GEOTECHNICAL INVESTIGATION

BATHURST HOSPITAL REDEVELOPMENT

361-365 HOWICK ST, WEST BATHURST NSW 2795

Prepared for HEALTH INFRASTRUCTURE

Prepared by RCA AUSTRALIA

RCA ref 16547-202/4

OCTOBER 2024

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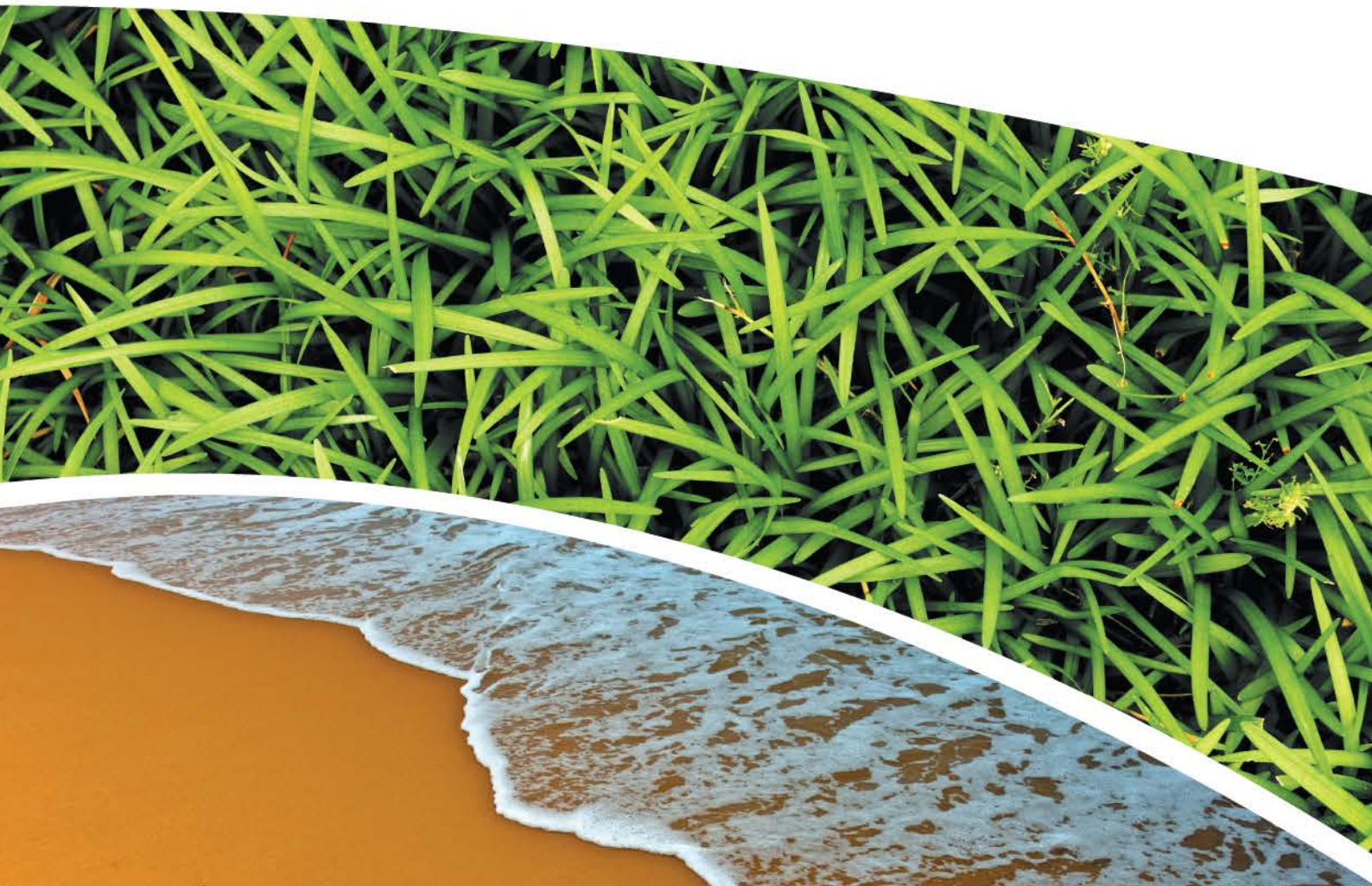

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RCA ref 16547-202/4
Client ref HI23010 BHR

22 October 2024

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GEOTECHNICAL INVESTIGATION
BATHURST HOSPITAL REDEVELOPMENT
361-365 HOWICK ST, WEST BATHURST NSW 2795

1 INTRODUCTION

This geotechnical investigation report has been prepared by RCA Australia (RCA) on behalf of Health Infrastructure for the redevelopment of the Bathurst Hospital at 361-365 Howick Street, Bathurst.

The site is located at 361-365 Howick Street, Bathurst, in the Bathurst Local Government Area. It is occupied by Bathurst Health Service, a Level C referral facility in the Western NSW Local Health District.

This report accompanies a State Significant Development Application that seeks approval for the construction and operation of a new-build expansion, refurbishment and repurposing works to the existing Bathurst Health Service main hospital building. Proposed works will include:

- A new-build, multi-storey health services building expansion toward Mitre St (including 1 plant level) to include overnight inpatient accommodation and non-admitted care services and a new hospital front-of house and entrance
- A new-build, two-storey expansion to the Emergency department and Operating Theatres (plus 1 plant level)

- A new-build, single-storey expansion to the existing Cancer Service building – Daffodil Cottage
- Refurbishment and repurposing to areas of the existing hospital
- Site establishment, demolition of some existing structure, cut and fill and remediation works
- Vehicular circulation and car parking improvements
- Tree removal
- Landscape works
- Alteration and amplification of existing hospital plant and services infrastructure

For a detailed project description, refer to the Environmental Impact Statement prepared by Ethos Urban. A summary of the Planning Secretary's Environmental Assessment Requirements (SEARs) which relate to the geotechnical investigation is provided in **Table 1** together with a reference to the relevant Section of this report.

Table 1 *Secretary's Environmental Assessment Requirements*

Item	SEARs Requirement	Relevant Section of Report
13	Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion,	Section 3.1, 4.2 and 4.3
13	salinity	Section 2, 3.1, 4.8 and 4.10
13	and acid sulfate soils.	Section 2 and 4.11
13	Provide a Surface and Groundwater Impact Assessment that assesses potential impacts on: o surface water resources (quality and quantity) including related infrastructure, hydrology, dependent ecosystems, drainage lines, downstream assets and watercourses. o groundwater resources in accordance with the *Groundwater Guidelines*.	Section 2 and 3.4

Mitigation measures for the development relating to the geotechnical conditions at the site (as indicated by the findings of the geotechnical investigation studies described in this report) are provided in the discussion and comments in this report, listed as follows:

- Mitigation measures relating to the design and construction of excavations are provided in Section 4.2.

- Mitigation measures relating to the design and construction of filling are provided in Section 4.3.
- Mitigation measures relating to the design and construction of retaining structures are provided in Section 4.4.
- Mitigation measures relating to the design and construction of footings are provided in Section 4.5.
- Mitigation measures relating to the design and construction of pavements are provided in Section 4.9.

2 FIELD AND LABORATORY INVESTIGATIONS

A concurrent preliminary site (contamination) assessment was undertaken by RCA along with the geotechnical investigation, the findings of which are reported separately.

Fieldwork was conducted from the 5th to the 9th of June 2023, and consisted of:

- Observations of site conditions.
- Drilling of eight bores (BH1 to BH8) to depths ranging from 8.0-19.8m. Bores were initially drilled using continuous flight augers and were then extended by NMLC diamond coring methods to termination depth. Core was recovered from all 8 bores. Point load strength testing was undertaken on representative core samples together with photography of the core.
- Drilling of one 300mm diameter bore (BH9) to 1.5m depth using an auger attachment fitted to an excavator to obtain information of existing pavement and subgrade conditions and to obtain a bulk sample of subgrade material for laboratory testing.
- Drilling of one bore using a hand auger (BH10) to 1.6m depth to obtain information on subsurface conditions where machinery access was not feasible.
- Dynamic cone penetrometer testing at the location of BH9 and BH10.
- Excavation of two test pits by excavator to depths of 1.25m (TP1) and 1.90m (TP2).
- In situ sampling and testing involving standard penetration testing and recovery of disturbed samples, bulk samples and samples for the concurrent preliminary site (contamination) assessment.

All fieldwork was carried out by and in the presence of RCA Australia (RCA) personnel. Test locations are shown on **Drawing 1** attached in **Appendix A**.

Test locations were set out and recorded with reference to existing site features and the locations should be considered approximate. Borehole surface levels for BH1 to BH8 have been estimated with reference to supplied survey information and should also be considered approximate.

Bore and test pit depths have been recorded relative to the existing ground surface at the time of investigation.

All bores and test pits were backfilled on completion.

Engineering logs of bores and test pits are presented in **Appendix B**, together with photographs and explanation sheets. Point load strength test results on rock core are shown on the logs.

Groundwater conditions have been noted on the bore and test pit logs at the time of fieldwork. Fluctuations in groundwater conditions/levels may be expected due to variations in rainfall and site conditions.

Laboratory testing of samples recovered during fieldwork consisted of:

- Three Atterberg limit and linear shrinkage tests to assess soil plasticity and shrinkage properties.
- Three standard compaction and four day soaked California bearing ratio (CBR) tests to assess subgrade strength.
- Three uniaxial compressive strength (UCS) tests to assess rock strength.
- Eight moisture content and density tests to assess rock properties.
- Eight chemistry tests to assess aggressivity to steel and concrete structures.

Laboratory test result sheets are attached in **Appendix C**.

A summary of laboratory test results are presented in **Table 2** to **Table 6**.

Table 2 *Summary of Atterberg Limits and Linear Shrinkage Test Results*

Bore	Depth (m)	Soil Type	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)
BH1	1.5 - 1.95	CLAY with sand	31	15	16	8
BH2	1.3 - 1.5	Gravelly CLAY	26	15	11	5.5
BH3	1.5 - 1.95	Sandy CLAY, trace gravel	28	16	12	6.5

Table 3 *Summary of Compaction and CBR Test Results*

Test Pit/ Bore	Depth (m)	Soil Type	FMC (%)	MDD (t/m^3)	SOMC (%)	CBR (%)	Swell (%)
TP1	0.6 - 0.8	Silty SAND with clay	7.8	1.768	13.9	6	1.0
TP2	0.85 - 1.1	Silty SAND with clay	12.2	1.883	11.5	10	0.5
BH9	0.7 - 1.1	Gravelly Clayey SAND	17.8	1.82	17.6	8	1.0

NOTES: FMC – field moisture content
MDD – maximum dry density (Standard compaction)
SOMC – Standard optimum moisture content
CBR – California bearing ratio, penetration 2.5 / 5.0mm

Table 4 *Summary of Rock UCS Test Results*

Bore	Depth (m)	Rock Type	UCS (MPa)
BH1	18.15 - 18.30	Granite	0.69
BH2	5.48 - 5.70	Granite	0.20
BH5	17.43 - 17.70	Granite	0.37

NOTES: UCS – Uniaxial Compressive Strength

Table 5 *Summary of Rock Moisture Content and Density Test Results*

Bore	Depth (m)	Rock Type	Moisture Content (%)	Dry Density (t/m^3)
BH1	18.15 - 18.30	Granite	3.7	2.3
BH2	5.48 - 5.70	Granite	6.8	2.1
BH4	9.30 - 9.53	Granite	4.3	2.3
BH5	17.43 - 17.70	Granite	6.2	2.0
BH5	19.40 - 19.70	Granite	4.8	2.3
BH6	7.70 - 7.85	Granite	4.2	2.2
BH7	16.00 - 16.15	Granite	4.8	2.1
BH8	17.30 - 17.60	Granite	4.0	2.2

Table 6 *Summary of Soil Chemistry Test Results*

Bore	Depth (m)	Soil Type	EC (µS/cm)	$pH_{(1:5)}$	Chloride (mg/kg)	Sulfate (mg/kg)
BH3	0.55 - 1.00	Gravelly Sandy CLAY	252	7.8	50	400
BH5	2.3 - 2.8	Extremely Weathered GRANITE	31	6.5	<10	40
BH6	1.5 -1.95	Silty SAND, trace of clay	77	7.3	<10	20
BH6	3.0 - 3.45	Silty SAND, trace of clay	119	7.3	<10	60
BH7	5.8 - 6.0	Highly Weathered GRANITE	37	6.9	<10	40
BH8	3.1 - 3.45	Silty SAND, trace of clay	123	7.6	<10	50
BH8	4.5 - 4.95	Silty SAND, trace of clay	97	6.6	50	50
BH8	5.8 - 6.0	Silty SAND, trace of clay	64	7.0	<10	40

Notes EC – Electrical Conductivity

Key findings of the laboratory testing are:

- The Atterberg limits test results indicate the samples tested are of low plasticity.
- The moisture content test results indicate the subgrade samples tested ranged from dry of, to approximately equal to standard optimum moisture content.
- The laboratory CBR of soils is in the range 6% to 10%.
- The rock strength of UCS samples is in the very low range, or below the very low range.

3 SITE DESCRIPTION

3.1 REGIONAL GEOLOGY AND SOIL LANDSCAPES

The NSW seamless geology map (published by the department of Regional NSW) indicates the site is underlain by the Bathurst Granite unit described as coarse-grained, porphyritic biotite granite.

The Soil Landscapes of the Bathurst 1:250,000 Sheet map and report (published by the department of Environment, Climate Change and Water NSW) indicates the site is within the Bathurst Soil Landscape comprising non-calcic brown soils with noted general soil properties including low soil salinity, moderate erosion hazard and moderate shrink-swell potential.

3.2 SURFACE CONDITIONS

The site covers an area of approximately 4.1 hectares between Howick, Mitre, Durham and Commonwealth Streets, West Bathurst as shown on the locality plan on **Drawing 1** attached in **Appendix A**. **Drawing 1** also contains a recent aerial image of the site and shows the approximate investigation test locations.

The site is located on the lower slopes of a north-east facing hill with overall slopes of about 5-10°. The site levels have been significantly modified by cut and fill earthworks, primarily cut below the south-west of the main services building lower storey/car parking/loading dock areas and fill over the north-east of the site.

The site contains the existing hospital buildings, asphalt driveways and car parking, concrete loading dock and ambulance bay hardstands and landscaped areas as shown on the aerial image on **Drawing 1**.

An approximately 2m height cut in residual soils and extremely weathered granite was observed in a subfloor area to the west of the loading dock at the western end of the site. A fill batter was present beyond the car parking areas around the northeastern edge of the site. Silty/clayey sand soils and extremely weathered granite fragments were observed were exposed on the edge of the fill batter.

3.3 SUBSURFACE CONDITIONS

The subsurface conditions encountered at the test locations are detailed on the engineering logs attached in **Appendix C.**

Geotechnical sections providing a visual summary of the subsurface conditions are provided on **Drawing 2**, **Drawing 3** and **Drawing 4** in **Appendix A**.

