
**Acid Sulfate Soil Assessment and
Management Plan**

**Kogarah Golf Club Redevelopment -
Concept & Early Works SSDA (SSD-
84467726)**

19 & 19A Marsh Street, Arncliffe NSW

**Prepared for Stockland Development Pty
Limited**

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

Signature

Date

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Table of Contents

	Page No
1. Introduction	1
2. Secretary's Environmental Assessment Requirements (SEARs)	2
3. Site Description	2
4. Site Environmental Setting	4
5. Project Description	5
6. Background on Acid Sulfate Soils and Risk Categories	9
7. Proposed Development	9
8. Previous Investigations	9
8.1 Douglas Partners	9
8.2 Consulting Earth Scientists (CES)	10
9. Sampling Plan	11
9.1 Rationale	11
9.2 Field Work Methodology	11
9.3 Field and Laboratory Testing	11
10. Assessment Criteria	11
11. Results	12
11.1 Field Work Results	12
11.2 Analytical Results	13
11.3 Discussion of Results	13
12. Potential for Oxidising Acid Sulfate Soil and Risk Categorisation	14
12.1 Acid sulfate soil oxidation potential	14
12.2 Assigned risk categorisation	14
13. Acid Sulfate Soil Management	15
13.1 Roles and responsibilities	15
13.2 Management options	15
13.3 Proposed management strategy for on-site treatment	15
13.4 Alternative strategy or contingency plan	19
14. Leachate and Groundwater Management	19

15.	Verification Testing of Treated Soils and Water	19
16.	General Monitoring Requirements	21
17.	Emergency Incident Response Plan	22
18.	Reporting and Record Keeping.....	23
19.	Conclusions and recommendations.....	24
20.	References	24
21.	Limitations.....	25

Appendix A: Notes about this report

Appendix B: Drawings

Previous Investigation Results

Appendix C: Acid Sulfate Soil Formation, Action Criteria and Treatment Verification

Appendix D: Summary of Results

Appendix E: Borehole Logs, Notes and Descriptive Terms

Appendix F: Laboratory Test Certificates

Appendix G: Liming Rate Calculation

Appendix H: Contingency Options to On-site Treatment

Appendix I: Water and Groundwater Management

Acid Sulfate Soil Assessment and Management Plan

Kogarah Golf Club Redevelopment - Concept & Early Works SSDA (SSD-84467726)

19 & 19A Marsh Street, Arncliffe NSW

1. Introduction

This Acid Sulfate Soils Assessment and Management Plan (ASSAMP) has been prepared by Douglas Partners Pty Ltd (Douglas) for the Stockland and John Boyd Properties Joint Venture (JV) to accompany a State Significant Development Application (SSDA) (SSD-84467726) for a Concept Masterplan and Early Works associated with the Kogarah Golf Club Redevelopment located on land identified as 13-19A Marsh Street, Arncliffe (the overall site). It is noted that this assessment and management plan specifically applies to the land at 19 and 19A Marsh Street, Arncliffe (the site).

The vision for the Kogarah Golf Club Redevelopment is to create a world-class precinct that leverages the site's strategic location adjacent to Sydney Airport and strong transport connections by delivering multi-level logistics development, trade-related enterprise and supporting uses with publicly accessible open space. It seeks to deliver state-of-the-art facilities that will redefine the logistics landscape in Australia, setting new benchmarks for scale, efficiency, sustainability and innovation.

The Concept & Early Works SSDA seeks consent for an overarching Concept Masterplan that establishes maximum building envelopes, Gross Floor Area (GFA), land uses, and other parameters through Urban Design Guidelines and technical reporting. It also seeks consent for the carrying out of Early Works to facilitate the initial site preparation and infrastructure works required to support future development and publicly accessible open space.

The objective of this ASSAMP is to confirm the presence or absence of acid sulfate soils (ASS), which may be disturbed during construction of the proposed development, and to provide management methods and procedures to minimise environmental impacts resulting from the disturbance of acid sulfate soils (ASS). This ASSAMP plan provides a summary of the investigation undertaken, ASS test results, neutralisation and treatment methods, verification testing and monitoring requirements, emergency response procedures and contingency measures.

This ASSAMP is devised on the basis of the guidelines and reference documents endorsed by NSW EPA and with reference to other national guidelines, where considered appropriate, and includes the following key guidelines:

- Acid Sulfate Soil Management Advisory Committee (ASSMAC), *Acid Sulfate Soil Manual 1998* (Stone, Ahern, & Blunden, 1998).
- QLD Department of Resources, QLD Department of Environment and Science, *Acid Sulfate Soil Technical Manual: Soil Management Guidelines, Version 5.1* (Dear, et al., 2024).
- Department of Agriculture and Water Resources (DAWR), *National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual* (Sullivan, et al, 2018a).

- DAWR, *National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual* (Sullivan, et al, 2018b).

This report must be read in conjunction with all appendices, including the notes provided in Appendix A.

2. Secretary's Environmental Assessment Requirements (SEARs)

This ASSAMP addresses the relevant Planning Secretary's Environmental Assessment Requirements (SEARs) for SSD-84467726, as outlined in Table 1 below.

Table 1: SEARs Compliance Table

Relevant Requirement	Response
Soils – an assessment of potential impacts on soil resources and riparian land on and near the site, including: - impacts on soil erosion, salinity and acid sulfate soils - details of earthworks, including cut and fill volumes - description of the proposed erosion and sediment controls during construction.	This Report

3. Site Description

The overall site is identified as 13-19A Marsh Street, Arncliffe within the Bayside Local Government Area (LGA). It is situated to the immediate west of the Cooks River and Sydney Airport, located approximately 6 km west of Port Botany and 10 km south of the Sydney Central Business District (CBD). It includes frontages to Marsh Street, providing direct access to the M5 Motorway, Sydney Airport and St Peter's Interchange (via the Sydney Gateway).

The overall site includes land associated with nine (9) allotments and a total area of approximately 32 hectares. The existing uses include the previous Kogarah Golf Club (vacated in March 2025) accessed via Levey Street and the temporary M6 Motorway Stage 1 construction compound accessed directly from Marsh Street.

The development area represents Lot 31 DP1231486 and Lot 100 DP1231954, excluding land subject to future dedication to Bayside Council. It comprises an area of approximately 16.7 hectares and is zoned SP4 Enterprise and C2 Environmental Conservation under the Bayside LEP 2021.

The overall site is described in Table 2 below and depicted in Figure 1 following.

Table 2: Overall Site Description

Lot & DP	Address	Ownership
Lot 31 DP1231486	19 Marsh Street, Arncliffe	Cook Cove Nominees No 1 Pty Ltd as trustee of Cook Cove Property Trust 1
Lot 100 DP1231954	19A Marsh Street, Arncliffe	Cook Cove Nominees No 2 Pty Ltd as trustee of Cook Cove Property Trust 2

Lot & DP	Address	Ownership
Lot 60 DP1301057	13 Marsh Street, Arncliffe	Bayside Council
Lot 61 DP1301057	19 Marsh Street, Arncliffe	
Lot 62 DP1301057	Marsh Street, Arncliffe	Transport for NSW
Lot 63 DP1301057	Marsh Street, Arncliffe	
Lot 12 DP570900	Marsh Street, Arncliffe	
Lot 102 DP1231954	Marsh Street, Arncliffe	
Lot 103 DP1231954	Marsh Street, Arncliffe	



Figure 1: Overall Site Aerial Map (Source: Nearmap, edited by Ethos Urban)

4. Site Environmental Setting

The site for this assessment and management plan includes 19 and 19A Marsh Street, Arncliffe (Items 1 and 2 in Table 2, the Development Area in Figure 1 and shown in Figure 2), and is summarised below.

Address	19 & 19A Marsh Street, Arncliffe, NSW, Drawing 1, Appendix B
Legal description	Items 1 and 2 in Table 2
Area	16.7 ha
Zoning	Unzoned
Local Council area	Bayside Council
Current use	Golf Club and Course
Surrounding uses	North – Marsh Street East – Cooks River South – M5 motorway West – Open space
Topography	The site is located on relatively flat terrain with surface levels generally varying between about RL 1 m and RL 3 m relative to Australian height datum (AHD) with elevated areas up to RL 6 m AHD at the clubhouse and small, localised elevated areas.
Geology	Reference to the Sydney 1:100 000 Geological Series Map and NSW Seamless Geology database indicates that the site is mostly underlain by freshwater swamp material (Clastic sediment) comprising estuarine and marine deposits of the Quaternary period. The deposits are estuarine tidal-delta flat material deposited in a transitional environment (marine to terrestrial), typically comprising fine- to medium-grained lithic-carbonate-quartz sand (marine-deposited), silt, clay, shell material, polymictic gravel. The geology mapping indicates that the northern portion of the site is underlain by Hawkesbury Sandstone. Hawkesbury Sandstone comprises medium to coarse grained quartz sandstone, with very minor shale and laminite lenses.
Soil landscape	Reference to the Sydney 1:100 000 Soil Landscape Series map indicates that the site is underlain by disturbed terrain. Disturbed terrain sites are characterised by level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Local relief is typically less than 10 m, slopes are less than 30% and the fill material can comprise soil, rock, building and waste material. Limitations associated with the soil landscape include mass movement hazard, unconsolidated low wet-strength materials, impermeable soil, poor drainage, localised very low fertility and toxic materials.

Groundwater	The proximity of the Cooks River and previous groundwater measurements by Douglas, and others, on the site suggest groundwater levels beneath the site generally between 0.5 m and 2 m depth (RL -0.5 m to RL 2.0 m AHD). Groundwater flows are expected to the east towards the Cooks River.
Surface water	The nearest surface water body is Cooks River which bounds the site to the east.
Acid sulfate soil risk	Reference to the 1:25 000 Acid Sulfate Soils (ASS) Risk map indicates that the site is in an area of high probability of occurrence of acid sulfate soils from depths of between 1 m and 3 m below the ground surface, with a severe environmental risk if ASS are disturbed by activities such as shallow drainage, excavation or clearing. Reference to the Acid Sulfate Soil Planning map indicates that the site is in areas identified as Class 2 (Sandplain).

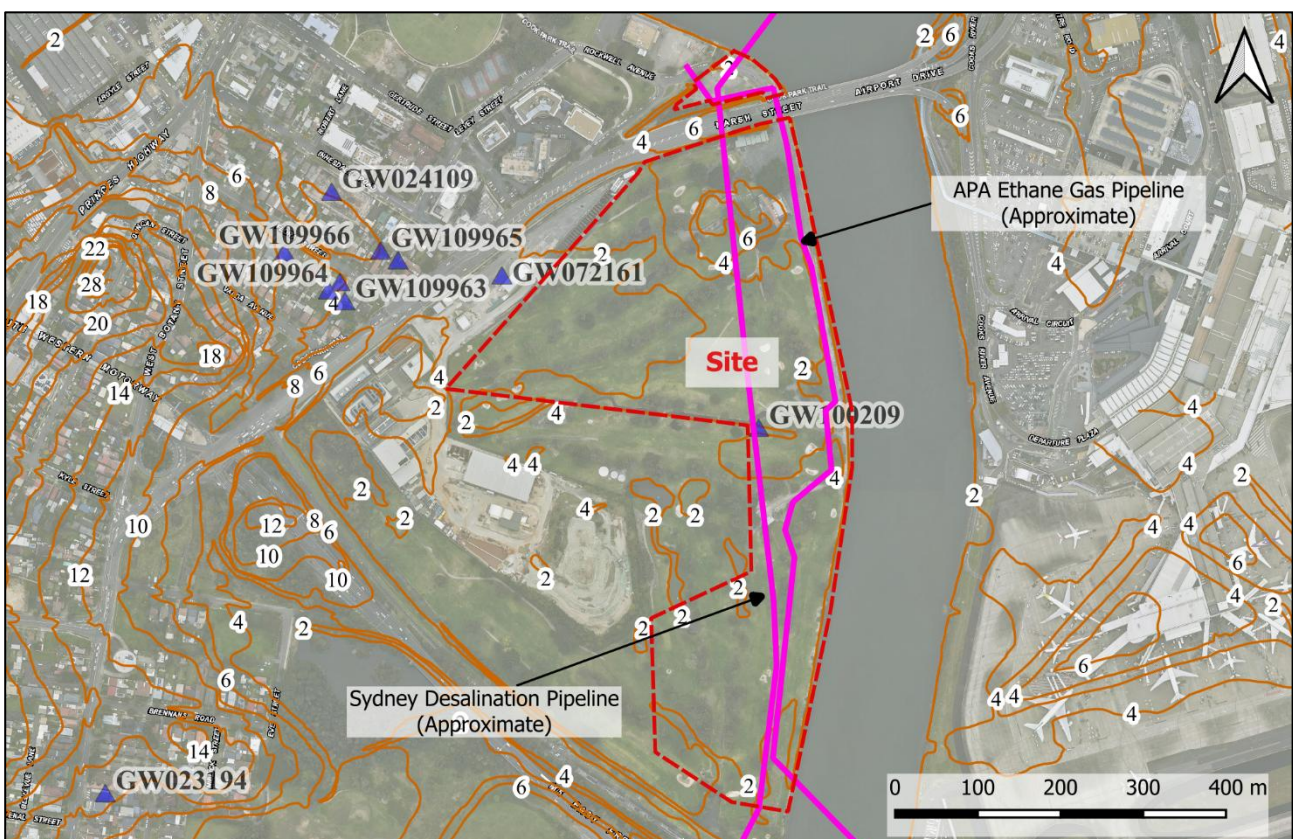


Figure 2: Aerial image of site overlain by 2 m surface contours to AHD

5. Project Description

The Concept & Early Works SSDA seeks consent for the following:

- Concept Masterplan to support the staged delivery of the Kogarah Golf Club Redevelopment, including:

- o Maximum building envelopes, including maximum building heights and minimum setbacks;
 - o Maximum Gross Floor Area (GFA) up to 343,250 m², comprising up to:
 - 3,250 m² of GFA (FSR of 1.25:1) on Lot 31 DP 1231486; and
 - 340,000 m² of GFA on Lot 100 DP 1231954.
 - o Conceptual primary land uses, including:
 - Block 1 – Mixed use and advertising structures;
 - Block 2 – Logistics and mixed-use;
 - Block 3A – Logistics;
 - Block 3B – Logistics; and
 - Block 3C – Logistics and Data centre.
 - o Urban Design Guidelines to guide future development of the built form and public domain; and
 - o Strategies and mitigation measures to manage potential environmental impacts.
- Early Works to support future delivery of built form and publicly accessible open space, including:
 - o Site preparation works, comprising:
 - Demolition of existing structures;
 - Clearing of existing vegetation;
 - Remediation works; and
 - Bulk earthworks, including ground improvement and flood mitigation works.
 - o Site servicing and infrastructure works, including:
 - Construction of the Flora Street East extension consistent with Item 3 of the executed Voluntary Planning Agreement with Bayside Council;
 - Construction of stormwater infrastructure; and
 - Construction and augmentation of service and utility infrastructure as necessary.

For a detailed description, refer to the Environmental Impact Statement prepared by Colliers Urban Planning.

The Concept Masterplan is supported by Indicative Reference Schemes that present as 'proof of concepts' within the proposed framework. The schemes demonstrate suitable primary land use, built form and public domain outcomes that align with the vision for a world-class precinct that leverages the site's strategic location adjacent to Sydney Airport and strong transport connections

The Indicative Reference Schemes consider different potential development outcomes enabled by the Concept Masterplan to support the delivery of the highest and best use at the time of redevelopment. This includes a Logistics scheme and Alternative Uses scheme, which facilitate

the potential for four (4) different primary land use outcomes across the Site. The alternative land use outcomes enabled by the Concept Masterplan include an alternative mixed-use outcome on Block 2 and alternative data centre outcome on Block 3C.

The Indicative Reference Schemes are established in Figure 3, with the Logistics scheme and Alternative Uses scheme prepared by Grimshaw depicted in Figure 4 and Figure 5.

It is noted that the Indicative Reference Schemes are indicative only and the development of future built form and publicly accessible open space will be subject to future Development Applications. The Indicative Reference Schemes demonstrate the ability to support different potential outcomes, consistent with the proposed framework under the Concept Masterplan including Urban Design Guidelines.



Figure 3: Indicative Reference Schemes (Source: Grimshaw)



Figure 4: Indicative Reference Scheme – Logistics Scheme (Source: Grimshaw)



Figure 5: Indicative Reference Scheme – Alternative Uses Scheme (Source: Grimshaw)

6. Background on Acid Sulfate Soils and Risk Categories

ASS are naturally occurring sediments that contain reduced inorganic sulfur (RIS), including iron sulfides, (primarily pyrite), commonly deposited in estuarine environments.

Further details on the formation of ASS are included in Appendix C and the relevant guidelines cited in Section 1 could also be consulted. ASS can either be classified as 'actual acid sulfate soils' (AASS) which are soils that have already reacted with oxygen to produce acid, or 'potential acid sulfate soils' (PASS) and are often found in the same soil profile, with AASS overlying PASS. PASS are soils containing iron sulfide that have not been exposed to oxygen (e.g. soils below the water table). PASS therefore have not produced sulfuric acid but have the potential to do so if exposure to oxygen occurs.

ASS field and laboratory-based criteria for assessing whether soils are classified as PASS or AASS, and/or exceed the action criteria for management if disturbed, are provided in Appendix C.

Dear, et al. (2024) relates environmental risk from ASS to the treatment level and volume of disturbance of ASS. Based on the tonnage of ASS to be disturbed and the average net acidity, the proposed disturbance of the site soils is categorised as one of the following:

- Low level of treatment: Category L;
- Medium level of treatment: Category M;
- High level of treatment: Category H;
- Very High level of treatment: Category VH; and
- Extra High level of treatment: Category XH.

The assessment of risk categorisation for this ASSAMP is provided in Section 12.2.

7. Proposed Development

It is understood that the proposed redevelopment will include the demolition of the existing golf course buildings and removal of golf course infrastructure followed by bulk earthworks for raising and levelling of the site, construction of multi-storey warehouse and office buildings, car parking and hardstand areas, as well as landscaping, footpaths and other ancillary works.

The bulk earthworks plans indicate a bulk earthworks level (BEL) of RL 3.1 m for roads, hardstands and pads, and a BEL of RL 1.6 m within building footprints with a finished floor level of RL 3.6 m. Filling will be required across much of the site to a maximum fill height of up to 3 m and cutting will be required in elevated areas, up to 4.5 m depth.

8. Previous Investigations

8.1 Douglas Partners

Douglas previously undertook a contamination data gap investigation at the site in 2024 (ref: 92400.01.R.001.Rev0, dated 14 November 2024) to identify and assess high-level contamination and remediation risks. The investigation included collection of samples from 43 sampling locations, installation of groundwater monitoring wells, and laboratory testing on soil

and groundwater and surface water samples for a range of contaminants. The primary areas of environmental concern identified in this investigation included:

- Asbestos in fill;
- Underground storage tanks (UST) and the maintenance area;
- Per-and poly-fluoroalkyl substances (PFAS) in fill, groundwater and surface water;
- Adjacent landfills and potential for migration of leachate in groundwater and/or landfill gas beneath the site;
- Fill (general contamination status);
- Groundwater (general groundwater quality / contamination status); and
- Nominal waste classifications for offsite disposal; and
- On-site structures (i.e. hazardous building materials).

As such the primary contaminants of concern at the site included:

- Eight metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- Polycyclic aromatic hydrocarbons (PAH);
- Benzene, toluene, ethylbenzene and xylene (BTEX);
- Total recoverable hydrocarbons (TRH);
- Polychlorinated biphenyls (PCB);
- Organochlorine pesticides (OCP);
- Organophosphorus pesticides (OPP);
- Per and polyfluoroalkyl substances (PFAS); and
- Asbestos.

8.2 Consulting Earth Scientists (CES)

Consulting Earth Scientists (CES) undertook a limited investigation at the site in 2001 and an additional investigation in 2008 to assess the presence of ASS. The investigations included the collection of samples down to 4.0 m depth from 58 sampling locations across a broader site area and the laboratory testing on samples for the presence of ASS. The results of the CES investigation and assessment (latest report revision, ref: Acid Sulfate Management Plan, CES130608-BP-AZ, Rev 01, dated 15 February 2023) were provided by Stockland. The results confirmed that all but two of the samples collected were classified as PASS, and that most of the site is likely to be underlain by PASS below 2.0 m depth. The sampling locations, borehole logs, and laboratory test results from the investigation are provided in Appendix B.

9. Sampling Plan

9.1 Rationale

Sullivan, et al. (2018b) recommends for the anticipated disturbance of ASS, a minimum of thirty-six (36) boreholes to be drilled within the proposed disturbance area of about 17 ha to a depth 1 m beyond the proposed disturbance depth. Given the findings and available data from the previous CES investigations, the adopted sampling rationale for Douglas' current investigation was for a reduced sampling density of ten boreholes within the area of the proposed disturbance to greater depths than the previous CES testing, undertaken concurrently with a geotechnical investigation (reported separately, ref: 223528.01.R.001).

9.2 Field Work Methodology

Field investigations were undertaken between 29 September and 14 October 2025 under the supervision of Douglas personnel. The field work included the drilling of ten (10) boreholes (BH401 to BH410) to depths between 8.0 m and 24.7 m using a track-mounted drilling rig. Boreholes were drilled using solid flight augers and rotary wash boring drilling techniques, followed by NMLC diamond coring, at selected locations.

In general, soil samples were collected at approximately 1.0 m depth intervals and at least one sample for every change in strata observed. Samples were collected at 3 m intervals in the deeper soils below about 9-10 m depth. Samples were placed immediately into zip-lock plastic bags after minimising air content and potential for moisture loss and immediately place on ice in a cooled, insulated and sealed container for transport to the laboratory.

The borehole locations are shown on Drawing 1 in Appendix B.

9.3 Field and Laboratory Testing

Based on the field screen results, S_{Cr} suite tests were undertaken on representative (including 'worst case' – low pH_F / pH_{Fox} or high pH drop between pH_F and pH_{Fox}) samples. Laboratory testing was undertaken by a NATA accredited laboratory. The number of samples tested, as recommended by Sullivan, et al (2018b), is summarised in Table 3 below.

Table 3: Summary of testing frequency

Test method	Number of tests by Douglas	Number of previous tests by CES
Field screen (test): pH_F and pH_{Fox}	71	10
Chromium reducible sulfur (S_{Cr} method)	24	18

10. Assessment Criteria

The ASS pH_F and pH_{Fox} screening test results were assessed for the possible presence of ASS conditions. It should be noted that ASS screening tests are a qualitative screening test which

provides a preliminary indication of the presence of ASS conditions, the results of which were used to guide the selection of samples for laboratory analysis.

Acid base accounting (ABA) via the S_{Cr} test, is a quantitative measurement and takes precedence over the screening test results when evaluating the presence or absence of ASS. The S_{Cr} results can also be used to correlate with the pH_F and pH_{FOX} screening test results.

The relevant assessment criteria from Sullivan, et al. (2018a), are summarised in Table 4 below (and the summary results table in Appendix D). The anticipated disturbance of ASS of greater than 1000 tonnes and this volume, along with the anticipated soil type, was considered in the derivation of the action criterion.

Table 4: Assessment criteria

Assessment criteria and associated test	Units	Threshold
Screening test assessment criteria pH_F and pH_{FOX}	pH_F	$<4^1$
	pH_{FOX}	$<3^2$
	ΔpH_F	>1
Action criterion: S_{Sr} net acidity / sulphur trail (%) <1000 tonnes Sands to loamy sands	% $S_{Oxidisable}$	≥ 0.03

Notes: pH_F = non-oxidised pH

pH_{FOX} = oxidised pH

ΔpH_F = pH_F minus pH_{FOX}

¹ Indicative value only for actual acid sulfate soil (AASS)

² Indicative value only for potential acid sulfate soil (PASS)

11. Results

11.1 Field Work Results

The borehole logs for this assessment are included in Appendix E. The logs recorded the following general sub-surface profile:

- FILL:** Fill was encountered at all CPT locations and boreholes BH401 and BH407 from the ground surface to depths of between 0.3 m and 3.6 m. At most boreholes locations the upper 0.1 m to 0.4 m of the fill comprised heavily root affected sandy clay similar to a topsoil type material. The test results indicated generally sandy silt and silty sand fill of variable consistency. The fill appeared generally consistent with very loose and loose sand material with some denser layers. Buried obstructions were encountered within the fill at CPT201, CPT201A and CPT201B, which were unable to be penetrated and the CPTs were terminated within the fill in these locations; overlying
- CLAY and SILT (very soft to firm):** Very soft, soft, soft to firm and firm clay, silty clay, and sandy silt with trace shell fragments and sulphurous odour to depths of between 1.7 m and 7.8 m; overlying
- SAND (very loose, loose & medium dense):** Very loose, loose and medium dense sand and silty sand to depths between 3.8 m and 8.0 m; followed by

- **INTERBEDDED CLAY & SAND:** Alternating layers of clay and sand to depths of between 8.0 m and 25.2 m. The clay ranged between stiff and hard, and the sand ranged between loose and very dense; overlying
- **SANDSTONE BEDROCK:** Generally low and medium strength, fresh to moderately weathered, pale grey fine to coarse grained sandstone (Hawkesbury Sandstone) bedrock.

Groundwater was observed in all boreholes during drilling at depths between 0.4 m and 2.5 m, with the exception of BH409 in which groundwater was not observed whilst augering to only a shallow depth. Groundwater levels were measured in the monitoring wells, screened in soils, installed during the geotechnical investigation at depths of between 0.6 m and 1.8 m. Note that groundwater levels can fluctuate due to seasonal and rainfall variations, and due to human influences.

11.2 Analytical Results

The results of screening tests / laboratory analysis are summarised in the Table D1 in Appendix D.

The laboratory certificates of analysis together with the chain of custody and sample receipt information are provided in Appendix F.

11.3 Discussion of Results

Based on the testing and the lithology observed at the site, the following is noted for the field screening results:

- pH_F was within the threshold criterion (<4 pH units, indicative of actual ASS) in all samples, ranging from 4.4 to 8.8 pH units;
- pH_{FOX} was below the threshold criterion (<3 pH units, indicative of potential ASS) for 52% of samples, ranging from 1.6 to 6.5 pH units; and
- All samples exceeded the threshold criterion for the drop in pH_F (>1 pH units), ranging from 1.5 to 6.7 pH units.

Chromium reducible sulphur (S_{Cr}) testing was undertaken on selected samples below a depth of 1 m where the screening results indicated the potential for ASS to be present and to confirm the depth of potential ASS. The S_{Cr} test results indicated that twenty samples tested between 0.9 m bgl and 9.0 m bgl exceeded the action criterion for net acidity of $>0.03\%$ S. No exceedances were recorded on deeper samples tested between 11 m bgl and 17 m bgl. The exceedances ranged from 0.05% S to 1.60% S. Including the results of laboratory testing undertaken during the CES investigation, the maximum net acidity is assessed to be 3.70% S.

Taking into consideration the ASS results and cross-referencing of borehole logs, the S_{Cr} results suggest that ASS is present at the site at depths of between 0.9 m and 9.0 m bgl and is likely to be associated with the estuarine and alluvial deposits across the site. As samples tested below 9.0 m depth did not exceed the threshold criteria, it is considered less likely that ASS is present below 9.0 m depth. Given the proposed development requires the excavation of soils, ASS may be encountered (excavated) during the proposed works although excavation is proposed above the groundwater table and is generally expected to be within fill material and sandstone bedrock where the risk of ASS is less.

12. Potential for Oxidising Acid Sulfate Soil and Risk Categorisation

12.1 Acid sulfate soil oxidation potential

Based on the proposed development (refer to Section 7) excavations and potential exposure of ASS include:

- Bulk excavations for site levelling. Excavations of up to 2.0 m depth across the broader site, and up to 4.2 m in elevated areas (to cut down to approximately RL 1.65 m), are anticipated;
- Excavations for service installations.

Based on the above, excavations are expected to be through fill material and a large rock outcrop in the northern portion of the site.

Although not currently part of the proposed development, if excavation below the water table is required then ASS may be exposed during dewatering. If spoil-generating piling is undertaken (e.g. CFA piling) then pile spoil will be exposed, however, this is not currently part of the masterplan design.

Based on the results of the current and previous investigations (refer to Sections 8 and 11), any excavations which disturb or uncover natural soils from low lying areas (estuarine and alluvial soils with surface level below 5 m AHD) in the site have the potential to oxidise PASS and/or disturb AASS. Some fill material may also include a component of reworked natural ASS.

Any disturbance of ASS must be undertaken in accordance with this ASSAMP.

12.2 Assigned risk categorisation

The risk categorisation and formulating this ASS management strategy considers:

- Proximity to the adjacent Cooks River and associated ecosystem; and
- The ASS results and soil types.

Dear, et al. (2024) relates environmental risk from ASS to the treatment level and volume of disturbance of ASS. Based on the proposed development, test results and allowance for some disturbance of ASS, this management plan has been developed for a risk rating up to:

- Very high level of treatment (VH).

It is understood that the early enabling works will be undertaken in stages that will reduce the volume of disturbance and lime treatment at any one time. Furthermore, the proposed early works will involve little or no dewatering, and dewatering is not expected to have significant drawdowns with no alteration to the seasonal lowest water table. Therefore, Douglas considers the risk of environmental harm from the proposed ASS management is limited and that the risk category can be lowered to H.

13. Acid Sulfate Soil Management

13.1 Roles and responsibilities

The following key roles and responsibilities are relevant to this ASSAMP:

- Contractor: the contractor with responsibility to implement this ASSAMP during earthworks / dewatering etc;
- Site Supervisor: head representative for the Contractor responsible for the day-to-day site operations including management of ASS; and
- Environmental Consultant: data collection / verification testing and documentation of the works, as per this ASSAMP.

13.2 Management options

Stone, Ahern, & Blunden (1998) and Dear, et al. (2024) provides the following potential soil management options:

Option 1	Non-excavation or minimal earthworks (avoidance);
Option 2	On-site treatment (neutralisation) followed by: Off-site disposal; and/or On-site reuse.
Option 3	Off-site treatment and disposal.
Option 4	Hydraulic separation of ASS fines.

Based on the proposed development, risk category and volume of disturbance, Option 2 – on site treatment followed by on-site reuse is recommended as the preferred management option, with reference to the relevant guidelines and reference materials. This option is recommended given the volume of disturbance is lower than the proposed volume of filling required for the proposed development.

It is the responsibility of the Contractor to manage ASS under this ASSAMP and in accordance with relevant standards and statutory requirements. Verification sampling and testing must be undertaken by the Environmental Consultant.

13.3 Proposed management strategy for on-site treatment

13.3.1 General

Prior to undertaking this management strategy, it is recommended that a further data gap assessment is undertaken at targeted locations where there is proposed bulk earthworks cutting to confirm the presence or absence of ASS at these locations. This would allow for optimisation of the proposed management strategy by delineating the lateral and vertical extent of ASS and confirmation of the volume of material that requires treatment and lime treatment rates for each area. The scope of the data gap assessment will be confirmed upon issue of the final cut and fill plans. If required based on the outcome of this data gap assessment an addendum of revision of this ASSAMP be prepared.

The process for treatment of excavated ASS comprises:

- Preparation of a treatment pad as described in Section 13.3.2;
- Excavation and segregation / stockpiling and treatment of ASS:
 - o For coarse soils (i.e. sands), treatment should occur within approximately 12 to 18 hours (or less) following excavation;
 - o For fine-grained soils (i.e. clays), treatment should occur within approximately 40 to 60 hours following excavation. Faster oxidation rates are possible, particularly in warm weather;
- Treatment via spreading the ASS over the guard layer in layers of up to 0.3 m thick, leaving a 1 m buffer between the toe of the spread soil and the containment bund or drain. When spreading the first soil layer, care should be taken not to churn up the guard layer;
- Application of Agricultural lime (aglime, CaCO_3) over the 0.3 m layer at the minimum lime dosing rate (refer to Section 13.3.3) and harrow / mix thoroughly. Use of rotary plough equipment (e.g. auger bucket) may be appropriate for cohesive soils, where adequate mixing is difficult to achieve. If ASS materials are too wet, adequate mixing of aglime cannot be achieved and soils may require a period of drying prior to mixing;
- Undertaking verification testing (as outlined in Section 15) to confirm that the ASS has been adequately neutralised in each layer prior to placement of the next layer to be treated. If verification testing indicates that additional neutralisation is required, add additional aglime (at an appropriate liming rate) and mix as described above;
- Continuing the spreading/ liming / harrowing / verification cycle for each 0.3 m layer until excavation is finished;
- Verification testing to confirm that the ASS has been adequately neutralised. Upon confirmation, the soil should be removed from the treatment pad for beneficial re-use on site and/or off-site disposal (subject to waste classification);
- Management of leachate and groundwater may also be required where leachate is produced and/or if groundwater is impacted by the works as outlined in Section 14; and
- Adding a layer of fine aglime at the base of excavations in ASS (5 kg/m³ is recommended) to neutralise downward seepage from exposed ASS, or to minimise acidification of groundwater following re-establishment of groundwater levels.

13.3.2 Preparation of treatment pads

The treatment pad should be located as far as practical from any ecological receptors (e.g. drainage lines which enter the stormwater system and nearby water bodies). The pad should be of an appropriate area to accommodate the volume of soil to be treated / stored and should be prepared on relatively level or gently sloping ground to minimise the risk of potential instability issues, with a fall to the local drainage sump.

Construction of the treatment pad involves:

- Lining the footprint of the pad with either:
 - o Natural low permeability clay;
 - o A compacted clay layer;

- o Geosynthetic liner (e.g. HDPE);
- o Impervious barrier (e.g. concrete or bitumen hardstand);
- Placement of a guard layer of fine aglime at approximately 10 kg/m² per 300 mm layer of ASS proposed. The guard layer should be re-applied each time treated soils are removed, prior to placement of the next batch of un-treated ASS; and
- Construction of a perimeter clay bund (or equivalent) to collect any leachate runoff and to prevent surface water from entering the treatment pad. The inner bund slopes should be lined to prevent leachate seeping into the ground surface and sized to prevent overflow of untreated leachate onto the site.

A standard treatment pad is shown on in Figure 6, below.

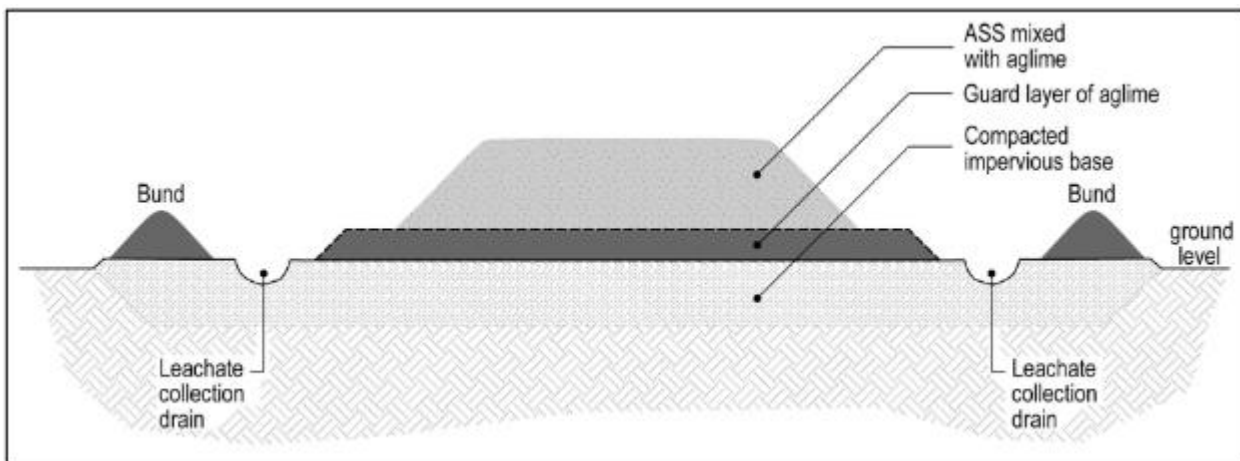


Figure 6: Schematic cross-section of a treatment pad, including compacted impervious base (clay layer), guard layer, leachate collection drains and bunding (source: Dear, et al. (2024))

Reapplication of the guard layer will be necessary under treatment pads if the treated soil is being removed as the guard layer could be removed with the treated soil. Guard layers may need to be applied between each placed ASS layer in situations where multiple layers of ASS are placed on the same treatment pad.

