Douglas Partners
Geotechnics | Environment | Groundwater

Integrated Practical Solutions

Report on
Detailed Geotechnical Investigation

Proposed New Hospital
Metford Road, Metford

Prepared for
Multiplex Constructions Pty Ltd

Project 81719.09
March 2019

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	81719.09	Document No.	R.001.Rev3
Document title	Report on Detailed Geotechnical Investigation Proposed New Hospital		
Site address	Metford Road, Metford		
Report prepared for	Multiplex Constructions Pty Ltd		
File name	81719.09.R.001.Rev3		

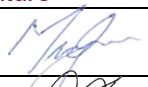
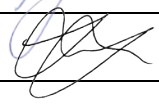
Document status and review

Status	Prepared by	Reviewed by	Date issued
Draft A	Michael Gawn / Daniel West	Scott McFarlane	11 January 2019
Rev 0	Michael Gawn / Daniel West	Scott McFarlane	16 January 2019
Rev 1	Daniel West	Michael Gawn	25 January 2019
Rev 2	Michael Gawn	Scott McFarlane	18 March 2019
Rev 3	Michael Gawn	Scott McFarlane	28 March 2019

Distribution of copies

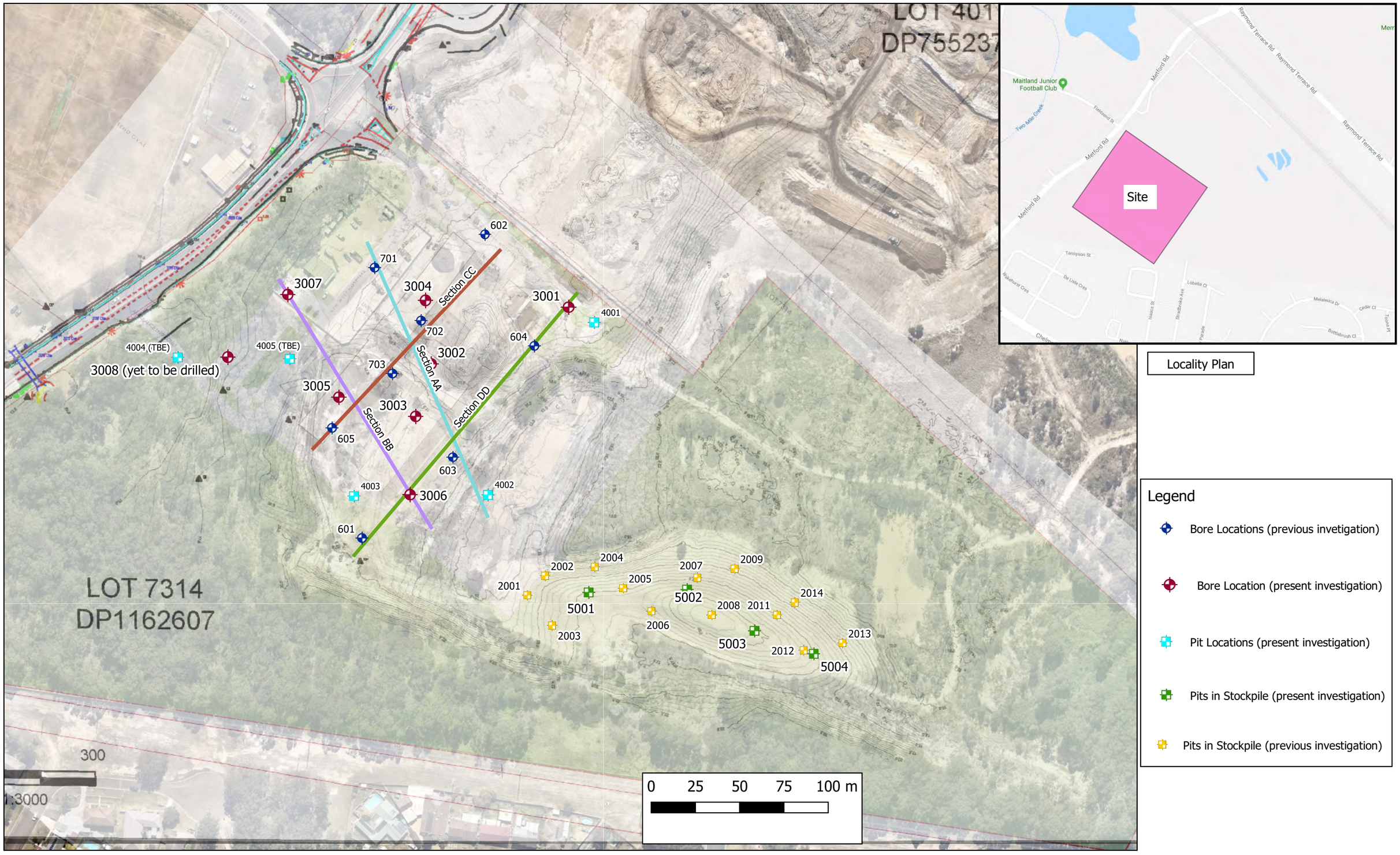
Status	Electronic	Paper	Issued to
Revision 0	1	0	John Jones, Multiplex Constructions Pty Ltd
Revision 1	1	0	John Jones, Multiplex Constructions Pty Ltd
Revision 2	1	0	John Jones, Multiplex Constructions Pty Ltd
Revision 3	1	0	John Jones, Multiplex Constructions Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		28 March 2019
Reviewer		28 March 2019

bsi. ISO 9001 Quality Management
FS 604853

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
15 Callistemon Close
Warabrook NSW 2304
PO Box 324
Hunter Region Mail Centre NSW 2310
Phone (02) 4960 9600
Fax (02) 4960 9601



Locality Plan

Legend

- Bore Locations (previous invetigation)
- Bore Location (present investigation)
- Pit Locations (present investigation)
- Pits in Stockpile (present investigation)
- Pits in Stockpile (previous investigation)

Drawing adapted from NearMap image dated 14 June 2018
TBE = to be excavated

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT:	Multiplex Constructions Pty Ltd		
OFFICE:	Newcastle	DRAWN BY:	MPG
SCALE:	1:2000 @ A3	DATE:	24.12.2018

TITLE: **Test Location Plan**
Proposed Maitland Hospital
Metford Road, Metford

N

PROJECT No:	81719.09
DRAWING No:	1
REVISION:	0

Table of Contents

Page

Report on Detailed Geotechnical Investigation
Proposed New Hospital
Metford Road, Metford

1. Introduction

This report presents the results of a detailed geotechnical investigation undertaken for a proposed new hospital at Metford Road, Metford. The investigation was undertaken with reference to Douglas Partners' proposal NCL180660 dated 13 November 2018. The work was commissioned by Multiplex Australasia in a consultancy agreement between Multiplex Constructions Pty Ltd and Douglas Partners Pty Ltd (DP).

The key features of the development include the following:

- A building envelope within the north-western part of Lot 7314 mostly on previously disturbed areas;
- Building mass of up to seven storeys (including lower ground but excluding plant level);
- Approximate gross floor area of 48,000 m^2;
- Primary access from Metford Road at a new roundabout junction opposite Fieldsend Street;
- Secondary access for ambulances from Metford Road, south of the Primary access. This allows for accessing the hospital from both points;
- An on-grade helipad located to the northeast of the hospital;
- Two car parking facilities;
- Stormwater drainage to the east of the hospital, to manage stormwater flows through the site from offsite lands as well as from the hospital precinct; and
- Partial retention of vegetation at the southern, western and eastern end of the site, with some clearing and understorey removal to meet bushfire mitigation requirements (APZ).

The aim of the investigation was to provide supplementary information on subsurface conditions as well as the following geotechnical items:

- Excavation conditions;
- Identification of areas of filling;
- Estimates of settlements in areas of deep filling subject to proposed building loads;
- Geotechnical parameters for high level and piled footings;
- Subgrade conditions for proposed pavement areas;
- Indicative pavement thickness designs;
- Risk of instability in the existing quarry excavation faces;
- Appropriate stabilisation/mitigation measures against quarry face instability;

- Construction methodology for filling of existing pond, if required;
- Material quality and compaction requirements for engineered filling; and
- Subgrade preparation measures.

This investigation comprised the drilling of seven bores, excavation of seven test pits, laboratory testing of selected samples, engineering analysis and reporting to supplement geotechnical investigations already undertaken.

2. Background Data

Douglas Partners Pty Ltd (DP) has undertaken a number of previous investigations at the site. The most relevant to the present investigation is the "Report on Geotechnical Assessment, New Maitland Hospital, Metford", Report 81719.00.R.001.Rev2, dated 9 May 2018 (Ref 16).

The previous geotechnical assessment carried out in July 2015 by DP (Ref 14) provided information on geotechnical conditions based on previous investigations within and near the site together with preliminary design parameters (end bearing, shaft adhesion parameters) for various foundation types as well as comments on a range of other geotechnical items. The 2018 report (Ref 16) included supplementary investigation comprising boreholes drilled during July 2017.

This present report should be read in conjunction with the previous report (Ref 16).

3. Site Description

The site is located within the former PGH Bricks site at Metford and is identified as Lot 7314 DP 1162607. The site is irregular in shape with an approximate area of 16.4ha. Figure 1 shows the PGH Bricks site (outlined black) and the site subject of this investigation extent (red).

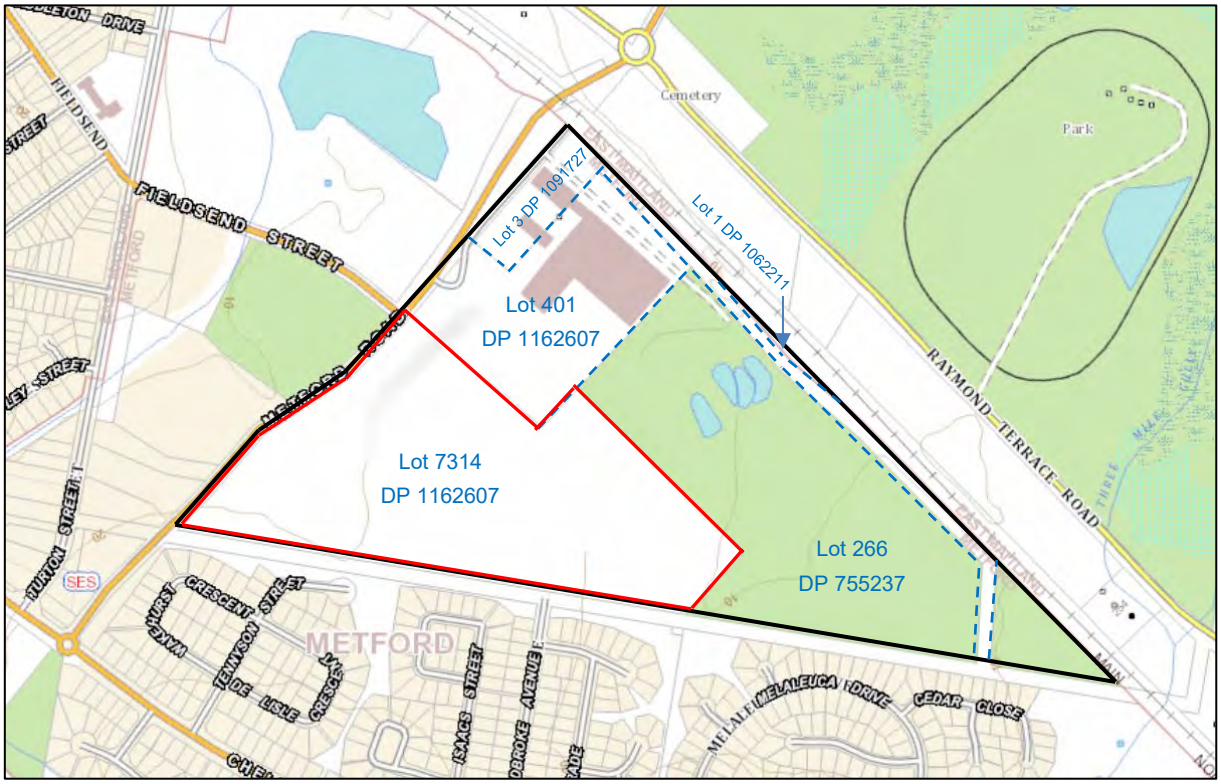


Figure 1: Location and Extent of the Site

The hospital is to be situated within the western half of Lot 7314, which is located within the south-western area of the former PGH Bricks site. The proposed hospital layout is shown on the attached test location plan in Appendix D. The site is bounded to the north and east by the former PGH Bricks site and the Northern Railway beyond. The site is bounded to the south by existing residential developments and Metford Road to the west.

The site ranges in surface level from 8 m AHD to 26 m AHD, generally comprised areas of fill above ground level (stockpiles), rock outcrops, water bodies, unsealed access roads, areas of dense vegetation (south-western area) as well as stripped / bare areas.

A full description of the site is provided in Ref 16 and is not repeated herein. Since the preparation of the previous report some civil works have been undertaken on the site and include the following:

- Bulk earthworks in the proposed hospital footprint and beyond, which has re-graded areas of the site;
- The prominent change in grade is still present between the higher western area and the lower area dominated by the existing pond (refer Figure 2);
- A construction compound which includes several temporary buildings has been created along the western boundary of the site; and
- The carbonaceous material stockpile located to the east-south-east of the proposed hospital footprint has been covered with a capping layer.

Figure 2: View of the site taken in September 2018 (sourced from Nearmap images)

Since the preparation of the report the site has been further altered. It should be noted however, that the geotechnical comments contained herein relate to the site condition at the time of investigation September to December 2018 – i.e. Figure 2).

General site features which are pertinent to the present investigation are discussed below.

- Based on survey information provided by the client, the surface levels within the proposed building footprint and immediate surrounds range from about RL 28 m AHD (within some stockpiles) but is generally around RL 20 m AHD in the higher western area, to about RL 8 AHD near the existing pond;
- The footprint of the hospital has been cleared of existing vegetation with the exception of the southern extent of the development (proposed car park and access pavement) where dense vegetation remains. DP was not able to complete the test locations in this area prior to preparation of this report. Further testing to be undertaken if requested by the structural or civil engineer.
- The majority of the proposed building footprint has been highly disturbed as is characterised by bare soil and rock surfaces with numerous stockpiles (Refer Figure 3 and 4) ;

- The stockpiles are typically about 5 m to 10 m in height above the surrounding ground level. The stockpiled material is variable but predominantly comprised either cohesive soils and ripped bedrock (clay, sandy clay, silty clay and weathered rock); or gravel, chitter (coarse coal reject) and coal;
- The lower area of the site, which includes the existing pond and surrounding area is characterised by weak sandy sediments and surface water, with carbonaceous material, including coal exposed in the area to the east (refer Figure 5);
- The depth of the water and weak sediments within the existing pond is not known but based on probing around the edges it was anticipated to be greater than 1 m to 2 m;
- The remainder of this lower area (beyond the pond) is covered by accumulated sediments and low vegetation; and
- A large capped stockpile of carbonaceous material is present to the east and south-east of the hospital footprint. A proposed car parking area is to be constructed over the existing pond and may encroach on the north-western edge of the stockpile (refer Drawing 1 and Figure 6).

Figure 3: Looking south from near Bore 3004 towards large stockpile in the central area of the site.

Figure 4: Looking north east from near pit 4003 towards construction compound (distant left and large stockpile in the central area of the site (distant right)

Figure 5: View of the site near Pit 4002, looking east.

Figure 6: Looking south-east towards low lying area from large stockpile in central area of the site.

Sandstone bedrock was observed outcropping in the northern area of the site near Pit 4001 and Bore 3001 as well as the rock cutting at in southern area of the site (refer Figure 7). The sandstone was generally very low strength or stronger.

Figure 7: Looking south-east towards sandstone cutting in southern area of the site

Figure 8 below shows the view across the low lying area of the site in 2015.

Figure 8: Looking south from top of a stockpile, carbonaceous stockpiles (left), water body (left), existing quarry cutting (back), stockpile (right) (2015)

- Coal was observed to be outcropping in excavations around the existing stockpile.

Figure 9: In-situ coal exposed beneath edge of carbonaceous material stockpile in eastern area of the site (2015)

Surface water was present in various water bodies / ponds across this area of the site and was most likely perched. There may be some connection between the ponds and groundwater however the rock permeability would be relatively low and flow rates would also be low. Preferential flow potentially occurs along strata interfaces within the rock, particularly coal and shale layers which tend to have higher permeability than neighbouring sandstone, siltstone and claystone layers.

4. Regional Geology

The Newcastle Coalfields 1:100,000 Geology map indicates that the site is underlain by the Tomago Coal Measures of Permian age (geology code Pt). This formation is described as comprising laminated sandstone, claystone, siltstone, coal and tuff. Figure 10 below shows the site overlain with the geological map and site topography (contours at 2 m intervals). Based on information provided by the project surveyor, these 2 m contours are not considered accurate for this site and should be treated as indicative only.

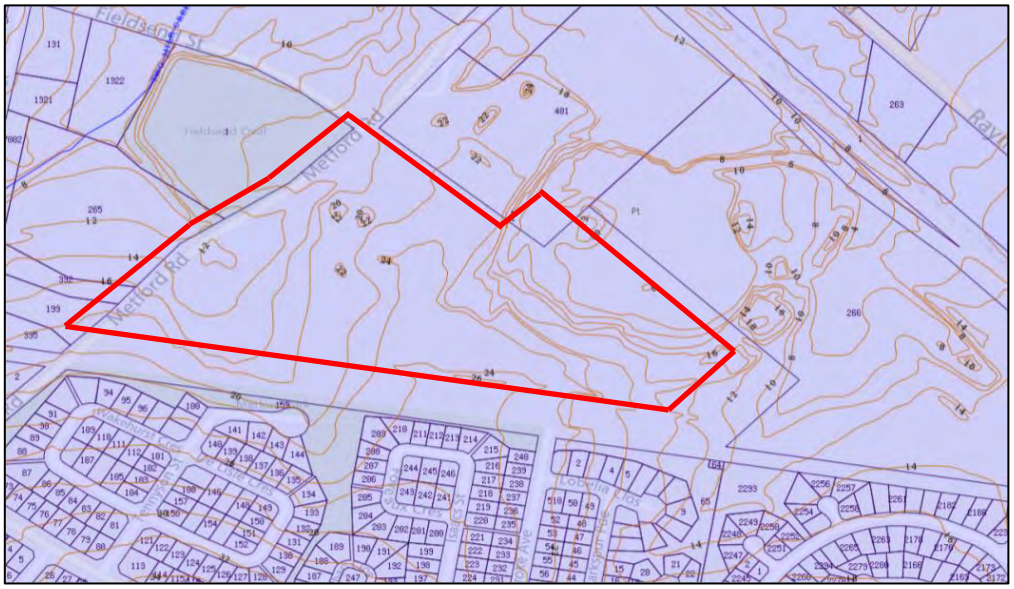


Figure 10: Geological Setting of the Site

The site topography also indicates where the natural drainage path exits the site along the western boundary, along Metford Road.

The Newcastle 1:100,000 Soil Landscapes Sheet indicated that the site includes two soil landscape types, as shown blow in Figure 11.

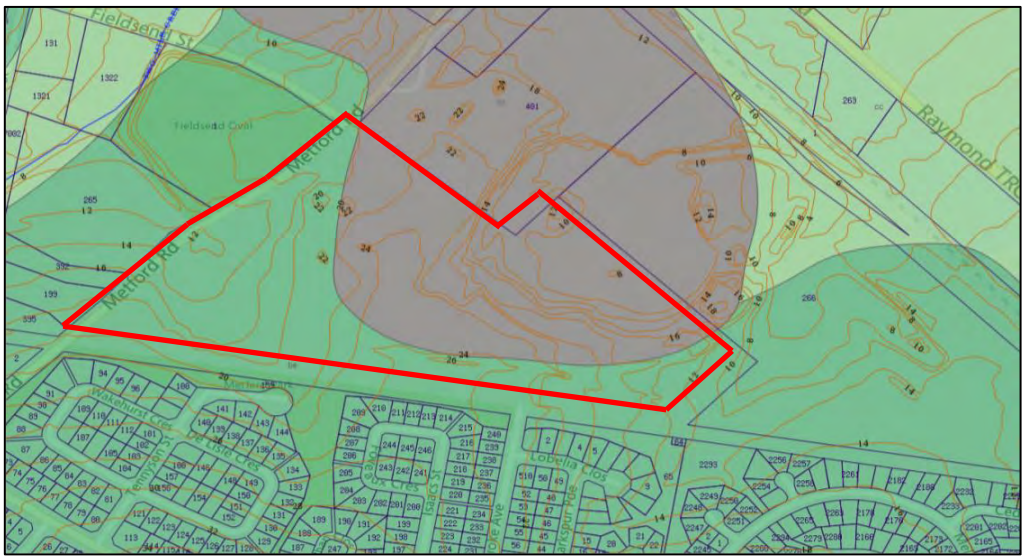


Figure 11: Soil Landscape Setting of the Site

The features of these soil landscapes are summarised in Table 1.

Table 1: Soil Landscape Features

Feature	Description		
Colour (in Figure 11)	Dark green	Light green	Grey
Soil Landscape Code	Be	cc	xx
Soil Process Group	RESIDUAL	ALLUVIAL	DISTURBED TERRAIN
Soil Landscape Name	Beresfield	Cockle Creek	Disturbed Terrain
Landscape Description	Undulating low hills and rises on Permian sediments in the East Maitland Hills region. Slope gradients 3-15%, local relief to 50m, elevation is 20-50m. Partially cleared tall open-forest.	Narrow floodplains, alluvial fan deposits and broad delta deposits. Slope gradients are 0-2%, elevation is <1-50m, local relief is <1m; Cleared open forest.	Level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Local relief variable. Land fill includes soil, rock, building and waste materials. Original vegetation completely cleared.
Soils Description (summary only)	Crests: moderately deep (<120cm), Yellow Podzolic Soils, Brown Podzolic Soils and brown Soloths. Upper Slopes: moderately deep (<120cm) Red Podzolic Soils and red Soloths. Sideslopes: brown Soloths and yellow Soloths. Lower Slopes: deep (>200cm), imperfectly to poorly drained Yellow Podzolic Soils, yellow Soloths and Gleyed Podzolic Soils.	Floodplains: deep (>200cm), imperfectly to poorly drained yellow Soloths (Dy3.41) and Yellow Podzolic soils. Delta / Fan Deposits: deep (>200cm), moderately well to poorly drained Yellow Earths and Grey Earths; with deep (>200cm) imperfectly drained, to well-drained Yellow Podzolic Soils.	Highly variable.
Limitations	High foundation hazard, water erosion hazard, seasonal waterlogging and high run-on localised lower slopes, highly acid soils of low fertility.	Flood hazard, water erosion hazard, permanently high watertables (localised), periodic to permanent waterlogging (localised), high run-on, acid, and infertile sodic / dispersible soils of low wet strength.	Dependent on nature of site. Limitations may include mass movement hazard, steep slopes, foundation hazard, unconsolidated low wet bearing strength materials, potential acid sulfate soils, impermeable soils, poor drainage or erosion hazard.

The NSW Acid Sulfate Soils Risk map indicates no risk of actual or potential acid sulfate soils.

5. Field Work Methods

5.1 Investigation Episodes

The initial field work was carried out in the period of 12 October 2015 to 5 November 2015. A supplementary investigation was then carried out from 11 August 2017 to 12 August 2017.

The present investigation was undertaken over the period extending from 29 November 2018 to 13 December 2018.

The initial investigation comprised the following:

- Drilling of six boreholes (Boreholes 601 to 606) to depths of between 8.0 m and 21.9 m;
- Excavation of 20 test pits (Pits 301 to 318 and 320 to 321) to depths of between 0.6 m and 2.8 m;
- Drilling of one borehole (Borehole 319) to 0.65 m using hand tools;
- Installation of groundwater wells in Bores 605 and 606; and
- Walk-over inspection by a Principal Geotechnical engineer to assess site conditions and possible instability in the existing quarry cutting.

A supplementary investigation comprised the following:

- Drilling of three boreholes (Boreholes 701 to 703) to depths of ranging from 8.55 m to 12.0 m; and
- Installation of a groundwater well in Bore 703.

The present investigation comprised the following:

- Drilling of seven boreholes (Boreholes 3001 to 3007) to depths of between 18.65 m and 23.3 m;
- Excavation of three test pits (Pits 4001 to 4003) to depths of between 1.6 m to 2.0 m. These pits were excavated at client nominated locations and were generally within proposed pavement areas (Pits 4001 and 4003), and on the edge of the existing pond (Pit 4002); and
- Excavation of four additional pits (Pits 5001 to 5004) in the carbonaceous stockpile to depths of between 1.6 m to 2.0 m. The purpose of the pits was to collect samples of the carbonaceous material for laboratory testing purposes.

It is noted that for the initial investigation, limited access was available to the majority of the site owing to the presence of trees, overly wet ground and stockpiled materials, subsurface investigation was limited to accessible locations.

The supplementary investigation (August 2017) and present investigation (Nov-Dec 2018) bores were drilled at client nominated locations.

A summary of the field investigation is presented in Table 2 below.

Table 2: Summary of Field Investigations – Bores

Bore	Surface Level (m AHD)[1]	Approximate Finished Floor Level of Development (m AHD)	Drilled Depth of Bore (m)	Elevation of Bore Termination (m AHD)
Present Investigation (Nov – Dec 2018)				
3001	21.4	15.3 (lower ground floor)	18.65	2.75
3002	18.6	15.3 (lower ground floor)	19.80	-1.2
3003	16.8	15.3 (lower ground floor)	20.15	-3.35
3004	21.5	20.3 (ground floor) 15.3 (lower ground floor)	23.30	-1.8
3005	16.8	20.3 (ground floor) 15.3 (lower ground floor)	20.21	-3.41
3006	16.1	15.3 (lower ground floor)	20.18	-4.08
3007	19.2	15.3 (lower ground floor)	20.35	-1.15
2015 Investigation				
601	17.0	15.3 (lower ground floor)	8.17	8.83
602	21[2]	20.3 (ground floor) 15.3 (lower ground floor)	21.85	-0.85
603	18.4	15.3 (lower ground floor)	8.2	10.2
604	19.3	15.3 (lower ground floor)	8.6	10.7
605	24.3		7.98	16.32
2017 Investigation				
701	20.5[3]	20.3 (ground floor)	8.55	11.95[3]
702	21[3]	20.3 (ground floor)	11.55	9.44[3]
703	17[3]	20.3 (ground floor)	12.00	5[3]

Notes to Table 2:

[1] See Section 5.3 for comment in relation to surface levels

[2] Surface level interpolated from survey plan provided by client and should be considered approximately only

[3] Surface level inferred from approximate coal level and should be considered very approximate only

NA = Not applicable

Point load index testing was undertaken on the recovered core samples prior to it being photographed by the geotechnical engineer. Photos of the recovered core are provided in the photo plates in Appendix B.

5.2 Investigation Methods

The test pits were excavated with a either a 4.5 tonne or 6.5 tonne excavator fitted with a 450 mm or 600 mm wide bucket with teeth.

The bores (except Bores 604 and 606) were drilled with a using a truck-mounted rotary drilling rig equipped with solid flight augers and wash boring equipment for drilling in soil and weathered rock, as well as NMLC diamond coring equipment for coring bedrock (refer Figure 12). Standard penetration tests (SPTs) were performed at selected bore locations and depths. A bobcat-mounted drilling rig was used for Boreholes 604 to 606.

Figure 12: Drilling Rig set up at Borehole 601 (looking west)

Groundwater monitoring wells constructed of 50 mm PVC casing and machine slotted 50 mm PVC screen were installed in Boreholes 605, 606 and 703 to depths of 8 m to 12.0 m. The wells were completed with a gravel pack extending several metres above the well screen and a bentonite plug of at least 0.5 m thickness in each well. Details of the monitoring well construction are provided on the detailed borehole logs in Appendix B.

The test locations were set out by a geotechnical engineer from DP. The engineer also logged the subsurface conditions encountered at each test location and collected samples for subsequent laboratory testing and identification purposes. The engineer boxed and photographed the rock core and carried out point load strength index tests on the core. Pocket penetrometer tests and dynamic penetrometer tests were performed at selected depths and locations.

5.3 Borehole Survey

The surface levels of the bores have been estimated and determined as follows:

Bores 601 to 606 – 2015 Investigation
The surface level of the bores was provided by the project surveyor. The surface level for Bores 602 and 606 were not provided and were interpolated from survey drawings and should therefore be considered as approximate.

Bores 701 to 703 – 2017 Investigation
Determination of the surface level of the bores was not possible at the time of the investigation. Reduction of surface levels from the 2 m digital contour mapping was not possible as the limited survey provided by the project surveyor reveals that the 2 m digital mapping is not accurate for this site. The MGA coordinates at each pit location were recorded using a hand held GPS unit which is normally accurate to within about ±5 to 10 m depending on satellite coverage.

DP has estimated a surface level for these bores based on interpolation of the level of the coal seam within all of the bores. The estimated surface level should be taken as indicative only and care should be undertaken attributing levels to the subsurface conditions encountered in these bores.

Bores 3001 to 3007 – Present Investigation
The surface level of the present investigation bores was recorded using a differential GPS unit, which is typically accurate to about 0.1 m in elevation. It should be noted, however, that DP is not a registered surveyor and hence it is recommended that all test locations are accurately surveyed prior to further design.

The approximate locations of the boreholes and test pits are indicated on the Test Location Plan, Drawing 1, in Appendix D.

6. Field Work Results

The previous geotechnical assessment (Ref 14) indicated the principal geotechnical conditions at the site would comprise sequences of four main elements: fill above general ground level (stockpiles), filled depressions / voids, residual clays and bedrock.

The subsurface conditions encountered in the bores and test pits undertaken for the present investigation are presented in detail in the borehole logs and test pit logs in Appendix B. These should be read in conjunction with the accompanying general notes in Appendix A which explain the descriptive terms and classification methods used in the logs. The results of the dynamic penetrometer tests are also included in Appendix B. The subsurface conditions encountered in the bores and pits are summarised in Tables 2 to 4 below. For the descriptions of the bedrock, the following general classifications were utilised:

- Class V Extremely low strength sandstone or siltstone and coal;
- Class IV Very low to low strength sandstone or siltstone; and
- Class III Medium strength or stronger sandstone or siltstone.

A summary of the field investigations, along with the approximate finished floor level of the development in the area of the bores is shown in Table 3.

Table 3: Summary of Subsurface Conditions – Depth Range of Each Unit

Bore	Depth range of Stratum (m)				
Unit	Filling	Residual Clay	Bedrock Class V	Bedrock Class IV	Bedrock Class III
3001	NE	NE	0.0 – 1.15 8.21 – 13.77	1.15 – 8.21 13.77–18.65	NE
3002	0.0 – 2.0	NE	2.0 – 2.5 11.8 – 16.78	2.5 – 11.8 16.78 – 19.8	NE
3003	0.0 – 0.3	0.3 – 1.1	1.1 – 2.61 9.0 – 20.15	2.61 – 9.0	NE
3004	0.0 – 4.2	4.2 – 4.65	4.65 – 8.6 17.18 – 23.3	8.6 – 17.18	NE
3005	0.0 – 0.3	0.3 – 0.9	14.42 – 19.05	0.9 – 14.401 9.05 – 20.21	NE
3006	0.0 – 0.5	0.5 – 1.2	7.98 – 20.18	1.2 – 7.98	NE
3007	0.0 – 2.1	NE	2.1 – 2.5 5.57 – 8.83	2.5 – 5.57 8.83 – 10.81 12.46 – 20.35	10.81 – 12.46
601	0.0 – 0.1	0.1 – 1.1	5.05 – 6.0	1.1 – 5.05 6.0 – 8.17	NE
602	0.0 – 0.8	NE	0.8 – 7.64 15.54 – 20.28	7.64 –15.54 20.28 – 21.85	NE
603	0.0 – 2.2	NE	NE	2.2 – 3.8 8.07 – 8.2	3.8 – 8.07
604	0.0 – 0.2	NE	0.2 – 2.08	2.08 – 8.6	NE
605	0.0 – 0.4	NE	0.4 – 4.47	4.47 – 7.98	NE
606	0.0 – 2.2	NE	NE	2.2 – 8.2	NE
701	0.0 – 0.15	0.15 – 0.6	0.6 – 4.1	4.1 – 8.55	NE
702	0.0 – 3.8	NE	3.8 – 4.4 6.75 – 7.08	4.4 – 6.75 7.08 – 8.68 10.73 – 11.55	8.68 – 10.73
703	0.0 – 0.3	0.3 – 0.7	0.7 – 1.35 11.71 – 12.00	2.0 – 5.08 10.78 – 11.71	1.35 – 2.0 5.08 – 10.78

No free groundwater was observed in the bores during auger drilling, however the introduction of drilling fluids during core drilling precluded further groundwater observations. Groundwater standpipes were installed in Boreholes 605, 606 and 703. Monitoring of standpipes 605 and 606 was undertaken on 5 November 2015, at which time Bore 606 was dry and Bore 605 had a groundwater at a depth of 7.2 m (RL 17.1 m AHD). Based on information received from GHD, groundwater was recorded in the installed wells at levels ranging from about 6.5 m AHD to 8 m AHD (wells located within the north-western and eastern areas of the site) and RL 16 to 17 m AHD in a well installed in the western corner of the site. No information on Well 703 groundwater level has been provided.

