Preliminary Geotechnical Investigation Report:
Proposed Master Plan Development
Barton Park, Bestic Street
Banksia, New South Wales.

Prepared for MODE Design Corp Pty Ltd.

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List of Abbreviations

Units of Measure

%	per cent
ug L^{-1}	Micrograms per Litre
ug m^{-3}	Micrograms per Cubic Metre
ha	Hectare
km	Kilometres
m	Metre
m AHD	Metres Above Australian Height Datum
m BGL	Metres Below Ground Level
m BTOC	Metres Below Top of Casing
mg kg^{-1}	Milligrams per Kilogram
mg L^{-1}	Milligrams per Litre
mg m^{-3}	Milligrams per Cubic Metre
mm	Millimetre
ppm	Parts Per Million
ppb	Parts Per Billion

General

ABC	Added Background Concentrations
ACL	Added Contaminant Limit
ACM	Asbestos Containing Materials
ADWG	Australian Drinking Water Guideline
AEC	Areas of Environmental Concern
AF	Asbestos Fines
AGST	Above Ground Storage Tank
AHD	Australian Height Datum
ALS	Australian Laboratory Services Pty Ltd
ANZECC	Australian and New Zealand Environment and Conservation Council
APHA	American Public Health Association
ASS	Acid Sulphate Soils
ASSMAC	Acid Sulfate Soils Management Advisory Committee
BGL	Below Ground Level
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene and Total Xylenes
CLM Act	NSW Contaminated Land Management Act, 1997
CMPC	Conceptual Model of Potential Contamination
COC	Chain of Custody
CoPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
CT	Contaminant Threshold
DA	Development Application
DAC	Data Acceptance Criteria
DCP	Development Control Plan
DNAPL	Dense Non-Aqueous Phase Liquid
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objectives
DSI	Detailed Site Investigation

EIL	Ecological Investigation Levels
EMP	Environmental Management Plan
EOH	End of Hole
EPA	Environment Protection Authority
EPA Act	Environmental Planning and Assessment Act, 1979
EQL	Environmental Quantitation Limit
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
FA	Fibrous Asbestos
FID	Flame Ionisation Detector
GIL	Groundwater Investigation Level
GPS	Global Positioning System
HIL	Health Based Investigation Levels
HSL	Health Screening Levels
IAA	Interim Audit Advice
LCS	Laboratory Control Sample
LEP	Local Environment Plan
LFG	Landfill Gas
LNAPL	Light Non-Aqueous Phase Liquid
LOR	Limit of Reporting
MDS	Multi-Dimensional Scaling
NATA	National Association of Testing Authorities
ML	Management Limits
NATA	National Association of Testing Authorities
ND	Not Detected
NEPC	National Environmental Protection Council
NEHF	National Environmental Health Forum
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Not Limiting
NSW	New South Wales
OCP	Organochlorine Pesticides
OEH	Office of Environment and Heritage
OPP	Organophosphorous Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
POEO Act	Protection of the Environment (Operations) Act, 1997
PQL	Practical Quantitation Limit
PSI	Preliminary Site Investigation
PSH	Phase Separated Hydrocarbon
PSP	Project Safety Plan
QA/QC	Quality Assurance and Quality Control
RL	Reduced Level
RPD	Relative Percentage Difference
RSL	Regional Screening Level
SAC	Site Assessment Criteria
SAQP	Sampling, Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement

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SCC	Specific Contaminant Concentration
SCEW	Standing Council on Environment and Water
SILs	Soil Investigation Levels
SPOCAS	Suspension Peroxide Oxidation – Combined Acidity and Sulfate
SPT	Standard Penetration Test
SVOC	Semi-Volatile Organic Compounds
SWL	Standing Water Level
TCLP	Toxicity Characteristics Leaching Procedure
TD	Termination Depth
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TV	Trigger Value
USEPA	United States Environment Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VOCCs	Volatile Organic Chlorinated Compounds
WHS	Work Health and Safety
--	On tables is 'not calculated', 'not measured', 'no criteria' or 'not applicable'

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1. Introduction

Bayside Council (Council) is the manager of the open space referred to as Barton Park as shown on Figures 1 and 2. In its' role as manager of Barton Park, Council has developed a Master Plan for the southern portion of the site (the site) (consisting of the following elements (Figures 3 and 4):

- Demolition of the existing grandstand and associated buildings;
- Construction of a new sporting amenities building, including public amenities, change rooms, canteen and storage;
- Construction of a new tiered seating area suitable for a minimum of 400 people with shade structure;
- Construction of four (4) turf playing fields;
- Construction of four (4) multi-purpose synthetic courts and supporting infrastructure;
- Off leash dog area;
- Playground or natural play area;
- Carparking and vehicular access driveways;
- Improvements to the public domain, including footpaths, paving, landscaping and street furniture;
- Shared pathway/cycleway;
- Passive recreation opportunities including lookouts, picnic areas, seating and fitness.

MODE Design Corp Pty Ltd (MODE) has been engaged by Council to undertake design works necessary to implement the masterplan. Edison Environmental & Engineering Pty Ltd (Edison) has been commissioned by MODE to undertake a complete a preliminary geotechnical investigation at the site to support the Masterplan development.

A site survey and the proposed masterplan are provided for reference in Annexure 1. It is understood that the new facilities will be constructed at (or near) existing grade and that preliminary geotechnical investigation is required to assist with the preliminary design of the development.

The report presents the factual results of all the field investigations completed by Edison to date and provides interpretation and recommendations regarding the ground conditions at the site in accordance with client requirements and the agreed scope of work.

It is assumed that each of the structures listed above will be constructed at (or near) existing grade to minimise future earthworks. With respect to the proposed grassed fields, it is assumed that they will be prepared in a manner consistent with the existing fields, including being top-dressed as required to manage future undulations.

2. Objective and Scope of Work

The objective of this investigation is to provide a preliminary characterisation of geotechnical conditions at the site for use in project design.

The scope of work is as follows:

- Visual appraisal of the site conditions and locality;
- Review of geological, soils and acid sulfate soil maps;
- Drilling and logging of boreholes to compliment the data collected in past environmental investigations as summarised by Edison (2020);
- Perform Standard Penetrometer Tests (SPTs) the boreholes to assess the consistency and/or relative density of the soil profile;
- Collection of representative soil samples for geotechnical testing;
- Analysis of selective samples for assessment of soil salinity and aggressivity;
- Collection of representative samples of bedrock;
- Strength testing of the bedrock samples;
- The performance of soil permeability and infiltration tests to determine the soil infiltration rate and coefficient of permeability to assist with the design of a potential stormwater absorption system; and
- Engineering assessment and reporting.

In preparing this report it is assumed that structures listed in Section 1 will be constructed at (or near) existing grade to minimise future earthworks. With respect to the proposed grassed fields, it is assumed that these will be prepared in a manner consistent with the existing fields, including being top-dressed as required to manage future undulations.

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3. Site Information

3.1 *Site Identification*

The site is bounded by Muddy Creek to the east, Bestic Street to the south, the Spring Street drain to the north and a combination of low-density residential properties and the Arncliffe Market gardens to the west (Refer to a Figure 1). The site covers an area of approximately 19 hectares and encompasses the following allotments:

- Part of CP 12437-3000 (south of Spring Street Drain);
- Part of Lot 1 DP 576148 (south of Spring Street Drain);
- Part of Lot 100 DP 1133869;
- Part of Lot 1 DP 514811.
- Part of Lot 7303 DP 1148740 (south of Spring Street Drain);
- Part of land referred to in CP 7979-3000.

The site is zoned for recreation/open-space land use and Special Uses (F6 Corridor) under Sydney Regional Environmental Plan 33 - Cooks Cove (2004 No 397).

3.2 *Site Description*

Most of the site is covered by grass and used as a park with three soccer playing fields. Structures on the site consist of brick soccer club and amenities buildings constructed on a concrete slab. There is also the former St George stadium which has been partly demolished by removing the roof sheets, glazing and doors. Access to all buildings are secured by locked doors and/or fencing.

The site is a former landfill. The waste mass covers most of the site with batters sloping towards each site boundary. Except for the former, disused St George Soccer Stadium which is understood to have been constructed on a raised fill mound on the former landfill, the surface of the former landfill mound is grassed and used for passive recreation. The site is uneven due to differential settlement of the underlying waste material. Batters of the former landfill mound are grassed (southern portion) or vegetated with shrubs (northern portion). The Landing Light Wetland is in the north-west portion of the site. The wetland is tidal and relates to Spring Street Canal by a concrete pipe. The level of the pipe allows shallow water depth to be retained within the wetland at low tide.

3.3 *Site History / Background Information*

It is understood that the site was used as a market garden until early in the twentieth century (Maunsell, 2001; Edison, 2020). Parts of the site were then used as a sewage farm serving south and western Sydney for approximately 40 years commencing in the late nineteenth Century. The sewage farm was decommissioned in the 1940s and filled with waste by Rockdale Council. Following completion of landfill operations (1940s-1980s), the site was covered with soil, grassed and converted into a series of sports fields.

Since 2001 the site has been the subject of a series of proposals seeking consent to redevelop the site as a golf course. No substantial changes have been made to the site since 2001 other than the closure of the St George soccer stadium.

3.4 *Topography*

The park and playing fields are relatively flat and according to the survey plan (Annexure 1), the surface elevation is between approximately 3.5m and 4.5m above Australian Height Datum (AHD). As previously

mentioned, the park and playing fields are part of the former landfill with batters sloping down towards the boundaries where the surface elevation is between approximately 0.5m and 1.0m AHD.

3.5 *Regional Geology and Soils*

The Sydney 1:100,000 Geological Series Map describes the underlying natural lithology as consisting of silty to peaty quartz sand, silt and clay with ferruginous and humic cementation in places and common shell layers. This material is most likely to be of alluvial origin, deposited as sub-aerial and sub-aqueous component of the Cooks River delta. The natural deposit has been reworked significantly in the last century as part of river diversion works. These works would have involved significant dredging operations (CES, 2001a). Additionally, waste landfills have been constructed over the natural sediments (Figure 2).

Based on borehole logs from past studies presented in Annexure 2, the generalised stratigraphic sequence for the site is as follows:

- Cover soil over waste (former landfill areas): Silty sand to sandy cover soil ranging from 0.1 to 2.7 m thickness over waste material;
- Waste (mounds) consisting of compacted municipal waste material including rubber, cloth, wood, glass, plastic, metal, fabric, ceramic, ash, construction/demolition waste and organic matter;
- Areas to the periphery of the waste mounds are underlain by reworked alluvial sediments associated with historical diversions/re-alignments of the Cooks River/Muddy Creek with surface fill material;
- Natural alluvial/estuarine sediments consisting of fine to medium-grained, loose sands to coarse-grained dense sands, black/brown peat and soft to dense clays;
- Sandstone bedrock.

3.6 *Hydrogeology*

Groundwater associated with filled land and underlying unconsolidated sediments is unconfined. The regional direction of groundwater flow is towards the Cooks River (CES, 2017b). Spring Street wetland, Spring Street Drain and the Landing Light Wetland are local groundwater sinks along with the Cooks River and Muddy Creek.

A list of registered groundwater extraction bores within 200 m of the site boundary bores is provided in Annexure 3 along with a plan showing their locations. Notably, there are no registered groundwater extraction bores on the site (GW111316 is a monitoring bore). A site inspection by Edison and enquiries with Bayside Council did not identify any unregistered extraction bores on the site. There are five (5) registered groundwater bores on residential properties to the west (hydraulically upgradient) of the site and four (4) bores to the south-east on the opposite side of Muddy Creek.

Groundwater at the site is unconfined, occurring within the waste mass and underlying alluvium Edison (2020). Groundwater is impacted with constituents derived from anoxic and anaerobic waste degradation (primarily ammonia) and is hydraulically connected to the surrounding surface-water bodies resources, namely: Spring Street Wetland; Spring Street Drain/Canal; Cooks River; Muddy Creek and the Landing Lights/Riverine Park Wetlands. The estimated quantity of impacted groundwater (and therefore contaminant loading) discharging to surface-water bodies is small relative to the volume of the diurnal tidal prism. Furthermore, the receiving waterways are substantially degraded as a result of urban runoff and organic-rich bed sediments, particularly in the wetlands, which are also likely to constitute a source of ammonia at low tide. On these bases, the risks arising from ammonia-impacted groundwater to baseflows

in surface-water bodies are considered to be low. The likelihood of potential human contact with impacted groundwater is low due to the configuration of the discharge zone to receiving surface-water resources.

Groundwater flow contours prepared by CES (2016a) are presented in Annexure 3. Indicating a radial groundwater flow pattern which is a subdued reflection of the surface topography.

3.7 *3Acid Sulfate Soils*

Based on the results of SPOCAS testing (CES, 2008a), the natural sediments are classified as Potential Acid Sulfate Soils (PASS). PASS are soils containing iron sulfides or sulfidic material (usually ferrous iron disulfide or pyrite) which are waterlogged soils, rich in pyrite, that have not been exposed to air and oxidised. Any disturbance that admits oxygen (such as excavation works) will lead to the development of actual acid sulfate soil layers, which may pose an environmental risk. An Acid Sulfate Soils Management Plan (ASSMP) would be required in the event that works involving the disturbance of natural sediments are proposed.

3.8 *Previous Geotechnical Investigations*

Edison is not aware of any previous geotechnical investigations having been completed at the site. However, there have been a number of environmental studies completed at the site as summarised by Edison (2020) as part of previous planning proposals that relate to the site and public land extending north to the Kogarah Golf Course. This land has been variously referred to as Cooks Cove, Cook Cove and Cooks Cove Inlet and is herein referred to as the "Cooks Cove Project".

These investigations included the drilling of numerous boreholes across the site. A copy of the available borehole logs is provided for reference in Annexure 2 along with plans showing the borehole locations. A summary of the borehole information, including total depth, depth of fill and depth to bedrock (where available), is provided in Table 1 along with boreholes drilled as part of this investigation.

With the exception of boreholes D1G01 and D1G02, all the boreholes were relatively shallow and did not reach the bedrock. Both D1G01 and D1G02 were deeper bores which extended into the bedrock formation which was encountered at a depth of between 17.7m and 20.8m below ground surface (bgs). The bedrock formation was predominately sandstone and based on the positioning of the boreholes, the bedrock appeared to be dipping down towards the north-east.

As indicated above, the majority of the boreholes encountered fill comprising significant proportions of waste which supports the history of landfilling at the site. The extent of past landfilling is indicated on Figure 2.

Information from these past borehole logs as summarised in Table 1 has been used in the development a geological model for the site which is presented in a subsequent section of this report.

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4. Methods of Investigation

Fieldwork was completed in August 2020 and comprised the following activities:

- Drilling and logging of one (1) borehole (BHDG101) within the approximately footprint of the proposed tiered seating area and amenities building to provide a preliminary assessment of the fill/soil conditions and the depth to bedrock at this location (Figures 3 and 4);
- Performance of Standard Penetration Tests (SPTs) in borehole BHDG101 to assess the consistency and/or relative density of the soil profile;
- Drilling and logging of four boreholes (BHDG102 to BHDG105) within the approximately footprint of the proposed new artificial grass fields to complement the existing information and to provide an additional assessment of the shallow fill/soil conditions (Figures 3 and 4);
- Collection of representative soil samples at regular intervals from the boreholes for selective laboratory testing;
- Collection of rock core from the borehole BHDG101 for selective laboratory testing; and
- Performance of *in-situ* soil permeability and infiltration tests to determine the soil infiltration rate and the coefficient of permeability.

4.1 *Borehole Drilling Operations and Logging*

A scan for potential underground services and utilities was completed on behalf of MODE by Suresearch Pty Ltd. Prior to commencement of the drilling operations, the report and ground markings by Suresearch were cross checked with the results of a Dial Before you Dig (DBYD) search conducted by Edison.

Boreholes were drilled using an Hanjin D&B 8D track-mounted, hydraulic drill rig operated by Geosense Drilling Pty Ltd. Bore holes were advanced ad using a combination of Solid Flight Augers (SFA) through fill, wash boring through underlying alluvium and NMLC diamond coring for bedrock. Borehole BHDG101 was advanced through the fill/landfill layer and the underlying alluvial soil profile before terminating within the underlying bedrock formation. The remaining bores (BHDG102 to BHDG105) were terminated at 3m depth in the waste landfill layer and were primarily used to better assess the depth of landfill cover soils placed over waste in addition to provide an indication as to the consistency of waste fill.

SPT tests were performed at regular intervals in borehole BHDG101 in accordance with *Australian Standard Test Method* AS1289.6.3.1-1997.

A summary of the subsurface conditions encountered is provided in Section 5.1, while a summary of the borehole information, including total depth, depth of fill and depth to bedrock, is provided in Table 1. The locations of the boreholes are shown on Figure 3 along with a recent aerial photograph and Figure 4 also shows the proposed masterplan.

Table 1: Summary of the Borehole Information

Borehole ID	Date Completed	Drilling Method	Total Depth	Depth of Filling	Depth to Bedrock	Groundwater Well Screen Interval
			(m BGS)	(m BGS)	(m BGS)	(m BGS)
Edison 2020 Boreholes						
BHDG101	17-Aug-20	SFA/WB/Core	19.43	9.5 *	16.2	--
BHDG102	17-Aug-20	SFA	3.0	≥3.0 *	ND	--
BHDG103	17-Aug-20	SFA	3.0	≥3.0 *	ND	--
BHDG104	17-Aug-20	SFA	3.0	≥3.0 *	ND	--
BHDG105	17-Aug-20	SFA	3.0	≥3.0 *	ND	--
Available Boreholes From Previous Environmental Studies (Refer to Annexure 2)						
DBH801	13-May-08	PT	2.4	1.7	ND	--
DBH802	13-May-08	PT	1.2	0.8	ND	--
DBH803	15-May-08	HA	0.35	≥0.35	ND	--
DBH804	13-May-08	PT	1.2	≥1.2 *	ND	--
DBH805	10-Apr-08	SFA	1.2	≥1.2 *	ND	--
DBH806	04-Apr-08	SFA	1.5	≥1.5 *	ND	--
DBH807	04-Apr-08	SFA	1.5	≥1.5 *	ND	--
DBH808	04-Apr-08	SFA	1.0	≥1.0 *	ND	--
DBH809	10-May-08	SFA	1.2	≥1.2 *	ND	--
DBH810	13-May-08	PT	1.2	0.7	ND	--
DBH811	04-Apr-08	SFA	1.2	≥1.2 *	ND	--
DBH812	04-Apr-08	SFA	1.0	≥1.0 *	ND	--
DBH813	01-Apr-08	SFA	1.1	≥1.1 *	ND	--
DBH814	04-Apr-08	SFA	1.0	≥1.0 *	ND	--
DBH815	01-Apr-08	SFA	1.5	≥1.5 *	ND	--
DBH816	01-Apr-08	SFA	2.0	≥2.0 *	ND	--
DBH817	07-Apr-08	SFA	1.5	0.5	ND	--
DBH818	04-Apr-08	SFA	1.0	≥1.0 *	ND	--
DBH819	07-Apr-08	SFA	1.5	≥1.5 *	ND	--
DBH820	07-Apr-08	SFA	1.5	0.5	ND	--
DBH821	07-Apr-08	SFA	1.5	≥1.5 *	ND	--
DMW803A	10-Apr-08	PT	3.6	1.1 *	ND	0.6 – 3.6
DMW805	01-Apr-08	SFA	5.0	≥5.0 *	ND	0.9 – 3.9
DMW806A	07-Apr-08	SFA	3.5	1.5	ND	0.5 – 3.5
D1MW1	19-Oct-15	SFA	6.0	3.3 *	ND	1.0 – 5.5
D1MW2	20-Oct-15	SFA	5.5	3.6 *	ND	1.0 – 5.5
D1MW3	19-Oct-15	SFA	7.0	5.5 *	ND	2.0 – 7.0
D1MW4	19-Oct-15	SFA	6.0	≥6.0 *	ND	1.0 – 5.0
D1MW5	15-Oct-15	SFA	7.3	≥7.3 *	ND	2.2 – 7.2
D1MW5b	15-Oct-15	SFA	2.2	≥2.2 *	ND	--
D1MW6	15-Oct-15	SFA	7.0	≥7.0 *	ND	--
D1MW7	16-Oct-15	SFA	4.0	≥4.0 *	ND	0.5 – 4.0
D1MW8	16-Oct-15	SFA	4.0	≥4.0 *	ND	0.5 – 4.0
D1G01	22-Oct-15	ADV/Core	28.26	6.2 *	20.8	2.0 – 6.0

D1G02	21-Oct-15	ADV/Core	19.96	7.5 *	17.7	2.0 – 6.0
D1BH10	16-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH11	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH12	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH13	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH14	12-Oct-15	SFA	2.4	≥2.4 *	ND	--
D1BH15	12-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH16	12-Oct-15	SFA	2.2	≥2.2 *	ND	--
D1BH17	12-Oct-15	SFA	1.0	≥1.0 *	ND	--
D1BH18	12-Oct-15	SFA	1.1	≥1.1 *	ND	--
D1BH19	12-Oct-15	SFA	2.0	≥2.0 *	ND	--
D1BH20	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH21	12-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH22	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH23	16-Oct-15	SFA	3.0	2.2 *	ND	--
D1BH24	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH25	14-Oct-15	SFA	3.0	1.8 *	ND	--
D1BH26	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH27	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH28	16-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH29	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH30	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH31	14-Oct-15	SFA	3.0	2.2 *	ND	--
D1BH32	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH33	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH34	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH36	13-Oct-15	SFA	2.3	≥2.3 *	ND	--
D1BH37	16-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH39	13-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH41	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH42	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH43	14-Oct-15	SFA	3.0	≥3.0 *	ND	--
D1BH44	14-Oct-15	SFA	0.9	≥0.9 *	ND	--
D1BH45	14-Oct-15	SFA	3.0	≥3.0 *	ND	--

m BGS = metres below ground surface
ND – Not Determined
HA – Hand Auger
SFA – Solid Flight Auger
WB – Wash Boring
ADV – Casing Advancing
Core – Diamond coring of bedrock
* filling included landfill waste material

4.2 *Soil Sampling*

Geotechnical soil and/or rock samples were collected from regular intervals from each borehole and submitted to either Eurofins MGT laboratory (Eurofins), Macquarie Geotechnical or MHK Geotechnical Pty Ltd for testing.

4.3 *In-Situ Permeability Testing*

An *in-situ* permeability test was conducted to assess the hydraulic conductivity of the near-surface fill/soils. This testing was undertaken to allow the infiltration rate to be estimated for the design of a potential future absorption system to manage stormwater from the new structures. The tests were undertaken approximately 10m to the north of borehole BHDG101 which is within close proximity to the proposed tiered seating and the amenities building. The results of the testing are provided below in Section 5.2.

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5. Investigation Results

5.1 *Subsurface Conditions*

The generalised stratigraphic sequence (from top to bottom) is as follows:

- Cover soil (topsoil);
- General fill possibly being a capping layer predominately comprising silty sand and sand with minor construction waste;
- Waste fill comprising landfilled waste material;
- Natural alluvial/estuarine sediments consisting of fine to medium-grained, loose sands to coarse-grained dense sands, black/brown peat and soft to dense clays;
- Bedrock which predominately comprises sandstone.

More detailed descriptions of the subsurface conditions are provided below in Table 2 and in the borehole logs provided in Annexure 2 and Annexure 4.

5.1.1 Groundwater

Groundwater was encountered at approximately 4.5m bgs within borehole BHDG101. Groundwater was not encountered in the shallow (3 m deep) boreholes (BHDG102 to BHDG105). Previous borehole logs indicate that groundwater is unconfined (Edison, 2020) and occurs at depths of between 1.0m and 5.8m bgs.

