Geotechnical Site Investigation Report

IPG Badgerys Creek

80221014

Prepared for
Ingham Property Group

29 September 2022

INGHAM PROPERTY

Stantec

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1 INTRODUCTION

1.1 Background

Cardno (NSW/ACT) Pty Ltd were engaged by Ingham Property Group ("the client") to prepare a geotechnical Investigation report to determine the in-situ ground conditions of existing agricultural lands to be redeveloped into mixed use industrial developments to be located within the suburb of Badgerys Creek, as part of the Western Sydney Airport development area.

The investigatory development area ("the site") is being developed by Ingham Property Group (IPG), whom are developing the 182-hectaire site into a mixed use industrial business park, situated adjacent to Western Sydney International Airport, Badgerys Creek. The subject site is identified as Lot 1 on the Deposited Plan (DP) 1123344, which is currently being utilised for mixed agricultural use, consisting of farm lands and open paddocks.

Investigatory geotechnical works, were undertaken by Cardno at locations selected in pattern sequence spread across the site to determine overall site topography, geology, aid bulk earthwork activities, proposed new developments and pavements to be incorporated across the subject site. The contents of this report detail the ground assessment methodology carried out for the assessment and the interpretation of data, so to facilitate further design consideration.

A site location plan and features are provided on **Figures 2-1**, respectively in **Appendix A**.

1.2 Project Appreciation

Ingham Property Group (IPG) are developing a 182-hectare mixed use industrial business park located adjacent to the Western Sydney International Airport. Western Sydney has and will continue to change and grow significantly. The Western Parkland City will transform with the construction of Western Sydney Aerotropolis. The IPG site will be at the core of this evolving and dynamic precinct. The site and its development process will need to evolve to cater for the current and future market.

1.3 Purpose, Objectives and Scope

The purpose of this report is to provide Ingham Property Group with geotechnical advice on the in-situ subsurface conditions to be encountered, for the proposed development works

The scope of works adopted for the geotechnical investigation were:

General Site Area

- Carry out geotechnical engineering logging of the sub-surface materials in conformance with the requirements of AS1726-2017, Geotechnical Site Investigations;
- Determine groundwater levels and fluctuations (if encountered across the subject site);
- Determine salinity and dispersive properties of existing soils and comment on their suitability for use;
- Assess the allowable bearing capacity and moisture reactivity of foundation materials to allow selection and design of a suitable footing system for proposed building.
- Consider the excavatability of material to be cut from the higher areas of the site and its suitability for use as fill.
- Provide information on the stability of cut and fill batters.
- Provide recommendations as to appropriate parameters for the assessment of lateral loads on retaining walls.
- Provide CBR and modulus of subgrade reaction parameters of subgrade materials for the design of pavements.

Infiltration Area

Partial investigation to determine if the site is suitable to be utilised as infiltration areas, for wastewater treatment, sediment basins and other; during investigation the following requirements would be satisfied;

- Determine the properties of the soil at the proposed application area and to allow the assignment of an appropriate 'Soil Category'.

> Determine what limitations are present on the site. Such limitations may include a shallow water table or rock, nearby water-courses or water supply, the elevation of the land and flood risk, public health concerns or the proximity of the proposed land application area to existing buildings and boundaries.

2 SITE DESCRIPTION

The site is located at 475 Badgerys Creek Road, Badgerys Creek, NSW. The current site consists of a mixed use agricultural area situated within Badgerys Creek, approximately 41 km to the west of Sydney centre business district. A site plan is presented in Figure 2-1 (and contained in **Appendix A**) detailing the proposed development site boundary. Further site details are presented in Table 2-1 below.

Figure 2-1 Site Plan of proposed development area

Table 2-1 Site Identification

Item	Details
Site Address	457 Badgerys Creek Road, Badgerys Creek
Approximate Site Area (ha)	182
Title details	Lot 1 in DP1123344
Local Government Area	Liverpool City Council
Current Site Owners	Private
Current Land Zoning	Mixed agricultural use

2.2 Topography and Drainage

Observed site conditions encountered during investigation, depicted the various farmlands scattered around the proposed development area separated by grassing paddocks of both low and high grass at various locations. The topography across the site inclined towards a mounded section, situated nearest the centre of the subject site. The land fell surrounding the mound from a typical topography of RL75 m declining to RL50 m. The majority of the site gradually declines from an eastern to north westerly direction.

A small creek was encountered meandering through the centre of the site in a north to southerly direction. The flow of the creek was observed towards the north. Due to the shallow waters encountered in the creek, it would be envisaged the creek would dry out during prolonged periods of dry weather. Two detention basins were also encountered in the middle of the subject site, assumed for agriculture use

2.3 Regional Geology

The Penrith 1:100 000 Geological Map, Clark N.R. and Jones D.C., 1991, 1st Edition, illustrates that the subject site is situated between two lithological boundaries. The maps how that the site it is predominately underlain by Bringelly Shale with Alluvium deposit along the creeks on the western and eastern ends. Bringelly Shale (Rwb) is charactered as Shale, carbonaceous, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff. Alluvium (Qal) deposit is consisted of fine-grained sand, silt and clay.

Regional geology of the site area is presented in Figure 2-2 below:

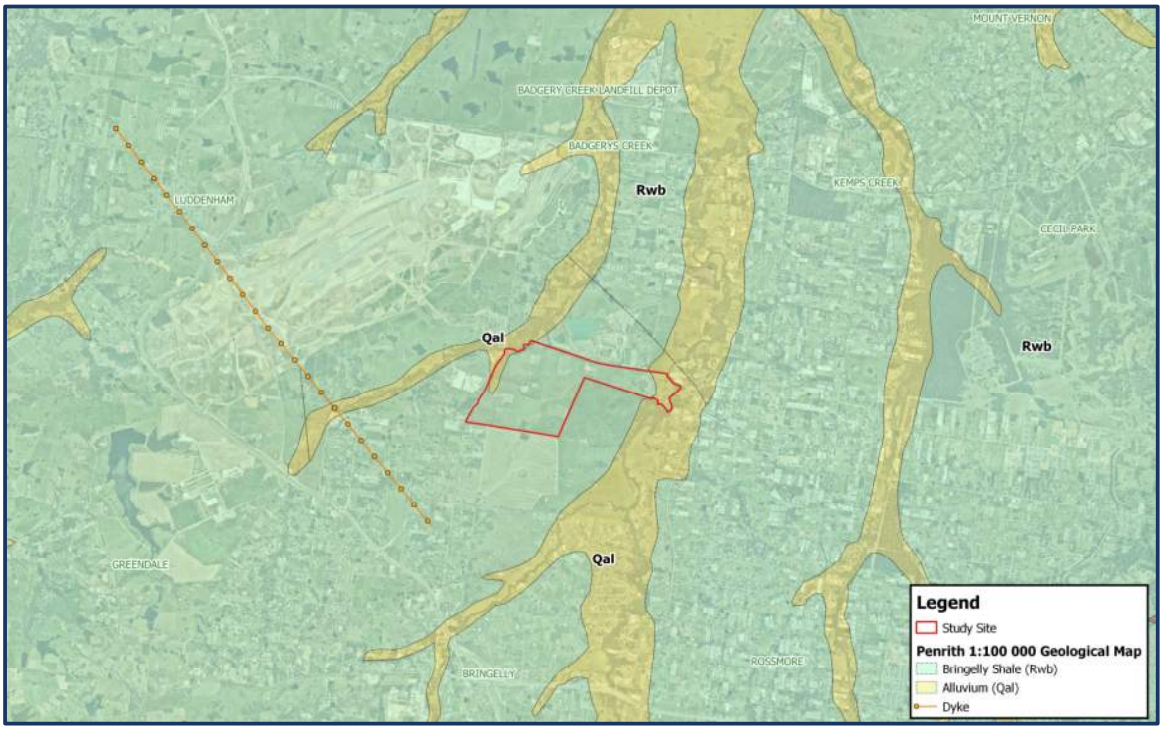

Figure 2-2 Geological Map, Clark N.R. and Jones D.C., 1991, 1st Edition

2.4 Climate and Weather

2.4.1 Climate

The Sydney region is classified as a humid subtropical climate. The region experiences mild cool winters to warm hot summers with typically minimal extremes in seasonal differences due to its proximity to the ocean. There are no distinct wet or dry seasons, however rainfall generally peaks early in the year during the late summer/early autumn months and plummets in the second half of the year. The mean rainfall for Sydney taken from the Bureau of Meteorology's Sydney Airport ranges from 60mm (September) to 125mm (June).

Temperatures range in the high 20s mid 30s during summer months and high teens to low 20s during winter months. The mean minimum temperature ranges from 7.3°C (June) to 19.1°C (February). The mean maximum temperature ranges from 17.1°C (June) to 26.7°C (January).

The El Nino Southern Oscillation can influence Sydney's climate. El Nino is generally associated with a sustained period of warming characterised by reduced rainfall, warmer temperatures, shift in temperature extremes and increased frost risk. La Nina is the counterpart to El Nino and is associated with cooler ocean temperatures associated periods of increased rainfall, particularly during summer months, with the east coast

of Australia experiencing twice as many flooding events during La Nina years (BOM, 2016). At the time of the investigation, the El Nino Southern Oscillation was considered “Neutral” (BOM, ENSO Wrap-Up, 2019) with a slight warming trend with the BOM suggesting a 50% probability of El Nino conditions in 2019/2020.

2.4.2 Weather

Mean and factual monthly rainfall data from the Bureau of Meteorology’s Badgerys Creek monitoring station is presented in Figure 2-3. The mean rainfall ranges from 34.9mm (September) to 108.4mm (February) in a typical year.

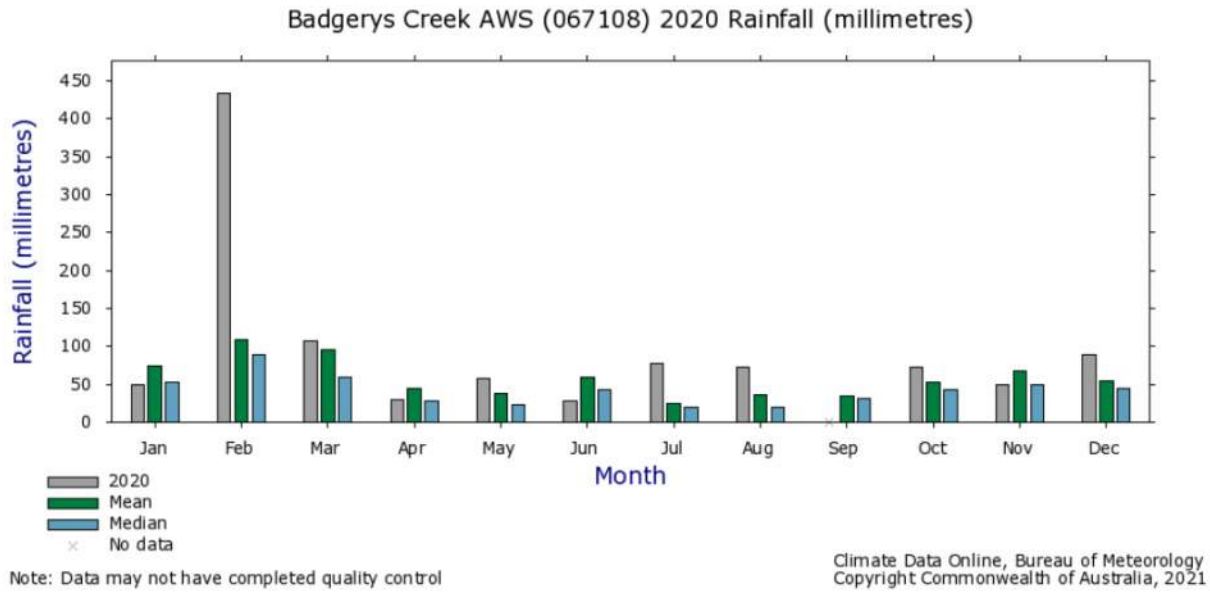

Figure 2-3 2020, mean and median Badgerys Creek rainfall data

2.5 Site Observations

During investigatory works the following field observations were noted:

- Single lane gravel tracks were encountered around the farm lands for access.
- Farmlands were disclosed with surrounding fencing, with some paddocks containing livestock
- The majority of investigatory boreholes were located in grassland, with some localities comprising of grass exceeding one (1) meter in height. Geotechnical investigation works could not be carried out at some nominated locations due to safety concerns, such as presence of snakes on site and potential fire hazard. The following boreholes; BH14, BH19, BH20, BH45, BH52 and BH55 were not completed.
- Demolished farming facility areas labelled as “Potential Asbestos” were avoided as a safety precaution. Areas contained stockpile of disturbed soils with red tape covering the area. Refer to **Appendix A** for ‘Disturbance’ locations.

3 INVESTIGATORY WORKS

3.1 Objective and Scope of Site Investigations

The objective of the geotechnical investigation was to provide sufficient information for the suitability of ground conditions for design and construction consideration for the proposed developments. Also to provide sufficient information for the suitability of ground conditions for on-site effluent disposal as discussed in **Section 1** of this report.

3.1.1 Investigation naming convention

For fieldworks, the naming convention adopted for investigatory boreholes (BHs) was standardised in a sequential manor, due to no previously known ground investigations undertaken on the site.

> BH01, BH02, continuing – Represents investigatory boreholes undertaken across the subject site

3.2 Borehole Locations

The ground co-ordinates of boreholes are listed in Table 3-1 below. At the time of investigation, boreholes were located by survey based on nominated positions outside restricted areas, farm lands, utility services and areas of known artefacts. Upon completion of works all boreholes were picked up with a Topcon GNSS Receiver to determine the ground co-ordinate marks and collar elevation, making reference to GDA2020, Zone 56 and AHD (m) respectively.

Table 3-1 Borehole Co-ordinates

Hole ID	Easting (m)	Northing (m)	Elevation (m AHD)
BH01	291513.040	6246122.926	65.33
BH02	291577.100	6246290.308	64.96
BH03	291550.020	6246418.000	62.77
BH04	291862.508	6246335.152	71.46
BH05	291774.104	6246183.157	73.42
BH06	291756.030	6246056.726	71.66
BH07	291586.104	6245625.673	71.60
BH08	291653.455	6245776.368	69.96
BH09	291546.282	6245801.535	68.33
BH10	291421.922	6245688.197	68.14
BH11	290476.945	6245962.814	65.21
BH12	290576.931	6246032.541	62.20
BH13	290647.060	6246167.856	61.29
BH15	291007.837	6246592.758	63.54
BH16	290644.547	6245746.126	70.32
BH17	290823.848	6245924.345	67.01
BH18	290950.020	6246277.439	68.65
BH21	291385.860	6246764.380	59.13
BH22	290977.902	6245690.981	72.08
BH23	291107.311	6245914.398	71.39

Hole ID	Easting (m)	Northing (m)	Elevation (m AHD)
BH24	291230.588	6246149.256	68.73
BH25	291364.729	6246413.045	64.02
BH26	291543.890	6246547.956	61.08
BH27	291559.760	6246698.296	59.90
BH28	291313.801	6245636.130	68.97
BH29	291427.270	6245839.679	66.20
BH30	291555.782	6246107.215	66.77
BH31	291676.423	6246360.069	67.11
BH32	291803.255	6246519.626	67.76
BH33	291577.325	6245594.442	71.85
BH34	291669.135	6245775.320	70.48
BH35	291808.172	6246075.635	73.86
BH36	291920.927	6246326.870	72.08
BH37	291876.887	6246613.261	67.06
BH38	292144.227	6246349.202	69.96
BH39	292223.791	6246513.984	67.34
BH40	292497.236	6246233.305	63.60
BH41	292416.887	6246477.335	62.43
BH42	292681.048	6246180.363	67.46
BH43	292766.494	6246302.466	58.88
BH44	292933.105	6246387.708	50.03
BH46	292074.782	6246543.175	67.90
BH47	291882.460	6246482.154	68.93
BH48	291685.655	6246306.358	68.30
BH49	291490.783	6245969.923	65.56
BH50	291265.659	6246112.513	67.65
BH51	291009.631	6246274.928	70.56
BH53	291219.691	6245814.214	66.82
BH54	290876.273	6245847.782	69.00

Notes:
a) Boreholes not completed due to safety concerns (i.e. BH14, BH19, BH20, BH45, BH52 & BH55) are not tabulated

3.3 Fieldworks

3.3.1 Underground Service Search

A Dial Before You Dig (DBYD) underground service search was conducted by Cardno for the nominated borehole locations and surrounding area prior to the fieldworks. A qualified underground service locator cleared the borehole locations from utilities, with the use of a pipe/cable locator & transmitter and ground-penetrating radar (GPR) prior to excavation.

3.3.2 Geotechnical Drilling

Investigatory drilling was undertaken with the use of a Ute mounted drilling rigs operated by Terratest Pty Ltd and Stratacore Drilling Pty Ltd.

All boreholes were drilled vertically (90 degrees from the horizontal). Drilling through the soil was carried out using solid flight auger with tungsten Carbide “TC” – bit, until target depth or refusal was reached, whichever came first. Standard Penetration Test (SPT) was carried out at all boreholes, from depths of 0.5m meters below surface level at 1.5m intervals.

3.3.3 Fieldwork Activities

Fieldwork for the investigation was carried out over multiple days, due to restrictive elements; weather & plant availability. Investigatory works were undertaken between the 13th October to 13th of November 2020, comprising of the following sequence of activities;

- A review of Dial Before You Dig (DBYD) and on-site service search.
- Drilling of forty-nine (49) boreholes out of fifty-five (55) using a Ute-mounted drill rig equipped with; solid flight auger and TC-bit;
- Standard Penetration Test (SPT) Tests were undertaken at 1.5m intervals within the soil profile down to 5 metres or refusal, if encountered prior.
- Undertaking in-situ permeability tests (Slug Test) in select bores.
- Collection of soil samples for geotechnical and environmental laboratory testing;
- Survey of all borehole locations using a GNSS receiver.

All fieldworks, including logging of the subsurface profile, collection of soil samples, was undertaken by Geotechnical Engineers from Cardno. The locations of the completed geotechnical investigations are shown on the borehole location plan, attached to this report in **Appendix A**.

Subsurface conditions encountered are summarised in **Section 4** and detailed in engineering borehole logs attached in **Appendix B**, together with explanatory notes. Fieldwork was carried out in accordance with Australian Standard, AS1726-2017 ‘*Australian Standard - Geotechnical Investigations’*.

3.3.4 Laboratory Works

Samples of representative strata were recovered and returned to NATA accredited laboratory. The following tests were carried out on selected samples:

- Thirty-eight (38) Atterberg Limits, sixteen (16) Particle Size Distribution, thirty-eight (38) Moisture Content and Eight (8) Emerson Class Number tests to aid material classification;
- Eight (8) California Bearing Ratio (CBR) tests to aid bulk density, swell potential of subgrade;
- Thirteen (13) Soil aggressivity tests to aid with chemical identification of the soils;
- Thirteen (13) Salinity tests to aid Salinity classification of the soil.

The Laboratory test results are included in **Appendix C**. Laboratory testing was carried out in accordance with Australian Standard AS1289 ‘Laboratory Testing for Engineering Purposes’.

4 GROUND CONDITIONS ENCOUNTERED

A brief summary of the typical sub-surface conditions encountered within each investigatory locality is provided below. For full description of the sub-surface profiles encountered, reference can be made to the borehole logs presented in **Appendix B**.

4.1 Subsurface Strata

The ground conditions across the subject site were relatively uniform, however inclining / declining with the general landscape topography.

The subsurface profiles encountered across the site were as follows:

> Topsoil consisting of silty CLAY, with organic matter from depths between 0.0 m and 0.10 m, overlying;

> Residual soil, comprising of silty Clay between 0.10 m and 4.60 m, overlying;

> Bedrock, the bedrock profile comprised of shale, from varying depths from 0.50m to refusal. No rock coring was undertaken as part of investigatory works to determine bedrock consistencies.

The subsurface profile is summarised below, and presented in engineering logs attached in **Appendix B**, together with explanatory notes.

Table 4-1 Subsurface Conditions Summary

Subsurface Conditions				
Layer	Description	Depth Range (m) BGL	Consistency Range	Moisture Condition / Rock Weathering
TOPSOIL	Comprising of Silty Clay	0.00 - 0.10	N/A	N/A
RESIDUAL SOIL	Comprising of Silty Clay	0.10 - 4.60	Generally Stiff to Very Stiff	M(<PL)
WEATHERED ROCK	Comprising of Silty Clay	0.50 – RD	Hard	Highly Weathered Rock

Notes:
a) NA= Not Applicable
b) RD = Refusal Depth

Alluvium deposits were not encountered during investigatory drilling, however have been determined present on the geological maps, showing potential alluvium towards the east and west of the site or near the creek. The presence of alluvium, maybe present during excavation works.

4.2 Groundwater

Groundwater was not encountered at any of the augured boreholes at the time of drilling. It should be noted that groundwater levels may fluctuate depending on the time of year and following periods of wet weather. Seepage may also occur along the soil/rock interface during and after periods of wet weather.

4.3 Laboratory testing results (Geotechnical)

A summary of laboratory test results are presented in Table 4-2 to Table 4-5 below.

4.3.1 Soil Properties and classification

The results of material classification testing on selected samples are summarised below in **Table 4-2** to **4-3** below.

Table 4-2 Soil classification lab results summary

Atterberg Limits, Particle Size Distribution, Moisture Content, Emerson Class									
Hole ID	Depth (m BSL)	PSD		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Moisture Content (%)	Emerson Class Number
		Clay / Silt (%)	Gravel / Sand (%)						
BH10	1.20-1.50	94	6	89	29	60	14	24.4	-
BH11	3.50-4.50	61	39	44	22	22	10.5	12.0	5
BH13	3.00-3.50	90	10	50	21	29	13	24.9	6
BH15	2.00-2.40	92	8	77	25	52	12.5	22.1	5
BH16	1.50-1.95	-	-	58	21	37	7.5	16.5	-
BH17	0.50-0.80	92	8	78	23	55	9.0	25.3	-
BH21	1.00-1.50	95	5	46	18	28	9.5	16.8	-
BH22	1.50-1.95	-	-	47	18	29	9.0	12.2	-
BH23	0.50-0.95	-	-	52	18	34	5.0	16.2	-
BH24	1.50-1.95	-	-	49	18	31	8.5	13.2	-
BH26	2.20-2.50	56	44	37	19	18	9.5		5
BH27	1.50-2.00	41	59	30	17	13	7.0	14.0	5
BH27	3.10-3.30	66	34	44	19	25	9.5	17.1	5
BH28	4.00-4.50	-	-	57	16	41	7.5	15.0	-
BH29	2.70-3.00	82	18	61	19	42	10.0	15.4	-
BH30	0.50-0.95	-	-	55	22	33	6.5	18.2	-
BH31	2.30-2.70	70	30	43	15	28	8.5	9.0	-
BH32	1.00-1.30	82	18	45	13	32	8.0	11.2	-
BH33	1.50-1.95	-	-	49	19	30	6.5	13.1	-
BH34	0.20-0.50	93	7	73	22	51	9.5	16.6	-
BH35	2.60-3.00	-	-	65	21	44	9.0	14.4	-
BH36	2.30-2.80	74	26	47	16	31	10.0	9.9	-
BH37	0.50-0.89	-	-	40	16	24	9.0	11.6	-
BH38	0.50-0.95	-	-	51	19	32	8.0	15.3	-
BH39	0.50-0.95	-	-	45	18	27	9.0	12.8	-
BH40	1.50-1.95	-	-	53	19	34	10.5	10.4	-
BH41	1.00-1.30	-	-	39	15	24	7.5	10.1	-
BH42	0.50-0.95	-	-	28	15	13	4.5	7.3	-
BH43	1.20-1.50	86	14	52	20	32	8.0	14.1	-
BH44	1.80-2.00	72	28	41	19	22	10.5	14.4	5
BH46	0.50-1.00	68	32	43	17	26	8.5	11.0	-

Atterberg Limits, Particle Size Distribution, Moisture Content, Emerson Class									
Hole ID	Depth (m BSL)	PSD		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Moisture Content (%)	Emerson Class Number
		Clay / Silt (%)	Gravel / Sand (%)						
BH47	0.30-0.80	80	20	71	19	52	7.0	20.1	-
BH48	0.50-1.00	89	11	64	21	43	7.5	15.5	-
BH49	0.50-1.00	64	36	53	19	34	7.0	15.5	-
BH50	0.50-1.00	86	14	60	21	39	9.0	17.1	-
BH51	0.50-1.00	67	33	45	15	30	8.5	15.5	5
BH53	0.50-1.00	72	28	39	19	20	7.5	13.4	-
BH54	0.50-1.00	81	19	61	19	42	12.5	16.8	-

Table 4-3 CBR lab results summary

CBR Test Results					
Hole ID	Depth (m BSL)	SMDD (t/m3)	OMC (%)	CBR (%)	Swell (%)
BH46	0.50-1.00	1.84	14.5	3.0	3.5
BH47	0.30-0.80	1.77	18.0	2.0	3.0
BH48	0.50-1.00	1.82	16.0	2.0	4.5
BH49	0.50-1.00	1.82	18.0	5.0	2.0
BH50	0.50-1.00	1.67	16.5	2.0	3.0
BH51	0.50-1.00	1.84	16.0	4.5	2.0
BH53	0.50-1.00	1.88	15.5	6.0	2.5
BH54	0.50-1.00	1.76	18.0	2.5	5.0

Notes:

a) CBR testing was undertaken on remoulded specimens compacted to a target 100% standard maximum dry density with a surcharge of 4.50 kg and soaked for four days. Subgrade strength is moisture and density dependent and where the existing subgrade is compacted to 100% standard compaction and moistures above OMC exist, the in situ CBR values may be less than the above tested values.

4.3.2 Permeability Well Set Up (Slug Test)

> Following the completion of drilling works, 50mm uPVC was installed in the bores, consisting of 1.5m slotted followed by 1.0m unslotted beyond surface level at each location.

> Bores were cased with 3-5mm pea gravel to 0.50m below surface and topped up with bentonite to create a sealed plug

> In-situ permeability test was undertaken as follows

- Groundwater well was filled with water to surface and allowed to dissipate (min 30mins)
- Groundwater well was recharged to surface, and monitoring undertaken, taking readings at select intervals of fall in height.
- Falling head test results are presented in Table 4-4 and contained in **Appendix D**.

Table 4-4 In-situ infiltration test results

In situ – Permeability Test Results				
Hole ID	Groundwater Level Encountered (m bgl)	Ksat (m/sec)	Ksat (m/day)	Inferred Permeability Condition
BH01	Not encountered	5.00E-7	4.32E-2	Very Low
BH02		5.18E-8	4.48E-3	Very Low
BH03		7.04E-8	6.08E-3	Very Low
BH04		1.06E-7	9.16E-3	Very Low
BH05		9.69E-8	8.37E-3	Very low
BH06		4.86E-9	4.22E-4	Very Low
BH08		3.46E-8	2.99E-3	Very Low
BH09		2.72E-7	2.35E-2	Very Low

Notes:
a) Permeability determined using Hvorslev Methodology

4.4 Laboratory testing results (Environmental)

4.4.1 Environmental Soil Aggressivity Results

Results of soil aggressivity tests on selected samples obtained from select boreholes and considered representative of the soil and weathered rock profiles encountered across the site are summarised below in Table 4-5.

Table 4-5 Environmental lab results summary

Soil Aggressivity								
Hole ID	Depth (m BSL)	Chloride (mg/kg)	pH	Sulphate (mg/kg)	Moisture (%)	Resistivity (ohm.m)	Exposure Classification[1] (AS3600-2009)	Exposure Classification[2] (AS2159-2009)
BH01	1.80-2.00	1300	5.5	260	13	19	A2	Mild
BH03	1.00-1.20	1600	4.9	580	17	17	A2	Mild
BH06	1.50-1.70	1900	4.8	830	19	13	A2	Mild
BH08	0.50-0.80	580	5.4	280	16	49	A2	Mild
BH09	1.70-1.90	660	5.3	410	15	29	A2	Mild
BH10	3.20-3.40	1300	7.8	460	14	17	A1	Non-aggressive
BH13	1.50-2.00	160	8.1	61	20	34	A1	Non-aggressive
BH15	2.40-3.00	210	6.0	71	19	23	A1	Non-aggressive
BH16	1.00-1.50	1600	5.1	850	19	13	A2	Mild

Soil Aggressivity								
Hole ID	Depth (m BSL)	Chloride (mg/kg)	pH	Sulphate (mg/kg)	Moisture (%)	Resistivity (ohm.m)	Exposure Classification[1] (AS3600-2009)	Exposure Classification[2] (AS2159-2009)
BH17	1.50-1.95	2400	5.0	1100	20	11	A2	Mild
BH21	1.00-1.50	270	5.1	47	16	20	A2	Mild
BH22	0.50-1.00	610	5.3	570	20	37	A2	Mild
BH23	1.00-1.50	970	5.5	1000	17	16	A2	Mild
BH26	1.20-1.40	300	5.6	48	17	19	A1	Non-aggressive
BH27	0.80-1.00	46	8.0	17	16	120	A1	Non-aggressive
BH34	0.20-0.50	630	5.3	660	14	25	A2	Mild
BH36	2.30-2.80	760	5.5	500	11	25	A2	Mild
BH44	1.50-1.80	310	7.5	48	23	17	A1	Non-aggressive

Notes:
a) Exposure classification for buried reinforced concrete based on Tables 4.8.1 and 4.8.2 of AS 3600 (2009).
b) Based on AS 2159-2009 and groundwater condition mentioned above in Section 6.4.2.

5 PROPOSED DEVELOPMENTS

Proposed developments plans were known at the stage of geotechnical investigation works, only that the site was proposed to become development of mixed industrial use. Proposed development key items are:

> Bulk earthworks

> Proposed mixed use industrial developments

> Proposed haul road alignment

> Proposed Infiltration areas

6 GEOTECHNICAL COMMENTS AND DESIGN PARAMETERS

6.1 General

Geotechnical parameters relevant to design of embankments, cuttings and structural foundations have been developed based on available geotechnical information obtained to date for the project, published data and our experience of materials of similar nature and history on projects within Sydney region.

The design values derived are generally obtained from statistical analyses of project specific in-situ and laboratory test results. The values are considered to be representative of the properties of the material in its current condition. Where there are insufficient in-situ or laboratory tests, empirical correlations are used.

When project specific in-situ and laboratory tests, or empirical correlations are not applicable or not available, design values are then chosen with due consideration of relevant experience from past projects and the application of engineering judgement.

Geotechnical design parameters have been developed for the following units:

> Residual Clay - Firm to Hard

> Shale – Rock Classes SHA – 5

Geotechnical design parameters for the shale encountered at the site have been derived based on the values documented in the literature (e.g. Pells P.J.N et al. 2019) for Sydney Sandstone and Shale and previous experience in similar geology.

6.2 Subsurface Conditions / Geology

From the borehole investigation undertaken on site, the subsurface ground profile was generally consistent with the geology maps, where a relatively thin laminate of topsoil, overlying residual clays was encountered, above bedrock. The bedrock profile is considered to be consistent with geology for the area of Bringelly Shale.

6.2.1 Residual Soil

Residual Soils encountered across the subject site, overly Bringelly Shales. The residual soils are formed due to the complete in-situ weathering of the bedrock, and tend to comprise of fine-grained materials (clays and silts) due to the underlying shales from which they are derived.

6.2.2 Bringelly Shales

Bringelly shales are commonly found in Western Sydney area, known to have highly expansive /reactive clay minerals, such as Smectite and Montmorillonite, when exposed to wetting and drying.

The following considerations must be taken prior to design advancements;

> Construction on residual soils require significant attention, especially where the soils have not previously been subject to laterisations.

> The removal of residual soils to found structures on the underlying shale will not eliminate ground movement, because Bringelly shale has the potential to swell if water is provided.

> It should also be noted the use of Bringelly Shale as a fill material is not recommended as it deteriorates rapidly in the presence of water and is prone to swelling.

> Cut batters in Bringelly Shale in similar projects have proven cut slopes evidently stable in the short-term became unstable with the deterioration of the rock structure when exposed (i.e. drying and wetting). Therefore, any cut batters in Bringelly shale should be designed for deteriorated condition

> Shallow footing foundations for buildings should be designed following AS2870 when the footings are founded on residual soil or competent shale rock (i.e. Bringelly Shale) considering the founding material is highly reactive.

> Where piles are used for building foundations, they should be designed for uplift and down drag forces due to seasonal swelling and shrinking of soils and ground floor slabs should be suspended on tie-beams and deflatable void formers as form work under the slabs.

> Road pavements are likely to undergo shrink swell movement when the pavement subgrade comprises of Bringelly shale, residuals or alluvials derived from Bringelly shale. Excessive shrink swell movement damages pavements. Therefore, road subgrade should either be treated with lime or replaced with imported non-shrinking soil to control the seasonal shrink swell movement to permissible limits.

The items discussed above will effect each stage of proposed development requiring special design considerations.

6.3 Geotechnical Parameters

Based on the borehole logs and the results of laboratory tests, geotechnical design parameters are inferred and presented to assist with geotechnical design.

6.3.1 Soil Classification

Due to the relatively shallow depths of soils, encountered across the subject site, no geotechnical parameters have been assigned for topsoil layers due to potential variability. Relative density of residual soil layers, shall be assessed based on DCP & SPT N values.

Table 6-1 Material Strength Parameters

Material	Unit Weight (KN/m^3)	Undrained Shear Strength Cu (kPa)	Cohesion C' (kPa)	Internal Angle of friction Φ	Young's Modulus E (MPa)
Topsoil	N/A	N/A	N/A	N/A	N/A
Residual, CLAY (Firm)	18	25	0	24	4
Residual, CLAY (Stiff)	19	50	1	26	8
Residual, CLAY (V. Stiff to Hard)	20	100	2	28	15

Notes;

a) N/A = No geotechnical parameters have been assigned to topsoil layers due to potential variability.

6.4 Rock Parameters

6.4.1 Strength Classification

It is proposed to use the strength classification system provided in Table 6-2 presented below

Table 6-2 Recommended Rock Strength

Term	Letter Symbol	Rock Mass Class	Point Load Index (MPa) Is(50)	Adopted UCS (MPa)
Very Low	VL	SHA-5	0.03 – 0.10	0.85
Low	L	SHA-4	0.10 – 0.3	2.5

Notes

a) The strength terms and associated point load values summarised in Table 6-2
b) A UCS correlation of 17 has been determined for Bringelly shale rock strength.

6.4.2 Rock mass parameters

The rock mass parameters for the design of cut slopes (I.e. effective cohesion (c') and internal friction angle (ϕ') has been derived based on past experience in similar geology.