It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time.

Mapping of the rock batter located to the south-east of the proposed hospital footprint was undertaken by a Principal Geotechnical Engineer on 5 November 2015 as part of the previous investigation. The inspection revealed the following:

- The batter was generally formed at a slope ranging from about 20° to 25°;
- Interbedded siltstone and sandstone was exposed within the batter;
- Within the upper portion of the batter, bedding was observed with a dip of 5° to 15° and a dip direction of about 310° to 340° M;
- The dominant jointing in this lower portion of the batter was sub-vertical to 80° with a dip direction of 080° to 090° M and a spacing ranging from about 0.05 m to 0.2 m;
- Within the lower half of the batter, bedding was observed with a dip of 0 to 5° and a dip direction ranging from about 000° to 050° M;
- The dominant joints were dipping at about 65° with a dip direction of around 060° M and a spacing ranging from 200 mm to 1000 mm; and
- Coal was exposed within the lower approximately 1 m towards the eastern visible extent of the batter (refer Figure 13 and Figure 14).

Figure 13: Coal exposed in lower area of batter

Figure 14: Coal in exposed batter

7. Laboratory Testing

Laboratory testing was undertaken on samples of soil and rock retrieved during the investigation, and included the following:

- Unconfined compressive strength (UCS) testing on samples of the recovered core; and
- Standard compaction testing on samples of the carbonaceous material blended with excess materials from the test pits (4000 series).

California Bearing Ratio (CBR) laboratory testing on three samples was in the process of being undertaken at the time of this draft report and the results were not available.

Detailed results are provided in Appendix C and are summarised in **Table 4** and Table 5.

Table 4: Results of CBR and Standard Compaction Testing

Pit	Depth (m)	Description	FMC (%)	SOMC (%)	SMDD (t/m3)	CBR (%)	Swell During Soaking Phase (%)
4001	0.6 – 0.8	Extremely weathered SANDSTONE	8.3	14.0	1.79	25	0
4002	0.3 – 0.45	Clayey SAND	27.8	16.0	1.75	16	0
4003	0.4 – 0.6	Extremely weathered SILTSTONE	12.3	16.5	1.73	4.5	7.5
SPM / Pit 4001 (0.6 – 0.8)		40% carbonaceous material and 60% Non-Carbonaceous Sandstone	-	14.5	1.63	-	-
SPM / Pit 4003 (0.4 – 0.6)		40% carbonaceous material and 60% Non-Carbonaceous Siltstone	-	18.0	1.58	-	-
SPM / Pit 4001 (0.6 – 0.8)		50% carbonaceous material and 50% Non-Carbonaceous Sandstone	-	16.0	1.56	-	-
SPM / Pit 4003 (0.4 – 0.6)		50% carbonaceous material and 50% Non-Carbonaceous Siltstone	-	19.0	1.53	-	-
SPM / Pit 4001 (0.6 – 0.8)		60% carbonaceous material and 40% Non-Carbonaceous Sandstone	-	16.5	1.55	-	-

Notes to Table 4:
FMC – Field Moisture content
SOMC – Optimum Moisture Content (Standard)
SPM – Stockpile Material
SMDD – Maximum Dry Density (Standard)
CBR – Californian Bearing Ratio

Table 5: Results of Unconfined Compressive Testing

Bore	Depth (m)	Description	UCS (Mpa)
3001	7.69 – 8.0	Sandstone	7.7
3001	14.79 – 15.0	Sandstone / Siltstone	5.5
3002	4.72 – 5.0	Sandstone	3.8
3003	2.0 – 2.25	Laminite	0.8
3004	7.53 – 7.8	Sandstone	1.6
3005	5.72 – 6.0	Laminite	1.1
3006	2.1 – 2.4	Sandstone	7.3
3007	11.45 – 11.71	Sandstone	75.5

8. Proposed Development

Health Infrastructure has committed to undertaking a Stage Infrastructure Application in accordance with Section 115ZD (1) of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the following works:

- Stage 1: Site clearance and preparatory works (approved under SSI9022); and
- Stage 2: Design and construction of the hospital main works (this application SSI9775).

Stage 2 works include the design and construction work generally comprising:

- A new seven storey Acute Services Building, including:
  - Emergency services;
  - Medical, surgical, paediatric and maternity services;
  - Critical care services for adults and babies, including a special care nursery;
  - Operating theatres, delivery suites and assessment rooms;
  - Palliative care and rehabilitation services;
  - Mental health services;
  - Satellite renal dialysis;
  - New chemotherapy services;
  - Oral health service;
  - A range of ambulatory care and outpatient clinics;
  - Internal road network and car parking for staff, patients and visitors;
  - Signage;
  - Site landscaping and open space improvements;
  - Tree removal;
  - Utility and services connection and amplifications works.

- The development is within the north-western part of Lot 7314 mostly on previously disturbed areas (refer Figure 15);

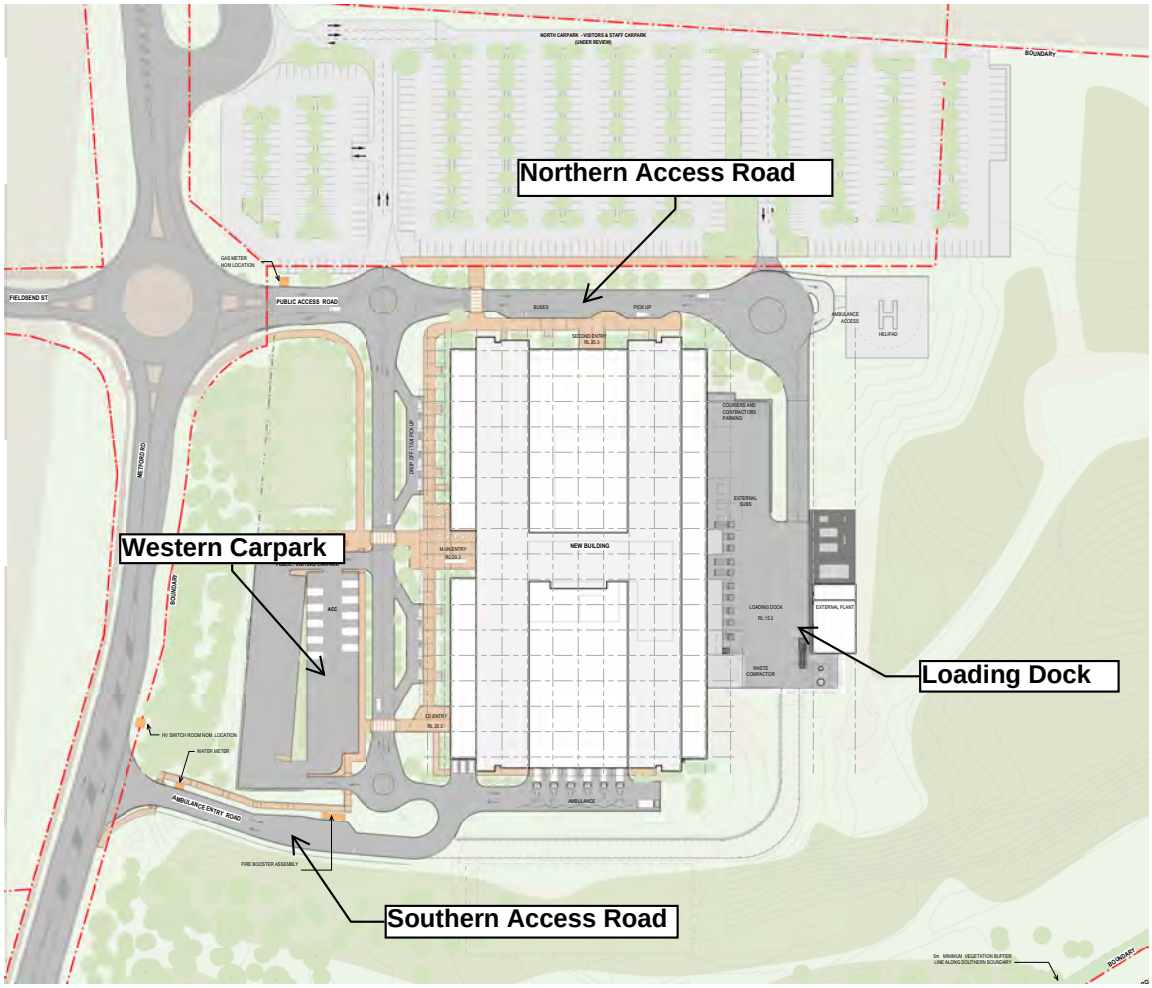


Figure 15: Extract from Master Plan showing layout of proposed hospital development

Based on the plans provided by the client, the bulk earthworks level for the development will be as follows:

- Raising of the site in the western area of the hospital building to raise site levels to about RL 20 m AHD. This will require placement of up to about 2 m to 3 m in some areas of the car parks and roadways, and also under the western tower of the proposed structure;
- Excavation to accommodate a finished floor level of 14.8 m AHD within the lower ground floor, which covers the area under approximately half of the western tower and the remaining building footprint to the east. This will require excavation ranging from less than 1 m to greater than 8 m;
- Filling of the existing pond to the east of the proposed building to create a new loading dock. The ground surface will be raised to approximately RL 14.8 m AHD, which will require up to 3 m of filling; and
- Figure 16, below, shows a typical elevation of the proposed hospital building.

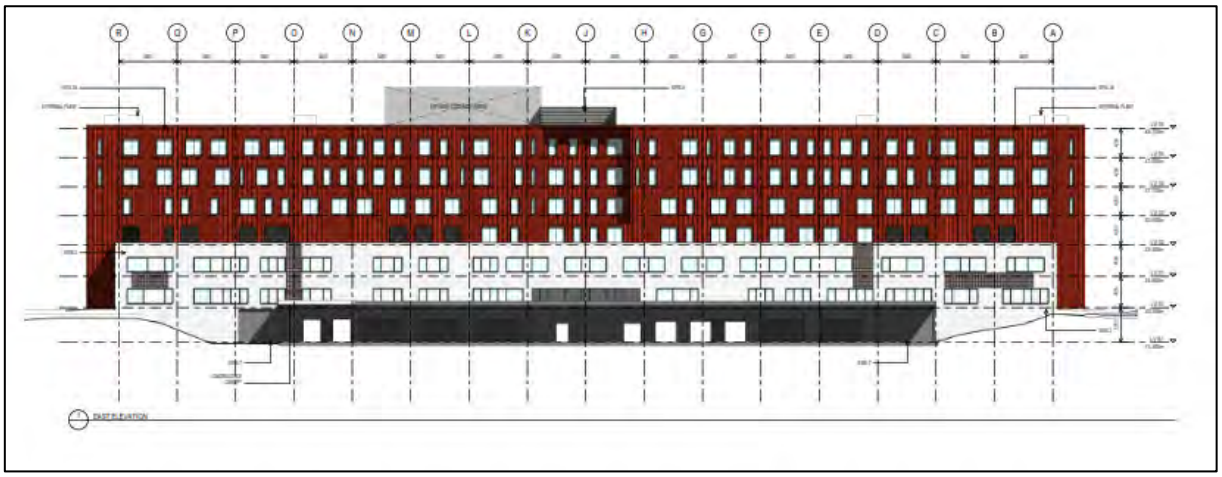


Figure 16: Elevation of the proposed development

Limited information in relation to the proposed foundation loads and proposed foundation system have been provided to DP for preparation of this report, as follows:

- Working loads are anticipated to be in the order of 4000 kN;
- The western, higher section of the building will be supported on piled footings, drilled through the existing filling to derive support from within the underlying bedrock;
- Bored piles are proposed at this stage, and are anticipated to be approximately 1.2 m in diameter; and
- The lower, eastern section of the building is to be supported on pad footings.

9. Comments

9.1 Conceptual Geotechnical Model

Based on the conditions encountered in the bores, the conceptual geotechnical model for the site has been developed and is described in Section 6, Table 3.

A review of the bores drilled during the present investigation using the three key classification parameters (UCS, defect spacing and allowable seams) is provided below in Table 6 for the proposed elevation range of the proposed pad footings.

Table 6: Interpreted Rock Classifications at Foundation Level

Bore	Approximate Foundation Level	UCS (Mpa) (based on multiplier of 17)	Defect Spacing(mm)	Seam(%)	Assessed Class of Rock
3001	20 (ground floor)	0.6 to 1	50 to 500	0	Class IV
	13.5 (lower ground floor)	2 to 10	500 to 1000	0	Class V (owing to presence of coal at RL 12.8)
3002	13.5 (lower ground floor)	0.8 to 6	500 to 1000	0	Class IV
3003	13.5 (lower ground floor)	3 to 6	30 to 1000	0	Class IV
3004	13.5 (lower ground floor)	1.2 to 3.5	500 to >1000	0	Class V/IV
3005	13.5 (lower ground floor)	3 to 6	100 to >1000	0	Class IV
3006	13.5 (lower ground floor)	2.2 to 3.4	100 to >1000	0	Class IV
3007	20 (ground floor)	Filling			
601	13.5 (lower ground floor)	7 to 12	500 to >1000	0	Class IV
602	13.5 (lower ground floor)	0.6 to 1.5	200 to 1000	0	Class IV
603	13.5 (lower ground floor)	4 to 6	300 to 500	0	Class III
604	13.5 (lower ground floor)	3 to 7	200 to 500	0	Class IV
605	20 (ground floor)	2 to 5	700 to >1000	0	Class V/IV
701(1)	20 (ground floor)	Filling			
702(1)	13.5 (lower ground floor)	3 to 7	600 to >1000	0	Class IV
703(1)	13.5 (lower ground floor)	2 to 5	>1000	0	Class IV

Notes to Table 6:

1. The surface level of these bores is very approximate only and hence the conditions at anticipated foundation level are also approximate
2. Piles founded within the coal or within 2 m above the coal should be designed for Class V parameters for the affected section of pile, as discussed below.

Table 7 below shows the anticipated conditions at proposed bulk excavation level based on the conditions encountered in the bores.

Table 7: Summary of Conditions Anticipated at Bulk Excavation Level

Bore	Approximate Surface Level (m AHD)[2]	Approximate Bulk Excavation Level (m AHD)[1]	Anticipated Conditions at Bulk Excavation Level
Present Investigation			
3001	21.4	14.8 (lower ground floor)	Low strength SANDSTONE
3002	18.6	14.8 (lower ground floor)	Very low strength LAMINITE
3003	16.8	14.8 (lower ground floor)	Low strength LAMINITE
3004	21.53	20 (ground floor)	Existing sandy clay FILLING
3004	21.53	14.8 (lower ground floor)	Very low to low strength SANDSTONE
3005	16.8	20 (ground floor)	Filling (above existing surface level)
3005	16.8	14.8 (lower ground floor)	Low strength SANDSTONE
3006	16.1	14.8 (lower ground floor)	Very low strength SILTSTONE
3007	19.2	20 (ground floor)	Filling (above existing surface level)
3008		Yet to be drilled	
2015 Investigation			
601	17	14.8 (lower ground floor)(outside of footprint)	Low to medium strength SANDSTONE
602	21	14.8 (lower ground floor)(outside of footprint)	Low strength SILTSTONE
603	18.4	14.8 (lower ground floor)	Low strength SANDSTONE
604	19.3	14.8 (lower ground floor)	Low to medium strength SANDSTONE
605	24.3	14.8 (lower ground floor)	Below drilled depth
2017 Investigation			
701	20.5	20 (ground floor)	Very stiff SANDY CLAY
702	21	14.8 (lower ground floor)	FILLING
703	17	14.8 (lower ground floor)	Low strength SANDSTONE

Notes to Table 7:

(1) Bulk excavation level has been based on finished floor level minus about 0.3 m and 0.5 m for the ground floor and lower ground floor levels respectively.

(2) See section 5.3 for comments in relation to surface levels of bores.

A graphical representation of the inferred UCS based on a correlation of 17 times the I_{50} point load index values for the sandstone and siltstone units of the test bedrock is presented in Figure 17 and Figure 18. The UCS ranges for the various classifications of the bedrock are based on the strength parameter alone and assessment of other factors such as discussed in Table 6 above should be considered in designation of rock classification.

For the model above and the graphical representation below, it can be seen that the assessed rock ranges from Class V to lower end Class II. Reference to the Pells et all paper indicates that appropriate ultimate end bearing pressures for these rock classes are as follows:

	Sandstone	Siltstone
• Class V	3 MPa	3 MPa
• Class IV	4 to 15 MPa	3 MPa
• Class III	20 to 40 MPa	6 to 30 MPa

As can be seen in Figure 17 and Figure 18, at the anticipated lower ground floor foundation level (about RL 13.5 m AHD) the anticipated bedrock is either predominantly Class IV sandstone or Class IV/III siltstone. Some areas of the site, however, are likely to expose weaker (Class V) bedrock.

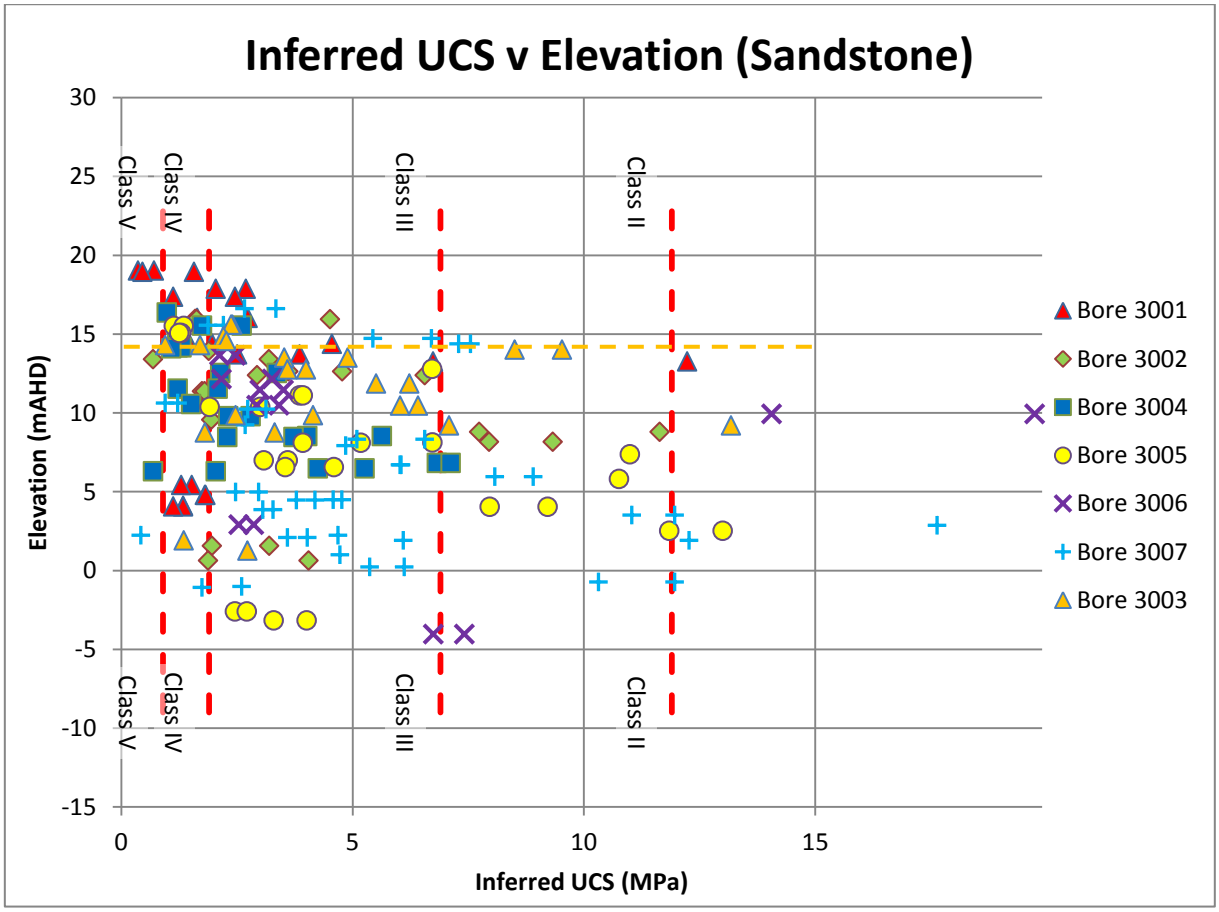


Figure 17: Inferred UCS against elevation for sandstone units

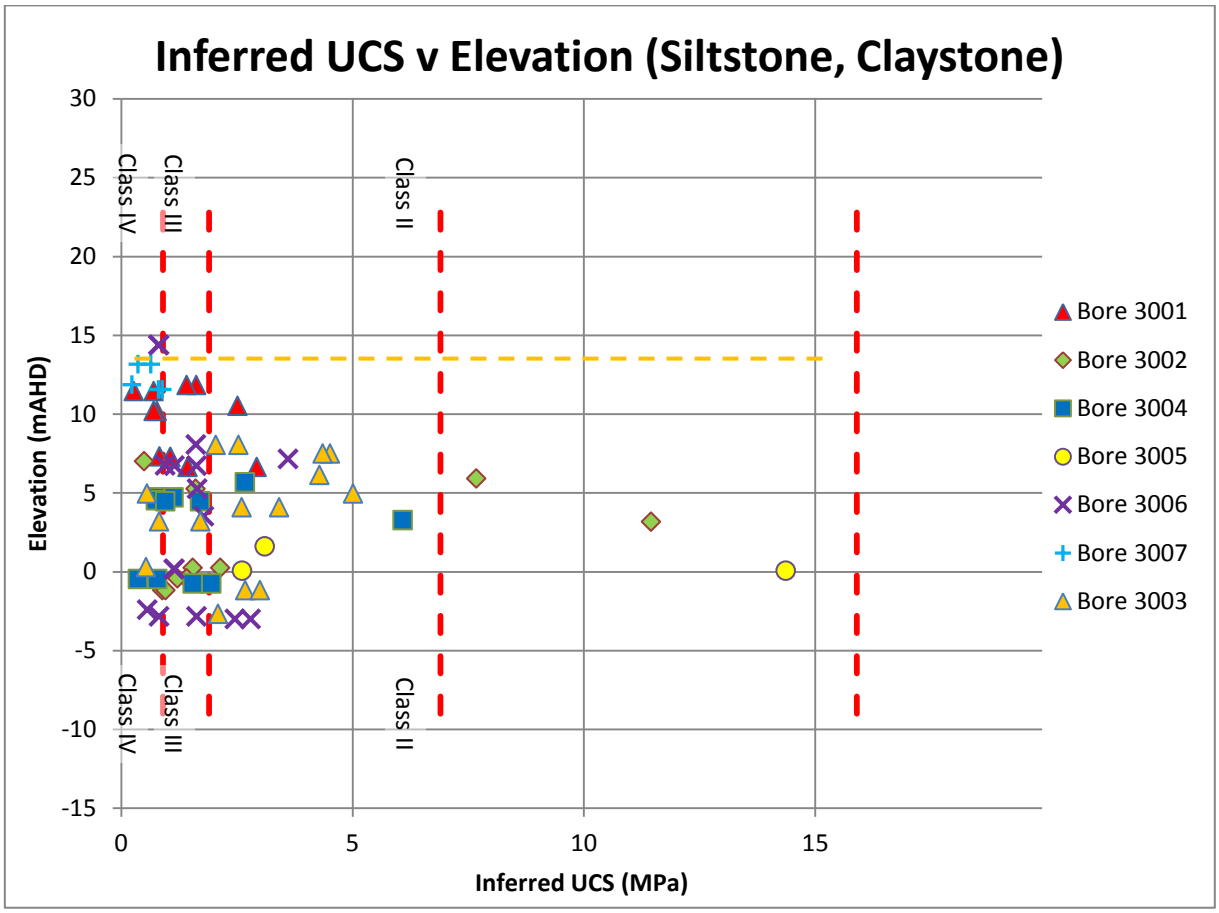


Figure 18: Inferred UCS against elevation for Siltstone units

9.2 Earthworks and Site Preparation (Stage 1 Works)

The earthworks associated with development of the site are expected to include bulk excavation of up to about 8 m depth and placement of filling to up to about 3 m.

The building will have several floor levels, as follows:

- Lower ground floor and loading dock RL 15.3 m AHD; and
- Ground floor RL 20.3 m AHD.

Based on a review of the drawings provided by the client along with the conditions encountered in the bores, the anticipated conditions at bulk excavation level (taken to be finished floor level minus about 0.3 m to 0.5 m) is shown in Table 7 in Section 9.1.

The earthworks associated with development of the site are expected to include excavation and re-compaction of existing fill materials, where present, and the placement and compaction of relocated or imported fill materials.

Based on conditions encountered within the bores, the strength of the bedrock within the upper 6 m to 8 m is generally very low to low strength and would be commensurate to Class V and Class IV sandstone, as defined in Ref 12. Some layers of medium strength rock were however encountered in the bores in the upper metres of rock.

Depending on the final layout of the development, placement of up to approximately 3 m of filling may be required within the former quarry floor.

Excavation through fill materials, in-situ clays and the zones of weaker rock (extremely low to low strength) is expected to be relatively straightforward using conventional excavation equipment such as excavators fitted with rock teeth, possibly a pneumatic or hydraulic hammer for harder zones and detailed excavation. It is noted the rock strength encountered in the boreholes ranged from very low to medium strength, generally the sandstone layers exhibit higher strength than siltstone and claystone which tend to weather more rapidly.

The production rate is expected to decrease as rock strength increases and fracture spacing is wider, such as the medium strength sandstone observed at the site. The excavation of Class III sandstone or Class II siltstone is likely to require a rock hammer or medium to heavy ripping by D9 dozer (or larger).

The following procedure is generally suggested for placement and compaction of engineered filling over existing natural soils / rock:

- Remove vegetation, topsoil, uncontrolled filling and deleterious materials;
- Test roll the surface in order to determine any soft zones and assess moisture condition. Moisture contents should be in the range OMC -2% (dry) to OMC+2% where OMC is the optimum content at standard compaction;
- Compact the tyned natural surface (where rock is not exposed) to a dry density ratio of at least 100% Standard. The re-compacted clay should be left exposed for a minimum of time prior to placement of additional fill layers, to minimise the occurrence of desiccation cracking or softening;
- Suitable filling should be placed in horizontal layers not exceeding 300 mm loose thickness and compacted to a dry density ratio of at least 95% to 100% Standard up to within 0.5 m of design bulk earthworks level and to at least 100% Standard in the upper 0.5 m. Moisture content should be in the range as stated above;
- Particle size should generally by less than 150 mm, however, an occasional absolute maximum particle size of up to 200 mm could be used;
- Unsuitable material at cut / fill transitions should be over excavated and replaced with select fill;
- Where carbonaceous materials are to be used as controlled fill, the filling should be blended with non-carbonaceous materials and placed in horizontal layers not exceeding 300 mm loose thickness and compacted to a dry density ratio of at least 100% Standard, as determined by test methods AS1289.5.1.1 (Ref 3) and AS1289.5.4.1 (Ref 10). Moisture content determinations are to be in accordance with AS1289.2.1.1 (Ref 11) with the exception that a 50°C oven is to be used (Ref 3).

In the lower, eastern area of the site, where the existing pond is located, additional site preparation will be required, as follows:

- Removal of all weak sediments and moisture affected soils;

- The depth of the sediments or the volume of water contained within the pond is not known at this stage and hence extensive dewatering should be anticipated at this stage, unless further investigation is undertaken to further quantify these volumes;
- Site drainage measures will be required to allow placement of engineered filling over the prepared surface once all the weak sediments have been removed;
- The use of a rock drainage blanket may be required to allow placement and compaction of the lower levels of the filling;
- Furthermore, it is anticipated that coal seams are likely to be exposed in this lower area during site stripping. Future groundwater flows through such seams should be anticipated and hence drainage should be designed to allow such groundwater flows to efficiently drain from the seam and from beneath the future pavement areas;
- The limited investigation carried out to date in this area (Pit 4002 and probing during previous investigations) has not established the depth of the weak sediments. Hence is it recommended that additional investigation is undertaken in this area once the surface water has been removed to further quantify the volume of weak sediments and provide further comments on likely site preparation measures required to allow placement of filling.

It is noted that the existing clay and silty clay soils are of medium to high plasticity and likely be difficult to work, particularly when wet. Site trafficability will be reduced when these soils become wet. If the soils become wet, they should be tyned and allowed to dry. Careful control of moisture will be required during compaction of these soils.

In the event that unfavourable weather conditions occur prior to and during construction, trafficability for non-tracked plant is expected to be very poor in the lower parts of the site and therefore the use of a layer of granular crushed rock, crushed recycled concrete, or similar may be required over the natural clays to provide a working platform for temporary access roads.

Alternatively, structures could be supported on piles installed through the fill to rock, as discussed in Section 9.8.

9.3 Retaining Structures

The design parameters for retaining structures for both short-term and long-term situations are shown in Table 8 for each of the principal geological units. These would apply to the design of cantilevered walls or shoring, contiguous pile walls and soldier pile walls. Any walls that will form part of a permanent structure should be based on long-term parameters.

The design values given are based on level ground behind the wall and do not include any surcharge loads that may be imposed near the top of the wall.

Passive pressures are given as either an earth pressure coefficient (Kp) for granular soils and / or ultimate passive pressures for residual clays and rock. The values given below are unfactored and because passive pressures are used as a resisting force, an appropriate factor of safety should be applied to determine working values and to limit deflections.

Table 8 provides suggested design parameters.

Table 8: Design Parameters for Retaining Structures

Description	Design Parameters (unfactored)								
	γ_b kN/m^3	Short Term				Long Term			
		K_a	K_0	K_p	P_p kPa	K_a	K_0	K_p	P_p kPa
Filling –cohesive	18	0.25	0.40	3.5	-	0.30	0.60	3.5	-
Filling – granular	20	0.30	0.50	3.3	-	0.30	0.50	3.3	-
Clay – stiff to very stiff	19	0.25	0.40	-	200	0.30	0.60	2.5	-
Clay – hard / extremely weathered rock	20	0.25	0.40	-	200	0.35	0.55	3.0	-
Class V (extremely low to very low strength sandstone or siltstone or coal)	22	0.15	0.30	-	400	0.20	0.35	-	400
Class IV (very low to low strength sandstone or siltstone)	22	0.00	0.10	-	2000	0.10	0.25	-	2000
Class III (medium strength sandstone or siltstone)	22	0.00	0.10	-	3000	0.10	0.25	-	3000

Notes to Table 8:
K_a – Active earth pressure coefficient
K_0 – 'At-rest' earth pressure coefficient
K_p – Passive earth pressure coefficient
P_p – Passive earth pressure

The use of active pressure coefficients (K_a) requires that there will be sufficient deflection of the retaining system during construction to reach active conditions. If lateral deflections are prevented or restricted, at-rest coefficients (K_0) should be used.