13.3.3 Neutralising materials and liming rate

Agricultural lime (aglime) is the preferred neutralisation material.

Refer to Appendix G for additional information on aglime and purity of specific aglime.

Based on the assessment results, fill / natural soils that are to be disturbed during excavation are to be treated using aglime prior to reuse on-site or off-site or disposal. Table 5 provides indicative liming rates for neutralisation of the ASS likely to be disturbed.

Table 5: Indicative liming rate for soil

Material description	Net Acidity (%S) max. ^a (range) ^c	Maximum Aglime application rate ^b (kg/tonne)	Average Aglime application rate ^d (kg/tonne)
Natural Soils: Generally grey sand and silty clay to a depth of 9.5 m / - 7.2 m AHD	3.7 (0.06-3.7)	182 kg/tonne (273.6 kg/m ³)	27.6 kg/tonne (41.4 kg/m ³)

Notes:

a Maximum net acidity for soil unit/type. Net acidity to be calculated based on the equation provided in Appendix C.

b Lime application rate calculated using maximum net acidity for soil unit / type using the equation in Appendix G. Lime rate calculated based on an ENV of 95% for aglime, a factor of safety (FOS) of 1.5 and a bulk density of 1.5 t/m³ for clay / silt and 1.8 t/m³ for sand

c Net acidity range for soil unit/type, including previous investigation results.

d Lime application rate calculated using average net acidity for soil unit / type using the equation in Appendix G.

13.3.4 Trenching works

For trenching works (i.e. service installation) which cannot be rerouted or modified to ensure the invert depth of the trench is above ASS and where trenchless tunnelling technologies cannot be used to minimise disturbance, the following process is recommended with reference to Dear, et al., (2024), for excavated trench spoil:

- Non-ASS surface soils should be removed and segregated from ASS. Soil horizons should be replaced back in the trench in the same order they were removed (after ASS has been neutralised), and subject to geotechnical considerations;
- The trench excavation should be staged, such that ASS soils are excavated, treated and backfilled within 24 hrs (typically within an 8-hour working day);
- Where the ASS risk assessment shows the risk is high (refer to Section 12.2), the trench is located in a sensitive environment and/or where dewatering is required, ASS should be removed from the trench and neutralised on a fully contained treatment pad (refer to above) and neutralisation performance criteria (refer to Section 15);
- Where the ASS risk assessment shows the risk is not high, the trench is not located in a sensitive environment and no dewatering is required the following management strategy could be adopted in lieu of a treatment pad:
 - o A guard layer of aglime (refer to above for application rates) should be applied to the ground surface alongside and adjacent to the trench;
 - o Excavated soil from the trench should be placed on the guard layer;
 - o Aglime should be applied to the surface of the excavated soil at double (FOS of three) the application rate provided in Section 13.3.3. Verification testing is not required for this methodology;
 - o A layer of aglime should be placed over the base of the excavation. A lime application rate of 10 kg/m² is recommended;
 - o The excavated treated soil should be backfilled into the trench; and
 - o Segregated non-ASS overlying ASS should be re-instated on top of the treated ASS, minimising any aglime at the ground surface

13.4 Alternative strategy or contingency plan

Where the proposed primary management option is not possible, or practical, alternate or contingency strategies, with reference to the applicable guidelines, may be considered and following a 'fit for purpose' assessment. These contingency options are outlined in Appendix H.

14. Leachate and Groundwater Management

Potential leachate and groundwater management strategies are provided in Appendix I.

15. Verification Testing of Treated Soils and Water

Verification testing to assess whether ASS has been adequately neutralised will be undertaken by means of:

- Screening tests (pH_F and pH_{FOX}) at the frequencies in Table 6; and
- Acid base accounting (e.g. using the chromium suite) testing at the frequencies in Table 6.

Based on a 'Category H' treatment level, verification testing of the ASS and leachate (if present) is required after the addition of lime to test whether the soil / water has been adequately neutralised, whether or not adequate mixing of the ASS has been achieved, and to reduce the risk of acidic water being returned to the environment (including watercourses). The verification testing frequency for ASS is in Table 6.

Table 6: Verification testing frequency for treated acid sulfate soils

Test	Frequency
Field test: pH_F and pH_{FOX} screening	One sample / soil type AND One sample / 25 m ³ -100 m ³ of treated soil (whichever is the greater frequency) AND At least three to six samples / 200 mm to 300 mm deep soil treatment layer
Net acidity (acid base accounting)	One sample / soil type AND Volumes of <250 m ³ = two samples OR Volumes 251–500 m ³ = three samples OR Volumes >500 m ³ and ≤2 %S = three samples, plus one sample per additional 500 m ³ OR Volumes of >500 m ³ and >2 %S = three samples, plus one sample per additional 250 m ³ AND At least one sample / 200 mm to 300 mm deep soil treatment layer

Note:

Verification testing frequencies should be adjusted (either increased or decreased) depending on net acidity value, performance, material quantities and purpose/reuse, and may be subject to change by the appropriate regulatory authority in the event of a review.

Laboratory analysis on untreated soils for each treatment layer should be considered where heterogenous materials are present and initial ASS investigations indicate the presence of existing ANC (unverified).

In addition, the pH of all ponded leachate around the confines of the treatment bunds and adjacent surface waters should be measured on a regular basis and results assessed against the criteria provided in Table 7 and against background (pre-construction) levels. The soil and water contained within the bunded treatment area should not be removed until the target values in Table 7, below, have been achieved. Treatment of deeper soil layers should not be commenced until the existing surface layer has been validated and removed.

Table 7: Target levels of neutralised soil and water

Test	Component	Target level
Monitoring of water (leachate, surface water and groundwater)	pH	pH 6.5 < pH < 8.5, or one pH unit from background levels
	Turbidity	To comply with either values determined in consultation with the Authority or less than local background levels (baseline monitoring required).
	Leachable Metals (Aluminium (Al), iron (Fe), copper (Cu), Zinc (Zn), Chromium (Cr), Arsenic (Ar) and Lead (Pb))	Establish local water quality data prior to site disturbance for comparison. Due consideration to the results and Site Assessment Criteria reported in Douglas' DSI report ^c .
	PAH, PFAS, OCP, OPP, PCB, TRH and BTEX ^d	To comply with the Site Assessment Criteria reported in Douglas' DSI report ^c . Testing to be confirmed by the Environmental Consultant based on the area of works and contamination risks at that locations (e.g. works near the UST require PAH, TRH and BTEX testing).
	Dissolved oxygen (DO)	To comply with either values determined in consultation with the Authority or less than local background levels established by baseline monitoring. Less than the results and Site Assessment Criteria reported in Douglas' DSI report ^c .
	Electrical conductivity (EC)	To comply with either values determined in consultation with the Authority or less than local background levels established by baseline monitoring. Less than the results and Site Assessment Criteria reported in Douglas' DSI report ^c .

Test	Component	Target level
	Nutrients (Ammonia)	To comply with either values determined in consultation with the Authority or less than local background levels established by baseline monitoring. Less than the results reported and Site Assessment Criteria in Douglas' DSI report ^c .
Field screening of soil ^a	pH _F	6.5 ≤ pH _F ≤ 8.5
	pH _{FOX}	6.5 ≤ pH _{FOX} ≤ 8.5
Acid base accounting (including chromium reducible sulfur (Scr) method)	Net acidity ^b	Zero or negative
	pH _{KCL}	6.5 ≤ pH _{KCL} ≤ 10

Notes:

a used as a guide only to assess when adequate neutralisation and soil mixing has been achieved.

b determined using the equation in Appendix C

c Contamination Data Gap Investigation Report 92400.01.R.001.Rev0, dated 14 November 2024.

d The scope of contaminant testing can potentially be adjusted (reduced) following the initial rounds of monitoring subject to a review of the results.

It should be noted that laboratory tests will require at least four days turnaround, possibly longer, and hence sufficient time should be allowed in the treatment program for such verification testing. Only appropriately skilled staff should collect and test verification samples.

16. General Monitoring Requirements

It is recommended that prior to commencement of works, a construction environmental management plan (CEMP) should be developed by the lead Contractor. The CEMP should also include a program for general site monitoring pertinent to the ASS. A typical monitoring program is provided in Table 8 and should be implemented by the responsible parties. These proposed monitoring requirements and controls should be reviewed following the data gap assessment and, where appropriate, may be reduced where the risk of ASS disturbance is low or has not been identified.

Table 8: General monitoring requirements

Task	Frequency	Standard	Reporting/ record keeping	Responsibility
Inception Meeting	Pre-start	ASSAMP	Minutes	Contractor / Site Supervisor, Environmental Consultant
Site inspection	Daily	Visual / olfactory signs of ASS	File note	Site Supervisor
Site inspection	Monthly	Visual / olfactory signs of ASS	File Note	Environmental Consultant

Task	Frequency	Standard	Reporting/ record keeping	Responsibility
Monitoring of disturbed excavations that are in ASS	Daily	Visual until backfilled	File note	Site Supervisor
Monitoring of ASS treatment area/s	Daily	Visual Daily pH testing until results show ASS or leachate has been neutralised (refer Section 15 for criteria and testing requirements)	File note and results of pH testing to be recorded in field sheets	Site Supervisor
Surface Waters	Daily (field parameters) Weekly (metals), plus prior to and following discharge	pH, EC, DO, total and dissolved metals (including Al and Fe) tested to demonstrate compliance with ASSAMP guidance or regulatory requirements prior to discharge	Field sheets and permit to discharge	Site Supervisor / Environmental Consultant
Groundwater	Daily (field parameters) Weekly (metals), plus prior to and following discharge Specific contaminants of concern to be tested based on area of works / dewatering	pH, EC, DO, total and dissolved metals (including Al and Fe) tested to demonstrate compliance with ASSAMP guidance or regulatory requirements. Concentrations of dissolved metals should be assessed against the recreational water quality guidelines. Reference should be made to the Site Assessment Criteria for groundwater levels in Douglas' DSI report ^a .	Field sheets	Site Supervisor / Environmental Consultant

a Contamination Data Gap Investigation Report 92400.01.R.001.Rev0, dated 14 November 2024.

b Additional testing may include some or all of the following based on recommendation of Environmental Consultant: PAH, PFAS, OCP, OPP, PCB, TRH and BTEX based on area of site and specific contamination risks

17. Emergency Incident Response Plan

Construction activities which may cause potential environmental impacts with respect to ASS are summarised in the table below together with recommendations for emergency response procedures.

Table 9: Emergency response procedures

Activity	Environmental threat	Emergency response
Excavations	Flooding of open excavation causing adjacent groundwater levels to rise, leading to potential acid leachate once the excavation is drained.	Inform site foreman and project manager/ environmental officer. Determine pH of groundwater / floodwater in excavation. Correct groundwater / floodwater pH by application of slaked lime (hydrated lime) to bring pH in range of 6.5 to 8.5 or to pre-construction background levels. Drain pit to tanks / ponds for water quality assessment prior to discharge.
Treatment / neutralisation	Soil washes or slips outside of bunded treatment area	Inform site foreman and project manager / environmental officer. Estimate volume of material breaching bund. Conduct pH analysis of adjacent watercourses (if any) and correct pH if potentially impacted. Remove escaped soil into a bunded treatment area. Over-excavate impacted area to 0.2m depth, apply and mix lime at rate as for guard layers (5 kg to 10 kg lime per m² of surface).
	Breach in containment bund	Inform site foreman and project manager/ environmental officer. Close breach in bund. Conduct pH analysis of adjacent watercourses (if any). Correct pH in any adjacent watercourse (if required).
	Extracted untreated groundwater, surface water or leachate is exiting the site in an uncontrolled manner.	Inform site foreman and project manager / environmental officer. Restrict / stop source of water. Conduct pH analysis of adjacent watercourses (if any).

For all construction activity incidents which pose a potential environmental impact, an incident report must be completed in order that:

- The cause of the incident may be determined;
- Additional control measures may be implemented; and
- Work procedures may be modified to reduce the likelihood of the incident re-occurring.

18. Reporting and Record Keeping

With reference to Dear, et al. (2024), it is good practice for the Contractor to maintain a record of treatment of ASS. Such records should include the following details:

- Date;

- Location / area / treatment pad;
- Time of excavation;
- Neutralisation process undertaken;
- Lime rate used including;
 - o Records which demonstrate a safety factor of 1.5 has been applied in calculating liming rates;
 - o Receipts showing quantities of aglime purchased;
 - o Evidence of composition, purity, particle size and ENV of the aglime used;
 - o Record of aglime use (e.g. per treatment pad, use in guard layers etc);
 - o Photographic evidence of incorporation of neutralising agent (aglime).
- Results of monitoring;
- Disposal and/or reuse location; and
- Tonnages and disposal/transfer dockets (if applicable).

A record should also be maintained confirming contingency measures and additional treatment if undertaken. A final report should be issued upon completion of the works presenting the monitoring regime and results and confirming that appropriate management of ASS has occurred during the works.

19. Conclusions and recommendations

This ASSAMP provides the ASS management procedures to be enacted to minimise the impact of ASS disturbance on the environment during the proposed works.

If ASS are encountered, then the ASS management procedures provided herein will be enacted to minimise the impact of ASS disturbance on the environment.

Further testing comprising a data gap assessment at targeted locations should be undertaken where there is proposed bulk earthworks cutting to confirm the presence or absence of ASS at these locations. Following the results of the data gap assessment, the proposed monitoring requirements, controls, and management strategy should be reviewed, and may be reduced where ASS risk is low or is not identified.

20. References

Dear, et al. (2024). *Queensland acid sulfate soil technical manual : soil management guidelines version 5.1*. Dear, S E; Williams, K M; McElnea, A E; Ahern, C R; Dobos, S K; Moore, N G; O'Brien, L E; Department of Environment, Science and Innovation.

Dear, S. E., Williams, K. M., McElnea, A. E., Ahern, C. R., Dobos, S. K., Moore, N. G., & O'Brien, L. E. (2024). *Queensland acid sulfate soil technical manual : soil management guidelines version 5.1*. Department of Environment, Science and Innovation.

Stone, Y., Ahern, C. R., & Blunden, B. (1998). *Acid Sulfate Soils Manual*. Wollongbar, NSW, Australia: Acid Sulfate Soil Management Advisory Committee.

Sullivan, et al. (2018a). *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Identification and Laboratory Methods Manual*. Canberra ACT CC BY 4.0: Sullivan, L; Ward, N; Toppler, N; Lancaster, G, Department of Agriculture and Water Resources.

Sullivan, et al. (2018b). *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification Methods Manual*. Canberra ACT CC BY 4.0: Sullivan, L; Ward, N; Toppler, N; Lancaster, G, Department of Agriculture and Water Resources.

21. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 19 & 19A Marsh Street, Arncliffe NSW in line with Douglas' proposal dated 11/07/2025 and acceptance received from Stockland Development Pty Limited. The work was carried out under the Standing Offer Deed between Douglas and Stockland Development Pty Ltd, dated February 2025. This report is provided for the exclusive use of Stockland Development Pty Limited for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

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

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

The assessment of atypical safety hazards arising from this advice is restricted to the ASS components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

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

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

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

Appendix A

About this Report

Introduction

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

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

Copyright

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

Borehole and Test Pit Logs

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

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

Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at

the time of construction as are indicated in the report; and

- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

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

Reports

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

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

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

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

continued next page

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

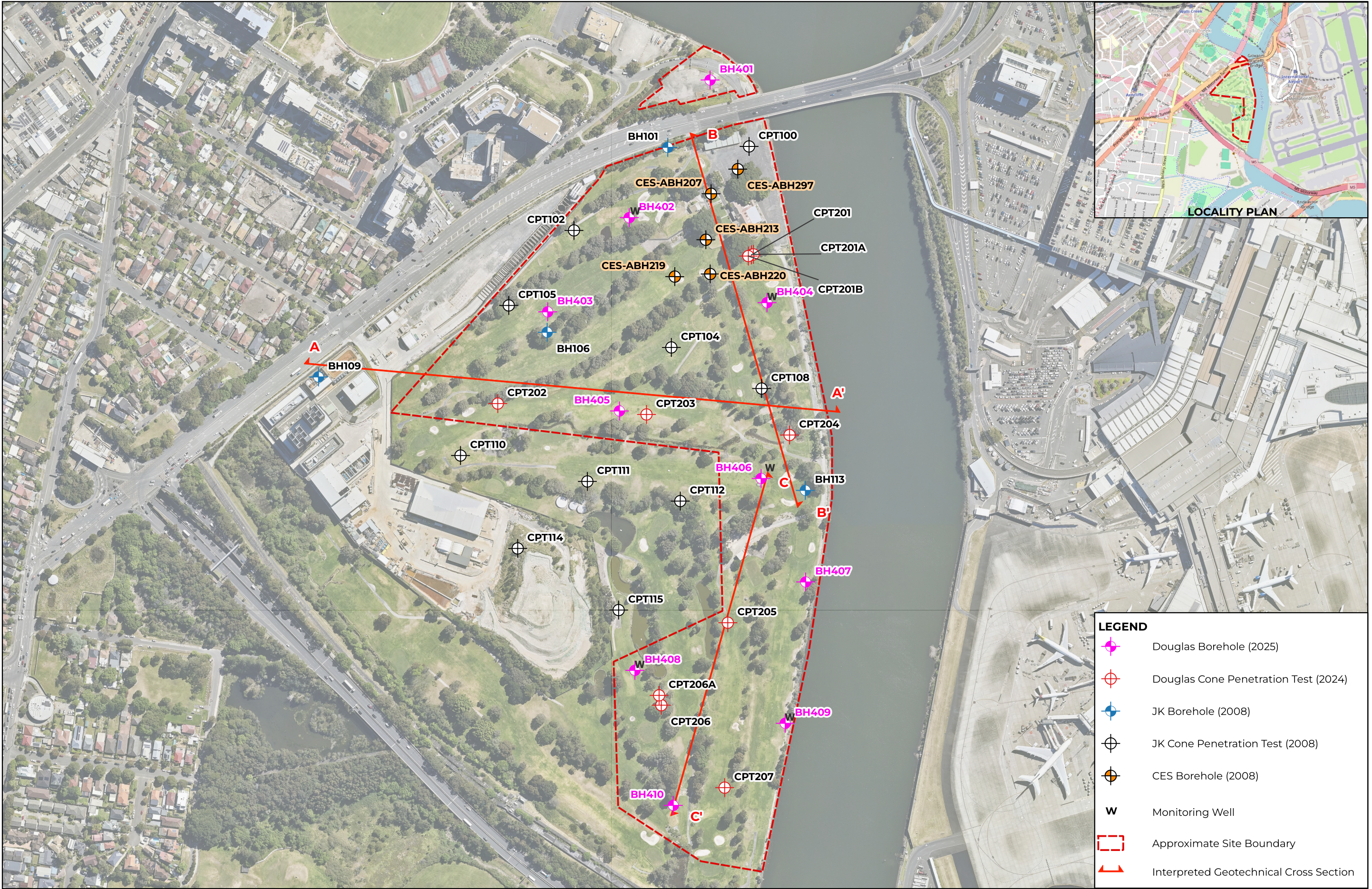
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Appendix B

Drawings

Previous Investigation Results



LEGEND

Douglas Borehole (2025)

Douglas Cone Penetration Test (2024)

JK Borehole (2008)

JK Cone Penetration Test (2008)

CES Borehole (2008)

Monitoring Well

Approximate Site Boundary

Interpreted Geotechnical Cross Section

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Issued for Information	06.11.2025	MN
SCALE: 0 50 100 150 200 m			
1:4000 @ A3			

PARTNERS

OFFICE: SYDNEY
96-98 Hermitage Rd, West Ryde NSW 2114
(02)9809 0666

CLIENT:
Stockland Development Pty Limited

NOTE:
1: Basemap from Metromap (Dated 04.09.2025)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Commercial-Industrial Development
PROJECT ADDRESS:
Kogarah Golf Course, Cooks Cove, Arncliffe NSW

DRAWING TITLE:
Test Location Plan

PROJECT NO:
223528.01

DRAWING NO:
1

REVISION:
0



Figure 2. Site Layout Plan and Sampling Locations





Legend

Cooks Cove Development Zone

Site Features

WTC

Marsh Street

0.1 0.05 0 0.1 0.2 0.3 0.4

Kilometers

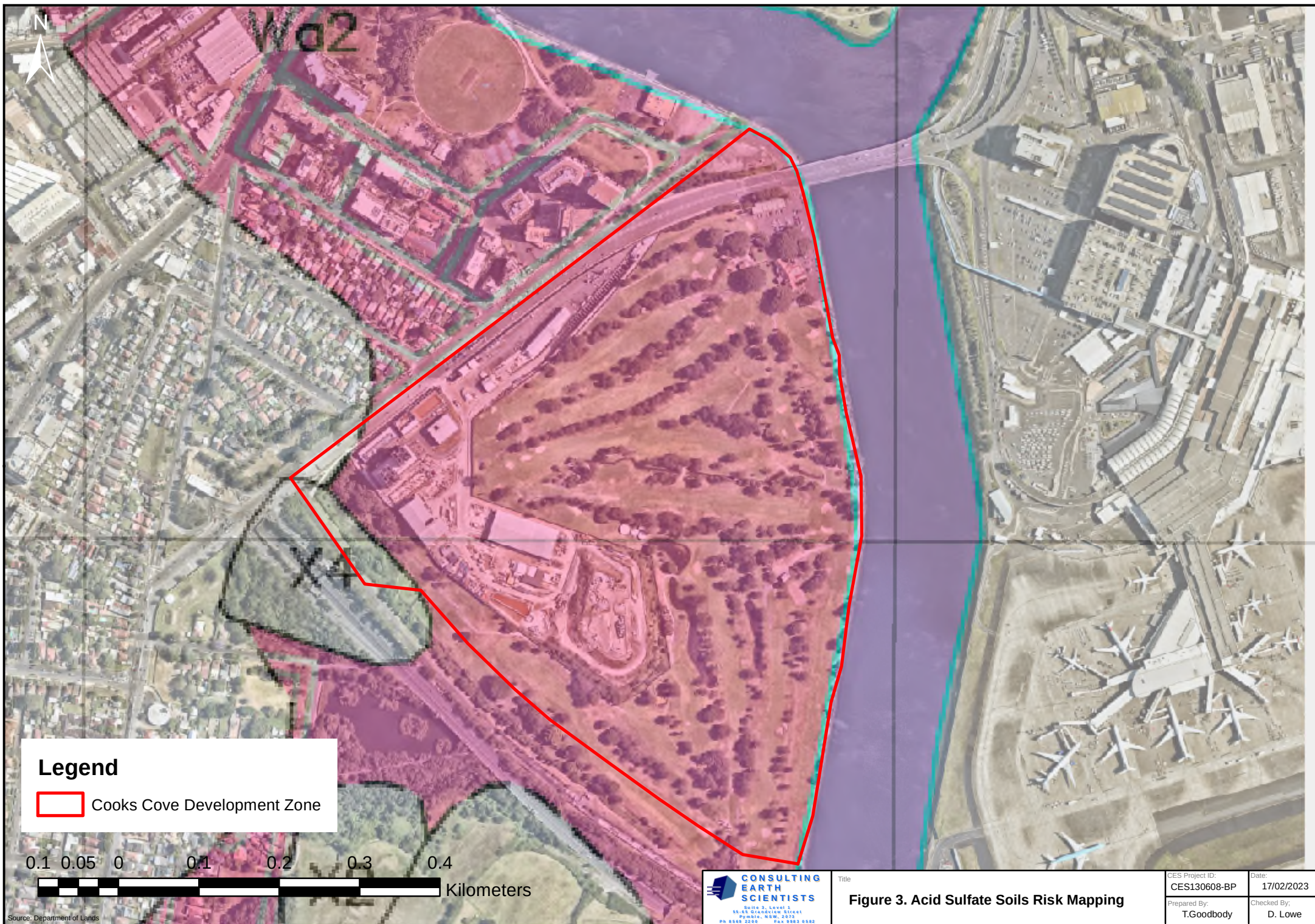


Table A1: Soil analytical results - sPOCAS - Cooks Cove

Parameters				TAA (mol H+/tonne)	TPA (mol H+/tonne)	S-KCl (%)	S-P (%)	S-POS (%)	TSA (mol H+/tonne)	Liming Rate kg CaCO ₃ /tonne
Sample	Date	Borehole	Material							
Area A										
-	7-May-08	ABH203(1.9-2.0)	Sand	12	130	0.02	0.33	0.31	118	15
-	6-May-08	ABH210(2.6-2.8)	Sand	<5	5	0.008	0.053	0.045	<5.0	2.3
-	6-May-08	ABH228(1.9-2.2)	Silty sand	12	165	0.039	0.48	0.44	153	22
-	8-May-08	ABH255(2.4-2.6)	Sand	5	213	0.072	0.58	0.51	213	19
-	13-May-08	ABH273(2.4-2.6)	Silty clay	<5	505	0.034	1.1	1	505	41
-	13-May-08	ABH274(2.5-2.7)	Silty clay	<5	338	0.031	0.81	0.78	338	29
-	13-May-08	ABH276(2.6-2.8)	Silty sand	<5	418	0.058	1.2	1.1	418	52
-	13-May-08	ABH278(2.6-2.8)	Silty sand	<5	240	0.038	0.68	0.65	240	30
-	15-May-08	ABH286(2.0-2.2)	Silty sand	<5	463	0.036	0.72	0.69	463	35
Area B										
-	28-Apr-08	BBH403(2.0-2.2)	Silty sand	<5	333	0.047	0.76	0.71	333	28
-	29-Apr-08	BBH406(1.8-1.9)	Sand	7.5	108	0.016	0.22	0.21	100	10
-	29-Apr-08	BBH411(2.2-2.3)	Sand	5	<5	0.009	0.12	0.11	<5	5.5
-	28-Apr-08	BBH412(2.2-2.4)	Sand	<5	338	0.039	0.78	0.74	335	35
-	29-Apr-08	BBH427(2.6-2.8)	Clayey silt	<5	1010	0.13	3.9	3.7	1010	109
-	29-Apr-08	BBH437(3.3-3.4)	Silty sand	<5	52	0.011	0.17	0.17	52	5.2
-	1-May-08	BBH440(2.3-2.4)	Silty clay	<5	253	0.024	0.52	0.49	253	20
-	30-Apr-08	BBH453(2.5-2.6)	Silt	<5	195	0.043	0.56	0.52	198	24
-	1-May-08	BBH458(3.8-4.0)	Silty sand	<5	1185	0.13	2.5	2.4	1188	112
Action Criteria (1 - 1000 tonnes)		Sands to loamy sands		-	18	-	-	0.03	-	-
		Sandy loams to light clays		-	36	-	-	0.06	-	-
		Medium to heavy clays		-	62	-	-	0.1	-	-
Action Criteria (>1000 tonnes)		Sands to loamy sands		-	18	-	-	0.03	-	-
		Sandy loams to light clays		-	18	-	-	0.03	-	-
		Medium to heavy clays		-	18	-	-	0.03	-	-

Note: Concentrations over action criteria are highlighted and shown in bold text.

Net acidity could not be determined due to the high acid neutralizing capacity of the soil

Table 22: Soil analytical results - POCAS																						
Parameters	EQL	ABH203(1.9-2.0)	ABH209(1.7-1.9)	ABH210(2.6-2.8)	ABH214(1.8-2.0)	ABH228(1.9-2.2)	ABH230(1.8-2.0)	BH231(1.6-1.8)	ABH238(1.9-2.0)	ABH237(2.3-2.4)	ABH242(1.6-1.7)	ABH255(2.4-2.6)	ABH258(1.6-1.7)	ABH266(2.02.2)	ABH269(2.1-2.2)	ABH270(2.4-2.6)	Action Criteria (1 - 1000 tonnes)			Action Criteria (>1000 tonnes)		
		7-May-08 Sand	7-May-08 Sand	6-May-08 Sand	7-May-08 Sand	6-May-08 Silty sand	8-May-08 Silty sand	8-May-08 Silty sand	7-May-08 Sand	6-May-08 Sand	8-May-08 Sand	8-May-08 Sand	12-May-08 Sand	12-May-08 Silty sand	13-May-08 Silty sand	13-May-08 Silty sand	Sands to loamy sands	Sandy loams to light clays	Medium to heavy clays	Sands to loamy sands	Sandy loams to light clays	Medium to heavy clays
Field pH (H ₂ O)	0.1	5.5	5.5	5.5	5.5	5.5	5.5	6	7	3.5	6	7	6	6	6.5	6.5						
Field pH (H ₂ O ₂)	0.1	1	1	1	5.5	0	5	8	2	0	5	0	3	2	1	0						
TAA (mol H ⁺ /tonne)	5	12	-	<5	-	12	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-
TPA (mol H ⁺ /tonne)	5	130	-	5	-	165	-	-	-	-	-	213	-	-	-	-	18	36	62	18	18	18
S-KCl (%)	0.01	0.02	-	0.008	-	0.039	-	-	-	-	-	0.072	-	-	-	-	-	-	-	-	-	-
S-P (%)	0.01	0.33	-	0.053	-	0.48	-	-	-	-	-	0.58	-	-	-	-	-	-	-	-	-	-
S-POS (%)	0.01	0.31	-	0.045	-	0.44	-	-	-	-	-	0.51	-	-	-	-	0.03	0.06	0.1	0.03	0.03	0.03
TSA (mol H ⁺ /tonne)	5	118	-	<5.0	-	153	-	-	-	-	-	213	-	-	-	-	-	-	-	-	-	-

Note: Concentration over action criteria are highlighted and shown in bold text.

Parameters	EQL	ABH222(2.2-2.4)	ABH272(2.4-2.6)	ABH273(2.4-2.6)	ABH274(2.5-2.7)	ABH275(2.6-2.8)	ABH276(2.6-2.8)	ABH277(1.2-1.4)	ABH278(2.6-2.8)	ABH281(2.4-2.6)	ABH286(2.0-2.2)	ABH291(2.6-2.7)	ABH295(2.4-2.6)	ALG202(2.0-2.4)	ALG203(2.2-2.4)	ALG204(2.0-2.4)	Action Criteria (1 - 1000 tonnes)			Action Criteria (>1000 tonnes)		
		13-May-08 Sand	13-May-08 Silty sand	13-May-08 Silty clay	13-May-08 Silty clay	13-May-08 Silty sand	13-May-08 Silty sand	13-May-08 Silty sand	13-May-08 Silty sand	13-May-08 Silty clay	13-May-08 Silty sand	13-May-08 Silty clay	13-May-08 Silty clay	12-May-08 Silty sand	13-May-08 Silty clay	13-May-08 Silty sand	Sands to loamy sands	Sandy loams to light clays	Medium to heavy clays	Sands to loamy sands	Sandy loams to light clays	Medium to heavy clays
Field ph (H ₂ O)	0.1	7	6	6.5	7	6.5	6.5	6	6.2	6	6.5	6.5	6.5	5	6.5	6.5						
Field ph (H ₂ O ₂)	0.1	6	3	0	1	0	0	4	0	3	3.5	6.5	6	4	6	6.5						
TAA (mol H ⁺ /tonne)	5	-	-	<5	<5	-	<5	-	<5	-	<5	-	-	-	-	-	-	-	-	-	-	-
TPA (mol H ⁺ /tonne)	5	-	-	505	338	-	418	-	240	-	463	-	-	-	-	-	18	36	62	18	18	18
S-KCl (%)	0.01	-	-	0.034	0.031	-	0.058	-	0.038	-	0.036	-	-	-	-	-	-	-	-	-	-	-
S-P (%)	0.01	-	-	1.1	0.81	-	1.2	-	0.68	-	0.72	-	-	-	-	-	-	-	-	-	-	-
S-POS (%)	0.01	-	-	1	0.78	-	1.1	-	0.65	-	0.69	-	-	-	-	-	0.03	0.06	0.1	0.03	0.03	0.03
TSA (mol H ⁺ /tonne)	5	-	-	505	338	-	418	-	240	-	463	-	-	-	-	-	18	36	62	18	18	18

Note: Concentration over action criteria are highlighted and shown in bold text.

Parameters	EQL	BBH401(2.6-2.8)	BBH403(2.0-2.2)	BBH406(1.8-1.9)	BBH408(2.0-2.2)	BBH411(2.2-2.3)	BBH412(2.2-2.4)	BBH413(2.6-2.8)	BBH421(1.8-2.0)	BBH422(2.6-2.8)	BBH427(2.6-2.8)	BBH440(2.3-2.4)	BBH442(2.6-2.8)	BBH447(2.6-2.8)	BBH453(2.5-2.6)	BBH458(3.8-4.0)	Action Criteria (1 - 1000 tonnes)			Action Criteria (>1000 tonnes)		
		28-Apr-08 Sand	28-Apr-08 Silty sand	29-Apr-08 Sand	29-Apr-08 Sand	29-Apr-08 Sand	28-Apr-08 Sand	30-Apr-08 Silty sand	30-Apr-08 Silty clay	30-Apr-08 Silty sand	29-Apr-08 Clayey silt	1-May-08 Silty clay	30-Apr-08 Silty clay	1-May-08 Silty clay	30-Apr-08 Silt	1-May-08 Silty sand	Sands to loamy sands	Sandy loams to light clays	Medium to heavy clays	Sands to loamy sands	Sandy loams to light clays	Medium to heavy clays
Field ph (H ₂ O)	0.1	7.5	6.5	6	6	6	7	6	6.5	6	7	6.5	6	6.5	5.5	6						
Field ph (H ₂ O ₂)	0.1	6.5	1	4.5	5	2	1	4.5	5	6	3	3	3.5	6.5	1.5	1						
TAA (mol H ⁺ /tonne)	5	-	<5	7.5	-	5	<5	-	-	-	<5	<5	-	-	<5	<5	-	-	-	-	-	-
TPA (mol H ⁺ /tonne)	5	-	333	108	-	<5	338	-	-	-	1010	253	-	-	195	1185	18	36	62	18	18	18
S-KCl (%)	0.01	-	0.047	0.016	-	0.009	0.039	-	-	-	0.13	0.024	-	-	0.043	0.13	-	-	-	-	-	-
S-P (%)	0.01	-	0.76	0.22	-	0.12	0.78	-	-	-	3.9	0.52	-	-	0.56	2.5	-	-	-	-	-	-
S-POS (%)	0.01	-	0.71	0.21	-	0.11	0.74	-	-	-	3.7	0.49	-	-	0.52	2.4	0.03	0.06	0.1	0.03	0.03	0.03
TSA (mol H ⁺ /tonne)	5	-	333	100	-	<5	335	-	-	-	1010	253	-	-	198	1188	18	36	62	18	18	18

Note: Concentration over action criteria are highlighted and shown in bold text.

