## Geotechnical Interpretive Report

Shoalhaven Hospital Redevelopment

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Prepared for NSW Health Infrastructure

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- Appendix A Investigation Plan
- Appendix B Engineering logs
- Appendix C Laboratory Certificates
- Appendix D Geotechnical Cross Sections
- Appendix E Permeability Test Tables
- Appendix F Important Information

### 1 Introduction

### 1.1 **Project Description**

NSW Health Infrastructure and Johnstaff ("the clients") have engaged Cardno NSW/ACT Pty Ltd ("Cardno") to undertake a geotechnical investigation as part of the proposed redevelopment for the Shoalhaven Hospital on Scenic Drive, Nowra. The project is currently in conceptual stages with developed master planning options presented below.



Figure 1-1 Master Plan Options for Shoalhaven Hospital Redevelopment

### 1.2 Objectives

The geotechnical investigation for the site was undertaken to inform the following:

- > Assess subsurface and groundwater conditions at the site;
- > Preliminary lot classification in accordance with AS2870-2011, Residential Slabs and Footings;
- > Comments on excavation conditions, excavatability and rock rippability;
- > Comments of likely subgrade CBR value to inform pavement design;
- > Comments on suitability of site won material for re-use as engineered fill;
- > Provide recommendations relating to likely suitable foundation systems;
- > Provide foundation design parameters;
- > Provide comments of any other geotechnical related factors relevant to the proposed development;
- > Provide geotechnical subsurface cross sections referencing soil type, depth and general properties to assist with foundation design; and
- > Provide permeability assessment to correlate infiltration rates to assist with stormwater and infiltration trench design.

### 1.3 Scope of Works

The scope of works for the geotechnical assessment comprised the following:

- > Assessment of geological maps and other published resources before attending site;
- Geotechnical assessment of subsurface conditions including excavation of test pits, excavation of hand auger boreholes and drilling of boreholes across the site;
- > Visual assessment of the composition of existing fill at stockpiles;
- > Laboratory testing to assist with the geotechnical assessment; and

> Permeability assessment of hand auger borehole locations.

It is noted that this geotechnical assessment is preliminary only and was intended to inform and finalise the master plan. Further detailed assessment would be required for the purpose of detailed design.

### 2 Site Description

The site is identified as Shoalhaven Hospital and Nowra Park, located within section of Lot 104 DP1165533, Lot 7034 DP1031852 and Part-lot Lot 373 DP755952. The current site is a vacant plot within the hospital ground. A site plan is presented in **Appendix A**, detailing the proposed development site boundary.

### 2.1 Topography and Drainage

The eastern and southern boundaries are adjacent to Shoalhaven Street and North Street respectively, whilst the northern and western boundary are adjacent to existing hospital buildings. Two filling areas have been identified on site with the origin of the fill material unknown. A portion of the fill potentially originated from the construction of the adjacent multilevel carpark and surrounding hospital buildings.

The site topography falls generally towards the north-east with the highest elevations at the south-western corner of the site. Surface slopes are generally gentle to moderate with steeper slopes associated with filling and embankments for surrounding structures.

The site and neighbouring land surfaces are a mixture of predominantly permeable covers (grass and bare earth) with impermeable hardstands (concrete and asphalt) to a lesser extent. Surface run-off is anticipated to either drain into stormwater management systems or penetrate ground surfaces at a rate reflective of the underlying material.



Figure 2-1 View of the site looking north-west across Nowra Park towards multi-storey parking

### 2.2 Regional Geology

Reference to the 1:250,000 Ulladulla Geological Series Sheet indicates that the site is underlain by:

> Psh – Permian aged Nowra Sandstone of the Shoalhaven Group comprising siltstone or sandstone.

Formations identified in close proximity to the site include:

> Q\_av - Quaternary aged alluvium gravel, swamp deposits or sand dunes; and



Figure 2-2 Site Geology Map (MinView Seamless Geology)

### **3 Geotechnical Investigation**

### 3.1 Site Investigation

### 3.1.1 Service Location

Underground utility locating was undertaken by A1 Locate Pty Ltd on the 17<sup>th</sup> June 2021 and additionally by Coastal Cable Locators Pty Ltd on 26<sup>th</sup> October 2021. Underground utility locating comprised the clearing of test pit, hand auger borehole and borehole locations using Cable Avoidance Tool (CAT) and generator. Test Pits

### 3.1.2 Test Pits

Geotechnical investigation comprising the excavation of test pits, was undertaken between 17<sup>th</sup> and 18<sup>th</sup> June 2021 and included:

- Excavation of nine (9) test pits utilising a 10t backhoe fitted with a 300 mm mud bucket. Test pits conducted for geotechnical assessment were advanced to the target depth of 3.00m below ground level or prior refusal.
- > Dynamic Cone Penetrometer (DCP) testing conducted adjacent to geotechnical test pit locations to provide an assessment of the in-situ soil strength conditions.
- Engineering assessment of the subsurface profiles encountered in general accordance with AS 1726 2017 *Geotechnical Site Investigations* by an engineering geologist from Cardno;
- > Sampling of material considered representative of subsurface profile encountered across the site for the purpose of laboratory assessment. Samples collected included bulk samples.
- > Upon completion, test pits were backfilled with excavation spoil materials, and nominally compacted with the excavator bucket and tracked over.

The locations of geotechnical test pits are shown on the Investigation Plan presented in Appendix A. Test locations were located by a hand-held GPS device and site RL's measured from the site contour plan. As such, the locations shown on the drawings shall be considered as approximate only. Engineering logs are contained in Appendix B together with explanatory notes.

### 3.1.3 Boreholes

Geotechnical investigation comprising boreholes was undertaken between 21<sup>st</sup> and 22<sup>nd</sup> June 2021 and included:

- > Drilling of six (6) boreholes to a target depth of six (6) metres, utilising solid flight auger techniques, equipped with tungsten carbide (TC) drill bit. Where refusal on rock was encountered, four (4) of the boreholes were progressed further using NMLC diamond drilling and allowed a minimum three (3) metres of core.
- Standard Penetration Tests (SPTs) were conducted at nominal 1.50m intervals at each borehole location to assess the in-situ strength characteristics of the encountered materials and to allow sample retrieval for laboratory testing;
- Engineering assessment of the subsurface profiles encountered in general accordance with AS 1726 2017 *Geotechnical Site Investigations* by an engineering geologist from Cardno;
- Sampling of material considered representative of soil units encountered for subsequent laboratory assessment, including geotechnical and acid sulfate soil sampling;
- > Upon completion, boreholes were backfilled with drill cuttings returning the location to existing surface level.

The locations of geotechnical boreholes are shown on the Investigation Plan presented in Appendix A. Test locations were located by a hand-held GPS device and site RL's measured from the site contour plan. As such, the locations shown on the drawings shall be considered as approximate only. Engineering logs are contained in Appendix B together with explanatory notes.

### 3.1.4 Hand Auger Boreholes and Permeability Testing

Geotechnical investigation comprising hand augers with permeability testing was undertaken between 28<sup>th</sup> and 29<sup>th</sup> October 2021 and included:

- > Hand excavation of five (5) hand auger boreholes utilising hand auger equipment. Hand auger boreholes were advanced to a target depth of 1.00m below ground level or prior refusal.
- > Dynamic Cone Penetrometer (DCP) testing conducted adjacent to hand auger borehole locations to provide an assessment of the in-situ soil strength conditions.
- Engineering- assessment of the subsurface profiles encountered in general accordance with AS 1726 2017 Geotechnical Site Investigations by an experienced engineering geologist from Cardno;
- Sampling of material considered representative of subsurface profile encountered across the site for the purpose of laboratory assessment. Samples collected included disturbed samples.
- Permeability testing was undertaken within all five (5) hand auger borehole locations with use of a trailer mounted water cart with routine water measurements taken to calculate permeability rates.
- > Upon completion, hand auger borehole locations were backfilled with excavation spoil materials, and nominally compacted with the excavator bucket and tracked over.

The locations of hand auger boreholes are shown on the Investigation Plan presented in Appendix A. Test locations were located by a hand-held GPS device and site RL's measured from the site contour plan. As such, the locations shown on the drawings shall be considered as approximate only. Engineering logs are contained in Appendix B together with explanatory notes.

#### 3.1.5 Laboratory Testing

Laboratory testing conducted on strategically selected samples recovered during the fieldwork comprised the following:

- > Seven (7) Particle Size Distribution (PSD) tests for material classification;
- > Seven (7) Atterberg Limits (PI) tests for material classification;
- > Seven (7) Moisture Content (MC) tests;
- > Two (2) Standard Compaction and California Bearing Ratio (CBR) tests for subgrade assessment;
- > Four (4) Emerson crumb tests to classify soil dispersion;
- > Four (4) Unconfined Compressive Strength (UCS) tests for rock strength assessment; and
- > Four (4) Soil Aggressivity testing suites.

Testing was conducted at 'Australian Soil and Concrete Testing (ASCT)' in Albion Park and 'Eurofins Scientific' in Unanderra, all of which are NATA accredited testing laboratories. Laboratory test report sheets and certificates are included in Appendix C.

### 4 Investigation Results

### 4.1 Subsurface Conditions

The soil profile encountered in test locations across the site comprised either fill material associated with fill embankments and built up areas for car parks and hospital buildings or a natural profile.

For a detailed description of the subsurface ground conditions encountered, engineering logs in Appendix B should be referred to. In summary, subsurface conditions encountered are displayed in Table 4-1 and Table 4-2 below.



Unit	Soil Type	Description of Layer
1a	FILL (PAVEMENT)	ASPHALT black
1b	FILL / TOPSOIL	Silty SAND / Clayey SAND / Clayey Sandy GRAVEL / Gravelly SAND / Gravelly Sandy CLAY low to medium plasticity, fine to coarse sand, grey, grey-brown, dark orange-brown, fine to coarse sub-angular gravels, moist, trace roots and rootlets, trace organic matter.
2	RESIDUAL SOIL	Sandy CLAY / Clayey SAND / CLAY medium to high plasticity, fine to coarse grained sand, brown, pale grey, pale blue-grey, pale red-brown, grey-brown mottled yellow and orange, trace gravels, weakly cemented, moist.
3	EXTREMELEY WEATHERED MATERIAL	<b>Clayey Gravelly SAND</b> medium plasticity, orange-brown, pale-grey, pale blue-grey, with fine to medium grained sand, weakly cemented, inferred as extremely weathered rock.
4	ROCK	<b>SANDSTONE,</b> medium to coarse grained, bedded, pale grey, stained red-brown and orange-brown

### The subsurface profiles encountered across the site, are summarised below in Table 4-2.

Test Location	Unit 1A	Unit 1B	Unit 2	Unit 3	Unit 4	Termination Depth (mbgl)
TP02	-	0.00	0.20	1.10	-	1.40
TP03	-	0.00	0.30	1.70	-	1.90
TP04	-	0.00	0.30	1.50	-	1.80
TP05	-	0.00	0.50	-	-	1.50
TP06	-	0.00	0.20	2.00	-	2.40
TP07	-	0.00	0.30	0.90	-	1.40
TP08	-	0.00	0.90	-	-	1.40
TP09	-	0.00	0.80	1.30	-	1.70
BH01	0.00	0.10	0.40	1.10	1.40	4.80
BH02	-	0.00	0.20	2.00	2.80	6.48
BH03	-	0.00	0.20	3.10	3.66	7.00
BH04	-	0.00	0.20	2.70	3.50	6.90
BH05	0.00	0.05	1.70	2.50	-	2.75
BH06	0.00	0.10	0.30	1.50	-	1.80
HA01	-	0.00	0.03	-	-	0.92
HA02	-	0.00	0.04	-	-	1.02
HA03	-	0.00	0.04	-	-	0.86
HA04	-	0.00	0.04	-	-	0.91
HA05	-	0.00	0.04	-	-	0.83

Table 4-2 Summary of Subsurface Conditions – Depth to Top of Layer (m)

For more detail of the subsurface conditions encountered, reference shall be made to the 'Engineering Logs' attached in **Appendix B**, with explanatory notes.

### 4.1.2 Geotechnical Cross Sections

Geotechnical cross sections have been drawn for the configurations shows in Figure 4-1 below. Geotechnical cross sections are attached in **Appendix D**.

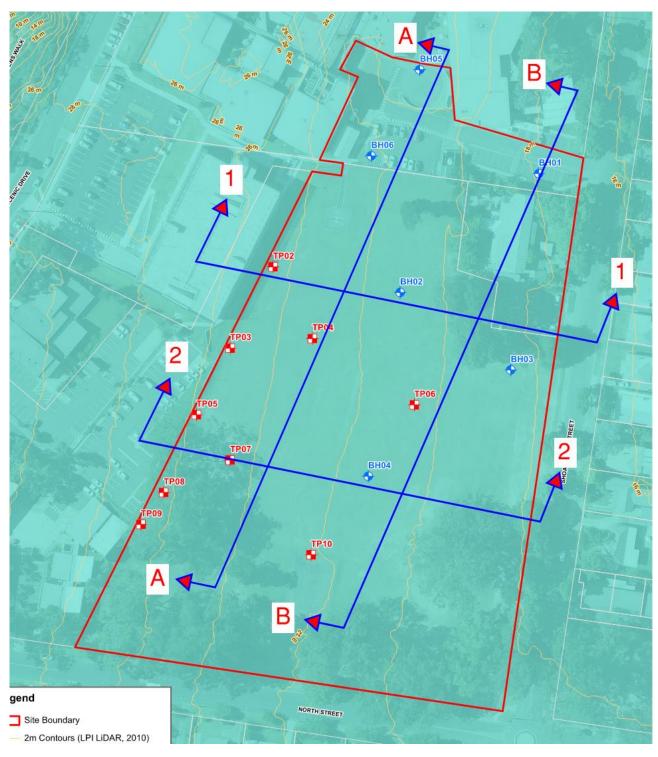


Figure 4-1 Geotechnical cross section alignments

### 4.2 Groundwater Observations

Groundwater was not encountered during investigation. It should be noted that groundwater levels are likely to fluctuate with variations in climatic and site conditions. Seepage may also occur along the soil/rock interface during and after periods of wet weather.

### 4.3 In-Situ Permeability

In-situ falling head permeability tests were performed by filling each hand auger borehole with water and recording the drop in water level over time. The depth of tested in-situ soil is summarised in Table 4-3 below.

Hand Auger	Groundwater (m bgl)	Permeability Test Depth
HA01	Not encountered	0.00m to 0.92m bgl
HA02	Not encountered	0.00m to 1.02m bgl
HA03	Not encountered	0.00m to 0.86m bgl
HA04	Not encountered	0.00m to 0.91m bgl
HA05	Not encountered	0.00m to 0.83m bgl

#### Table 4-3 Permeability Test Depth

Falling head tests were calculated over a time period considered practical with one test in each hand auger borehole been left over night. Following the first test, the hand auger borehole walls were scraped to eliminate any smear effects. Falling head permeability test results are attached to **Appendix E**. A summary of soil permeability is presented below in Table 4-4.

#### Table 4-4 Falling Head Permeability Results

Borehole	Test Number	Permeability K (m/s)	Time Interval (seconds)	Final Water Level (m bgl)	Permeability Classification *
HA01	1	2.02 E-08	70200	0.46m	Well Watertight
HAUI	2	2.02 E-08	37380	0.61m	Well Watertight
	1	9.38 E-09	22500	0.29m	Well Watertight
HA02	2	1.65 E-08	52200	0.39m	Well Watertight
	3	1.78 E-08	37800	0.34m	Well Watertight
LLA02	1	2.34 E-08	66600	0.50m	Well Watertight
HA03	2	2.14 E-08	37080	0.42m	Well Watertight
HA04	1	5.04 E-08	57600	0.64m	Well Watertight
TAU4	2	5.85 E-08	36600	0.58m	Well Watertight
	1	2.83 E-08	63000	0.48m	Well Watertight
HA05	2	3.25 E-08	36840	0.43m	Well Watertight
Average		2.71 E-08			

Notes:

\* NagyL. Tabacks A., Huszak T., Mahler A., Varga G, *Comparison of Permeability Testing Methods,* Proceedings of the 18<sup>th</sup> International Conference on Soil Mechanics and Geotechnical Engineering, Paris 2013.

## Coefficient of permeability is broadly consistent with Table 2.1 of BS 8004: 1986 as seen in Figure 4-2 below.

I I0 <sup>-1</sup>	10 <sup>-2</sup> 10 <sup>-3</sup> 10	- <sup>4</sup> 10 <sup>-5</sup> 10 <sup>-6</sup>	10 <sup>-7</sup> 10 <sup>-8</sup>	10 <sup>-9</sup> 10 <sup>-10</sup>
Clean gravels	Clean sands and sand-gravel mixtures	Very fine sands. silts and clay-silt laminate	Unfissurd clay-silts clay)	ed clays and (>20%
	Desiccated a	nd fissured clays		

### Table 2.1 Coefficient of permeability (m/s) (BS 8004: 1986)

### Cardno<sup>®</sup>

Figure 4-2 Coefficient of permeability from BS 8004: 1986

### 4.4 In-Situ Testing

### 4.4.1 Dynamic Cone Penetrometer (DCP)

A DCP test involves raising and dropping a 9kg hammer to drive a steel cone on the end of a rod shaft through the underlying layers. The number of blows it requires to penetrate the rod across 100mm increments is measured until target depth is reached or the cone is bouncing, causing refusal (Blow counts > 25).

DCP tests were undertaken at seven (7) test pit locations and five (5) hand auger borehole locations to determine subsurface strength properties. CPT tests were undertaken from surface to 3.00mbgl for test pits and 1.00mbgl for hand auger boreholes, or prior refusal. The DCP results are presented in the engineering logs provided in Appendix B.

### 4.4.2 Standard Penetration Testing (SPT)

A SPT test is undertaken on the drill rig and involves the raising and dropping of a 63.5kg weight a standard distance of 760mm. Blow counts are counted for every 150mm increments over three increments. The first increment is classed as the seating drive, with the next two increments classed as the test. The total blow counts over the test become the 'N' value. If the hammer is bouncing, or the count reaches 30 in an increment this becomes a refusal.

SPT tests were undertaken at all six (6) borehole locations at 1.50m intervals to determine the 'N' value and assess subsurface strength properties.

### 4.5 Laboratory Test Results

### 4.5.1 Soil Testing

The results of laboratory testing are summarised in the tables below. Table 4-5 presents material property and soil classification testing and Table 4-6 presents results of standard compaction and California Bearing Ratio (CBR) testing. Chemical testing results are presented in Table 4-8.

Test Pit / Borehole	Depth (m)	Unit	Gravel (%)	Sand (%)	Fines (%)	MC (%)	LL (%)	PL (%)	PI (%)	LS (%)	Emerson Class
TP02	0.10-0.20	1B	-	-	-	14.2	24	20	4	1.5	-
TP04	1.00-1.20	2	-	-	-	23.1	55	25	50	15.0	-
TP05	0.60-0.80	2	-	-	-	11.0	-	-	-	-	4
TP06	1.00-1.20	2	11	42	47	-	-	-	-	-	-
TP07	0.40-0.60	2	-	-	-	23.2	49	24	25	12.0	-

Table 4-5 Material property test results

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TP09	0.40-0.50	1B	-	-	-	10.9	-	-	-	-	4
TP09	1.00-1.20	2	-	-	-	17.4	38	17	21	10.0	-
TP09	1.50-1.70	3	23	44	29	-	-	-	-	-	-
BH01	0.20-0.40	1B	55	26	14	-	-	-	-	-	-
BH01	0.50-0.95	2	-	-	-	12.9	-	-	-	-	4
BH02	1.20-1.50	2	-	-	-	25.1	64	26	38	18.0	-
BH03	2.70-3.00	2	12	48	40	-	-	-	-	-	-
BH04	0.50-1.00	2	-	-	-	28.4	-	-	-	-	4
BH04	1.20-1.50	2	-	-	-	25.8	51	25	26	13.0	-
BH04	1.50-1.95	2	8	34	55	-	-	-	-	-	-
BH06	1.20-1.50	2	8	62	31	-	-	-	-	-	-
HA04	0.50-0.91	2	20	55	25	21.3	42	22	20	10	-

Notes to table:

MC: Moisture Content

LL: Liquid Limit

PL: Plastic Limit

PI: Plasticity IndexLS: Linear Shrinkage

#### Table 4-6 Laboratory CBR test results

Test Pit / Borehole	Depth (m)	Unit	Soil Description	МС (%)	SOMC (%)	SMDD (t/m³)	Swell (%)	CBR (%)
TP02	1.20-1.40	3	Clayey Gravelly SAND	15.4	13.4	1.863	0.0	30
BH04	0.50-1.00	2	Sandy CLAY	28.4	24.7	1.562	1.0	6

Notes to table:

MC: Field moisture content

SOMC: Standard Optimum Moisture Content

SMDD: Standard Maximum Dry Density

CBR testing was undertaken on remoulded specimens compacted to a target 100% standard maximum dry density and soaked with a surcharge for four (4) days. Subgrade strength is moisture and density dependent and where the existing subgrade is compacted to less than 100% standard compaction and moistures above SOMC exist, the in-situ CBR values may be less than the above tested values.

For details of the laboratory testing conducted, reference shall be made to the laboratory report sheets contained within Appendix C.

#### 4.5.2 Rock Testing

Unconfined Compressive Strength (UCS) testing was carried out on recovered rock core to assess intact rock strength. The laboratory test certificates are presented in Appendix C and a summary of the test results are presented in Table 4-7 below.

Table 4-7         Summary of UCS Testing			
Borehole	Depth (m)	UCS (MPa)	
BH01	3.36-3.59	47.5	
BH02	3.29-3.38	34.5	
BH03	4.60-4.81	41.3	
BH04	6.59-6.79	42.8	

### 4.5.3 Chemical Testing

Four (4) soil samples were recovered and tested for aggressivity including chloride content, electrical conductivity (EC), pH, resistivity, sulphate content, and moisture content (MC). The test certificate is presented in Appendix C and a summary of the test result is presented in Table 4-8 below.

Table 4-8	Soli Aggressivity Testing							
Borehole	Depth (m)	Soil Description	Chloride (mg/kg)	EC (µS/cm)	рН	Resistivity (ohm.m)	Sulfate (mg/kg)	MC (%)
BH02	0.50-0.95	Sandy CLAY	15	15	5.3	660	<10	18
BH02	1.50-1.95	Sandy CLAY	10	13	5.2	770	<10	12
BH03	1.50-1.95	Sandy CLAY	10	13	5.3	750	<10	18
BH04	0.50-0.95	Sandy CLAY	<10	13	5.9	780	14	20

Table 4-8 Soil Aggressivity Testing

In accordance with AS2159-2009 Piling-Design and Installation [3], the exposure classification has been assessed for in-ground concrete structures (Table 6.4.2 (C)) and in-ground steel structures (Table 6.5.2 (C)) as follows:

For in-ground concrete structures:

- Mild to moderate (all soils above ground water or low permeability soils).
- Moderate to severe (all soils below ground water with high permeability soils).

For in-ground steel structures:

- Non-aggressive (all soils above ground water or low permeability soils).
- Non-aggressive to mild (all soils below ground water with high permeability soils).

For design purposes it is recommended the worst-case classification be taken i.e. all soils below ground water with high permeability soils.

### 5 Comment & Recommendations

### 5.1 Preliminary Site Classification

A preliminary site classification has been provided for the site with a separate classification for areas of filling greater than 0.40m deep and less than 0.40m deep.

A summary of preliminary site classifications can be seen below in Table 5-1.

Table 5-1 Preliminary site classification summary table

Test Location	Site Classification
Areas with FILL greater than 0.40 mbgl: BH05, TP08, TP09, TP10	CLASS P
Areas with FILL less than 0.40 mbgl: BH01, BH02, BH03, BH04, BH06, TP02, TP03, TP04, TP05, TP06, TP07	CLASS M

Based on these results and using the calculation method presented in Appendix F of AS2870-2011, a characteristic surface movement (ys) between 20mm to 40mm is estimated for the natural portion of the site in its existing condition. Based on our experience of soils in this area, we recommend that residential slabs and footings in these areas are designed in accordance with recommendations in AS2870-2011 for a Class M site provided that footings founded in the natural ground.

It is noted that the final site classification would be dependent on conducting a site-specific geotechnical investigation and testing following completion of the bulk earthworks at the site.

Details regarding causes of soil related building movements and prevention methods are presented in CSIRO Building Technology File, BTF18. The following precautions could be considered to assist in reducing the reactive soil movements:

- Provide paving to the edge of a building (where applicable) to limit soil moisture variations due to seasonal wetting and drying. The paved surface should be graded away from the building such that runoff drains away and water cannot pond against the building.
- Restrict tree planting in the vicinity of the building. AS2870 recommends that trees be planted no closer to a building / footing than a distance equal to 1.0 times their mature height on Class H1 sites. This distance should be increased where rows or groups of trees are involved.
- Service trenches, particularly plumbing and drainage, should be avoided beneath amenities buildings. Where service trenches are to pass beneath or near to a building they should be backfilled with a low permeability material, such as non-reactive compacted clay, to prevent the ingress of water.
- During construction the exposed subgrade, trenches and footing excavations should not be left exposed to the weather for extended periods. Water should not be allowed to pond in these areas nor should they be left unprotected to dry and crack in the sun.

### 5.2 Earthworks

### 5.2.1 Site Preparation

Prior to bulk earthworks, any fill, pavement or structure footings areas shall be cleared of any foreign matter or unsuitable material which includes but is not limited to the following:

- > Vegetation or organic matter including root balls of any larger trees onsite;
- > Topsoil or soil significantly affected by roots or root fibres;
- > Any scattered waste or dumped materials;
- > Uncontrolled filling which would be subject to further assessment; or
- > Loose or low strength (soft) soils or otherwise 'unsuitable' soils.

Deleterious materials that cannot be reused on site shall be disposed of at a licenced waste facility and classified in accordance with the NSW EPA Waste Classification Guidelines. Stripped topsoils shall be stockpiled for re-use where suitable.

The majority of the site clays may also require treatment, dry-back or over excavation prior to filling over due to the high moisture content and consistency.

Soils with high moisture contents may be considered unsuitable at the time of construction but appropriate dry back would deem the soils suitable for general fill. The requirement for moisture conditioning will depend on the weather conditions prior to and during construction.

### 5.2.2 Excavation and Trench Stability

Temporary excavations in the existing fill and alluvial soils or where water seepage occurs, may be unstable. Unsupported short-term excavations or trenches may undergo slumping into the excavation as observed during the excavation of test pits across the site. Trench support should be used or excavations shall be battered and benched in accordance with recommendations below.

Temporary excavations or trenches in the stiff or better clay within the residual soil profile would be expected to stand close to vertical in the short-term (<1 day) however should be limited to no greater than 2 m in height. Where deeper excavations are required, benching or shallower batters should be provided. No personnel shall be permitted to enter trenches or stand adjacent an unsupported vertical excavation over 1.2 m in height due to the risk of sudden collapse. Unsupported short-term excavations or trenches may undergo some local slumping into the excavation in residual stratum or where seepage occurs.

Excavations in the vicinity of existing road, footpath or carparks or other structures shall be fully supported in accordance with a temporary works design from a suitably qualified geotechnical engineer where appropriate to ensure no inadvertent instability affecting adjacent infrastructure.

Where personnel are to enter excavations, options for short-term excavations include benching or battering back of the excavations to recommendations as per Table 5-2 or flatter batters would be required or the support of excavations.

Temporary excavations should be inspected for signs of failure i.e. tension cracks, on a daily basis and following inclement weather. No plant / equipment or stockpiling of material shall be placed within a horizontal distance equal to the height of the excavation. Where this is not possible to be adhered to, a specific geotechnical assessment shall be carried out by a suitably experienced geotechnical engineer.

Groundwater inflow was not encountered at the time of investigation. As seepage or inflow may be encountered during construction, an allowance should be made for control such water utilising a sump and pump.

### 5.2.2.1 Open Cuts / Temporary and Permanent

Recommendations for temporary unsupported cuts batters (if required) are presented in the following table:

Geotechnical profile	Temporary Batter (Horizontal to Vertical Ratio)		
Fill	2H: 1V		
Residual Soil	1.5H : 1V		
Sandstone Class IV - V	1.3H:1V		
Sandstone Class III or better <sup>g)</sup>	1H:1V		

Table 5-2 Cut Batter Recommendations

Notes:

a) Table 5-2 applies to temporary unsupported cut batters only, for a period of no greater than 1 months once constructed and inspected

b) Temporary support applies to batters no greater than 1.50m in vertical height. Where deeper cuts are proposed for each stratum, further geotechnical designed support or retention systems may be required.

c) Excavations in soil have assumed no groundwater table has been encountered;

d) The ground surface at the crest of the excavation is horizontal;

- e) There is no surcharge at the crest of the excavation for a distance equal to the depth of the excavation;
- f) All cuts are protected from erosion.

g) Subject to inspection by qualified geotechnical engineer

#### 5.2.2.2 Permanent cuts

Permanent cuts have not been fully identified at this stage, due to the unknown locality and depth of proposed cuts. However, where deep cuts are envisaged as part of permanent works, the following measures would potentially be required

Table 5-3 Batter stabilisati	on options for permanent works	
Geotechnical profile	Permanent Options	Additional Comments
Residual Soils	<ul><li>Regrade batter slope</li><li>Soil nail and shotcrete</li></ul>	<ul> <li>Longer soil nails would be required in thicker soil profile areas encountered across subject site</li> </ul>
Sandstone Class IV – V / or better	<ul> <li>Regrade batter</li> <li>Scaling, block removal and reprofiling</li> <li>Rock / spot bolting</li> <li>Rock fall netting</li> <li>Catch fence and ditches</li> </ul>	<ul> <li>Requires geotechnical input / site observations during top down excavation works to determine extend of stabilization options required</li> </ul>

Table 5-3	Batter	stabilisation	options	for	permanent	works

#### 5.2.3 Filling

Fill shall be placed and compacted in accordance with AS 3798-2007 *Guidelines on Earthworks for Commercial and Residential Development* with consideration to the following recommendations.

It is expected that construction of fill platforms during the bulk earthworks, which would be suitable to support structural loads associated with residential development, would include the following:

- Removal of any existing fill, topsoil or deleterious soils and unsuitable material from areas where fill is to be placed. In general, unsuitable material such as presence of vegetation, organic matter, topsoil, silts and existing filling shall be removed.
- > Benching shall be provided in slopes steeper than 1V:8H (approximately 7°) where filling is to occur.
- The exposed subgrade should be scarified and compacted using a heavy vibrating pad foot roller to achieve a dry density ratio of at least 100% Standard compaction and within ± 2% of Standard Optimum Moisture Content (SOMC) in accordance with AS1289.5.1.1, 5.4.1 or 5.7.1.
- Any soft or weak areas identified during the subgrade compaction process or proof rolling, that do not respond to further compaction, should be removed and replaced with select fill in layers not exceeding 200mm loose thickness and each layer compacted to achieve a Dry Density Ratio of at least 100% Standard and within ± 2% of SOMC in accordance with AS1289 5.1.1, 5.4.1 or 5.7.1. Excavations to remove any soft or weak areas should have side slopes battered not steeper than 2H:1V. Should extensive soft or weak areas be encountered, further geotechnical advice should be sought.
- Engineered fill should be placed in uniform horizontal layers with maximum thickness of 150mm after compaction. Each layer should be compacted to a minimum dry density ratio of 95% Standard Compaction at moisture contents in the order of ±2% optimum moisture content. Over compaction and/or placement of clays significantly dry of OMC should be avoided.
- Exposed subgrade and all fill layers should be test-rolled immediately following completion of compaction. If further test rolling is required at later date, the surface should be moisture conditions as required, and given not less than four coverages of the testing roller prior to test rolling.
- > Fill materials shall comprise suitable materials as detailed below in Section 5.2.5.

All fill shall be battered at a slope of 1V:2H or flatter (preferably 1V:3H) and temporary erosion control shall be provided. To prevent erosion in the long term, provision of protection by vegetation along with adequate drainage is also required. Batter slopes of 1V:3H are recommended for long term maintenance as it would reduce the risk of erosion. Where a suitable batter slope is not possible, the fill shall be supported by a designed and suitably constructed retaining wall.

All fill placed for lot filling shall be tested in accordance with Level 1 Inspection and Testing by the Geotechnical Inspection and Testing Authority (GITA) including:

> Completion of removal of topsoil and inspection/proof rolling;

- > Placing imported or cut material;
- > Compaction and adding/removing of moisture;
- > Test rolling;
- > Trenching and backfilling as required;
- > Testing to comply with the required compaction control;

The Level 1 testing schedule, including the number of field density tests should be conducted in accordance with Table 8.1 in AS3798-2007.

#### 5.2.4 Reuse of Fill Material

Filling is expected to comprise both site-won soils and import material. This shall not include any unsuitable material as described in Section 5.2.2. The site materials may require treatment and would be expected to require some degree of moisture re-conditioning, subject to further assessment and weather conditions prior to and during construction. Fill materials are expected to comprise of the following.

- > Site won residual soils: Generally, soils excavated on site with the exception of topsoil and unsuitable materials are considered suitable for re-use as engineered general fill with the limit that it cannot be used as structural fill.
- Imported materials: Classified as Virgin Excavated Natural Material (VENM) in accordance with the NSW Waste Classification Guidelines Part 1 Classification of Waste, or Excavated Natural Material (ENM) as per the Protection of the Environment Operations (Waste) Regulation 2005 The Excavated Natural Material Exemption 2012.

The reuse of reactive soils is generally not advised however it is acceptable under circumstances where the movements due to moisture changes are controlled. This may include capping the material with non-reactive soils and ensuring the material is placed in the lower portion of any fill volume as to minimise potential movements. If reactive soils are to be used as fill, further detailed assessment will be required.

#### 5.2.5 Pavement Subgrade Conditions

Laboratory testing undertaken on residual sandy CLAY and clayey gravelly SAND (extremely weathered material), resulted in CBR values of 6% & 30% respectively, with a swell of 1% & 0% respectively.

Based on the lab results and our experience with similar materials, it is recommended for pavements within the existing fill, a design CBR of 2.5% may be adopted due to the variable nature of fill soils. For pavements within the alluvial and residual soils a design CBR of 5% may be adopted.

Subgrade comprising residual clays would have considerable potential for volume change due to moisture variations and strategies to minimise volume change as outline in clause 5.3.5 of Austroads should be employed.

The specific considerations in relation to expansive soils should be considered:

- Regimented moisture control of subgrade and protection to prevent drying prior to placement of overlying layers;
- Lower permeability and low swell select fill layers in the upper layers of filling or comprising a minimum 150 mm of subgrade replacement in clay subgrades;
- > Placing subsoil drains to subbase or select level, not extending to the expansive subgrade;
- > Restrict planting of vegetation planting near the pavement;
- > Recommendation for sealed shoulders and impermeable verge material;
- > Recommend appropriate construction techniques; and
- > Reduction of the volume expansion potential of the expansive soils by lime stabilisation.

#### 5.2.6 Trench Backfill

Trench backfill including bed and haunch zones, and side and overlay zones shall meet the requirements of the SCC requirements. Care is required to ensure that compaction is achieved over the entire fill area, particularly adjacent any vertical excavated faces. This may require 'keying in' or benching to allow

compaction equipment to achieve full compaction to the edge. Alternately, the use of hand compaction equipment would be required.

Level 2 Inspection and Testing is to be undertaken by a geotechnical testing authority (GTA) and should follow the testing schedule in Shoalhaven City Council Construction Specifications.

### 5.3 Erosion Control

The results of the limited laboratory dispersion tests indicate that the Emerson Class Number of the site soils is 4, with materials classified as highly dispersive to slightly dispersive with calcite or gypsum present. This variability of Emerson Class on site may result from the fill containing mixed soils.

Prior to earthworks, appropriate site surface drainage and other measures shall be implemented to prevent ponding and scouring during the construction, and to minimise the risk of trafficability issues on site clays and sands during and after inclement weather. These measures shall include temporary drains, surface grading along with erosion and sediment control, and shall be appropriately reinstated following the construction.

In general, the dispersion potential can be ameliorated by regimented compaction and moisture control. A suitable thickness of topsoil (preferably >150 mm) shall also be provided to promote vegetation growth for longer term erosion control.

Provision of suitable vegetation protection and adequate drainage would be required as a minimum erosion protection measure. Appropriate surface drainage should be installed to intercept and reduce the velocity of up-slope overland surface flows and to restrict overland surface flows from flowing onto adjacent areas where practical.

All collected stormwater shall be appropriately detained in on-site storage or detention basins and discharged in a controlled manner where required. This shall be conducted in accordance with the relevant SCC requirements.

Consideration should also be made to installing subsurface drainage at the base of drainage lines prior to filling.

### 5.4 Excavatability

Fill and residual soils were observed throughout the site which generally comprised soft to hard clays or loose to medium dense sand. Boreholes encountered moderately weathered sandstone between 1.40-3.66 mbgl, becoming increasingly harder with depth, and refusal of TC auger bit between 1.80-2.75 mbgl.