Any surcharge loads such as pavements, construction equipment or sloping backfill should be added to the design pressures determined for the soil / rock profile alone. Below the water table the additional load due to hydrostatic pressure should be added.

The parameters provided above are based on the provision of full drainage behind the retaining walls.

9.4 Batter Slope Stability

During site works temporary batters may be needed to facilitate construction, such as building retaining walls or filling in quarry voids with controlled fill that will cover the slope.

Permanent batter slopes may be required where they form part of the completed development. Preliminary assessment may be based on the slopes provided in Table 9.

Table 9: Temporary and Permanent Batter Slopes

Stratum	Short Term (Temporary)[1]	Long Term (Permanent)[1]
Fill - Compacted	2H:1V	2.5H:1V
Residual Clays	1.5H:1V	2H:1V
Class V (extremely low to very low strength sandstone or siltstone or coal)[2]	1H:1V	1.5H:1V
Class IV (very low to low strength sandstone or siltstone)[2]	0.5H:1V	1H:1V
Class III (medium strength sandstone or siltstone)[2]	Vertical	0.25H:1V to Vertical[3]

Notes to Table 9:

1. Above values are for a maximum vertical height of 3 m. Greater depths to be specifically assessed, and may require measures for stability and drainage.
2. Batters in rock are dependent on jointing and will require confirmation at time of excavation.
3. Vertical cuts may be feasible subject to geological mapping and rock bolting or similar, if needed.

All batter slopes will require appropriate erosion protection measures, depending on the location, depth, drainage conditions and longevity of the slope in question.

In this regard, the former quarry excavation face has been formed at around 22°, which is about 2.5H:1V. No signs of gross instability were observed within this batter, although it is noted that some erosion has taken place. It is noted that some soils on the site returned high pH values. Careful selection of vegetation which is tolerant of these pH levels will be required on these slopes.

9.5 Existing Filling

Based on the conditions encountered in the pits and bores, filling to depths (below surrounding ground surface levels) of greater than about 1 m is generally restricted to the north-western area and south-western area. Stockpiles of filling, which are about 5 m to 10 m in height are also present.

Table 10: Summary of Depth of Filling

Bore	Depth of Filling (m)
3001	Nil
3002	2.0
3003	0.3
3004	4.2
3005	0.3
3006	0.5
3007	2.1
601	0.1(1)
602	0.8(1)
603	2.2(1)
604	0.2(1)
605	0.4(1)
606	2.2(1)
701	0.15(1)
702	3.8(1)
703	0.3(1)

Notes to Table 10

1. It should be noted that extensive site regrading has occurred since drilling of these bores and hence the depth of fill is likely to vary from that shown in this table.

The majority of the deeper filling (greater than about 1 m) is located within the central and north-western area of the proposed building footprint.

9.6 Suitability of Site Materials for Reuse as Filling

9.6.1 Soils and Extremely Weathered Rock

The results of the present investigation suggest that the majority of the former upper clayey profile has been removed, although some residual clay remains (Bore 3003 to 1.1 m depth and Bore 3006 to 1.2 m depth). Existing sandy clay filling is present in some locations (notably Bore 3002 to 2 m depth, Bore 3004 to 4.2 m depth and Bore 3007 to 2.1 m depth). The natural clay material was typically described as having very stiff or stronger consistency whereas the clay filling appeared to be in a variable compacted condition.

Figure 19 and Figure 20, below, present a graphical summary of soil plasticity and shrink-swell data obtained for soils in the vicinity of the site during the previous investigation by DP (Ref 14).

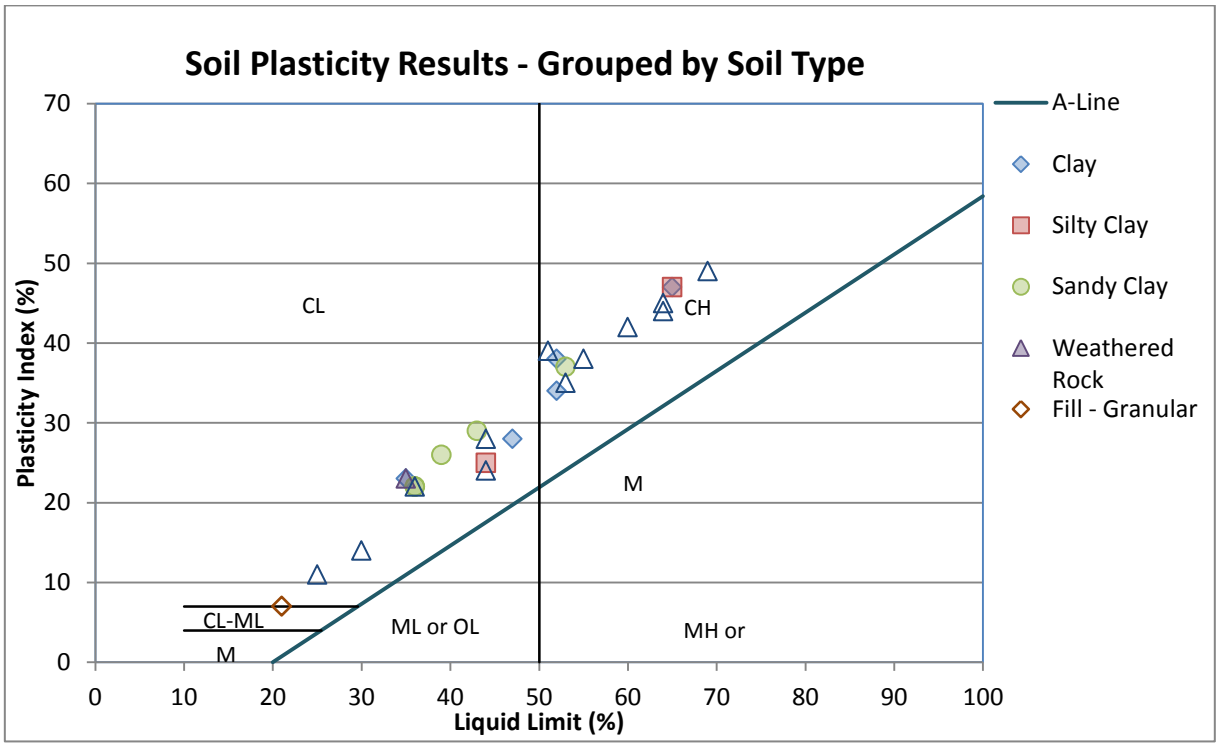


Figure 19: Chart of Soil Plasticity Tests

Available data on clay reactivity in terms of the shrink-swell index is shown plotted in Figure 20.

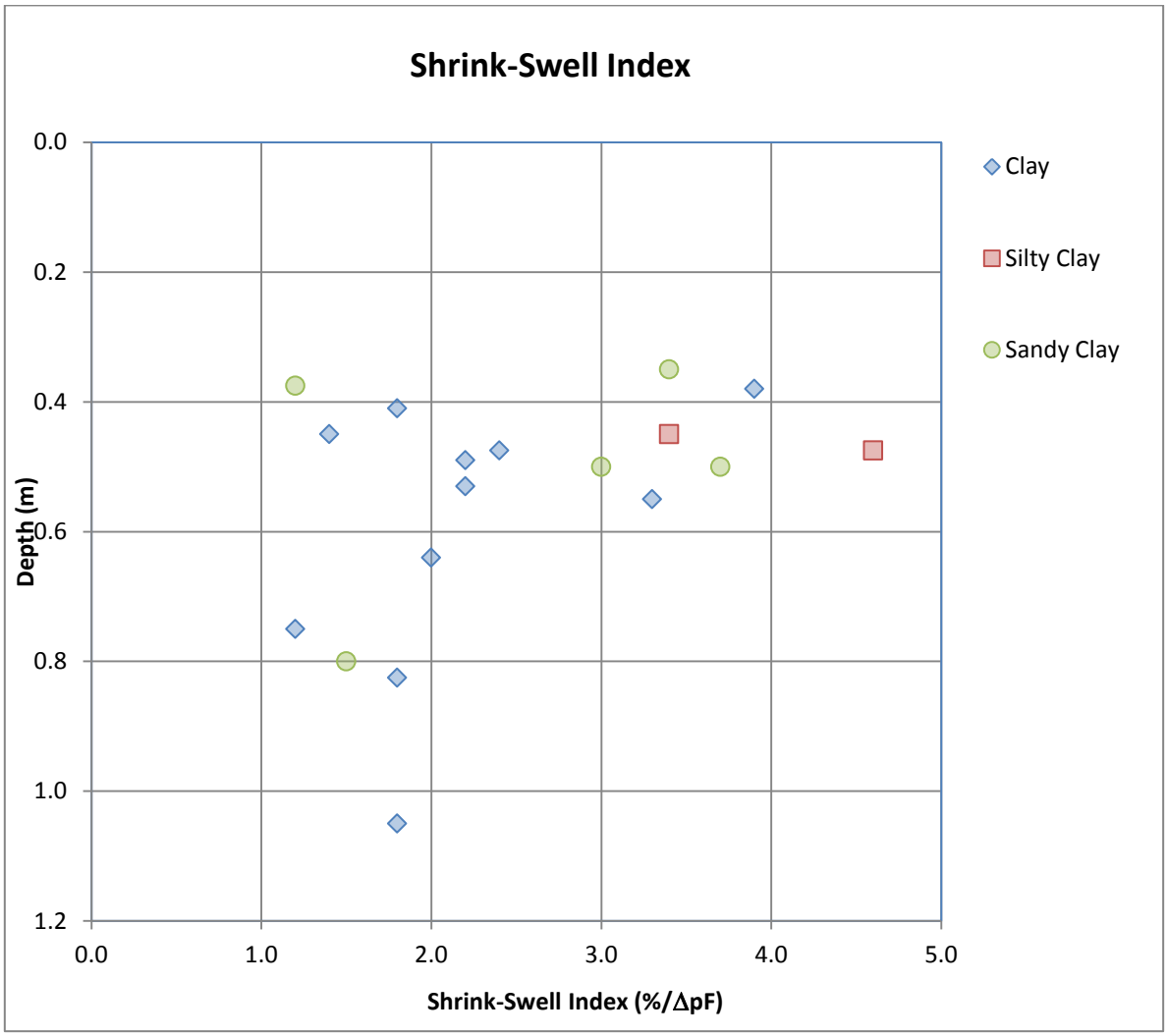


Figure 20: Chart of Shrink-Swell Index Tests

The testing indicates that the clay has a moderate propensity to change in volume with changes with moisture content. The results also indicate that the underlying clays have a moderate potential to soften on exposure to moisture, as indicated by the low soaked CBR values (as low as 5%).

The potential large characteristic surface movements associated with the use of the high plasticity clays needs to be considered if the clay is to be used beneath building areas. The use of at least 1.0 m of low-reactivity filling over the high plasticity clay will reduce the characteristic surface movement of the final profile.

The soils present within the eastern, low lying, area of the site are anticipated to have elevated moisture content and are not likely to be suitable for re-use without significant moisture reconditioning. Pit 4002, which was excavated within the edge of the existing pond (refer Drawing 1), encountered loose/soft clayey sand to 1.4 m depth overlying soft sandy clay sediments to 1.6 m depth where collapse of the pit precluded further investigation (refer Figure 21). These water-charged sediments are anticipated to be difficult to work with and would require removal to expose the underlying stiff or stronger natural soils prior to placement of filling.

Figure 21: Conditions encountered in Pit 4002

9.6.2 Weathered Rock

The ability to re-use weathered rock material won from bulk earthworks will be a function of the particle size achieved during excavation. In general, particle size should not exceed 150 mm for re-use as engineered filling. The purpose of this is to reduce the likelihood of difficulties if excavations are required at a later date, for example, to install footings and to reduce void spaces which could lead to piping / erosion as well as to assist with compaction. The material should be well-graded to control the compacted density and void ratio. All material to be re-used as engineered filling should be free of organics and other deleterious materials and debris.

It is anticipated that very low to medium strength weathered siltstone and sandstone encountered in Pits 301 to 305, and Bores 601 to 606, could be readily excavated / ripped to a particle size of less than about 0.3 m but more likely less than 0.15 m. It is suggested that cross-ripping methods and heavy pad foot rollers could be used to further break down excavated bedrock to material with a maximum particle size of less than 150 mm. Pits 4001 and 4003 were excavated in the areas of proposed pavements. These pits do, however, provide an indication of the excavatability of the weathered siltstone and sandstone. The weathered bedrock was relatively readily excavated using a 6.5 tonne excavator into particles in the order of 50 mm to 300 mm in Pit 4001 (refer Figure 22), and hence with additional preparation (breaking down of particles) this material would be suitable for re-use as engineered filling.

Figure 22: Weathered rock conditions in Pit 4001

It may be possible to use the coal within the bulk filling provided it is blended with other non-combustible material (refer Section 9.6.4).

9.6.3 Stockpiled Material

It is considered that the existing stockpiled material (predominantly ripped sandstone and siltstone with some clay) would be suitable for reuse as engineered fill in embankments or in building pads, provided that the material is moisture conditioned to achieve a moisture content at the time of placement as recommended in Section 9.2. Coarse material within the stockpile would need to be broken down such that the maximum particle size is no greater than 150 mm.

9.6.4 Carbonaceous Stockpiled Material

An assessment of the combustibility of the stockpiled carbonaceous material was undertaken during the previous investigation (Ref 17) and concluded the following:

- A capping Layer ranging in thickness from 0.3 m to 1.5 m is present; overlying;
- Carbonaceous siltstone and coal.

The carbonaceous material is likely to be high in combustible material. In this regard, previous assessment of samples from the site (Ref 16) indicated that combustible percentages of up to 90% were recorded in the samples of coal testing. The pits undertaken within the stockpile (Pits 5001 to 5004) encountered a blend of coal and carbonaceous material (refer Figure 23).

Figure 23: Photo of Pit 5002, showing existing capping and underlying carbonaceous material

It is understood that consideration is being given to the re-use of this carbonaceous material. This material may be suitable for re-use provided it is blended with non-carbonaceous material (ripped sandstone or siltstone, residual clay or clayey filling). In order to reduce the combustible material to an acceptable level (maximum combustibles of 40% - Ref 17) an initial blending ratio of 50:50 between the carbonaceous material and the non-carbonaceous material is recommended. If an alternative blend is proposed, additional assessment, including laboratory testing to characterise the combustibility of the blended mix should be undertaken.

Compaction testing was undertaken on a blended mix of material from the carbonaceous stockpile and completely weathered bedrock retrieved from Pits 4001 and 4003. Various blends were tested as follows:

- 40% carbonaceous material and 60% non-carbonaceous material;
- 50% carbonaceous material and 50% non-carbonaceous material; and
- 60% carbonaceous material and 40% non-carbonaceous material.

The results indicate that the material is likely to be moderately difficult to work with some sensitivity to changes in moisture. Careful control of moisture content will be required to achieve adequate compaction of this material.

Furthermore, a re-use management plan should be developed if this material is to be considered further for re-use as engineered filling, which outlines measures to ensure adequate blending to avoid pockets of high combustibility material, control of moisture content and compaction achieved.

DP has not considered chemical concentrations of the carbonaceous materials in this assessment. Recommendations from GHD in relation to contamination issues at the site may render the material unsuitable for re-use. However, provided that the material is deemed suitable for re-use from a contamination viewpoint, it may be suitable as bulk filling provided the recommendations outlined below are followed.

Development of detailed procedures and specifications for remediation will be required prior to remediation works. A combustion risk mitigation program, including a Remediation Action Plan will be required which will outline the procedures, specifications and responsibilities for remediation works at the site.

It is also recommended that a management plan is prepared for future management of combustion risk at the sites.

9.7 High Level Footings (Stage 1 Works)

It is preferable that all footings found on material of similar stiffness, (i.e. all footings to bear on the bedrock). Careful consideration of detailing and articulation of the structures would be needed during the design to allow the structures to tolerate the differential movements which could result from founding on materials of differing stiffness, such as bedrock and clay or filling.

Spread footings founded within the relevant strata should be designed for the following ultimate limit state bearing pressures:

- Class V (Extremely low to very low strength siltstone or sandstone, or coal) 3000 kPa;
- Class IV (Very Low strength or stronger siltstone or sandstone) 5000 kPa;
- Class III (Typically Medium strength or stronger sandstone) 10000 kPa.

A factor of safety of 3 should be applied to these values to derive an allowable bearing pressure but serviceability (settlement) analysis needs to be undertaken during detailed design.

As outlined in Table 6, the anticipated conditions at foundation level for the lower ground floor level generally includes very low strength through to medium strength sandstone or laminate bedrock (i.e. Class IV rock but may include some areas of Class V bedrock).

It is suggested that the design of pad footings could be design on Class IV parameters, however, it should be noted that some localised widening or deepening of footings may be required in some areas of the site. Careful geotechnical inspection of all pad footing excavations must be undertaken during construction to determine where such alterations to the footing design is required.

Reference to the geological sections provided in Appendix D show that coal or carbonaceous material is not generally anticipated at foundation level, with the coal seam generally several metres below the anticipated foundation level. In some bores, however, such as Bore 701 and Bore 3001, coal was encountered within 1 m to 2 m of the proposed foundation level. The shear strength of the coal and associated carbonaceous material is highly sensitive to changes in moisture, and they will soften appreciably if subjected to increased moisture.

Therefore, if carbonaceous rock or coal is encountered at foundation level, the design and construction of the footings must account for the moisture-sensitive ground conditions and lower bearing pressures, commensurate with Class V rock conditions should be adopted. Further advice should be sought from the geotechnical engineer during construction in relation to these areas of the site.

9.8 Deep Footings / Piles (Stage 1 Works)

9.8.1 Geotechnical Strength Reduction Factor

In the current Piling Code (Ref 1), the design geotechnical strength of a pile ($R_{d,g}$) is the ultimate geotechnical strength ($R_{d,ug}$) multiplied by the geotechnical strength reduction factor (ϕ_g), such that:

- $R_{d,g} = \phi_g . R_{d,ug}$

The calculated value $R_{d,g}$ must equal or exceed the structural design action effect E_d.

Selection of the geotechnical strength reduction factor (ϕ_g) is based on a series of individual risk ratings (IRR) which are weighted and lead to an average risk rating (ARR). The individual risk ratings and final value of ϕ_g depend on the following factors:

- Site: the type, quantity and quality of testing;
- Design: design methods and parameter selection;
- Installation: construction control and monitoring;
- Pile testing regime; testing benefit factor based on percentage of piles tested and the type of testing; and
- Redundancy: whether other piles can take up load if a given pile settles or fails.

Using the methodology outlined in the piling code and the supplementary site data retrieved during the present investigation, average risk ratings have been assessed for future foundations.

The recommended geotechnical strength reduction factors (ϕ_g) for piles founded in bedrock is as follows in Table 11.

Table 11: Recommended Geotechnical Strength Reduction Factor

Foundation Strata	Geotechnical Strength Reduction Factor (ϕ_g)	
	Low Redundancy in design of piles	High Redundancy in design of piles
Piles founded in underlying bedrock	0.55	0.60

These strength reduction factors are based on inspections to be completed by a qualified geotechnical engineer during piling operations, and on dynamic or static load testing in accordance with the requirements of AS2159 (Ref 1) during piling operations. It is however pointed out that the final strength reduction factor will depend on the piling contractor chosen and experience of the pile designer. The strength reduction factors should be checked when this information is available. Piles should be installed by experienced operators, using suitably sized piling rigs, monitoring equipment and supervision.

9.8.2 Pile Parameters

Deep foundation systems would be appropriate for the support of major loads and where the presence of uncontrolled fill precludes the use of shallow footings. Bored piles would be suitable founded within the very low to low strength sandstone bedrock. Given the presence of shallow bedrock driven piles are not considered suitable for this site.

The recommended preliminary design parameters for piles are shown in Table 12.

Table 12: Design Parameters for Piles

Stratum	Ultimate[7]		Serviceability (Working Loads)
	End Bearing (kPa)	Shaft Adhesion (kPa)	End Bearing (kPa)
Clay – hard / extremely weathered rock	1800	80	600
Class V (extremely low to very low strength sandstone or siltstone or coal)[2]	4000	200	1200
Class IV (very low to low strength sandstone or siltstone)[2]	10000	500	2500
Class III (medium strength sandstone or siltstone)[2]	20000	1100	4000

Notes to Table 12:

1. The design bearing pressures should be adjusted to account for weaker layers below the bearing layer if present.
2. Piles founded on coal or claystone should be avoided due to potential for softening and excessive settlement.
3. Ultimate Values occur at large settlements (> 5% of minimum pile diameter / width)
4. Design geotechnical strength ($R_{d,g}$) should initially be based on a strength reduction factor of $\phi_g = 0.55$
5. Serviceability / Max Allowable end bearing to cause settlement of < 1% of minimum pile diameter / width
6. AS 2159 – 2009 requires that the contribution of the shaft from ground surface to 1.5 times pile diameter or 1 m (whichever is greater) shall be ignored
7. Piles founded within the coal or within 2 m above the coal should be designed for Class V parameters for the affected section of pile, as discussed below.

For piles in tension, the shaft adhesion parameters should be reduced to 75% of the values in Table 12.

For vertical loading, it is suggested that piles should be spaced at 2.5 pile diameters or greater such that the overall capacity of the pile group can be equivalent to the sum of the individual piles (i.e. group efficiency factor of unity).

It should be noted that the parameters given in Table 12 are for clean rock sockets (with an R2 roughness rating) and bases. Specific cleaning buckets and grooving tools should be used in pile construction, together with suitable inspection or verification methods.

For calculation of serviceability geotechnical strength, the capacity can be calculated using the serviceability end bearing values and ultimate shaft adhesion values within the rock units. In the serviceability case, these values do not need to be factored. It is recommended that deflection under load is checked and compared to serviceability deflection limits.

It is noted that higher strength seams are present within the sandstone and conglomerate and hence careful selection of piling equipment should be made by the piling contractor, which is able to penetrate through these higher strength seams.

Pile installation could be affected by the possible presence of obstructions within existing fill such as concrete, steel and other coarse inclusions. The available information suggests that this will not be a widespread problem however the possibility cannot be precluded. Piles founded within the coal or within 2 m above the coal should be designed for Class V parameters.

Given the presence of coal seams within the subsurface profile, it is considered of reasonable likelihood that pile excavations which intersect coal seams may encounter groundwater as coal seams often act as permeable conduits within the rock mass. Allowances should be made to either remove groundwater from the base of the pile excavations prior to the placement of concrete and steel (if feasible) or the placement of concrete via tremie methods to the base of the pile excavation. A contingency of providing temporary casing may also be required if collapsing conditions occur within the coal seam.

9.8.3 Pile Testing and Geotechnical Inspections

Section 8 of AS2159 – 2009 (Ref 1) outlines the pile load testing requirements. Clause 8.2.4 of AS2159 states that where the basic geotechnical strength reduction factor is greater than 0.4, testing shall be performed to verify the integrity of pile shafts. Assessment of pile shaft integrity may be by high-strain dynamic pile testing or other methods of integrity testing. Seismic integrity testing may be suitable in this instance. It is recommended that a percentage of piles are tested as outlined in AS2159 (Ref 1).

It is also recommended that comprehensive inspections and monitoring be undertaken during the installation of piles, including but not necessarily limited to geotechnical inspection during installation to record the depth of pile, the conditions encountered at the toe of the pile and review of any pile installation data acquired during drilling.

During construction the design bearing pressures should be confirmed by geotechnical inspection and / or quality assurance testing relevant to the type of pile and method of installation.

9.9 Seismic Design

The earthquake code (AS1170.4-2007, Ref 13) provides design factors based on location (earthquake risk) geotechnical conditions.

The Hazard Factor (Z) for Maitland is 0.10 as given in Table 3.2 of AS1170.4. This is the bedrock acceleration coefficient with an annual probability of exceedance of 1 in 500.

The site sub-soil class is assessed to be Class C_e – "shallow soil site", with reference to Table 4.1 of AS1170.4 due to the presence of soil beneath some areas of the proposed building footprint, with the remained of the building foot print to comprise bedrock at bulk excavation level.

However, a site subsoil class of B_e – "Rock Site" could be considered if the proposed building can be designed such that the areas of the site can be designed to be founded on bedrock and with a UCS rock strength > 1 Mpa and the building is appropriately designed to be isolated from the shallow soils.

The building maybe isolated from the shallow soils by constructing a suspended slab supported on sleaved piles. All foundations should a permanent steel casing sleave through the soil with the outer permanent casing creating an annulus (gap) between the outer casing and the pile.

An alternative option could include removal of all soil from the building footprint to expose bedrock with a UCS of greater than 1 MPa and replacing the soil with a stabilised soil material such that the stabilised soil which has an average compacted UCS of at least 1.5 MPa and not less 1 MPa. If this option is to be further considered, further geotechnical advice should be sought together with additional laboratory testing which will be required to confirm the appropriate cementitious material and percentage to be incorporated into the soil to achieve the design UCS strength.

9.10 Pavements

9.10.1 Subgrade Conditions and Design CBR

Pavements are proposed to be constructed to allow access from Metford Road, with an entrance on both the northern and southern side of the building. A main, terraced car parking area is shown in the eastern part of the site on the revised master plan for the site. A secondary car park, located to the west of the proposed hospital is also shown on the plans. Limited investigation has been undertaken within these areas of the site to date (particularly within the eastern, low lying areas). Once further access is available, it is recommended that additional investigation is undertaken to characterise the subsurface conditions in these areas of the site and to allow further comment on subgrade preparation measures. Preliminary comments are provided below to allow preliminary design of pavements.

Based on the results of the pits and bores, conditions anticipated to be exposed at subgrade levels are discussed for each development area in Table 13 below.

Table 13: Anticipated Subgrade Conditions

Pavement Area	Relevant Bores/Pits	Anticipated Subgrade Level (m AHD)	Anticipated Subgrade Conditions
Northern Access Road	602, 3001, 4001	19 to 21	Clayey filling, residual clay soils or weak bedrock
Western Carpark and Access Road	3007, 3008 and 4004	19.3 to 21	Existing sandy clay filling (Bore 3007). Remainder of bores/pits not excavated at date of reporting, waiting for site clearance
New West Hospital Road	701 and 4005	19.3	Residual clay soils or weak bedrock. (Pit 4005 not excavated at date of reporting, waiting on site clearance)
Car Park, Loading Dock and New East Hospital Road	3006, 603, 604, 4002	13.8 (loading dock) to 19.3 (car park)	Very low strength or stronger sandstone (part of loading dock) and weak sediments in existing pond (to be removed and replaced with engineered filling)

As discussed in Section 9.2, groundwater and surface water inflow into the lower, eastern area of the site should be anticipated, and hence extensive drainage measures will be required to allow placement and compaction of engineered filling. The provision of a rock drainage blanket may also be required.

The further comments provided below are based on the assumption that further assessment is undertaken and site preparation measures are enacted to remove all weak sediments and unsuitable material followed by placement and adequate compaction of engineered filling under all pavement areas.

It should be noted that variable depth of filling is present throughout the site and hence subgrade conditions are likely to vary considerably throughout pavement alignments. Additional investigation is strongly recommended once the site has been cleared of existing stockpiles and trees (where remaining) to allow further assessment of subgrade conditions.

The existing filling is deemed as “uncontrolled”. It is likely to exhibit variation in compaction levels and materials present, as noted in the test bores and pits. The filling appears to have been progressively placed over the last 20 to 30 years. Ongoing settlement of the filling is likely to have occurred over this time, although it is not currently possible to determine the magnitude of any future settlements of the filling. The results of the in-situ testing within the filling indicate that it is generally moderately compacted.

In order to provide uniform support for the proposed road pavements and to reduce the risk of future differential settlements, it is recommended that rigorous subgrade improvements are undertaken within the area of the existing fill. These measures are discussed in Section 9.10.2.2.

Provided that residual soils, where encountered at subgrade level, are of at least stiff consistency, it is suggested that the standard subgrade preparation measures outlined in Section 9.10.2.1 would be appropriate. Similar subgrade preparation measures would be suitable for areas where bedrock is exposed.

The results of the laboratory testing indicated a soaked CBR of 16% and 25% for clayey sand and sandstone and a soaked CBR of only 4.5% for extremely weathered siltstone (clay-like properties). Based on previous experience in the Metford area, the natural clays have a soaked CBR of about 3% Based on the results of the testing a design CBR value of 3% has been adopted for areas comprising residual clay and fill subgrade. It is noted that the design CBR value of the fill subgrade will be dependent on the quality of the filling used during in bulk earthworks and the subgrade preparation measures enacted as discussed in Section 9.10.2.2 below.

A preliminary design subgrade CBR of 8% is recommended for areas where weathered sandstone rock is exposed at subgrade level.

9.10.2 Subgrade Preparation

9.10.2.1 Standard Subgrade

Pavement subgrade preparation should be carried out in general accordance with the following methodology:

- Strip all vegetation and organic topsoils from the pavement alignment;
- Excavate to design subgrade level;
- Undertake geotechnical inspection of the exposed surface to assess the suitability of any existing filling to remain in place. This may require proof rolling of the exposed surface together with additional dynamic penetrometer testing at close spacing (say every 20 m);
- Where rock is encountered at formation level it should be ripped to a depth of 300 mm below the subgrade level and re-compacted;
- In areas of natural ground at nominal subgrade level, roll the exposed subgrade surface with at least six passes of a minimum 12 tonne deadweight vibrating roller, with a final proof rolling pass undertaken at slow speed with careful visual inspection by a geotechnical engineer to allow the detection of any soft or compressible zones;
- In the event that sections of the exposed subgrade are deemed unsuitable to remain in place, additional excavation and replacement with approved filling will be required;
- Any subgrade replacement filling should be placed in horizontal layers of less than 250 mm loose thickness with each layer compacted to at least 100% Standard dry density ratio with moisture contents maintained within the range of -4% to -1% of optimum moisture content for Standard compaction in accordance with AS3798-2007 (Ref 9);
- Adjust the moisture content of the exposed subgrade to the moisture range as presented above;
- Compact the subgrade to a density ratio of at least 100% relative to Standard compaction with moisture contents as presented above;
- Protect the area after subgrade preparation to maintain moisture contents as far as practicable. Previous experience suggests that shrinkage of clay soils may result if they are allowed to dry and then subsequently swell as they return to their equilibrium moisture content following completion of pavement construction. Therefore excessive surface drying should be avoided in pavement subgrade areas.

9.10.2.2 In Deep Fill Areas

A more rigorous subgrade preparation will be required in areas of the site which have deep existing filling (such as anticipated within the western car park where filling was encountered to 2.1 m in Bore 3007).

Where the filling is likely to not be affected by groundwater and is anticipated to be in a moderately compacted conditions (i.e. western car park), re-compaction of at least the upper 1 m of the existing filling below nominal subgrade level, where suitable for re-use in terms of particle size, moisture condition and material types, is considered to be the minimum required to provide a relatively uniform support for the future pavement.

It should be recognised that construction of the pavement over the existing filling will result in an increased, yet unquantifiable, risk of premature failure of the pavement owing to ongoing settlement of the filling. Such failures may lead to increased maintenance costs and the need to re-sheet the pavement at shorter intervals, possibly every three to five years. Whilst the more rigorous subgrade preparation outlined below is aimed at reducing this risk, it cannot economically be completely eliminated and therefore the client must accept this increased risk.

