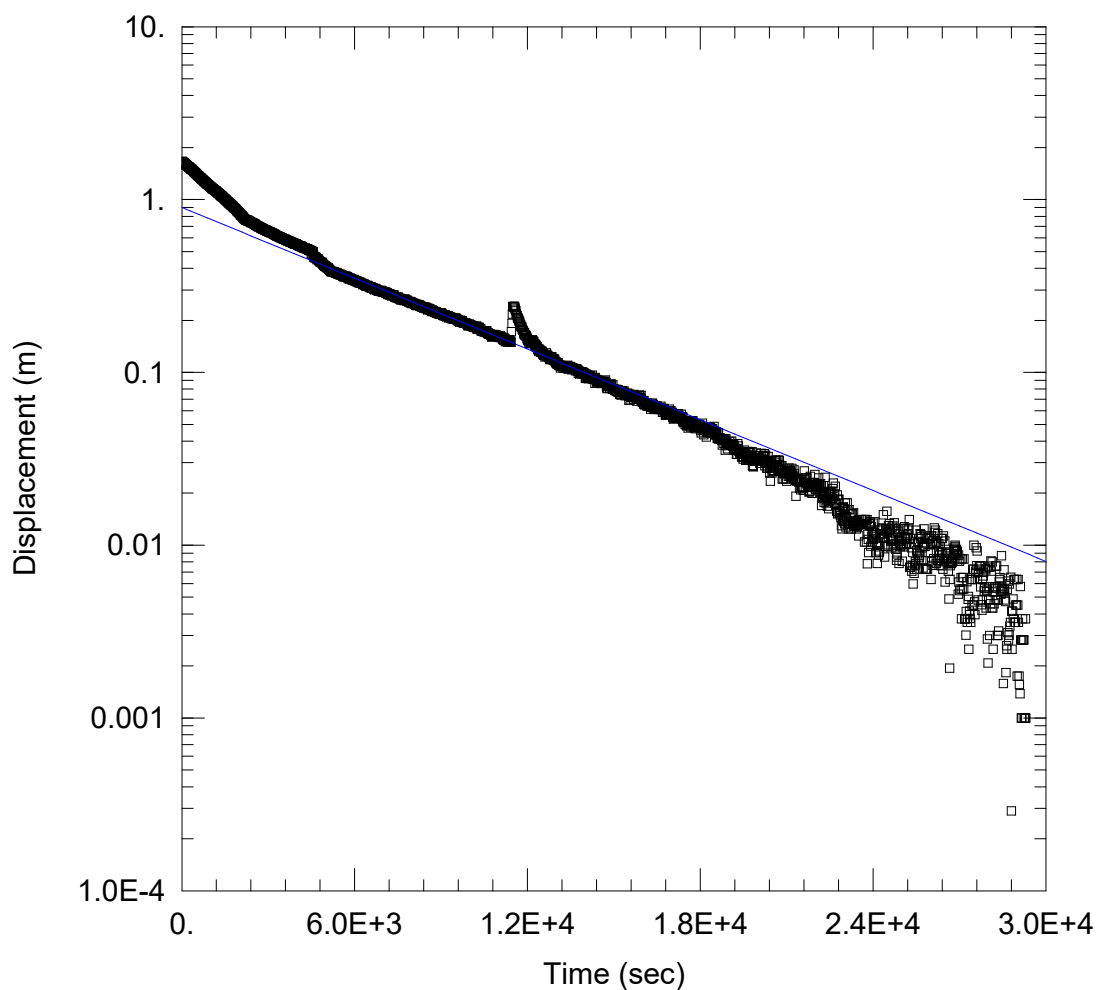
SOLUTION

Aquifer Model: Unconfined

$K = 0.00466$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.8864$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH4A - RHT1.aqt

Date: 12/05/25

Time: 10:34:00

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 3.7 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH4A)