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Table 2: Summary of Subsurface Conditions / Geological Model

Layer / Unit	Description	Depth to Base of Layer (m)	Consistency / Relative Density(1) / Rock Strength
1- TOPSOIL	SAND / Silty SAND: dark brown, fine to medium grained with roots	0.1 – 0.2	Loose
2 – GENERAL FILL	Silty SAND / SAND / Gravelly SAND: dark brown, grey and brown, fine to coarse grained sand, fine to coarse gravel with some cobble sizes and some construction and demolition waste (predominately brick and concrete).	1.0 – 1.7	Loose to medium dense
3 – WASTE FILL	Clayey SAND and SAND with much waste material (including wood, glass, plastic, metal, concrete, wire and rubber) and minor silt and gravel.	1.1 – 9.0	Very Loose
4 - NATURAL SOIL (Alluvial)	SAND / Silty SAND and CLAYEY SAND: light grey and dark grey, fine to medium grained sand, with shell fragments and pockets/bands or clay/organics. Noticeable landfill odour and a hydrocarbon odour was also noted in some areas.	13.5 - 18.5	Very Loose to Loose with some medium dense bands
5 – NATURAL SOIL (Residual)	Clayey SAND and Sandy CLAY: light grey, white and brown, fine to medium sand, low plasticity clay and trace gravel (sandstone).	16.2 - 20.8	Medium dense to dense / Stiff to Very Stiff
6a - BEDROCK	SANDSTONE with minor SHALE/LAMINITE bands: black, grey, orange, pink, fine to medium sandstone, extremely weathered to distinctly weathered (Class V shale/sandstone - Pells et al 2019)	17.4 - 24.85	Extremely low to low strength
6b - BEDROCK	SANDSTONE: grey and light grey, fine grained, fresh (Class III/II sandstone - Pells *et al* (2019)	--	Medium to high strength

Note 1: Determined from the borehole and SPT test observations

5.2 *Permeability and Water Infiltration Assessment*

In accordance with Rockdale Councils' '*Technical Specification: Stormwater Management*' (RCC, 2011) on-site absorption is a suitable method of managing stormwater provided the base of the absorption system is at least 0.5m above bedrock and 1.0m above the water table. In this regard, on-site absorption is considered suitable, although the nominal rate of absorption must exceed 0.05 litres/second/m^2. Physical limitations are high water table, rock close to the surface or contaminated soils. Additionally, increasing infiltration has the potential to increase landfill leachate and landfill gas generation and should not be undertaken on this basis.

Notwithstanding this, Edison performed some *in-situ* variable (falling) head permeability tests to estimate an appropriate coefficient of permeability (k) and infiltration rate. The tests were conducted after saturating the test location for approximately 2 hours to provide a more conservative test result and mimic prolonged rainfall events.

The variable-head tests involved the use of a 235mm diameter cylinder (0.043 m^2), secured in the ground using with excavated. The base of the cylinder was seated in fill comprising of compacted gravelly sand with some brick and concrete.

Markings on the cylinder indicating the height above the base of the cylinder were used to determine the piezometric head (Hc) of water above either the water table or any aquaclude (*e.g.* bedrock or permanent water table). In this case, the piezometric head was measured from the depth to groundwater at a nearby well which was 3.5 m bgl.

For the variable head tests, the cylinder was partially filled with water and the drop-in water head was recorded at regular intervals.

By applying the same Hvorslev (1949) variable head formula for a cylinder in a uniform soil which is flush with the base (Case C from Lambe and Whitman, 1969), the co-efficient of soil permeability (k) was determined. Using the calculated soil permeability rates, and assuming a piezometric head of 3.2 m, the infiltration rate was also determined. A piezometric head of 3.2 m equates to a water level which is approximately 0.3 m below ground, and this was adopted to mimic water within a submerged infiltration pit.

The results of each variable head test, and equivalent infiltration rate, is provided below:

	Test 1	Test 2
Soil permeability (k – cm/sec)	4.8×10^{-5}	4.0×10^{-5}
Infiltration Rate ($L/m^2/sec$)	0.023	0.019

In-situ permeability tests were also carried out on the cover soils at two other locations as part of a previous environmental study (CES, 2008b) and the measured permeability ranged between 5.3×10^{-6} cm/sec at DBH811 to 1.7×10^{-3} cm/sec at DBH815. The results show that cover soils are of variable permeability which is attributed to the variability in composition and compaction.

Finally, the infiltrations rates measured as part of this investigation were below the minimum rate specified by Council for absorption systems to be considered suitable (RCC, 2011).

5.3 *Laboratory Testing*

Representative soil samples were selected for the following geotechnical testing parameters:

- Electrical Conductivity (EC) to provide an assessment of the salinity potential of the soil profile;
- Sulphate, Chloride, resistivity and pH to determine the exposure classification of the soil with respect to buried structural concrete and unprotected steel;
- Californian Bearing Ratio (CBR) testing to evaluate the mechanical strength of the upper soil profile to assist with future pavement design; and
- Point load strength index testing of the recovered bedrock core to characterise the strength of the bedrock.

The laboratory test results are presented in Annexure 5. A summary of the results is provided in the following sub-sections.

5.3.1 Soil Salinity Testing

Soil salinity was assessed with reference to guidance published by the Department Land and Water Conservation NSW (DLWC, 2002). Selected samples of natural soil were submitted to Envirolab for NATA accredited testing of Electrical Conductivity (EC), which is the primary indicator of salinity.

The raw EC results and the EC_e results (EC data multiplied by a conversion factor which depends upon the soil texture / type) are provided in Table 3.

Table 3: Electrical Conductivity Results

Sample ID	Sample Location / Depth	Sample Description	EC (dS/m)	Multiplication Factor[1]	EC_e (dS/m)
ZZ170820-01	BHDG101 / 1.5-1.95m	FILL – Clayey SAND	0.18	14	2.52
ZZ170820-04	BHDG101 / 12.0 – 12.45m	FILL - Silty SAND	1.00	14	14.00
ZZ170820-05	BHDG101 / 13.5 – 13.95m	FILL - Silty SAND	0.58	14	7.00

According to the DLWC (2002), ECe results less than 2dS/m are considered to be non-saline, ECe results between 2dS/m to 4dS/m are slightly saline, ECe results between 4dS/m to 8dS/m are moderately saline, ECe results between 8dS/m to 16dS/m are very saline and results over 16dS/m are considered to be highly saline. The above test data indicate that the fill/natural soil profile is sightly to very saline.

5.3.2 Aggressivity Testing

Selected soil samples were submitted to Envirolab for NATA accredited testing of pH, sulfate, chloride and resistivity to provide a preliminary assessment of the exposure classification (or the aggressiveness/corrosiveness potential) of the soil with respect to future buried steel and/or concrete (e.g. footings).

To determine the aggressiveness of the soil and water environment on concrete or steel, chemical test results are compared to Table 6.4.2(C) and Table 6.5.2(C) from Section 6 of the Australian Standard AS 2159-2009 which specify criteria to assess the 'exposure classification' for a concrete or steel piles. The Standard has two classes of soil conditions:

(A) high permeability soils below groundwater; and
(B) low permeability soils and all soils above groundwater.

For this site, the soil samples are considered to be either condition 'A' or condition 'B' depending on if they were above or below the water table (i.e. sand below the water table – A or sand above the water table – B). Based on the chemical testing results, the standard provides a range of 'exposure classifications' from non-aggressive to very severe. For the range of chemical conditions in the soil surrounding the structure, the condition leading to the most severe aggressive conditions is adopted.

A summary of the soil results is provided in Table 4.

Table 4: Exposure classification (aggressivity) test results

Sample ID	Sample Location / Depth	Sample Description	Soil Condition	pH	Sulphate (SO_4) mg/kg	Chloride (Cl) mg/kg	Resistivity Ohm.cm
ZZ170820-01	BHDG101 / 1.5-1.95m	FILL – Clayey SAND	B	7.3	81	36	5,600
ZZ170820-04	BHDG101 / 12.0 – 12.45m	FILL - Silty SAND	A	8.3	210	2000	21,000
ZZ170820-05	BHDG101 / 13.5 – 13.95m	FILL - Silty SAND	A	8.4	150	1100	15,000

The aggressivity potential of an environment on concrete is dependent on the sulphate and pH levels of the soil. Based on the test results above and taking into account the 'worst-case' sample results, the subsurface profile is considered to be mildly aggressive towards concrete. However, the standard also states that concrete piles exposed to domestic waste refuse should be designed based on severe aggressivity. According to Australian Standard AS 3600-2009, specifically Table 4.8.1, a severe aggressivity rating equates to an exposure classification of 'B2'. This exposure classification is also suitable for the salinity levels in the fill and natural soil profile and for piles submerged in seawater.

The corrosive potential of an environment on unprotected steel is normally dependent on pH, chloride, and resistivity levels of the soil. Based on the limited number of test results above and considering the 'worst-case' sample results, the subsurface profile is considered to be non-aggressive / non-corrosive towards any unprotected steel. However, should any unprotected steel elements extend into the landfill material then a severe classification should be adopted. This classification is also appropriate for any unprotected steel submerged in seawater.

5.3.3 Californian Bearing Ration (CBR) Testing

To assist with the potential design of a flexible pavement for any future pavements, a bulk sample collected from boreholes BHDG103 and BHDG104/BHDG105 and tested for the CBR. To assist with calculation of the desired compaction for each CBR test, a dry density / optimum moisture content relationship test (otherwise referred to as a compaction test) was also completed on the same samples.

Bulk samples were collected from 0.2 m to 1.0 m depth representing the upper, predominately sandy fill layer. This layer was targeted because it is expected to remain in place as part of the Masterplan implementation and therefore this material will comprise the future pavement subgrade.

CBR samples were remoulded in the laboratory and compacted to approximately 98% Standard Maximum Dry Density (SMDD) at Optimum Moisture Content (OMC). Prior to testing the compacted samples were then soaked for 4 days under a surcharge load of 4.5 kg to provide soaked CBR values. Soaked CBR values are provided in **Table 5**, along with the optimum moisture content of each sample and the moisture content at compaction.

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Table 5: CBR Test Results

Sample ID	Sample Location / Depth (m)	Sample Description	CBR Value (%)	Optimum Moisture Content (%)	Maximum Dry Density (t/m^3)
			5.0mm		
G3	BHDG103/0.2 – 1.2m	SAND with minor silt and gravel	40.0	14.1	1.769
G4/G5	BHDG104 & BHDG105/0.2 – 1.0m	Gravelly SAND and SAND	35.0	11.9	1.87

It is noted that the CBR values presented in Table 5 are based on the basis that the subgrade material is compacted in the laboratory to approximately 100% standard compaction. However, this level of compaction (or a minimum of 95% standard compaction) is unlikely to be achieved in the field because of the poor quality of the underlying waste fill. Caution should therefore be applied in the use of the reported CBR values for conventional a conventional pavement design. Rather, Edison recommends that other engineering measures be used to reinforce the subgrade and, in turn, improve the lifespan of the pavements. Further discussion is provided below in Section 6.0.

5.3.4 Rock Strength Testing

Point-load index (I_{s50}) testing was undertaken on representative samples of rock core in order to assess the strength of the bedrock encountered at the site. Sub-sampling and testing were undertaken by MHK Geotechnical Pty Ltd on behalf of Edison.

Point load tests were conducted at approximately 1 m intervals, subject to the rock quality. Point load test values are routinely multiplied by a factor of 15 to 20 to estimate an Unconfined Compressive Strength (UCS) value of rock samples, although the correlation between point-load index and UCS values is known to vary significantly. For the purpose of this investigation a multiplication factor of 15 was adopted for estimating the UCS value from the point load tests.

For point load testing, rock core samples were loaded in the test apparatus and the failure load was recorded. Samples of the core were loaded diametrally and axially and the failure loads for each recorded. Results for core samples loaded axially ranged from 0.41 MPa to 1.33 MPa with an average of 0.92 MPa. Results for diametrally-loaded samples ranged from 0.50Pa to 1.11MPa with an average of 0.88MPa. Considering that future foundations load the bedrock in a similar direction as the axial loaded point load tests, then more emphasis is placed on these results.

Assuming a UCS/Is50 correlation factor of 15, the inferred UCS values for all the point load test results, when loaded axially, are estimated to be approximately 6.08 MPa to 20.0 MPa, with an average of 13.81 MPa.

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6. Discussion

6.1 *Geotechnical Issues*

The presence of an uncontrolled waste fill layer is the primary geotechnical issue or constraint at the site. The was layer consists of municipal waste placed across most of site between the 1940s and 1980s. The former landfill was not properly closed or capped and does not include provisions for the management of leachate and gas (Edison, 2020). Rather than being formally capped, waste was covered with a layer of predominately sand soil with gravel and minor construction waste (i.e. brick and concrete) and finished off with a thin layer of topsoil and grass. The base of the landfill waste layer ranges from approximately 1 m around the perimeter of the landfilled area (Figure 2) and up to approximately 9 m. Undulations in the existing playing surfaces are a direct consequence of the differential settlement of uncontrolled waste fill material and the degradation of the municipal waste.

A secondary geotechnical issue is the inconsistency of the alluvium underlying the waste. Alluvium varies from very loose to loose to medium dense and dense and therefore minimises any confidence on this layer being a suitable bearing stratum for the major structures that are proposed on the site, namely the tiered seating area and amenities building).

6.2 *Site Preparation*

Prior to construction of the proposed new structures and the artificial grass fields, all topsoil with organic matter and any pavement materials, should be removed. Stripped topsoil should be stockpiled for re-use as landscape material or disposed off-site.

Material removed from site will need to be managed in accordance with the provisions of current legislation and may include segregation by material type classification in accordance with NSW EPA (2014) *Waste Classification Guidelines* and disposal at facilities appropriately licensed to receive the particular materials.

6.3 *Pavement Subgrade Preparations and Design*

The proposed development is expected to comprise a number of flexible pavements including the access roads, car parking areas and a network of pedestrian and bicycle pathways. Flexible pavements are also expected to be adopted beneath the artificial grass playing fields.

Pavement designs are based on the CBR and the modulus of the subgrade materials, encountered after any excavation or re-grading has taken place. The principal aim of the subgrade preparation for pavements is to provide a uniform foundation so that there will be little risk of settlement (particularly differential settlement) over the long term.

Assuming minimal earthworks are undertaken as specified above, the final pavement subgrade across the site will likely comprise the general fill layer (i.e. Unit 2) which predominately comprises a mixture of silty and, sand and gravelly sand with minor construction waste (e.g. concrete and brick). This layer is considered suitable as a subgrade and will offer a relatively high CBR as indicated with the limited testing completed herein (refer to Section5.3.3). However, regardless of the suitability of the existing subgrade and its high CBR properties, differential settlements are expected to continue across the site as the underlying landfilled waste layer (Unit 3) continues to degrade.

There are a number of ways to manage the ongoing differential settlements and the final choice will depend on the project budget, available timeframe and sensitivity/tolerance of the final product is to differential settlements.

A solution which can prevent ongoing differential settlement occurring but is at the high end of the cost spectrum, is a suspended slab supported by piles founded through the fill layer and into competent natural soil profile or the bedrock formation. This methodology has recently been used for an artificial multi-use field in Lane Cove (Blackman Park), however, Edison expects that this is excessive and most likely cost-prohibitive for this project, especially for the proposed roads, carparks and cycleways.

A more cost-effective solution for significantly minimising future differential settlement is the use polypropylene geogrids to reinforce the pavement subgrade. The use of a geogrids is well established for improving the bearing capacity of soft soils and minimising differential settlement and localised settlements due to abruptly settling or subsiding weak zones, such as within a landfilled area. Essentially the tensile strength of the geogrid is combined with a layer of aggregate (including recycled aggregate) which has a greater rigidity, which in turn creates a composite layer which has a greater rigidity and stability than the individual layers alone.

Of the pavements proposed for this project, the artificial grass playing fields will be the most sensitive to differential settlements and from past experience, at least two layers of geogrid should be allowed for in the final budget. Whether geogrids are used to reinforce the subgrades of the other pavements will ultimately depend on the remaining project budget and whether future undulations and repairs are desired.

6.4 *Foundations*

6.4.1 Tiered Seating Area and Amenities Building

Given the subsurface conditions and the scale of the proposed development, a shallow foundation system is not recommended for the proposed grandstand and amenities building. The upper portion of the natural, alluvial soil profile is inconsistent with variable density and therefore, Edison recommends that footings are advanced using piles into the underlying bedrock formation. The use of CFA piling equipment is preferred for the ground conditions encountered and to reduce the possibility of Acid Sulfate Soils (ASS) associated with natural alluvium being brought to the surface.

Based on the limited information available, the depth to bedrock in the vicinity of these structures varies between 16.2m and 20.8m bgs with the depth to bedrock increasing towards the north-east. The upper portion (Unit 3a) of the bedrock formation appears to have inconsistent strength, before becoming consistently medium to high strength and at least Class III Sandstone in accordance with Pells *et al*, 2019. Preliminary design parameters are provided in **Table 6** for both Units 6a and 6b, however, Edison recommends that additional investigations are completed to confirm this quality and strength of bedrock is consistent across the entire building footprints.

Table 6: Preliminary Foundation Design Parameters

Founding Stratum	Serviceability End Bearing Pressure (MPa)	Ultimate compressive Side Shear (kPa)	Elastic (Young's) Modulus (MPa)	Design Poisson's Ratio (γ)
Unit 6a Bedrock	0.7	50	50	0.3
Unit 6 b Bedrock	3.5	800	350	0.25

For piles, the above design parameters assume that the piles are socketed at least 0.5 m into the rock class and the ultimate side shear values assumes a rough socket of category R2 or better is achieved.

Settlements for footings on rock are anticipated to be less than about 1% of the pile diameter.

Finally, footing systems should be designed by a suitably qualified and experienced structural engineer and as CFA piling is a 'blind' piling technique (and hence not suited to geotechnical inspections), CFA piles would need to be certified by the piling contractor, to confirm that the piles have reached a suitable depth and that the material encountered is consistent with the design assumptions.

6.4.2 Minor Structures

For the other minor structures proposed in the Masterplan that are less susceptible to differential settlements caused by the landfilled layer, a raft slab may be adopted. If adopted, raft slabs may be designed based on a relatively conservative bearing capacity of 75kPa.

6.4.3 Aggressivity / Exposure Potential

Based on the limited exposure classification test results (Section 5.3.2), and in accordance with AS 2159-2009, the subsurface concrete structures (*e.g*. footings) should be designed based on severely-aggressive soil conditions for concrete. According to Australian Standard AS 3600-2009, the equivalent exposure classification is 'B2' which takes into account the highly saline fill layer. Any un-protected steel placed in contact with the fill and natural soil profile should be designed based on severely corrosive conditions.

6.5 *Earthquake Design*

Structural design for earthquake loads should be carried out in accordance with the relevant provisions in AS1170.4–2007. At this preliminary stage and with reference to Table 4.1 of AS1170.4, the site sub-soil class is considered to be D_e. This classification is provided because there were occasional SPT results of less than 6 which infers very loose soils are present, albeit sporadically.

6.6 *Salinity*

Laboratory testing completed as part of this preliminary geotechnical investigation indicates that subsurface fill and natural soil profile is very saline. Considering there are no major earthworks proposed for the site, a site-specific salinity management plan is not warranted. However, the salinity levels should be considered when designing concrete elements in contact with the fill and natural soil profile.

6.7 *Stormwater Infiltration*

Based on the *in-situ* permeability testing conducted as part of this investigation and taking into account Rockdale Councils' '*Technical Specification: Stormwater Management*', an absorption system to manage stormwater from future structures is unlikely to be feasible. Considering permeability test results and the requirement to mitigate potential landfill leachate and gas generation by minimising infiltration, an alternative system is recommended.

7. Conclusion and Recommendations

Sufficient information has been gained to be confident of the subsurface conditions across the site and to broadly identify geotechnical constraints to implementation of the Masterplan and to assist with the preliminary design.

Based on the results of the investigation, the proposed Masterplan development is considered feasible. However, further investigation is recommended to define the strength and quality of the bedrock formation more accurately beneath the proposed new grandstand and amenities building.

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8. General Limitations

Soil and rock formations are variable. The logs or other information presented as part of this report indicate the approximate subsurface conditions only at the specific test locations. Boundaries between zones on the logs or stratigraphic sections are often not distinct, but rather are transitional and have been interpreted.

The precision with which subsurface conditions are indicated depends largely on the frequency and method of sampling, and on the uniformity of subsurface conditions. The spacing of test sites also usually reflects budget and schedule constraints. Groundwater conditions described in this report refer only to those observed at the place and under circumstances noted in the report. The conditions may vary seasonally or as a consequence of construction activities on the site or adjacent sites.

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Edison be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of changed soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

The comments given in this report are intended only for the guidance of the design engineer, or for other purposes specifically noted in the report. The number of boreholes or test excavations necessary to determine all relevant underground conditions which may affect construction costs, techniques and equipment choice, scheduling, and sequence of operations would normally be greater than has been carried out for design purposes. Contractors should therefore rely on their own additional investigations, as well as their own interpretations of the borehole/test pit data in this report, as to how subsurface conditions may affect their work.

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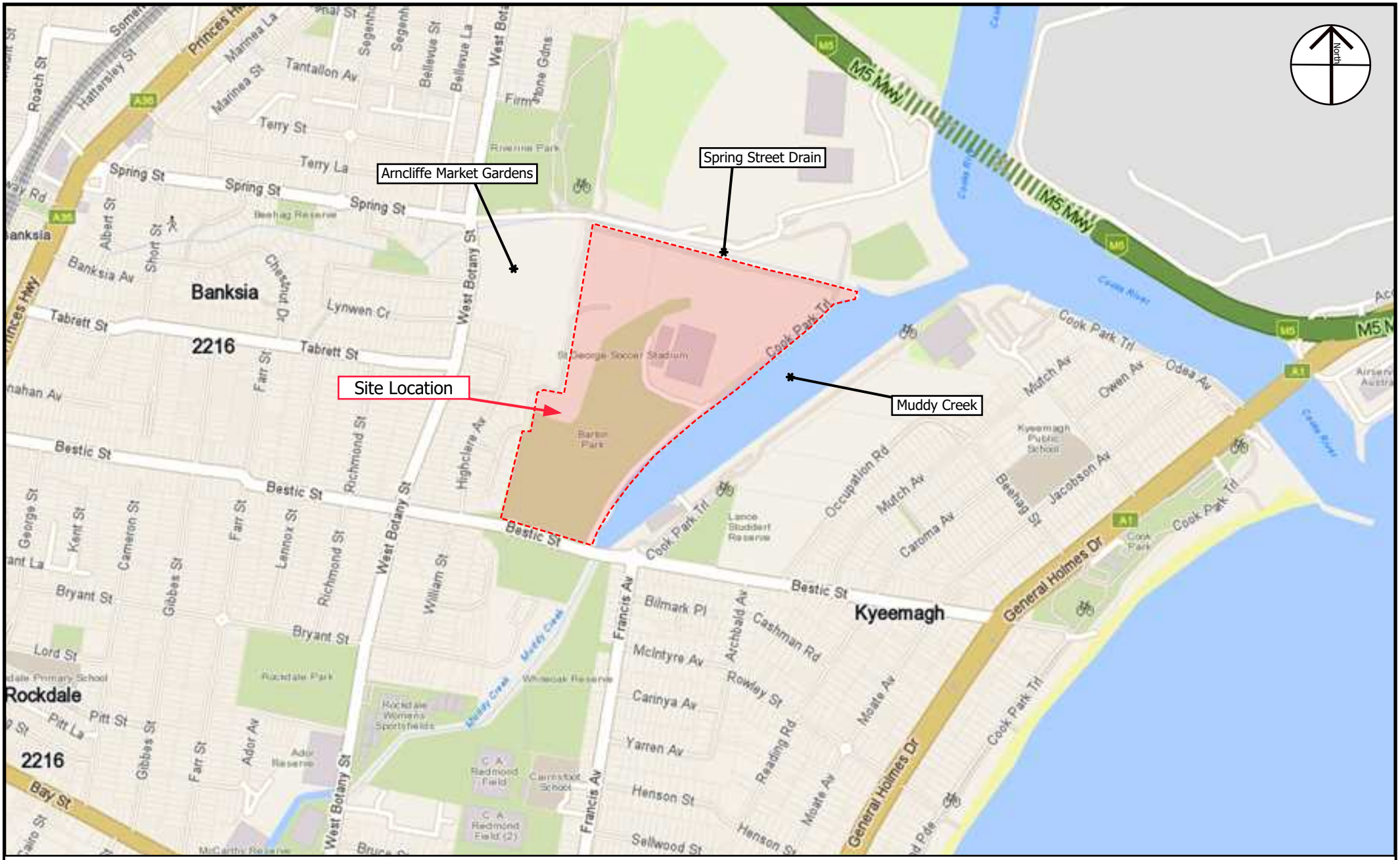


Image Source: www.whereis.com Map data © OpenStreetMap contributors

EDISON ENVIRONMENTAL + ENGINEERING	TITLE: SITE LOCATION MAP Barton Park, Bestic Street, Rockdale NSW	SCALE: N.T.S	DATE: 20 Aug 2020	FIGURE No. 1
		DRAWN: S. McC	JOB No.: E17011-CU	REVISION: A

Image Source: Nearmap Limited (www.nearmap.com) - Aerial Image Date: 2 August 2020

EDISON ENVIRONMENTAL + ENGINEERING	TITLE: SITE PLAN Barton Park, Bestic Street, Rockdale NSW	SCALE: N.T.S	DATE: 20 Aug 2020	FIGURE No. 2
		DRAWN: S. McC	JOB No.: E17011-CU	REVISION: A

Image Source: Nearmap Limited (www.nearmap.com) - Aerial Image Date: 2 August 2020