A summary of the depths to the various subsurface materials encountered at the test locations is provided in **Table 7**. A general description of the various subsurface materials encountered is provided in **Table 8**.

Table 7 *Summary of Depths to Subsurface Materials at Test Locations*

Test Pit/ Bore	Depth (m)						Termination Depth (m)
	Pavement Materials	Fill	Topsoil	Residual Soil	Extremely Weathered Granite	Highly Weathered Granite	
BH1	N/A	0 - 0.6	not encountered	0.6 - 3.0	3.0 - 6.0	6.0 - 11.3	11.3
BH2	0 - 0.2	not encountered	not encountered	not encountered	0.2 - 4.8	4.8 - 9.9	9.9
BH3	0 - 0.6	0.6 - 1.5	not encountered	1.5 - 3.0	3.0 - 8.0	not encountered	8.0
BH4	0 - 0.2	0.2 - 0.5	not encountered	not encountered	0.5 - 3.9	3.9 - 9.9	9.9
BH5	0 - 0.3	0.3 - 1.6	not encountered	not encountered	1.6 - 5.3	5.3 - 19.8	19.8
BH6	0 - 0.1	0.1 - 7.5	not encountered	not encountered	not encountered	7.5 - 16.2	16.2
BH7	0 - 0.3	0.3 - 1.9	not encountered	1.9 - 2.6	2.6 - 5.4	5.4 - 10.0	10.0
BH8	N/A	0 - 6.1	not encountered	not encountered	6.1 - 7.3	7.3 - 19.3	19.3
BH9	0 - 0.7	not encountered	not encountered	0.7 - 1.5	not encountered	not encountered	1.5
BH10	not encountered	0 - 1.1	1.1 - 1.3	1.3 - 1.6	not encountered	not encountered	1.6
TP1	not encountered	not encountered	0 - 0.6	not encountered	0.6 - 1.3	not encountered	1.3
TP2	not encountered	0 - 0.7	0.7 - 0.9	0.9 - 1.4	1.4 - 1.9	not encountered	1.90

Table 8 *Description of Subsurface Materials*

Layer	Description	Typical Characteristics/Extent
Pavement Materials	Concrete/asphaltic concrete over gravel base materials	Up to 0.7m thickness.
Fill	Typically sandy soil materials with a significant fines component. Clayey fill materials encountered in BH3 and BH10. Details in regard to placement and compaction of the existing fill at the site are unknown, however in the absence of earthworks documentation the existing fill at the site would be considered as uncontrolled fill.	Fill to depths of up to 7.5m encountered at the eastern end of the site.
Topsoil	Silt materials	Only encountered in BH10, TP1 and TP2.
Residual Soil	Low to medium plasticity clay residual soils encountered in BH1, BH3 and BH7. Sandy residual soils with a significant fines component encountered in BH9, BH10 and TP2	Up to 2.4m thick.
Extremely Weathered Granite	Engineering properties of weakly cemented very dense sandy soil.	Some very high strength corestones encountered within extremely weathered profile. Varies from not present to up to at least 5m thickness.
Highly Weathered Granite	Coarse grained, crystalline structure. Very low strength.	Core readily disintegrates under hand pressure. Some very high strength corestones encountered within highly weathered profile. Deeply weathered granite profile with no further significant increase in strength with depth encountered in the boreholes.

3.4 GROUNDWATER

Groundwater was not encountered within the augered portion of the boreholes or within the test pits during or shortly after drilling/excavation. No longer term groundwater monitoring was carried out.

The addition of water to the boreholes during coring prevented meaningful groundwater observations within the cored portion of the boreholes.

Groundwater conditions are expected to vary with changes in climate and site conditions.

Transient/perched groundwater seepage could be expected to occur at the soil-rock interface following periods of rainfall. The possible presence of a deeper groundwater table within the extremely or highly weathered granite profile within the depths of excavation required for the development is expected to be unlikely.

Specific groundwater investigation to inform a groundwater assessment in accordance with the NSW Government January 2022 published *Guidelines for Groundwater Documentation for SSD/SSI Projects* document was not within the scope of the geotechnical investigation. Notwithstanding, and with reference to these guidelines following completion of the investigation and based on the information available, the project is expected to be located above the groundwater table and thus is unlikely to have a major impact on groundwater systems.

Where definitive information on groundwater levels at specific locations on the site is required, this should be further investigated by installing groundwater monitoring well(s) in boreholes and monitoring the water levels over a period of time.

4 DISCUSSION AND COMMENTS

4.1 GEOTECHNICAL CONDITIONS

Significant geotechnical features relevant to proposed development include the following:

- Deep fill to depths up to in the order of 8m was encountered over the eastern portion of the proposed development area.

- The natural subsurface materials at the site are associated with deeply weathered granite profile. Rock strength is typically very low with no further significant increase in rock strength with depth up to about 20m encountered in the boreholes.

4.2 EXCAVATIONS

Draft schematic design drawings prepared by Taylor Thomson Whitting (Ref Project No. 231092, Revision A) show a proposed finished floor level of RL 665.765m for the proposed new building Level 00 in the eastern corner of the site which would require up to approximately 5m of excavation below existing site levels.

If/where excavations in proximity to existing structures are required, care and appropriate measures should be taken to ensure that the stability and support of the adjacent structures is maintained. This may require measures such as shoring and/or prior installation of excavation support (e.g., soldier pile wall or contiguous pile retaining wall) installed prior to excavation. Where existing footings and occur within a 2H:1V projection from the base of any proposed excavations, it is recommended that allowance should be made for the full support of the excavations.

It is suggested that full height retaining structures will be required as part of the final structure and may be used to temporarily support the excavation during the excavation and construction phase.

Excavations in the fill and residual soil materials are expected to be achievable by conventional earthmoving equipment such as backhoes and excavators. At the test pit locations TP1 and TP2, excavations are expected to be achievable to the depths shown on the test pit logs.

The extremely weathered and highly weathered granite materials are expected to be more resistant to excavation and may require heavy excavation equipment, e.g., bulldozers/large excavators and/or rock breakers to facilitate excavation.

Noise and vibration will be generated by excavation work on the site and allowance for this should be made during design and construction given the close proximity to hospital buildings.

It is recommended that long-term excavations should be battered at an appropriate batter slope for the material in which the excavation is undertaken and protected against erosion by vegetation and the provision of adequate drainage or be supported by properly designed and constructed retaining walls. Recommended batter slopes for temporary and long-term or permanent excavations are provided in **Table 9**.

Table 9 *Recommended Batter Slopes for Excavations*

Strata	Recommended Maximum Batter Slopes for Excavations	
	Temporary Excavations	Long-term or Permanent Excavations
Existing silty and clayey sand fill	1.5H:1V	2H:1V
Residual soils and extremely weathered granite with residual soil properties	1H:1V	2H:1V
Highly weathered, very low strength granite	0.5H:1V	1H:1V

It is noted that excavations in rock may be able to be battered steeper than that shown in **Table 9** subject to specific geotechnical assessment of the rock profile exposed in the excavations.

4.3 FILLING

Any filling on the site should be placed and compacted in accordance with *AS3798-2007, Guidelines on Earthworks for Commercial and Residential Development*.

From a geotechnical perspective, material excavated from the site would generally be suitable for use as engineered fill provided deleterious material and particles with sizes greater than 75mm diameter are removed.

The placement and compaction of any proposed engineered fill to support structural loads should be undertaken in accordance with *AS 3798-2007*. Where it is proposed to found footings for the proposed new buildings in engineered fill, Level 1 supervision (as defined in *AS 3798-2007*) of earthworks should be undertaken.

All fill should be supported by properly designed and constructed retaining walls or else battered at 2H:1V or flatter and protected against erosion by vegetation or similar and the provision of adequate drainage provided with lining to minimise erosion.

If/where fill is to be placed on slopes of surface gradient greater than about 8H:1V (about 7°) a benched (stepped) foundation should be cut into the slope to provide a level platform for the fill.

4.4 RETAINING STRUCTURES

Design of retaining walls should:

- Consider surcharge loading from slopes, structures above and backfill behind the wall.
- Provide adequate subsurface and surface drainage.
- Utilise materials that are not susceptible to deterioration.
- Provide for full drainage or make provision to support full hydrostatic load.

Preliminary geotechnical design parameters for retaining wall design are presented in **Table 10**. Note that the parameters provided in **Table 10** do not include allowance for surcharge loads, slopes above the wall and hydrostatic pressure.

Table 10 *Preliminary Geotechnical Parameters for Retaining Wall Design*

Material	Geotechnical Parameters				
	Bulk Unit Weight (kN/m^3)	**Cohesion c' (kPa)**	**Friction Angle ϕ' (degrees)**	**At Rest (1) Coefficient of Lateral Earth Pressure**	**Active (2) Coefficient of Lateral Earth Pressure**
Fill	19	0	25	0.58	0.4
Residual soils	19	5	25	0.58	0.4
Extremely weathered granite	22	5	30	0.50	0.33
Highly weathered, very low strength granite	24	10	35	0.43	0.27

(1) At Rest Lateral Earth Pressure for design of rigid and permanent walls.

(2) Active Lateral Earth Pressure for design of temporary flexible walls (eg cantilever walls).

It is recommended that geotechnical inspection of rock excavation is carried out to assess for the presence of adverse defects/structure that could affect short term stability and increase the pressures acting on retaining walls.

Foundations for retaining structures may be based on the parameters presented in **Table 11** and **Table 12**.

4.5 FOOTINGS

All footings for structures should be founded below any existing fill, topsoil or deleterious soils and it is recommended that footings for the same structure should be founded on the same strata to minimise potential differential movements.

4.5.1 HIGH-LEVEL FOOTINGS

High-level footing alternatives for the proposed new buildings could be expected to include slabs on ground with edge beams or pad footings for the support of concentrated loads. These high-level footing types could be founded on dense/very stiff or better residual soils or extremely weathered granite below any topsoil, or existing fill, or founded on engineered fill that is placed and compacted in accordance with *AS 3798-2007*.

It is recommended that footings for the same structure should be founded on the same strata to minimise potential differential movements.

Following bulk excavation for the proposed new building Level 00 towards the eastern corner of the site the exposed subgrade is expected to comprise a range of materials including:

- Existing uncontrolled fill materials including silty/clayey sand fill material with low standard penetration test N values of less than 10 recorded in the boreholes.
- Residual soils
- Extremely weathered granite

It is considered that the existing fill materials could either be excavated and replaced as engineered fill to facilitate construction of high-level slab on ground footings (with due regard for the potential for differential movements associated with, e.g., areas of extremely weathered granite subgrade and areas of engineered fill subgrade), or ground floor slabs over the existing fill materials left in place could be designed as suspended slabs.

Where the existing fill materials are left in place it is recommended that ground floor slabs over the existing fill materials are designed as suspended slabs. The existing fill materials, following proof roll to identify and weak or unsuitable areas and to compact the near surface materials, are expected to be suitable for support of temporary/construction loading including support of wet weight of concrete for suspended slab design

It is suggested that high-level footings may be proportioned based on the allowable bearing pressures shown on **Table 11.** Settlements of high-level footings under these design allowable bearing pressures are estimated to be less than 5-10mm.

Table 11 *Allowable Bearing Pressures for High Level Footings*

Founding Strata	Allowable Bearing Pressure (kPa)
Engineered fill that is placed and compacted in accordance with *AS 3798-2007* under Level 1 inspection and testing	100
Residual soils - Dense or better relative density sand soils - Very stiff or better consistency clay soils	150
Extremely Weathered Granite	400
Highly Weathered Granite - Very low strength	700

Inspection of high-level footing excavations should be undertaken during construction to confirm founding conditions. The base of all footing excavations should be cleaned of fall-in prior to formation of the footing.

Piered footings are an alternative to high-level footings and are discussed in the following section.

4.5.2 PIERED FOOTINGS

Suitable founding strata for piered footings are expected to comprise extremely weathered and highly weathered granite.

It is suggested that piered footings may be designed based on the parameters shown in **Table 12**.

Table 12 *Design Parameters for Bored Piers*

Founding Strata	End Bearing Pressure (kPa)		Ultimate Shaft Adhesion [3] (kPa)		Young's Modulus [5]
	Ultimate [1]	Serviceability [2]	Compression	Uplift	
Dense/very stiff or better residual clay soils	-	-	40	20	30
Extremely Weathered Granite	3000	400	80	40	50
Highly Weathered, Very Low Strength Granite	5000	1000	150	75	100

(1) Ultimate values occur at large settlement (>5% of minimum footing dimensions).

(2) End bearing pressure to cause settlement of <1% of minimum footing dimension.

(3) Shaft adhesion should be ignored for the upper part of the subsurface profile for a depth corresponding to a minimum of three pier diameters.

(4) Parameters for piers assume L>4D (L= pier length, D = pier diameter).

(5) E' is stress dependent and should be selected from the appropriate stress range as required.

Any fall-in should be removed from the base of footing excavations or pier holes prior to the formation of the footings. Bored pier installation would require specific attention to removal of debris from socket bases and the base of all pier holes should be cleaned of fall-in prior to formation of the pier.

It is recommended that inspection of the footing excavations or pier holes be undertaken by an experienced engineer at the time of construction to confirm founding conditions.

4.5.3 GEOTECHNICAL STRENGTH REDUCTION FACTOR

At this stage it is recommended that a geotechnical strength reduction factor (ϕ_g) of 0.5 be adopted. Depending on the proposed structural design system and proposed pile testing and construction verification level the geotechnical strength reduction factor will be able to be revised for detailed design.

4.6 SITE CLASSIFICATION

The proposed development is beyond the scope of *AS2870-2011*. Discussion and comments in this section are provided for guidance.

In accordance with *AS2870-2011* the site is classified as Class P due to the following:

- Abnormal moisture conditions associated with the existing structures at the site which are likely to have significantly modified the soil moisture conditions below.
- The presence of fill at the site.

The Atterberg limit and linear shrinkage laboratory test results summarised in **Table 2** indicate the clay soils samples tested are of low plasticity. Linear shrinkage values of 8% or less were recorded.

The boreholes indicated variable subsurface conditions including predominantly sand soils or low to medium plasticity clay soils over extremely weathered granite.

Based on the subsurface conditions encountered in the boreholes and interpretation of the laboratory test results, in the absence of abnormal moisture conditions characteristic surface movements at the site are calculated to be within the range associated with Class M - Moderately Reactive site classification as defined in *AS2870-2011*.

4.7 EARTHQUAKE DESIGN

Based on the geotechnical investigation borehole information the site is classified as a Subsoil Class C_e – shallow soil site in accordance with *AS 1170.4-2007*.

It is noted that the highly weathered, very low strength granite does not meet the minimum compressive strength requirement to be considered as a rock site in accordance with *AS 1170.4-2007*.