Project ID: CES050706-BCC

Easting: 329867.686



Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
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Project: ESA

Northing: 6243591.190

Client: Boyd Cooks Cove

Elevation: 2.97

Location: Cooks Cove - Area A

Environmental Log: **ABH201**

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 over silty sand topsoil, fine grained, dark brown, dry, loose with rootlets.	050508-01-KW	Direct Push						
				FILL: Sand, medium grained, orange/brown, dry, loose, trace clay with gravels.								
				FILL: Sandstone fill, coarse grained, white, dry, hard. conglomerate rock (pink/white) - possible concrete.	050508-02-KW	Direct Push						
1				FILL: Sand, fine grained, yellow, dry to moist, loose.								
				FILL: Sand, fine grained, dark brown, dry, loose.								
				FILL: Sand, fine grained, yellow, dry, loose.								
				FILL: Sandstone fill, coarse grained, white, hard (core loss)								
2				SAND: Sand, fine grained, brown, dry, loose with trace clay and gravels.								
				SAND: Sand, fine grained, brown, dry to moist, dense.								
				SAND: Sand, fine grained, pale grey, moist, dense.	050508-03-KW	Direct Push						
3			EOH at 2.8mBGL (targeted depth)									
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 05/05/2008

Drill Model: Mac200

Date Completed: 05/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329924.428


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Project: ESA

Northing: 6243586.055

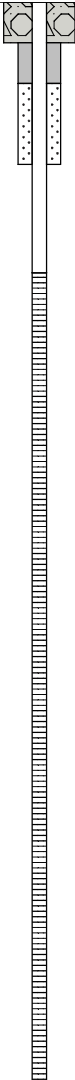
Client: Boyd Cooks Cove

Elevation: 1.74

Location: Cooks Cove - Area A

Environmental Log:

ABH202

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION					WELL DETAIL			
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm)						
							0	250	500		750		
0	Auger Hollow Flight			ASPHALT: Bitumen	090508-191-KW	Hand Auger							
				FILL: Sand, fine grained, brown, dry, loose, gravels and rootlets, odourless. Moist at 0.4 m.		090508-192-KW	Hand Auger						
				FILL: Silty sand, fine grained, brown/grey, moist, soft, trace clay, sandstone, gravels, roots.		090508-193-KW	Hand Auger						
1				SAND: Sand, fine to medium grained, grey/brown, wet at 1.3 m. Hydrocarbon odour at 1.3 m. Strong hydrocarbon odour at 2.0 m.		090508-200-KW	Push Tube						
						090508-202-KW	Push Tube						
2													
3													
4													

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 150

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329763.306
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 26-32 Pirrama Road Pyrmont 2009
 PH: (02) 8569 2200 FAX: (02) 9552 4399
Project: ESA**Northing:** 6243541.165**Client:** Boyd Cooks Cove**Elevation:** 1.23**Location:** Cooks Cove - Area A**Environmental Log:****ABH203**

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 over silty sand topsoil, fine grained, dark brown, moist, dense, rootlets.	070508-59-KW	Push Tube							
					FILL: Silty sand, fine to medium grained, grey/brown, moist, dense, gravels, minor crushed sandstone.								
					SAND: Sand, fine to medium grained, pale grey, moist, dense.	070508-60-KW	Push Tube						
1					SAND: Sand, fine to medium grained, daker grey, wet from 1.2 m, moderately dense, H2S odour, roots, saturated from 1.5 m to 2.2 m.								
2							ABH203(1.9-2.0)	Push Tube					
				SAND: Sand, fine to medium grained, pale grey, wet, dense, slight H2S odour.	070508-61-KW	Push Tube							
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 07/05/2008**Drill Model:** Mac200**Date Completed:** 07/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329799.291


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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

Project: ESA

Northing: 6243532.840

Client: Boyd Cooks Cove

Elevation: 1.06

Location: Cooks Cove - Area A

Environmental Log:

ABH204

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 over silty sand topsoil, fine grained, dark brown, moist, rootlets.	070508-57-KW	Push Tube							
					FILL: Silty sand, fine grained, dark brown/grey, moist, dense, ironstone gravel at 0.2 m, rootlets throughout.	070508-56-KW	Push Tube						
							070508-55-KW	Push Tube					
1				SAND: Sand, fine to medium grained, pale grey, moist to wet from 1.2 m, dense, minor silty lenses, H2S odour.									
				SILTY SAND: Silty sand, fine to medium grained, dark grey, moist to wet, dense.	070508-58-KW	Push Tube							
2				SAND: Sand, fine to medium grained, pale grey, saturated from 1.5 to 1.8 m, then moist to wet, H2S odour.									
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329831.695


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Project: ESA

Northing: 6243544.297

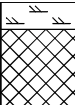
Client: Boyd Cooks Cove

Elevation: 1.19

Location: Cooks Cove - Area A

Environmental Log:

ABH205

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 over silty sand topsoil, fine grained, dark brown, moist, rootlets.	060508-49-KW	Push Tube							
					FILL: Sand, fine grained, dark brown/grey, moist, firm, silty.	060508-50-KW	Push Tube						
					FILL: Silty sand, fine to medium grained, dark brown/black, moist, dense.								
1					FILL: Sand, fine to medium grained, pale grey, moist, moderately dense, silty lenses, H2S odour.								
					FILL: Sand, fine to medium grained, pale brown, wet at 1.5 m, silty lenses, H2S odour.								
2				SAND: Sand, fine to meidum grained, pale grey, wet, dense, silty lenses, H2S odour.	060508-51-KW	Push Tube							
3				End of borehole.									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329880.449


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

Project: ESA

Northing: 6243542.211

Client: Boyd Cooks Cove

Elevation: 2.68

Location: Cooks Cove - Area A

Environmental Log:

ABH206

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 on silty sand topsoil, brown, dry, loose, roots.	090508-208-KW	Push Tube							
				SAND: Sand, fine to medium grained, yellow, dry, loose.									
				SILTY SAND: Silty sand, fine grained, dark grey/brown, dry, loose to mod dense.									
1				SAND: Sand, fine grained, pale grey, dry, loose.	090508-209-KW	Push Tube							
				SILTY SAND: Silty sand, fine grained, dark grey, dry, loose, odourless.									
				SAND: Sand, fine to medium grained, wet from 1.4 m, loose, trace silty, H2S odour.									
2													
					090508-210-KW	Push Tube							
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 09/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329925.011

Project: ESA

Northing: 6243539.904

Client: Boyd Cooks Cove

Elevation: 3.72



Location: Cooks Cove - Area A

Environmental Log: ABH207

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			ASPHALT: Bitumen	090508-207-KW	Push Tube					
			FILL: Roadbase and gravel with crushed sandstone, dry, odourless.								
			SANDSTONE: Sandstone, white/orange, dry, hard. EOH at 0.4mBGL (Refusal on sandstone bedrock)								
1											
2											
3											
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 09/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Project ID: CES050706-BCC**Easting:** 329676.926

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

Project: ESA**Northing:** 6243500.164**Client:** Boyd Cooks Cove**Elevation:** 2.12**Location:** Cooks Cove - Area A**Environmental Log:** ABH208

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: 0.2 m core loss. Grass over silty sand topsoil, fine grained, dark brown, moist to dry, roots.	070508-67-KW	Push Tube						
				FILL: Sand, fine grained, pale brown, dry, loose, shells, ironstone, gravels.								
1				FILL: Sand, fine grained, dark brown, crushed sandstone (orange), with charcoal fragments.	070508-68-KW	Push Tube						
				SILTY SAND: Silty sand, fine to medium grained, dark brown, moist, dense, trace clay.								
2				SAND: Sand, fine to medium grained, pale grey, saturated from 2.4-2.7m, moderately dense, trace silty, H2S odour.	070508-69-KW	Push Tube						
				EOH at 2.8mBGL (targeted depth)								
3												
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 07/05/2008**Drill Model:** Mac200**Date Completed:** 07/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329738.333**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**Project:** ESA**Northing:** 6243496.302**Client:** Boyd Cooks Cove**Elevation:** 1.13**Location:** Cooks Cove - Area A**Environmental Log:****ABH209**

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: 0.5 m core loss. Grass over silty sand, fine grained, dark brown, moist, roots.	070508-62-KW	Push Tube					
				FILL: Sand, fine to medium grained, yellow, dry to moist, loose, bark and gravel.	070508-63-KW	Push Tube					
				SILTY SAND: Silty sand, fine to medium grained, dark brown, moist, moderately dense, trace clay, increasing clay with depth.							
1				SILTY SAND: Sand, fine grained, pale grey/brown, saturated from 1.5-2.2 m, soft, silt lenses, H2S odour.	070508-64-KW	Push Tube					
				SAND: Sand, fine to medium grained, pale grey, wet, dense, trace silty lenses H2S odour.	ABH209(1.7-1.9)	Push Tube					
2											
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 07/05/2008**Drill Model:** Mac200**Date Completed:** 07/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329798.581



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

Project: ESA

Northing: 6243492.370

Client: Boyd Cooks Cove

Elevation: 0.86

Location: Cooks Cove - Area A

Environmental Log:

ABH210

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: 0.3 m core loss. Grass over silty clay topsoil, fine grained, dark brown, moist, soft, rootlets.	060508-46-KW	Push Tube							
				FILL: Black coke and ash with white slag and silty sand, fine grained, dark brown, moist, glass, VOC (WD40) odour.	060508-47-KW	Push Tube							
				SILTY SAND: Silty sand, fine to medium grained, dark grey, moist, dense.									
1				SILTY SAND: Silty sand, medium to coarse grained, pale brown, moist, dense, trace clay, slight VOC and H2S odour.	060508-48-KW	Push Tube							
				SAND: Sand, medium grained, pale grey, moist and wet at 1.2 m, dense, silt lenses, H2S odour.									
2				SILTY SAND: Silty sand, medium grained, dark grey, wet (saturated from 1.4-2.8 m), H2S odour.									
				SAND: Sand, medium grained, grey, wet, moderately dense, silty lenses.									
					ABH210(2.6-2.8)	Push Tube							
3					EOH at 2.8mBGL (targeted depth)								
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329832.382
**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
Project: ESA**Northing:** 6243498.085**Client:** Boyd Cooks Cove**Elevation:** 1.18**Location:** Cooks Cove - Area A**Environmental Log:****ABH211**

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 over silty sand, trace clay, dark brown, fine grained, moist, dense with rootlets	120508-214-KW	Push Tube					
				FILL: Sand, brown, trace clay, fine to medium grained, dense, moist, silt lenses and rootlets							
				FILL: Sand, pale grey, medium grained, moist to wet, H2S odour, dense, silt lenses throughout, saturated at 1.4m to 2.0m							
1					120508-216-KW	Push Tube					
					120508-215-KW	Push Tube					
2			SAND: Sand, pale grey, course grained, dense and wet								
					120508-217-KW	Push Tube					
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329878.222


**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

Project: ESA

Northing: 6243497.379

Client: Boyd Cooks Cove

Elevation: 5.73

Location: Cooks Cove - Area A

Environmental Log:

ABH212

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 over silty top soil, dark brown and moist	080508-161-KW							
				FILL: Silty sand, fine to medium grained, brown, firm, charcoal fragments and shells at 0.4m. Trace clay and moist	080508-169-KW	Push Tube						
				FILL: Sand, yellow, fine grained, dense and dry to moist	080508-162-KW	Push Tube						
1												
					FILL: Silty sand, dark brown, fine grained and dry							
2				SAND: Sand, white, fine grained, very dense, hard and dry (near rig refusal)								
					080508-163-KW	Push Tube						
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329919.200


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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

Project: ESA

Northing: 6243488.726

Client: Boyd Cooks Cove

Elevation: 5.00

Location: Cooks Cove - Area A

Environmental Log:

ABH213

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 over silty sand topsoil, dark brown, loose, dry to moist with rootlets	120508-211-KW	Push Tube					
				FILL: Sand, pale brown, fine grained, loose, dry to moist							
				FILL: Sand, yellow, medium grained, dry, black charcoal at 0.5m	120508-212-KW	Push Tube					
1				SANDSTONE: Sandstone, orange course grained and dry. Refusal at 1.3m BGL on sandstone bedrock							
				End of borehole.	120508-213-KW	Push Tube					
2											
3											
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329655.819


**CONSULTING
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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

Project: ESA

Northing: 6243449.734

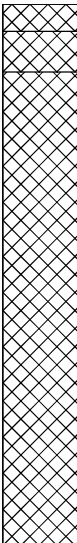
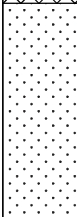
Client: Boyd Cooks Cove

Elevation: 0.97

Location: Cooks Cove - Area A

Environmental Log:

ABH214

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 over silty sand topsoil, dark brown, moist with rootlets	070508-70-KW	Push Tube							
				FILL: Silty sand, dark brown, fine grained, dense and moist									
				FILL: Sand, yellow/pale grey, fine to medium grained, dense, moist and H2S odour. Silt lenses from 0.8m. Wet from 0.6m. Saturated from 1.5-2.0m	070508-71-KW	Push Tube							
1													
2				SAND: Sand, pale grey, fine to medium grained, dense, moist to wet									
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329724.248


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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

Project: ESA

Northing: 6243447.953

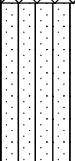
Client: Boyd Cooks Cove

Elevation: 1.04

Location: Cooks Cove - Area A

Environmental Log:

ABH215

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 over silty clay topsoil, dark brown, firm to soft, moist with rootlets	060508-36-KW	Push Tube						
				FILL: Silty sand, dark grey, fine to medium grained, moist and dense								
				FILL: Sand, yellow/pale grey, fine to medium grained, dense, moist with rootlets. Silt lenses and H2S odour throughout	060508-38-KW	Push Tube						
1					060508-37-KW	Push Tube						
				SILTY SAND: Silty sand, fine to medium grained with trace clay, brown/grey, soft and H2S odour. Saturated form 1.45m to 2.0m								
2			SAND: Sand, pale grey, fine to medium grained, moderately dense, moist to wet with H2S odour	060508-39-KW	Push Tube							
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329754.370
**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
Project: ESA**Northing:** 6243446.681**Client:** Boyd Cooks Cove**Elevation:** 0.97**Location:** Cooks Cove - Area A**Environmental Log:****ABH216**

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 over silty clay topsoil, brown/orange, moist, dense with rootlets	060508-40-KW	Push Tube						
				FILL: Silty sand, fine to medium grained, pale brown, moist and slightly loose	060508-41-KW	Push Tube						
				FILL: Silty clayey sand, dark brown, fine to medium grained, dense, moist and odourless								
1				FILL: Silty sand, fine to medium grained, pale brown/yellow, moist, dense with H2S odour								
				FILL: Sand with minor silt, pale grey, moist, loose and moist with H2S odour, becoming darker grey/brown. Sturated from 1.4-2.1m								
2				SAND: Sand, pale grey, wet, fine to medium grained, dense with H2S odour								
					060508-42-KW	Push Tube						
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 06/05/2008**Drill Model:** Mac200**Date Completed:** 06/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329814.547



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

Project: ESA

Northing: 6243438.850

Client: Boyd Cooks Cove

Elevation: 0.93

Location: Cooks Cove - Area A

Environmental Log:

ABH217

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 over silty sand, topsoil, fine to medium grained, dark brown, moist and loose	060508-43-KW	Push Tube							
				FILL: Silty sand, fine to medium grained, moist, pale brown/grey, dense with H2S odour. Grading to sand with trace silts with depth	060508-44-KW	Push Tube							
				FILL: Silty sand with trace clay, light brown, fine to medium grained, moist and dense with H2S odour									
1				FILL: Increase in clay content, becoming wet at 1.3m		050608-45-KW	Push Tube						
				SILTY SAND: Silty sand, dark brown/grey, fine to medium grained, saturated, loose wit H2S odour									
2				SAND: Sand with trace silt, grey, fine to medium grained, moist, dense with H2S odour.									
			EOH at 2.3mBGL (refusal on dense sands)										
3													
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329845.698**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**Project:** ESA**Northing:** 6243452.655**Client:** Boyd Cooks Cove**Elevation:** 1.39**Location:** Cooks Cove - Area A**Environmental Log:****ABH218**

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 over silty sand topsoil, dark brown, moist with rootlets	060508-06-KW	Push Tube							
				FILL: Sand, brown, moist, fine grained and dense									
				SAND: Sand, light brown, fine grained, moist and dense. Refusal at 0.5mBGL on Sandstone			060508-07-KW	Push Tube					
1													
2													
3													
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 06/05/2008**Drill Model:** Mac200**Date Completed:** 06/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329884.676


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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

Project: ESA

Northing: 6243447.707

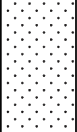
Client: Boyd Cooks Cove

Elevation: 2.50

Location: Cooks Cove - Area A

Environmental Log:

ABH219

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 over silty sand topsoil, dark brown, loose, moist, with rootlets	060508-08-KW	Push Tube						
				FILL: Sand, brown, fine grained, loose, dry to moist. Sandstone at 0.4-0.5m								
				SAND: Sand, dark grey, fine to medium grained and moist. Refusal on sandstone at 1.0mBGL								
						060508-09-KW	Push Tube					
1				EOH at 1.0mBGL (refusal on sandstone bedrock)								
2												
3												
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329924.044**Project:** ESA**Northing:** 6243450.645**Client:** Boyd Cooks Cove**Elevation:** 2.25**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**Location:** Cooks Cove - Area A**Environmental Log:****ABH220**

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 over silty sand topsoil, dark brown, fine grained, moist with rootlets	060508-04-KW	Push Tube						
				FILL: Ash fill, black/grey, crisp and dry to moist	060508-05-KW	Push Tube						
				FILL: Sand, yellow, fine grained, moist and dense								
1				FILL: Clayey sand with trace silt, dark grey, moist and dense								
				FILL: Sand, trace clay, light brown, dense and moist. Refusal on sandstone bedrock at 0.6mBGL								
2												
3												
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 06/05/2008**Drill Model:** Mac200**Date Completed:** 06/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329994.603


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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

Project: ESA

Northing: 6243450.997

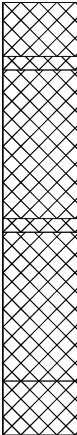
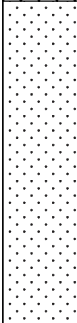
Client: Boyd Cooks Cove

Elevation: 1.31

Location: Cooks Cove - Area A

Environmental Log:

ABH221

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 on silty sand topsoil, dark brown, fine brown, roots, dry to moist	080508-158-KW	Push Tube							
				FILL: concrete rubble									
				FILL: Sand, fine grained, brown, loose and dry. Shells at 0.8m									
				FILL: Sandstone, coarse grained, yellow and dry	080508-159-KW	Push Tube							
1				FILL: Sand, brown, fine to medium grained, dense, shells, moist to wet with silt lenses									
				FILL: Silty clay sand, brown, soft, wet to saturated at 1.5-1.8m	080508-160-KW	Push Tube							
2				SAND: Sand, grey soft, fine grained, wet with numerous shells									
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

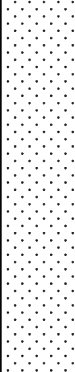
Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329565.810
**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
Project: ESA**Northing:** 6243401.446**Client:** Boyd Cooks Cove**Elevation:** 0.94**Location:** Cooks Cove - Area A**Environmental Log:****ABH222**

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 topsoil, brown, moist with roots	070508-76-KW	Push Tube						
				FILL: Silty sand, dark brown/black, fine grained, moist and soft	070508-77-KW	Push Tube						
				UNKNOWN: Coreloss								
				SAND: Sand, pale grey, fine to medium grained, moist to wet, soft and loose with H2S odour. Silt lenses from 2.0. Saturated from 1.7-2.5m.	070508-78-KW	Push Tube						
1												
2												
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 08/05/2008**Drill Model:** Mac200**Date Completed:** 08/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329606.336


**CONSULTING
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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

Project: ESA

Northing: 6243406.270

Client: Boyd Cooks Cove

Elevation: 2.09

Location: Cooks Cove - Area A

Environmental Log:

ABH223

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 over sandy topsoil, brown, dry with gravels and rootlets	070508-72-KW	Push Tube						
				FILL: Sand, fine grained, brown, dry and loose with gravels and ash at 0.5-0.6m. Shells and sandstone gravels, dense and moist at depth	070508-73-KW	Push Tube						
1				FILL: Silty sand, brown/grey, fine grained, dense, moist, with gravels and possible ash	070508-74-KW	Push Tube						
				FILL: Silty sand, dark grey/black, fine grained, dense, moist, silt lenses at 1.9-2.1m								
2				SAND: Sand, pale grey, fine to medium grained, dense, moist to wet with roots								
				SILTY SAND: Silty sand, dark grey, fine to medium grained, moist to wet at 2.8m. Saturated at 3.7-4.1m								
3												
					070508-75-KW	Push Tube						
4				EOH at 4.1mBGL (targeted depth)								
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329657.034


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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

Project: ESA

Northing: 6243404.105

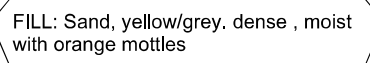
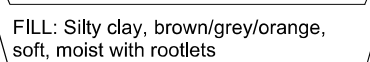
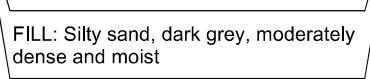
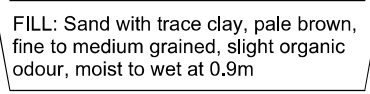
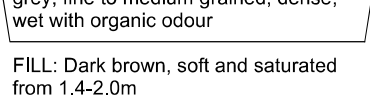
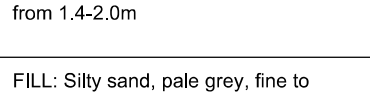
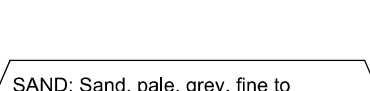
Client: Boyd Cooks Cove

Elevation: 1.16

Location: Cooks Cove - Area A

Environmental Log:

ABH224

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 over silty sand top soil, fine grained, loose, moist with roots	060508-30-KW	Push Tube						
												
												
				FILL: Silty clay, brown/grey/orange, soft, moist with rootlets	060508-31-KW	Push Tube						
												
1				FILL: Silty sand, dark grey, moderately dense and moist								
												
				FILL: Sand with trace clay, pale brown, fine to medium grained, slight organic odour, moist to wet at 0.9m								
				FILL: Silty sand with trace clay, pale grey, fine to medium grained, dense, wet with organic odour								
												
				FILL: Dark brown, soft and saturated from 1.4-2.0m								
2												
				FILL: Silty sand, pale grey, fine to medium grained, dense with wood								
				FILL: Sand, pale, grey, fine to medium grained, wet and dense	060508-32-KW	Push Tube						
												
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329694.665


**CONSULTING
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SCIENTISTS**

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

Project: ESA

Northing: 6243404.713

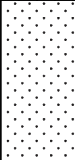
Client: Boyd Cooks Cove

Elevation: 1.32

Location: Cooks Cove - Area A

Environmental Log:

ABH225

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 over silty sand topsoil, fine to medium grained, dark brown, moist with rootlets	060508-33-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose, moist, odourless and shells	060508-34-KW	Push Tube						
1				FILL: Silty clay, brown/orange, dense, moist with rootlets								
				FILL: Silty sand, dark grey, fine to medium grained, moist and odourless with silt lenses. Saturated at 1.5m								
				FILL: Silty sand, brown, fine to medium grained wit trace clays, loose and soft with slight H2S odour. Saturated from 1.5-2.0m	060508-35-KW	Push Tube						
2				FILL: Silty clay sand, dark grey/brown, fine to medium grained, wet, slightly loose with slight H2S odour								
				SAND: Sand, pale grey, fine to medium grained, moist, dense and odourless								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329755.651


**CONSULTING
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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

Project: ESA

Northing: 6243402.717

Client: Boyd Cooks Cove

Elevation: 1.32

Location: Cooks Cove - Area A

Environmental Log:

ABH226

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 topsoil, brown, fine grained, moist, loose with roots	060508-20-KW	Push Tube					
				FILL: Black ash fill							
				FILL: Sand, yellow, fine to medium grained, moderately dense, moist, shells, charcoal gravels and tree roots	060508-21-KW	Push Tube					
				FILL: Silty clay, brown, soft and moist							
1				FILL: Silty sand, dark brown, fine to medium grained, moderately dense, moist with organic odour							
				FILL: Sand, pale grey, fine to medium grained, dense, moist, organic odour with silt lenses and trace clays at 1.4m							
				FILL: Sand brown, wet and loose							
2				FILL: Clayey sand, brown/dark grey, fine to medium grained, dense and wet	060508-22-KW	Push Tube					
				SAND: Sand, pale grey, medium grained, moist and dense with minor silt lenses							
3						EOH at 2.8mBGL (targeted depth)					
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329798.506



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

Project: ESA

Northing: 6243404.901

Client: Boyd Cooks Cove

Elevation: 1.03

Location: Cooks Cove - Area A

Environmental Log:

ABH227

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 over silty sand topsoil, brown, moist and loose							
				FILL: Silty clay, brown/grey, soft and moist with minor gravels	060508-19-KW	Push Tube					
				FILL: Silty sand, dark brown/grey, fine to medium grained moderately dense and moist	060508-18-KW	Push Tube					
				FILL: Sand, pale grey, medium grained, moderately dense with trace silt lenses	060508-17-KW	Push Tube					
1				FILL: Clayey silt sand, dark grey with organic odour							
				FILL: Silty sand, brown/grey, moist and moderately dense							
				FILL: Grading to silty clayey sand							
2				SAND: Sand, pale grey, fien to medium grained, wet with slight organic odour							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329849.080


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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

Project: ESA

Northing: 6243400.702

Client: Boyd Cooks Cove

Elevation: 1.10

Location: Cooks Cove - Area A

Environmental Log:

ABH228

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 over silty clay topsoil, dark brown and moist with charcoal at 0.3m	060508-10-KW	Push Tube		
				FILL: Sand, yellow/pale grey, fine to medium grained with shells and moist				
				FILL: Clayey silt, brown/grey, soft, moist with minor gravels	060508-11-KW	Push Tube		
				FILL: Sand, dark grey, fine to medium grained with trace clay, moist with rootlets				
1				FILL: Sand, pale grey, fine grained with silt lenses, moist and wet at 1.5m				
				FILL: silty sand, dark grey, wet, loose with organic odour				
2				SAND: Sand, pale grey, fine to medium grained, dense and moist	060508-12-KW	Push Tube		
				EOH at 2.6mBGL (refusal on sandstone bedrock)				
3								
4								
5								

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329888.140


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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

Project: ESA

Northing: 6243401.205

Client: Boyd Cooks Cove

Elevation: 0.76

Location: Cooks Cove - Area A

Environmental Log:

ABH229

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 over silty clay topsoil, dark brown, moist with rootlets. Ash at 0.1m and tree roots at 0.3m	060508-13-KW	Push Tube					
				FILL: Sand, pale grey, fine to medium grained, shells, moist and dense							
				FILL: Silty sand, dark brown, firm, moist with trace clay	060508-16-KW	Push Tube					
				SAND: Sand, pale grey, fine grained, dense, moist with H2S odour. Silt clay contant from 1.2m. Wet from 1.5m. Refusal on sandstone at 1.6mBGL	060508-15-KW	Push Tube					
1					060508-14-KW	Push Tube					
			EOH at 1.6mBGL (refusal on sandstone bedrock)								
2											
3											
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329918.449


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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

Project: ESA

Northing: 6243403.763

Client: Boyd Cooks Cove

Elevation: 1.23

Location: Cooks Cove - Area A

Environmental Log:

ABH230

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 over sandy topsoil, brown, moist with roots	080508-148-KW	Push Tube						
				FILL: Sand, brown, fine to medium grained, loose, dry to moist with gravels, sandstone and minor charcoal	080508-149-KW	Push Tube						
				FILL: Shale rocks, crushed brick, brown clay, stiff, dry and sandstone rubble								
1				FILL: Sand, yellow, fine to medium grained, moderately dense and moist								
				FILL: Silty sand, grey, fine to medium grained, moist and dense with H2S odour								
				FILL: Silty clayey sand, brown/grey and wet from 1.4 - 2.2m								
2				SILTY SAND: Silty sand, grey, wet, soft with rootlets and H2S odour								
			SANDSTONE: Weathered sandstone, coarse grained, white and wet	080508-150-KW	Push Tube							
			EOH at 2.2mBGL (refusal on sandstone bedrock)									
3												
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329973.047


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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

Project: ESA

Northing: 6243405.760

Client: Boyd Cooks Cove

Elevation: 0.97

Location: Cooks Cove - Area A

Environmental Log:

ABH231

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 over silty sand topsoil, fine grained, loose, moist with roots	080508-151-KW	Push Tube							
				FILL: Sand, pale grey/brown, fine grained, loose and dry									
				FILL: Crushed sandstone, white, dry									
				FILL: Silty sand with trace clay, fine grained, brown, moderately dense and moist	080508-153-KW	Push Tube							
					080508-152-KW	Push Tube							
1					080508-154-KW								
				FILL: Sand, yellow, fine to medium grained, moderately dense and moist		Push Tube							
				FILL: Silty sand, grey, fine grained, dense and moist with concrete gravels									
				FILL: Sand, pale grey, fine to medium grained, dense, silty lenses with H2S odour									
2					FILL: Silty clayey sand, brown, soft and wet, Saturated from 1.5-2.1m								
		SILTY SAND: Silty sand, dark grey, fine to medium grained, dense and moist to wet											
		SAND: Sand, pale grey, fine to medium grained, dense and wet to moist											
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329835.915


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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

Project: ESA

Northing: 6243574.015

Client: Boyd Cooks Cove

Elevation: 1.30

Location: Cooks Cove - Area A

Environmental Log:

ABH232

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 over silty clay top soil, dark brown, soft and moist	060508-52-KW	Push Tube		
				FILL: Crushed sandstone, white/orange, coarse grained, dry to moist	060508-53-KW	Push Tube		
				FILL: Silty clayey sand, dark brown, moist with rootlets				
				FILL: Silty sand, dark brown, fine grained, moist and odourless				
1				FILL: Sand, pale grey, fine to medium grained, dense, moist with silt lenses. Wet at 1.4m				
2				SAND: Sand with silt layers, grey, fine to medium grained, dense with H2S odour. Saturated from, 2.2-2.6m	060508-54-KW	Push Tube		
3				EOH at 2.8mBGL (targeted depth)				
4								
5								

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329498.372
**CONSULTING
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SCIENTISTS**

 Jones Bay Wharf 19-21, Lower Level Suite 121
 26-32 Pirrama Road Pyrmont 2009
 PH: (02) 8569 2200 FAX: (02) 9552 4399
Project: ESA**Northing:** 6243360.060**Client:** Boyd Cooks Cove**Elevation:** 1.27**Location:** Cooks Cove - Area A**Environmental Log:****ABH233**

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 over silty sand topsoil, moist, dense with roots	070508-93-KW	Push Tube					
				FILL: Sand, brown, fine to medium grained, loose, moist with gravels	070508-95-KW	Push Tube					
				FILL: Sandstone rubble, white/orange, hard. Clay with sand, brown, fine grained and moist	070508-94-KW	Push Tube					
				FILL: Silty sand, black, fine grained, dinse and moist							
1				SAND: Sand, pale grey, fine to medium grained, moderately dense, moist, H2S odour. Wet from 1.4m. Saturated at 2.2-2.6m							
2											
				SILTY SAND: Silty clay sand, grey, wet with H2S odour	070508-96-KW	Push Tube					
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 07/05/2008**Drill Model:** Mac200**Date Completed:** 07/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329568.152



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

Project: ESA

Northing: 6243360.562

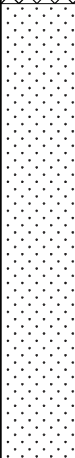
Client: Boyd Cooks Cove

Elevation: 0.85

Location: Cooks Cove - Area A

Environmental Log:

ABH234

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 over silty sand topsoil, dark brown, moist with roots							
				FILL: Sand, pale grey, fine to medium grained, moderately dense and moist	070508-82-KW	Push Tube					
				FILL: Silty sand, dark brown, fine grained, very dense and moist	070508-81-KW	Push Tube					
				FILL: Sand with trace clay, pale brown, dense and moist with roots							
1						SAND: Sand, pale grey, fine to medium grained, dense, moist with H2S odour. Saturated at 1.5-2.4m					
2											
				SILTY SAND: Silty sand, dark grey, fine to medium grained, soft to dense and moist to wet	070508-83-KW	Push Tube					
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329611.110


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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

Project: ESA

Northing: 6243354.212

Client: Boyd Cooks Cove

Elevation: 1.14

Location: Cooks Cove - Area A

Environmental Log:

ABH235

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	070508-79-KW	Push Tube					
				FILL: Sand, yellow, fine grained, loose and moist	070508-80-KW	Push Tube					
				FILL: Silty clay, brown/grey, soft and moist							
				FILL: Sand, yellow, fine to medium grained, dense and moist							
				FILL: Silty clay, dark brown, soft and moist							
				FILL: Sand, yellow, fine to medium grained, dense and moist							
				FILL: Silty clay, dark brown, soft and moist							
				FILL: Sand, pale grey/orange, fien to medium grained, dense and moist							
				FILL: Silty clay, dark brown, soft and moist							
				FILL: Silty sand, dark grey, fine to medium grained, dense and moist							
				SAND: Sand, pale grey, silt lenses, moist to wet and H2S odour. Saturated from 1.4-2.3m							
3				SAND: Sand, pale grey, medium grained, dense, moist to wet with silt lenses at 2.6m. EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329665.268


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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

Project: ESA

Northing: 6243343.476

Client: Boyd Cooks Cove

Elevation: 1.25

Location: Cooks Cove - Area A

Environmental Log:

ABH236

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	080508-102-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose, moist, trace silts and shells								
				FILL: Silty clay, dark brown, soft and moist	080508-103-KW	Push Tube						
1				FILL: Sand, pale grey with orange mottles, fine to medium grained, trace silt lenses, shells and moist								
				FILL: Silty sand, dark grey, fine grained, dense and moist with rootlets								
				FILL: Sand, pale brown/grey, fine to medium grained, silt lenses and moist to wet	080508-104-KW	Push Tube						
				SILTY SAND: Silty clayey sand, brown/grey, fine to medium grained, wet, soft with H2S odour. Saturated from 1.4-2.5m								
2				SAND: Sand, pale grey, fine to medium grained, dense and moist								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329703.000

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

Project: ESA**Northing:** 6243361.425**Client:** Boyd Cooks Cove**Elevation:** 1.40**Location:** Cooks Cove - Area A**Environmental Log:** ABH237

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	060508-27-KW	Push Tube					
				FILL: Sand, yellow, fine to medium grained, silty clay lenses at 1.0-1.2m, moderately dense, moist and shells							
1				FILL: Silty clay lense, grey, moist and dense	060508-28-KW	Push Tube					
				FILL: Silty sand, dark brown, fine to medium grained, moist with rootlets							
				SAND: Sand, pale grey, fine to medium grained, dense, moist with shells. Saturated at 1.7m							
2				SILTY SAND: Silty clay sand, dark grey, fine to medium grained, moderately dense, wet and H2S odour							
					060508-29-KW	Push Tube					
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 06/05/2008**Drill Model:** Mac200**Date Completed:** 06/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329743.172