The rigorous pavement subgrade preparation should include:

- Excavate to 1 m below the nominal subgrade level within the existing filling or to the natural soils in areas of proposed pavement and stockpile for assessment by a geotechnical engineer for its suitability for re-use;
- Remove any additional topsoil, overly wet or deleterious filling or other material;
- Where rock is encountered at formation level it should be ripped to a depth of 300 mm below the subgrade level and re-compacted;
- Undertake a series of dynamic cone penetrometer tests (DCP) on a grid pattern (say 5 – 10 m centres) across the site to assess the condition of the underlying material and its suitability to act as a subgrade;
- Roll the exposed subgrade surface with at least six passes of a minimum 12 tonne deadweight vibrating roller, with a final proof rolling pass undertaken at slow speed with careful visual inspection by a geotechnical engineer to allow the detection of any soft or compressible zones;
- In the event that sections of the exposed subgrade are deemed unsuitable to remain in place as a result of either the DPT or the proof rolling, additional excavation and replacement with approved filling will be required or alternative measures such as the provision of a geogrid and geotextile layer will be required;
- A provisional rate for over excavation of additional unsuitable material and importation of suitable replacement filling should be included in the cost schedule for this site;
- Compact the exposed natural soils or existing filling deemed suitable to act as subgrade to a minimum dry density ratio of 100% Standard in accordance with AS3798-2007 (Ref 9); and
- Any subgrade replacement filling should be placed in horizontal layers of less than 250 mm loose thickness with each layer compacted to at least 100% Standard dry density ratio with moisture contents maintained within the range of -4% to -1% of optimum moisture content for Standard compaction.

Based on tactile assessment of the upper filling material encountered in the bores and the results of the CBR testing, the majority of the material is anticipated to be suitable for re-use within the improved subgrade provided that all deleterious, oversized and organic material is removed.

Compaction testing of all engineered filling and prepared subgrade surfaces should be carried out with sufficient density testing to justify that it is well compacted. AS 3798: *Guidelines on Earthworks for Commercial and Residential Developments* (Ref 9) provides information regarding the placement of filling. A Level 1 inspection and testing regime as defined in AS3798 is suggested for the rigorous subgrade preparation measures.

9.10.2.3 Loading Dock

Limited investigation has been undertaken within the area of the loading dock and eastern car park owing to the presence of the existing pond and weak surface soils. It is strongly recommended that additional investigation is undertaken within these areas once site access is available to further characterise the subsurface conditions and allow further comment on pavement preparation measures. Preliminary comments on site preparation in these areas are presented in Section 9.2.

9.10.3 Pavement Drainage

The pavement should be designed to incorporate the provision of adequate surface and subsoil drainage so as to maintain the subgrade as close to the optimum moisture content as possible and to ensure that the pavement layers do not become saturated.

Normally, subsoil drainage should be installed at least 0.5 m below subgrade level adjacent to pavements. Preparation of subgrade surfaces should be such that adequate crossfalls for surface drainage are achieved across the final pavement.

Given the presence of deep, uncontrolled filling in some areas of proposed pavement, it is suggested that subsurface drainage is installed with a slightly steeper grade than is normally required to reduce the risk of reversal of drainage paths in the event that ongoing settlement occurs within the filling.

9.10.4 Pavement Thickness Design

The design traffic loading for the proposed link road has not been provided to DP.

Two pavement thickness designs are presented based on the following design traffic loadings:

- 4×10^4 ESA, which is based on the roads being consistent with “local access with no buses” as defined in Austroads; and
- 3×10^5 ESA, which is based on the roads being consistent with “local access in industrial area” as defined in Austroads.

If the traffic loading is to be significantly different from this value, the pavement thickness designs presented in the following sections should be reviewed.

9.10.5 Flexible Pavement Thickness Design

It is understood that the pavements will be privately owned and therefore not a Council asset. The pavement thickness design presented below has been based on procedures outlined in Austroads – Guide to Pavement Technology (Ref 6).

The proposed pavement thickness design is outlined in Table 14 below.

Table 14: Pavement Thickness Design – Sealed Flexible Pavement

Layer	Layer Thickness (mm)			
Traffic Loading (ESA)	4×10^4 ESA		3×10^5 ESA	
Design Subgrade CBR	3% (new filling or clay soil)	8% (weathered sandstone rock)	3% (new filling or clay soil)	8% (weathered sandstone rock)
Wearing Course	40 mm AC10*	40 mm AC10*	40 mm AC10*	40 mm AC10*
Basecourse	120	100	120	120
Subbase	200	150	280	150
Select Subgrade	200(1)	-	200(1)	-
Total	360 (excluding select)	290	440 (excluding select)	310

Notes to Table 14:

A 7 mm or 10 mm prime seal should be placed over the basecourse

(1) Additional select may be required dependent on conditions exposed at the time of excavation

The recommended material quality and compaction requirements for sealed flexible pavement are presented in Table 15, below.

Table 15: Material Quality and Compaction Requirements – Sealed Flexible Pavement

Pavement Layer	Material Quality	Compaction Requirements
Basecourse	CBR ≥ 80%, PI ≤ 6%, Grading in accordance with Table 242.3 of Ref 17	Compact to at least 98% dry density ratio Modified (AS 1289.5.2.1, Ref 8)
Subbase	CBR ≥ 30%, PI ≤ 12%. Grading in accordance with Table 242.4 (Ref 17)	Compact to at least 95% dry density ratio Modified (AS 1289.5.2.1, Ref 8)
Select Subgrade (if required)	Soaked CBR ≥ 15%	Compact to 100% dry density ratio Standard (AS 1289.5.1.1, Ref 3)
Subgrade	Refer to Section 9.10.1 and Section 9.10.2	Compact to at least 100% dry density ratio Standard (AS 1289.5.1.1, Ref 3)

Notes to Table 15

CBR – California bearing ratio (4 day soaked)
PI – Plasticity Index

The select subgrade should be a well-graded material which is suitable for placement over the clay, filling and weathered bedrock subgrade, and which requires minimal working / rolling to achieve compaction. Thus coarse material is not expected to be suitable. The maximum particle size of the select should be no greater than one-half the layer thickness.

10. References

1. Australian Standard 2159-2009, “Piling – Design and Installation”, Standards Australia.
2. Wollongong City Council, “Wollongong Development Control Plan 2009, Part E: General Controls – Environmental Controls, Chapter E19: Earthworks (Land Reshaping Works)”.
3. Australian Standard AS 1289.5.1.1-2003, “Methods of testing soils for engineering purposes”, Standards Australia.
4. Australian Standard AS2870-2011, ‘Residential Slabs and Footings’, April 2011, Standards Australia.
5. Cement Concrete Aggregates Australia, Technical Note 61 “Articulated Walling”.
6. Austroads, “Guide to Pavement Technology, Part 2: Pavement Structural Design”, 2017.
7. Australian Road Research Board, Special Report No.41, “Into a New Age of Pavement Design, A Structural Design Guide for Flexible Residential Street Pavements”, dated 1989.
8. Australian Standard AS 1289.5.2.1-2003, “Methods of testing soils for engineering purposes”, Standards Australia.
9. Australian Standard AS 3798-2007 “Guidelines on Earthworks for Commercial and Residential Developments”, Standards Association of Australia.

10. Australian Standard AS 1289.5.4.1-2007, “Methods of testing soils for engineering purposes”, Standards Australia.

11. Australian Standard AS 1289.2.11-2005, “Methods of testing soils for engineering purposes”, Standards Australia.

12. P.J.N.Pells, G. Mostyn and B.F.Walker, “Foundations on Sandstone and Shale in the Sydney Region”, Australian Geomechanics – December 1998.

13. Australian Standard 1170.4-2007, “Structural design actions, Part 4: Earthquake actions in Australia”, Standards Australia.

14. Douglas Partners Pty Ltd, “Report on Geotechnical Assessment, New Maitland Hospital, Metford”, Report 81719.00.R.001.Rev1, dated 15 July 2015.

15. Douglas Partners Pty Ltd, “Report on Geotechnical Investigation, Proposed New Maitland Hospital, Metford Road, Metford”, Report 81719.01.R.001.Rev0, dated 14 December 2015.

16. Douglas Partners Pty Ltd, “Report on Geotechnical Investigation, Proposed New Maitland Hospital, Metford Road, Metford”, Report 81719.01.R.001.Rev2, dated 9 May 2018.

17. Douglas Partners Pty Ltd, “Assessment of Existing Capping over Carbonaceous Material Stockpile, Proposed New Maitland Hospital (Chitter Pile), Metford Road, Metford”, Report 81719.07.R.001.Rev1, dated 12 July 2018.

18. Maitland City Council, “Manual of Engineering Standards”.

11. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at Metford Road, Metford with reference to DP’s proposal NCL180660 dated 13 November 2018 and acceptance received from Multiplex Constructions Pty Ltd dated 22 November 2018. The work was carried out under a consultancy agreement between DP and Multiplex Constructions Pty Ltd. This report is provided for the exclusive use of Multiplex Constructions Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP’s field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report
Sampling Methods
Soil Descriptions
Symbols and Abbreviations
Rock Descriptions

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

Douglas Partners

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

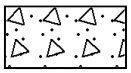
Symbols & Abbreviations

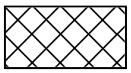
Graphic Symbols for Soil and Rock

General

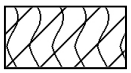

Asphalt

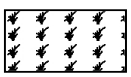

Road base

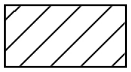

Concrete

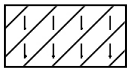

Filling

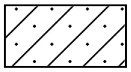
Soils


Topsoil

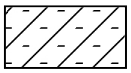

Peat

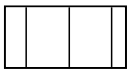

Clay

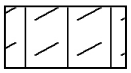

Silty clay

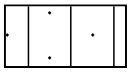

Sandy clay

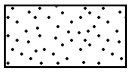

Gravelly clay

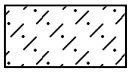

Shaly clay

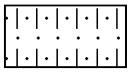

Silt


Clayey silt


Sandy silt


Sand

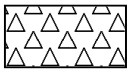

Clayey sand


Silty sand


Gravel

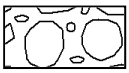

Sandy gravel


Cobbles, boulders

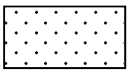

Talus

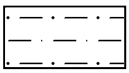
Sedimentary Rocks

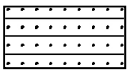

Boulder conglomerate

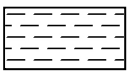

Conglomerate


Conglomeratic sandstone

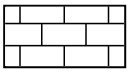

Sandstone


Siltstone

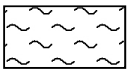

Laminite

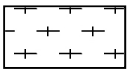

Mudstone, claystone, shale

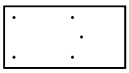

Coal


Limestone

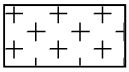
Metamorphic Rocks

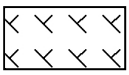

Slate, phyllite, schist

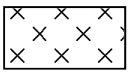

Gneiss

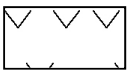

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Appendix B

Borehole Logs (3001 to 3007) current investigation
Borehole Logs (601 to 606 and 701 to 703) previous investigation
Core Photoplates
Test Pit Logs (4001 to 4003 and 5001 to 5004) current investigation
Test Pit Logs (2001 to 2014) previous investigation

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.4 AHD
EASTING: 369387
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3001
PROJECT No: 81719.09
DATE: 13/12/2018
SHEET 1 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
21	0	SANDSTONE - Extremely low strength, extremely weathered, fine to coarse grained sandstone							D			
									D			
		From 0.75m, becomes very low to low strength (auger screech)										
	1											
	1.15	SILTSTONE - Very low strength, highly weathered, grey to pale grey siltstone						1.29m: P, sh, pl, ro 1.32m: J, 80°,un, ro 1.35m: P, sh, un, ro, inf, fe				
20	1.78								C	100	86	
	1.83	SANDSTONE - Medium strength, moderately weathered, fine to medium grained sandstone						1.83m: P, 10°, pl, ro				
	2											
	2.0	SILTSTONE - Very low strength, highly weathered, pale grey siltstone with significant ironstaining						2m: P, sh, pl, ro, inf, fe				
	2.26	SANDSTONE - Low to medium strength, moderately weathered, fine to medium grained sandstone										PL(A) = 0.07 PL(D) = 0.04
19		LAMINITE - Very low strength, moderately weathered, grey to pale grey fine to medium grained sandstone (70%) and siltstone (30%) laminite										PL(A) = 0.14 PL(D) = 0.05
	2.86											
	3	SANDSTONE - Very low strength, highly weathered, grey fine to medium grained sandstone with significant ironstaining						2.98m: J, 10°, pl, or, inf, fe				
18	3.42	SANDSTONE - Low strength, slightly weathered, grey fine to medium grained sandstone with some ironstaining							C	100	100	PL(A) = 0.18 PL(D) = 0.23
		From 3.7m to 4.22m, very low strength										
	4											PL(A) = 0.1 PL(D) = 0.21
17								4.47m: J, 50°, pl, ro				
								4.84m: J, 45°, pl, ro				

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.15m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.15m, then NMLC coring to 18.65m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m. Noticeable water loss experienced at 5.7m and again at 12.9m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3001

1.15 m to 5.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3001

5.0 m to 10.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	1
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.4 AHD
EASTING: 369387
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3001
PROJECT No: 81719.09
DATE: 13/12/2018
SHEET 2 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
16		SANDSTONE - Low strength, slightly weathered, grey fine to medium grained sandstone with some ironstaining *(continued)*						5.16m: J, 70°, un, ro	C	100	100	PL(A) = 0.15 PL(D) = 0.24
								5.64m: J, 75°, pl, in, fe				
	6	From 6.0m to 6.6m, with carbonaceous lenses up to 2 mm thick						6.15m: P, 10°, pl, ro				
15								6.6m: P, sh, pl, ro				PL(A) = 0.12
									C	100	97	
	7											PL(A) = 0.17 PL(D) = 0.39
14								7.11m: J, 30°, pl, ro				
		From 7.7m, medium to high strength							U			PL(A) = 0.33 UCS = 7.7 MPa
	8							8.08m: J, 20°, pl, ro	C			PL(A) = 1.03 PL(D) = 0.57
	8.21	SILTSTONE - Very low strength, highly weathered, grey to brown siltstone						From 8.33 to 8.35m, fractured				
13	8.52	COAL - Very low strength, moderately weathered, black coal						8.47m: P, sh, pl, ro, inf, fe				
	8.58	CORE LOSS - Probable coal						8.54m: P, sh, pl, ro 8.58m: CORE LOSS: 240mm				
	8.82	COAL - Low strength, slightly weathered, black coal						From 8.82m to 8.89m, fractured				
	8.89	CARBONACEOUS SILTSTONE - Low strength, slightly weathered, black to dark brown carbonaceous siltstone						8.91m: J, sv, un, ro 9.03m: P, sh, pl, ro 9.09m: J, 70°, pl, ro 9.17m: J, 85°, healed (iron and coal infill) 9.27m: J, 80°, un, tight				
	9											
	9.25	From 9.2m, black coal							C	91	65	
12	9.3							From 9.29m to 9.42m, fractured				
	9.42	CLAYSTONE - Low strength, moderately weathered, brown claystone										PL(A) = 0.13 PL(D) = 0.14
		COAL - Low strength, slightly weathered, black coal										
	9.91	SILTSTONE - Low strength, moderately weathered, grey to dark grey siltstone										PL(A) = 0.07

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.15m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.15m, then NMLC coring to 18.65m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m. Noticeable water loss experienced at 5.7m and again at 12.9m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.4 AHD
EASTING: 369387
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3001
PROJECT No: 81719.09
DATE: 13/12/2018
SHEET 3 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
11	10.3	CARBONACEOUS SILTSTONE - Low strength, slightly weathered, brown to black carbonaceous siltstone *(continued)*										PL(D) = 0.03
	10.4	SILTSTONE - Low to medium strength, moderately weathered, grey siltstone						From 10.42m to 10.51m, fractured	C	91	65	
	10.5	COAL - Low strength, slightly weathered, black coal										
	10.65	TUFFACEOUS SILTSTONE - Extremely low to very low strength, highly weathered, grey tuffaceous siltstone										PL(A) = 0.22
	10.93											
10	11	COAL - Low strength, slightly weathered, black coal										
	11.1	TUFFACEOUS SILTSTONE - Very low strength, highy weathered, tuffaceous siltstone						11.1m: P, sh, pl, ro	C	100	66	PL(A) = 0.07
	11.36											
	11.44	CARBONACEOUS SILTSTONE - very low strength, slightly weathered, black carbonaceous siltstone						From 11.44m to 11.51m, fractured 11.55m: J, sv, un, ro 11.59m: CORE LOSS: 1300mm				
	11.59	From 11.22m to 11.26m, very low strength, highly weathered, claystone										
	12	CLAYSTONE - Low strength, moderately weathered, brown claystone										
9		COAL - Low strength, slightly weathered, black coal							C	42	16	
		CORE LOSS - Probable coal										
	12.89	COAL / CARBONACEOUS SILTSTONE - Low strength, slightly weathered, black coal / carbonaceous siltstone						From 12.89m to 13.23m, fractured				
	13							From 13.61m to 13.62m, fractured				
8	13.77	SILTSTONE - Very low to low strength, highly weathered, grey siltstone										
	14	From 14m, slightly weathered							C	100	95	PL(D) = 0.08 PL(A) = 0.1 PL(D) = 0.1
7		From 14.65m to 14.91m, low strength, slightly weathered, fine to medium grained sandstone							U			PL(A) = 0.25 PL(D) = 0.13 UCS = 5.5 MPa
	15.0											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.15m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.15m, then NMLC coring to 18.65m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m. Noticeable water loss experienced at 5.7m and again at 12.9m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3001

10.0 m to 15.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3001

15.0 m to 18.65 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	2
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.4 AHD
EASTING: 369387
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3001
PROJECT No: 81719.09
DATE: 13/12/2018
SHEET 4 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SANDSTONE - Low strength, slightly weathered, grey siltstone										
		From 15.41m to 15.58m, carbonaceous / coal						15.44m: P, sh, un, ro, cbs lam 15.47m: P, sh, un, ro, cbs lam	C	100	95	
	15.6	SANDSTONE - Low strength, slightly weathered, grey, fine grained sandstone with bands of siltstone up to 30%										PL(A) = 0.12 PL(D) = 0.14
	16											PL(A) = 0.16 PL(D) = 0.16
		From 16.78m, less than 10% siltstone content										
	17								C C	100	84	PL(D) = 0.12 PL(A) = 0.1 PL(D) = 0.12
	17.54	SILTSTONE - Low strength, slightly weathered, grey siltstone										
	18	From 17.97m to 18.22m, high strength						From 17.98m to 18.2m, fractured 18.08m: J, sv, un, ro				PL(A) = 3.98
		From 18.22m to 18.44m, very low strength, highly weathered						18.36m: P, sh, pl, ro				
	18.44 18.49	COAL - Low strength, slightly weathered, black coal						18.44m: P, sh, pl, ro, inf, coal				
	18.65	SILTSTONE - Very low strength, highly weathered, grey siltstone						18.55m: P, sh, pl, ro, cbs lam				
		Bore discontinued at 18.65m, limit of investigation										
	19											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.15m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.15m, then NMLC coring to 18.65m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m. Noticeable water loss experienced at 5.7m and again at 12.9m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18.6 AHD
EASTING: 369307
NORTHING: 6374510
DIP/AZIMUTH: 90°/--

BORE No: 3002
PROJECT No: 81719.09
DATE: 14/12/2018
SHEET 1 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
18	0	FILLING - Generally comprising gravelly fine to coarse grained sand filling with subangular to subrounded gravel up to 50mm, moist							D			
		From 0.3m, becoming fine to coarse grained sandy clay filling							D			
	1								D			
									S			4,9,9 N = 18
17									D			
	2	2.0 SANDSTONE - Extremely low strength, extremely weathered, yellow fine to coarse grained sadnstone (starts screeching)										
16		2.5 SANDSTONE - Low strength, moderately weathered, grey to yellow fine to coarse grained sandstone with ironstaining										PL(D) = 0.1 PL(A) = 0.1 PL(D) = 0.27
	3	From 3.22m to 3.75m, very low strength										
		From 3.35m to 3.75m, highly weathered						3.29m: P, sh, pl, ro, inf, fe 3.33m: P, sh, pl, ro, inf, fe	C	100	98	
15		3.78 From 3.75m to 3.78m, extremely low strength, extremely weathered						3.83m: J, sv, un, ro				
	4	LAMINITE - Extremely low strength, highly weathered, grey to dark grey, fine to coarse grained sandstone (70%) and siltstone (30%) laminite with some ironstaining						4.12m: P, sh, pl, ro, inf				
		From 3.89m, very low strength										
		From 4.12m, low strength, slightly weathered										
14		From 4.21m, no ironstaining							C	100	98	PL(A) = 0.12
		4.74 SANDSTONE - Low to medium strength, slightly weathered, grey, fine to coarse grained sandstone										UCS = 3.8 MPa
	5	5.0										

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit 2.5m, then NMLC coring to 19.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3002

2.5 m to 7.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3002

7.0 m to 12.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	3
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18.6 AHD
EASTING: 369307
NORTHING: 6374510
DIP/AZIMUTH: 90°/--

BORE No: 3002
PROJECT No: 81719.09
DATE: 14/12/2018
SHEET 2 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SANDSTONE - Low to medium strength, slightly weathered, grey, fine to coarse grained sandstone										PL(A) = 0.19
13								5.51m: P, sh, pl, ro 5.59m: P, sh, pl, ro				
	6											PL(A) = 0.22 PL(D) = 0.29
		From 6.25m, ironstaining										PL(A) = 0.18 PL(D) = 0.39
12									C	100	98	
	7											PL(A) = 0.11 PL(D) = 0.11
11		From 7.89m to 8.64m, very low strength, moderately weathered										
	8	From 8.2m to 8.64m, highly weathered						8.09m: J, sv, pl, ro (joint is 0.22m long)				
10												
	9							9.05m: P, sh, pl, ro, inf, coal	C	100	100	PL(A) = 0.12
		From 9.22m to 10.87m, medium strength, slightly weathered						9.31m: J, 70°, pl, ro				
9								9.5m: J, 70°, pl, ro, healed, (joint is 0.5 m long)				
	10.0											PL(A) = 0.46 PL(D) = 0.69

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit 2.5m, then NMLC coring to 19.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18.6 AHD
EASTING: 369307
NORTHING: 6374510
DIP/AZIMUTH: 90°/--

BORE No: 3002
PROJECT No: 81719.09
DATE: 14/12/2018
SHEET 3 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
8		SANDSTONE - Medium strength, slightly weathered, grey, fine to coarse grained sandstone							C	100	100	PL(A) = 0.47 PL(D) = 0.55
	11							10.95m: J, 70°, pl				
	11.1	LAMINITE - Very low strength, slightly weathered, grey fine grained sandstone (20%) and siltstone (80%) From 11.3m, moderately weathered						11.32m: P, sh, pl, ro 11.39m: P, sh, pl, ro 11.43m: P, sh, pl, ro 11.46m: J, 20°, un, ro 11.56m: P, sh, pl, ro	C	92	32	PL(D) = 0.03
7	11.8	COAL - Low strength, fresh, black coal						From 11.8m to 11.87m, fractured				
	12 12.0	CORE LOSS - Probable coal						12m: CORE LOSS: 120mm				
	12.12	COAL - Low strength, black coal 12.19m to 12.25m, tuffaceous siltstone, extremely low strength, highly weathered						From 12.12m to 12.32m, fractured From 12.46m to 12.52m, fractured From 12.57m to 12.67m, fractured				
6	12.67	CARBONACEOUS SANDSTONE - Low to medium strength, slightly weathered, dark brown to black carbonaceous sandstone						12.78m: J, p, sv, pl, ro	C	82	0	PL(A) = 0.46
	12.87	COAL - Low strength, fresh, black coal						12.9m: P, sh, pl, ro 12.95m: P, sh, pl, ro 13.04m: P, sh, pl, ro 13.09m: J, sv, un, ro				
	13 13.15	CORE LOSS - Probable coal						13.15m: CORE LOSS: 150mm				
	13.3	COAL - Low strength, fresh, black coal						13.35m: P, sh, pl, ro From 13.42m to 13.5m, fractured				PL(A) = 0.1
5	13.5	TUFFACEOUS SAND / CLAYSTONE - Low strength, highly weathered, pale to grey tuffaceous sand / claystone							C	98	60	
	13.63	COAL - Low strength, fresh, black coal						13.76m: J, 80°, pl, ro, (joint runs for 0.12m)				
	14											
	14.29	CLAYSTONE - Very low strength, highly weathered, brown claystone						From 14.2m to 14.29m, fractured				
	14.37 14.38	COAL - Low strength, fresh, black coal						From 14.37m to 14.38m, fractured 14.38m: CORE LOSS: 520mm	C	50	0	
4		CORE LOSS - Probable coal										
	14.9							From 14.9m to 15.1m,				

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit 2.5m, then NMLC coring to 19.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3002

12.0 m to 17.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3002

17.0 m to 19.8 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	4
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18.6 AHD
EASTING: 369307
NORTHING: 6374510
DIP/AZIMUTH: 90°/--

BORE No: 3002
PROJECT No: 81719.09
DATE: 14/12/2018
SHEET 4 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		COAL - Low strength, fresh, black coal *(continued)*						fractured				
	15.2	TUFFACEOUS SILTSTONE - Very low to low strength, moderately weathered, grey to pale tuffaceous siltstone						15.15m: J, sv, un, ro From 15.2m to 15.45m, fractured	C	50	0	PL(A) = 0.68
	15.3	COAL - Low to medium strength, fresh black coal						15.58m: P, sh, pl, ro 15.64m: J, sv, un, ro 15.83m: J, 80°, un, ro				
	16 16.0	From 15.92m to 15.94m, low strength						From 15.94m to 16.0m, fractured				
		CORE LOSS - Probable coal						16m: CORE LOSS: 200mm				
	16.2	COAL - Low strength, fresh, black coal with trace pyrite							C	92	40	
	16.28	SILTSTONE - Very low strength, highly weathered, dark brown siltstone with interbedded lenses of coal										
	16.64	COAL - Low to medium strength, fresh, black coal						From 16.7m to 16.76m, fractured				
	16.78	From 16.68m to 16.71m, carbonaceous siltstone, slightly weathered										
	17 17.0	SILTSTONE - Low strength, highly weathered, grey siltstone										PL(A) = 0.12 PL(D) = 0.19
		SANDSTONE - Low strength, moderately weathered, grey, fine to medium grained sandstone										
		From 17.5 m, very low strength, highly weathered silt/sandstone										
	17.78	LAMINITE - Low to medium strength, slightly weathered, grey to dark grey, fine to coarse grained sandstone (80%) and siltstone (20%) laminite										PL(A) = 0.12 PL(D) = 0.24 UCS = 3.7 MPa
	18											
	18.25	SILTSTONE - Very low to low strength, moderately weathered, grey siltstone							C	100	94	PL(A) = 0.1 PL(D) = 0.13
	18.8	CARBONACEOUS SILTSTONE - Very low strength, highly weathered, dark brown carbonaceous siltstone with coal lenses up to 2mm thick						18.69m: J, 40°, un, ro 18.9m: J, sv, un, ro (joints run for 0.18m)				PL(A) = 0.08 PL(D) = 0.09
	19 19.0	SILTSTONE - Very low strength, moderately weathered, grey siltstone										
	19.8	Bore discontinued at 19.8m, limit of investigation										PL(A) = 0.06 PL(D) = 0.06

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit 2.5m, then NMLC coring to 19.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369299
NORTHING: 6374480
DIP/AZIMUTH: 90°/--

BORE No: 3003
PROJECT No: 81719.09
DATE: 6/12/2018
SHEET 1 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		FILLING - Generally comprising brown silty fine to medium grained sand filling with some subangular to subrounded gravel up to 10mm in size, trace clay							D			
	0.3	CLAY - Stiff to very stiff brown clay with some fine to medium grained sand, trace subangular to subrounded gravel up to 10mm in size, M<Wp							D			
16	1	From 1m, hard, no sand							D S			25/70,-,- refusal
	1.1	SANDSTONE - Low strength, moderately weathered, grey, fine grained sandstone with 10% interbedded siltstone bands up to 5mm thick						1.45m: P, sh, pl, ro, fe	C	100	100	pp >500 PL(A) = 0.15 PL(D) = 0.15
15	1.74	LAMINITE - Low strength, moderately weathered, grey, fine grained sandstone (30%) and siltstone (70%) laminite										PL(A) = 0.14
	2								U			UCS = 0.8 MPa
												PL(A) = 0.14
								2.4m: P, sh, pl, ro, fe				PL(A) = 0.11 PL(D) = 0.06
	2.61	From 2.54m, very low strength						2.54m: P, sh, pl, ro, fe 2.61m: J, 15°, pl, ro, fe				
14		SANDSTONE - Medium strength, slightly weathered, grey, fine to coarse grained sandstone										PL(A) = 0.51 PL(D) = 0.57
	3											
		From 3.3m to 4.38m, low strength										PL(A) = 0.29 PL(D) = 0.21
									C	100	97	
13								3.81m: J, 55°, pl, ro				
	4											PL(A) = 0.24 PL(D) = 0.22
		From 4.38m to 4.47m, carbonaceous, very low strength										
12	5.0											PL(A) = 0.33

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.05m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.1m, then NMLC coring to 20.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3003

1.1 m to 5.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3003

5.0 m to 10.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	5
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369299
NORTHING: 6374480
DIP/AZIMUTH: 90°/--

BORE No: 3003
PROJECT No: 81719.09
DATE: 6/12/2018
SHEET 2 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
		SANDSTONE - Medium strength, fresh, grey, fine to coarse grained sandstone							C	100	97	PL(D) = 0.37
		From 6.7m, low strength						6.8m: J, 80°, un, ro, tight, fe	C	100	77	PL(A) = 0.38 PL(D) = 0.36
	7.06	SANDSTONE - Extremely low strength, extremely weathered, grey, fine to coarse grained sandstone (friable, soil like properties)						7.07m: J, 40°, pl, ro 7.2m: J, 50°, pl, ro, tight 7.26m: J, 50°, pl, ro, tight				PL(A) = 0.25 PL(D) = 0.15 pp = 400
	7.5	SANDSTONE - Medium strength, slightly weathered, grey, fine to coarse grained sandstone From 7.78m, low strength, fine to medium grained From 8m to 8.22m, fine grained sandstone (50%) and siltstone (50%) laminite						7.42m: J, 40°, un, ro 7.48m: P, sh, pl, ro, fe 7.55m: P, sh, pl, ro, fe 7.68m: J, 70°, pl, ro, fe 7.8m: J, 70°, pl, ro, fe				PL(A) = 0.78 PL(D) = 0.42 PL(A) = 0.2 PL(D) = 0.11
	8.46	SILTSTONE - Low strength, fresh, grey siltstone						8.35m: P, 5°, un, ro 8.4m: J, 80°, un, ro 8.42m: P, 10°, un, ro	C	100	89	PL(A) = 0.13 PL(D) = 0.16
	9.0	CARBONACEOUS SILTSTONE - Low strength, fresh, dark grey carbonaceous siltstone with 30% interbedded fine grained sandstone										PL(A) = 0.26 PL(D) = 0.27
	9.4	COAL - Low strength, fresh, black coal From 9.52m, tuffaceous siltstone to 9.64m						From 9.4m to 9.52m, fg 9.56m: P, 5°, un, ro From 9.64m to 9.84m, fractured				
	9.9	From 9.84m to 9.9m, carbonaceous claystone						9.9m: CORE LOSS:	C	50	0	pp = 500

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.05m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.1m, then NMLC coring to 20.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369299
NORTHING: 6374480
DIP/AZIMUTH: 90°/--