4.8 DURABILITY DESIGN

Soil and rock samples were submitted for laboratory testing to assess potential for aggressive soil conditions that could impact on buried concrete and steel elements. Results of the analysis were compared to aggressivity levels in the Piling – Design and Installation Standard (AS2159-2009). The laboratory test reports for aggressivity are attached in **Appendix C** and results are summarized in **Table 6**.

Exposure classifications based on AS2159-2009 are presented in **Table 13**.

Table 13 *Summary of Soil and Rock Aggressivity Results*

Bore	Depth (m)	Soil Type	Aggressivity to buried steel elements	Aggressivity to buried concrete elements
BH3	0.55 - 1.00	Gravelly Sandy CLAY	Non-aggressive	Non-aggressive
BH5	2.3 - 2.8	Extremely Weathered GRANITE	Non-aggressive	Non-aggressive
BH6	1.5 -1.95	Silty SAND, trace of clay	Non-aggressive	Non-aggressive
BH6	3.0 - 3.45	Silty SAND, trace of clay	Non-aggressive	Non-aggressive
BH7	5.8 - 6.0	Highly Weathered GRANITE	Non-aggressive	Non-aggressive
BH8	3.1 - 3.45	Silty SAND, trace of clay	Non-aggressive	Non-aggressive
BH8	4.5 - 4.95	Silty SAND, trace of clay	Non-aggressive	Non-aggressive

Bore	Depth (m)	Soil Type	Aggressivity to buried steel elements	Aggressivity to buried concrete elements
BH8	5.8 - 6.0	Silty SAND, trace of clay	Non-aggressive	Non-aggressive

The test results indicate non-aggressive conditions to buried steel and concrete in accordance with *AS2159-2009*.

4.9 PAVEMENTS

4.9.1 SUBGRADE CONDITIONS SUPPORT PARAMETERS

The natural subgrade conditions encountered in the test pits and BH9 comprised residual sandy soils or extremely weathered granite. The subgrade materials contain a significant proportion of silt and clay fines which are expected to influence the subgrade support properties.

Laboratory CBR values of 6%, 10% and 8% were recorded on samples of the subgrade materials from the test pits and BH9.

Due to the variability in the laboratory CBR results and expected variable composition and fines content in the natural subgrade materials it is suggested that design subgrade CBR value of 5% be adopted for pavement design purposes.

Estimates of subgrade Young's modulus for the residual soils are as follows:

- Short-term loading 35MPa
- Long-term loading 25 MPa

4.9.1 PAVEMENT MATERIALS AND COMPACTION REQUIREMENTS

Pavement material specifications and compaction requirements for unbound pavement materials are shown on **Table 14**.

Table 14 *Pavement Materials and Compaction Requirements*

Pavement Layer	Material Specification	Compaction Requirements
<u>Basecourse</u> High quality crushed rock or base quality gravel	Material complying with RMS QA Specification 3051 (Ref [4]). CBR > 80% PI < 6%	Min 98% Modified (AS 1289 5.2.1)
<u>Subbase</u> Subbase quality gravel	Material complying with RMS QA Specification 3051 (Ref [4]). CBR > 30% PI < 12%	Min 95% Modified (AS 1289 5.2.1)
<u>Fill</u> Select subgrade or subgrade replacement	CBR > 15%	Min 100% Standard (AS 1289 5.1.1)

Subgrade		Min 100% Standard (AS 1289 5.1.1)

CBR – California bearing ratio, PI – Plasticity index.

4.9.2 SUBGRADE PREPARATION

Subgrade preparation for pavement construction could generally be expected to comprise the following:

- Excavation to subgrade formation level.
- Ripping of any weathered rock exposed at subgrade formation level to a minimum depth of 300mm below subgrade formation level.
- Proof rolling of the exposed subgrade with a heavy (minimum 10 tonne static) roller. Soft or weak areas detected during the proof rolling should be excavated and replaced with compacted select fill/subgrade replacement.

Compaction of the subgrade to achieve a minimum dry density ratio of 100% Standard (AS 1289 5.1.1).

4.9.1 PAVEMENT DRAINAGE

The moisture regime associated with a pavement has a major influence on the performance of the pavement since the stiffness/strength of the pavement materials and subgrade is very dependent on the moisture content of the materials. Accordingly, to protect the pavement materials and subgrade from wetting up and softening, particular care would be required to provide a waterproof seal for the pavement materials and adequate surface and subsurface drainage of the pavement and adjacent area.

It is recommended that subsoil drains should be provided at the edge of pavements and interface with adjoining pavements.

Where subsoil drains will be subject to traffic it is suggested that no fines concrete be used for the drainage material.

4.10 SALINITY

The Soil Landscapes of the Bathurst 1:250,000 Sheet map and report (published by the department of Environment, Climate Change and Water NSW) indicates the site is within the Bathurst Soil Landscape comprising non-calcic brown soils with noted general soil properties including low soil salinity.

The soil chemistry test results summarised in Sections 2 and 4.8 indicate non-aggressive conditions to buried steel and concrete in accordance with *AS2159-2009*. The limited soil electrical conductivity testing carried out for the geotechnical investigation indicates non-saline or slightly saline soil conditions

No evidence of salinity (e.g. staining, die back of trees, presence of indicator vegetation species etc.) was noted during the site fieldwork.

The findings of the geotechnical investigation indicate a Salinity Management Plan is not required.

4.11 ACID SULFATE SOILS.

Published maps, the site location and elevation, together with the soil pH testing values recorded of between 6.5-7.8 (summarised in Section 2) indicate a very low probability of the presence of acid sulfate soils at the site.

The findings of the geotechnical investigation indicate an Acid Sulfate Soils Management Plan is not required.

5 LIMITATIONS

This report has been prepared for Health Infrastructure in accordance with the agreement with RCA. The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Health Infrastructure for the specific purpose and the specific development described in the report. The report may not contain sufficient information for purposes or developments other than that described in the report or for parties other than Health Infrastructure. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without permission.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. The conclusions drawn in the report are based on interpolation between boreholes or test pits. Conditions can vary between test locations that cannot be explicitly defined or inferred by investigation.

Yours faithfully
RCA AUSTRALIA

Robert Cater
Senior Geotechnical Engineer

Dr Mark Allman
Principal Geotechnical Engineer

REFERENCES

[1] Standards Association of Australia. AS 2870-2011: Residential Slabs and Footings – Construction. Standards Association of Australia, 2011.

[2] Standards Association of Australia. AS 3798-2007: Guidelines on Earthworks for Commercial and Residential Structures. Standards Association of Australia, 2007.

[3] Standards Association of Australia. AS 2159-2009: Piling Design and Installation. Standards Association of Australia, 2009.

[4] Roads and Maritime Services. "*Granular Pavement Base and Subbase Materials*", QA Specification 3051, Edition 7 / Revision 0, August 2018

Appendix A

Drawing 1 - Site and Test Location Plan

Drawing 2 - Geotechnical Section A-A

Drawing 3 - Geotechnical Section B-B

Drawing 4 - Geotechnical Section C-C

LEGEND

- Approximate site boundary
- Geotechnical section
- Approximate test pit location
- Approximate borehole location
- Approximate hand auger location
- Approximate 300mm dia.pavement borehole location

Note: Aerial image taken from Nearmap, 25 February 2023
(used in accordance with commercial licence)

0 12.5 25 50 75 100
metres

N

RCA AUSTRALIA
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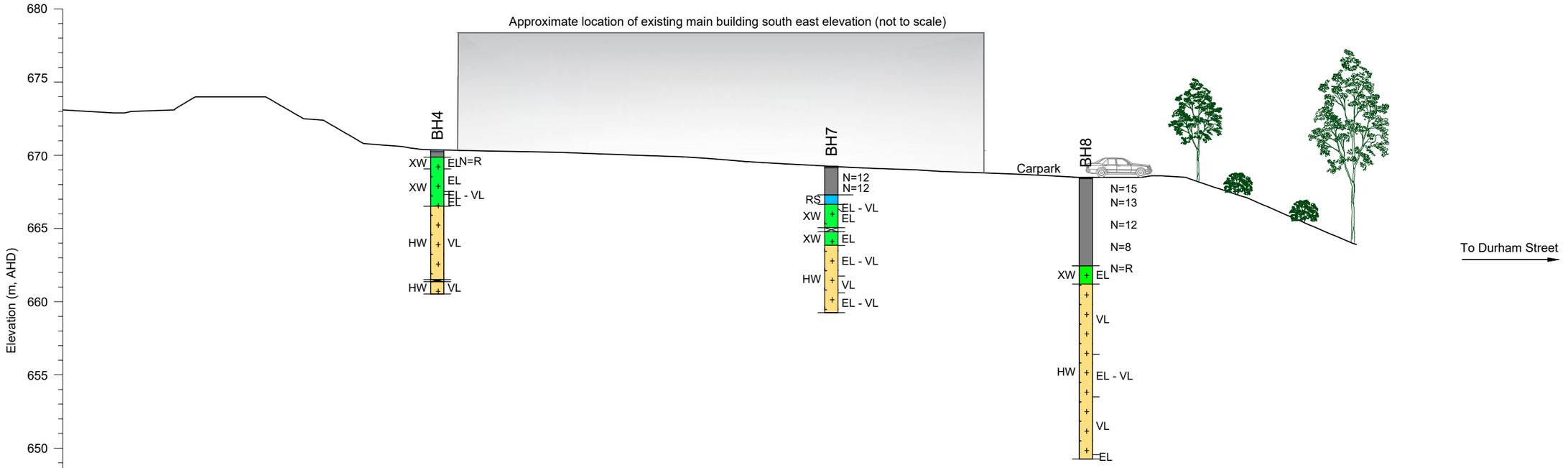
SITE AND TEST LOCATION PLAN
BATHURST HOSPITAL
BATHURST

CLIENT	Health Infrastructure			RCA Ref	16547-202/2
DRAWN BY	RC	SCALE	1:1,500 (A3)	DRAWING No 1	REV 1
APPROVED BY	MA	DATE	29/08/2023	OFFICE	NEWCASTLE



Section A - A

LEGEND

Geotechnical Units

- WOOD CHIPS/MULCH
- CONCRETE
- ASPHALT
- FILL
- TOPSOIL
- RESIDUAL SOILS
- Extremely Weathered GRANITE
- Highly Weathered GRANITE

15 30 DCP - blow counts per 100mm interval

DCP Test results

BOREHOLE ID

Soil consistency/ density xx

Penetrometer test result (kPa) PP=

Rock weathering xx

Groundwater Level

Seepage

N=00 SPT N value

xx Estimated Rock strength

NOTE: Existing ground surface profile derived from Stage 1 Detail Survey supplied by TSA Management, prepared by Usher and Company
The stratigraphy and geotechnical units shown on the above section is a generalised summary only. For further details and for design purposes, reference should be made to the borehole logs.

SCALE: 1:300 H
1:300 V

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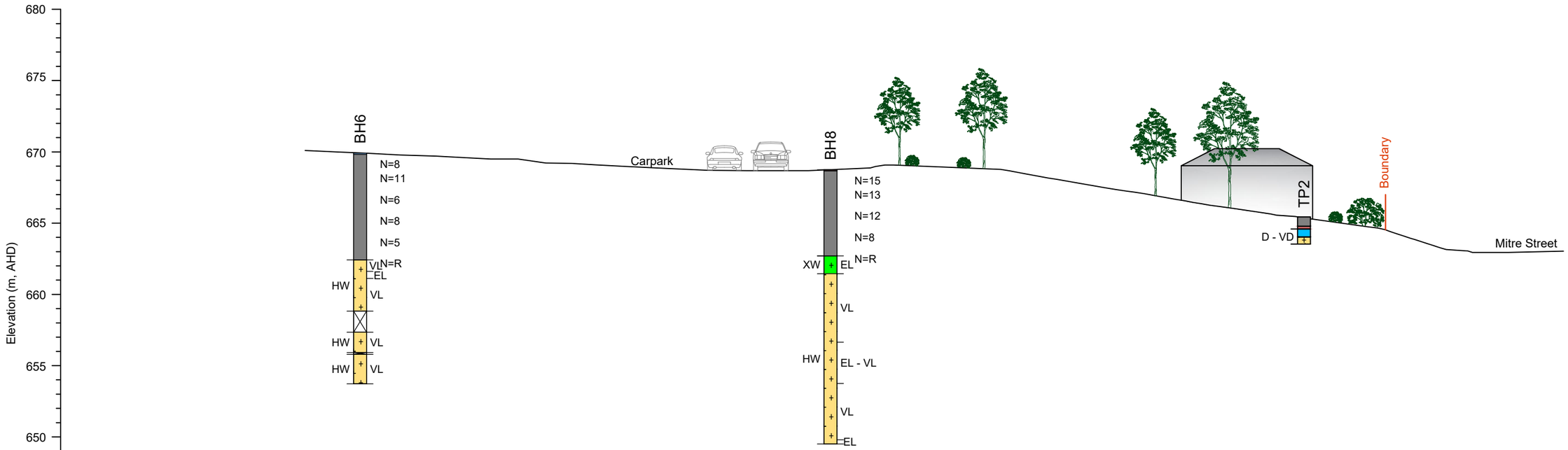
GEOTECHNICAL SECTION A-A
BATHURST HOSPITAL
BATHURST

CLIENT	Health infrastructure			RCA Ref	16547-202/2
DRAWN BY	RC	SCALE	As Shown (A3)	DRAWING No 2	REV 0
APPROVED BY	MA	DATE	4/08/2023	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1

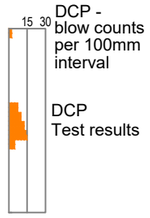


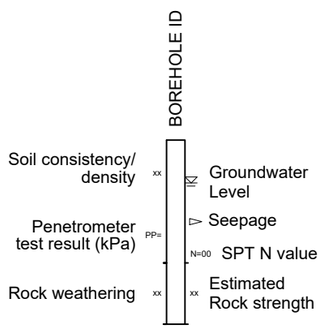
Section B-B

LEGEND

Geotechnical Units

- WOOD CHIPS/MULCH
- CONCRETE
- ASPHALT
- FILL
- TOPSOIL
- RESIDUAL SOILS
- Extremely Weathered GRANITE
- Highly Weathered GRANITE





NOTE: Existing ground surface profile derived from Stage 1 Detail Survey supplied by TSA Management, prepared by Usher and Company
The stratigraphy and geotechnical units shown on the above section is a generalised summary only. For further details and for design purposes, reference should be made to the borehole logs.