Table 6-3 Recommended Rock Design Parameters

Rock Mass Class	Unit Weight, Yb (kN/m3)	Rock Mass Modulus Erm (MPa)	Ultimate End Bearing (MPa)	Serviceability End Bearing (MPa)	Ultimate Shaft Adhesion (kPa)	Cohesion c' (kPa)	Friction Angle Φ' (degrees)
SHA-5	22	50	1.5	0.7	50	10	28
SHA-4	23	100	3	1.0	150	15	28

6.5 Pavement Design Evaluation

As presented in Table 4-3, laboratory soaked CBR tests indicates that the subgrade material has swell of 2.0% to 5.0%. The material therefore has a “high” expansively for pavement design purposes. The test result for the specimens indicate CBR values in the range 2% to 6%. A review of the DCP testing indicates that the residual subgrade materials are generally firm to stiff with 3 or more blows per 100 mm of DCP test. Taking this into consideration, an in-situ CBRs in the range 2+ can be adopted for design consideration.

A pavement design CBR of 2% is recommended for the site locality. Based on the low design CBR and expansive clay subgrade encountered, the use of a capping layer is recommended, to limit seasonal change occurrences of the underlying subgrade. Due to the presence of low CBR, highly expansive clays and presence of Bringelly shales; Pavement designs should be undertaken in consideration of *“RMS Supplement to Austroads Guide to Pavement Technology, Part 2: Pavement Structural Design”*

Drainage measures should be adopted to ensure that the subgrade and pavements do not become saturated in service. The exposed subgrade should be closely inspected at the time of construction to ensure that material of lower than the assumed design strength does not support the pavement at any locations. Should weaker subgrade material be encountered, consideration should be given to removing and replacing the weak strata with a higher quality material, or reassessing the pavement design.

6.6 Soil Dispersion

Soil dispersion tests were carried out on select samples, with results presented in Table 4-2. From test results, soil dispersion was determined as non-dispersive across the subject site.

6.7 Soil Aggressivity Results

Results of soil aggressivity tests were undertaken on selected samples obtained from select boreholes and considered representative of the soil and weathered rock profiles encountered across the site and are summarised above in Table 4-5. In accordance with AS3600 (2009), exposure classification for concrete resulted in ‘A2’, (Mild in accordance with AS2159-2009) for the subsurface materials across the investigated areas.

6.8 Soil Salinity

Results of analytical testing of the soils at the site were compared to the following guideline values derived from of Department of Land Water Conservation (DLWC) NSW, 2002: Site Investigations for urban salinity . It is noted that the values provided in Site Investigations for urban salinity, were derived for agricultural purposes although are considered appropriate when used in conjunction with the soil aggressivity values outlined
further in this report.

The adopted criteria are listed in Table 6-4 below.

Table 6-4 Salinity Class Assessment Criteria in Soil

Salinity Class Assessment		
Class	**EC_e(dS/m)**	**EC_e (mg/kg)**
Non-Saline	< 2	< 1280
Slightly Saline	2 – 4	1280 – 2560
Moderately Saline	4 – 8	2560 – 5210
Very Saline	8 – 16	5210 – 10240
Highly Saline	> 16	> 10240

Table 6-5 Laboratory Salinity Classification

Salinity Classification				
Hole ID	Depth (m BSL)	Material	Ec_e (mg/kg)	Salinity Class
BH10	3.20-3.40	Silty Clay	330	Non-Saline
BH13	1.50-2.00	Silty Clay	180	Non-Saline
BH15	2.40-3.00	Silty Clay	260	Non-Saline
BH16	1.00-1.50	Silty Clay	470	Non-Saline
BH17	1.50-1.95	Silty Clay	580	Non-Saline
BH21	1.00-1.50	Silty Clay	290	Non-Saline
BH22	0.50-1.00	Silty Clay	160	Non-Saline
BH23	1.00-1.50	Silty Clay	360	Non-Saline
BH26	1.20-1.40	Silty Clay	310	Non-Saline
BH27	0.80-1.00	Silty Clay	53	Non-Saline
BH34	0.20-0.50	Silty Clay	220	Non-Saline
BH36	2.30-2.80	Silty Clay	220	Non-Saline
BH44	1.50-1.80	Silty Clay	380	Non-Saline

Salinity assessment carried out select locations as a part of preliminary site investigation, depicted the site to non-saline. Further sampling should be carried out as part of detailed site investigation (DSI) once subject lots are development cut/fill area are completed in accordance with DWLC Salinity Guidelines.

7 DESIGN OPTIONS FOR STRUCTURES

Design options can be considered for the following structures, as discussed below:

> Foundations for minor buildings

> Foundations for minor structures

> Foundations for retaining walls

7.1 Foundations for buildings

Due to variability of soils, Bringelly shales to be encountered across the proposed development site, a site classification in accordance with AS2870 should be considered for each development area, this will require additional testing once final levels of structures have been finalised. The selection of materials to be utilised during bulk earthworks will aid development of site classification.

7.1.1 Cohesive Soils

In accordance with AS2870, the Sydney region is predominately underlain by clay soils to a depth of 1.80m thick should be classified as Class H1 and H2. Reclassification of site class can be undertaken with further laboratory testing within the subject site area. It should be considered that Bringelly shales are not recommended to be utilised as fill material, reuse of these materials could result in lower lot classification, for foundation design

7.2 Non-Cohesive / granular soils

Should the use of non-cohesive materials be adopted within the top 2.0m below final surface level, a higher level of site classification could be adopted, once placed in a controlled manor.

7.3 Foundations for Minor buildings

For proposed minor structures pad / raft footings maybe a feasible option provided the footings are founded into a structural fill / natural stratum. Due to the unknown anticipated loading conditions of the structures at this stage, no specified allowable bearing capacities can be determined at this time. Once specific loadings have been ascertained, Cardno can assist to optimise the footing size and depth to suit the loading on the founding material.

The following parameters are provided for preliminary sizing of shallow footings of ancillary structures. Bearing capacity of footings needs to be subjected to geotechnical checking considering site classification, footing size, depth, slope (ground surface and/or footing base) and loadings (i.e. bearing capacity is not a soil property but is dependant of footing size, depth, slope and loadings). A footing subjected to pull out forces should be further geotechnical assessment in addition to bearing capacity, overturning and sliding.

Table 7-1 Shallow / Pad Footing Design Parameters

Shallow footing parameters			
Material (Natural / Residual)	Nominal Embedment depth(m)	Nominal Footing (m)	Ultimate Bearing Capacity (MPa)[1]
Natural - Clay (Hard)	0.5	1m * 1m	400
Natural - Clay (Very Stiff)	0.5	1m * 1m	250
Natural - Clay (Stiff)	0.5	1m * 1m	100
Natural - Clay (Firm)	0.5	1m * 1m	50

Notes:
a) Ultimate bearing capacity tabulated above assuming eccentricity of 1/6 x footing width
b) Horizontal ground is assumed
c) Consideration of section 6.2 should be considered, prior to selection of founding level

7.4 Foundations for minor structures

Foundations supporting large sign structures and noise walls are mainly laterally loaded. It is believed that the most efficient option would be bored piles into competent residual clays / weathered shale bedrock. The detailed designer might also be able to look at the option of using pad footings as an alternative.

7.5 Foundations for Retaining Walls

Potential retaining walls within the proposed development area might be used to reduce the footprint of embankment fills. The following design options can be considered at detailed design stage:

- L-shaped retaining wall
- Proprietary blockwork retaining wall
- Reinforced soil wall
- Piled retaining wall

8 EARTHWORKS MATERIALS PLANNING & MANAGEMENT

8.1 Site Preparation

All site preparation work should be carried out in accordance with AS3798-2007 'Guidelines on Earthworks for Commercial and Residential Developments'.

All soil containing grass and root material should be stripped from the construction and access areas prior to construction. This material is not considered suitable for use as structural fill but may be stockpiled for possible future landscaping purposes, if required.

Due to the highly swell potential of the Bringelly shales, the reuse of this material is not considered suitable for site one material or select fills. Adequate site preparation should be considered for reuse of this material, with sufficient tolerances to aid surface movement, alternatively treatment of material with use of lime stabilisation or other methods, could be considered to mitigate the expansive behaviour of this material.

8.2 Earthworks

8.2.1 Excavatability

No problems should be encountered in excavating the near surface material on site. Most soils encountered on site should be within the excavation limits of a small dozer (eg Cat D6 or similar) in bulk excavations or medium size backhoe (eg Case 580 or similar) in trench excavations.

While there is no direct reliable relationship between drilling resistance and excavatability, as a rule of thumb the limit of the *'TC'* bit may be taken as indicative of the limit of excavation of a medium sized dozer in bulk excavation (Cat D7E, D8) or a large excavator in trench excavation.

Generally below the *'TC'* bit limit, larger excavation equipment, compressor driven pneumatic tools, or hydraulic rock breakers would be required for excavation.

'TC' bit refusal was encountered using an Qdrill 300. Whilst it is considered that the weathered rock strata should not decrease significantly in strength below *'TC'* bit refusal, it is possible that *'reverse weathering'* may exist at this site. This would be an unusual occurrence but would result in weaker material than assumed below the level of *'TC'* bit refusal. This could be determined conclusively using rock coring techniques but would incur additional costs.

8.2.2 Embankments

The design of maximum 3H:1V embankments should confirm to project specific design criteria. The design shall include slope stability checks and foundation settlement check. Shallower embankments have been specified, due to the presence of Bringelly where past failures have been encountered with steeper batter slopes.

Should, site one fills be used for embankments, the embankment fills must be constructed with moisture at OMC +/-1 degree of required compacted effort.

The settlement of embankment is expected to include elastic settlement calculations of the embankment foundation, due to the presence of competent foundation material (generally frim to stiff or better ground conditions).

8.2.3 Structural Fill / Compaction Specification and quality control

Prior to the placement of any structural fill, subgrade preparation (treatment or replacement) should be designed to suit the limit of subgrade movement, additional consideration must be allowed for seasonal movements of the fills.

the site should be proof rolled using a minimum 10 tonne vibrating pad foot roller. Should isolated soft/loose areas be encountered during this process, this material should be removed and replaced with select fill.

Depressions formed by the removal of vegetation should have all disturbed soil cleaned out and be backfilled with compacted select fill material.

To minimise the potential for post compaction volume, change due to moisture content variations, any structural clay bearing fill, containing cohesive strata, should be placed in loose layers not greater than 300mm thick at a moisture content in the range -1% to +1% of the standard optimum moisture content, and be compacted to a minimum dry density ratio of 98% standard compaction as per AS1289 5.1.1.

Measures should be adopted to ensure that this clay fill material is not allowed to dry out prior to the placement of succeeding layers of fill and final covering with building slabs and road pavements.

It is recommended that the placement of all structural fill be inspected, tested and certified by Cardno to Level 1 requirements, during the earthworks operations to ensure that all fill is placed in a 'controlled manner', in accordance with AS3798-2007 '*Guidelines on Earthworks for Commercial and Residential developments*'.

Compaction of embankments should be carried out in accordance with the requirements of AS3798-2007. In general, general fill should be compacted to a dry density ratio of at least 98% of Standard Maximum Dry Density (SMDD) in layers no more than 200 mm thick.

To provide compaction to the full width of embankments, fill should be placed and compacted wider than proposed prior to trimming to finished grade lines.

Earthworks at tie-ins to existing embankments should allow for benching and re-compaction of existing batters to provide an even and stable platform for pavements. In some of the embankments, the near surface fill may require excavation and re-compaction to form a suitable subgrade for embankment and pavement construction.

8.2.4 Reuse of In-situ Materials

The reuse of the soils encountered onsite is generally not recommended due to high shrink / swell potential of clays and rock encountered for Bringelly shales.

Should re-use of material be required across the subject site, detailed earthworks specification could be adopted, along with potential of admixtures or stabilisation measures adopted, subject to trail mixes.

8.2.5 Open Cuts / Temporary and Permanent

8.2.5.1 Temporary cuts

Where open cuts are required as part of temporary works around the development site. Recommendations for temporary unsupported cuts batters (if required) are presented in the following table:

Table 8-1 Cut Batter Recommendations

Geotechnical profile	Temporary Batter (Horizontal to Vertical Ratio)
Residual Soil	1.5H : 1V
Shale Class IV - V	1.3H:1V

Notes:

a) Table 8-1 applies to temporary unsupported cut batters only, for a period of no greater than 3 months once constructed
b) Temporary support applies to batters no greater than 1.50m in vertical height. Where deeper cuts are proposed for each stratum, further geotechnical designed support or retention systems may be required.
c) Excavations in soil have assumed no groundwater table has been encountered;
d) The ground surface at the crest of the excavation is horizontal;
e) There is no surcharge at the crest of the excavation for a distance equal to the depth of the excavation;
f) All cuts are protected from erosion.

8.2.5.2 Permanent cuts

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

Table 8-2 Batter stabilisation options for permanent works

Geotechnical profile	Permanent Options	Additional Comments
Residual Soils	▪ Regrade batter slope ▪ Soil nail and shotcrete	▪ Insufficiently residual soil encountered across subject site
Shale Class IV – V /	▪ Regrade batter ▪ Scaling, block removal and re-profiling ▪ Rock / spot bolting ▪ Rock fall netting ▪ Catch fence and ditches	▪ Requires geotechnical input / site observations during top down excavation works to determine extend of stabilization options required ▪ Backfills behind permanent buried structures such as basement carpark walls and base slabs, if in contact with reactive soils, must be designed to allow for induced swelling pressures.

8.2.5.3 Earth pressures for shoring support

Table 8-3 Earth pressure coefficients for retaining wall design

Material	Unit Weight (KN/m^3)	Cohesion C' (kPa)	Internal Angle of friction Φ	Young's Modulus E (MPa)	Active Earth Pressure (Ka)	Passive Earth Pressure (Kp)
Topsoil	N/A	N/A	N/A	N/A	N/A	N/A
Residual, CLAY (Firm)	18	0	24	4	0.42	2.37
Residual, CLAY (Stiff)	19	1	26	8	0.39	2.56
Residual, CLAY (V. Stiff to Hard)	20	2	28	15	0.36	2.76
Shale Class V – IV	22	10	28	50	0.36	2.76

Notes
a) Where earth pressure are allowed for permanent structures, additional allowance for swelling pressures must also be considered.

8.3 Subsurface Drainage and Erosion

Salinity classification as defined by the Site Investigations for *Urban Salinity* from the Department of Land and Water Conservation are provided in are provided in **Section 4**. Saline environments may prevent drainage during periods of wet weather and may result in tunnelling erosion if exposed. Furthermore, a significant number of crops may be affected where moderately saline soils are encountered.

Effective erosion and sedimentation control measures should be installed and maintained for the duration of the construction. Furthermore, adequate drainage of all working areas shall be maintained throughout the period of construction to ensure run-off of water without ponding except where ponding forms part of a planned erosion and sedimentation control system. Rainfall and runoff on exposed slopes of dispersive clays can cause severe erosion. Allowance should be made to designate nondispersive materials as a liner for the embankment.

Consideration should also be given to the permeability of any proposed fill and foundation materials and also the depth and flow direction of groundwater at the site to verify the requirements for the design of any core or cut-off within the embankment and safely channel seepage water to the downstream section of the embankment.

To promote long term performance of the proposed development and surrounding infrastructure, sub soil drainage and related features should also be considered to minimise moisture ingress and subsequent pavement failure.

Drainage for the cuttings should comprise a combination of longitudinal subsoil drains and drainage blanket. Longitudinal drains along the toe of cut batters would intercept groundwater flows from the toe of the cutting and would act as outlet drains for the drainage blanket enabling the drainage blanket to be constructed over the potentially wet subgrade area only rather than extending the full length of the cutting to provide a

drainage outlet. This will also improve the long term stability of batters constructed to avoid water erosion at the batter toe. The drainage blanket, located across the floor of the cutting and beneath the pavement, provides a level of confidence in the interception of groundwater, in particular deeper flows that may bypass the longitudinal drain at the toe of the cutting.

Buried pipes within the Bringelly shales will be subject to reactive soils, design consideration needs to be allowed for differential settlement / movement. Alternatively, services should be location outside this unfavourable soil profile.

9 SOIL INFILTRATION AREAS

Proposed soil infiltration areas have been selected across the subject to be potentially utilised as onsite. Figure 9-1 represents the outlined site boundary, with the proposed infiltration area highlighted in yellow

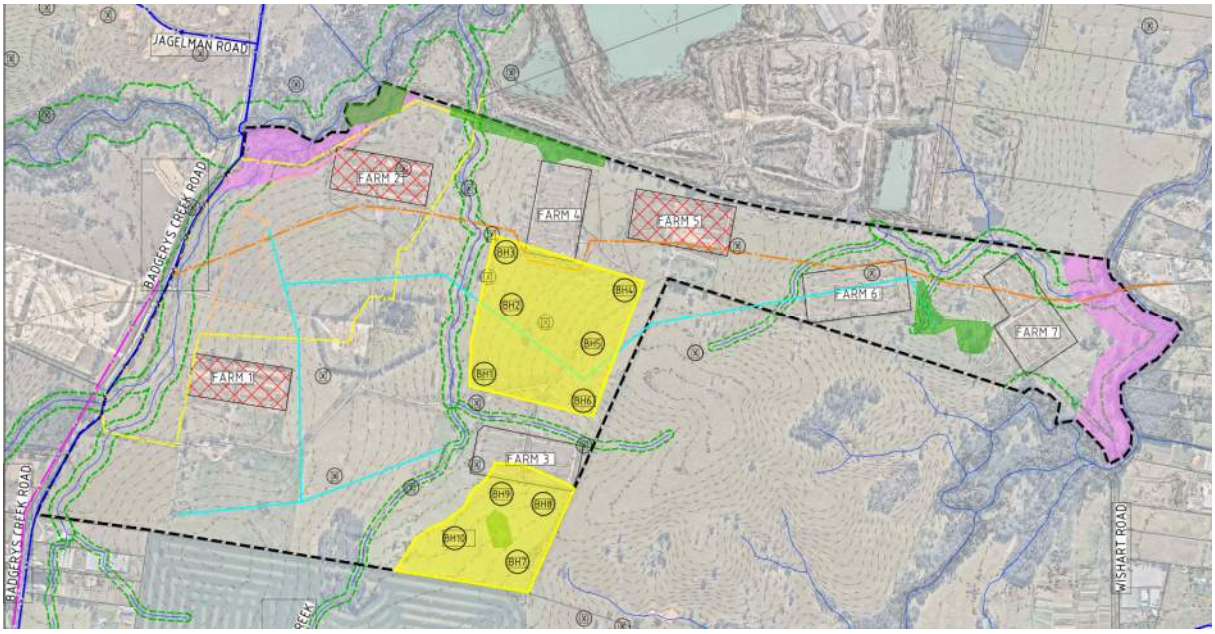

Figure 9-1 Site Plan of proposed development area

9.2 Suitability of in situ soil to be used as Bioretention System

The results of permeability tests documented in section 4.3 of this report. From representative sample of silty clay encountered on site indicated the clay material are of very low permeability due to the presence of residual and Bringelly Bedrock, which all possess low hydraulic conductivity.

9.2.1 Soil Type Summary

Table 9-1 Soil type summary table

Layer	Depth	Stratum	MC	Structure	Sampled	Consistency	Soil Category	Permeability (Ksat)(m/d)
1	0.10 – 2.0	Silty Clay	Moist	Moderate	Yes	Stiff to Very Stiff	6	<0.06

9.2.2 HYDRAULIC LOADING

The hydraulic loading is dependent on the proposed development usage. Once established the hydraulic loading for the area can be determined to aid the land application and treatment areas.

9.2.3 Absorption Areas

Due to the very low permeability conditions of the site, the site would not be considered suitable to receive primary (which would generally be produced by a septic tank) or secondary effluent, however a water balance for land application could be implemented, subject to the proposed usage.

9.2.4 SEPARATION DISTANCES

Certain minimum distances between the disposal area and environmental constraints (such as creeks, gullies, high water table, etc) are required. These are listed on figure 9-2 as an extract from Sydney catchment authority. The edge of the land application area must be at least 100m away from the intermittent watercourse boundary, 100m from the bore well boundary and 6m from the house. Any pathways, driveways, and children's play areas must be at least 15m from the land application area.

Table 2.4 – Buffer distances (after Table 5.5 'Silver Book' (DLG, in draft))

Feature	Level of effluent treatment	Effluent application method	Buffer distance	Achievable
Buildings, retaining walls	Primary	Subsoil	2.0 m downslope and where flat, or 4.0 m upslope	☐ Yes ☐ No ☐ N/A
	Secondary (disinfected)	Subsurface and surface (including drip or trickle) irrigation	6.0 m	☐ Yes ☐ No ☐ N/A
Premises boundaries, paths and walkways, recreation areas	Primary	Subsoil	3.0 m downslope and where flat, or 6.0 m upslope	☐ Yes ☐ No ☐ N/A
	Secondary (disinfected)	Subsurface irrigation	2.0 m downslope and where flat, or 4.0 m upslope	☐ Yes ☐ No ☐ N/A
		Surface irrigation	6.0 m up- or downslope	☐ Yes ☐ No ☐ N/A
In ground potable water tanks, in ground swimming pools	Primary	Subsoil	15.0 m	☐ Yes ☐ No ☐ N/A
	Secondary (disinfected)	Subsurface and surface irrigation	15.0 m - should not be located upslope of feature	☐ Yes ☐ No ☐ N/A
Permanent and intermittent watercourses	Primary	Subsoil	100 m from the high water level; 150 m to a SCA named river*	☐ Yes ☐ No ☐ N/A
	Secondary (disinfected)	Subsurface and surface irrigation	100 m from the high water level; 150 m to a SCA named river*	☐ Yes ☐ No ☐ N/A
Bore or well used for domestic^ consumption	Primary	Subsoil	100 m from the high water level	☐ Yes ☐ No ☐ N/A
	Secondary (disinfected)	Subsurface and surface irrigation	100 m from the high water level	☐ Yes ☐ No ☐ N/A
Dam and drainage depression	Primary	Subsoil	40 m from the high water level	☐ Yes ☐ No ☐ N/A
	Secondary (disinfected)	Subsurface and surface irrigation	40 m from the high water level	☐ Yes ☐ No ☐ N/A

* SCA named rivers include: Wingecarribee, Nattai, Nepean, Coxs, Wollondilly, Kangaroo, Shoalhaven, Mongarlowe and Tarlo for the full length as defined on the topographical maps, and the Mulwaree River upstream as far as the Braidwood Road Crossing. Reference must be made to the SCA NorBE Assessment Guideline (SCA, 2011).

^ If within 100 metres of a bore or well used for domestic consumption, a draw-down analysis done using an appropriate methodology, such as Cromer, Gardner and Beavers, 2001 'An improved viral die-off method to estimate setback distances' is required.

Figure 9-2 Sydney Catchment Authorities

10 CONSTRUCTION INSPECTION

It is recommended that placement of all structural fill and excavations, excavation retention (shoring, retaining wall) installation, unsupported cut and battered excavations, plant induced vibrations, groundwater seepage from excavation faces, ground settlement, exposed materials at foundation levels, sedimentation downslope of excavated areas be inspected, tested and certified where necessary, by a Geotechnical Engineer to ensure recommendations made in this report have been adhered to.

Should subsurface conditions other than those described in the report be encountered, Cardno should be consulted immediately and appropriate modifications developed and implemented if necessary.

11 SUMMARY AND CONCLUSION OF WORKS

The following provides a summary of the conclusions and recommendations with regard to the geotechnical investigation that was undertaken for Ingham Property Group at Badgerys Creek. The preceding sections of this report should be consulted for the detailed conclusion and recommendations relating to each aspect of the investigation.

11.1 Conclusions

> Geotechnical investigatory works were undertaken at strategic locations within the proposed development footprint area.

> Investigatory works comprised of drilling forty-nine (49) out of proposed fifty-five (55) boreholes to a minimum depth of 5.0 m or refusal depths (if encountered prior), with collection of soil samples for analysis, as described in section 4 of this report.

> The subsurface conditions encountered across the site were relatively uniform and are consistent with regional geology expected in accordance with published geological maps. The ground profile generally comprised of a thin veneer of topsoil, over residual gravelly clays derived from the shallow bedrock encountered. The encountered bedrock generally comprised of shale.

> No groundwater was encountered within the investigatory boreholes

> From assessment, typical concept footings such as both shallow and deep footings systems may be adopted for various structures, across the subject site.

11.2 Recommendations

> The formation of Bringelly shales encountered across the subject site, can be problematic for various reasons. Specific recommendations for the use and non-use of Bringelly shales is discussed is Section 6-2

> Earthworks should be carried out in compliance with AS3798 –2007 "*Guidelines on earthworks for commercial and residential developments*".

> Table 6-1 presents recommended soil strength and deformation parameters.

> Table 6-2 presents recommended rock classification applicable for the site.

> Excavatability of material has been assessed as hard digging upto hard ripping in weathered rock, which is further discussed in section 8.2.

> Section 8.3 describes recommended structural earth fill that may be required.

> Table 7-1 presents bearing capacity values for soil materials for assumed conditions for preliminary footing sizing only. The footings shall be designed by a geotechnical designer once loadings and geometry details are available.

- Recommended preliminary bearing capacity parameters for geotechnical design purposes are provided in Section 6. However, we note that the recommended bearing capacity values should be reviewed / revised considering adopted footing type and site-specific foundation material.
- Adequate drainage of all working areas shall be maintained throughout the period of construction to ensure run-off of water without ponding except where ponding forms part of a planned erosion and sedimentation control system.
- Further salinity testing is recommended to undertaken to confirm initial findings “non-saline” soil conditions across soil profiles and development areas, considering final development details. A salinity management plan is recommended to be prepared prior to construction if saline conditions are encountered from future investigatory works.

The analysis and recommendations submitted are based on the result of site investigations. Should a site condition encountered during construction vary from the conditions indicated in this report, it may be necessary to re-evaluate the recommendations of this report.

Important Information about this Geotechnical Report

Scope of Work

The purpose of this report and any associated documentation is expressly stated in the document. This document does not form a complete assessment of the site, and no implicit determinations about Cardno's scope can be taken if not specifically referenced. Whilst this report is intended to reduce geotechnical risk, no level of detail or scope of work can entirely eliminate risk.

The nature of geotechnical data typically precludes auxiliary environmental assessment without undertaking specific methods in the investigation. Therefore, unless it is explicitly stated in the scope of work, this report does not provide any contamination or environmental assessment of the site or adjacent sites, nor can it be inferred or implied from any component of the document.

The scope of work, geotechnical information, and assessments made by Cardno may be summarised in the report; however, all aspects of the document, including associated data and limitations should be reviewed in its entirety.

Standard of care

Cardno have undertaken investigations, performed consulting services, and prepared this report based on the Client's specific requirements, data that was available or was collected, and previous experience.

Cardno's findings and assessment represent its reasonable judgment, diligence, skill, with sound professional standards, within the time and budget constraints of its commission. No warranty, expressed or implied, is made as to the professional advice included in this report.

Data sources

In preparing this document, or providing any consulting services during the commission, Cardno may have relied on information from third parties including, but not limited to; sub-consultants, published data, and the Client including its employees or representatives. This data may not be verified and Cardno assumes no responsibility for the adequacy, incompleteness, inaccuracies, or reliability of this information.

Cardno does not assume any responsibility for assessments made partly, or entirely based on information provided by third parties.

Variability in conditions and limitations of data

Subsurface conditions are complex and can be highly variable; they cannot be accurately defined by discrete investigations. Geotechnical data is based on investigation locations which are explicitly representative of the specific sample or test points. Interpretation of conditions between such points cannot be assumed to represent actual subsurface information and there are unknowns or variations in ground conditions between test locations that cannot be inferred or predicted.

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

Subsurface conditions are formed by various natural and anthropogenic processes and therefore are subject to change over time. This is particularly relevant with changes to the site ownership or usage, site boundary or layout, and design or planning modifications. Aspects of the site may also not be able to be determined due to physical or project related constraints and any information provided by Cardno cannot apply following modification to the site, regulations, standards, or the development itself.

It is important to appreciate that no level of detail in investigation, or diligence in assessment, can eliminate uncertainty related to subsurface conditions and thus, geotechnical risk. Cardno cannot and does not provide unqualified warranties nor does it assume any liability for site conditions not observed or accessible during the investigations.

Verification of opinions and recommendations

Geotechnical information, by nature, represents an opinion and is based extensively on judgment of both data and interpretive assessments or observation. This report and its associated documentation are provided explicitly based on Cardno's opinion of the site at the time of inspection, and cannot be extended beyond this.

Any recommendations or design are provided as preliminary until verified on site during project implementation or construction. Inspection and verification on site shall be conducted by a suitably qualified geotechnical consultant or engineer, and where subsurface conditions or interpretations differ from those provided in this document or otherwise anticipated, Cardno must be notified and be provided with an opportunity to review the recommendations.

Client and copyright

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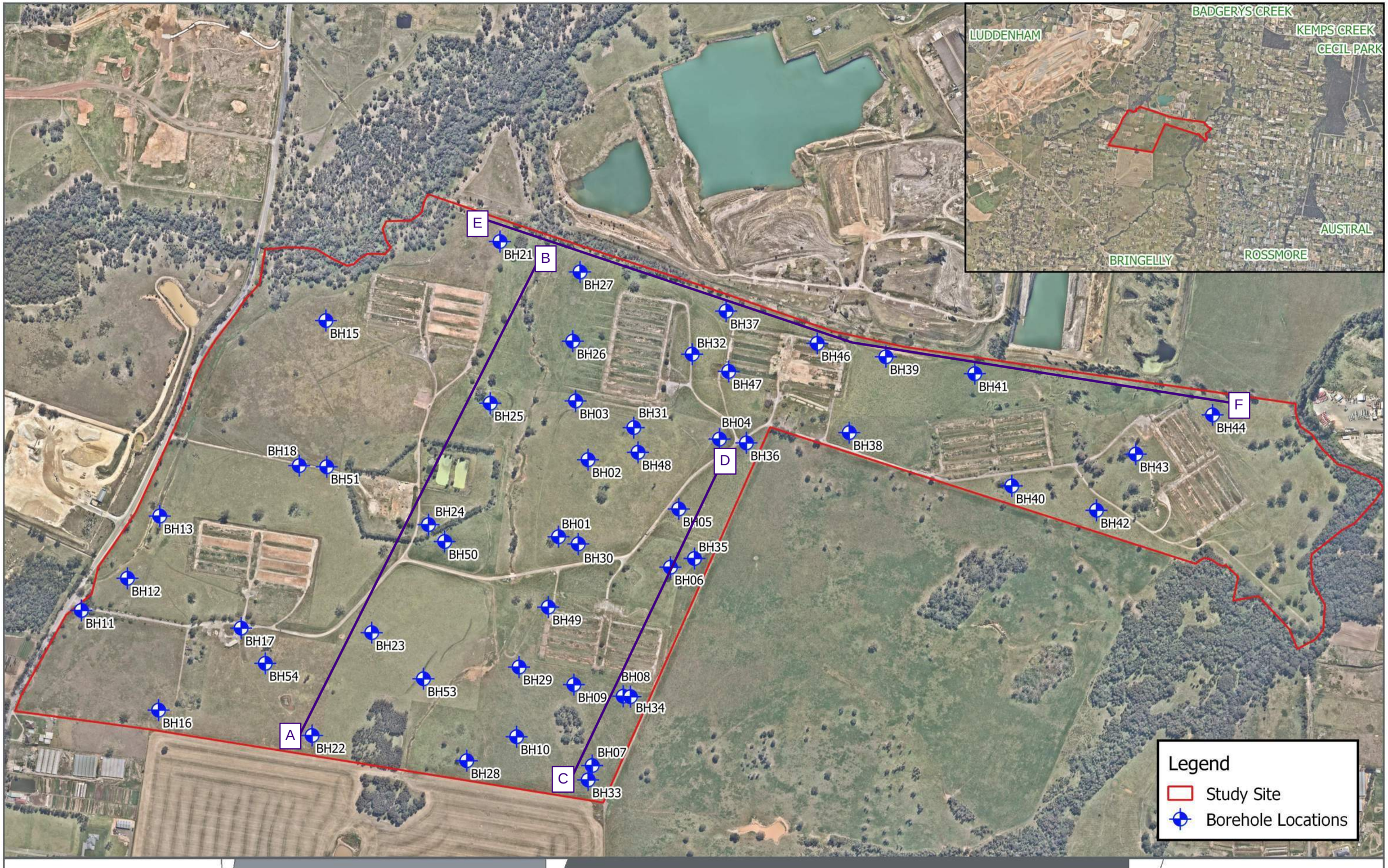
IPG Badgerys Creek

APPENDIX A

GEOTECHNICAL INVESTIGATION PLAN



INGHAM PROPERTY

1:7500 Scale at A3

0 100 200 300 400 m

IPG Badgerys Creek

Geotechnical Investigation - Site Plan

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (SYD)
Date: 2020-11-16| Project: 80221014
Coordinate System: MGA Zone 56
Aerial imagery supplied by nearmap (September, 2020)

A

B

0 100 200 300 400 500 600 700 800

ELEVATION (m AHD)

72 70 68 66 64 62 60 58 56 54

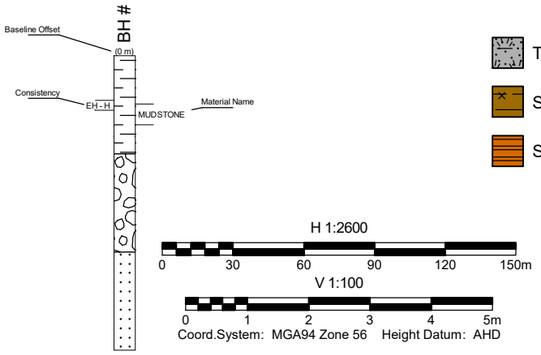
BH22
(4 m)
SILTY CLAY
St
SILTY CLAY
VSt
SILTY CLAY
H
SILTY CLAY