EDISON ENVIRONMENTAL + ENGINEERING	TITLE: BOREHOLE LOCATIONS (Aerial) Barton Park, Bestic Street, Rockdale NSW	SCALE: N.T.S	DATE: 20 Aug 2020	FIGURE No. 3
		DRAWN: S. McC	JOB No.: E17011-CU	REVISION: A

Legend

Edison Boreholes (2020)

CES Boreholes (2015)

Image Source: Masterplan - Carpark Option 1, Barton Park Precinct Prepared by Mode Design Corp (Project ID 20273 Drawing LD-0100 Revision 2 18/08/20)

EDISON ENVIRONMENTAL + ENGINEERING

TITLE:	SCALE:	DATE:	FIGURE No.
BOREHOLE LOCATIONS (Masterplan) Barton Park, Bestic Street, Rockdale NSW	N.T.S	20 Aug 2020	4
	DRAWN: S. McC	JOB No.: E17011-CU	REVISION: A

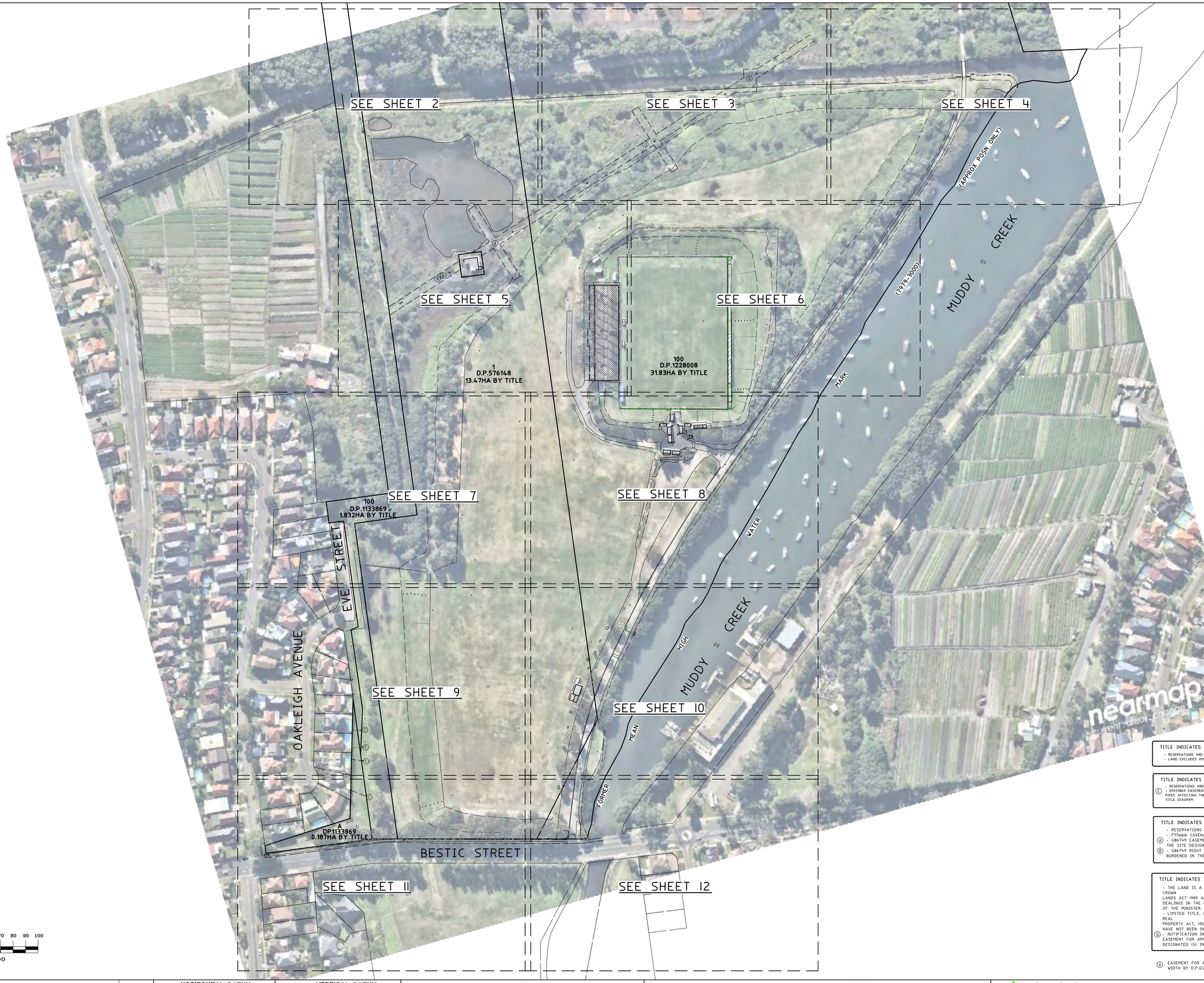
FIGURES

EDISON
ENVIRONMENTAL + ENGINEERING

ANNEXURE 1:
Survey and Masterplan of the Proposed Development

A0

APPROX TRUE NORTH
MGA NORTH



0 10 20 30 40 50 60 70 80 90 100

SCALE 1:1000

- INDIVIDUAL LOT BOUNDARIES HAVE BEEN PLOTTED FROM THE DIGITAL CADASTRE DATABASE. THE LOCATION OF THESE BOUNDARIES MUST BE TAKEN AS INDICATIVE ONLY, AND ARE SUBJECT TO FURTHER SURVEY.
- THE DIGITAL TERRAIN MODEL PAST THE BOTTOM OF BANK IN THE NORTH WESTERN CORNER IS APPROXIMATE ONLY, DUE TO HEAVY VEGETATION AND AS PER THE SCOPE. THE DIGITAL TERRAIN MODEL IS CONSTRUCTED FROM SPOT LEVELS AT A LARGER INTERVALS (SPACING) THAN AS PER NORMAL SURVEY PRACTICE.

Notes:

- **BOUNDARIES HAVE NOT BEEN DEFINED - BOUNDARY DEFINITION IS SUBJECT TO FURTHER SURVEY.**
- **A BASIC BOUNDARY SURVEY HAS BEEN UNDERTAKEN SUITABLE FOR COUNCIL DA SUBMISSION (TITLE DIMENSIONS ONLY).**
- **IF CONSTRUCTION ON OR NEAR BOUNDARIES IS REQUIRED IT IS RECOMMENDED THAT THE BOUNDARIES OF THE LAND BE MARKED.**
- **AREA IS APPROXIMATE ONLY FROM TITLE DIMENSIONS. ALL TITLE DIMENSIONS OF THE LAND HAVE NOT BEEN CONFIRMED BY SURVEY. IF AREAS ARE CRITICAL WE RECOMMEND A BOUNDARY SURVEY FOR PUBLIC RECORD.**
- **THIS SURVEY IS FOR DESIGN PURPOSES OF THE SUBJECT LAND ONLY. THIS PLAN MUST NOT BE USED FOR ANY OTHER MATTER, PURPOSE OR CONSTRUCTION SETOUT.**
- TREE SIZES ARE ESTIMATES ONLY.
- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF MODE DESIGN CORPORATION PTY LTD
- RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC ONLY. WHERE OFFSETS ARE CRITICAL THEY SHOULD BE CONFIRMED BY FURTHER SURVEY.
- EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- SEWER MAN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
- CONTOUR INTERVAL - 0.5 metre. - SPOT LEVELS SHOULD BE ADOPTED.
- THE INFORMATION IS ONLY TO BE USED AT A SCALE ACCURACY OF 1:500@A1 SHEET(S) AND 1:1000@A3 SHEET 2-10.
- DO NOT SCALE OFF THIS PLAN / FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED READINGS.
- COPYRIGHT © CMS SURVEYORS 2020.
- NO PART OF THIS SURVEY MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM, WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT OWNER EXCEPT AS PERMITTED BY THE COPYRIGHT ACT 1968
- ANY PERMITTED DOWNLOADING, ELECTRONIC STORAGE, DISPLAY, PRINT COPY OR REPRODUCTION OF THIS SURVEY SHOULD CONTAIN NO ALTERATION OR ADDITION TO THE ORIGINAL SURVEY.
- THIS NOTICE MUST NOT BE ERASED.

TITLE INDICATES THAT LOT A IN D.P.400546 IS SUBJECT TO:
- RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- LAND EXCLUDES MINERALS (S.M PUBLIC WORKS ACT, 1912)

TITLE INDICATES THAT LOT 100 IN D.P.1133869 IS SUBJECT TO:
(C) - DP893869 EASEMENT FOR SEWERAGE PURPOSES OVER EXISTING LINE OF PIPES AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM

TITLE INDICATES THAT LOT 1 IN D.P.576148 IS SUBJECT TO:
- RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- F596666 COVENANT (NOT INVESTIGATED)
(A) - G86749 EASEMENT FOR APPROACH LIGHTING SYSTEM AFFECTING THE SITE DESIGNATED (A) IN THE TITLE DIAGRAM
(B) - G86749 RIGHT OF WAY AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM

TITLE INDICATES THAT LOT 100 IN D.P.1228008 IS SUBJECT TO:
- THE LAND IS A RESERVE WITHIN THE MEANING OF PART 5 OF THE CROWN LANDS ACT 1989 AND THERE ARE RESTRICTIONS ON TRANSFER AND OTHER DEALINGS IN THE LAND UNDER THAT ACT, WHICH MAY REQUIRE CONSENT OF THE MINISTER.
- LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.
(G) - NOTIFICATION IN COMMONWEALTH GOVERNMENT GAZETTE DATED 12.11.1993. EASEMENT FOR APPROACH LIGHTING SYSTEM AFFECTING THE SITE DESIGNATED (G) IN THE TITLE DIAGRAM

(A) EASEMENT FOR APPROACH LIGHTING SYSTEM 6.09§ WIDE AND VARIABLE WIDTH BY D.P.1228008

1	FIRST ISSUE	05/08/2020

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 91983 & SSM 105974
L.G.A. BAYSIDE

VERTICAL DATUM:
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B.M. ADOPTED: SSM 91983
R.L. 1.599 (CLASS LB)
SOURCE: S.C.I.M.S. (22/07/2020)

CLIENT:
MODE DESIGN CORPORATION PTY LTD
LEVEL 5, 111-117 DEVONSHIRE STREET
SURRY HILLS, NSW, 2010

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BANKSIA, NSW, 2216

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2/99A South Creek Road, Dee Why NSW 2099
Telephone: (02) 9971 4802 Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

SURVEYED	DRAWN	CHECKED	APPROVED
NS	ABS	NS	AF

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
19535	1:1000 @ A0	22-30/07/2020

DRAWING NAME: **19535detail**
CAD FILE: 19535detail 1.dwg
SHEET 1 OF 12
ISSUE 1

LEGEND:

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× TREE
SPREAD-DIAMETER-HEIGHT

SUBSURFACE UTILITY INFORMATION

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IS THE NEXT LEVEL UP FROM QL-D. AS5488 STATES THAT QL-C IS A SURFACE FEATURE CORRELATION OR AN INTERPRETATION OF THE APPROXIMATE LOCATIONS AND ATTRIBUTES OF A SURFACE FEATURE USING A COMBINATION OF EXISTING RECORDS (ANECDOTAL EVIDENCE) SONIC ROOM TECHNIQUES AND A SITE SURVEY OF VISIBLE EVIDENCE.
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HORIZONTAL AND VERTICAL
TOLERANCE: +/-50MM.

NOTES 1

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LEGEND: (SEE NOTES 1)

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LEGEND:

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CODE	DEPTH	PIPE DIAMETER	
106.78	SSL	B 1.31	0.10 EOT
RL	LOCATION QUALITY		NOTE

1	FIRST ISSUE	05/08/2020

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SURVEYED	DRAWN	CHECKED	APPROVED
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SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
19535	1:200 @ A0	22-30/07/2020

DRAWING NAME: **19535detail**
CAD FILE: 19535detail 1.dwg
SHEET: 2 OF 12
ISSUE: 1

A0

APPROX TRUE NORTH
MAGNETIC NORTH

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RL	CODE	LOCATION QUALITY	DEPTH	PIPE DIAMETER	NOTE
106.78	SSL	B	1.31	0.100	EOT

EASEMENT NOT PLOTTED PAST
THIS POINT DUE TO BEING OUTSIDE SCOPE AREA

100
DP1228008

CONCRETE DRAINAGE CHANNEL
GRASSED TRACK
WETLANDS
HEAVILY VEGETATED AREA
LAWN
ADJOINS SHEET 2
ADJOINS SHEET 5
ADJOINS SHEET 6
ADJOINS SHEET 4

SCALE 1:200
0 5 10 15 20

I	FIRST ISSUE	05/08/2020

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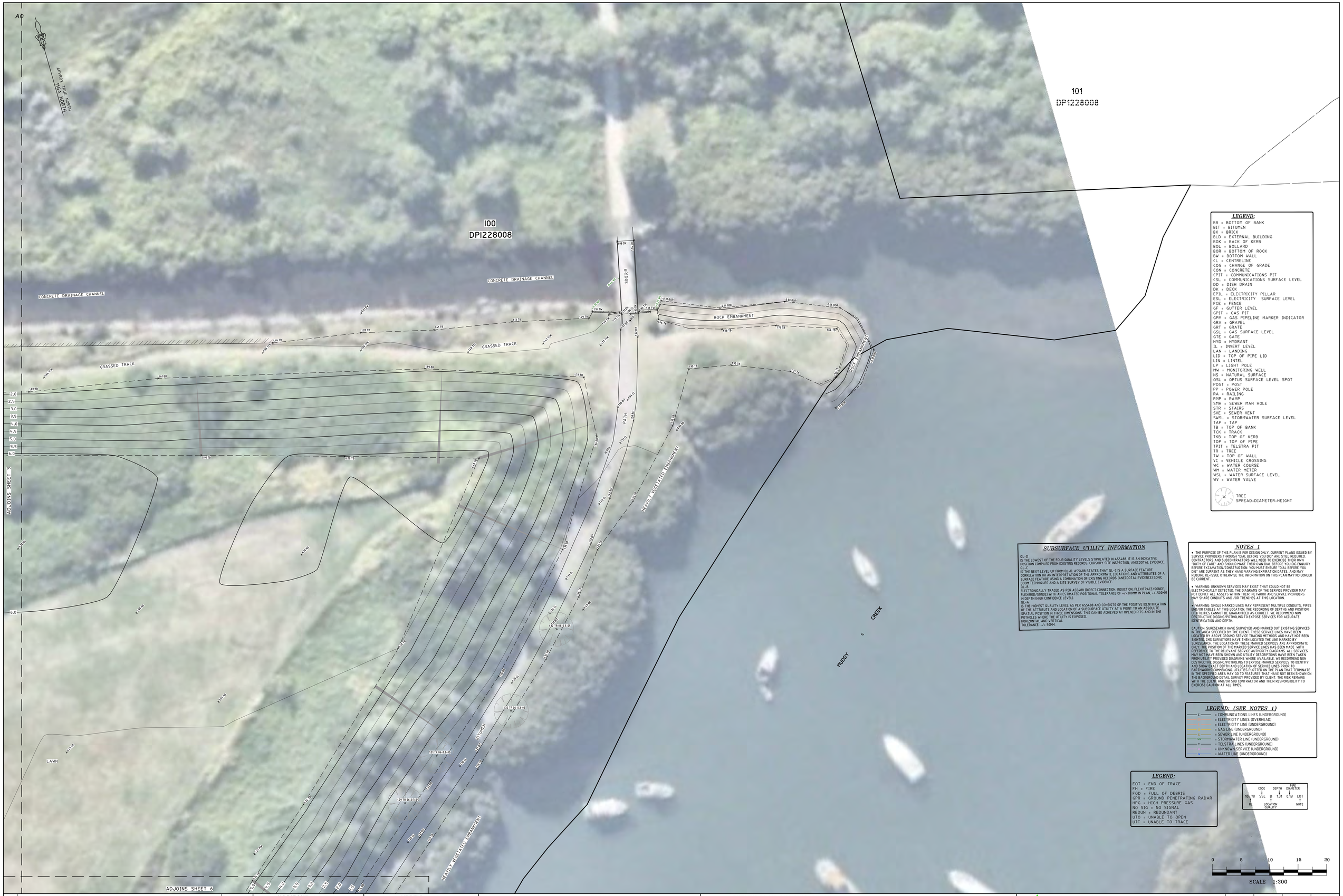
DRAWING NAME: 19535detail
CAD FILE: 19535detail I.dwg
SHEET 3 OF 12
ISSUE I



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LEGEND: (SEE NOTES 1)

C = COMMUNICATIONS LINES (UNDERGROUND)
OH = ELECTRICITY LINES (OVERHEAD)
E = ELECTRICITY LINE (UNDERGROUND)
G = GAS LINE (UNDERGROUND)
S = SEWER LINE (UNDERGROUND)
SW = STORMWATER LINE (UNDERGROUND)
T = TELSTRA LINES (UNDERGROUND)
? = UNKNOWN SERVICE (UNDERGROUND)
W = WATER LINE (UNDERGROUND)

LEGEND:

EOT = END OF TRACE
FH = FIRE
FOD = FULL OF DEBRIS
GPR = GROUND PENETRATING RADAR
HPG = HIGH PRESSURE GAS
NO SIG = NO SIGNAL
REDUN = REDUNDANT
UTO = UNABLE TO OPEN
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CODE	DEPTH	PIPE DIAMETER
100.78 SSL	B 1.31	0.10 EOT
RL	LOCATION QUALITY	NOTE

0 5 10 15 20

SCALE 1:200

I	FIRST ISSUE	05/08/2020

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 91983 & SSM 105974
L.G.A. BAYSIDE

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 91983
R.L. 1.599 (CLASS LB)
SOURCE: S.C.I.M.S. (22/07/2020)

CLIENT:
MODE DESIGN CORPORATION PTY LTD
LEVEL 5, 111-117 DEVONSHIRE STREET
SURRY HILLS, NSW, 2010

SURVEY PLAN SHOWING DETAIL, LEVELS AND UNDERGROUND SERVICES OVER PART LOT 100 IN DP1228008, LOT A IN DP400546, PART LOT 1 IN DP576148 & PART LOT 100 IN DP1133869
BARTON PARK PRECINCT
BANKSIA, NSW, 2216

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ACN: 096 240 201
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2/99A South Creek Road, Dee Why NSW 2099
Telephone: (02) 9971 4802 Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

SURVEYED	DRAWN	CHECKED	APPROVED
NS	ABS	NS	AF
SURVEY INSTRUCTION	SCALE	DATE OF SURVEY	
19535	1:200 @ A0	22-30/07/2020	
DRAWING NAME			ISSUE
19535detail		SHEET 4 OF 12	I
CAD FILE 19535detail I.dwg			

LEGEND:

BB = BOTTOM OF BANK
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TREE
SPREAD-DIAMETER-HEIGHT

0 5 10 15 20

SUBSURFACE UTILITY INFORMATION

QL-D
IS THE LOWEST OF THE FOUR QUALITY LEVELS STIPULATED IN AS5488. IT IS AN INDICATIVE POSITION COMPILED FROM EXISTING RECORDS, CURSORY SITE INSPECTION, ANECDOTAL EVIDENCE.
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QL-B
ELECTRONICALLY TRACED AS PER AS5488 (DIRECT CONNECTION, INDUCTION, FLEXITRACE/SONDE, FLEXROD/SONDE) WITH AN ESTIMATED POSITIONAL TOLERANCE OF +/-300MM IN PLAN, +/-500MM IN DEPTH (HIGH CONFIDENCE LEVEL).
QL-A
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HORIZONTAL AND VERTICAL
TOLERANCE: +/- 50MM.

NOTES 1

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CODE	DEPTH	PIPE DIAMETER	
106/78	SSL	B 1.31	0.10 EOT
RL	LOCATION QUALITY		NOTE

LEGEND:

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SURVEYED	DRAWN	CHECKED	APPROVED
NS	ABS	NS	AF

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
19535	1:200 @ A0	22-30/07/2020

DRAWING NAME: 19535detail
CAD FILE: 19535detail 1.dwg
SHEET: 5 OF 12
ISSUE: I

LEGEND: (SEE NOTES 1)

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HORIZONTAL AND VERTICAL
TOLERANCE -/+ 50MM.

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CODE	DEPTH	PIPE DIAMETER
106.78 SSL	B 1.31	0.18 EOT
RL	LOCATION QUALITY	NOTE

0 5 10 15 20

SCALE 1:200

I	FIRST ISSUE	05/08/2020

HORIZONTAL DATUM:
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SURVEYED	DRAWN	CHECKED	APPROVED
NS	ABS	NS	AF

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
19535	1:200 @ A0	22-30/07/2020

DRAWING NAME: 19535detail
CAD FILE: 19535detail.dwg
SHEET: 6 of 12
ISSUE: I

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HORIZONTAL AND VERTICAL
TOLERANCE: +/- 50MM.

NOTES 1

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TREE
SPREAD-DIAMETER-HEIGHT

LEGEND: (SEE NOTES 1)

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RL	CODE / LOCATION QUALITY	DEPTH	PIPE DIAMETER	NOTE
106.78	SSL B	1.31	0.10	EOT

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DRAWING NAME: 19535detail
CAD FILE: 19535detail 1.dwg
SHEET 7 OF 12
ISSUE 1

SUBSURFACE UTILITY INFORMATION

QL-D
IS THE LOWEST OF THE FOUR QUALITY LEVELS STIPULATED IN AS5488. IT IS AN INDICATIVE POSITION COMPILED FROM EXISTING RECORDS, CURSORY SITE INSPECTION, ANECDOTAL EVIDENCE.
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IS THE NEXT LEVEL UP FROM QL-D. AS5488 STATES THAT QL-C IS A SURFACE FEATURE CORRELATION OR AN INTERPRETATION OF THE APPROXIMATE LOCATIONS AND ATTRIBUTES OF A SURFACE FEATURE USING A COMBINATION OF EXISTING RECORDS (ANECDOTAL EVIDENCE) SONIC BOOM TECHNIQUES AND A SITE SURVEY OF VISIBLE EVIDENCE.
QL-B
ELECTRONICALLY TRACED AS PER AS5488 (DIRECT CONNECTION, INDUCTION, FLEXITRACE/SONDE, FLEXROD/SONDE) WITH AN ESTIMATED POSITIONAL TOLERANCE OF +/-300MM IN PLAN, +/-500MM IN DEPTH (HIGH CONFIDENCE LEVEL).
QL-A
IS THE HIGHEST QUALITY LEVEL AS PER AS5488 AND CONSISTS OF THE POSITIVE IDENTIFICATION OF THE ATTRIBUTE AND LOCATION OF A SUBSURFACE UTILITY AT A POINT TO AN ABSOLUTE SPATIAL POSITION IN THREE DIMENSIONS. THIS CAN BE ACHIEVED AT OPENED PITS AND IN THE POTHOLES WHERE THE UTILITY IS EXPOSED.
HORIZONTAL AND VERTICAL
TOLERANCE: -/+ 50MM.