Initial Displacement: 1.666 m

Total Well Penetration Depth: 4.5 m

Casing Radius: 0.025 m

Static Water Column Height: 3.7 m

Screen Length: 3. m

Well Radius: 0.0575 m

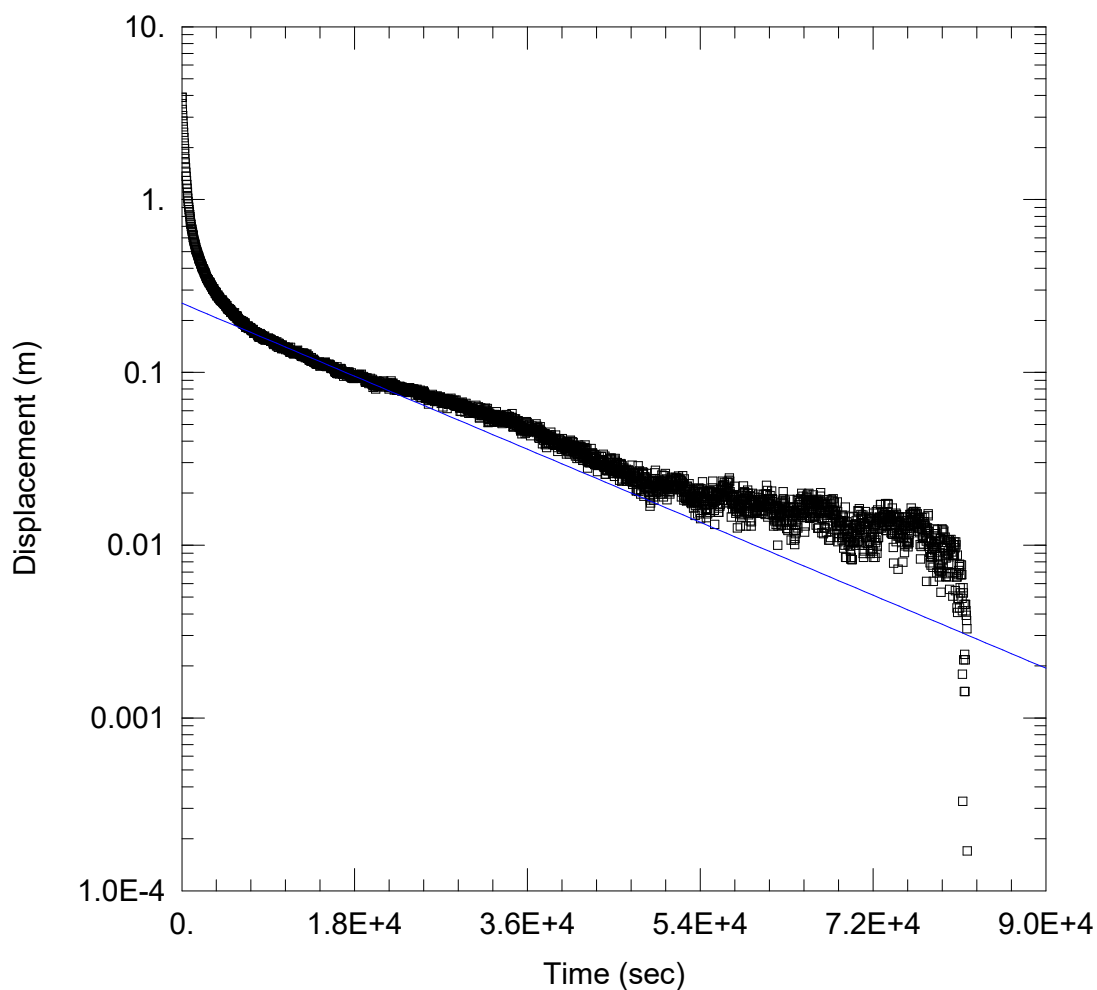
SOLUTION

Aquifer Model: Unconfined

$K = 0.006575$ m/day

Solution Method: Hvorslev

$y_0 = 0.8997$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH5 - RHT1.aqt

Date: 12/05/25

Time: 10:37:53

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 14.8 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (BH5)