SCALE: 1:300 H
1:300 V

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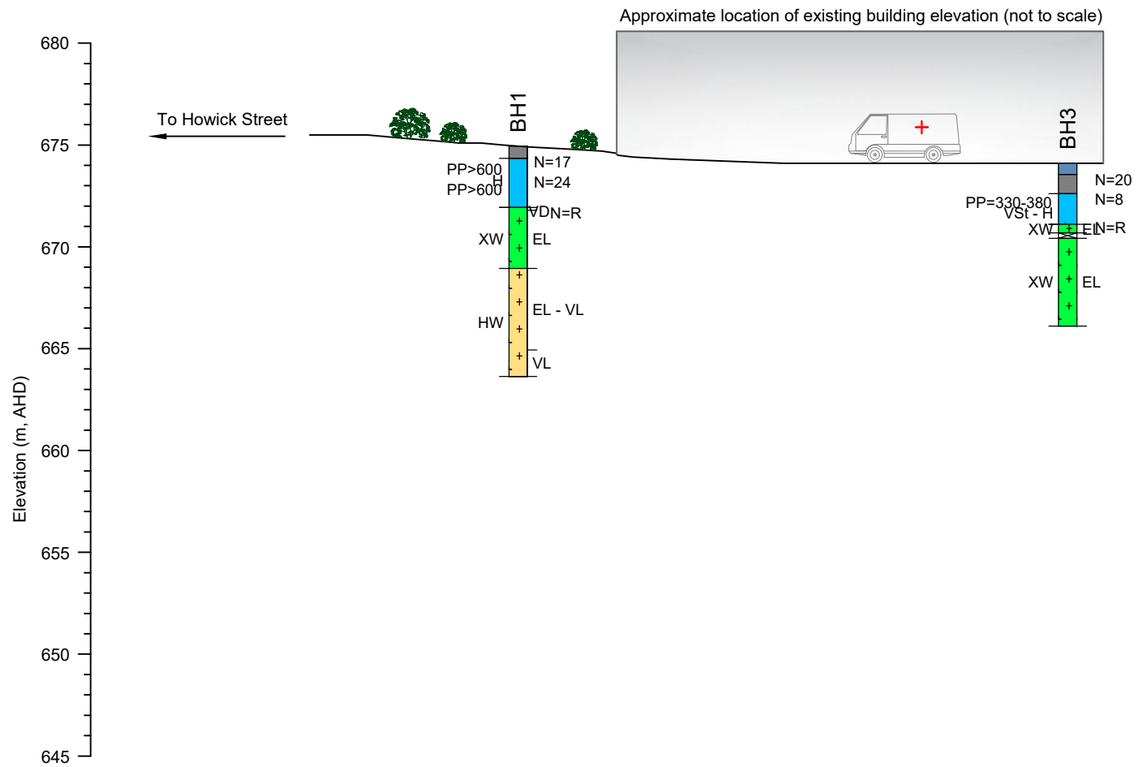
GEOTECHNICAL SECTION B-B
BATHURST HOSPITAL
BATHURST

CLIENT	Health infrastructure			RCA Ref	16547-202/2
DRAWN BY	RC	SCALE	As Shown (A3)	DRAWING No 3	REV 0
APPROVED BY	MA	DATE	4/08/2023	OFFICE	NEWCASTLE

CDT—DWG—A3H—001/1



Section C-C

LEGEND

Geotechnical Units

- WOOD CHIPS/MULCH
- CONCRETE
- ASPHALT
- FILL
- TOPSOIL
- RESIDUAL SOILS
- Extremely Weathered GRANITE
- Highly Weathered GRANITE

15 30 DCP - blow counts per 100mm interval

DCP Test results

BOREHOLE ID

Soil consistency/ density xx

Penetrometer test result (kPa) PP=

Rock weathering xx

Groundwater Level

Seepage

N=00 SPT N value

xx Estimated Rock strength

NOTE: Existing ground surface profile derived from Stage 1 Detail Survey supplied by TSA Management, prepared by Usher and Company
The stratigraphy and geotechnical units shown on the above section is a generalised summary only. For further details and for design purposes, reference should be made to the borehole logs.

SCALE: 1:300 H
1:300 V

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GEOTECHNICAL SECTION C-C
BATHURST HOSPITAL
BATHURST

CLIENT	Health infrastructure			RCA Ref	16547-202/2
DRAWN BY	RC	SCALE	As Shown (A3)	DRAWING No 4	REV 0
APPROVED BY	MA	DATE	4/08/2023	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1

Appendix B

Engineering Logs

Core Photographs

Test Pit Photographs

Explanatory Notes

GEOTECHNICAL BOREHOLE LOG

BH1

SHEET 1 OF 4

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 09/06/2023
DATE COMPLETED: 09/06/2023
SURFACE RL: 674.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered)		BH1 0.10m	674.5	0.5		SM	FILL, Silty SAND, fine to medium grained, brown, trace of gravel	M		FILL Grass on surface
		0.50m	0.50m								
		SPT 3, 6, 11 N=17 PP>600kPa	BH1a (0.6-0.7m) D (0.5-0.9	674.0	0.60		CL-CI	CLAY, low to medium plasticity, brown, with sand	w<PL	H	RESIDUAL
		0.95m	0.95m		1.0						
			1.00m BH1b 1.20m	673.5							
		1.50m	1.50m		1.5						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
		SPT 4, 9, 15 N=24 PP>600kPa	BH1c (1.8-2.0m) D (1.5-1.9	673.0							
		1.95m	2.00m		2.0						
				672.5				becoming with extremely weathered granite lenses/zones at 2.2m			
					2.5						
				672.0							
		3.00m	3.00m		3.00						
WS		3.04m SPT 5/40mm N=R	D 3.04m			+ + + +		Extremely Weathered Granite, properties of Silty Clayey SAND,, orange-brown	XW	VD	EXTREMELY WEATHERED MATERIAL
								CONTINUED AS CORED BOREHOLE			
				671.5	3.5						
				671.0							
					4.0						
				670.5							
					4.5						
				670.0							

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 09/06/2023
DATE COMPLETED: 09/06/2023
SURFACE RL: 674.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				674.5	0.5						
				674.0	1.0						
				673.5	1.5						
				673.0	2.0						
				672.5	2.5						
				672.0	3.0		START CORING AT 3.15m				
NMLC	0% LOSS	100	0	671.5	3.15	+ + +	GRANITE, coarse grained, orange-brown and grey	XW			
				671.0	3.5	+ + +					
				670.5	4.0	+ + +					
				670.0	4.5	+ + +					

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 09/06/2023
DATE COMPLETED: 09/06/2023
SURFACE RL: 674.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	0	669.5	5.00	+ + +	GRANITE, coarse grained, white, grey and brown, crystallite texture, indistinct fabric	XW			
					5.5						
				669.0							
					6.0			HW			Note: Granite core disintergrates readily into sandy soil under hand pressure
				668.5							
					6.5						FE infilled defect, tight, up to 6mm thick
		100	85	668.0							
					7.0						
				667.5							
					7.5						
				667.0							
					8.0						
				666.5							
					8.5						
				666.0							
					9.0						
		100	100	665.5							
					9.5						
				665.0							

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 09/06/2023
DATE COMPLETED: 09/06/2023
SURFACE RL: 674.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	100	664.5	10.5	+ + +	GRANITE, coarse grained, white, grey and brown, crystallite texture, indistinct fabric	HW			
				664.0	11.0	+ + +					
				663.5	11.30		CORED BOREHOLE BH1 TERMINATED AT 11.30 m				
				663.0	11.5						
				662.5	12.0						
				662.0	12.5						
				661.5	13.0						
				661.0	13.5						
				660.5	14.0						
				660.0	14.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH1 - Photograph 1 of 1**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG

BH2

SHEET 1 OF 3

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 05/06/2023
DATE COMPLETED: 05/06/2023
SURFACE RL: 668.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			0.20m		0.18 0.20			CONCRETE, 180mm thick			LOADING DOCK/CAR PARKING SURFACE
AD/T	(Not Encountered)	0.50m 0.54m SPT 5/40mm N=R	BH2 0.50m D 0.54m	668.5	0.5		GP SM	FILL, GRAVEL, medium, dark grey, sub-angular Extremely Weathered Granite, properties of Silty SAND, fine to coarse grained, trace of clay	XW	VD	FILL EXTREMELY WEATHERED MATERIAL
			0.90m BH2a 1.20m	668.0 667.5	1.0						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
		1.48m 1.50m SPT 5/20mm N=R	1.48m D 1.50m		1.5			CONTINUED AS CORED BOREHOLE			
				667.0	2.0						
				666.5	2.5						
				666.0	3.0						
				665.5	3.5						
				665.0	4.0						
				664.5	4.5						
				664.0							

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CORED BOREHOLE LOG
BH2

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 05/06/2023
DATE COMPLETED: 05/06/2023
SURFACE RL: 668.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				668.5	0.5						
				668.0	1.0						
				667.5	1.50		START CORING AT 1.50m				
NMLC	0% LOSS	100	0	667.0	2.0		GRANITE, coarse grained, orange-brown and grey	XW			
		100	0	666.5	2.5		iron indurated/weakly cemented from 2.25m to 2.65m				
				666.0	3.0						
				665.5	3.5						
				665.0	4.0						
		100	0	664.5	4.5						
		100	83	664.0	4.80		GRANITE, coarse grained, orange-brown, pale grey and dark grey, crystalline texture, indistinct fabric	HW			Note: Granite core disintergrates readily into sandy soil under hand pressure

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH2

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

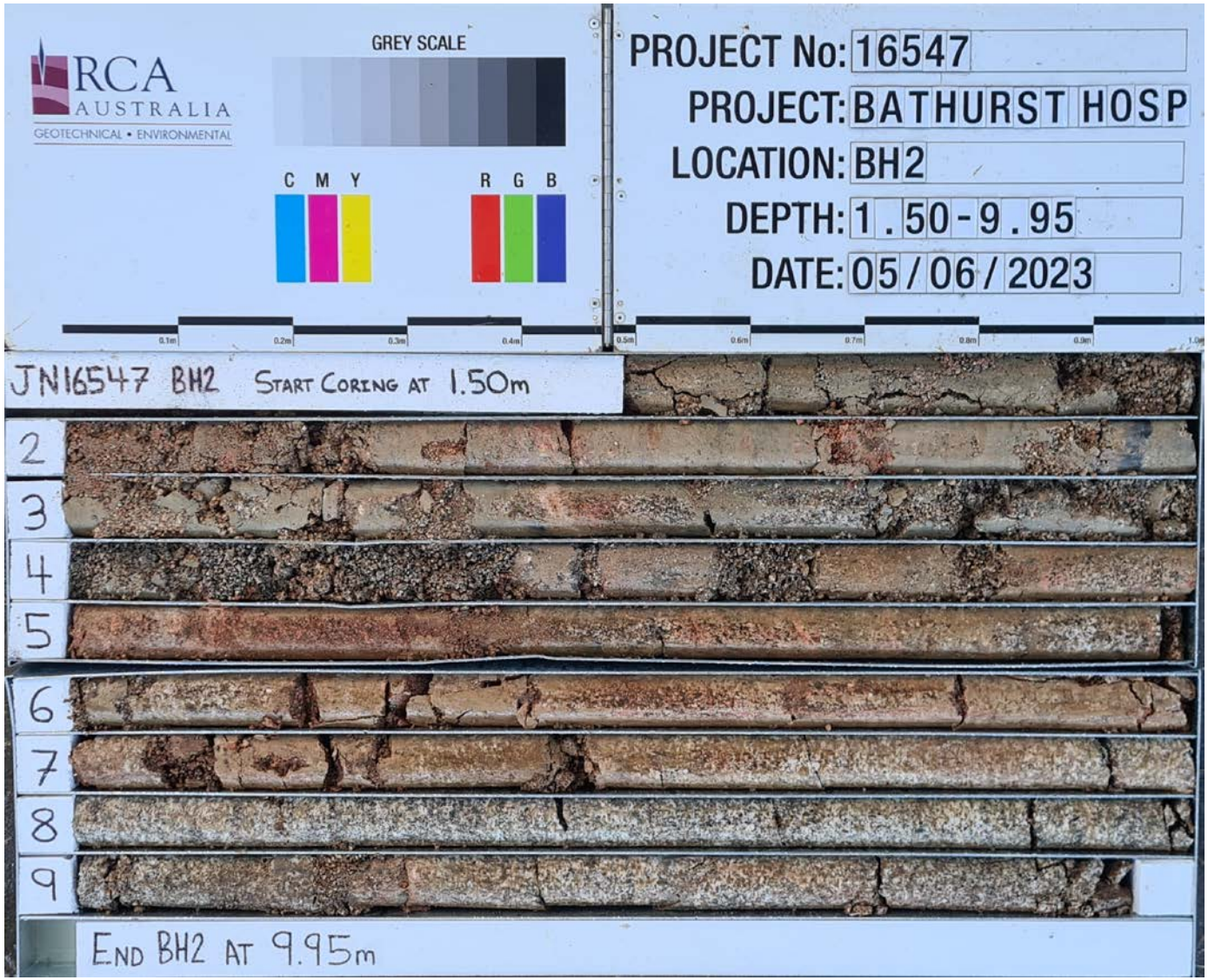
DATE COMMENCED: 05/06/2023
DATE COMPLETED: 05/06/2023
SURFACE RL: 668.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information | Field Material Description

METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	83	663.5	5.5		GRANITE, coarse grained, orange-brown, pale grey and dark grey, crystalline texture, indistinct fabric	HW			DZ 50 mm
				663.0	6.0						
				662.5	6.5						DZ 50 mm JT 75° PR RF
				662.0	7.0						DZ 180 mm
				661.5	7.5		becoming white, grey and brown at 7.6m				DZ 30 mm
		100	99	661.0	8.0						
				660.5	8.5						
				660.0	9.0						
				659.5	9.5						JT 50° Fe PR S
				659.0							

CORED BOREHOLE BH2 TERMINATED AT 9.95 m

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023



Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH2 - Photograph 1 of 1**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG

BH3

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 674.10 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT		0.55m	0.55m	674.0	0.10			CONCRETE, 100mm thick			AMBULANCE BAY PAVEMENT
					0.5			CONCRETE, 440mm			
AD/T	(Not Encountered)	SPT 4, 14, 6 N=20 1.00m	BH3 (0.55-0.75m) D (0.55-1.0m) BH3a (0.9-1.1m) 1.10m	673.5	0.55		CI-CH	FILL, Gravelly Sandy CLAY, medium plasticity, dark grey-brown, trace of brick fragments	w>PL		FILL
				673.0	1.0						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
		1.50m	1.30m BH3b **1.50m**		1.50						
		SPT 3, 3, 5 N=8 PP330 - 380kPa 1.95m	D 1.80m BH3c 1.95m 2.00m	672.5			CI	Sandy CLAY, medium plasticity, orange-brown, fine to coarse grained sand, trace of fine gravel		VSt - H	RESIDUAL
				672.0	2.0						
				671.5	2.5						
		2.90m SPT 10/100mm N=R 3.00m	3.00m		3.0			CONTINUED AS CORED BOREHOLE			
				671.0							
				670.5	3.5						
				670.0	4.0						
				669.5	4.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH3