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LEGEND:

BB = BOTTOM OF BANK
BIT = BITUMEN
BK = BRICK
BLD = EXTERNAL BUILDING
BOK = BACK OF KERB
BOL = BOLLARD
BOR = BOTTOM OF ROCK
BW = BOTTOM WALL
CL = CENTRELINE
COG = CHANGE OF GRADE
CON = CONCRETE
CPIT = COMMUNICATIONS PIT
CSL = COMMUNICATIONS SURFACE LEVEL
DD = DISH DRAIN
DK = DECK
EPIL = ELECTRICITY PILLAR
ESL = ELECTRICITY SURFACE LEVEL
FCE = FENCE
GF = GUTTER LEVEL
GPIT = GAS PIT
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GRA = GRAVEL
GRT = GRATE
GSL = GAS SURFACE LEVEL
GTE = GATE
HYD = HYDRANT
IL = INVERT LEVEL
LAN = LANDING
LID = TOP OF PIPE LID
LIN = LINTEL
LP = LIGHT POLE
MW = MONITORING WELL
NS = NATURAL SURFACE
OSL = OPTUS SURFACE LEVEL SPOT
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SMH = SEWER MAN HOLE
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SVE = SEWER VENT
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TKB = TOP OF KERB
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TPIT = TELSTRA PIT
TR = TREE
TW = TOP OF WALL
VC = VEHICLE CROSSING
WC = WATER COURSE
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WV = WATER VALVE

× TREE
SPREAD-DIAMETER-HEIGHT

LEGEND: (SEE NOTES 1)

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LEGEND:

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CODE	DEPTH	PIPE DIAMETER	
106.78	SSL B	1.31	0.18 EOT
RL	LOCATION QUALITY		NOTE

0 5 10 15 20
SCALE 1:200

1	FIRST ISSUE	05/08/2020

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
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L.G.A. BAYSIDE

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CLIENT:
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BANKSIA, NSW, 2216

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ACN: 096 240 201
PO Box 463 Dee Why NSW 2099
2/99A South Creek Road, Dee Why NSW 2099
Telephone: (02) 9971 4802 Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

SURVEYED	DRAWN	CHECKED	APPROVED
NS	ABS	NS	AF

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
19535	1:200 @ A0	22-30/07/2020

DRAWING NAME: 19535detail
CAD FILE: 19535detail 1.dwg
SHEET 8 OF 12
ISSUE 1

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CODE	DEPTH	PIPE DIAMETER	
106.78	SSL	B 1.31	0.10 EOT
RL	LOCATION QUALITY		NOTE

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HORIZONTAL AND VERTICAL
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I	FIRST ISSUE	05/08/2020

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19535	1:200 @ A0	22-30/07/2020	
DRAWING NAME	SHEET	ISSUE	
19535detail	9 OF 12	I	
CAD FILE			
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106.78	1.31	0.18
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0 5 10 15 20
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CAD FILE: 19535detail .dwg		

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GPR = GROUND PENETRATING RADAR
HPG = HIGH PRESSURE GAS
NO SIG = NO SIGNAL
REDUN = REDUNDANT
UTO = UNABLE TO OPEN
UTT = UNABLE TO TRACE

RL	CODE	LOCATION QUALITY	DEPTH	PIPE DIAMETER	NOTE
106.78	SSL	B	1.31	0.10	EOT

LEGEND:

BB = BOTTOM OF BANK
BIT = BITUMEN
BK = BRICK
BLD = EXTERNAL BUILDING
BOK = BACK OF KERB
BOL = BOLLARD
BOR = BOTTOM OF ROCK
BW = BOTTOM WALL
CL = CENTRELINE
COG = CHANGE OF GRADE
CON = CONCRETE
CPIT = COMMUNICATIONS PIT
CSL = COMMUNICATIONS SURFACE LEVEL
DD = DISH DRAIN
DK = DECK
EPIL = ELECTRICITY PILLAR
ESL = ELECTRICITY SURFACE LEVEL
FCE = FENCE
GF = GUTTER LEVEL
GPIT = GAS PIT
GPM = GAS PIPELINE MARKER INDICATOR
GRA = GRAVEL
GRT = GRATE
GSL = GAS SURFACE LEVEL
GTE = GATE
HYD = HYDRANT
IL = INVERT LEVEL
LAN = LANDING
LID = TOP OF PIPE LID
LIN = LINTEL
LP = LIGHT POLE
MW = MONITORING WELL
NS = NATURAL SURFACE
OSL = OPTUS SURFACE LEVEL SPOT
POST = POST
PP = POWER POLE
RA = RAILING
RMP = RAMP
SMH = SEWER MAN HOLE
STR = STAIRS
SVE = SEWER VENT
SWSL = STORMWATER SURFACE LEVEL
TAP = TAP
TB = TOP OF BANK
TCK = TRACK
TKB = TOP OF KERB
TOP = TOP OF PIPE
TPIT = TELSTRA PIT
TR = TREE
TW = TOP OF WALL
VC = VEHICLE CROSSING
WC = WATER COURSE
WM = WATER METER
WSL = WATER SURFACE LEVEL
WV = WATER VALVE

TREE
SPREAD-DIAMETER-HEIGHT

I	FIRST ISSUE	05/08/2020

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 91983 & SSM 105974
L.G.A. BAYSIDE

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 91983
R.L. 1.599 (CLASS LB)
SOURCE: S.C.I.M.S. (22/07/2020)

CLIENT:
MODE DESIGN CORPORATION PTY LTD
LEVEL 5, 111-117 DEVONSHIRE STREET
SURRY HILLS, NSW, 2010

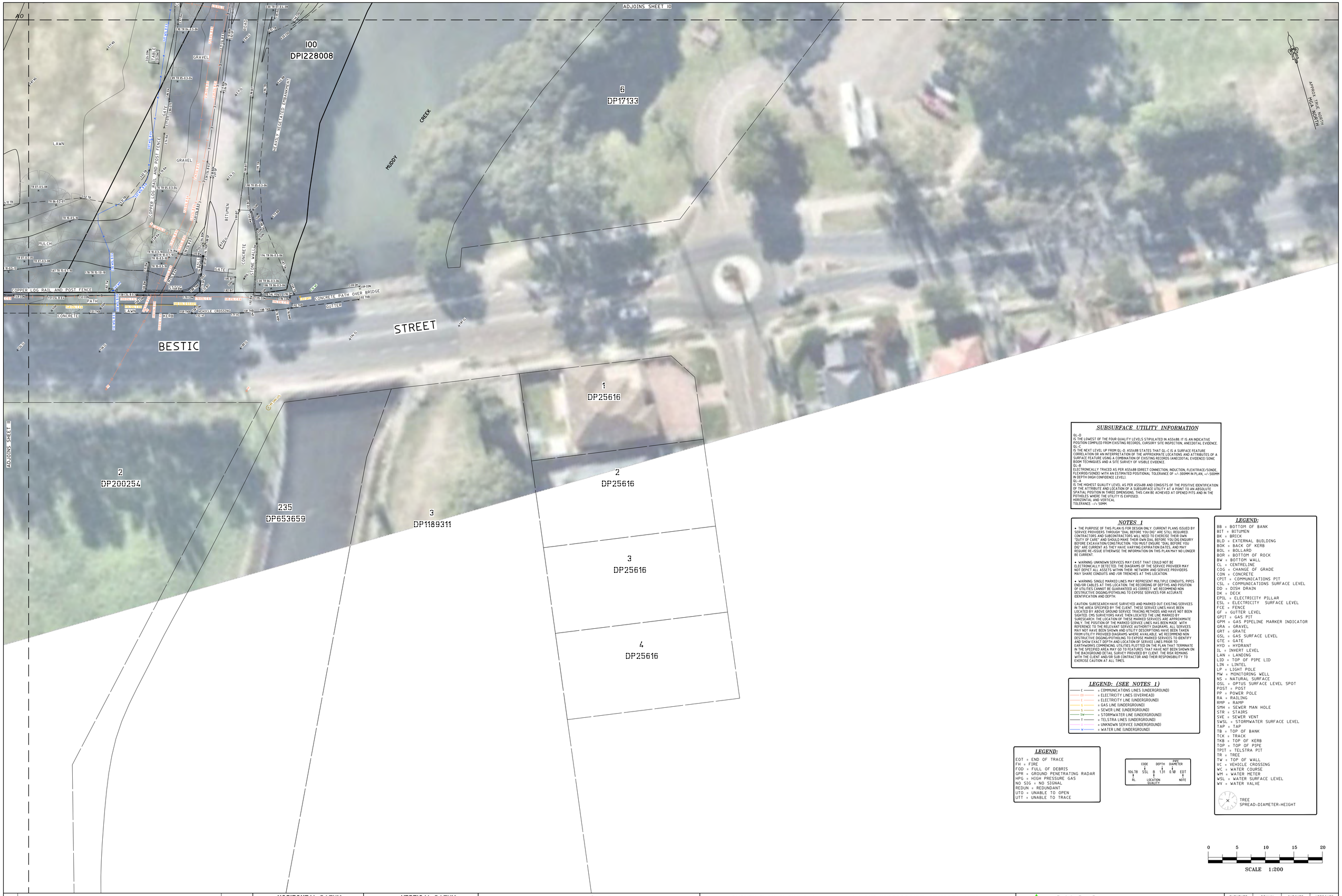
SURVEY PLAN SHOWING DETAIL, LEVELS AND UNDERGROUND SERVICES OVER PART LOT 100 IN DP1228008, LOT A IN DP400546, PART LOT 1 IN DP576148 & PART LOT 100 IN DP1133869
BARTON PARK PRECINCT
BANKSIA, NSW, 2216

C.M.S. Surveyors Pty Limited
ACN: 096 240 201
PO Box 463 Dee Why NSW 2099
2/99A South Creek Road, Dee Why NSW 2099
Telephone: (02) 9971 4802 Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

SURVEYED	DRAWN	CHECKED	APPROVED
NS	ABS	NS	AF

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
19535	1:200 @ A0	22-30/07/2020

DRAWING NAME	SHEET	ISSUE
19535detail CAD FILE 19535detail I.dwg	11 OF 12	I



SUBSURFACE UTILITY INFORMATION

QL-D
IS THE LOWEST OF THE FOUR QUALITY LEVELS STIPULATED IN AS5488. IT IS AN INDICATIVE POSITION COMPILED FROM EXISTING RECORDS, CURSORY SITE INSPECTION, ANECDOTAL EVIDENCE.
QL-C
IS THE NEXT LEVEL UP FROM QL-D. AS5488 STATES THAT QL-C IS A SURFACE FEATURE CORRELATION OR AN INTERPRETATION OF THE APPROXIMATE LOCATIONS AND ATTRIBUTES OF A SURFACE FEATURE USING A COMBINATION OF EXISTING RECORDS (ANECDOTAL EVIDENCE) SONIC BOOM TECHNIQUES AND A SITE SURVEY OF VISIBLE EVIDENCE.
QL-B
ELECTRONICALLY TRACED AS PER AS5488 (DIRECT CONNECTION, INDUCTION, FLEXITRACE/SONDE, FLEXROD/SONDE) WITH AN ESTIMATED POSITIONAL TOLERANCE OF +/-300MM IN PLAN, +/-500MM IN DEPTH (HIGH CONFIDENCE LEVEL).
QL-A
IS THE HIGHEST QUALITY LEVEL AS PER AS5488 AND CONSISTS OF THE POSITIVE IDENTIFICATION OF THE ATTRIBUTE AND LOCATION OF A SUBSURFACE UTILITY AT A POINT TO AN ABSOLUTE SPATIAL POSITION IN THREE DIMENSIONS. THIS CAN BE ACHIEVED AT OPENED PITS AND IN THE POTHOLES WHERE THE UTILITY IS EXPOSED.
HORIZONTAL AND VERTICAL
TOLERANCE: +/- 50MM.

NOTES 1

- THE PURPOSE OF THIS PLAN IS FOR DESIGN ONLY. CURRENT PLANS ISSUED BY SERVICE PROVIDERS THROUGH "DIAL BEFORE YOU DIG" ARE STILL REQUIRED. CONTRACTORS AND SUBCONTRACTORS WILL NEED TO EXERCISE THEIR OWN "DUTY OF CARE" AND SHOULD MAKE THEIR OWN DIAL BEFORE YOU DIG ENQUIRY BEFORE EXCAVATION/CONSTRUCTION. YOU MUST ENSURE "DIAL BEFORE YOU DIG" ARE CURRENT AS THEY HAVE VARYING EXPIRATION DATES, AND MAY REQUIRE RE-ISSUE OTHERWISE THE INFORMATION ON THIS PLAN MAY NO LONGER BE CURRENT.

- WARNING UNKNOWN SERVICES MAY EXIST THAT COULD NOT BE ELECTRONICALLY DETECTED. THE DIAGRAMS OF THE SERVICE PROVIDER MAY NOT DEPICT ALL ASSETS WITHIN THEIR NETWORK AND SERVICE PROVIDERS MAY SHARE CONDUITS AND /OR TRENCHES AT THIS LOCATION.

- WARNING SINGLE MARKED LINES MAY REPRESENT MULTIPLE CONDUITS, PIPES END/OR CABLES AT THIS LOCATION. THE RECORDING OF DEPTHS AND POSITION OF UTILITIES CANNOT BE GUARANTEED AS CORRECT. WE RECOMMEND NON DESTRUCTIVE DIGGING/POTHOLING TO EXPOSE SERVICES FOR ACCURATE IDENTIFICATION AND DEPTH.

CAUTION: SURESEARCH HAVE SURVEYED AND MARKED OUT EXISTING SERVICES IN THE AREA SPECIFIED BY THE CLIENT. THESE SERVICE LINES HAVE BEEN LOCATED BY ABOVE GROUND SERVICE TRACING METHODS AND HAVE NOT BEEN SIGHTED. CMS SURVEYORS HAVE THEN LOCATED THE LINE MARKED BY SURESEARCH. THE LOCATION OF THESE MARKED SERVICES ARE APPROXIMATE ONLY. THE POSITION OF THE MARKED SERVICE LINES HAS BEEN MADE WITH REFERENCE TO THE RELEVANT SERVICE AUTHORITY DIAGRAMS. ALL SERVICES MAY NOT HAVE BEEN SHOWN AND UTILITY DESCRIPTIONS HAVE BEEN TAKEN FROM UTILITY PROVIDED DIAGRAMS WHERE AVAILABLE. WE RECOMMEND NON DESTRUCTIVE DIGGING/POTHOLING TO EXPOSE MARKED SERVICES TO IDENTIFY AND SHOW EXACT DEPTH AND LOCATION OF SERVICE LINES PRIOR TO EARTHWORKS COMMENCING. UTILITIES PLOTTED ON THE PLAN THAT TERMINATE IN THE SPECIFIED AREA MAY GO TO FEATURES THAT HAVE NOT BEEN SHOWN ON THE BACKGROUND DETAIL SURVEY PROVIDED BY CLIENT. THE RISK REMAINS WITH THE CLIENT AND/OR SUB CONTRACTOR AND THEIR RESPONSIBILITY TO EXERCISE CAUTION AT ALL TIMES.

LEGEND:

BB = BOTTOM OF BANK
BIT = BITUMEN
BK = BRICK
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WC = WATER COURSE
WM = WATER METER
WSL = WATER SURFACE LEVEL
WV = WATER VALVE

TREE
SPREAD-DIAMETER-HEIGHT

LEGEND: (SEE NOTES 1)

C = COMMUNICATIONS LINES (UNDERGROUND)
EO = ELECTRICITY LINES (OVERHEAD)
E = ELECTRICITY LINE (UNDERGROUND)
G = GAS LINE (UNDERGROUND)
S = SEWER LINE (UNDERGROUND)
SW = STORMWATER LINE (UNDERGROUND)
T = TELSTRA LINES (UNDERGROUND)
U = UNKNOWN SERVICE (UNDERGROUND)
W = WATER LINE (UNDERGROUND)

LEGEND:

EOT = END OF TRACE
FH = FIRE
FOD = FULL OF DEBRIS
GPR = GROUND PENETRATING RADAR
HPG = HIGH PRESSURE GAS
NO SIG = NO SIGNAL
REDUN = REDUNDANT
UTO = UNABLE TO OPEN
UTT = UNABLE TO TRACE

CODE	DEPTH	PIPE DIAMETER
106.78 SSL	B 1.31	0.10 EOT
RL	LOCATION QUALITY	NOTE

0 5 10 15 20

SCALE 1:200

1	FIRST ISSUE	05/08/2020

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 91983 & SSM 105974
L.G.A. BAYSIDE

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SURVEYED	DRAWN	CHECKED	APPROVED
NS	ABS	NS	AF

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
19535	1:200 @ A0	22-30/07/2020

DRAWING NAME: 19535detail
CAD FILE: 19535detail 1.dwg
SHEET: 12 OF 12
ISSUE: 1

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- Verify all dimensions on site prior to commencement of work.
- DO NOT scale off these drawings.
- Report any discrepancies to the architect before carrying out any work.

AMENDMENTS

REV	DESCRIPTION	AUTH	CHK	DATE
1	FOR COORDINATION	CG	TW	14/08/20
2	FOR COORDINATION	CG	TW	18/08/20

STATUS

0m 1 2 3 4 5

NORTH

BRISBANE
Plaza Level, Mosaic
826 Ann St
Fortitude Valley QLD 4006
T +61 7 3253 9900
bne@modedesign.com.au
ABN: 65 112 807 931

CLIENT

Bayside Council

PROJECT

BARTON PARK PRECINCT

88-96 Bestic Street, Banksia

DRAWING TITLE

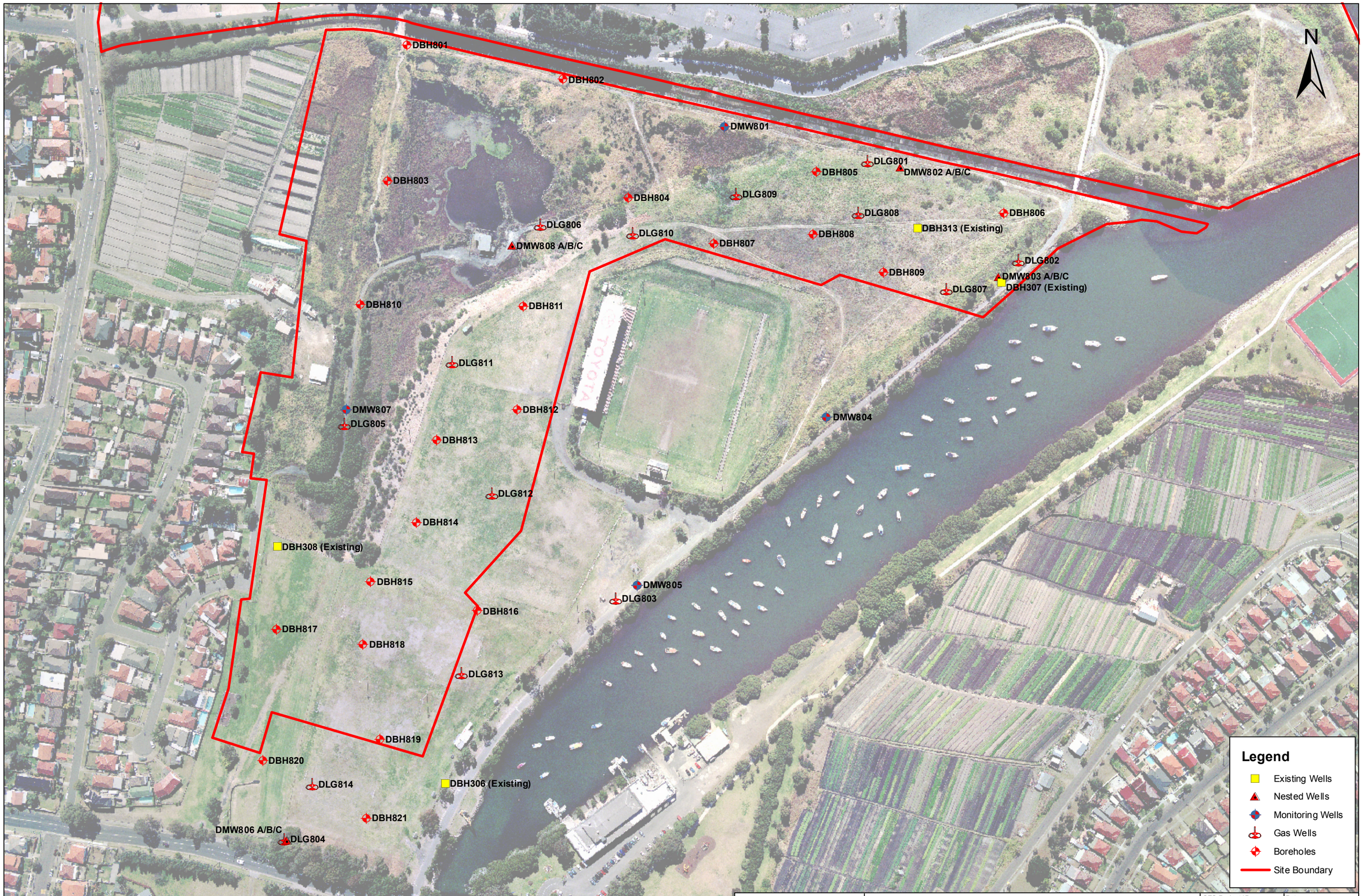
MASTERPLAN - CARPARK OPTION 1

DRAWN	CHECKED
CG	TW
ISSUE 18/08/2020 5:50:05 PM	SCALE @ A1 1 : 1000

PROJECT No	STAGE	DRAWING No	REVISION
20273	DD	LD- 0100	2

EDISON
ENVIRONMENTAL + ENGINEERING

ANNEXURE 2:
Previous Borehole Logs and Site Plan



CONSULTING EARTH SCIENTISTS
Jones Bay Wharf 19-21, Suite 121
26-32 Pirrama Road, Pyrmont, NSW, 2009
ph 8569 2200 fax 9552 4399

Title

Figure 2: Sample Location Plan

CES Project ID:	Date:
CES050706-BCC	27/06/2008
Prepared By: M.Howden	Checked By: P.Norris

N
D1MW5
D1BH14
D1BH15
D1BH16
D1BH17
D1MW6
D1BH13
D1BH18
D1BH19
D1BH20
D1BH21
D1BH33
D1BH22
D1MW7
DMW804
D1BH12
D1BH24
D1BH23
D1G02
D1BH28
D1MW8
D1BH11
D1G01
D1BH10
D1BH27
D1BH26
D1BH25
D1MW4
D1BH32
D1BH31
DMW805
D1BH29
D1BH30
DLG805
DBH816
D1BH35
D1BH36
D1MW1
DLG813
D1BH37
D1BH38
D1MW3
D1BH44
D1BH39
DBH820
DBH806
DLG814
D1BH34
D1BH43
D1BH42
DBH821
D1BH41
DMW806A/B/C
DLG804
D1BH45
D1MW2
0
50
100
150
200
Meters
Source: Department of Lands
Legend
Pre-existing Wells
Pre-existing Gas Wells
Boreholes (2015)
Monitoring Wells (2015)
Geotechnical Boreholes (2015)
D1 Site Boundary
CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55-65 Grandview Street
Pymble, NSW, 2073
Ph 8569 2200 Fax 9983 0582
Title
Figure 3: Borehole and Groundwater Monitoring Well Location Plan Area D1
CES Project ID: CES130608-BP
Date: 02/02/2016
Prepared By: W. South
Checked By: J. Dobson

Project ID:	CES050706-BCC	**Easting:**	329290.10
Project:	Cooks Cove	**Northing:**	6242415.23
Client:	Boyd Cook Cove	**Elevation:**	1.98
Location:	Cooks Cove		

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26-32 Pirrama Road Pyrmont 2009
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Environmental Log: DBH801

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Direct Push			FILL: Grass/topsoil, silty sand, brown, dry. loose, fine grained, minor gravel up to 5mm diameter				
				FILL: Silty sand, brown, dry, loose, fine grained, sandstone up to 25mm in diameter, minor paint flecks/pieces (blue) up to 10mm in diameter				
				FILL: Crushed sandstone, weathered, white/orange, dry				
1				FILL: Sandy clay, brown/orange, moist, soft, fine grained, minor sandstone up to 10mm in diameter, minor gravel up to 15mm diameter				
				SILTY CLAY: Dark grey to black, moist, soft, organic matter				
2				SILTY SAND: Grey/brown, wet, loose, fine grained, organic matter				
3				**End of borehole.**				
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	13/05/2008
Drill Model:	Geoprobe 7720DT	**Date Completed:**	13/05/2008
Hole Diameter (mm):	83	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329402.18
Project:	Cooks Cove	**Northing:**	6242389.69
Client:	Boyd Cook Cove	**Elevation:**	1.43
Location:	Cooks Cove		

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Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399

Environmental Log: DBH802

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Direct Push			FILL: Roadbase				
				FILL: Silty sand, dark grey, dry, loose, fine grained, gravel up to 10mm in diameter				
				FILL: Sandy clay, brown/orange, moist, soft, fine grained, minor sandstone up to 5mm in diameter, minor organic matter				
1				SANDY CLAY: Dark grey/black, moist, soft, fine grained, organic matter				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	13/05/2008
Drill Model:	Geoprobe 7720DT	**Date Completed:**	13/05/2008
Hole Diameter (mm):	83	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329281.57
Project:	Cooks Cove	**Northing:**	6242316.46
Client:	Boyd Cook Cove	**Elevation:**	1.31
Location:	Cooks Cove		

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26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399

Environmental Log: DBH803

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Hand Aug			FILL: Silty sand, brown, dry, loose, fine grained, brick up to 10mm diameter, slag/ash material up to 10mm diameter, basalt up to 20mm diameter, minor sandstone (crushed)				
				FILL: Refusal				
1				**End of borehole.**				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	15/05/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	15/05/2008
Hole Diameter (mm):	75	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329449.64
Project:	Cooks Cove	**Northing:**	6242314.30
Client:	Boyd Cook Cove	**Elevation:**	1.05
Location:	Cooks Cove		

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Environmental Log: DBH804

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Direct Push			FILL: Grass/topsoil, silty sand, brown, moist, loose, fine grained, gravel up to 10mm diameter, sandstone up to 20mm diameter				
				FILL: Extremely weathered shale, silt, light grey, dry to moist, minor organic matter				
1				FILL: Silty sand, dark grey/black, moist to wet, loose, medium grained, gravel up to 10mm diameter, slag/ash material up to 20mm diameter, plastic, timber fragments, slight landfill odour				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	13/05/2008
Drill Model:	Geoprobe 7720DT	**Date Completed:**	13/05/2008
Hole Diameter (mm):	83	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329586.28
Project:	Cooks Cove	**Northing:**	6242322.97
Client:	Boyd Cook Cove	**Elevation:**	5.89
Location:	Cooks Cove		