BH23
(-5 m)
SILTY CLAY
St to VSt
SILTY CLAY
H
SILTY CLAY

BH24
(-3 m)
SILTY CLAY
VSt
SILTY CLAY
H
SILTY CLAY

BH25
(3 m)
SILTY CLAY
VSt
SILTY CLAY
H
SILTY CLAY

POST LEGEND



TOPSOIL

Silty CLAY

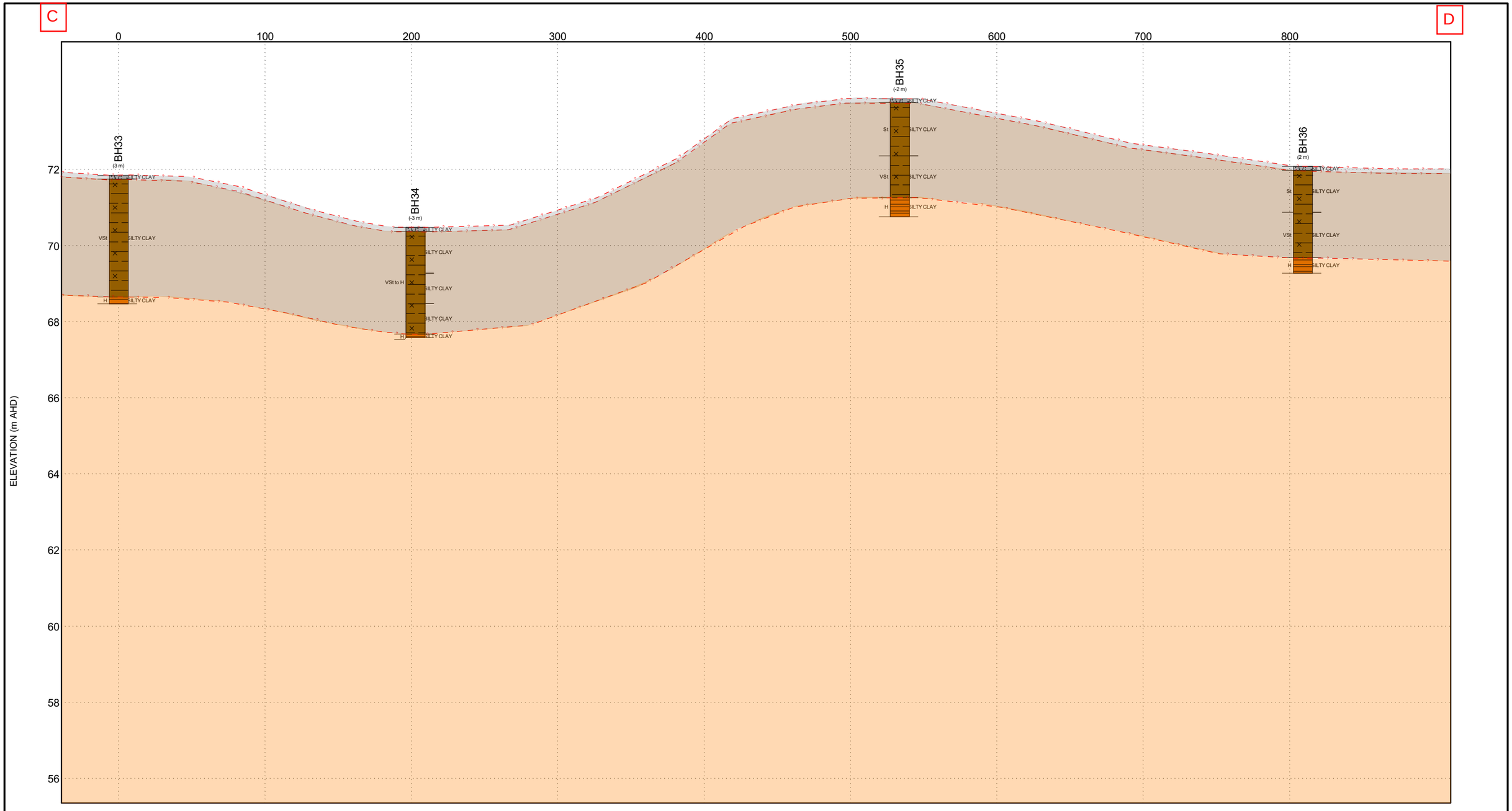
SHALE

Cardno

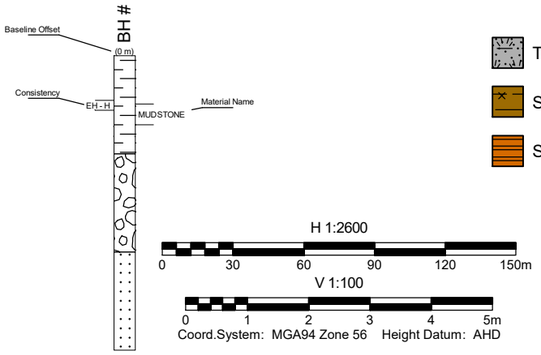
CLIENT Ingham Property Group		PROJECT IPG Badgerys Creek Badgerys Creek	
DRAWN A.T	DATE 23/11/2020	TITLE Inferred Subsurface Section	
CHECKED D.D	DATE 23/11/2020		
SCALE H 1:2600 V 1:100	A3	PROJECT No 80221014	FIGURE No 1

C

D



POST LEGEND



TOPSOIL

Silty CLAY

SHALE

H 1:2600

0 30 60 90 120 150m

V 1:100

0 1 2 3 4 5m

Coord.System: MGA94 Zone 56 Height Datum: AHD

Cardno

CLIENT Ingham Property Group		PROJECT IPG Badgerys Creek Badgerys Creek	
DRAWN A.T	DATE 23/11/2020	TITLE Inferred Subsurface Section	
CHECKED D.D	DATE 23/11/2020		
SCALE H 1:2600 V 1:100	A3	PROJECT No 80221014	FIGURE No 2

E

F

0 100 200 300 400 500 600 700 800 900 1,000

ELEVATION (m AHD)

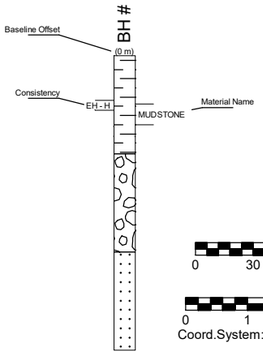
62 60 58 56 54 52 50 48 46 44

BH21
(8 m)
TOPSOIL
F to St SILTY CLAY
VSt to H SILTY CLAY
H SILTY CLAY

BH27
(-10 m)
TOPSOIL
St SILTY CLAY
VSt to H SILTY CLAY
H SILTY CLAY

BH41
(2 m)
TOPSOIL
VSt SILTY CLAY
H SILTY CLAY

POST LEGEND



TOPSOIL
Silty CLAY
SHALE

H 1:3200
0 30 60 90 120 150m
V 1:100
0 1 2 3 4 5m
Coord.System: MGA94 Zone 56 Height Datum: AHD

Cardno

CLIENT Ingham Property Group		PROJECT IPG Badgerys Creek Badgerys Creek	
DRAWN A.T	DATE 23/11/2020	TITLE Inferred Subsurface Section	
CHECKED D.D	DATE 23/11/2020		
SCALE H 1:3200 V 1:100	A3	PROJECT No 80221014	FIGURE No 3

IPG Badgerys Creek

APPENDIX B

ENGINEERING LOGS

Explanatory Notes

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. Material descriptions are deduced from field observation or engineering examination, and may be appended or confirmed by in situ or laboratory testing. The information is dependent on the scope of investigation, the extent of sampling and testing, and the inherent variability of the conditions encountered.

Subsurface investigation may be conducted by one or a combination of the following methods.

Method	
Test Pitting: excavation/trench	
BH	Backhoe bucket
EX	Excavator bucket
R	Ripper
H	Hydraulic Hammer
X	Existing excavation
N	Natural exposure
Manual drilling: hand operated tools	
HA	Hand Auger
Continuous sample drilling	
PT	Push tube
PS	Percussion sampling
SON	Sonic drilling
Hammer drilling	
AH	Air hammer
AT	Air track
Spiral flight auger drilling	
AS	Auger screwing
AD/V	Continuous flight auger: V-bit
AD/T	Continuous spiral flight auger: TC-Bit
HFA	Continuous hollow flight auger
Rotary non-core drilling	
WB	Washbore drilling
RR	Rock roller
Rotary core drilling	
PQ	85mm core (wire line core barrel)
HQ	63.5mm core (wire line core barrel)
NMLC	51.94mm core (conventional core barrel)
NQ	47.6mm core (wire line core barrel)
DT	Diatube (concrete coring)

Sampling is conducted to facilitate further assessment of selected materials encountered.

Sampling method	
Soil sampling	
B	Bulk disturbed sample
D	Disturbed sample
C	Core sample
ES	Environmental soil sample
SPT	Standard Penetration Test sample
U	Thin wall tube 'undisturbed' sample
Water sampling	
WS	Environmental water sample

Field testing may be conducted as a means of assessment of the in situ conditions of materials.

Field testing	
SPT	Standard Penetration Test
HP/PP	Hand/Pocket Penetrometer
Dynamic Penetrometers (blows per noted increment)	
DCP	Dynamic Cone Penetrometer
PSP	Perth Sand Penetrometer
MC	Moisture Content
VS	Vane Shear
PBT	Plate Bearing Test
IMP	Borehole Impression Test
PID	Photo Ionization Detector

If encountered, refusal (R), virtual refusal (VR) or hammer bouncing (HB) of penetrometers may be noted.

The quality of the rock can be assessed by the degree of natural defects/fractures and the following.

Rock quality description	
TCR	Total Core Recovery (%) (length of core recovered divided by the length of core run)
RQD	Rock Quality Designation (%) (sum of axial lengths of core greater than 100mm long divided by the length of core run)

Notes on groundwater conditions encountered may include.

Groundwater	
Not Encountered	Excavation is dry in the short term
Not Observed	Water level observation not possible
Seepage	Water seeping into hole
Inflow	Water flowing/flooding into hole

Perched groundwater may result in a misleading indication of the depth to the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

Notes on the stability of excavations may include.

Excavation conditions	
Stable	No obvious/gross short term instability noted
Spalling	Material falling into excavation (minor/major)
Unstable	Collapse of the majority, or one or more face of the excavation

Explanatory Notes: General Soil Description

The methods of description and classification of soils used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, a material is described as a soil if it can be remoulded by hand in its field condition or in water. The dominant component is shown in upper case, with secondary components in lower case. In general descriptions cover: soil type, plasticity or particle size/shape, colour, strength or density, moisture and inclusions.

In general, soil types are classified according to the dominant particle on the basis of the following particle sizes.

Soil Classification		Particle Size (mm)
CLAY		< 0.002
SILT		0.002 0.075
SAND	fine	0.075 to 0.21
	medium	0.21 to 0.6
	coarse	0.6 to 2.36
GRAVEL	fine	2.36 to 6.7
	medium	6.7 to 19
	coarse	19 to 63
COBBLES		63 to 200
BOULDERS		> 200

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading.

Terminology	In coarse grained soils		In fine soils
	% fines	% coarse	% coarse
Trace	≤5	≤15	≤15
With	>5, ≤12	>15, ≤30	>15, ≤30

The strength of cohesive soils is classified by engineering assessment or field/lab testing as follows.

Strength	Symbol	Undrained shear strength
Very Soft	VS	≤12kPa
Soft	S	12kPa to ≤25kPa
Firm	F	25kPa to ≤50kPa
Stiff	St	50kPa to ≤100kPa
Very Stiff	VSt	100kPa to ≤200kPa
Hard	H	>200kPa

Cohesionless soils are classified on the basis of relative density as follows.

Relative Density	Symbol	Density Index
Very Loose	VL	<15%
Loose	L	15% to ≤35%
Medium Dense	MD	35% to ≤65%
Dense	D	65% to ≤85%
Very Dense	VD	>85%

The plasticity of cohesive soils is defined by the Liquid Limit (LL) as follows.

Plasticity	Silt LL	Clay LL
Low plasticity	≤ 35%	≤ 35%
Medium plasticity	N/A	> 35% ≤ 50%
High plasticity	> 50%	> 50%

The moisture condition of soil (*w*) is described by appearance and feel and may be described in relation to the Plastic Limit (PL), Liquid Limit (LL) or Optimum Moisture Content (OMC).

Moisture condition and description	
Dry	Cohesive soils: hard, friable, dry of plastic limit. Granular soils: cohesionless and free-running
Moist	Cool feel and darkened colour: Cohesive soils can be moulded. Granular soils tend to cohere
Wet	Cool feel and darkened colour: Cohesive soils usually weakened and free water forms when handling. Granular soils tend to cohere

The structure of the soil may be described as follows.

Zoning	Description
Layer	Continuous across exposure or sample
Lens	Discontinuous layer (lenticular shape)
Pocket	Irregular inclusion of different material

The structure of soil layers may include: defects such as softened zones, fissures, cracks, joints and root-holes; and coarse grained soils may be described as strongly or weakly cemented.

The soil origin may also be noted if possible to deduce.

Soil origin and description	
Fill	Anthropogenic deposits or disturbed material
Topsoil	Zone of soil affected by roots and root fibres
Peat	Significantly organic soils
Colluvial	Transported down slopes by gravity/water
Aeolian	Transported and deposited by wind
Alluvial	Deposited by rivers
Estuarine	Deposited in coastal estuaries
Lacustrine	Deposited in freshwater lakes
Marine	Deposits in marine environments
Residual soil	Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident
Extremely weathered material	Formed by in situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties

The origin of the soil generally cannot be deduced solely on the appearance of the material and the inference may be supplemented by further geological evidence or other field observation. Where there is doubt, the terms ‘possibly’ or ‘probably’ may be used

Explanatory Notes: General Rock Description

The methods of description and classification of rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, if a material cannot be remoulded by hand in its field condition or in water, it is described as a rock. In general, descriptions cover: rock type, grain size, structure, colour, degree of weathering, strength, minor components or inclusions, and where applicable, the defect types, shape, roughness and coating/infill.

Rock types are generally described according to the predominant grain or crystal size, and in groups for each rock type as follows.

Rock type	Groups
Sedimentary	Deposited, carbonate (porous or non), volcanic ejection
Igneous	Felsic (much quartz, pale), Intermediate, or mafic (little quartz, dark)
Metamorphic	Foliated or non-foliated
Duricrust	Cementing minerology (iron oxides or hydroxides, silica, calcium carbonate, gypsum)

Reference should be made to AS1726 for details of the rock types and methods of classification.

The classification of rock weathering is described based on definitions in AS1726 and summarised as follows.

Term and symbol		Definition
Residual Soil	RS	Soil developed on rock with the mass structure and substance of the parent rock no longer evident
Extremely weathered	XW	Weathered to such an extent that the rock has 'soil-like' properties. Mass structure and substance still evident
Distinctly weathered	DW	The strength is usually changed and may be highly discoloured. Porosity may be increased by leaching, or decreased due to deposition in pores. May be distinguished into MW (Moderately Weathered) and HW (Highly Weathered).
Slightly weathered	SW	Slightly discoloured; little or no change of strength from fresh rock
Fresh Rock	FR	The rock shows no sign of decomposition or staining

The rock material strength can be defined based on the point load index as follows.

Term and symbol		Point Load Index I_s50 (MPa)
Very Low	VL	0.03 to 0.1
Low	L	0.1 to 0.3
Medium	M	0.3 to 1.0
High	H	1.0 to 3
Very High	VH	3 to 10
Extremely High	EH	> 10

It is important to note that the rock material strength as above is distinct from the rock mass strength which can be significantly weaker due to the effect of defects.

A preliminary assessment of rock strength may be made using the field guide detailed in AS1726, and this is conducted in the absence of point load testing.

The defect spacing measured normal to defects of the same set or bedding, is described as follows.

Definition	Defect Spacing (mm)
Thinly laminated	< 6
Laminated	6 to 20
Very thinly bedded	20 to 60
Thinly bedded	60 to 200
Medium bedded	200 to 600
Thickly bedded	600 to 2000
Very thickly bedded	> 2000

Terms for describing rock and defects are as follows.

Defect Terms			
Joint	JT	Sheared zone	SZ
Bedding Parting	BP	Seam	SM
Foliation	FL	Vein	VN
Cleavage	CL	Drill Lift	DL
Crushed Seam	CS	Handling Break	HB
Fracture Zone	FZ	Drilling Break	DB

The shape and roughness of defects in the rock mass are described using the following terms.

Planarity		Roughness	
Planar	PR	Very Rough	VR
Curved	CU	Rough	RF
Undulose	UN	Smooth	S
Irregular	IR	Slickensided	SL
Stepped	ST	Polished	POL
Discontinuous	DIS		

The coating or infill associated with defects in the rock mass are described as follows.

Infill and Coating		
Clean	CN	
Stained	SN	
Carbonaceous	X	
Minerals	MU	Unidentified mineral
	MS	Secondary mineral
	KT	Chlorite
	CA	Calcite
	Fe	Iron Oxide
	Qz	Quartz
Veneer	VNR	Thin or patchy coating
Coating	CT	Infill up to 1mm

Graphic Symbols Index


CLAY


Silty CLAY


Sandy CLAY


Gravelly CLAY


Silty Gravelly CLAY


Silty Sandy CLAY


Sandy Gravelly


CLAY SILT


Clayey SILT


Sandy SILT Gravelly


SILT


Clayey Sandy SILT


Clayey Gravelly SILT


Sandy Gravelly SILT


SAND


Clayey SAND


Silty SAND


Gravelly SAND


Clayey Silty SAND


Clayey Gravelly SAND


Silty Gravelly SAND


GRAVEL


Clayey GRAVEL


Silty GRAVEL


Sandy GRAVEL


Clayey Silty GRAVEL


Clayey Sandy GRAVEL


Silty Sandy GRAVEL


COBBLES & BOULDERS


PEAT, highly organic soil


TOPSOIL


FILL


FILL: Asphalt or Bituminous Seal


FILL: Ballast


FILL: Concrete


FILL: Roadbase


Sedimentary rock: fine, mostly clay (CLAYSTONE)


Sedimentary rock: fine, mostly silt (SILTSTONE)


Sedimentary rock: fine, silt and clay (MUDSTONE, SHALE, LAMINITE)


Sedimentary rock: medium (SANDSTONE, GREYWACKE)

Sedimentary rock: fine to coarse, angular (BRECCIA)

Sedimentary rock: coarse, rounded (CONGLOMERATE)

Sedimentary rock: Organic (COAL)

Sedimentary rock: Carbonate (LIMESTONE, DOLOMITE)

Sedimentary rock: Volcanic (TUFF, VOLCANIC BRECCIA, AGGLOMERATE)

Igneous rock: Felsic, fine (RHYOLITE)

Igneous rock: Felsic, coarse (GRANITE)

Igneous rock: Mafic, fine to medium (BASALT, DOLERITE)

Igneous rock: Mafic, coarse (GABBRO)

Metamorphic rock: Foliated, fine to medium (SLATE, PHYLLITE, SHIST)

Metamorphic rock: Foliated, coarse (GNEISS)

Metamorphic rock: Non-foliated (QUARTZITE, HORNFELS, MARBLE)

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH01

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291513.04, N: 6246122.93 SURFACE ELEVATION : 65.334 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	2.00m ES	F	Not Encountered	0.50m SPT 2, 3, 4 N=7	65.0		CI	Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					0.0			0.10m			
								Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	F	RESIDUAL SOIL
				0.95m	64.5						
					1.0						
								1.20m			
				1.50m SPT 6, 11, 10 N=21	64.0		CI	Silty CLAY medium plasticity, pale grey , brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	VSt to H	1.70: HP In-situ =330 - 430 kPa
		H		1.95m	63.5			1.80m			WEATHERED ROCK
								Silty CLAY medium plasticity, pale grey, pale brown , red, with fine to medium grained sand, trace fine grained, sub-rounded gravel, inferred as highly weathered shale	M (<PL)	H	
					2.0			2.00m			
								BOREHOLE BH01 TERMINATED AT 2.00 m Target depth			
					63.0						
					62.5						
					3.0						

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

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Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH02

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291577.10, N: 6246290.31 SURFACE ELEVATION : 64.960 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
					64.5	0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
AD/T	1.00m ES	F	Not Encountered	1.00m SPT 3, 10, 13 N=23	64.0	1.0		CI		M (<PL)	VSt	
		H							1.20-1.40m: Band WRK , dark grey		H	1.20: HP In-situ =330 - 380 kPa
				1.45m		1.40m			Silty CLAY medium plasticity, pale grey , pale brown , red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
		F-H			63.5			CI		M (<PL)	VSt	
					63.0	2.00m			BOREHOLE BH02 TERMINATED AT 2.00 m Target depth			
					62.5							
					62.0	3.0						

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

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Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH03

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291550.02, N: 6246418.00 SURFACE ELEVATION : 62.774 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	1.00m ES	F	Not Encountered	0.50m SPT 3, 2, 2 N=4	62.5			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					0.10m			Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
					62.0		CI		M (<PL)	F	
				0.95m	1.0						
					61.5						
				1.50m	1.50m						
		H		SPT 6, 8, 10 N=18				Silty CLAY medium plasticity, pale grey , pale brown , red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand 1.60-1.80m: Sandstone Cobbles			1.60: HP In-situ =520 - 600 kPa
					61.0		CI		M (<PL)	VSt to H	
				1.95m	2.0						
					2.00m			BOREHOLE BH03 TERMINATED AT 2.00 m Target depth			
					60.5						
					60.0						
					3.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH04

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291862.51, N: 6246335.15 SURFACE ELEVATION : 71.461 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					71.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
		F						CI		M (<PL)	St	
			Not Encountered	1.00m SPT 4, 9, 14 N=23	70.5	1.0			1.00m Silty CLAY medium plasticity, pale grey , pale brown , red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			1.20: HP In-situ =550 - 600 kPa
				1.45m								
		F-H			70.0			CI		M (<PL)	VSt to H	
	2.00m ES				69.5	2.0			2.00m BOREHOLE BH04 TERMINATED AT 2.00 m Target depth			
					69.0							
					68.5	3.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH05

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291774.10, N: 6246183.16 SURFACE ELEVATION : 73.422 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
					0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					0.10m			Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
				0.50m SPT 3, 4, 4 N=8	73.0					St	
AD/T	1.00m ES	F	Not Encountered				CI		M (<PL)		0.80: HP In-situ =320 - 360 kPa
				0.95m	72.5 1.0					VSt	
				1.50m SPT 14, 25/120mm HB N=R	72.0			Silty CLAY medium plasticity, pale grey , pale brown , red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			1.60: HP In-situ >600 kPa
		H		1.77m			CI		M (<PL)	VSt to H	
					71.5 2.0						
					71.0			BOREHOLE BH05 TERMINATED AT 2.00 m Target depth			
					70.5 3.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH06

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291756.03, N: 6246056.73 SURFACE ELEVATION : 71.662 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					0.10m						
					71.5			Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
		F			71.0		CI		M (<PL)	St to VSt	
			Not Encountered	1.00m SPT 5, 5, 8 N=13	1.0						1.10: HP In-situ =210 - 260 kPa
					70.5						
					1.20m			Silty CLAY medium plasticity, pale grey , pale brown , red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
				1.45m							1.40: HP In-situ =450 - 520 kPa
	1.50m ES	H					CI		M (<PL)	VSt to H	
					70.0						
					2.0						
					2.00m			BOREHOLE BH06 TERMINATED AT 2.00 m Target depth			
					69.5						
					69.0						
					3.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH07

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291586.10, N: 6245625.67 SURFACE ELEVATION : 71.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL							
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/100mm	HAND PENETRO-METER	STRUCTURE & Other Observations
AD/T		F	Not Encountered		71.5 / 0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
								Silty CLAY medium plasticity, brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					71.0 / 1.0		CI			St to VSt			
					70.5			1.10m Silty CLAY medium plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (≈PL)				
					70.0 / 2.0		CI			H			
		H			69.5			2.20m Silty CLAY medium plasticity, pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H			WEATHERED ROCK
								2.50m BOREHOLE BH07 TERMINATED AT 2.50 m Refusal					
					69.0 / 3.0								
					68.5 / 4.0								
					68.0								
					67.5								
					67.0 / 5.0								

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH08

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291653.46, N: 6245776.37 SURFACE ELEVATION : 69.963 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m ES	F	Not Encountered	1.00m SPT 3, 7, 9 N=16	69.5 / 0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
								0.10m			
								Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
							CI		M (<PL)	St to VSt	
					69.0 / 1.0						1.10: HP In-situ =280 - 310 kPa
								1.30m			
		H		1.45m	68.5			Silty CLAY medium plasticity, pale grey , pale brown , red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			1.40: HP In-situ =470 - 520 kPa
							CI		M (<PL)	VSt to H	
					68.0 / 2.0			2.00m			
								BOREHOLE BH08 TERMINATED AT 2.00 m Target depth			
					67.5						
					67.0 / 3.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH09

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291546.28, N: 6245801.54 SURFACE ELEVATION : 68.330 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MCT200 MOUNTING : Truck CONTRACTOR : TERRATEST DRILLER : CD

DATE STARTED : 13/10/20 DATE COMPLETED : 13/10/20 DATE LOGGED : 13/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					68.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
				0.50m SPT 2, 3, 5 N=8								0.50: HP In-situ =390 - 450 kPa
		F			67.5			CI		M (<PL)	St to VSt	0.80: HP In-situ =500 kPa
			Not Encountered	0.95m		1.0						
					67.0							
				1.50m SPT 8, 14, 15 N=29		1.50m			Silty CLAY medium plasticity, pale grey , pale brown , red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
	1.70m ES	H			66.5			CI		M (<PL)	VSt to H	
				1.95m		2.0						
						2.00m			BOREHOLE BH09 TERMINATED AT 2.00 m Target depth			
					66.0							
					65.5							
						3.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH10

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291421.92, N: 6245688.20 SURFACE ELEVATION : 68.140 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/100mm	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
AD/T	1.20m D	F	Not Encountered		68.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
	1.50m					0.10m			Silty CLAY medium to high plasticity, brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					67.5			CI-CH			St to VSt			
					67.0	1.0								
					66.5	1.60m			Silty CLAY high plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)				
					66.0	2.0								
								CH			VSt to H			
					65.5									
	3.20m ES	H			65.0	3.0								WEATHERED ROCK
	3.40m					3.20m			Silty CLAY medium plasticity, pale brown, pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H			
					64.5	3.40m			BOREHOLE BH10 TERMINATED AT 3.40 m Refusal					
						4.0								
					64.0									
					63.5									
						5.0								

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH11

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290476.95, N: 6245962.81 SURFACE ELEVATION : 65.210 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					0.0 / 65.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					0.10m			Silty CLAY medium plasticity, pale brown, pale grey, red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
					1.0 / 64.0		CI				
		F	Not Encountered		1.90m / 63.5			Silty CLAY medium plasticity, brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	St to VSt	
					2.0 / 63.0						
					3.0 / 62.5		CI				
	3.50m D				62.0						
					3.80m / 61.5			Silty CLAY medium plasticity, dark brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale			WEATHERED ROCK
		H			4.0 / 61.0					H	
	4.50m				4.50m			BOREHOLE BH11 TERMINATED AT 4.50 m Refusal			
					60.5 / 5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH12

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290576.93, N: 6246032.54 SURFACE ELEVATION : 62.200 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/100mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
AD/T		F	▶		62.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
						0.10m			Silty CLAY medium plasticity, pale brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					61.5	1.0		Cl			F to St			
					61.0	1.10m			Silty CLAY medium plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)				
					60.5	2.0								
					60.0			Cl			VSt to H			
					59.5									
					59.0	3.0				W				
		H			58.5	3.80m			Silty CLAY medium plasticity, dark brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale	M (<PL)	H			WEATHERED ROCK
					58.0	4.0								
						4.40m			BOREHOLE BH12 TERMINATED AT 4.40 m Refusal					
					57.5	5.0								

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH13

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290647.06, N: 6246167.86 SURFACE ELEVATION : 61.290 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/100mm	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
AD/T	1.50m ES	F			61.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
						0.10m			Silty CLAY medium plasticity, pale brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					60.5	1.0		CI			F to St			
					60.0	1.40m			Silty CLAY medium to high plasticity, brown, pale grey, red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)				
	2.00m				59.5	2.0								
					59.0			CI-CH			VSt to H			
	3.00m D				58.5	3.0				W				
	3.50m	H			58.0									
					57.5	3.80m			Silty CLAY medium plasticity, pale grey, pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale	M (<PL)	H			WEATHERED ROCK
						4.0								
						4.10m			BOREHOLE BH13 TERMINATED AT 4.10 m Refusal					
					57.0									
					56.5	5.0								

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH15

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291007.84, N: 6246592.76 SURFACE ELEVATION : 63.540 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					63.5	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium plasticity, pale brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
					63.0			CI				
					62.5	1.0			1.20m Silty CLAY high plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand		St to VSt	
		F	Not Encountered		62.0			CH		M (<PL)		
	2.00m D				61.5	2.0						
	2.40m								2.40m Silty CLAY medium plasticity, pale grey, pale brown-red, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale			WEATHERED ROCK
	ES 2.50m D				61.0						H	
		H										
	3.00m					3.0			3.00m BOREHOLE BH15 TERMINATED AT 3.00 m Refusal			
					60.5							
					60.0							
					59.5	4.0						
					59.0							
						5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH16

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290644.55, N: 6245746.13 SURFACE ELEVATION : 70.320 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
					70.0 / 0.0				0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium plasticity, pale grey,brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.50m D1			0.50m SPT 3, 3, 5 N=8				CI			St	
					69.5 / 0.8m							
	0.95m 1.00m ES			0.95m					Silty CLAY high plasticity, pale grey,yellow-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
					69.0 / 1.0							
AD/T	1.50m D2	F	Not Encountered	1.50m SPT 7, 10, 14 N=24						M (<PL)		
					68.5 / 2.0			CH			VSt	
	3.00m D3	H		3.00m SPT 25/130mm HB N=R 3.13m	68.0 / 3.0				3.00m Silty CLAY medium plasticity, brown ,grey, with fine to medium grained sand, trace fine grained , sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
	3.20m				67.5 / 3.13m				BOREHOLE BH16 TERMINATED AT 3.13 m Refusal			
					67.0 / 4.0							
					66.5 / 5.0							
					66.0							
					65.5							

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH17

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290823.85, N: 6245924.35 SURFACE ELEVATION : 67.010 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m D1	F	Not Encountered	0.50m SPT 4, 6, 8 N=14	67.0	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium to high plasticity, pale grey,brown-yellow, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.95m			0.95m	66.5			CI-CH			St	
					66.0	1.0			1.00m Silty CLAY high plasticity, pale grey,red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)		
	1.50m D2 ES			1.50m SPT 4, 6, 8 N=14	65.5							
	1.95m			1.95m	65.0	2.0		CH			St to VSt	
	3.00m D3	H		3.00m SPT 23, 10/120mm HB N=R 3.27m	64.0	3.0			3.00m Silty CLAY medium plasticity, brown ,grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale 3.27m		H	WEATHERED ROCK
	3.45m				63.5	4.0			BOREHOLE BH17 TERMINATED AT 3.27 m Refusal			
					63.0							
					62.5	5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH18

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290950.02, N: 6246277.44 SURFACE ELEVATION : 68.650 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/100mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
AD/T		F	Not Encountered		68.5	0.0			Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
						0.10m			Silty CLAY medium plasticity, pale brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					68.0			CI			St to VSt			
						1.0								
					67.5									
						1.30m			Silty CLAY medium plasticity, pale grey , brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					
					67.0					M (<PL)				
						2.0								
					66.5			CI			H			
					66.0									
						3.0								
		H				3.00m			Silty CLAY medium plasticity, pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale					WEATHERED ROCK
					65.5	3.30m			BOREHOLE BH18 TERMINATED AT 3.30 m Refusal					
					65.0									
						4.0								
					64.5									
					64.0									
						5.0								

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH21

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291385.86, N: 6246764.38 SURFACE ELEVATION : 59.130 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/100mm	HAND PENETRO-METER	STRUCTURE & Other Observations
AD/T	1.00m D ES	F	Not Encountered		59.0	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
									Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					58.5	1.0		CI			F to St			
	1.50m				58.0				1.20m Silty CLAY medium plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (≈PL)				
					57.5									
						2.0		CI			VSt to H			
					57.0									
					56.5				2.80m Silty CLAY medium plasticity, pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale					WEATHERED ROCK
		H				3.0			3.10m BOREHOLE BH21 TERMINATED AT 3.10 m Refusal		H			
					56.0									
					55.5									
						4.0								
					55.0									
					54.5									
						5.0								

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH22

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290977.90, N: 6245690.98 SURFACE ELEVATION : 72.080 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
					72.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY medium plasticity, brown , pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
AD/T	0.50m D1 ES	F	Not Encountered	0.50m SPT 3, 4, 7 N=11	71.5			Cl			St	
	0.95m 1.00m			0.95m		0.80m			Silty CLAY medium plasticity, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)		
	1.50m D2	H		1.50m SPT 7, 14, 24 N=38	71.0 70.5	1.0		Cl			VSt	
	1.95m			1.95m		1.80m			Silty CLAY medium plasticity, brown-red , pale grey , yellow, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as weathered shale		H	WEATHERED ROCK
					70.0	2.0			BOREHOLE BH22 TERMINATED AT 1.95 m Refusal			
					69.5							
					69.0	3.0						
					68.5							
					68.0	4.0						
					67.5							
						5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH23

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291107.31, N: 6245914.40 SURFACE ELEVATION : 71.390 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
					71.390	0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY medium to high plasticity, brown , pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
AD/T	0.50m D1	F	Not Encountered	0.50m SPT 2, 5, 12 N=17	71.0			CI-CH		M (<PL)	St to VSt	
	0.95m			0.95m	70.5	1.0						
	1.00m ES	H										
						1.10m						WEATHERED ROCK
						1.30m			Silty CLAY medium plasticity, pale brown , pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	
									BOREHOLE BH23 TERMINATED AT 1.30 m Refusal			
	1.50m				70.0							
					69.5	2.0						
					69.0							
					68.5	3.0						
					68.0							
					67.5	4.0						
					67.0							
					66.5	5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH24

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291230.59, N: 6246149.26 SURFACE ELEVATION : 68.730 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					68.730	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					68.5				Silty CLAY medium plasticity, pale brown , mottled grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.50m D1			0.50m SPT 7, 4, 11 N=15	68.0			CI				
	0.95m	F	Not Encountered	0.95m		1.0					VSt	
					67.5				1.20m Silty CLAY medium plasticity, pale grey , brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)		
	1.50m D2			1.50m SPT 12, 17, 16 N=33				CI				
	1.90m D3 1.95m			1.95m	67.0	2.0			2.00m Silty CLAY medium plasticity, pale brown , pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale			WEATHERED ROCK
	2.30m	H			66.5				2.30m BOREHOLE BH24 TERMINATED AT 2.30 m Refusal		H	
					66.0	3.0						
					65.5							
					65.0	4.0						
					64.5							
					64.0	5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH25

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291364.73, N: 6246413.05 SURFACE ELEVATION : 64.020 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/100mm	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
AD/T		F	Not Encountered		64.0	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
									Silty CLAY medium plasticity, brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					63.5			CI						
					63.0	1.0			1.10m Silty CLAY medium plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	VSt to H			
					62.5			CI						
					62.0	2.0								
		H			61.5				2.60m Silty CLAY medium plasticity, pale brown, pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale 2.80m		H			WEATHERED ROCK
									BOREHOLE BH25 TERMINATED AT 2.80 m Refusal					
					61.0	3.0								
					60.5									
					60.0	4.0								
					59.5									
						5.0								

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH26

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291543.89, N: 6246547.96 SURFACE ELEVATION : 61.080 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/100mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
AD/T		F	Not Encountered		61.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
						0.10m			Silty CLAY medium plasticity, brown, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
	1.20m ES 1.40m				60.5			Cl			St			
					60.0	1.0								
						1.30m			Silty CLAY medium plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (≈PL)				
					59.5			Cl			VSt to H			
					59.0	2.0								
	2.20m D 2.50m	H				2.20m			Silty CLAY medium plasticity, pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H			WEATHERED ROCK
						2.50m			BOREHOLE BH26 TERMINATED AT 2.50 m Refusal					
					58.5									
					58.0	3.0								
					57.5									
					57.0	4.0								
					56.5									
						5.0								