**CONSULTING
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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

Project: ESA

Northing: 6243375.462

Client: Boyd Cooks Cove

Elevation: 1.22

Location: Cooks Cove - Area A

Environmental Log:

ABH238

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	060508-24-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose, moist with shells at 0.7m	060508-23-KW	Push Tube						
				FILL: Silty clay, grey/brown, moist and oderately dense								
1				FILL: Sand, pale grey, fine to medium grained, dense and moist	060508-25-KW	Push Tube						
				FILL: Silty clay, grey/brown, fine to medium grained and moderately dense								
				FILL: Silty sand, dark brown, fine to medium grained, dense and moist	060508-26-KW	Push Tube						
2				FILL: Sand, yellow, fine to medium grained, dense, moist with organic odour								
				SILTY SAND: Silty sand with trace clays, brown/grey, moist, dense, organic odour and shells. Saturated from 1.5m								
				SILTY SAND: Silty clay sand, dark grey, fine to medium grained with increase in density								
3				SAND: Sand, pale grey, moist and dense. EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 06/05/2008

Drill Model: Mac200

Date Completed: 06/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329791.277


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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

Project: ESA

Northing: 6243361.707

Client: Boyd Cooks Cove

Elevation: 1.04

Location: Cooks Cove - Area A

Environmental Log:

ABH239

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	080508-121-KW	Push Tube					
				FILL: Crushed sandstone, orange, course grained and white	080508-122-KW	Push Tube					
				FILL: Sand, pale, brown, fine grained, loose and moist with white shells							
				FILL: Silty clay, dark brown, firm and moist							
1				FILL: Sand, grey, fine to medium grained, silty clay lenses throughout and moist							
				SILTY SAND: Silty clay sand, fine to medium grained, brown/grey with H2S odour. Saturated from 1.4 to 1.7m							
2				SAND: Sand, pale grey, fine to medium grained, wet and very dense							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329850.039


**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

Project: ESA

Northing: 6243371.561

Client: Boyd Cooks Cove

Elevation: 1.04

Location: Cooks Cove - Area A

Environmental Log:

ABH240

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	080508-125-KW	Push Tube					
				FILL: Sand, yellow, fine to medium grained, loose, moist with shells	080508-124-KW	Push Tube					
				FILL: Silty sand, brown, soft and moist	080508-123-KW	Push Tube					
				FILL: Silty sand, dark grey, firm and moist with trace silty clay lenses	080508-126-KW	Push Tube					
1				FILL: Sand, pale grey, fine to medium grained, dense, moist with slight organic odour							
				FILL: Silty clay sand, brown/grey, soft and wet. Saturated from 1.4-1.6m and wet from 1.6-2.0m							
2				SAND: Sand, pale grey, fine to medium grained, dense and most to wet							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329885.967


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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

Project: ESA

Northing: 6243340.325

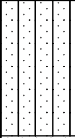
Client: Boyd Cooks Cove

Elevation: 0.79

Location: Cooks Cove - Area A

Environmental Log:

ABH241

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 over silty clay topsoil, dark brown, loose, moist with rootlets	080508-127-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose, moist with shells and orange mottles								
				FILL: Silty clay, orange/brown/grey, soft to firm and moist	080508-128-KW	Push Tube						
				FILL: Silty sand, dark grey/orange/brown, dense and moist								
1				FILL: Silty clayey sand, dark brown, soft and moist. Saturated from 1.4-1.9m. Clay content and stiffness increased with depth								
					080508-129-KW	Push Tube						
2				SILTY SAND: Silty sand with trace clay, dark grey, fine grained and moist to wet								
				SAND: Sand, pale grey, fine to medium grained, dense and moist								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329921.058



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

Project: ESA

Northing: 6243367.814

Client: Boyd Cooks Cove

Elevation: 0.68

Location: Cooks Cove - Area A

Environmental Log: **ABH242**

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 over silty sand topsoil, dark brown, dense with roots	080508-144-KW	Push Tube		
				FILL: Sand, pale grey, fine grained, dense, moist with orange mottles, rootlets and shells				
				FILL: Crushed brick, orange and dry	080508-146-KW	Push Tube		
				FILL: Silty sand, brown, fine grained, dense and moist	080508-145-KW	Push Tube		
1				SAND: Sand, pale grey, interspersed with thin silty clay layers, moist, firm with H2S odour. Saturated at 1.5-2.0m				
2				SAND: Sand, pale grey, fine to medium grained, dense and wet				
					080508-147-KW	Push Tube		
3				EOH at 2.8mBGL (targeted depth)				
4								
5								

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329975.701


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 PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

Northing: 6243350.352

Client: Boyd Cooks Cove

Elevation: 0.82

Location: Cooks Cove - Area A

Environmental Log:

ABH243

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	080508-141-KW	Push Tube						
				FILL: Silty sand, dark brown, fine grained, dense and moist with black charcoal at 0.2m	080508-142-KW	Push Tube						
				FILL: Silty sand, dark grey, fine grained, moderately dense, moist with coarse grained, yellow crushed sandstone								
1				FILL: Sand, pale grey with orange mottles, fine grained, moist to wet and dense								
				FILL: Silty sand, dark brown, firm and moist	080508-143-KW	Push Tube						
				FILL: Silty sand, dark brown, silty clay lenses throughout, dense and moist								
2				SILTY SAND: Silty clay sand, dark grey, soft and wet								
				SAND: Sand, pale grey, fine to medium grained, dense and moist								
3			EOH at 2.8mBGL (targeted depth)									
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329477.016


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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

Project: ESA

Northing: 6243318.888

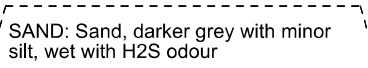
Client: Boyd Cooks Cove

Elevation: 1.37

Location: Cooks Cove - Area A

Environmental Log:

ABH244

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	070508-90-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose, dry to moist	070508-91-KW	Push Tube						
				FILL: Ash fill, black/grey with sand								
				FILL: Silty sand with trace clays, dark grey, soft and moist								
1				FILL: Ash fill, white gravels, minor sand, moist to wet								
			SAND: Sand, pale grey, fine to medium grained with silt lenses, moderately dense, moist to wet with H2S odour. Saturated from 1.5-2.7m	070508-92-KW	Push Tube							
2												
				SAND: Sand, darker grey with minor silt, wet with H2S odour								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329519.186


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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

Project: ESA

Northing: 6243321.583

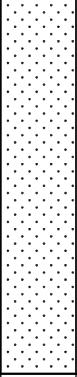
Client: Boyd Cooks Cove

Elevation: 1.19

Location: Cooks Cove - Area A

Environmental Log:

ABH245

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 over silty sand topsoil, dark brown, moist, gravels with roots								
				FILL: Sand, dark brown, fine grained, loose with ash	070508-87-KW	Push Tube						
				FILL: Sand, yellow, fine grained, loose and moist	070508-88-KW	Push Tube						
				FILL: Sand, dark brown, fine grained, ash waste and loose								
1				FILL: Silty sand, dark brown, fine grained, dense and moist	070508-89-KW	Push Tube						
				SAND: Sand, pale grey, fine to medium grained, loose to moderately dense and moist. Saturated from 1.5-2.8m with H2S odour								
2												
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329557.512


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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

Project: ESA

Northing: 6243322.832

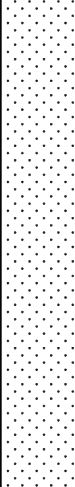
Client: Boyd Cooks Cove

Elevation: 0.94

Location: Cooks Cove - Area A

Environmental Log:

ABH246

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 over silty sand topsoil, dark brown, moist with roots	070508-84-KW	Push Tube					
				FILL: Sand, pale grey, fine to medium grained, loose, dry and moist							
				FILL: Silty sand and trace clay, dark brown, moist and loose							
				FILL: Sand, yellow, fine to medium grained, firm and moist							
1				SAND: Sand, pale grey, fine to medium grained, firm, moist, with silt lenses and H2S odour. Staurated at 1.4-2.8m							
					070508-86-KW	Push Tube					
					070508-85-KW	Push Tube					
2											
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329615.280



Jones Bay Wharf 19-21, Lower Level Suite 121
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PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

Northing: 6243323.531

Client: Boyd Cooks Cove

Elevation: 1.60

Location: Cooks Cove - Area A

Environmental Log:

ABH247

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 over silty sand topsoil, dark brown, roots and dry	070508-99-KW	Push Tube					
				FILL: Silty sand, dark brown, fine to medium grained, dense, black charcoal and gravels	070508-98-KW	Push Tube					
				FILL: Sand, yellow, fine to medium grained, dense with some gravels							
				FILL: Sand, pale grey, fine to medium grained, dense, moist with silt lenses and shells	070508-100-KW	Push Tube					
1				SILTY SAND: Silty sand, dark grey/brown, dense, moist with H2S odour. Saturated from 1.5-2.2m							
2				SAND: Sand, pale grey, fine to medium grained, dense, moist with H2S odour	070508-101-KW	Push Tube					
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329653.717


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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

Project: ESA

Northing: 6243309.430

Client: Boyd Cooks Cove

Elevation: 1.26

Location: Cooks Cove - Area A

Environmental Log:

ABH248

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 over silty sand topsoil, dark brown, trace clay and moist	080508-105-KW	Push Tube					
					FILL: Sand, yellow, fine to medium grained, loose, dry to moist with silt lenses and shells						
1					FILL: Silty clayey sand, fine grained, soft and moist	080508-107-KW	Push Tube				
					FILL: Silty sand, dark grey, fine to medium grained, trace clay with H2S odour	080508-106-KW	Push Tube				
					FILL: Sand, pale grey, fine to medium grained, moderately dense and moist						
2					SILTY SAND: Silty clayey, sand, dark grey, saturated, from 1.7-2.0m. Wet from 2.0-2.3m with H2S odour						
			SAND: Sand, pale grey, fine to medium, moderately, moist to wet with H2S odour		080508-108-KW	Push Tube					
3			EOH at 2.8mBGL (targeted depth)								
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329700.709



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

Project: ESA

Northing: 6243313.382

Client: Boyd Cooks Cove

Elevation: 1.25

Location: Cooks Cove - Area A

Environmental Log:

ABH249

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 over silty sand topsoil, dark brown, loose, moist with roots	080508-109-KW	Push Tube						
					FILL: Sand, pale brown, fine to medium grained, loose, dry to moist							
					FILL: Silty sand, grey, fine grained, dense, moist with ash waste (black and white)	080508-110-KW	Push Tube					
1					FILL: Silty clayey sand, dark grey, soft and moist	080508-111-KW	Push Tube					
					FILL: Sand, grey with silt clay lenses, fine to medium grained and moist							
					SILTY SAND: Silty clayey sand, dark grey, fine grained, wet. Saturated from 1.5-2.2m							
2					080508-112-KW	Push Tube						
				SAND: Sand, pale grey, fine to medium grained, moderately dense and wet								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329744.618

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

Project: ESA**Northing:** 6243326.767**Client:** Boyd Cooks Cove**Elevation:** 1.28**Location:** Cooks Cove - Area A**Environmental Log:** ABH250

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 over silty sand, dark brown, fine grained, loose and moist with roots	080508-113-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose, dry to moist, shells, black gravels with trace silty clay lenses								
				FILL: Ash waste layer, balck/white, wet from 0.9-1.1m	080508-114-KW	Push Tube						
				FILL: Silty sand, grey, fine grained, silty clay lenses and moist to wet								
				SILTY SAND: Silty clayey sand, fine grained, soft and wet. Saturated from 1.4-2.0m	080508-115-KW	Push Tube						
1												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
3				EOH at 2.8mBGL (targeted depth)								

Drill Company: Macquarie Drilling**Date Commenced:** 08/05/2008**Drill Model:** Mac200**Date Completed:** 08/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329785.264



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

Project: ESA

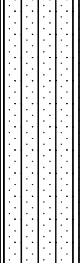
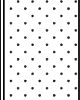
Northing: 6243325.035

Client: Boyd Cooks Cove

Elevation: 1.28

Location: Cooks Cove - Area A

Environmental Log: **ABH251**

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 over silty sand topsoil, dark brown, fine grained, loose and moist with roots	080508-116-KW	Push Tube							
					FILL: Sand, yellow, fine to medium grained, loose, moist with shells and orange mottles								
1					FILL: Silty sand with trace clay, brown, firm and moist with roots	080508-117-KW	Push Tube						
					FILL: Silty clay, brown, soft and moist								
					SILTY SAND: Silty sand with trace clay, saturated at 1.4-2.4m								
2													
				SAND: Sand, pale grey, fine to medium grained, dense and wet with trace silt									
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329839.757


**CONSULTING
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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

Project: ESA

Northing: 6243324.867

Client: Boyd Cooks Cove

Elevation: 0.93

Location: Cooks Cove - Area A

Environmental Log:

ABH252

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 over silty sand topsoil, dark brown, fine to medium grained, moist with rootlets	080508-130-KW	Push Tube							
				FILL: Sand, yellow, fine to medium grained, loose, shells and moist									
				FILL: Silty clay, dark brown, soft and moist	080508-131-KW	Push Tube							
				FILL: Sand, yellow, fine to medium grained, dense and moist with shells									
				FILL: Silty clay, dark brown, firm and moist									
				FILL: Silty sand, dark grey, fine to medium grained, dense and moist	080508-132-KW	Push Tube							
				FILL: Silty clayey sand, brown/grey, fine grained, soft and wet from 1.4-2.1m									
1													
2													
				SILTY CLAY: Sand, pale grey, fine to medium grained, dense, moist to wet									
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329882.049


**CONSULTING
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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

Project: ESA

Northing: 6243319.073

Client: Boyd Cooks Cove

Elevation: 0.83

Location: Cooks Cove - Area A

Environmental Log:

ABH253

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 over silty sand topsoil, dark brown, loose, moist with roots	080508-133-KW	Push Tube						
					FILL: Sand, fine to medium grained, loose, moist with silt lenses							
					FILL: Silty clay, dark brown, soft and moist	080508-134-KW	Push Tube					
					FILL: Sand, yellow, fine to medium grained, loose and moist							
1					FILL: Silty clay, dark brown, firm and moist							
					FILL: Sand, yellow, fine to medium grained, loose and moist with shells							
					FILL: Silty clay, dark brown, soft and very moist							
					FILL: Silty sand, dark grey/brown, fine grained and moist							
2					SILTY SAND: Silty clayey sand, brown, fine grained, soft, moist to wet. Saturated from 1.5-2.4m	080508-135-KW	Push Tube					
					SAND: Shells with pale grey sand							
			SAND: Sand, pale grey, fine to medium grained, dense and moist									
3			EOH at 2.8mBGL (targeted depth)									
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 08/05/2008

Drill Model: Mac200

Date Completed: 08/05/2008

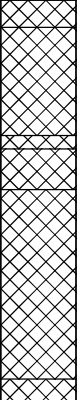
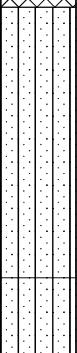
Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329933.287
**CONSULTING
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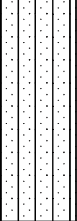
 Jones Bay Wharf 19-21, Lower Level Suite 121
 26-32 Pirrama Road Pyrmont 2009
 PH: (02) 8569 2200 FAX: (02) 9552 4399
Project: ESA**Northing:** 6243310.216**Client:** Boyd Cooks Cove**Elevation:** 0.82**Location:** Cooks Cove - Area A**Environmental Log:****ABH254**

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 over silty clay topsoil, trace sand, dark brown, firm, moist with roots and shells	080508-136-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose to moderately dense, moist with shells								
				FILL: Silty sand, dark grey, fine grained, dense and moist	080508-137-KW	Push Tube						
1				FILL: Silty sand, dark grey, soft and wet to 0.6m								
				FILL: Silty sand, dark grey/brown mottled silty clay lenses, soft and moist to wet								
				FILL: Sand yellow, fine to medium grained, dense, shells and moist								
2				SILTY SAND: Silty clayey sand, grey, soft and wet. Saturated from 1.5-2.0m then wet								
				SILTY SAND: Ilty sand with trace clay, grey, rootlets, dense and moist	080508-138-KW	Push Tube						
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 08/05/2008**Drill Model:** Mac200**Date Completed:** 08/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329978.015**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**Project:** ESA**Northing:** 6243308.488**Client:** Boyd Cooks Cove**Elevation:** 0.77**Location:** Cooks Cove - Area A**Environmental Log:****ABH255**

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 over silty sand topsoil, dark brown, dense, moist with roots	080508-139-KW	Push Tube							
					FILL: Sand, yellow/pale brown, fine grained, danse with large shells								
					FILL: Silty clay, dark brown, firm and moist								
					FILL: Sand, pale grey, fine to medium grained, loose to moderately dense, moist with silt lenses	080508-140-KW	Push Tube						
1					FILL: Silty clay, brown, soft and wet								
					FILL: Silty sand, silty clay lenses throughout, dark grey, dense and moist to wet								
					SAND: Sand, pale grey, fine to medium grained, moist and dense								
2					SILTY SAND: Silty clayey sand, dark grey, soft and wet. Saturated from 1.5-2.1m								
					EOH at 2.8mBGL (targeted depth)								
3													
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 08/05/2008**Drill Model:** Mac200**Date Completed:** 08/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329467.368**Project:** ESA**Northing:** 6243267.568**Client:** Boyd Cooks Cove**Elevation:** 1.04**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**Location:** Cooks Cove - Area A**Environmental Log:****ABH256**

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 over silty sand, brown, moist with roots	120508-264-KW	Push Tube						
				FILL: Sand, pale brown, fine to medium grained, loose, moist with roots								
				FILL: Silty sand, dark brown, fine grained, dense and moist								
1				SAND: Sand, pale grey, fine to medium grained, moderately dane, silt lenses, Wet from 1.5-2.6m with slight H2S odour at 2.0m	120508-265-KW	Push Tube						
												
2												
					120508-266-KW	Push Tube						
				SILTY SAND: Silty sand, brown, fine grained, dense and moist								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329513.168**Project:** ESA**Northing:** 6243272.842**Client:** Boyd Cooks Cove**Elevation:** 1.65**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**Location:** Cooks Cove - Area A**Environmental Log:****ABH257**

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 over silty sand topsoil, dark brown, fine grained, loose, moist with roots	120508-254-KW	Push Tube					
				FILL: Silty sand with trace clay, dark brown, medium grained, dense, moist with roots and gravels at 0.4-0.5m	120508-255-KW	Push Tube					
1				SAND: Sand, pale grey, medium grained, dense, moist to wet with silt lenses. Saturated from 1.4-2.2m							
2					120508-256-KW	Push Tube					
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329554.256


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

Project: ESA

Northing: 6243257.574

Client: Boyd Cooks Cove

Elevation: 1.21

Location: Cooks Cove - Area A

Environmental Log:

ABH258

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 over silty sand topsoil, dark brown, fine grained, dense, moist with roots	120508-251-KW	Push Tube						
				FILL: Sand, brown, fine to medium grained, loose, moist with sandstone gravels								
1				FILL: Silty sand, dark brown, fine grained, very dense, and moist	120508-252-KW	Push Tube						
				FILL: Sand, pale brown, fine to medium grained, dense, moist with silt lenses								
2				SAND: Sand, pale grey, fine to medium grained, silt lenses, moist, trace clay from 1.5m. Saturated from 1.5-2.1m with H2S odour	120508-253-KW	Push Tube						
				SAND: Sand, pale grey, fine to medium grained, dense and moist to wet								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329604.740



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

Project: ESA

Northing: 6243280.712

Client: Boyd Cooks Cove

Elevation: 1.21

Location: Cooks Cove - Area A

Environmental Log:

ABH259

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 on silty sand topsoil, dark brown, loose and moist with roots	120508-248-KW	Push Tube						
				FILL: Sand, brown, fine grained, moist, roots and silt inclusions								
				FILL: Sand, pale gray, fine grained, loose, moist with silt lenses	120508-249-KW	Push Tube						
				FILL: Silty clay, brown/grey, soft and wet								
1				FILL: Sand, aple grey, fine to medium grained, dense and wet with shells, orange mottles and silt lenses								
				FILL: Silty clay, dark grey, soft and wet								
			SAND: Sand, pale grey, fine to medium grained, moist and loose		120508-250-KW	Push Tube						
2												
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329656.650



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

Project: ESA

Northing: 6243268.514

Client: Boyd Cooks Cove

Elevation: 1.74

Location: Cooks Cove - Area A

Environmental Log:

ABH260

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 over silty sand topsoil, dark brown, dry, loose, roots with gravels	120508-243-KW	Push Tube						
				FILL: Sand, pale grey, fine grained, dry, loose, shells and moist from 1.0m								
					120508-246-KW	Push Tube						
					120508-245-KW	Push Tube						
1				FILL: Silty sand, layered orange/brown/grey with trace sand, moist, shells and wet from 1.5-1.8m								
					120508-247-KW	Push Tube						
				FILL: Silty clay, dark grey, soft and wet								
2				FILL: Silty sand, black, fine grained, roots, trace clay and moist								
				SAND: Sand, pale grey, moderately dense and wet								
				SAND: Sand, dark grey, silt lenses, fine grained, dense and moist								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329700.965**Project:** ESA**Northing:** 6243271.449**Client:** Boyd Cooks Cove**Elevation:** 3.04**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**Location:** Cooks Cove - Area A**Environmental Log:****ABH261**

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 on silty sand topsoil, brown, loose and dry	120508-244-KW	Push Tube				
				FILL: Silty sand, dark grey/black, fine grained, dry to moist and loose						
				FILL: Sand, yellow, fine to medium grained, dry to moist, loose with sporadic shells						
1					120508-241-KW	Push Tube				
				FILL: Silty sand with trace clay, brown, soft, shells with pale grey sand, fine grained and wet						
2				FILL: Silty clay, dark brown, dense and moist						
				FILL: Silty sand, dark brown, dense and moist						
					120508-242-KW	Push Tube				
3				SAND: Sand, grey, fine to medium grained, firm, moist with silt lenses. EOH at 2.8mBGL (targeted depth)						
4										
5										

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329744.916


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

Project: ESA

Northing: 6243270.357

Client: Boyd Cooks Cove

Elevation: 1.53

Location: Cooks Cove - Area A

Environmental Log:

ABH262

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 over sand topsoil, brown, dry and loose	120508-240-KW								
				FILL: Sand, yellow, fien to medium grained, loose dry with shells	120508-238-KW	Push Tube							
1													
2													

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329790.581
**CONSULTING
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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
Project: ESA**Northing:** 6243269.523**Client:** Boyd Cooks Cove**Elevation:** 0.56**Location:** Cooks Cove - Area A**Environmental Log:****ABH263**

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 on sand topsoil, fine grained, dry, roots and loose	120508-235-KW	Push Tube		
				FILL: SAnd, yellow, fine grained, loose and dry. Medium grained with shells at 1.2m				
1					120508-236-KW	Push Tube		
				FILL: Calyeye sandy silt, black, firm and moist				
2								
				FILL: Silty clay, dark brown, firm to stiff and moist	120508-237-KW	Push Tube		
				CLAYEY SAND: Clayey silty sand, dark grey, fine grained, dense, wet, dark grey with shells and H2S odour				
				SILTY SAND: Silty sand, pale grey, mostly shells				
3				EOH at 2.8mBGL (targeted depth)				
4								
5								

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329834.351


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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

Project: ESA

Northing: 6243275.328

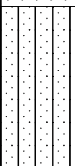
Client: Boyd Cooks Cove

Elevation: 1.15

Location: Cooks Cove - Area A

Environmental Log:

ABH264

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 over silty sand topsoil, fine grained, roots, dry and loose	120508-232-KW	Push Tube						
				FILL: Sand, yellow, finr to medium grained, loose, dry with shells	120508-233-KW	Push Tube						
1				SAND: Sand, greym fine to medium grained, loose, moist with silt lenses and H2S odour. Wet at 1.4m and saturated to 2.2m								
2				SILTY SAND: Silty clayay sand, brown/grey, soft and wet with shells at 2.7m	120508-234-KW	Push Tube						
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329879.674



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

Project: ESA

Northing: 6243269.251

Client: Boyd Cooks Cove

Elevation: 0.98

Location: Cooks Cove - Area A

Environmental Log:

ABH265

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 over silty sand, dark brown, dense, moist, fine grained with roots and shells	120508-228-KW	Push Tube					
				FILL: Sand, yellow, fine to medium grained, loose, moist with orange mottles and shells							
				FILL: Sand, pale grey, medium grained, dense, moist with shells and wet at 1.0m	120508-230-KW	Push Tube					
1				FILL: Silty clayey sand, dark grey, shells, medium grained and wet	120508-229-KW	Push Tube					
				SAND: Sand with silt lenses, pale grey, medium grained, wet and dense							
				SILTY SAND: Silty clayey sand, dark grey, soft wet with shells at 2.5m	120508-231-KW	Push Tube					
2											
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329923.654**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**Project:** ESA**Northing:** 6243270.129**Client:** Boyd Cooks Cove**Elevation:** 0.89**Location:** Cooks Cove - Area A**Environmental Log:****ABH266**

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 over sand silt, brown, fine grained, moist, loose with rootlets	120508-226-KW	Push Tube					
				FILL: Sand, yellow becoming pale grey, medium grained, moist with shells							
1				FILL: Sand, pale grey with orange mottling, moist to wet with shell layers							
				SILTY SAND: Silty sand, grey, moist to wet, fine to medium grained with shells	120508-227-KW	Push Tube					
2				SILTY SAND: Silty clayey sand, dark brown/grey, wet, fine grained, H2S odour and shells. Saturated from 1.9 to 2.8m							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329967.925


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

Project: ESA

Northing: 6243267.861

Client: Boyd Cooks Cove

Elevation: 0.84

Location: Cooks Cove - Area A

Environmental Log:

ABH267

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 over silty sandtopsoil, brown, fine to medium grained dry, rootlets and shells	120508-223-KW	Push Tube							
				FILL: Sand, pale grey/yellow, medium grained, moist and loose with shells and roots	120508-224-KW	Push Tube							
1					FILL: Silty sand, black/dark brown, fine grained, moist to wet with organic odour	120508-225-KW	Push Tube						
					SILTY SAND: Silty clayey sand, pale brown, fine grained, moist to wet with organic odour								
2				SAND: Sand, pale grey, medium grained, loose and wet with shells									
				SILTY SAND: Silty clayey sand, dark grey, soft and wet with organic odour									
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329593.088


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 PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

Northing: 6243240.023

Client: Boyd Cooks Cove

Elevation: 1.23

Location: Cooks Cove - Area A

Environmental Log:

ABH268

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 over silty sand topsoil, dark brown, firm and moist with roots	120508-275-KW	Push Tube						
					FILL: Silty sand, brown, fine grained, moist and loose							
					FILL: Silty sand with trace clay, brown/grey, fine grained, moist, gravels and shells	120508-273-KW	Push Tube					
					FILL: Sandstone, orange/grey, hard and moist							
1					FILL: Clay, orange/brown/grey/red mottles, stiff with roots							
					SILTY SAND: Silty clayey sand, dark grey, fine grained, firm, moist to wet	120508-274-KW	Push Tube					
2												
				SAND: Sand, pale grey, fine to medium grained, moderately dense and moist								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329604.835
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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
Project: ESA**Northing:** 6243226.073**Client:** Boyd Cooks Cove**Elevation:** 1.78**Location:** Cooks Cove - Area A**Environmental Log:****ABH269**

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 over silty sand topsoil, dark brown, fine grained, dry and loose	130508-314-KW	Push Tube						
					FILL: Sand, brown, fine grained, dry, loose with shells							
					FILL: Silty sand, dark brown, moist, roots with organic odour	130508-315-KW	Push Tube					
					FILL: Sand, yellow, fine to medium grained, loose to moderately dense							
1					FILL: Silty clay, dark brown, soft and moist	130508-316-KW	Push Tube					
					FILL: Crushed sandstone, yellow/orange, moist and hard							
				SILTY SAND: Silty clayey sand, dark brown, wet, dense with slight H2S odour								
2												
				SILTY SAND: Silty sand, grey, fine to medium grained, silt lenses, dense and moist								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329651.860**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**Project:** ESA**Northing:** 6243217.683**Client:** Boyd Cooks Cove**Elevation:** 1.77**Location:** Cooks Cove - Area A**Environmental Log:****ABH270**

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 over silty sand topsoil, dark brown, fine grained, moist, loose with roots	130508-311-KW	Push Tube							
				FILL: Sand, yellow, fine to medium grained, loose, moist with numerous shells. Wet at 1.5m									
1													
				FILL: Sand, pale grey, fine to medium grained, moderately dense, wet with trace shells	130508-312-KW	Push Tube							
2				FILL: Silty clay, dark brown, soft and wet									
				FILL: Silty sand, dark brown/black, fine grained, moist with rootlets and trace clay									
				SILTY SAND: Silty clayey sand, dark brown, fine grained, wet and soft									
3				SILTY SAND: Silty sand, dark grey, fine grained, dense, moist with rootlets	130508-313-KW	Push Tube							
				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329701.581


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

Project: ESA

Northing: 6243235.471

Client: Boyd Cooks Cove

Elevation: 2.04

Location: Cooks Cove - Area A

Environmental Log:

ABH271

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 over sandy topsoil, brown, fine to medium, dry, loose with roots	130508-308-KW	Push Tube							
				FILL: Silty sand, pale brown, dry and loose									
				FILL: Sand, yellow, fine grained, dry, loose with shells	130508-309-KW	Push Tube							
				FILL: Sand, pale grey, fine to medium grained, dry grading to moist with depth, shells and loose									
1													
				FILL: Silty sand with trace clay, dark grey, fine to medium grained, numerous shells. Silty clay lenses	130508-310-KW	Push Tube							
2				FILL: Silty clayey sand, dark grey, fine grained, wet to saturated									
				FILL: Silty sand, dark brown, firm, moist to wet									
				FILL: Silty bsand, dark grey/black, fine grained and wet									
3				FILL: Silty clay, dark brown, wet and dense									
	SAND: Sand, grey, medium to course grained, wet with silt lenses. EOH at 2.8mBGL (targeted depth)												
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329748.078


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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

Project: ESA

Northing: 6243224.958

Client: Boyd Cooks Cove

Elevation: 2.32

Location: Cooks Cove - Area A

Environmental Log:

ABH272

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 over sand, pale brown, fine to medium grained, dry, loose with roots. Charcoal fragments and metal pieces	130508-305-KW	Push Tube						
				FILL: Bark, brown and dry	130508-304-KW	Push Tube						
				FILL: Clay, orange/red/grey, stiff, dry with rootlets								
				FILL: Silty, sand, dark brown, fine grained, dry to moist with rootlets								
				FILL: Silty clay, dark brown, dry to moist, soft with shells								
				FILL: Sand, pale grey, fine to medium grained, moderately dense, moist to wet with shells and orange mottles								
				FILL: Silty clayey sand, dark grey, fine to medium grained, soft and wet								
				FILL: Sandy silt, dark grey, soft and wet	130508-307-KW	Push Tube						
				FILL: Silty clay, dark brown, soft and wet								
				SILTY SAND: Silty clayey sand, dark grey, fine to medium grained, wet and soft								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

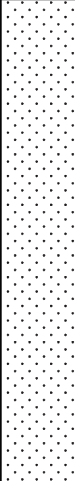
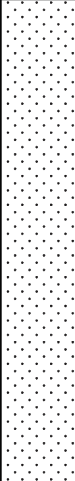
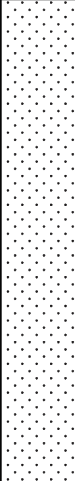
Project ID: CES050706-BCC**Easting:** 329799.533**Project:** ESA**Northing:** 6243215.432**Client:** Boyd Cooks Cove**Elevation:** 1.66**CONSULTING
EARTH
SCIENTISTS**Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Location:** Cooks Cove - Area A**Environmental Log:****ABH273**

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 over silty sand topsoil, brown, fine grained, dry and loose with roots	130508-292-KW	Push Tube							
				FILL: Sand, aple brown, fine grained, dry and loose with roots and shells									
				FILL: Sand, yellow/pale grey with orange mottles and trace silts and several shells. Fine grained and moist	130508-294-KW	Push Tube							
1							130508-293-KW	Push Tube					
2					SAND: Sand, pale grey, fine to medium grained, moderately dense and wet with shells								
					SILTY CLAY: Silty clay, dark brown, soft and wet								
					SILTY SAND: Silty clayey sand, dark grey, wet and dense. FOH at 2.8mBGL (targeted depth)								
3													
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329843.486**Project:** ESA**Northing:** 6243214.480**Client:** Boyd Cooks Cove**Elevation:** 2.05**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**Location:** Cooks Cove - Area A**Environmental Log:****ABH274**

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 over silty sand topsoil, brown, dry, fine grained with rootlets	130508-289-KW	Push Tube				
				FILL: Crushed sandstone, orange/brown, coarse grained with clay and moist						
				FILL: Sand, dark brown, fine to medium grained, loose and moist	130508-290-KW	Push Tube				
1				SAND: Sand, pale grey, fine to medium grained, loose, moist with shells. Saturated from 1.4-2.5m						
2					130508-291-KW	Push Tube				
				CLAYEY SILT: Clayey silt, dark brown, firm and wet						
				SILTY CLAY: Silty clay, dark brown, soft and moist						
				EOH at 2.8mBGL (targeted depth)						
3										
4										
5										

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329883.398
**CONSULTING
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SCIENTISTS**

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 26-32 Pirrama Road Pyrmont 2009
 PH: (02) 8569 2200 FAX: (02) 9552 4399
Project: ESA**Northing:** 6243214.269**Client:** Boyd Cooks Cove**Elevation:** 1.36**Location:** Cooks Cove - Area A**Environmental Log:****ABH275**

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 over silty sand, brown, fine grained, loose, moist with roots	130508-285-KW	Push Tube					
					FILL: Sand, pale brown, fine to medium grained, loose, dry to moist, shells with orange mottles and roots						
					FILL: Sand, yellow, fine to medium grained, moderately turbid, dense, large shells and moist	130508-288-KW	Push Tube				
1					SAND: Sand, pale grey, fine to medium grained, shells and moist	130508-287-KW	Push Tube				
						130508-286-KW	Push Tube				
2					SILTY CLAY: Silty clay, dark grey, very soft and wet						
				SILTY SAND: Silty clayey sand, dark grey, dense, moist, with shells at 2.7-2.8m							
3			EOH at 2.8mBGL (targeted depth)								
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329929.395


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 PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

Northing: 6243205.442

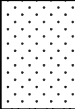
Client: Boyd Cooks Cove

Elevation: 1.81

Location: Cooks Cove - Area A

Environmental Log:

ABH276

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 over silty sand, topsoil, dark brown, loose and dry with rootlets	130508-282-KW	Push Tube							
				FILL: Sand, brown, fine to medium grained, gravels and ash (black/grey/white), dry to moist and loose									
1				FILL: Sand, pale grey, fine grained, moderately dense, moist with shells	130508-283-KW	Push Tube							
				FILL: Sand, orange, fine grained, dense and moist	130508-284-KW	Push Tube							
				FILL: Sand, yellow, medium grained, moderately dense, moist and shells									
2													
				SAND: Sand, pale grey, fine to medium grained and moderately dense									
				SILTY SAND: Silty clayey sand, dark grey, soft and moist with organic odour									
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329968.774