The results of the investigation indicate that excavations and stripping could be readily undertaken in the surficial soil and extremely weathered rock at shallow depths of down to approximately 2.00m bgl, permitting easy ripping with traditional excavation methods to be implemented (such as a 20t excavator or equivalent).

### 5.5 Foundations

All footing systems for residential structures should be designed and constructed in accordance with AS2870-2011 [4] for the appropriate classification. Suitable footing systems may comprise pad or strip footings.

### 5.5.1 Earthquake Site Classification

Based on the classification system presented in AS 1170.4-2007 "Structural Design Actions Part 4: Earthquake Actions in Australia" and the encountered conditions, the site is deemed to have a site subsoil classification of 'Class Ce', shallow soil site with a Hazard Design Factor (Z) of 0.09.

### 5.5.2 Shallow Foundations

Allowable bearing pressures for mass concrete pad footings are provided in Table 5-2.

Table 5-4Allowable bearing pressures for high level footings

Expected founding material Nominal Embedment Depth (m)	Nominal Footing Dimensions (m)	Allowable Bearing Capacity (kPa)
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Uncontrolled FILL	Not recommended	Not recommended	Not recommended
Residual - stiff to very stiff CLAY	0.50	1m x 1m	200

Notes to table:

a) Allowable bearing capacity tabulated above assuming eccentricity of 1/6 x footing width

b) Horizontal ground is assumed.

Footing construction methods should be "flexible" in that footing excavations can be readily deepened or widened to target more competent materials should lower bearing capacity materials be present.

Bearing pressures nominated above are based on footing bases founding a minimum of 0.50m into the founding material.

The nominated bearing pressures assume that all loose, disturbed or softened materials will be removed from footing excavations prior to casting concrete. If the material at the base of the excavation is allowed to wet and soften, it must be over-excavated until competent material is encountered and replaced with lean mix concrete or compacted granular fill. Footing excavation should be inspected by a suitably experienced geotechnical engineer or engineering geologist prior to installing reinforcing and casting concrete to confirm that founding conditions are consistent with the design values.

#### 5.5.3 Settlement

Settlement of spread footings will depend on the size, shape and founding depth of the footings. At the time of preparing this report, details of the footing loads have not been provided. However, based on the allowable bearing pressures presented in Section 5.5.1, settlements less than 20mm may be anticipated for spread footings up to 1.00m wide for preliminary purposes with a proportion of this settlement likely to occur during construction.

A detailed review of settlement should be undertaken once footing layouts and loadings are finalised.

#### 5.5.4 Piled Foundations

At the time of writing this report the expected column loads have not been provided. Table 5-3 presents parameters for the design of piles founded in rock. These parameters are compatible with AS2159-2009 which follows a limit state method.

Geotechnical Material	Ultimate end bearing capacity (kPa)	Ultimate shaft adhesion (kPa)	Elastic modulus E' (MPa)
Residual – stiff to very stiff CLAY	450	50	15
Extremely weathered sandstone	3,000	100	100

Notes:

1. Skin friction (fs) and base resistance (fb) as defined in AS2159-2009.

2. Ignore bored pile shaft within 1 m of ground surface to account for potential site disturbance and moisture change effects.

3. Ultimate shaft adhesion based on a clean rock socket with roughness category R2 or better (Pells 1998).

Piles should be designed for both ultimate and serviceability conditions. Ultimate end bearing and shaft adhesion values are to be used with appropriate load factors and geotechnical strength reduction factors to assess ultimate capacity.

The geotechnical strength reduction factor will depend on various influences such as the level of information available for the rock and the level of construction control. Based on the above influence factors applicable for the site and uncertainty with construction method and quality control etc., an average risk rating, ARR and geotechnical strength reduction factor,  $\Phi_{gb}$  should be calculated. For limit state strength design, a geotechnical strength reduction factor ( $\Phi_{gb}$ ) of 0.45 can be applied to the ultimate capacity presented in Table 5-3.

Pile testing requirements will be dependent on AS2159-2009. For piles subject to uplift loads, the geotechnical strength should be multiplied by a factor of 0.7 in addition to the geotechnical strength reduction factor.

Whilst bored piles are considered feasible, constructability within a high groundwater level may be problematic and will likely require temporary lining. An alternative would be to use CFA pile techniques. This would alleviate the need for temporary lining and reduce the amount of spoil generated through the installation. Piles should extend a minimum of two (2) pile diameters into the founding bedrock.

The design values require good construction practices which includes socket cleaning and concreting in a continuous process without delay. It is recommended that an experienced geotechnical engineer or engineering geologist observes pile drilling as well as shaft and mechanical base cleaning to confirm the adequacy of founding strata. Such observations would be undertaken from the piling platform level and would include observation of returned cuttings and drill rig performance, as well as the effectiveness of shaft roughening (if required) and down-hole cleaning.

### 5.6 Vibration

### 5.6.1 Vibration Assessment

Vibration effects may impact on the adjacent shopping centre structures or residential properties. Vibration assessment based on the Australian Road Research Boards Special Report: Ground Vibrations, Damaging Effect to Buildings is used to assess the likelihood of impacts to any neighbouring structures or features. The proposed limit of effects on humans are based on AS 2670.2-1990 *Evaluation of human exposure to whole-body vibration - Continuous and shock-induced vibration in buildings.* 

The effects of vibrations may vary greatly depending on the magnitude and frequency of works, the ground conditions and the interaction between footings and foundations. The intensity, duration, frequency and number of occurrences of a vibration all play a vital role in both the annoyance levels caused and the strains induced in structures. Sources of ground vibration for construction is likely to comprise bulldozers, hydraulic rock breakers, and vibratory rollers during road construction.

Where there is concern due to construction related vibration effects, a continuous vibration assessment during construction could be adopted to ensure that vibrations to adjacent structures are within an acceptable limit; however in lieu of this, the following levels should be adopted. The guidelines are based on previous experience and published data with generalised distance limits considered suitable for the management of ground vibrations generated through earthworks and construction.

Activity	Typical Levels of Ground Vibration
Vibratory rollers	Up to 1.5 mm/s at distances of 25 m Higher levels could occur at closer distances; however, no damage would be expected for any new buildings at distances greater than approximately 12m (for a medium to heavy roller)
Bulldozer	1 to 2 mm/s at distances of approximately 5 m at distances greater than 20 m, vibration is usually below 0.2 mm/s.
	At closer distances to the piling operations, some compaction of loose fill would occur due to vibratory effects and may cause displacement
Hydraulic rock breakers	4.5 mm/s at 5 m 1.3 mm/s at 10 m 0.4 mm/s at 20 m 0.1 mm/s at 50 m
Compactor	20 mm/s at distances of approximately 5 m, 2 mm/s at distances of 15 m. At distances greater than 30m, vibration is typically below 0.3 mm/s
Pile driving/removal	1 to 5 mm/s at distances of 25 to 50 m depending on soil conditions and the energy of the pile driving hammer.

Table 5-6	Approximate generated vibration levels for various construction activities
	Approximate generated vibration levels for various construction activities

### 5.6.2 Effects of Vibration

It is well documented that humans often perceive vibrations to be much higher in amplitude than what is occurring in reality and complaints can often be made in cases where no structural damage is likely. A proactive measure or contingency plan would be to install vibration monitoring equipment to provide evidence to potential residents that may feel their homes are not being structurally damaged. Regular community engagement with updates advising when and where construction activities may generate perceptible levels of vibration may also help mitigate community complaints.

### 5.6.3 Vibration Management

As heavy machinery including vibrating rollers are likely to be used during development, it is advised that an assessment by the contractor must be conducted prior to the use of heavy machinery. This assessment is to determine the suitability of the equipment and proposed methodology if the machine will be operating within 20.0 m of any structure. If the works are within a 20.0 m zone of a dwelling or structure, then the contractor must utilise equipment that produces acceptable vibrations (based on the guidelines in Table 5-1) and provide vibration monitoring, dilapidation reports as required depending on the structure and the tolerated level of vibration.

### 6 Important Information

We appreciate the opportunity to work collaboratively with you on this project. Our team looks forward to bringing our high level of expertise to deliver successful outcomes in your future projects.

Your attention is drawn to the appended document titled "*Important Information about this Geotechnical Report*". This document is intended to clarify to the reader what the realistic expectations of this report should be, and what is the correct use of the document. Misinterpretation of geotechnical information presents significant risk to projects: The document includes a discussion on general limitations of geotechnical services, which by nature, are based extensively on opinion and judgement.

The statements included in this document are not intended to be exculpatory clauses or to reduce the general responsibility accepted by Cardno, but rather to identify where Cardno and our Client's responsibilities lie. The statements ensure that all parties that may rely on the report are aware of their respective responsibilities.

For further enquiries, please do not hesitate to contact Cardno on the information supplied.

### Shoalhaven Hospital Redevelopment

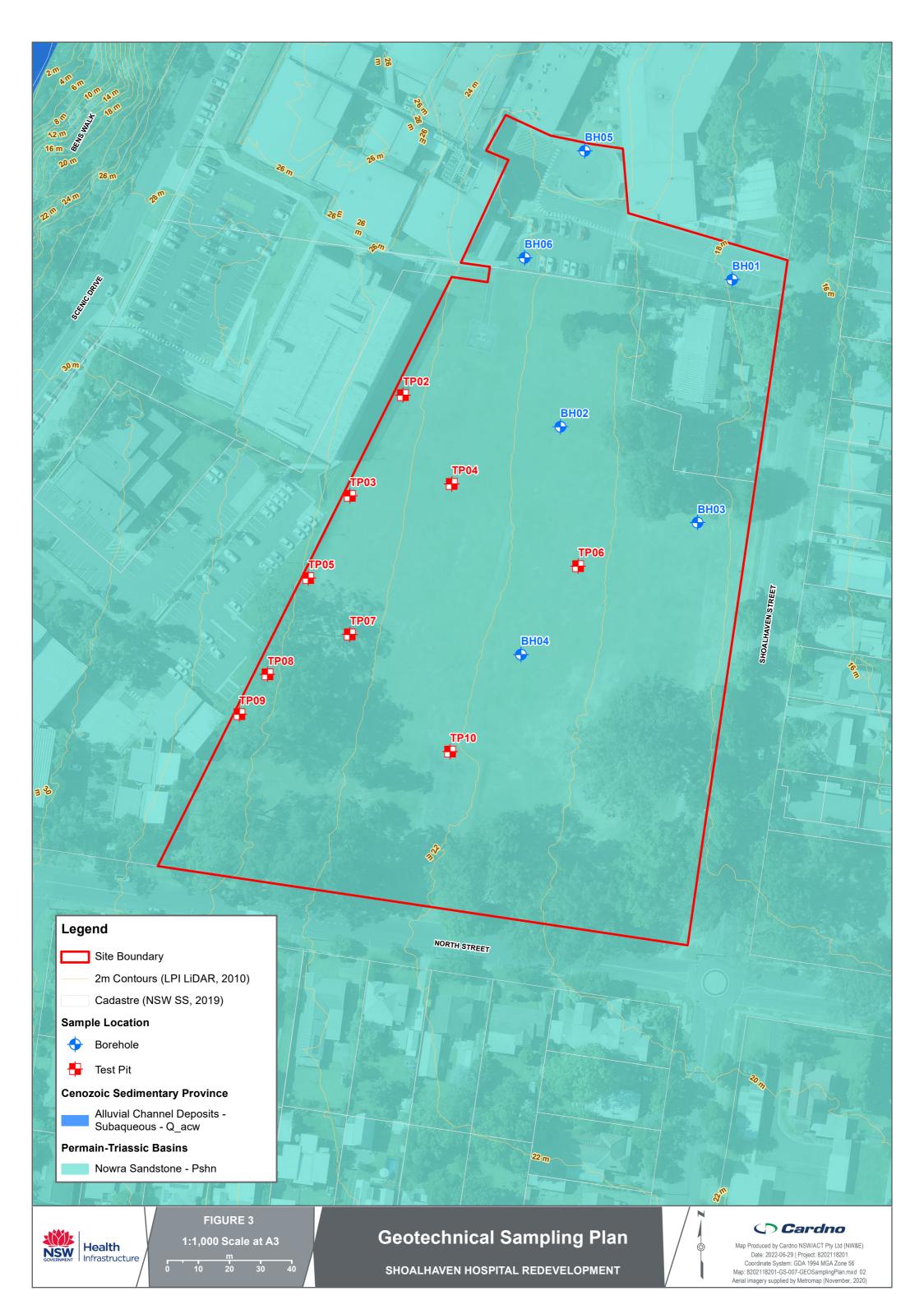
## APPENDIX



### **INVESTIGATION PLAN**







## Shoalhaven Hospital Redevelopment

# APPENDIX

B

## ENGINEERING LOGS



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	Ation     Type I       Ition     Type I       State     C       Plning     S       C     Plning       State     C       Plning     S       C     Plning	LUNG Solid fligh Solid fligh	ation:     Sceni       tion:     E280296       Type:     Hanjin       ing Diameter:     a       a Started:     22/6       Coring     Image: Construct and the second and t	ation:       Scenic Driver         tion:       E280296.396         Type:       Hanjin D&B ation         ing Diameter:       HW         a Started:       22/6/21         Coring       (a)         Pinil:       (b)         Diameter:       HW         a Started:       22/6/21         Coring       (a)         Pinil:       (b)         Diameter:       (c)         Pinil:       (c)         Diameter:       (c)         Pinil:       (c)         Diameter:       (c)         Pinil:       (c)         Pinil:       (c)         Diameter:       (c)         Pinil:       (c)	ation:       Scenic Drive, No.         tion:       E280296.396 N6138         Type:       Hanjin D&B 8D         ing Diameter:       HW         a Started:       22/6/21         Coring       (f)         Pinjul       (g)         Diameter:       HW         a Started:       22/6/21         Coring       (f)         Pinjul       (g)         Diameter:       HW         a Started:       22/6/21         Coring       (f)         Pinjul       (g)         Diameter:       HW         a Diameter:       (g)         Pinjul       (g)         Solid fight auge:       (g)         100       100         13.0       -         -       -         12.0       -         -       12.0         -       -         10.5       -         -       -         10.5       -         -       -         10.0       -         10.0       -         10.0       -         -       -         -	ation:       Scenic Drive, Nowra NSV         tion:       E280296.396 N6138778.147         Type:       Hanjin D&B 8D         ing Diameter:       HW       Bit Type         Started:       22/6/21       Date Control         Unified in the second secon	attom:       Scenic Drive, Nowra NSW 2541         titon:       E280296.396 N6138778.147 56 MGA2020         Type:       Hanjin D&B 80         ing Diameter:       HW         Bit Type:       NMLC         Started:       22/6/21         Date Completed:       22/6/21         Coring       Material D         ing Diameter:       Material D         ing Diameter:       With Eight auger. Valie         ing Diameter:       Image: Diameter:         ing Diameter:       With Eight auger. Valie       Sold Trype: Insticution         ing Diameter:       100       100       13.5         -4.5       -4.5       Sold Trype: Material D         ing Diameter:       13.0       -5.0       Sold Trype: Material D         ing Diameter:       13.0       -5.5       Sold Trype: Material D         ing Diameter:       13.0       -5.5       Sold Trype: Material D         ing Diameter:       10.5       -5.5       Sold Trype: Material D         ing Diameter:       10.5       -7.5       Sold Trype: Material D         ing Diameter:       10.5       -7.5       Sold Trype: Material D         ing Diameter:       10.5       -7.5       Sold Trype: Material D	ation:     Scenic Drive, Nowra NSW 2541     Job No:       tion:     E280296.396 Mc138778.147 56 MGA2020     Angle fro       Type:     Hanjin D&B BD     Mounting       Image:     Bit Type:     NMLC     Bit Cond       Started:     22/6/21     Date Completed:     22/6/21     Logged I       Image:     Image:     Image:     Image:     Image:     Image:       Image:     Image:     Image:     Image:     Image:     Image:     Image: <td>attor:     Scenic Drive, Novra NSW 2541     Job No: 8202       ttor:     E280296.396 Ne138778.147 56 MGA2020     Angle from Hu       Ting Diameter:     HW     Bit Type: NMLC     Bit Condition:       State:     22/6/21     Date Complete:     22/6/21     Logged B: E       Coring     Image Diameter:     HW     Bit Type: NMLC     Bit Condition:       State:     22/6/21     Date Complete:     22/6/21     Logged B: E       Coring     Image Diameter:     HW     Bit Type: NMLC     Solt:       Time:     Solt:     Transpite     Material Description     Image Diameter:     Material Description       Image:     Image:     Image Diameter:     Image Diameter:     Image Diameter:     Image Diameter:     Image Diameter:       Image:     Image Diameter:     I</td> <td>Sonic Drive, Novra NSW 2541     Joh No: 82021162       Angle from Horizon       Itim: E20296.396 Ne138773.147 56 MGA2020       Mounting: Track     Bit Condition: Gor       Control       Office and texture, HW       Bit Type: NMLC       Bit Condition: Gor       Office and texture, resolution       Total Control       <td co<="" td=""><td>Liton:         Sconic Drive, Nowra NSW 2541         Job No:         8202118201           tion:         E280296.396 NB138778.147 56 MGA2020         Angle from Horizontal: 96         Mounting: Track           ing Diameter:         HW         Bit Type: Nall, C         Bit Condition:         Good           ing Diameter:         HW         Bit Type: NMLC         Bit Condition:         Good           ing Diameter:         HW         Date Completed:         22/6/21         Logged By:         BA           Coring         Grip Grip Grip Grip Grip Grip Grip Grip</td><td>Liton:         Scenic Drive, Novra NSW 2541         Job No:         222118201           tion:         E280296.396 N6138778.147 56 MGA2020         Angle from Horizontal: 90°         Yop:           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Date Completed:         20/62         Estimated         No           Ing Diameter:         Ing Diameter:         Ing Diameter:         Ing Diameter:         Estimated         No           Ing Diameter:         Ing Diameter:<td>Hom:         Scenic Drive, Novra NSW 2541         Job No: 8202118201           tion:         E280296.398 Net33778.147 56 MGA2020         Angle from Horizontal: 90°           Trgp:         Harding:         Track           Ing Diameter:         W         Bit Type: Nanjin D&amp;B 8D         Mounting:           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         200         SUL TYPE; plasticity or particle than an texture.         Bit Started:         Started:           Solid:         TYPE; plasticity or particle than an texture.         Bit Condition: Good         Started:           Solid:         Solid:         Solid:         Solid:         Started:         Started:           Solid:         Solid:         Solid:         Started:         Started:         Started:           Solid:         Solid:         Started:         <t< td=""><td>Liton:         Scenic Drive, Nowra NSW 2541         Job No:: 8202148201           Type:         Hanjin D&amp;B BD         Mounting: Track         Drive           Type:         Hanjin D&amp;B BD         Bit Toronition: Good         Cord           Startet:         200 P.S.         Bit Toronition: Good         Cord           Startet:         Startet:         Startet:         Startet:         Normal Material Description           Startet:         Startet:         Startet:         Startet:         Startet:         Startet:           Starte:         Starte:         Startet:         Startet:         Startet:         Startet:           Startet:         Startet:         Startet:</td><td>Littor:         Social: Drive, Novim NSW 2541         Job No:         Startace         Surface E           Hom:         Doble:         Surface E         Mounting:         Track         Driller: C           Ing Diameter:         HW         Bit Type:         MulC         Bit Condition:         Good         Contract           Started:         20/20         Det Completed:         20/20         Det Completed:         Det Condition:         Condition:         Contract         Contract         Bit Condition:         Contract         Contract         Contract         Contract         Bit Condition:         Contract         Started:         Contract         Contract         Started:         Contract         St</td></t<></td></td></td></td>	attor:     Scenic Drive, Novra NSW 2541     Job No: 8202       ttor:     E280296.396 Ne138778.147 56 MGA2020     Angle from Hu       Ting Diameter:     HW     Bit Type: NMLC     Bit Condition:       State:     22/6/21     Date Complete:     22/6/21     Logged B: E       Coring     Image Diameter:     HW     Bit Type: NMLC     Bit Condition:       State:     22/6/21     Date Complete:     22/6/21     Logged B: E       Coring     Image Diameter:     HW     Bit Type: NMLC     Solt:       Time:     Solt:     Transpite     Material Description     Image Diameter:     Material Description       Image:     Image:     Image Diameter:     Image Diameter:     Image Diameter:     Image Diameter:     Image Diameter:       Image:     Image Diameter:     I	Sonic Drive, Novra NSW 2541     Joh No: 82021162       Angle from Horizon       Itim: E20296.396 Ne138773.147 56 MGA2020       Mounting: Track     Bit Condition: Gor       Control       Office and texture, HW       Bit Type: NMLC       Bit Condition: Gor       Office and texture, resolution       Total Control       Total Control <td co<="" td=""><td>Liton:         Sconic Drive, Nowra NSW 2541         Job No:         8202118201           tion:         E280296.396 NB138778.147 56 MGA2020         Angle from Horizontal: 96         Mounting: Track           ing Diameter:         HW         Bit Type: Nall, C         Bit Condition:         Good           ing Diameter:         HW         Bit Type: NMLC         Bit Condition:         Good           ing Diameter:         HW         Date Completed:         22/6/21         Logged By:         BA           Coring         Grip Grip Grip Grip Grip Grip Grip Grip</td><td>Liton:         Scenic Drive, Novra NSW 2541         Job No:         222118201           tion:         E280296.396 N6138778.147 56 MGA2020         Angle from Horizontal: 90°         Yop:           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Date Completed:         20/62         Estimated         No           Ing Diameter:         Ing Diameter:         Ing Diameter:         Ing Diameter:         Estimated         No           Ing Diameter:         Ing Diameter:<td>Hom:         Scenic Drive, Novra NSW 2541         Job No: 8202118201           tion:         E280296.398 Net33778.147 56 MGA2020         Angle from Horizontal: 90°           Trgp:         Harding:         Track           Ing Diameter:         W         Bit Type: Nanjin D&amp;B 8D         Mounting:           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         200         SUL TYPE; plasticity or particle than an texture.         Bit Started:         Started:           Solid:         TYPE; plasticity or particle than an texture.         Bit Condition: Good         Started:           Solid:         Solid:         Solid:         Solid:         Started:         Started:           Solid:         Solid:         Solid:         Started:         Started:         Started:           Solid:         Solid:         Started:         <t< td=""><td>Liton:         Scenic Drive, Nowra NSW 2541         Job No:: 8202148201           Type:         Hanjin D&amp;B BD         Mounting: Track         Drive           Type:         Hanjin D&amp;B BD         Bit Toronition: Good         Cord           Startet:         200 P.S.         Bit Toronition: Good         Cord           Startet:         Startet:         Startet:         Startet:         Normal Material Description           Startet:         Startet:         Startet:         Startet:         Startet:         Startet:           Starte:         Starte:         Startet:         Startet:         Startet:         Startet:           Startet:         Startet:         Startet:</td><td>Littor:         Social: Drive, Novim NSW 2541         Job No:         Startace         Surface E           Hom:         Doble:         Surface E         Mounting:         Track         Driller: C           Ing Diameter:         HW         Bit Type:         MulC         Bit Condition:         Good         Contract           Started:         20/20         Det Completed:         20/20         Det Completed:         Det Condition:         Condition:         Contract         Contract         Bit Condition:         Contract         Contract         Contract         Contract         Bit Condition:         Contract         Started:         Contract         Contract         Started:         Contract         St</td></t<></td></td></td>	<td>Liton:         Sconic Drive, Nowra NSW 2541         Job No:         8202118201           tion:         E280296.396 NB138778.147 56 MGA2020         Angle from Horizontal: 96         Mounting: Track           ing Diameter:         HW         Bit Type: Nall, C         Bit Condition:         Good           ing Diameter:         HW         Bit Type: NMLC         Bit Condition:         Good           ing Diameter:         HW         Date Completed:         22/6/21         Logged By:         BA           Coring         Grip Grip Grip Grip Grip Grip Grip Grip</td> <td>Liton:         Scenic Drive, Novra NSW 2541         Job No:         222118201           tion:         E280296.396 N6138778.147 56 MGA2020         Angle from Horizontal: 90°         Yop:           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Date Completed:         20/62         Estimated         No           Ing Diameter:         Ing Diameter:         Ing Diameter:         Ing Diameter:         Estimated         No           Ing Diameter:         Ing Diameter:<td>Hom:         Scenic Drive, Novra NSW 2541         Job No: 8202118201           tion:         E280296.398 Net33778.147 56 MGA2020         Angle from Horizontal: 90°           Trgp:         Harding:         Track           Ing Diameter:         W         Bit Type: Nanjin D&amp;B 8D         Mounting:           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         200         SUL TYPE; plasticity or particle than an texture.         Bit Started:         Started:           Solid:         TYPE; plasticity or particle than an texture.         Bit Condition: Good         Started:           Solid:         Solid:         Solid:         Solid:         Started:         Started:           Solid:         Solid:         Solid:         Started:         Started:         Started:           Solid:         Solid:         Started:         <t< td=""><td>Liton:         Scenic Drive, Nowra NSW 2541         Job No:: 8202148201           Type:         Hanjin D&amp;B BD         Mounting: Track         Drive           Type:         Hanjin D&amp;B BD         Bit Toronition: Good         Cord           Startet:         200 P.S.         Bit Toronition: Good         Cord           Startet:         Startet:         Startet:         Startet:         Normal Material Description           Startet:         Startet:         Startet:         Startet:         Startet:         Startet:           Starte:         Starte:         Startet:         Startet:         Startet:         Startet:           Startet:         Startet:         Startet:</td><td>Littor:         Social: Drive, Novim NSW 2541         Job No:         Startace         Surface E           Hom:         Doble:         Surface E         Mounting:         Track         Driller: C           Ing Diameter:         HW         Bit Type:         MulC         Bit Condition:         Good         Contract           Started:         20/20         Det Completed:         20/20         Det Completed:         Det Condition:         Condition:         Contract         Contract         Bit Condition:         Contract         Contract         Contract         Contract         Bit Condition:         Contract         Started:         Contract         Contract         Started:         Contract         St</td></t<></td></td>	Liton:         Sconic Drive, Nowra NSW 2541         Job No:         8202118201           tion:         E280296.396 NB138778.147 56 MGA2020         Angle from Horizontal: 96         Mounting: Track           ing Diameter:         HW         Bit Type: Nall, C         Bit Condition:         Good           ing Diameter:         HW         Bit Type: NMLC         Bit Condition:         Good           ing Diameter:         HW         Date Completed:         22/6/21         Logged By:         BA           Coring         Grip Grip Grip Grip Grip Grip Grip Grip	Liton:         Scenic Drive, Novra NSW 2541         Job No:         222118201           tion:         E280296.396 N6138778.147 56 MGA2020         Angle from Horizontal: 90°         Yop:           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Bit Condition:         Good           Ing Diameter:         HW         Bit Type:         Mult C         Date Completed:         20/62         Estimated         No           Ing Diameter:         Ing Diameter:         Ing Diameter:         Ing Diameter:         Estimated         No           Ing Diameter:         Ing Diameter: <td>Hom:         Scenic Drive, Novra NSW 2541         Job No: 8202118201           tion:         E280296.398 Net33778.147 56 MGA2020         Angle from Horizontal: 90°           Trgp:         Harding:         Track           Ing Diameter:         W         Bit Type: Nanjin D&amp;B 8D         Mounting:           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         200         SUL TYPE; plasticity or particle than an texture.         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Bit Toronition: Good         Cord           Startet:         Startet:         Startet:         Startet:         Normal Material Description           Startet:         Startet:         Startet:         Startet:         Startet:         Startet:           Starte:         Starte:         Startet:         Startet:         Startet:         Startet:           Startet:         Startet:         Startet:</td><td>Littor:         Social: Drive, Novim NSW 2541         Job No:         Startace         Surface E           Hom:         Doble:         Surface E         Mounting:         Track         Driller: C           Ing Diameter:         HW         Bit Type:         MulC         Bit Condition:         Good         Contract           Started:         20/20         Det Completed:         20/20         Det Completed:         Det Condition:         Condition:         Contract         Contract         Bit Condition:         Contract         Contract         Contract         Contract         Bit Condition:         Contract         Started:         Contract         Contract         Started:         Contract         St</td></t<></td>	Hom:         Scenic Drive, Novra NSW 2541         Job No: 8202118201           tion:         E280296.398 Net33778.147 56 MGA2020         Angle from Horizontal: 90°           Trgp:         Harding:         Track           Ing Diameter:         W         Bit Type: Nanjin D&B 8D         Mounting:           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         226/21         Date Complete:         22/212         Bit Condition: Good           Started:         200         SUL TYPE; plasticity or particle than an texture.         Bit Started:         Started:           Solid:         TYPE; plasticity or particle than an texture.         Bit Condition: Good         Started:           Solid:         Solid:         Solid:         Solid:         Started:         Started:           Solid:         Solid:         Solid:         Started:         Started:         Started:           Solid:         Solid:         Started:         Started: <t< td=""><td>Liton:         Scenic Drive, Nowra NSW 2541         Job No:: 8202148201           Type:         Hanjin D&amp;B BD         Mounting: Track         Drive           Type:         Hanjin D&amp;B BD         Bit Toronition: Good         Cord           Startet:         200 P.S.         Bit Toronition: Good         Cord           Startet:         Startet:         Startet:         Startet:         Normal Material Description           Startet:         Startet:         Startet:         Startet:         Startet:         Startet:           Starte:         Starte:         Startet:         Startet:         Startet:         Startet:           Startet:         Startet:         Startet:</td><td>Littor:         Social: Drive, Novim NSW 2541         Job No:         Startace         Surface E           Hom:         Doble:         Surface E         Mounting:         Track         Driller: C           Ing Diameter:         HW         Bit Type:         MulC         Bit Condition:         Good         Contract           Started:         20/20         Det Completed:         20/20         Det Completed:         Det Condition:         Condition:         Contract         Contract         Bit Condition:         Contract         Contract         Contract         Contract         Bit Condition:         Contract         Started:         Contract         Contract         Started:         Contract         St</td></t<>	Liton:         Scenic Drive, Nowra NSW 2541         Job No:: 8202148201           Type:         Hanjin D&B BD         Mounting: Track         Drive           Type:         Hanjin D&B BD         Bit Toronition: Good         Cord           Startet:         200 P.S.         Bit Toronition: Good         Cord           Startet:         Startet:         Startet:         Startet:         Normal Material Description           Startet:         Startet:         Startet:         Startet:         Startet:         Startet:           Starte:         Starte:         Startet:         Startet:         Startet:         Startet:           Startet:         Startet:         Startet:	Littor:         Social: Drive, Novim NSW 2541         Job No:         Startace         Surface E           Hom:         Doble:         Surface E         Mounting:         Track         Driller: C           Ing Diameter:         HW         Bit Type:         MulC         Bit Condition:         Good         Contract           Started:         20/20         Det Completed:         20/20         Det Completed:         Det Condition:         Condition:         Contract         Contract         Bit Condition:         Contract         Contract         Contract         Contract         Bit Condition:         Contract         Started:         Contract         Contract         Started:         Contract         St			

The metalling for	TITLE:		notographs - BH01 n - Shoalhaven Hospital GI	
C Cardno Shaping the Future	PROJECT NO: 8202118201	TEST DATE: 22/06/2021	INCLINATION: -90 degree	CORED LENGTH: BOX 1 OF 1 - 1.40m to 4.80m - 3.40m Length
	DRILL RIG: Hanjin DB8	CONTRACTOR: Cardno & Total Drilling	LOGGED BY: BA	CHECKED BY: DR
0       0       0         0       0       0	PROJECT: Shoo	wra core tra	BH01 1.40 - 4.80 VNO: 1 of 1 22 - 06 - 2021	
82021	18201 - Shoalhave Hospital	- BH01 - 2	2.06.2021	- B.A.
1.	start coring @ 1.4	10m -		
2.		17 and a state of a		
3.	are Loss			
4.		( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	121	EOH @ 4.80m

		) <i>C</i>	aro	<b>ino</b> °							E		EHOLE LOG SHEET			
	ent: ject:		Shoa	Ihaven Hos								ŀ	lole No: BH02			
	atio				owra NSW 2					Job No: 8202118201			Sheet: 1 of 3			
-					8730.733 56	6 MGA2	2020			Angle from Horizontal: 90°	Surface Elevation: 21.130 m AHI					
-			-	D&B 8D						Mounting: Track		Driller				
		Diam arted			Date Cor	malata	4. 24	16124		Logged By: BA			ctor: Total Drilling ed By: DR			
Da	Drillin		21/0		g & Testing	Inpleted		0/21		Material Descript		CHECK	eu by. DR			
				Sampin	y & resuriy	- <u> </u>			-							
Method	Resistance	Casing	Water	Sample o Field Tes		L RL (m AHD)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations			
	E			ES 0.10 m		21.0 -	-		sм	Silty SAND: fine to coarse grained, dark grey and dark brown, trace fine to coarse grained sand 0.20m	м		TOPSOIL			
				ES 0.50 m SPT 0.50 - 0.95 m 3, 4, 5 N=9		- - - 20.5 -	- 0.5			Sandy CLAY: orange-brown, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel			RESIDUAL SOIL			
AD/T	F	HW		D 1.20 - 1.00	m	- - 20.0 – - -	- - - - - - - - - - - - -		CI		M (>PL)	St	-			
AI				SPT 1.50 - 1.95 m 5, 7, 9 N=16		- 19.5 – -	- 1.5				M ( <pl)< td=""><td>VSt</td><td></td></pl)<>	VSt				
	н		ige - Wet Soil	D 2.20 - 2.50	m	- 19.0 – -	- 2.0	6 a 0 a 6 20	sc	2.00m Clayey Gravelly SAND: fine to coarse grained, sub-rounded to sub-angular, motified red-brown and grey, fine to coarse, sub-angular to sub-rounded gravel	м	D - VD	EXTREMELY WEATHERED			
	∨н		2.20m Minor Seepage - We			- 18.5 -	- 2.5			2.80m Continued as Cored Drill Hole	w					
						- - 18.0 –	- 3.0									
						- - - - - - -	- 3.5									
M ERFESSES A A A FS R	R A H F P ON S ON S S S S S S S S S S S S S S S S S S S	xcavato lipper land au ush tub onic dri ir hamn ercussi hort sp olid flig	ger lling ner on san iral aug ht aug ight au re drilli	npler Jer er: V-Bit er: TC-Bit ger	PENETRATION VE Very Easy F Firm H Hard VH Very Hard (I WATER Water Water water water	No Resistan Refusal) Level on I		SP HP DC PSI MC	- P - F - T - P -	Standard Penetration Test Hand/Pocket Penetrometer     B     - Bu       Dynamic Cone Penetrometer     D     - Di       Perth Sand Penetrometer     U     - Th       Moisture Content     Moisture Content     Moisture Content       Plate Bearing Test     D     - Di       Porchole Impression Test     M     - Mu       Vane Shear; P=Peak,     PL     - Pl       Parabase (uncorrected (PD))     - Lic     - Lic	y bist	ample tal sampl be 'undis	le F - Firm			
HI W RI	FA H B W R R fer to ex	lollow fi /ashboi lock roll	ight au e drilli er y notes	ger	•	outflow	CA	VS	-	Vane Shear; P=Peak, PL - Pl: LL - Lic	astic limit Juid limit	ntent	MD - Mediu D - Dense			

				Ino																G SHE		
	ect:	9	Shoa	Ihave	n Hos												HC	ble		BH		
	atio						SW 2541		Job No:											heet: 2		
						3730.73	33 56 MGA2	020	Angle fr			ntal:	90			Surface Elevation: 21.130 m AHD Driller: CM						
-		e: ⊓a Diam		D&B	00	Mounting: Track           Bit Type: NMLC         Bit Condition: Good											tal Dril	lina				
		arted:				Date Completed: 21/6/21 Logged By: BA											ecked			iiig		
	Со	ring					•	Material Descri											ription			
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	charact & ROCK N colo	YPE, plasticity or pareristic, colour, secor minor components IAME, grain size and ur, fabric and texture ons & minor compon	rticle ndary I type, e,	Weathering	St Is <sub>(</sub> ; ●- Axia	timated rength 50) MPa 1 O- Diame 5 S 2 S	etral	Average Natura Defect Spacing (mm) ର ତ ତି	 : 9	Visual	5	EFECT shape, i	oughnes	Data prientation, s, infilling ess, other		
				21.0 - 20.5 - 20.0 - 19.5 - 19.0 -			2.80m START C	ORING AT 2.80m														
A DR ADF.	/TS AH	olid fligh	nt auge ght aug	r: TC-Bit er	5	ATER ∠ Wat	SANDST	DNE, medium to coarse gr ale grey stained orange-br grey stained orange-br EH Extremty High EH Extremty High H High H High M Medium	rained, rown to	JT SZ BP	Beddi	red zone ing Part			Curve Disco Irregu	ed ontinu ılar	— 3.75 r — 3.83 r — 3.88 r — 3.95 r	n: JT, 10' n: JT, 10' n: JT, 10' n: DB n: BP, 0°, n: HF, 5° <b>COAT</b> CN SN VNR	Clean Stained Veneer (	SN, Fe SN, Fe thin or patcl		
RR PQ HQ DT PT SO AH	R R ILC R P N S	ock roll otary co otary co otary co	er ore (85 ore (63 ore (51 concret e on sam lling	mm) .5mm) .94mm) e coring	Di R	OCK QUA ESCRIPT QD Ro De CR Toi	er outflow ALITY	King States of the second	ed nered	SM FL VN CL CS FZ DL HB DB	Fractu Drift L Handi	ion rage ned Sea ure Zone	e ak	ST UN ROUG VR RF S	Very Roug Smoo Slock	bed llose SS Roug h oth censio		CT INFILL X MU MS KT CA Fe Qz	MATERIA Carbona Unidentif	ceus fied mintera ry mineral		
Ref abb	er to ex reviatio	planatory	y notes t asis of c	for details lescriptio	s of ns			CARDNO (N	ISW/A	CT)	PT	YL	TD	)								