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH27

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291559.76, N: 6246698.30 SURFACE ELEVATION : 59.900 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/100mm	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
AD/T	0.80m ES 1.00m	F	Not Encountered		59.5	0.0			0.10m Silty CLAY low to medium plasticity, brown, trace rootlets					TOPSOIL
									Silty CLAY low to medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					59.0	1.0		CL-Cl			St			
	1.50m D 2.00m				58.5				1.40m Silty CLAY low plasticity, pale grey, yellow, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)				
					58.0	2.0		CL			VSt to H			
					57.5									
	3.10m D 3.30m	H			57.0	3.0			3.20m Silty CLAY medium plasticity, brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale 3.40m		H			WEATHERED ROCK
					56.5				BOREHOLE BH27 TERMINATED AT 3.40 m Refusal					
					56.0	4.0								
					55.5									
					55.0	5.0								

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH28

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291313.80, N: 6245636.13 SURFACE ELEVATION : 68.970 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
						0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY medium to high plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.20m D1											
	0.50m			0.50m SPT 3, 6, 7 N=13	68.5							
				0.95m	68.0	1.0						
	1.20m D2 ES 1.40m											
	1.50m D3			1.50m SPT 10, 8, 11 N=19	67.5			CI-CH			St to VSt	
	1.95m	F	Not Encountered	1.95m	67.0	2.0				M (<PL)		
AD/T	2.60m D4				66.5							
						2.80m			Silty CLAY high plasticity, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
	3.00m D5			3.00m SPT 7, 11, 16 N=27	66.0	3.0		CH			VSt	
	3.45m			3.45m	65.5							
	4.00m D6	H			65.0	4.0			Silty CLAY high plasticity, pale orange , pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
	4.50m				64.5	4.50m			BOREHOLE BH28 TERMINATED AT 4.50 m Refusal			
					64.0	5.0						

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH29

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291427.27, N: 6245839.68 SURFACE ELEVATION : 66.200 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.20m D1 ES	E	Not Encountered	0.50m SPT 2, 2, 5 N=7	66.0 / 0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
	0.50m D2							0.10m Silty CLAY medium plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.95m			0.95m	65.5 / 1.0		CI			St	
	1.20m D3							1.20m Silty CLAY medium to high plasticity, pale brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
	1.50m D4			1.50m SPT 5, 7, 11 N=18	65.0		CI-CH				
	1.95m			1.95m	64.5 / 2.0			2.00m Silty CLAY high plasticity, pale grey . mottled orange, trace fine grained gravel, trace fine to medium grained sand	M (<PL)		
	2.70m D5				64.0					VSt	
	3.00m D6			3.00m SPT 6, 12, 17 N=29	63.5 / 3.0		CH				
	3.45m	F		3.45m	63.0						
	4.00m D7				62.5 / 4.0						
				4.50m SPT 12, 24/140mm HB N=R	62.0			4.60m Silty CLAY high plasticity, grey , brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
	4.79m	H		4.79m	61.5 / 4.79m			BOREHOLE BH29 TERMINATED AT 4.79 m Refusal			
					5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH30

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291555.78, N: 6246107.22 SURFACE ELEVATION : 66.770 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.20m ES 0.50m D1 0.95m	F	Not Encountered	0.50m SPT 3, 6, 5 N=11 0.95m 1.50m SPT 18, 20/120mm HB N=R 1.77m	66.5 66.0 65.5 65.0 64.5 64.0 63.5 63.0 62.5 62.0	0.0 1.0 2.0 3.0 4.0 5.0		CI-CH	0.10m Silty CLAY medium plasticity, brown, trace rootlets Silty CLAY medium to high plasticity, pale brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand 1.60m Silty CLAY medium plasticity, pale brown , grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale 1.77m BOREHOLE BH30 TERMINATED AT 1.77 m Refusal	M (<PL)	St to VSt H	TOPSOIL RESIDUAL SOIL WEATHERED ROCK

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH31

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291676.42, N: 6246360.07 SURFACE ELEVATION : 67.110 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					67.0	0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.50m D1			0.50m SPT 3, 4, 6 N=10	66.5			CI			St	
	0.95m	F	Not Encountered	0.95m		1.00m						
					66.0	1.0			Silty CLAY medium plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)		
	1.50m D2			1.50m SPT 6, 11, 15 N=26	65.5			CI			VSt	
	1.95m			1.95m		2.0						
					65.0							
	2.30m D3	H				2.20m			Silty CLAY medium plasticity, pale red-brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale			WEATHERED ROCK
	2.70m				64.5	2.70m					H	
									BOREHOLE BH31 TERMINATED AT 2.70 m Refusal			
					64.0	3.0						
					63.5							
					63.0	4.0						
					62.5							
						5.0						

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH32

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291803.26, N: 6246519.63 SURFACE ELEVATION : 67.760 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
					0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
	0.20m D1				67.5			Silty CLAY medium plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
AD/T	0.50m D2	F	Not Encountered	0.50m SPT 4, 5, 14 N=19			Cl		M (<PL)	St to VSt	
	0.95m 1.00m D3			0.95m	67.0 1.0			1.10m			
		H						1.20m Silty CLAY medium plasticity, brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
	1.30m				66.5			BOREHOLE BH32 TERMINATED AT 1.20 m Refusal			
					66.0 2.0						
					65.5						
					65.0 3.0						
					64.5						
					64.0 4.0						
					63.5						
					63.0 5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH33

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291577.33, N: 6245594.44 SURFACE ELEVATION : 71.850 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
					0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					0.10m			Silty CLAY medium to high plasticity, pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
AD/T	0.50m D1	F	Not Encountered	0.50m SPT 3, 9, 11 N=20	71.5						
	0.95m			0.95m	71.0 1.0						
	1.50m D2			1.50m SPT 9, 15, 14 N=29	70.5		CI-CH		M (<PL)	VSt	
	1.95m			1.95m	70.0 2.0						
	3.00m D3	H		3.00m SPT 18, 19, 20/80mm HB N=R	69.5						
	3.38m			3.38m	69.0 3.0						
					3.20m			Silty CLAY medium plasticity, grey - orange, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
					3.38m 68.5			BOREHOLE BH33 TERMINATED AT 3.38 m Refusal			
					68.0 4.0						
					67.5						
					67.0 5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH34

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291669.14, N: 6245775.32 SURFACE ELEVATION : 70.480 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
						0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
						0.10m			Silty CLAY high plasticity, pale brown - red, trace fine grained gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.20m D1 ES											
	0.50m D2			0.50m SPT 3, 8, 12 N=20	70.0			CH				
	0.95m			0.95m	69.5	1.0						
						1.20m			Silty CLAY high plasticity, pale grey , pale brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
AD/T	1.50m D3	F	Not Encountered	1.50m SPT 7, 15, 25 N=40	69.0			CH		M (<PL)	VSt to H	
	1.95m			1.95m	68.5	2.0						
						2.00m			Silty CLAY high plasticity, pale grey , pale red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
					68.0			CH				
		H				2.80m					H	WEATHERED ROCK
						2.90m			Silty CLAY high plasticity, pale brown , pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale			
					67.5	3.0			BOREHOLE BH34 TERMINATED AT 2.90 m Refusal			
					67.0							
					66.5	4.0						
					66.0							
					65.5	5.0						

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH35

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291808.17, N: 6246075.64 SURFACE ELEVATION : 73.860 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.20m D1	F	Not Encountered	0.50m SPT 2, 4, 8 N=12	73.5	0.0			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
	0.50m D2					0.10m			Silty CLAY medium to high plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.95m			0.95m	73.0	1.0		CI-CH			St	
	1.50m D3			1.50m SPT 7, 10, 14 N=24	72.5	1.50m			Silty CLAY high plasticity, pale grey , red-yellow, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)		
	1.95m	F-H		1.95m	72.0	2.0		CH			VSt	
	2.60m D4 ES	H			71.5	2.60m			Silty CLAY high plasticity, pale grey , pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale			WEATHERED ROCK
	3.00m				71.0	3.0		CH			H	
					70.5	3.10m			BOREHOLE BH35 TERMINATED AT 3.10 m Refusal			
					70.0	4.0						
					69.5							
					69.0	5.0						

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH36

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291920.93, N: 6246326.87 SURFACE ELEVATION : 72.080 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m D1	F	Not Encountered	0.50m SPT 3, 7, 9 N=16	72.0	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.95m			0.95m	71.5	1.0		CI			St	
					71.0				1.20m Silty CLAY medium plasticity, pale grey , brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)		
	1.50m D2			1.50m SPT 9, 13, 23 N=36	70.5			CI			VSt	
	1.95m			1.95m		2.0						
	2.30m D3 ES	H			70.0				2.40m Silty CLAY medium plasticity, pale brown , pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
	2.80m				69.5				2.80m			
					69.0	3.0			BOREHOLE BH36 TERMINATED AT 2.80 m Refusal			
					68.5							
					68.0	4.0						
					67.5							
						5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH37

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291876.89, N: 6246613.26 SURFACE ELEVATION : 67.060 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL						
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.20m D1	F	Not Encountered	0.50m SPT 3, 11, 20/90mm HB N=R	67.0 / 0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
								Silty CLAY medium plasticity, brown mottled pale grey, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.50m D2				66.5		Cl		M (<PL)	VSt	
		H		0.89m				0.70m Silty CLAY medium plasticity, pale brown , pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
	0.89m							0.89m BOREHOLE BH37 TERMINATED AT 0.89 m Refusal			
					66.0 / 1.0						
					65.5 / 2.0						
					65.0 / 3.0						
					64.5 / 4.0						
					64.0 / 5.0						
					63.5						
					63.0						
					62.5						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH38

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292144.23, N: 6246349.20 SURFACE ELEVATION : 69.960 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					69.960 0.0				Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					69.86 0.10				Silty CLAY medium to high plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
								CI-CH			St	
	0.50m D1			0.50m SPT 4, 4, 8 N=12	69.5 0.50				Silty CLAY high plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
	0.95m	F	Not Encountered	0.95m						M (<PL)		
					69.0 1.0			CH			VSt	
	1.50m D2	H		1.50m SPT 11, 21/110mm HB N=R	68.5 1.50				Silty CLAY medium plasticity, pale brown , pale grey, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale			WEATHERED ROCK
	1.76m			1.76m							H	
									BOREHOLE BH38 TERMINATED AT 1.76 m Refusal			
					68.0 2.0							
					67.5							
					67.0 3.0							
					66.5							
					66.0 4.0							
					65.5							
					65.0 5.0							

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH39

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292223.79, N: 6246513.98 SURFACE ELEVATION : 67.340 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL						
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m D1	F	Not Encountered	0.50m SPT 4, 17, 20 N=37	67.0	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
								CI		M (<PL)	VSt	
	0.95m	H		0.95m	66.5	0.80m			0.95m Silty CLAY medium plasticity, pale brown-red, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
						1.0			BOREHOLE BH39 TERMINATED AT 0.95 m Refusal			
					66.0							
					65.5	2.0						
					65.0							
					64.5	3.0						
					64.0							
					63.5	4.0						
					63.0							
					62.5	5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH40

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292497.24, N: 6246233.31 SURFACE ELEVATION : 63.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m D1	F	Not Encountered	0.50m SPT 2, 3, 3 N=6	63.5	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					63.0	0.5			Silty CLAY medium to high plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.95m			0.95m		1.0						
	1.50m D2			1.50m SPT 5, 12, 17 N=29	62.5	1.5		CI-CH		M (<PL)	St to VSt	
	1.95m			1.95m	62.0	2.0						
					61.5	2.5						
					61.0	3.0			2.90m Silty CLAY medium plasticity, pale brown, with fine to medium grained sand, gravel trace fine grained, sub-rounded gravel inferred as highly weathered shale			WEATHERED ROCK
	3.00m D3	H		3.00m SPT 12, 19, 20/90mm HB N=R	60.5	3.0					H	
	3.39m			3.39m		3.39			3.39m BOREHOLE BH40 TERMINATED AT 3.39 m Refusal			
					60.0	4.0						
					59.5	4.5						
					59.0	5.0						

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

CARDNO (NSW/ACT) PTY LTD

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH41

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292416.89, N: 6246477.34 SURFACE ELEVATION : 62.430 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL						
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m D1	F	Not Encountered	0.50m SPT 4, 7, 15 N=22	62.0		CL	0.10m Silty CLAY low plasticity, brown, trace rootlets Silty CLAY low plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	VSt	TOPSOIL RESIDUAL SOIL
	0.95m 1.00m D2	H		0.95m	61.5 / 1.0			1.00m Silty CLAY low to medium plasticity, pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale		H	WEATHERED ROCK
	1.30m							1.30m BOREHOLE BH41 TERMINATED AT 1.30 m Refusal			
					61.0						
					60.5 / 2.0						
					60.0						
					59.5 / 3.0						
					59.0						
					58.5 / 4.0						
					58.0						
					57.5 / 5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH42

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292681.05, N: 6246180.36 SURFACE ELEVATION : 67.460 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					0.0			Silty CLAY low plasticity, brown, trace rootlets			TOPSOIL
					0.10m			Silty CLAY low plasticity, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.50m D1	F	Not Encountered	0.50m SPT 6, 17, 21 N=38	67.0		CL			VSt	
	0.95m			0.95m	66.5 1.0			Silty CLAY low to medium plasticity, pale brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale	M (<PL)	H	WEATHERED ROCK
	1.50m D2	H		1.50m SPT 13, 20/100mm HB N=R	66.0						
	1.75m			1.75m							
					1.75m			BOREHOLE BH42 TERMINATED AT 1.75 m Refusal			
					65.5 2.0						
					65.0						
					64.5 3.0						
					64.0						
					63.5 4.0						
					63.0						
					62.5 5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH43

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292766.49, N: 6246302.47 SURFACE ELEVATION : 58.880 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T					58.880	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium to high plasticity, brown-red, trace fine to medium grained sand, trace fine grained, sub-rounded gravel			RESIDUAL SOIL
					58.5			CI-CH			VSt	
	0.50m D1	F	Not Encountered	0.50m SPT 3, 5, 11 N=16					0.50m Silty CLAY high plasticity, pale brown-red, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale	M (<PL)		WEATHERED ROCK
	0.90m			0.95m	58.0	1.0					H	
	1.20m D2 ES	H			57.5							
	1.50m D3 1.64m			1.50m SPT 21/140mm HB N=R 1.64m					1.64m BOREHOLE BH43 TERMINATED AT 1.64 m Refusal			
					57.0	2.0						
					56.5							
					56.0	3.0						
					55.5							
					55.0	4.0						
					54.5							
					54.0	5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH44

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292933.11, N: 6246387.71 SURFACE ELEVATION : 50.030 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING | MATERIAL

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/100mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
AD/T		F	Not Encountered		50.0 / 0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets					TOPSOIL
								Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand					RESIDUAL SOIL
					49.5		CI			St to VSt			
					49.0 / 1.0			1.00m Silty CLAY medium plasticity, pale grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)				
	1.50m ES						CI			VSt to H			
	1.80m D 2.00m	H			48.5			1.80m Silty CLAY medium plasticity, brown, with fine to medium grained sand, trace fine grained, sub-rounded gravel inferred as highly weathered shale 2.00m		H			WEATHERED ROCK
					48.0 / 2.0			BOREHOLE BH44 TERMINATED AT 2.00 m Refusal					
					47.5								
					47.0 / 3.0								
					46.5								
					46.0 / 4.0								
					45.5								
					5.0								

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH46

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 292074.78, N: 6246543.18 SURFACE ELEVATION : 67.900 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m B	F	Not Encountered		67.5	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium plasticity, pale brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	1.00m				67.0	1.0		Cl		M (<PL)	St to VSt	
		F-H			66.5	1.30m			Silty CLAY medium plasticity, pale grey , brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
								Cl				
					66.0	2.0			2.00m BOREHOLE BH46 TERMINATED AT 2.00 m Target depth			
					65.5							
					65.0	3.0						
					64.5							
					64.0	4.0						
					63.5							
					63.0	5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH47

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291882.46, N: 6246482.15 SURFACE ELEVATION : 68.930 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL						
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.30m B1	F	Not Encountered		68.5			Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
					0.0 / 0.10m			Silty CLAY medium plasticity, pale brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
	0.80m				68.0 / 1.0		CI		M (<PL)	St to VSt	
	1.50m B2	F-H			67.5 / 1.50m			Silty CLAY medium plasticity, pale grey , brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
	2.00m				67.0 / 2.0		CI				
					2.00m			BOREHOLE BH47 TERMINATED AT 2.00 m Target depth			
					66.5 / 3.0						
					66.0 / 4.0						
					65.5 / 5.0						
					65.0						
					64.5						
					64.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH48

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291685.66, N: 6246306.36 SURFACE ELEVATION : 68.300 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 21/10/20 DATE COMPLETED : 21/10/20 DATE LOGGED : 21/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m B	F	Not Encountered		68.0	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium to high plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
					67.5			CI-CH		M (<PL)	St to VSt	
	1.00m				67.0	1.0			1.00m Silty CLAY high plasticity, pale grey , brown -red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
		F-H						CH				
									1.50m BOREHOLE BH48 TERMINATED AT 1.50 m Target depth			
					66.5	2.0						
					66.0							
					65.5	3.0						
					65.0							
					64.5	4.0						
					64.0							
					63.5	5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH49

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291490.78, N: 6245969.92 SURFACE ELEVATION : 65.560 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m B	F	Not Encountered		65.5	0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium to high plasticity, pale brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
					65.0			CI-CH		M (<PL)	St to VSt	
	1.00m				64.5	1.0			1.00m Silty CLAY high plasticity, pale grey , pale brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
		E						CH				
						1.50			1.50m BOREHOLE BH49 TERMINATED AT 1.50 m Target depth			
					64.0							
					63.5	2.0						
					63.0							
					62.5	3.0						
					62.0							
					61.5	4.0						
					61.0							
						5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH50

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291265.66, N: 6246112.51 SURFACE ELEVATION : 67.650 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m B 1.00m	F	Not Encountered		67.5 / 0.0				0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
									Silty CLAY medium to high plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
								CI-CH				
					67.0 / 0.5				0.70m Silty CLAY high plasticity, pale grey , brown -red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	St to VSt	
					66.5 / 1.0			CH				
									1.50m BOREHOLE BH50 TERMINATED AT 1.50 m Target depth			
					66.0 / 2.0							
					65.5 / 3.0							
					65.0 / 4.0							
					64.5 / 5.0							
					64.0							
					63.5							
					63.0							

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH51

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291009.63, N: 6246274.93 SURFACE ELEVATION : 70.560 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 13/11/20 DATE COMPLETED : 13/11/20 DATE LOGGED : 13/11/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m B 1.00m	F	Not Encountered		70.5 / 0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
								Silty CLAY medium plasticity, brown, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
					70.0 / 1.0		CI		M (<PL)	St to VSt	
					69.5			1.20m Silty CLAY medium plasticity, brown grey, brown-red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			
					69.0		CI				
					2.0 / 68.5			2.00m BOREHOLE BH51 TERMINATED AT 2.00 m Target depth			
					68.0						
					3.0 / 67.5						
					67.0						
					4.0 / 66.5						
					66.0						
					5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH53

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 291219.69, N: 6245814.21 SURFACE ELEVATION : 66.820 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m B 1.00m	F	Not Encountered		66.820 / 0.0			0.10m Silty CLAY medium plasticity, brown, trace rootlets			TOPSOIL
								Silty CLAY medium plasticity, brown-orange, trace fine grained, sub-rounded gravel, trace fine to medium grained sand			RESIDUAL SOIL
					66.5		CI				
					66.0 / 1.0			0.80m Silty CLAY medium plasticity, dark brown,red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	St to VSt	
					65.5		CI				
								1.50m BOREHOLE BH53 TERMINATED AT 1.50 m Target depth			
					65.0 / 2.0						
					64.5						
					64.0 / 3.0						
					63.5						
					63.0 / 4.0						
					62.5						
					62.0 / 5.0						

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH54

PROJECT : IPG Badgerys Creek
LOCATION : Badgerys Creek
CLIENT : Ingham Property Group
FILE / JOB NO : 80221014
SHEET : 1 OF 1

POSITION : E: 290876.27, N: 6245847.78 SURFACE ELEVATION : 69.000 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : LANDCRUISER MOUNTING : Ute CONTRACTOR : STRATACORE DRILLER : LT

DATE STARTED : 22/10/20 DATE COMPLETED : 22/10/20 DATE LOGGED : 22/10/20 LOGGED BY : AT CHECKED BY : DD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T	0.50m B 1.00m	F	Not Encountered		69.0 / 0.0 68.5 68.0 / 1.0		CI-CH	0.10m Silty CLAY medium plasticity, brown, trace rootlets Silty CLAY medium to high plasticity, pale grey , brown -red, trace fine grained, sub-rounded gravel, trace fine to medium grained sand	M (<PL)	St to VSt	TOPSOIL RESIDUAL SOIL
					67.5 67.0 / 2.0 66.5 66.0 / 3.0 65.5 65.0 / 4.0 64.5 64.0 / 5.0			1.50m BOREHOLE BH54 TERMINATED AT 1.50 m Target depth			

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

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

IPG Badgerys Creek

APPENDIX C

LABORATORY TEST RESULTS

Construction Sciences

Construction Sciences Pty Ltd
ABN: 74 128 806 735

Address:
Unit 2/4 Kellogg Road,
Glendenning NSW 2761

Laboratory: **Glendenning Laboratory**
Phone: 02 4577 3555
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MOISTURE CONTENT REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232576-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 1 of 4

Test Procedures:	AS1289.2.1.1

Sample Number	12385/S/836546	12385/S/836547	12385/S/836548	12385/S/836549
ID / Client ID	80221014	80221014	80221014	80221014
Lot Number	-	-	-	-
Date / Time Sampled	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Sampling Method	T100	T100	T100	T100
Sampled By	Riley Deasy	Riley Deasy	Riley Deasy	Riley Deasy
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Material Source	Existing	Existing	Existing	Existing
Material Type	In-Situ	In-Situ	In-Situ	In-Situ
Borehole	BH16	BH17	BH22	BH23
Depth	1.50-1.95	0.50-0.80	1.50-1.95	0.50-0.95
Moisture Content (%)	**16.5**	**25.3**	**12.2**	**16.2**

Sample Number	12385/S/836550	12385/S/836551	12385/S/836552	12385/S/836553
ID / Client ID	80221014	80221014	80221014	80221014
Lot Number	-	-	-	-
Date / Time Sampled	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Sampling Method	T100	T100	T100	T100
Sampled By	Riley Deasy	Riley Deasy	Riley Deasy	Riley Deasy
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Material Source	Existing	Existing	Existing	Existing
Material Type	In-Situ	In-Situ	In-Situ	In-Situ
Borehole	BH24	BH28	BH29	BH30
Depth (m)	1.50-1.95	4.00-4.50	2.70-3.00	0.50-0.95
Moisture Content (%)	**13.2**	**15.0**	**15.4**	**18.2**

Remarks

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Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W20Rep Rev 3

Construction Sciences

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MOISTURE CONTENT REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232576-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 2 of 4

Test Procedures:	AS1289.2.1.1

Sample Number	12385/S/836554	12385/S/836555	12385/S/836556	12385/S/836557
ID / Client ID	80221014	80221014	80221014	80221014
Lot Number	-	-	-	-
Date / Time Sampled	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Sampling Method	T100	T100	T100	T100
Sampled By	Riley Deasy	Riley Deasy	Riley Deasy	Riley Deasy
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Material Source	Existing	Existing	Existing	Existing
Material Type	In-Situ	In-Situ	In-Situ	In-Situ
Borehole	BH31	BH32	BH33	BH34
Depth	2.30-2.70	1.00-1.30	1.50-1.95	0.20-0.50
Moisture Content (%)	**9.0**	**11.2**	**13.1**	**16.6**

Sample Number	12385/S/836558	12385/S/836559	12385/S/836560	12385/S/836561
ID / Client ID	80221014	80221014	80221014	80221014
Lot Number	-	-	-	-
Date / Time Sampled	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Sampling Method	T100	T100	T100	T100
Sampled By	Riley Deasy	Riley Deasy	Riley Deasy	Riley Deasy
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Material Source	Existing	Existing	Existing	Existing
Material Type	In-Situ	In-Situ	In-Situ	In-Situ
Borehole	BH35	BH36	BH37	BH38
Depth (m)	2.60-3.00	2.30-2.80	0.50-0.89	0.50-0.95
Moisture Content (%)	**14.4**	**9.9**	**11.6**	**15.3**

Remarks

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Approved Signatory: Patrick Deasy
Form ID: W20Rep Rev 3

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MOISTURE CONTENT REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232576-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 3 of 4

Test Procedures:	AS1289.2.1.1

Sample Number	12385/S/836562	12385/S/836563	12385/S/836564	12385/S/836565
ID / Client ID	80221014	80221014	80221014	80221014
Lot Number	-	-	-	-
Date / Time Sampled	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Sampling Method	T100	T100	T100	T100
Sampled By	Riley Deasy	Riley Deasy	Riley Deasy	Riley Deasy
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Material Source	Existing	Existing	Existing	Existing
Material Type	In-Situ	In-Situ	In-Situ	In-Situ
Borehole	BH39	BH40	BH41	BH42
Depth	0.50-0.95	1.50-1.95	1.00-1.30	0.50-0.95
Moisture Content (%)	**12.8**	**10.4**	**10.1**	**7.3**

Sample Number	12385/S/836566	12385/S/836567	12385/S/836568	12385/S/836569
ID / Client ID	80221014	80221014	80221014	80221014
Lot Number	-	-	-	-
Date / Time Sampled	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Sampling Method	T100	T100	T100	T100
Sampled By	Riley Deasy	Riley Deasy	Riley Deasy	Riley Deasy
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Material Source	Existing	Existing	Existing	Existing
Material Type	In-Situ	In-Situ	In-Situ	In-Situ
Borehole	BH43	BH46	BH47	BH48
Depth (m)	1.20-1.50	0.50-1.50	0.30-0.80	0.50-1.00
Moisture Content (%)	**14.1**	**11.0**	**20.1**	**15.5**

Remarks

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Approved Signatory: Patrick Deasy
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MOISTURE CONTENT REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232576-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 4 of 4

Test Procedures:	AS1289.2.1.1

Sample Number	12385/S/836570	12385/S/836571	12385/S/836572	12385/S/836573
ID / Client ID	80221014	80221014	80221014	80221014
Lot Number	-	-	-	-
Date / Time Sampled	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Sampling Method	T100	T100	T100	T100
Sampled By	Riley Deasy	Riley Deasy	Riley Deasy	Riley Deasy
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	29/10/2020	28/10/2020	29/10/2020	29/10/2020
Material Source	Existing	Existing	Existing	Existing
Material Type	In-Situ	In-Situ	In-Situ	In-Situ
Borehole	BH49	BH50	BH53	BH54
Depth	0.50-1.00	0.50-1.00	0.50-1.00	0.50-1.00
Moisture Content (%)	**15.5**	**17.1**	**13.4**	**16.8**

Sample Number				
ID / Client ID				
Lot Number				
Date / Time Sampled				
Sampling Method				
Sampled By				
Tested By				
Date Tested				
Material Source				
Material Type				
Borehole				
Depth (m)				
Moisture Content (%)				

Remarks

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MOISTURE CONTENT REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233466-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	Various
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 1 of 2

Test Procedures:	AS1289.2.1.1

Sample Number	12385/S/843271	12385/S/843272	12385/S/843273	12385/S/843274
ID / Client ID	BH10	BH11	BH13	BH15
Lot Number	BH10	BH11	BH13	BH15
Date / Time Sampled	13/11/2020	13/11/2020	13/11/2020	13/11/2020
Sampling Method	-	-	-	-
Sampled By	Client Sampled	Client Sampled	Client Sampled	Client Sampled
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	20/11/2020	20/11/2020	20/11/2020	20/11/2020
Material Source	In-Situ	In-Situ	In-Situ	In-Situ
Material Type	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel
Borehole	BH10	BH11	BH13	BH15
Depth	1.20-1.50	3.50-4.50	3.00-3.50	2.00-2.40
Moisture Content (%)	**24.4**	**12.0**	**24.9**	**22.1**

Sample Number	12385/S/843275	12385/S/843277	12385/S/843278	12385/S/843279
ID / Client ID	BH21	BH27	BH27	BH44
Lot Number	BH21	BH27	BH27	BH44
Date / Time Sampled	13/11/2020	13/11/2020	13/11/2020	13/11/2020
Sampling Method	-	-	-	-
Sampled By	Client Sampled	Client Sampled	Client Sampled	Client Sampled
Tested By	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem	Muhammad Saleem
Date Tested	20/11/2020	20/11/2020	20/11/2020	20/11/2020
Material Source	In-Situ	In-Situ	In-Situ	In-Situ
Material Type	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel
Borehole	BH21	BH27	BH27	BH44
Depth (m)	1.00-1.50	1.50-2.0	3.10-3.30	1.8-2.00
Moisture Content (%)	**16.8**	**14.0**	**17.1**	**14.4**

Remarks

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Accreditation Number: 1986
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Approved Signatory: Patrick Deasy
Form ID: W20Rep Rev 3

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MOISTURE CONTENT REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233466-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	Various
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 2 of 2

Test Procedures:	AS1289.2.1.1

Sample Number	12385/S/843280			
ID / Client ID	BH51			
Lot Number	BH51			
Date / Time Sampled	13/11/2020			
Sampling Method	-			
Sampled By	Client Sampled			
Tested By	Muhammad Saleem			
Date Tested	20/11/2020			
Material Source	In-Situ			
Material Type	Clayey, Gravel			
Borehole	BH51			
Depth	0.50-1.00			
Moisture Content (%)	**15.5**			

Sample Number				
ID / Client ID				
Lot Number				
Date / Time Sampled				
Sampling Method				
Sampled By				
Tested By				
Date Tested				
Material Source				
Material Type				
Borehole				
Depth (m)				
Moisture Content (%)				

Remarks

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Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W20Rep Rev 3

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 1 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836546	Sample Location	
Sampling Method	T100	Borehole	BH16
Date Sampled	28/10/2020	Depth (m)	1.50-1.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**58**	
Plastic Limit (%)		**21**	
Plasticity Index (%)		**37**	
Linear Shrinkage (%)		**7.5**	
Linear Shrinkage Defects:	None		

Remarks

Accredited for compliance with ISO/IEC 17025 – Testing

NATA

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W11bRep Rev 1

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 2 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836547	Sample Location	
Sampling Method	T100	Borehole	BH17
Date Sampled	28/10/2020	Depth (m)	0.50-0.80
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**78**	
Plastic Limit (%)		**23**	
Plasticity Index (%)		**55**	
Linear Shrinkage (%)		**9.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 253.0mm / None		

Remarks

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Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W11bRep Rev 1

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 3 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836548	Sample Location	
Sampling Method	T100	Borehole	BH22
Date Sampled	28/10/2020	Depth (m)	1.50-1.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**47**	
Plastic Limit (%)		**18**	
Plasticity Index (%)		**29**	
Linear Shrinkage (%)		**9.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 250.3mm / 1 crack		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 4 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836549	Sample Location	
Sampling Method	T100	Borehole	BH23
Date Sampled	28/10/2020	Depth (m)	0.50-0.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**52**	
Plastic Limit (%)		**18**	
Plasticity Index (%)		**34**	
Linear Shrinkage (%)		**5.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.1mm / None		

Remarks

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Approved Signatory: Patrick Deasy
Form ID: W11bRep Rev 1

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 5 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836550	Sample Location	
Sampling Method	T100	Borehole	BH24
Date Sampled	28/10/2020	Depth (m)	1.50-1.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**49**	
Plastic Limit (%)		**18**	
Plasticity Index (%)		**31**	
Linear Shrinkage (%)		**8.5**	
Linear Shrinkage Defects:	1 crack		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 6 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836551	Sample Location	
Sampling Method	T100	Borehole	BH28
Date Sampled	28/10/2020	Depth (m)	4.00-4.50
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**57**	
Plastic Limit (%)		**16**	
Plasticity Index (%)		**41**	
Linear Shrinkage (%)		**7.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 251.0mm / None		

Remarks

Accredited for compliance with ISO/IEC 17025 – Testing

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W11bRep Rev 1

Construction Sciences

Construction Sciences Pty Ltd
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Laboratory: **Glendenning Laboratory**
Phone: 02 4577 3555
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Email: Sydney@constructionsciences.net

ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 7 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836552	Sample Location	
Sampling Method	T100	Borehole	BH29
Date Sampled	28/10/2020	Depth (m)	2.70-3.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**61**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**42**	
Linear Shrinkage (%)		**10.0**	
Linear Shrinkage Defects:	None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 8 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836553	Sample Location	
Sampling Method	T100	Borehole	BH30
Date Sampled	28/10/2020	Depth (m)	0.50-0.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**55**	
Plastic Limit (%)		**22**	
Plasticity Index (%)		**33**	
Linear Shrinkage (%)		**6.5**	
Linear Shrinkage Defects:	None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 9 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836554	Sample Location	
Sampling Method	T100	Borehole	BH31
Date Sampled	28/10/2020	Depth (m)	2.30-2.70
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Clayey Soil		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**43**	
Plastic Limit (%)		**15**	
Plasticity Index (%)		**28**	
Linear Shrinkage (%)		**8.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.1mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 10 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836555	Sample Location	
Sampling Method	T100	Borehole	BH32
Date Sampled	28/10/2020	Depth (m)	1.00-1.30
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**45**	
Plastic Limit (%)		**13**	
Plasticity Index (%)		**32**	
Linear Shrinkage (%)		**8.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.1mm / 1 CRACK		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 11 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836556	Sample Location	
Sampling Method	T100	Borehole	BH33
Date Sampled	28/10/2020	Depth (m)	1.50-1.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**49**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**30**	
Linear Shrinkage (%)		**6.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 253.5mm / -		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 12 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836557	Sample Location	
Sampling Method	T100	Borehole	BH34
Date Sampled	28/10/2020	Depth (m)	0.20-0.50
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	-	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**73**	
Plastic Limit (%)		**22**	
Plasticity Index (%)		**51**	
Linear Shrinkage (%)		**9.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.1mm / 1 CRACK		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 13 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836558	Sample Location	
Sampling Method	T100	Borehole	BH35
Date Sampled	28/10/2020	Depth (m)	2.60-3.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**65**	
Plastic Limit (%)		**21**	
Plasticity Index (%)		**44**	
Linear Shrinkage (%)		**9.0**	
Linear Shrinkage Defects:	-		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 14 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836559	Sample Location	
Sampling Method	T100	Borehole	BH36
Date Sampled	28/10/2020	Depth (m)	2.30-2.80
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**47**	
Plastic Limit (%)		**16**	
Plasticity Index (%)		**31**	
Linear Shrinkage (%)		**10.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 250.5mm / -		