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

Project: ESA

Northing: 6243234.696

Client: Boyd Cooks Cove

Elevation: 0.96

Location: Cooks Cove - Area A

Environmental Log:

ABH277

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 over silty sand topsoil, dark brown/black, fine grained, loose and moist with roots	130508-279-KW	Push Tube					
				FILL: Sand, yellow, fine to medium grained, loose and moist with shells and rootlets	130508-278-KW	Push Tube					
				FILL: Sand, yellow and pale grey with trace silt and large shells. Moist, medium grained and loose							
1				FILL: Sandy clayey silt, dark brown/black, strong H2S odour	130508-280-KW	Push Tube					
				FILL: Silty sand, dark grey, moist with rootlets, shells and strong H2S odour							
2				FILL: Silty clayey sand, fine grained, dark brown, soft and saturated with H2S odour	130508-281-KW	Push Tube					
				FILL: Silty clay, dark brown/grey, soft and moist with large shells and H2S odour							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 330013.553



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

Project: ESA

Northing: 6243235.996

Client: Boyd Cooks Cove

Elevation: 0.89

Location: Cooks Cove - Area A

Environmental Log:

ABH278

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 over silty sand topsoil, dark brown, soft, fine grained and moist	120508-276-KW	Push Tube					
				FILL: Sand, yellow grading to pale brown, fine to medium grained, moderately dense and moist							
				FILL: Silty sand with trace clay, dark grey. Mostly shells	120508-277-KW	Push Tube					
1				FILL: Silty sand, grey, fine to medium grained, moderately dense and moist with shells							
				FILL: Sand, pale grey, medium grained, moist to wet with large shells							
				FILL: Clayey silt, dark brown, soft and moist to wet							
2				FILL: Sand, pale grey, medium grained, wet with shells							
				FILL: Clayey silt, dark brown/black and wet							
			SILTY SAND: Silty sand with trace clay, dark grey, wet with slight H2S odour								
3			EOH at 2.8mBGL (targeted depth)								
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329709.653**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**Project:** ESA**Northing:** 6243160.286**Client:** Boyd Cooks Cove**Elevation:** 2.58**Location:** Cooks Cove - Area A**Environmental Log:****ABH279**

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 over sandy topsoil, dark brown, loose, dry with roots	130508-319-KW	Push Tube					
				FILL: Sand, dark brown, fine grained, dry with gravels and clay							
1				FILL: Sand and silt layers, brown, grey with shells	130508-320-KW	Push Tube					
2				SAND: Sand, pale grey, medium grained, wet, dense with trace silt and shells	130508-321-KW	Push Tube					
				SAND: Sand, grey, medium grained and wet							
3				CLAYEY SILT: Clayey silt, dark grey, firm and moist. EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329745.044


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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

Project: ESA

Northing: 6243167.894

Client: Boyd Cooks Cove

Elevation: 2.87

Location: Cooks Cove - Area A

Environmental Log:

ABH280

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 over sandy topsoil, brown, fine to medium grained, dry and loose	130508-299-KW	Push Tube							
				FILL: Sand, brown, fine to medium grained, dry to moist and loose									
				FILL: Clay, brown/grey/orange mottles, gravels and very stiff	130508-300-KW	Push Tube							
				FILL: Sand, pale grey, fine to medium grained, dry and loose with shells									
1				FILL: Crushed sandstone, white/pink, dry and hard									
				UNKNOWN: Core loss									
2				SAND: Sand, pale grey, fine to medium grained, loose, moist with shells									
				SILTY SAND: Silty sand, grey, fine to medium grained, moist, shells, silt lenses with shells and H2S odour	130508-301-KW	Push Tube							
				EOH at 2.8mBGL (targeted depth)									
3													
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329789.418**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**Project:** ESA**Northing:** 6243190.974**Client:** Boyd Cooks Cove**Elevation:** 1.85**Location:** Cooks Cove - Area A**Environmental Log:****ABH281**

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 over unknown due to core loss	130508-302-KW	Push Tube									
							FILL: Sand, yellow, fine to medium grained, loose, moist with shells. Silt lenses at 0.9m								
1															
							FILL: Silty sand, fine to medium grained, loos and moist to wet. Grading through brown/grey/yellow and grey. Wet from 1.4m	130508-303-KW	Push Tube						
2															
				FILL: Silty clay, dark grey, soft and wet											
				FILL: Silty sand, dark grey, fine to medium grained, wet, moderately dense with shells and trace clay											
				FILL: Sandy clayey silt, black, moderately dense and wet											
				FILL: Silty clay, dark brown/grey, soft and moist											
3				FILL: Silty clayey sand, fine grained, dark brown, dense and moist. EOH at 2.8mBGL (targeted depth)											
4															
5															

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329825.352
**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
Project: ESA**Northing:** 6243184.501**Client:** Boyd Cooks Cove**Elevation:** 1.35**Location:** Cooks Cove - Area A**Environmental Log:****ABH282**

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 over silty sand topsoil, dark brown, moist with rootlets	130508-296-KW	Push Tube						
				FILL: Sand, pale brown, fine to medium grained, loose and moist with shells								
				FILL: Sand, yellow, fine to medium grained, loose and moist with shells								
				FILL: Sand, dark grey, fine to medium grained, loose and moist with shells								
1				FILL: Sand, pale grey, with dark brown, fine to coarse grained, moderately dense and moist with silt lenses, orange mottles and shells	130508-297-KW	Push Tube						
				SAND: Sand, pale grey, medium grained, moderately dense and wet at 1.5m								
2				SAND: Shell layer								
			SILTY SAND: Silty clayey sand, grey, moist and soft	130508-298-KW	Push Tube							
			EOH at 2.8mBGL (targeted depth)									
3												
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329888.702
**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
Project: ESA**Northing:** 6243165.119**Client:** Boyd Cooks Cove**Elevation:** 1.59**Location:** Cooks Cove - Area A**Environmental Log:****ABH283**

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 over silty clayey sand topsoil, dark brown, firm, dry to moist with roots and charcoal	150508-381-KW	Push Tube								
					FILL: Sand, pale brown, fine grained, loose and dry to moist									
						FILL: Sand, pale yellow, grading to grey, fine to medium grained, loose and moist. Wet at 1.5m	150508-382-KW	Push Tube						
1														
						SAND: Sand, pale grey, medium grained, moderately dense and wet with shells	150508-383-KW	Push Tube						
2														
				SILTY CLAY: Silty clay, dark brown, firm and wet										
				SILTY SAND: Silty sand, grey, medium grained and wet										
3				SILTY CLAY: Silty clay, dark grey, firm and wet. EOH at 2.8mBGL (targeted depth)										
4														
5														

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329927.212


**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

Project: ESA

Northing: 6243176.201

Client: Boyd Cooks Cove

Elevation: 1.76

Location: Cooks Cove - Area A

Environmental Log:

ABH284

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 over silty top soil, dark brown, firm, dry with roots	150508-384-KW	Push Tube					
				FILL: Sand, yellow, fine grained, loose and dry							
				FILL: Silty clay, dark brown, firm and dry							
				FILL: Sand, yellow, fine to medium grained, orange mottles, shells and wet from 1.4m							
1							150508-387-KW	Push Tube			
				SAND: Sand, grey, medium grained, moderately dense and wet	150508-386-KW	Push Tube					
					150508-385-KW	Push Tube					
2				SILTY SAND: Silty clayey sand, dark brown, soft and wet with shells							
					150508-388-KW	Push Tube					
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329971.624**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**Project:** ESA**Northing:** 6243183.325**Client:** Boyd Cooks Cove**Elevation:** 1.74**Location:** Cooks Cove - Area A**Environmental Log:****ABH285**

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: Bark over silty sand topsoil, dark brown, dry, loose with roots	150508-389-KW	Push Tube					
				FILL: Silty clay, dark brown, firm and dry							
				FILL: Sand, pale grey with orange mottles and shells, fine to medium grained, loose to dense and moist. Wet at 1.4m	150508-390-KW	Push Tube					
1											
				SILTY SAND: Silty clayey sand, fine grained, dark brown and wet							
2	SILTY SAND: Silty sand, dark grey with trace clay and wet										
				EOH at 2.8mBGL (targeted depth)							
3											
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 330001.417


**CONSULTING
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SCIENTISTS**

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

Project: ESA

Northing: 6243192.728

Client: Boyd Cooks Cove

Elevation: 1.44

Location: Cooks Cove - Area A

Environmental Log:

ABH286

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 on silty sand topsoil with trace clay, dark brown, moist, roots and gravels	150508-391-KW	Push Tube							
						FILL: Sand, yellow, fine to medium grained, dry, loose, shells and orange mottles. Ash at 0.3m							
1						FILL: Sand, grey, fine to medium grained, moist, shells, loose with orange mottles and wet at 1.3m	150508-392-KW	Push Tube					
						FILL: Silty clayey sand, dark brown, wet and soft							
2						SILTY SAND: Silty sand, grey, fine to medium grained, moderately dense, wet with rootlets	150508-394-KW	Push Tube					
						SILTY SAND: Silty clayey sand, dark grey, soft, moist to wet with shells. EOH at 2.8mBGL (targeted depth)	150508-393-KW	Push Tube					
3													
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329802.345**Project:** ESA**Northing:** 6243164.287**Client:** Boyd Cooks Cove**Elevation:** 1.88**Location:** Cooks Cove - Area A**Environmental Log:** ABH287

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 over silty topsoil, brown, fine grained, dry, loose with rootlets	150508-379-KW	Push Tube							
				FILL: Sand, pale grey, silt lenses and orange mottles, shells, fine to medium grained, moist at depth and wet from 1.3m	150508-378-KW	Push Tube							
1													
							150508-380-KW	Push Tube					
2				SILTY SAND: Silty sand, dark grey, firm, fine to medium grained, wet with shells and silt lenses									
		SILTY SAND: Silty clay, dark brown and moist											
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329838.139



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PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

Northing: 6243142.892

Client: Boyd Cooks Cove

Elevation: 1.53

Location: Cooks Cove - Area A

Environmental Log: **ABH288**

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 over silty sand topsoil, dark brown, fine grained, moist and rootlets	150508-373-KW	Push Tube					
				FILL: Sand, pale grey, fine to medium grained, loose and moist with shells							
				FILL: Silty clay, brown/grey mottled, firm and dry to moist	150508-374-KW	Push Tube					
1				FILL: Sand, pale grey with orange mottles, fine to medium grained, moist and dense with shells							
				FILL: Sand, orange, medium grained, wet and loose							
2				SILTY SAND: Silty sand, medium grained, wet with shells							
				SILTY CLAY: Silty clay, dark brown, soft and moist							
				EOH at 2.8mBGL (targeted depth)	150508-375-KW	Push Tube					
3											
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329888.068**Project:** ESA**Northing:** 6243145.122**Client:** Boyd Cooks Cove**Elevation:** 1.88**Location:** Cooks Cove - Area A**Environmental Log:** ABH289

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 over silty clay topsoil, dark brown, moist with rootlets	150508-371-KW	Push Tube		
					150508-370-KW	Push Tube		
1				FILL: Sand, pale grey/orange mottles, fine to medium grained, moderately dense, moist with shells. Wet at 1.4m				
2					150508-372-KW	Push Tube		
				SANDY CLAY: Sandy silty clay, dark brown, firm and moist				
				SILTY SAND: Silty clayey sand, dark brown, firm and moist with shells and roots				
3				EOH at 2.8mBGL (targeted depth)				
4								
5								

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329924.715



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PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

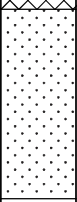
Northing: 6243131.849

Client: Boyd Cooks Cove

Elevation: 1.87

Location: Cooks Cove - Area A

Environmental Log: **ABH290**

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 over silty sand, topsoil, dark brown, firm with trace clay	150508-358-KW	Push Tube						
				FILL: Crushed sandstone, coarse grained, orange and dry								
				FILL: Silty sand, dark brown, fine grained and dry								
				FILL: Silty clay, dark brown, firm and dry								
1				FILL: Sand, pale, grey, fine to medium grained, dry and dense with shells and orange mottles								
				FILL: Silty clay, dark brown, firm and dry	150508-359-KW	Push Tube						
			FILL: Sand, pale grey, medium grained, orange mottles, moist with shells									
2			SAND: Sand, pale grey, fine to medium grained, dense and wet with shells									
			SILTY CLAY: Silty clay, dark brown, soft and moist									
3			EOH at 2.8mBGL (targeted depth)									
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329972.055**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**Project:** ESA**Northing:** 6243136.666**Client:** Boyd Cooks Cove**Elevation:** 2.52**Location:** Cooks Cove - Area A**Environmental Log:****ABH291**

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 over silty sand topsoil, dark brown, firm and moist	150508-354-KW	Push Tube									
				FILL: Sand, pale brown, fine to medium grained, loose to dense, dry to moist with sandstone gravels	150508-353-KW	Push Tube									
					150508-352-KW	Push Tube									
1						FILL: Silty clayey sand, brown, soft and moist with shells									
						FILL: Sand, pale grey, fine to medium grained, moist and loose	150508-355-KW	Push Tube							
						FILL: Silt clay, dark brown, firm and moist									
2						FILL: Sand, pale grey, medium grained, dense and wet with shells									
						FILL: Ash waste, black/white, loose and wet									
						SILTY SAND: Silty clayey sand, dark grey, soft and wet	150508-356-KW	Push Tube							
3															
4				SAND: Sand with trace clay, brown, fine grained and moist to wet	150508-357-KW	Push Tube									
			EOH at 4.2mBGL (targeted depth)												
5															

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329795.443
**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
Project: ESA**Northing:** 6243093.234**Client:** Boyd Cooks Cove**Elevation:** 1.88**Location:** Cooks Cove - Area A**Environmental Log:****ABH292**

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 over silty sand topsoil, brown, fine to medium grained, moist and loose.								
				FILL: Sand, yellow, fine to medium grained, moist and loose with ash gravels at 0.8-0.9m								
				FILL: Clayey silt, brown/orange mottles, dense and moist	130508-325-KW	Push Tube						
1				FILL: Silty sand, yellow, fine to medium grained, with shells and as gravels	130508-326-KW	Push Tube						
				FILL: Silty clay, grey/brown, dense and moist with orange mottles								
				FILL: Sand, pale grey, medium grained, moist and loose with shells. Saturated form 1.4-1.6m	130508-327-KW	Push Tube						
2				FILL: Silty sand, grey, dense and moist with shells								
				FILL: Clayey silt, grey dense and moist with shells								
				FILL: Clayey silt with trace sands, black, dense and moist with ash wast, glass and gravels. Refusal on sandstone fill at 1.9mBGL								
3												
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 13/05/2008**Drill Model:** Mac200**Date Completed:** 13/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329831.892


**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

Project: ESA

Northing: 6243084.592

Client: Boyd Cooks Cove

Elevation: 1.91

Location: Cooks Cove - Area A

Environmental Log:

ABH293

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 over sand topsoil, dark brown and moist with rootlets							
				FILL: Crushed sandstone (white/brown), brown with silt, clay and ash at 0.4-0.5m	130508-328-KW	Push Tube					
				FILL: Silty clay, brown/orange, moist, firm with charcoal and gravels							
				FILL: Crushed sandstone, orange, course grained and moist							
1				FILL: Silty sand, brwon/grey with charcoal	130508-329-KW	Push Tube					
				FILL: Sand, pale grey, fine to medium grained with silt lenses and shells. Wet at 1.4m							
											
2				SILTY CLAY: Silty clay, dark grey, firm and moist with shells	130508-330-KW	Push Tube					
											
				SILT: Silt, black, fine grained and firm							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329858.669**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**Project:** ESA**Northing:** 6243120.087**Client:** Boyd Cooks Cove**Elevation:** 1.70**Location:** Cooks Cove - Area A**Environmental Log:****ABH294**

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 over silty sand, dark brown, moist and roots	150508-367-KW	Push Tube					
				FILL: Silty clayey sand, dark brown, gravels, firm and moist with shells							
				FILL: Silty clay, brown/grey, firm and dry with rootlets	150508-368-KW	Push Tube					
1											
					FILL: Sand, grey, silty, fine to medium grained with shells and wet from 1.4m						
2											
			FILL: silty clay, dark grey, soft and wet	150508-369-KW	Push Tube						
				SAND: Sand, grey, silty, medium grained and wet with shells							
				SILTY CLAY: Silty clay, dark grey, soft and wet							
3			EOH at 2.8mBGL (targeted depth)								
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329741.167



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

Project: ESA

Northing: 6243137.961

Client: Boyd Cooks Cove

Elevation: 2.02

Location: Cooks Cove - Area A

Environmental Log:

ABH295

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 over silty sand topsoil, fine grained, dry and loose with roots	130508-324-KW	Push Tube		
				FILL: Sand, yellow, fine to medium grained, loose and dry with shells. Moist at 1.4m. Wet at 1.6m with silt lenses	130508-322-KW			
1								
					130508-323-KW	Push Tube		
2				FILL: Silty clay, dark grey, firm and moist				
				FILL: Sand, pale grey, medium grained, wet and dense				
				FILL: Silty clay, dark grey, firm and moist				
3				SAND: Silty sand, dark grey, moist, dense with slight H2S odour				
				EOH at 2.8mBGL (targeted depth)				
4								
5								

Drill Company: Macquarie Drilling

Date Commenced: 13/05/2008

Drill Model: Mac200

Date Completed: 13/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329442.022**Project:** ESA**Northing:** 6243279.278**Client:** Boyd Cooks Cove**Elevation:** 1.42**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**Location:** Cooks Cove - Area A**Environmental Log:****ABH296**

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 over silty topsoil, dark brown, dense and moist with roots	120508-261-KW	Push Tube							
				FILL: Sand, pale brown, fine grained, loose and dry									
				FILL: Silty sand, dark brown, fine grained, dense and moist									
1													
				SAND: Sand, pale grey, fine to medium grained, loose to moderately dense, moist with trace silt lenses and roots									
2													
					120508-263-KW	Push Tube							
3				EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329954.741


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 Jones Bay Wharf 19-21, Lower Level Suite 121
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 PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

Northing: 6243567.285

Client: Boyd Cooks Cove

Elevation: 1.82

Location: Cooks Cove - Area A

Environmental Log:

ABH297

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 ↑ ↓			ASPHALT: Bitumen	090508-166-KW	Push Tube					
			FILL: Sand, dark brown, fine to medium grained, loose and dry with gravels and shell fragments	090508-164-KW							
			FILL: Sand, yellow, fine grained, loose, dry and odourless	090508-165-KW	Push Tube						
1			FILL: Silty sand, dark grey, fine grained, loose, dry and odourless	090805-166-KW							
			FILL: Silty sand, dark grey, fine grained, loose, dry and odourless	090508-181-KW	Push Tube						
		SANDSTONE: Sanstone, yellow/white/orange, coarse grained, moist and odourless. Refusal on sandstone bedrock at 1.3mBGL									
2											
3											
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 09/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329957.270

Project: ESA

Northing: 6243565.596

Client: Boyd Cooks Cove

Elevation: 1.97



Location: Cooks Cove - Area A

Environmental Log: ABH298

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 ↑ ↓			ASPHALT: Bitumen	090508-167-KW	Push Tube					
				FILL: Sand, brown, fine to medium grained, loose and dry with gravels, shells and trace clay							
1				FILL: Silty sand, dark brown, fine grained, dry, loose and odourless							
				FILL: Sand, yellow, fine to medium grained, loose and dry.	EOH at 1.5mBGL (targeted depth)	090508-184-KW	Push Tube				
2											
3											
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 09/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

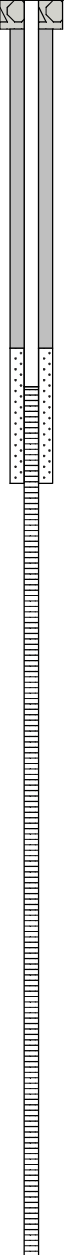
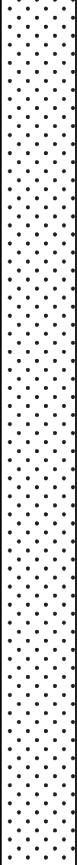
Project ID: CES050706-BCC**Easting:** 329956.887**CONSULTING
EARTH
SCIENTISTS**Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Project:** ESA**Northing:** 6243568.981**Client:** Boyd Cooks Cove**Elevation:** 1.86**Location:** Cooks Cove - Area A**Environmental Log:****ABH299**

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			ASPHALT: Bitumen	090508-168-KW	Hand Auger						
				FILL: Sand, brown, fine to medium grained, loose, dry with gravels, shells and charcoal	090508-169-KW	Hand Auger						
				FILL: Sand, grey/brown, fine grained, loose, dry to moist and odourless	090508-170-KW	Hand Auger						
1				FILL: Sand, yellow, fine grained, dense, dry and odourless	090508-182-KW	Push Tube						
				FILL: Silty sand, dark grey, fine grained, dry, loose and odourless	090508-183-KW	Push Tube						
2				FILL: Sandstone, yellow/orange, course grained and moist. Refusal on sandstone at 1.5mBGL		Push Tube						
3												
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 09/05/2008**Drill Model:** Mac200**Date Completed:** 09/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329957.565**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**Project:** ESA**Northing:** 6243566.232**Client:** Boyd Cooks Cove**Elevation:** 2.16**Location:** Cooks Cove - Area A**Environmental Log:****ABH2100**

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			ASPHALT: Bitumen	090508-171-KW	Hand Auger						
				FILL: Sand, brown, fine grained, loose, dry, gravesl, brick, blue metal, sheells and odourless	090508-172-KW	Hand Auger						
				FILL: Sand, grey, fine grained, dry and odourless								
1				FILL: Sand, yellow/grey, fine grained, dry, loose and odourless	090508-173-KW	Hand Auger						
				FILL: Silty sand, dark grey, fine grained, loose and dry	090508-180-KW	Push Tube						
					090508-179-KW	Push Tube						
					SANDSTONE: Orange/yellow sandstone, fine grained and dry							
2				SANDSTONE: Sandstone, white and moist								
3												
4												
5												
6												
7				EOH at 6.5mBGL (targeted depth)								

Drill Company: Macquarie Drilling**Date Commenced:** 21/05/2008**Drill Model:** Mac200**Date Completed:** 21/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329960.173


**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

Project: ESA

Northing: 6243565.265

Client: Boyd Cooks Cove

Elevation: 2.16

Location: Cooks Cove - Area A

Environmental Log:

ABH2101

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			ASPHALT: Bitumen								
				FILL: Sand, brown, fine grained, loose, dry with gravels and blue metals	090508-174-KW	Hand Auger						
				FILL: Sand, grey, fine grained, loose dry and odourless	090508-175-KW	Hand Auger						
				FILL: Sand, yellow/brown, fine grained, loose, dry and odourless								
1				FILL: Silt sand, dark brown, fine grained, dry, loose and odourless	090508-176-KW	Hand Auger						
												
			SANDSTONE: Weathered sandstone, white/orange, moist and odourless	090508-177-KW	Push Tube							
				EOH at 1.7mBGL (refusal on sandstone bedrock)	090508-178-KW	Push Tube						
2												
3												
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 09/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329960.984**Project:** ESA**Northing:** 6243570.536**Client:** Boyd Cooks Cove**Elevation:** 2.16**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**Location:** Cooks Cove - Area A**Environmental Log:****ABH2102**

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			ASPHALT: Bitumen and blue metal						
				FILL: Crushed sandstone fill, pale brown/orange, coarse grained, sandstone gravels, loose and dry	090508-185-KW	Push Tube				
				FILL: Sand, grey/brown, loose and dry with black gravels						
				FILL: Crushed brick, red. hard and dry	090508-186-KW	Push Tube				
1				FILL: Sand, pale brown, fine grained, moderately dense dry						
				FILL: Silty sand, dark brown, fine grained, moderately dense and dry						
				FILL: Sand, yellow/pale brown, medium grained and dry to moist						
			FILL: Silty sand with trace clay, dark brown/grey. Wet at 1.6m	090508-187-KW	Push Tube					
2				FILL: Sand, pale grey with silt lenses and wet. Refusal on sandstone at 2.0mBGL						
3										
4										
5										

Drill Company: Macquarie Drilling**Date Commenced:** 09/05/2008**Drill Model:** Mac200**Date Completed:** 09/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329920.146**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**Project:** ESA**Northing:** 6243581.574**Client:** Boyd Cooks Cove**Elevation:****Location:** Cooks Cove - Area A**Environmental Log:****ABH2103**

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			ASPHALT: Bitumen	090508-195-KW	Hand Auger						
				FILL: Sand, brown, fine grained, loose, dry to moist with gravels and shells. Terracota at 0.3m. Moist with orange mottles at 0.9m and gravels	090508-194-KW	Hand Auger						
					090508-196-KW	Hand Auger						
						Hand Auger						
1				FILL: Sand, grey with silt lenses, fine to medium grained, wet from 1.4m. Saturated from 1.4-2.8m	090508-197-KW	Hand Auger						
					090508-199-KW	Push Tube						
2				FILL: Silty clayey sand, brown, soft and saturated with several shells								
					090508-201-KW	Push Tube						
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 09/05/2008**Drill Model:** Mac200**Date Completed:** 09/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329920.146


**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

Project: ESA

Northing: 6243581.574

Client: Boyd Cooks Cove

Elevation: 1.89

Location: Cooks Cove - Area A

Environmental Log:

ABH2104

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: Sand, brown, fine to medium grained, loose and moist with gravels	090508-198-KW	Hand Auger							
				FILL: Sand, yellow, fine grained and odourless. Grading to grey/yellow, fine to medium grained and wet	090508-334-KW	Hand Auger							
1					090508-335-KW	Hand Auger							
				FILL: Sand, silty brown, fine grained, moist, dense and wet at 1.5m									
				FILL: Sand, grey, medium grained, wet and dense									
2				FILL: Silty clayey sand, grey/brown, dense and wet with shells									
					090508-349-KW	Push Tube							
3													
				FILL: Sand, pale grey, course grained, dense, wet and odourless									
				090508-350-KW	Push Tube								
4				EOH at 4.0mBGL (targeted depth)									
5													

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 09/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329916.377


**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

Project: ESA

Northing: 6243589.938

Client: Boyd Cooks Cove

Elevation: 1.98

Location: Cooks Cove - Area A

Environmental Log:

ABH2105

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: Gravels								
				FILL: Clayey sand, orange/grey, coarse grained, odourless and moist, large boulder rocks, sandstone and concrete. Very strong, hydrocarbon odour from 1m	150508-323-KW	Hand Auger						
1												
				UNKNOWN: Core loss	150508-333-KW	Hand Auger						
2												
				SAND: Sand grey, fine to medium grained, saturated, hydrocarbon odour and loose	150508-346-KW	Push Tube						
3												
				SAND: Brown sand, fine to medium grained with no odour	150508-600-KW	Solid Flight Auger						
4				EOH at 4.0mBGL (targeted depth)								
5												

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329905.057**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**Project:** ESA**Northing:** 6243586.237**Client:** Boyd Cooks Cove**Elevation:** 2.25**Location:** Cooks Cove - Area A**Environmental Log:****ABH2106**

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			ASPHALT: Bitumen	090508-204-KW	Push Tube						
				FILL: Silty brown topsoil, fine grained and moist								
				FILL: Sand, brown, loose, moist with shells and gravels								
1				FILL: Brick, yellow sandstone and moist	090508-205-KW	Push Tube						
				FILL: Sand, yellow, medium grained, moderately dense with shells and moist. Saturated at 2.0m								
2				FILL: Sand, grey, medium grained, moderately dense with shells and moist. Saturated at 2.0m								
		FILL: Silty clay, grey, soft and wet with H2S odour	090508-206-KW	Push Tube								
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling**Date Commenced:** 09/05/2008**Drill Model:** Mac200**Date Completed:** 09/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329919.941


**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

Project: ESA

Northing: 6243590.875

Client: Boyd Cooks Cove

Elevation:

Location: Cooks Cove - Area A

Environmental Log:

ABH2107

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			CONCRETE: Concrete									
				FILL: Silty sand topsoil, fine to medium grained, moist and odourless with gravels	150508-339-KW	Hand Auger							
				FILL: Sand, brown/grey, fine to medium grained, gravels and odourless	150508-340-KW	Hand Auger							
1				FILL: Rocks, sand, grey becoming brown, moist to wet with strong hydrocarbon odour and surface sheen.	150508-341-KW	Hand Auger							
					150508-342-KW	Hand Auger							
			EOH at 1.6mBGL due to access restrictions										
2													
3													
4													
5													

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 50

Logged/checked by: K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329921.010**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**Project:** ESA**Northing:** 6243586.932**Client:** Boyd Cooks Cove**Elevation:****Location:** Cooks Cove - Area A**Environmental Log:****ABH2108**

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		CONCRETE: Concrete		150508-343-KW	Hand Auger					
			FILL: Sand, yellow, fine grained, most to dry. Rocks at 0.3m								
			FILL: Silty sand, dark brown, fine grained with trace clay, moist with slight HC odour	150508-344-KW	Hand Auger						
			FILL: Very strong Hydrocarbon odour								
1			FILL: Silty sand, dark grey, fine to medium grained, wet with shells and hydrocarbon odour	150508-345-KW	Hand Auger						
2											
3					150508-347-KW	Push Tube					
4			SAND: Sand, pale grey, silty lenses, odourless and moist		150508-348-KW	Push Tube					
			EOH at 4.5mBGL (targeted depth)								
5											

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329905.057
**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
Project: ESA**Northing:** 6243586.237**Client:** Boyd Cooks Cove**Elevation:** 2.25**Location:** Cooks Cove - Area A**Environmental Log:****ABH2109**

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: Gravels and roadbase	150508-336-KW	Hand Auger							
				FILL: Silty sand, dark brown, fine to medium grained, moist and odourless									
					150508-337-KW	Hand Auger							
1				FILL: Sand, grey, fine to medium grained, moist and odourless									
				FILL: Sand, pale grey, fien to medium grained, dense, odourless and wet at 1.4m	150508-338-KW	Hand Auger							
2													
				SILTY SAND: Silty sand, grey, fine to medium grained, moist and dense									
				150508-351-KW	Push Tube								
3				EOH at 3.0mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 50**Logged/checked by:** K.Weir/L.Jenkins

Sheet: 1 of 1

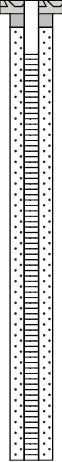
Project ID: CES050706-BCC**Easting:** 329956.998**Project:** ESA**Northing:** 6243565.240**Client:** Boyd Cooks Cove**Elevation:** 1.9**CONSULTING
EARTH
SCIENTISTS**Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Location:** Cooks Cove - Area A**Environmental Log:****ABH2110**

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			ASPHALT: Bitumen							
				FILL: Sand, brown, fine grained, loose, dry, gravesl, brick, blue metal, sheells and odourless							
				FILL: Sand, grey, fine grained, dry and odourless							
1				FILL: Sand, yellow/grey, fine grained, dry, loose and odourless							
				FILL: Silty sand, dark grey, fine grained, loose and dry							
				SANDSTONE: Orange/yellow sandstone, fine grained and dry							
2				EOH at 2.0mBGL (targeted depth)							
3											
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 21/05/2008**Drill Model:** Mac200**Date Completed:** 21/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329464.951**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**Project:** ESA**Northing:** 6243255.406**Client:** Boyd Cooks Cove**Elevation:** 1.09**Location:** Cooks Cove - Area A**Environmental Log:****ALG201**

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 over silty sand topsoil, dark brown, moist, roots and fine grained							
				FILL: Sand, brown, fine to medium grained, moist, loose with roots and trace silt	120508-267-KW	Push Tube					
				FILL: Silty sand, brown, fine grained, dense and moist	120508-268-KW	Push Tube					
1				SAND: Sand, pale grey, fine to medium grained, moderately dense with silt lenses. Saturated from 1.5-2.6m. H2S odour at 2.0m	120508-269-KW	Push Tube					
2				SAND: Silty sand, brown, fine grained, dense and moist							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329556.712


**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

Project: ESA

Northing: 6243218.788

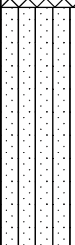
Client: Boyd Cooks Cove

Elevation: 1.68

Location: Cooks Cove - Area A

Environmental Log:

ALG202

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 over silty sand topsoil, fine grained with roots	120508-270-KW	Push Tube					
				FILL: Sand, pale brown, fine grained, dry and loose with sandstone fragments (white), minor coal fragments. Orange/red mottles							
1				FILL: Clay, red/brown/orange/grey mottles, coal fragments, pebbles and dry to moist	120508-272-KW	Push Tube					
				FILL: Silty sand, fine to medium grained, loose and wet . Saturated from 1.5-2.0m	120508-271-KW	Push Tube					
				FILL: Silty clay, brown, moist and soft							
2				SILTY SAND: Silty sand, pale grey, dense and moist with silt lenses							
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

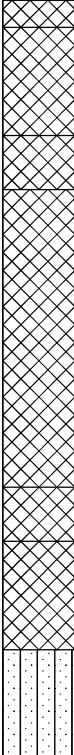
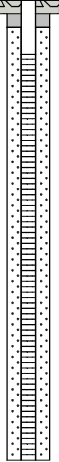
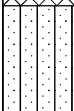
Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329702.791
**CONSULTING
EARTH
SCIENTISTS**

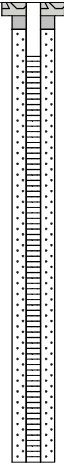
 Jones Bay Wharf 19-21, Lower Level Suite 121
 26-32 Pirrama Road Pyrmont 2009
 PH: (02) 8569 2200 FAX: (02) 9552 4399
Project: ESA**Northing:** 6243184.299**Client:** Boyd Cooks Cove**Elevation:** 1.98**Location:** Cooks Cove - Area A**Environmental Log:****ALG203**

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 over silty sand topsoil, dark brown, fine grained, dry to moist	130508-317-KW	Push Tube								
						FILL: Silty sand, dark brown, fine grained, dense and dry to moist								
						FILL: Silty sand, yellow, fine grained, moist and loose								
						FILL: Sand, yellow, medium grained, loose, moist with shells and silt lenses, orange mottles and wet at 1.5m	130508-318-KW	Push Tube						
1														
							FILL: Sand, grey, fine to medium grained, moderately dense, wet with shells							
2				FILL: Silty clay, dark brown, moist and soft										
				SILTY SAND: Silty sand, dark brown/grey, moist and soft										
3				EOH at 2.8mBGL (targeted depth)										
4														
5														

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329801.119**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**Project:** ESA**Northing:** 6243134.358**Client:** Boyd Cooks Cove**Elevation:** 1.54**Location:** Cooks Cove - Area A**Environmental Log:****ALG204**

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 over silty clay topsoil, dark brown, moist with roots	150508-376-KW	Push Tube							
				FILL: Sand, yellow, fine to medium grained, loose, dry, shells. Wet at 1.4m									
1													
				FILL: Sand, grey, fine to medium grained, wet and dense	150508-377-KW	Push Tube							
				FILL: Silty clay, dark grey, firm to moist and wet									
2				FILL: Sand, grey, fine to medium grained, wet and dense									
				FILL: Silty clay, dark brown, firm and wet. Slight H2S odour									
				FILL: Siltyb sand, dark brown, dense and moist									
3				FILL: Silty clay, dark brown, firm and moist									
				FILL: Silt, dark grey, trace clay, firm, moist with shells. EOH at 2.8mBGL (targeted depth)									
4													
5													