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26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399

Environmental Log: DBH805

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Silty sand, brown, dry, loose , medium grained, minor clay, sandstone up to 10mm in diameter, ironstone up to 10mm in diameter				
				FILL: Brick/tile rubble				
1				FILL: Silty sand, brown, dry, loose, fine - medium grained, minor gravel, sandstone up to 10mm in diameter				
				FILL: Silty sand, dark grey, dry, loose, medium - coarse grained, minor gravel, minor slag/ash material, waste material - plastic, glass, timber. No ACH observed in fill material				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	10/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	10/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329720.33
Project:	Cooks Cove	**Northing:**	6242291.53
Client:	Boyd Cook Cove	**Elevation:**	6.30
Location:	Cooks Cove		

CONSULTING EARTH SCIENTISTS
Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399

Environmental Log: DBH806

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Silty sand, brown, dry, loose, fine grained, brick up to 40mm diameter, concrete up to 25mm in diameter				
1				FILL: Silty sand, brown, dry, loose, fine grained, brick up to 40mm diameter, concrete up to 25mm in diameter				
				FILL: Silty sand, brown, dry, loose, medium grained, minor clay, gravel up 10mm diameter, sandstone up to 20mm diameter, fibrous material present - pieces up to 10mm in diameter (possible ACH)				
2				**End of borehole.**				
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	04/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	04/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329514.62
Project:	Cooks Cove	**Northing:**	6242273.96
Client:	Boyd Cook Cove	**Elevation:**	6.62
Location:	Cooks Cove		

CONSULTING EARTH SCIENTISTS
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26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399

Environmental Log: DBH807

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Silty sand, light brown, dry, loose, medium grained, minor ironstone up to 10mm diameter, minor gravel, sandstone up to 15mm diameter, minor glass pieces up to 5mm diameter				
1				FILL: Sandy clay, dark brown to black, moist, stiff, fine - medium grained, brick up to 20mm diameter, sandstone up to 10mm diameter, minor gravel, minor glass pieces up to 5mm in diameter				
				FILL: As above. Slight landfill odour, waste material present - plastic, metal, ceramic, timber. Note - No asbestos material observed				
2				**End of borehole.**				
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	04/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	04/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329584.09
Project:	Cooks Cove	**Northing:**	6242278.55
Client:	Boyd Cook Cove	**Elevation:**	6.16
Location:	Cooks Cove		

CONSULTING EARTH SCIENTISTS
Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399

Environmental Log: DBH808

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Silty sand, brown to dark brown, dry, loose, medium grained, minor concrete, slag - ash material, glass pieces (up to 10mm diameter), brick, minor fibrous material present (up to 10mm diameter), crushed sandstone				
				FILL: As above, slight landfill odour, timber, plastic, metal present				
1				**End of borehole.**				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	04/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	04/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329633.92
Project:	Cooks Cove	**Northing:**	6242251.35
Client:	Boyd Cook Cove	**Elevation:**	5.77
Location:	Cooks Cove		

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Environmental Log: DBH809

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Silty sand, brown, grey, dry, loose				
				FILL: Sandstone rubble				
1				FILL: Silty sand, grey - dark brown, dry, loose, medium grained, minor gravel, sandstone up to 20mm diameter, brick up to 30mm in diameter, minor concrete, slag/ash material, minor glass/ceramic.				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	10/04/2008
Drill Model:	Geoprobe 6620DT	**Date Completed:**	10/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329273.90
Project:	Cooks Cove	**Northing:**	6242228.60
Client:	Boyd Cook Cove	**Elevation:**	0.86
Location:	Cooks Cove		

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Environmental Log: DBH810

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Direct Push			FILL: Silty sand, dark grey, dry, loose, medium grained, slag/ash material up to 10mm diameter, minor roadbase up to 5mm diameter	130508-09-PN	Grab		
				FILL: Silty sand, grey/orange, moist, loose, fine grained, minor gravel up to 5mm diameter, organic matter	130508-11-PN	Grab		
				SILTY CLAY: Organic rich, black, moist, soft	130508-10-PN	Grab		
1				SANDY CLAY: Grey/brown, moist, soft, fine grained, organic matter				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	13/05/2008
Drill Model:	Geoprobe 7720DT	**Date Completed:**	13/05/2008
Hole Diameter (mm):	83	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329377.51
Project:	Cooks Cove	**Northing:**	6242226.88
Client:	Boyd Cook Cove	**Elevation:**	5.44
Location:	Cooks Cove		

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Environmental Log: DBH811

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Silty sand, dry, loose, grey, fine grained, gravel up to 20mm diameter				
				FILL: Silty sand, dark grey, dry, loose, medium grained, minor brick up to 5mm diameter, minor concrete up to 5mm in diameter				
1				FILL: Silty sand, dark grey, dry, loose, fine grained, brick up to 10mm diameter, minor gravel, slight landfill odour, waste material present - timber, glass, metal, ceramic				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	04/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	04/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329371.11
Project:	Cooks Cove	**Northing:**	6242149.85
Client:	Boyd Cook Cove	**Elevation:**	4.97
Location:	Cooks Cove		

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Environmental Log: DBH812

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Silty clay, dark brown/black, moist, soft, fine grained, brick up to 20mm diameter, minor gravel, sandstone up to 20mm diameter				
				FILL: Dark brown - black, moist, soft, coarse grained sand, brick up to 20mm diameter, minor gravel, sandstone up to 20mm diameter, landfill odour, waste material - metal, glass, plastic, timber. No asbestos material observed				
1				**End of borehole.**				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	04/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	04/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329316.28
Project:	Cooks Cove	**Northing:**	6242132.16
Client:	Boyd Cook Cove	**Elevation:**	5.31
Location:	Cooks Cove		

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Environmental Log: DBH813

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil				
				FILL: Silty sand, brown, dry, loose, fine grained, gravel up to 15mm diameter				
				FILL: Clayey sand, moist, soft, fine to medium grained, brown, sandstone (red/orange) up to 20mm diameter, gravel, potential asbestos material (white / fibrous), ironstone up to 10mm diameter				
1				FILL: Silty sand, dark grey, moist, loose, medium to coarse grained, landfill odour, sandstone up to 20mm diameter, ironstone up to 10mm diameter, concrete, gravel up to 5mm diameter				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	01/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	01/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329302.17
Project:	Cooks Cove	**Northing:**	6242073.62
Client:	Boyd Cook Cove	**Elevation:**	5.01
Location:	Cooks Cove		

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Environmental Log: DBH814

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil				
				FILL: Silty sand, brown, moist, loose, medium grained, slag/ash material up to 20mm diameter, minor clay, plastic, ceramic up to 10mm diameter, minor gravel				
				FILL: Silty sand, dark grey - black, medium - coarse grained, moist, loose, 20mm diameter, minor gravel, landfill odour, waste material - metal, glass, ceramic, plastic. Note - No asbestos material observed				
1				**End of borehole.**				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	01/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	01/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329269.68
Project:	Cooks Cove	**Northing:**	6242031.29
Client:	Boyd Cook Cove	**Elevation:**	5.10
Location:	Cooks Cove		

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Environmental Log: DBH815

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil				
				FILL: Silty sand, brown, dry loose, fine grained, minor sandstone up to 10mm diameter, minor clay, minor slag/ash material up to 10mm diameter, minor charcoal material (fragments up to 5mm diameter)				
1				FILL: Same description as above. Slight landfill odour, brick up to 20mm diameter, plastic, metal, tile (waste material)				
				FILL: Silty clay, dark grey, moist, soft, fine grained, minor shell fragments. Note - No asbestos material observed				
2				**End of borehole.**				
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	01/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	01/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329345.55
Project:	Cooks Cove	**Northing:**	6242010.72
Client:	Boyd Cook Cove	**Elevation:**	4.17
Location:	Cooks Cove		

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Environmental Log: DBH816

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Silty sand, brown to dark, dry, loose, fine grained, brick fragments, sandstone up to 10mm diameter				
				FILL: Silty sand, brown to dark, dry, loose, fine grained, brick fragments, sandstone up to 10mm diameter				
1				FILL: Silty sand, brown to dark, dry, loose, fine grained, brick fragments, sandstone up to 10mm diameter				
				FILL: Silty sand, dark grey, moist, loose, fine grained				
				FILL: Silty sand, dark grey to black, moist, loose, fine grained, landfill odour, waste material - glass, ceramic, metal. Note - No asbestos material observed				
2				**End of borehole.**				
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	01/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	01/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329205.83
Project:	Cooks Cove	**Northing:**	6241996.58
Client:	Boyd Cook Cove	**Elevation:**	1.27
Location:	Cooks Cove		

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Environmental Log: DBH817

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			TOPSOIL: Grass				
				FILL: Clayey sand, brown to dark brown, dry to moist, stiff, fine grained, sandstone up to 20mm diameter				
				SANDY CLAY: Brown/orange, dry to moist, soft, fine grained, minor organic matter, minor ironstone up to 5mm diameter				
1				SILTY CLAY: Dark grey/black, moist, soft				
				SAND: Light grey, moist, loose, fine grained, shell fragments				
				SANDY CLAY: Grey to dark grey, moist to wet, soft, fine grained, organic matter				
				CLAYEY SAND: Dark grey, wet, loose, fine grained				
2				**End of borehole.**				
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	07/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	07/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329264.22
Project:	Cooks Cove	**Northing:**	6241986.87
Client:	Boyd Cook Cove	**Elevation:**	4.87
Location:	Cooks Cove		

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Environmental Log: DBH818

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass / topsoil (silty sand)				
				FILL: Brown, dry, loose, fine grained, gravel, sandstone up to 20mm diameter				
				FILL: Dark grey - black, loose, dry, coarse grained, basalt up to 45mm diameter, slag/ash material, sandstone up to 20mm diameter, minor gravel, slight landfill odour, waste material - timber, glass, metal. Note - No asbestos material observed				
1				**End of borehole.**				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	04/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	04/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329276.15
Project:	Cooks Cove	**Northing:**	6241919.63
Client:	Boyd Cook Cove	**Elevation:**	4.64
Location:	Cooks Cove		

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Environmental Log: DBH819

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			TOPSOIL: Grass				
				FILL: Silty sand, brown, dry, loose, fine grained, minor gravel				
				FILL: Clayey sand, grey/brown, dry, loose, fine grained, minor gravel, minor sandstone (crushed)				
1				FILL: As above, waste material - metal, plastic, timber, glass, slight landfill odour				
				FILL: As above				
2				**End of borehole.**				
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	07/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	07/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329192.66
Project:	Cooks Cove	**Northing:**	6241904.46
Client:	Boyd Cook Cove	**Elevation:**	1.34
Location:	Cooks Cove		

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Environmental Log: DBH820

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			TOPSOIL: Grass				
				FILL: Silty sand, brown, dry to moist, loose, medium grained, minor gravel, sandstone up to 10mm diameter, slag/ash material				
				SANDY CLAY: Brown/orange, moist, soft, fine grained, ironstone up to 5mm diameter, organic matter				
1				SAND: Light grey, wet, loose, fine to medium grained				
				CLAYEY SAND: Grey, wet, loose, fine grained				
2				**End of borehole.**				
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	07/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	07/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329269.14
Project:	Cooks Cove	**Northing:**	6241861.07
Client:	Boyd Cook Cove	**Elevation:**	4.19
Location:	Cooks Cove		

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Environmental Log: DBH821

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			TOPSOIL: Grass				
				FILL: Silty sand, brown, dry, loose, medium grained, minor gravel, sandstone up to 20mm diameter, brick up to 10mm diameter				
				FILL: Silty sand, dark brown, dry to moist, loose, fine to medium grained, basalt up to 40mm diameter, minor sandstone, minor gravel				
1				FILL: Silty sand, dark grey/black, moist, loose, fine grained, gravel, minor sandstone (crushed)				
				FILL: As above, waste material - plastic, metal, glass, timber, slight landfill odour				
				End of borehole.				
2								
3								
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	07/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	07/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES050706-BCC	**Easting:**	329719.72
Project:	Cooks Cove	**Northing:**	6242245.15
Client:	Boyd Cook Cove	**Elevation:**	1.50
Location:	Cooks Cove		

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Environmental Log: DMW803A

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Direct Push			TOPSOIL: Grass				
				FILL: Concrete/sandstone rubble, minor roadbase				
				FILL: Silty sand, brown, dry, loose, fine grained, sandstone (crushed)				
1				FILL: Silty sand, dark brown, moist, loose, fine grained, minor bitumen/concrete, waste material - timber, glass, plastic				
				SILTY SAND: Dark brown to dark grey, wet, loose, minor organic matter, slight organic odour				
2								
3				SAND: Light grey, fine to medium grained, wet, loose				
4				**End of borehole.**				
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	10/04/2008
Drill Model:	Geoprobe 6620DT	**Date Completed:**	10/04/2008
Hole Diameter (mm):	83	**Logged/checked by:**	Philip Norris

Project ID:

Project: Cooks Cove

Client: Boyd Cook Cove

Location: Cooks Cove

Easting: 329455.13

Northing: 6242031.24

Elevation: 2.05

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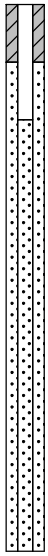
Environmental Log: **DMW805**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Grass and topsoil				
1				FILL: Silty sand, brown, dry, loose, fine grained, sandstone up to 15mm diameter, glass up to 15mm diameter				
2				FILL: Clayey sand, dark grey to black, moist, soft, fine grained, waste material present - timber, paint chips, glass, hydrocarbon odour				
3				FILL: Silty sand, moist, loose, fine grained, grey. Groundwater intersected @ 1.8m				
4				FILL: Clayey sand, dark brown, wet, soft, fine grained, minor organic matter (roots)				
5				FILL: Silty sand, grey, wet, loose, fine grained. Note - No asbestos material observed				
6				FILL: Silty sand, grey, wet, loose, fine grained. Note - Borehole over drilled 4.0 - 5.0m to compensate for collapse				
7				FILL: Silty sand, grey, wet, loose, fine grained				
8				**End of borehole.**				
9								
10								



Drill Company: Macquarie Drilling

Drill Model: Hydrapower Scout V

Hole Diameter (mm): 125

Date Commenced: 01/04/2008

Date Completed: 01/04/2008

Logged/checked by: Philip Norris

Project ID:	CES050706-BCC	**Easting:**	
Project:	Cooks Cove	**Northing:**	
Client:	Boyd Cook Cove	**Elevation:**	
Location:	Cooks Cove		

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Environmental Log: DMW806A

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger Solid Flight			FILL: Mulch				
1				FILL: Silty sand, grey/brown, moist, loose, fine to medium grained				
2				CLAYEY SAND: Grey to dark grey, wet, soft, fine to medium grained				
3								
				End of borehole.				
4								
5								

Drill Company:	Macquarie Drilling	**Date Commenced:**	07/04/2008
Drill Model:	Hydrapower Scout V	**Date Completed:**	07/04/2008
Hole Diameter (mm):	125	**Logged/checked by:**	Philip Norris

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1MW1**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil: Brown, sandy soil, organic matter				
				FILL: Clayey SAND: dark brown, fine - medium grain, medium- high plasticity, dry-moist, wood, rock and brick fragments, pieces of plastic and glass, hydrocarbon odour	D1MW1-1 QA/QC101 QA/QC102			
1				low -medium plasticity from 1.8 metres moist at 1.8 metres wet at 2.2 metres				
2					D1MW1-2			
					D1MW1-3			
3				CLAY: Clayey SAND: grey/brown, fine grained, low plasticity, wet, sulphuric odour				
				Possibly natural (PASS)	D1MW1-4			
4								
5								
6								
7								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	19 October 2015
Drill Model:	EDSON 100	**Date Completed:**	19 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1MW2**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil				
				FILL: Clayey SAND: brown, fine-medium grain, high plasticity, dry, brick and rock fragments	D1MW2-1			
1				FILL: Clayey SAND: dark brown, medium plasticity, dry-moist, brick and rock fragments, plastic and wood materials, hydrocarbon odours Oil sheen from 3.1 metres Wet at 3.1 metres	D1MW2-2			
2								
3					D1MW2-3			
					D1MW2-4			
4				CLAY: Clayey SAND: brown/grey, fine-medium grain, low plasticity, wet, hydrocarbon odour Possibly natural	D1MW2-5			
5								
6								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	20 October 2015
Drill Model:	EDSON 100	**Date Completed:**	20 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1MW3**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil: Brown				
				FILL: Clayey SAND: brown, fine-medium grain, high plasticity, dry-moist, rock fragments	D1MW3-1 QA/QC103			
1								
				FILL: Clayey SAND: dark brown, fine grained, medium-high plasticity, dry-moist, rock and glass fragments, wood material. hydrocarbon odours Abundant amounts of wood materials from approximately 2.0 metres Wet at approximately 4.2 metres Oil sheen from 4.0 metres	D1MW3-2			
2								
					D1MW3-3			
3								
4								
					D1MW3-4			
5								
				CLAY: Clayey SAND: Dark grey/brown, fine grained, low plasticity, wet, very slight sulphuric odour, peaty				
6								
7								
8								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	19 October 2015
Drill Model:	EDSON 100	**Date Completed:**	19 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Sheet: 1/1

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1MW4**

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PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil: Grey/brown, sandy, medium grain, organic material				
				FILL: Clayey SAND: grey/brown, fine-medium grain, medium-high plasticity, dry, rock fragments, sub-angular shale, sandy in parts, hydrocarbon odour	D1MW4-1			
1					D1MW4-2			
				FILL: Clayey SAND: dark brown/black, fine-medium grained, medium plasticity, moist, hydrocarbon odours, large amounts of wood materials, rock fragments, cement fragments, pieces of wire and plastic, slight sheen Water at 3.5 metres				
2					D1MW4-3			
3					D1MW4-4			
4					D1MW4-5			
5					D1MW4-6			
6								
7								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	19 October 2015
Drill Model:	EDSON 100	**Date Completed:**	19 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1MW5**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown, fine, dry, with angular gravel Presence of bricks around 1.5 metres Becoming dark brown	D1MW5_0.0-1.0			
1					D1MW5_1.0-2.0			
2				FILL: Clayey SAND: dark brown, fine, dry, with high plasticity clay	D1MW5_2.0-3.0			
3					D1MW5_3.0-4.0			
4					D1MW5_4.0-5.0			
5				FILL: Clayey SAND: dark brown, fine, dry, with high plasticity clay, with waste Water at 5.8 metres Wire/cables at 7.0 metres	D1MW5_5.0-6.0			
6				Refusal terminated on account of steel cable/wire	D1MW5_6.0-7.0			
7					D1MW5_7.0-7.2			
8								

Drill Company:	SDI	**Date Commenced:**	15/10/15
Drill Model:		**Date Completed:**	15/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1MW5b**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Clayey SAND: brown, fine, dry - with low to medium plasticity clay, and with fragments of brick Steel around 1.7 metres	D1MW5b_0.0-1.0			
1					D1MW5b_1.0-2.0			
2								
3								
4								

Drill Company:	SDI	**Date Commenced:**	15/10/15
Drill Model:		**Date Completed:**	15/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1MW6**

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PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Capping Layer Gravelly SAND: brown, fine, dry	D1MW6_0.0-1.0			
1				FILL: Clayey SAND: dark brown, fine, dry, with high plasticity clay, with waste (treated wood), and moderate hydrocarbon odour Becoming moist around 3.0 metres	D1MW6_1.0-2.0			
2				Presence of nylon fishing line - new V bit. Wet at 4.5 metres	D1MW6_2.0-3.0			
3					D1MW6_3.0-4.0			
4					D1MW6_4.0-5.0			
5					D1MW6_5.0-6.0			
6					D1MW6_6.0-7.0			
7								
8								

Drill Company:	SDI	**Date Commenced:**	15/10/15
Drill Model:		**Date Completed:**	15/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1MW7**

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PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil: Brown/grey				
				FILL: SAND: grey/brown, fine grain, organic material, rock fragments				
				FILL: Sand/Peat, dark grey, fine grain, moist, organic material, hydrocarbon odour, rock fragments	D1MW7-5			
				FILL: Clayey SAND: brown/grey, fine-medium grain, low plasticity, soft, moist-wet, hydrocarbon odour (lessening with depth) Wet at 2.2 metres				
1					D1MW7-1			
				Possibly natural from 2.4 metres (?) Clayey SAND: grey/brown, fine grain, low plasticity, soft, wet, slight hydrocarbon odour, slight sulphurous odour				
2					D1MW7-2			
3					D1MW7-3			
4					D1MW7-4			
5								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	16 October 2015
Drill Model:	EDSON 100	**Date Completed:**	16 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Sheet: 1/1

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1MW8**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil: Brown/ organic material				
				FILL: Clayey SAND: Light grey/brown, fine-medium grain, low plasticity, soft, moist, peat/organic layers,sulphuric odour	D1MW8-1			
				Wet at 1.1 metres to EOH	D1MW8-2			
1								
2					D1MW8-3			
3					D1MW8-4			
4					D1MW8-5			
5								
6								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	16 October 2015
Drill Model:	EDSON 100	**Date Completed:**	16 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	CONSULTING EARTH SCIENTISTS	**Borehole No:**
Client:	Boyd Properties Pty Ltd	Level 1, 55 Grandview Street	**D1G01**
Project:	Cooks Cove Development	Suite 3, Pymble, NSW 2073	
Location:	Area D1, Cooks Cove	PH: (02) 8569 2200 FAX: (02) 9552 4399	Sheet: 1 of 2
		www.consultingearth.com.au	

X-Coord:	329417.8	**Date Commenced:**	22/10/2015	**Logged by:**	M.E
Y-Coord:	6242098.2	**Date Completed:**	23/10/2015	**Checked by:**	S.M
Surface Elevation (R.L) :	4.51 m AHD	**Hole Diameter (mm):**	125		

Drilling Information				LITHOLOGY					Samples	Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor component	Consistency / Density	Moisture	Sample ID	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Notes and additional observations
0						TOPSOIL: Silty Sand, dark brown, fine to medium grained, trace fine to medium gravel and ash.	L	D				
	4						L	M				
1						FILL: Sand, black and dark grey, fine to medium grained, fine to medium gravel of shale, sandstone and aggregate with minor clay content. Ash, glass, wire, plastic, broken concrete and wood fragments throughout.						
	3									SPT01 1.5-1.95m 6, 8, 4 N =12		
2												
	2											
3										SPT02 3.0m N>10 Refusal, bouncing on 0.5 inch wire.		
	1											
4		ADV	⊠			... At 4.0m, increasing in wood fragments, wire and clay content.		W				
	0									SPT03 4.5-4.95m 6, 2, 6 N = 8		
5												
	-1											
6						6.2m				SPT04 6.0-6.45m 2, 2, 3 N = 5		
	-2					SAND: Light grey and dark grey, fine to medium grained, shells throughout. (Alluvium)	VL - MD	W				
7												
	-3									SPT05 8.25-8.70m 4, 5, 7 N=12		
8												
	-4					... In SPT05 8.25-8.70m, large amount of shell fragments.						
9												
	-5									SPT06 9.75-10.20m N = 0 dropped under weight of hammer		
10						... At 9.75m, minor clay content.						
	-6											

Drill Company:	Site Drilling and Investigation	**Operator Name:**	Doug Millar	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 100 (Truck mounted)			

Project ID:	CES130608-BP	CONSULTING EARTH SCIENTISTS	**Borehole No:**
Client:	Boyd Properties Pty Ltd	Level 1, 55 Grandview Street	**D1G01**
Project:	Cooks Cove Development	Suite 3, Pymble, NSW 2073	
Location:	Area D1, Cooks Cove	PH: (02) 8569 2200 FAX: (02) 9552 4399	Sheet: 2 of 2
		www.consultingearth.com.au	

X-Coord:	329417.8	**Date Commenced:**	22/10/2015	**Logged by:**	M.E
Y-Coord:	6242098.2	**Date Completed:**	23/10/2015	**Checked by:**	S.M
Surface Elevation (R.L) :	4.51 m AHD	**Hole Diameter (mm):**	125		