Remarks

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NATA

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Form ID: W11bRep Rev 1

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 15 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836560	Sample Location	
Sampling Method	T100	Borehole	BH37
Date Sampled	28/10/2020	Depth (m)	0.50-0.89
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**40**	
Plastic Limit (%)		**16**	
Plasticity Index (%)		**24**	
Linear Shrinkage (%)		**9.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 125.4mm / -		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 16 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836561	Sample Location	
Sampling Method	T100	Borehole	BH38
Date Sampled	28/10/2020	Depth (m)	0.50-0.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**51**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**32**	
Linear Shrinkage (%)		**8.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 248.0mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 17 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836562	Sample Location	
Sampling Method	T100	Borehole	BH39
Date Sampled	28/10/2020	Depth (m)	0.50-0.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**45**	
Plastic Limit (%)		**18**	
Plasticity Index (%)		**27**	
Linear Shrinkage (%)		**9.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 250.3mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 18 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836563	Sample Location	
Sampling Method	T100	Borehole	BH40
Date Sampled	28/10/2020	Depth (m)	1.50-1.95
Sampled By	Riley Deasy		
Date Tested	16/11/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**53**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**34**	
Linear Shrinkage (%)		**10.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 250.5mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 19 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836564	Sample Location	
Sampling Method	T100	Borehole	BH41
Date Sampled	28/10/2020	Depth (m)	1.00-1.30
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**39**	
Plastic Limit (%)		**15**	
Plasticity Index (%)		**24**	
Linear Shrinkage (%)		**7.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 249.4mm / 1 crack		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 20 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836565	Sample Location	
Sampling Method	T100	Borehole	BH42
Date Sampled	28/10/2020	Depth (m)	0.50-0.95
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**28**	
Plastic Limit (%)		**15**	
Plasticity Index (%)		**13**	
Linear Shrinkage (%)		**4.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 250.5mm / -		

Remarks

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NATA

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W11bRep Rev 1

Construction Sciences

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Phone: 02 4577 3555
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Email: Sydney@constructionsciences.net

ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 21 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836566	Sample Location	
Sampling Method	T100	Borehole	BH43
Date Sampled	28/10/2020	Depth (m)	1.20-1.50
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	-		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**52**	
Plastic Limit (%)		**20**	
Plasticity Index (%)		**32**	
Linear Shrinkage (%)		**8.0**	
Linear Shrinkage Defects:	-		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 22 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836567	Sample Location	
Sampling Method	T100	Borehole	BH46
Date Sampled	28/10/2020	Depth (m)	0.50-1.50
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Sandy CLAY, Pale Brown		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**43**	
Plastic Limit (%)		**17**	
Plasticity Index (%)		**26**	
Linear Shrinkage (%)		**8.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.1mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 23 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836568	Sample Location	
Sampling Method	T100	Borehole	BH47
Date Sampled	28/10/2020	Depth (m)	0.30-0.80
Sampled By	Riley Deasy		
Date Tested	9/11/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Sandy CLAY, Red/Brown		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**71**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**52**	
Linear Shrinkage (%)		**7.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.0mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 24 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836569	Sample Location	
Sampling Method	T100	Borehole	BH48
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Sandy CLAY, Brown		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**64**	
Plastic Limit (%)		**21**	
Plasticity Index (%)		**43**	
Linear Shrinkage (%)		**7.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.7mm / 2 cracks		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 25 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836570	Sample Location	
Sampling Method	T100	Borehole	BH49
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Sandy CLAY, Dark Brown		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**53**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**34**	
Linear Shrinkage (%)		**7.0**	
Linear Shrinkage Defects:	-		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 26 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836571	Sample Location	
Sampling Method	T100	Borehole	BH50
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Grey/brown clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**60**	
Plastic Limit (%)		**21**	
Plasticity Index (%)		**39**	
Linear Shrinkage (%)		**9.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 125.4mm / -		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 27 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836572	Sample Location	
Sampling Method	T100	Borehole	BH53
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	10/11/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Sandy CLAY, Brown		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**39**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**20**	
Linear Shrinkage (%)		**7.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 253.5mm / 1 crack		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232584-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 28 of 28

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/836573	Sample Location	
Sampling Method	T100	Borehole	BH54
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Att. Drying Method	Oven Dried	Material Source	Existing
Atterberg Preparation	Dry Sieved	Material Type	In-Situ
Material Description	Sandy CLAY, Brown		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**61**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**42**	
Linear Shrinkage (%)		**12.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 253.0mm / -		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH10
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 1 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843271	Sample Location	
Sampling Method	-	Borehole	BH10
Date Sampled	13/11/2020	Depth (m)	1.20-1.50
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Air Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**89**	
Plastic Limit (%)		**29**	
Plasticity Index (%)		**60**	
Linear Shrinkage (%)		**14.0**	
Linear Shrinkage Defects:	Curvy		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH11
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 2 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843272	Sample Location	
Sampling Method	-	Borehole	BH11
Date Sampled	13/11/2020	Depth (m)	3.50-4.50
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**44**	
Plastic Limit (%)		**22**	
Plasticity Index (%)		**22**	
Linear Shrinkage (%)		**10.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.7mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH13
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 3 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843273	Sample Location	
Sampling Method	-	Borehole	BH13
Date Sampled	13/11/2020	Depth (m)	3.00-3.50
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**50**	
Plastic Limit (%)		**21**	
Plasticity Index (%)		**29**	
Linear Shrinkage (%)		**13.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 250.5mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH15
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 4 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843274	Sample Location	
Sampling Method	-	Borehole	BH15
Date Sampled	13/11/2020	Depth (m)	2.00-2.40
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**77**	
Plastic Limit (%)		**25**	
Plasticity Index (%)		**52**	
Linear Shrinkage (%)		**12.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 248.0mm / Curvy		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH21
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 5 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843275	Sample Location	
Sampling Method	-	Borehole	BH21
Date Sampled	13/11/2020	Depth (m)	1.00-1.50
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	CLAY		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**46**	
Plastic Limit (%)		**18**	
Plasticity Index (%)		**28**	
Linear Shrinkage (%)		**9.5**	
Linear Shrinkage Defects:	Curvy		

Remarks

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Laboratory: **Glendenning Laboratory**
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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH26
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 6 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843276	Sample Location	
Sampling Method	-	Borehole	BH26
Date Sampled	13/11/2020	Depth (m)	2.20-2.50
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**37**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**18**	
Linear Shrinkage (%)		**9.5**	
Linear Shrinkage Defects:	None		

Remarks

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Approved Signatory: Patrick Deasy
Form ID: W11bRep Rev 1

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH27
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 7 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843277	Sample Location	
Sampling Method	-	Borehole	BH27
Date Sampled	13/11/2020	Depth (m)	1.50-2.0
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Silty Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**30**	
Plastic Limit (%)		**17**	
Plasticity Index (%)		**13**	
Linear Shrinkage (%)		**7.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 253.0mm / Cracks		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH27
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 8 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843278	Sample Location	
Sampling Method	-	Borehole	BH27
Date Sampled	13/11/2020	Depth (m)	3.10-3.30
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**44**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**25**	
Linear Shrinkage (%)		**9.5**	
Linear Shrinkage Defects:	None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH44
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 9 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843279	Sample Location	
Sampling Method	-	Borehole	BH44
Date Sampled	13/11/2020	Depth (m)	1.8-2.00
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**41**	
Plastic Limit (%)		**19**	
Plasticity Index (%)		**22**	
Linear Shrinkage (%)		**10.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 251.0mm / None		

Remarks

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233520-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH51
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 10 of 10

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/843280	Sample Location	
Sampling Method	-	Borehole	BH51
Date Sampled	13/11/2020	Depth (m)	0.50-1.00
Sampled By	Client Sampled		
Date Tested	28/11/2020		
Att. Drying Method	Oven Dried	Material Source	In-Situ
Atterberg Preparation	Dry Sieved	Material Type	Clayey, Gravel
Material Description	Brown clay		

Atterberg Limits Results

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**45**	
Plastic Limit (%)		**15**	
Plasticity Index (%)		**30**	
Linear Shrinkage (%)		**8.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 249.4mm / Curvy		

Remarks

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CALIFORNIA BEARING RATIO REPORT

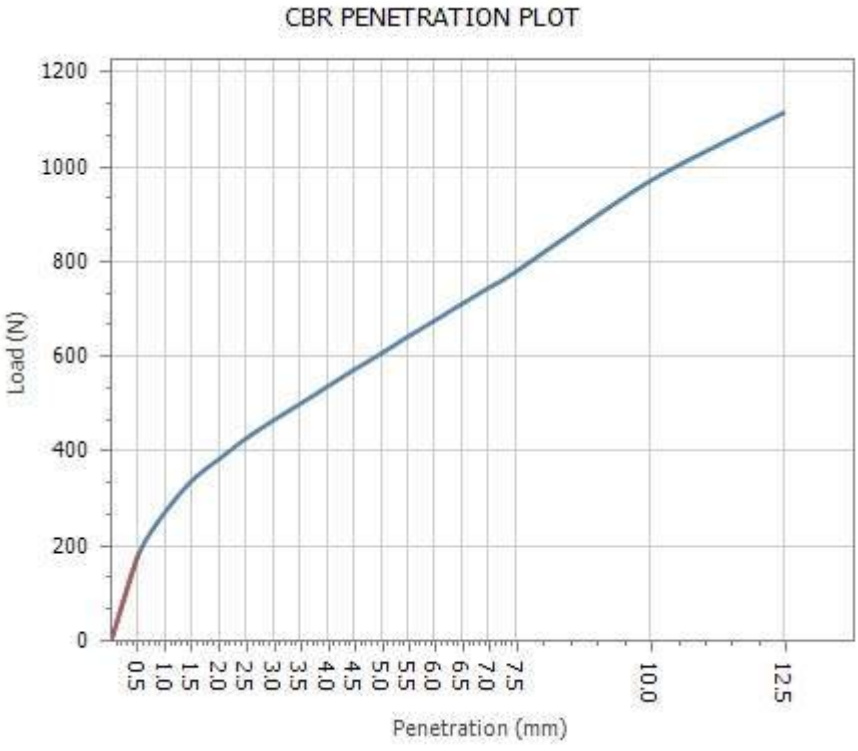
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232587-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 1 of 7

Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1

		Sample Location		
Sample Number	12385/S/836567	Borehole		BH46
Sampling Method	T100	Depth	(m)	0.50-1.50
Date Sampled	28/10/2020			
Sampled By	Riley Deasy			
Date Tested	9/11/2020			
Material Source	Existing	Material Limit Start		-
Material Type	In-Situ	Material Limit End		-
Client Reference	80221014	Compactive Effort		Standard

Material Description	Sandy CLAY, Pale Brown

Maximum Dry Density (t/m³):	1.84
Optimum Moisture Content (%):	14.5
Field Moisture Content (%):	11.7
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.84
Placement Dry Density Ratio (%):	100.0
Placement Moisture Content (%):	14.5
Placement Moisture Ratio (%):	100.0
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.77
Total Curing Time (hrs)	48
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	22.1
Moisture (remainder) After Soak (%)	16.4
CBR Swell (%):	3.5
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**3.0**



Remarks

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CALIFORNIA BEARING RATIO REPORT

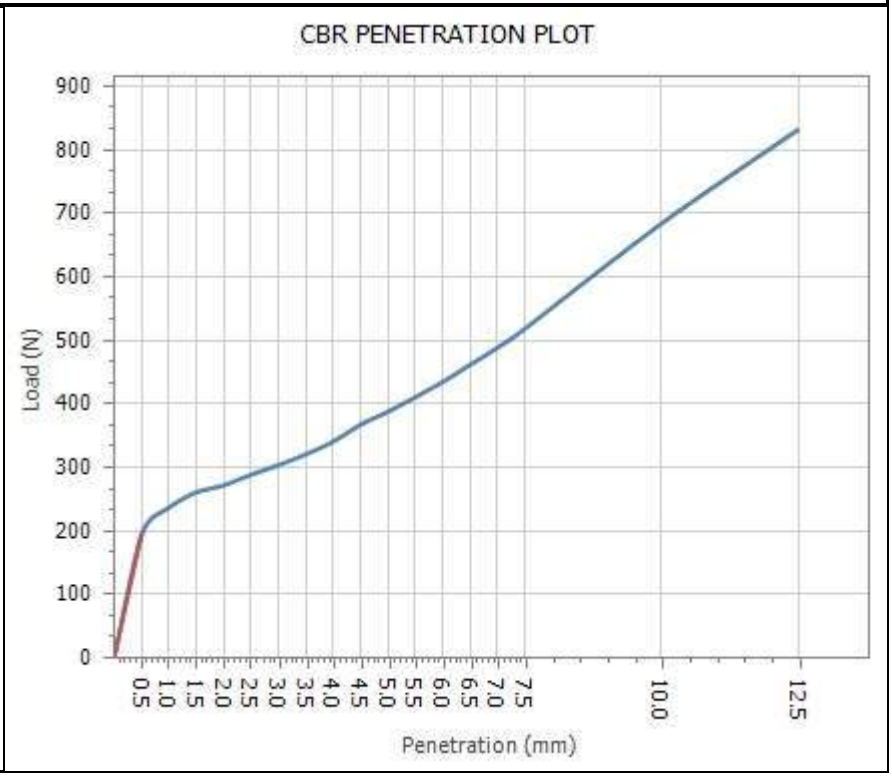
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232587-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 2 of 7

Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1

		Sample Location		
Sample Number	12385/S/836568	Borehole		BH47
Sampling Method	T100	Depth	(m)	0.30-0.80
Date Sampled	28/10/2020			
Sampled By	Riley Deasy			
Date Tested	9/11/2020			
Material Source	Existing	Material Limit Start		-
Material Type	In-Situ	Material Limit End		-
Client Reference	80221014	Compactive Effort		Standard

Material Description	Sandy CLAY, Red/Brown

Maximum Dry Density (t/m³):	1.77
Optimum Moisture Content (%):	18.0
Field Moisture Content (%):	20.5
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.78
Placement Dry Density Ratio (%):	100.0
Placement Moisture Content (%):	18.0
Placement Moisture Ratio (%):	99.5
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.72
Total Curing Time (hrs)	50
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	27.3
Moisture (remainder) After Soak (%)	19.1
CBR Swell (%):	3.0
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**2.0**



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CALIFORNIA BEARING RATIO REPORT

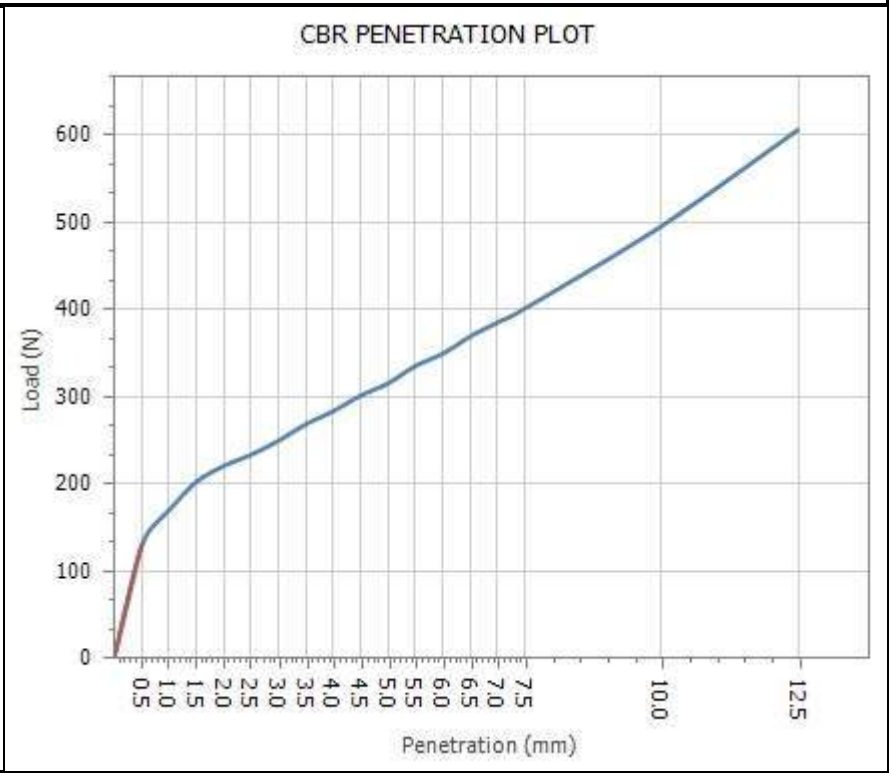
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232587-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 3 of 7

Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1

		Sample Location		
Sample Number	12385/S/836569	Borehole		BH48
Sampling Method	T100	Depth	(m)	0.50-1.00
Date Sampled	28/10/2020			
Sampled By	Riley Deasy			
Date Tested	9/11/2020			
Material Source	Existing	Material Limit Start		-
Material Type	In-Situ	Material Limit End		-
Client Reference	80221014	Compactive Effort		Standard

Material Description	Sandy CLAY, Brown

Maximum Dry Density (t/m³):	1.82
Optimum Moisture Content (%):	16.0
Field Moisture Content (%):	15.4
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.81
Placement Dry Density Ratio (%):	100.0
Placement Moisture Content (%):	15.9
Placement Moisture Ratio (%):	100.5
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.74
Total Curing Time (hrs)	49
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	27.6
Moisture (remainder) After Soak (%)	18.1
CBR Swell (%):	4.5
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**2.0**



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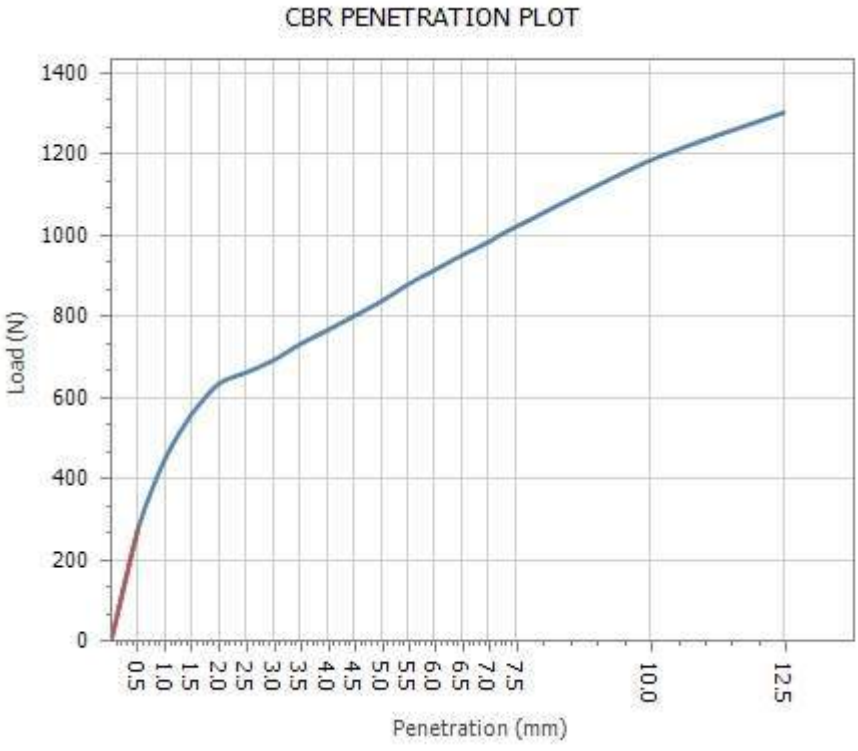
CALIFORNIA BEARING RATIO REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232587-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 4 of 7

Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1		
Sample Number	12385/S/836570	Sample Location	
Sampling Method	T100	Borehole	BH49
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	9/11/2020		
Material Source	Existing	Material Limit Start	-
Material Type	In-Situ	Material Limit End	-
Client Reference	80221014	Compactive Effort	Standard
Material Description	Sandy CLAY, Dark Brown		

Maximum Dry Density (t/m³):	1.82
Optimum Moisture Content (%):	18.0
Field Moisture Content (%):	17.9
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.82
Placement Dry Density Ratio (%):	100.0
Placement Moisture Content (%):	18.0
Placement Moisture Ratio (%):	100.0
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.79
Total Curing Time (hrs)	49
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	23.1
Moisture (remainder) After Soak (%)	18.4
CBR Swell (%):	2.0
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**5**



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CALIFORNIA BEARING RATIO REPORT

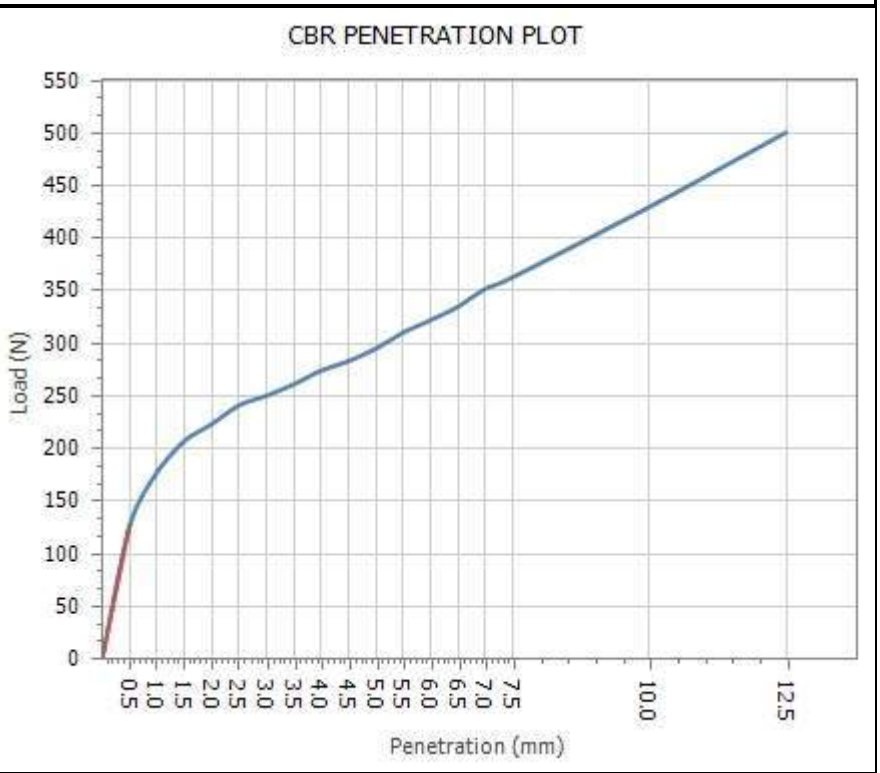
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232587-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 5 of 7

Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1

		Sample Location		
Sample Number	12385/S/836571	Borehole		BH50
Sampling Method	T100	Depth	(m)	0.50-1.00
Date Sampled	28/10/2020			
Sampled By	Riley Deasy			
Date Tested	3/11/2020			
Material Source	Existing	Material Limit Start		-
Material Type	In-Situ	Material Limit End		-
Client Reference	80221014	Compactive Effort		Standard

Material Description	Grey/brown clay

Maximum Dry Density (t/m³):	1.67
Optimum Moisture Content (%):	16.5
Field Moisture Content (%):	17.7
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.68
Placement Dry Density Ratio (%):	100.5
Placement Moisture Content (%):	16.4
Placement Moisture Ratio (%):	100.5
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.63
Total Curing Time (hrs)	n/a
Liquid Limit Method	n/a
Moisture (top 30mm) After Soak (%)	31.0
Moisture (remainder) After Soak (%)	21.6
CBR Swell (%):	3.0
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**2.0**



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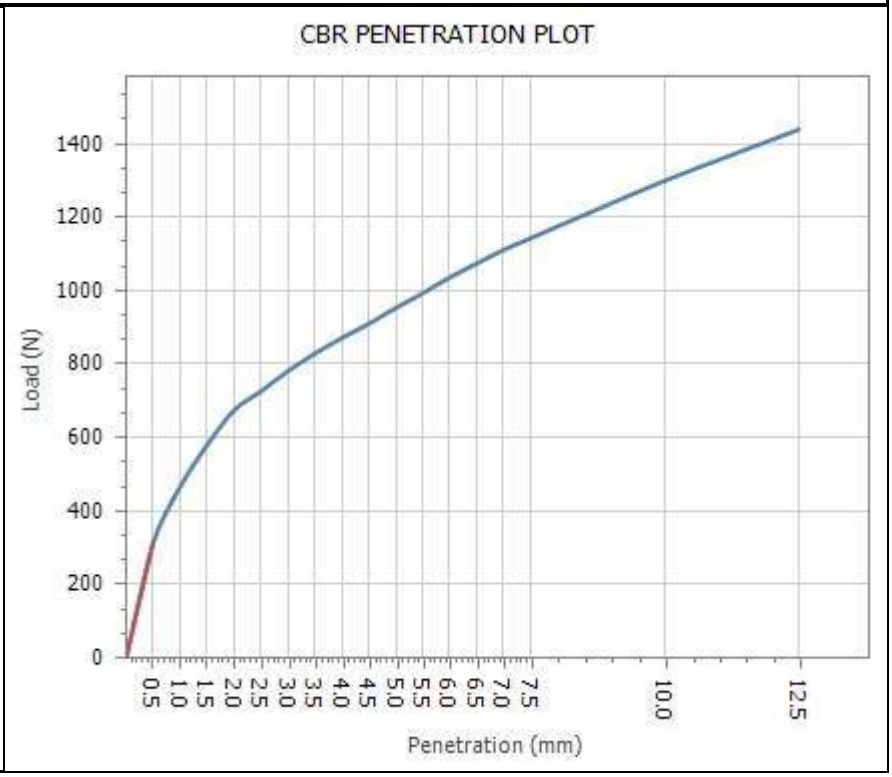
CALIFORNIA BEARING RATIO REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232587-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 6 of 7

Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1		
Sample Number	12385/S/836572	Sample Location	
Sampling Method	T100	Borehole	BH53
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	9/11/2020		
Material Source	Existing	Material Limit Start	-
Material Type	In-Situ	Material Limit End	-
Client Reference	80221014	Compactive Effort	Standard
Material Description	Sandy CLAY, Brown		

Maximum Dry Density (t/m³):	1.88
Optimum Moisture Content (%):	15.5
Field Moisture Content (%):	13.6
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.87
Placement Dry Density Ratio (%):	100.0
Placement Moisture Content (%):	15.7
Placement Moisture Ratio (%):	101.5
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.83
Total Curing Time (hrs)	44
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	22.2
Moisture (remainder) After Soak (%)	17.8
CBR Swell (%):	2.5
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**6**



Remarks

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Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W2ASRep Rev2

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Laboratory: **Glendenning Laboratory**
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Email: Sydney@constructionsciences.net

CALIFORNIA BEARING RATIO REPORT

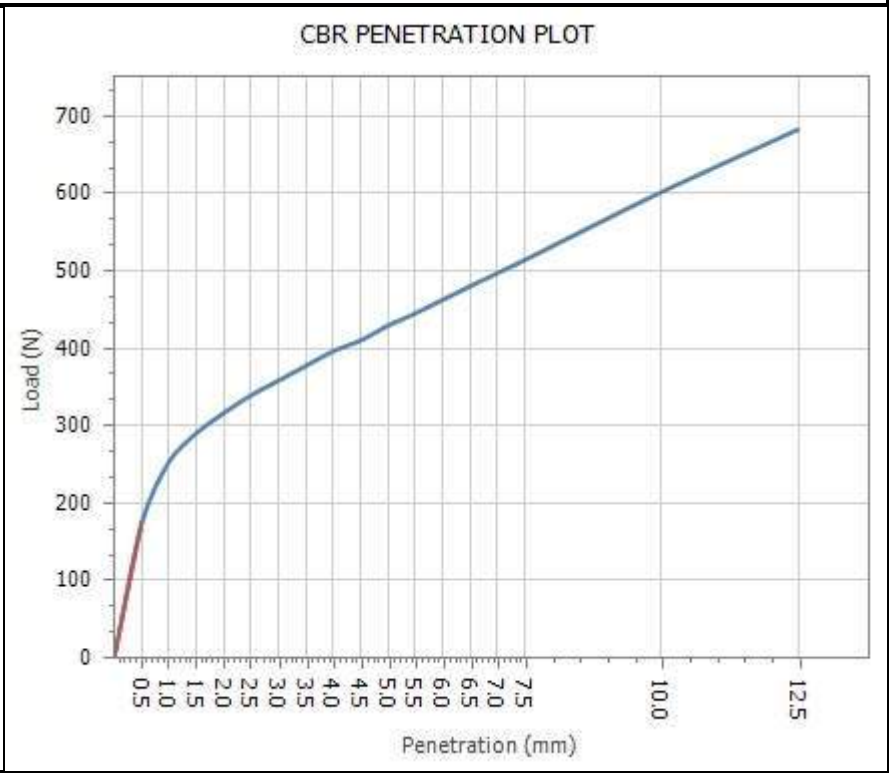
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232587-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 7 of 7

Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1

		Sample Location		
Sample Number	12385/S/836573	Borehole		BH54
Sampling Method	T100	Depth	(m)	0.50-1.00
Date Sampled	28/10/2020			
Sampled By	Riley Deasy			
Date Tested	9/11/2020			
Material Source	Existing	Material Limit Start		-
Material Type	In-Situ	Material Limit End		-
Client Reference	80221014	Compactive Effort		Standard

Material Description	Sandy CLAY, Brown

Maximum Dry Density (t/m³):	1.76
Optimum Moisture Content (%):	18.0
Field Moisture Content (%):	18.4
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.77
Placement Dry Density Ratio (%):	100.5
Placement Moisture Content (%):	18.0
Placement Moisture Ratio (%):	100.5
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.68
Total Curing Time (hrs)	47
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	28.5
Moisture (remainder) After Soak (%)	19.0
CBR Swell (%):	5.0
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**2.5**



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CALIFORNIA BEARING RATIO REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233464-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH51
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 1 of 1

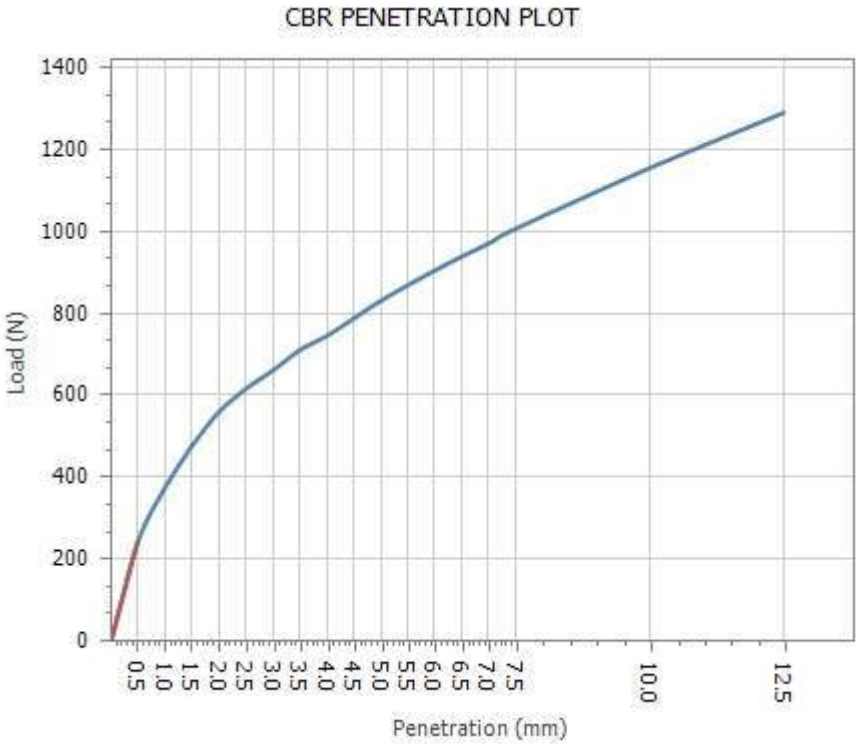
Test Procedures	AS1289.6.1.1, AS1289.5.1.1, AS1289.2.1.1
Sample Number	12385/S/843280
Sampling Method	-
Date Sampled	13/11/2020
Sampled By	Client Sampled
Date Tested	25/11/2020
Material Source	In-Situ
Material Type	Clayey, Gravel
Client Reference	BH51
Material Description	Brown clay

Sample Location

Borehole		BH51
Depth	(m)	0.50-1.00

Material Limit Start	-
Material Limit End	-
Compactive Effort	Standard

Maximum Dry Density (t/m³):	1.84
Optimum Moisture Content (%):	16.0
Field Moisture Content (%):	16.1
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.84
Placement Dry Density Ratio (%):	100.5
Placement Moisture Content (%):	16.1
Placement Moisture Ratio (%):	100.0
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	6.8
Dry Density After Soak (t/m³):	1.81
Total Curing Time (hrs)	n/a
Liquid Limit Method	n/a
Moisture (top 30mm) After Soak (%)	21.3
Moisture (remainder) After Soak (%)	16.5
CBR Swell (%):	2.0
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**4.5**



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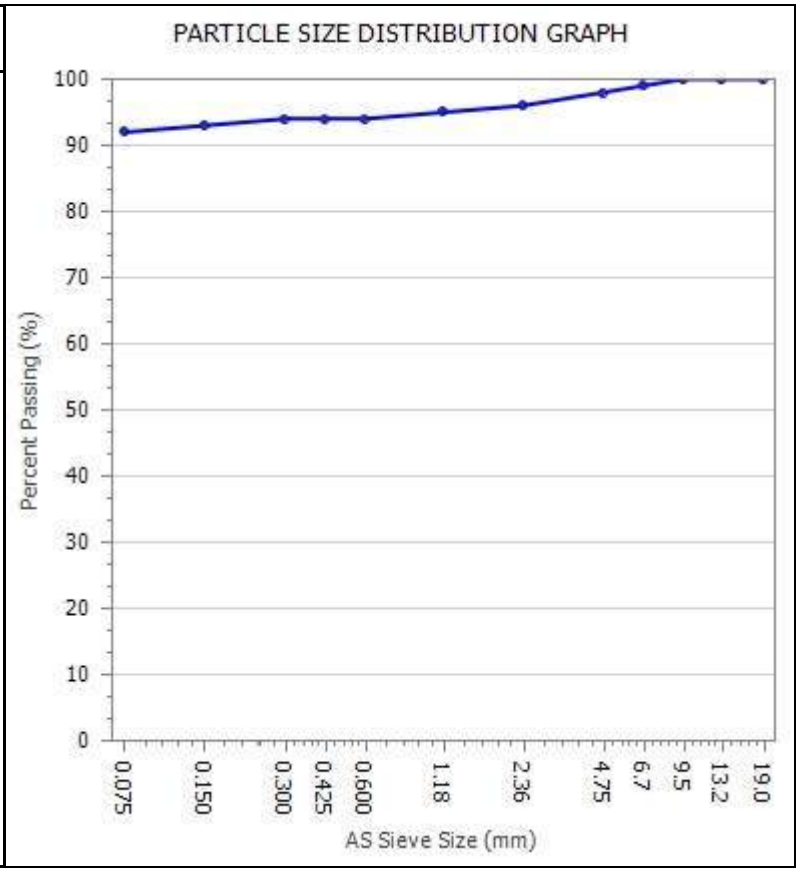
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 1 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836547	Sample Location	
Sampling Method	T100	Borehole	BH17
Date Sampled	28/10/2020	Depth (m)	0.50-0.80
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**99**	
4.75		**98**	
2.36		**96**	
1.18		**95**	
0.600		**94**	
0.425		**94**	
0.300		**94**	
0.150		**93**	
0.075		**92**	