BORE No: 3003
PROJECT No: 81719.09
DATE: 6/12/2018
SHEET 3 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
		CORE LOSS - 250mm *(continued)*						250mm	C	50	0	
	10.15	COAL - Low strength, fresh, black coal with interbedded carbonaceous mudstone bands up to 100mm thick						From 10.15m to 10.26m, fractured 10.35m: P, sh, pl, ro From 10.35m to 10.63m, fractured	C	100	0	PL(A) = 0.26
6		From 10.82m to 10.94m, tuffaceous siltstone						10.68m: P, sh, pl, ro From 10.72m to 10.82m, fractured 10.93m: J, 45°, pl, ro 10.94m: P, sh, pl, ro 10.97m: P, sh, pl, ro 11.05m: J, sv, pl, ro				
	11	From 11.32m to 11.58m, extremely low strength, extremely weathered, tuffaceous siltstone with carbonaceous bands up to 50mm in thickness From 11.58m to 11.65m, very low strength, interbedded carbonaceous siltstone and tuffaceous siltstone						From 11.15m to 11.22m, fractured 11.25m: J, 75°, pl, ro 11.3m: P, sh, pl, ro 11.8m: P, sh, pl, ro				PL(A) = 0.3 PL(D) = 0.04
5	12	From 11.65m to 11.93m, very low to low strength interbedded carbonaceous siltstone						From 11.93m to 12.11m, fragmented 12.46m: P, 5°, pl, ro	C	100	40	
		From 12.75m to 12.82m, very low strength, highly weathered, carbonaceous siltstone						From 12.75m to 12.86m, fractured 12.9m: J, 45°, pl, ro 12.96m: P, sh, pl, ro From 13m to 13.08m, fractured 13.2m: J, sv, un, ro 13.3m: J, sv, un, ro				PL(A) = 0.21 PL(D) = 0.16
4	13	From 12.82m to 13.0m, carbonaceous siltstone From 13m to 13.47m, medium strength							C	83	27	
		From 13.47m to 13.52m, very low strength From 13.52m to 13.91m, low strength, carbonaceous siltstone						From 13.81m to 13.83m, fractured From 13.9m to 14.0m, fractured				PL(A) = 0.11 PL(D) = 0.05
3	14	From 13.91m to 14m, medium strength						14m: CORE LOSS: 200mm				
	14.0	CORE LOSS - 0.2m										
	14.2	SANDSTONE - Low strength, slightly weathered, grey, fine grained sandstone with 30% interbedded siltstone							C	100	88	PL(A) = 0.09
2												

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.05m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.1m, then NMLC coring to 20.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3003

10.0 m to 15.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3003

15.0 m to 20.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	6
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369299
NORTHING: 6374480
DIP/AZIMUTH: 90°/--

BORE No: 3003
PROJECT No: 81719.09
DATE: 6/12/2018
SHEET 4 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	15.25	SANDSTONE - Low strength, fresh, grey, fine to medium grained sandstone										PL(A) = 0.17
	15.75	SILTSTONE - Very low strength, moderately weathered, grey siltstone with 10% fine to medium grained sandstone										
	16							16.3m: J, 35°, un, ro 16.39m: J, 45°, un, ro 16.43m: P, sh, pl, ro 16.51m: P, sh, pl, ro From 16.56m to 16.63m, fractured	C	100	88	PL(A) = 0.04
		From 16.84m to 17.2m, low strength										
	17											
		From 17.78m to 18m, low strength										
	18	From 18m, highly weathered						18.13m: J, 45°, un, ro 18.55m: P, sh, pl, ro	C	100	68	PL(A) = 0.16
	19											
	19.26	From 19.15m to 19.26m, medium strength, fresh, black coal						From 19.15m to 19.26m, fractured				
		From 19.26m to 19.51m, low strength										PL(A) = 0.13 PL(D) = 0.18
	19.51	From 19.51m to 19.65m, medium strength, fresh, black coal						19.5m: P, sh, pl, ro From 19.51m to 19.65m, fractured				
	19.65											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.05m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.1m, then NMLC coring to 20.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369299
NORTHING: 6374480
DIP/AZIMUTH: 90°/--

BORE No: 3003
PROJECT No: 81719.09
DATE: 6/12/2018
SHEET 5 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
									C	100	68	
	20.15	Bore discontinued at 20.15m, limit of investigation										
-4	21											
-5	22											
-6	23											
-7	24											
-8												

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.05m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.1m, then NMLC coring to 20.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

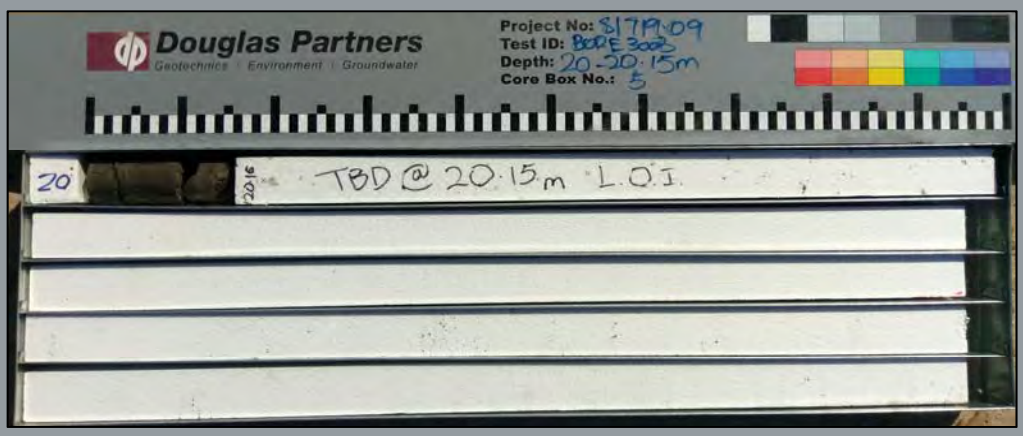
SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3003



20.0 m to 20.15 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	7
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.5 AHD
EASTING: 369305
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3004
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 1 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
21	0.2	FILLING - Generally comprising gravelly fine to coarse grained sand filling with some clay with subangular to subrounded gravel up to 30mm in size							D			
		FILLING - Generally comprising fine to coarse grained sandy clay filling with some subangular to subrounded gravel upto 10mm in size							D			
		From 0.6m, trace gravel										
	1								D			
									S			4,3,4 N = 7
20												
	2											
19		From 2.5m, becoming clay filling with some subangular to subrounded gravel and trace fine to coarse grained sand							S			7,5,6 N = 11
	3											
18												
	4								D			
	4.2	CLAY - Hard, brown mottled yellow clay, M<Wp							S			pp >400 12,12,15 N = 27
17	4.65	SANDSTONE - Very low strength, moderately weathered, light grey fine to coarse grained sandstone, some ironstaining, carbonaceous lenses up to 2mm thick							C	100	100	
	5.0											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 4.65m

TYPE OF BORING: Solid flight auger drilling with V-bit to 4.65m, then NMLC coring to 23.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3004

4.65 m to 8.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3004

8.0 m to 13.0 m

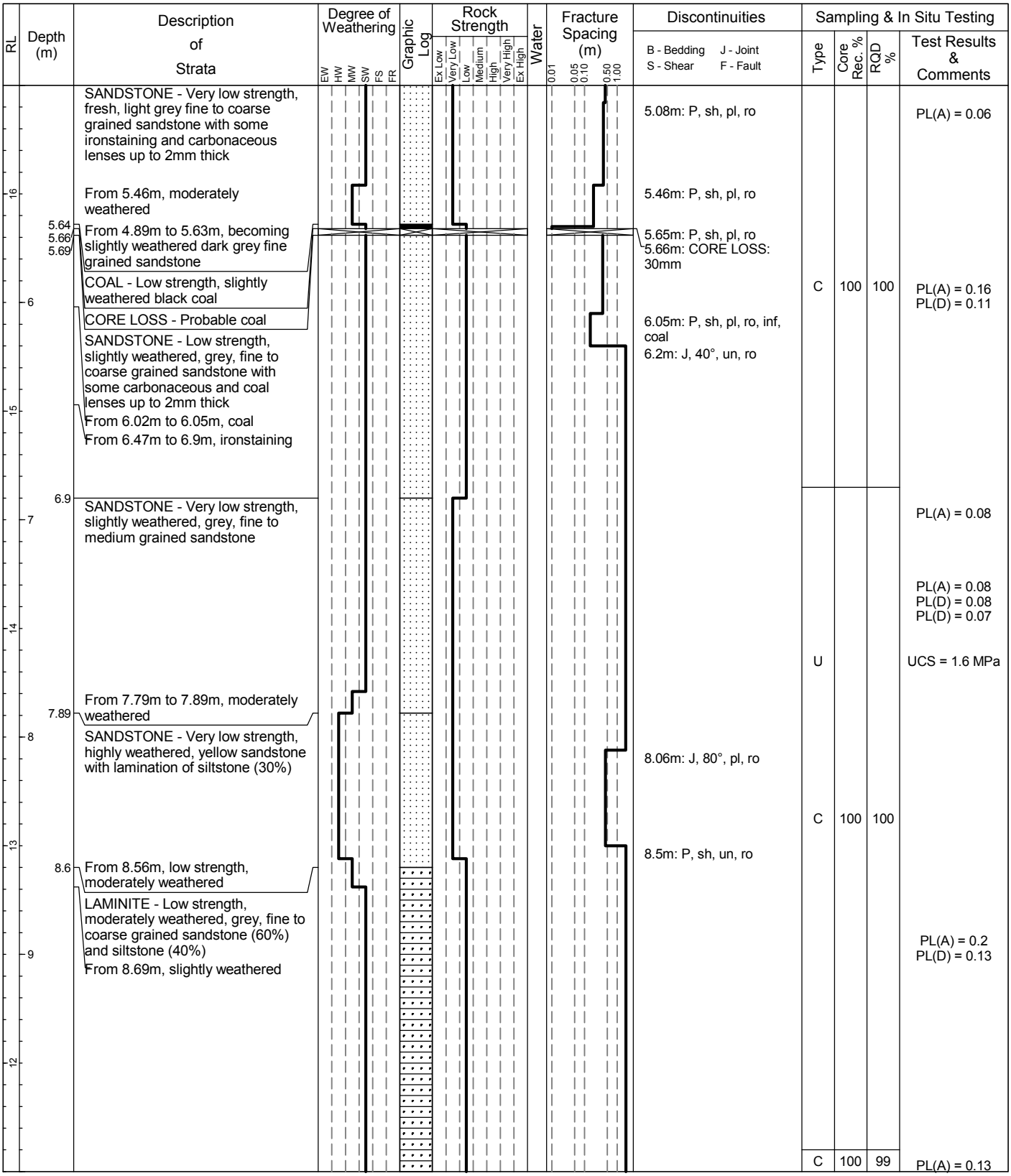
Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	8
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.5 AHD
EASTING: 369305
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3004
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 2 OF 5



RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 4.65m

TYPE OF BORING: Solid flight auger drilling with V-bit to 4.65m, then NMLC coring to 23.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.5 AHD
EASTING: 369305
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3004
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 3 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	10.19	At 10.16m, coal band, 1mm thick										
		SANDSTONE - Low strength, slightly weathered, grey fine to coarse grained sandstone						10.37m: J, 45°, un, ro				
11		From 10.86m to 11.03m, very low strength siltstone laminations										PL(A) = 0.09 PL(D) = 0.08
10									C	100	99	
												PL(A) = 0.14 PL(D) = 0.17
12								12m: J, 80°, pl, ro				
								12.31m: J, sv, un, ro				
9		From 12.4m, low to medium strength										
13								13.06m: J, 40°, pl, ro				PL(A) = 0.24 PL(D) = 0.34 PL(A) = 0.22 PL(D) = 0.14
8								13.5m: J, sv, pl, ro				
14									C	100	100	
7												PL(A) = 0.42 PL(D) = 0.41
	15.0											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 4.65m

TYPE OF BORING: Solid flight auger drilling with V-bit to 4.65m, then NMLC coring to 23.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3004

13.0 m to 18.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3004

18.0 m to 23.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	9
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.5 AHD
EASTING: 369305
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3004
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 4 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SANDSTONE - Low to medium strength, slightly weathered, grey fine to coarse grained sandstone From 15.17m to 15.28m, interbedded bands of carbonaceous sandstone						15.23m: P, sh, pl, ro	C	100	100	PL(A) = 0.32 PL(D) = 0.26 PL(A) = 0.13
	15.74	SILTSTONE - Low strength, moderately weathered, grey siltstone with 10°-20° bands of fine grained sandstone From 15.9m, with 10% interbedded sandstone laminates						15.74m: P, sh, pl, ro				PL(A) = 0.16
	16.25	SANDSTONE - Low to medium strength, slightly weathered, grey fine to medium grained sandstone						16.36m: J, 70°, pl, ro 16.4m: P, sh, pl, ro 16.5m: P, sh, pl, ro				
	16.73	LAMINITE - Very low strength, slightly weathered, grey fine to medium grained sandstone (50%) and siltstone (50%) laminite										PL(A) = 0.07 PL(D) = 0.05 PL(A) = 0.05 PL(A) = 0.11 PL(D) = 0.06
	17.18 17.36	COAL / CARBONACEOUS SILTSTONE - Low strength, slightly weathered, black coal / carbonaceous siltstone						From 17.22m to 17.35m, fractured	C	83	66	
	17.51	SANDSTONE - Low to medium strength, moderately weathered, fine to medium grained sandstone						17.47m: P, sh, pl, ro 17.51m: P, sh, pl, ro				
		COAL - Low to medium strength, fresh, black coal From 17.7m to 17.91m, carbonaceous siltstone From 18m, medium strength						17.63m: J, sv, un, ro				PL(A) = 0.36
	18.35	CORE LOSS - Probable coal						18.35m: CORE LOSS: 500mm				
	18.85	TUFFACEOUS SILTSTONE - Very low strength, highly weathered, tuffaceous siltstone						19.18m: P, sh, pl, ro				
	19.32 19.4	COAL - Low to medium strength, fresh, black coal						19.33m: P, sh, pl, ro 19.36m: J, sv, pl, ro	C	87	67	
	19.63	CLAYSTONE - Very low strength, highly weathered, brown claystone From 19.47m, grey siltstone										
		COAL - Low strength, fresh, black coal						19.85m: P, sh, pl, ro 19.91m: P, sh, pl, ro				
	19.94											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 4.65m

TYPE OF BORING: Solid flight auger drilling with V-bit to 4.65m, then NMLC coring to 23.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21.5 AHD
EASTING: 369305
NORTHING: 6374546
DIP/AZIMUTH: 90°/--

BORE No: 3004
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 5 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	20.07	CLAYSTONE - Very low strength, moderately weathered, brown claystone *(continued)*						19.93m: P, sh, pl, ro				
		COAL - Low to medium strength, fresh, black coal						From 20.2m to 20.36m, fractured				
								From 20.52m to 20.67m, fractured	C	87	67	
	20.87	CORE LOSS - Probable coal						From 20.79m to 20.87m, fractured 20.87m: CORE LOSS: 280mm				
	21.15	COAL - Low to medium strength, slightly weathered, black coal						21.24m: J, sv, pl, ro				
	21.3	CORE LOSS - Probable coal						21.29m: P, sh, un, ro 21.3m: CORE LOSS: 360mm				
	21.66	COAL - Low strength, fresh, black coal From 21.73m to 22.1m, very low strength, highly weathered, carbonaceous siltstone						21.72m: P, sh, pl, ro 21.77m: P, 10°, pl, ro 21.85m: P, 10°, pl, ro				PL(A) = 0.05 PL(D) = 0.03
	22.25	SANDSTONE - Low strength, moderately weathered, grey-brown fine grained sandstone							C	83	60	PL(A) = 0.12 PL(D) = 0.1
	22.35	SILTSTONE - Very low strength, moderately weathered, grey siltstone						22.36m: J, 75°, pl, ro 22.48m: J, 70°, pl, ro				
	23.3	Bore discontinued at 23.3m, limit of investigation										

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 4.65m

TYPE OF BORING: Solid flight auger drilling with V-bit to 4.65m, then NMLC coring to 23.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3004

23.0 m to 23.3 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	10
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369256
NORTHING: 6374493
DIP/AZIMUTH: 90°/--

BORE No: 3005
PROJECT No: 81719.09
DATE: 10/12/2018
SHEET 1 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		FILLING - Generally comprising brown to pale clay with some rootlets							D			
	0.3	SANDY CLAY - Very stiff, brown mottled orange clay with fine to coarse grained sand, M<Wp							D			
16		From 0.7m, becoming hard (auger screaches)										
	0.9	SANDSTONE - Extremely low strength, extremely weathered, pale grey to yellow fine to coarse grained sandstone										
	1.0	SANDSTONE - Very low strength, slightly weathered, fine to medium grained sandstone						1.28m: P, sh, pl, ro				PL(A) = 0.07 PL(D) = 0.06
		From 1.52m to 2.5m, fresh							C	100	100	
		From 1.63m to 1.7m, low strength										PL(A) = 0.07 PL(D) = 0.07
15		From 1.78m, becoming low strength						1.77m: P, sh, pl, ro				
	2											
14												
	3	From 3.0m to 3.78m, moderately weathered										
13								3.6m: P, sh, pl, ro 3.7m: J, 80°, un, ro 3.78m: P, sh, pl, ro	C	100	98	
	3.9	SANDSTONE - Medium strength, fresh, grey, fine to medium grained sandstone with 10% interbedded bands of siltstone										PL(A) = 0.34
	4											
12												
	5.0											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.0m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.0m, then NMLC coring to 20.21m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3005

1.0 m to 5.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3005

5.0 m to 10.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	11
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369256
NORTHING: 6374493
DIP/AZIMUTH: 90°/--

BORE No: 3005
PROJECT No: 81719.09
DATE: 10/12/2018
SHEET 2 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
11	6	LAMINITE - Low strength, fresh, grey, 50% fine grained sandstone, 50% siltstone laminite							C	100	98	
												PL(A) = 0.2 PL(D) = 0.2
									U			UCS = 1.1 MPa
												PL(A) = 0.16 PL(D) = 0.1
	6.58	SANDSTONE - Low to medium strength, fresh, grey fine to medium grained sandstone						>>	C	100	100	
10	7											
9	8											
8	9	From 9.2m to 9.5m, medium strength, slightly weathered, sandstone with calcite laminations up to 100mm thick From 9.6m to 10.45m, 50% low strength interbedded bands of sandstone up to 50mm thick						9.18m: P, sh, un, ro, infil From 9.2m to 9.5m, vein, calcite 9.45m: J, 25°, un, ro 9.52m: J, sv, un, ro	C	100	98	PL(D) = 0.34 PL(A) = 0.2 PL(D) = 0.26 PL(D) = 0.55 PL(A) = 0.19 PL(D) = 0.16
7												

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.0m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.0m, then NMLC coring to 20.21m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369256
NORTHING: 6374493
DIP/AZIMUTH: 90°/--

BORE No: 3005
PROJECT No: 81719.09
DATE: 10/12/2018
SHEET 3 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 0.05 0.10 0.50 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
6	11	SANDSTONE - Low to medium strength, fresh, grey fine to medium grained sandstone *(continued)*						10.64m: J, sv, pl, ro	C	100	98	PL(A) = 0.23 PL(D) = 0.18 PL(D) = 0.54
5	12							12.25m: P, sh to 5°, un, ro				
4	13							12.76m: P, sh to 5°, un, ro	C	100	100	PL(A) = 0.47 PL(D) = 0.4
								13.27m: J, 80°, pl, ro				
3	14											
2	14.42	COAL - Medium strength, fresh black coal						14.5m: P, sh, pl, ro 14.52m: P, sh, pl, ro 14.56m: P, sh, pl, ro 14.7m: P, sh, pl, ro 14.76m: J, 75°, un, ro	C	79	49	PL(A) = 0.66 PL(D) = 0.6
	14.52											
	14.72	SILTSTONE - Low strength, moderately weathered, grey siltstone with iron bands up to 20mm thick						14.93m: J, 75°, un, ro				

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.0m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.0m, then NMLC coring to 20.21m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3005

10.0 m to 15.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3005

15.0 m to 20.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	12
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369256
NORTHING: 6374493
DIP/AZIMUTH: 90°/--

BORE No: 3005
PROJECT No: 81719.09
DATE: 10/12/2018
SHEET 4 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
		COAL - Low strength, fresh, black coal *(continued)* From 14.88m to 15.1m, carbonaceous siltstone						15.1m: P, sh, pl, ro				PL(A) = 0.16
								15.37m: J, 40°, un, ro 15.43m: J, 40°, un, ro				
	15.55	TUFFACEOUS SILTSTONE - Very low strength, highly weathered, grey tuffaceous siltstone										
	15.69	COAL - Low strength, fresh, black coal From 15.93m to 16.1m, moderately weathered carbonaceous siltstone							C	79	49	
	16							15.95m: P, sh, pl, ro				
	16.2	CORE LOSS - Probable coal						16.15m: J, 80°, un, ro 16.2m: CORE LOSS: 500mm				
	16.7	COAL - Medium strength, fresh, black coal						16.74m: P, sh, pl, ro 16.81m: P, sh, pl, ro From 16.81m to 16.9m, fractured				PL(A) = 0.72 PL(D) = 0.14
	16.9	CORE LOSS - Probable coal						16.9m: CORE LOSS: 670mm				
	17											
	17.57	COAL - Medium strength, fresh, black coal						17.6m: J, 70°, pl, ro 17.68m: P, sh, pl, ro	C	61	28	
	18							From 18m to 18.1m, fractured				
								18.3m: J, sv, un, ro				
	18.47	CARBONACEOUS SILTSTONE - Low strength, slightly weathered carbonaceous siltstone										
	18.9	CORE LOSS - Probable coal						18.86m: P, sh, un, ro 18.9m: CORE LOSS: 100mm				
	19 19.0							From 19.0m to 19.05m, fractured				
	19.05	COAL - Medium strength, fresh black coal										
		SANDSTONE - Low strength, fresh, grey, fine to medium grained sandstone, interbedded siltstone bands up to 30mm thick							C	94	79	PL(A) = 0.14 PL(D) = 0.13
												PL(A) = 0.17

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.0m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.0m, then NMLC coring to 20.21m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.8 AHD
EASTING: 369256
NORTHING: 6374493
DIP/AZIMUTH: 90°/--

BORE No: 3005
PROJECT No: 81719.09
DATE: 10/12/2018
SHEET 5 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
									C	94	79	PL(D) = 0.21
	20.21	Bore discontinued at 20.21m, limit of investigation										
-4	21											
-5	22											
-6	23											
-7	24											
-8												

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.0m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.0m, then NMLC coring to 20.21m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

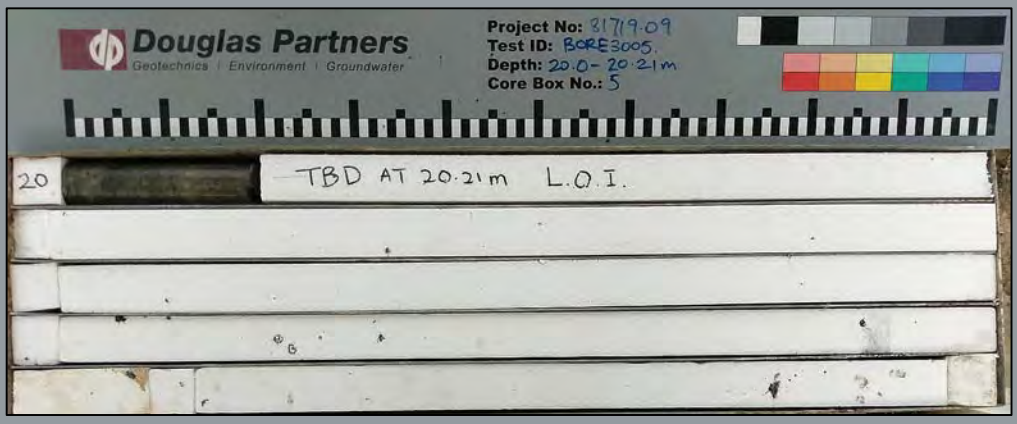
SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3005



20.0 m to 20.21 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	13
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.1 AHD
EASTING: 369295
NORTHING: 6374436
DIP/AZIMUTH: 90°/--

BORE No: 3006
PROJECT No: 81719.09
DATE: 7/12/2018
SHEET 1 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
16		FILLING - Generally comprising brown gravelly silty fine to coarse grained sand with subangular to subrounded gravel up to 20mm in size, moist							D			
	0.5	CLAYEY SAND - Brown clayey fine to coarse grained clayey sand, moist							D			
	0.6	CLAY - Very stiff, brown clay, M<Wp										
15	1	From 1.0m, hard							D S			25/70,-,- refusal
	1.2	SILTSTONE - Very low strength, moderately weathered, grey siltstone with 30% interbedded fine grained sandstone bands up to 30mm thick						1.41m: P, sh, pl, ro, inf, clay 1.7m: P, 5°, pl, ro, fe				PL(A) = 0.05 PL(D) = 0.05
	1.82	From 1.79m to 1.82m, ironstaining						1.8m: P, 5°, pl, ro, fe 1.82m: P, 5°, pl, ro, fe	C	100	98	
14	2	SANDSTONE - Low strength, moderately weathered, grey, fine to coarse grained sandstone From 2m to 6.61m, slightly weathered							U			UCS = 7.3 MPa
												PL(A) = 0.13 PL(D) = 0.15
								2.65m: J, 50°, un, ro, inf, carbonaceous 2.75m: J, 50°, un, ro, inf, carbonaceous				
13	3								C	100	100	
												PL(A) = 0.13 PL(D) = 0.2
12	4							>>				
												PL(A) = 0.21 PL(D) = 0.18

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.2m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.2m, then NMLC coring to 20.18m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3006

1.2 m to 5.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3006

5.0 m to 10.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	14
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.1 AHD
EASTING: 369295
NORTHING: 6374436
DIP/AZIMUTH: 90°/--

BORE No: 3006
PROJECT No: 81719.09
DATE: 7/12/2018
SHEET 2 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
11		SANDSTONE - Low strength, moderately weathered, grey, fine to coarse grained sandstone *(continued)*							C	100	100	
												PL(A) = 0.21 PL(D) = 0.18
10	6							6.14m: J, 85°, pl, ro				PL(A) = 0.83 PL(D) = 1.17
		From 6.2m to 6.61m, medium strength							C	100	100	
		From 6.61m, high strength, fresh						6.61m: J, 55°, pl, ro				
9	7											PL(A) = 1.71 PL(D) = 1.4
	7.26	LAMINITE - Low strength, moderately weathered, grey, 70% fine grained sandstone and 30% siltstone laminite						7.33m: P, sh, pl, ro 7.4m: P, sh, pl, ro 7.58m: P, sh, un, ro 7.67m: J, 20°, un, ro	C	100	50	
8	8											
	7.98	COAL - Low strength, fresh, black coal						7.98m: P, sh, un, ro 8.06m: P, sh, pl, ro From 8.06m to 8.27m, fractured				PL(A) = 0.1
		From 8.27m to 8.44m, becoming carbonaceous siltstone						8.4m: J, 60°, un, ro 8.42m to 8.57m, fractured				
		From 8.58m to 8.83m, low strength, moderately weathered, carbonaceous claystone						8.84m: P, sh, pl, ro 8.92m: P, sh, pl, ro				PL(A) = 0.22
7	9											
		From 9.06m to 9.2m, carbonaceous siltstone						9.06m: P, sh, pl, ro	C	82	39	
	9.27	TUFFACEOUS SANDSTONE - Very low strength, moderately weathered, fine to coarse grained tuffaceous sandstone with 20% interbedded siltstone bands up to 5mm thick						9.27m: P, sh, pl, ro 9.42m: P, sh, pl, ro 9.55m: J, sv, un, ro				PL(D) = 0.06 PL(A) = 0.1 PL(D) = 0.07
	9.42											
	9.67	COAL - Low strength, fresh, black coal						9.67m: CORE LOSS: 280mm				
	9.95	CORE LOSS - 0.28m										

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.2m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.2m, then NMLC coring to 20.18m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.1 AHD
EASTING: 369295
NORTHING: 6374436
DIP/AZIMUTH: 90°/--

BORE No: 3006
PROJECT No: 81719.09
DATE: 7/12/2018
SHEET 3 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
6		TUFFACEOUS SILTSTONE - Low strength, highly weathered grey tuffaceous siltstone *(continued)*						9.98m: P, sh, pl, ro	C	72	30	
	10.25	COAL - Low strength, fresh, black coal						10.2m: P, sh, pl, ro 10.22m: P, sh, pl, ro 10.27m: J, sv, un, ro 10.36m: J, 80°, un, healed				
	10.54	From 10.43m to 10.49m, very low strength, highly weathered tuffaceous claystone						10.41m: P, sh,un, ro From 10.48m to 10.54m, fractured	C	72	30	
		CORE LOSS - 0.29m						10.54m: CORE LOSS: 290mm				
	10.83	CARBONACEOUS SILTSTONE - Low strength, fresh, dark grey to black carbonaceous siltstone						10.88m: P, sh, un, ro				PL(A) = 0.1
5	11 11.0	CORE LOSS - 0.44m						11m: CORE LOSS: 440mm				
	11.44	COAL - Medium strength, fresh, black coal						From 11.44m to 11.74m, fractured				
4	12							11.79m: P, sh, ro, un 11.81m: P, sh, ro, un 11.83m: J, sv, ro, un 11.89m: J, 40°, un, ro 12m: J, 80°, pl, ro	C	76	25	
		From 12.26m to 12.62m, low strength, moderately weathered carbonaceous siltstone						12.2m: P, sh, pl, ro 12.4m: P, sh, pl, ro 12.55m: J, 10°-30°, pl, ro 12.63m: P, 5°, pl, ro 12.67m: P, 5°, pl, ro 12.83m: P, sh, pl, ro 12.91m: P, sh, pl, ro				PL(A) = 0.11
	12.76	SILTSTONE - Low strength, highly weathered siltstone with 20% fine grained sandstone										
	12.92	LAMINITE - Low strength, slightly weathered, grey, fine grained sandstone (70%) and siltstone (30%)										
3	13								C	100	61	PL(A) = 0.16 PL(D) = 0.17
2	14							14.67m: P, sh, pl, ro	C	100	93	

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.2m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.2m, then NMLC coring to 20.18m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3006

10.0 m to 15.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3006

15.0 m to 20.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	15
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.1 AHD
EASTING: 369295
NORTHING: 6374436
DIP/AZIMUTH: 90°/--

BORE No: 3006
PROJECT No: 81719.09
DATE: 7/12/2018
SHEET 4 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		LAMINITE - Low strength, slightly weathered, grey, fine grained sandstone (70%) and siltstone (30%) *(continued)*										
	15.31	From 15.12m, low strength, moderately weathered, 50% sandstone and 50% siltstone From 15.15m to 15.18m, coal										
		SILTSTONE - Very low to low strength, slightly weathered, grey siltstone with 10% interbedded fine grained sandstone bands						15.93m: P, sh, un, ro				PL(A) = 0.07 PL(D) = 0.07
0	16								C	100	93	
-1	17											
		From 17.19m, very low strength						17.19m: J, 20°, pl, ro				
	17.29 17.3	SILTSTONE - Medium to high strength, slightly weathered, grey siltstone (possibly sideritic) CORE LOSS - 0.38m						17.3m: CORE LOSS: 380mm				
	17.68	SILTSTONE - Medium to high strength, slightly weathered, grey siltstone (possibly sideritic)						17.83m: J, 30°, un, healed				
	17.81	SILTSTONE - Very low strength, moderately weathered, grey siltstone										
-2	18								C	78	36	
	18.33	COAL - Low strength, fresh, black coal From 18.41m, becomes very low strength, moderately weathered carbonaceous						18.41m: J, 30°, un, ro 18.44m: J, 30°, un, ro 18.53m: J, 5°, un, ro				PL(A) = 0.04
	18.64	SILTSTONE - Very low to low strength grey siltstone						18.91m: J, 45°, un, ro				PL(A) = 0.1 PL(D) = 0.05
-3	19											PL(A) = 0.15 PL(D) = 0.17
								19.13m: P, sh, un, ro				
	19.38	From 19.3m, low strength, fresh, coal SANDSTONE - Low strength, fresh, fine to coarse grained grey sandstone							C	100	81	
		From 19.72m, medium strength						19.73m: J, 30°, pl, ro				

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.2m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.2m, then NMLC coring to 20.18m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 16.1 AHD
EASTING: 369295
NORTHING: 6374436
DIP/AZIMUTH: 90°/--

BORE No: 3006
PROJECT No: 81719.09
DATE: 7/12/2018
SHEET 5 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-4									C	100	81	PL(A) = 0.4 PL(D) = 0.44
	20.18	Bore discontinued at 20.18m, limit of investigation										
	21											
-5												
	22											
-6												
	23											
-7												
	24											
-8												