: ct: ion:	S			n Intra							
ion:		shoa	Ihave	n Hos	astructure pital						Hole No: BH02
					owra NSW 2541 3730.733 56 MGA2020			118201	<b>^</b>	0	Sheet: 3 of 3
-		-	D&B		730.733 56 MGA2020	Mounti		orizontal: 9 ack	0-		rface Elevation: 21.130 m AHD iller: CM
			HW		Bit Type: NMLC		<u> </u>	Good			ontractor: Total Drilling
Star	rted:	21/6	/21		Date Completed: 21	Checked By: DR					
Cori	ing				N	laterial Description					Defect Description
Fluid	TCR (%)	RQD (%)	RL (m AHD	Depth (m)	<u>ن</u> characteristic دطری ساله ROCK NAME ن ساله colour, fa	, colour, secondary r components , grain size and type, bric and texture,	Weathering	0.1 3	Average Natural Defect Spacing (mm)	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other
0% LUSS	100	87	17.0 -	-4.5	SANDSTONE, m bedded, pale gre	edium to coarse grained, y stained orange-brown to	SW				<ul> <li>3.97 m: BP, 0°, UN, RF, SN, Fe</li> <li>4.00 m: BP, 0°, UN, RF, SN, Fe</li> <li>4.02 m: HF, 5°</li> <li>4.04 m: HF, 0°</li> <li>4.04 m: HF, 0°</li> <li>4.04 m: HF, 0°</li> <li>4.04 m: HF, 0°</li> <li>4.05 m: BP, 5°, UN, RF, SN, Fe</li> <li>4.20 m: BP, 5°, UN, RF, SN, Fe</li> <li>4.20 m: BP, 5°, UN, RF, CN</li> <li>5.00 m: HB</li> <li>5.00 m: HB</li> <li>5.00 m: BP, 10°, UN, RF, CN</li> <li>5.16 m: BP, 5°, UN, RF, CN</li> <li>5.37 m: BP, 10°, UN, RF, CN</li> <li>5.51 m: BP, 10°, UN, RF, CN</li> <li>5.51 m: BP, 10°, UN, RF, CN</li> <li>5.59 m: BP, 10°, UN, RF, CN</li> </ul>
U% LOSS	100	91	15.5 - - - - - - - - - - - - - - - - - - -	- 6.0	6.48m						5.59 m: BP, 10°, UN, RF, CN 5.73 m: BP, 10°, UN, RF, CN 5.75 m: DB 6.00 m: HB 6.19 m: BP, 0°, IR, RF, CN, on Fossil
			14.5 -	=6.5 - - - - - - - - - - - - - - - - - - -	TERMINATED A Target depth						
Soli Hol Wa Rot Rot Dia Per Sor	lid fligh llow flig ashbore ck rolle tary co tary co atube c sh tube rcussio nic drill	t auger ght aug e drillin er ore (85) ore (63) ore (51) concrete on sam ling	r: TC-Bit er g mm) .5mm) .94mm) e coring	Ri Di Ri	✓ Water Level on date shown     EH VH       ✓ water inflow     M       ▲ water outflow     L       ✓ UCK QUALITY     ROC       ESCRIPTIONS     FR       QD     Rock Quality       Designation (%)     DW       MW     HW	Extremly High Very High High Medium Low Very Low KWEATHERING Fresh Slightly Weathered Distinctly Weathered Moderately Weathered Highly Weathered	JT SZ BP SM FL VN CL CS FZ DL HB DB	Joint Sheared zone Bedding Partin Seam Foliation Vein Cleavage Crushed Seam Fracture Zone Drift Lift	CU Curv DIS Disc PR Plan ST Step UN Undu <b>ROUGHNE</b> VR Very RF Roug S Smo	red ontinu ular ar ulose <b>SS</b> Roug gh ooth kensid	VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceus MU Unidentified minteral MS Secondary mineral KT Chlorite CA Calcite
	NG Sos Sos Sos Sos Mada Markana Hada Diala Markana Pur Pur Para Para Markana Pur Pur Pur Pur Pur Pur Pur Pur Pur Pur	NG Solid fligh Hollow flig Washbor Rotary cc Rotary cc Rotary cc Rotary cc Rotary cc Rotary cc Rotary cc Rotary cc Rotary cc Push tubic Solid fligh Hollow flig Washbor Solid fligh Hollow flig Washbor Solid fligh Hollow flig Washbor Rotary cc Rotary cc Push tubic Solid fligh Hollow flig Washbor Solid fligh Hollow flig Washbor Rotary cc Rotary cc	tarted: 21/6         Coring         Image: Construct of the second	tarted: 21/6/21         Coring       Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2"         Image: Colspan="2">Coring         Image: Colspan="2">Image: Colspan="2"         Image: Colspan="2"       Image: Colspan="2"         Image: Colsp	tarted: 21/6/21         Coring         Image: Coring of the second sec	NG     Water     Early of the shown (control       100     91       100     91       100     91       100     91       100     91       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.5       100     15.0       100     15.0       1100     14.5       100     15.0       100     14.5       100     15.0       1100     15.0       111     14.5       111     14.5       111     14.5       111     14.5       111     14.5       111     14.5       112.5     13.5       113.5     13.5       113.5     13.5       113.5     13.5       114.5     14.5       114.5     14.5       114.5     14.5       115.5     15.5       114.5     14.5	No     Water     Value     Completed:     21/6/21     Logged       100     97 <td>NO     VATER     Completed:     21/6/21     Logged By: E       000     0     0     0     0     0     0     0       0     0     0     0     0     0     0     0     0       0     0     0     0     0     0     0     0     0       0     0     0     0     0     0     0     0     0       100     87     16.5     -4.5     0     0     0     0       100     87     16.5     -5.0     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     11.5.5     -5.5     0     0     0     0     0       10.5     -7.5<!--</td--><td>tarted: 21/6/21     Logged By: EA       Metrial Description       Image: Description     Metrial Description       Image: Description     Generation: Colour, secondary Bool Marce Insize and type, colour, fabric and texture, inclusions &amp; minor components     MW       Image: Description     Metrial Description       Image: Description     South Type, Jashidory on particle characteristic, colour, secondary colour, fabric and texture, inclusions &amp; minor components     MW       Image: Description     MW<!--</td--><td>Construct:         Date Completed:         21/6/21         Logged By:         EA           Construct:         0         Material Description         Estimated Strength         Average Natural Constructions         Average Strength           0         0         0         0         0         0         0         0         Discover Constructions         Estimated Strength         Average Natural Constructions           0<td>Iarried: 21/6/21         Date Completed: 21/6/21         Logged By: BA         Cr           Comp         Material Description         Material Description         Starting Control         Starting Contro         Starting Control         Starting Cont</td></td></td></td>	NO     VATER     Completed:     21/6/21     Logged By: E       000     0     0     0     0     0     0     0       0     0     0     0     0     0     0     0     0       0     0     0     0     0     0     0     0     0       0     0     0     0     0     0     0     0     0       100     87     16.5     -4.5     0     0     0     0       100     87     16.5     -5.0     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     91     -5.0     -5.5     0     0     0     0       100     11.5.5     -5.5     0     0     0     0     0       10.5     -7.5 </td <td>tarted: 21/6/21     Logged By: EA       Metrial Description       Image: Description     Metrial Description       Image: Description     Generation: Colour, secondary Bool Marce Insize and type, colour, fabric and texture, inclusions &amp; minor components     MW       Image: Description     Metrial Description       Image: Description     South Type, Jashidory on particle characteristic, colour, secondary colour, fabric and texture, inclusions &amp; minor components     MW       Image: Description     MW<!--</td--><td>Construct:         Date Completed:         21/6/21         Logged By:         EA           Construct:         0         Material Description         Estimated Strength         Average Natural Constructions         Average Strength           0         0         0         0         0         0         0         0         Discover Constructions         Estimated Strength         Average Natural Constructions           0<td>Iarried: 21/6/21         Date Completed: 21/6/21         Logged By: BA         Cr           Comp         Material Description         Material Description         Starting Control         Starting Contro         Starting Control         Starting Cont</td></td></td>	tarted: 21/6/21     Logged By: EA       Metrial Description       Image: Description     Metrial Description       Image: Description     Generation: Colour, secondary Bool Marce Insize and type, colour, fabric and texture, inclusions & minor components     MW       Image: Description     Metrial Description       Image: Description     South Type, Jashidory on particle characteristic, colour, secondary colour, fabric and texture, inclusions & minor components     MW       Image: Description     MW </td <td>Construct:         Date Completed:         21/6/21         Logged By:         EA           Construct:         0         Material Description         Estimated Strength         Average Natural Constructions         Average Strength           0         0         0         0         0         0         0         0         Discover Constructions         Estimated Strength         Average Natural Constructions           0<td>Iarried: 21/6/21         Date Completed: 21/6/21         Logged By: BA         Cr           Comp         Material Description         Material Description         Starting Control         Starting Contro         Starting Control         Starting Cont</td></td>	Construct:         Date Completed:         21/6/21         Logged By:         EA           Construct:         0         Material Description         Estimated Strength         Average Natural Constructions         Average Strength           0         0         0         0         0         0         0         0         Discover Constructions         Estimated Strength         Average Natural Constructions           0 <td>Iarried: 21/6/21         Date Completed: 21/6/21         Logged By: BA         Cr           Comp         Material Description         Material Description         Starting Control         Starting Contro         Starting Control         Starting Cont</td>	Iarried: 21/6/21         Date Completed: 21/6/21         Logged By: BA         Cr           Comp         Material Description         Material Description         Starting Control         Starting Contro         Starting Control         Starting Cont

	TITLE:		Photographs - BH02 on - Shoalhaven Hospital GI	
Contraction Cardno	PROJECT NO: 8202118201	TEST DATE: 21/06/2021	INCLINATION: -90 degree	CORED LENGTH: BOX 1 OF 1 - 2.80m to 6.48m - 3.68m Length
	DRILL RIG: Hanjin DB8	CONTRACTOR: Cardno & Total Drilling	LOGGED BY: BA	CHECKED BY:
Wollongong Tel: 02 4228 4133 Level 1, 47 Burell Street, Wollongon New South Wales 2500 Australia	JOB NUMBER: 820	CORE TRAY	BHOZ 2.80-6.48- NO: 1 of 1 22-06-2021	LOGGED BY: BA
82021182	01 - Shoalhaven - Hospital -	- BHO2 - 21.	06.2021 - @ 2.80m	
3.				A Ball BAD
4. (11)				
5. 6 6	( )	21. 57	A start	
6.	n Ö	E	OH @ 6.48,	m

<	D	C	arc	dno°							E	BORE	EHOLE LOG SHEET
	ent: ject:			Health Info	astructure							ŀ	lole No: BH03
Loc	atio	n: \$	Scen	ic Drive, N	owra NSW 2					Job No: 8202118201			Sheet: 1 of 3
Pos	sition	: E28	028	5.178 N613	8699.830 56	6 MGA2	020			Angle from Horizontal: 90°			e Elevation: 18.620 m AHD
			-	D&B 8D						Mounting: Track		Driller	
-				HW	Data Car		. 04	10104		Lowed Dry DA			ctor: Total Drilling
	e Sta		21/0		Date Con	npieteo	1: 21/	/6/21		Logged By: BA		Спеск	ed By: DR
	Drilling	9 T	-	Samplir	ig & Testing		(			Material Descript	lion		
Method	Resistance	Casing	Water	Sample o Field Tes		L RL (m AHD)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
	E			ES 0.10 m		- 18.5	-		sм	Silty SAND: fine to coarse grained, dark grey and dark brown, trace fine to coarse grained sand 0.20m	м		TOPSOIL
						-	-			Sandy CLAY: low to medium plasticity, orange-brown, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel			RESIDUAL SOIL
				ES 0.50 m SPT 0.50 - 0.95 m 3, 3, 5 N=8		- 18.0 -	- 0.5 - - -						
				D 1.20 - 1.50	m	- 17.5 – -	- 1.0 - -		CL- CI		M (>PL)	St	
AD/T	F	нw	Not Encountered	SPT 1.50 - 1.95 m 4, 4, 5 N=9		- - 17.0 – -	- 1.5 - -						
						- - 16.5 -	- - 2.0 - -			1.90m Sandy CLAY: low to medium plasticity, red-brown, fine to coarse grained, sub-rounded to sub-angular sand, with fine to coarse, sub-rounded to sub-angular gravel			
				D 2.70 - 3.00	m	- - 16.0 -	- - 2.5 - -		CL- CI		M ( <pl)< td=""><td>VSt</td><td></td></pl)<>	VSt	
	н			SPT 3.00 - 3.35 m 8, 10, 8/50m N=R	m	- - 15.5 – - -	- 3.0 - - -		sc	3.10m Clayey Gravelly SAND: fine to coarse grained, sub-rounded to sub-angular, grey, fine to coarse, sub-angular to sub-rounded gravel	м	D - VD	EXTREMELY WEATHERED
- WB	VH					- 15.0	3.5 - -			3.50m Continued as Cored Drill Hole			-
M	ETHOD				PENETRATION	-	-	FIEI		STS SAMPLES			- - SOIL CONSISTENCY
AE HF W RF	Ri A Ha DN Sc A Ain Ain Ain Ain A Ain A Ain Ain Ain Ain Ain Ain Ain Ain Ain Ain	blid flig blow fli ashbor bck roll	ger e lling ner on san ral aug nt aug ght au ght au e drilli er	npler ger er: V-Bit er: TC-Bit iger ng	VE Very Easy (I E Easy F Firm H Hard VH Very Hard (F WATER Water Shown water i water o	Refusal) Level on inflow outflow	Date	HP DCI PSF MC PB <sup>-</sup> IMF PID VS	- P - - T - - -	Hand/Pocket Penetrometer     D     Di       Dynamic Cone Penetrometer     ES     Er       Perth Sand Penetrometer     U     Th       Moisture Content     MOISTURE       Plate Bearing Test     D     Dr       Borehole Impression Test     M     Mk       Photoionisation Detector     W     W       Vane Shear; P=Peak,     LL     Lic       R=Resdual (uncorrected kPa)     W     Mc	y bist	ample tal sampl be 'undist	le F - Firm
Re abl	fer to ex breviation	planator ns and b	/ notes asis of (	for details of descriptions			CA	RDN	0 (	(NSW/ACT) PTY LTD			

				Ino															SHEE
Clie Proj	ect:	5	Shoa	have	n Hos											Ho	ole l		BH0
Loca							SW 2541		Job No:						•	( F			et: 2 of
				D&B		699.83	0 56 MGA20	120	Angle fi Mountir			tal: 90	-			ller: C		on: 18.6	20 m AHE
		Diam	-			Bit T	ype: NMLC		Bit Con	-		d						al Drillir	g
Date	Sta	rted:	21/6	/21		Date	Completed	21/6/21	Logged	By: B	Α					ecked			
	Co	ring		_				Material Des	cription							Defec	t Desci	ription	
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	characte & ROCK N color	PE, plasticity or pristic, colour, sec minor component AME, grain size a ur, fabric and text ns & minor comp	condary is ind type, ure,	Weathering	Stre Is <sub>(50)</sub> ●-Axial C 5 중 .	nated ingth MPa - Diametral	Aver Natu Def Spac (mi	ural ect cing	Visual	5	EFECT shape, ro	ditional Da TYPE, orie bughness, g, thicknes	entation, infilling
								DRING AT 3.50m											
NMLC	0% LOSS	92	79	15.0 - -	-		3.66m SANDSTC	SS 0.16m (3.50-3.66) NE, medium to coarse le grey stained orange		MW						— 3.73 - — 3.78 r — 3.81 r	n: DB	M, 20 mm, C	lay
AD/ AD/ HFA WB RR PQ HQ DT PT PS SOT AH	T So Ho W Ro Ro Ro LC Ro Di Pu Pu Po Ai	blid fligh blid fligh blow flig ashbor ock rolk otary co otary co	nt auger ght aug e drillin er ore (85 ore (63 ore (51 concret e on sam lling her	: TC-Bit er g mm) 5mm) 94mm) e coring	R R T T	✓ on da ✓ wate ✓ wate OCK QUA ESCRIPTION QD Root Des CR Tota	LITY DNS k Quality signation (%) al Core covery (%)	ROCK STRENGTH EH Extremly High VH Very High M Medium L Low VL Very Low ROCK WEATHERIN FR Fresh SW Slightly Weath DW Distinctly Weather XW Extremly Weather XW Extremly Weather CARDNO (	ered hered athered red hered	JT SZ BP SM FL VN CS FZ DL HB DB	Seam Foliation Vein Cleavag Crushed Fracture Drift Lift Handing Drilling	d zone g Parting n d Seam e Zone g Break Break	CU DIS IR PR ST UN <b>RO</b> R S SL PO	Disc Irreg Plar Step Und UGHNI Very Rou Smo	ved continu jular pped ulose <b>ESS</b> v Roug gh poth ckensic	h	SN VNR CT INFILL X MU MS KT CA Fe	Clean Stained	<b>3</b> us 1 minteral

2.01.7 LIB.GLB Log CARDNO CORED BOREHOLE 8202118201 LOGS.GPJ <<DrawingFile>> 09/09/2021 19:02 10.0.000 Datgel AGS RTA, Photo, Monit

S 280				pital						Hole No: BH03
			ve, No	wra NSW 2541		b No: 8202 <sup>,</sup>				Sheet: 3 of
				699.830 56 MG		•	orizontal: 90	°		rface Elevation: 18.620 m AHD
		D&B 8	BD			ounting: Tra				ller: CM
	ter: 21/6			Bit Type: NM Date Complet		t Condition: gged By: B				ntractor: Total Drilling ecked By: DR
1	21/0	21		Date Complet	Material Description		<u>~</u>			Defect Description
, 		D)	(	SOI	. TYPE, plasticity or particl	<u>م</u>	Estimated	Average		
(%) YO I	RQD (%)	RL (m AHD)	Depth (m)	Char Char CO CO CO CO CO CO CO CO CO CO CO CO CO	& minor components & Minor components < NAME, grain size and typolour, fabric and texture, sions & minor component	ry , eathering	Strength Is <sub>(50)</sub> MPa • Axial O - Diametral 5 5 - , , , , , , J _ E I J _ U	Natural Defect Spacing (mm) R & R & R & R	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other
		- 14.5	-	SAND bedde	STONE, medium to coarse graine d, pale grey stained orange-brown own (continued)	d, MW				∽4.00 m: HB
		- - 14.0 —	- - 4.5 -							— 4.41 m: BP, 10°, UN, RF, SN, Fe
2	79	-	- - 5.0							<ul> <li>— 4.85 m: BP, 5°, UN, RF, SN, Fe</li> <li>— 4.91 m: BP, 10°, UN, RF, VNR, Clay</li> <li>4.93 m: BP, 0°, UN, RF, VNR, Clay</li> <li>4.94 - 5.00 m: SM, 5°, 60 mm, Clay</li> </ul>
		13.5 — - -	-							— 5.10 m: BP, 5°, UN, RF, VNR, Clay — 5.14 m: BP, 10°, UN, RF, VNR, Clay
		- 13.0 —	- 5.5 - -							— 5.51 m: BP, 5°, UN, RF, CN
00	89	- - 12.5 — -	- 6.0 - -							— 5.77 m: BP, 5°, UN, RF, SN, Fe — 5.93 m: BP, 10°, UN, RF, SN, Fe — 6.00 m: HB
		- - 12.0 — -	- - 6.5 - -			HW				— 6.41 m: JT, 60°, PR, RF, SN, Fe — 6.50 m: JT, 20°, PR, RF, SN, Fe — 6.58 m: JT, 20°, PR, RF, SN, Fe — 6.71 m: BP, 5°, UN, RF, CN — 6.86 m: BP, 10°, UN, RF, CN, on Fossil
			- 7.0	7.00m TERM Targe	INATED AT 7.00 m depth					- 7.00 m: DB
		-	- - - 7.5							
		11.0	-							
flight v fligh ibore roller	auger ht auge drilling r re (85r re (63.	: TC-Bit er 9 nm) 5mm) 94mm)	- R	Water Level on date shown water inflow water outflow OCK QUALITY ESCRIPTIONS	ROCK STRENGTH       EH     Extremly High       VH     Very High       H     High       M     Medium       L     Low       VL     Very Low       ROCK WEATHERING       FR     Fresh       SW     Silontly Weathered	JT SZ BP SM FL VN CL CS FZ	Joint Sheared zone Bedding Parting Seam Foliation Vein Cleavage Crushed Seam Fracture Zone	CU Curv DIS Disco IR Irregu PR Plans ST Step UN Undu <b>ROUGHNE</b> VR Very	ed ontinu ular ar ped ulose <b>SS</b> Roug	VNR Veneer (thin or patchy CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceus MU Unidentified minteral
flight v fligh ibore roller	au hta dr r re(	iger auge illing (85r (63. (51.)	illing (85mm) (63.5mm) (51.94mm)	ger: V-Bit ger: TC-Bit auger illing (85mm) (63.5mm) 51.94mm) rete coring	ger: TC-Bit auger illing (85mm) 63.5mm) 51.94mm) rete coring CCK QUALITY DESCRIPTIONS	ger: V-Bit ger: TC-Bit auger illing (855mm) (63.5mm) rete coring RQD Rock Quality RQD Rock Quality Barbon RQD Rock Quality ROCK Barbon RQD Rock Quality Barbon RQD Rock Quality SUB Starbon SUB Star	ger: V-Bit ger: TC-Bit auger illing (855mm) (63.5mm) rete coring RQD Rock Quality RQD Rock Quality Barbon ROCK Barbon RQD Rock Quality ROCK QUALITY ROCK QUALITY ROCK QUALITY ROCK QUALITY ROCK QUALITY ROCK QUALITY ROCK QUALITY SW Slightly Weathered FZ	ger: V-Bit ger: TC-Bit auger lifting (85mm) (51.94mm) (51.94mm) BECRIPTIONS BER Extremly High VH Very High H High M Medium L Low VL Very Low VL Ve	ger: V-Bit ger: TC-Bit ger: TC-Bit ger: TC-Bit ger: TC-Bit sugger illing (855mm) (63.5mm) rete coring RQD Rock Quality RQD Rock Quality Ber Bedding Parting M Medium L Low VL Very Low	ger: V-Bit ger: TC-Bit auger     Water Level on date shown     EH     Extremly High VH     JT     Joint SZ     CU     Curved DIS       water inflow illing     water outflow     High High M     High Medium L     BP     Bedding Parting SM     BR     Irregular       (855mm) (63.5mm) (51.94mm) rete coring     ROCK QUALITY ROCK QUALITY     ROCK WEATHERING FR     CL     Cleavage CL     Cleavage CL     Cleavage VN       RQD     Rock Quality     SW     Sightly Weathered     FZ     Fracture Zone     ROUGHNESS

	TITLE:		<b>hotographs - BH03</b> n - Shoalhaven Hospital GI	
Cardno Shaping the Future	PROJECT NO: 8202118201	TEST DATE: 21/06/2021	INCLINATION: -90 degree	CORED LENGTH: BOX 1 OF 1 - 3.50m to 7.00m - 3.50m Length
	DRILL RIG: Hanjin DB8	CONTRACTOR: Cardno & Total Drilling	LOGGED BY: BA	CHECKED BY:
0       0       0         0       0       0         0       0       0         0       0       0	PROJECT: Shoa	haven Hospital DEPTH: Ura CORE TR	BH03 3.50-7.00 m AY NO: 1 of 1 21-06-2021	
820211	8201 - Shealhave Hospital	" - BHO3 -	21.06.2021	
13.	start coving	@ 3.50m - Car	E Loss 1.50 3.66m	*
4.				
5.				1. 11/2-1-2
6.				

	$\mathcal{D}$			dno°							E		EHOLE LOG SHEET
Pro	ent: ject:	:	Shoa	Health Infr Ihaven Hos	pital							ŀ	lole No: BH04
	ation				owra NSW 2					Job No: 8202118201			Sheet: 1 of 3
				D&B 8D	3657.496 56	5 MGA2	2020			Angle from Horizontal: 90° Mounting: Track		Surfac Driller:	e Elevation: 21.320 m AHD
			-	HW						Mounting. Track			ctor: Total Drilling
	e Sta				Date Cor	npleted	d: 22	/6/21		Logged By: BA			ed By: DR
	Drillin				g & Testing					Material Descrip			
			1			- Â	Ē		Ę				
Method	Resistance	Casing	Water	Sample o Field Tes		L (m AHD)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				ES 0.10 m			-		х SM	Silty SAND: fine to coarse grained, dark grey and dark brown, trace fine to coarse grained sand 0.20m	М		TOPSOIL
						21.0 -				Sandy CLAY: low to medium plasticity, orange-brown, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel	M (>PL)		RESIDUAL SOIL
	E			B 0.50 - 1.00 ES 0.50 m SPT 0.50 -	m		- 0.5			graver		-	
				0.95 m 3, 5, 5 N=10		20.5 -	-		CL- CI			St	
				1.00 m C 1.00 m	_		- 1.0						
				D 1.20 - 1.50	m	-				1.20m Sandy CLAY: low to medium plasticity, red-brown and grey, fine to coarse grained,	-		
1		нw		SPT 1.50 -	_	20.0-	- 1.5			sub-rounded to sub-angular sand, with fine to coarse, sub-rounded to sub-angular gravel			
T/DA			Not Encountered	1.95 m 8, 13, 21 N=3	4						M ( <pl)< td=""><td></td><td></td></pl)<>		
	F		Not			19.5 -			CL- CI				
							-2.0					VSt	
						19.0 -	- 2.5						
				D 2.70 - 3.00	m		- 2.5			2.70m Clayey Gravelly SAND: fine to coarse	<u> </u>		EXTREMELY WEATHERED
						18.5 -				grained, sub-rounded to sub-angular, mottled red-brown and grey, fine to coarse, sub-angular to sub-rounded gravel			
*	н			SPT 3.00 - 3.10 m \12/100mm N	<u>=R /</u>		- 3.0		sc		м	D - VD	
•	VH	-				18.0 -		000		3.50m			
_						-	-3.5-			Continued as Cored Drill Hole			
						17.5 -							
ME EX HA PT SC AF	Ri Ha Pu ON So I Air	cavato pper and aug ush tub pnic dri r hamm ercussio	ger e Iling ner		PENETRATION VE Very Easy ( E Easy F Firm H Hard VH Very Hard ( WATER	No Resistan	ice)	SP HP DC PSI MC	- P- P-	Standard Penetration Test     B     - Bu       Hand/Pocket Penetrometer     D     - Di       Dynamic Cone Penetrometer     ES     - Er       Perth Sand Penetrometer     U     - Tr       Moisture Content     MOISTURE		ample tal sampl	e F - Stift turbed' St - Stiff VSt - Very Stiff H - Hard
AS AD AD HF WI	Sh NV So NT So A Ho B W	ort spi blid flig	ral aug ht aug ht aug ght au re drilli	ger er: V-Bit er: TC-Bit iger	Water Shown Water Water	า inflow	Date	IMF PID VS	 ) -	Borehole Impression Test M - M Photoionisation Detector W - W Vane Shear; P=Peak, PL - PI DeDeceture (uncertated kDe)	oist	ntent	RELATIVE DENSITY         VL       - Very Loose         L       - Loose         MD       Medium Dense         D       - Dense         VD       - Very Dense
Ret abb	fer to ex previation	planator; ns and b	y notes asis of	for details of descriptions			CA	RDN	0	(NSW/ACT) PTY LTD			

-	)	Ca	arq	lno									C	ORE LOG SHE
Clier Proje					h Infra n Hos	astruct pital	ure						Ho	ole No: BH0
Loca	tior	n: S	Sceni	ic Dri	ve, No	owra NS	SW 2541	Job No: 82						Sheet: 2 c
						8657.49	6 56 MGA2020			orizontal: 90	0			levation: 21.320 m Al
				D&B	8D	D:4 T		Mounting:					iller: Cl	
		Diamo rted:					Type: NMLC Completed: 22/6/21	Bit Condition Logged By:						r: Total Drilling By: DR
Date		ring	22/0			Date	Material D							t Description
				<u></u>	(L		SOIL TYPE, plasticity	or particle		Estimated	Average		Deree	
ро	σ	(%)	(%)	RL (m AHD)	Depth (m)	in the second	characteristic, colour, & minor compon	secondary	Weathering	Strength Is <sub>(50)</sub> MPa	Natural Defect	<u>_</u>		Additional Data
Method	Fluid	TCR (%)	RQD (%)	SL (r	Dep	Graphic Log	ROCK NAME, grain siz	e and type,	eathe	<ul> <li>Axial O- Diametral</li> </ul>	Spacing	Visual		EFECT TYPE, orientation, shape, roughness, infilling
-		-					colour, fabric and t inclusions & minor co	exture, ponents	Š	<sup>9 3 3 3 3</sup> ЕН <sup>9 3 3 33</sup>	(mm) ຣິຣິຣິຣິຣ ຣ		O	r coating, thickness, other
				-										
				-	[									
				-										
				21.0 -										
					- 0.5									
				_	-					<u>iiii</u>	<u>iiiii</u>			
				-	-									
				20.5	ŀ									
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				-	- 1.0									
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				-	ŀ									
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				18.5	F									
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				-	- 3.0									
				-										
				- 18.0	ŀ									
					ŀ									
				-	3.5	::::::	3.50m START CORING AT 3.50m SANDSTONE, medium to co	arse grained.	лw					
				-	ŀ		bedded, pale grey stained ora red-brown							
NMLC-	0% LOSS	100	87	-	ŀ								2 00	
ź	0%			17.5 –	ŀ								Clay	n: BP, 10°, CU, RF, VNR, 10 mm, 3.84 m: SM, 10 mm, Clay
				-	ŀ								- 3.03 - 3.98 m	
					w	ATER	ROCK STRENG			CT TYPE	PLANARI		. 0.30 11	COATING
AD/\ AD/T HFA	r So	olid fligh olid fligh ollow flig	t auger	: TC-Bit		兰 on da	er Level EH Extremly Hi ate shown VH Very High H High	gh JT SZ BP	Ζ	Joint Sheared zone Bedding Parting		continu	ous	CN Clean SN Stained VNR Veneer (thin or patch
WB RR	W Ro	ashbor ock rolle	e drillin er	g		→ wate	er inflow M Medium er outflow L Low	SM FL	М	Seam Foliation	PR Plai	gular nar oped		CT Coating (up to 1mm)
PQ HQ	Ro Ro	otary co otary co	ore (85) ore (63.	5mm)	R	OCK QUA	LITY VL Very Low	VN	N	Vein Cleavage	UN Und	lulose		INFILL MATERIALS X Carbonaceus
NML DT PT	Di	otary co atube c ush tube	oncrete	94mm) e coring		ESCRIPTION QD Roc	ONS FR Fresh ck Quality SW Slightly We	athered FZ	SZ	Crushed Seam Fracture Zone		y Roug	h	MU Unidentified minteral MS Secondary mineral
PT PS SON	Pe	ercussionic dril	on sam	pling		Des	signation (%) DW Distinctly W MW Moderately	Veathered DL Weathered HB	L B	Drift Lift Handing Break		ooth		KT Chlorite CA Calcite
		r hamm					al Core HW Highly Wea	thered DB		Drilling Break	SL Slo	ckensio	bed	Fe Iron Oxide
AH						Rec	covery (%) XW Extremly W	eathered		·	POL Poli	shed		Qz Quartz

01.7 LIB.GLB Log CARDNO CORED BOREHOLE 8202118201 LOGS.GPJ <<DrawingFile>> 09/09/2021 19:02 10.0.000 Datgel AGS RTA, Photo, Monit

Cardno					CORE LOG SHEET
Project: Shoalhave					Hole No: BH04
	ve, Nowra NSW 2541	Job No: 8202			Sheet: 3 of 3 Inface Elevation: 21.320 m AHD
Rig Type: Hanjin D&B	N6138657.496 56 MGA2020	Mounting: Tr	orizontal: 90° rack		iller: CM
Casing Diameter: HW	Bit Type: NMLC	Bit Condition			ontractor: Total Drilling
Date Started: 22/6/21	Date Completed: 22/6	21 Logged By: E	ЗА		necked By: DR
Coring	Ma	terial Description			Defect Description
Method Fluid TCR (%) RQD (%) RL (m AHD)	ت) بن من من من من من من من من من من من من من	asticity or particle colour, secondary components rain size and type, ic and texture, inor components	Estimated Strength Is <sub>(50)</sub> MPa • Axial O-Diametral 5 5 - 6 9 J 2 1 5 1 5	Average Natural Defect Spacing (mm) N 00 00 000000000000000000000000000000	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other
UTINU S S S S S S S S S S S S S S S S S S S	SANDSTONE, me	ium to coarse grained, MW tained orange-brown to			4.00 m: HB 4.08 m: HB 4.18 m: BP, 10°, UN, RF, SN, Fe 4.23 m: JT, 20°, PR, RF, SN, Fe 4.25 m: JT, 30°, PR, RF, SN, Fe 4.30 m: BP, 10°, UN, RF, SN, Fe 4.48 - 4.50 m: SM, 5°, Clay 4.54 m: HF, 10° 4.73 m: JT, 10°, PR, RF, CN, on Fossil 4.86 m: HB 5.00 m: HB 5.10 m: BP, 10°, UN, RF, CN, on Fossil 5.37 m: BP, 10°, PR, RF, SN, Fe 5.45 m: BP, 20°, UN, RF, SN, Fe 5.66 m: DB 6.00 m: HB 6.09 m: BP, 20°, UN, RF, CN, on Fossil 6.30 m: BP, 20°, UN, RF, CN, on Fossil
↓       14.5 -         ↓       14.5 -         ↓       14.5 -         ↓       14.0 -         ↓       14.0 -         ↓       14.0 -         ↓       14.0 -         ↓       14.0 -         ↓       14.0 -         ↓       13.5 -         ↓       13.5 -         ↓       ↓ <t< td=""><td>Water Level       EH       EV         on date shown       H       H         water inflow       H       H         water outflow       L       L         ROCK QUALITY       ROCK       POCK         DESCRIPTIONS       FR       FR         RQD       Rock Quality       DW       DW         Designation (%)       TCR       Total Core       HW</td><td></td><td>I         I           I         I</td><td>I         I         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII</td><td>VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceus MU Unidentified minteral MS Secondary mineral KT Chlorite CA Calcite</td></t<>	Water Level       EH       EV         on date shown       H       H         water inflow       H       H         water outflow       L       L         ROCK QUALITY       ROCK       POCK         DESCRIPTIONS       FR       FR         RQD       Rock Quality       DW       DW         Designation (%)       TCR       Total Core       HW		I         I           I         I	I         I         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceus MU Unidentified minteral MS Secondary mineral KT Chlorite CA Calcite
Refer to explanatory notes for details abbreviations and basis of descriptior		DNO (NSW/ACT)	) PTY LTD		

		TITLE:		<b>hotographs - BH04</b> n - Shoalhaven Hospital GI	
5	<b>Cardno</b> Shaping the Future	PROJECT NO: 8202118201	TEST DATE: 22/06/2021	INCLINATION: -90 degree	CORED LENGTH: BOX 1 OF 1 - 3.50m to 6.90m - 3.40m Length
		DRILL RIG: Hanjin DB8	CONTRACTOR: Cardno & Total Drilling	LOGGED BY: BA	CHECKED BY: DR
	000     000       000     000       000     000	Area PROJECT: Show	alhaven Hospital DEPTH:	BH04 3.50 - 6.90m AY NO: 1 of 1 22-06 - 2021	
	820211	18201 - shoalha Hospite	uen - BH04 -	22.06.2021	
3.		start coring	@ 3.50m ->	A state of the	
4.				Mar and M	be the second of
5.6				000	
6.	1.2.	A FR			EOH @6.90m