Initial Displacement: 3.898 m

Total Well Penetration Depth: 16.3 m

Casing Radius: 0.025 m

Static Water Column Height: 14.8 m

Screen Length: 7. m

Well Radius: 0.0575 m

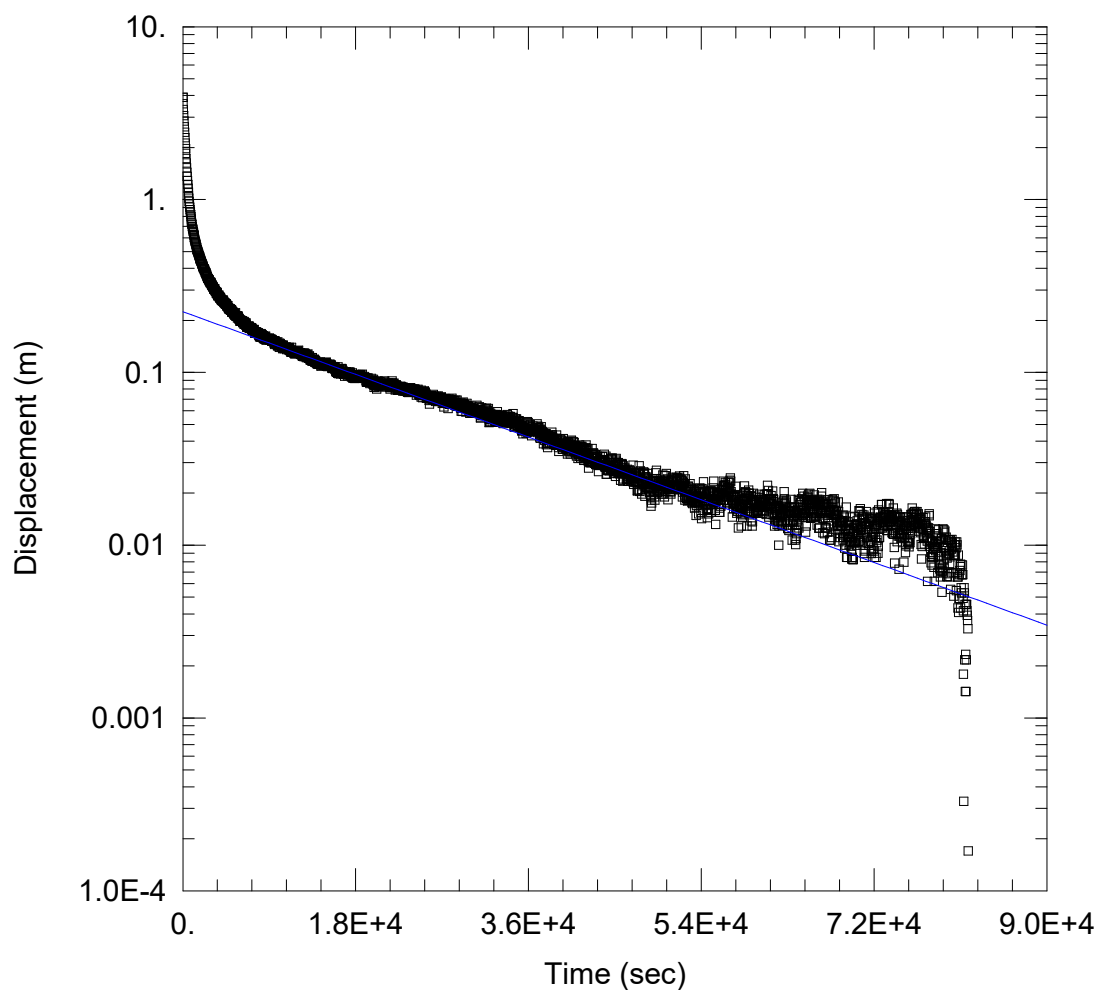
SOLUTION

Aquifer Model: Unconfined

$K = 0.0008843$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.2514$ m



WELL TEST ANALYSIS

Data Set: C:\...\BH5 - RHT1.aqt

Date: 12/05/25

Time: 10:41:46

PROJECT INFORMATION

Company: Reditus

Client: Urban Property

Project: 25304

Location: Gosford NSW

Test Well: RHT1

Test Date: 11/08/2025

AQUIFER DATA

Saturated Thickness: 14.8 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH5)

Initial Displacement: 3.898 m

Total Well Penetration Depth: 16.3 m

Casing Radius: 0.025 m

Static Water Column Height: 14.8 m

Screen Length: 7. m

Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined

K = 0.0009837 m/day

Solution Method: Hvorslev

y0 = 0.2245 m



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