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 1.2m

TYPE OF BORING: Solid flight auger drilling with V-bit to 1.2m, then NMLC coring to 20.18m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

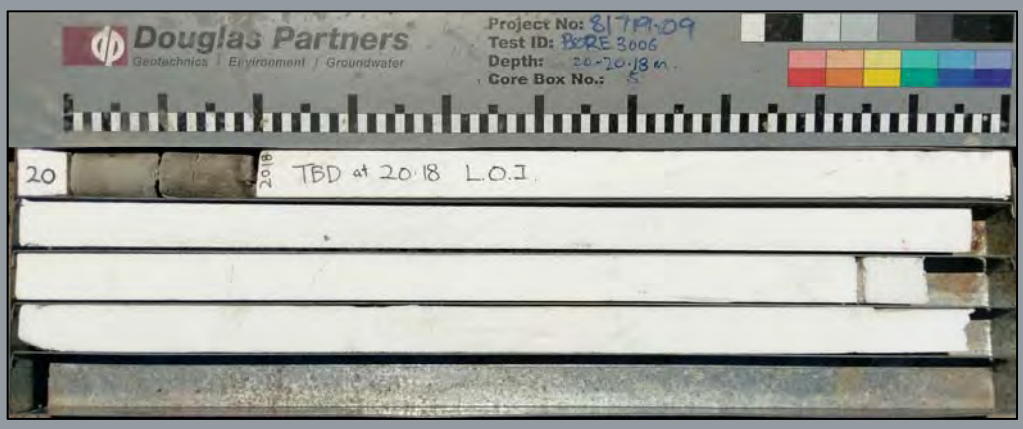
SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3006



20.0 m to 2.18 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	16
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 19.2 AHD
EASTING: 369226
NORTHING: 6374549
DIP/AZIMUTH: 90°/--

BORE No: 3007
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 1 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
19	0.2	FILLING - Generally comprising gravelly sand filling with subangular to subrounded gravel up to 20mm in size							D			
		FILLING - Generally comprising fine to coarse grained sandy clay filling with trace subangular to subrounded gravel up to 5mm in size							D			
	1								D			
18									S			12,10,14 N = 24
	2											
17	2.1	SANDSTONE - Extremely low strength, extremely weathered, fine to coarse grained sandstone							D			
	2.5	SANDSTONE - Low strength, moderately weathered, fine to coarse grained grey with ironstaining sandstone						2.59m: J, 30°, un, ro				PL(A) = 0.2 PL(D) = 0.16
	3	From 2.9m to 2.98m, very low strength						2.85m: J, 40°, un, ro 2.88m: J, 20°, pl, ro				
16		From 3.14m to 3.39m, very low strength, grey						3.14m: J, 30°, un, ro				
		From 3.49m to 5.06m with some subangular to subrounded gravel up to 5mm in size							C	100	90	PL(A) = 0.12 PL(D) = 0.14
	4											
15		From 4.35m to 5.06m, medium strength						4.53m: J, 30°, pl, ro				PL(A) = 0.4 PL(D) = 0.33
	5.0											PL(A) = 0.43 PL(D) = 0.45

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit to 2.2m, then NMLC coring to 20.35m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 19.2 AHD
EASTING: 369226
NORTHING: 6374549
DIP/AZIMUTH: 90°/--

BORE No: 3007
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 2 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
14		SANDSTONE - Medium strength, moderately weathered, fine to coarse grained grey with ironstaining sandstone						5.07m: P, 5°-10°, pl, ro	C	100	90	
		From 5.14m, very low strength						5.16m: P, sh, pl, ro				
		From 5.14m to 5.21m, highly weathered						5.26m: P, 10°, pl, ro				
	5.57							5.3m: J, 25°, pl, ro				
		COAL - Very low strength, moderately weathered, black coal / carbonaceous siltstone										
	5.73											
		CARBONACEOUS CLAYSTONE - Very low strength, highly weathered, brown carbonaceous claystone						5.87m: J, 10°, un, ro				
6	6.05											PL(A) = 0.04 PL(D) = 0.03
13		SILTSTONE - Very low strength, highly weathered, grey siltstone										
	6.23											
	6.3	COAL - Very low strength, moderately weathered black coal										
		SILTSTONE - Very low strength, highly weathered, grey siltstone										
									C	100	90	
7												
12		From 7.26m to 7.4m, extremely low strength						7.24m: J, 70°, un, ro				PL(A) = 0.02
								7.4m: J, 30°, un, ro				PL(A) = 0.05 PL(D) = 0.06
	7.8											
		SANDSTONE - Low strength, moderately weathered, fine to medium grained grey sandstone with siltstone laminations up to 50%										
8	7.96											
11		SILTSTONE - Very low strength, highly weathered, grey siltstone with some ironstaining						8.35m: J, 40°, pl, ro				
								8.5m: J, 30°, pl, ro				PL(A) = 0.08 PL(D) = 0.06
								8.65m: P, sh, un, ro				
	8.74							8.74m: J, 20°, un, ro				
	8.78	COAL - Very low strength, highly weathered black coal						8.78m: CORE LOSS: 50mm				
	8.83	CORE LOSS - Probable coal										PL(A) = 0.19 PL(D) = 0.17
9		SANDSTONE - Low strength, slightly weathered, fine to medium grained sandstone										
10									C	98	97	
												PL(A) = 0.16

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit to 2.2m, then NMLC coring to 20.35m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

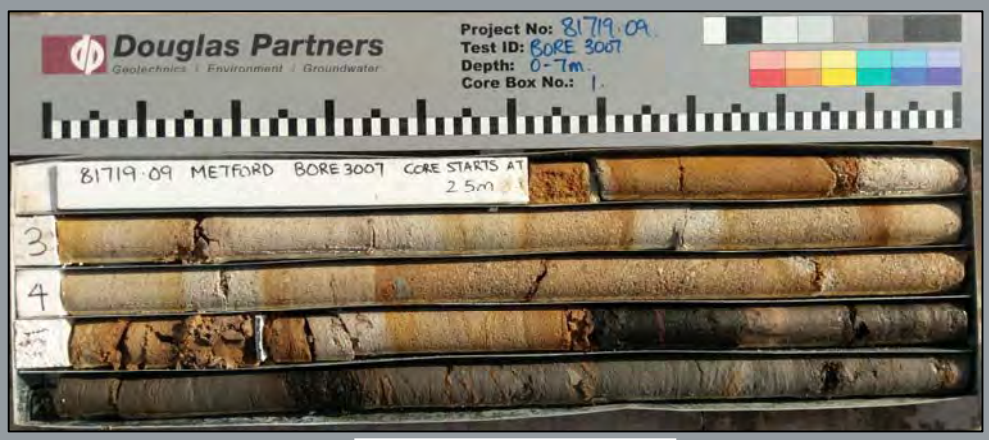
SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3007



2.5 m to 7.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3007

7.0 m to 12.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	17
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 19.2 AHD
EASTING: 369226
NORTHING: 6374549
DIP/AZIMUTH: 90°/--

BORE No: 3007
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 3 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
9	10.22	LAMINITE - Low strength, slightly weathered, fine grained sandstone (50%) and siltstone (50%) laminite							C	98	97	
8	10.81	SANDSTONE - Medium strength, slightly weathered, fine to medium grained sandstone										PL(A) = 0.31 PL(D) = 0.39
	11											PL(A) = 0.29
		From 11.47m, high to very strength										PL(D) = 4.3
7	12											PL(D) = 4.52
								12.28m: J, 50°, pl, ro				
	12.46	LAMINITE - Medium strength, slightly weathered, grey laminite, fine grained sandstone (70%) and siltstone (30%)										PL(A) = 0.36 PL(D) = 0.36
6	13								C	100	100	
		From 13.3m, low strength										PL(A) = 0.53 PL(D) = 0.48
5	14											PL(A) = 0.18 PL(D) = 0.15
								14.3m: P, sh, un, ro				
									C	100	100	PL(A) = 0.29 PL(D) = 0.28
								14.7m: P, sh, po, ro				PL(A) = 0.25 PL(D) = 0.23
	15.0											

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit to 2.2m, then NMLC coring to 20.35m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 19.2 AHD
EASTING: 369226
NORTHING: 6374549
DIP/AZIMUTH: 90°/--

BORE No: 3007
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 4 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
4		LAMINITE - Low strength, slightly weathered, grey laminite, fine grained sandstone (70%) and siltstone (30%)										PL(A) = 0.2 PL(D) = 0.19
	15.66	SANDSTONE - Low to medium strength, fine to medium grained sandstone with some interbedded siltstone layers up to 3mm thick										PL(A) = 0.66 PL(D) = 0.71
	16								C	100	100	
3												PL(A) = 0.28 PL(D) = 0.03
								16.4m: P, sh, po, ro				
		From 16.59m to 16.94m, medium to high strength										
	17											PL(A) = 0.24 PL(D) = 0.22
2												PL(A) = 0.73 PL(D) = 0.36
	18											
								18.05m: J, sv, un, ro (runs for 0.15m)				PL(A) = 0.28
1								18.4m: P, 30°, pl, ro				
								18.6m: J, 75°, pl, ro				
	19											PL(A) = 0.37 PL(D) = 0.32
0		From 19.11m to 19.40m, carbonaceous sandstone / coal laminates up to 2mm thick										
								19.32m: P, sh, un, ro 19.36m: J, 80°, pl, ro				
		From 19.8m to 20.17m, carbonaceous sandstone / coal										PL(A) = 0.71 PL(D) = 0.61

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit to 2.2m, then NMLC coring to 20.35m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

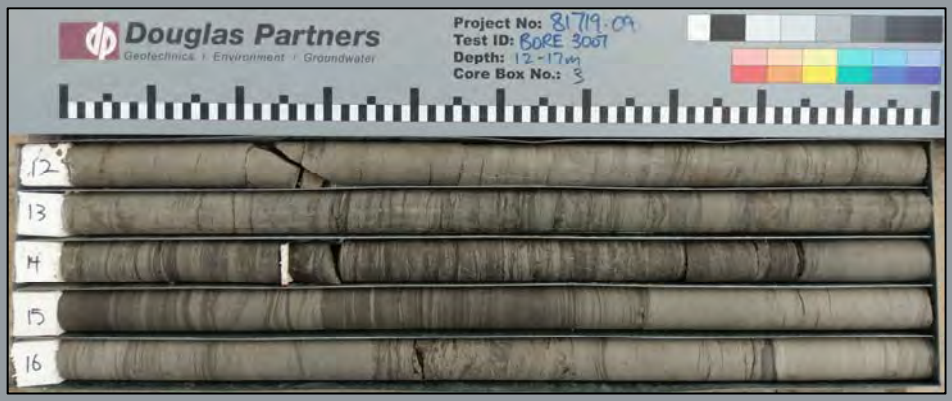
SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3007



12.0 m to 17.0 m

Proposed New Maitland Hospital, Metford Road, Metford

Bore 3007

17.0 m to 20.25 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **Proposed New Maitland Hospital** **Metford Street, Metford**	PROJECT:	81719.09
		PLATE No:	18
		REV:	0
	CLIENT: Multiplex Constructions Pty Ltd	DATE:	Dec 2018

BOREHOLE LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 19.2 AHD
EASTING: 369226
NORTHING: 6374549
DIP/AZIMUTH: 90°/--

BORE No: 3007
PROJECT No: 81719.09
DATE: 12/12/2018
SHEET 5 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		laminations up to 2mm thick										
-1		SANDSTONE - Low to medium strength, fine to medium grained sandstone with some interbedded siltstone layers up to 3mm thick *(continued)*										PL(A) = 0.16 PL(D) = 0.11
	20.35	From 20.17m to 20.35m, carbonaceous sandstone / coal laminations up to 2mm thick										
		Bore discontinued at 20.35m, limit of investigation										
	21											
-2												
	22											
-3												
	23											
-4												
	24											
-5												

RIG: Explora 140 **DRILLER:** Groundtest **LOGGED:** Ma **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger drilling with V-bit to 2.2m, then NMLC coring to 20.35m

WATER OBSERVATIONS: No free groundwater observed whilst augering, then groundwater obscured by drilling fluid during coring

REMARKS: Co-ordinates obtained from using differential GPS, typical accuracy +0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 17.0 AHD*
EASTING: 369268
NORTHING: 6374412
DIP/AZIMUTH: 90°/--

BORE No: 601
PROJECT No: 81719.01
DATE: 16/10/2015
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
17	0.1	FILLING - Generally comprising brown, fine to medium grained gravelly sand filling, sandstone gravel, trace coal on surface										
16	1	SANDSTONE - (Extremely low to very low strength) grey, stained orange, fine to medium grained sandstone										
	1.1	From 0.5m, probably low strength										PL(A) = 1.6 PL(D) = 1.1
	1.2	SANDSTONE - Medium to high strength, moderately weathered, slightly fractured, orange-brown, fine to medium grained sandstone						1.36m: P, sh, pl, stn, fe	C	100	66	PL(A) = 0.05
	1.65	SANDSTONE - Very low strength, moderately weathered, orange-brown, slightly fractured, fine to medium grained sandstone						1.82m: P, sh, pl, stn, fe				PL(A) = 0.32
15	2	SANDSTONE - Low to medium strength, fresh stained, slightly fractured, grey, fine grained sandstone, some silt						2.59m: J, 10°, pl, un, clay				PL(A) = 0.23 PL(D) = 0.26
14	3	From 2.62m to 2.67m, very low strength						2.62m: J, 10°, pl, cbs				
	3.22	SANDSTONE - Medium strength, fresh stained, slightly fractured to unbroken, pale grey, medium grained sandstone, carbonaceous bands in parts							C	100	93	PL(A) = 0.75 PL(D) = 0.42
13	4	From 4.05m to 4.20m, 1mm carbonaceous layers horizontally bedded						3.85m: P, sh, pl, cbs				
		From 4.12m to 4.15m, low strength										PL(A) = 0.72 PL(D) = 0.65
12	5	From 5.00m to 5.01m, carbonaceous coal band										
	5.05	SANDSTONE - Extremely low strength, highly weathered, friable, orange-brown, medium grained sandstone										
11	6	SANDSTONE - Medium strength, slightly weathered, slightly fractured to unbroken, pale grey, stained orange in parts, medium grained sandstone						6.08m: J, 20°, pl, ro, stn, fe	C	100	73	PL(A) = 0.38 PL(D) = 0.26
10	7											PL(A) = 0.6 PL(D) = 0.3
9	8											
	8.17	Bore discontinued at 8.17m, limit of investigation										
8	9											

RIG: Explorer **DRILLER:** Ground Test (Simon) **LOGGED:** Parkinson **CASING:** HQ to 1.1m

TYPE OF BORING: Solid flight auger TC bit to 1.1m, NMLC core to 8.17m

WATER OBSERVATIONS: Observations obscured by drilling fluids below 1.1m

REMARKS: *Surface level provided by project surveyor

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 601 PROJECT 81719.01 2015

1.10 m – 6.00 m

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 601 PROJECT 81719.01 2015

6.00 m – 8.17 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **New Maitland Hospital, Metford**	PROJECT:	81719.01
		PLATE No:	1
		REV:	0
	CLIENT: Health Infrastructure	DATE:	25-Nov-15

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21 AHD*
EASTING: 369340
NORTHING: 6374598
DIP/AZIMUTH: 90°/--

BORE No: 602
PROJECT No: 81719.01
DATE: 15/10/2015
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
21		FILLING - Brown-grey sandy clay filling, comprising fine to medium grained sand with some fine to medium sized gravel (coal, siltstone, sandstone and brick fragments)							A			
	0.8								A			
20	1	SILTSTONE - Extremely low to very low strength, highly weathered brown siltstone							S			17,25/100 refusal
		From 1.75m to 1.85m, extremely weathered coal/carbonaceous siltstone										
19	2											
	2.15	SANDSTONE - Low strength, moderately weathered, slightly fractured, light brown fine to medium grained sandstone						2.3m: P, 3°, pl, sm 2.4m: P, 5°, pl, sl				PL(A) = 0.3 PL(D) = 0.28
18	3											
	3.11	SILTSTONE - Low to very low strength, highly weathered, slightly fractured, pale grey and brown siltstone with carbonaceous lenses						3.36m: P, 3°, pl, sm, Cn				PL(A) = 0.27 PL(D) = 0.09
	3.59	SANDSTONE - Very low strength, highly weathered, unbroken brown, fine to medium grained sandstone with trace carbonaceous lenses up to 2mm thick							C	100	56	PL(A) = 0.06 PL(D) = 0.07
17	4	From 4.26m to 4.65m, extremely low strength						4.57m: P, 2°, pl, sm				PL(A) = 0.04 PL(D) = 0.04
		At 4.93m, low strength										PL(A) = 0.08 PL(D) = 0.1
16	5	From 5.15m, fine grained						5.13m: P, 3°, pl, sm, Fe				PL(A) = 0.28 PL(D) = 0.25
								5.59m: P, 3°, pl, sm				PL(A) = 0.39 PL(D) = 0.25
15	6											PL(A) = 0.43 PL(D) = 0.27
	6.03	SANDY SILTSTONE - Low strength, fresh stained, slightly fractured, fine grained sandy siltstone										PL(A) = 0.21 PL(D) = 0.2
14	7							6.56m: BP, 2°, pl, sm 6.74m: BP, 2°, pl, sm	C	100	90	
								7.39m: BP, 2°, pl, sl				PL(A) = 0.3 PL(D) = 0.13
	7.64	SANDSTONE - Low strength, slightly weathered, slightly fractured, fine to medium grained sandstone with trace carbonaceous lenses up to 2mm thick										PL(A) = 0.24 PL(D) = 0.23
13	8							8.12m: P, 3°, un, sm				PL(A) = 0.28 PL(D) = 0.3
12	9	From 9.09m, medium strength, some low strength, moderately weathered bands							C	100	96	PL(A) = 0.41 PL(D) = 0.33
								9.59m: P, sh, pl, sm, fe 9.76m: J, 65°, pl, ti, fe				

RIG: Explorer **DRILLER:** Ground Test (Simon) **LOGGED:** Fulham **CASING:** HQ to 1.1m

TYPE OF BORING: Solid flight auger to 1.25m, rock roller to 2.15m, NMLC to 21.85m

WATER OBSERVATIONS: Free groundwater obscured due to drilling methods

REMARKS: *Surface level interpolated from historic survey plan

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 602 PROJECT 81719.01 2015

2.15 m – 7.00 m

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 602 PROJECT 81719.01 2015

7.00 m – 12.00 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **New Maitland Hospital, Metford**	PROJECT: 81719.01 PLATE No: 2 REV: 0
	CLIENT: Health Infrastructure	DATE: 25-Nov-15

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21 AHD*
EASTING: 369340
NORTHING: 6374598
DIP/AZIMUTH: 90°/--

BORE No: 602
PROJECT No: 81719.01
DATE: 15/10/2015
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
11		SANDSTONE - Low strength, slightly weathered, slightly fractured, fine to medium grained sandstone with trace carbonaceous lenses up to 2mm thick *(continued)*						10.12m: J, 75°, pl, ti, fe	C	100	96	PL(A) = 0.3 PL(D) = 0.34 PL(A) = 0.3 PL(D) = 0.26
10	11											PL(I) = 0.13
9	12	From 11.77m to 12.0m, some medium sized subrounded gravel							C	100	100	PL(A) = 0.35 PL(D) = 0.38 PL(A) = 0.25 PL(D) = 0.24
8	13							12.82m: BP, 2°, pl, sm, coal 13.36m: J, 40°, pl, sm, fe				PL(A) = 0.51 PL(D) = 0.38
7	14	From 13.75m, fine grained with some carbonaceous lenses										PL(A) = 0.2 PL(D) = 0.1 PL(A) = 0.31 PL(D) = 0.21
6	15	15.04 SILTSTONE - Low strength, fresh, grey siltstone						14.49m: P, 2°, pl, sm, coal	C	82	62	PL(A) = 0.56 PL(D) = 0.31 PL(A) = 0.15 PL(D) = 0.07
5	16	15.54 COAL/CARBONACEOUS SILTSTONE - Low strength, fresh, black coal with bands of carbonaceous siltstone up to 40mm thick 16.0 From 15.83m to 15.9m, medium strength 16.4 CORE LOSS - 0.4m in probable coal 16.8						15.54m to 16.0m, fractured 16m: CORE LOSS: 400mm 16.8m: CORE LOSS: 200mm	C	66	17	PL(A) = 0.23 PL(A) = 0.48 PL(A) = 0.06
4	17	17.0 COAL/CARBONACEOUS SILTSTONE - Very low strength, fresh, black coal with some bands of high strength carbonaceous siltstone CORE LOSS - 0.20m, in probable coal						17.13m to 18.0m, P, 3°, pl, sm at 140mm spacings	C	85	25	PL(A) = 0.11 PL(D) = 0.03 PL(A) = 0.52 PL(D) = 0.24 PL(A) = 0.51 PL(D) = 0.17
3	18	COAL/CARBONACEOUS SILTSTONE - Very low strength, fresh black coal with interbedded carbonaceous siltstone bands						18.1m: 3 x J, sv, pl, sm 18.32m: P, sh, pl, sl				PL(I) = 1.42
	18.62	CORE LOSS - 0.28m						18.62m: CORE LOSS: 280mm				
2	18.9 19 19.0	COAL - Low to medium strength, fresh, fragmented, black coal						18.90m to 19.0m, fragmented	C	100	0	
		CORE LOSS - 0.79m, in probable coal						19m: CORE LOSS: 790mm	C	6	0	
	19.79							19.79m to 20m,	C	100	60	

RIG: Explorer **DRILLER:** Ground Test (Simon) **LOGGED:** Fulham **CASING:** HQ to 1.1m

TYPE OF BORING: Solid flight auger to 1.25m, rock roller to 2.15m, NMLC to 21.85m

WATER OBSERVATIONS: Free groundwater obscured due to drilling methods

REMARKS: *Surface level interpolated from historic survey plan

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 602 PROJECT 81719.01 2015

12.00 m – 17.00m

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 602 PROJECT 81719.01 2015

17.00 m – 21.85 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **New Maitland Hospital, Metford**	PROJECT: 81719.01 PLATE No: 3 REV: 0
	CLIENT: Health Infrastructure	DATE: 25-Nov-15

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 21 AHD*
EASTING: 369340
NORTHING: 6374598
DIP/AZIMUTH: 90°/--

BORE No: 602
PROJECT No: 81719.01
DATE: 15/10/2015
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	20.28	CARBONACEOUS SILTSTONE - Very low strength, fresh, black to dark brown carbonaceous siltstone *(continued)*						fragmented 20.19m to 20.28m, fragmented				PL(A) = 0.13 PL(D) = 0.07
	20.65	SILTSTONE - Fresh, slightly fractured, grey siltstone										PL(A) = 0.11 PL(D) = 0.11
0	21	SANDSTONE - Low strength, fresh, unbroken grey fine grained sandstone with laminations of siltstone							C	100	60	PL(A) = 0.24 PL(D) = 0.14
	21.85											PL(A) = 0.22 PL(D) = 0.23
-1	22	Bore discontinued at 21.85m										
-2	23											
-3	24											
-4	25											
-5	26											
-6	27											
-7	28											
-8	29											

RIG: Explorer **DRILLER:** Ground Test (Simon) **LOGGED:** Fulham **CASING:** HQ to 1.1m

TYPE OF BORING: Solid flight auger to 1.25m, rock roller to 2.15m, NMLC to 21.85m

WATER OBSERVATIONS: Free groundwater obscured due to drilling methods

REMARKS: *Surface level interpolated from historic survey plan

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18.4 AHD*
EASTING: 369326
NORTHING: 6374480
DIP/AZIMUTH: 90°/--

BORE No: 603
PROJECT No: 81719.01
DATE: 16/10/2015
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
18	0	FILLING - Generally comprising grey-brown, fine to medium grained, gravelly sand filling, sandstone gravel, possible sandstone cobbles, trace clay										
17	1								S			10,19,18 N = 37
16	2											
	2.2	SANDSTONE - (Low strength) grey, fine grained sandstone, some silt										
	2.47	SANDSTONE - Low strength, slightly weathered, slightly fractured, grey, fine grained sandstone, some silt, some carbonaceous bands up to 1mm thick, horizontally bedded						2.82m: J, 10°, pl, sm, stn, fe 3.28m: J, 10°, ir, ro, stn, fe 3.71m: J, 10°, pl, ro, cbs	C	100	100	PL(A) = 0.2 PL(D) = 0.3 PL(A) = 0.23 PL(D) = 0.13
15	3											
	3.8	SANDSTONE - Medium strength, slightly weathered, slightly fractured, pale grey, medium grained sandstone, some carbonaceous bands, horizontally bedded At 4.30m, 30mm carbonaceous band At 4.73m, 10mm carbonaceous band						4.17m: P, sh, pl, ro, cbs 4.51m: J, 20°, ir, ro, cbs 5.07m: J, 80°, ir, ro, stn, fe 5.54m: Cs, sh, pl, 5mm clay	C	100	100	PL(A) = 0.29 PL(D) = 0.26 PL(A) = 0.36 PL(D) = 0.34
14	4											
13	5											
12	6											PL(A) = 0.51 PL(D) = 0.56
11	7							7.16m to 7.22m, Cs, sh, pl, 5mm clay spaced generally 20mm 7.78m: P, sh, pl, ro, stn, fe	C	100	98	PL(A) = 0.32 PL(D) = 0.3
10	8							8m: J, 10°, pl, ro, stn, fe				
	8.07	SILTSTONE - Low strength, slightly weathered, grey siltstone, some fine grained sand										PL(A) = 0.17 PL(D) = 0.13
	8.2	Bore discontinued at 8.2m, limit of investigation										
9	9											

RIG: Ground Test **DRILLER:** Ground Test (Simon) **LOGGED:** Parkinson **CASING:** HQ to 2.47m

TYPE OF BORING: Solid flight auger TC bit to 2.47m, NMLC core to 8.20m

WATER OBSERVATIONS: Observations obscured by drilling fluids below 2.47m

REMARKS: *Surface level provided by project surveyor

SAMPLING & IN SITU TESTING LEGEND

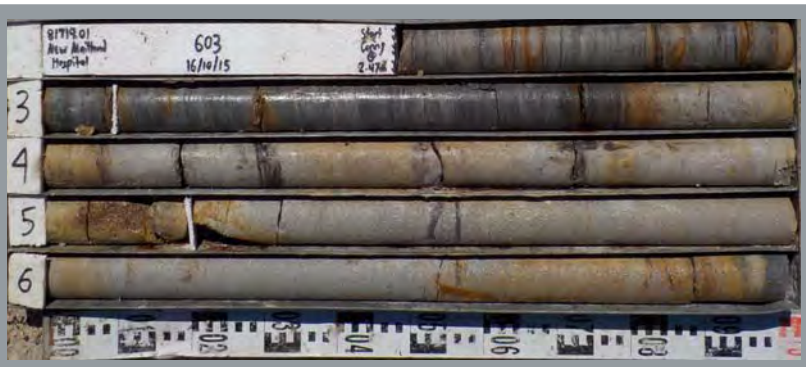
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 603 PROJECT 81719.01 2015

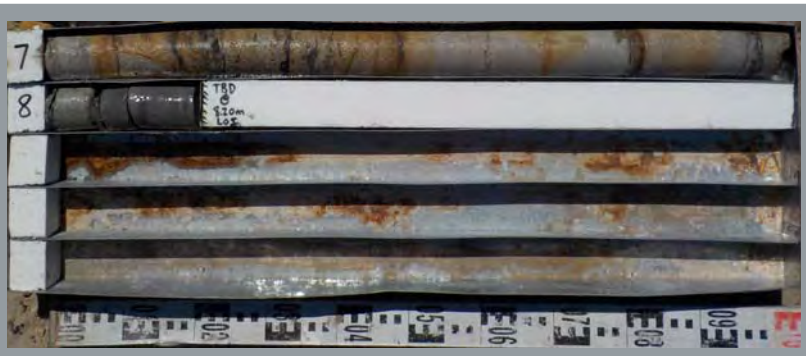


2.47 m – 7.00 m

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 603 PROJECT 81719.01 2015



7.00 m – 8.20 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **New Maitland Hospital, Metford**	PROJECT: 81719.01 PLATE No: 4 REV: 0
	CLIENT: Health Infrastructure	DATE: 25-Nov-15

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 19.3 AHD*
EASTING: 369372
NORTHING: 6374543
DIP/AZIMUTH: 90°/--

BORE No: 604
PROJECT No: 81719.01
DATE: 21 - 22/10/2015
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
19	0.2	FILLING - Generally comprising brown, sandy gravel filling (ripped sandstone and siltstone)										
	0.8	SANDSTONE - Extremely low to very low strength, highly weathered, brown fine to medium grained sandstone										
18	1.2	SILTSTONE - Extremely low to very low strength, highly weathered, grey siltstone						1.2m: CORE LOSS: 100mm				PL(A) = 0.05
	1.3	CORE LOSS - 0.1m, (1.2 - 1.3m) in probable siltstone						1.68m: P, sh. pl, sm, fe	C	93	36	PL(A) = 0.02 PL(A) = 0.96 PL(A) = 0.1 PL(D) = 0.06 PL(A) = 0.08 PL(D) = 0.03 PL(A) = 0.19 PL(D) = 0.15
17	2.08	SILTSTONE - Extremely low to very low strength, extremely to highly weathered, slightly fractured, dark grey siltstone From 1.84m, light brown										
16		SANDSTONE - Low strength, slightly weathered, unbroken, grey, fine to medium grained sandstone with some lenses of dark grey siltstone						3.08m: P, sh, pl, sm, fe 3.13m to 3.58m, 45° to 90°, un, sm, fe				PL(A) = 0.13 PL(A) = 0.12 PL(D) = 0.11 PL(A) = 0.11 PL(D) = 0.18
15	4.06	From 3.89m, extremely low strength, highly weathered, friable						4.06m: CORE LOSS: 130mm	C	96	73	PL(A) = 0 PL(A) = 0.02
	4.19	CORE LOSS - 0.13m (4.06m - 4.19m) in highly weathered sandstone										
14	4.56	SANDSTONE - Extremely low strength, extremely weathered, friable, brown, fine to medium grained sandstone										PL(A) = 0.15
		SANDSTONE - Low to medium strength, moderatley weathered to fresh stained, slightly fractured, brown and grey, fine to medium grained sandstone						5.06m: B, sh, pl, sm 5.26m: J, 70°, pl, sm 5.67m: P, sh, pl, sm 5.97m: J, 45°, pl, sm, fe 6.43m: J, 20°, pl, sm, coal 7.53m: J, 20°, pl, sm, fe 8.08m: B, sh, pl, sm	C	100	93	PL(A) = 0.29 PL(A) = 0.18 PL(A) = 0.41 PL(D) = 0.22 PL(A) = 0.41 PL(D) = 0.4 PL(A) = 0.06 PL(D) = 0.04 PL(A) = 0.45 PL(D) = 0.48 PL(A) = 0.12 PL(D) = 0.1
11	8.3	SILTSTONE - Low strength, slightly weathered, slightly fractured dark grey siltstone						8.52m: P, 3°, pl, sm				
10	8.6	Bore discontinued at 8.6m, limit of investigation										

RIG: DT25 **DRILLER:** Ground Test (Kerny-Ennis) **LOGGED:** Fulham **CASING:** HQ to 1.2m

TYPE OF BORING: Solid flight auger to 1.2m, NMLC core to 8.6m

WATER OBSERVATIONS: Free groundwater obscured by drilling methods

REMARKS: 10% water loss from 3.89m. *Surface level provided by project surveyor

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 604 PROJECT 81719.01 2015

1.20 m – 6.00 m

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 604 PROJECT 81719.01 2015

6.00 m – 8.60 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **New Maitland Hospital, Metford**	PROJECT: 81719.01
		PLATE No: 5
		REV: 0
	CLIENT: Health Infrastructure	DATE: 25-Nov-15

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 24.3 AHD*
EASTING: 369257
NORTHING: 6374488
DIP/AZIMUTH: 90°/--