	$\mathcal{D}$			dno°							E		EHOLE LOG SHEET
	ject:	:	Shoa	Health Infrast	al							ŀ	lole No: BH05
	ation			ic Drive, Nowr 3.930 N613881			020			Job No: 8202118201 Angle from Horizontal: 90°		Surfac	Sheet: 1 of 1 e Elevation: 23.650 m AHD
				D&B 8D			020			Mounting: Track		Driller	
		Diam											ctor: Total Drilling
	e Sta	arted	21/6	Sampling &	Date Com	pletec	1: 21	/6/21		Logged By: BA Material Descrip		Check	ed By: DR
		9	1	Camping &		(p	(F		c				
Method	Resistance	Casing	Water	Sample or Field Test	(blows per 150 mm)	RL (m AHD)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
	<u>н</u> F	-				- 23.5 —	-		66	0.05m ASPHALT: 0.05m thick Clayey Sandy GRAVEL: fine to medium, angular, grey to dark grey, fine to coarse grained sand	D	_	PAVEMENT
	F	_				-	-		GC	0.40m FILL: Gravelly Sandy CLAY: low plasticity,		_	- FILL
	E			SPT 0.50 - 0.95 m 6, 5, 5 N=10		- 23.0	- 0.5 - -			brown, fine to coarse grained stand, fine to coarse gravel, trace fine to coarse, sub-rounded to sub-angular gravel			-
			Not Encountered	D 1.20 - 1.50 m		- - 22.5 — -	- 1.0 - -		CL		M ( <pl)< td=""><td></td><td>-</td></pl)<>		-
AD/T			Not End	SPT 1.50 -		-	- 1.5						
	F			1.95 m 4, 4, 5 N=9		22.0	-			1.70m Sandy CLAY: orange-brown, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel			RESIDUAL SOIL
						- - 21.5 — -	- - 2.0 - -		СІ	Sub-angular gravor	M ( <pl)< td=""><td>St</td><td>-</td></pl)<>	St	-
	н	-		D 2.50 - 2.70 m		- - 21.0 —	- 2.5 -		sc	2.50m Clayey Gravelly SAND: fine to coarse grained, sub-rounded to sub-angular, mottied red-brown and grey, fine to coarse, sub-angular to sub-rounded gravel		D - VD	EXTREMELY WEATHERED
	VH						- - - 3.0	-22-01-021		2.75m TERMINATED AT 2.75 m Refusal TC-Bit Auger Refusal			
						20.5	-						
						- 20.0	- 3.5 - - -						
ME EX R HA PT SAH PS AD AD HF WE RF	Ri A Ha DN So DN So A Ai S Pe S Sh D/V So D/V So D/V So D/V So D/T So FA Ho B W	kcavato pper and augush tub pnic dri r hamm ercussio nort spi plid fligi	ger lling her on sam ral aug ht aug ght aug ght au	et VE F H VH ger TC-Bit ger	IETRATION Very Easy (No Easy Firm Hard Very Hard (Re TER Water L Shown water in Water ou	<sup>fusal)</sup> evel on flow		SP1 HP	- - - - - -	Standard Penetration Test Hand/Pocket Penetrometer     B     -     B       Dynamic Cone Penetrometer     D     -     D       Perth Sand Penetrometer     U     -     T       Moisture Content     Plate Bearing Test     D     -     D       Borehole Impression Test     M     M     M     M       Photoionisation Detector     W     -     PL       Vane Shear; P=Peak,     PL     -     PL	ulk disturb isturbed s nvironmen nin wall tu E ry oist	ample tal sampl be 'undis	le F - Firm
Rei abt	fer to ex previatio	planator ns and b	y notes asis of o	for details of descriptions			CA	RDN	0	(NSW/ACT) PTY LTD			

	$\square$	) C	arc	lno <sup>°</sup>							B	ORE	EHOLE LOG SHEET
	ent: ject:		-	Health Infrast Ihaven Hospit								ŀ	lole No: BH06
Loc	atio	n: :	Scen	ic Drive, Now	ra NSW 254					Job No: 8202118201			Sheet: 1 of 1
-				.575 N613878	5.184 56 N	MGA2	2020			Angle from Horizontal: 90°			e Elevation: 22.430 m AHD
_			-	D&B 8D						Mounting: Track		Driller	
		Diam arted			Date Comp	alotor	1. 22	6/21		Logged By: BA			etor: Total Drilling
Dai	Drillir			Sampling &	i	Jietet		0/21		Material Descript		Oneck	
		. <u>9</u>	1		looung	ĝ	Ê		Ē				
Method	Resistance	Casing	Water	Sample or Field Test		RL (m AHD)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
	н					-		MMMA		ASPHALT: 0.05m thick 0.10m		-	PAVEMENT
	F					-			GC	Clayey Sandy GRAVEL: fine to medium, angular, grey to dark grey, fine to coarse grained sand 0.30m	м		-
	E			SPT 0.50 - 0.95 m 3, 4, 4 N=8	_	- 22.0 <del>-</del> -	- 0.5			Sandy CLAY: mottled orange-brown, red-brown and grey, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel			RESIDUAL SOIL
— AD/T			Not Encountered		_	- - 21.5 —	1.0		СІ		M ( <pl)< td=""><td>St</td><td>-</td></pl)<>	St	-
	F			D 1.20 - 1.50 m	-	-	-						-
	н			SPT 1.50 - 1.64 m 25/140mm N=R	,	21.0	- 1.5		sc	1.50m Clayey Gravelly SAND: fine to coarse grained, sub-rounded to sub-angular, orange-brown, fine to coarse, sub-angular to sub-rounded gravel	м	D - VD	EXTREMELY WEATHERED
	VH					20.5	- 2.0			1.80m TERMINATED AT 1.80 m Refusal TC-Bit Auger Refusal			
						- - 20.0 — -	- 2.5						
						- - 19.5 — -	- 3.0						
						- - 19.0 – -	- 3.5						
	ETHO			pe	NETRATION	- - 18.5 —	-	EIE		STS SAMPLES			SOIL CONSISTENCY
	K ER RA H FON SON AP SON SON FA H B W	xcavato lipper land au ush tub onic dri ir hamn ercussi hort spi olid flig	ger lling her on san ral aug ht aug ght aug ght au	et VE F H VH ver er: V-Bit er: TC-Bit ger	Very Easy (No Easy Firm Hard Very Hard (Ref VER Water Le shown water inf Water ou	<sup>iusal)</sup> evel on ilow		SP HP DC PSI MC	T - P - F - T - T -	Standard Penetration Test Hand/Pocket Penetrometer     B     - Bu       Dynamic Cone Penetrometer     D     - Dit       Perth Sand Penetrometer     U     - Th       Moisture Content     MolSTURE       Plate Bearing Test     D     - Dit       Porchole Impression Test     M     - Mu       Yane Shear; P=Peak,     PL     - Pic       Parbacelus (upper metric)     - Lic     - Lic	in wall tub : y pist	ample tal sampl be 'undist	le VS - Very Soft S - Soft le F - Firm
Re ab				or details of lescriptions			CA	RDN	0	(NSW/ACT) PTY LTD			

	nt: iect:		-	Health Infrastru Ihaven Hospital									ŀ	lole	No:	TPC
	ation			ic Drive, Nowra		41				Job No: 8202118201					S	heet: 1 c
	ition									Angle from Horizontal			Surface	e Elevat	ion:	
				ckhoe						Excavation Method: E	xcavator B					
				sions: 1.50m L	ONG AN	D 0.8	oum wi	DE		Lowed Dry DA					/nch Civ	11
			ea: 1	7/6/21						Logged By: BA			леске	ed By: I	JR	
EX	cavat	on		Sampling & Te	esting					Materia	al Description	1				
Method	Resistance	Stability	Water	Sample or Field Test	(blows per 150 mm)	Depth (m)	Graphic Log	Classification		SOIL TYPE, plasticity or particle cha colour, secondary and minor com ROCK TYPE, grain size and type, fabric & texture, strength, weath defects and structure	ponents colour,	Moisture Condition	Consistency Relative Density	ł	STRUC & Other Obs	
				D 0.10 - 0.20 m ES 0.10 m		_		ML	0.20m	FILL: Sandy SILT: low plasticity, dar to coarse grained sand, trace fine gr rootlets, trace plastic	k brown, fine ravel, trace	M ( <pl)< td=""><td></td><td>FILL</td><td></td><td></td></pl)<>		FILL		
	E			PID 0.10 m 0.4 ppm		-		sc		FILL: Clayey SAND: fine to coarse g orange-brown	jrained,	м				
			untered	ES 0.50 m PID 0.50 m 1.1 ppm		-0.5			0.50m	Sandy CLAY: mottled orange-brown and grey, fine to coarse grained, sul	b-rounded to			RESIDUA	L SOIL	
	F	Stable	Not Encountered	PP 0.70 m =200 - 250 kPa		-		СІ		sub-ăngular sand, trace fine to coan sub-rounded to sub-angular gravel	se,	M (>PL)	St			
				ES 1.00 m PID 1.00 m 1.7 ppm					1.10m	Clayey Gravelly SAND: fine to coars	se grained			EXTREM	ELY WEATI	HERED
	н VH			D 1.20 - 0.40 m		-		sc	1.40m	sub-rounded to sub-angular, mottlec and grey, fine to coarse, sub-angula sub-rounded gravel	d red-brown	м	D - VD			
•						- 1.5	-7.12.5		1.40m	TERMINATED AT 1.40 m Refusal						
						- - 2.0 - - - 2.5 - - - 3.0 - - - 3.5 - - - - - - - - - - - - - - - - - - -										
ME EX R HA PT SO H PS A D A HE WE RR	Rij Ha Pu N So Air Pe Sh /V So /T So A Ho 3 Wi		ler e er on sam al aug t auge t auge ght aug ght aug e drillir	et VE F H VH er r: V-Bit r: TC-Bit per	TRATION Very Easy (No Easy Hard Very Hard (Re SR Water Le Shown water inf water ou	efusal) evel on low		S H D P N P	IP - DCP - PSP - 1C - PBT - MP - PID -	Standard Penetration Test Hand/Pocket Penetrometer Dynamic Cone Penetrometer Perth Sand Penetrometer Moisture Content Plate Bearing Test Borehole Impression Test	D - Dis ES - Env U - Thi <b>MOISTURE</b> D - Dry M - Mo W - We PL - Pla LL - Liq	, ist t stic limit	mple al sample e 'undistu		VS - S - St - VSt - H - <b>RELATIV</b> VL - L - MD - D -	Very Dense Very Dense Very Stiff Hard Very Stiff Very Loose Medium Den Dense

Clie Pro	ent: ject:			Health Infrastru Ihaven Hospital								ŀ	Hole No: TP0
Loc	atio	n: S		ic Drive, Nowra		541				Job No: 8202118201			Sheet: 1 of
	ition			al de a a						Angle from Horizontal: 90° Excavation Method: Excavator		Surfac	e Elevation:
				ckhoe Isions: 1.50m L			50m W	DE		Excavation Method: Excavator		Contra	ctor: Lynch Civil
				7/6/21						Logged By: BA			ed By: DR
Ex	cava	tion		Sampling & Te	esting					Material Descriptio	on		
Method	Resistance	Stability	Water	Sample or Field Test	(blows per 150 mm	<b>´</b>	Graphic Log	Classification	s	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				ES 0.10 m PID 0.10 m 0.5 ppm		-		SM		FILL: Silty SAND: fine to coarse grained, dark grey, trace rootlets, trace ceramics			FILL
	E	_	ered	ES 0.50 m PID 0.50 m 0.8 ppm		- - 0.5 -		sc	0.30m	FILL: Clayey SAND: fine to coarse grained, orange-brown, trace fine to coarse, sub-rounded to sub-angular gravel	м		
EX	F H		Not Encountered	ES 1.00 m PP 1.00 m =200 - 250 kPa PID 1.00 m 0.3 ppm	11/3pmm1	- - 1.0  -		СІ	0.90m	Sandy CLAY: mottled orange-brown, red-brown and grey, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel	M ( <pl)< td=""><td>VSt</td><td>RESIDUAL SOIL</td></pl)<>	VSt	RESIDUAL SOIL
	н	_		D 1.40 - 1.60 m		- 1.5 - -			1.70m	Clayey Gravelly SAND: fine to coarse grained,			EXTREMELY WEATHERED
	VH	-		D 1.80 - 1.90 m		-	<b>S</b> (	sc	1.90m	sub-rounded to sub-angular, mottled red-brown and grey, fine to coarse, sub-angular to sub-rounded gravel	D - M	D - VD	
						- 2.0 - - - 2.5 - - - - - - - - - - - - - - - - - - -				TERMINATED AT 1.90 m Refusal Backhoe Bucket Refusal			
EX R PT SO AH PS AD AD HF WE	METHOD     PENETRATION       EX     Excavator bucket     VE     Very Easy (       R     Ripper     E     Easy       HA     Hand auger     F     Firm       27     Push tube     H     Hard       SON     Sonic drilling     VH     Very Hard (       AH     Air hammer     SP     Percussion sampler					Refusal) ∟evel on nflow		S H D P M P	IP - ICP - ISP - IC - IBT - MP - ID -	Standard Penetration Test     B     -       Hand/Pocket Penetrometer     D     -       Dynamic Cone Penetrometer     U     -       Perth Sand Penetrometer     U     -       Moisture Content     MOISTU     Plate Bearing Test     D       Photoionisation Detector     W     -       Vane Shear; P=Peak,     PL     -	Bulk disturbe Disturbed sa Environmen Thin wall tub <b>RE</b>	ample tal sample e 'undistu	S - Soft F - Firm

	ent: ject:			Health Infrastru Ihaven Hospital									ŀ	Hole No: TP0
	ation			ic Drive, Nowra		1				Job No: 8202118201				Sheet: 1 of
	ition			-1-1						Angle from Horizontal: 90			Surfac	e Elevation:
				ckhoe nsions: 1.50m L		0 0	0m WI	DE		Excavation Method: Exca	vator Bu		Contra	ctor: Lynch Civil
				7/6/21		5 0.0				Logged By: BA				ed By: DR
	cava			Sampling & Te	esting					Material De	scription			<b>,</b>
Method	Resistance	Stability	Water	Sample or Field Test	(blows per 150 mm)	Depth (m)	Graphic Log	Classification	cc R	TYPE, plasticity or particle character lour, secondary and minor componer OCK TYPE, grain size and type, colou fabric & texture, strength, weathering, defects and structure	nts ur,	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				D 0.10 - 0.20 m ES 0.10 m		 -		SM		L: Silty SAND: fine to coarse grained, o y, trace rootlets	dark			FILL
	E			PID 0.10 m 1.1 ppm ES 0.50 m PID 0.50 m 1.5 ppm		- - - 0.5		sc	ora sub	L: Clayey SAND: fine to coarse graine nge-brown, trace fine to coarse, sub-a -rounded gravel		М		
		Stable	Not Encountered			-			and	ndy CLAY: mottled orange-brown, red- grey, fine to coarse grained, sub-rour -angular sand, trace fine to coarse, -rounded to sub-angular gravel	-brown nded to		F	RESIDUAL SOIL
	F	_		D 1.00 - 1.20 m ES 1.00 m PID 1.00 m 1.1 ppm		1.0 - -		СІ			1	M (>PL)	St	
	н	-		D 1.50 - 1.60 m		- 1.5 -		sc	sub and	yey Gravelly SAND: fine to coarse gra -rounded to sub-angular, mottled red-l grey, fine to coarse, sub-angular to -rounded gravel		М	D - VD	EXTREMELY WEATHERED
¥.	VH								1.80m	RMINATED AT 1.80 m				
										usal khoe Bucket Refusal				
ME R HA PT SC AF PS AD AD HF WE	Ri Pron N Si N Si Si Si Si Si Si Si Si Si Si Si Si Si	ccavato pper and aug ush tube onic drill r hamm ercussic nort spir olid fligh	ler e er on sam al aug t auge t auge ght aug	et VE F H VH er r: V-Bit r: TC-Bit ger	TRATION Very Easy (No Easy Firm Hard Very Hard (Re' R Water Le shown water infle water out	<sup>fusal)</sup> vel on ow		S H D P N	P - Ha CP - Dy SP - Per C - Mo ST - Pla P - Bo D - Ph S - Va	ndard Penetration Test B nd/Pocket Penetrometer D namic Cone Penetrometer U th Sand Penetrometer	) - Distu ES - Envir J - Thin V MOISTURE M - Dry M - Moist V - Wet PL - Plasti	rbed sai onmenta wall tube c ic limit d limit	al sample e 'undistu	S - Soft F - Firm

	$\square$	Ca	arc	lno°						TEST	PIT LOG SHEET
Clie Proj	nt: ect: atior	S	Shoa	Health Infrastr Ihaven Hospita ic Drive, Nowra	I		44				le No: TP05
	ition		Cen	ic Drive, Nowra	NOV	V 25	41			Job No: 8202118201 Angle from Horizontal: 90° Surface El	Sheet: 1 of 1
		-	. Ba	ckhoe						Excavation Method: Excavator Bucket	evation:
				isions: 1.50m l	ONC	<b>Ξ</b> ΔΝ	<u>ب</u> ۵ ما	50m W	DF		: Lynch Civil
				7/6/21						Logged By: BA Checked E	
	cavat			Sampling & T	estino	3				Material Description	<b>j</b>
				1 3 4	Ť		ē		_		
Method	Resistance	Stability	Water	Sample or Field Test	150	ows er mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	STRUCTURE & Other Observations
	E			ES 0.10 m PID 0.10 m 1 ppm D 0.20 - 0.40 m			-		sм	FILL: Silty SAND: fine to coarse grained, dark grey and dark brown, trace rootlets, trace ceramics, trace charcoal	
— EX —		Stable	Not Encountered	ES 0.50 m PID 0.50 m 1.2 ppr D 0.60 - 0.80 m			0.5 - -		sc	0.50m FILL: Clayey SAND: fine to coarse grained, orange-brown, trace fine to coarse, sub-angular to sub-rounded gravel, trace rootlets	
	F			ES 1.00 m PID 1.00 m 0.5 ppm PP 1.20 m =300 - 350 kPa			- 1.0 - -		СІ	and grey, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel St	SIDUAL SOIL
	VH						F			M ( <pl) td="" vst<=""><td></td></pl)>	
						0mm R             	- - - -			1.50m     TERMINATED AT 1.50 m       Refusal     Backhoe Bucket Refusal	
							- 2.0 				
ME EX HA PT SOI AH PS AD AD HF WB RR	Ri Ha Pu Sc Ain Pe St V Sc V T Sc A Ho S W	cavator pper and aug ish tube onic drill r hamm ercussic ort spir olid fligh	er ing er al auge t auge t auge yht auge e drillin	et VE E F H VH VH er C-V-Bit er	Easy Firm Hard Very F ER W Sh wa	Easy (No	evel on flow		S F F M F	FIELD TESTS       SAMPLES         SPT - Standard Penetration Test       B       - Bulk disturbed sample         HP - Hand/Pocket Penetrometer       D       - Disturbed sample         DCP - Dynamic Cone Penetrometer       D       - Disturbed sample         PSP - Perth Sand Penetrometer       U       - Thin wall tube 'undisturbed'         MC - Moisture Content       MOISTURE         PBT - Plate Bearing Test       D       - Dry         IMP - Borchole Impression Test       M       Moist         PID - Photoionisation Detector       W       - Wet         VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)       L       - Liquid limit	SOIL CONSISTENCY         VS       - Very Soft         S       - Soft         F       - Firm         St       - Stiff         VSt       - Very Stiff         H       - Hard         RELATIVE DENSITY         VL       - Very Loose         L       - Loose         MD       - Medium Dense         D       - Dense         VD       - Very Dense
Refe abbi	er to ex reviatior	blanatory ns and ba	notes fo	or details of escriptions				CAR		NO (NSW/ACT) PTY LTD	

		Li	are	dno									TE	ST PIT LOG SHEET
Clie Pro	ent: ject:			Health Infrastru Ihaven Hospital	cture								ŀ	Hole No: TP06
	atio	n: §		ic Drive, Nowra	NSW 254	1				Job No: 8202118201				Sheet: 1 of 1
	ition									Angle from Horizontal:			Surface	e Elevation:
				ckhoe Isions: 1.50m L			50m \//l			Excavation Method: E	xcavator Bi		Contra	ctor: Lynch Civil
				7/6/21						Logged By: BA				ed By: DR
E)	cava	tion		Sampling & Te	esting						al Description			,
Method	Resistance	Stability	Water	Sample or Field Test	(blows per 150 mm)	Depth (m)	Graphic Log	Classification	s	OIL TYPE, plasticity or particle char colour, secondary and minor comp ROCK TYPE, grain size and type, fabric & texture, strength, weath defects and structure	colour,	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				ES 0.10 m PID 0.10 m 0.5 ppm	1 3 6 12			SM		FILL: Silty SAND: fine to coarse grai grey, trace rootlets	ined, dark			FILL
	E			1 10 0.10 m 0.5 ppm				SC		FILL: Clayey SAND: fine to coarse g orange-brown, trace fine to coarse, s sub-rounded gravel	rained, sub-angular to	м		
				ES 0.50 m PID 0.50 m 0.8 ppm		-0.5				Sandy CLAY: mottled orange-brown and grey, fine to coarse grained, sub sub-angular sand, trace fine to coars sub-rounded to sub-angular gravel	, red-brown p-rounded to se,			RESIDUAL SOIL
EX	F	Stable	Not Encountered	D 1.00 - 1.20 m ES 1.00 m PP 1.00 m =200 - 250 kPa PID 1.00 m 0.7 ppm		- 1.0		CI				M (>PL)	St	
				PP 2.00 m =250 -		- 1.5			2.00m	Clayey Gravelly SAND: fine to coars	e grained	M ( <pl)< td=""><td>VSt</td><td>EXTREMELY WEATHERED</td></pl)<>	VSt	EXTREMELY WEATHERED
	H VH	-		300 kPa	25/90mmR			SC		sub-rounded to sub-angular, mottled and grey, fine to coarse, sub-angula sub-rounded gravel	l red-brown	м	VD	
ME EX R HA PTC SAH PSC SAH PTC SAH PTC SAH PTC SAH PTC SAH PTC SAH PTC SAH PTC SAH SASSAN SASSAS SASSAS SASSAN SASSAN SASSAN SASSAN SASSAN SASSAN SASSAN SA						- 2.5				TERMINATED AT 2.40 m Refusal Backhoe Bucket Refusal				
ME EX R HA PT SCI AF AS AD HF WI RF	R H N S N N S S N N S S N N S S N N S S N N S S N N S S N N S N N S N N S N N S N N S N N S N	xcavato ipper and aug ush tube onic drill ir hamm ercussic hort spir olid fligh ollow flig /ashbor ock rolle	er er on sam al aug t auge t auge ght aug drillin er	et VE F F H VH er r: V-Bit r: TC-Bit ger	TRATION Very Easy (No I Easy Firm Hard Very Hard (Refr R  Very Hard (Refr shown water inflc water outf	iusal) vel on ow flow	Date	SH DP PM PINP V	IP - DCP - PSP - MC - PBT - MP - PID - YS -	Standard Penetration Test Hand/Pocket Penetrometer Dynamic Cone Penetrometer Perth Sand Penetrometer Moisture Content Plate Bearing Test Borehole Impression Test Photoionisation Detector Vane Shear; P=Peak, R=Resdual (uncorrected kPa)	D - Dist ES - Env U - Thir <b>MOISTURE</b> D - Dry M - Moi W - Wet PL - Plas LL - Liqu w - Moi	n wall tube st	mple al sample e 'undistu	S - Soft F - Firm
Ret	rer to ex previatio	planatory Ins and ba	notes f isis of d	or details of lescriptions			CAR	D١	10 (	NSW/ACT) PTY I	LTD			

C Cardno

### TEST PIT LOG SHEET

	$\mathcal{D}$	Ca	arc	<b>Ino</b> °							TE	ST PIT LOG SHEET
Clie Pro	ent: ject: atior	9	Shoa	Health Infra Ihaven Hosj ic Drive, No	pital						ŀ	Hole No: TP07
			scen	ic Drive, No	wra NSW	V 2341			Job No: 8202118201		<b></b>	Sheet: 1 of 1 e Elevation:
	sition		. Po	ckhoe					Angle from Horizontal: 90° Excavation Method: Excavator		Surrace	e Elevation:
				sions: 1.50			0m \//		Excavation Method: Excavator		Contra	ctor: Lynch Civil
				7/6/21		AND 0.5		DE	Logged By: BA			ed By: DR
	cavat		50. 1		& Testing				Material Descriptio		onecke	
				Sampling				_				
Method	Resistance	Stability	Water	Sample o Field Tes	or pe st 150 i	er mm) 6 12	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
	E			ES 0.10 m PID 0.10 m 0.6		2   2   - 1   - 2   -		SM	FILL: Silty SAND: fine to coarse grained, dark brown, trace rootlets	м		FILL
	F	-	Not Encountered	D 0.40 - 0.60 m ES 0.50 m PID 0.50 m 0.9				CI	Sandy CLAY: mottled orange-brown, red-brown and grey, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel	M ( <pl)< td=""><td>F</td><td>RESIDUAL SOIL</td></pl)<>	F	RESIDUAL SOIL
Ц Ш Ц		Stable	Not Enco							M ( <pl)< td=""><td>VSt</td><td></td></pl)<>	VSt	
	н	-		D 1.00 - 1.20 m				SC	.90m Clayey Gravelly SAND: fine to coarse grained, sub-rounded to sub-angular, mottled red-brown and grey, fine to coarse, sub-angular to sub-rounded gravel	M ( <pl)< td=""><td>н</td><td>EXTREMELY WEATHERED</td></pl)<>	н	EXTREMELY WEATHERED
Y	VH					-     1.5                   -			.40m Refusal Backhoe Bucket Refusal			
ME EX R HA PTC AFS AE AE HF WI RF	Ri Ha DN Sci DN Sci B Pe S St Sci S St Sci B W	ccavato pper and aug ush tube onic drill r hamm ercussic nort spir olid fligh	er ing er on sam al auge t auge ght auge ght auge e drillin	pler er :: V-Bit r: TC-Bit ler	PENETRATI VE Very Ea E Easy H Hard VH Very Ha WATER WATER Water Water Water Water Water	ION asy (No Resistan ard (Refusal) ater Level on form own ter inflow ter outflow			-     Hand/Pocket Penetrometer     D     -     ES     -     T       P     -     Porth Sand Penetrometer     U     -     T     T     T     Table Bearing Test     D     -     C     D     -     C       P     -     Borehole Impression Test     M     -     M     M       O     -     Photoionisation Detector     W     -     V     -     F       Participation     (Magnetic for the strength of the strengt of the strength of the strength of the stre	ulk disturbe isturbed sa invironment hin wall tub RE Iny loist	mple al sample e 'undistu	S - Soft F - Firm

Client:		arc NSW	Health Infrastruc	ture						ST PIT LOG SHEE
Project: _ocatio	: :	Shoa	Ihaven Hospital ic Drive, Nowra N				Job No: 8202118201		ſ	Sheet: 1 of
Position							Angle from Horizontal: 90°		Surfac	e Elevation:
Machin		e: Ba	ckhoe				Excavation Method: Excavator B			
			nsions: 1.50m LC	ONG AND 0.	50m W	/IDE			Contra	ctor: Lynch Civil
Date Ex	cavat	ed: ′	7/6/21				Logged By: CL		Check	ed By: CC
Excava	ation		Sampling & Tes	ting			Material Description			
Method Resistance	Stability	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
			ES 0.10 m PID 0.10 m 0.4 ppm				FILL: Silty SAND: fine to coarse grained, dark brown, trace fine to coarse sub-rounded gravel, trace fine to coarse sub-rounded cobbles, no odour observed			FILL 0.00 m: Organic matter (grass and rootiets) Trace glass, brick and fine to coarse grained sandstone boulders observed Frequent wood observed
— EX —	Stable	Not Encountered	ES 0.50 m PID 0.50 m 0.1 ppm	- 0.5 - -		SM		D to M		
			ES 1.00 m PID 1.00 m 0.4 ppm	- 1.0 - -		CI	0.90m Sandy CLAY: medium plasticity, pale brown to orange-brown, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse, sub-rounded to sub-angular gravel, no odour observed	м	-	RESIDUAL SOIL 0.90 m: Organic matter (grass and rootlets) Trace wood observed
•				- 1.5			140m TERMINATED AT 1.40 m Target depth Target Depth Reached			
R R R HA H PT P SON S AH A PS P AS S AD/V S AD/T S HFA H WB W	Excavato Ripper Hand aug Push tub Sonic dri Nir hamm Percussio Short spi Solid fligi	ger e lling her on san ral aug nt aug ght au ght au	pler WATEF er : TC-Bit ger	ery Easy (No Resistan asy ard ard (Refusal)		SH DP P P	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     ES     En       SP     Perth Sand Penetrometer     U     Thi       C     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     Dry       IP     Borehole Impression Test     M     Mo       ID     Photoionisation Detector     W     We       S     Vane Shear; P=Peak,     LL     Lit	/ ist	ample tal sampl be 'undis	le F - Firm

	nt: ject:	Ś	Shoa	Health Infrastru Ihaven Hospital							ŀ	Hole No: TPC
.oc	ation	:: S	Scen	ic Drive, Nowra	NSW 254	41			Job No: 8202118201			Sheet: 1 o
	ition		. Do	althaa					Angle from Horizontal: 90°		Surface	e Elevation:
				ckhoe Isions: 1.50m L		0 0	50m W/I	DE	Excavation Method: Excavator B		Contra	ctor: Lynch Civil
				7/6/21		0.0			Logged By: BA			ed By: DR
	cavat			Sampling & Te	estina				Material Description		onconc	Juby. Dit
Method	Resistance	Stability	Water	Sample or Field Test	(blows per 150 mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				ES 0.10 m		-		ö	FILL: Silty SAND: fine to coarse grained, dark brown, trace fine to coarse sub-rounded gravel, trace cobbles, trace rootlets, trace hessian, plastic		-	FILL
				PID 0.10 m 0.1 ppm		-			and aluminium			
	E			D 0.40 - 0.50 m		-		SM		M		
			ntered	ES 0.50 m PID 0.50 m 0.4 ppm		- 0.5 - -						
   		Stable	Not Encountered			-			0.80m Sandy CLAY: pale brown to orange-brown, fine to coarse grained, sub-rounded to sub-angular sand,			RESIDUAL SOIL
		s s	Ž			- 1.0			trace fine to coarse, sub-rounded to sub-angular sand, gravel	1		
	F			D 1.00 - 1.20 m ES 1.00 m PID 1.00 m 0.3 ppm		- 1.0		CI		M (>PL)	St	
						-			.30m Clayey Gravelly SAND: fine to coarse grained, sub rounded to sub angular, mattled rod brown	-		EXTREMELY WEATHERED
	н			D 1 50 4 70 ···		- 1.5	Po	sc	sub-rounded to sub-angular, mottled red-brown and grey, fine to coarse, sub-angular to sub-rounded gravel	м	D - VD	
				D 1.50 - 1.70 m ES 1.50 m PID 1.50 m 0.3 ppm		-	0			1		
1	VH			נו ט וו ט.ס ppm			<u> </u>		.70m TERMINATED AT 1.70 m			
						- 2.0 						
ME R HA PT S A H S A D H E R R	Rij Ha Pu N So Air Pe Sh /V So /T So A Ho 3 Wi	cavato oper and aug sh tube nic drill hamm rcussic ort spir lid fligh	er ing er on sam al auge t auge ght auge ght auge e drillin	et VE F H VH er r: V-Bit r: TC-Bit per	TRATION Very Easy (No Easy Hard Very Hard (Re R R Very Hard (Re R S Water Le shown water inf water ou	efusal) evel on low		S H D P	P     Hand/Pocket Penetrometer     D     D     Dis       P     Dynamic Cone Penetrometer     U     -     Th       P     Perth Sand Penetrometer     U     -     Th       C     Moisture Content     MOISTURE     D     -     Dn       P     Plate Bearing Test     D     -     Dn     Nd       P     Photoionisation Detector     W     -     We       Vane Shear; P=Peak,     LL     -     Lie	/ bist	mple al sample e 'undistui	S - Soft F - Firm

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	nt: ect: atior		Shoa	Health Infrastructure Ihaven Hospital ic Drive, Nowra NSW 2	2544					ŀ	Hole No: TP1
	ition		scen	IC DIIVE, NOWIA NOW	2341			Job No: 8202118201 Angle from Horizontal: 90°		Surfac	Sheet: 1 of e Elevation:
			e. Ba	ickhoe				Excavation Method: Excavator B		Surrac	
				nsions: 1.50m LONG	AND 0.	50m W	/IDE			Contra	ctor: Lynch Civil
Date	e Exc	cavat	ed: 1	17/6/21				Logged By: CL			ed By: CC
Ex	cavat	ion		Sampling & Testing				Material Description			
Method	Resistance	Stability	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
•				ES 0.10 m	-		SP-	0.05m ASPHALT: 0.05m thick, no odour observed FILL: Gravelly SAND: fine to coarse grained, gap graded, sub-rounded to sub-angular, orange /	D D to M	-	PAVEMENT FILL 0.05 m: Organic matter (grass and
×		ble	Not Encountered	QA/QC100 PID 0.10 m 0.2 ppm ES 0.30 m PID 0.30 m 0.7 ppm	- - 0.5		sc	0.25m sbrown, fine to coarse grained, sub-rounded to sub-rounded to sub-angular gravel, with fine to coarse grained, sub-rounded to sub-angular cobbles, no odour observed FILL: Clayey SAND: fine to coarse grained, well graded, sub-rounded to sub-angular, light brown, low to medium plasticity clay, trace fine to coarse 0.60m grained, sub-rounded to sub-angular gravel, no	м	-	rootlets) 0.25 m: Organic matter (grass and rootlets)
EX		Stable	Not E	ES 1.00 m PID 1.00 m 0.3 ppm	- - - - 1.0		CL- CI	odour observed Sandy CLAY: low to medium plasticity, orange / brown, fine to coarse grained, sub-rounded to sub-angular sand, trace fine to coarse grained, sub-rounded to sub-angular gravel, no odour observed	М		RESIDUAL SOIL 0.60 m: Organic matter (rootlets) observed
V					-			1.20m TERMINATED AT 1.20 m Target depth Target Depth Reached			
					- 1.5 - -						
					- 2.0						
					- 2.5						
					-						
					- 3.5						
EX R HA PT O AH PS AD AD HF WB	Rij Ha Pu N Sc Air Pe Sh V Sc V T Sc A Ho S	ccavato pper and aug ush tub pnic dril r hamm ercussio nort spi blid fligi blid fligi blow fli ashbor	ger e ling ler on sam ral aug nt aug nt aug ght au ght au	pler ler er: V-Bit ger trong trong to the t	(No Resistar (Refusal) r Level on n i inflow		S F F F	P     Hand/Pocket Penetrometer     D     Display       CP     Dynamic Cone Penetrometer     U     Thi       SP     Perth Sand Penetrometer     U     Thi       CF     Moisture Content     MOISTURE       BT     Plate Bearing Test     D     D       ID     Photoionisation Detector     M     Moisture       S     Vane Shear; P=Peak,     L     LL	ist t stic limit	ample tal sampl be 'undist	e turbed' St - Stiff VSt - Very Stiff H - Hard <b>RELATIVE DENSITY</b> VL - Very Loose L - Loose MD - Medium Dens D - Dense
RR	Ro er to exp	planatory	er / notes t	for details of lescriptions	outflow	CAF				ntent	D - Dense VD - Very Dense

22016UB.CB Log CARDNONON-CORED \$202118201\_CONTAMLOGS.GPJ <<DrawingFile>> 13007/2021 15:00 10:00:01:07 Datgel AGS RTA, Phelo, Montik

Proj	ent: ject: atio	ŝ	lohnS Shoal Nowra	Staff haven Hospita a. NSW	al Redeve	elopm	ent Ad	ditio			ŀ	Hole No: HA0 Sheet: 1 of
				.000 N613860	5.000 56	MGA	94		Job No: 82021182-02 Angle from Horizontal: 90°	9	Surfac	Sheet: 1 of the section:
				Auger		mora					Janua	
-	-	Diam								(	Contra	actor: Cardno
)ata	a Sta	arted:	28/1	0/21					Logged By: DP	(	Check	ed By: DO
[	Drillin	g		Sampling &	Testing				Material Description			
Method	Resistance	Casing	Water	Sample or Field Test	DCP (blows per 150 mm)	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				D 0.03 - 0.15 m		-		SP SC	0.03m SAND: fine to coarse grained, grey, with low plasticity clay, trace roots and rootlets (<2mm)/ Clayey SAND: fine to coarse grained, brown, low plasticity clay	D to M	MD	TOPSOIL \0.00 m: grass over RESIDUAL SOIL
	E			D 0.15 - 0.40 m		-			0.15m Sandy CLAY: medium plasticity, brown, fine to coarse sand, trace clayey sand beds (<2mm)	M ( <pl)< td=""><td></td><td></td></pl)<>		
						-			0.40m		 F	-
— HA —	F		Dry	D 0.40 - 0.85 m		- 0.5		CI	Sandy CLAY: medium plasticity, brown and orange-brown, fine to coarse sand, trace fine, sub-angular gravel	 M ( <b>≈</b> PL)	F to St	
				D 0.85 - 0.92 m		-			0.85-0.92m: trace fine to coarse, sub-angular gravel TERMINATED AT 0.92 m Hand Auger Refusal		St	
						- 1.0						
						- 1.5						
						-						
ME EX R HA PS AB AD AD HF	Ri Pu Pu Ai Po Ai Si V So /T So A Ho	cavator pper and augush tub onic dril r hamm ercussion nort spir blid fligh	e ling er on samp ral auge nt auge nt auge ght aug	t VE E F H VH VH er : V-Bit r: TC-Bit ler	IETRATION Very Easy (N Easy Firm Hard Very Hard (R TER Water I shown water ir ¶	<sup>efusal)</sup> ∟evel on nflow		S H D P M P I P	IP     -     Hand/Pocket Penetrometer       ICP     -     Dynamic Cone Penetrometer       ISP     -     Perth Sand Penetrometer       IC     Moisture Content     MOSTURE       Pate Bearing Test     D     -       ID     -     Borehole Impression Test       ID     -     Photoionisation Detector       VID     -     Photoionisation Penetation	/ bist	ample al sampl	Ie S - Soft F - Firm