Drilling Information				LITHOLOGY					Samples	Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor component	Consistency / Density	Moisture	Sample ID	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Notes and additional observations
11	-6	Wash Bore (MUD)				SAND (Continued): Light grey and dark grey, fine to medium grained, shells throughout. (Alluvium) 11.5m	VL - MD	W		SPT07 11.25-11.70m 2,1,1 N = 2		11
12	-7					SAND: Grey and light grey, fine to medium grained, very stiff medium to high plasticity sandy clay bands throughout. Trace shells. (Alluvium)	MD	M-W				12
13	-8									SPT08 12.75-13.05m 15,25 N>25		13
14	-9									SPT09 14.25-14.52m 21,25 N>25		14
15	-10											15
16	-11									SPT10 15.75-16.20m 8,8,11 N = 19		16
17	-12					... At 17.0m, becoming dark grey.				SPT11 17.25-17.70m 9,9,10 N = 19		17
18	-13					18.5m				SPT12 18.75-19.20m 7,17, 24 N = 41		18
19	-14					Clayey SAND: Light grey to white and brown, low plasticity, fine to medium sand, medium to coarse gravel of sandstone.(Residual soil)	MD-D	M				19
20	-15					... At 20.5m losing water flush. Approximately 40% returns. Refusal of bit at 20.8m, refer to cored borehole log.				SPT13 20.25-20.7m 7,11,14 N = 25		20
	-16											

Drill Company:	Site Drilling and Investigation	**Operator Name:**	Doug Millar	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 100 (Truck mounted)			

Project ID:	CES130608-BP	CONSULTING EARTH SCIENTISTS	**Corehole No:**
Client:	Boyd Properties Pty Ltd	Level 1 55 Grandview Street	**D1G01**
Project:	Cooks Cove Development	Suite 3, Pymble, NSW 2073	
Location:	Area D1, Cooks Cove	PH: (02) 8569 2200 FAX: (02) 9983 0582	Sheet: 1 of 2
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X-Coord:	329417.8	**Date Commenced:**	22/10/2015	**Logged by:**	M.E
Y-Coord:	6242098.2	**Date Completed:**	23/10/2015	**Checked by:**	S.M
Surface Elevation (R.L):	4.51	**Hole Diameter (mm):**	51.95		

Drilling Information | **LITHOLOGY** | **Natural Defects**

Depth (mBGL)	R.L. (m)	Method (Support)	% Coreloss	Water	Symbol	Rock Description (ROCK TYPE: grain characteristics, colour structure, minor components)	Weathering	Estimated UCS Strength MPa (0.06 EL, 2.0 VL, 6.0 L, 20 M, 60 H, 200 VH, EH)	RQD %	Spacing (mm) (20, 60, 200, 600, 2000)	Description
21		NMLC	48			SANDSTONE: Orange/brown/pink, fine to medium grained with partings of stiff residual clay. ... Core loss between 20.8 - 21.67m.	EW		0		
	-17					21.76m			0		
22						SHALE: Black, heavily fragmented with partings of stiff residual clay.	EW				Unless otherwise stated, bedding angle is near horizontal. 22.22 Dolerite contact, 60°
						22.22m					
	-18					DOLERITE: Intrusion, grey and orange, fine grained with partings of stiff residual clay.	EW		15		22.75 BD 10°, RO, UN, CL 22.90 JT 60°, RO, UN, CL
23											
	-19	NMLC	0						0		
24						24.18m					
						SHALE: Black, heavily fragmented with partings of stiff residual clay.	EW				
	-20					24.85m			15		
25						LAMINITE: Black and dark grey with fine grained light grey sandstone laminations.	FR				25.27 DB
						25.43m					
	-21					SANDSTONE: White and light grey, fine to medium grained.	FR		98		25.43 Shale/Sandstone contact 0° UN, SL, CLAY 5mm 25.66 - 25.67 Dolerite 0°, RO, PL, CLAY < 2mm

Drill Company:	Site Drilling and Investigation	**Operator Name:** Doug Millar	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 100 (Truck mounted)		

Project ID:	CES130608-BP	CONSULTING EARTH SCIENTISTS	**Corehole No:**
Client:	Boyd Properties Pty Ltd	Level 1 55 Grandview Street	**D1G01**
Project:	Cooks Cove Development	Suite 3, Pymble, NSW 2073	
Location:	Area D1, Cooks Cove	PH: (02) 8569 2200 FAX: (02) 9983 0582	Sheet: 2 of 2
		www.consultingearth.com.au	

X-Coord:	329417.8	**Date Commenced:**	22/10/2015	**Logged by:**	M.E
Y-Coord:	6242098.2	**Date Completed:**	23/10/2015	**Checked by:**	S.M
Surface Elevation (R.L):	4.51	**Hole Diameter (mm):**	51.95		

Drilling Information					LITHOLOGY				Natural Defects		
Depth (mBGL)	R.L. (m)	Method (Support)	% Coreloss	Water	Symbol	Rock Description ROCK TYPE: grain characteristics, colour structure, minor components	Weathering	Estimated UCS Strength MPa (0.06, 2.0, 6.0, 20, 60, 200; EL, VL, L, M, H, VH, EH)	RQD %	Spacing (mm) (20, 60, 200, 600, 2000)	Description
26		NMLC	0			SANDSTONE (Continued): White and light grey, fine to medium grained.	FR		100		
	-22										26.60 BD 0°, RO, PL, CL 26.64 Unbroken Joint.
27									100		27.09 - 27.41 JT Sub vertical, RO, UN, CL
	-23										
28						28.20m					
						MUDSTONE: Grey, fragmented.	FR		77		28.08 BD 10°, RO, UN, CL
						End of hole at 28.26m.					

Groundwater Monitoring Well Installation
Gatic Cover at the surface.
Casing: 0.0 - 2.0m
Screen: 2.0 - 6.0m
Concrete: 0.0 - 0.2m
Bentonite Plug: 0.2 - 1.2m
Sand Filter: 1.2 - 7.0m
Bentonite Plug: 7.0 - 8.5m
Sand Backfill: 8.5 - 28.26m (E.O.H)

Drill Company:	Site Drilling and Investigation	**Operator Name:** Doug Millar	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 100 (Truck mounted)		

CONSULTING EARTH SCIENTISTS
COOKS COVE DEVELOPMENT
BOYD PROPERTIES PTY LTD
D1G01 20.80 – 26.43
OCTOBER 2015
20.80 m
CORE LOSS
20.80 -21.67m
22.60 m
25.40 m
26.43 m

CONSULTING EARTH SCIENTISTS
COOKS COVE DEVELOPMENT
BOYD PROPERTIES PTY LTD
D1G01 26.43 – 28.26
OCTOBER 2015
26.43 m
28.26m

Project ID:	CES130608-BP	CONSULTING EARTH SCIENTISTS	**Borehole No:**
Client:	Boyd Properties Pty Ltd	Level 1, 55 Grandview Street	**D1G02**
Project:	Cooks Cove Development	Suite 3, Pymble, NSW 2073	
Location:	Area D1, Cooks Cove	PH: (02) 8569 2200 FAX: (02) 9552 4399	Sheet: 1 of 2
		www.consultingearth.com.au	

X-Coord:	329388.7	**Date Commenced:**	20/10/2015	**Logged by:**	M.E
Y-Coord:	6242115.8	**Date Completed:**	21/10/2015	**Checked by:**	S.M
Surface Elevation (R.L) :	4.65 m AHD	**Hole Diameter (mm):**	125		

Drilling Information				LITHOLOGY					Samples	Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor component	Consistency / Density	Moisture	Sample ID	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Notes and additional observations
0						TOPSOIL: Silty Sand, grey and brown, fine to medium grained, trace fine to coarse gravel. Roots and wood fragments.	L	D				
	4						VL - L	M				
1						FILL: Clayey Sand, black and brown, fine to medium grained, low plasticity, trace fine to medium gravel of sandstone and roadbase. Plastic, wood, brick fragments, glass shards.				SPT01 1.5-1.95m 1, 4, 11 N >15 Bouncing on wood.		
	3											
2												
	2									SPT02 3.0-3.375m 4, 3, 7 N>10 Bouncing on wood.		
3												
	1	ADV	⊠									
4												
								W				
	0									SPT03 4.5-4.95m 3, 2, 3 N = 5		
5												
	-1									SPT04 6.0-6.45m 6, 13, 5 N >18 Bouncing on wood and wire.		
6												
	-2											
7						7.5m						
	-3					Sandy CLAY: Black, medium to high plasticity, fine to medium sand with trace shells. (Alluvium)	S - F	M		SPT05 7.5-7.95m 1, 2, 2 N = 4		
8												
	-4											
9						9.0m				SPT06 9.0-9.45m N = 0 Dropped under weight of hammer		
						Clayey SAND: Grey, fine to medium grained, low plasticity. (Alluvium)	VL	W				
	-5											
10										SPT07 10.0-10.45m 2, 1, 1 N = 2		

Drill Company:	Site Drilling and Investigation	**Operator Name:**	Doug Millar
Machine Type:	Edson 100 (Truck mounted)		Refer to Standard Sheets for details of abbreviations

Project ID:	CES130608-BP	CONSULTING EARTH SCIENTISTS	**Borehole No:**
Client:	Boyd Properties Pty Ltd	Level 1, 55 Grandview Street	**D1G02**
Project:	Cooks Cove Development	Suite 3, Pymble, NSW 2073	
Location:	Area D1, Cooks Cove	PH: (02) 8569 2200 FAX: (02) 9552 4399	Sheet: 2 of 2
		www.consultingearth.com.au	

X-Coord:	329388.7	**Date Commenced:**	20/10/2015	**Logged by:**	M.E
Y-Coord:	6242115.8	**Date Completed:**	21/10/2015	**Checked by:**	S.M
Surface Elevation (R.L) :	4.65 m AHD	**Hole Diameter (mm):**	125		

Drilling Information				LITHOLOGY					Samples	Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor component	Consistency / Density	Moisture	Sample ID	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Notes and additional observations
11	-6	Water Bore (MUD)				Clayey SAND (Continued): Grey, fine to medium grained, low plasticity. (Alluvium) 13.5m	VL	W				11
	-7									SPT08 11.5-11.95m 2, 1, 2 N = 3		
12												12
	-8											
13										SPT09 13.0-13.45m 9, 14, 9 N = 23		13
	-9					CLAY: Light brown and grey, high plasticity, trace fine sand. (Residual soil) 14.6m	St - V St	M				
14												14
	-10					Sandy CLAY/Clayey SAND: Grey and light brown, fine to medium sand, low to medium plasticity. (Residual soil)	D & H	M		SPT10 14.5-14.95m 11, 14, 17 N = 31		
15												15
	-11											
16										SPT11 16.0-16.45m 5, 11, 24 N = 35		16
	-12											
17										SPT12 17.5-17.385m 4, 7, 17 N > 24 Bouncing on bedrock.		17
	-13					Refusal of bit at 17.7m, refer to cored borehole log.						

Drill Company:	Site Drilling and Investigation	**Operator Name:**	Doug Millar	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 100 (Truck mounted)			

Project ID:	CES130608-BP	CONSULTING EARTH SCIENTISTS	**Corehole No:**
Client:	Boyd Properties Pty Ltd	Level 1 55 Grandview Street	**D1G02**
Project:	Cooks Cove Development	Suite 3, Pymble, NSW 2073	
Location:	Area D1, Cooks Cove	PH: (02) 8569 2200 FAX: (02) 9983 0582	Sheet: 1 of 1
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X-Coord:	329388.7	**Date Commenced:**	20/10/2015	**Logged by:**	M.E
Y-Coord:	6242115.8	**Date Completed:**	21/10/2015	**Checked by:**	S.M
Surface Elevation (R.L):	4.65	**Hole Diameter (mm):**	51.95		

Drilling Information					LITHOLOGY				Natural Defects		
Depth (mBGL)	R.L. (m)	Method (Support)	% Coreloss	Water	Symbol	Rock Description ROCK TYPE: grain characteristics, colour structure, minor components	Weathering	Estimated UCS Strength MPa (0.06 EL, 2.0 VL, 6.0 L, 20 M, 60 H, 200 VH, EH)	RQD %	Spacing (mm) (20, 60, 200, 600, 2000)	Description
18		NMLC	0			SANDSTONE: White and red, fine to medium grained.	DW		100		17.92 DB 18.12 DB 18.34 DB 18.59 DB 18.77 DB 18.84 DB
	-14								100		
19						... At 19.02m, becoming iron stained.			100		18.93 DB 19.55 DB 19.76 DB 19.88 DB
	-15					End of hole at 19.96m.					

Groundwater Monitoring Well Installation
Gatic Cover at the surface.
Casing: 0.0 - 2.0m
Screen: 2.0 - 6.0m
Concrete: 0.0 - 0.2m
Sand Backfill: 0.2 - 0.5m
Bentonite Plug: 0.5 - 1.5m
Sand Filter: 1.5 - 8.0m
Bentonite Plug: 8.0 - 9.5m
Sand Backfill: 9.5 - 19.96m (E.O.H)

Drill Company:	Site Drilling and Investigation	**Operator Name:** Doug Millar	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 100 (Truck mounted)		

CONSULTING EARTH SCIENTISTS
COOKS COVE DEVELOPMENT
BOYD PROPERTIES PTY LTD
D1G02 17.70 – 19.96
OCTOBER 2015
17.70m
19.96m

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1BH10**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Roadbase				
				FILL: Clayey SAND: brown/grey, fine-medium grain, medium- high plasticity, dry, wood fragments, rock and glass, hydrocarbon odour, rags, tin/metal	D1BH10-1			
1					D1BH10-2			
2					D1BH10-3			
3					D1BH10-4			
4								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	16 October 2015
Drill Model:	EDSON 100	**Date Completed:**	16 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH11**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: SAND: brown, fine to medium, dry	D1BH11_0-1.0			
1				FILL: Clayey SAND: dark brown, fine to medium, most,with treated wood	D1BH11_1.3-1.7			
				FILL: Clayey SAND: brown to grey, medium, moist	D1BH11_1.7-2.0			
2				FILL: Clayey SAND: dark brown, medium to fine, moist, with waste (treated timber)	D1BH11_2.0-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH12**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Capping Layer Gravelly SAND: grey to brown, medium, dry, with bricks	D1BH12_0-0.4			
				FILL: Clayey SAND: brown, fine, dry - with high plasticity clay, with glass waste	D1BH12_0.4-1.0			
1				FILL: Clayey SAND: dark brown, medium, dry - with high plasticity clay, waste (mattress)	D1BH12_1.1-2.0			
2					D1BH12_2.0-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH13**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly/Clayey SAND: brown, medium, dry - with high plasticity clay, and with angular gravel	D1BH13_0-1.0			
1					D1BH13_1.0-1.4			
				FILL: Clayey SAND: dark brown, fine to medium, dry- with high plasticity clay	D1BH13_1.4-1.8			
2				FILL: Clayey SAND: fine to medium, with timber - peat	D1BH13_1.8-2.0			
					D1BH13_2.4-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH14**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: Silty sand, fine, grey, dry	D1BH14_0-1.0			
1				becoming grey to dark brown with gravels	D1BH14_1.0-1.5			
					D1BH14_1.5-2.0			
2					D1BH14_2.0-2.4			
				Refusal at 2.4 mbgl				
3								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 12/10/2015

Date Completed: 12/10/2015

Logged/checked by: GH/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH15**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: sand, brown, fine, dry with traces of clay and presence of bricks	D1BH15_0-1.0			
1				FILL: sandy clay, brown, medium plasticity, dry with fine sand and fragments of bricks	D1BH15_1.0-1.5			
2					D1BH15_2.0-3.0			
3								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 12/10/2015

Date Completed: 12/10/2015

Logged/checked by: GH/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH16**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: sand, brown, fine, dry with traces of plastic waste	D1BH16_0-1.0			
1					D1BH16_1.0-2.0			
2				FILL: ash, grey, fine, dry	D1BH16_2.0-2.2			
				Refusal at 2.2 mbgl				
3								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 12/10/2015

Date Completed: 12/10/2015

Logged/checked by: GH/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH17**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: gravelly sand, dark brown, fine, dry with angular gravels and presence of rubbles and metallic waste	D1BH17_0-0.5			
1				**Refusal at 1.0 mbgl**				
2								
3								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 12/10/2015

Date Completed: 12/10/2015

Logged/checked by: GH/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH18**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: silty sand, grey to dark brown, fine, dry	D1BH18_0-1.0			
1				FILL: sand, gry, fine, dry	D1BH18_1.0-1.1			
				Refusal at 1.1 mbgl				
2								
3								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 12/10/2015

Date Completed: 12/10/2015

Logged/checked by: GH/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH19**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: silty sand, dark brown, fine, dry with bricks fragments and plastic waste	D1BH19_0-0.5			
					D1BH19_0.5-1.0			
1					D1BH19_1.5-2.0			
				becoming gravelly sand				
2				**Refusal at 2.0 mbgl**				
3								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 12/10/2015

Date Completed: 12/10/2015

Logged/checked by: GH/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH20**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: sand, dark brown, fine, dry	D1BH20_0-0.4			
				FILL: clayey sand, fine to medium, brown, dry with low to medium plasticity clay and brick fragments	D1BH20_0.4-1.5			
1								
2					D1BH20_2-3			
3				**Refusal at 3.0 mbgl**				
4								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 13/10/2015

Date Completed: 13/10/2015

Logged/checked by: GH/JD

Project ID:

Project: CES130806-BP

Client: Boyd Properties Pty Ltd

Location: Cooks Cove

Easting:

Northing:

Elevation:

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Environmental Log: **D1BH21**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 250 500 750	
0	Auger			FILL: silty sand, dark brown, fine, dry with bricks fragments, plastic and timber waste and gravels	D1BH21_0-1.0			
1								
				presence of fragments of wood with strong hydrocarbon odour	D1BH21_1.5-2.5			
2								
				presence of ash	D1BH21_2.5-3.0			
3								

Drill Company: SDI

Drill Model:

Hole Diameter (mm):

Date Commenced: 12/10/2015

Date Completed: 12/10/2015

Logged/checked by: GH/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH22**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: SAND: brown, medium, dry with bricks fragments	D1BH22_0-1.0			
1				FILL: Clayey SAND: brown, medium, dry, medium plasticity, with bricks and gravels	D1BH22_1-2			
2					D1BH22_2-3			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1BH23**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil: Brown/ organic material				
				FILL: Clayey SAND: dark brown/grey, fine grain, medium- high plasticity, moist, rock and glass fragments, hydrocarbon odour	D1BH23-1			
				Water at 1.0 metres				
				Difficult to drill				
1					D1BH23-2			
2					D1BH23-3			
				CLAY: Clayey SAND: (possibly natural) Grey/brown, fine, low plasticity, soft, wet, hydrocarbon odours, slight sulphur odour				
					D1BH23-4			
3								
4								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	16 October 2015
Drill Model:	EDSON 100	**Date Completed:**	16 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH24**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: pale brown, dry, with angular gravels and brick and plastic waste	D1BH24_0-1.0			
1					D1BH24_1-2			
2					D1BH24_2-3			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH25**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Rubble/ concrete	D1BH25_0.0-1.0B			
				FILL: Clayey SAND: dark brown, fine to medium, dry with moderate plasticity clay, low to moderate hydrocarbon odour, with little waste Becoming moist around 1.2 metres				
1					D1BH25_0.0-1.0			
					D1BH25_1.0-1.8			
2				Sandy CLAY: dark brown, fine, wet, high plasticity Possible natural material	D1BH25_2.0-3.0B			
3					D1BH25_2.0-3.0			
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH26**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: dark brown, fine, moist, angular gravel	D1BH23_0.0-1.0			
1				FILL: Clayey SAND: dark brown, fine to medium,moist, with timber and plastic waste, high hydrocarbon odour Becoming wet at 1.8 metres	D1BH26_1.3-2.0			
2					D1BH26_2.0-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH27**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil	D1BH27_0-1.0			
				FILL: Gravelly SAND: brown, fine to medium, dry, with brick and angular gravels				
1				FILL: SAND: dark brown, fine to medium, dry	D1BH27_1.2-2.0			
2				FILL: SAND: dark brown, fine to medium, dry, with treated wood.	D1BH27_2.0-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1BH28**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil: Grey/brown, sands, organic material				
				FILL: Clayey SAND: dark brown, fine - medium grain, medium- high plasticity, rock, glass, and brick fragments, hydrocarbon odour	D1BH28-1			
					D1BH28-2			
1								
2					D1BH28-3			
3					D1BH28-4			
4								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	16 October 2015
Drill Model:	EDSON 100	**Date Completed:**	16 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH29**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown, fine to medium, dry, with rubble Becomiing dark brown with hydrocarbon odour	D1BH29_0.0-1.0B			
1					D1BH29_0.0-1.0			
				FILL: SAND: dark brown, moist, with hydrocarbon odour	D1BH29_1.6-2.0			
2								
				FILL: SAND: with waste	D1BH29_2.4-3.0			
3								
4								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH30**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: dark brown, fine to medium, dry	D1BH30_0-1.0			
1								
				FILL: Clayey SAND: dark brown, medium, moist, medium plasticity, with timber, plastic, glass, and ash, high hydrocarbon odour	D1BH30_1.6-2.0			
2				FILL: Clayey SAND: with treated timber	D1BH30_2.0-2.5			
				FILL: CLAY: grey, dry to moist, high plasticity, with waste (glass, gravel)				
3					D1BH30_2.5-3.0			
4								
5								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH31**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown , fine to medium, dry	D1BH31_0-0.8			
1				FILL: Clayey SAND: dark brown, fine to medium, moist with high plasticity clay, waste (wood, plastic), strong hydrocarbon odour	D1BH31_1.0-2.0B			
2					D1BH31_1.0-2.0			
				Silty SAND: dark brown, fine to medium, wet, moderate hydrocarbon odour Possible natural material	D1BH31_2.2-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH32**

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55-65 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: grey, fine to medium, dry, subangular-angular gravels	D1BH32_0-1.0			
1				FILL: Clayey SAND: dark brown, fine to medium, dry, gravelly with brick	D1BH32_1.2-2.0			
2				FILL: Clayey SAND: dark brown, fine to medium, moist, with waste (plastic, treated wood), hydrocarbon odour	D1BH32_2.4-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH33**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown, medium, dry, with angular gravel	D1BH33_0-1.0			
1				FILL: Clayey SAND: dark brown, fine, moist - with high plasticity clay, with waste (plastic, brick and mattress), hydrocarbon odour Becoming Sandy CLAY at approximately 2.8 metres	D1BH33_1.3-2.0B D1BH33_1.3-2.0 D1BH33_2.0-3.0			
2								
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH34**

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Suite 3, Level 1
55-65 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND:brown, medium, dry, angular gravel	D1BH34_0-1.0			
1					D1BH34_1.0-1.7			
				FILL: Clayey SAND: dark brown, fine, moist, medium plasticiity, with timber, with trace of coal/coke (black shiny element)	D1BH34_1.7-2.0			
2					D1BH34_2.0-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH36**

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PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown, fine to medium, dry	D1BH36_0-1.5			
1								
				FILL: Clayey SAND: dark brown, medium, dry, clay is medium plasticity, with waste	D1BH36_1.7-2.0			
2					D1BH36_2.0-2.3			
3								
4								

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	Environmental Site Assessment	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Bestic St, Banksia - Cook Cove Dev.	**Environmental Log:**	**D1BH37**

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PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			Topsoil				
				FILL: Clayey SOIL: dark brown, fine - medium grain, medium- high plasticity, dry, wood and brick fragments, wire pieces, moist at base, hydrocarbon odour	D1BH37-1			
					D1BH37-2			
1								
					D1BH37-3			
2								
					D1BH37-4			
3								
4								

Drill Company:	Site Drilling and Investigations	**Date Commenced:**	16 October 2015
Drill Model:	EDSON 100	**Date Completed:**	16 October 2015
Hole Diameter (mm):	N/A	**Logged/checked by:**	WS

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH39**

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Suite 3, Level 1
55-65 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0–1.8	Auger			FILL: Gravelly SAND:brown, fine to medium, dry, angular gravel	D1BH39_0-1.0			
1.8–3.0				FILL: SAND: dark brown, medium, moist, with wood waste, moderate hydrocarbon odour	D1BH39_1.8-2.0 D1BH39_2.0-2.4			
3.0–3.5				FILL: Gravelly SAND: brown, medium, dry, subangular to angular gravel and rubble, strong hydrocarbon odour	D1BH39_2.4-3.0			

Drill Company:	SDI	**Date Commenced:**	13/10/15
Drill Model:		**Date Completed:**	13/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH41**

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55-65 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Clayey SAND: brown to dark brown, fine to medium, dry with high plasticity, clay with traces of waste (plastic, wood)	D1BH41_0-0.6			
				FILL: Sandy CLAY: dark brown, medium, moist, high plasticiity, with trace of waste (wood), moderate to high hydrocarbon odour	D1BH41_0.6-1.0			
1					D1BH41_1.0-2.0			
2				FILL: Sandy CLAY: dark brown, fine to medium, moist with high plasticity, no waste, low hydrocabon odour Possible natural material	D1BH41_2.1-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH42**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown , fine, dry, with subangular to angular gravel	D1BH42_0-1.0			
1				FILL: Clayey SAND: dark brown, fine to medium, dry, angular gravel, with rubble, pastic, wood, concrete, strong hydrocarbon odour	D1BH42_1.0-2.0B			
2					D1BH42_1.0-2.0			
					D1BH42_2.0-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH43**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: pale brown and grey, medium to coarse, moist, with angular gravel	D1BH43_0-1.0			
1				FILL: CLAY: dark brown, medium, moist, high plasticity Wet at 1.2 metres	D1BH43_1.3-2.0B D1BH43_1.3-2.0			
2								
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH44**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown , fine to medium, dry	D1BH44_0-0.2			
				FILL: SAND: grey, fine, dry, hard	D1BH44_0.2-0.9			
1								
2								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