BORE No: 605
PROJECT No: 81719.01
DATE: 22/10/2015
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
24	0.05	FILLING - Generally comprising light grey silt filling, humid										
	0.4	FILLING - Brown gravelly sand filling, comprising fine to medium grained sand and fine to medium sized gravel (ripped sandstone, siltstone and coal)										
23	1.2	SILTSTONE - Very low strength, highly weathered, brown and grey siltstone						1.26m: P, 2°, un, sm, coal				PL(A) = 0.12
		SANDSTONE - Extremely low strength, slightly weathered, slightly fractured, pale grey, fine to medium grained sandstone							C	100	88	
22		From 2.31m to 2.87m, very low strength						2.11m: P, sh, pl, ro, fe 2.2m: B, 3°, un, sm, coal 2.25m: P, 2°, pl, sm, fe 2.5m: P, 2°, pl, sm 2.71m: P, 5°, pl, sm				PL(A) = 0.49 PL(D) = 0.25 PL(A) = 0.07 PL(D) = 0.05
21								3.11m to 3.32m, J, 70°, pl, ro				PL(A) = 0.1 PL(D) = 0.12
	3.67	CORE LOSS - 0.2m (3.67m to 3.87m) in probable extremely weathered sandstone						3.6m: J, 60°, pl, sm 3.67m: CORE LOSS: 200mm	C	92	42	PL(A) = 0.13 PL(D) = 0.06
20	3.87	SANDSTONE - Extremely low strength, extremely weathered, friable, brown, fine to medium grained sandstone (with soil like properties)										PL(D) = 0.09
	4.47							4.61m: J, 50°, pl, sm				PL(A) = 0.24
19		SANDSTONE - Low strength, slightly weathered, slightly fractured, grey, fine to medium grained sandstone with wisps of dark grey siltstone From 4.72m, fresh										PL(A) = 0.33 PL(D) = 0.26
18	6.2	LAMINATE - Low strength, fresh, slightly fractured, grey, interbedded siltstone and fine grained sandstone						6.35m: J, 45°, pl, sm	C	100	100	PL(A) = 0.23 PL(D) = 0.16
17	7.1	SANDSTONE - Medium strength, fresh, unbroken, grey, medium grained sandstone						7.1m: P, 2°, pl, sm, cn				PL(A) = 0.47 PL(D) = 0.48
16	7.98	Bore discontinued at 7.98m, limit of investigation										
15												

RIG: DT25 **DRILLER:** Ground Test (Kerny-Ennis) **LOGGED:** Fulham **CASING:** HQ to 1.2m

TYPE OF BORING: Solid flight auger to 1.2m, NMLC core to 7.98m

WATER OBSERVATIONS: Free groundwater obscured by drilling methods

REMARKS: *Surface level provided by project surveyor

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 605 PROJECT 81719.01 2015

1.20 m – 6.00 m

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 605 PROJECT 81719.01 2015

6.00 m – 7.98 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **New Maitland Hospital, Metford**	PROJECT: 81719.01 PLATE No: 6 REV: 0
	CLIENT: Health Infrastructure	DATE: 25-Nov-15

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369285
NORTHING: 6374363
DIP/AZIMUTH: 90°/--

BORE No: 606
PROJECT No: 81719.01
DATE: 22/10/2015
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	0	FILLING - Brown, gravelly sand filling comprising fine to medium grained sand and fine to medium sized gravel (ripped sandstone and siltstone, trace coal) trace cobbles and tree roots							A			
	1								A			
	2								A			
	2.2	SANDSTONE - Very low strength, extremely weathered, friable, brown and orange, fine to medium grained sandstone										PL(D) = 0.04
	2.7	SANDSTONE - Low strength, highly weathered, unbroken, brown, fine to medium grained sandstone with bands of extremely low strength, moderately weathered pale grey sandstone						2.58m: P, 5°, un, sm, fe				PL(A) = 0.11
	3											PL(A) = 0.02
	4							3.71m: P, 2°, Pl, sm, cn 3.91m: P, 10°, Pl, ro, fe	C	100	44	PL(A) = 0.11 PL(A) = 0.13 PL(D) = 0.14
	5											PL(A) = 0.04 PL(D) = 0.05 PL(A) = 0.1
	5.18	CORE LOSS - 0.06m (5.18m to 5.24m)						5.18m: CORE LOSS: 60mm				
	5.24							5.3m: P, 2°, un, sm, fe				PL(A) = 0.05
	5.45	LAMINATE - Very low strength, extremely weathered, friable, orange-brown and pale grey interbedded fine to medium sandstone and siltstone						5.74m: B, 2°, cu, sm, fe 5.88m: B, 2°, cu, sm, fe				PL(A) = 0.1
	6							6.12m: P, 2°, PL, sm, fe				PL(A) = 0.24
		LAMINATE - Low to medium strength, moderately weathered, slightly fractured, grey and brown fine grained sandstone interbedded with siltstone						6.59m: P, 2°, Pl, sm, cn 6.78m: P, 2°, Pl, sm, cn	C	98	72	PL(A) = 0.23
	7											PL(A) = 0.25 PL(D) = 0.05 PL(A) = 0.09 PL(D) = 0.07
	7.04	CARBONACEOUS SILTSTONE - Low strength, highly weathered, dark brown siltstone						7.29m: P, 3°, Pl, sm, coal				
	7.42	From 7.2m, very low strength, extremely weathered						7.65m: P, 5°, Pl, sm, fe 7.84m: P, 2°, pl, sm, fe				PL(A) = 0.38 PL(D) = 0.45
	8	SANDSTONE - Medium strength, slightly weathered, slightly fractured brown and grey, fine to medium grained sandstone						7.9m: P, 2°, Pl, sm 8.08m: J, 65°, Pl, sm				
	8.2	Bore discontinued at 8.2m, limit of investigation						8.13m: P, 2°, Pl, sm, carbonaceous				
	9											

RIG: DT25 **DRILLER:** Ground Test (Kerny-Ennis) **LOGGED:** Fulham **CASING:** HW to 1.2m, HQ to 2.2m

TYPE OF BORING: Solid flight auger to 2.2m, NMLC core to 8.2m

WATER OBSERVATIONS: No free groundwter observed whilst augering

REMARKS: Surface level not recorded

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 606 PROJECT 81719.01 2015

2.20 m – 7.00 m

DOUGLAS PARTNERS PTY LTD

NEW MAITLAND HOSPITAL, METFORD

BORE 606 PROJECT 81719.01 2015

7.00 m – 8.20 m

Douglas Partners Geotechnics / Environment / Groundwater	**Core Photoplates** **New Maitland Hospital, Metford**	PROJECT: 81719.01 PLATE No: 7 REV: 0
	CLIENT: Health Infrastructure	DATE: 25-Nov-15

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 20.5 AHD
EASTING: 369283
NORTHING: 6374585
DIP/AZIMUTH: 90°/--

BORE No: 701
PROJECT No: 81719.01
DATE: 11/7/2017
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
20	0.15	FILLING - Generally comprising grey brown, fine to medium grained sandy clay filling, some medium sized subangular gravel, M<Wp							D			
		SANDY CLAY - Very stiff, grey brown, fine to medium grained sandy clay, M<Wp										
	0.6	SANDSTONE - Extremely low strength, extremely weathered, grey stained orange, medium grained sandstone							S			25/80 refusal
19	1.5	Start coring at 1.50m										
		CORE LOSS - 0.46m, probable sandstone						1.5m: CORE LOSS: 460mm				
	1.96	SANDSTONE - Extremely low strength, extremely weathered, orange grey, medium grained sandstone (soil properties)							C	54	0	pp = 450
	2.1	CLAYSTONE - Extremely low strength, extremely weathered, grey claystone, some fine to medium grained sand (soil like properties)										
18	2.5	CORE LOSS - 0.19m, probable claystone						2.5m: CORE LOSS: 190mm				
	2.69	SANDSTONE - Extremely low strength, extremely weathered, grey stained orange, medium grained sandstone						2.90-3.0m, Cs, sh, pl	C	81	0	pp = 350
	3.0	From 2.9m to 3.0m, clay seam (very stiff)						3.27m: Cz, 20°, ir, ro				pp = 400
	3.4	COAL - Extremely low strength, highly weathered, black coal										
17		CARBONACEOUS SILTSTONE - Extremely low to very low strength, slightly weathered, dark brown carbonaceous siltstone						3.68m: P, 30°, ir, he				PL(A) = 0.06
		From 3.84m to 3.91m, coal seam						3.9m: P, sh, pl	C	100	40	
		From 3.91m to 4.10m, clay seam										
	4.1	SANDSTONE - Low strength, slightly weathered, grey, fine grained sandstone, stained orange in parts, slightly fractured, some horizontal carbonaceous bands 1-5mm thick										PL(A) = 0.11 PL(D) = 0.1
16								4.72-4.79m, P, sh, pl, ro, he, stn fe, spaced 20mm	C	100	91	PL(A) = 0.11
								4.88m: J, 10°, pl, ro, stn,				

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 1.5m

TYPE OF BORING: Solid flight auger v-bit to 1.5m (refusal), NMLC from 1.5m to 8.55m

WATER OBSERVATIONS: Observations obscured below 1.5m due to drilling fluids

REMARKS: 30% water loss from 1.5m, backfilled at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 20.5 AHD
EASTING: 369283
NORTHING: 6374585
DIP/AZIMUTH: 90°/--

BORE No: 701
PROJECT No: 81719.01
DATE: 11/7/2017
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
15		SANDSTONE - Low strength, slightly weathered, grey, fine grained sandstone, stained orange in parts, slightly fractured, some horizontal carbonaceous bands 1-5mm thick *(continued)*	EW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00	fe 5.06m: J, 10°, pl, ro, stn fe 5.09m: Cz, 10°, pl, ro, stn fe	C	100	91	PL(A) = 0.16 PL(D) = 0.16
	5.6	SILTSTONE - Low strength, slightly weathered, grey siltstone, slightly fractured										PL(A) = 0.19 PL(D) = 0.19
6								6.21m: P, sh, pl, sm				PL(A) = 0.09
14	6.42	COAL - Low strength, slightly weathered, black coal, fragmented						6.42-6.54m, fg				
	6.54	SANDSTONE - Low strength, slightly weathered, grey, fine to medium grained sandstone, slightly fractured						6.75m: J, 10°, pl, sm				PL(A) = 0.12 PL(D) = 0.07
7								7.1m: P, sh, pl, cbs	C	100	83	
13												PL(A) = 0.32 PL(D) = 0.27
8								7.9m: P, sh, pl, ro 7.95m: P, sh, pl, ro				
								8.23m: P, sh, pl, ro				PL(A) = 0.06
12												PL(A) = 0.3 PL(D) = 0.27
	8.55	Bore discontinued at 8.55m, limit of investigation										
9												
11												

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 1.5m

TYPE OF BORING: Solid flight auger v-bit to 1.5m (refusal), NMLC from 1.5m to 8.55m

WATER OBSERVATIONS: Observations obscured below 1.5m due to drilling fluids

REMARKS: 30% water loss from 1.5m, backfilled at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18 AHD
EASTING: 369315
NORTHING: 6374543
DIP/AZIMUTH: 90°/--

BORE No: 702
PROJECT No: 81719.01
DATE: 11 - 12/7/2017
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
18		FILLING - Generally comprising grey brown gravelly sandy clay filling, fine to medium grained sand, gravel ripped sandstone medium to boulder sized, abundant silt, trace coal, humid										
17	1								S			pp = 200 4,2,6 N = 8
16	2	From 2.0m, brown, moist							S			pp = 200 2,4,5 N = 9
15	3											
14	4	3.8 CARBONACEOUS SANDSTONE - Extremely low strength, extremely weathered, grey black, fine to medium grained carbonaceous sandstone Start coring at 4.4m							S			pp = 450 9,16,25/100 refusal
		4.4 SANDSTONE - Low strength, moderately weathered, grey stained orange, medium grained sandstone, slightly fractured to unbroken							C	100	100	PL(A) = 0.11 PL(D) = 0.12

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 4.4m

TYPE OF BORING: Solid flight auger v-bit to 4.4m, NMLC from 4.4m to 11.55m

WATER OBSERVATIONS: Observations obscured below 4.4m due to drilling fluids

REMARKS: Backfilled at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18 AHD
EASTING: 369315
NORTHING: 6374543
DIP/AZIMUTH: 90°/--

BORE No: 702
PROJECT No: 81719.01
DATE: 11 - 12/7/2017
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 0.05 0.10 0.50 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
13		SANDSTONE - Low strength, moderately weathered, grey stained orange, medium grained sandstone, slightly fractured to unbroken *(continued)*							C	100	100	
								5.66m: J, 10°, pl, ro, stn fe				PL(A) = 0.17
								5.81m: P, sh, pl, ro, stn fe				
12	6	From 6.25-6.4m, extremely low strength, extremely weathered						6.3m: Cz, sh, pl, ro				PL(A) = 0.56
		From 6.4-6.75m, medium strength										PL(D) = 0.46
								6.57m: J, 10°, pl, ro, stn fe				
		From 6.75-7.08m, extremely low strength, extremely weathered						6.67m: P, sh, pl, ro				
11	7								C	100	78	
		From 7.08m, very low strength, slightly weathered						7.08m: P, sh, pl, ro, stn fe				
	7.25	SANDSTONE - Low to medium strength, slightly weathered, grey, fine grained sandstone, some horizontal carbonaceous bands 1-2mm thick, slightly fractured										PL(A) = 0.05
												PL(A) = 0.34
10	8							7.92m: P, sh, pl, cbs				
												PL(A) = 0.27
	8.68	From 8.55m to 8.68m, extremely low to very low strength										
		SANDSTONE - Medium strength, slightly weathered, grey stained orange in parts, medium to coarse grained sandstone, slightly fractured						8.7m: P, sh, pl, ro, stn fe				PL(A) = 0.45 PL(D) = 0.4
9	9								C	100	89	
								9.4m: P, sh, pl, he				
								9.55m: P, sh, pl, ro, stn fe				
												PL(A) = 0.42 PL(D) = 0.42

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 4.4m

TYPE OF BORING: Solid flight auger v-bit to 4.4m, NMLC from 4.4m to 11.55m

WATER OBSERVATIONS: Observations obscured below 4.4m due to drilling fluids

REMARKS: Backfilled at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 18 AHD
EASTING: 369315
NORTHING: 6374543
DIP/AZIMUTH: 90°/--

BORE No: 702
PROJECT No: 81719.01
DATE: 11 - 12/7/2017
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
8		SANDSTONE - Medium strength, slightly weathered, grey stained orange in parts, medium to coarse grained sandstone, slightly fractured *(continued)*						10.16m: J, 10°, pl, ro, cbs				
	10.73	SANDSTONE - Low strength, slightly weathered, grey, fine to medium grained sandstone, some horizontal carbonaceous bands 1-2mm thick, slightly fractured							C	100	89	PL(A) = 0.12
7	11	From 11.35-11.55m, very low strength						11.21m: P, sh, ir, cbs 11.4m: J, 20°, pl, ro				PL(A) = 0.03
	11.55	Bore discontinued at 11.55m, limit of investigation										
6	12											
5	13											
4	14											

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 4.4m

TYPE OF BORING: Solid flight auger v-bit to 4.4m, NMLC from 4.4m to 11.55m

WATER OBSERVATIONS: Observations obscured below 4.4m due to drilling fluids

REMARKS: Backfilled at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 17 AHD
EASTING: 369291
NORTHING: 6374511
DIP/AZIMUTH: 90°/--

BORE No: 703
PROJECT No: 81719.01
DATE: 12/7/2017
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
17	0.0	FILLING - Generally comprising brown, fine grained silty sand filling, trace coal fines and rootlets, moist (slope wash)										
	0.3	CARBONACEOUS CLAY - Hard, black carbonaceous clay with some fine to medium grained sand, M<Wp										
	0.7	CARBONACEOUS SILTSTONE - Extremely low strength, extremely weathered, black carbonaceous siltstone, some coal bands (soil like properties)										
16	1								S			pp = 400 8,25/50 refusal
	1.3	Start coring at 1.3m										
	1.35	CARBONACEOUS SILTSTONE - Extremely low strength, extremely weathered, black carbonaceous siltstone, some coal bands (soil like properties)										
		SANDSTONE - Medium strength, moderately weathered, grey stained orange, fine to medium grained sandstone, slightly fractured						1.56-1.58m, Cz, sh, pl, ro, stn fe	C	100	94	PL(A) = 0.49 PL(D) = 0.47
15	2	From 2.0m, low strength										PL(A) = 0.11 PL(D) = 0.08
		From 2.58m to 3.25m, very low strength, highly weathered						2.58m: P, sh, pl, ro, stn fe 2.77m: P, sh, pl, he, stn fe 3.04m: P, sh, pl, ro, stn fe 3.07m: P, sh, pl, ro, stn fe 3.25m: Cz, sh, pl, ro, stn fe				PL(A) = 0.08
14	3											
	3.35	SANDSTONE - Low strength, slightly weathered, grey, fine grained sandstone, some horizontal carbonaceous bands 1-3mm thick, unbroken							C	100	74	PL(A) = 0.15 PL(D) = 0.12
13	4							4.17m: Handling break				PL(A) = 0.29 PL(D) = 0.16

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 1.3m

TYPE OF BORING: Solid flight auger v-bit to 1.3m, NMLC from 1.3m to 12.0m

WATER OBSERVATIONS: Observations obscured below 1.3m due to drilling fluids

REMARKS: Well installed at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 17 AHD
EASTING: 369291
NORTHING: 6374511
DIP/AZIMUTH: 90°/--

BORE No: 703
PROJECT No: 81719.01
DATE: 12/7/2017
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
12	5.08	SANDSTONE - Medium strength, slightly weathered, grey, medium to coarse grained sandstone, unbroken							C	100	74	PL(A) = 0.32 PL(D) = 0.29
11	6							>>				
	6.5	SANDSTONE - Low strength, slightly weathered, grey, medium to coarse grained sandstone, unbroken										PL(A) = 0.22
10	7								C	100	100	PL(A) = 0.11
								7.65m: Handling break				
9	8											PL(A) = 0.2 PL(D) = 0.16
8	9								C	98	98	PL(A) = 0.36 PL(D) = 0.22
								9.4m: Pt, sh, pl, ro				
								9.67m: J, 40°, ir, inf cbs				
								9.9m: J, 10°, pl, ro, inf				PL(D) = 0.13

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 1.3m

TYPE OF BORING: Solid flight auger v-bit to 1.3m, NMLC from 1.3m to 12.0m

WATER OBSERVATIONS: Observations obscured below 1.3m due to drilling fluids

REMARKS: Well installed at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Proposed Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: 17 AHD
EASTING: 369291
NORTHING: 6374511
DIP/AZIMUTH: 90°/--

BORE No: 703
PROJECT No: 81719.01
DATE: 12/7/2017
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
								cbs				
	10.23											
	10.28	CORE LOSS - 0.05m, probable sandstone						10.23m: CORE LOSS: 50mm				
		SANDSTONE - Low strength, slightly weathered, grey, medium to coarse grained sandstone, some siltstone inclusions						10.28-10.4m, fg, possibly drill induced 10.57m: J, 30°, ir, ro, cbs	C	98	98	
	10.78	SILTSTONE - Low strength, slightly weathered, grey siltstone, slightly fractured										
6	11											PL(A) = 0.11
								11.24m: J, 70°, pl, sm				PL(A) = 0.1 PL(D) = 0.16
	11.71	CORE LOSS - 0.19m, probable coal						11.71m: CORE LOSS: 190mm	C	62	42	
	11.9	COAL - Medium strength, slightly weathered, black coal						11.9-12.0m, Pt, sh, pl, sm, spaced 20mm				PL(A) = 0.33
5	12 12.0	Bore discontinued at 12.0m, limit of investigation										
4	13											
3	14											

RIG: Isuzu Mounted TD101 **DRILLER:** Total Drilling **LOGGED:** Parkinson **CASING:** HWt to 1.3m

TYPE OF BORING: Solid flight auger v-bit to 1.3m, NMLC from 1.3m to 12.0m

WATER OBSERVATIONS: Observations obscured below 1.3m due to drilling fluids

REMARKS: Well installed at completion

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369398
NORTHING: 6374534

PIT No: 4001
PROJECT No: 81719.09
DATE: 29/11/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
		SILTY GRAVEL - Trace clay, grey brown, moist, medium, fine to coarse grained subangular to subrounded gravel to 30mm in size							
	0.2	COMPLETELY WEATHERED SANDSTONE - (Sand like properties), extremely low strength, extremely weathered, pale yellow-brown fine to medium grained sandstone							
					0.6				
				B					
					0.8				
	1								1
	2.0	Pit discontinued at 2.0m, limit of investigation							2

RIG: Hitachi 6.5t Excavator Zaxis

LOGGED: Millard

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed, whilst pit remained open

REMARKS: Hand held GPS ±10m

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369338
NORTHING: 6374434

PIT No: 4002
PROJECT No: 81719.09
DATE: 29/11/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILLING - Firm to soft, clayey fine to medium grained sand filling, moist to wet		B	0.3				
	0.45	FILLING - Fine to medium grained sand filling, saturated Cobbles (sandstone) subangular to subrounded to 350mm in size			0.45			▼	
	1.4	FILLING - Soft, grey sandy clay filling, wet			1.4		pp = 30		
	1.6	Pit discontinued at 1.6m, due to pit walls collapsing							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1; 2

RIG: Hitachi 6.5t Excavator Zaxis

LOGGED: Millard

SURVEY DATUM: MGA94

WATER OBSERVATIONS: Free groundwater observed at 0.45m

REMARKS: Pit collapse due to water ingress. Hand held GPS ±10m

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369260
NORTHING: 6374434

PIT No: 4003
PROJECT No: 81719.09
DATE: 29/11/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
	0.1	CLAYEY SAND - Yellow brown very dense, moist, fine to medium grained sand, trace medium to coarse grained subrounded sandstone gravel							
		SILTSTONE - Extremely low strength, highly weathered, grey siltstone, thinly laminated		B	0.4 0.6				
	0.75	COAL - Black, with carbonaceous siltstone							
1	1.0	SILTSTONE - Extremely low strength grey siltstone, carbonaceous lenses, thinly laminated							1
	1.2	CLAYEY SAND - (Completely weathered sandstone), extremely low strength, pale brown, moist, fine to medium grained sand, carbonaceous clay lenses (1mm thickness)							
2	2.0	Pit discontinued at 2.0m, limit of investigation							2

RIG: Hitachi 6.5t Excavator Zaxis

LOGGED: Millard

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed, whilst pit remained open

REMARKS: Hand held GPS ±10m

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369396
NORTHING: 6374381

PIT No: 5001
PROJECT No: 81719.09
DATE: 29/11/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING (Capping) - Medium to coarse grained sandy gravel filling, trace clay, cobbles to 200m in size							
	0.6	FILLING - Intermixed carbonaceous siltstone and coal filling (rejects), dark grey with coal fines and coal / carbonaceous siltstone fragments up to 150mm in size, moist		B	0.8				1
	2.0	Pit discontinued at 2.0m, limit of investigation			2.0				2

RIG: Hitachi 6.5t Excavator Zaxis

LOGGED: Millard

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed, whilst pit remained open

REMARKS: Hand held GPS ±10m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369450
NORTHING: 6374382

PIT No: 5002
PROJECT No: 81719.09
DATE: 29/11/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING (Capping) - Medium to coarse grained sandy gravel filling, trace clay, cobbles to 250m in size							
	0.8								
	1	FILLING - Intermixed carbonaceous siltstone and coal filling (rejects), dark grey with coal fines and coal / carbonaceous siltstone fragments up to 150mm in size, moist		B	1.0				1
	1.6	Pit discontinued at 1.6m, limit of investigation			1.6				
	2								2

RIG: Hitachi 6.5t Excavator Zaxis

LOGGED: Millard

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed, whilst pit remained open

REMARKS: Hand held GPS ±10m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369489
NORTHING: 6374359

PIT No: 5003
PROJECT No: 81719.09
DATE: 29/11/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING (Capping) - Medium to coarse grained sandy gravel filling, trace clay, cobbles to 150m in size							
1	1.0	FILLING - Intermixed carbonaceous siltstone and coal filling (rejects), dark grey with coal fines and coal / carbonaceous siltstone fragments up to 150mm in size, moist		B	1.0				1
	1.8	Pit discontinued at 1.8m, limit of investigation			1.8				
2									2

RIG: Hitachi 6.5t Excavator Zaxis

LOGGED: Millard

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed, whilst pit remained open

REMARKS: Hand held GPS ±10m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Multiplex Constructions Pty Ltd
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL: --
EASTING: 369522
NORTHING: 6374347

PIT No: 5004
PROJECT No: 81719.09
DATE: 29/11/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING (Capping) - Medium to coarse grained sandy gravel filling, trace clay, cobbles to 200m in size							
	0.8								
	1	FILLING - Intermixed carbonaceous siltstone and coal filling (rejects), dark grey with coal fines and coal / carbonaceous siltstone fragments up to 150mm in size, moist		B	1.0				1
	1.8	Pit discontinued at 1.8m, limit of investigation			1.8				
	2								2

RIG: Hitachi 6.5t Excavator Zaxis

LOGGED: Millard

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed, whilst pit remained open

REMARKS: Hand held GPS ±10m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369362
NORTHING: 6374380
DIP/AZIMUTH: 90°/--

PIT No: 2001
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed	B			0.0		FILL/SANDY GRAVEL: medium to coarse; brown; trace clay; cobbles to 300mm			>>	
						0.5			moist			
						1.0					1	
								1.25m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS 1.30m	dry			
								Pit discontinued at 1.30m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369372
NORTHING: 6374391
DIP/AZIMUTH: 90°/--

PIT No: 2002
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS			SAMPLING								
DRILLING & CASING	WATER	GROUND WATER LEVELS	GEO	ENV	IDs and REMARKS	RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace clay; sandstone cobbles to 250mm, siltstone cobbles to 100mm	moist			
						0.5		0.50m 0.55m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS Pit discontinued at 0.55m depth Limit of investigation				
						1.0						
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369376
NORTHING: 6374363
DIP/AZIMUTH: 90°/--

PIT No: 2003
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed	B			0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt; cobbles to 200mm	moist			
						0.5						
								0.90m				
						0.95m		FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS				
						1.0		Pit discontinued at 0.95m depth Limit of investigation				
						1.5					>>	

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369400
NORTHING: 6374396
DIP/AZIMUTH: 90°/--

PIT No: 2004
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace medium plasticity clay; cobbles to 200mm	moist			
						0.5						
								0.70m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
						1.0		1.00m Pit discontinued at 1.00m depth Limit of investigation			1	
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369416
NORTHING: 6374384
DIP/AZIMUTH: 90°/--

PIT No: 2005
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed	B			0.0		FILL/SANDY GRAVEL: medium to coarse; silt; cobbles to 200mm	moist		>>	
						0.5						
								0.90m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
						1.0		0.95m Pit discontinued at 0.95m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369432
NORTHING: 63743
DIP/AZIMUTH: 90°/--

PIT No: 2006
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS			SAMPLING								
DRILLING & CASING	WATER	GROUND WATER LEVELS	GEO	ENV	IDs and REMARKS	RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; with medium plasticity clay; cobbles to 20mm	moist			
						0.5						
								0.95m				
						1.0		1.00m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry		1	
								Pit discontinued at 1.00m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369458
NORTHING: 6374390
DIP/AZIMUTH: 90°/--

PIT No: 2007
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt	moist			
						0.5						
								0.90m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
						1.0		0.95m Pit discontinued at 0.95m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369466
NORTHING: 6374369
DIP/AZIMUTH: 90°/--

PIT No: 2008
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS			SAMPLING								
DRILLING & CASING	WATER	GROUND WATER LEVELS	GEO	ENV	IDs and REMARKS	RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt; cobbles to 300mm	moist		>>	
						0.45m		FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
						0.5		0.50m Pit discontinued at 0.50m depth Limit of investigation				
						1.0						
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369479
NORTHING: 6374395
DIP/AZIMUTH: 90°/--

PIT No: 2009
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed	B			0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt; cobbles to 100mm	moist			
						0.5						
						1.0					1	
						1.5		1.50m				
								1.55m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
								Pit discontinued at 1.55m depth Limit of investigation				

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▷	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369481
NORTHING: 6374351
DIP/AZIMUTH: 90°/--

PIT No: 2010
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS			SAMPLING								
DRILLING & CASING	WATER	GROUND WATER LEVELS	GEO	ENV	IDs and REMARKS	RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP (5 10 15 20 25)	TEST RESULTS & COMMENTS
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt; cobbles to 300mm	moist			
						0.5						
								0.95m				
						1.0		1.00m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry		1	
								Pit discontinued at 1.00m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▷	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369503
NORTHING: 6374369
DIP/AZIMUTH: 90°/--

PIT No: 2011
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS			SAMPLING								
DRILLING & CASING	WATER	GROUND WATER LEVELS	GEO	ENV	IDs and REMARKS	RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
		No free groundwater observed	B			0.0		FILL/SANDY GRAVEL: medium to coarse; trace silt; sandstone cobbles to 250mm, siltstone cobbles to 150mm	moist			
						0.5		0.55m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
								0.60m Pit discontinued at 0.60m depth Limit of investigation				
						1.0						
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▷	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369518
NORTHING: 6374349
DIP/AZIMUTH: 90°/--

PIT No: 2012
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt; cobbles to 200mm	moist			
						0.5						
								0.90m				
								0.95m FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
						1.0		Pit discontinued at 0.95m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369540
NORTHING: 6374353
DIP/AZIMUTH: 90°/--

PIT No: 2013
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS			SAMPLING								
DRILLING & CASING	WATER	GROUND WATER LEVELS	GEO	ENV	IDs and REMARKS	RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
		No free groundwater observed	B			0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt; cobbles to 200mm			>>	
						0.5			moist			
						1.0					1	
								1.30m				
								FILL/CARBONACEOUS SILTSTONE & COAL FILLING (REJECTS), DARK GREY WITH COAL FINES AND COAL / CARBONACEOUS SILTSONE FRAGMENTS	dry			
								1.35m Pit discontinued at 1.35m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Proposed New Maitland Hospital
LOCATION: Metford Road, Metford

SURFACE LEVEL:
EASTING: 369513
NORTHING: 6374376
DIP/AZIMUTH: 90°/--

PIT No: 2014
PROJECT NO: 81719.07
DATE: 29/6/2018
SHEET: 1 of 1

DRILLING						MATERIAL					
PROGRESS		GROUND WATER LEVELS	SAMPLING			RL / DEPTH (m)	GRAPHIC LOG	DESCRIPTION OF STRATA	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP blows/150mm (tip: cone) 5 10 15 20 25	TEST RESULTS & COMMENTS
DRILLING & CASING	WATER		GEO	ENV	IDs and REMARKS							
		No free groundwater observed				0.0		FILL/SANDY GRAVEL: medium to coarse; grey brown; trace silt; cobbles to 250mm	moist			
						0.5						
								0.95m				
						1.0		SILTY CLAY: dark grey; medium plasticity, abundant organics; alluvial 1.00m	moist		1	
								Pit discontinued at 1.00m depth Limit of investigation				
						1.5						

REFER TO EXPLANATORY NOTES FOR DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

RIG: Excavator **DRILLER:** **LOGGED:** Millard **CHECKED:** West

REMARKS: Hand Held GPS ± 10 m **GRID DATUM:** MGA94 Zone 56

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
B	Bulk sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	▽	Water seep	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▼	Water level	SPT	Standard penetration test
E	Envirnmental Sample	PID	Photo ionisation detector (ppm)	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

DPDGD 1.04.04.GLB Log DP_301.00.02_SOIL_WGATE 81719.07.L.001.REV0.GPJ <<DrawingFile>> 11/01/2019 16:04 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: dpdgd 1.04.02 Prj: dpdgd 1.03.04

Appendix C

Laboratory Test Results

Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Fax: (02) 4960 9601
Email: Peter.Gorseski@douglaspartners.com.au