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 674.10 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				674.0	0.0						
				673.5	0.5						
				673.0	1.0						
				672.5	1.5						
				672.0	2.0						
				671.5	2.5						
					3.00		START CORING AT 3.00m				
NMLC	0% LOSS	100	0	671.0			GRANITE, coarse grained, orange-brown and grey	XW			
					3.42						
				670.5	3.5		CORE LOSS 0.27m (3.42-3.69)				
					3.69						
		87	0	670.0	4.0		GRANITE, coarse grained, orange-brown and grey, crystalline structure	XW			
				669.5	4.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH3

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 674.10 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	87	0	669.0	5.5		GRANITE, coarse grained, orange-brown and grey, crystalline structure	XW			JT 28° Fe PR S
		100	0	668.5	6.0						
				668.0	6.5						
				667.5	7.0						
				667.0	7.5						
				666.5	8.00						
				666.0	8.5		CORED BOREHOLE BH3 TERMINATED AT 8.00 m				
				665.5	9.0						
				665.0	9.5						
				664.5							

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH3 - Photograph 1 of 1**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG

BH4

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 670.50 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT					0.13			CONCRETE, 130mm thick			CONCRETE FOOTPATH
			0.20m		0.20		GM	FILL, Silty Sandy GRAVEL, fine to medium, dark grey, sub-angular	M		FILL
			BH4				SM	FILL, Silty SAND, fine to coarse grained, brown			
			0.40m								
		0.50m	0.50m D	670.0	0.50						
AD/T	(Not Encountered)	0.55m SPT 10/50mm N=R	0.55m					GRANITE, pale grey, dark grey and orange	XW	EL	BEDROCK
			0.90m								
			BH4a 1.10m	669.5	1.0						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
											TC Bit refusal at 1.3m
								CONTINUED AS CORED BOREHOLE			
				669.0	1.5						
				668.5	2.0						
				668.0	2.5						
				667.5	3.0						
				667.0	3.5						
				666.5	4.0						
				666.0	4.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH4

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 670.50 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				670.0	0.5						
				669.5	1.0						
					1.30		START CORING AT 1.30m				
NMLC	0% LOSS	100	0	669.0	1.5	+ + +	GRANITE, coarse grained, brown	XW			
					1.65	+ + +	GRANITE, coarse grained, white, brown and grey, crystalline texture				
		100	0	668.5	2.0	+ + +					
				668.0	2.5	+ + +					
		100	0			+ + +					
				667.5	3.0	+ + +					
				667.0	3.5	+ + +	very high strength fresh granite corestone/fragments from 3.43m to 3.60m				JT 20° Clay VNR CU S Note: Point load test on granite corestone/fragment
		100	48		3.85	+ + +					Note: Granite core disintergrates readily into sandy soil under hand pressure
				666.5	4.0	+ + +	GRANITE, coarse grained, white, brown and grey, crystalline texture, indistinct fabric	HW			
				666.0	4.5	+ + +					
		100	100			+ + +					

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH4

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 670.50 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	100	665.0	5.5		GRANITE, coarse grained, white, brown and grey, crystalline texture, indistinct fabric	HW			
				664.5	6.0						
				664.0	6.5						
		96	94	663.5	7.0						DZ 50 mm
				663.0	7.5						HB
				662.5	8.0						
				662.0	8.5						
					8.87		CORE LOSS 0.13m (8.87-9.00)				
				661.5	9.00		GRANITE, coarse grained, white, brown and grey, crystalline texture, indistinct fabric	HW			
				661.0	9.5						
							CORED BOREHOLE BH4 TERMINATED AT 9.85 m				

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH4 - Photograph 1 of 1**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG
BH5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 669.70 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered)			669.5	0.12			ASPHALTIC CONCRETE, 120mm thick	M		CAR PARK SURFACE
			0.30m		0.27			FILL, Silty Sandy GRAVEL			CAR PARK BASE MATERIAL
		0.50m	BH5 0.50m		0.5			FILL, Silty SAND, fine to coarse grained, brown and grey, trace of clay and gravel			FILL
		SPT 4, 6, 9 N=15 0.95m	D 0.5-0.95 BH5a (0.8-1.0m) 1.00m	669.0	1.0						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
			1.30m	668.5							
		1.50m	BH5b 1.50m		1.5						
		SPT 9, 18/150mm N=R 1.80m	D 1.95m	668.0	1.60			GRANITE, grey, dark grey and orange	XW	EL	BEDROCK
				667.5	2.0						
				667.0	2.5						TC Bit refusal at 2.8m
								CONTINUED AS CORED BOREHOLE			
				666.5	3.0						
				666.0	3.5						
				665.5	4.0						
				665.0	4.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 669.70 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				669.5	0.5						
				669.0	1.0						
				668.5	1.5						
				668.0	2.0						
				667.5	2.5						
				667.0	2.80		START CORING AT 2.80m				
NMLC	0% LOSS	100	0	666.5	3.0	+ + +	GRANITE, coarse grained, pale grey, brown and dark grey, crystalline texture	XW			
				666.0	3.5	+ + +					
				665.5	4.0	+ + +					
				665.0	4.5	+ + +	becoming white, brown and grey at 4.3m				
		100	78			+ + +					

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 669.70 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	78	664.5	5.00	+ +	GRANITE, coarse grained, white, brown and grey	XW			
					5.30	+ +	GRANITE, coarse grained, white, brown and grey, crystalline texture, indistinct fabric	HW			Note: Granite core disintergrates readily into sandy soil under hand pressure
				664.0	5.5						
				663.5	6.0						
				663.0	6.5						
				662.5	7.0						
		100	100	662.0	7.5						
				661.5	8.0						
				661.0	8.5						
				660.5	9.0						
		100	100	660.0	9.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 669.70 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	100	659.5	10.5		GRANITE, coarse grained, white, brown and grey, crystalline texture, indistinct fabric	HW			
				659.0	11.0						
				658.5	11.5						
		100	100	658.0	12.0						
				657.5	12.5						
		100	100	657.0	13.0						
				656.5	13.5						
				656.0	14.0						
		100	100	655.5	14.5						
				655.0							

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 07/06/2023
DATE COMPLETED: 07/06/2023
SURFACE RL: 669.70 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	100	654.5	15.5		GRANITE, coarse grained, white, brown and grey, crystalline texture, indistinct fabric	HW			
				654.0							
				653.5	16.0						
				653.0	16.5						
				652.5	17.0						
				652.0	17.5						
		100	100	651.5	18.0						
				651.0	18.5						JT 45° PR RF
				650.5	19.0		fresh granite corestone from 19.15m to 19.3m				
				650.0	19.5		CORED BOREHOLE BH5 TERMINATED AT 19.78 m				

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH5 - Photograph 1 of 2**	
Location:	Bathurst Hospital		**RCA ref:** 16547

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH5 - Photograph 2 of 2**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG

BH6

SHEET 1 OF 5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 669.90 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			0.15m		0.11			CONCRETE, 110mm thick			FOOTPATH PAVEMENT
AD/T	(Not Encountered)		BH6 0.30m				SM	FILL, Silty SAND, fine to coarse grained, brown, trace of clay	M		FILL
		0.50m	0.50m	669.5	0.5						
		SPT 2, 3, 5 N=8	D (0.5-0.95m) BH6a/DUP1 (0.8-1.0m)								
		0.95m	1.00m	669.0	1.0						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
		1.50m	1.50m	668.5	1.5						
		SPT 6, 6, 5 N=11	D (1.5-1.95m) BH6b/QA1 (1.8-2.0m)								
		1.95m	2.00m	668.0	2.0						
				667.5	2.5						
			2.80m								
		3.00m	BH6c **3.00m**	667.0	3.0						Coarse, sub-rounded gravel fragment in SPT at 3.0m
		SPT 2, 3, 3 N=6	D								
		3.45m	3.45m	666.5	3.5						
			3.80m								
			BH6d/QA2	666.0							
			4.00m		4.0						
				665.5							
		4.50m	4.50m		4.5						
		SPT 4, 4, 4 N=8	D								
		4.95m	4.95m	665.0							

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

GEOTECHNICAL BOREHOLE LOG

BH6

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 669.90 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered)			664.5	5.5		SM	FILL, Silty SAND, fine to coarse grained, brown, trace of clay	M		FILL
			5.80m								
			BH6e	664.0							
		6.00m	**6.00m**		6.0						
		SPT 3, 2, 3 N=5	D								
		6.45m	6.45m	663.5	6.5						
				663.0	7.0						
				662.5							
		7.50m	7.50m D		7.50		SM	GRANITE, coarse grained, white, dark grey and brown, crystallite texture, indistinct fabric	HW	VL	BEDROCK
		7.53m SPT 8/30mm N=R	7.53m					CONTINUED AS CORED BOREHOLE			
				662.0	8.0						
				661.5	8.5						
				661.0	9.0						
				660.5	9.5						
				660.0							

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CORED BOREHOLE LOG
BH6

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 669.90 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				664.5	5.5						
				664.0	6.0						
				663.5	6.5						
				663.0	7.0						
				662.5	7.5		START CORING AT 7.53m				
NMLC	0% LOSS	100	76	662.0	8.0		GRANITE, coarse grained, white, dark grey and brown, crystallite texture, indistinct fabric	HW			Note: Granite core disintergrates readily into sandy soil under hand pressure
				661.5	8.5						DZ
				661.0	9.0						
				660.5	9.5						
		100	100	660.0							

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CORED BOREHOLE LOG
BH6

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 669.90 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	100	659.5	10.5		GRANITE, coarse grained, white, dark grey and brown, crystallite texture, indistinct fabric	HW			
				659.0	11.0						
					11.10		CORE LOSS 1.48m (11.10-12.58)				No change in drilling penetration resistance observed in core loss zone from 11.10m to 12.58m
		49	49	658.5	11.5						
				658.0	12.0						
				657.5	12.5						
					12.58		GRANITE, coarse grained, white, dark grey and brown, crystallite texture, indistinct fabric	HW			
				657.0	13.0						
				656.5	13.5						
				656.0	14.00		CORE LOSS 0.13m (14.00-14.13)				
					14.13		GRANITE, coarse grained, white, dark grey and brown, crystallite texture, indistinct fabric	HW			JT 60° Fe Clay VNR PR RF
		94	91	655.5	14.5						
				655.0			fresh granite corestone from 14.80m to 14.93m				

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CORED BOREHOLE LOG
BH6

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 08/06/2023
DATE COMPLETED: 08/06/2023
SURFACE RL: 669.90 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	94	91	654.5	15.5	+ + +	GRANITE, coarse grained, white, dark grey and brown, crystallite texture, indistinct fabric	HW			
				654.0	16.0	+ + +					
					16.20		CORED BOREHOLE BH6 TERMINATED AT 16.20 m				
				653.5	16.5						
				653.0	17.0						
				652.5	17.5						
				652.0	18.0						
				651.5	18.5						
				651.0	19.0						
				650.5	19.5						
				650.0							

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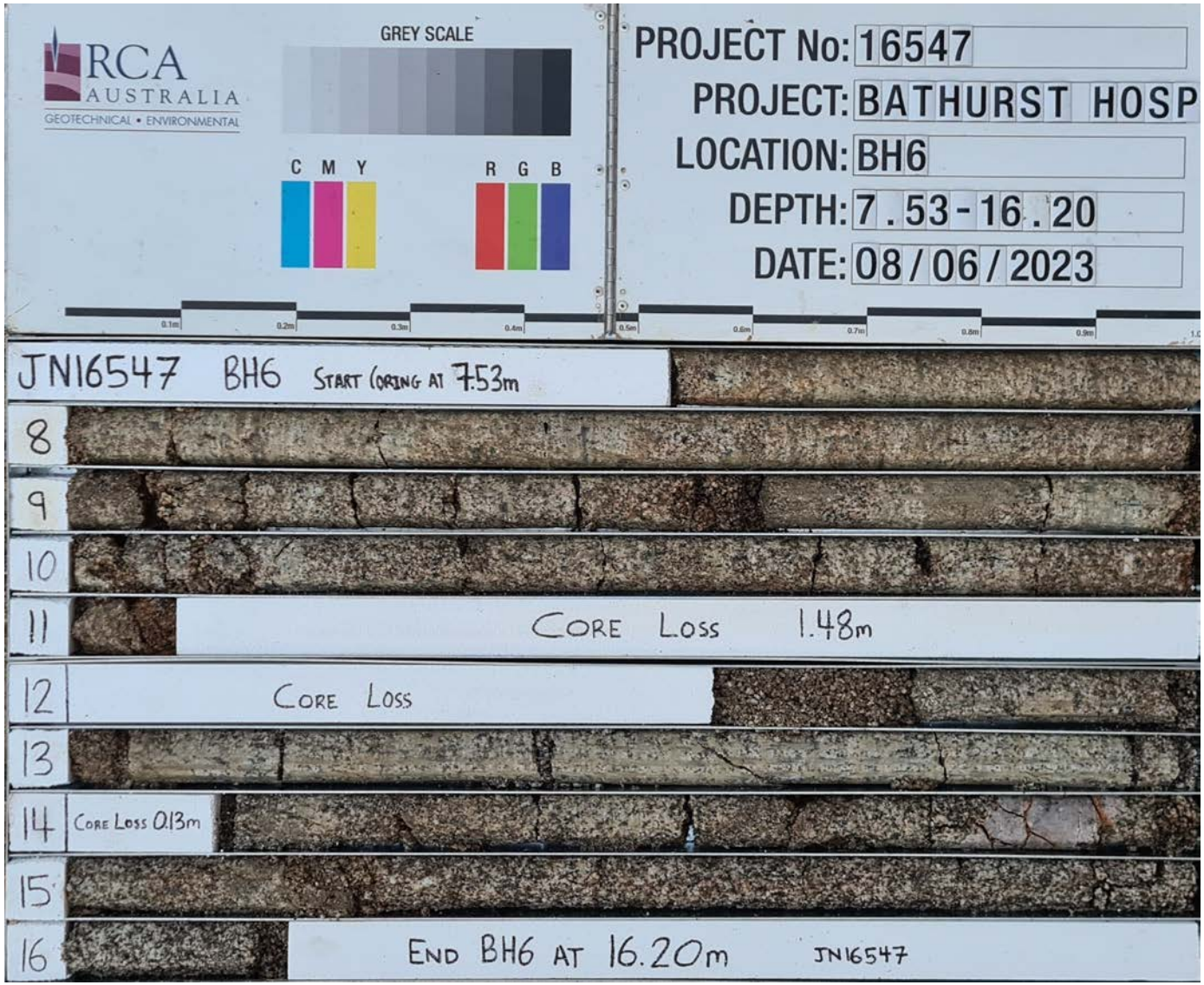

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH6 - Photograph 1 of 1**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG

BH7

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 669.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered)				0.10			ASPHALTIC CONCRETE, 100mm thick			CAR PARK PAVEMENT
			0.30m BH7a (0.3-0.5m)	669.5	0.30		SM	FILL, Silty Sandy GRAVEL, fine to medium, grey-brown, sub-angular	M		CAR PARK BASE MATERIAL
		0.50m	0.50m		0.5		SM	FILL, Silty SAND, fine to coarse grained, grey, trace of clay and fine gravel			FILL
		SPT 6, 6, 6 N=12	D (0.5-0.95m) BH7b (0.8-1.0m)	669.0							
		0.95m	1.00m		1.0						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
		1.20m	1.20m								
		SPT 4, 6, 6 N=12	D (1.2-1.65m) BH7c (1.6-1.8m)	668.5	1.5						TC Bit refusal at 1.8m (on inferred very high strength granite boulder) Wash bore/install casing
		1.65m									
			1.80m	668.0				granite boulder in residual soil matrix at 1.8m			
					2.0			CONTINUED AS CORED BOREHOLE			
				667.5	2.5						
				667.0	3.0						
				666.5	3.5						
				666.0	4.0						
				665.5	4.5						
				665.0							

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CORED BOREHOLE LOG
BH7

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 669.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				669.5	0.5						
				669.0	1.0						
				668.5	1.5						
				668.0	1.95		START CORING AT 1.95m				
NMLC	0% LOSS	100	0	667.5	2.0		Sandy CLAY, medium plasticity, brown, with gravel/cobble sized fresh granite fragments, very stiff consistency	RS			
				667.0	2.5						
				666.5	2.60		GRANITE coarse grained, pale grey, brown and dark grey	XW			Water level at 3.1m on completion on NMLC coring
				666.0	3.0						
				665.5	3.5						
		61	0		4.0		becoming with gravel sized quartz, up to 50mm at 4.1m				
					4.20		CORE LOSS 0.27m (4.20-4.47)				
					4.47		GRANITE, coarse grained, red-brown, crystalline texture	XW			
		100	73	665.0	4.5						

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CORED BOREHOLE LOG
BH7

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 669.80 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	73	664.5	5.40		GRANITE, coarse grained, red-brown, crystalline texture	XW			
				664.0	5.5		GRANITE, coarse grained, pale grey, dark grey and orange-brown, crystalline texture, indistinct fabric	HW			
				663.5	6.0						
				663.0	6.5		dark brown zone from 6.6m to 6.7m				
				662.5	7.0						
		100	97	662.0	7.5		becoming white, dark grey and brown at 7.7m				
				661.5	8.0						
				661.0	8.5						
				660.5	9.0						CS with fresh granite corestone fragments
				660.0	9.5						

CORED BOREHOLE BH7 TERMINATED AT 10.00 m

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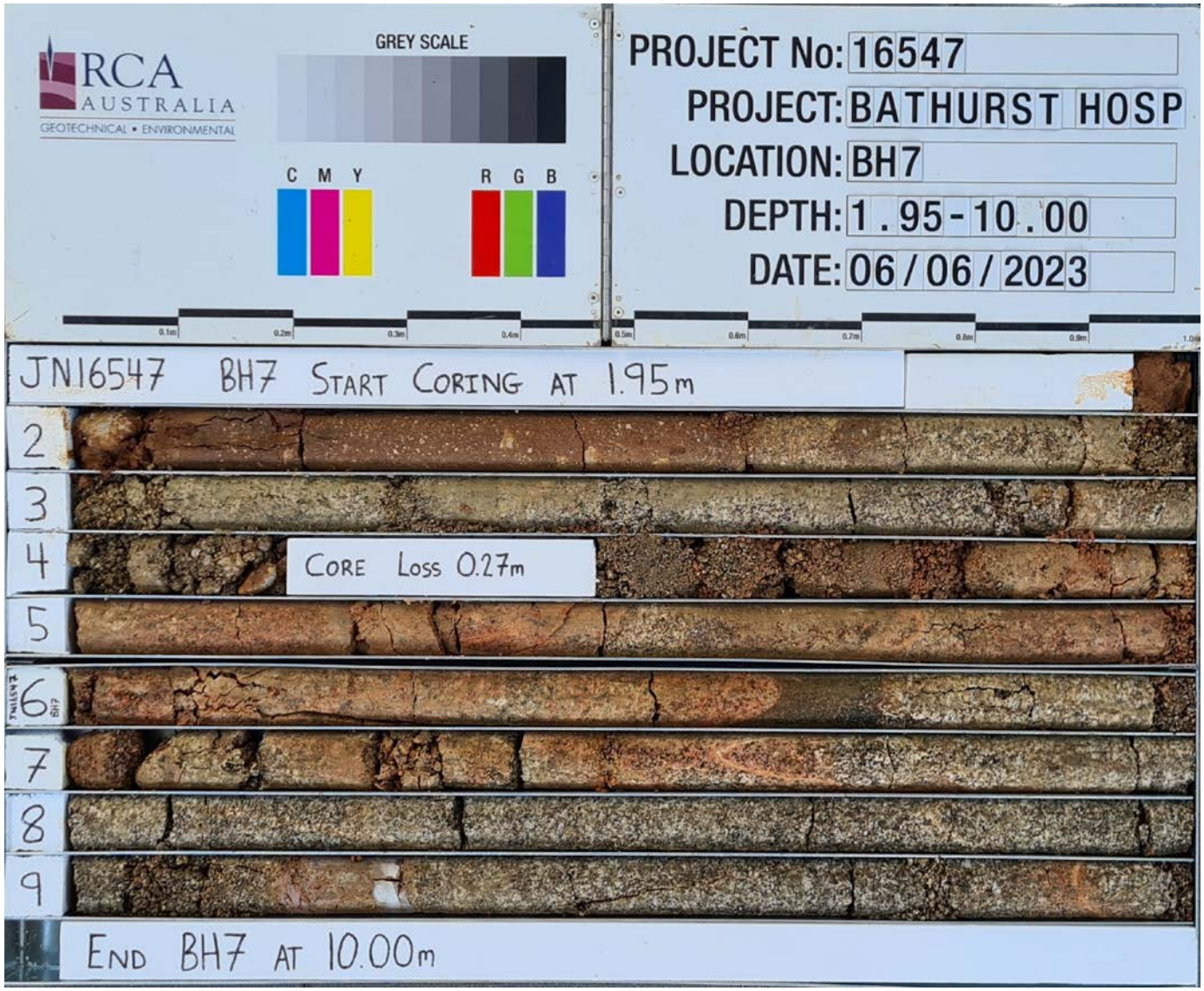

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH7 - Photograph 1 of 1**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG

BH8

SHEET 1 OF 5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 668.60 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered)		0.10m	668.5	0.10			WOOD CHIPS/MULCH			LANDSCAPED AREA
			BH8 0.30m					FILL, Silty SAND, fine to coarse grained, trace of clay and gravel	M		FILL
			0.40m								
		0.50m			0.5						
		SPT 4, 6, 9 N=15	BH8a (0.4-0.6m)	668.0							
			D (0.5-0.95m)								
		0.95m	BH8b (0.9-1.1m)								
			1.10m	667.5	1.0						**NOTE: Borehole surface RL estimated based on supplied survey plan (borehole not surveyed)**
		1.50m	1.50m		1.5						
				667.0							
		SPT 7, 6, 7 N=13	D-BH8c (1.8-2.0m)								
		1.95m	2.00m		2.0						
				666.5							
					2.5						
				666.0							
		3.00m	3.00m		3.0						
			D (3.0-3.45m)	665.5							
		SPT 3, 5, 7 N=12	BH8d (3.1-3.3m)								
		3.45m	3.45m		3.5						
				665.0							
					4.0						
				664.5							
		4.50m	4.50m		4.5						
			BH8e (4.5-4.7m)	664.0							
		SPT 2, 3, 5 N=8	D (4.5-4.95m)								
		4.95m	4.95m								

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GEOTECHNICAL BOREHOLE LOG

BH8

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 668.60 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered)			663.5				FILL, Silty SAND, fine to coarse grained, trace of clay and gravel	M		FILL
				663.0	5.5						
			5.80m BH8f								
		6.00m	**6.00m**								
		SPT 12/100mm N=R	6.01m D	662.5	6.0			CONTINUED AS CORED BOREHOLE			
				662.0	6.5						
				661.5	7.0						
				661.0	7.5						
				660.5	8.0						
				660.0	8.5						
				659.5	9.0						
				659.0	9.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH8

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 668.60 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
				663.5							
					5.5						
				663.0							
					6.0		START CORING AT 6.05m				
					6.05						
NMLC	0% LOSS	100	24	662.5			GRANITE, orange-brown	XW			
					6.5						
				662.0			becoming pale grey and dark grey at 6.55m				
					7.0						
				661.5							
					7.5			HW			Note: Granite core disintergrates readily into sandy soil under hand pressure
				661.0							
		100	100		8.0						
				660.5							
					8.5						
				660.0							
					9.0						
				659.5							
					9.5						
				659.0							

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH8

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 668.60 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description					
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	100	658.5	10.5		GRANITE, orange-brown	HW			JT 60° PR S
				658.0							
				657.5	11.0						
				657.0	11.5						
		10	100	656.5	12.0		dark grey/brown altered zone from 12.1m to 12.65m				JT 50° Fe PR VR
				656.0	12.5						
				655.5	13.0						JT 50° PR RF
		100	100	655.0	13.5						
				654.5	14.0						
				654.0	14.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

CORED BOREHOLE LOG
BH8

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE COMMENCED: 06/06/2023
DATE COMPLETED: 06/06/2023
SURFACE RL: 668.60 m AHD
COORDS:
DRILL MODEL: Hanjin D&B 8-D

Borehole Information						Field Material Description				
METHOD	WATER LOSS	CORE RECOVERY	RQD	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
NMLC	0% LOSS	100	100	653.5	15.5		GRANITE, orange-brown	HW			
				653.0							
				652.5	16.0						
				652.0	16.5		fresh granite corestone from 16.55m to 16.64m				
		100	90	651.5	17.0						
				651.0	17.5						
				650.5	18.0						
				650.0	18.5						
				649.5	19.0						DZ
					19.25		CORED BOREHOLE BH8 TERMINATED AT 19.25 m				
				649.0	19.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH8 - Photograph 1 of 2**	
Location:	Bathurst Hospital		**RCA ref:** 16547

Client:	Health Infrastructure		**RCA Australia**
Project:	Geotechnical Investigation	**BH8 - Photograph 2 of 2**	
Location:	Bathurst Hospital		**RCA ref:** 16547

GEOTECHNICAL BOREHOLE LOG

BH9

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE: 09/06/2023
SURFACE RL: ~674m AHD
COORDS:
EXCAVATION METHOD: 5t Excavator with 300mm Auger

Borehole Information					Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered				0.04			ASPHALTIC CONCRETE, 40mm thick	M		CAR PARK PAVEMENT
			0.30m				FILL, Silty Sandy GRAVEL, fine to medium, grey, sub-angular			CAR PARK BASE MATERIAL
			BH9 0.50m	0.5						**NOTE: Borehole surface RL estimated and extrapolated based on supplied survey plan (borehole not surveyed)**
	6		0.70m	0.70						
	4		BH9a (0.8-1.0m)				Clayey Gravelly SAND, fine to coarse grained, orange-brown		MD	RESIDUAL
	5		B (0.7-1.1m)	1.0						
	6								D - VD	
	15		1.10m	1.10						
	19						Silty SAND, fine to coarse grained, brown, trace of clay and gravel			
			1.30m							
			BH9b 1.50m	1.50						
							BOREHOLE BH9 TERMINATED AT 1.50 m			
				2.0						
				2.5						
				3.0						
				3.5						
				4.0						
				4.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

BH9 PHOTOGRAPH 1

Client:	Health Infrastructure	**RCA Australia**
Project:	Geotechnical Investigation	
Location:	Bathurst Hospital	**RCA ref:** 16547

BH9 PHOTOGRAPH 2

GEOTECHNICAL BOREHOLE LOG

BH10

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE: 09/06/2023
SURFACE RL: ~673m AHD
COORDS:
EXCAVATION METHOD: Hand Auger

Borehole Information					Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
	3		0.10m	0.10		ML	FILL/TOPSOIL, Clayey SILT, low plasticity, brown	M		FILL / TOPSOIL
	6		BH10			CI	FILL, CLAY, medium plasticity, brown, with sand and gravel	w~PL		FILL
	8		0.30m							
	5									
	3			0.5						
	2									**NOTE: Borehole surface RL estimated and extrapolated based on supplied survey plan (borehole not surveyed)**
	3									
	2		0.80m							
	2		BH10a							
	11		1.00m	1.0						
	6		1.10m	1.10						
	6		BH10b			ML	TOPSOIL, SILT, low plasticity, brown	M		TOPSOIL
	10		**1.30m**	1.30						
	11		BH10c				Clayey SAND, fine to coarse grained, brown		D	RESIDUAL
	11		1.50m	1.5			becoming pale brown at 1.4m			
	19			1.60						
	19						BOREHOLE BH10 TERMINATED AT 1.60 m			
	23									
	25			2.0						
	19									
	19									
	19									
	33			2.5						
				3.0						
				3.5						
				4.0						
				4.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

GEOTECHNICAL TEST PIT LOG

TP1

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE: 09/06/2023
SURFACE RL: ~669.3m AHD
COORDS:
EXCAVATION METHOD: 5t Excavator with 400mm Bucket

Test Pit Information					Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered			TP1/DUP3/ QA3 0.20m	0.5		ML	TOPSOIL, SILT, low plasticity, orange-brown	M		TOPSOIL **NOTE: Test pit surface RL estimated based on supplied survey plan (test pt not surveyed)**
			0.60m	0.60						
			TP1a B (0.6-0.8m) 0.80m				Extremely Weathered Granite, properties of Silty SAND, fine to coarse grained, orange-brown, with clay	XW	D - VD	EXTREMELY WEATHERED MATERIAL
			1.00m	1.0						
			TP1b 1.20m	1.25			TEST PIT TP1 TERMINATED AT 1.25 m			
				1.5						
				2.0						
				2.5						
				3.0						
				3.5						
				4.0						
				4.5						

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

TP1 PHOTOGRAPH 1

Client:	Health Infrastructure	**RCA Australia**
Project:	Geotechnical Investigation	
Location:	Bathurst Hospital	**RCA ref:** 16547

GEOTECHNICAL TEST PIT LOG
TP2

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16547
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: Bathurst Hospital

DATE: 09/06/2023
SURFACE RL: ~665.8m AHD
COORDS:
EXCAVATION METHOD: 5t Excavator with 400mm Bucket

Test Pit Information					Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered			TP2 0.10m				FILL, Silty SAND, fine to coarse grained, brown	M		FILL
			0.40m TP2a 0.50m	0.5						**NOTE: Test pit surface RL estimated based on supplied survey plan (test pt not surveyed)**
			0.70m TP2b 0.80m 0.85m	0.65		ML	TOPSOIL, SILT, low plasticity, brown			TOPSOIL
			B 1.10m	0.85 1.0			Silty SAND, fine to coarse grained, brown, with clay and lenses of extremely weathered material		D - VD	RESIDUAL
				1.40 1.5			Extremely Weathered Granite, properties of Silty SAND, fine to coarse grained, orange-brown, with clay	XW		EXTREMELY WEATHERED MATERIAL
				1.90 2.0 2.5 3.0 3.5 4.0 4.5			TEST PIT TP2 TERMINATED AT 1.90 m			

LOGGED: RC | CHECKED: MA | DATE: 04/08/2023

TP2 PHOTOGRAPH 1

Client:	Health Infrastructure	**RCA Australia**
Project:	Geotechnical Investigation	
Location:	Bathurst Hospital	**RCA ref:** 16547

Explanatory Notes – Soil Description

In engineering terms, soil includes every type of uncemented or partially cemented material found in the ground. In practice, if the material can be remoulded by hand in its field condition or in water it is described as a soil. The dominant soil constituent is given in capital letters, with secondary textures in lower case. The dominant feature is assessed from *AS 1726:2017 – Geotechnical Site Investigations* and a soil symbol is used to define a soil layer.