			Cá	arc	lno°							HA	ND AUGER SHEET
Pr	ient ojec ocati	:t:	S	Shoa	Staff Ihaven Hosp a, NSW	ital Redeve	elopm	ent Ad	diti	onal GI Job No: 82021182-02		ŀ	Iole No: HA02 Sheet: 1 of 1
Po	siti	on:			.000 N61380	628.000 56	MGAS	94		Angle from Horizontal: 90°	ę	Surfac	e Elevation:
					Auger								
		-		eter:						Lowerd Dry, DD			ctor: Cardno
Da		lling	tea:	28/1	0/21 Sampling	& Testing				Logged By: DP Material Description	,	леск	ed By: DO
_		Ť			Camping		- -		6				
Method	Decietance	Kesistance	Casing	Water	Sample or Field Test		) Dept	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
	E	E			D 0.00 - 0.04 m D 0.04 - 0.30 m		-		sc	0.04m Clayey SAND: fine to coarse grained, dark grey-brown, low plasticity clay, trace fine to medium, sub-rounded to sub-angular gravel, trace roots and vootlets (<2mm) Clayey SAND: fine to coarse grained, brown and orange-brown, low plasticity clay, trace fine to medium, sub-angular gravel 0.20-0.30m: becoming sandy clay	D to M	MD	TOPSOIL (0.00 m: grass over ^ RESIDUAL SOIL
- HA	F	F		Dry	D 0.30 - 0.35 m		- - 0.5 - -		CI	Sandy CLAY: medium plasticity, brown and pale orange-brown, fine to coarse sand Sandy CLAY: medium plasticity, pale brown, fine to coarse sand, trace fine, sub-angular gravel	M ( <b>~</b> PL)	F to St	
¥							- 1.0			1.02m TERMINATED AT 1.02 m Hand Auger Refusal			
							-						-
b													-
							-						-
							-						
	R AA AA AA AA AA AA AA AA AA AA AA AA AA	Exca Ripp Hand Push Soni Air h Perc Solic Solic Solic Holld Was Roch	er d aug h tube ic drill amm cussio rt spir d fligh d fligh ow flig hbore k rolle	e ing er n sam al aug t aug t aug t aug ght aug e drillir er notes f	et v pler V er v-Bit er: TC-Bit ger	Firm	<sup>tefusal)</sup> Level on	Date	S F F II F	IP     -     Hand/Pocket Penetrometer     D     -     Director       ICP     Dynamic Cone Penetrometer     U     -     Tr       ISP     Perth Sand Penetrometer     U     -     Tr       IC     Moisture Content     D     -     Director       IBT     Plate Bearing Test     D     -     Director       IID     Photoionisation Detector     W     -     W       VS     Vane Shear; P=Peak,     L     -     Pil	in wall tub : y pist	imple al sampl be 'undist	e S - Soft F - Firm

Proj	nt: ect: atior	ŝ	Shoa	Staff Ihaven Hospit a, NSW	al Redeve	elopm	ent Ad	ditio	nal GI Job No: 82021182-02		ŀ	Hole No: HAO Sheet: 1 o
				3.000 N613865	2.000 56	MGA	94		Angle from Horizontal: 90°		Surfac	e Elevation:
	•			Auger							0	a fam. Oamlaa
	ing [ a Sta								Logged By: DP			actor: Cardno ed By: DO
	Drilling		20/1	Sampling &	Testing				Material Description		oncon	
					DCP	Ê		Ę				
Method	Resistance	Casing	Water	Sample or Field Test	(blows per 150 mm)		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristi colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	, Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				D 0.04 - 0.20 m		-		sc (	Odm Clayey SAND: fine to coarse grained, dark grey low plasticity clay, trace roots and rootlets (<2n Clayey SAND: fine to coarse grained, dark grey low plasticity clay, trace fine, sub-angular grave	<u>1m)</u> _/ <sup>-</sup>		TOPSOIL 0.00 m: grass over
	E			D 0.20 - 0.40 m		-		sc	Clayey SAND: fine to coarse grained, brown, lo plasticity clay, trace fine to medium, sub-rounde sub-angular gravel, trace pockets of clay (<10n	ed to	MD	
— ни —			Dry	D 0.40 - 0.55 m	_ <u>_</u> ∐	0.5		сі	.40m			-
	F			D 0.55 - 0.86 m		-		(CI	.55m	 led M ( <pl)< td=""><td>St</td><td></td></pl)<>	St	
						- 1.0 			TERMINATED AT 0.86 m Hand Auger Refusal			
ME EX R A P S A P S A D A D F W R	Rip Ha Pu N So Air Pe Sh /V So /T So A Ho 3 Wa	cavator oper nd aug sh tub nic dril hamm rcussic ort spii lid fligh lid fligh lid fligh llow flig ashbori ck rolle	ler e er on sam ral auge at auge at auge ght au e drillir	et VE F H VH ver er: V-Bit er: TC-Bit ger	Very Easy (N Easy Firm Hard Very Hard (R TER Water I shown water ir water o	efusal) ∟evel or nflow		SP HF DC PS MC	-     Hand/Pocket Penetrometer     D       P     Dynamic Cone Penetrometer     ES       P     Perth Sand Penetrometer     U       C     Moisture Content     MOIS       T     Plate Bearing Test     D       P     Borehole Impression Test     M       O     Photoionisation Detector     W       Vane Shear; P=Peak,     PL	<ul> <li>Bulk disturb</li> <li>Disturbed s</li> <li>Environmer</li> <li>Thin wall tu</li> </ul>	ample ital samp be 'undis	le S - Soft F - Firm

Proj	ent: ject: atior	Ś	Shoa	Staff Ihaven Hospita a, NSW	al Redeve	elopm	ent Ad	lditio	nal GI Job No: 82021182-02		ŀ	Hole No: HAO Sheet: 1 of
				.000 N6138664	4.000 56	MGA	94		Angle from Horizontal: 90°	;	Surfac	e Elevation:
	•			Auger								
	ing [ a Sta								Logged By: DP			ctor: Cardno ed By: DO
	Drilling			Sampling & -	Testing				Material Description			·····
	0				DCP	Ê		Ę	· · · · · · · · · · · · · · · · · · ·			
Method	Resistance	Casing	Water	Sample or Field Test	(blows per 150 mm		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				D 0.04 - 0.20 m				sc	0.04m Clayey SAND: fine to coarse grained, dark grey, trace roots and rootlets (<2mm) Clayey SAND: fine to coarse grained, dark grey,	/ D to M	MD	TOPSOIL 0.00 m: grass over RESIDUAL SOIL
								sc	trace fine, sub-rounded gravel	D to M	MD	
	E		~	D 0.20 - 0.50 m		-		CL- CI	Sandy CLAY: low to medium plasticity, brown and dark grey-brown, fine to coarse sand, trace fine, sub-rounded gravel		F to St	
			Dry	D 0.50 - 0.91 m		-0.5			0.50m Clayey SAND: fine to coarse grained, brown and orange-brown trace red-brown, fine to coarse clay, with fine, sub-angular gravel	 M ( <pl)< td=""><td></td><td></td></pl)<>		
	F					-		SC	0.91m			
						- 1.0			TERMINATED AT 0.91 m Hand Auger Refusal			
ME EX R HAPSOAD AD HE RR	N So Air Pe Sh /V So /T So A Ho 3 Wa	cavator oper nd aug sh tub nic dril hamm rcussic ort spi lid fligh lid fligh lid fligh lid fligh shbor ack rolle	ger e ling er on sam ral auge nt auge ght au ght au	et VE F H VH ver er: V-Bit er: TC-Bit ger	I I I I I I I I I I I I I I I I I I I	<sup>efusal)</sup> ∟evel or nflow		S H D M P M	P     - Hand/Pocket Penetrometer     D     - D       CP     Dynamic Cone Penetrometer     U     - T       SP     Perth Sand Penetrometer     U     - T       C     Moisture Content     D     - D       BT     Plate Bearing Test     D     - D       IP     Borehole Impression Test     M     M       D     - Photoionisation Detector     W     - W       S     Vane Shear; P=Peak,     L     - P	ulk disturb isturbed sa nvironment hin wall tub E ry loist	ample tal sampl be 'undis	le S - Soft F - Firm

Proj	ent: ject: atior	ŝ	Shoa	Staff haven Hospita a, NSW	al Redeve	elopm	ent Ad	ditio	onal GI Job No: 82021182-02		H	Iole No: HA0 Sheet: 1 of
Pos	ition			.000 N613868	2.000 56	MGA	94		Angle from Horizontal: 90°	\$	Surface	e Elevation:
	ipme ing D			Auger							Contro	ctor: Cardno
	a Sta								Logged By: DP			ed By: DO
	Drilling			Sampling &	Testing				Material Description			•
Method	Resistance	Casing	Water	Sample or Field Test	DCP (blows per 150 mm)		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
A							ند علد علد علد علد ع	sc	0.04m Clayey SAND: fine to coarse grained, dark grey,			TOPSOIL 0.00 m: grass over
	E			D 0.15 - 0.35 m		-		sc  sc	Clayey SAND: fine to coarse grained, dark grey, low plasticity clay 0.15m Clayey SAND: fine to coarse grained, dark grey and brown, low plasticity clay, trace fine to medium, angular gravel	D to M	MD	RESIDUAL SOIL — — — — —
HA			Dıy	D 0.35 - 0.65 m				CI	0.35m Sandy CLAY: medium plasticity, brown and orange-brown, fine to coarse sand, trace fine to coarse, sub-rounded to sub-angular gravel		F to St	
v	F			D 0.65 - 0.83 m		-		 CI	0.60m	_ M ( <pl)< td=""><td>— — — VSt — — — Н</td><td></td></pl)<>	— — — VSt — — — Н	
						- 1.0			Hand Auger Refusal			
ME EX HA PTO A PS A D A D F WE R	Rit Ha Pu N So Air Pe Sh /V So /T So A Ho 3 Wa	cavator oper nd aug sh tub nic dril hamm rcussic ort spir lid fligh lid fligh llow flig shborn ck rolle	ler e er on sam ral aug at auge at auge ght auge ght auge	er r: V-Bit r: TC-Bit ger	IETRATION Very Easy (N Easy Firm Hard Very Hard (R TER Water I shown water ir ¶ water o	<sup>efusal)</sup> ∟evel on nflow		S F F P M P I P	P     - Hand/Pocket Penetrometer     D     - Disi       CP     Dynamic Cone Penetrometer     U     - Thir       SP     - Perth Sand Penetrometer     U     - Thir       IC     - Moisture Content     MOISTURE       BT     - Plate Bearing Test     D     - Dry       ID     - Photoionisation Detector     W     - We       S     - Vane Shear; P=Peak,     P     - Pla	turbed sa vironment n wall tub sist t stic limit	al sample be 'undisti	S - Soft F - Firm

### Shoalhaven Hospital Redevelopment

# APPENDIX



## LABORATORY CERTIFICATES



	<b>A</b>					Illawarra Laboratory	1	
Notifies         0497 379 329           Report on Molisture Content, Emerson Class, Soli pH, EC and PASS/ASS           Clem Address:         12 Burdli SL, Wollowgov (KW 2500         Report Ion:         24 Status           Clem Address:         12 Burdli SL, Wollowgov (KW 2500         Report Ion:         24 Status           Vorist Component:         Shoalhaven Hospital Redevelopmet         Report Ion:         24 Status           Works Component:         Shoalhaven Hospital Redevelopmet         Report Ion:         24 Status           Material Ubec:         Institu         Let Number:         25 Status           Comments:         Control Unic:         707/2021         707/2021         707/2021           Songle Number:         0         1         1         1         1           Control Unic:         19 OCS/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         17/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021		JSTRALIA	AN		7/3 Hargraves Avenue, Albion Park Rail NSW 2527			
Notifies         0497 379 329           Report on Molisture Content, Emerson Class, Soli pH, EC and PASS/ASS           Clem Address:         12 Burdli SL, Wollowgov (KW 2500         Report Ion:         24 Status           Clem Address:         12 Burdli SL, Wollowgov (KW 2500         Report Ion:         24 Status           Vorist Component:         Shoalhaven Hospital Redevelopmet         Report Ion:         24 Status           Works Component:         Shoalhaven Hospital Redevelopmet         Report Ion:         24 Status           Material Ubec:         Institu         Let Number:         25 Status           Comments:         Control Unic:         707/2021         707/2021         707/2021           Songle Number:         0         1         1         1         1           Control Unic:         19 OCS/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         220/66/2021         17/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021		SOIL AND	)					
Standard         Solution         Openation           Clean         Action         Report on Molisture Content, Emerson Class, Soli pH, EC and PASS/ASS           Clean         Cardon         Solid Soli	A.S.C.T.	CONCR	ETE					
A.B.#.         34 65 802 609           Report on Moisture Content, Emerson Class, Solip H, C C and PASS/AASS           Cirent:         Cardna         Report No:         454           Cient:         Genetahical Tisting         Report No:         254           Project:         Genetahical Tisting         Report Date:         280/07/021           Warks Component:         Shalihawan Hospital Reduvelopmet         Project No:         26           Material Description:         Initiau         Test Request/Order:         8202118201           Material Description:         Initiau         Tor/72021         7/07/2021         7/07/2021           Material Description:         Initiau         Initiau         Initiau         Initiau           Sample Number:         Initiau         Initiau         Initiau         Initiau           Material Description:         Initiau         Initiau							-	
Report on Moisture Content, Emerson Class, Soil pH, EC and PASS/ASS           Client:         Cardon         Report No::         454           Client:         16 Burell'St. Wollongong NSW 2500         Report No::         254           Veroits:         Socialnews Insta         Socialnews Insta         Report No::         26           Material Description:         Stoalnews Insta         Test Request/Order:         20           Veroits:         -         Insta         Test Request/Order:         20           Veroits:         -         -         -         -           Lot Owners:         -         -         -         -           Sample Number:         -         -         -         -         -           Veroit Comments:         -         -         -         -         -         -           Veroit Comments:         -		TESTI	NG					
Clent:         Cardin         Report No:         44           Clent Address:         16 Burells, Wollongong RSW 2500         Report Page:         Page 10 f1           Project:         Generchical Testing         Report Page:         Page 10 f1           Works Component:         Shollhown Hospital Redevelopmet         Project No:         26           Material Description:         -         Int Number:         -           Lot Sumdarise:         Offsets - to         ITP/PCP Number:         -           Lot Comments:         -         Commons:         -         -           Distarcing:         Consider Pitting         22/06/2021         22/06/2021         22/06/2021         17/07/2021           T/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021           To Start Fore (north)         Mit         -         -         -         -           Start Start (Mokinsre):         Mit         Distribut         -         -         -         -           Test Dash:         Immit         BH01-SPT01         BH04-B01         BH04-B01         FP0/201         -         -         -         -         -         -         -         -         -         -         - <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
Client Address: 16 Burchi St, Wollongong NSW 2500 Project: Geneterical Testing Works Component: Shoulhaven Hospital Redevelopmet Works Component: Shoulhaven Hospital Redevelopmet Works Component: Shoulhaven Hospital Redevelopmet Uto Number: Charace - Chara		-	n Moisture Cont	tent, Eme	rson Clas			
Project: Geotechnical Testing						•		
Works Component:         Shoalhaven Hospital Redevelopmet         Project No:         Z 26           Material Use:         Instru         Test Request/Order:         8302118201           Lot Boundaries:         Chainage - to - Offsets - to         ITES Request/Order:         8302118201           Lot Roundaries:         -         Control Line:         BH01-SPT01           Sample Number:         -         -         -           Ind Sample/Test Date:         2206/0201         2206/0201         7/07/2021         7/07/2021           Anage / Location:         Im         BH03-SPT01         BH04-B01         BH04-D01         TPD2-D01           Let Uspth:         Im         0.50-0.59         1.20-1.50         0.10-0.20         Im           Let Uspth:         Im         BH03-SPT01         BH02-D01         BH04-B01         BH02-D01           Mosture Content:         PM         12.4         2.5         1.5         -         -           Let Uspth:         Imm         BH03-SPT01         BH03-SPT01         BH04-B01         BH04-D01         TPD2-D01           Let Uspth:         Imm         D.2.1.50         0.50-1.00         1.20-1.50         -         -           Solibaspension mode of 305 01818         -         -						•		
Material less(:         Instu         Test Request/Order:         8.02.118.01.           Lot Boundaries:         Chainage to Offsets to         Int Number:         Int								1
Material Description:       -       Lot Number:       ·         Lot Comments:       -       Control Line:       BH01-SPT01         Sample Number:       239662       399663       399665       399667       399667         Sample Number:       22/06/2021       22/06/2021       22/06/2021       22/06/2021       12/06/2021         Lab Test Date:       7/07/2021       7/07/2021       7/07/2021       7/07/2021       7/07/2021         Change / Location:       Im       BH01-SPT01       BH02-D01       BH04-D01       TP02-D01         Level of Test:       Im       BH01-SPT01       BH02-D10       D.0.0-0.20       Moisture:         Ext Water Voted:       Distilled       -       -       -       -         Clustry Content:       (H)       12.9       25.1       28.4       22.8       14.2         Test Water Voted:       Distilled       -			oital Redevelopmet			,		201
Lat Commers:       Chainage - to - Offsets - to -       TP//PCP Number: Control Line:       Hol SPT01         Sample Number:       39662       39663       39663       39665       39669         Field Sample View Date:       22/06/2021       22/06/2021       22/06/2021       7/07/2021       7/07/2021         Chainage / Location:       (m)       1       -       -       -       -         Offset from control line:       (m)       BH01-SPT01       BH02-D01       BH04-B01       TP02-D01         Test Det (Notwire):       (m)       BH01-SPT01       BH02-D01       BH04-B01       TP02-D01         Test Detpit:       (m)       BH01-SPT01       BH02-D01       BH04-B01       TP02-D01         Test Detpit:       (m)       BH01-SPT01       BH02-D01       TP02-D01       BH04-B01       TP02-D01         Test Detpit:       (m)       BH02-D01       BH04-B01       TP02-D01       BH04-B01       TP02-D01         Soll Description:       CLSSIV CLAY       -       CLSSIV       -       -       -         Plot Plot Soll Soll goll 8 :       -       -       -       -       -       -       -       -       -       -       -       -       -       -       - <td< td=""><td></td><td>Insitu</td><td></td><td></td><td></td><td></td><td></td><td>201</td></td<>		Insitu						201
Lot Comments:         Control Line:         BH01-SPT01           Sample Number:         39662         39663         39665         39667         39667           Hold Sample/Text Date:         22/06/2021         22/06/2021         22/06/2021         22/06/2021         22/06/2021         22/06/2021         22/06/2021         22/06/2021         22/06/2021         22/06/2021         7/07/2021         <	•	- Chainage - to - (	Officets - to -					
Sample Number:         39662         39663         39665         39667         39669           Died Sample/Text Date:         22/06/2021         22/06/2021         22/06/2021         7/07/201         7/07/201         7/07/2021         7/07/201         7/07/201         7/07/201         7/07/201         7/07/201         7/07/201         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021 <td></td> <td>-</td> <td>JIISCIS 10 .</td> <td></td> <td></td> <td></td> <td></td> <td>-01</td>		-	JIISCIS 10 .					-01
Field Sample/Test Date:         22/06/2021         22/06/2021         22/06/2021         22/06/2021         7/07/20				-				
Lab Test Date (Molsture):         7/07/2021         7/07/2021         7/07/2021         7/07/2021         7/07/2021           Chanage / Location:         (m)         -	•	_						
Chainage / Location: (m)	• •	L						
Offset from control line:         (m)         -<		F						
Level of Test:         (m)         BH01-SPT01         BH02-D01         BH04-B01         BH04-D01         TP02-D01           Test Depth:         (m)         0.50-0.95         1.20-1.50         0.50-1.00         1.20-1.50         0.10-0.20           Moisture Content:         (H)         12.9         25.1         28.4         25.8         14.2           Test Water Used:         Distilled         -         Distilled         -         -           Soil Description:         (C)         15         -         15         -           Soil Suspension made of 30g soil &:         -         -         -         -         -           PM Value of Soil-suspension:         (PH)         -         -         -         -         -           Field pH Oxidised:         (PHoa)         -								
Test Depth:       (mm)       0.50-0.95       1.20-1.50       0.50-1.00       1.20-1.50       0.10-0.20         Moisture Content:       (%)       12.9       25.1       28.4       25.8       14.2         Test Water Used:       Distilled       -       Distilled       -       -       -         Soil Description:       (CL       15       - </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td>							-	
Moisture Content:         (%)         12.9         25.1         28.4         25.8         14.2           Test Water Used:         Distilled         -         Distilled         -<								
Test Water Used:       Distilled       -       Distilled       -       -         Temperature of Water:       (C)       15       -       -       -       -         Goli Description:       CLASS 4       -       CLASS 4       -       -       -         Soli-suspension made of 30g soil &:       -	· ·	. ,						
Temperature of Water:       (*)       15       .       15       .         Soil Description:       CI,Silty CLAY       .       CI,Silty CLAY       .       .         Berreson Class Number:       CLASS 4       .       .       .       .       .         Soil-suspension made of 30g soil &:       .       <		(%)		2:	-		23.0	14.2
Soil Description:         CI,Silty CLAY         CI,Silty CLAY         .           Emerson Class Number:         CLASS 4         .         CLASS 4         .           Soil-suspension made of 30g soil & :         .         .         .         .           PH Value of Soil-suspension:         (PH)         .         .         .         .           Field pH:         (PH)         .         .         .         .         .           Field pH:         (PH)         .         .         .         .         .           Field pH:         (PH)         .         .         .         .         .           Sample Number:         .         .         .         .         .         .           T/706/2021         17/06/2021		(°C)		+	-			-
Emerson Class Number:         CLASS 4         -         CLASS 4         -         -           Soll-suspension made of 30g soil & :         - <td< td=""><td>•</td><td>( )</td><td></td><td>-</td><td></td><td></td><td></td><td>_</td></td<>	•	( )		-				_
Soll-suspension made of 30g soll & :       -       -       -       -       -         pH Value of Soll-suspension:       (pH)       -       -       -       -       -         Field pH       (PH <sub>702</sub> )       -       -       -       -       -       -         Field pH Oxidised:       (pH <sub>702</sub> )       -       -       -       -       -       -         Field pH Oxidised:       (PH <sub>702</sub> )       -       -       -       -       -       -         Sample Number:       39671       39672       39674       39675       39676         Sample Number:       7/07/2021       17/06/2021       17/06/2021       17/06/2021       17/06/2021       17/06/2021         Lab Test Date (Moisture):       (m)       -       -       -       -       -       -         Offset from control line:       (m)       -		-		-		-		-
pH Value of Soil-suspension:       (pH)       -		Og soil & :			-		-	-
Field pH:       (pH,)       -       -       -       -       -         Field pH Oxidised:       (pH,va)       -       -       -       -       -         Field pH Oxidised:       (pH,va)       -       -       -       -       -       -         Acid Sulfate Soil Indication:       -       -       -       -       -       -       -         Electrical Conductivity:       (ms)       -	•	-	-		-	-	-	-
Acid Sulfate Soil Indication:         . <th.< td=""><td></td><td></td><td>-</td><td></td><td>-</td><td>-</td><td>-</td><td>-</td></th.<>			-		-	-	-	-
Electrical Conductivity:         (ms)         -<	Field pH Oxidised:	(pH <sub>FOX</sub> )	-		-	-	-	-
Sample Number: Field Sample/Test Date: Lab Test Date (Moisture):         39671         39672         39674         39675         39676           Chainage / Location:         (Moisture):         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         17/06/2021         7/07/2021	Acid Sulfate Soil Indicatio	n:	-		-	-	-	-
Held Sample/Test Date:       17/06/2021       17/06/2021       17/06/2021       17/06/2021       17/06/2021         Lab Test Date (Moisture):       7/07/2021       7/07/2021       7/07/2021       7/07/2021       7/07/2021         Chainage / Location:       (m)       -       -       -       -       -       -         Chainage / Location:       (m)       -	Electrical Conductivity:	(mS)	-		-	-	-	-
Held Sample/Test Date:       17/06/2021       17/06/2021       17/06/2021       17/06/2021       17/06/2021         Lab Test Date (Moisture):       7/07/2021       7/07/2021       7/07/2021       7/07/2021       7/07/2021         Chainage / Location:       (m)       -       -       -       -       -       -         Chainage / Location:       (m)       -	Sample Number:		39671	39	672	39674	39675	39676
Lab Test Date (Moisture):       7/07/2021       7/07/2021       7/07/2021       7/07/2021         Chainage / Location:       (m)       -       -       -       -         Offset from control line:       (m)       -       -       -       -         Offset from control line:       (m)       TP04-D02       TP05-D02       TP07-D01       TP09-D01       TP09-D02         Test Depth:       (mm)       1.00-1.20       0.60-0.80       0.40-0.60       0.40-0.50       1.00-1.20         Moisture Content:       (%)       23.1       11       23.2       10.9       17.4         Test Water Used:       -       Distilled       -       15       -       5       -         Soil Description:       -       CLSandy CLAY       -       SM/Silty SAND       -       -         Emerson Class Number:       -       -       -       -       -       -       -         Field pH:       (PH)       -	•							
Chainage / Location:       (m)       - <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
Level of Test:         (m)         TP04-D02         TP05-D02         TP07-D01         TP09-D01         TP09-D02           Test Depth:         (mm)         1.00-1.20         0.60-0.80         0.40-0.60         0.40-0.50         1.00-1.20           Moisture Content:         (%)         23.1         11         23.2         10.9         1.00-1.20           Test Water Used:         -         Distilled         -         15         -         15         -         15         -         15         -         15         -         15         -         15         -         15         -         15         -         16         16         16         16         16         16         16         16         16         16         16         16 <td>Chainage / Location:</td> <td>(m)</td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td>-</td>	Chainage / Location:	(m)	-			-		-
Test Depth:         (mm)         1.00-1.20         0.60-0.80         0.40-0.60         0.40-0.50         1.00-1.20           Moisture Content:         (%)         23.1         11         23.2         10.9         17.4           Test Water Used:         -         Distilled         -         Distilled         -         Distilled         -           Temparture of Water:         (°C)         -         15         -         15         -           Soil Description:         -         CL/Sandy CLAY         -         SM/Silty SAND         -           Emerson Class Number:         -         CLASS 4         -         CLASS 4         -         -           Soil-suspension made of 30g soil & :         -         -         -         -         -         -           PH Value of Soil-suspension:         (PH)         -	Offset from control line:	(m)	-		-	-	-	-
Moisture Content:       (%)       23.1       11       23.2       10.9       17.4         Test Water Used:       -       Distilled       -       Distilled       -         Temperature of Water:       (°C)       -       15       -       15       -         Soil Description:       -       CL,Sandy CLAY       -       SM,Silty SAND       -         Emerson Class Number:       -       CLASS 4       -       CLASS 4       -         Soil-suspension made of 30g soil & :       -       -       -       -       -         Field pH:       (PH <sub>I</sub> )       -       -       -       -       -       -         Field pH:       (PH <sub>I</sub> )       -	Level of Test:	(m)	TP04-D02	TP05	5-D02	TP07-D01	TP09-D01	TP09-D02
Test Water Used:       -       Distilled       -       Distilled       -         Temperature of Water:       (°C)       -       15       -       15       -         Soil Description:       -       CL,Sandy CLAY       -       SM,Silty SAND       -         Emerson Class Number:       -       CLASS 4       -       CLASS 4       -         Soil-suspension made of 30g soil & :       -       -       -       -       -         pH Value of Soil-suspension:       (pH)       -       -       -       -       -         Field pH:       (pH,o)       -       -       -       -       -       -       -         Field pH Oxidised:       (pH,oo)       - <td>Test Depth:</td> <td>(mm)</td> <td>1.00-1.20</td> <td>0.60</td> <td>-0.80</td> <td>0.40-0.60</td> <td>0.40-0.50</td> <td>1.00-1.20</td>	Test Depth:	(mm)	1.00-1.20	0.60	-0.80	0.40-0.60	0.40-0.50	1.00-1.20
Temperature of Water:       (°C)       -       15       -       15       -         Soil Description:       -       CL,Sandy CLAY       -       SM,Silty SAND       -         Emerson Class Number:       -       CLASS 4       -       CLASS 4       -         Soil-suspension made of 30g soil & :       -       -       -       -       -         pH Value of Soil-suspension:       (PH)       -       -       -       -       -         Field pH:       (PH <sub>P</sub> )       -       -       -       -       -       -         Field pH Oxidised:       (PH <sub>Pox</sub> )       -	Moisture Content:	(%)	23.1	_		23.2	10.9	17.4
Soil Description:       -       CL,Sandy CLAY       -       SM,Silty SAND       -         Emerson Class Number:       -       CLASS 4       -       CLASS 4       -         Soil-suspension made of 30g soil & :       -       -       -       -       -         PH Value of Soil-suspension:       (pH)       -       -       -       -       -         Field pH:       (pH,q)       -       -       -       -       -       -         Field pH Oxidised:       (pHrox)       -       -       -       -       -       -         Acid Sulfate Soil Indication:       -       -       -       -       -       -       -         Electrical Conductivity:       (ms)       -	Test Water Used:	_	-	Dist	illed	-	Distilled	-
Emerson Class Number:       -       CLASS 4       -       CLASS 4       -         Soil-suspension made of 30g soil & :       -	•	(°C)	-			-		-
Soil-suspension made of 30g soil & :       -			-	-		-		-
pH Value of Soil-suspension:       (pH)       -       -       -       -         Field pH:       (pH <sub>r</sub> )       -       -       -       -       -         Field pH Oxidised:       (pH <sub>rox</sub> )       -       -       -       -       -         Acid Sulfate Soil Indication:       -       -       -       -       -       -         Acid Sulfate Soil Indication:       -       -       -       -       -       -         Electrical Conductivity:       (ms)       -       -       -       -       -         Sampling & Test Methods (Results relate only to the items sampled/tested)       Report Remarks & Endorsement       -       -         Sampled by Customer: Results apply to the sample/s as received. **       AS 1289.1.1: (2001)Preparation of disturbed soil samples       AS 1289.3.8.1: (2017)Emerson Class number of a soil       **         AS 1289.4.3.1: (1997)pH value of a soil (Electrometric method)       Issued By: <u>P.Baltoski</u> P.Baltoski         Accredited for compliance with ISO/IEC 17025 - Testing.       P.Baltoski       Approved Signatory				CLA	SS 4	-	CLASS 4	-
Field pH:       (pH,)       -       -       -       -       -       -         Field pH Oxidised:       (pHrox)       -		-			-	-	-	-
Field pH Oxidised:       (pH <sub>rox</sub> )       -       -       -       -       -         Acid Sulfate Soil Indication:       -       -       -       -       -       -         Electrical Conductivity:       (ms)       -       -       -       -       -       -         Sampling & Test Methods (Results relate only to the items sampled/tested)       Report Remarks & Endorsement       -       -       -         Sampled by Customer: Results apply to the sample/s as received. **       AS 1289.1.1: (2001)Preparation of disturbed soil samples       AS 1289.3.8.1: (2017)Emerson Class number of a soil       AS 1289.4.3.1: (1997)pH value of a soil (Electrometric method)       Issued By:       P.Baltoski         Accredited for compliance with ISO/IEC 17025 - Testing.       P.Baltoski       Approved Signatory					-			-
Acid Sulfate Soil Indication:       - <t< td=""><td></td><td></td><td></td><td></td><td>-</td><td>-</td><td></td><td>-</td></t<>					-	-		-
Electrical Conductivity:       (ms)       -	•							
Sampling & Test Methods (Results relate only to the items sampled/tested)       Report Remarks & Endorsement         Sampled by Customer: Results apply to the sample/s as received. **       AS 1289.1.1: (2001)Preparation of disturbed soil samples         AS 1289.3.8.1: (2007)Emerson Class number of a soil       AS 1289.4.3.1: (1997)pH value of a soil (Electrometric method)         Issued By:       P.B.Altoski         Accredited for compliance with       P.Baltoski         ISO/IEC 17025 - Testing.       Approved Signatory					-	-	-	-
Sampled by Customer: Results apply to the sample/s as received. ** AS 1289.1.1: (2001)Preparation of disturbed soil samples AS 1289.3.8.1: (2017)Emerson Class number of a soil AS 1289.4.3.1: (1997)pH value of a soil (Electrometric method) Issued By: P.Baltoski Accredited for compliance with ISO/IEC 17025 - Testing.					T			
AS 1289.1.1: (2001)Preparation of disturbed soil samples AS 1289.3.8.1: (2017)Emerson Class number of a soil AS 1289.4.3.1: (1997)pH value of a soil (Electrometric method) Issued By: <u>P.B.altoaki</u> Accredited for compliance with ISO/IEC 17025 - Testing. Approved Signatory						Report	Remarks & Endorsement	
AS 1289.3.8.1: (2017)Emerson Class number of a soil AS 1289.4.3.1: (1997)pH value of a soil (Electrometric method) Issued By: <u>P.B.altoski</u> Accredited for compliance with ISO/IEC 17025 - Testing. Approved Signatory								
AS 1289.4.3.1: (1997)pH value of a soil (Electrometric method)          Issued By:       P.Baltoski         Accredited for compliance with       P.Baltoski         ISO/IEC 17025 - Testing.       Approved Signatory			-					
Issued By: <u>P.Baltoski</u> Accredited for compliance with P.Baltoski ISO/IEC 17025 - Testing. Approved Signatory						~		
Accredited for compliance withP.BaltoskiISO/IEC 17025 - Testing.Approved Signatory	AS 1289.4.3.1: (1997)pH va	aiue of a soil (Electr	ometric method)			NATA		
Accredited for compliance withP.BaltoskiISO/IEC 17025 - Testing.Approved Signatory						V		Battarbi
ISO/IEC 17025 - Testing. Approved Signatory					Acorodit-	d for compliance with		P Baltoski
					-	-		ovcu Signatory
							20030	
(** NATA accreditation does not cover the performance of this service) WB057 - Rev 10, 2/10/202	(** NATA accreditation	n does not cover th	e performance of this	service)				WB057 - Rev 10, 2/10/2020

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-			24.625.06	2 600
		A.B.N.	34 635 06	2 609
	Report on PSD (AS128	89.3.6.1) and AS Atter	rbergs	
Client:	Cardno		Report No:	460B
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 2
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 07/07/2021		Control Line:	BH06-D01

AUSTRALIAN

SOIL AND

CONCRETE

TESTING

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39668	22/06/2021	-	-	BH06-D01	1.20-1.50

Pre-Treatment	Units	Result	Specification Limits	Specification Name
Retained 53.0mm Sieve	%			
Pretreatment by Weathering	%			
Pretreatment by Compaction	%			
Particle Size Distribution	Units	Result	Specification Limits	Particle Size Distribution
Passing Sieve - 150mm	%			
Passing Sieve - 125mm	%			90
Passing Sieve - 100mm	%			
Passing Sieve - 75mm	%			80
Passing Sieve - 53mm	%			70
Passing Sieve - 37.5mm	%			G 60
Passing Sieve - 26.5mm	%			(%) 60
Passing Sieve - 19.0mm	%	100		(%) 80 (%
Passing Sieve - 13.2mm	%	99		
Passing Sieve - 9.5mm	%	98		
Passing Sieve - 6.7mm	%	97		30
Passing Sieve - 4.75mm	%	95		20
Passing Sieve - 2.36mm	%	92		20
Passing Sieve - 1.18mm	%	84		10
Passing Sieve - 0.600mm	%	70		
Passing Sieve - 0.425mm	%	60		
Passing Sieve - 0.300mm	%	47		53 37.5 19.0 13.2 9.5 6.7 2.36 2.36 2.36 0.425 0.425 0.300 0.425 0.150
Passing Sieve - 0.150mm	%	35		Sieve Aperture (mm)
Passing Sieve - 0.075mm	%	31		

Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
Sampled by Customer: Results apply to the sample/s as received. ** AS 1289.1.1: (2001) Preparation of disturbed soil samples for testing AS 1289.3.6.1: (2009) Particle Size Distribution of a soil (Standard, by Sieving)	
	Issued By: L. Romano
	Accredited for compliance with     L.Romano       ISO/IEC 17025 - Testing.     Approved Signatory       NATA Accreditation number:     20656
(** NATA accreditation does not cover the performance of this service)	WB012 - Rev 14, 09/04/2021

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**SOIL AND** TESTING

AUSTRALIAN

A.S.C.T.