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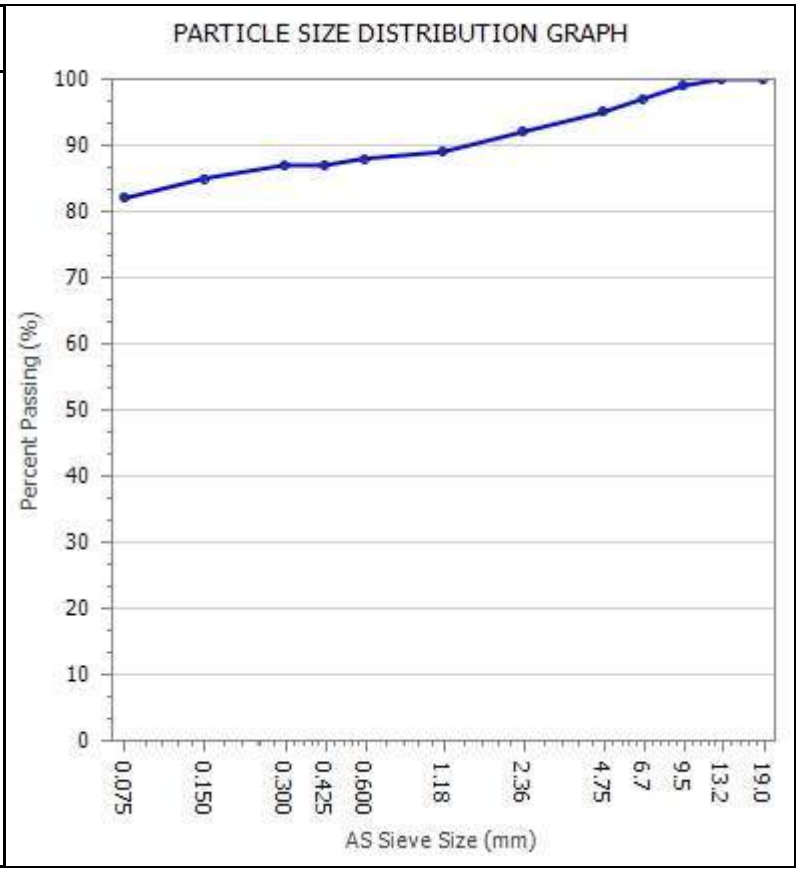
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 2 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836552	Sample Location	
Sampling Method	T100	Borehole	BH29
Date Sampled	28/10/2020	Depth (m)	2.70-3.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**99**	
6.7		**97**	
4.75		**95**	
2.36		**92**	
1.18		**89**	
0.600		**88**	
0.425		**87**	
0.300		**87**	
0.150		**85**	
0.075		**82**	



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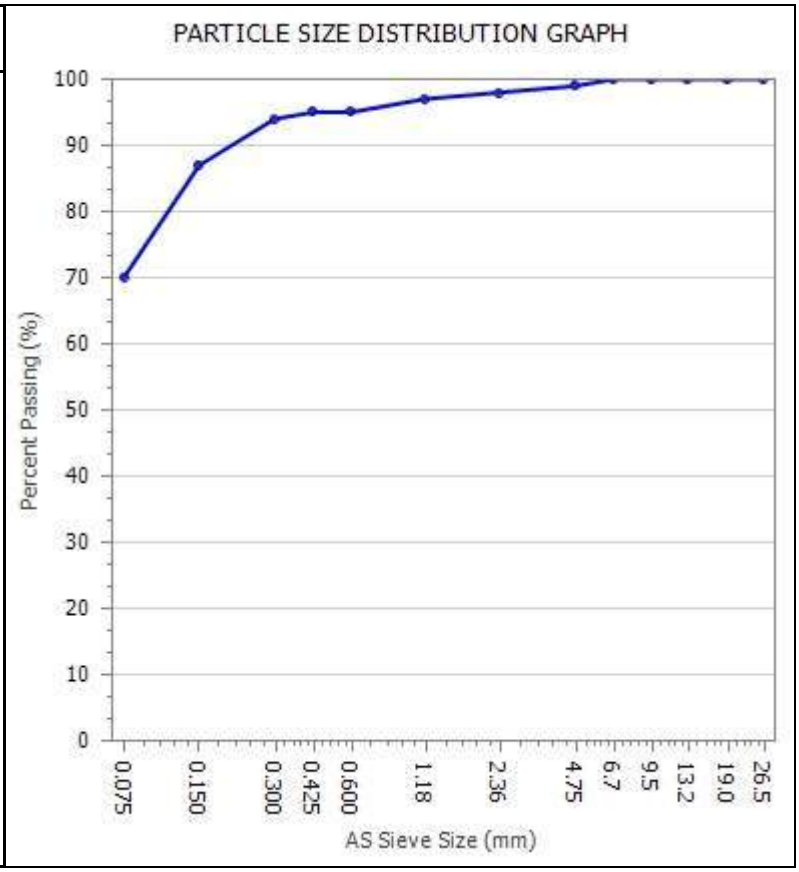
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 3 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836554	Sample Location	
Sampling Method	T100	Borehole	BH31
Date Sampled	28/10/2020	Depth (m)	2.30-2.70
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
26.5		**100**	
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**100**	
4.75		**99**	
2.36		**98**	
1.18		**97**	
0.600		**95**	
0.425		**95**	
0.300		**94**	
0.150		**87**	
0.075		**70**	



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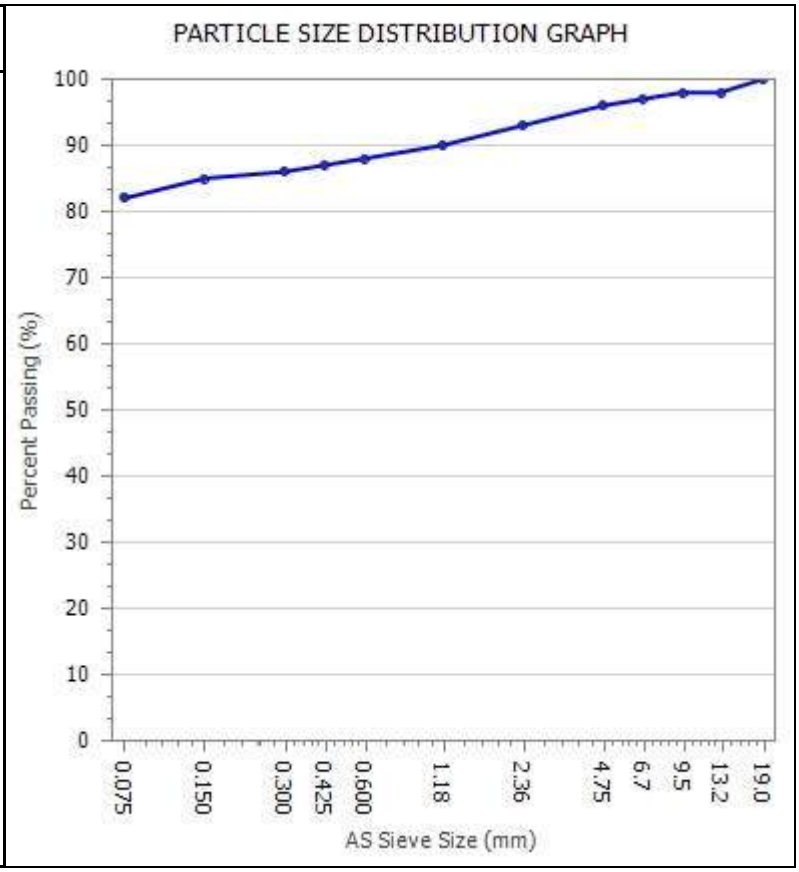
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 4 of 14

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/836555	Sample Location	
Sampling Method	T100	Borehole	BH32
Date Sampled	28/10/2020	Depth (m)	1.00-1.30
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**98**	
9.5		**98**	
6.7		**97**	
4.75		**96**	
2.36		**93**	
1.18		**90**	
0.600		**88**	
0.425		**87**	
0.300		**86**	
0.150		**85**	
0.075		**82**	



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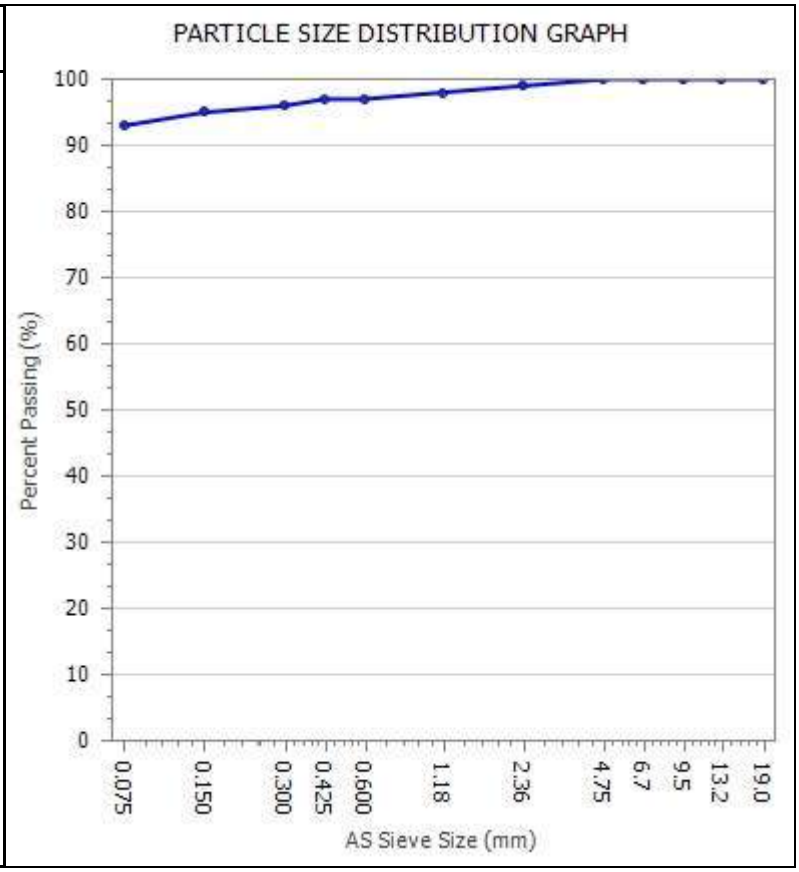
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 5 of 14

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/836557	Sample Location	
Sampling Method	T100	Borehole	BH34
Date Sampled	28/10/2020	Depth (m)	0.20-0.50
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**100**	
4.75		**100**	
2.36		**99**	
1.18		**98**	
0.600		**97**	
0.425		**97**	
0.300		**96**	
0.150		**95**	
0.075		**93**	



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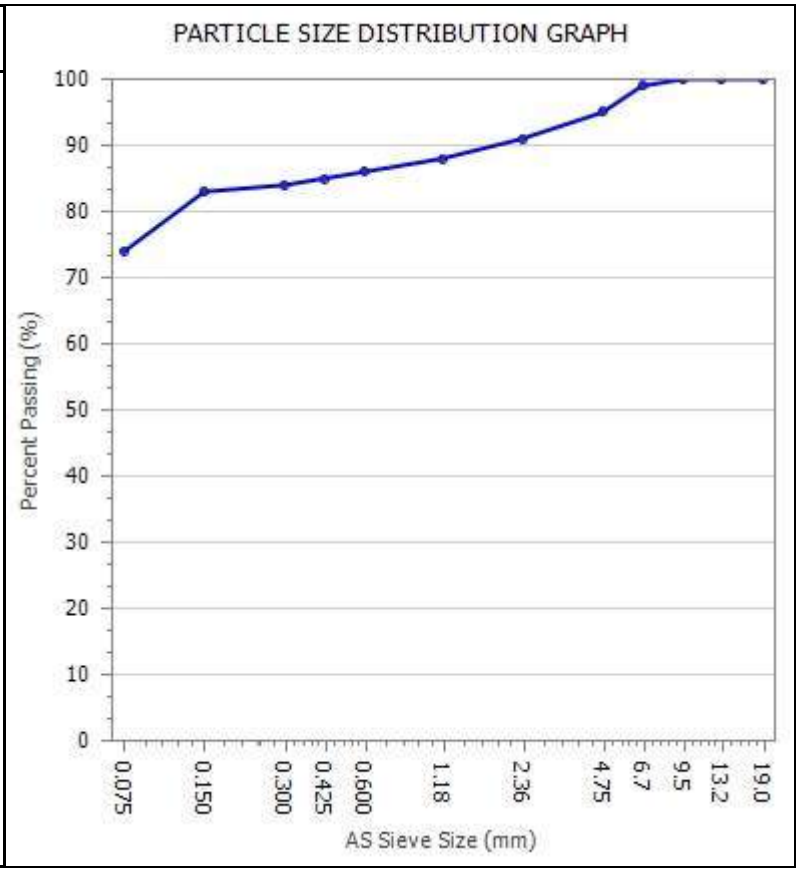
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 6 of 14

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/836559	Sample Location	
Sampling Method	T100	Borehole	BH36
Date Sampled	28/10/2020	Depth (m)	2.30-2.80
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**99**	
4.75		**95**	
2.36		**91**	
1.18		**88**	
0.600		**86**	
0.425		**85**	
0.300		**84**	
0.150		**83**	
0.075		**74**	



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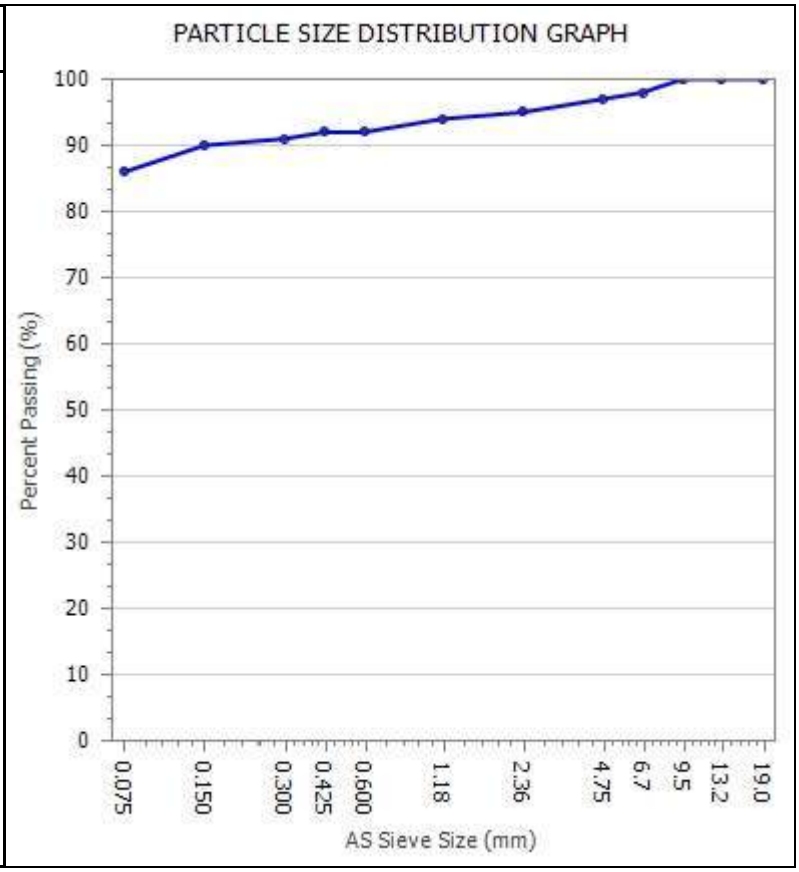
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 7 of 14

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/836566	Sample Location	
Sampling Method	T100	Borehole	BH43
Date Sampled	28/10/2020	Depth (m)	1.20-1.50
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**98**	
4.75		**97**	
2.36		**95**	
1.18		**94**	
0.600		**92**	
0.425		**92**	
0.300		**91**	
0.150		**90**	
0.075		**86**	



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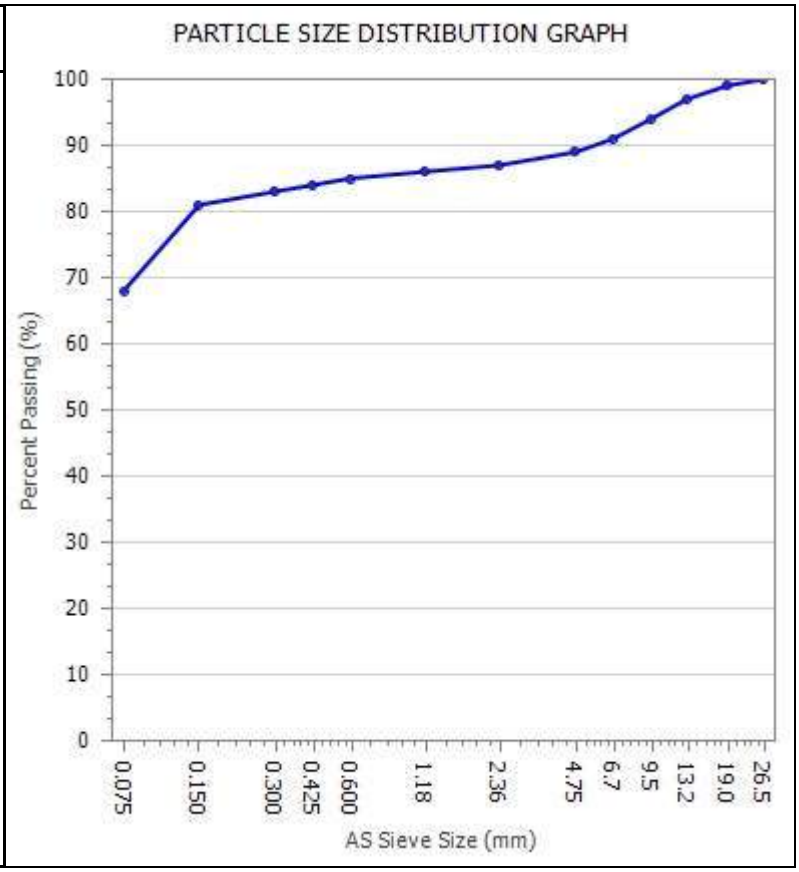
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 8 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836567	Sample Location	
Sampling Method	T100	Borehole	BH46
Date Sampled	28/10/2020	Depth (m)	0.50-1.50
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
26.5		**100**	
19.0		**99**	
13.2		**97**	
9.5		**94**	
6.7		**91**	
4.75		**89**	
2.36		**87**	
1.18		**86**	
0.600		**85**	
0.425		**84**	
0.300		**83**	
0.150		**81**	
0.075		**68**	



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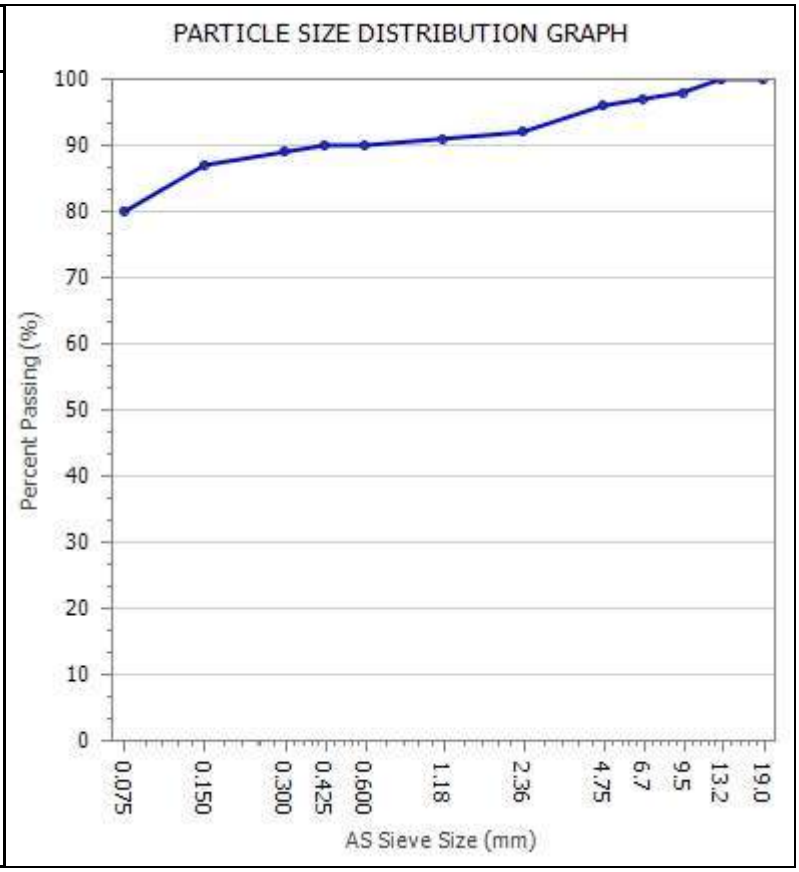
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 9 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836568	Sample Location	
Sampling Method	T100	Borehole	BH47
Date Sampled	28/10/2020	Depth (m)	0.30-0.80
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**98**	
6.7		**97**	
4.75		**96**	
2.36		**92**	
1.18		**91**	
0.600		**90**	
0.425		**90**	
0.300		**89**	
0.150		**87**	
0.075		**80**	



Remarks

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Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W9Rep Rev 2

Construction Sciences

Construction Sciences Pty Ltd
ABN: 74 128 806 735

Address:
Unit 2/4 Kellogg Road,
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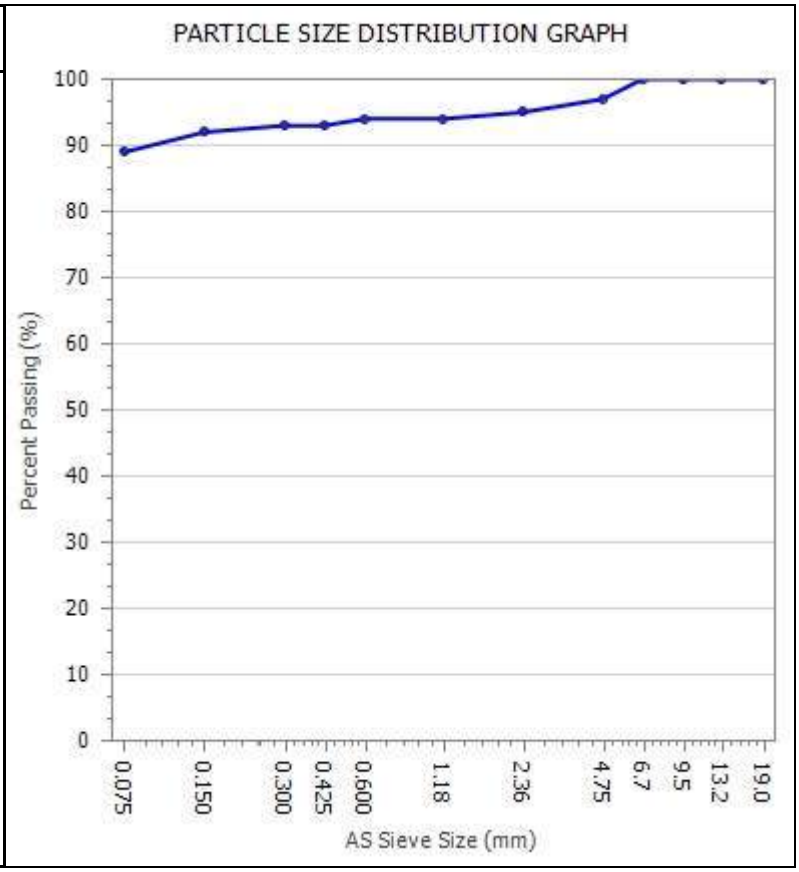
Laboratory: **Glendenning Laboratory**
Phone: 02 4577 3555
Fax: 02 4577 9055
Email: Sydney@constructionsciences.net

PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 10 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836569	Sample Location	
Sampling Method	T100	Borehole	BH48
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**100**	
4.75		**97**	
2.36		**95**	
1.18		**94**	
0.600		**94**	
0.425		**93**	
0.300		**93**	
0.150		**92**	
0.075		**89**	



Remarks

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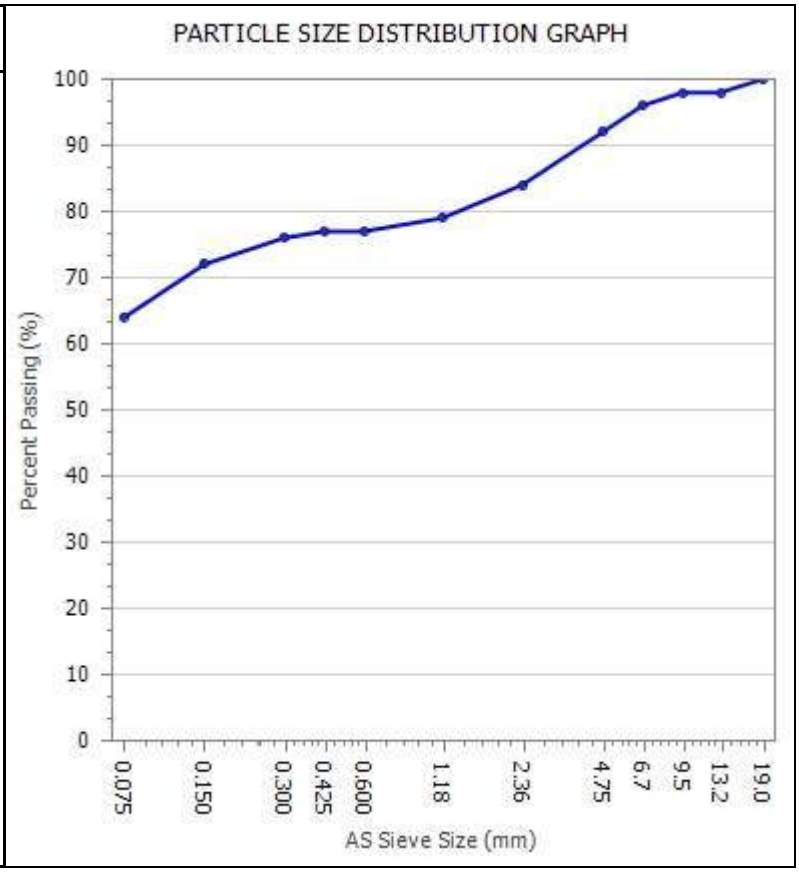
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 11 of 14

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/836570	Sample Location	
Sampling Method	T100	Borehole	BH49
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**98**	
9.5		**98**	
6.7		**96**	
4.75		**92**	
2.36		**84**	
1.18		**79**	
0.600		**77**	
0.425		**77**	
0.300		**76**	
0.150		**72**	
0.075		**64**	



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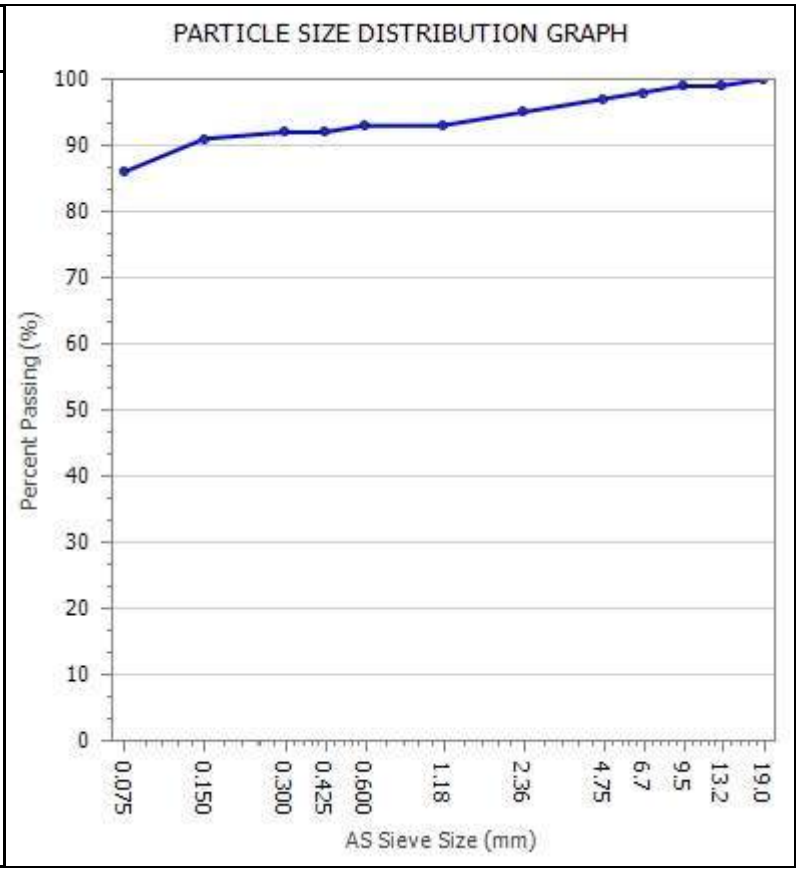
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 12 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836571	Sample Location	
Sampling Method	T100	Borehole	BH50
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**99**	
9.5		**99**	
6.7		**98**	
4.75		**97**	
2.36		**95**	
1.18		**93**	
0.600		**93**	
0.425		**92**	
0.300		**92**	
0.150		**91**	
0.075		**86**	



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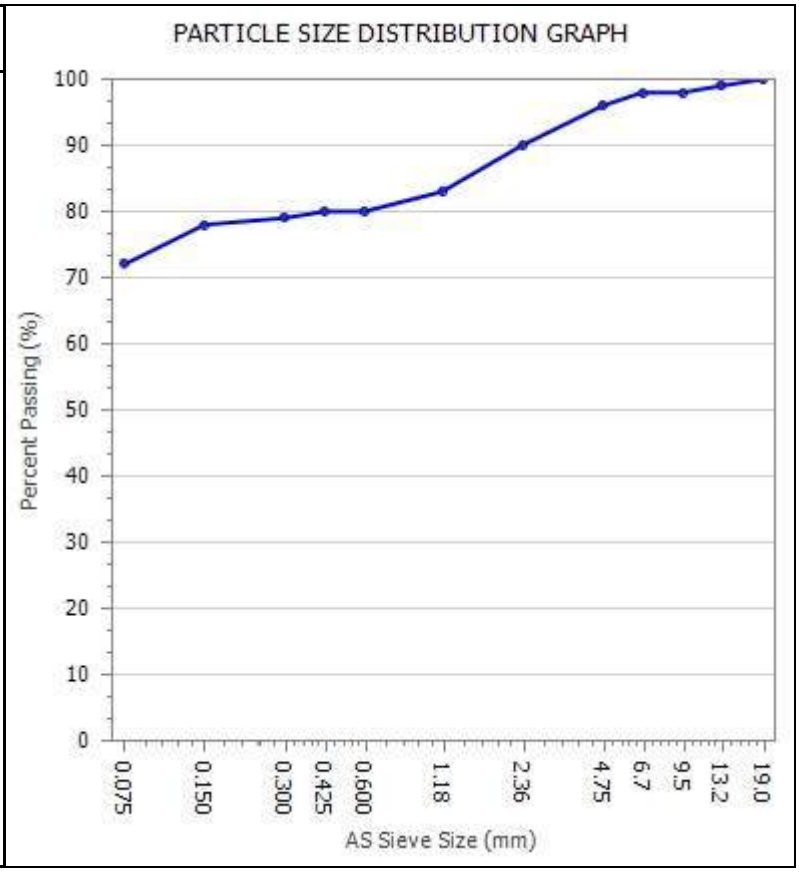
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 13 of 14

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/836572	Sample Location	
Sampling Method	T100	Borehole	BH53
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**99**	
9.5		**98**	
6.7		**98**	
4.75		**96**	
2.36		**90**	
1.18		**83**	
0.600		**80**	
0.425		**80**	
0.300		**79**	
0.150		**78**	
0.075		**72**	



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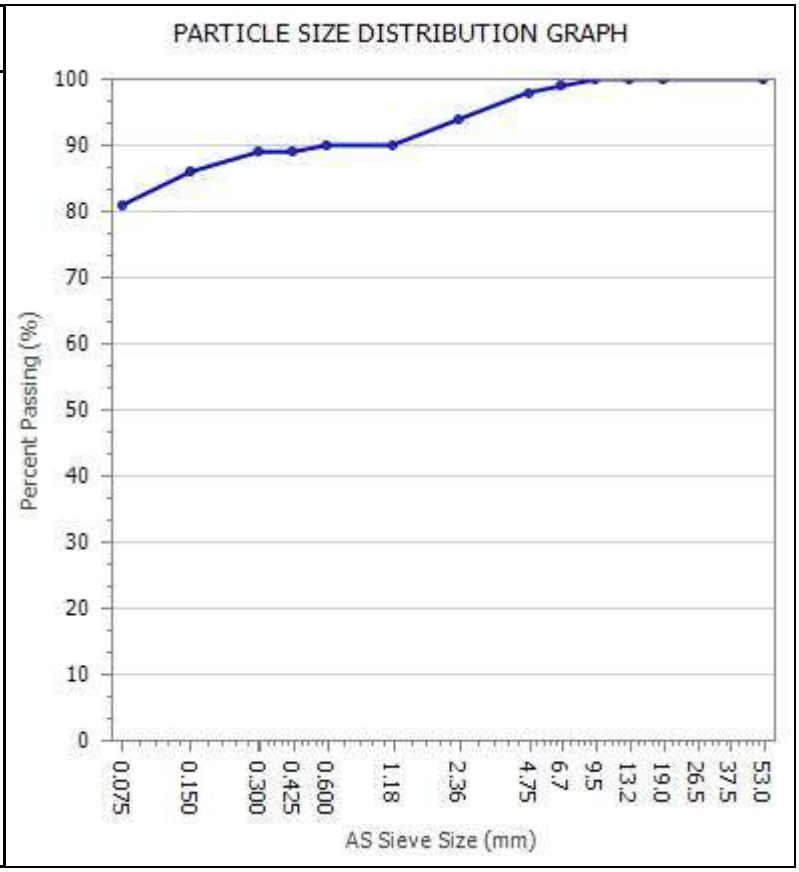
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/232589-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	
Location:	Badgerys Creek	Internal Test Request:	12385/T/103938
Supplied To:	Ahmad Turani	Client Reference/s:	80221014
Area Description:		Report Date / Page:	23/11/2020 Page 14 of 14

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/836573	Sample Location	
Sampling Method	T100	Borehole	BH54
Date Sampled	28/10/2020	Depth (m)	0.50-1.00
Sampled By	Riley Deasy		
Date Tested	29/10/2020		
Material Source	Existing	Material Type	In-Situ

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
53.0		**100**	
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**99**	
4.75		**98**	
2.36		**94**	
1.18		**90**	
0.600		**90**	
0.425		**89**	
0.300		**89**	
0.150		**86**	
0.075		**81**	