METHOD

Method	Description
AD/T	Auger Drilling with tungsten carbide bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
AT	Air Track
BH	Backhoe
CT	Cable Tool Rig
DB	Washbore Drag Bit
DT	Diatube
E	Excavator
EH	Excavator with Hammer
HA	Hand Auger
HQ	Diamond Core-63mm diameter
N	Natural Exposure
NMLC	Diamond Core-52mm diameter
NQ	Diamond Core-47mm diameter
Percussion	Percussion Drilling
PT	Push Tube
RR	Rock Roller
V	Vacuum Excavation
WS	Washbore
X	Existing Excavation

WATER

Water level at date shown

Seepage

NOT ENCOUNTERED: The borehole/test pit was dry soon after excavation. Inflow may have been observed had the borehole/test pit been left open for a longer period.

NOT OBSERVED: The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.

SAMPLING

Sample	Description
B	Bulk Disturbed Sample
D	Disturbed Sample
SPT	Standard Penetration Test
U50	Undisturbed Sample - 50mm diameter
U75	Undisturbed Sample - 75mm diameter
ES	Soil Sample, Environmental
EW	Water Sample, Environmental
G	Gas Sample

SOIL CLASSIFICATION

The appropriate symbols are selected based on the result of visual examination, field tests and available laboratory test results, such as particle size analysis, liquid limit and plasticity index.

Group Symbol	Description
GW	Well graded gravel
GP	Poorly graded gravel
GM	Silty gravel
GC	Clayey gravel
SW	Well graded sand
SP	Poorly graded sand
SM	Silty sand
SC	Clayey sand
ML	Silt of low plasticity
CL	Clay of low plasticity
OL	Organic soil of low plasticity
CI	Clay of medium plasticity
MH	Silt of high plasticity
CH	Clay of high plasticity
OH	Organic soil of high plasticity
Pt	Peat, highly organic soil

MOISTURE CONDITION

For coarse grained soils, the following terms are used

Dry - Non-cohesive and free-running

Moist - Soil feels cool, darkened in colour
- Soil tends to stick together

Wet - Soil feels cool, darkened in colour
- Soil tends to stick together, free water forms when handling

For fine grained soils, the following moisture content (w) terms are used:

w < PL - Moist, dry of plastic limit

w ≈ PL - Moist, near plastic limit.

w > PL - Moist, wet of plastic limit.

w ≈ LL - Wet, near liquid limit.

w > LL - Wet, wet of liquid limit

PLASTICITY

Soil plasticity is a measure of the range of water content over which a soil exhibits plastic properties. The classification of the degree of plasticity in terms of the Liquid Limit (LL) is as follows.

Description of Plasticity	Range of Liquid Limit for Silt	Range of Liquid Limit for Clay
Non-plastic	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

COHESIVE SOILS – CONSISTENCY

The consistency of a cohesive soil is defined by descriptive terminology such as very soft, soft, firm, stiff, very stiff and hard. These terms are assessed by the shear strength of the soil as observed visually, by hand penetrometer, dynamic cone penetrometer or vane shear values and by resistance to deformation to hand moulding.

A hand penetrometer may be used in the field or the laboratory to provide an approximate assessment of the unconfined compressive strength (UCS) of cohesive soils. Undrained shear strength $c_u = 0.5 \times UCS$. Undrained shear strength values are recorded in kPa as follows:

Strength	Symbol	Indicative Undrained Shear Strength, c_u (kPa)
Very Soft	VS	≤12
Soft	S	>12 and ≤25
Firm	F	>25 and ≤50
Stiff	St	>50 and ≤100
Very Stiff	VSt	>100 and ≤200
Hard	H	>200
Friable	Fr	—

COHESIONLESS SOILS – RELATIVE DENSITY

Relative density terms such as very loose, loose, medium dense, dense and very dense are used to describe silty and sandy material, and these are usually based on resistance to drilling penetration, Standard Penetration Test (SPT) N values or Perth Sand Penetrometer resistance.

Term	Symbol	Density Index
Very Loose	VL	0 to 15
Loose	L	15 to 35
Medium Dense	MD	35 to 65
Dense	D	65 to 85
Very Dense	VD	>85

SOIL PARTICLE SIZE DESCRIPTIVE TERMS

Fraction	Name	Subdivision	Size (mm)
Oversize	Boulders		>200
	Cobbles		63 to 200
Coarse grained soil	Gravel	Coarse	19 to 63
		Medium	6.7 to 19
		Fine	2.36 to 6.7
	Sand	Coarse	0.6 to 2.36
		Medium	0.21 to 0.6
		Fine	0.075 to 0.21
Fine grained soil	Silt		0.002 to 0.075
	Clay		<0.002

Explanatory Notes - Rock Description

METHOD

Refer to soil description sheet.

WATER

Refer to soil description sheet.

ROCK QUALITY

The defect spacing is shown where applicable and the Rock Quality Designation (RQD) and Total Core Recovery (TCR) for each core run is given where:

$$TCR = \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100\%$$

$$RQD = \frac{\text{Sum of axial length of sound core pieces >100mm long}}{\text{Length of core run}} \times 100\%$$

ROCK MATERIAL WEATHERING

Rock material weathering is described using the abbreviations and definitions used in *AS1726:2017– Geotechnical Site Investigations*.

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

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

ROCK MATERIAL STRENGTH

Rock strength is described using *AS1726:2017– Geotechnical Site Investigations* and *ISRM – Commission on Standardisation of Laboratory and Field Tests, 'Suggested method of determining the Uniaxial Compressive Strength of Rock materials and the Point Load Index'* as follows:

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Point Load Index Is_{50} (MPa)
Very Low	VL	0.6 to 2	0.03 to 0.1
Low	L	2 to 6	0.1 to 0.3
Medium	M	6 to 20	0.3 to 1
High	H	20 to 60	1 to 3
Very High	VH	60 to 200	3 to 10
Extremely High	EH	>200	>10

◀ Diametral Point Load Index test.

▼ Axial Point Load Index test.

DEFECT SPACING/BEDDING THICKNESS

Depending on the project, may be either described as mean perpendicular spacing within a set of defects or bedding, or as the spacing between all defects within the rock mass.

Term	Defect Spacing	Bedding
Extremely closely spaced	<6 mm	Thinly laminated
	6 to 20 mm	Laminated
Very closely spaced	20 to 60 mm	Very thin
Closely spaced	0.06 to 0.2 m	Thin
Moderately widely spaced	0.2 to 0.6 m	Medium
Widely spaced	0.6 to 2.0 m	Thick
Very widely spaced	>2 m	Very thick

DEFECT DESCRIPTION

Type	Definition
JT	Joint
BP	Bedding Parting
CO	Contact
CS	Clay Seam
CZ	Crush Zone
DK	Dyke
DZ	Decomposed Zone
FC	Fracture
FZ	Fracture Zone
FL	Foliation
FLT	Fault
VN	Vein
SM	Seam
IS	Infilled Seam
SZ	Shear Zone

Planarity	Roughness
PR – Planar	VR – Very Rough
CU – Curved	RF – Rough
U – Undulating	S – Smooth
ST – Stepped	POL – Polished
IR – Irregular	SL – Slickensided

Symbol	Coating or Infill
CA	Calcite
Clay	Clay
CN	Clean
Fe	Iron oxide
KT	Chlorite
Qz	Quartz
X	Carbonaceous
SN	Stain
VNR	Veneer

The inclinations of defects are measured from perpendicular to the core axis.

Appendix C

Laboratory Test Results

RCA LABORATORIES
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CONSTRUCTION MATERIALS TESTING

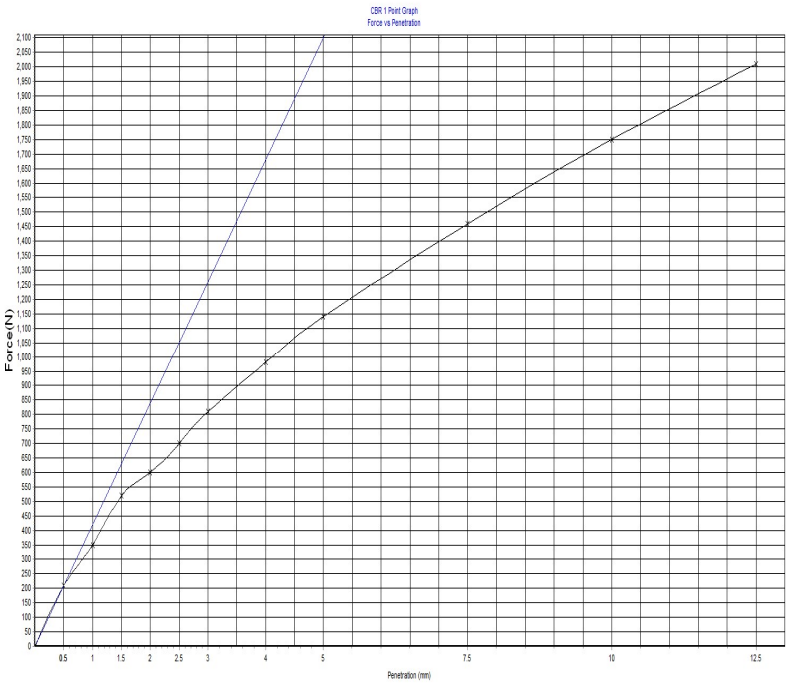
92 Hill St Carrington Newcastle NSW 2294
Ph +61 2 4902 9200
Web www.rca.com.au
ABN 53 063 515 711
NATA Accredited Laboratory: 9811
Corporate Site No: 9804
Construction Materials Testing

California Bearing Ratio Report (1 Point)

Client :	**Health Infrastructure**	Report Number:	**16547 - 001**
Address :	**1 Reserve Road, St Leonards, NSW, 2065**	Report Date :	**18/07/2023**
Project Number :	**16547**	Order Number :	
Project Name :	**Geotechnical Investigation**	Test Method :	**AS 1289.6.1.1**
Location:	**Bathurst Hospital , Bathurst**	**Page 1 of 3**	

		SAMPLE LOCATION
Sample Number :	23-1765	
Date Sampled :	9/06/2023	TP1
Date Tested :	17/07/2023	0.6-0.8m
Sampled By :	RCA Geotech	
Sampling Method :	AS SUPPLIED	
Material Source :		Lot Number :
Material Type :		Test Number :
Remarks : Results apply to samples as received		

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m³) :	1.768
Optimum Moisture Content (%) :	13.9
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	101
Achieved Percentage of OMC :	100.0
Dry Density Before Soak (t/m³) :	1.779
Dry Density After Soak (t/m³) :	1.757
Moisture Content Before Soak (%) :	13.9
Moisture Content After Soak (%) :	15.9
Density Ratio After Soak (%) :	99
Field Moisture Content (%) :	7.8
Top Moisture Content - After Penetration (%) :	15.9
Total Moisture Content - After Penetration (%) :	15.9
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	1.0



CBR Surcharge (kg) :	4.5		
Oversize (%) :	0	CBR 5.0mm (%) :	**6**
Oversize Material Replaced (%) :	Excluded	**CBR Value (%) :**	**6**

Site Selection :	
Soil Description :	Silty SAND with clay

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

APPROVED SIGNATORY

Timothy Baker - Senior Soil Technician
NATA Accreditation Number :
9811

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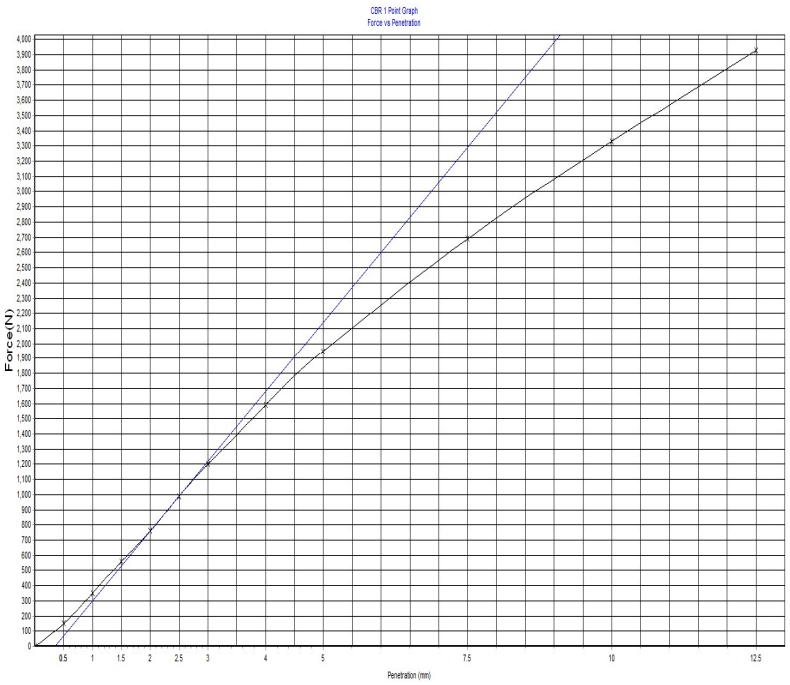
Corporate Site No: 9804
Construction Materials Testing

California Bearing Ratio Report (1 Point)

Client :	**Health Infrastructure**	Report Number:	**16547 - 001**
Address :	**1 Reserve Road, St Leonards, NSW, 2065**	Report Date :	**18/07/2023**
Project Number :	**16547**	Order Number :	
Project Name :	**Geotechnical Investigation**	Test Method :	**AS 1289.6.1.1**
Location:	**Bathurst Hospital , Bathurst**	**Page 2 of 3**	

		SAMPLE LOCATION
Sample Number :	23-1766	
Date Sampled :	9/06/2023	TP2
Date Tested :	17/07/2023	0.85-1.1m
Sampled By :	RCA Geotech	
Sampling Method :	AS SUPPLIED	
Material Source :		Lot Number :
Material Type :		Test Number :
Remarks :Results apply to samples as received		