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329892.571


**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

Project: ESA

Northing: 6243104.247

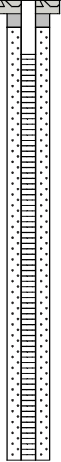
Client: Boyd Cooks Cove

Elevation: 2.49

Location: Cooks Cove - Area A

Environmental Log:

ALG205

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 on silty sand, dark brown, firm, dry to moist	150508-363-KW	Push Tube								
						FILL: Sand, yellow, fine to medium grained, loose, dry, grading to grey								
						FILL: Silty clay, lense, brown, dry with roots								
1						FILL: Sand, pale grey, fine to medium grained, moist, sandstone gravels with charcoal and ash	150508-364-KW	Push Tube						
						FILL: Silty clay, dark brown, soft and moist								
						FILL: SSand, pale brown, fine to medium grained, wet at 1.4m, shells and moderately dense								
2						FILL: Silty clay, dark brown/grey, soft and wet								
						FILL: Silt, black, fine grained, organics								
						FILL: Crushed sandstone, grey and white	150508-365-KW	Push Tube						
3						SILTY CLAY: Silty clay, shells, moist to wet with H2S odour								
					150508-366-KW	Push Tube								
4														
				EOH at 4.2mBGL (targeted depth)										
5														

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329967.076**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**Project:** ESA**Northing:** 6243101.231**Client:** Boyd Cooks Cove**Elevation:** 1.75**Location:** Cooks Cove - Area A**Environmental Log:****ALG206**

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 over silty sand topsoil, dark brown, dry with roots						
				FILL: Sand, yellow, fine grained, dense, moist, grading to pale grey with silt lenses						
1				FILL: Silty clay, dark brown, soft and moist						
				FILL: Sandy silty clay, dark brown, soft and wet at 1.4m. Becoming grey at 1.9m						
2				FILL: Silty clay, dark grey, firm and moist						
				SAND: Sand, pale grey, medium grained, dense, wet with shells						
				SILTY SAND: Silty sand with trace clay, dark brown/grey, soft and moist						
3				EOH at 2.8mBGL (targeted depth)						
4										
5										

Drill Company: Macquarie Drilling**Date Commenced:** 15/05/2008**Drill Model:** Mac200**Date Completed:** 15/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329456.755**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**Project:** ESA**Northing:** 6243292.819**Client:** Boyd Cooks Cove**Elevation:** 1.15**Location:** Cooks Cove - Area A**Environmental Log:****AMW201**

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 over silty sand topsoil, dark brown, moist with roots	120508-257-KW	Push Tube					
				FILL: Sand, pale brown, fine grained, moderately dense, moist with gravels							
				FILL: Silty clayey sand, brown, fine grained, moist and very dense							
				FILL: Sand, pale grey, fine to medium grained, loose and moist	120508-260-KW	Push Tube					
1				FILL: Silty sand, dark brown, fine grained, trace clay, dense and moist	120508-259-KW	Push Tube					
				SAND: Sand, pale grey, fine to medium grained, moist with silt lenses	120508-258-KW	Push Tube					
2											
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 12/05/2008**Drill Model:** Mac200**Date Completed:** 12/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329693.146



Jones Bay Wharf 19-21, Lower Level Suite 121
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PH: (02) 8569 2200 FAX: (02) 9552 4399

Project: ESA

Northing: 6243513.796

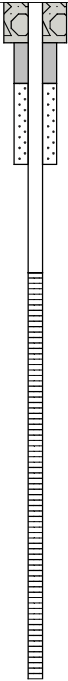
Client: Boyd Cooks Cove

Elevation: 1.37

Location: Cooks Cove - Area A

Environmental Log:

AMW202

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 over silty sand topsoil, dark brown, fine grained, loose with roots	070508-65-KW	Push Tube					
				FILL: Silty sand, pale brown, fine grained, dense, moist with sandstone gravels, tiles and no odour	070508-66-KW	Push Tube					
				FILL: Silty clayey sand, brown/orange, moist, dense with no odour							
1				SAND: Sand, dark grey grading to pale grey with depth, fine to medium grained, moist and dense with trace silt. Saturated from 1.5-1.8m. H2S odour							
2											
3				EOH at 2.8mBGL (targeted depth)							
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 07/05/2008

Drill Model: Mac200

Date Completed: 07/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329961.734



Jones Bay Wharf 19-21, Lower Level Suite 121
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Project: ESA

Northing: 6243611.832

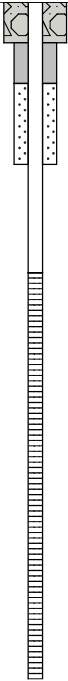
Client: Boyd Cooks Cove

Elevation: 1.97

Location: Cooks Cove - Area A

Environmental Log:

AMW203

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 over silty sand topsoil, dark brown, loose and dry with rootlets										
				FILL: Sand, dark brown, fine grained, dry with crushed sandstone fill, course grained, yellow and dry	090508-188-KW	Push Tube								
				FILL: Ash ffill, black gravels with sand, dark grey, fine grained and dry	090508-189-KW	Push Tube								
				FILL: Sand, brown, trace clay, fine to medium grained, loose and dry										
1				FILL: Ash waste, black and dry										
				FILL: Sand, pale brown/yellow, fine to medium grained, moist to wet at 1.4m. Shells and H2S odour										
2				SAND: Sand, pale grey with trace silt and clay, wet with shells and H2S odour			090508-190-KW	Push Tube						
				SILTY CLAY: Silty clay, dark grey, soft, wet with H2S odour										
				SILTY SAND: Silty clayey sand, dark brown, fine to medium grained, soft and wet with shells										
3							EOH at 2.8mBGL (targeted depth)							
4														
5														

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

Date Completed: 09/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329812.026


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Project: ESA

Northing: 6243339.925

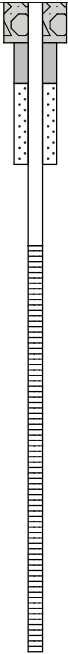
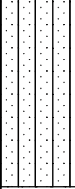
Client: Boyd Cooks Cove

Elevation: 1.21

Location: Cooks Cove - Area A

Environmental Log:

AMW204

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 over silty sand top soil, dark brown, fine grained, loose, dry to moist with roots	080508-118-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose grading to dense with depth, dry to moist with depth and shells								
1				FILL: Silty clay, brown, soft and moist	080508-119-KW	Push Tube						
				FILL: Silty sand, dark grey/black, rootlets, fine grained and moist								
				FILL: Sand, pale grey, fine to medium grained, moderately dense, moist with silt lenses								
2				SILTY SAND: Silty clayey sand, brown/grey, wet from 1.4-2.4m								
				SAND: Sand, grey, fine to medium grained, dense and wet	080508-120-KW	Push Tube						
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 09/05/2008

Drill Model: Mac200

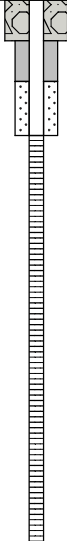
Date Completed: 09/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 329962.633**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**Project:** ESA**Northing:** 6243424.415**Client:** Boyd Cooks Cove**Elevation:** 0.78**Location:** Cooks Cove - Area A**Environmental Log:****AMW205**

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 over silty sand top soil, dark brown, firm, moist with rootlets	080508-155-KW	Push Tube					
				FILL: Sand, yellow, fine to medium grained, loose to moderate density and moist							
				FILL: Sand, pale grey, fine to medium grained, loose and moist	080508-156-KW	Push Tube					
				FILL: Silty clay, brown, firm and moist							
1				FILL: Silty sand, brown grading to grey, fine to medium grained, dense and moist							
				FILL: Silty clayey sand, saturated from 1.4 to 2.0m. Brown and stiff							
2			SAND: Sand, pale grey, fine grained, dense and wet with shells. Refusal at 2.2mBGL on sandstone	080508-157-KW	Push Tube						
			EOH at 2.2mBGL (refusal on sandstone bedrock)								
3											
4											
5											

Drill Company: Macquarie Drilling**Date Commenced:** 08/05/2008**Drill Model:** Mac200**Date Completed:** 08/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 329965.424


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 26-32 Pirrama Road Pyrmont 2009
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Project: ESA

Northing: 6243103.057

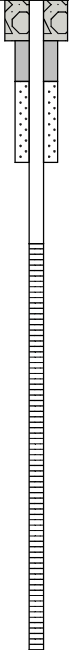
Client: Boyd Cooks Cove

Elevation: 1.80

Location: Cooks Cove - Area A

Environmental Log:

AMW206

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 over silty sand topsoil, dark brown, dry with roots							
				FILL: Sand, yellow, fine grained, dense, moist, grading to pale grey with silt lenses	150508-361-KW	Push Tube					
					FILL: Sand, yellow, fine grained, dense, moist, grading to pale grey with silt lenses	150508-360-KW	Push Tube				
1				FILL: Silty clay, dark brown, soft and moist							
				FILL: Sandy silty clay, dark brown, soft and wet at 1.4m. Becoming grey at 1.9m							
2					FILL: Silty clay, dark grey, firm and moist						
				SAND: Sand, pale grey, medium grained, dense, wet with shells							
		SILTY SAND: Silty sand with trace clay, dark brown/grey, soft and moist									
3			EOH at 2.8mBGL (targeted depth)								
4											
5											

Drill Company: Macquarie Drilling

Date Commenced: 15/05/2008

Drill Model: Mac200

Date Completed: 15/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 330009.173


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Project: ESA

Northing: 6243281.985

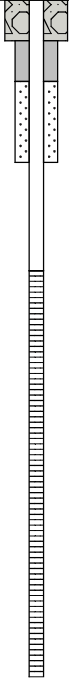
Client: Boyd Cooks Cove

Elevation: 1.71

Location: Cooks Cove - Area A

Environmental Log:

AMW207

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 top soil, brown, dry, loose with rootlets. Ash at 0.2m	120508-218-KW	Push Tube						
				FILL: Sand fill, fine to medium grained, alternating sand layers. Dark brown/grey/pale brown/grey. Slightly moist with minor ash throughout fill. Metal shavings at 0.6m	120508-219-KW	Push Tube						
1					FILL: Sandy clay to clayey sand, pale brown/orange to dark brown, moist and dense with ash gravels at 1.4-1.5m	120508-220-KW	Push Tube					
					FILL: Clayey sand, grey/brown, wet, fine to medium grained							
2					FILL: Silty clay, dark brown and wet, soft with H2S odour	120508-221-KW	Push Tube					
					FILL: Clayey sand, brown, wet, fine to medium grained, silt layers with H2S odour							
				FILL: Silty clay, dark grey, soft and wet with shells	120508-222-KW	Push Tube						
3				EOH at 2.8mBGL (targeted depth)								
4												
5												

Drill Company: Macquarie Drilling

Date Commenced: 12/05/2008

Drill Model: Mac200

Date Completed: 12/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243578.389



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

Project: Cooks Cove

Northing: 329982.604

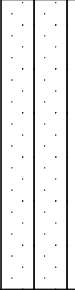
Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH401

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			ASPHALT: Bitumen surface							
				FILL: Sand, medium grained, white/brown, dry and odourless	280408-01-KW	Push Tube					
				FILL: Crushed red brick, hard, dry							
				FILL: Sand, white/pale brown, loose, possible thin peat with shells grading to dark brown/grey. Moist at 1.2m	280408-02-KW	Push Tube					
1						280408-03-KW	Push Tube				
					SANDY SILT: Sandy clay silt, dark grey, organics, some shells, dense and wet						
						280408-04-KW	Push Tube				
2					SAND: Sand, white/light grey, shell content, some dark grey silt lenses (potentially peat), wet and dense						

Drill Company: Macquarie Drilling

Date Commenced: 28/04/2008

Drill Model:

Date Completed: 28/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243477.126



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

Project: Cooks Cove

Northing: 330007.791

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH402

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 over sandy clay topsoil, brown, roots, dry and loose	280408-05-KW	Push Tube							
				FILL: Clayey sand, orange/brown, ash, sandstone fragments (pink/white)									
				FILL: Gravelly sand fill, brown, loose, dry to moist, ash (black) with sandstone fragments	280408-06-KW	Push Tube							
				FILL: Sand, light to dark brown, moderately dense, fine to medium grained, coal/ash (small air bubbles) at 0.8-0.9m. Dry to moist	280408-07-KW	Push Tube							
				FILL: White crushed sandstone									
1				FILL: Sand, dark brown, organic/shell content. Very dense, fine grained with sandstone									
				FILL: Silty sand, trace clay, black/dark brown, shells with organic odour. Very dense, fine grained and moist	280408-08-KW	Push Tube							
				FILL: Fractured sandstone, white and dry									
				FILL: Sand, brown, loose, fine to medium grained with shells									
2				FILL: Silty clay, brown, moist and plastic									
	FILL: Sandy clay, black, dense, fine grained, moist and wet at 2.5m, shells and organic odour. Refusal on sandstone fill												

Drill Company: Macquarie Drilling

Date Commenced: 28/04/2008

Drill Model:

Date Completed: 28/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243347.165


**CONSULTING
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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

Project: Cooks Cove

Northing: 330025.068

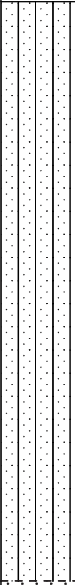
Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH403

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 over silty sand topsoil, brown with rootlets	280408-10-KW	Push Tube						
					FILL: Sand, yellow/orange, trace clay, fine grained, dry to moist gravels, dense							
					FILL: Becoming dark brown, shells at 0.7m	280408-11-KW	Push Tube					
					SAND: Sand, light grey, moist to wet, fine to medium grained, loose							
1					SAND: Becoming dark grey, silty clay lenses, organic odour	280408-14-KW	Push Tube					
					SILTY SAND: Silty clay sand, dark grey, organic odour and inclusions, wet at 2.3m	280408-13-KW	Push Tube					
						280408-12-KW	Push Tube					
2				SAND: Sand, light grey, medium grained, loose and wet								

Drill Company: Macquarie Drilling

Date Commenced: 28/04/2008

Drill Model:

Date Completed: 28/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243231.781



Jones Bay Wharf 19-21, Lower Level Suite 121
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Project: Cooks Cove

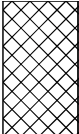
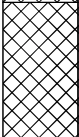
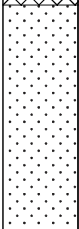
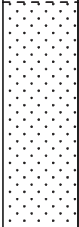
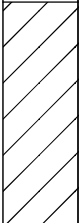
Northing: 330048.383

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH404**

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 over sand, light grey, fine to medium grained, moist with shells, rootlets and gravels	280408-15-KW	Push Tube							
					FILL: Dark brown, silty clayey sand, fine grained and moist								
					FILL: Clay, light grey with red ironstone gravels								
					FILL: Dark brown, silty sand, fine grained, gravels, organic odour, moist and dense	280408-16-KW	Push Tube						
					FILL: Sandstone, white/orange, crushed								
1					SAND: Sand, grey, fine grained, loose, dry to moist, organic black peat lense at 1.3m								
					SAND: Becoming grey/orange fine to medium grained	280408-17-KW	Push Tube						
2					CLAY: Clay, dark brown, moist to wet, plastic								
					SAND: Sand, grey, fine grained, moderately dense and moist								
					PEAT: Black peat silty lense with brown sand, medium grained, loose								
			End of borehole.										
3													

Drill Company: Macquarie Drilling

Date Commenced: 28/04/2008

Drill Model:

Date Completed: 28/04/2008

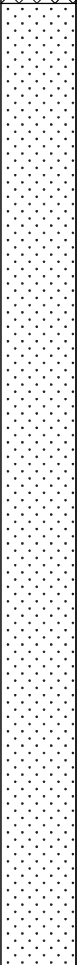
Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Sheet: 1 of 1

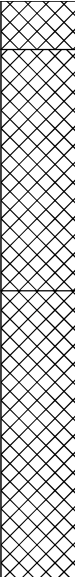
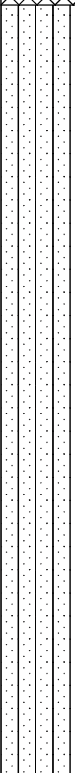
Project ID: CES050706-BCC**Easting:** 6243252.022**CONSULTING
EARTH
SCIENTISTS**Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Project:** Cooks Cove**Northing:** 329429.637**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH406**

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 over silty sand topsoil. Medium grained, light brown, moist, loose, some gravels	290408-46-KW	Push Tube					
				FILL: Sandy silt, dark brown, fine to medium grained							
				FILL: Silty sand, darker brown, moist, dense medium grained	290408-47-KW	Push Tube					
1				SAND: Sand, pale grey, medium grained, moist, moderately dense, brown peat lenses throughout, wet at 1.5m							
2											

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243213.42Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Project:** Cooks Cove**Northing:** 329440.547**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH407**

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 over silty sand top soil, fine grained, dark brown, moist with gravels	290408-43-KW	Push Tube							
						FILL: Clayey sand, fine to medium grained, light brown/orange with crushed white sandstone and ironstone gravels, moist and dense	290408-44-KW	Push Tube					
						FILL: Silty clayey sand, dark brown, fine to medium grained, very dense, minor gravels, bone, moist with organic odour							
1							SILTY SAND: Silty sand, dark grey, fine grained, very dense, moist to wet. Wet at 1.6m.	290408-45-KW	Push Tube				
2													

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243233.644**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**Project:** Cooks Cove**Northing:** 329503.188**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH408**

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 over silty sand top soil, grey/brown, roots, moist, medium grained and loose	290408-50-KW	Push Tube											
					FILL: Silty sand, dark grey/brown, dense, moist, fine grained with gravels												
					FILL: Sandy silt, dark brown, moderately dense and moist												
					SAND: Sand, grey, medium grained, moderately dense, moist, wet at 1.4m. Organic odour												
1						290408-52-KW						Push Tube					
					SAND: Becoming dark brown	290408-51-KW						Push Tube					
2																	
					SAND: Becoming light grey												

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243181.502**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**Project:** Cooks Cove**Northing:** 329480.958**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH409**

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 over silty sand topsoil, dark brown, rootlets						
				FILL: Sand, grey to brown, fine to medium grained, loose to moderately dense, moist, minor/trace gravels	290408-41-KW	Push Tube				
				CLAYEY SAND: Dark brown, fine to medium grained, dense, moist	290408-40-KW	Push Tube				
					290408-39-KW	Push Tube				
				SAND: Pale grey, medium grained, wet at 0.8m, moderately dense						
1										
				</						

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243199.687


**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

Project: Cooks Cove

Northing: 329560.807

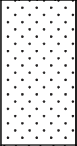
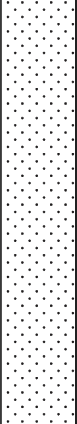
Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH410

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 over sandy topsoil, brown/orange/yellow, fine grained with minor clay. Ash at 0.1m. Red ironstone gravels at 0.5m, black charcoal fragments throughout	280408-25-KW	Push Tube							
					FILL: Sand, dark brown, fine grained with glass, bone, moist and loose	280408-26-KW	Push Tube						
1					SAND: Grey, fine grained, moderately dense, moist, shells throughout								
					PEAT: Black decaying organic fibres								
					CLAY: Clay, black, wet at 1.6m, plastic, organic odour, roots, shells with bacterial sheen	280408-27-KW	Push Tube						
					SAND: Sand, fine to medium grained, grey with shells throughout , wet								
2													
							280408-28-KW	Push Tube					

Drill Company: Macquarie Drilling

Date Commenced: 29/04/2008

Drill Model:

Date Completed: 29/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243134.049**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**Project:** Cooks Cove**Northing:** 329478.399**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH411**

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 over silty sand topsoil, fine to medium grained, grey/brown, moist with rootlets						
				FILL: Clay, grey/red/orange, stiff and dry with trace sand, gravels, ironstone gravels, sandstone and shale fragments with ash at 0.8-0.9m	290408-36-KW	Push Tube				
						290408-37-KW	Push Tube			
1										
				SAND: Silty sand, dark brown/grey with sandstone gravels, loose and dry						
2				SILT: Silt, black to dark brown, loose, organic odour, moist						
				SILT: Sand, medium grained, grey, moist and dense	290408-38-KW	Push Tube				

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243161.139


**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

Project: Cooks Cove

Northing: 329551.915

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH412

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 overlying sandy clay topsoil, brown, rootlets, moist with charcoal pieces	280408-21-KW	Push Tube						
					FILL: Sand, dark brown/grey, fine grained, loose, trace clay, moist							
							280408-22-KW	Push Tube				
						FILL: Light grey/brown sand						
						FILL: Silty sandy clay, black with glass and ash inclusions, ash odour						
1							280408-23-KW	Push Tube				
						SAND: Sand, grey, with trace silt and clay, moderately dense, moist and fine grained						
							280408-24-KW	Push Tube				
2												

Drill Company: Macquarie Drilling

Date Commenced: 29/04/2008

Drill Model:

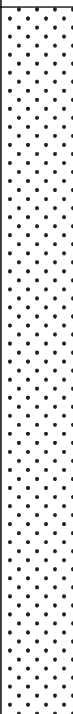
Date Completed: 29/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243127.577**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**Project:** Cooks Cove**Northing:** 329632.103**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH413**

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 over sandy topsoil, brown, rootlets, dry and shells	280408-18-KW	Push Tube					
				FILL: Sand, yellow, medium grained, loose, dry to moist, some shells, silty peat lense at 0.7m							
					SAND: Sand, grey with dark brown lenses, shells, organics, moist to wet	280408-20-KW	Push Tube				
1					CLAYEY SILT: Clayey silt, dark brown, moist, plastic with organic odour						
				SANDSTONE: White, hard sandstone bedrock. Refusal at 1.6m	280408-19-KW	Push Tube					
2											

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243132.138



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

Project: Cooks Cove

Northing: 329689.226

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH414**

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 over silty sand topsoil, roots and moist	020508-169-KW	Push Tube												
				FILL: Sand, brown, trace clay, fine grained, moist with some gravels	020508-168-KW	Push Tube												
					020508-170-KW	Push Tube												
					FILL: Sand, yellow, fine to medium grained, loose, shells, moist, silt lenses, wet at 1.5m													
1					020508-171-KW	Push Tube												
2						SAND: Sand, grey, fine to medium grained, moderately dense, shells and moist												
						SILTY SAND: Silty sand, dark grey, fine grained, dense and moist												
						SILTY CLAY: Silty clay, dark grey soft and moist												
				SILT: Black silt, organic odour, fine grained moist														
				End of borehole.														
3																		

Drill Company: Macquarie Drilling

Date Commenced: 02/05/2008

Drill Model:

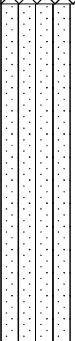
Date Completed: 02/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243127.487**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**Project:** Cooks Cove**Northing:** 330037.091**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH415**

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 over silty sand topsoil with trace clay and gravels, fine grained and moist	300408-78-KW	Push Tube						
					FILL: Clayey sand, orange/brown/grey, moist, medium grained, moderately dense with crushed sandstone							
1				SILTY SAND: Silty sand, dark grey, medium grained, moderately dense, moist with organic odour	300408-79-KW	Push Tube						
					SILTY SAND: Silty sand, dark grey, medium grained, moderately dense, wet with H2S odour at 2.6m							
2					300408-80-KW	Push Tube						

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243103.394



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

Project: Cooks Cove

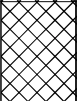
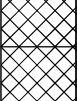
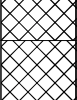
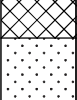
Northing: 329558.472

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH417**

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 over silty clay topsoil, fine grained and odourless									
				FILL: Clayey silty sand, grey/brown with ash and glass fragments, moist and dense	290408-29-KW	Push Tube							
				FILL: Clayey sand, grey/orange, moist and dense									
				FILL: Becoming dark grey									
1				FILL: Black silt, fibrous root mass, organic odour, gravels (possible ash), moist to wet	290408-30-KW	Push Tube							
				SAND: Sand, grey, fine to medium grained, moist to wet									
				SILTY SAND: Silty sand, dark grey, moist to wet, moderately dense, organic odour. Shells and rootlets from 2.3m									
2					290408-31-KW	Push Tube							

Drill Company: Macquarie Drilling

Date Commenced: 29/04/2008

Drill Model:

Date Completed: 29/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243065.891**Project:** Cooks Cove**Northing:** 329619.808**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH418**

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 over silty sand topsoil, fine grained, moist, roots and loose	290408-66KW	Push Tube					
					FILL: Sand, pale grey, fine grained, moderately dense, moist with shells						
					FILL: Clayey silt, dark brown, soft, dense. Layered grey/orange silt from 0.8 to 0.9m	290408-67-KW	Push Tube				
1											
					FILL: Silty sand, dark brown, fine grained, dense and moist						
					SAND: Sand, pale grey, wet, medium grained and dense	290408-68-KW	Push Tube				
					SILTY SAND: Silty sand, dark brown, fine grained, dense with trace clay						
2			SILTY SAND: Silty sand, grey, fine grained, dense, wet with shells								

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243081.721



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

Project: Cooks Cove

Northing: 329679.285

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH419**

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 oversilty sand topsoil, brown, loose, fine grained, rootlets and moist									
				FILL: Sand, brown/grey, fine to medium grained, loose, moist with gravels coal and sandstone	290408-62-KW	Push Tube							
				FILL: Silt, dark brown, moist with gravels									
				FILL: Clay, grey/orange, moist, stiff with gravels	290408-63-KW	Push Tube							
				FILL: Silty sand, black, fine grained, moderately dense, moist with gravels									
				FILL: Sand, pale grey, fine grained with trace clay, moist to wet with shells at 1.5m									
1					FILL: Sandy silt, brown/grey and wet								
					FILL: Silty clay, dark brown, soft, wet and dense								
					FILL: Fibrous black mass, silt, ash, rock, glass and wet	290408-64-KW	Push Tube						
					FILL: Clayey silt, dark brown, soft, wet and dense								
2						SAND: Sand, grey with silt, shells, moist to wet and dense	290408-65-KW	Push Tube					

Drill Company: Macquarie Drilling

Date Commenced: 29/04/2008

Drill Model:

Date Completed: 29/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

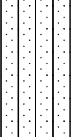
Project ID: CES050706-BCC**Easting:** 6243090.111**Project:** Cooks Cove**Northing:** 329732.258**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH420**

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 over silty sand top soil, dark brown, fine grained, loose, moist with roots	020508-165-KW	Push Tube							
				FILL: Sand, yellow, fine grained to medium grained. Moderately dense, moist with shells									
					020508-166-KW	Push Tube							
1				FILL: Silty clay, dark brown. Fine grained sand, dense, moist with organic odour									
				FILL: Sand. Pale grey, fine to medium grained, moist to wet, moderately dense with silt lenses. Wet at 1.6m									
				FILL: Silty sand, minor clay, dark grey, fine grained, moist to wet									
				FILL: Silty clay. Dark brown, fine grained, soft, moist to wet									
2				FILL: Silt. Black, sandy and moist									
				FILL: Crushed sandstone, orange/white, clay content, moist (wet at 2.4m) and odourless									
					020508-167-KW	Push Tube							
				SILTY SAND: NOTE: End depth was null so start depth was used instead. Dark brown, clay content with organic odour.									

Drill Company: Macquarie Drilling**Date Commenced:** 02/05/2008**Drill Model:****Date Completed:** 02/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

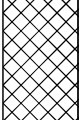
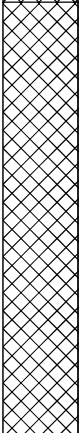
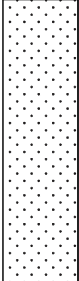
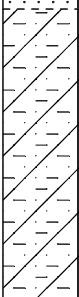
Project ID: CES050706-BCC**Easting:** 6243083.702**CONSULTING
EARTH
SCIENTISTS**Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Project:** Cooks Cove**Northing:** 329934.986**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH421**

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 over sandy topsoil, brown, fine grained, loose, dry with rootlets	300408-105-KW	Push Tube					
				FILL: Sand, pale grey, fine to medium grained, loose, dry with rootlets. Silty clay lenses at 0.3m, shells, moist and dense at 0.6m							
						300408-104-KW	Push Tube				
1					FILL: Silty clay, dark brown, fine grained and dense						
					FILL: Sand, pale grey, medium grained, moderately dense, shells and wet at 1.4m						
					SILTY CLAY: Silty clay, dark brown/grey, fine grained, soft, wet with H2S odour						
2											
					SILTY SAND: Silty sand, trace clay, dark grey, fine grained, moist with H2S odour						
					SILTY CLAY: Silty clay, dark grey, soft, moist to wet						
					SAND: Sand, pale grey, medium grained, dense, wet with shells						
					SILTY CLAY: Silty clay, dark grey, soft, moist to wet with trace sand						

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

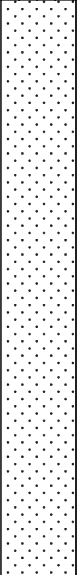
Project ID: CES050706-BCC**Easting:** 6243065.802**Project:** Cooks Cove**Northing:** 329981.096**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH422**

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 over silty sand topsoil, brown, moist with rootlets							
				FILL: Sand, yellow, fine to medium grained, moderately dense with gravels from 0.2-0.4m	300408-112-KW	Push Tube					
				FILL: Sand, pale grey, fine to medium grained, moderately dense, moist and shells							
1				FILL: Silty clay, dark grey, soft and moist to wet							
				SAND: Sand, pale grey, fine to medium grained, moderately dense and moist							
2				SILTY CLAY: Silty clay, dark brown, soft and wet (saturated at 2.0-2.2m) and organic odour	300408-113-KW	Push Tube					
				SILTY SAND: Silty sand, fine to medium grained, brown with organic odour							

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243077.14**Project:** Cooks Cove**Northing:** 330027.905**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH423**

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 over silty sand topsoil, brown, fine grained, loose and moist	300408-81-KW	Push Tube						
				FILL: Weathered sandstone, orange/white, medium to coarse grained, moderately dense and moist								
				FILL: Sand, grey to dark grey, medium grained, moderately dense, moist, gravels and ash at 0.7-0.8m	300408-82-KW	Push Tube						
				FILL: Sand, pale grey, silt layers, moist to wet at 1.3m								
1				FILL: Silty sand, dark grey, fine to medium grained, dense, wet with H2S odour. Shells at 2.2m	300408-83-KW	Push Tube						
		SAND: Sand, pale grey, trace silts, medium grained, dense, moist and odourless										
2												

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243018.161**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**Project:** Cooks Cove**Northing:** 329618.635**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH425**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION					WELL DETAIL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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0	Direct Push			FILL: Grass over silty sand topsoil, dark brown, fine grained, loose and moist																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243029.629**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**Project:** Cooks Cove**Northing:** 329677.034**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH426**

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 over silty sand topsoil, brown, medium grained, loose, dry to moist	290408-69-KW	Push Tube						
					FILL: Sand, yellow grading to pale grey with depth, dense and dry to moist							
						290408-70-KW	Push Tube					
1					FILL: Clayey silt, dark brown, soft. Wet at 1.5m							
						FILL: Silt, dark brown, soft with glass, gravel and roots	290408-71-KW	Push Tube				
				FILL: Silty sand with trace clay, dark grey, wet and dense								
2												
				SAND: Sand, pale grey, medium grained, dense, wet with shells								

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243015.816**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**Project:** Cooks Cove**Northing:** 329761.281**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH427**

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 over silty sand topsoil, dark brown, fine grained, loose and moist	290408-59-KW	Push Tube							
				FILL: Clayey sand, brown/orange with concrete rubble, gravels and shells. Some stiffer brown clay									
				FILL: Sand, yellow, medium grained									
						290408-60-KW	Push Tube						
1					FILL: Orange sand lenses								
					290408-61-KW	Push Tube							
2				CLAYEY SILT: Clayey silt, dark brown, stiff dense with shells									

Drill Company: Macquarie Drilling**Date Commenced:** 29/04/2008**Drill Model:****Date Completed:** 29/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243055.224



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

Project: Cooks Cove

Northing: 329789.882

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH428**

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 over silty sand topsoil, brown, loose, dry, fine grained with roots	010508-162-KW	Push Tube							
						FILL: Silty sand, brown, fine grained moist with gravels and roots							
						FILL: Sand, yellow/pale grey with orange mottles, shells and peat sections throughout	010508-163-KW	Push Tube					
1							FILL: Silty clay, dark grey, moist and soft						
							FILL: Sand, grey, fine grained to medium grained, loose, wet with shells and peat layers						
							FILL: Silty clay, dark grey, wet with organic odour						
							FILL: Sand, silt lenses, grey/orange, moist to wet and dense						
							FILL: Silty clay, dark grey, moist and soft						
2							FILL: Silty sand, moist with gravels, glass and organic odour	010508-164-KW	Push Tube				
				FILL: Silt clay, dark brown/black, soft with organic odour									

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243040.823



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

Project: Cooks Cove

Northing: 329870.154

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH429**

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 over silty clay topsoil, dark brown, roots and gravels	010508-152-KW	Push Tube							
				FILL: Crushed sandstone (white)									
				FILL: Clayey sand, dark brown, moist, dense with gravels, silt lenses. Ash at 0.5m									
				FILL: Clay, dark grey/brown mottles, moist, stiff, roots and sand at 1.3m	010508-153-KW	Push Tube							
1													
				FILL: Sand, grey, wet, fine grained with silt lenses									
				FILL: Silty clay, dark grey, soft and wet with H2S odour									
2													
				FILL: Sandy silt, black, roots, glass, plastic, moist to wet with gravels and H2S odour	010508-155-KW	Push Tube							
				FILL: Sand with trace silts, grey, fine grained to moist, moderately dense, moist									
		FILL: Silty clay, dark brown, soft with H2S odour											
				End of borehole.									
3													

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243044.653



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

Project: Cooks Cove

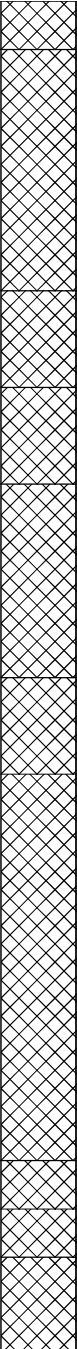
Northing: 329936.013

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH430**

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 over silty clay topsoil, dark brown, moist, rootlets and minor sand	300408-106-KW	Push Tube											
				FILL: Sand, pale grey, fine to medium grained, moderately dense, moist with shells throughout													
				FILL: Silty peat layer at 0.6m (dark brown)													
				FILL: Orange/brown/grey mottles													
1				FILL: Silty clay, dark brown, soft and moist													
				FILL: Sand, pale grey, fine to medium grained, wet with shells. Grading to silty clay at 1.6m													
				FILL: Silty clay, dark brown, stiff however soft due to moisture and organics													
2																	
				FILL: Silt, black with gravels and organic odour	300408-107-KW	Push Tube											
				FILL: Silty clay, dark brown, soft and moist													
	FILL: Sand, grey, fine to medium grained, moist and dense																

Drill Company: Macquarie Drilling

Date Commenced: 30/04/2008

Drill Model:

Date Completed: 30/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243011.033