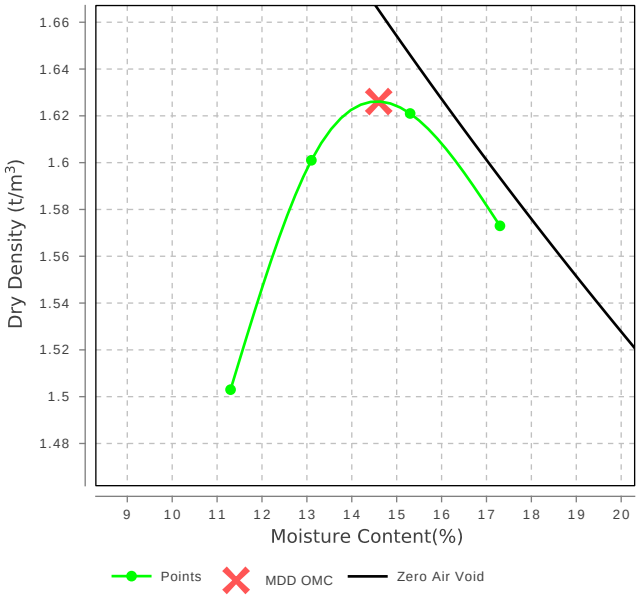
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **81719.09-2**
Issue Number: 1
Date Issued: 11/01/2019
Client: Multiplex Constructions Pty Ltd
GPO Box 172, Sydney NSW 2000
Project Number: 81719.09
Project Name: Proposed New Maitland Hospital
Project Location: Metford Road, Metford
Work Request: 2910
Sample Number: 19-2910D
Date Sampled: 29/11/2018
Sampling Method: Sampled by Engineering Department
Sample Location: **Stockpile Material / Pit 4001 (0.6-0.8)**
Material: 40% Carbonaceous Material / 60% non-Carbonaceous Sandstone

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)	
Mould Type	2.4 LITRE MOULD B
Compaction	Standard
No. Layers	3
No. Blows / Layer	60
Maximum Dry Density (t/m^3)	1.63
Optimum Moisture Content (%)	14.5
Oversize Sieve (mm)	37.5
Oversize Material (%)	0.6
Method used to Determine Plasticity	Visual Assessment
Curing Hours	2

Moisture Density Relationship



Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Fax: (02) 4960 9601
Email: Peter.Gorseski@douglaspartners.com.au

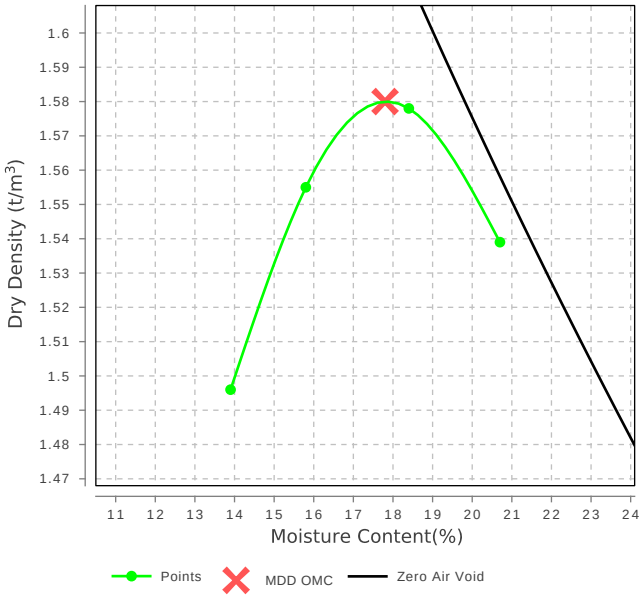
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **81719.09-2**
Issue Number: 1
Date Issued: 11/01/2019
Client: Multiplex Constructions Pty Ltd
GPO Box 172, Sydney NSW 2000
Project Number: 81719.09
Project Name: Proposed New Maitland Hospital
Project Location: Metford Road, Metford
Work Request: 2910
Sample Number: 19-2910E
Date Sampled: 29/11/2018
Sampling Method: Sampled by Engineering Department
Sample Location: **Stockpile Material / Pit 4003 (0.4-0.6)**
Material: 40% Carbonaceous Material / 60% non-Carbonaceous Siltstone

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)	
Mould Type	2.4 LITRE MOULD B
Compaction	Standard
No. Layers	3
No. Blows / Layer	60
Maximum Dry Density (t/m^3)	1.58
Optimum Moisture Content (%)	18.0
Oversize Sieve (mm)	37.5
Oversize Material (%)	1.9
Method used to Determine Plasticity	Visual Assessment
Curing Hours	2

Moisture Density Relationship



Material Test Report

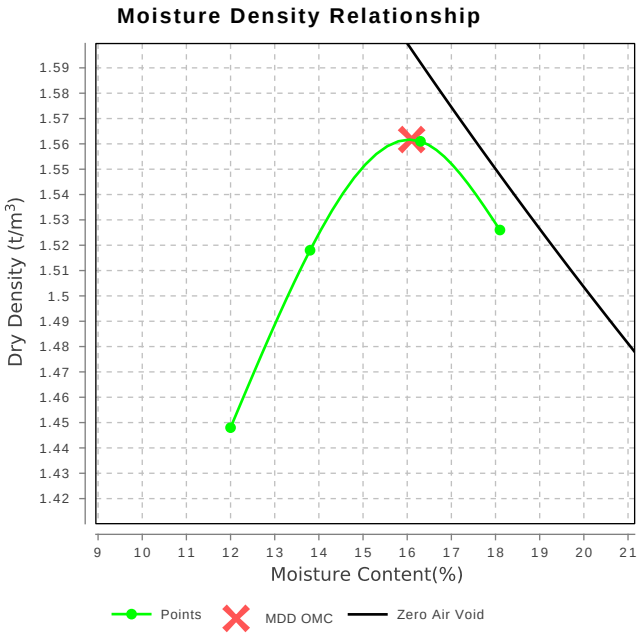
Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Fax: (02) 4960 9601
Email: Peter.Gorseski@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **81719.09-2**
Issue Number: 1
Date Issued: 11/01/2019
Client: Multiplex Constructions Pty Ltd
GPO Box 172, Sydney NSW 2000
Project Number: 81719.09
Project Name: Proposed New Maitland Hospital
Project Location: Metford Road, Metford
Work Request: 2910
Sample Number: 19-2910F
Date Sampled: 29/11/2018
Sampling Method: Sampled by Engineering Department
Sample Location: **Stockpile Material / Pit 4001 (0.6-0.8)**
Material: 50% Carbonaceous Material / 50% non Carbonaceous Sandstone

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)	
Mould Type	2.4 LITRE MOULD B
Compaction	Standard
No. Layers	3
No. Blows / Layer	60
Maximum Dry Density (t/m^3)	1.56
Optimum Moisture Content (%)	16.0
Oversize Sieve (mm)	37.5
Oversize Material (%)	5.7
Method used to Determine Plasticity	Visual Assessment
Curing Hours	2.3



Material Test Report

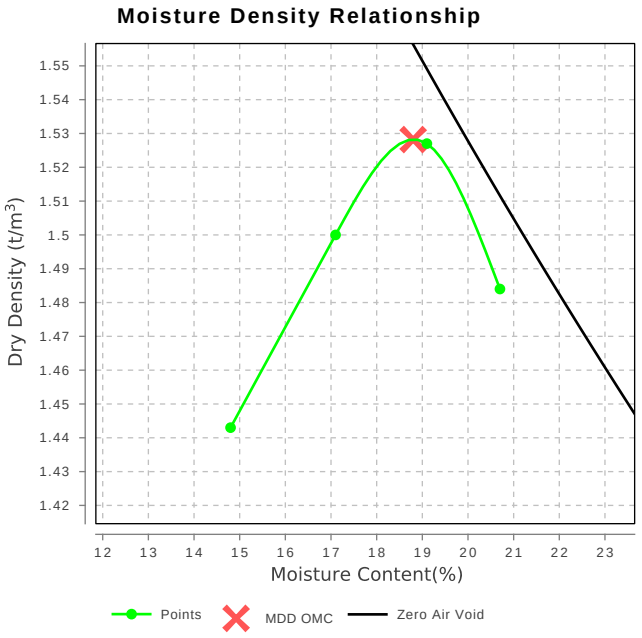
Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Fax: (02) 4960 9601
Email: Peter.Gorseski@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **81719.09-2**
Issue Number: 1
Date Issued: 11/01/2019
Client: Multiplex Constructions Pty Ltd
GPO Box 172, Sydney NSW 2000
Project Number: 81719.09
Project Name: Proposed New Maitland Hospital
Project Location: Metford Road, Metford
Work Request: 2910
Sample Number: 19-2910G
Date Sampled: 29/11/2018
Sampling Method: Sampled by Engineering Department
Sample Location: **Stockpile Material / Pit 4003 (0.4-0.6)**
Material: 50% Carbonaceous Material / 50% non Carbonaceous Siltstone

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)	
Mould Type	2.4 LITRE MOULD B
Compaction	Standard
No. Layers	3
No. Blows / Layer	60
Maximum Dry Density (t/m^3)	1.53
Optimum Moisture Content (%)	19.0
Oversize Sieve (mm)	37.5
Oversize Material (%)	1
Method used to Determine Plasticity	Visual Assessment
Curing Hours	2.3



Material Test Report

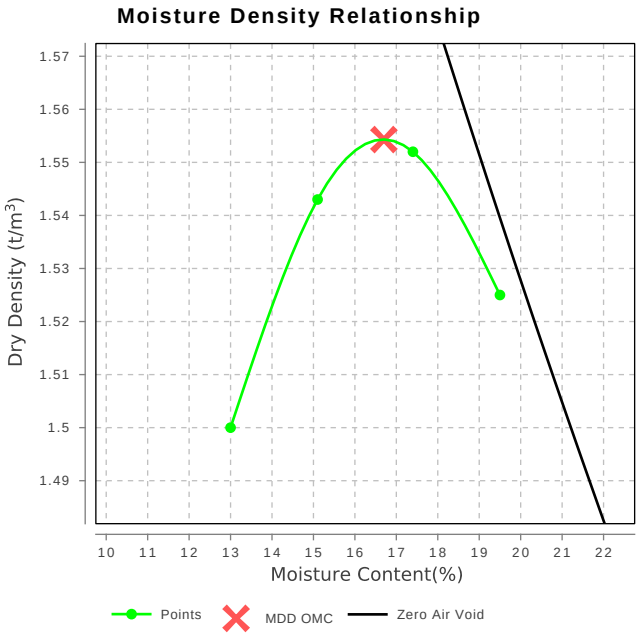
Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Fax: (02) 4960 9601
Email: Peter.Gorseski@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **81719.09-2**
Issue Number: 1
Date Issued: 11/01/2019
Client: Multiplex Constructions Pty Ltd
GPO Box 172, Sydney NSW 2000
Project Number: 81719.09
Project Name: Proposed New Maitland Hospital
Project Location: Metford Road, Metford
Work Request: 2910
Sample Number: 19-2910H
Date Sampled: 29/11/2018
Sampling Method: Sampled by Engineering Department
Sample Location: **Stockpile Material / Pit 4001 (0.6-0.8)**
Material: 60% Carbonaceous Material / 40% non-Carbonaceous Sandstone

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)	
Mould Type	1 LITRE MOULD A
Compaction	Standard
No. Layers	3
No. Blows / Layer	60
Maximum Dry Density (t/m^3)	1.55
Optimum Moisture Content (%)	16.5
Oversize Sieve (mm)	37.5
Oversize Material (%)	4.1
Method used to Determine Plasticity	Visual Assessment
Curing Hours	3



Uniaxial Compressive Strength

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	13.12.2018
Sampling Method:	Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski

NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3001
Sample Location	-
Depth (m)	7.69 - 8.0
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	210
Average Diameter (mm)	51.8
Average Height (mm)	138
Height to Diameter Ratio	2.7 : 1
Moisture Content (%)	7.6
Wet Mass / Unit Volume (t/m^3)	2.27
Dry Mass / Unit Volume (t/m^3)	2.11
Uniaxial Compressive Strength (MPa)	**7.7**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number: 81719.09_1
Issue Number: 1
Date Issued: 10.01.2018
Client: Multiplex Constructions Pty Ltd

Project Number: 81719.09
Project Name: Proposed New Maitland Hospital
Project Location: Metford Road, Metford
Work Request: 2909
Date Sampled: 13.12.2018
Sampling Method: Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3001
Sample Location	-
Depth (m)	14.79 - 15.0
Rock Description	Sandstone / Siltstone
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	185
Average Diameter (mm)	51.6
Average Height (mm)	131
Height to Diameter Ratio	2.5 : 1
Moisture Content (%)	8.8
Wet Mass / Unit Volume (t/m^3)	2.29
Dry Mass / Unit Volume (t/m^3)	2.11
Uniaxial Compressive Strength (MPa)	**5.5**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	14.12.2018
Sampling Method:	Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3002
Sample Location	-
Depth (m)	4.72 - 5.0
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	205
Average Diameter (mm)	51.3
Average Height (mm)	125
Height to Diameter Ratio	2.5 : 1
Moisture Content (%)	9.1
Wet Mass / Unit Volume (t/m^3)	2.28
Dry Mass / Unit Volume (t/m^3)	2.09
Uniaxial Compressive Strength (MPa)	**3.8**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	14.12.2018
Sampling Method:	Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3002
Sample Location	-
Depth (m)	18.0 - 18.25
Rock Description	Laminite
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	200
Average Diameter (mm)	51.6
Average Height (mm)	131
Height to Diameter Ratio	2.5 : 1
Moisture Content (%)	9.8
Wet Mass / Unit Volume (t/m^3)	2.28
Dry Mass / Unit Volume (t/m^3)	2.08
Uniaxial Compressive Strength (MPa)	**3.7**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	06.12.2018
Sampling Method:	Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3003
Sample Location	-
Depth (m)	2.0 - 2.25
Rock Description	Laminite
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	180
Average Diameter (mm)	52.7
Average Height (mm)	132
Height to Diameter Ratio	2.5 : 1
Moisture Content (%)	11.8
Wet Mass / Unit Volume (t/m^3)	2.21
Dry Mass / Unit Volume (t/m^3)	1.97
Uniaxial Compressive Strength (MPa)	**0.8**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	12.12.2018
Sampling Method:	Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3004
Sample Location	-
Depth (m)	7.53 - 7.8
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	177
Average Diameter (mm)	51.7
Average Height (mm)	141
Height to Diameter Ratio	2.7 : 1
Moisture Content (%)	11.2
Wet Mass / Unit Volume (t/m^3)	2.29
Dry Mass / Unit Volume (t/m^3)	2.06
Uniaxial Compressive Strength (MPa)	**1.6**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	10.12.2018
Sampling Method:	Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3005
Sample Location	-
Depth (m)	5.72 - 6.0
Rock Description	Laminite
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	181
Average Diameter (mm)	51.6
Average Height (mm)	133
Height to Diameter Ratio	2.6 : 1
Moisture Content (%)	9.8
Wet Mass / Unit Volume (t/m^3)	2.25
Dry Mass / Unit Volume (t/m^3)	2.05
Uniaxial Compressive Strength (MPa)	**1.1**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	07.12.2018
Sampling Method:	Sampled by DP Engineering

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski

NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3006
Sample Location	-
Depth (m)	2.1 - 2.4
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	222
Average Diameter (mm)	51.7
Average Height (mm)	130
Height to Diameter Ratio	2.5 : 1
Moisture Content (%)	7.9
Wet Mass / Unit Volume (t/m^3)	2.23
Dry Mass / Unit Volume (t/m^3)	2.07
Uniaxial Compressive Strength (MPa)	**7.3**
Comments	

Uniaxial Compressive Strength

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Report Number:	81719.09_1
Issue Number:	1
Date Issued:	10.01.2018
Client:	Multiplex Constructions Pty Ltd
Project Number:	81719.09
Project Name:	Proposed New Maitland Hospital
Project Location:	Metford Road, Metford
Work Request:	2909
Date Sampled:	12.12.2018
Sampling Method:	Sampled by DP Engineering

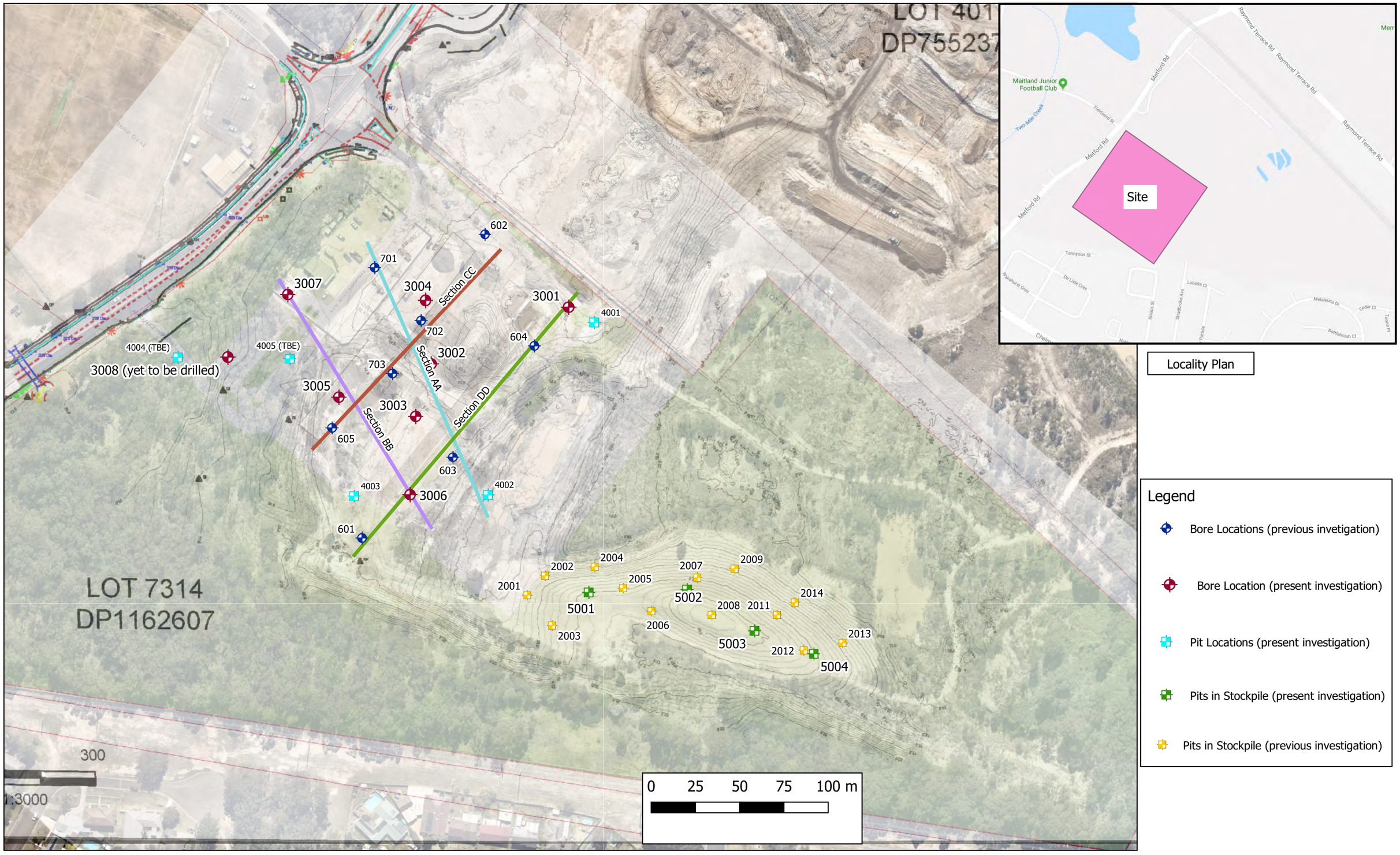
Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2, AS 4133.1.1.1	
Sample Number	3007
Sample Location	-
Depth (m)	11.45 - 11.71
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Orientation to Bedding	-
Compression Machine	Autocon Model CL10320
Date of Testing	07.01.2018
Duration of Test (seconds)	310
Average Diameter (mm)	51.8
Average Height (mm)	131
Height to Diameter Ratio	2.5 : 1
Moisture Content (%)	2.5
Wet Mass / Unit Volume (t/m^3)	2.55
Dry Mass / Unit Volume (t/m^3)	2.49
Uniaxial Compressive Strength (MPa)	**75.5**
Comments	

Appendix D

Drawing 1 – Test Location Plan
Drawings 2 to 6 – Cross-sections A'-A to E'-E



Locality Plan

Legend

- Bore Locations (previous invetigation)
- Bore Location (present investigation)
- Pit Locations (present investigation)
- Pits in Stockpile (present investigation)
- Pits in Stockpile (previous investigation)

Drawing adapted from NearMap image dated 14 June 2018
TBE = to be excavated

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT:	Multiplex Constructions Pty Ltd		
OFFICE:	Newcastle	DRAWN BY:	MPG
SCALE:	1:2000 @ A3	DATE:	24.12.2018

TITLE: **Test Location Plan**
Proposed Maitland Hospital
Metford Road, Metford

N

PROJECT No:	81719.09
DRAWING No:	1
REVISION:	0

A

A'

ELEVATION (AHD)

20
15
10
5
0
−5
−10
−15

0
20
40
60
80
100
120
140
160

DISTANCE ALONG PROFILE (m)

4002
Bottom Depth 1.6 m

3003
Rock Strength
refusal
Bottom Depth 20.15 m

3002
Rock Strength
N = 18
Bottom Depth 19.8 m

702
Rock Strength
N = 5
N = 9
refusal
Bottom Depth 11.55 m

701
Rock Strength
refusal
Bottom Depth 8.55 m

NOTE: Summary logs only. Should be read in conjunction with detailed logs.

LEGEND

- Carbonaceous Siltstone
- Core Loss
- Clay
- Claystone
- Coal
- Filling
- Laminite
- Sand
- Sandstone
- Sandy Clay
- Siltstone
- Surface Level very approximate only

TESTS / OTHER
N - Standard penetration test value
▼ - Water level
PP- Pocket penetrometer test value

0 10
Horizontal Scale (metres)

Vertical Exaggeration = 2.5

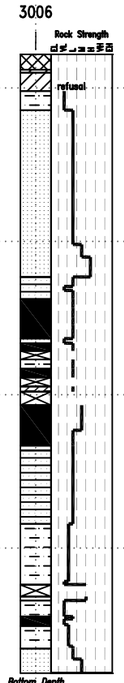
Douglas Partners
Geotechnics | Environment | Groundwater

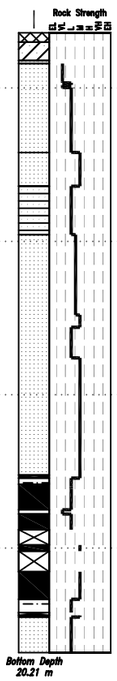
CLIENT: Multiplex Constructions Pty Ltd		TITLE: Cross-section A-A' Proposed New Maitland Hospital Metford Road, Metford
OFFICE: Newcastle	DRAWN BY: PLH	
SCALE: 1:500 (H) 1:200 (V) @ A3	DATE: 15.01.2019	

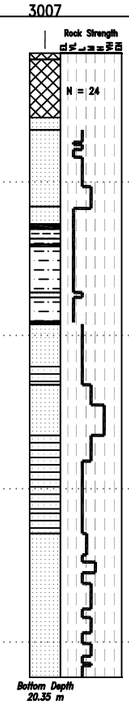
PROJECT No:	81719.09
DRAWING No:	2
REVISION:	0

B

B′







ELEVATION (AHD)

15 10 5 0 −5 −10 −15 −20

0 20 40 60 80 100 120 140

DISTANCE ALONG PROFILE (m)

NOTE: Summary logs only. Should be read in conjunction with detailed logs.

LEGEND

- Carbonaceous Siltstone
- Core Loss
- Clay
- Clayey Sand
- Claystone
- Coal
- Filling
- Laminite
- Sandstone
- Sandy Clay
- Siltstone

TESTS / OTHER
N - Standard penetration test value
▼ - Water level
PP- Pocket penetrometer test value

0 8
Horizontal Scale (metres)

Vertical Exaggeration = 2.0

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Multiplex Constructions Pty Ltd		TITLE: Cross-section B-B'	PROJECT No: 81719.09
OFFICE: Newcastle	DRAWN BY: PLH	Proposed New Maitland Hospital	DRAWING No: 3
SCALE: 1:400 (H) 1:200 (V) @ A3	DATE: 15.01.2019	Metford Road, Metford	REVISION: 0

C

C′

ELEVATION (AHD)

40
35
30
25
20
15
10
5
0
-5

605
Rock Strength
Bottom Depth 7.98 m
3005
Rock Strength
Bottom Depth 20.21 m

703
Rock Strength
refusal
Bottom Depth 12 m
3002
Rock Strength
N = 18
Bottom Depth 19.8 m

3004
Rock Strength
N = 7
N = 11
N = 21
702
Rock Strength
N = 8
N = 9
refusal
Bottom Depth 11.53 m
Bottom Depth 23.3 m

602
Rock Strength
refusal
Bottom Depth 21.85 m

0
20
40
60
80
100
120
140

DISTANCE ALONG PROFILE (m)

NOTE: Summary logs only. Should be read in conjunction with detailed logs.

LEGEND

- Carbonaceous Siltst
- Coal
- Sandstone
- Core Loss
- Filling
- Sandy Clay
- Clay
- Laminite
- Sandy Silt
- Claystone
- Sand
- Siltstone
- Surface Level very approximate only

TESTS / OTHER
N - Standard penetration test value
- Water level
PP- Pocket penetrometer test value

0 8
Horizontal Scale (metres)
Vertical Exaggeration = 1.6

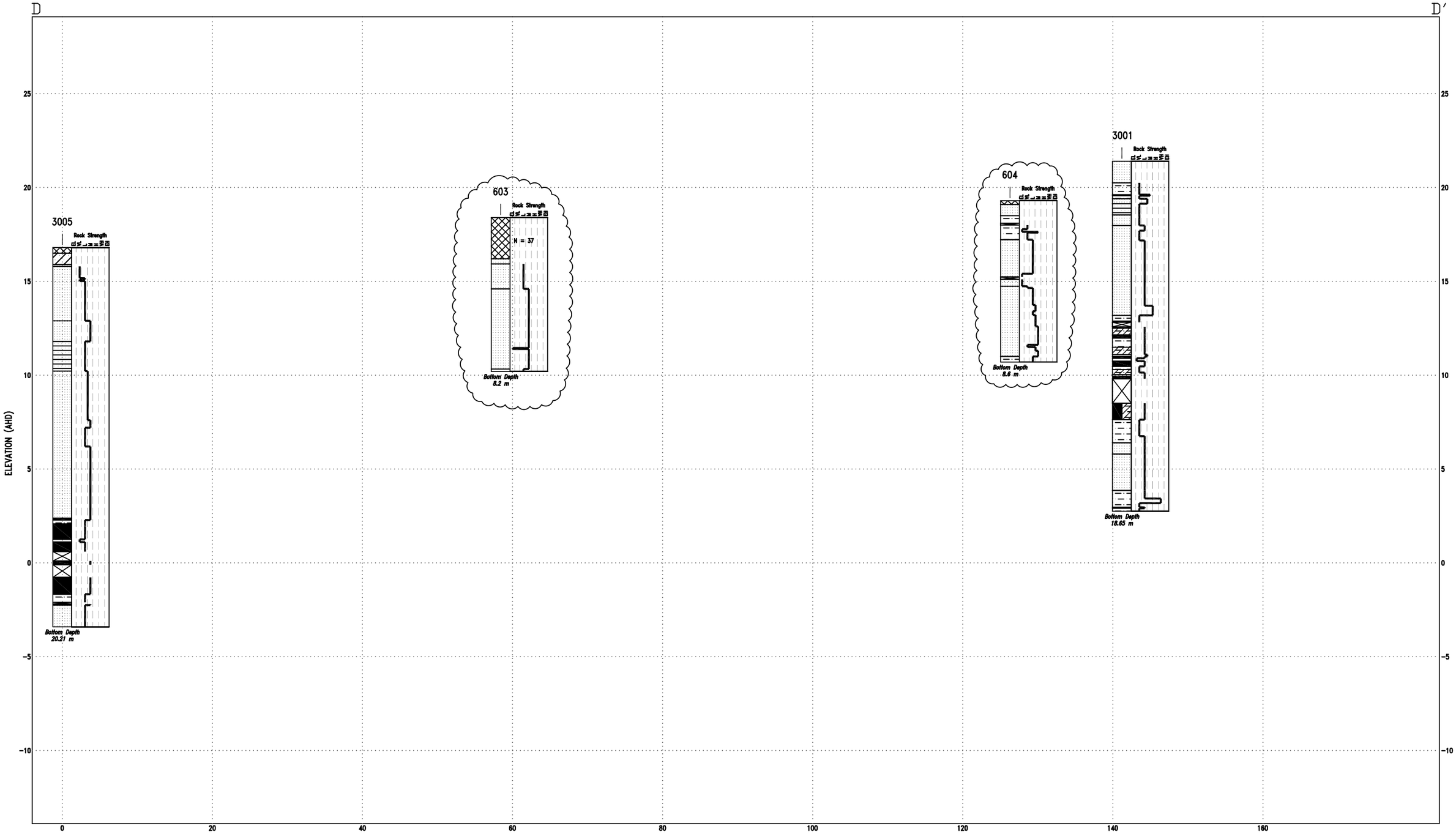
Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Multiplex Constructions Pty Ltd		TITLE: Cross-section C-C'
OFFICE: Newcastle	DRAWN BY: PLH	Proposed New Maitland Hospital
SCALE: 1:400 (H) 1:250 (V) @ A3	DATE: 15.01.2019	Metford Road, Metford

PROJECT No:	81719.09
DRAWING No:	4
REVISION:	0

D

D′



DISTANCE ALONG PROFILE (m)

NOTE: Summary logs only. Should be read in conjunction with detailed logs.

LEGEND

- Carbonaceous Siltstone
- Core Loss
- Claystone
- Coal
- Filling
- Laminite
- Sandstone
- Sandy Clay
- Siltstone
- Surface Level very approximate only

TESTS / OTHER
N - Standard penetration test value
▼ - Water level
PP- Pocket penetrometer test value

0 10
Horizontal Scale (metres)
Vertical Exaggeration = 2.5

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Multiplex Constructions Pty Ltd		TITLE: Cross-section D-D'	PROJECT No: 81719.09
OFFICE: Newcastle	DRAWN BY: PLH	Proposed New Maitland Hospital	DRAWING No: 5
SCALE: 1:500 (H) 1:200 (V) @ A3	DATE: 15.01.2019	Metford Road, Metford	REVISION: 0

E

E′

ELEVATION (AHD)

20
15
10
5
0
−5

4002
Bottom Depth
1.6 m

3003
Rock Strength
refusal
Bottom Depth
20.15 m

3002
Rock Strength
N = 18
Bottom Depth
19.8 m

702
Rock Strength
N = 8
N = 9
refusal
Bottom Depth
11.55 m

3004
Rock Strength
N = 7
N = 11
N = 27
Bottom Depth
23.3 m

701
Rock Strength
refusal
Bottom Depth
8.55 m

0
20
40
60
80
100
120
140
160

DISTANCE ALONG PROFILE (m)

NOTE: Summary logs only. Should be read in conjunction with detailed logs.

LEGEND

- Carbonaceous Siltstone
- Core Loss
- Clay
- Claystone
- Coal
- Filling
- Laminite
- Sand
- Sandstone
- Sandy Clay
- Siltstone
- Surface Level very approximate only

TESTS / OTHER
N - Standard penetration test value
▽ - Water level
PP- Pocket penetrometer test value

0 10
Horizontal Scale (metres)
Vertical Exaggeration = 3.3

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Multiplex Constructions Pty Ltd		TITLE: Cross-section E-E'	PROJECT No: 81719.09
OFFICE: Newcastle	DRAWN BY: PLH	Proposed New Maitland Hospital	DRAWING No: 6
SCALE: 1:500 (H) 1:150 (V) @ A3	DATE: 15.01.2019	Metford Road, Metford	REVISION: 0