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m³) :	1.883
Optimum Moisture Content (%) :	11.5
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	99.0
Dry Density Before Soak (t/m³) :	1.891
Dry Density After Soak (t/m³) :	1.878
Moisture Content Before Soak (%) :	11.4
Moisture Content After Soak (%) :	12.7
Density Ratio After Soak (%) :	100
Field Moisture Content (%) :	12.2
Top Moisture Content - After Penetration (%) :	13.2
Total Moisture Content - After Penetration (%) :	13.0
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	0.5



CBR Surcharge (kg) :	4.5		
Oversize (%) :	0	CBR 5.0mm (%) :	**10**
Oversize Material Replaced (%) :	Excluded	**CBR Value (%) :**	**10**

Site Selection :	
Soil Description :	Silty SAND with clay

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NATA Accreditation Number :
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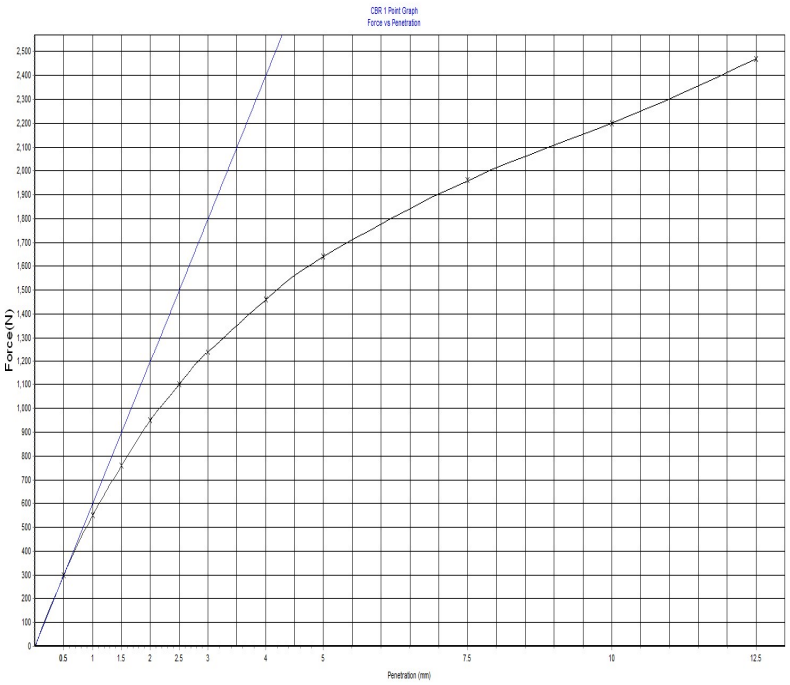
Corporate Site No: 9804
Construction Materials Testing

California Bearing Ratio Report (1 Point)

Client :	**Health Infrastructure**	Report Number:	**16547 - 001**
Address :	**1 Reserve Road, St Leonards, NSW, 2065**	Report Date :	**18/07/2023**
Project Number :	**16547**	Order Number :	
Project Name :	**Geotechnical Investigation**	Test Method :	**AS 1289.6.1.1**
Location:	**Bathurst Hospital , Bathurst**	**Page 3 of 3**	

Sample Number :	23-1767	SAMPLE LOCATION
Date Sampled :	9/06/2023	BH9
Date Tested :	17/07/2023	0.7-1.1m
Sampled By :	RCA Geotech	
Sampling Method :	AS SUPPLIED	
Material Source :		Lot Number :
Material Type :		Test Number :
Remarks : Results apply to samples as received		

Moisture Method :	AS 1289.2.1.1
Maximum Dry Density (t/m³) :	1.82
Optimum Moisture Content (%) :	17.6
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	101.0
Dry Density Before Soak (t/m³) :	1.821
Dry Density After Soak (t/m³) :	1.8
Moisture Content Before Soak (%) :	17.7
Moisture Content After Soak (%) :	19.3
Density Ratio After Soak (%) :	99
Field Moisture Content (%) :	17.8
Top Moisture Content - After Penetration (%) :	19.8
Total Moisture Content - After Penetration (%) :	18.8
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	1.0



CBR Surcharge (kg) :	4.5		
Oversize (%) :	0	CBR 5.0mm (%) :	**8**
Oversize Material Replaced (%) :	Excluded	**CBR Value (%) :**	**8**

Site Selection :	
Soil Description :	Gravelly Clayey SAND

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Accredited for compliance with ISO/IEC 17025 - Testing.

APPROVED SIGNATORY

Timothy Baker - Senior Soil Technician
NATA Accreditation Number :
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Corporate Site No: 9804
Construction Materials Testing

Atterberg Limits Report

Client :	**Health Infrastructure**	Report Number:	**16547 - 002**
Address :	**1 Reserve Road, St Leonards, NSW, 2065**	Report Date :	**18/07/2023**
Project Name :	**Geotechnical Investigation**	Order Number :	
Project Number :	**16547**	Test Method :	**AS1289.3.1.2, 3.2.1, 3.3.1, 3.4.1**
Location:	**Bathurst Hospital , Bathurst**		

Sample Number :	23-1768	23-1769	23-1770	
Test Number :				
Date Sampled :	9/06/2023	8/06/2023	8/06/2023	
Date Tested :	30/06/2023	30/06/2023	30/06/2023	
Sampled By :	RCA Geotech	RCA Geotech	RCA Geotech	
Sampling Method :	AS SUPPLIED	AS SUPPLIED	AS SUPPLIED	
Material Source :				
Material Type :	CLAY with SAND	Gravelly CLAY	Sandy CLAY trace gravel	
Sample Location :	BH1 1.5-1.95m	BH3 1.3-1.5m	BH3 1.5-1.95m	
Lot Number :				
Moisture Method :	AS 1289.2.1.1	AS 1289.2.1.1	AS 1289.2.1.1	
Sample History :	Oven dried prep (50°C)	Oven dried prep (50°C)	Oven dried prep (50°C)	
Sample Preparation :	Dry	Dry	Dry	
Notes :	Slight cracking	Slight cracking	Slight cracking	
Mould Length (mm) :	125	125	125	
Liquid Limit (%) :	31	26	28	
Plastic Limit (%) :	15	15	16	
Plasticity Index (%) :	16	11	12	
Linear Shrinkage (%) :	8	5.5	6.5	
SPECIFICATION DETAILS				
Specification Number :				
Liquid Limit - Max :				
Plasticity Index - Max :				
Linear Shrinkage - Max :				
Remarks :	Results apply to samples as received			

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

APPROVED SIGNATORY

Timothy Baker - Senior Soil Technician
NATA Accreditation Number :
9811

Sydney Laboratory
Unit 5 / 43 Herbert St
Artarmon NSW 2064
email: artarmon@ghd.com.au
web: ghd.com.au/ghdgeotechnics
Tel: (02) 9462 4860
Fax: (02) 9462 4710

Uniaxial Compressive Strength - Report

Report No: SYD2301721
Issue No: 1

Client:	RCA Laboratories
Project:	Job 16547
Location:	Bathurst
Job No.:	12519163

Accredited for compliance with ISO / IEC 17025 - Testing Laboratory Accreditation No. 679

Authorised signatory: D. Brooke

Date of Issue: 6/07/2023

Sample Details

Test Method: AS4133.4.2.2 - UCS less than 50 Mpa
Storage History: Tested as received

Sample ID:	SYD23-0317-01	SYD23-0317-02	SYD23-0317-04		
Client Sample ID:	-	-	-		
Borehole No.:	BH1	BH2	BH5		
Depth (m):	18.15 - 18.30	5.48 - 5.70	17.43 - 17.70		
Date Sampled:	9/06/2023	5/06/2023	7/07/2023		
Date Tested:	29/06/2023	29/06/2023	29/06/2023		
Sample Description:	Granite	Granite	Granite		

Test Results

Sample Height (mm):	126.9	83.9	134.2		
Sample Diameter (mm):	52.5	52.6	52.6		
Sample Height/Diameter Ratio:	2.4	1.6	2.6		
Sample Dry Density (t/m3):	2.314	2.071	2.273		
Moisture Content (%):	3.7	6.8	4.3		
Time of Failure (min):	17.1	10.5	12.2		
Uniaxial compressive strength (MPa):	**0.690**	**0.195**	**0.374**		
Mode of Failure:	Axial Multiple	Single Shear	Single Shear		
Specimen Comments:	Note 2	Note 1	Note 2		
Where rock strength is likely to exceed 50 Mpa, ends are ground flat to 0.02mm	Note 3	Note 2 Note 3	Note 3		

Comments (if applicable):

Note 1	The length to diameter ratio falls outside the test method limits of 2.5:1 to 3:1.
Note 2	Specimen sides not straight to within 0.3mm
Note 3	Specimen ends not parallel or at right angles
Note 4	(T229) The length to diameter ratio falls outside the test method limits of 2.0:1 to 2.5:1.
Note 5	Maximum load falls below the limit of performance of compression machine

Testing machine Wykeham Farrance - 50 kN

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Uniaxial Compressive Strength - Report

Report No: SYD2301721
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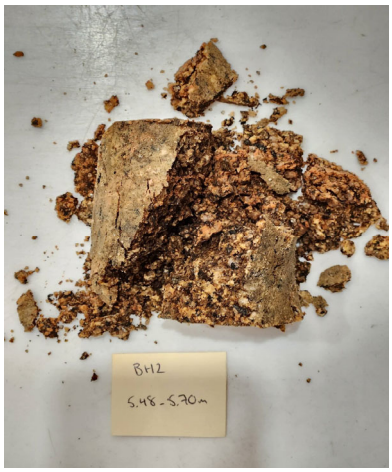
Client:	RCA Laboratories
Project:	Job 16547
Location:	Bathurst
Job No.:	12519163

Accredited for compliance
with ISO / IEC 17025
Laboratory Accreditation No. 679

Photographs

BH1
18.15 - 18.30



BH2
5.48 - 5.70

BH5
17.43 - 17.70

Natural Moisture / Density Report

Report No: *SYD2301746*

Client :	RCA Laboratories
Project :	Project 16547
Location :	Bathurst NSW
TEST METHOD :	AS1289.2.1.1

Job No :	12519163
Borehole No :	See below
Depth :	See below
Sample No :	See below
Client ID :	See below

GHD Sample No	BH ID	Depth (m)	FMC (%)	Bulk Density (t/m³)	Dry Density (t/m³)	Description
SYD23-0317-02	BH4	9.3 - 9.53	6.2	2.159	2.033	granite
SYD23-0317-05	BH5	19.4 - 19.7	4.8	2.407	2.297	granite
SYD23-0317-06	BH6	7.7 - 7.85	4.2	2.247	2.155	granite
SYD23-0317-07	BH7	16.00 - 16.15	4.8	2.215	2.115	granite
SYD23-0317-08	BH8	17.3 - 17.6	4.0	2.286	2.198	granite

Comments :

Bulk density performed on rock core by measurement & weight

Tested By:	AM
Date Tested:	29/06/2023
Checked By:	GV
Approved Signatory :	D. Brooke
Date :	6/07/2021

GHD Pty Ltd
5/43 Herbert St Artarmon, NSW 2065
Telephone: (02) 9462 4860 Fax: (02) 9462 4710
GEOTECHNICAL TESTING SERVICES

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17026
Laboratory Accreditation Number: 679

CERTIFICATE OF ANALYSIS

Work Order	: **ES2320297**	Page	: 1 of 4
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR ROBERT CATER	Contact	: Customer Services ES
Address	: 92 HILL STREET CARRINGTON NSW 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 49029200	Telephone	: +61-2-8784 8555
Project	: GEOTECHNICAL INVESTIGATION	Date Samples Received	: 19-Jun-2023 16:08
Order number	: 16547	Date Analysis Commenced	: 20-Jun-2023
C-O-C number	: ----	Issue Date	: 26-Jun-2023 13:47
Sampler	: ROBERT CATER		
Site	: ----		
Quote number	: SYBQ/400/21		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH3, 0.55-1.00m	BH5, 2.3-2.8m	BH6, 1.5-1.95m	BH6, 3-3.45m	BH7, 5.8-6.0m
			Sampling date / time	08-Jun-2023 00:00	07-Jun-2023 00:00	08-Jun-2023 00:00	08-Jun-2023 00:00	06-Jun-2023 00:00
Compound	CAS Number	LOR	Unit	ES2320297-001	ES2320297-002	ES2320297-003	ES2320297-004	ES2320297-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	7.8	6.5	7.3	7.3	6.9
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	252	31	77	119	37
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	15.9	12.7	22.3	9.6	6.7
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	400	40	20	60	40
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	50	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH8, 5.8-6.0m	BH8, 3.1-3.45m	BH8, 4.5-4.95m	----	----
			Sampling date / time	06-Jun-2023 00:00	06-Jun-2023 00:00	06-Jun-2023 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2320297-006	ES2320297-007	ES2320297-008	--------	--------
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**7.6**	**6.6**	**7.0**	**----**	**----**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**123**	**97**	**64**	**----**	**----**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**7.7**	**14.9**	**9.6**	**----**	**----**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**50**	**50**	**40**	**----**	**----**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	<10	**50**	<10	**----**	**----**

Appendix D

Consultant Declaration

CONSULTANT DECLARATION

PROJECT DETAILS	
Project name	Bathurst Hospital Redevelopment
Application number	SSD-64733959
Address of subject land	361-365 Howick Street, Bathurst
Lot / DP	Lot 100 in DP 1126063
APPLICANT DETAILS	
Applicant name	Health Administration Corporation
Applicant address	1 Reserve Road, St Leonards, NSW 2065
REPORT DETAILS	
Name of report this declaration relates	GEOTECHNICAL INVESTIGATION BATHURST HOSPITAL REDEVELOPMENT 361-365 HOWICK ST, WEST BATHURST NSW 2795
Report reference no.	16547-202/4
Report date	04/10/2024
Company name (inc. ABN / ACN)	RCA Australia, ABN 53 063 515 711, ACN 063 515 711
Author name	Robert Cater
Author qualifications	BE (Civil), MEngSc
Author address	92 Hill Street, Carrington, NSW 2294
DECLARATION BY CONSULTANT	
Name	Dr Mark Allman
Registration no.	N/A
Organisation registered with	NSW Government SCM 1191
Declaration	The undersigned declares that RCA Geotechnical Investigation Report reference no. 16547-202/4: • has been prepared in accordance with the following **policy, guidelines, or** legislative requirements: - AS1726-2017 Geotechnical Site Investigations • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the [consultant report] relates; • does not contain information that is false or misleading; • identifies and addresses the relevant Planning Secretary's environmental assessment requirements (SEARs) for the project; • ~~identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments to which the [consultant report] relates;~~ N/A • contains a consolidated summary of the proposed or necessary mitigation measures
Signature	
Date	04/10/2024