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

Project: Cooks Cove

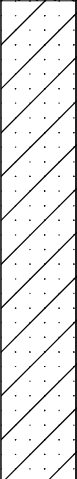
Northing: 329810.103

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH431**

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 over silty sand topsoil, brown, rootlets, fine grained, loose and moist	300408-84-KW	Push Tube								
				FILL: Sand, medium grained, loose, dark grey grading to pale grey										
				FILL: Silty sand, dark grey, fine to medium grained, moist, loose with ash and gravels	300408-85-KW	Push Tube								
				FILL: Crushed sandstone, orange/white, course grained, moderately dense and moist										
				FILL: Silty sand, pale to dark grey (lenses), moist, soft, organic odour and wet at 1.5m										
1														
						CLAYEY SAND: Clayey silty sand, grey, medium grained, dense, soft with organic odour. Shells at 2.1-2.2m. Grading to silty clay with trace sands at 2.5m	300408-86-KW	Push Tube						
2														

Drill Company: Macquarie Drilling

Date Commenced: 30/04/2008

Drill Model:

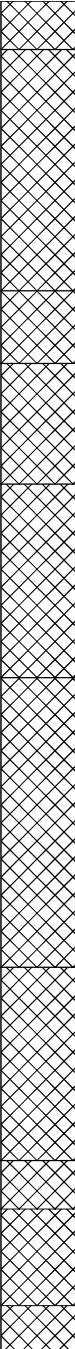
Date Completed: 30/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243019.116**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**Project:** Cooks Cove**Northing:** 329848.468**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH433**

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 over silty clay topsoil, dark brown, fine grained, moist with roots	010508-157-KW	Push Tube						
				FILL: Sandy silt clay, brown with gravels, ceramic pieces, charcoal, moist and dense	010508-156-KW	Push Tube						
				FILL: Silty clay, brown, moist and hard								
				FILL: Sand (grey) lense at 0.75m								
1				FILL: Silty clay becoming soft and moist								
				FILL: Silty sand, grey, fine grained and wet								
				FILL: Silty clay, dark grey, soft, moist to wet with organic odour								
2				FILL: Silt, black, moist with glass, gravels and sand	010508-159-KW	Push Tube						
				FILL: Silty sand, grey, fine to medium grained, moderately dense and moist								
				FILL: Silty clay, dark brown, moist with H2S odour								

Drill Company: Macquarie Drilling**Date Commenced:** 01/05/2008**Drill Model:****Date Completed:** 01/05/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243005.174



Project: Cooks Cove

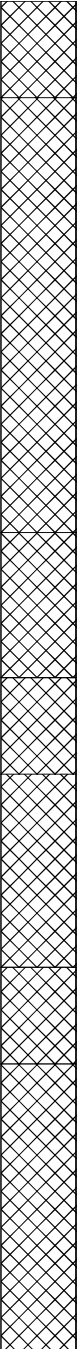
Northing: 329919.656

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH434**

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 over sandy topsoil, dark brown, loose, dry to moist, rootlets with trace clays	300408-108-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, concrete rubble and gravels at 0.4m. Ironstone gravels at 0.8m								
					300408-109-KW	Push Tube						
1					FILL: Sand, grey, fine to medium grained, moderately dense, moist with shells							
					FILL: Sand yellow, fine to medium grained, dense, wet with shells throughout							
					FILL: Sand, grey, fine to medium grained, dense, wet grading to moist at 1.9m. Increasing clay content with depth							
2				FILL: Clayey sand, grey, fine to medium grained and moist								
				FILL: Silty clay, dark brown/grey, moist, soft grading to stiff with depth								

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243031.649**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**Project:** Cooks Cove**Northing:** 329978.796**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH435**

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 over silty sand topsoil with trace clay, brown, moderately dense, dry to moist with rootlets	300408-110-KW	Push Tube						
				FILL: Clayey silt sand, grey/brown, fine grained, dense, dry to moist								
				FILL: Sand, yellow grading to grey at 1.0m, fine to medium grained, moderately dense, moist to wet at 1.4m								
1					300408-111-KW	Push Tube						
2				FILL: Silty clay, dark brown/grey, stiff grading to soft with depth, moist to wet								
				FILL: Silty sand, dark brown/grey, fine grained, moist to wet								

Drill Company: Macquarie Drilling**Date Commenced:** 01/05/2008**Drill Model:****Date Completed:** 01/05/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

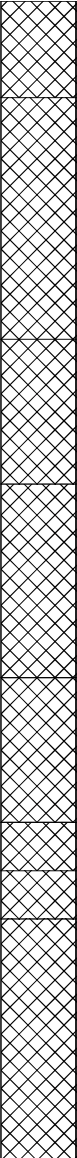
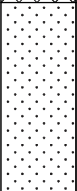
Project ID: CES050706-BCC**Easting:** 6242995.182**CONSULTING
EARTH
SCIENTISTS**Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Project:** Cooks Cove**Northing:** 330012.116**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH436**

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 over silty sand topsoil, fine grained, loose, moist with rootlets	300408-87-KW	Push Tube					
				FILL: Sand, pale grey, fine to medium grained, loose, moist with black gravels							
				FILL: Crushed sandstone fill, white, coarse grained and slightly dense							
				FILL: Sand with trace silt and clay at 1.1m, brown/grey/orange, medium grained, dense, moist	300408-88-KW	Push Tube					
1				SAND: Sand, pale grey, medium grained, dense, wet at 1.6m							
2				SANDY CLAY: Sandy silty clay, dark grey, fine grained, moist with organic odour							

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6242976.331**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**Project:** Cooks Cove**Northing:** 329674.761**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH438**

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 over silty sand topsoil, brown, dry loose with rootlets								
				FILL: Silty sand with trace clay, brown, dry to moist, dense with rootlets	290408-72-KW	Push Tube						
				FILL: Sand, yellow, fine grained, dense, moist with shells								
				FILL: Clayey silt, dark brown with brown clay lenses, shells, organics and moist								
1				FILL: Sand, yellow/pale grey, medium grained, dense, wet with shells								
				FILL: Clayey silt, dark brown, soft and wet								
				FILL: Silty clay, wet with ash and glass								
				FILL: Clayey silt, dark brown, soft, dense and wet	290408-73-KW	Push Tube						
2												
						SAND: Sand, grey, moist to wet, dense with shells						

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6242962.433



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

Project: Cooks Cove

Northing: 329755.357

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH439

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 over silty sand topsoil with trace clay, brown, fine grained, dry with roots	010508-133-KW	Push Tube								
						FILL: Sandy clay, brown sand with orange clay, black gravels, glass, dry and odourless	010508-134-KW	Push Tube						
						FILL: Silty sand, dark brown/orange with black gravels								
						FILL: Sand, yellow, fine to medium grained, loose, dry to moist. Shells at 1.0m with orange sand								
1														
2														

Drill Company: Macquarie Drilling

Date Commenced: 30/04/2008

Drill Model:

Date Completed: 30/04/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Sheet: 1 of 1

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243065.802**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**Project:** Cooks Cove**Northing:** 329981.096**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH442**

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 over silty clay topsoil with trace sand, dark brown, fine grained, moist with rootlets	300408-102-KW	Push Tube							
						FILL: Sand, brown/grey, fine to medium grained, loose, moist with shells	300408-101-KW	Push Tube					
1				FILL: Sand, pale grey, medium grained, moist, broken shells. Rock/gravels at 1.3m	300408-103-KW	Push Tube							
2				SILTY CLAY: Silty clay, dark brown, organic odour, moist and soft									

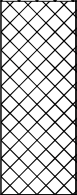
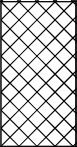
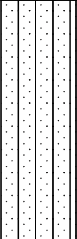
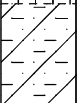
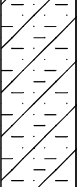
Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6242955.64

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

Project: Cooks Cove**Northing:** 330006.678**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH443**

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 over silty clay topsoil, dark brown, fine grained, loose to firm, dry to moist with rootlets							
				FILL: Sand, trace clay, grey, fine grained, dense, moist to dry, gravels							
				FILL: Crushed sandstone, orange/white, coarse grained, dense, moist to dry with rock/gravels	300408-90-KW	Push Tube					
				FILL: Sand, dark grey, fine to medium grained, dense, trace clay, moist, grading to light grey with orange sand at 1.1m	300408-89-KW	Push Tube					
1				FILL: Silty clay, dark grey, minor medium grained sand, very dense with no odour							
				FILL: Sand, grey/orange, medium grained, moderately dense, wet at 1.5m							
				SILTY SAND: Silty sand, dark grey, fine grained, dense and moist to wet							
2				SILTY CLAY: Silty clay, dark grey, fine grained, dense and moist	300408-91-KW	Push Tube					
											

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting:



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

Project: Cooks Cove

Northing:

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH445**

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 over silty sand topsoil, dark brown, loose, dry with roots	010508-138-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained, loose, dry. Brown silty lense at 1.2m	010508-137-KW	Push Tube						
						010508-136-KW	Push Tube					
1					FILL: Silty sand, grey, fine to medium grained, moist and dense							
					FILL: Silty clay, dark brown, soft and wet	010508-139-KW	Push Tube					
2					SAND: Sand with trace silt, grey, fine to medium grained, moderately dense, shells throughout							
					SILTY CLAY: Silty clay, dark grey, wet and soft with H2S odour							
					SILTY SAND: Silty sand, fine to medium grained, wet with shells and dense							
					SILTY CLAY: Silty clay, dark grey, moist and soft							
3					SILTY SAND: Silty sand, grey, fine to medium grained, moist with H2S odour							
				SILTY CLAY: Silty clay, dark grey, soft wet with H2S odour								
				SILT: Silt, black, moist to dry, fine grained with H2S odour								
4												

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6242919.264



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

Project: Cooks Cove

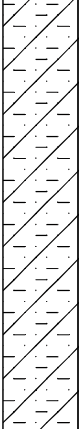
Northing: 329830.177

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH446**

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 over silty clay topsoil, dark brown, moist with roots and gravels	010508-146-KW	Push Tube						
				FILL: Sand, yellow, fine to medium grained layers, moist and loose								
				FILL: Silty clay, dark grey/brown mottles, moist and rootlets	010508-147-KW	Push Tube						
					FILL: Sand, yellow, fine grained, loose and moist							
1					FILL: Silty clay, dark grey, moist and soft							
					FILL: Sand, white/pale grey, fine to medium grained, loose, moist to dry							
					FILL: Silty clay, dark grey, wet, soft with organic odour							
					SILTY SAND: Silty sand, grey, moist and dense							
					SILTY SAND: Silty sand, grey, moist to wet at 1.4m, dense with shells throughout							
2				SILTY CLAY: Silty clay, dark grey, wet, soft, H2S odour and shells at 2.7m								

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

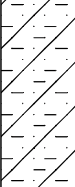
Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6242925.015**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**Project:** Cooks Cove**Northing:** 329881.732**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH447**

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 over silty sand topsoil, brown, fine grained, loose, dry and roots	010508-144-KW	Push Tube							
						FILL: Sand, yellow, fine to medium grained, loose, dry, becoming moist at 0.5m							
						FILL: Silty sand, dark brown, fine grained, rootlets, moderately dense and moist	010508-145-KW	Push Tube					
						FILL: Sand, pale grey, medium grained, moist, moderately dense, shells and gravels, brown silty clay lenses at 1.4m, moist to wet from 1.4m							
1													
							FILL: Silty clay, dark grey, minor sand, wet, soft with organic odour						
							FILL: Sand, pale grey, fine to medium grained, wet and moderately dense						
							FILL: Soft clay, dark grey, wet, soft with organic odour						
							SAND: Sand, pale grey, dark grey, moderately dense, fine to medium grained, moist to wet with H2S odour						
							SILTY CLAY: Silty clay, dark grey, moist, soft with H2S odour						

Drill Company: Macquarie Drilling**Date Commenced:** 01/05/2008**Drill Model:****Date Completed:** 01/05/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6242916.076



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

Project: Cooks Cove

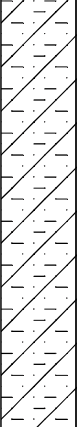
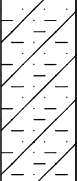
Northing: 329928.224

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH448**

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 over silty clay topsoil, brown, stiff, moist with rootlets	300408-98-KW	Push Tube								
				FILL: Sand, pale grey, fine to medium grained, loose to dense, moist. Shells at 0.3m										
				FILL: Silty clay, dark brown, shells, soft with organic odour	300408-99-KW	Push Tube								
				FILL: Sand, fine to medium grained, pale grey, and wet										
1							300408-100-KW	Push Tube						
					SILTY CLAY: Silty clay, soft, wet, brown with organic odour. Stiffer from 2.0m									
2														
					SILTY SAND: Silty sand, grey, fine grained, dense, moist with organic odour									
					SILTY CLAY: Silty clay, brown, stiff, moist with organic odour. Becoming stiffer with depth									

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6242777.469



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

Project: Cooks Cove

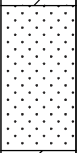
Northing: 329955.331

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH450**

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 over silty sand topsoil, brown, dry, loose with roots									
				FILL: Sand, yellow, fine to medium grained, loose, dry to moist (increasing with depth), minor charcoal/coal fragments, from 0.1-0.8m. Crushed white sandstone at 0.8m								010508-140-KW	Push Tube
						010508-141-KW	Push Tube						
1				FILL: Sand, yellow/pale grey, loose, moist to wet and shells throughout									
2				SILTY CLAY: Silty clay, dark grey, soft and wet									
				SAND: Sand, dark grey, fine to medium grained, wet and dense with shells at silt lenses									
				SILTY CLAY: Silty clay, dark grey, moist and soft									
				SILTY CLAY: Sand with silt lenses, dark grey, fine to medium grained and moist									

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6242875.203



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

Project: Cooks Cove

Northing: 329862.954

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH451**

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: Sand, yellow, fine to medium grained, moist and loose	010508-A1-KW	Grab						
				FILL: Silty clay, brown, moist and soft with roots	010508-142-KW	Push Tube						
							010508-143-KW	Push Tube				
						FILL: Sand, pale grey with orange lenses						
						FILL: Silty clay, dark brown, soft and wet						
1						SAND: Sand, grey fine to medium grained, dense with shells, silt lenses and H2S odour						
						SILTY CLAY: Silty clay, dark grey, wet, soft with H2S odour						
				SILTY SAND: Silty sand, grey, fine to medium grained, wet and dense with H2S odour								
				CLAYEY SAND: Clayey silty sand, grey, soft and wet with H2S odour								
2				SILTY SAND: Silty sand, grey, wet and dense with shells								
				SILTY CLAY: Silty clay with trace sand, wet with shells and H2S odour								

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6242877.696**Project:** Cooks Cove**Northing:** 329916.604**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log: BBH452**

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 over silty sand topsoil, dark brown, fine grained, loose, moist with rootlets and trace clays	300408-96-KW	Push Tube							
					FILL: Sandy clay, dark brown, fine grained, dense/stiff and moist								
					FILL: Sand, pale grey, fine to medium grained, loose and dense, moist with shells at 0.7-0.8m	300408-97-KW	Push Tube						
					FILL: Silty clay, brown/dark grey mottles, stiff and moist								
1					FILL: Silty clay, dark brown, stiff, moist with organic odour. Soft layer at 1.4m								
					FILL: Sand, aple grey, wet, fine to medium grained, loose with shells								
					SILTY CLAY: Silty clay, dark brown, soft and wet								
2					SILTY SAND: Silty sand with trace clay, dark grey, wet and soft with shells. Increasing clay content from 2.4m								

Drill Company: Macquarie Drilling**Date Commenced:** 01/05/2008**Drill Model:****Date Completed:** 01/05/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6242882.563



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

Project: Cooks Cove

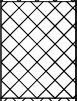
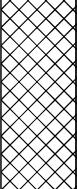
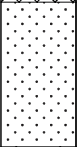
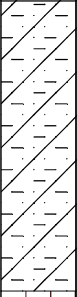
Northing: 329994.194

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BBH453**

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 over silty sand topsoil with trace clay, brown, dense, fine grained and moist with rootlets								
				FILL: Crushed sandstone, orange/white, coarse grained and dry	300408-92-KW	Push Tube						
				FILL: Sand, brown, fine to medium grained, loose and dry								
				FILL: Clayey sand, brown, fine grained, dense and moist	300408-93-KW	Push Tube						
1				FILL: Silty clay with trace sand, dark brown, fine grained, soft and dense, moist with slight organic odour								
				SAND: Sand, grey, medium grained, dense and wet								
2				SILTY CLAY: Silty sandy clay, dark grey, fine grained, moist, soft and dense								
				SILT: Silt, black, moist with H2S odour								
				SAND: Sand with trace silt and clay, pale grey, medium grained, dense and moist								

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting:

Project: Cooks Cove

Northing:

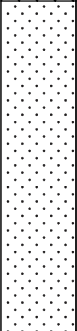
Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH456

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 over silty sand topsoil, dark brown, fine grain, dense, moist with rootlets	010508-118-KW	Push Tube							
				FILL: Sandy silt, brown, moist and dense									
				FILL: Sandy clay, brown with weathered/crushed sandstone (white/yellow)									
				FILL: Silty clay, brown/grey, moderately stiff									
				FILL: Sand, yellow, fine to medium grained, slightly dense, moist with shells									
1							010508-119-KW	Push Tube					
						SAND: Sand, pale grey, fine to medium grained, moderately dense, moist to wet at 1.4m							
2						SILTY SAND: Silty sand, grading to silty clay, wet from 1.9-2.2m							
						SILTY SAND: Silty sand, grey, fine grained, moist and dense							
						SILTY CLAY: Silty clay, dark grey, fine grained, soft, moist to wet							
				SILTY SAND: Silty sand, grey, fine grained, moist and dense									
				SILTY CLAY: Silty clay, grey, minor sand and moist to wet									

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

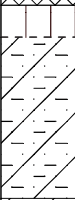
Project ID: CES050706-BCC**Easting:** 6242838.899**CONSULTING
EARTH
SCIENTISTS**Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Project:** Cooks Cove**Northing:** 329986.908**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH457**

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 over silty sand topsoil, dark brown, fine grained, loose, moist with rootlets							
				FILL: Sandy clay, brown, fine grained, soft, moist with rootlets							
				FILL: Sand, dry to moist, black with ash(black and white), crunchy and sharp	300408-94-KW	Push Tube					
				FILL: Crushed weathered sandstone with trace clay, white/orange, dense and dry to moist							
				SILTY CLAY: Silty clay, dark brown, fine grained, stiff, soft from 1.1m, shells at 1.3m and organic odour							
1					300408-95-KW	Push Tube					
2											

Drill Company: Macquarie Drilling**Date Commenced:** 30/04/2008**Drill Model:****Date Completed:** 30/04/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6242800.902**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**Project:** Cooks Cove**Northing:** 329820.421**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BBH458**

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 over silty sand topsoil, dark brown, loose, dry with rootlets	010508-124-KW	Push Tube							
				FILL: Sand pale grey, fine to medium grained, loose and dry. Interspersed silt layers. H2S odour at 2.6m. Moist to wet at 2.8m	010508-123-KW	Push Tube							
					010508-122-KW	Push Tube							
1					010508-125-KW	Push Tube							
2													
3													
4													
				SILT: Silt with trace clay, black, moist with strong H2S odour									
				SILTY CLAY: Silty clay, dark grey, soft with strong H2S odour									
				SILTY CLAY: Silty sandy clay, dark grey, dense with strong H2S odour									

Drill Company: Macquarie Drilling**Date Commenced:** 01/05/2008**Drill Model:****Date Completed:** 01/05/2008**Hole Diameter (mm):****Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting:


**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

Project: Cooks Cove

Northing:

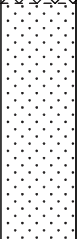
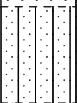
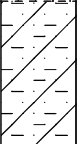
Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log:

BBH460

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 over silty sand topsoil, dark brown, fine grained, moist with rootlets	010508-114-KW	Push Tube						
					FILL: Sand, yellow, fine to medium grained, moderately dense, moist shells, silty clay, lenses at 0.8m							
						010508-115-KW	Push Tube					
					FILL: Sand, pale grey, fine to medium grained, moderately dense and moist							
1					FILL: Silty clay, dark grey, soft, fine grained, moist to wet							
					SAND: Sand, pale grey, fine to medium grained, wet at 1.5m and shells							
					SILTY SAND: Silty sand, dark grey, fine to medium grained, wet with shells							
2					SILTY CLAY: Silty clay, dark grey, fine grained, soft to dense and wet							
					SILTY SAND: Silty sand, grey, medium grained, moist with shells							
					SANDY SILT: Sandy silt, black/dark grey, organic and H2S odour							

Drill Company: Macquarie Drilling

Date Commenced: 01/05/2008

Drill Model:

Date Completed: 01/05/2008

Hole Diameter (mm):

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6243088.007



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

Project: Cooks Cove

Northing: 329478.534

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: **BLG401**

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: Sandy clay, brown with concrete rubble and gravel, crushed sandstone and ironstone gravels	020508-185-KW	Push Tube						
				FILL: Clay, orange/grey/red mottled, gravels, shell, dry								
				FILL: Sand, yellow, fine grained, dry to moist, gravels and clear plastic sheeting								
1				FILL: Black gravels, sand and dry	020508-186-KW	Push Tube						
				FILL: Clay. Grey/orange/red, gravels, stiff and dry								
				FILL: Clayey sand, brown/grey/red, with brown gravels, glass at 1.9m, crushed brick/sandstone								
2				SAND: Grey, fine grained, dense, dry to moist with silt lenses								
				SAND: Pale grey, fine to medium grained, minor silt throughout, moist and dense. Becoming wet at 3.4m								
3												

Drill Company: Macquarie Drilling

Date Commenced: 02/05/2008

Drill Model:

Date Completed: 02/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243088.007**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**Project:** Cooks Cove**Northing:** 329478.534**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BLG402**

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 over silty clay top soil, brown, fine grained, moist, loose with rootlets	020508-172-KW	Push Tube					
				FILL: Silty sand clay, brown, dense, slightly moist, rootlets							
				FILL: Silty sand, light brown, fine grained, dense, moist and shells							
				FILL: Sand, pale grey, medium grained, dense, moist, orange sand mottles	020508-173-KW	Push Tube					
				FILL: Silty clay, brown/orange/grey mottles, moist and stiff							
1				FILL: Silty sand, dark grey, fine grained, gravels, moist, wet at 1.7m. Minor clay content							
						020508-174-KW'	Push Tube				
2			SILTY SAND: Silty clay sand, dark grey/brown, fine grained, soft and wet								

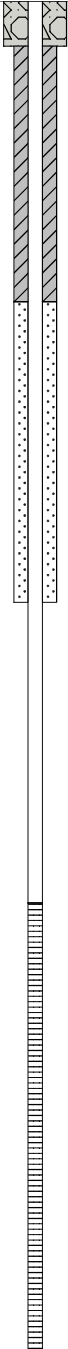
Drill Company: Macquarie Drilling**Date Commenced:** 02/05/2008**Drill Model:****Date Completed:** 02/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Sheet: 1 of 1

Sheet: 1 of 1

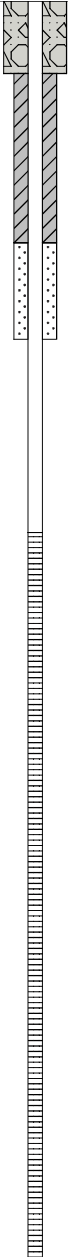
Project ID: CES050706-BCC**Easting:** 6243174.979Jones Bay Wharf 19-21, Lower Level Suite 121
26-32 Pirrama Road Pyrmont 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399**Project:** Cooks Cove**Northing:** 329414.632**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BMW401**

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 over silty sand, brown, dry, loose, rootlets with gravels.	020508-187-KW	Push Tube					
				CONCRETE: Concrete rubble							
				FILL: Crushed weathered sandstone							
				FILL: Clayey sand fill, brown, fine grained, dry, large gravels.	020508-A2-KW	Push Tube					
				FILL: Crushed sandstone fill, white, dry.							
1				FILL: Clay fill with brown/orange sand, dry with black gravels. Asbestos fragments at 0.7m.							
				FILL: Crushed sandstone, coarse grained, orange.	020508-188-LJ	Push Tube					
				FILL: Fill. Clay, brown/orange, stiff, dry, gravels, crushed sandstone, sandy clay with ash at 1.3m.							
2											
					SAND: Sand. Dark grey grading to pale grey. Fine grained, moist and loose. Becoming wet at 3.4m. Silt lenses throughout at depth.						
3											
4											

Drill Company: Macquarie Drilling**Date Commenced:** 02/05/2008**Drill Model:****Date Completed:** 02/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC**Easting:** 6243090.111**Project:** Cooks Cove**Northing:** 329732.258**Client:** Boyd Cook Cove**Elevation:****Location:** Cooks Cove**Environmental Log:****BMW402**

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 over silty sand top soil, dark brown, fine grained, loose, moist with roots								
				FILL: Sand, yellow, fine grained to grained. Moderately dense, moist with shells								
1					FILL: Silty clay, dark brown. Fine grained sand, dense, moist with organic odour							
					FILL: Sand. Pale grey, fine to medium grained, moist to wet, moderately dense with silt lenses. Wet at 1.6m							
					FILL: Silty sand, minor clay, dark grey, fine grained, moist to wet							
					FILL: Silty clay. Dark brown, fine grained, soft, moist to wet							
2					FILL: Silt. Black, sandy and moist							
					FILL: Crushed sandstone, orange/white, clay content, moist (wet at 2.4m) and odourless							
					SILTY SAND: Dark brown, clay content with organic odour							

Drill Company: Macquarie Drilling**Date Commenced:** 02/05/2008**Drill Model:****Date Completed:** 02/05/2008**Hole Diameter (mm):** 75**Logged/checked by:** Jenkins/Weir

Sheet: 1 of 1

Project ID: CES050706-BCC

Easting: 6242940.504



Project: Cooks Cove

Northing: 329616.3

Client: Boyd Cook Cove

Elevation:

Location: Cooks Cove

Environmental Log: BMW403

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 top soil, brown, fine grained, moist with rootlets							
				FILL: Clay, orange/brown/grey, dry, rootlets and gravels							
				FILL: Silty sand, brown, fine grained, dry to moist and dense							
				SAND: Yellow grading to grey, fine to medium grained, dense moist. Silt lenses through from 1.4 to 2.8							
1											
2				SAND: Pale grey with minor silt throughout, dense and moist. Becoming wet at 3.4m							
3											
4											

Drill Company: Macquarie Drilling

Date Commenced: 02/05/2008

Drill Model:

Date Completed: 02/05/2008

Hole Diameter (mm): 75

Logged/checked by: Jenkins/Weir

Project ID:

Easting:


**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

Project:

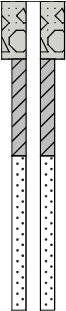
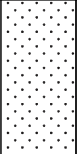
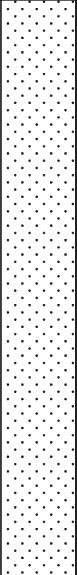
Northing:

Client:

Elevation:

Location:

Environmental Log:

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 over silty sand top soil, brown, dry, loose with roots	020508-175-KW	Push Tube							
				FILL: Crushed sandstone, white, coarse grained, gravels and ceramics									
				FILL: Sand, brown, fine grained, loose, dry, black gravels with silt inclusions	020508-176-KW	Push Tube							
				FILL: Sand, black, dry with black as gravels									
				UNKNOWN: Core loss									
1													
				SAND: Sand, yellow, fine to medium grained, loose, dry to moist									
				UNKNOWN: Core loss									
2													
				SAND: Sand, grey, fine to medium grained, silt lenses, dry to moist			020508-177-KW	Push Tube					
3													

Drill Company:

Date Commenced:

Drill Model:

Date Completed:

Hole Diameter (mm):

Logged/checked by:

Sheet:

Table 12: Soil analytical results - sPOCAS

Parameters				TAA (mol H ⁺ /tonne)	TPA (mol H ⁺ /tonne)	S-POS (%)	TSA (mol H ⁺ /tonne)	Liming Rate (kg CaCO ₃ /tonne)
	Sample	Date	Borehole	Material				
	BH02-1.5	23-Jan-18	BH02	Gravelly sand			120	12
	BH02-3.25-3.45	23-Jan-18	BH02	Clayey sand			190	15
	Action Criteria (1 - 1000 tonnes)		Sands to loamy sands				18	-
			Sandy loams to light clays				36	-
	Action Criteria (>1000 tonnes)		Medium to heavy clays				62	-
			Sands to loamy sands				18	-
			Sandy loams to light clays				18	-
			Medium to heavy clays				18	-

Note: Concentrations over action criteria are highlighted and shown in bold text.

Project ID: CES130608-BP
Client: Boyd Properties Pty Ltd
Project: Lot 10 Detailed Site Investigation
Location: 19 Marsh Street, Arncliffe

**LOG ID:
BH01**

Sheet: 1/1

X-Coord: 329929.657 **Date Commenced:** 22/01/2018 **Logged by:** EM
Y-Coord: 6243690.387 **Date Completed:** 22/01/2018 **Checked by:** IW
Surface Elevation (R.L) : 1.73 m AHD **Hole Diameter (mm):** 200

Drilling Information				LITHOLOGY			Samples		Tests		Well Installation Detail	
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description	Consistency / Density	Sample ID	Type	SPT		Pocket Penetrometer (kPa) 100 200 300 400
0	0					FILL: Gravelly sand, brown, fine to medium grained sand, sub-angular to sub-rounded gravels with shell fragments and fines (silt). With organics / roots.						
1	-1							BH01-1.0				
2	-2					FILL: Silty sand, brown, fine to medium grained sand, with gravels and shell fragments.		BH01-2.0				
3	-3					At 2.5m becoming dark brown.		BH01-3.0				
4	-4							BH01-4.0				
5	-5							BH01-5.0				
6	-6							BH01-6.0				
7	-7							BH01-7.0				
8	-8					End of borehole at target depth		BH01-8.0				

Drill Company: Hagstrom Drilling
Machine Type: Truck mounted rig

Operator Name: Shane Smith
Operators Licence No.:

Refer to Standard Sheets
for details of abbreviations

Project ID: CES130608-BP
Client: Boyd Properties Pty Lt
Project: Lot 10 Detailed Site Investigation
Location: 19 Marsh Street, Arncliffe



LOG ID:
BH02

Sheet: 1/1

X-Coord:	329958	GDA 94 MGA 56	Date Commenced:	23/01/2018	Logged by:	EM
Y-Coord:	6245670.3		Date Completed:	25/01/2018	Checked by:	IW
Surface Elevation (R.L) : 1.877 m AHD			Hole Diameter (mm): 200			

Drilling Information				LITHOLOGY			Samples		Tests		Well Installation Detail	
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description	Consistency / Density	Sample ID	Type	SPT		Pocket Penetrometer (kPa) 100 200 300 400
0	0					Topsoil: Silty sand, fine to coarse grained, sub-angular to sub-rounded sand, low plasticity, organics and roots.						
1	-1					FILL: Silty clayey sand, medium to coarse grained sub-angular to sub-rounded sand, medium plasticity clay, with shells and fine grained trace gravels.		BH2-1.0 BH2-2.0				
2	-2					Gravel and Sand: Brown grey, fine to coarse grained sub-angular to sub-rounded sand, fine to coarse grained sub-angular to sub-rounded gravels, with shells and fines (silt), gravels comprise cementation.		BH2-3-3.25				
3	-3					Silty CLAY: Dark grey, medium plasticity clay, marine sediment odour.		BH2-3.25-3.45		SPT 1 @3-3.45 m 2,1,0 N=1		
4	-4					Silty SAND: Brown, fine to medium grained, sub-angular to sub-rounded sand, low plasticity silts.		BH2-4.5-4.95		SPT 2 @ 4.45-4.95m 0,0,3 N=3		
5	-5					Clayey Sand: Dark grey, fine to medium grained sub-angular to sub-rounded sand, medium plasticity clay.		BH2-6-6.27		SPT 3 @ 6-6.45m 14,30/120mm N=R		
6	-6					Clayey Sand: Pale grey to dark grey, fine to medium grained sub-angular to sub-rounded sand, medium plasticity clay.		BH2-7.5-7.9		SPT 4 @ 7.5-7.9m 17,36,18/100mm N=R		
7	-7					Sand: Pale grey to green grey, fine to medium grained sub-angular to sub-rounded sand, with fines.		BH2-9-9.45		SPT 5 @ 9-9.45m 2,0,6 N=6		
8	-8					Sand: Pale grey with yellow grey streaks,		BH2-10.5-10.95		SPT 6 @ 10.5-10.95m 8,1,15 N=26		
9	-9					Clayey Sand: Pale grey/white, fine to medium grained sub-angular to sub-rounded sand, medium to high plasticity clay.						
10	-10					Clayey Sand: Pale grey/white, fine to medium grained sub-angular to sub-rounded sand, medium to high plasticity clay.						
11	-11					At 10.90m becoming mottled yellow brown/ pale grey.						
12	-12											

Drill Company: Hagstrom Drilling
Machine Type: Truck mounted rig

Operator Name: Shane Smith
Operators Licence No.:

Refer to Standard Sheets for details of abbreviations

Project ID: CES130608-BP Client: Boyd Properties Pty Lt Project: Lot 10 Detailed Site Investigation Location: 19 Marsh Street, Arncliffe		 CONSULTING EARTH SCIENTISTS Suite 3, Level 1 55 Grandview Street, Pymble NSW 2073 PH: (02) 8569 2200 FAX: (02) 9983 0582 www.consultingeearth.com.au		LOG ID: BH02 Sheet: 1/1									
X-Coord: 329958 Y-Coord: 6245670.3 Surface Elevation (R.L) : 1.877 m AHD		Date Commenced: 23/01/2018 Date Completed: 25/01/2018 Hole Diameter (mm): 200		Logged by: EM Checked by: IW									
Drilling Information		LITHOLOGY		Samples		Tests		Well Installation Detail					
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400		
12	-12					Silty CLAY: Pale grey, high plasticity clay, very stiff, dry.		BH2-12-12.45		SPT 7 @ 12-12.45m 7,13,15 N=28		12	
13	-13					Sandy CLAY: Pale grey, high plasticity clay, fine to medium grained sub-angular to sub-rounded sand.		BH2-13.5-13.95		SPT 8 @ 13.5-13.95m 6,10,9 N=19		13	
14	-14												14
15	-15												15
16	-16					Sand: Red brown, fine to coarse grained sub-angular to sub-rounded sand with low plasticity fines.		BH2-15-15.45		SPT 9 @ 15-15.45m 7,8,11 N=19		16	
17	-17												17
18	-18					Sandstone: White/pale grey, fine to coarse grained sub-angular to sub-rounded sand, compact [recovered as sand].		BH2-16.5-16.95		SPT 10 @ 16.5-16.95m N=R		18	
19	-19												19
20	-20					Sandstone: Red brown / white, fine to coarse grained sub-angular to sub-rounded sand, with fines [recovered as sand].		BH2-18-18.45		SPT 11 @ 18-18.45m 30-50mm (HB) N=R		20	
21	-21												21
22	-22							BH2-19.5-19.95		SPT 12 @ 19.5-19.95m 11,17,23 N=40		22	
23	-23					Terminated at 22.58m		BH2-21-21.45		SPT 13 @ 21-21.35m 28,30,14/50mm N=R		23	
								BH2-22.5-22.58		SPT 14 @ 22.5-22.58m 20/80mm (HB)			