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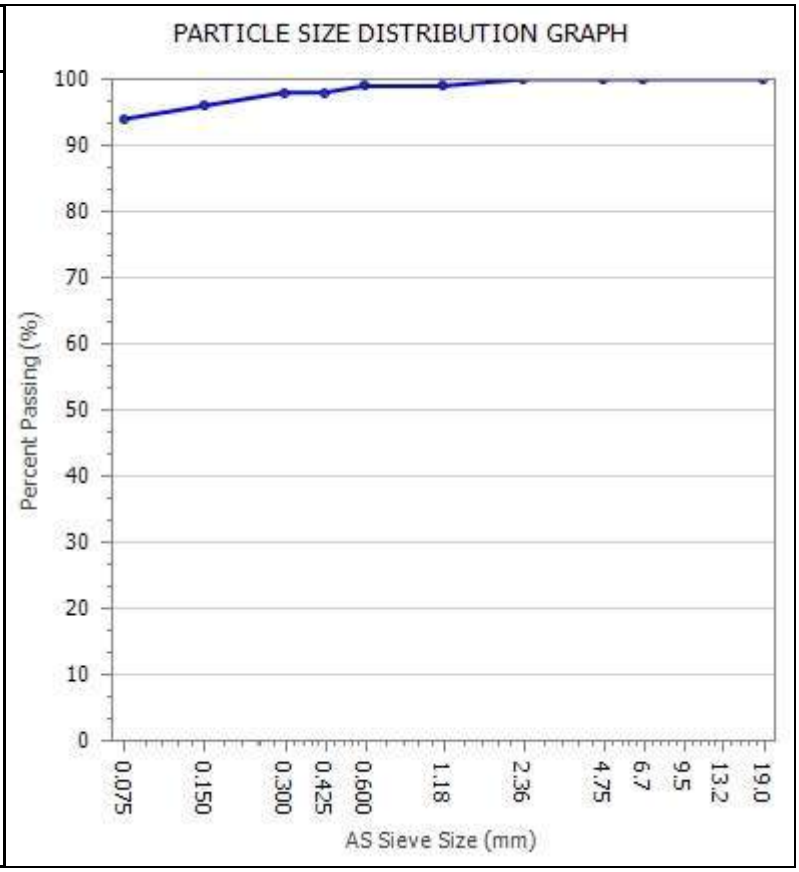
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH10
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 1 of 9

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/843271	Sample Location	
Sampling Method	-	Borehole	BH10
Date Sampled	13/11/2020	Depth (m)	1.20-1.50
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
6.7		**100**	
4.75		**100**	
2.36		**100**	
1.18		**99**	
0.600		**99**	
0.425		**98**	
0.300		**98**	
0.150		**96**	
0.075		**94**	



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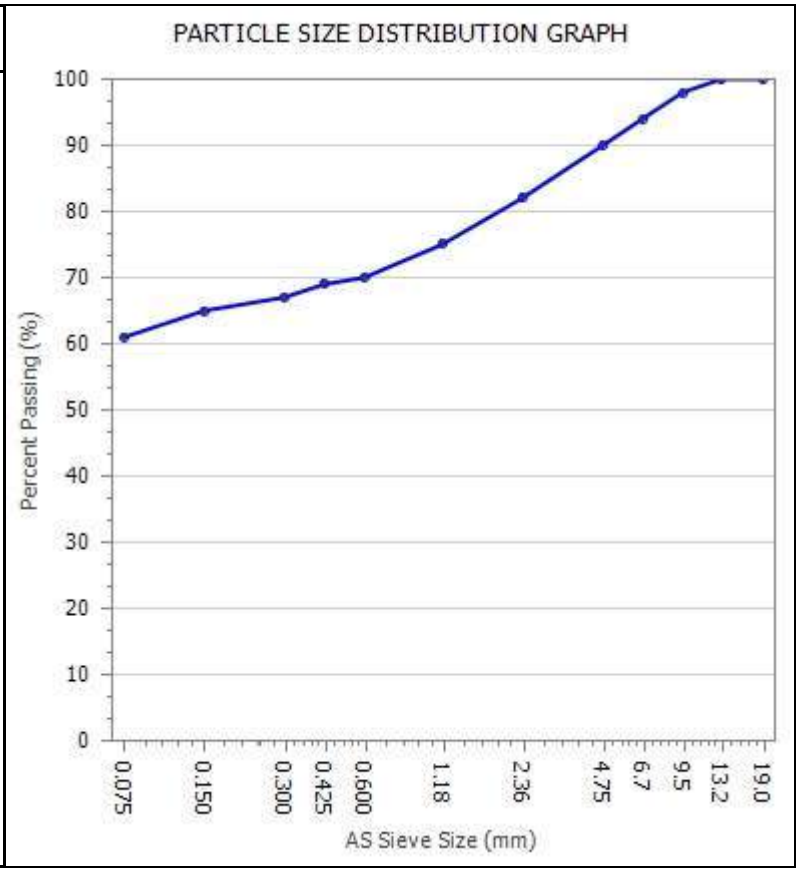
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH11
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 2 of 9

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/843272	Sample Location	
Sampling Method	-	Borehole	BH11
Date Sampled	13/11/2020	Depth (m)	3.50-4.50
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**98**	
6.7		**94**	
4.75		**90**	
2.36		**82**	
1.18		**75**	
0.600		**70**	
0.425		**69**	
0.300		**67**	
0.150		**65**	
0.075		**61**	



Remarks

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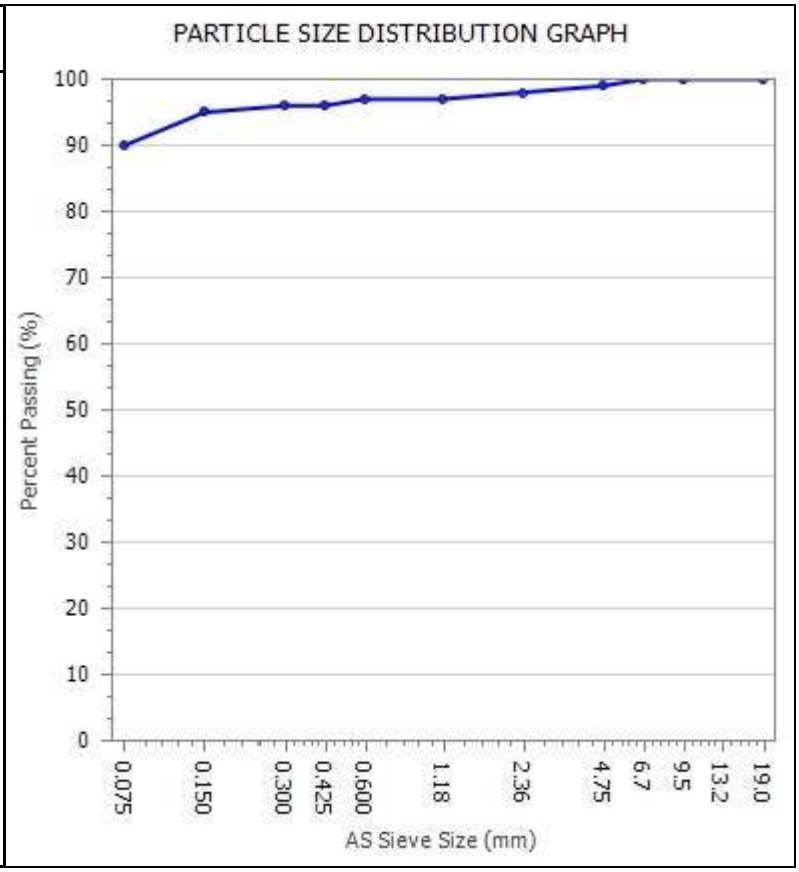
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH13
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 3 of 9

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/843273	Sample Location	
Sampling Method	-	Borehole	BH13
Date Sampled	13/11/2020	Depth (m)	3.00-3.50
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
9.5		**100**	
6.7		**100**	
4.75		**99**	
2.36		**98**	
1.18		**97**	
0.600		**97**	
0.425		**96**	
0.300		**96**	
0.150		**95**	
0.075		**90**	



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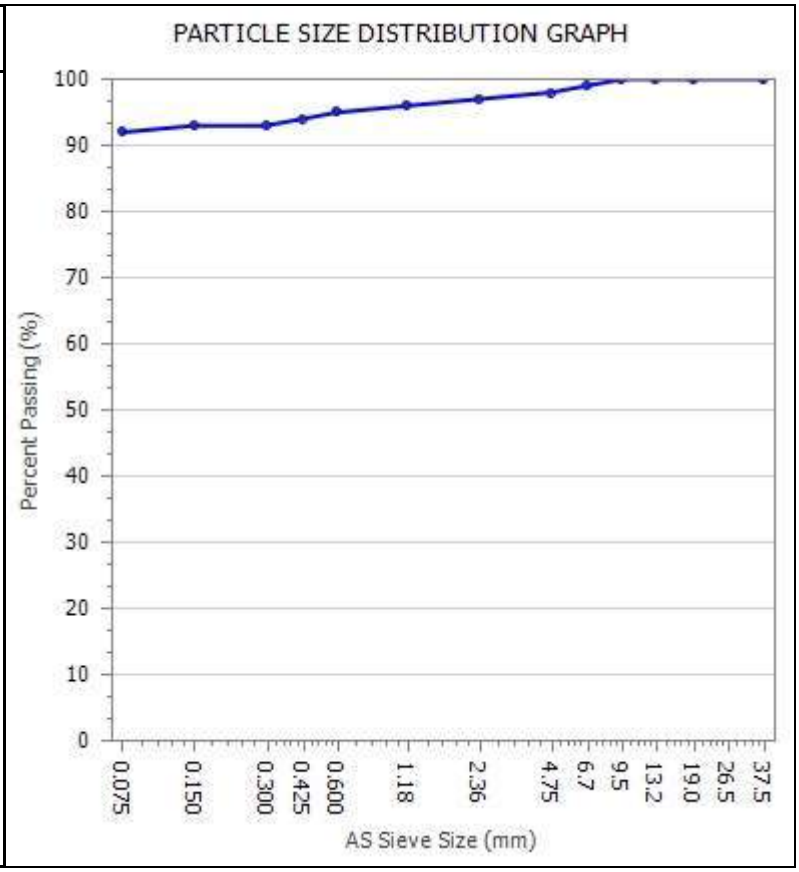
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH15
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 4 of 9

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/843274	Sample Location	
Sampling Method	-	Borehole	BH15
Date Sampled	13/11/2020	Depth (m)	2.00-2.40
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
37.5		**100**	
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**99**	
4.75		**98**	
2.36		**97**	
1.18		**96**	
0.600		**95**	
0.425		**94**	
0.300		**93**	
0.150		**93**	
0.075		**92**	



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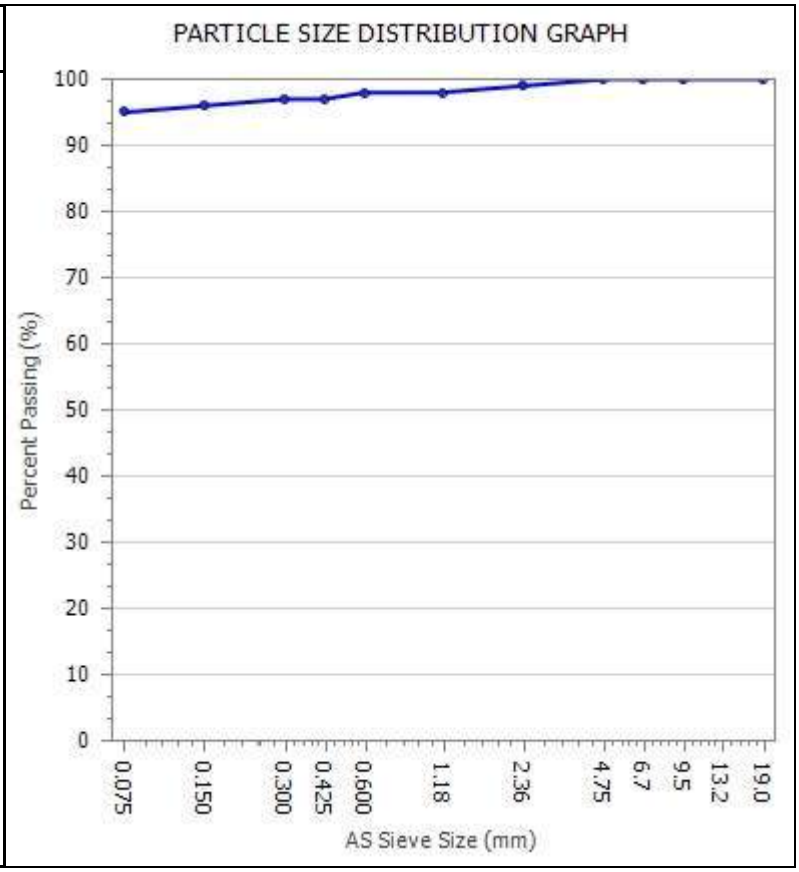
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH21
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 5 of 9

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/843275	Sample Location	
Sampling Method	-	Borehole	BH21
Date Sampled	13/11/2020	Depth (m)	1.00-1.50
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
9.5		**100**	
6.7		**100**	
4.75		**100**	
2.36		**99**	
1.18		**98**	
0.600		**98**	
0.425		**97**	
0.300		**97**	
0.150		**96**	
0.075		**95**	



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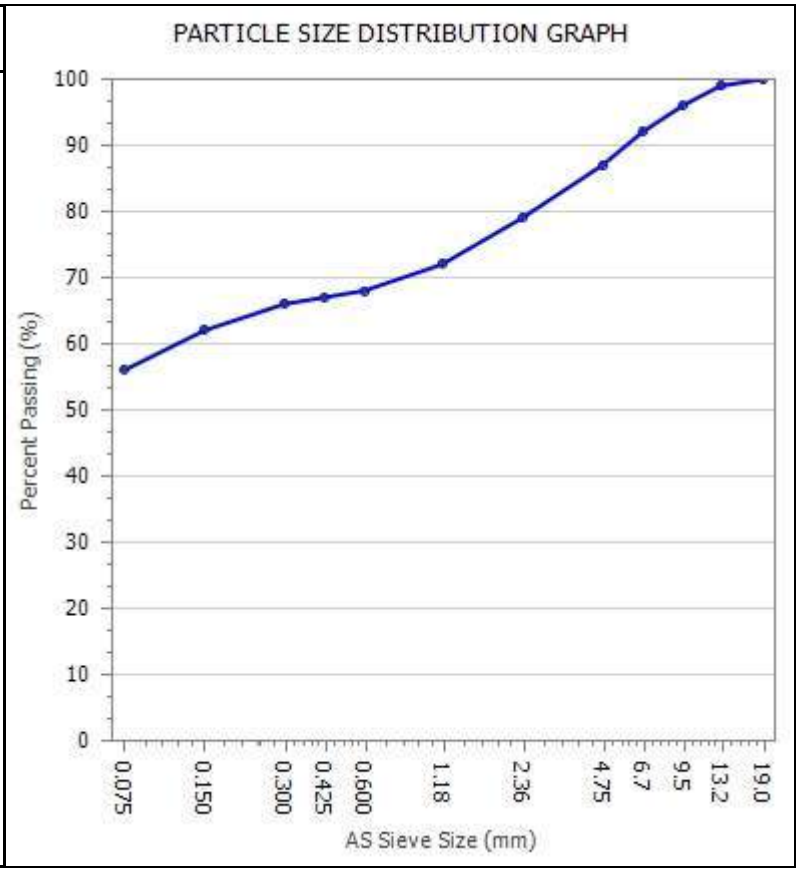
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH26
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 6 of 9

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/843276	Sample Location	
Sampling Method	-	Borehole	BH26
Date Sampled	13/11/2020	Depth (m)	2.20-2.50
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**99**	
9.5		**96**	
6.7		**92**	
4.75		**87**	
2.36		**79**	
1.18		**72**	
0.600		**68**	
0.425		**67**	
0.300		**66**	
0.150		**62**	
0.075		**56**	



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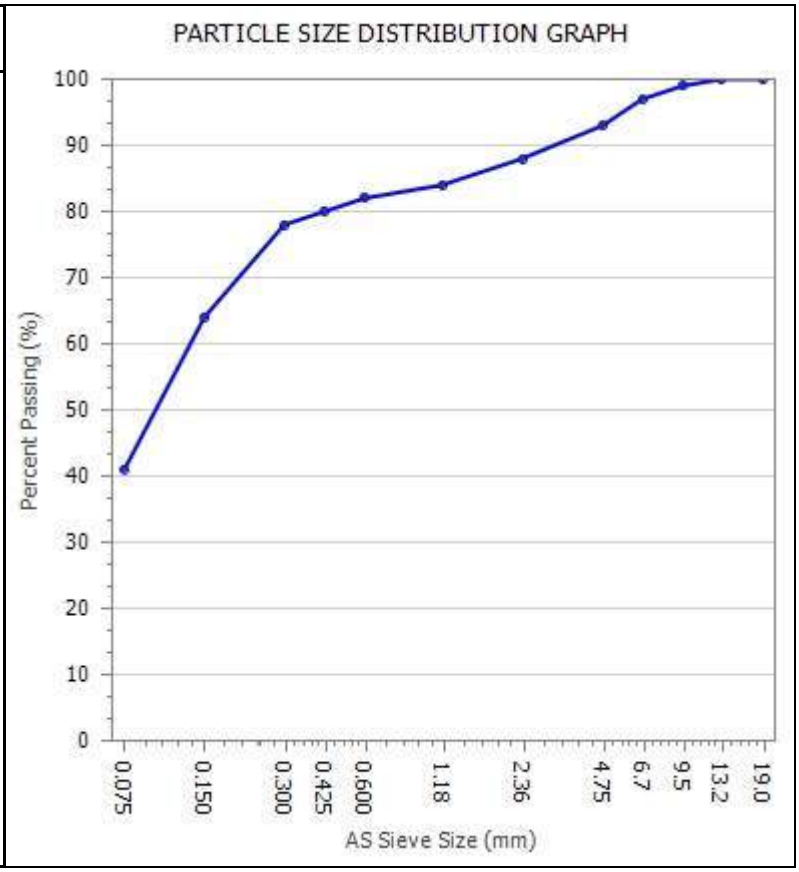
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH27
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 7 of 9

Test Procedures: AS1289.3.6.1

Sample Number	12385/S/843277	Sample Location	
Sampling Method	-	Borehole	BH27
Date Sampled	13/11/2020	Depth (m)	1.50-2.0
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**99**	
6.7		**97**	
4.75		**93**	
2.36		**88**	
1.18		**84**	
0.600		**82**	
0.425		**80**	
0.300		**78**	
0.150		**64**	
0.075		**41**	



Remarks

Accredited for compliance with ISO/IEC 17025 – Testing

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W9Rep Rev 2

Construction Sciences

Construction Sciences Pty Ltd
ABN: 74 128 806 735

Address:
Unit 2/4 Kellogg Road,
Glendenning NSW 2761

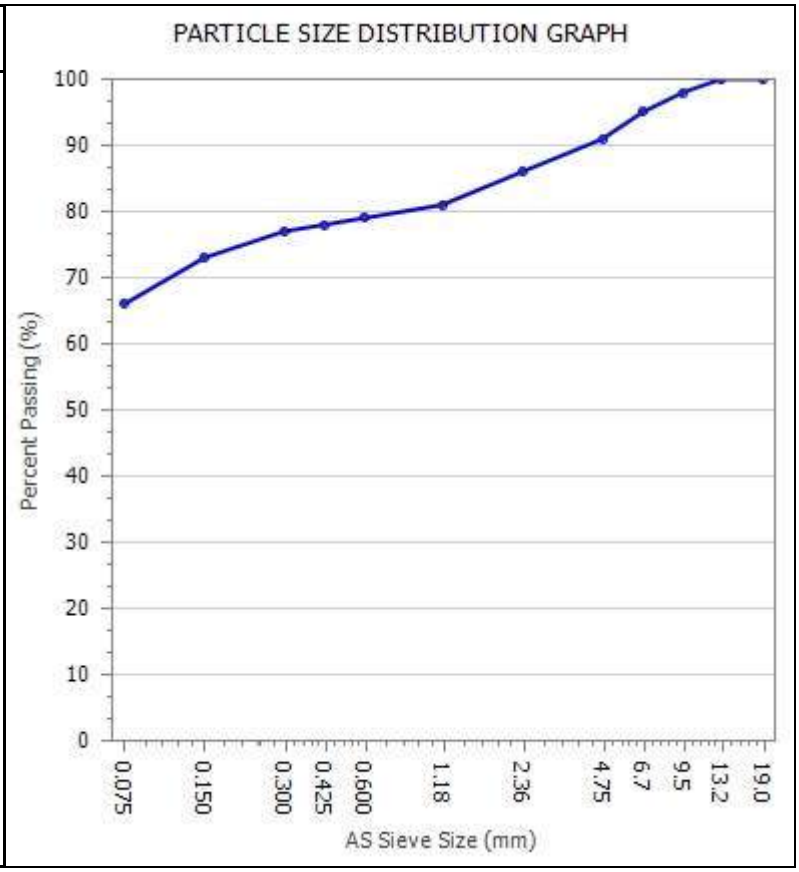
Laboratory: **Glendenning Laboratory**
Phone: 02 9854 1700
Fax: 02 4577 9055
Email: Sydney@constructionsciences.net

PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH27
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 8 of 9

Test Procedures:	AS1289.3.6.1		
Sample Number	12385/S/843278	Sample Location	
Sampling Method	-	Borehole	BH27
Date Sampled	13/11/2020	Depth (m)	3.10-3.30
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**98**	
6.7		**95**	
4.75		**91**	
2.36		**86**	
1.18		**81**	
0.600		**79**	
0.425		**78**	
0.300		**77**	
0.150		**73**	
0.075		**66**	



Remarks

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Email: Sydney@constructionsciences.net

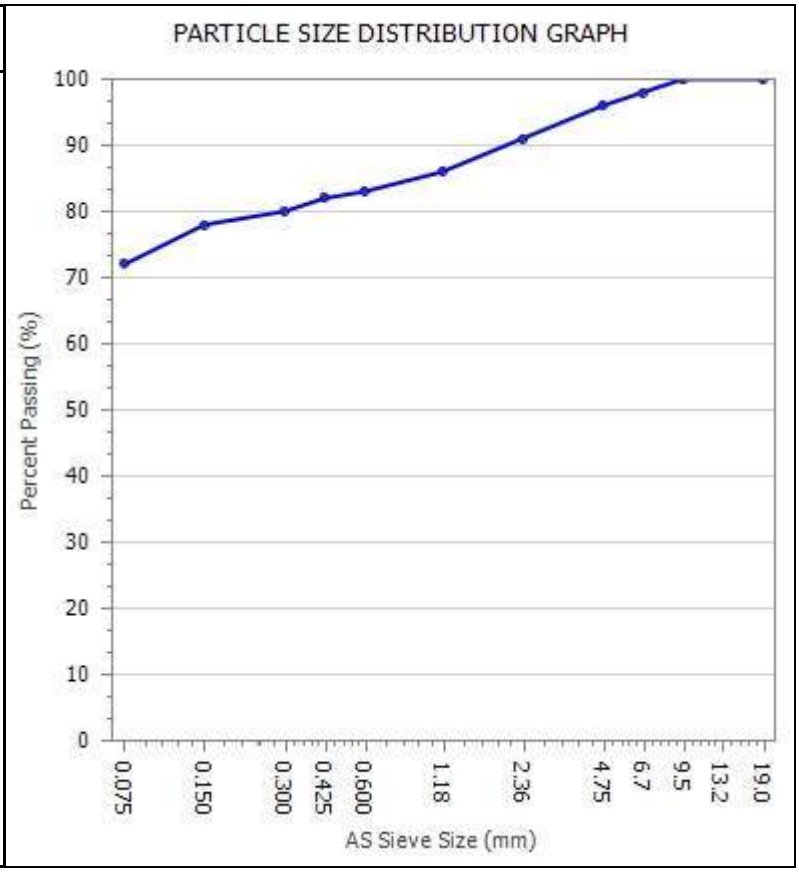
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233469-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH44
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 9 of 9

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/843279	Sample Location	
Sampling Method	-	Borehole	BH44
Date Sampled	13/11/2020	Depth (m)	1.8-2.00
Sampled By	Client Sampled		
Date Tested	26/11/2020		
Material Source	In-Situ	Material Type	Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
9.5		**100**	
6.7		**98**	
4.75		**96**	
2.36		**91**	
1.18		**86**	
0.600		**83**	
0.425		**82**	
0.300		**80**	
0.150		**78**	
0.075		**72**	



Remarks

NATA

Accredited for compliance with ISO/IEC 17025 – Testing

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W9Rep Rev 2

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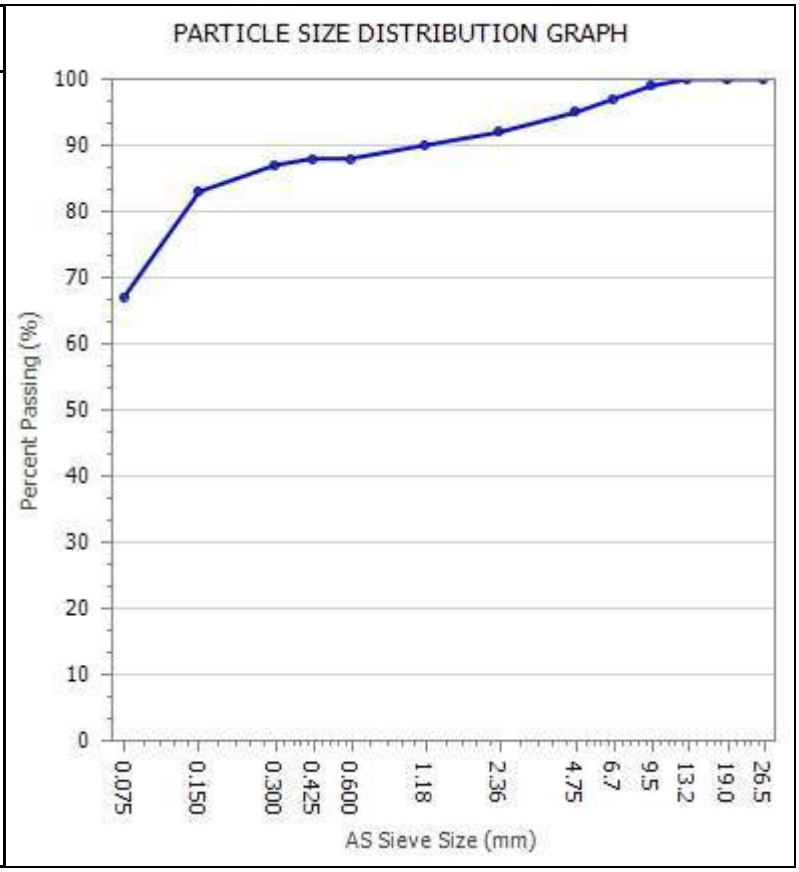
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233519-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	BH51
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 1 of 1

Test Procedures:	AS1289.3.6.1			
Sample Number	12385/S/843280	Sample Location		
Sampling Method	-	Borehole		BH51
Date Sampled	13/11/2020	Depth	(m)	0.50-1.00
Sampled By	Client Sampled			
Date Tested	30/11/2020			
Material Source	In-Situ	Material Type		Clayey, Gravel

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
26.5		**100**	
19.0		**100**	
13.2		**100**	
9.5		**99**	
6.7		**97**	
4.75		**95**	
2.36		**92**	
1.18		**90**	
0.600		**88**	
0.425		**88**	
0.300		**87**	
0.150		**83**	
0.075		**67**	



Remarks

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EMERSON CLASS NUMBER REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233470-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	Various
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 1 of 2

Test Procedures:	AS1289.3.8.1

Sample Number	12385/S/843272	12385/S/843273	12385/S/843274	12385/S/843276
ID / Client ID	BH11	BH13	BH15	BH26
Lot Number	BH11	BH13	BH15	BH26
Date / Time Sampled	13/11/2020	13/11/2020	13/11/2020	13/11/2020
Date Tested	23/11/2020	23/11/2020	23/11/2020	23/11/2020
Material Source	In-Situ	In-Situ	In-Situ	In-Situ
Material Type	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel
Sampling Method	-	-	-	-
Water Type	Potable water	Potable water	Potable Water	Potable Water
Water Temperature (C°)	22	23	23	23
Borehole	BH11	BH13	BH15	BH26
Depth	3.50-4.50	3.00-3.50	2.00-2.40	2.20-2.50
Soil Description	Clay	Clay	Clay	Clay
Emerson Class Number	**5**	**6**	**5**	**5**

Remarks

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Approved Signatory: Patrick Deasy
Form ID: W34Rep Rev 2

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Email: Sydney@constructionsciences.net

EMERSON CLASS NUMBER REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/233470-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1405
Project:	IPG Badgerys Creek	Lot Number:	Various
Location:	Badgerys Creek	Internal Test Request:	12385/T/104691
Component:	Material Testing	Client Reference/s:	80221014 Batch (2)
Area Description:	Badgerys Creek	Report Date / Page:	30/11/2020 Page 2 of 2

Test Procedures:	AS1289.3.8.1

Sample Number	12385/S/843277	12385/S/843278	12385/S/843279	12385/S/843280
ID / Client ID	BH27	BH27	BH44	BH51
Lot Number	BH27	BH27	BH44	BH51
Date / Time Sampled	13/11/2020	13/11/2020	13/11/2020	13/11/2020
Date Tested	23/11/2020	23/11/2020	23/11/2020	23/11/2020
Material Source	In-Situ	In-Situ	In-Situ	In-Situ
Material Type	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel	Clayey, Gravel
Sampling Method	-	-	-	-
Water Type	Potable Water	Potable Water	Potable Water	Potable Water
Water Temperature (C°)	23	23	23	23
Borehole	BH27	BH27	BH44	BH51
Depth	1.50-2.0	3.10-3.30	1.8-2.00	0.50-1.00
Soil Description	Silty Clay	Clay	Clay	Brown clay
Emerson Class Number	**5**	**5**	**5**	**5**

Remarks

Accredited for compliance with ISO/IEC 17025 – Testing

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W34Rep Rev 2

Cardno (NSW/ACT) Pty Ltd
Level 9, 203 Pacific Highway
St Leonards
NSW 2065

Attention: **Ahmad Turani**

Report **753181-S**
Project name IPG BADGERYS CREEK
Project ID 80221014
Received Date Oct 23, 2020

Client Sample ID			**BH16 1.00-1.50**	**BH17 1.50-1.95**	**BH22 0.50-1.00**	**BH23 1.00-1.50**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Oc46413**	**S20-Oc46414**	**S20-Oc46415**	**S20-Oc46416**
Date Sampled			**Oct 22, 2020**	**Oct 22, 2020**	**Oct 22, 2020**	**Oct 22, 2020**
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	1600	2400	610	970
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	780	940	270	620
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.1	5.0	5.3	5.5
Resistivity*	0.5	ohm.m	13	11	37	16
Salinity* (1:5 aqueous extract calc. from EC at 25C)	1	mg/kg	470	580	160	360
Sulphate (as SO4)	10	mg/kg	850	1100	570	1000
% Moisture	1	%	19	20	20	17
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.9	5.2	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.2	4.3	4.3
Reaction Ratings*[S05]	-	comment	2.0	2.0	2.0	2.0

Client Sample ID			**BH34 0.20-0.50**	**BH36 2.30-2.80**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S20-Oc46420**	**S20-Oc46422**
Date Sampled			**Oct 22, 2020**	**Oct 21, 2020**
Test/Reference	LOR	Unit		
Chloride	10	mg/kg	630	760
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	400	400
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.3	5.5
Resistivity*	0.5	ohm.m	25	25
Salinity* (1:5 aqueous extract calc. from EC at 25C)	1	mg/kg	220	220
Sulphate (as SO4)	10	mg/kg	660	500
% Moisture	1	%	14	11
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	5.1	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.8
Reaction Ratings*[S05]	-	comment	2.0	2.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Chloride	Sydney	Oct 28, 2020	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Oct 28, 2020	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Oct 28, 2020	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Sydney	Oct 28, 2020	28 Days
- Method: E045 Anions by Ion Chromatography			
Salinity* (1:5 aqueous extract calc. from EC at 25C)	Sydney	Oct 28, 2020	21 Days
- Method: LTM-INO-4030			
Acid Sulfate Soils Field pH Test	Sydney	Oct 28, 2020	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Sydney	Oct 28, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
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NATA # 1261 Site # 20794

Perth
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Site # 23736

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IANZ # 1290

Company Name: Cardno (NSW/ACT) Pty Ltd
Address: Level 9, 203 Pacific Highway
St Leonards
NSW 2065

Project Name: IPG BADGERYS CREEK
Project ID: 80221014

Order No.:
Report #: 753181
Phone: 0294967700
Fax: 02 9499 3902

Received: Oct 28, 2020 9:50 AM
Due: Nov 4, 2020
Priority: 5 Day
Contact Name: Ahmad Turani

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Salinity* (1:5 aqueous extract calc. from EC at 25C)	Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	BH16 1.00-1.50	Oct 22, 2020		Soil	S20-Oc46413		X	X	X	X
2	BH17 1.50-1.95	Oct 22, 2020		Soil	S20-Oc46414		X	X	X	X
3	BH22 0.50-1.00	Oct 22, 2020		Soil	S20-Oc46415		X	X	X	X
4	BH23 1.00-1.50	Oct 22, 2020		Soil	S20-Oc46416		X	X	X	X
5	BH28 1.20-1.40	Oct 22, 2020		Soil	S20-Oc46417	X				
6	BH29 0.20-	Oct 22, 2020		Soil	S20-Oc46418	X				

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

Perth
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Phone : 0800 856 450
IANZ # 1290

Company Name: Cardno (NSW/ACT) Pty Ltd
Address: Level 9, 203 Pacific Highway
St Leonards
NSW 2065

Project Name: IPG BADGERYS CREEK
Project ID: 80221014

Order No.:
Report #: 753181
Phone: 0294967700
Fax: 02 9499 3902

Received: Oct 28, 2020 9:50 AM
Due: Nov 4, 2020
Priority: 5 Day
Contact Name: Ahmad Turani

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Salinity* (1:5 aqueous extract calc. from EC at 25C)	Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory										
External Laboratory										
	0.50									
7	BH30 0.20-0.50	Oct 22, 2020		Soil	S20-Oc46419	X				
8	BH34 0.20-0.50	Oct 22, 2020		Soil	S20-Oc46420		X	X	X	X
9	BH35 2.60-3.00	Oct 21, 2020		Soil	S20-Oc46421	X				
10	BH36 2.30-2.80	Oct 21, 2020		Soil	S20-Oc46422		X	X	X	X
11	BH43 1.20-1.50	Oct 21, 2020		Soil	S20-Oc46423	X				
Test Counts						5	6	6	6	6