<b>_</b>	TESTING					Mobile: 0497979929		
					A.B.N.	34 635 06	2 609	
		Repo	ort on PS	D (AS1289.3.6.1	) and AS At	terbergs		
lient:	Cardno					Report No:	460B	
lient Address:	16 Burelli St, V	Vollongong I	NSW 2500			Report Date:	28/07/2021	
roject:	Geotechnical T	esting				Report Page:	Page 2 of 2	
Vorks Component:	Shoalhaven Ho	ospital Redev	velopmet			Project No:	26	
Aaterial Used:	Insitu					Test Request:	8202118201	
Naterial Description:	-					Lot Number:	-	
ot Comments:	-					ITP/PCP Number:	Page 2 of 2	
ab Test Date/s:	Laboratory tes	ting 07/07/2	2021			Control Line:	BH06-D01	
PSD Curve Character	istics	Units	Result	Specification Limi	ts	Re	marks	
* Ratio A - 0.425mm/	2.36mm		65					
* Ratio B - 0.075mm/	0.425mm		51					
* Ratio C - 0.0135mm	ı/0.075mm							
# Coefficient of Unifo	rmity (Cu)							
# Coefficient of Curva	ture (Cc)							
# D85		mm	1.26					
# D60		mm	0.42					
# D50		mm	0.32					
# D30		mm						
# D20		mm						
# D15 mm		mm						
# D10		mm						
Plasticity		Units	Result	Specification Limi	ts	Re	marks	
Liquid Limit		%						
Plastic Limit		%	-					
Plastic Index		%						
Linear Shrinkage		%						
Weighted Plasticity In		%						
Weighted Linear Shri		%						
^ AS 1726:2017 - Con	1	ription				I		
Fraction	Component		Size (mm	n) Sa	mple (%)	AS 1	726:2017 - Figure 5	
Oversize	BOULDERS		150+		0	60	, 11 <sup>10</sup> 8	
	COBBLES		53-150			50	1000000	
	GRAVEL Coars		19-53		_	£ 40 -	10 hume 200	
	GRAVEL Mediu	ım	6.7-19	3	8	an an an an an an an an an an an an an a	CH or OH	
Coarse Grained Soil	GRAVEL Fine		2.36-6.7	5		S 40 H 20 S 20	Cl or Ol	
	SAND Coarse		0.6-2.36	22			MH or OH	
	SAND Medium		0.3-0.6	22	62	10		
	SAND Fine		0.075-0.			0	ML or OL 00 70 90 00	
			0.002-0.0	31	31	0 10 20 30	40 50 60 70 80 90 Liquid Limit (%)	
Fine Grained Soil	SILT		CLAY <0.002					
Fine Grained Soil	SILT CLAY		<0.002					
Fine Grained Soil Description			<0.002					
			<0.002					
			<0.002					
		are derived		nothed T107				

These values (#), are derived from the calculations provided in AS1726:2017 Clause 6.1.4.11. #

The values are not included in the Nata endorsement.

۸ The values given in this table are approximated from AS1726:2017, given the available test data. The table & it's contents are not included in the Nata endorsement.

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		A.B.N.	34 635 06	62 609
	Report on PSD (AS128	9.3.6.1) and AS Atte	erbergs	
Client:	Cardno		Report No:	465B
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 2
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 07/07/2021		Control Line:	TP06-D01

AUSTRALIAN

SOIL AND

CONCRETE

TESTING

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39673	17/06/2021	-	-	TP06-D01	1.00-1.20

Pre-Treatment	Units	Result	Specification Limits	Specification Name
Retained 53.0mm Sieve	%			
Pretreatment by Weathering	%			
Pretreatment by Compaction	%			
Particle Size Distribution	Units	Result	Specification Limits	Particle Size Distribution
Passing Sieve - 150mm	%			
Passing Sieve - 125mm	%			90
Passing Sieve - 100mm	%			
Passing Sieve - 75mm	%			80
Passing Sieve - 53mm	%			70
Passing Sieve - 37.5mm	%			
Passing Sieve - 26.5mm	%			
Passing Sieve - 19.0mm	%	100		(%) and the second seco
Passing Sieve - 13.2mm	%	100		
Passing Sieve - 9.5mm	%	99		LL 40
Passing Sieve - 6.7mm	%	97		30
Passing Sieve - 4.75mm	%	94		20
Passing Sieve - 2.36mm	%	89		20
Passing Sieve - 1.18mm	%	85		10
Passing Sieve - 0.600mm	%	80		
Passing Sieve - 0.425mm	%	76		
Passing Sieve - 0.300mm	%	70		53 37.5 19.0 13.2 9.5 6.7 4.75 2.36 2.36 0.425 0.425 0.300 0.425 0.150
Passing Sieve - 0.150mm	%	55		Sieve Aperture (mm)
Passing Sieve - 0.075mm	%	47		

Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
Sampled by Customer: Results apply to the sample/s as received. **	
AS 1289.1.1: (2001) Preparation of disturbed soil samples for testing	
AS 1289.3.6.1: (2009) Particle Size Distribution of a soil (Standard, by Sieving)	
	Issued By: <u>L. Romano</u> Accredited for compliance with ISO/IEC 17025 - Testing. Approved Signatory
	NATA Accreditation number: 20656
(** NATA accreditation does not cover the performance of this service)	WB012 - Rev 14, 09/04/2021

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**SOIL AND** S.C.T. Telephone: 02 4256 1684 CONCRETE E-Mail: illawarra@asct.com.au Mobile: 0497 979 929 TESTING A.B.N. 34 635 062 609 Report on PSD (AS1289.3.6.1) and AS Atterbergs Client: Cardno 465B Report No: Client Address: 16 Burelli St, Wollongong NSW 2500 Report Date: 28/07/2021 Report Page: Proiect: **Geotechnical Testing** Page 2 of 2 Works Component: Shoalhaven Hospital Redevelopmet Project No: 26 Test Request: Material Used: Insitu 8202118201 Material Description: Lot Number: -Lot Comments: ITP/PCP Number: Page 2 of 2 Laboratory testing 07/07/2021 Control Line: TP06-D01 Lab Test Date/s: **PSD Curve Characteristics** Units **Specification Limits** Result Remarks \* Ratio A - 0.425mm/2.36mm --86 \* Ratio B - 0.075mm/0.425mm 62 --\* Ratio C - 0.0135mm/0.075mm --# Coefficient of Uniformity (Cu) ---# Coefficient of Curvature (Cc) --# D85 1.16 mm # D60 mm 0.19 # D50 mm 0.10 # D30 mm # D20 mm # D15 mm # D10 mm Plasticity Units Result **Specification Limits** Remarks Liquid Limit % Plastic Limit % -Plastic Index % Linear Shrinkage % Weighted Plasticity Index (WPI) % Weighted Linear Shrinkage (WLS): % ^ AS 1726:2017 - Components & Description AS 1726:2017 - Figure 5 Component Size (mm) Sample (%) Fraction BOULDERS 150+ Oversize n COBBLES 53-150 50 19-53 **GRAVEL** Coarse 8 40 **GRAVEL** Medium 6.7-19 11 3 2.36-6.7 **GRAVEL** Fine 8 Coarse Grained Soil 0.6-2.36 SAND Coarse 9 0.3-0.6 SAND Medium 11 42 0.075-0.3 SAND Fine 23 ML 0.002-0.075 SILT Fine Grained Soil 47 47 Liquid Limit (%) < 0.002 CLAY Description

\* These values (\*), are derived from RMS method T107.

AUSTRALIAN

The values are not included in the Nata endorsement.

# These values (#), are derived from the calculations provided in AS1726:2017 Clause 6.1.4.11.

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The values given in this table are approximated from AS1726:2017, given the available test data.
 The table & it's contents are not included in the Nata endorsement.

Telephone:

E-Mail:

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		A.B.N.	34 635 06	2 609
	Report on PSD (AS128	9.3.6.1) and AS Atte	erbergs	
Client:	Cardno		Report No:	469B
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 2
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 07/07/2021		Control Line:	TP09-D03

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TESTING

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39677	17/06/2021	-	-	TP09-D03	1.50-1.70

Pre-Treatment	Units	Result	Specification Limits	Specification Name
Retained 53.0mm Sieve	%			
Pretreatment by Weathering	%			
Pretreatment by Compaction	%			
Particle Size Distribution	Units	Result	Specification Limits	Particle Size Distribution
Passing Sieve - 150mm	%			
Passing Sieve - 125mm	%			90
Passing Sieve - 100mm	%			80
Passing Sieve - 75mm	%			80
Passing Sieve - 53mm	%			70
Passing Sieve - 37.5mm	%			<u><u>a</u> 60</u>
Passing Sieve - 26.5mm	%	100		8
Passing Sieve - 19.0mm	%	96		(%) 60 aa 50 
Passing Sieve - 13.2mm	%	92		
Passing Sieve - 9.5mm	%	88		
Passing Sieve - 6.7mm	%	83		30
Passing Sieve - 4.75mm	%	78		20
Passing Sieve - 2.36mm	%	73		
Passing Sieve - 1.18mm	%	71		10
Passing Sieve - 0.600mm	%	66		
Passing Sieve - 0.425mm	%	61		
Passing Sieve - 0.300mm	%	52		53 37.5 26.5 19.0 13.2 9.5 6.7 4.75 2.36 2.36 0.425 0.425 0.425 0.300 0.150
Passing Sieve - 0.150mm	%	35		Sieve Aperture (mm)
Passing Sieve - 0.075mm	%	29		

Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
Sampled by Customer: Results apply to the sample/s as received. ** AS 1289.1.1: (2001) Preparation of disturbed soil samples for testing AS 1289.3.6.1: (2009) Particle Size Distribution of a soil (Standard, by Sieving)	
	Issued By: L. Romano
	Accredited for compliance with     L.Romano       ISO/IEC 17025 - Testing.     Approved Signatory       NATA Accreditation number:     20656
(** NATA accreditation does not cover the performance of this service)	WB012 - Rev 14, 09/04/2021

Telephone:

E-Mail:

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A.B.N.

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illawarra@asct.com.au

**SOIL AND** S.C.T. CONCRETE TESTING Report on PSD (AS1289.3.6.1) and AS Atterbergs Cardno 16 Burelli St, Wollongong NSW 2500 **Geotechnical Testing** Shoalhaven Hospital Redevelopmet Insitu -

AUSTRALIAN

Client: 469B Report No: Client Address: Report Date: 28/07/2021 Report Page: Proiect: Page 2 of 2 Works Component: Project No: 26 Test Request: Material Used: 8202118201 Material Description: Lot Number: Lot Comments: ITP/PCP Number: Page 2 of 2 Laboratory testing 07/07/2021 Control Line: TP09-D03 Lab Test Date/s: **PSD Curve Characteristics** Units **Specification Limits** Result Remarks \* Ratio A - 0.425mm/2.36mm --83 \* Ratio B - 0.075mm/0.425mm 48 --\* Ratio C - 0.0135mm/0.075mm --# Coefficient of Uniformity (Cu) ---# Coefficient of Curvature (Cc) --# D85 7.74 mm # D60 mm 0.41 # D50 mm 0.27 # D30 mm 0.08 # D20 mm # D15 mm # D10 mm Plasticity Units Result **Specification Limits** Remarks Liquid Limit % Plastic Limit % -Plastic Index % Linear Shrinkage % Weighted Plasticity Index (WPI) % Weighted Linear Shrinkage (WLS): % ^ AS 1726:2017 - Components & Description AS 1726:2017 - Figure 5 Component Size (mm) Sample (%) Fraction BOULDERS 150+ Oversize n COBBLES 53-150 50 19-53 **GRAVEL** Coarse 8 40 **GRAVEL** Medium 6.7-19 13 23 2.36-6.7 **GRAVEL** Fine 10 Coarse Grained Soil 0.6-2.36 SAND Coarse 8 0.3-0.6 SAND Medium 13 44 0.075-0.3 SAND Fine 23 ML 0.002-0.075 SILT Fine Grained Soil 29 29 Liquid Limit (%) < 0.002 CLAY Description

These values (\*), are derived from RMS method T107.

The values are not included in the Nata endorsement.

These values (#), are derived from the calculations provided in AS1726:2017 Clause 6.1.4.11. #

The values are not included in the Nata endorsement.

۸ The values given in this table are approximated from AS1726:2017, given the available test data. The table & it's contents are not included in the Nata endorsement.

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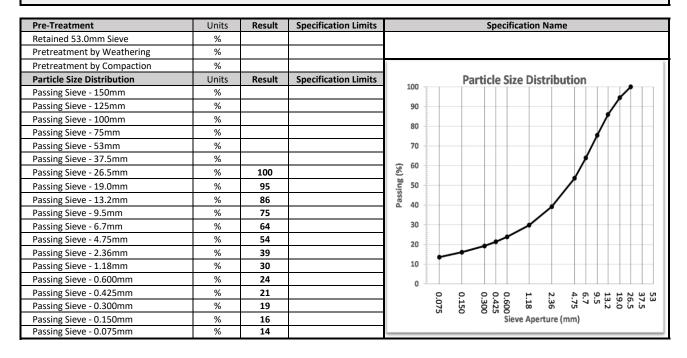
7/3 Hargraves Avenue, Albion Park Rail NSW 2527

Telephone: E-Mail: Mobile: A.B.N.

02 4256 1684 illawarra@asct.com.au 0497 979 929 34 635 062 609

Report on PSD (AS1289.3.6.1) and AS Atterbergs				
Client:	Cardno	Report No:	453B	
Client Address:	16 Burelli St, Wollongong NSW 2500	Report Date:	27/07/2021	
Project:	Geotechnical Testing	Report Page:	Page 1 of 2	
Works Component:	Shoalhaven Hospital Redevelopmet	Project No:	26	
Material Used:	Insitu	Test Request:	8202118201	
Material Description:	-	Lot Number:	-	
Lot Comments:	-	ITP/PCP Number:	-	
Lab Test Date/s:	Laboratory testing 07/07/2021	Control Line:	BH01-D01	

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39661	22/06/2021	-	-	BH01-D01	0.20-0.40



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report R	emarks & En	dorsement
Sampled by Customer: Results apply to the sample/s as received. **			
AS 1289.1.1: (2001) Preparation of disturbed soil samples for testing			
AS 1289.3.6.1: (2009) Particle Size Distribution of a soil (Standard, by Sieving)			
	~		
	NATA		
		Issued Bv:	The yorg -
	Accredited for compliance with	issueu by.	T.Morgan
	ISO/IEC 17025 - Testing.		Approved Signatory
	NATA Accreditation number:	20656	,
		20000	
(** NATA accreditation does not cover the performance of this service)			WB012 - Rev 14, 09/04/2021



7/3 Hargraves Avenue, Albion Park Rail NSW 2527

02 4256 1684 Telephone: E-Mail: 0497 979 929 Mobile:

illawarra@asct.com.au

		NG				A.B.N.	34 635 06	2 609	
		Rep	ort on PS	D (AS128	9.3.6.1) a	nd AS At	terbergs		
Client:	Cardno			- (			Report No:	453B	
Client Address:	16 Burelli St, W	/ollongong	NSW 2500				Report Date:	27/07/2021	
Project:	Geotechnical T						Report Page:	Page 2 of 2	
Works Component:	Shoalhaven Ho	•	a day vala a maat				Project No:	26	
•		spital Reue	velopinet						
Material Used:	Insitu						Test Request:	8202118201	
Material Description:	-						Lot Number:		
Lot Comments:	-						ITP/PCP Number:	Page 2 of 2	
Lab Test Date/s:	Laboratory tes	-		o :6			Control Line:	BH01-D01	
PSD Curve Character		Units	Result	Specificat	tion Limits		Re	marks	
* Ratio A - 0.425mm/			55						
* Ratio B - 0.075mm/			63						
* Ratio C - 0.0135mm									
# Coefficient of Unifo									
# Coefficient of Curva	ature (Cc)								
# DOF			12.02						
# D85 # D60		mm	12.82 5.88	<u> </u>					
		mm							
# D50		mm	3.98						
# D30		mm	1.20						
# D20		mm	0.34						
# D15		mm	0.11						
# D10		mm							
Plasticity		Units	Result	Specificat	tion Limits		Re	marks	
Liquid Limit		%							
Plastic Limit		%	-						
Plastic Index		%							
Linear Shrinkage		%							
Weighted Plasticity I	ndex (WPI)	%							
Weighted Linear Shri	. ,	%							
^ AS 1726:2017 - Cor	nponents & Descr	iption							
Fraction	Component		Size (mn	n)	Samp	le (%)	AS 1	726:2017 - Figure 5	
Oversize	BOULDERS		150+			0	60		
OVERSIZE	COBBLES		53-150			•	50 -	me source	
	GRAVEL Coarse	e	19-53					x 40	1
	GRAVEL Mediu	ım	6.7-19		31	55	J ve	CH or OH	
Coarse Grained Soil	GRAVEL Fine		2.36-6.7		25		45 30		
Coarse Grained Soli	SAND Coarse		0.6-2.36		15		8 40 30 130 130 130 130 130 130 130	CI or OI MH or OH	
	SAND Medium		0.3-0.6		5	26	10		
	SAND Fine		0.075-0.	3	6		CLIME	ML or OL	
Fine Grained Soil	SILT		0.002-0.	075	14	14	0 10 20 30	40 50 60 70 80 90 100	
Fille Grained Soli	CLAY		<0.002		14	14		Liquid Limit (%)	
Description									
	I								
*	Those values (*)	are derived	from DMC -	mothed T10	7				
	These values (*), The values are no								
#						\$1726·201	7 Clause 6.1.4.11.		
IT	The values are no					51,20.201	, c.ause 0.1.7.11.		
^						17 givon +k	ne available test data.		
-	The table & it's co						ie available lest uald.		
		untents are	not include	u in the Nati		ent.			
								WB012 - Rev 14, 09/04/2021	

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Mobile:

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7		A.B.N.	34 635 06	2 609				
	Report on PSD (AS1289.3.6.1) and AS Atterbergs							
Client:	Cardno	F	Report No:	456B				
Client Address:	16 Burelli St, Wollongong NSW 2500	F	Report Date:	27/07/2021				
Project:	Geotechnical Testing	F	Report Page:	Page 1 of 2				
Works Component:	Shoalhaven Hospital Redevelopmet	F	Project No:	26				
Material Used:	Insitu	I	Test Request:	8202118201				
Material Description:	-	l	Lot Number:	-				
Lot Comments:	-	I	ITP/PCP Number:	-				
Lab Test Date/s:	Laboratory testing 07/07/2021	(	Control Line:	BH03-D02				

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TESTING

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39664	21/06/2021	-	-	BH03-D02	2.70-3.00

Pre-Treatment	Units	Result	Specification Limits	Specification Name
Retained 53.0mm Sieve	%			
Pretreatment by Weathering	%			
Pretreatment by Compaction	%			
Particle Size Distribution	Units	Result	Specification Limits	Particle Size Distribution
Passing Sieve - 150mm	%			
Passing Sieve - 125mm	%			90
Passing Sieve - 100mm	%			80
Passing Sieve - 75mm	%			80
Passing Sieve - 53mm	%			70
Passing Sieve - 37.5mm	%			G 60
Passing Sieve - 26.5mm	%			80
Passing Sieve - 19.0mm	%	100		(%) ag 50 i i i so 60 i i i i so 60 i i i i i i i i i i i i i i i i i i i
Passing Sieve - 13.2mm	%	100		
Passing Sieve - 9.5mm	%	99		
Passing Sieve - 6.7mm	%	97		30
Passing Sieve - 4.75mm	%	94		20
Passing Sieve - 2.36mm	%	88		
Passing Sieve - 1.18mm	%	83		10
Passing Sieve - 0.600mm	%	76		
Passing Sieve - 0.425mm	%	71		-
Passing Sieve - 0.300mm	%	64		53 37.5 26.5 19.0 13.2 9.5 6.7 4.75 2.36 2.36 0.425 0.425 0.425 0.425
Passing Sieve - 0.150mm	%	48		Sieve Aperture (mm)
Passing Sieve - 0.075mm	%	40		

Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
Sampled by Customer: Results apply to the sample/s as received. ** AS 1289.1.1: (2001) Preparation of disturbed soil samples for testing AS 1289.3.6.1: (2009) Particle Size Distribution of a soil (Standard, by Sieving)	
	Issued By: L. Romano
	Accredited for compliance withL.RomanoISO/IEC 17025 - Testing.Approved SignatoryNATA Accreditation number:20656
(** NATA accreditation does not cover the performance of this service)	WB012 - Rev 14, 09/04/2021

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**SOIL AND** S.C.T. Telephone: 02 4256 1684 CONCRETE E-Mail: illawarra@asct.com.au Mobile: 0497 979 929 TESTING A.B.N. 34 635 062 609 Report on PSD (AS1289.3.6.1) and AS Atterbergs Client: Cardno 456B Report No: Client Address: 16 Burelli St, Wollongong NSW 2500 Report Date: 27/07/2021 Report Page: Proiect: **Geotechnical Testing** Page 2 of 2 Works Component: Shoalhaven Hospital Redevelopmet Project No: 26 Test Request: Material Used: Insitu 8202118201 Material Description: Lot Number: -Lot Comments: ITP/PCP Number: Page 2 of 2 Laboratory testing 07/07/2021 Control Line: BH03-D02 Lab Test Date/s: **PSD Curve Characteristics** Units **Specification Limits** Result Remarks \* Ratio A - 0.425mm/2.36mm --80 \* Ratio B - 0.075mm/0.425mm 56 --\* Ratio C - 0.0135mm/0.075mm --# Coefficient of Uniformity (Cu) ---# Coefficient of Curvature (Cc) --# D85 1.60 mm # D60 mm 0.26 # D50 mm 0.16 # D30 mm # D20 mm # D15 mm # D10 mm Plasticity Units Result **Specification Limits** Remarks Liquid Limit % Plastic Limit % -Plastic Index % Linear Shrinkage % Weighted Plasticity Index (WPI) % Weighted Linear Shrinkage (WLS): % ^ AS 1726:2017 - Components & Description AS 1726:2017 - Figure 5 Component Size (mm) Sample (%) Fraction BOULDERS 150+ Oversize n COBBLES 53-150 50 19-53 **GRAVEL** Coarse 8 40 **GRAVEL** Medium 6.7-19 12 3 2.36-6.7 **GRAVEL** Fine 9 Coarse Grained Soil 0.6-2.36 12 SAND Coarse 0.3-0.6 SAND Medium 48 12 0.075-0.3 SAND Fine 24 ML 0.002-0.075 SILT Fine Grained Soil 40 40 Liquid Limit (%) < 0.002 CLAY Description These values (\*), are derived from RMS method T107. The values are not included in the Nata endorsement. These values (#), are derived from the calculations provided in AS1726:2017 Clause 6.1.4.11. #

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AUSTRALIAN

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WB012 - Rev 14, 09/04/2021

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-				
		A.B.N.	34 635 06	2 609
	Report on PSD (AS1289	.3.6.1) and AS Atte	erbergs	
Client:	Cardno		Report No:	458B
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	27/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 2
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 07/07/2021		Control Line:	BH04-SPT02

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TESTING

A.S.C.T.

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39666	22/06/2021	-	-	BH04-SPT02	1.50-1.95

Pre-Treatment	Units	Result	Specification Limits	Specification Name
Retained 53.0mm Sieve	%			
Pretreatment by Weathering	%			
Pretreatment by Compaction	%			
Particle Size Distribution	Units	Result	Specification Limits	Particle Size Distribution
Passing Sieve - 150mm	%			
Passing Sieve - 125mm	%			90
Passing Sieve - 100mm	%			80
Passing Sieve - 75mm	%			80
Passing Sieve - 53mm	%			70
Passing Sieve - 37.5mm	%			G 60
Passing Sieve - 26.5mm	%			(%) <sup>g</sup> 50 <sup>40</sup>
Passing Sieve - 19.0mm	%			20 50 50 50 50 50 50 50 50 50 50 50 50 50
Passing Sieve - 13.2mm	%			
Passing Sieve - 9.5mm	%	100		
Passing Sieve - 6.7mm	%	97		30
Passing Sieve - 4.75mm	%	94		20
Passing Sieve - 2.36mm	%	89		
Passing Sieve - 1.18mm	%	85		10
Passing Sieve - 0.600mm	%	81		
Passing Sieve - 0.425mm	%	78		
Passing Sieve - 0.300mm	%	73		53 37.5 26.5 19.0 9.5 6.7 4.75 2.36 2.36 0.425 0.425 0.425 0.425 0.425
Passing Sieve - 0.150mm	%	62		Sieve Aperture (mm)
Passing Sieve - 0.075mm	%	55		

Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
Sampled by Customer: Results apply to the sample/s as received. ** AS 1289.1.1: (2001) Preparation of disturbed soil samples for testing AS 1289.3.6.1: (2009) Particle Size Distribution of a soil (Standard, by Sieving)	
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**SOIL AND** S.C.T. Telephone: 02 4256 1684 CONCRETE E-Mail: illawarra@asct.com.au Mobile: 0497 979 929 TESTING A.B.N. 34 635 062 609 Report on PSD (AS1289.3.6.1) and AS Atterbergs Client: Cardno 458B Report No: Client Address: 16 Burelli St, Wollongong NSW 2500 Report Date: 27/07/2021 Report Page: Proiect: **Geotechnical Testing** Page 2 of 2 Works Component: Shoalhaven Hospital Redevelopmet Project No: 26 Test Request: Material Used: Insitu 8202118201 Material Description: Lot Number: -Lot Comments: ITP/PCP Number: Page 2 of 2 Laboratory testing 07/07/2021 Control Line: BH04-SPT02 Lab Test Date/s: **PSD Curve Characteristics** Units **Specification Limits** Result Remarks \* Ratio A - 0.425mm/2.36mm --88 \* Ratio B - 0.075mm/0.425mm 70 --\* Ratio C - 0.0135mm/0.075mm --# Coefficient of Uniformity (Cu) ---# Coefficient of Curvature (Cc) --# D85 1.16 mm # D60 mm 0.13 # D50 mm # D30 mm # D20 mm # D15 mm # D10 mm Plasticity Units Result **Specification Limits** Remarks Liquid Limit % **Plastic Limit** % -Plastic Index % Linear Shrinkage % Weighted Plasticity Index (WPI) % Weighted Linear Shrinkage (WLS): % ^ AS 1726:2017 - Components & Description AS 1726:2017 - Figure 5 Component Size (mm) Sample (%) Fraction BOULDERS 150+ Oversize n COBBLES 53-150 50 19-53 **GRAVEL** Coarse £ 40 **GRAVEL** Medium 6.7-19 8 2.36-6.7 **GRAVEL** Fine 8 Coarse Grained Soil 0.6-2.36 SAND Coarse 8 0.3-0.6 SAND Medium 8 34 0.075-0.3 SAND Fine 18 ML 0.002-0.075 SILT Fine Grained Soil 55 55 Liquid Limit (%) < 0.002 CLAY Description These values (\*), are derived from RMS method T107. The values are not included in the Nata endorsement. These values (#), are derived from the calculations provided in AS1726:2017 Clause 6.1.4.11. # The values are not included in the Nata endorsement.

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 The table & it's contents are not included in the Nata endorsement.

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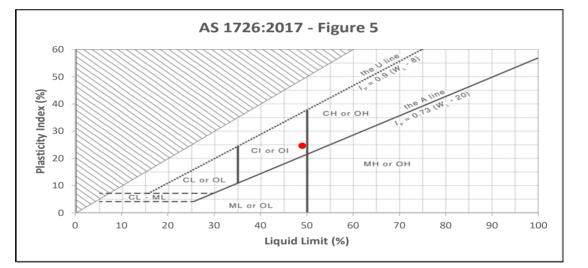
Telephone:

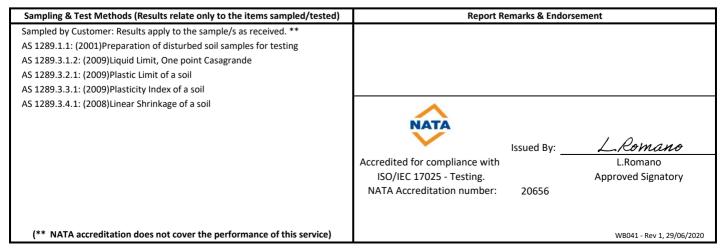
7/3 Hargraves Avenue, Albion Park Rail NSW 2527

	TESTING	E-Mail: Mobile: A.B.N.	illawarra@ 0497 979 34 635 06	
	Report on P	lastic Properties		
Client:	Cardno		Report No:	466A
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 1
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 23/07/2021		Control Line:	TP07-D01

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39674	17/06/2021	-	-	TP07-D01	0.40-0.60

Specification Name				
		1		
Pretreatment	Units	Result	Specification Limits	Remarks
Retained 53.0mm Sieve	%			
Pretreatment by Weathering				
Pretreatment by Compaction				
Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	49		Oven Dried & Dry Sieved
Plastic Limit	%	24		Oven Dried & Dry Sieved
Plastic Index	%	25		Oven Dried & Dry Sieved
Linear Shrinkage	%	12.0		Oven Dried & Dry Sieved. Curled Bar







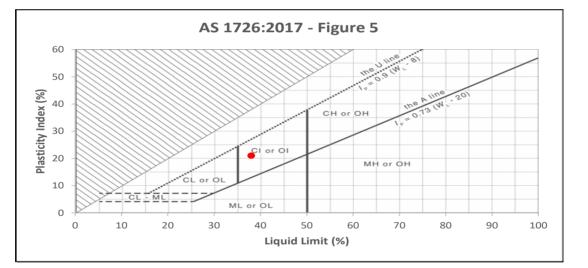
Telephone:

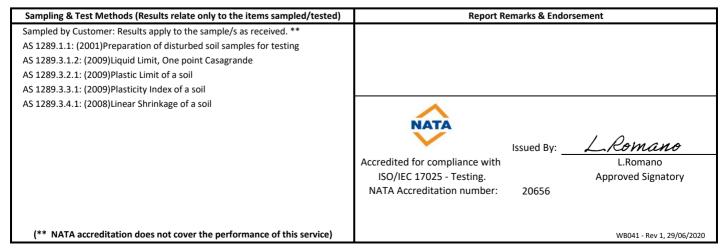
7/3 Hargraves Avenue, Albion Park Rail NSW 2527

	TESTING	E-Mail: Mobile: A.B.N.	illawarra@ 0497 979 34 635 06	
	Report on P	lastic Properties		
Client:	Cardno		Report No:	468A
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 1
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 23/07/2021		Control Line:	TP09-D02

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39676	17/06/2021	-	-	TP09-D02	1.00-1.20

Specification Name				
• · · ·				
Pretreatment	Units	Result	Specification Limits	Remarks
Retained 53.0mm Sieve	%			
Pretreatment by Weathering				
Pretreatment by Compaction				
Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	38		Oven Dried & Dry Sieved
Plastic Limit	%	17		Oven Dried & Dry Sieved
Plastic Index	%	21		Oven Dried & Dry Sieved
Linear Shrinkage	%	10.0		Oven Dried & Dry Sieved. Cracked/Broken Bar







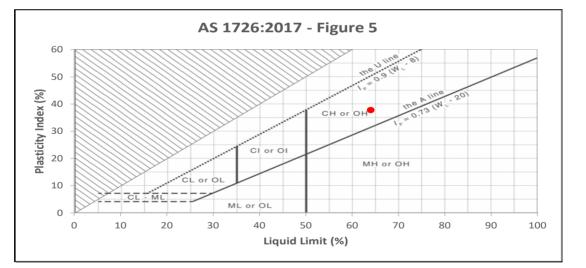
Telephone:

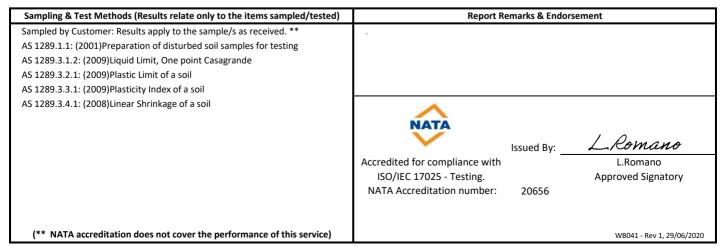
7/3 Hargraves Avenue, Albion Park Rail NSW 2527

	TESTING	E-Mail: Mobile: A.B.N.	illawarra( 0497 979 34 635 06	
	Report on P	lastic Properties		
Client:	Cardno		Report No:	455A
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 1
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 26/07/2021		Control Line:	BH02-D01

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39663	21/06/2021	-	-	BH02-D01	1.20-1.50

Specification Name					
		-			
Pretreatment	Units	Result	Specification Limits	Remarks	
Retained 53.0mm Sieve	%				
Pretreatment by Weathering					
Pretreatment by Compaction					
Plasticity	Units	Result	Specification Limits	Remarks	
Liquid Limit	%	64		Oven Dried & Dry Sieved	
Plastic Limit	%	26		Oven Dried & Dry Sieved	
Plastic Index	%	38		Oven Dried & Dry Sieved	
Linear Shrinkage	%	18.0		Oven Dried & Dry Sieved. Curled Bar	







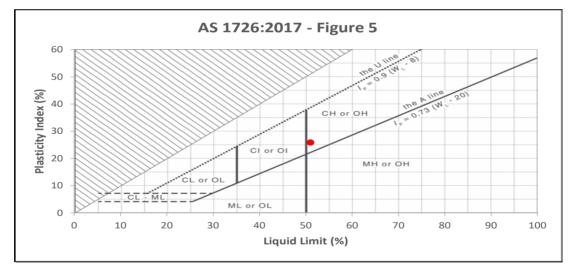
Telephone:

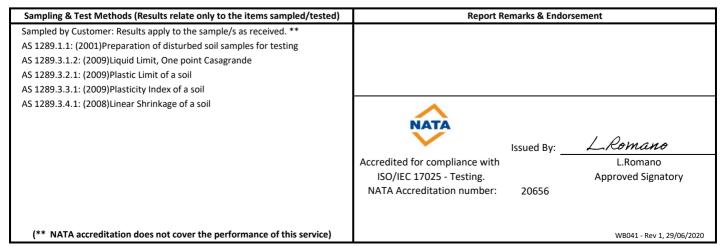
7/3 Hargraves Avenue, Albion Park Rail NSW 2527

		E-Mail: Mobile: A.B.N.	illawarra@ 0497 979 34 635 06	
	Report on P	lastic Properties		
Client:	Cardno		Report No:	459A
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 1
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 26/07/2021		Control Line:	BH04-D01

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39667	22/06/2021	-	-	BH04-D01	1.20-1.50

Specification Name					
	1				
Pretreatment	Units	Result	Specification Limits	Remarks	
Retained 53.0mm Sieve	%				
Pretreatment by Weathering					
Pretreatment by Compaction					
Plasticity	Units	Result	Specification Limits	Remarks	
Liquid Limit	%	51		Oven Dried & Dry Sieved	
Plastic Limit	%	25		Oven Dried & Dry Sieved	
Plastic Index	%	26		Oven Dried & Dry Sieved	
Linear Shrinkage	%	13.0		Oven Dried & Dry Sieved. Curled Bar	







7/3 Hargraves Avenue, Albion Park Rail NSW 2527

Telephone:02E-Mail:illMobile:04

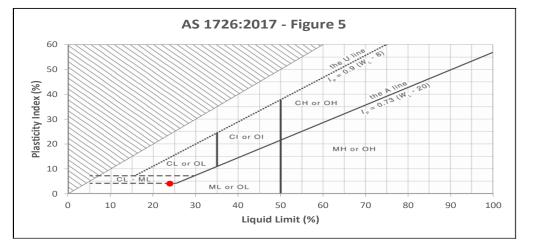
02 4256 1684 illawarra@asct.com.au 0497 979 929

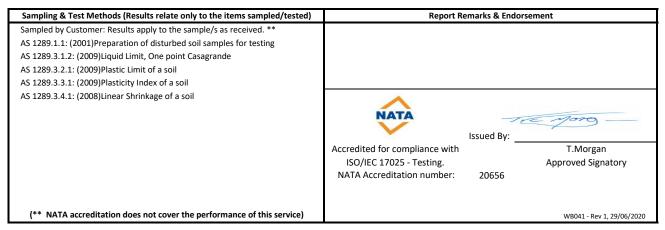
	IESTING	A.B.N. 34 63	5 062 609					
Report on Plastic Properties								
Client:	Cardno	Report No:	461A					
Client Address:	16 Burelli St, Wollongong NSW 2500	Report Date:	27/07/2021					
Project:	Geotechnical Testing	Report Page:	Page 1 of 1					
Works Component:	Shoalhaven Hospital Redevelopmet	Project No:	26					
Material Used:	Insitu	Test Request:	8202118201					
Material Description:	-	Lot Number:	-					
Lot Comments:	-	ITP/PCP Numb	er: -					
Lab Test Date/s:	Laboratory testing 26/07/2021	Control Line:	TP02-D01					