Project ID:	CES130608-BP	**Easting:**	
Project:	CES130806-BP	**Northing:**	
Client:	Boyd Properties Pty Ltd	**Elevation:**	
Location:	Cooks Cove	**Environmental Log:**	**D1BH45**

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DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			Well Construction
Depth	Method	Water	Symbol	Description	Sample ID	Type	PID (ppm) 0 250 500 750	
0	Auger			FILL: Gravelly SAND: brown, fine to medium, with angular gravel	D1BH45_0-1.0			
1					D1BH45_1.0-1.7			
				FILL: Clayey Sand: dark brown, medium, dry with medium plasticity clay, with timber, plastic, ceramic waste	D1BH45_1.7-2.0			
2					D1BH45_2.0-3.0			
3								
4								
5								

Drill Company:	SDI	**Date Commenced:**	14/10/15
Drill Model:		**Date Completed:**	14/10/15
Hole Diameter (mm):		**Logged/checked by:**	EM/JD

ANNEXURE 3:
Registered Groundwater Bores within 200 m of Barton Park Boundary

Groundwater Extraction Bores within 200 m of the																		
Hydroid	Hydrocode	Stateborei	Statepipei	Stateterri	Agency	Wcode	Boredepth	Drilleddep	Status	Drilleddat	Hguid	Hgunumber	Nafhgunumb	Ftype	Latitude	Longitude	Easting	Northing
10038509	GW023191.1.1	GW023191	1.1	1	1	11	3.6	3.7	UNK	18000101	-19999999	-9999	-9999	WSUP	-33.943881	151.150091	329041	6242525
10092875	GW100444.1.1	GW100444	1.1	1	1	11	5.49	5.49	UNK	19961122	-19999999	-9999	-9999	HUSE	-33.951144	151.153328	329355	6241725
10038512	GW023194.1.1	GW023194	1.1	1	1	11	4.8	4.9	UNK	19651101	-19999999	-9999	-9999	WSUP	-33.941322	151.151391	329156	6242811
10099338	GW106982.1.1	GW106982	1.1	1	1	11	5	5	UNK	20050207	-19999999	-9999	-9999	RECN	-33.950208	151.153627	329381	6241829
10098809	GW106450.1.1	GW106450	1.1	1	1	11	2	2	ABN	20041008	-19999999	-9999	-9999	HUSE	-33.948403	151.151028	329137	6242025
10100634	GW108295.1.1	GW108295	1.1	1	1	11	8	8	USE	20061101	-19999999	-9999	-9999	HUSE	-33.944391	151.148626	328907	6242466
10101202	GW108870.1.1	GW108870	1.1	1	1	11	5	0	UNK	20080512	-19999999	-9999	-9999	IRAG	-33.946008	151.1507	329102	6242290
10101049	GW108717.1.1	GW108717	1.1	1	1	11	5.183	5.19	USE	20070406	-19999999	-9999	-9999	HUSE	-33.951547	151.1532	329344	6241680
10100773	GW108439.1.1	GW108439	1.1	1	1	11	8	8	UNK	20070105	-19999999	-9999	-9999	HUSE	-33.94428	151.148477	328893	6242478
10103058	GW110735.1.1	GW110735	1.1	1	1	11	8	0	UNK	20060101	-19999999	-9999	-9999	HUSE	-33.943831	151.148945	328935	6242529
10103639	GW111316.1.1	GW111316	1.1	1	1	11	162	162	UNK	20100301	-19999999	-9999	-9999	MON	-33.943811	151.153248	329333	6242538
10103547	GW111224.1.1	GW111224	1.1	1	1	11	6	6	UNK	20100822	-19999999	-9999	-9999	HUSE	-33.951206	151.154419	329456	6241720

Cooks Cove Site Boundary (July 2019)																	
Projection	Projecti_1	Coordmetho	Heightdatu	Refelev	Refelevdes	Refelevmet	Tsrefelev	Tsrefelevd	Tsrefelevm	Landelev	Landelevme	Ismultipip	Borelineco	Worksid	Licenceext	Licencee_1	Licenceuse
1	56	MAP	AHD	4.62	NGS	DEM	0	UNK	UNK	4.62	DEM	0		0	0	0	0
1	56	UNK	AHD	2.79	NGS	DEM	0	UNK	UNK	2.79	DEM	0		0	0	0	0
1	56	MAP	AHD	11.12	NGS	DEM	0	UNK	UNK	11.12	DEM	0		0	0	0	0
1	56	UNK	AHD	1.91	NGS	DEM	0	UNK	UNK	1.91	DEM	0		0	0	0	0
1	56	MAP	AHD	5.4	NGS	DEM	0	UNK	UNK	5.4	DEM	0		0	0	0	0
1	56	MAP	AHD	3.53	NGS	DEM	0	UNK	UNK	3.53	DEM	0		0	0	0	0
1	56	UNK	AHD	4.54	NGS	DEM	0	UNK	UNK	4.54	DEM	0		0	0	0	0
1	56	MAP	AHD	3.74	NGS	DEM	0	UNK	UNK	3.74	DEM	0		0	0	0	0
1	56	UNK	AHD	3.82	NGS	DEM	0	UNK	UNK	3.82	DEM	0		0	0	0	0
1	56	UNK	AHD	4.35	NGS	DEM	0	UNK	UNK	4.35	DEM	0		0	0	0	0
1	56	UNK	AHD	4.62	NGS	DEM	4.62	NGS	DEM	4.62	DEM	0		0	0	0	0
1	56	UNK	AHD	2.59	NGS	DEM	0	UNK	UNK	2.59	DEM	0		0	0	0	0

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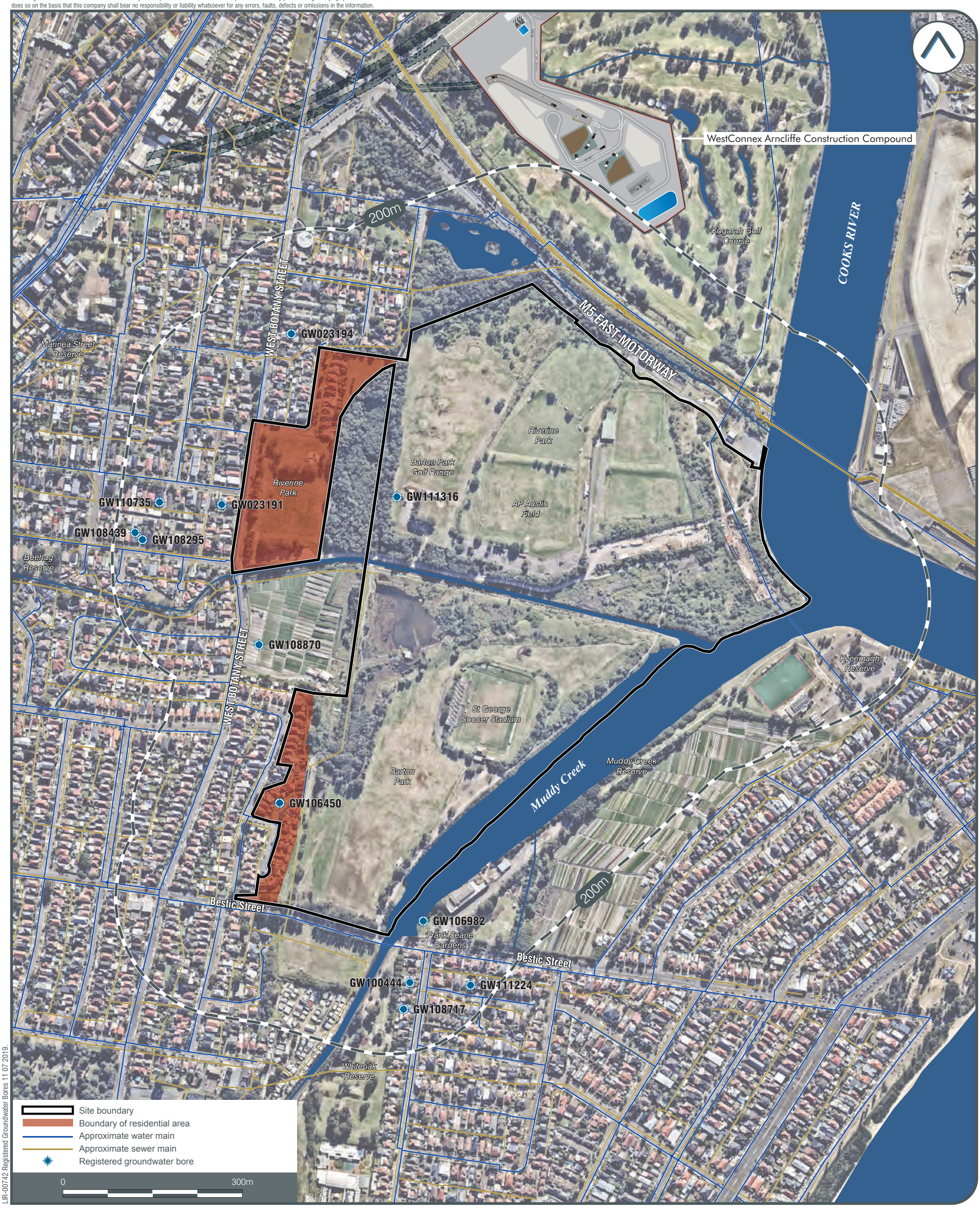

LIR-00742 Registered Groundwater Bores 11 07 2019

REGISTERED GROUNDWATER BORES

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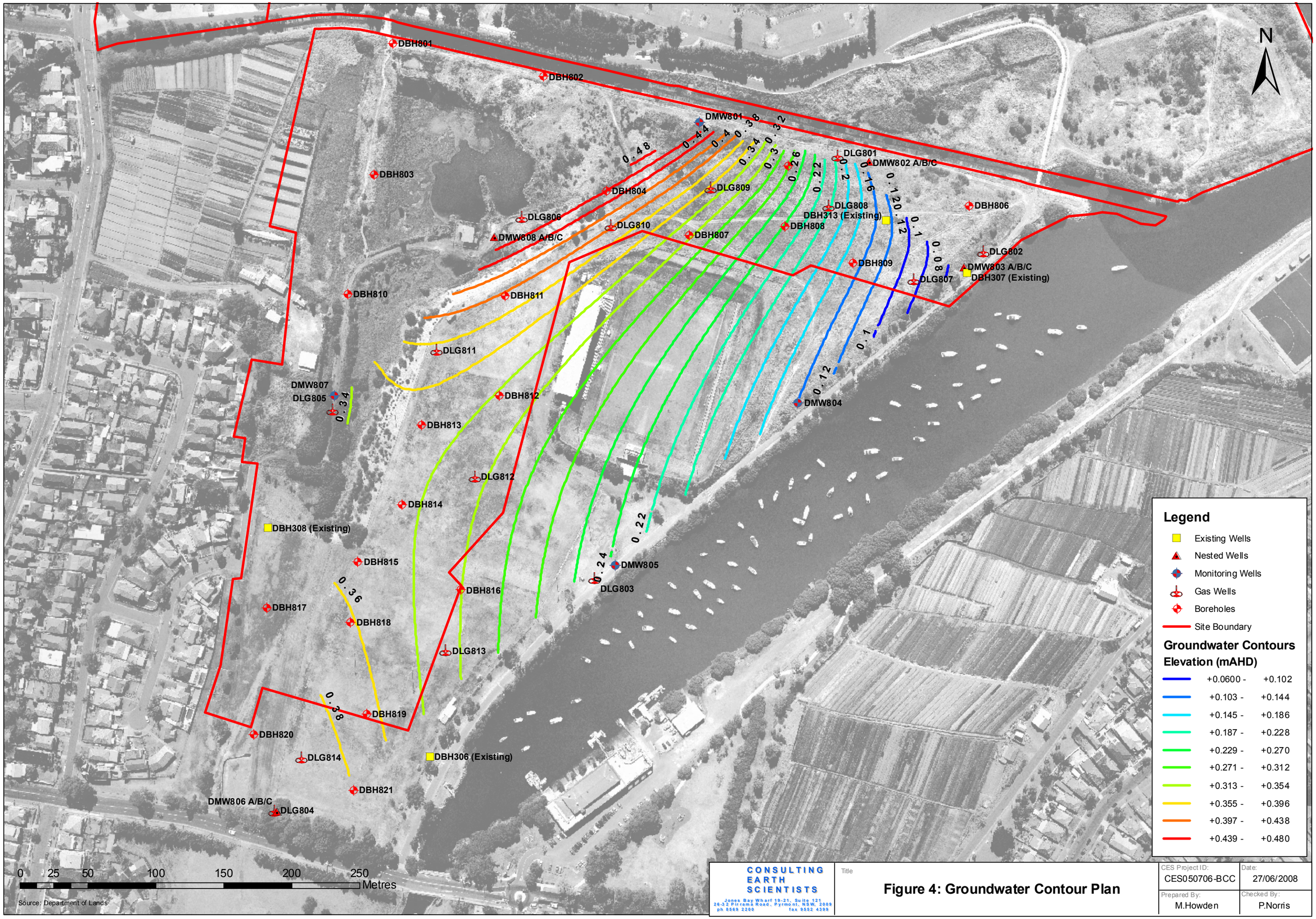

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Title

Figure 4: Groundwater Contour Plan

CES Project ID:	Date:
CES050706-BCC	27/06/2008
Prepared By: M.Howden	Checked By: P.Norris

N
D1MW5
D1BH14
0.6m
D1BH15
D1BH16
D1BH17
D1MW6
0.4m
D1BH13
0.8m
D1BH18
D1BH19
0.2m
D1BH20
D1BH21
D1BH22
D1MW7
DMW804
D1BH12
D1BH23
D1MW8
D1G02
D1BH28
D1G01
1.0m
D1BH27
D1BH26
D1BH25
D1MW4
D1BH32
D1BH31
DMW805
0.8m
D1BH29
D1BH30
DLG805
0.2m
DBH816
D1BH35
0.6m
D1BH36
D1MW1
DLG813
D1BH37
0.4m
D1BH38
D1MW3
D1BH44
D1BH39
DBH820
DBH806
DLG814
D1BH43
D1BH42
D1BH41
DMW806A/B/C
DLG804
D1BH45
D1MW2
0
50
100
150
200
Meters
Source: Department of Lands
Legend
Pre-existing Wells
Pre-existing Gas Wells
Boreholes (2015)
Monitoring Wells (2015)
Geotechnical Boreholes (2015)
Groundwater Contours
D1 Site Boundary
CONSULTING EARTH SCIENTISTS
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Ph 8569 3200 Fax 9983 0582
Title
Figure 5: Piezometric Groundwater Flow Direction Area D1
CES Project ID:
CES130608-BP
Date:
02/02/2016
Prepared By:
W. South
Checked By:
J. Dobson

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ANNEXURE 4:
Edison Geotechnical Borehole Logs

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	BHDG101
Hole Depth:	19.43 m
Sheet:	1 of 5

Project Name:	Preliminary Geotechnical Investigation	Project Number:	G20067ROC
Location / Site:	Barton Park, Banksia NSW	Client:	MODE Design Corp Pty Ltd

Drilling Company:	Geosense	Date Started:	17-AUG-20	Ground Level:	RL4.3m (approx)
Drill Method:	SFA/NLMC	Date Completed:	17-AUG-20	Easting:	151.153598
Equipment:	Track Mounted Hanjin D&B- 8D			Northing:	-33.947746

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests: ID No.	Samples / Tests: SPT	Observations / Comments
							Surface: Grass					
SFA						Fill	**TOPSOIL**- Sand, dark brown, fine to medium grained.		m			
			4.0		SP		**FILL**- Gravelly Sand, dark brown, fine to coarse grained, trace pockets of clay and some cobbles and boulders noted (brick and SS). concrete boulder between 0.7 and 0.9m.		m			
		1.0	3.0		SP		**FILL**- Clayey Sand, brown grey, fine to medium grained, trace fine to coarse gravel (brick, ironstone and SS). concrete boulder between 1.2m and 1.3m.		m			
		2.0	2.0		SP		**FILL**- Sand, black, fine to medium grained, with minor silt and clay and much anthropogenic material (wood, rubber, plastic, wire, glass and metal noted), moderate odour.		m	ZZ170820-01 1.50-1.95m	3 3 3 N=6	
		3.0	1.0						vm	ZZ170820-02 3.00-3.45m	5 6 4 N=10	
	4.5m 17-Aug-20	4.0	0.0						w			
		5.0										

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: Zachary Ziesel	Date: 17-Aug-20	Checked By: Stephen McCormack	Date: 24-AUG-20

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	**BHDG101**
Hole Depth:	**19.43 m**
Sheet:	**2 of 5**

Project Name:	**Preliminary Geotechnical Investigation**	Project Number:	**G20067ROC**
Location / Site:	**Barton Park, Banksia NSW**	Client:	**MODE Design Corp Pty Ltd**

Drilling Company:	**Geosense**	Date Started:	**17-AUG-20**	Ground Level:	**RL4.3m** (approx)
Drill Method:	**SFA/NLMC**	Date Completed:	**17-AUG-20**	Easting:	**151.153598**
Equipment:	**Track Mounted Hanjin D&B- 8D**			Northing:	**-33.947746**

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests: ID No.	Samples / Tests: SPT	Observations / Comments
SFA		6.0	-1.0		SP	Fill	**FILL**- Sand, black, fine to medium grained, with minor silt and clay and much anthropogenic material (wood, rubber, plastic, wire, glass and metal noted), moderate odour.*(continued)*		m			
			-2.0							ZZ170820-03 6.00-6.50m	1 1 2 N=3	
		7.0	-3.0									
		8.0	-4.0									
		9.0	-5.0		SP	Alluvium	**SAND**- dark grey, fine to medium grained, some silt and clay and shell fragments and occassional pockets of clay/organics.		w			Water table at approcximately 9.5m
		10.0										

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Zachary Ziesel**	Date: **17-Aug-20**	Checked By: **Stephen McCormack**	Date: **24-AUG-20**

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	**BHDG101**
Hole Depth:	**19.43 m**
Sheet:	**3 of 5**

Project Name:	**Preliminary Geotechnical Investigation**	Project Number:	**G20067ROC**
Location / Site:	**Barton Park, Banksia NSW**	Client:	**MODE Design Corp Pty Ltd**

Drilling Company:	**Geosense**	Date Started:	**17-AUG-20**	Ground Level:	**RL4.3m** (approx)
Drill Method:	**SFA/NLMC**	Date Completed:	**17-AUG-20**	Easting:	**151.153598**
Equipment:	**Track Mounted Hanjin D&B- 8D**			Northing:	**-33.947746**

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests: ID No.	Samples / Tests: SPT	Observations / Comments
SFA		11.0	-6.0		SP	Alluvium	**SAND**- dark grey, fine to medium grained, some silt and clay and shell fragments and occassional pockets of clay/organics.*(continued)*		w			
		12.0	-7.0									
		13.0	-8.0							ZZ170820-04 12.00-12.45m	0 0 1 N=1	
		14.0	-9.0				light grey at 13.8m.			ZZ170820-05 13.50-13.95m	3 2 1 N=3	Increase in drilling resistance at 13.0m Organic Layer last 100mm of SPT
		15.0	-10.0				**Sandy CLAY / Clayey SAND**- grey and light brown, fine to medium grained.	medium dense to dense	w			Increased drilling torque from 14.7m

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Zachary Ziesel** Date: **17-Aug-20** | Checked By: **Stephen McCormack** Date: **24-AUG-20**

GEE DAVIES BH LOG G20067ROC.GPJ GEE.GDT 27-8-20 9:06:22 AM

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	**BHDG101**
Hole Depth:	**19.43 m**
Sheet:	**4 of 5**

Project Name:	**Preliminary Geotechnical Investigation**	Project Number:	**G20067ROC**
Location / Site:	**Barton Park, Banksia NSW**	Client:	**MODE Design Corp Pty Ltd**

Drilling Company:	**Geosense**	Date Started:	**17-AUG-20**	Ground Level:	**RL4.3m** (approx)
Drill Method:	**SFA/NLMC**	Date Completed:	**17-AUG-20**	Easting:	**151.153598**
Equipment:	**Track Mounted Hanjin D&B- 8D**			Northing:	**-33.947746**

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests: ID No.	Samples / Tests: SPT	Observations / Comments
SFA		16.0	-11.0			Residual Soil	**Sandy CLAY / Clayey SAND**- grey and light brown, fine to medium grained.*(continued)*	medium dense to dense	w			Drilling resistance increased from 16.2m
			-12.0				**SANDSTONE**- grey, fine to coarse grained, Estimated HW/VL strength.				10 - -	SPT double bouncing
		17.0	-13.0			Bedrock	*BHDG101 continued as cored hole from 16.5m*					
		18.0	-14.0									
		19.0	-15.0									
		20.0										

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Zachary Ziesel**	Date: **17-Aug-20**	Checked By: **Stephen McCormack**	Date: **24-AUG-20**

GEE DAVIES BH LOG G20067ROC.GPJ GEE.GDT 27-8-20 9:06:22 AM

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	BHDG101
Hole Depth:	19.43 m
Sheet:	5 of 5

Project Name:	Preliminary Geotechnical Investigation	Project Number:	G20067ROC
Location / Site:	Barton Park, Banksia NSW	Client:	MODE Design Corp Pty Ltd

Drilling Company:	Geosense	Date Started:	17-AUG-20	Ground Level:	RL4.3m (approx)
Drill Method:	SFA/NLMC	Date Completed:	17-AUG-20	Easting:	151.153598
Equipment:	Track Mounted Hanjin D&B- 8D			Northing:	-33.947746

Method	Water Level	Depth (m)	RL (m)	Graphic Log	Material Type	Material Description	Weathering	Estimated Strength (MPa) EL 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH	$Is_{(50)}$ MPa D=diametral A=axial	U.C.S. (Mpa)	RQD %	Core Photo	Defect Spacing (mm) 20 60 200 600 2000	Defect Description type, inclination, thickness, shape, roughness, coating Specific / General	Depth (m)	Casing & Core Lifts
						Continued from non-cored borehole from 16.5m										
NMLC Coring		17.0	-12.5 -13.0			**SANDSTONE** - grey, fine to coarse grained. clay imbedded and highly weathered from 16.62.	DW		A=0.41 D=0.5		100			DB	17.0	
		17.5 18.0 18.5 19.0	-13.5 -14.0 -14.5 -15.0			**SANDSTONE** - orange, fine to coarse grained, Fe stained. orange, pink and grey at 17.8m.	FR		A=0.78 D=0.98 A=1.33 D=0.95 A=1.17 D=1.11					BD, Fe, 1, RG SM, CLAY BD, 0 SM, CLAY	17.5 18.0 18.5 19.0	19.43
		19.5 20.0 20.5 21.0 21.5	-15.5 -16.0 -16.5 -17.0			**End of Hole at 19.43 m** Target Depth Reached									19.5 20.0 20.5 21.0 21.5	

Additional Comments

Logged By: Zachary Ziesel	Date: 17-Aug-20	Checked By: Stephen McCormack	Date: 24-AUG-20

GEE DAVIES CH LOG G20067ROC.GPJ GEE.GDT 27-8-20 9:07:17 AM

BARTON PARK
ROCKDALE
BHDG1D1 START 16.5M
17
18
19
END 19.43M
17/8/20

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	BHDG102
Hole Depth:	3.00 m
Sheet:	1 of 1

Project Name:	Preliminary Geotechnical Investigation	Project Number:	G20067ROC
Location / Site:	Barton Park, Banksia NSW	Client:	MODE Design Corp Pty Ltd

Drilling Company:	Geosense	Date Started:	17-AUG-20	Ground Level:	RL4.0m (approx)
Drill Method:	SFA	Date Completed:	17-AUG-20	Easting:	151.153207
Equipment:	Track Mounted Hanjin D&B- 8D			Northing:	-33.948496

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Observations / Comments
							Surface: Grass			
SFA					SP		**TOPSOIL**- Silty Sand, dark brown, fine to medium grained.		m	
							FILL- Sand, brown, fine to mediuim, with some fine to medium gravel and trace silt.	loose	m	
					SP		increase in gravel at 0.5m.			
		1.0	3.0							
						Fill	**FILL**- Sand With Clay, black, fine to medium grained, Much anthropogenic material (plastic, brick and glass noted), moderate odour.	very loose to loose	m	
		2.0	2.0		SP					
		3.0	1.0							
							End of Hole at 3.00m Target Depth Reached			
		4.0	0.0							
		5.0	-1.0							