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

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

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Chloride	mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Sulphate (as SO4)	mg/kg	< 10			10	Pass	
LCS - % Recovery							
Chloride	%	106			70-130	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	95			70-130	Pass	
Resistivity*	%	95			70-130	Pass	
Sulphate (as SO4)	%	109			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	S20-Oc47859	NCP	%	116			70-130	Pass	
Sulphate (as SO4)	S20-Oc47859	NCP	%	119			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S20-Oc47859	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Sulphate (as SO4)	S20-Oc47859	NCP	mg/kg	68	81	17	30%	Pass	
% Moisture	S20-Oc46231	NCP	%	5.5	5.1	7.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	S20-Oc46415	CP	uS/cm	270	280	1.0	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S20-Oc46415	CP	pH Units	5.3	5.3	Pass	30%	Pass	
Resistivity*	S20-Oc46415	CP	ohm.m	37	36	1.0	30%	Pass	
Salinity* (1:5 aqueous extract calc. from EC at 25C)	S20-Oc46415	CP	mg/kg	160	170	1.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ursula Long	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Inorganic (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

Cardno (NSW/ACT) Pty Ltd
Level 9, 203 Pacific Highway
St Leonards
NSW 2065

Attention: **Ahmad Turani**

Report **757467-S**
Project name IPG BADGERYS CREEK
Project ID 80221014
Received Date Nov 17, 2020

Client Sample ID			**BH10_3.20-3.40**	**BH13_1.50-2.00**	**BH15_2.40-3.00**	**BH21_1.00-1.50**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-No29808**	**S20-No29809**	**S20-No29810**	**S20-No29811**
Date Sampled			**Nov 13, 2020**	**Nov 13, 2020**	**Nov 13, 2020**	**Nov 13, 2020**
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	1300	160	210	270
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	590	300	430	500
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	7.8	8.1	6.0	5.1
Resistivity*	0.5	ohm.m	17	34	23	20
Salinity* (1:5 aqueous extract calc. from EC at 25C)	1	mg/kg	330	180	260	290
Sulphate (as SO4)	10	mg/kg	460	61	71	47
% Moisture	1	%	14	20	19	16
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.7	5.8	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.5	7.0	5.6	4.1
Reaction Ratings*[S05]	-	comment	4.0	3.0	1.0	1.0

Client Sample ID			**BH26_1.20-1.40**	**BH27_0.80-1.00**	**BH44_1.50-1.80**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-No29812**	**S20-No29813**	**S20-No29814**
Date Sampled			**Nov 13, 2020**	**Nov 13, 2020**	**Nov 13, 2020**
Test/Reference	LOR	Unit			
Chloride	10	mg/kg	300	46	310
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	530	84	610
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.6	8.0	7.5
Resistivity*	0.5	ohm.m	19	120	17
Salinity* (1:5 aqueous extract calc. from EC at 25C)	1	mg/kg	310	53	380
Sulphate (as SO4)	10	mg/kg	48	17	48
% Moisture	1	%	17	16	23
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	5.6	8.3	7.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	7.7	7.3
Reaction Ratings*[S05]	-	comment	2.0	4.0	4.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Chloride	Sydney	Nov 21, 2020	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Nov 21, 2020	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Nov 21, 2020	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Sydney	Nov 21, 2020	28 Days
- Method: E045 Anions by Ion Chromatography			
Salinity* (1:5 aqueous extract calc. from EC at 25C)	Sydney	Nov 21, 2020	21 Days
- Method: LTM-INO-4030			
Acid Sulfate Soils Field pH Test	Sydney	Nov 21, 2020	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Sydney	Nov 17, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Company Name: Cardno (NSW/ACT) Pty Ltd
Address: Level 9, 203 Pacific Highway
St Leonards
NSW 2065

Project Name: IPG BADGERYS CREEK
Project ID: 80221014

Order No.:
Report #: 757467
Phone: 0294967700
Fax: 02 9499 3902

Received: Nov 17, 2020 8:33 AM
Due: Nov 24, 2020
Priority: 5 Day
Contact Name: Ahmad Turani

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Salinity* (1:5 aqueous extract calc. from EC at 25C)	Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	BH10_3.20-3.40	Nov 13, 2020		Soil	S20-No29808		X	X	X	X
2	BH13_1.50-2.00	Nov 13, 2020		Soil	S20-No29809		X	X	X	X
3	BH15_2.40-3.00	Nov 13, 2020		Soil	S20-No29810		X	X	X	X
4	BH21_1.00-1.50	Nov 13, 2020		Soil	S20-No29811		X	X	X	X
5	BH26_1.20-1.40	Nov 13, 2020		Soil	S20-No29812		X	X	X	X
6	BH27_0.80-	Nov 13, 2020		Soil	S20-No29813		X	X	X	X

eurofins | Environment Testing

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Company Name: Cardno (NSW/ACT) Pty Ltd
Address: Level 9, 203 Pacific Highway
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NSW 2065

Project Name: IPG BADGERYS CREEK
Project ID: 80221014

Order No.:
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Phone: 0294967700
Fax: 02 9499 3902

Received: Nov 17, 2020 8:33 AM
Due: Nov 24, 2020
Priority: 5 Day
Contact Name: Ahmad Turani

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Salinity* (1:5 aqueous extract calc. from EC at 25C)	Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory										
External Laboratory										
	1.00									
7	BH44_1.50-1.80	Nov 13, 2020		Soil	S20-No29814		X	X	X	X
8	BH44_1.50	Nov 13, 2020		Soil	S20-No29815	X				
Test Counts						1	7	7	7	7

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

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

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Chloride	mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Sulphate (as SO4)	mg/kg	< 10			10	Pass	
LCS - % Recovery							
Chloride	%	103			70-130	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	99			70-130	Pass	
Resistivity*	%	101			70-130	Pass	
Sulphate (as SO4)	%	100			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	S20-No30107	NCP	%	111			70-130	Pass	
Sulphate (as SO4)	S20-No30107	NCP	%	99			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S20-No29808	CP	mg/kg	1300	1500	11	30%	Pass	
Sulphate (as SO4)	S20-No29808	CP	mg/kg	460	490	6.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	S20-No29809	CP	uS/cm	300	310	3.0	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S20-No29809	CP	pH Units	8.1	8.0	Pass	30%	Pass	
Resistivity*	S20-No29809	CP	ohm.m	34	32	3.0	30%	Pass	
Salinity* (1:5 aqueous extract calc. from EC at 25C)	S20-No29809	CP	mg/kg	180	190	3.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-No29811	CP	%	16	16	1.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Asim Khan	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Inorganic (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

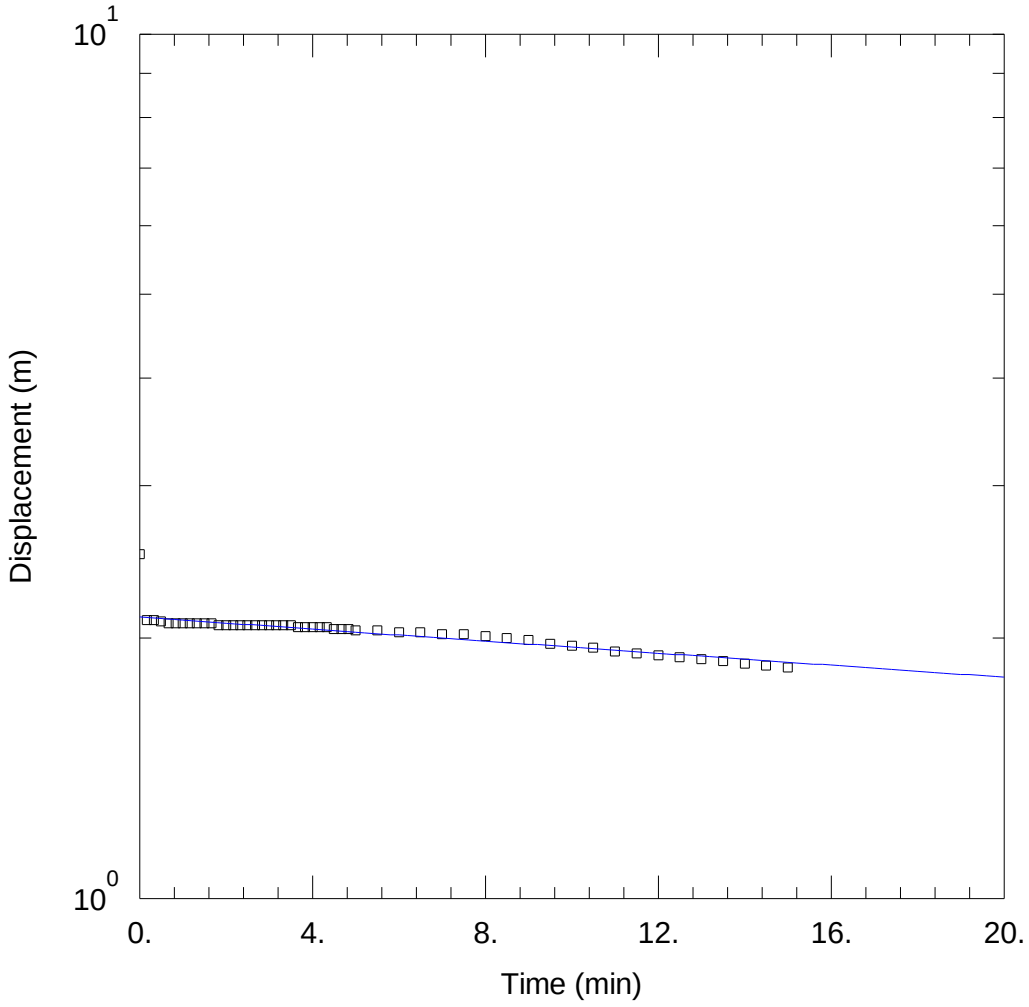
* Indicates NATA accreditation does not cover the performance of this service

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

IPG Badgerys Creek

APPENDIX D

INFILTRATION TEST RESULTS



IPG BADGERYS CREEK

Data Set: N:\...\BH01.aqt
Date: 10/28/20 Time: 11:50:46

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 5. m Anisotropy Ratio (Kz/Kr): 1.

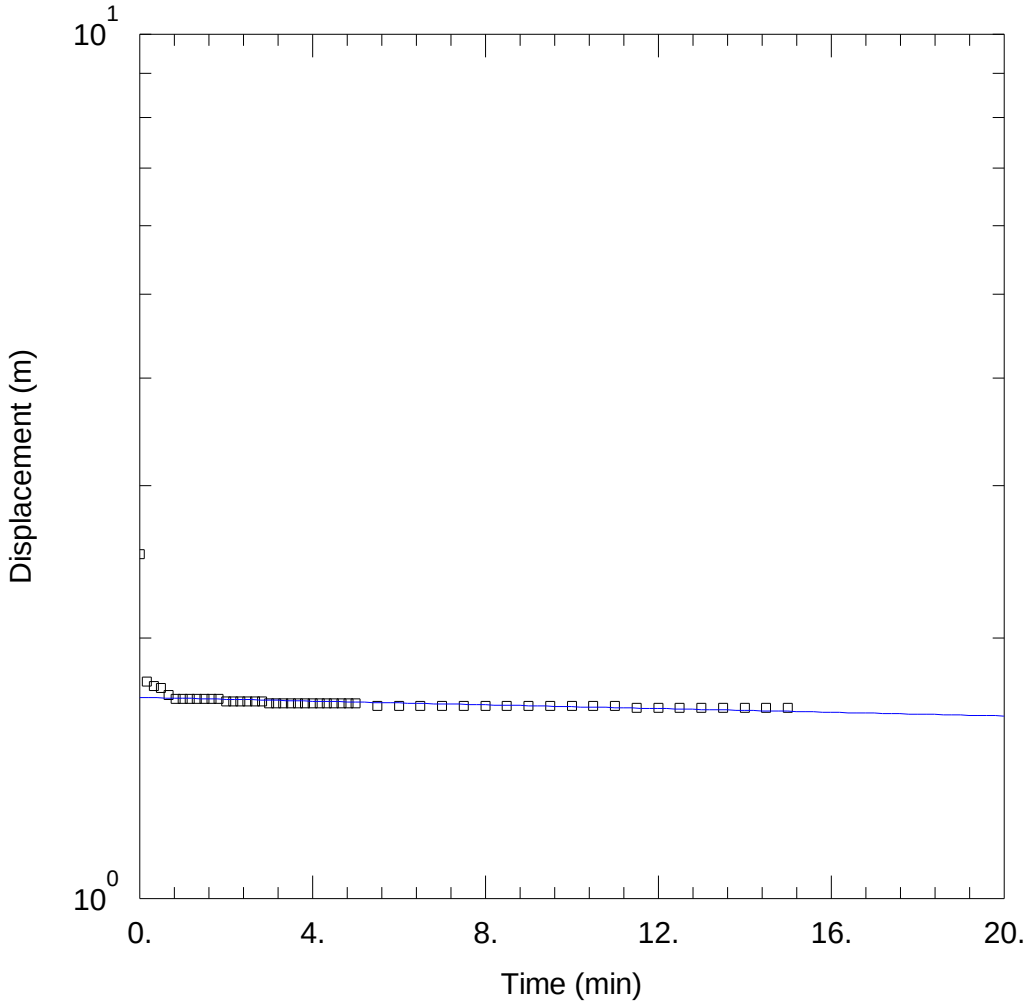
WELL DATA (BH01)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 5.005E-7 m/sec y0 = 2.115 m



IPG BADGERYS CREEK

Data Set: N:\...\BH02.aqt
Date: 10/28/20 Time: 11:46:03

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 5. m Anisotropy Ratio (Kz/Kr): 1.

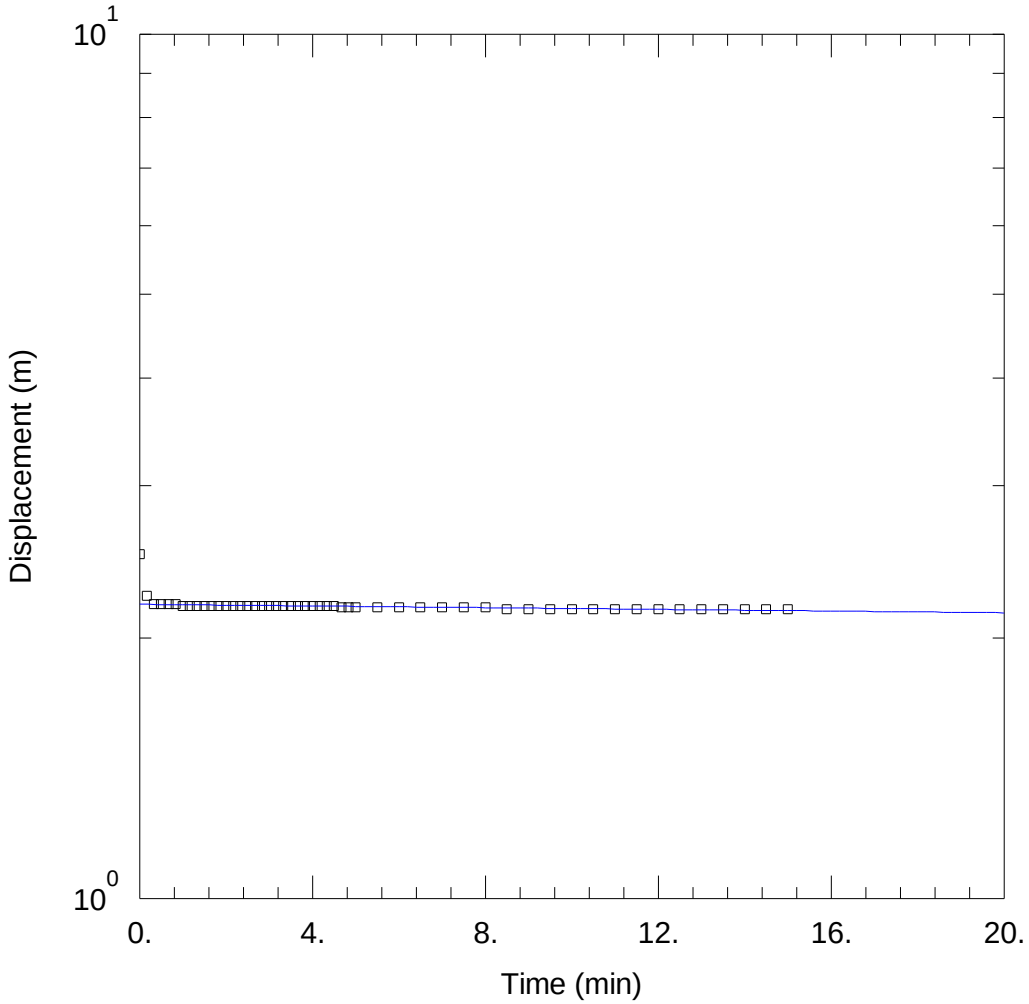
WELL DATA (BH02)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.547E-7 m/sec y0 = 1.708 m



IPG BADGERYS CREEK

Data Set: N:\...\BH03.aqt
Date: 10/28/20 Time: 11:59:33

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 5. m Anisotropy Ratio (Kz/Kr): 1.

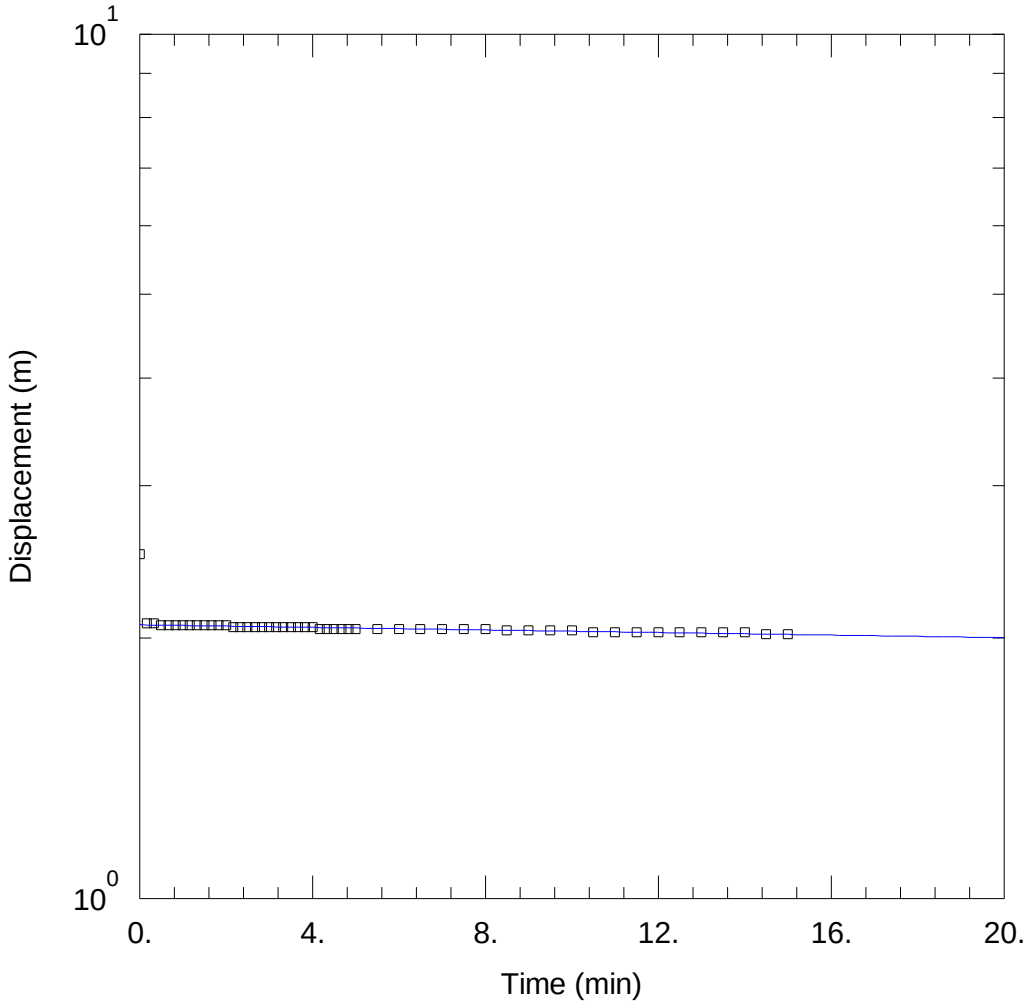
WELL DATA (BH03)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 7.037E-8 m/sec y0 = 2.188 m



IPG BADGERYS CREEK

Data Set: N:\...\BH04.aqt
Date: 10/28/20 Time: 12:13:18

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 5. m Anisotropy Ratio (Kz/Kr): 1.

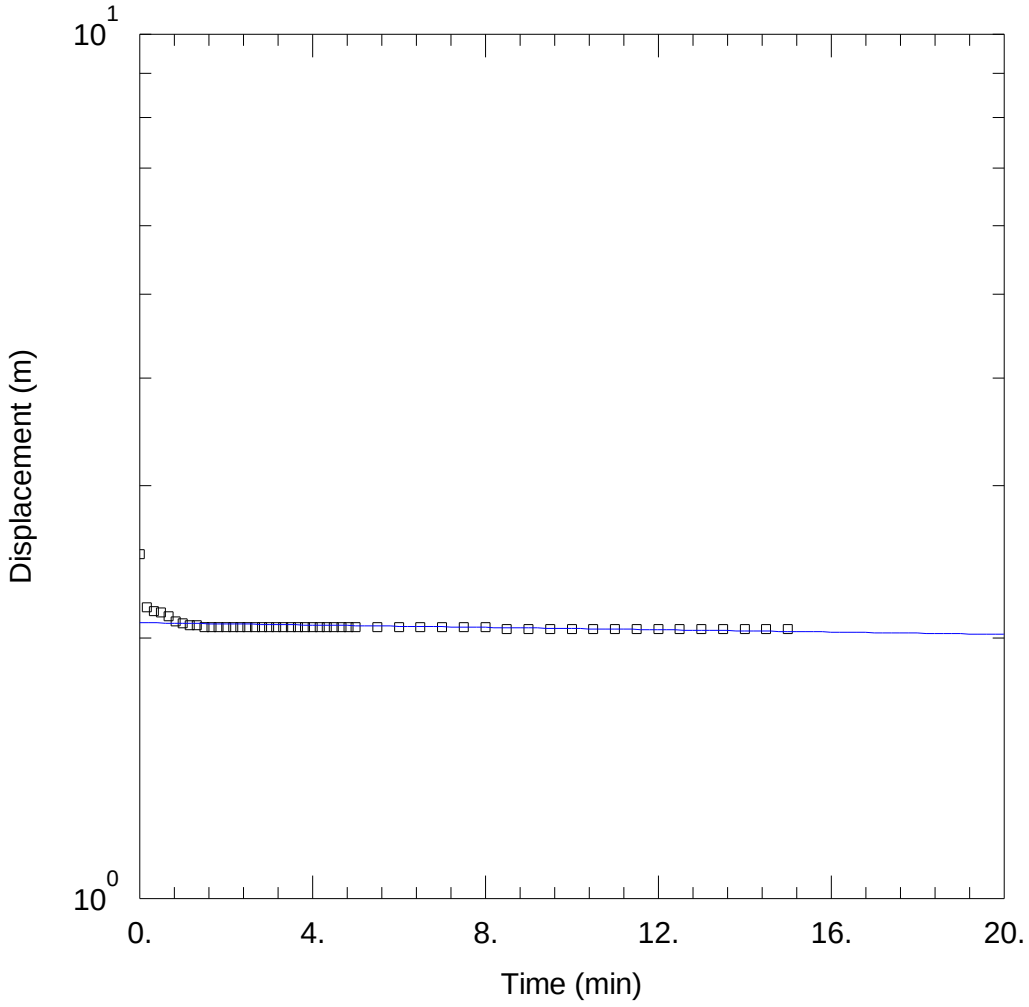
WELL DATA (BH04)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.065E-7 m/sec y0 = 2.072 m



IPG BADGERYS CREEK

Data Set: N:\...\BH05.aqt
Date: 10/28/20 Time: 12:18:54

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 5. m Anisotropy Ratio (Kz/Kr): 1.

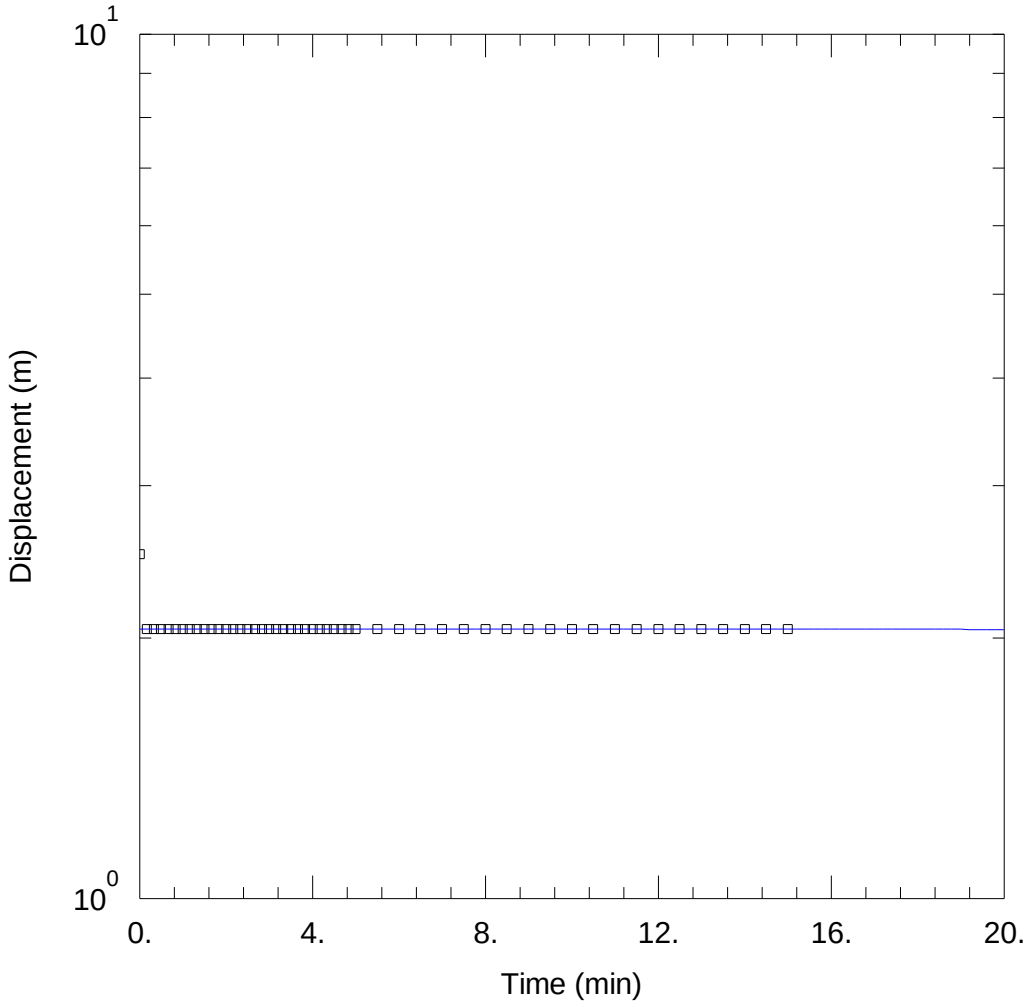
WELL DATA (BH05)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 9.692E-8 m/sec y0 = 2.084 m



IPG BADGERYS CREEK

Data Set: N:\...\BH06.aqt
Date: 10/28/20 Time: 12:32:40

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 5. m Anisotropy Ratio (Kz/Kr): 1.

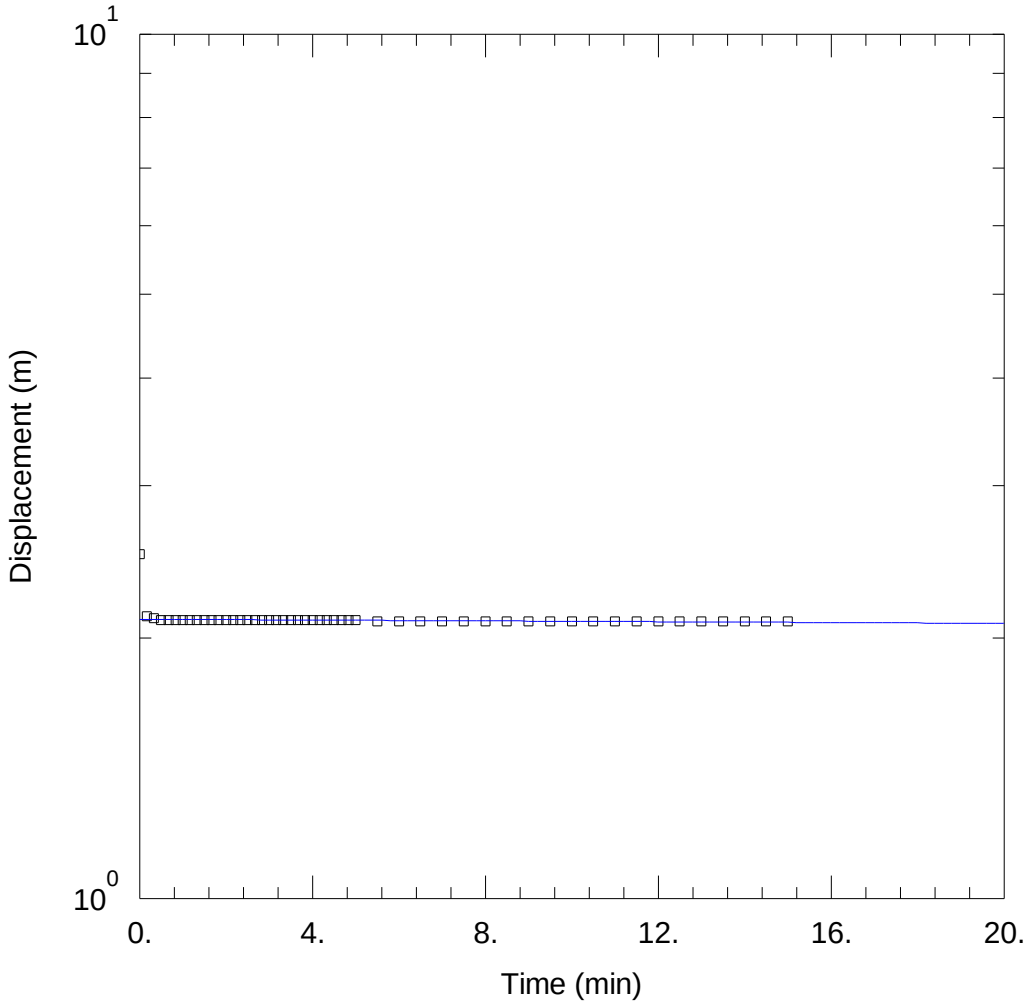
WELL DATA (BH06)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 4.856E-9 m/sec y0 = 2.05 m



IPG BADGERYS CREEK

Data Set: N:\...\BH08.aqt
Date: 10/28/20 Time: 12:32:15

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 5. m Anisotropy Ratio (Kz/Kr): 1.

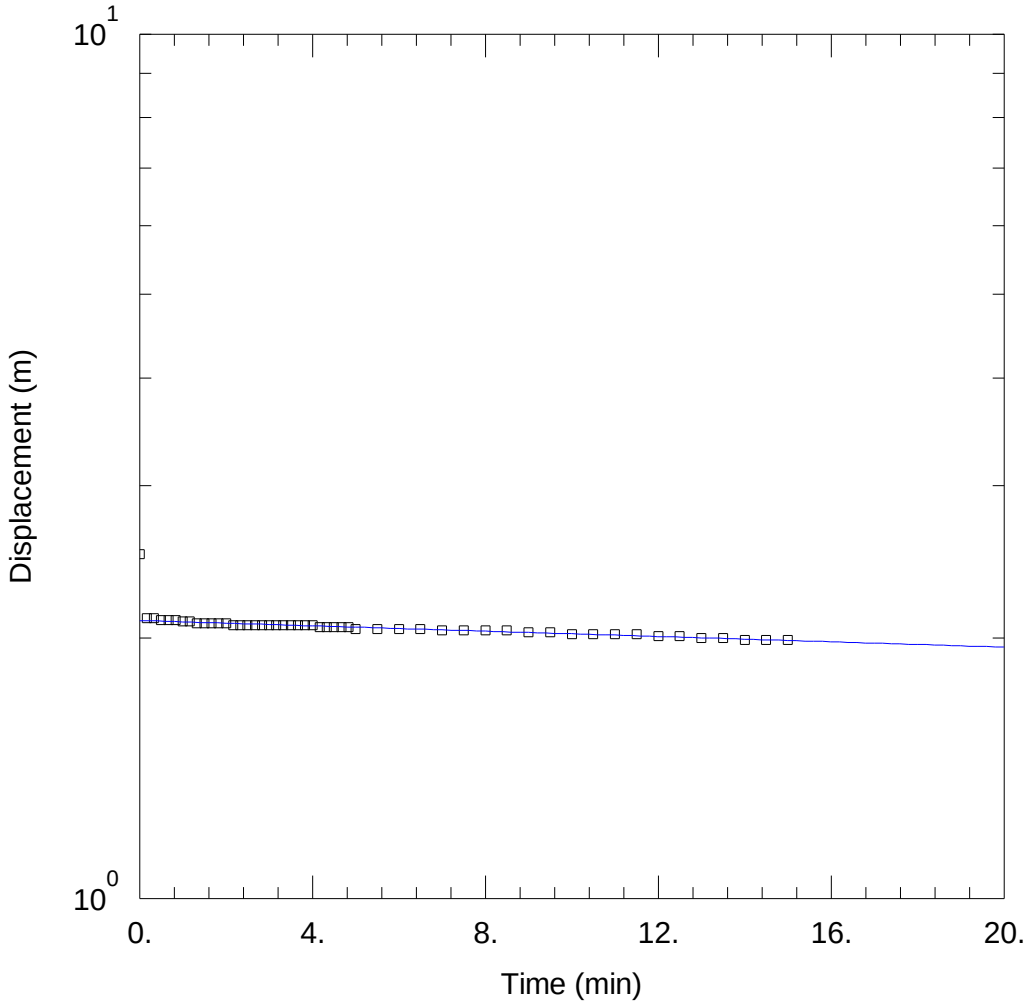
WELL DATA (BH08)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 3.459E-8 m/sec y0 = 2.103 m



IPG BADGERYS CREEK

Data Set: N:\...\BH09.aqt
Date: 10/28/20 Time: 12:36:20

PROJECT INFORMATION

Company: Cardno
Client: Ingham Property Group
Project: 80221014
Location: Badgerys Creek
Test Well: BH
Test Date: 13/10/20

AQUIFER DATA

Saturated Thickness: 2. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH09)

Initial Displacement: 2.5 m
Total Well Penetration Depth: 2. m
Casing Radius: 0.05 m
Static Water Column Height: 5. m
Screen Length: 1. m
Well Radius: 0.05 m
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 2.722E-7 m/sec y0 = 2.096 m