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39669	17/06/2021	-	-	TP02-D01	0.10-0.20

### Specification Name

Pretreatment	Units	Result	Specification Limits	Remarks	
Retained 53.0mm Sieve	%				
Pretreatment by Weathering					
Pretreatment by Compaction					
Plasticity	Units	Result	Specification Limits	Remarks	
Liquid Limit	%	24		Oven Dried & Dry Sieved	
Plastic Limit	%	20		Oven Dried & Dry Sieved	
Plastic Index	%	4		Oven Dried & Dry Sieved	
Linear Shrinkage	%	1.5		Oven Dried & Dry Sieved. Cracked/Broken Bar	







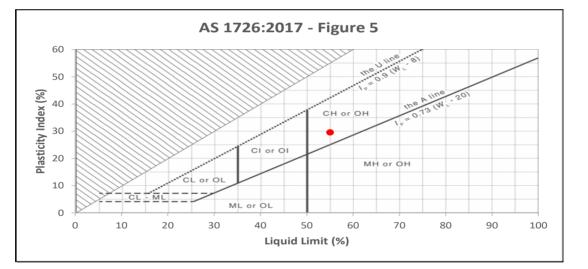
Telephone:

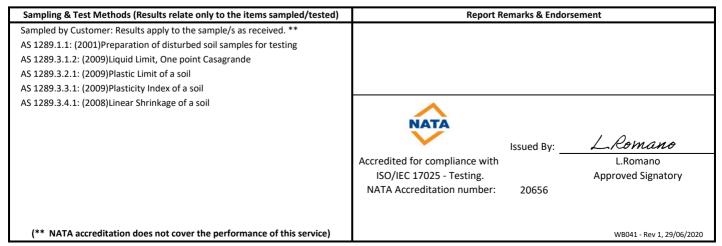
7/3 Hargraves Avenue, Albion Park Rail NSW 2527

		E-Mail: Mobile: A.B.N.	illawarra 0497 979 34 635 06	
	Report on P	lastic Properties		
Client:	Cardno		Report No:	463A
Client Address:	16 Burelli St, Wollongong NSW 2500		Report Date:	28/07/2021
Project:	Geotechnical Testing		Report Page:	Page 1 of 1
Works Component:	Shoalhaven Hospital Redevelopmet		Project No:	26
Material Used:	Insitu		Test Request:	8202118201
Material Description:	-		Lot Number:	-
Lot Comments:	-		ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 26/07/2021		Control Line:	TP04-D02

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
39671	17/06/2021	-	-	TP04-D02	1.00-1.20

Specification Name					
Pretreatment	Units	Result	Specification Limits	Remarks	
Retained 53.0mm Sieve	%				
Pretreatment by Weathering					
Pretreatment by Compaction					
Plasticity	Units	Result	Specification Limits	Remarks	
Liquid Limit	%	55		Oven Dried & Dry Sieved	
Plastic Limit	%	25		Oven Dried & Dry Sieved	
Plastic Index	%	30		Oven Dried & Dry Sieved	
Linear Shrinkage	%	15.0		Oven Dried & Dry Sieved. Curled Bar	





AUSTRALIAN SOIL AND CONCRETE TESTING

## Illawarra Laboratory

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			Report on A	S CBR and MDD		
Client:	Cardno		•		ort No: 26-462-	CBR
Client Address:	16 Burelli St, W	ollongong I	NSW 2500	•	ort Date: 28/07/2	
Project:	Geotechnical T			•	ort Page: Page 1 c	of 1
Works Component:	Shoalhaven Ho	•	velopmet		ect No: 26	
Material Used(Source):	Insitu	opical fielde	i ciopine i		Request/Order: 8202118	8201
Material Description:	-				Number: -	201
ot Boundaries:	-				PCP Number: -	
	-		2021 += 20/07/2021			1
_ab Test Date/s:			2021 to 28/07/2021		trol Line: TP02-BC	
Sample Number	Sample Date	Cha	inage/Location	Offset	Level of Test	Test Depth
39670	17/06/2021		-	-	TP02-B01	1.20-1.40
Parameters		Units	Test Results		Information	
Pretreatment Regime			No Pretreatment			
Portion Retained on A	S Sieve	%	16% on 19mm		Retained material e	xcluded from CBR
Material Plasticity (Liq	uid Limit)		Low (Less than 35%)		By Technician's Asse	essment
Sample Curing Time	,	hrs	289			
Soil Particle Density		t/m3	2.67		Estimated value onl	v**
Maximum Dry Density	(MDD)	t/m3	1.863		Standard compactiv	•
Optimum Moisture Co			13.4		Stanuaru compactiv	
		%		Dres 10.0.0/	Dessing 10 Omers	rtian
Field/Prep Moisture C		%	Field %	Prep 13.3 %	Passing 19.0mm po	
Compaction Moisture		%	Achieved 13.3 %	LMR = 99.5%	Specified LMR = 100	
Compaction Dry Densi	ity	t/m3	Achieved 1.87 t/m3	LDR = 100.5%	Specified LDR = 100	%
Surcharge Load		kg	4.5			
Period of Soaking		Days	Soaked - 4 Days		Dry Density (after so	oaking) = 1.87 t/m3
Specimen Swell		%	0.0			
Moisture Content - To	p 30mm	%	15.4		After Penetration	
Moisture Content - Re	emaining	%	13.8		After Penetration	
Dry Density Vs	Moisture Co	ontent	Load-Pe	netration Curve	Material CE	BR Value (%)
1.92 1.90 1.88 (Eu); 1.84 1.84 1.82 1.82 1.80 1.78			10000 9000 8000 7000 6000 5000 4000			earing Ratios
E 1.76 1.74 1.72	11.0 12.0 13.0 14.0 1	5.0 16.0	3000 2000 1000 0		CBR <sub>2.5</sub> = CBR <sub>5.0</sub> =	25 30
	pisture Content (%)	510 2010	0 1 2 3	4 5 6 7 8 9 10 11 12 Penetration (mm)	•	olied Correction of
Sampling & Test Metho	nds (Results relate	only to the it	tems sampled /tested)	Penetration (mm)	port Remarks & Endorsement	3 mm
Sampled by Customer: F	•			Re	Port Acmarks & Endorsement	
AS 1289.1.1: (2001)Prep AS1289.2.1.1: (2005) Mo	paration of disturbe pisture Content of a	d soil sample a Soil (Oven I	es Drying)			
AS1289.5.1.1: (2017)Dry AS1289.6.1.1: (2014)Cal				NATA		
					Issued By:	Romano
				Accredited for compliance		L.Romano
				ISO/IEC 17025 - Testing NATA Accreditation num	g. App	proved Signatory
** NATA accreditati	on does not cover	the perform	ance of this service			WB011 - Rev 21, 15/04/20

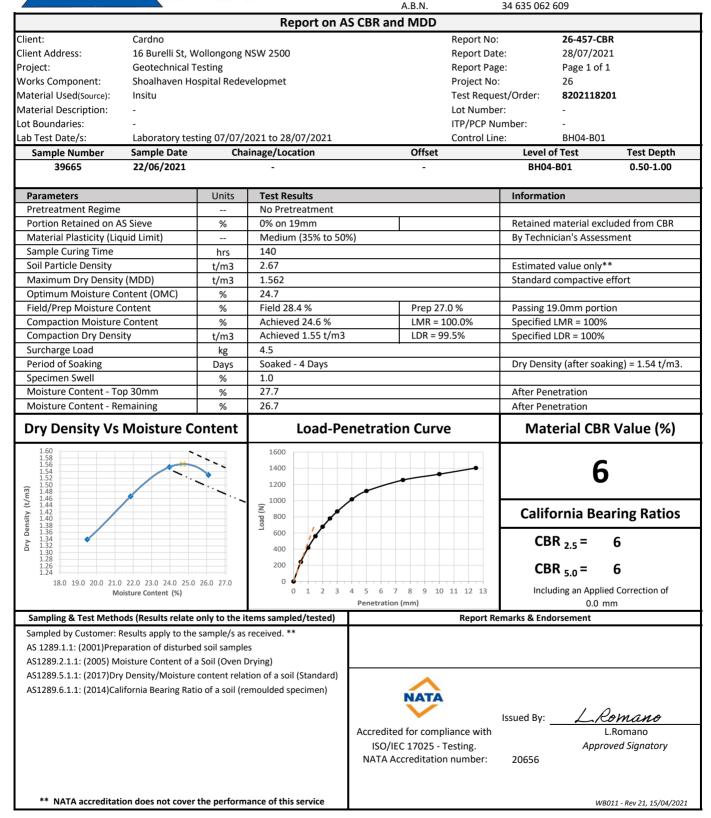
AUSTRALIAN SOIL AND CONCRETE TESTING

#### Illawarra Laboratory

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AUSTRALIAN SOIL AND CONCRETE

TESTING

.С.Т.

## ASCT Illawarra

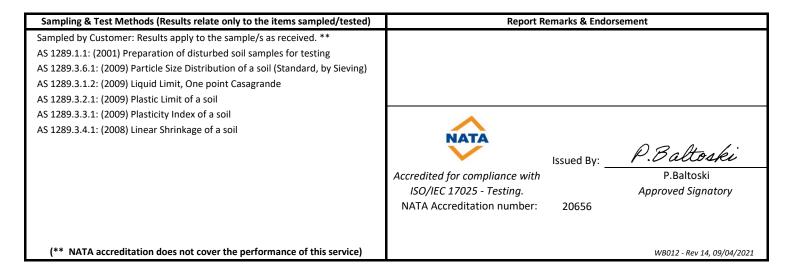
2/15 Miall Way, Albion Park Rail NSW 2527

Telephone: E-Mail: Mobile: A.B.N. +61 (02) 4208 3186 illawarra@asct.com.au +61 (0) 497 979 929 34 635 062 609

Report on PSD (AS1289.3.6.1) and AS Atterbergs							
Client:	Cardno	Report No:	724B				
Client Address:	16 Burelli St, Wollongong NSW 2500	Report Date:	19/11/2021				
Project:	Geotechnical Testing	Report Page:	Page 1 of 2				
Works Component:	Shoalhaven Hospital Redevelopment Additional Geotechnical Investigation	Project No:	26				
Material Used:	-	Test Request:	82021182-02				
Material Description:	-	Lot Number:	-				
Lot Comments:	DS	ITP/PCP Number:	-				
Lab Test Date/s:	Laboratory testing 12/11/2021 to 18/11/2021	Control Line:	HA04				

Sample Nu	mber Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
43786	28/10/2021	-	-	0.50-0.91	HA04

Pre-Treatment	Units	Result	Specification Limits	Specification Name
Retained 53.0mm Sieve	%			
Pretreatment by Weathering	%			
Pretreatment by Compaction	%			
Particle Size Distribution	Units	Result	Specification Limits	Particle Size Distribution
Passing Sieve - 150mm	%			
Passing Sieve - 125mm	%			90
Passing Sieve - 100mm	%			80
Passing Sieve - 75mm	%			
Passing Sieve - 53mm	%			70
Passing Sieve - 37.5mm	%			
Passing Sieve - 26.5mm	%			8
Passing Sieve - 19.0mm	%	100		(%) Buissed 40
Passing Sieve - 13.2mm	%	100		
Passing Sieve - 9.5mm	%	99		
Passing Sieve - 6.7mm	%	97		30
Passing Sieve - 4.75mm	%	91		20
Passing Sieve - 2.36mm	%	80		
Passing Sieve - 1.18mm	%	71		10
Passing Sieve - 0.600mm	%	64		
Passing Sieve - 0.425mm	%	59		
Passing Sieve - 0.300mm	%	51		53 37.5 26.5 19.0 13.2 9.5 6.7 4.75 2.36 0.600 0.425 0.300 0.425 0.300
Passing Sieve - 0.150mm	%	35		Sieve Aperture (mm)
Passing Sieve - 0.075mm	%	25		



AUSTRALIAN SOIL AND CONCRETE

TESTING

S.C.T.`

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		Rep	ort on PSI	D (AS128	9.3.6.1) a	nd AS Att	erbergs		
Client:							Report No:	724B	
Client Address:	16 Burelli St, W	/ollongong	NSW 2500				Report Date:	19/11/2021	
Project:	Geotechnical T						Report Page:	Page 2 of 2	
Works Component:	Shoalhaven Ho	-	elopment A	dditional Ge	otechnical In	vestigation	Project No:	26	
Material Used:	-						Test Request:	82021182-02	
Material Description:	-						Lot Number:	-	
Lot Comments:	DS						ITP/PCP Number:	Page 2 of 2	
Lab Test Date/s:	Laboratory tes	ting 12/11/	2021 to 18/	11/2021			Control Line:	HA04	
PSD Curve Characteri	-	Units	Result	Specificat	ion Limits			marks	
* Ratio A - 0.425mm/			73						
* Ratio B - 0.075mm/			43						
* Ratio C - 0.0135mm			_						
# Coefficient of Unifo									
# Coefficient of Curva									
# D85		mm	3.25						
# D60		mm	0.47						
# D50		mm	0.29						
# D30		mm	0.11						
# D20									
# D15									
# D10		mm							
Plasticity		Units	Result	Specificat	ion Limits		Remarks		
Liquid Limit		%	42			Oven Drie	ed & Dry Sieved		
Plastic Limit		%	22			Oven Drie	ed & Dry Sieved		
Plastic Index		%	20			Oven Drie	ed & Dry Sieved		
Linear Shrinkage		%	10.0			Oven Drie	ed & Dry Sieved. Crac	cked/Broken Bar	
Weighted Plasticity In	dex (WPI)	%	1193						
Weighted Linear Shrir	nkage (WLS):	%	581						
^ AS 1726:2017 - Con	nponents & Descr	ription							
Fraction	Component		Size (mm	ו)	Samp	le (%)	AS 17	726:2017 - Figure 5	
Oversize	BOULDERS		150+			0	60		
00013120	COBBLES		53-150			Ū	50 -	1180 1 W.C 0	
	GRAVEL Coarse	5	19-53				₹ 40 ×	1 + 2 - 201	
	GRAVEL Mediu	ım	6.7-19		3	20	\$40 x april y april	CH or OH	
Coarse Grained Soil	GRAVEL Fine		2.36-6.7		17		- 30		
Coarse Granned Son	SAND Coarse		0.6-2.36		17		20 June 20	CL or OL MH or OH	
	SAND Medium		0.3-0.6		12	55	10		
	SAND Fine		0.075-0.3	3	26			ML or OL	
Fine Grained Soil	SILT		0.002-0.0	075	25	25	0 10 20 30	40 50 60 70 80 90 100	
Fine Grained Soli	CLAY		<0.002		25	25		Liquid Limit (%)	
Description						·			

\* These values (\*), are derived from RMS method T107.

The values are not included in the Nata endorsement.

# These values (#), are derived from the calculations provided in AS1726:2017 Clause 6.1.4.11.

The values are not included in the Nata endorsement.

The values given in this table are approximated from AS1726:2017, given the available test data.
 The table & it's contents are not included in the Nata endorsement.

WB012 - Rev 14, 09/04/2021

ASCT Illawarra

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-	IESTIN			widdite.		01 (0) 457		
				A.B.N.		4 635 062	609	
		Repor	rt on Moisture (	Content				
Client:	Cardno				Report No:		26-724-N	мс
Client Address:	16 Burelli St, Wol	longong NSW 2500			Report Date	:	19/11/20	021
Project:	Geotechnical Tes	ting			Report Page	:	Page 1 o	f 1
Works Component:	Shoalhaven Hospit	tal Redevelopment Addi	tional Geotechnical I	nvestigation	Project No:		26	
Material Used:	-				Test Reques	t/Order:	8202118	2-02
Material Description:	-				Lot Number		-	
Lot Boundaries:	Chainage - to O	ffsets - to			ITP/PCP Nur	nber:	-	
Lot Comments:	DS				Control Line	:	HA04	
Sample Number:		43786	-		-	-		-
Field Sample/Test Date:		28/10/2021	-		-	-		-
Lab Test Date:		12/11/2021	-		-	-		-
Chainage / Location:	(m)	-	-		-	-		-
Offset from control line:	(m)	-	-		-	-		-
Level of Test:	(m)	0.50-0.91	-		-	-		-
Test Depth:	(mm)	HA04	-		-	-		-
Moisture Content (Calculated	l): (%)	21.3	-		-	-		-
Moisture Content (Correct	ed): (%)	-	-		-	-		-
Sample Number:		-	-		-	-		-
Field Sample/Test Date:		-	-		-	-		-
Lab Test Date:		-	-		-	-		-
Chainage / Location:	(m)	-	-		-	-		-
Offset from control line:	(m)	-	-		-	-		-
Level of Test:	(m)	-	-		-	-		-
Test Depth:	(mm)	-	-		-	-		-
Moisture Content (Calculated	l): (%)	-	-		-	-		-
Moisture Content (Correct	ed): (%)	-	-		-	-		-
Sample Number:		-	-		-	-		-
Field Sample/Test Date:		-	-		-	-		-
_ab Test Date:		-	-		-	-		-
Chainage / Location:	(m)	-	-		-	-		-
Offset from control line:	(m)	-	-		-	-		-
_evel of Test:	(m)	-	-	· ·	-	-		-
Test Depth:	(mm)	-	-		-	-		-
Moisture Content (Calculated	l): (%)	-	-		-	-		-
Moisture Content (Correct	ed): (%)	-	-	.	-	-		-

Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
Sampled by Customer: Results apply to the sample/s as received. **	
AS 1289.1.1: (2001)Preparation of disturbed soil samples	
AS 1289.2.1.1: (2005) Moisture Content (Oven Drying)	
	NATA
	Issued By: <u>P. Baltoski</u>
	Accredited for compliance with P.Baltoski
	ISO/IEC 17025 - Testing. Approved Signatory
	NATA Accreditation number: 20656
(** NATA accreditation does not cover the performance of this service)	WB056 - Rev 9, 15/06/2021



AUSTRALI SOIL AN CONCI TEST	D RETE							Illawarra Laboratory7/3 Hargraves Avenue, Albion Park Rail NSW 2527Telephone:02 4256 1684E-Mail:illawarra@asct.com.auMobile:0497 979 929A.B.N.34 635 062 609		
				Report on Re	ock Core Testing					
Client: Client Address: Project: Works Component: Material Used: Material Description: Lot Comments: Lab Test Date/s: Sample Date:	Cardno 16 Burelli St, Wollongo Geotechnical Testing Shoalhaven Hospital R - - Laboratory testing 30/0 22/06/2021	edevelopmet						Report No: Report Date: Report Page: Project No: Test Request: Lot Number: ITP/PCP Number: Control Line: Sample Number:	<b>470</b> 2/07/2021 Page 1 of 3 26 8202118201 - - BH01 - UCS <b>39742</b>	
Point Load Strength Index	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Specimen 6	Specimen 7	Specimen 8	Specimen 9	Specimen 10
Client ID Number										
Borehole	BH01	BH02	BH03	BH04						
Depth	3.36-3.59	3.29-3.38	4.60-4.81	6.59-6.79						
Lithological Description										
Moisture Condition	Moist	Moist	Moist	Moist						
Test Type	Axial	Axial	Axial	Axial						
Anisotropic Direction										
Failure Mode	1	1	1	1						
Failure Sketch	17	F	M	M						
Uncorrected Strength (Mpa)	1.30	0.92	0.83	1.47						
Point Load Strength Index (Mpa)	1.33	0.93	0.90	1.55						
Descriptive Strength (AS1726, Table 19)	High	Medium	Medium	High						
UCS [AS1726, Table 19] (MPa)	20 to 60	6 to 20	6 to 20	20 to 60						
Comments										

MEAN VALUE - Point Load Strength Index (Mpa)

Normal Direction

-

- Strength Anisotropy Index [Ia(50)] (Mpa)

] (Mpa) --

Sampling & Test Methods (Results relate only to the items sampled/tested)		Point Load - Failure Mode Descriptions	Repor	t Endorsement	
Sampled by Client: Results apply to the sample/s as received. **	1	Fracture through fabric, oblique to banding.			
As Received: Samples stored & Tested in as received condition.	2	Fracture along banding.			
AS4133.4.1: (2007) Determination of Point Load Index	3	Fracture through rock mass.	NATA		DD 11 1:
AS4133.4.2.2: (2013) Determination of Uniaxial Compressive Strength (<50MPa) **	4J	Fracture influenced by Joint Plane.	$\mathbf{\vee}$		P.Baltoski
AS4133.1.1.1: (2005) Determination of moisture content of rock, oven drying. **	4M	Fracture influenced by Micro-fracture.	Accredited for compliance with	Issued By:	P.Baltoski
	4F	Fracture influenced by Foliation.	ISO/IEC 17025 - Testing.		Approved Signatory
	4V	Fracture influenced by Vein.	NATA Accreditation number: 2065	56	
	5	Invalid Result (Partial fracture, or chip).			
(** NATA accreditation does not cover the performance of this service)			WB62 - Rev 5, 06/05/2021		

Parallel Direction

AU:	STRALIAN
S	OIL AND
A.S.C.T.	CONCRETE
	TESTING

7/3 Hargraves Avenue, Albion Park Rail NSW 2527

	CRETE							Telephone: E-Mail: Mobile: A.B.N.	02 4256 1684 illawarra@asct.com.a 0497 979 929 34 635 062 609	u
				Report on Re	ock Core Testing					
Client: Client Address: Project: Works Component: Material Used: Material Description: Lot Comments: Lab Test Date/s: Sample Date:	Cardno 16 Burelli St, Wollong Geotechnical Testing Shoalhaven Hospital f - - Laboratory testing 30, 22/06/2021	Redevelopmet						Report No: Report Date: Report Page: Project No: Test Request: Lot Number: ITP/PCP Number: Control Line: Sample Number:	<b>470</b> 2/07/2021 Page 2 of 3 26 8202118201 - - BH01 - UCS <b>39742</b>	
Uniaxial Compressive Strength	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Specimen 6	Specimen 7	Specimen 8	Specimen 9	Specimen 10
Client ID Number	opeenien I	Specificit 2	specificity	opecimen 4	specificity	opeennen o	opeoment	opeennento	specificity	opecimen 10
Borehole	BH01	BH02	BH03	BH04						
Depth	3.36-3.59	3.29-3.38	4.60-4.81	6.59-6.79						
Lithological Description										
Type of Testing Machine	ILLACONC1	ILLACONC1	ILLACONC1	ILLACONC1						
Date of Test	30/06/2021	30/06/2021	30/06/2021	30/06/2021						
Height (mm)	143	142	137	140						
Diameter (mm)	52.1	52.0	52.0	52.0						
Test Duration (mins)	212.00	274.00	331.00	336.00						
Failure Mode	(a) Single Shear	(AM) Axial Multiple	(e) Tensile Dominated	(a) Single Shear						
Failure Sketch										
UCS (Mpa)	47.521	34.506	41.329	42.754						
Average UCS (Mpa)					41	.528		1		1
Moisture Content	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Specimen 6	Specimen 7	Specimen 8	Specimen 9	Specimen 10
Moisture Content (%)	4.8	4.8	3.9	6.3						

General Report Remarks:

AUSTRA				Illawarra Laborator 7/3 Hargraves Aven	<b>'y</b> iue, Albion Park Rail NSW 2527
	AND NCRETE STING			Telephone: E-Mail: Mobile: A.B.N.	02 4256 1684 illawarra@asct.com.au 0497 979 929 34 635 062 609
		Report	on Rock Core Testing	,	
Client: Client Address: Project: Works Component: Material Used:	Cardno 16 Burelli St, Wollongong NS <b>Geotechnical Testing</b> Shoalhaven Hospital Redevel -	W 2500		Report No: Report Date: Report Page: Project No: Test Request:	<b>470</b> 2/07/2021 Page 3 of 3 26 8202118201
Material Description: Lot Comments: Lab Test Date/s: Sample Date:	- - Laboratory testing 30/06/202 22/06/2021			Lot Number: ITP/PCP Number: Control Line: Sample Number:	- - BH01 - UCS <b>39742</b>
	UCS Less Than 50 Mpa) - Specimen	1	Uniaxial Compressive Strength (UCS Less Than 50 Mpa)		
Rate of Displacement (mm/min):		Encoimon After Failure	Rate of Displacement (mm/min):		Coopimon After Failure
Specimen - Befor BH01	re Testing	Specimen - After Failure BH01	Specimen - Before Testing BH03		Specimen - After Failure BH03
BH02		вног	BHO4		BHO4

WB62 - Rev 5, 06/05/2021



Cardno Pty Ltd (WOLL) Groung Floor, 16 Burelli Street Wollongong NSW 2500





NATA Accredited Accreditation Number 1261 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

## Attention:

## **Benjamin Armstrong**

Report Project name Project ID Received Date 806809-S SHOALHAVEN HOSPITAL REDEVELOPMENT 8202118201 Jun 25, 2021

Client Sample ID			BH04-SPT01 0.50-0.95	BH02-SPT01 0.50-0.95	BH03-SPT02 1.50-1.95	BH02-SPT02 1.50-1.95
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Jn60332	S21-Jn60333	S21-Jn60334	S21-Jn60335
Date Sampled			Jun 22, 2021	Jun 21, 2021	Jun 21, 2021	Jun 21, 2021
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	< 10	15	10	10
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	13	15	13	13
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.9	5.3	5.3	5.2
Resistivity*	0.5	ohm.m	780	660	750	770
Sulphate (as SO4)	10	mg/kg	14	< 10	< 10	< 10
% Moisture	1	%	20	18	18	12



## Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description Chloride	<b>Testing Site</b> Sydney	Extracted Jun 30, 2021	<b>Holding Time</b> 28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Jun 30, 2021	7 Days
- Method: LTM-INO-4030 Conductivity pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Jun 30, 2021	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE Sulphate (as SO4)	Sydney	Jun 30, 2021	28 Days
- Method: E045 Anions by Ion Chromatography % Moisture	Sydney	Jun 30, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

	eurofi	nc			Australia						New Zealand	
•••	0 005 085 521 web: v	Envi	email: EnviroSale	Testing	Melbourne 6 Monterey Road Dandenong South VIC 3 Phone : +61 3 8564 500 NATA # 1261 Site # 1254	U 175 1 0 Li P	ydney Init F3, E 6 Mars F ane Cov hone : + IATA # 1	Road ve West •61 2 99		Newcastle 4/52 Industrial Drive Mayfield East NSW 2304 PO Box 60 Wickham 2293 Phone : +61 2 4968 8448 NATA # 1261 Site # 25079	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone: - t64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 7675 Phone: 0800 856 450 IANZ # 1290
	mpany Name: dress:	Cardno Pty L Groung Floo Wollongong NSW 2500	.td (WOLL) r, 16 Burelli S	treet			Re Ph	rder N eport none: ax:	806809 02 4231 9672	Received: Due: Priority: Contact Name:	Jun 25, 2021 3:15 I Jul 2, 2021 5 Day Benjamin Armstron	
	oject Name: oject ID:	SHOALHAVI 8202118201		L REDEVELOF	PMENT					Eurofins Analytical	Services Manager : L	Jrsula Long
			mple Detail			HOLD	Aggressivity Soil Set	Moisture Set				
			II 1254			V						
	ourne Laborato						I X	X				
Sydn	ey Laboratory	- NATA Site # 1	8217			X	X	X				
Sydn Brisk	ney Laboratory	- NATA Site # 1 y - NATA Site #	8217 20794			×	X	X				
Sydn Brisk Perth	ey Laboratory	- NATA Site # 1 y - NATA Site # NATA Site # 237	8217 20794 /36				X					
Sydn Brisk Perth Mayf	ney Laboratory Dane Laboratory n Laboratory - N	- NATA Site # 1 y - NATA Site # NATA Site # 237 y - NATA Site # 2	8217 20794 /36				X	X				
Sydn Brisk Perth Mayf	ney Laboratory pane Laboratory n Laboratory - N iield Laboratory	- NATA Site # 1 y - NATA Site # NATA Site # 237 y - NATA Site # 2	8217 20794 /36	Matrix	LAB ID		X	X				
Sydn Brisk Perth Mayf Exter No	ney Laboratory pane Laboratory n Laboratory - N ield Laboratory rnal Laboratory	- NATA Site # 1 y - NATA Site # NATA Site # 237 y - NATA Site # 2	8217 20794 736 25079 Sampling	Matrix Soil	LAB ID S21-Jn60332		x 	x				
Sydn Brisk Perth Mayf Exter No 1	ney Laboratory pane Laboratory n Laboratory - N ield Laboratory rnal Laboratory Sample ID BH04-SPT01	- NATA Site # 1 y - NATA Site # NATA Site # 237 y - NATA Site # 2 Sample Date	8217 20794 736 25079 Sampling									
Sydn Brisk Perth Mayf Exter No 1	ney Laboratory pane Laboratory - N ield Laboratory - N ield Laboratory rnal Laboratory Sample ID BH04-SPT01 0.50-0.95 BH02-SPT01	- NATA Site # 1 y - NATA Site # NATA Site # 237 y - NATA Site # 2 Sample Date Jun 22, 2021	8217 20794 736 25079 Sampling	Soil	S21-Jn60332		X	x				
Sydn Brisk Perth Mayf Exter No 1 2 3	hey Laboratory bane Laboratory - N ield Laboratory - N ield Laboratory rnal Laboratory Sample ID BH04-SPT01 0.50-0.95 BH02-SPT01 0.50-0.95 BH03-SPT02	- NATA Site # 1 y - NATA Site # 237 v - NATA Site # 237 v - NATA Site # 2 Sample Date Jun 22, 2021 Jun 21, 2021	8217 20794 736 25079 Sampling	Soil Soil	S21-Jn60332 S21-Jn60333		x	x				
Sydn Brisk Perth Mayf Exter No 1 2 3 4 5	hey Laboratory bane Laboratory - N ield Laboratory - N ield Laboratory rnal Laboratory Sample ID BH04-SPT01 0.50-0.95 BH02-SPT01 0.50-0.95 BH03-SPT02 1.50-1.95 BH02-SPT02	- NATA Site # 1 y - NATA Site # NATA Site # 237 - NATA Site # 237 - NATA Site # 2 Sample Date Jun 22, 2021 Jun 21, 2021 Jun 21, 2021	8217 20794 736 25079 Sampling	Soil Soil Soil	S21-Jn60332 S21-Jn60333 S21-Jn60334	x		x				

<b>eurofir</b> BN: 50 005 085 521 web: w	Env	ironment ] u email: EnviroSales	0	Australia Melbourne 6 Monterey Road Dandenong South VIC 3 Phone : +61 3 8564 500 NATA # 1261 Site # 1254	U 3175 1 )0 L P	6 Mars ane Cov hone : -			Newcastle 4/52 Industrial Drive Mayfield East NSW 2304 PO Box 60 Wickham 2293 Phone : +61 2 4968 8448 NATA # 1261 Site # 25079	New Zealand Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone : +64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 7 Phone : 0800 856 450 IANZ # 1290
Company Name: Address:	Cardno Pty I Groung Floo Wollongong NSW 2500	or, 16 Burelli Str	reet			R Pl	rder N eport hone: ax:	806809 02 4231 9672	Received: Due: Priority: Contact Name:	Jun 25, 2021 3:15 Jul 2, 2021 5 Day Benjamin Armstror	
Project Name: Project ID:	SHOALHAV 8202118201	EN HOSPITAL	REDEVELC	PMENT					Eurofins Analytical	Services Manager : I	Ursula Long
	Sa	ample Detail			HOLD	Aggressivity Soil Set	Moisture Set				
Melbourne Laborator	y - NATA Site	# 1254									
Sydney Laboratory -					X	X	Х				
Brisbane Laboratory											
Perth Laboratory - N/											
Mayfield Laboratory	- NATA Site #	25079									
External Laboratory		1 1									
0.50-0.95	Jun 21, 2021		Soil	S21-Jn60338	x						
7 BH06-SPT01 、 0.50-0.95	501121, 2021										



#### Internal Quality Control Review and Glossary

#### General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site 1. Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- 2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued. 9.

#### **Holding Times**

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days. \*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ug/L: micrograms per litre
ppm: Parts per million	ppb: Parts per billion	%: Percentage
org/100mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100mL: Most Probable Number of organisms per 100 millilitres

Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Limit of Reporting.
Addition of the analyte to the sample and reported as percentage recovery.
Relative Percent Difference between two Duplicate pieces of analysis.
Laboratory Control Sample - reported as percent recovery.
Certified Reference Material - reported as percent recovery.
In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
The addition of a like compound to the analyte target and reported as percentage recovery.
A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
United States Environmental Protection Agency
American Public Health Association
Toxicity Characteristic Leaching Procedure
Chain of Custody
Sample Receipt Advice
US Department of Defense Quality Systems Manual Version 5.3
Client Parent - QC was performed on samples pertaining to this report
Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
Toxic Equivalency Quotient

#### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

#### QC Data General Comments

- 1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- 2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- 3. Organochlorine Pesticide analysis where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 4. Organochlorine Pesticide analysis where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported 5. in the C10-C14 cell of the Report.
- 6. pH and Free Chlorine analysed in the laboratory Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- 7. Recovery Data (Spikes & Surrogates) where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- 8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- 9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
- 10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.