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: Zachary Ziesel	Date: 17-Aug-20	Checked By: Stephen McCormack	Date: 24-AUG-20

GEE DAVIES BH LOG G20067ROC.GPJ GEE.GDT 27-8-20 9:06:24 AM

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	BHDG103
Hole Depth:	3.00 m
Sheet:	1 of 1

Project Name:	Preliminary Geotechnical Investigation	Project Number:	G20067ROC
Location / Site:	Barton Park, Banksia NSW	Client:	MODE Design Corp Pty Ltd

Drilling Company:	Geosense	Date Started:	17-AUG-20	Ground Level:	RL4.1m (approx)
Drill Method:	SFA	Date Completed:	17-AUG-20	Easting:	151.154076
Equipment:	Track Mounted Hanjin D&B- 8D			Northing:	-33.948127

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Grass			
SFA			4.0		SP	Fill	**TOPSOIL**- Silty Sand, dark brown, fine to medium grained.	m		
		1.0	3.0		SP		**FILL**- Sand, brown, fine to mediuim, trace silt and fine to coarse gravel. Occassional brick and concrete also noted.	m	ZZ170820-G3 (CBR) 0.20-1.20m	
		2.0	2.0		SP		**FILL**- Sand With Clay, black, fine to medium grained, Much anthropogenic material (plastic, brick and glass noted), moderate odour.	m		
		3.0								
			1.0				**End of Hole at 3.00m** Target Depth Reached			
		4.0	0.0							
		5.0								

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: Zachary Ziesel	Date: 17-Aug-20	Checked By: Stephen McCormack	Date: 24-AUG-20

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	BHDG104
Hole Depth:	3.00 m
Sheet:	1 of 1

Project Name:	Preliminary Geotechnical Investigation	Project Number:	G20067ROC
Location / Site:	Barton Park, Banksia NSW	Client:	MODE Design Corp Pty Ltd

Drilling Company:	Geosense	Date Started:	17-AUG-20	Ground Level:	RL4.4m	(approx)
Drill Method:	SFA	Date Completed:	17-AUG-20	Easting:	151.15344	
Equipment:	Track Mounted Hanjin D&B- 8D			Northing:	-33.947878	

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Grass			
SFA					SP	Fill	**TOPSOIL**- Silty Sand, dark brown, fine to medium grained.	m		
			4.0		SP		**FILL**- Sand Trace Silt, brown, fine to mediuim, trace fine to medium gravel.	m	ZZ170820-G4 (CBR) 0.20-1.00m	
		1.0								
			3.0							
					SP		**FILL**- Sand With Clay, black, fine to medium grained, Much anthropogenic material (plastic, fabric, brick, and foam noted), moderate odour.	m		
		2.0								
			2.0		SP		**FILL**- Silty Sand, red, fine to medium grained, Much anthropogenic material (fabric, wood and plastic noted), strong odour.	m		
		3.0								
							End of Hole at 3.00m Target Depth Reached			
			1.0							
		4.0								
			0.0							
		5.0								

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: Zachary Ziesel	Date: 17-Aug-20	Checked By: Stephen McCormack	Date: 24-AUG-20

Borehole Log Report

EDISON ENVIRONMENTAL + ENGINEERING

Hole ID.	BHDG105
Hole Depth:	3.00 m
Sheet:	1 of 1

Project Name:	Preliminary Geotechnical Investigation	Project Number:	G20067ROC
Location / Site:	Barton Park, Banksia NSW	Client:	MODE Design Corp Pty Ltd

Drilling Company:	Geosense	Date Started:	17-AUG-20	Ground Level:	RL4.7m (approx)
Drill Method:	SFA	Date Completed:	17-AUG-20	Easting:	151.153924
Equipment:	Track Mounted Hanjin D&B- 8D			Northing:	-33947411

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Gravel road				
SFA		0.5	4.0		GW	Fill	**FILL**- Silty Gravel, grey blue, fine to coarse sand and gravel.		m		
		1.0			SP		**FILL**- Gravelly Sand, dark brown, fine to coarse sand and gravel.	compacted	m	ZZ170820-G5 (CBR) 0.20-1.00m	
		1.5	3.0		SP		**FILL**- Sand With Some Clay, black, fine to medium grained, Much anthropogenic material (plastic, rubber and wood noted), moderate odour.		m		
		2.0									
		2.5	2.0								
		3.0									
		3.5	1.0				**End of Hole at 3.00m** Target Depth Reached				
		4.0									
		4.5	0.0								
		5.0									

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: Zachary Ziesel	Date: 17-Aug-20	Checked By: Stephen McCormack	Date: 24-AUG-20

EDISON ENVIRONMENTAL + ENGINEERING

Log Report Legend

MATERIAL SYMBOL

FILL	CONCRETE	ASPHALT	TOPSOIL
ORGANICS	ESTUARINE MUD		

CLAY	SAND	SILT	GRAVEL
Sandy CLAY	Clayey SAND	Clayey SILT	Clayey GRAVEL
Silty CLAY	Silty SAND	Sandy SILT	Sandy GRAVEL
Gravelly CLAY	Gravelly SAND	Gravelly SILT	Silty GRAVEL
CLAY & SAND	SAND & CLAY	SILT & CLAY	GRAVEL & CLAY
CLAY & SILT	SAND & SILT	SILT & SAND	GRAVEL & SAND
CLAY & GRAVEL	SAND & GRAVEL	SILT & GRAVEL	GRAVEL & SILT
Sandy Silty CLAY	Clayey Silty SAND	Sandy Clayey SILT	Sandy Clayey GRAVEL
Silty Sandy CLAY	Silty Clayey SAND	Clayey Sandy SILT	Clayey Sandy GRAVEL
Sandy Gravelly CLAY	Clayey Gravelly SAND	Sandy Gravelly SILT	Silty Clayey GRAVEL
Silty Gravelly CLAY	Silty Gravelly SAND	Clayey Gravelly SILT	Clayey Silty GRAVEL
Gravelly Silty CLAY	Gravelly Silty SAND	Gravelly Clayey SILT	Sandy Silty GRAVEL
Gravelly Sandy CLAY	Gravelly Clayey SAND	Gravelly Sandy SILT	Silty Sandy GRAVEL

SANDSTONE	SHALE	GRANITE	BASALT	SHALE / SANDSTONE
PORCELLANITE	GNEISS	SHALE / CLAYSTONE	MUDSTONE	
CLAYSTONE	MUDSTONE / CLAYSTONE	SHALE / SILTSTONE	IRONSTONE	

WATER LEVELS

Encountered Water

Standing Water

ABBREVIATIONS

PT	Pushtube
SFA	Solid Flight Auger
PWS	Percussion Window Sampler
HA	Hand Auger
HFA	Hollow Flight Auger

WELL GRAPHICS

Cuttings	Bentonite	Screen
Gravel Pack	Grout	Cave-in

GEE LEGEND * * 29/10/09 5:04:07 PM

EDISON
ENVIRONMENTAL + ENGINEERING

ANNEXURE 5:
Laboratory Certificates of Analysis

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Geo-Environmental Engineering Pty Ltd
82 Bridge St
Lane Cove
NSW 2066

Attention: **ALL INVOICES Stephen McCormack**

Report **738225-S**
Project name ROCKDALE
Project ID ROCKDALE
Received Date Aug 17, 2020

Client Sample ID			**ZZ170820-01**	**ZZ170820-04**	**ZZ170820-05**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Au23553**	**S20-Au23554**	**S20-Au23555**
Date Sampled			**Not Provided** I12	**Not Provided** I12	**Not Provided** I12
Test/Reference	LOR	Unit			
Chloride	10	mg/kg	36	2000	1100
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	180	1000	580
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	7.3	8.3	8.4
Resistivity*	0.5	ohm.m	56	9.9	17
Sulphate (as SO4)	10	mg/kg	81	210	150
% Moisture	1	%	16	27	26

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	Aug 19, 2020	28 Days
- Method: E045 /E047 Chloride			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Aug 21, 2020	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Aug 21, 2020	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Sydney	Aug 19, 2020	28 Days
- Method: E045 Anions by Ion Chromatography			
% Moisture	Sydney	Aug 17, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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IANZ # 1290

Company Name: Geo-Environmental Engineering P/L
Address: 82 Bridge St
Lane Cove
NSW 2066

Project Name: ROCKDALE
Project ID: ROCKDALE

Order No.:
Report #: 738225
Phone: 02 9592 0218
Fax: 02 9519 9140

Received: Aug 17, 2020 3:30 PM
Due: Aug 24, 2020
Priority: 5 Day
Contact Name: ALL INVOICES Stephen

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aggressivity Soil Set	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	ZZ170820-01	Not Provided		Soil	S20-Au23553	X	X
2	ZZ170820-04	Not Provided		Soil	S20-Au23554	X	X
3	ZZ170820-05	Not Provided		Soil	S20-Au23555	X	X
Test Counts						3	3

eurofins | Environment Testing

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			%	87			70-130	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)			%	90			70-130	Pass	
Sulphate (as SO4)			%	83			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Chloride	S20-Au24760	NCP	%	88			70-130	Pass	
Sulphate (as SO4)	S20-Au24760	NCP	%	83			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S20-Au24760	NCP	mg/kg	19	17	13	30%	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	S20-Au23553	CP	uS/cm	180	190	4.0	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S20-Au23553	CP	pH Units	7.3	7.7	Pass	30%	Pass	
Resistivity*	S20-Au23553	CP	ohm.m	56	54	4.0	30%	Pass	
Sulphate (as SO4)	S20-Au24760	NCP	mg/kg	480	470	3.0	30%	Pass	
% Moisture	S20-Au23516	NCP	%	11	11	4.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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	N/A
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
I12	Where sampling date has not been provided, Eurofins | Environment Testing is not able to determine whether analysis has been performed within recommended holding times.

Authorised By

Andrew Black	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.

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POINT LOAD STRENGTH INDEX

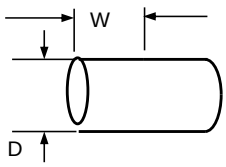
Project No.	G20067ROC

Client:	Geo-Environmental Engineering Pty Ltd	Date:	17-Aug-20
Project:	Geotechnical Investigation	Tested by:	MK
Location:	444 - 446 Princes Highway, Rockdale NSW 2216	Data checked:	MK

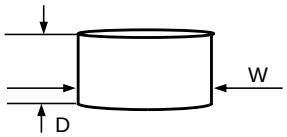
Test Machine:	GSA	Test Locality:	MHK	Core Size:	52 mm

Bore/TP	Depth (m)	Rock Type	Moisture Condition	Test Type	W (mm)	D (mm)	Load kN (P)	Failure Type	Point Load Strength Index $Is_{(50)}$ (MPa)	Strength Classification
BH-G1	16.57	SANDSTONE	F	D	52.0	49.0	1.21	2	0.50	M
BH-G1	16.57	SANDSTONE	F	A	52.0	50.0	1.26	1	0.41	M
BH-G1	17.47	SANDSTONE	F	D	52.0	49.0	2.37	2	0.98	M
BH-G1	17.47	SANDSTONE	F	A	52.0	50.0	2.41	1	0.78	M
BH-G1	18.55	SANDSTONE	F	D	52.0	50.0	2.38	2	0.95	M
BH-G1	18.55	SANDSTONE	F	A	52.0	49.0	4.08	1	1.33	H
BH-G1	19.38	SANDSTONE	F	D	52.0	49.0	2.69	2	1.11	H
BH-G1	19.38	SANDSTONE	F	A	52.0	47.0	3.46	1	1.17	H

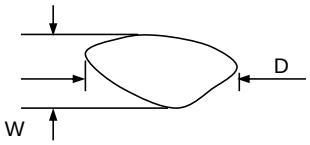
TEST TYPE :



W/D > 0.5
DIAMETRAL (D)



D/W = 0.3 - 1.0
AXIAL (A)



D/W = 0.3 - 1.0
IRREGULAR LUMP (I)

MOISTURE CONDITION :
Field (F), Saturated (S), Dry (D)

FAILURE TYPE :
1. Fracture through fabric of specimen oblique to bedding, not influenced by weak planes.
2. Fracture along bedding.
3. Fracture influenced by pre-existing joint plane (J), microfracture (M), vein (V), chemical alteration (C).
4. Chip or partial fracture.

For specimens tested perpendicular to plane of weakness $D_e^2 = 4WD/\pi$

CALIFORNIA BEARING RATIO REPORT

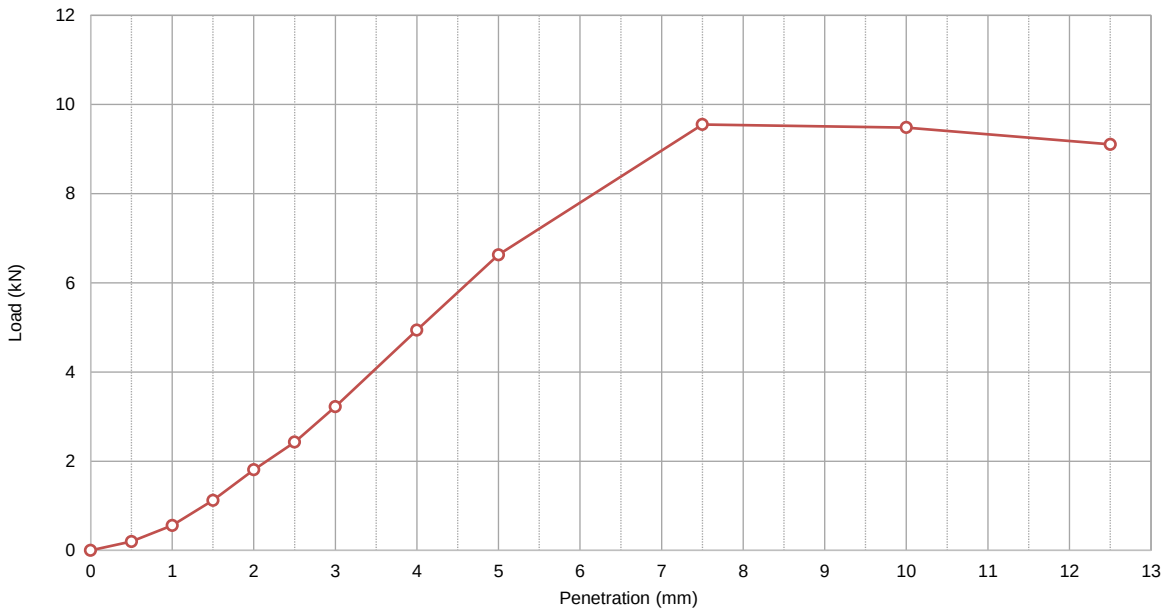
Client	Geo-Environmental Engineering	**Source**	G3
Address	82 Bridge Street Lane Cove 2066	**Sample Description**	Silty SAND trace of Gravel.
Project	Geotechnical Investigation (G20067ROC)	**Report No.**	S63129-CBR
Job No.	S20380	**Sample No.**	S63129

Test Procedure:

☑	AS 1289.6.1.1	☐ RMS T117	California Bearing Ratio
☑	AS 1289.5.1.1	☐ RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
☐	AS 1289.5.2.1	☐ RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
☑	AS 1289.2.1.1	☐ RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 17/08/2020

Preparation: Prepared in accordance with the test method



Preparation & Specification		Density & Moisture	Achieved	Target
Retained on 19.0mm Sieve (%)	3	Lab Moisture Ratio - LMR (%)	102.5	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	99.5	100.0
Sample Curing Time (hrs)	24 hrs	Dry Density - At Compaction (t/m³)	1.76	1.77
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	1.76	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)	0.0	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	14.4	
Maximum Dry Density - MDD (t/m³)	1.77	Moisture Content - Top 30mm (%)	15.0	
Optimum Moisture Content - OMC (%)	14.1	Moisture Content - Remainder (%)	14.7	

Material CBR Value (%): **40** **at a penetration of** **5.0** **mm**

Notes:

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Authorised Signatory:

Chris Lloyd

Date: 1/09/2020

MACQUARIE GEOTECH

Macquarie Geotechnical
U7/8 10 Bradford Street
Alexandria NSW 2015

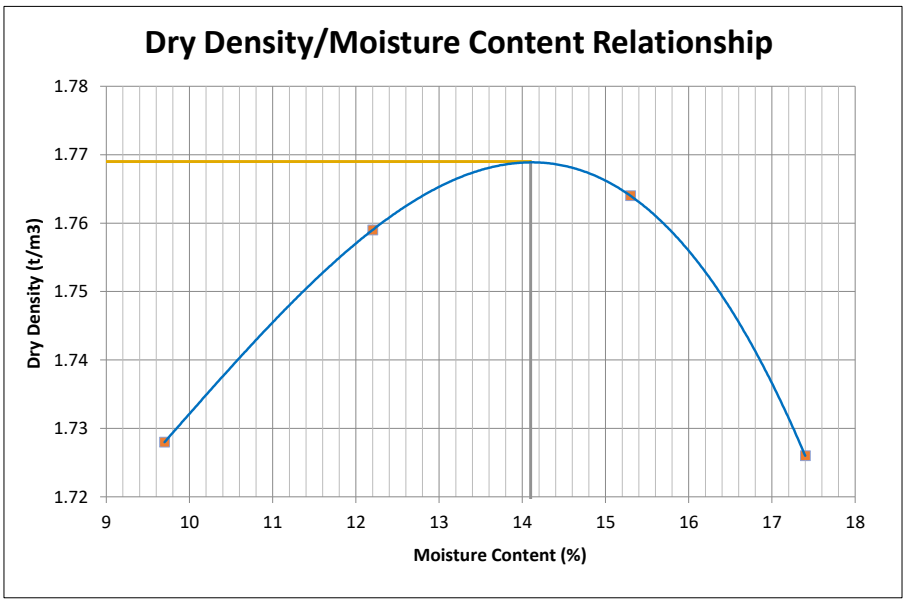
DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Environmental Engineering	**Source**	G3
Address	82 Bridge Street Lane Cove 2066	**Sample Description**	Silty SAND
Project	Geotechnical Investigation (G20067ROC)	**Report No**	S63129-MDD
Job No	S20380	**Sample No**	S63129

Test Procedure:
- ☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction
- ☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 17/08/2020

Preparation: Prepared in accordance with the test method



Maximum Dry Density (t/m^3)	1.769
Optimum Moisture Content (%)	14.1
Oversize Retained on 19mm sieve (%)	3.1
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	29 hrs
Liquid Limit Determination	Technician Assessment

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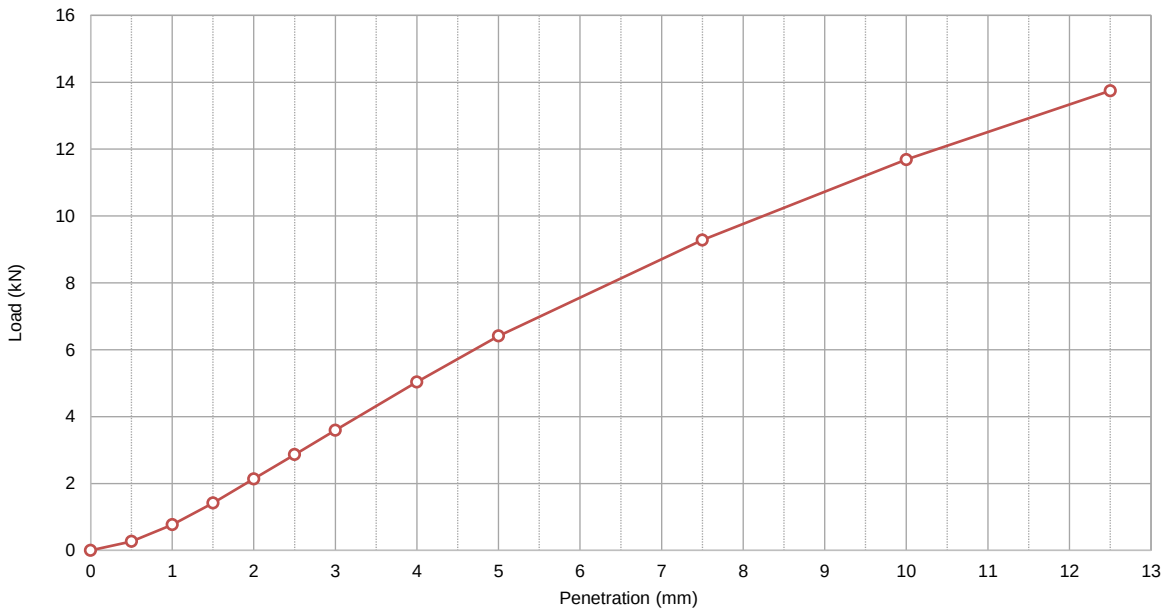
CALIFORNIA BEARING RATIO REPORT

Client	Geo-Environmental Engineering	**Source**	G4-G5
Address	82 Bridge Street Lane Cove 2066	**Sample Description**	Silty SAND with Gravel.
Project	Geotechnical Investigation (G20067ROC)	**Report No.**	S63130-CBR
Job No.	S20380	**Sample No.**	S63130

Test Procedure:				
	☑ AS 1289.6.1.1	☐ RMS T117	California Bearing Ratio
	☑ AS 1289.5.1.1	☐ RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
	☐ AS 1289.5.2.1	☐ RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
	☑ AS 1289.2.1.1	☐ RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling:	Sampled by Client - results apply to the sample as received	**Date Sampled:**	17/08/2020
Preparation:	Prepared in accordance with the test method		



Preparation & Specification		**Density & Moisture**	**Achieved**	**Target**
Retained on 19.0mm Sieve (%)	4	Lab Moisture Ratio - LMR (%)	97.5	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	100.5	100.0
Sample Curing Time (hrs)	24 hrs	Dry Density - At Compaction (t/m³)	1.88	1.87
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	1.88	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)	0.0	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	11.6	
Maximum Dry Density - MDD (t/m³)	1.87	Moisture Content - Top 30mm (%)	12.7	
Optimum Moisture Content - OMC (%)	11.9	Moisture Content - Remainder (%)	12.1	

Material CBR Value (%): **35** **at a penetration of** **5.0** **mm**

Notes:

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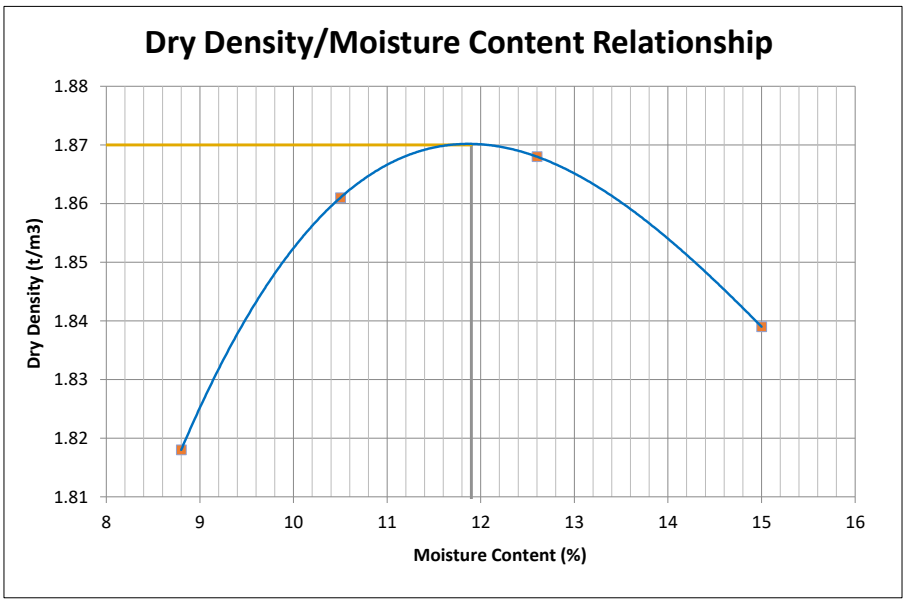
DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Environmental Engineering	**Source**	G4-G5
Address	82 Bridge Street Lane Cove 2066	**Sample Description**	Silty Gravelly SAND
Project	Geotechnical Investigation (G20067ROC)	**Report No**	S63130-MDD
Job No	S20380	**Sample No**	S63130

Test Procedure:
- ☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction
- ☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling: Sampled by Client - results apply to the sample as received **Date Sampled:** 17/08/2020

Preparation: Prepared in accordance with the test method



Maximum Dry Density (t/m^3)	1.870
Optimum Moisture Content (%)	11.9
Oversize Retained on 19mm sieve (%)	3.8
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	28 hrs
Liquid Limit Determination	Technician Assessment

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