## **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Chloride			mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at	25°C as rec.)		uS/cm	< 10			10	Pass	
Sulphate (as SO4)			mg/kg	< 10			10	Pass	
LCS - % Recovery								-	
Conductivity (1:5 aqueous extract at	25°C as rec.)		%	88			70-130	Pass	
Resistivity*		_	%	88			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	S21-Jn52802	NCP	%	103			70-130	Pass	
Sulphate (as SO4)	S21-Jn52802	NCP	%	103			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate		-							
				Result 1	Result 2	RPD			
Chloride	S21-Jn52802	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	S21-Jn54607	NCP	uS/cm	220	200	8.0	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S21-Jn54607	NCP	pH Units	5.1	5.1	<1	30%	Pass	
Resistivity*	S21-Jn54607	NCP	ohm.m	47	51	8.0	30%	Pass	
Sulphate (as SO4)	S21-Jn52802	NCP	mg/kg	46	44	4.0	30%	Pass	
% Moisture	S21-Jn60239	NCP	%	14	14	1.0	30%	Pass	



## Comments

Sample Integrity	
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

## Authorised by:

Ursula Long Charl Du Preez Analytical Services Manager Senior Analyst-Inorganic (NSW)

Glenn Jackson General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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## Shoalhaven Hospital Redevelopment

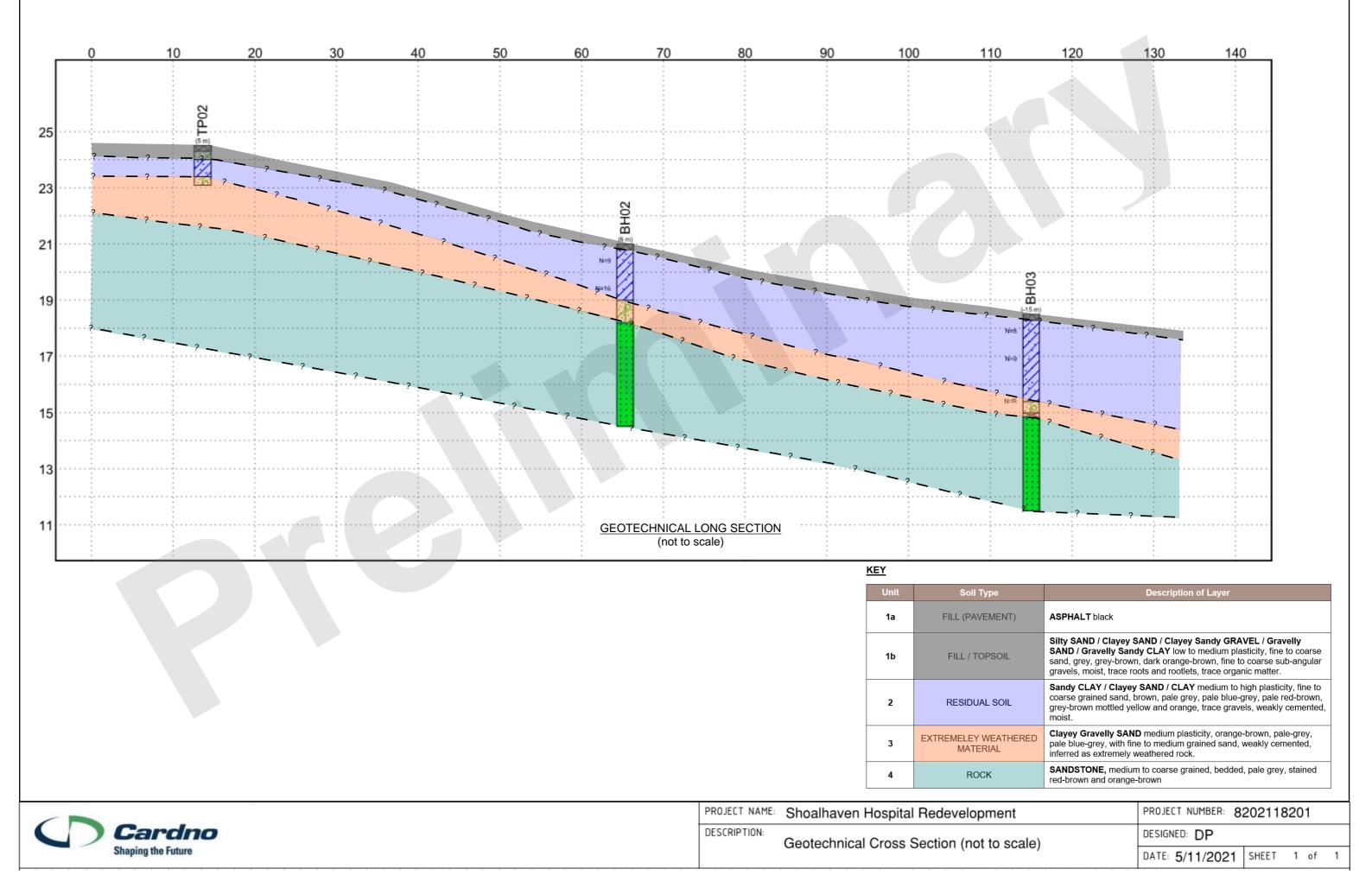
## APPENDIX

 $\Box$ 

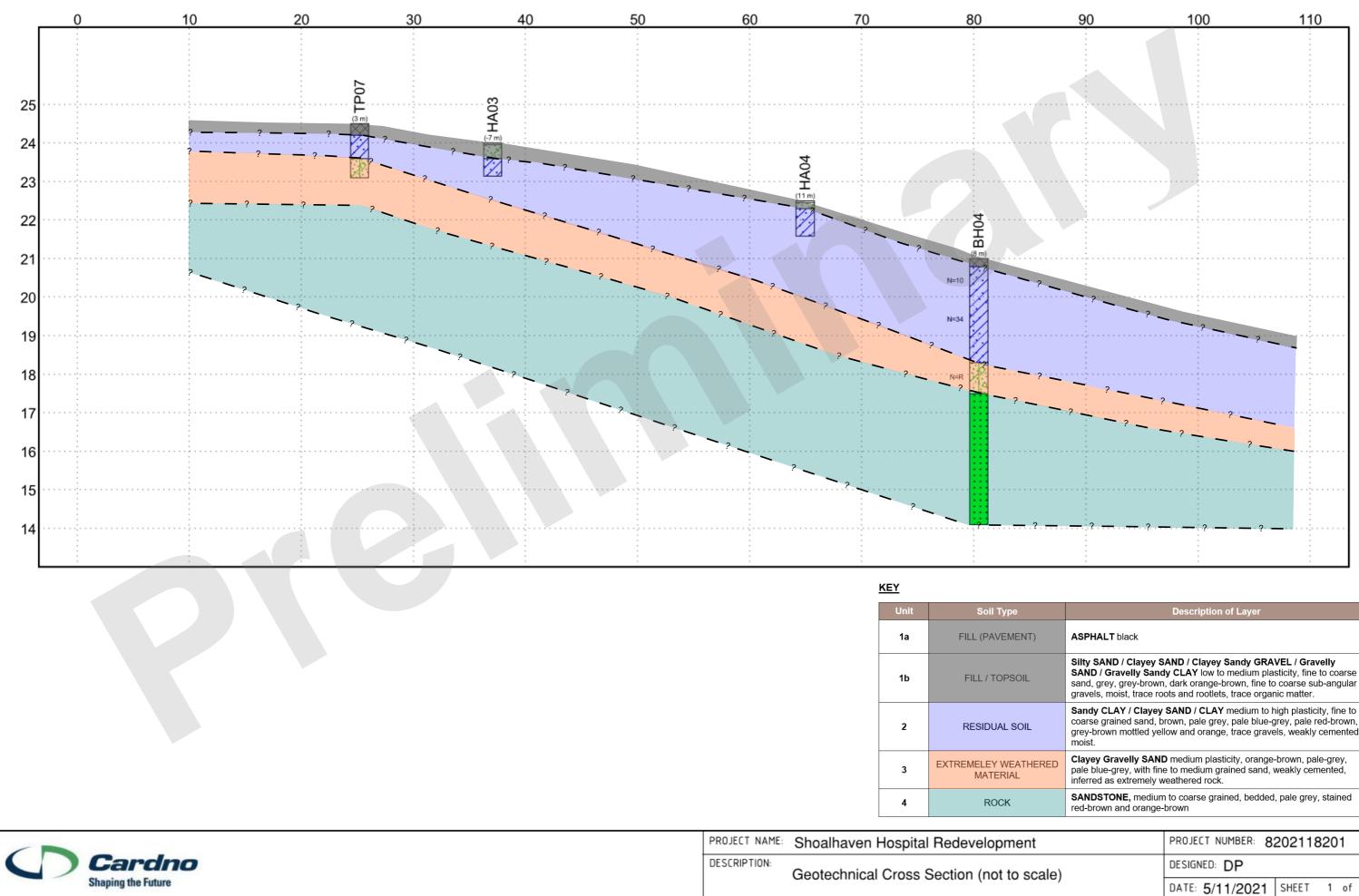
## GEOTECHNICAL CROSS SECTIONS



# **CROSS SECTION 1**



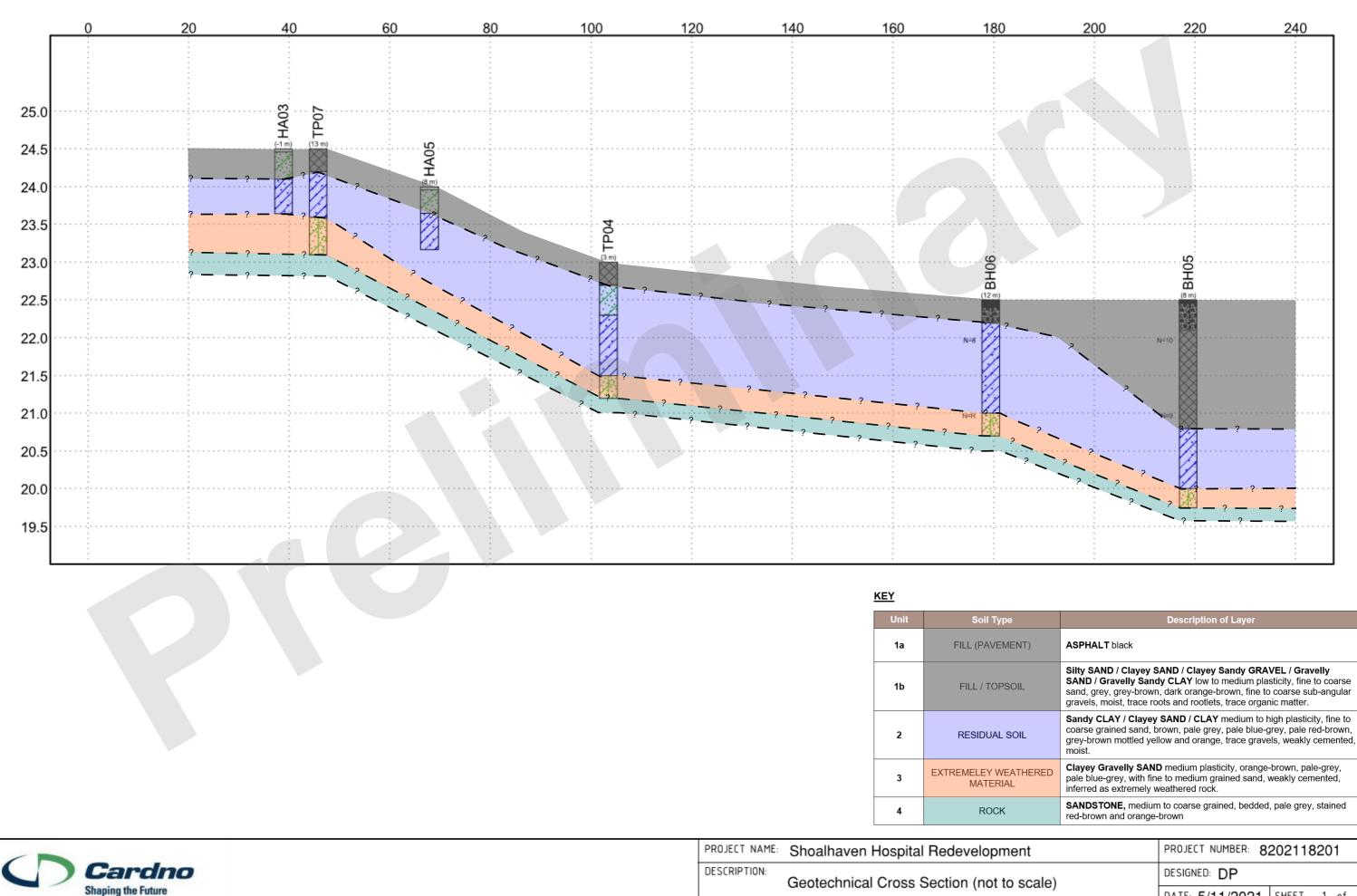
# **CROSS SECTION 2**



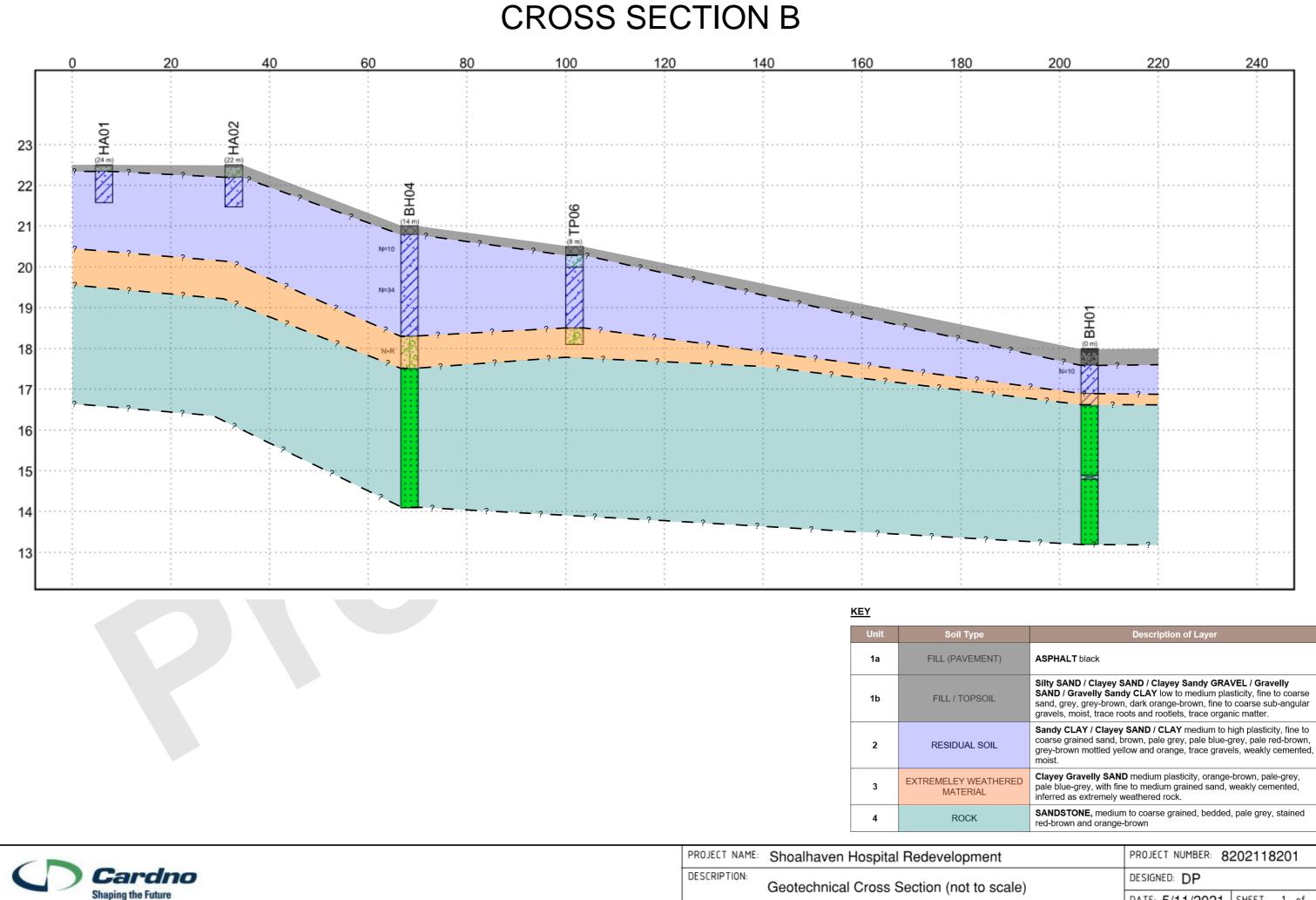
		Description of Layer						
	ASPHALT black							
	Silty SAND / Clayey SAND / Clayey Sandy GRAVEL / Gravelly SAND / Gravelly Sandy CLAY low to medium plasticity, fine to coarse sand, grey, grey-brown, dark orange-brown, fine to coarse sub-angular gravels, moist, trace roots and rootlets, trace organic matter.							
	coarse grained sand, bi	Sandy CLAY / Clayey SAND / CLAY medium to high plasticity, fine to coarse grained sand, brown, pale grey, pale blue-grey, pale red-brown, grey-brown mottled yellow and orange, trace gravels, weakly cemented,						
)		D medium plasticity, orange-brown, pale-grey, e to medium grained sand, weakly cemented, eathered rock.						
	SANDSTONE, medium to coarse grained, bedded, pale grey, stained red-brown and orange-brown							
		PROJECT NUMBER: 8202118201						
)		DESIGNED: DP						

1

# **CROSS SECTION A**



	PROJECT NUMBER: 8	2021182	201	
<i>i</i> )	DESIGNED: DP			
·)	DATE: 5/11/2021	SHEET	1 of	1



<b>Clayey Gravelly SAND</b> medium plasticity, orange-brown, pale-grey, pale blue-grey, with fine to medium grained sand, weakly cemented, inferred as extremely weathered rock.
SANDSTONE, medium to coarse grained, bedded, pale grey, stained

	PROJECT NUMBER: 8	2021182	01	
)	DESIGNED: DP			
7	DATE: 5/11/2021	SHEET 1	of	1

## Shoalhaven Hospital Redevelopment

## APPENDIX



## PERMEABILITY TEST TABLES



## VARIABLE HEAD PERMEABILITY TEST

	rdno Varia						
SITE	HA01-TEST 1			Report Revision:		1	
PROJECT	SHOALHAVEN HOSPITA	L		Piezometer Depth:		0.92	mBGL
INITIAL COND	ITIONS			·			
	est Carried out on	Standpipe					
Base of Standp		0.92	mBGL	Operator		D	
Top of Standpi	pe (Top Response Zone)	0.00	mBGL mBGL	Date Checked by		28/10 D	
	en (Bottom Response Zone)	0.00	mBGL	Checked by Time		D	ĸ
Diameter of Bo		70.00	mm	Weather			
Diameter of Ca	ising	70.00	mm	Response Le		0.92	m
Elevation of Su		-	m RL	Response Z	one	SANDY	′ CLAY
Groundwater L	evel (Below Top of Pipe)	-	m	Materials		_	_
	TEST CALCULATION			Elapsed (minutes)	Total seconds	Head (metres)	H/H
				0	0	0.92	1.0
				0	9.6	0.90	0.9
Intake Factor	F			1	30	0.89	0.9
	F=	A 77	(i)	1	45	0.88	0.9
	Γ=	1.77	(i)	1	60 90	0.88 0.87	0.9 0.9
Borehole Case				2	120	0.86	0.9
Hvorslev				3	150		0.9
				3	180		0.9
				4	210 240	0.85 0.84	0.9 0.9
				5	240 270	0.84 0.84	0.9
Permeability, K	,			5	300	0.84	0.9
				6	360	0.84	0.9
K= <u>A</u> F.T			(iii)	7	420	0.84	0.9
F.1				8	480 540	0.84 0.83	0.9 0.9
Where T is the	Basic Time Lag Factor			9 10	540 600	0.83	0.9
corresponding	to an H/Ho value of 0.37			15	900		0.9
Hvorslev				20	1200	0.82	0.8
				30	1800	0.81	0.8
L= 0.92 D= 0.070	m m			40 50	2400 3000	0.80 0.80	0.8 0.8
L/D= 13				60	3600	0.80	0.8
				90	5400	0.77	0.8
A= 0.00385	m^2			120	7200	0.76	0.8
F= 1.77		From (i)	0.07	180	10800	0.73	0.7
T= 1800 T= 108000	min corresponding to an s corresponding to an H/			210 240	12600 14400	0.72 0.70	0.7 0.7
K= <b>2.02E-08</b>		From (iii)	.01	240 270	16200	0.70	0.7
		~ /		1170	70200	0.46	0.5
Remarks							
1.0			3				
0.1 0 200 400	) 600 800 1000 1200 1 Time (min)	400 1600 1	800 2000				

	SITE	HA01-TEST 2			Ren	ort Revision:		1	
	PROJECT				-	neter Depth:			mPCI
		SHOALHAVEN HOSPITA	L.		Plezor	neter Deptn:		0.92	mBGL
	INITIAL CONDIT		Cto a da ia a						
-	Base of Standpip	Carried out on	Standpipe 0.92	mBGL		Operator			P
	Top of Standpipe		0.92	mBGL		Date		28/10	
		, op Response Zone)	0.00	mBGL		Checked by			R
		n (Bottom Response Zone)	0.00	mBGL		Time			
	Diameter of Bore		70.00	mm		Weather			
	Diameter of Casi		70.00	mm		Response Le		0.92	m
	Elevation of Surf		-	m RL		Response Zo	one	SANDY	
1	Groundwater Lev	vel (Below Top of Pipe)	-	m		Materials		0/110	02/11
		TEST CALCULATION				Elapsed (minutes)	Total seconds	Head (metres)	H/H
	Intake Factor, F Borehole Case Hvorslev	 F=	1.77	(i)		0 0 1 1 2 17 161 623	0 9.6 19.8 30 45 60 120 1020 9660 37380	0.92 0.87 0.91 0.91 0.91 0.91 0.91 0.91 0.88 0.77 0.61	1.0 0.9 0.9 0.9 0.9 0.9 0.9 0.8 0.8
K=-		asic Time Lag Factor an H/Ho value of 0.37		(iii)					
L= D= L/D= F= T= T= K=	0.92 0.070 13 0.00385 1.77 1800 108000 <b>2.02E-08</b>	s corresponding to an H/ min corresponding to an	From (i) /Ho value of 0. H/Ho value of From (iii)	37 f 0.37					
	Remarks								
		600 800 1000 1200 1							

Cardno VARIA	BLE HEAD P	ERMEABILIT	Y TEST				
SITE HA02-TEST 1			Report	Revision:		1	
PROJECT SHOALHAVEN HOSPITA	L		Piezomet			1.02	mBGL
INITIAL CONDITIONS							
Test Carried out on	Standpipe						
Base of Standpipe	1.02	mBGL		erator			P
Top of Standpipe Top of Screen (Top Response Zone)	0.00	mBGL mBGL	Da				/2021 R
Bottom of Screen (Bottom Response Zone)	0.00	mBGL	Tin	ecked by		D	ית
Diameter of Borehole	70.00	mm		eather			
Diameter of Casing	70.00	mm		sponse Le		1.02	m
Elevation of Surface	-	m RL		sponse Zo	one	SAND	( CLAY
Groundwater Level (Below Top of Pipe)	-	m	IMa	iterials			
TEST CALCULATION				Elapsed ninutes)	Total seconds	Head (metres)	H/Ho
Intake Factor, F F=	1.90	(i)		0 0 1 1 1	0 9.6 30 45 60	1.02 0.97 0.92 0.91 0.90	1.00 0.95 0.90 0.89 0.88
Borehole Case Hvorslev				2 2 3 3 4 4 5	90 120 150 280 240 270	0.88 0.87 0.86 0.85 0.84 0.84 0.83	0.86 0.85 0.84 0.83 0.82 0.82 0.82 0.81
Permeability, K K= <u>A</u> F.T Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37 Hvorslev		(iii)		5 6 7 8 9 10 15 20	300 360 420 480 540 600 900 1200	0.83 0.82 0.81 0.81 0.81 0.81 0.80 0.80	0.81 0.80 0.79 0.79 0.79 0.79 0.78 0.78
T= 3600 min corresponding to an T= 216000 s corresponding to an H/				25 30 40 50 60 90 120 180 240 270 300 360	1500 1800 2400 3000 5400 7200 10800 14400 16200 18000 21600	0.80 0.80 0.79 0.79 0.78 0.78 0.76 0.74 0.74 0.74 0.73	0.78 0.78 0.77 0.77 0.76 0.76 0.76 0.74 0.73 0.73 0.73 0.72
				360 375	21600 22500	0.73 0.73	0.72 0.72
0.1 0.1 0 500 1000 1500 2000 2500 Time (min)	3000 350	<b>1</b> 00 4000					

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## VARIABLE HEAD PERMEABILITY TEST

SITE	SITE HA02-TEST 2		Repo	Report Revision:				
PROJECT	SHOALHAVEN HOSPITA	L		Piezon	neter Depth:		1.02	mBGL
INITIAL CONDIT	IONS							
	Carried out on	Standpipe						
Base of Standpip		1.02	mBGL		Operator			P
Top of Standpipe		0.00	mBGL		Date		28/10	
Top of Screen (1	op Response Zone)	0.00	mBGL		Checked by		D	R
Diameter of Bore	n (Bottom Response Zone)	0.00 70.00	mBGL		Time Weather			
Diameter of Casi		70.00	mm mm		Response Le	onath	1.02	m
Elevation of Surf	ace		m RL		Response Zo			
	vel (Below Top of Pipe)	-	m		Materials	5110	SANDY	Y CLAY
				L	Matorialo			
	TEST CALCULATION				Elapsed (minutes)	Total seconds	Head (metres)	H/F
					(minutes)	Seconds	(menes)	
					0	0	1.02	1.0
					0	9.6	1.01	0.9
Intake Factor, F	-				1	30	1.00	0.9
	F=	1.90	(i)		1	60 120	1.00 0.99	0.9 0.9
	1 =	1.90	(i)		2	120 180	0.99 0.99	0.9
Borehole Case					4	240	0.99	0.8
Hvorslev					5	300	0.98	0.9
-					10	600	0.96	0.9
					20	1200	0.93	0.9
					50	3000	0.90	0.8
Permeability, K					870	52200	0.63	0.6
	_		(iii)					
$K = \frac{A}{F.T}$			(iii)					
	asic Time Lag Factor an H/Ho value of 0.37							
L= 1.02 D= 0.070 _/D= 15	m m							
A= 0.00385	m^2							
F= 1.90		From (i)						
T= 2050	min corresponding to an							
T= 123000	s corresponding to an H/		.37					
K= <b>1.65E-08</b>	m/s	From (iii)						
Remarks			1					
1.0								
~.	••••							
+	ק'							
-								
-								
0.1								
0 500 10	00 1500 2000 2500	3000 350	00 4000					

#### C Cardno VARIABLE HEAD PERMEABILITY TEST SITE HA02-TEST 3 Report Revision: 1 PROJECT SHOALHAVEN HOSPITAL Piezometer Depth: 1.02 mBGL INITIAL CONDITIONS Standpipe Test Carried out on Base of Standpipe mBGL DP 1.02 Operator Top of Standpipe 0.00 mBGL Date 28/10/2021 mBGL Checked by Top of Screen (Top Response Zone) 0.00 DR Bottom of Screen (Bottom Response Zone) mBGL 0.00 Time Diameter of Borehole 70.00 mm Weather Diameter of Casing 70.00 Response Length 1.02 m mm Elevation of Surface m RL Response Zone -SANDY CLAY Groundwater Level (Below Top of Pipe) Materials m Elapsed Total Head **TEST CALCULATION** H/Ho (minutes) (metres) seconds 1.02 1.00 0 0 0 9.6 1.02 1.00 Intake Factor, F 19.8 0 1.02 1.00 30 1.02 1.00 1 F= 1.90 0.99 (i) 1 45 1.01 1 60 1.01 0.99 Borehole Case 120 1.00 2 3 0.98 Hvorslev 180 1.00 0.98 4 240 0.99 0.97 5 300 0.99 0.97 23 1380 0.97 0.95 168 10080 0.84 0.82 Permeability, K 630 37800 0.68 0.67 K=<u>A</u> F.T (iii) Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37 Hvorslev L= 1.02 m 0.070 D= m L/D= 15 A= 0.00385 m^2 F= 1.90 From (i) T= 1900 min corresponding to an H/Ho value of 0.37 114000 s corresponding to an H/Ho value of 0.37 T= 1.78E-08 K= m/s From (iii) Remarks 1.0

4000

- -

2000

Time (min)

2500

3000

3500

1500

Value of H/Ho

0.1 ⊥ 0

500

1000

5	Cardno VARIA	BLE HEAD PI	ERMEABILIT	Y TEST				
	SITE HA03-TEST 1			-	ort Revision:		1	
	PROJECT SHOALHAVEN HOSPITA	L		Piezon	neter Depth:		0.86	mBGL
	INITIAL CONDITIONS							
	Test Carried out on	Standpipe						
	Base of Standpipe	0.86	mBGL		Operator			)P
	Top of Standpipe	0.00	mBGL		Date Checked by			)/2021
	Top of Screen (Top Response Zone) Bottom of Screen (Bottom Response Zone)	0.00	mBGL mBGL		Checked by Time		L	R
	Diameter of Borehole	70.00	mm		Weather			
	Diameter of Casing	70.00	mm		Response Lo	enath	0.86	m
	Elevation of Surface	-	m RL		Response Z		CAND	
	Groundwater Level (Below Top of Pipe)	-	m		Materials		SAND	Y CLAY
	TEST CALCULATION				Elapsed (minutes)	Total seconds	Head (metres)	H/Ho
					0	0	0.86	1.00
					0	9.6	0.84	0.98
.	Intake Factor, F				1	30		0.97
			(1)		1	45		0.96
	F=	1.69	(i)		1	60		0.95
	Borehole Case				2	90 120		0.94 0.94
	Hvorslev				3	120		0.94
					3	180		0.92
					4	210		0.92
					4	240	0.79	0.91
					5	270		0.91
-	Permeability, K				5	300		0.90
			<i>/</i>		6	360		0.88
K=-	<u>A</u> F.T		(iii)		7	420		0.87
	F.1				8 9	480 540		0.87 0.86
	Where T is the Basic Time Lag Factor				10			0.85
	corresponding to an H/Ho value of 0.37				11	660		0.84
	Hvorslev				12	720		0.83
					13			0.83
L=	0.86 m				14			0.81
D=	0.070 m				15	900		0.80
L/D=	12				20	1200		0.77
	0.00285				25	1500		0.74
A= F=	0.00385 m^2	From (i)			30 40	1800		0.72
F= T=	1.69 1625 min corresponding to an		0.37		40 60	2400 3600		0.67 0.62
T=	97500 s corresponding to an H/				90 90	5400		0.62
K=		From (iii)			120	7200		0.59
		~ /			180			0.55
1.0	Remarks				240 1110			0.53 0.41
Value of H/Ho	0 250 500 750 1000 1250 Time (min)	1500 175	0 2000					

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# Cardino VARIABLE HEAD PERMEABILITY TEST SITE HA03-TEST 2 Report Revision: PROJECT SHOALHAVEN HOSPITAL Piezometer Depth: INITIAL CONDITIONS Test Carried out on Standpipe Base of Standpipe 0.86 mBGL Operator

1

0.86

mBGL

Base of Standpipe DP Operator Top of Standpipe 0.00 mBGL Date 28/10/2021 mBGL Checked by Top of Screen (Top Response Zone) 0.00 DR Bottom of Screen (Bottom Response Zone) mBGL 0.00 Time Diameter of Borehole 70.00 mm Weather Diameter of Casing 70.00 Response Length 0.86 m mm Elevation of Surface m RL Response Zone -SANDY CLAY Groundwater Level (Below Top of Pipe) Materials m Elapsed Total Head **TEST CALCULATION** H/Ho (minutes) (metres) seconds 0.86 1.00 0 0 0 9.6 0.85 0.99 Intake Factor, F 19.8 0 0.85 0.98 30 0.98 0.85 1 F= 1.69 0.98 (i) 45 0.84 1 1 60 0.84 0.97 Borehole Case 2 120 0.83 0.96 Hvorslev 14 840 0.77 0.90 157 9420 0.53 0.62 618 37080 0.44 0.51 Permeability, K  $K = \frac{A}{F.T}$ (iii) Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37 Hvorslev L= 0.86 m 0.070 D= m L/D= 12 A= 0.00385 m^2 F= 1.69 From (i) T= 1775 min corresponding to an H/Ho value of 0.37 106500 s corresponding to an H/Ho value of 0.37 T= 2.14E-08 K= m/s From (iii) Remarks 1.0 Value of H/Ho \_\_\_\_ 0.1 0 1000 2000 250 500 750 1250 1500 1750 Time (min)

Cardno VARIA	ABLE HEAD P	ERMEABILIT	Y TEST				
SITE HA04-TEST 1			-	ort Revision:		1	
PROJECT SHOALHAVEN HOSPIT/	4L		Piezon	neter Depth:		0.91	mBGL
INITIAL CONDITIONS							
Test Carried out on Base of Standpipe	Standpipe 0.91	mBGL		Operator			)P
Top of Standpipe	0.00	mBGL		Date			)/2021
Top of Screen (Top Response Zone)	0.00	mBGL		Checked by			)R
Bottom of Screen (Bottom Response Zone)	0.00	mBGL		Time			
Diameter of Borehole	70.00	mm		Weather		0.04	1
Diameter of Casing Elevation of Surface	70.00	mm m RL		Response Le Response Ze	ength	0.91	m
Groundwater Level (Below Top of Pipe)	-	m		Materials	UIIE	SAND	Y CLAY
				Materialo			1
TEST CALCULATION				Elapsed (minutes)	Total seconds	Head (metres)	H/Ho
Intake Factor, F				0 0 1 1	0 9.6 30 45	0.89 0.89 0.89	1.00 0.98 0.98 0.98
F= Borehole Case Hvorslev	1.75	(i)		1 2 3 4	60 120 180 240	0.88 0.87	0.98 0.97 0.95 0.95
				5 15 20 30	300 900 1200 1800	0.80 0.78	0.93 0.88 0.86 0.80
Permeability, K				90 960	5400 57600	0.62	0.68 0.30
K= <u>A</u> F.T		(iii)					
Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37 Hvorslev							
L= 0.91 m D= 0.070 m L/D= 13							
A= 0.00385 m^2 F= 1.75 T= 725 min corresponding to an T= 43500 s corresponding to an H K= <b>5.04E-08</b> m/s	From (i) H/Ho value of /Ho value of 0. From (iii)	0.37 37					
Remarks							
PHH jo entre 1.0 0.1							
0 250 500 750 Time (min)	1000						

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#### C Cardno VARIABLE HEAD PERMEABILITY TEST SITE HA04-TEST 2 Report Revision: 1 PROJECT SHOALHAVEN HOSPITAL Piezometer Depth: 0.91 mBGL INITIAL CONDITIONS Test Carried out on Standpipe Base of Standpipe mBGL DP 0.91 Operator Top of Standpipe 0.00 mBGL Date 28/10/2021 mBGL Checked by Top of Screen (Top Response Zone) 0.00 DR Bottom of Screen (Bottom Response Zone) mBGL 0.00 Time Diameter of Borehole 70.00 mm Weather Diameter of Casing 70.00 Response Length 0.91 m mm Elevation of Surface m RL Response Zone -SANDY CLAY Groundwater Level (Below Top of Pipe) Materials m Elapsed Total Head **TEST CALCULATION** H/Ho (minutes) (metres) seconds 0.91 1.00 0 0 0.16 9.6 0.90 0.99 Intake Factor, F 0.33 19.8 0.90 0.98 0.5 30 0.90 0.98 F= 1.75 (i) 0.75 45 0.90 0.98 60 0.90 0.98 **Borehole Case** 0.98 2 120 0.89 Hvorslev 540 0.82 0.90 8940 0.54 0.59 149 36600 0.33 0.36 610 Permeability, K $K = \frac{A}{F.T}$ (iii) Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37 Hvorslev 0.91 L= m 0.070 D= m L/D= 13 0.00385 A= m^2 F= 1.75 From (i) min corresponding to an H/Ho value of 0.37 T= 625 37500 s corresponding to an H/Ho value of 0.37 T= 5.85E-08 K= m/s From (iii) Remarks 1.0 Value of H/Ho 0.1 0 250 500 750 1000 Time (min)

VARIABLE HEAD PERMEABILITY	Y TEST	
SITE HA05-TEST 1 PROJECT SHOALHAVEN HOSPITAL	Report Revision: Piezometer Depth:	1 0.83 mBGL
INITIAL CONDITIONS         Test Carried out on       Standpipe         Base of Standpipe       0.83       mBGL         Top of Standpipe       0.00       mBGL         Top of Screen (Top Response Zone)       0.00       mBGL         Bottom of Screen (Bottom Response Zone)       0.00       mBGL         Diameter of Borehole       70.00       mm         Diameter of Casing       70.00       mm         Elevation of Surface       -       m RL         Groundwater Level (Below Top of Pipe)       -       m	Operator Date Checked by Time Weather Response Length Response Zone Materials	DP 28/10/2021 DR 0.83 m SANDY CLAY
TEST CALCULATION         Intake Factor, F         F= 1.65 (i)         Borehole Case         Hvorslev	Elapsed (minutes)         Total seconds           0         0           0.16         9.6           0.5         30           0.75         45           1         60           1.5         90           2         120           2.5         150           3         180           3.5         210           4         240	Head (metres)H/Ho0.831.000.820.980.810.980.800.960.800.960.790.950.790.950.780.940.780.930.770.93
Permeability, K K= <u>A</u> F.T (iii) Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37 Hvorslev	5 270 5 300 6 360 7 420 8 480 9 540 10 600 15 900 20 1200	0.77         0.92           0.76         0.92           0.76         0.91           0.75         0.90           0.74         0.89           0.74         0.89           0.74         0.89           0.74         0.89           0.74         0.89           0.71         0.85           0.69         0.83
L=       0.83       m         D=       0.070       m         L/D=       12         A=       0.00385       m^2         F=       1.65       From (i)         T=       1375       min corresponding to an H/Ho value of 0.37         T=       82500       min corresponding to an H/Ho value of 0.37         K= <b>2.83E-08</b> m/s	25 1500 30 1800 60 3600 120 7200 180 10800 1050 63000	0.67         0.81           0.65         0.78           0.61         0.73           0.57         0.69           0.54         0.65           0.36         0.43
Remarks		

C Cardn		SLE HEAD P	ERMEABILIT	I IESI				
SITE HA05-	TEST 1			Ren	ort Revision:		1	
	_HAVEN HOSPITAL				meter Depth:			mBGL
INITIAL CONDITIONS		_		1 16201	neter Depth.		0.05	MDOL
Test Carried	out on	Standpipe						
Base of Standpipe		0.83	mBGL		Operator		D	
Top of Standpipe Top of Screen (Top Resp		0.00	mBGL mBGL		Date Checked by		28/10 D	
Bottom of Screen (Bottom		0.00	mBGL		Time			N
Diameter of Borehole		70.00	mm		Weather			
Diameter of Casing		70.00	mm		Response Le		0.83	m
Elevation of Surface Groundwater Level (Below	(Top of Pipe)	-	m RL m		Response Zo Materials	one	SAND	CLAY
<u></u>					materiale			
TEST	CALCULATION				Elapsed (minutes)	Total seconds	Head (metres)	H/Ho
					0	0	0.83	1.00
					0.16	9.6	0.82	0.99
Intake Factor, F					0.33	19.8	0.82	0.9
F=		1.65	(i)		0.5	30 45	0.82 0.82	0.98 0.98
r=		1.05	(I)		0.75	43 60	0.82	0.9
Borehole Case					2	120	0.80	0.9
Hvorslev					15	900	0.74	0.8
					153	9180	0.52	0.6
					614	36840	0.40	0.4
Permeability, K								
K= <u>A</u> F.T			(iii)					
Where T is the Basic Time corresponding to an H/Ho Hvorslev								
L= 0.83 m D= 0.070 m L/D= 12								
A= 0.00385 m^2								
F= 1.65		-rom (i)						
	orresponding to an H							
T= 72000 s corr K= <b>3.25E-08</b> m/s	esponding to an H/F F	Ho value of 0. ⁼rom (iii)	31					
Remarks								
1.0								
	······							
		<u></u>						
0.1								
0 250 500	750 100	0 1250	1500					
	Time (min)							

## Shoalhaven Hospital Redevelopment

## APPENDIX

## IMPORTANT INFORMATION

Cardno<sup>®</sup>



## Important Information about this Geotechnical Report

## Scope of Work

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The precision and reliability of interpretive assessment between discrete points is dependent on the uniformity of the subsurface strata, as well as the frequency, detail, and method of sampling or testing.

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