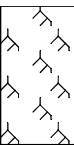
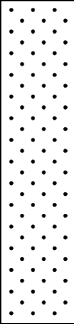
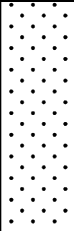
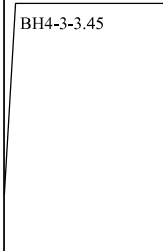
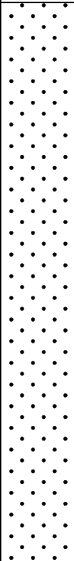
Drill Company: Hagstrom Drilling Machine Type: Truck mounted rig	Operator Name: Shane Smith Operators Licence No.:	Refer to Standard Sheets for details of abbreviations
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Project ID: CES130608-BP
Client: Boyd Properties Pty Lt
Project: Lot 10 Detailed Site Investigation
Location: 19 Marsh Street, Arncliffe

LOG ID:
BH04

Sheet: 1/1

X-Coord: 329903.19 **GDA 94 MGA 56** **Date Commenced:** 25/01/2018 **Logged by:** 6243657.056
Y-Coord: 6243670.3 **Date Completed:** 25/01/2018 **Checked by:** IW
Surface Elevation (R.L.) : 1.861 m AHD **Hole Diameter (mm):** 200

Drilling Information				LITHOLOGY			Samples		Tests		Well Installation Detail	
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description	Consistency / Density	Sample ID	Type	SPT		Pocket Penetrometer (kPa)
0	0					Topsoil: Sand, fine to medium grained, sub-angular to sub-rounded sand, trace fines.						0
1	-1					Sand: Brown to dark grey, fine to medium grained, sub-angular to sub-rounded sand, with fines. At 1.0m becoming brown.		BH4-1.0 BH4-2.0				1
2	-2					Sand: Dark grey, fine to medium grained sub-angular to sub-rounded sand, with fines (clay), medium plasticity clay.						2
3	-3					Sand: Dark grey-brown, fine to coarse grained, sub-angular to sub-rounded sand, trace seashells. moist.		BH4-4-4.45		SPT 1 @3-3.45 m 3,2,3 N=5		3
4	-4									SPT 2 @ 4-4.45m 3,3,4 N=7		4
5	-5							BH4-5-5.45				5
						Terminated at 5.45m				SPT 3 @ 5-5.45m 6,9,14 N=23		
6	-6											

Drill Company: Hagstrom Drilling
Machine Type: Truck mounted rig

Operator Name: Shane Smith
Operators Licence No.:

Refer to Standard Sheets
for details of abbreviations

Project ID: CES130608-BP
Client: Boyd Properties Pty Lt
Project: Lot 10 Detailed Site Investigation
Location: 19 Marsh Street, Arncliffe

LOG ID:
BH05

Sheet: 1/1

X-Coord: 329868.672 **GDA 94 MGA 56** **Date Commenced:** 23/01/2018 **Logged by:** EM
Y-Coord: 6243646.94 **Date Completed:** 23/01/2018 **Checked by:** IW
Surface Elevation (R.L) : 1.791 m AHD **Hole Diameter (mm):** 200

Drilling Information				LITHOLOGY			Samples		Tests		Well Installation Detail	
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description	Consistency / Density	Sample ID	Type	SPT		Pocket Penetrometer (kPa)
						SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components						100 200 300 400
0	0					Roadbase: Silty Sandy Gravel, pale grey to grey, fine to coarse grained sub-angular to angular gravels, fine to coarse grained sub-angular sand, with clay, compact, dry.						
1	-1					FILL: Sandy gravel fill / wastes. comprising timber block >200mm. aluminium cans.						
2	-2					At 0.8m boulder encountered						
3	-3					Silty SAND: dark grey / brown grey, fine to coarse grained sub-angular to sub-rounded sand, low plasticity silt.		BH5-3.0-3.45		SPT 1 @3-3.45 m 2,3,3 N=6		
4	-4											
5	-5					Sand: Dark grey / brown grey, fine to coarse grained sub-anglar to sub-rounded sand, trace fines, (beach sand)		BH5-4.5-4.95		SPT 2 @ 4.5-4.95m 10,14,21 N=35		
6	-6											
7	-7							BH5-6.0-6.45		SPT 3 @ 6-6.45m 9,18,40 N=R		
8	-8					Silty CLAY: Dark grey, high plasticity, firm to stiff, with shell fragments, hydrocarbon odour.		BH5-7.5-7.95		SPT 4 @ 7.5-7.95m 2,3,4 N=7		
9	-9					Silty CLAY: Grey/black/dark grey/green grey, firm to stiff, hydrocarbon odour		BH5-9.0-9.45		SPT 5 @ 9-9.45m 3,3,3 N=6		
10	-10											
11	-11					Sandy CLAY: Mottled pale grey, yellow/green grey (stain), high plasticity clay, fine to medium grained sub-angular to sub-rounded sand, strong hydrocarbon odour, stiff to very stiff, moist.		BH5-10.5-10.95		SPT 6 @ 10.5-10.95m 5,6,9 N=15		
12	-12											
13	-13					Clayey Sand: Pale grey, fine to coarse grained, sub-angular to sub-rounded sand, medium plasticity clay.		BH5-12-12.45		SPT 7 @ 12-12.45m 4,6,14 N=20		

Drill Company: Hagstrom Drilling
Machine Type: Truck mounted rig

Operator Name: Shane Smith
Operators Licence No.:

Refer to Standard Sheets for details of abbreviations

Project ID: CES130608-BP		Client: Boyd Properties Pty Lt		Project: Lot 10 Detailed Site Investigation		Location: 19 Marsh Street, Arncliffe		 CONSULTING EARTH SCIENTISTS Suite 3, Level 1 55 Grandview Street, Pymble NSW 2073 PH: (02) 8569 2200 FAX: (02) 9983 0582 www.consultingeearth.com.au		LOG ID: BH05				
										Sheet: 1/1				
X-Coord: 329868.672		Y-Coord: 6243646.94		Date Commenced: 23/01/2018		Logged by: EM		Date Completed: 23/01/2018		Checked by: IW				
Surface Elevation (R.L.) : 1.791		m AHD		Hole Diameter (mm): 200										
Drilling Information				LITHOLOGY				Samples		Tests		Well Installation Detail		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa)			
						SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components					100 200 300 400			
14	-14					Sandy CLAY: Grey to green/grey with yellow streaks, high plasticity, fine to medium grained sub-angular to sub-rounded sand, very slight hydrocarbon odour		BH5-13.5-13.95		SPT 8 @ 13.5-13.95m 7,12,16 N=28		14		
15	-15							BH5-15-15.45		SPT 9 @ 15-15.45m 4,5,6 N=11		15		
16	-16							BH5-16.5-16.95		SPT 10 @ 16.5-16.95m 10,4,2 N=6		16		
17	-17					Sandy CLAY: Pale grey, high plasticity, fine to medium grained sub-angular to sub-rounded sand, odourless.		BH5-18-18.45		SPT 11 @ 18-18.45m 5,5,5 N=10		17		
18	-18					Silty CLAY: Pale grey, high plasticity.		BH5-19.5-19.95		SPT 12 @ 19.5-19.95m 4,5,5 N=10		18		
19	-19							BH5-21-21.45		SPT 13 @ 21-21.45m 6,7,9 N=16		19		
20	-20					Silty CLAY: Red brown, high plasticity, with fine to medium to coarse grained sub-angular to sub-rounded sand, stiff.		BH5-22.5-22.95		SPT 14 @ 22.5-22.95m 21,30,40 N=70 HB		20		
21	-21					Silty CLAY: Pale grey, high plasticity, very stiff, moist.		BH5-25.5-25.65		SPT 15 @ 24-24.07m 18/70mm HB		21		
22	-22									SPT 16 @ 25.5-25.65m 16, 18/50mm HB		22		
23	-23					Clayey Sand: Pale grey, fine to coarse grained sub-angular to sub-rounded sand, high plasticity clay, very dense / compact.						23		
24	-24											24		
25	-25					Silty CLAY: Mottled brown and pale grey, high plasticity, very stiff.						25		
26	-26					Terminated at 25.65m						26		
Drill Company: Hagstrom Drilling				Operator Name: Shane Smith				Machine Type: Truck mounted rig				Operators Licence No.:		Refer to Standard Sheets for details of abbreviations

Project ID: CES130608-BP
Client: Boyd Properties Pty Lt
Project: Lot 10 Detailed Site Investigation
Location: 19 Marsh Street, Arncliffe

LOG ID:
HA04

Sheet: 1/1

X-Coord: 329925.162 **GDA 94 MGA 56** **Date Commenced:** 22/01/2018 **Logged by:** EM
Y-Coord: 6243672.896 **Date Completed:** 22/01/2018 **Checked by:** IW
Surface Elevation (R.L.) : 1.41 m AHD **Hole Diameter (mm):** 200

Drilling Information				LITHOLOGY			Samples		Tests		Well Installation Detail	
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description	Consistency / Density	Sample ID	Type	SPT		Pocket Penetrometer (kPa) 100 200 300 400
0	0	HA				Topsoil: Silty sand, dark brown, fine to medium grained sub-angular to sub-rounded sand, low plasticity, organics and roots, trace shells, loose, dry.						0
				Silty SAND: Brown, fine to medium grained sub-angular to sub-rounded sand, low plasticity, with shell fragments, trace rootlets, loose, dry.		HA4-0.45-0.5						
				Sand: Pale brown, medium to coarse grained, sub-angular to sub-rounded sand, loose, dry.								
				Sand: At 0.68m becoming yellow brown. Shell fragments observed.								
1	-1					Sand: At 1m wet, becoming dark brown.		HA4-1.0-1.1				
			Sand: At 1.19m becoming pale brown.									
			Clayey Sand: Dark grey/brown, fine to medium grained sub-angular to sub-rounded sand, low plasticity clay, marine odour.	HA4-1.4-1.5								1
						Terminated at 1.5m (borehole collapse)						

Drill Company: Hagstrom Drilling
Machine Type:

Operator Name:
Operators Licence No.:

Refer to Standard Sheets
 for details of abbreviations

Appendix C

Acid Sulfate Soil Formation, Action Criteria and Treatment Verification

1. Introduction

This appendix provides background information on acid sulfate soil formation. Details the acid sulfate soil action criteria, acid sulfate soil treatment verification criteria, equations for net acidity and waste classification criteria are also included. The action criteria are based on Sullivan, et. al. (2018).

2. Formation of acid sulfate soils

The key features of landscapes where ASS occurs include:

- Coastal lowlands below 5 m AHD i.e. tidal flats, estuaries, mangroves, and salt marshes;
- Estuarine and marine sediments;
- Floodplains and wetlands i.e. depositional environments where waterlogging persists;
- Backswamps and lagoons i.e. areas of poor drainage where organic-rich sediments accumulate; and
- Certain man-made disturbed areas where land reclamation, dredging, or drainage exposes sulfide-rich sediments to oxygen, leading to acidification.

Reduced inorganic sulfur (RIS) forms readily in landscapes under waterlogged, anoxic conditions where there is a ready supply of organic matter, sulfate and iron. Under such conditions, the formation of RIS occurs via microbially-mediated processes. The occurrence of ASS is associated with areas or regions that have previously been or are currently estuarine environments. Due to changes in sea level or geomorphologic changes to coastal systems, these sediments are often overlain by terrestrial sediments.

When ASS are exposed to air (e.g. due to bulk excavation or dewatering), the oxygen reacts with RIS in the sediment, producing sulfuric acid. This acid can be produced in large quantities and is highly mobile in water. The acid can result in severe acidification of soil and groundwater and mobilise metals (for example arsenic, iron, aluminium, copper, cobalt, zinc), nutrients (for example phosphate) and rare earth elements. The sulfuric acid generated from the site has the potential to impact site soils, groundwater and structures, and can drain into waterways causing severe short and long term socio-economic and environmental impacts, including damage to man-made structures and natural ecosystems (for example fish kills).

The factor common to all ASS materials is that RIS components have either had, or may have, a major influence on the properties or behaviour of these soil materials.

3. Action criteria

The following section provides the action criteria used to assess whether the soil is classified as PASS/ASS.

3.1 Field screening

Field screening indicators do not form part of the action criteria but can be used to provide an indication of the ASS status and to assist in selecting samples for laboratory testing. Indicators of ASS from field screening include:

- Field pH is less than or equal to pH 4;
- pH_{fox} is less than 3;
- A decrease of 1 pH unit or more from the field pH to the pH_{fox} ;
- Bubbling, production of heat or release of sulphur odours during pH_{fox} testing; and
- Change in colour from grey to brown tones during oxidation.

3.2 Laboratory analysis

The following Table 1 provides the action criteria. As per Sullivan, et. al. (2018).

Table 1: Action criteria

Type of material		Net acidity #	
		1-1000 t materials disturbed	>1000 t materials disturbed
Texture range	Approx. clay (%)	% S-equiv	% S-equiv
Fine: light medium to heavy clay	>40	≥ 0.1	≥ 0.03
Medium: clayey sand to light clays	5-40	≥ 0.06	≥ 0.03
Coarse and Peats: sands to loamy sands	<5	≥ 0.03	≥ 0.03

Notes:

Net acidity can only include a soil material measured acid neutralising capacity (ANC) where this measure has been corroborated by other data

Equation 1 is used to calculate the net acidity when the effectiveness of a soil's measured acid neutralising capacity has not been corroborated by other data.

$$\text{Net acidity} = \text{potential sulfidic acidity} + \text{actual acidity} + \text{retained acidity}$$

$$\text{Net acidity} = \text{Scr} + \text{S-TAA at pH 6.5} + \text{SNAS}$$

4. Verification of treatment

The following section provides the equations and methods of verifying that the neutralisation treatment has been successful / completed.

4.1 Field screening

Field screening results will be considered to be acceptable when the results meet the adopted criteria. When soils do meet the following criteria, confirmatory laboratory testing should be undertaken.

- Field pH is ≥ 5.5 (but ideally between pH 6.5 and 8.5); and
- $\text{pH}_{\text{fox}} \geq 6.5$.

4.2 Laboratory testing

The soil will be considered successfully treated where:

- pH_{KCL} is ≥ 6.5 ;
- (total actual acidity) TAA = 0; and
- Net acidity ≤ 0 . Net acidity must be determined by Equation 2, below.

Equation 2 is used to calculate the verification of post-treatment net acidity.

Verification net acidity = potential sulfidic acidity + actual acidity + retained acidity – (post neutralised acid neutralising capacity – pre neutralised acid neutralising capacity)

Verification net acidity = Scr + S-TAA at pH 6.5 + SNAS – (ANCBT of treated material – ANCBT of untreated material)

5. Off-site disposal requirements

Prior to disposal off-site the soil must be classified in accordance with relevant guidelines.

PASS / ASS and treated PASS / ASS cannot be classified as virgin excavated natural material (VENM). A 'specific exemption' for treated PASS can be sought from NSW EPA under relevant waste regulations for beneficial reuse on a defined receiving site willing to accept the material, however, the application can take some time to process.

If soil is proposed to be disposed to landfill (post-treatment), it must be classified in accordance with the POEO Act, including the current guidelines, namely:

- NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a).
- NSW EPA *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* (NSW EPA, 2014b).

6. Disposal as untreated potential acid sulfate soil

Further guidance for the disposal of untreated soil as PASS is provided in Appendix E.

7. References

NSW EPA. (2014a). *Waste Classification Guidelines, Part 1: Classifying Waste*. NSW Environment Protection Authority.

NSW EPA. (2014b). *Waste Classification Guidelines, Part 4: Acid Sulfate Soils*. NSW Environment Protection Authority.

Sullivan, L., Ward, N., Toppler, N., & Lancaster, G. (2018). *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification Methods Manual*. Canberra ACT CC BY 4.0: Department of Agriculture and Water Resources.

Appendix D

Summary of Results

Acid Sulfate Soil Test Results¹

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Table D1: Summary of Results - Acid Sulfate Soils

Project No:	223528.01
Project Name:	Kogarah Golf Club Redevelopment - Concept & Early Works SSDA (SSD-84467726)
Location:	13-19A Marsh Street, Arncliffe NSW

Sample information						Screening test results				Laboratory analysis results (acid base accounting)								
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample description	Adopted texture	pH _F (pH units)	pH _{Feox} (pH units)	Reaction strength	pH change (pH units)	pH _{KCl} (pH units)	S _{KCl} (%S)	S _{HCl} (%S)	Scr (%S)	TAA (%S)	S _{NAS} (%S)	ANC _{BT} (%S)	ANC corroborated (Y/N or NA)	Net acidity (%S)
Assessment criteria (pH units)						<4	<3	-	1.0	Action criteria (%S)		Coarse texture: sands to loamy sands and peats						0.03
												Medium texture: clayey sand to light clays						0.06 ^a /0.03 ^b
												Fine texture: light medium to heavy clays						0.1 ^a /0.03 ^b
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample Description	Adopted Texture	pH _F (pH units)	pH _{Feox} (pH units)	Reaction Strength	pH change (pH units)	pH _{KCl} (pH units)	S _{KCl} (%S)	S _{HCl} (%S)	Scr (%S)	TAA (%S)	S _{NAS} (%S)	ANC _{BT} (%S)	ANC corroborated (Y/N or NA)	Net Acidity (%S)
BH401	0.90	1.00	0.7 to 0.6	FILL	C	7.7	6.0		1.7								N	
BH401	2.00	2.20	-0.4 to -0.6	Sandy SILT	M	7.5	3.1		4.4								N	
BH401	3.00	3.45	-1.4 to -1.9	SAND	C	7.0	2.7		4.3								N	
BH401	5.00	5.45	-3.4 to -3.9	SAND	C	7.8	2.6		5.2								N	
BH401	6.00	6.45	-4.4 to -4.9	SAND	C	7.8	2.3		5.5	6.7			0.120	<0.01		0.100	N	0.120
BH401	7.00	7.45	-5.4 to -5.9	Silty CLAY	F	7.1	1.8		5.3	6.6			1.600	<0.01		<0.05	N	1.600
BH401	8.00	8.45	-6.4 to -6.9	Silty CLAY	F	8.1	2.4		5.7								N	
BH401	11.00	11.45	-9.4 to -9.9	Silty CLAY	F					7.2			<0.005	<0.01		0.06	N	<0.005
BH401	17.00	17.45	-15.4 to -15.9	Clayey SAND	C					6.4			0.006	<0.01			N	0.006
BH402	0.90	1.00	0.3 to 0.2	SAND	C	6.5	4.1		2.4								N	
BH402	2.00	2.45	-0.8 to -1.3	SAND	C	5.3	2.9		2.4								N	
BH402	3.20	3.65	-2.0 to -2.5	SAND	C	4.4	2.2		2.2	4.8			0.120	0.020			N	0.150
BH402	4.00	4.45	-2.8 to -3.3	SAND	C	5.0	2.6		2.4	4.3			0.100	0.040			N	0.140
BH402	5.12	5.50	-3.9 to -4.3	SAND	C	4.8	2.9		1.9								N	
BH403	0.90	1.00	0.3 to 0.2	SAND	C	8.0	6.0		2.0								N	
BH403	2.00	2.20	-0.8 to -1.0	SAND	C	6.3	1.6		4.7								N	
BH403	3.20	3.65	-2.0 to -2.5	SAND	C	5.8	3.2		2.6								N	
BH403	4.00	4.45	-2.8 to -3.3	SAND	C	6.5	2.3		4.2								N	
BH403	5.00	5.45	-3.8 to -4.3	SAND	C	6.8	2.2		4.6	7.0			0.080	<0.01		0.180	N	0.080
BH403	6.00	6.45	-4.8 to -5.3	SAND and CLAY	C	6.0	2.3		3.7	5.8			0.080	<0.01			N	0.081
BH403	7.00	7.45	-5.8 to -6.3	CLAY	F	7.5	6.0		1.5								N	
BH403	8.00	8.45	-6.8 to -7.3	SAND	C	5.9	4.0		1.9								N	
BH404	0.90	1.00	-0.2 to -0.3	Sandy SILT	M	7.6	5.7		1.9								N	
BH404	2.00	2.45	-1.3 to -1.8	Sandy SILT	M	7.4	2.8		4.6	6.3			0.12	<0.01			N	0.12
BH404	3.20	3.65	-2.8 to -3.2	SAND	C	7.5	2.3		5.2	6.2			0.450	<0.01			N	0.450
BH405	0.90	1.00	0.3 to 0.2	FILL / SAND	C	8.7	6.4		2.3								N	
BH405	3.00	3.45	-1.8 to -2.3	Sandy SILT and SAND	M	7.6	2.3		5.3								N	
BH405	4.00	4.45	-2.8 to -3.3	SAND	C	8.3	2.4		5.9								N	
BH405	5.00	5.45	-3.8 to -4.3	SAND	C	7.8	2.5		5.3	7.2			0.060	<0.01		0.140	N	0.060
BH405	6.00	6.45	-4.8 to -5.3	SAND	C	7.7	2.2		5.5								N	
BH405	7.00	7.45	-5.8 to -6.3	CLAY	F	7.8	5.6		2.2								N	
BH405	8.00	8.45	-6.8 to -7.3	SAND	C	7.3	2.1		5.2	6.7			0.070	<0.01		0.060	N	0.068
BH405	14.00	14.45	-12.8 to -13.3	Sandy CLAY	F					6.0			<0.005	<0.01			N	<0.005
BH406	0.90	1.00	0.2 to 0.1	SAND	C	8.1	6.4		1.7								N	
BH406	2.50	2.80	-1.4 to -1.7	Sandy SILT	M	7.8	2.3		5.5	8.2			0.200	<0.01		0.420	N	0.200
BH406	3.00	3.45	-1.9 to -2.4	Sandy SILT	M	8.5	5.7		2.8								N	
BH406	4.00	4.45	-2.9 to -3.4	SAND	C	8.1	6.1		2.0								N	
BH406	5.00	5.45	-3.9 to -4.4	SAND	C	8.4	6.2		2.2								N	

Acid Sulfate Soil Test Results¹

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Sample information						Screening test results				Laboratory analysis results (acid base accounting)								
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample description	Adopted texture	pH _F (pH units)	pH _{FOX} (pH units)	Reaction strength	pH change (pH units)	pH _{KCl} (pH units)	S _{KCl} (‰S)	S _{HCl} (‰S)	Scr (‰S)	TAA (‰S)	S _{NAS} (‰S)	ANC _{BT} (‰S)	ANC corroborated (Y/N or NA)	Net acidity (‰S)
Assessment criteria (pH units)						≤4	≤3	-	1.0	Action criteria (‰S)		Coarse texture: sands to loamy sands and peats						0.03
												Medium texture: clayey sand to light clays						0.06 ^a /0.03 ^b
												Fine texture: light medium to heavy clays						0.1 ^a /0.03 ^b
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample Description	Adopted Texture	pH _F (pH units)	pH _{FOX} (pH units)	Reaction Strength	pH change (pH units)	pH _{KCl} (pH units)	S _{KCl} (‰S)	S _{HCl} (‰S)	Scr (‰S)	TAA (‰S)	S _{NAS} (‰S)	ANC _{BT} (‰S)	ANC corroborated (Y/N or NA)	Net Acidity (‰S)
BH406	6.00	6.45	-4.9 to -5.4	SAND	C	8.7	6.5		2.2								N	
BH406	7.00	7.10	-5.9 to -6.0	SAND	C	7.4	1.8		5.6	5.5			0.280	<0.01			N	0.290
BH406	8.00	8.45	-6.9 to -7.4	SAND	C	8.6	6.1		2.5								N	
BH407	0.90	1.00	0.8 to 0.7	FILL / SAND	M	8.3	5.7		2.6								N	
BH407	2.10	2.55	-0.4 to -0.9	Sandy SILT	M	8.3	3.4		4.9								N	
BH407	3.00	3.45	-1.3 to -1.8	Sandy SILT	M	8.4	2.8		5.6								N	
BH407	4.00	4.45	-2.3 to -2.8	Silty CLAY	F	8.2	2.6		5.6	8.5			0.460	<0.01		1.500	N	0.460
BH407	5.00	5.45	-3.3 to -3.8	Silty CLAY	F	8.1	3.3		4.8								N	
BH407	6.00	6.45	-4.3 to -4.8	Silty CLAY	F	8.4	5.5		2.9								N	
BH407	7.00	7.45	-5.3 to -5.8	Silty SAND	C	8.3	2.4		5.9								N	
BH407	8.00	8.45	-6.3 to -6.8	Silty SAND	C	8.1	2.4		5.7	8.9			0.400	<0.01		0.260	N	0.400
BH408	2.00	2.45	-0.5 to -1.0	Silty CLAY	F	8.3	2.9		5.4								N	
BH408	3.00	3.45	-1.5 to -2.0	Silty CLAY	F	7.8	2.7		5.1	8.7			0.610	<0.01		1.300	N	0.610
BH408	4.00	4.45	-2.5 to -3.0	Silty CLAY	F	7.9	3.2		4.7								N	
BH408	5.00	5.45	-3.5 to -4.0	Silty CLAY	F	8.2	3.2		5.0								N	
BH408	6.00	6.45	-4.5 to -5.0	Silty SAND	C	8.4	6.1		2.3								N	
BH408	7.00	7.45	-5.5 to -6.0	Silty SAND	C	8.3	1.6		6.7								N	
BH408	8.00	8.45	-6.5 to -7.0	Sandy CLAY	F	8.3	2.4		5.9								N	
BH408	9.00	9.45	-7.5 to -8.0	Sandy CLAY and SAND	F	7.6	2.4		5.2	6.9			0.880	<0.01		0.110	N	0.880
BH409	0.90	1.00	0.6 to 0.5	Sandy SILT	M	5.4	2.0		3.4	5.3			0.050	0.010			N	0.059
BH409	2.50	2.95	-1.0 to -1.5	Sandy SILT	M	5.9	1.8		4.1	7.0			0.110	<0.01		0.060	N	0.110
BH409	3.00	3.45	-1.5 to -2.0	Silty CLAY	F	6.3	1.8		4.5								N	
BH409	4.00	4.45	-2.5 to -3.0	Silty CLAY	F	7.6	5.5		2.1								N	
BH409	6.00	6.45	-4.5 to -5.0	Silty CLAY	F	8.4	4.4		4.0								N	
BH409	7.00	7.45	-5.5 to -6.0	Silty CLAY	F	8.2	2.5		5.7								N	
BH409	8.00	8.45	-6.5 to -7.0	CLAY	F	8.8	6.5		2.3								N	
BH409	9.00	9.45	-7.5 to -8.0	CLAY	F	8.1	6.2		1.9								N	
BH409	13.00	13.45	-11.5 to -12.0	SAND	C					6.0			<0.005	<0.01			N	<0.005
BH410	0.90	1.00	0.4 to 0.3	Sandy SILT	M	7.5	4.7		2.8								N	
BH410	2.00	2.45	-0.7 to -1.2	Sandy SILT	M	8.4	2.0		6.4	8.5			0.340	<0.01		0.290	N	0.340
BH410	3.20	3.65	-1.9 to -2.4	Silty CLAY	F	7.6	2.4		5.2								N	
BH410	4.00	4.45	-2.7 to -3.2	Silty CLAY	F	7.7	3.9		3.8								N	
BH410	5.00	5.45	-3.7 to -4.2	Silty CLAY	F	7.9	4.8		3.1								N	
BH410	6.00	6.45	-4.7 to -5.2	Silty SAND	C	8.3	6.3		2.0								N	
BH410	7.00	7.45	-5.7 to -6.2	Silty SAND	C	8.1	6.2		1.9								N	
BH410	8.00	8.45	-6.7 to -7.2	Sandy CLAY	F	8.2	2.4		5.8	7.6			0.100	<0.01		0.140	N	0.096
BH410	9.00	9.45	-7.7 to -8.2	Sandy CLAY	C	8.4	5.1		3.3								N	

Acid Sulfate Soil Test Results1

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Sample information						Screening test results				Laboratory analysis results (acid base accounting)								
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample description	Adopted texture	pH _F (pH units)	pH _{FOX} (pH units)	Reaction strength	pH change (pH units)	pH _{KCl} (pH units)	S _{KCl} (%S)	S _{HCl} (%S)	Scr (%S)	TAA (%S)	S _{NAS} (%S)	ANC _{BT} (%S)	ANC corroborated (Y/N or NA)	Net acidity (%S)
Assessment criteria (pH units)						<4	<3	-	1.0	Action criteria (%S)		Coarse texture: sands to loamy sands and peats						0.03
												Medium texture: clayey sand to light clays						0.06 ^a /0.03 ^b
												Fine texture: light medium to heavy clays						0.1 ^a /0.03 ^b
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample Description	Adopted Texture	pH _F (pH units)	pH _{FOX} (pH units)	Reaction Strength	pH change (pH units)	pH _{KCl} (pH units)	S _{KCl} (%S)	S _{HCl} (%S)	Scr (%S)	TAA (%S)	S _{NAS} (%S)	ANC _{BT} (%S)	ANC corroborated (Y/N or NA)	Net Acidity (%S)

Notes:

Adopted texture - C = coarse, M = medium, F = fine

pH_F - Soil pH in water

pH_{FOX} - Soil pH in peroxide

Reaction strength: L - Low , M - Medium, H - High, X - Extreme, V - Volcanic, F - Frothing (indicative of organic material)

pH change = pH_F - pH_{FOX}

pH_{KCL} - KCl extractable pH

S_{KCl} - KCl extractable sulfur

S_{HCl} - HCl extractable sulfur

S_{cr} - potential sulfidic acidity

TAA - titratable actual acidity (reported if pH_{KCL}<6.5)

S_{NAS} – retained acidity (reported if pH_{KCl} < 4.5)

ANC_{BT} – acid neutralising capacity (reported if pH_{KCl} ≥ 6.5)

NT - Not tested

Blue depths indicate where samples have been collected at or below the groundwater table

Bold results are indicators of ASS conditions, noting:

- Assessment criteria are considered a reasonable initial screening for AASS or PASS
- pH_F<4 is indicative of the presence of actual ASS (AASS), although it is not conclusive of ASS on its own as naturally occurring non ASS soils can have pH_F<5
- pH_{FOX}<3 or pH Change ≥1 may indicate potential ASS (PASS), although exceptions apply. Laboratory testing required to confirm presence of Reduced Inorganic Sulfur (RIS)
- Refer to Table 5.1, A2, A3 of Sullivan,L. et al (2018) for further details

Shaded results trigger action (i.e. equal to or exceed the action criteria). Criteria is specific for soil texture and anticipated tonnage of soil disturbed.

Net Acidity can only include the measured ANC where the ANC has been corroborated by other data (for example slab incubation data) that demonstrates the soil material does not experience acidification during complete oxidation under field conditions.

a - Action criterion for disturbance of 1-1000 tonnes of material

b - Action criterion for disturbance of more than 1000 tonnes of material

The action criteria apply only to ASS materials and not to other acidic soils such as acidic peatlands and coastal heaths.

Appendix E

Borehole Logs, Notes and Descriptive Terms

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:329923.9, N:6243666.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH401
PROJECT No: 223528.01
DATE: 03/10/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED														SAMPLE		TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN ^(#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY	(%)						
03/10/25 ▼		0.10	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand.		FILL	ND									ASS	D	0.10		
		0.20			FILL										x2 ASS	D	0.40		
		0.60	FILL / SAND trace gravel: dark brown; medium; medium gravel.																
		1	FILL / SAND with silt: dark grey; medium.		FILL	(VL)									ASS	D	0.90		
		1.50													SPT		1.00	SPT	0,1,1 N=2
		1.45															1.45		
		2	Sandy SILT (ML): dark grey; low plasticity; fine to medium sand; trace shells.																
		2			EST	VS	w=LL								ASS	D	2.00		
		2.00													no return	SPT	2.20	SPT	0,0,0 N=0 (HW)
		2.45																	
		2.90	SAND (SP) trace silt: grey; medium.												ASS	SPT	3.00	SPT	0,1,1 N=2
		3.45																	
		4					VL								ASS	SPT	4.00	SPT	1,0,1 N=1
		4.45																	
		5	From 4.80m: No silt, pale grey		EST			W											
		5.20													ASS	SPT	5.20	SPT	9,16,20 N=36
		5.65																	
		6					D								ASS	SPT	6.00	SPT	8,17,25 N=42
	6.45																		
	6.90	Silty CLAY (CH): grey; high plasticity.												ASS	SPT	7.00	SPT	1,2,1 N=3	
	7.45																		
	8				EST	VS	w>PL							ASS	SPT	8.00	SPT	0,1,0 N=1	
	8.45																		
	9																		
	9.70				ALV	VSt													

NOTES: ^(#)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam

METHOD: AD/T to 4.0 m, WB to 21.1m

CASING: HWT to 5.1m

REMARKS:

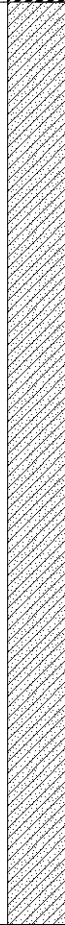
Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:329923.9, N:6243666.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH401
PROJECT No: 223528.01
DATE: 03/10/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN [#]	CONSIS. ¹ DENSITY. ¹	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS						
			Silty CLAY (CH): grey; high plasticity.																	
			Clayey SAND (SC): grey; medium.																	
	</																			

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

METHOD: AD/T to 4.0 m, WB to 21.1m

REMARKS:

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam

CASING: HWT to 5.1m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:329923.9, N:6243666.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH401
PROJECT No: 223528.01
DATE: 03/10/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED																			SAMPLE					TESTING	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL				ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS				
					ORIGIN ^(#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY	(%)	RQD	FRACTURE SPACING (m)							DEFECTS & REMARKS			
			[CONT] Clayey SAND (SC): grey; medium.		ALV	L	W																		
		21	Borehole discontinued at 21.10m depth. WB Refusal on Inferred Sandstone Bedrock.														21								
		22																							
		23																							
		24																							
		25																							
		26																							
		27																							
		28																							
		29																							

NOTES: ^(#)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ^H Soil origin is "probable" unless otherwise stated. ^V Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305
METHOD: AD/T to 4.0 m, WB to 21.1m
REMARKS:

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam
CASING: HWT to 5.1m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329833.9, N:6243513.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH402
PROJECT No: 223528.01
DATE: 09/10/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING						
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			WEATH.	ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
					ORIGIN ^(#)	CONSIS. ^(*)	DENSITY ^(*)		MOISTURE	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)								
		0.20	FILL / SAND trace silt; brown; fine; heavy roots to 0.06m, trace roots to 0.3m; Topsoil.		EST	ND									ASS	D	0.10 0.20					
		0.70	Silty SAND (SM): dark brown; fine.												ASS	D	0.40 0.50					
		1	SAND (SP): grey and orange-brown; fine to medium.												ASS	D	0.90 1.00					
															SPT		1.45	SPT	0,0,0 N=0 (HW)			
		2				VL									ASS	SPT	2.00 2.45	SPT	1,1,1 N=2			
		3			EST										ASS	SPT	3.00 3.65	SPT	3,5,8 N=13			
		4				MD									ASS	SPT	4.00 4.45	SPT	3,1,0 N=1			
		5	From 4.20m-5.00m: Soft clay bed												ASS	SPT	5.00 5.12	SPT	1,3,7/80m m (HB)			
		5.60															5.76m: B, 10°, IR, CN, SM					
		6	SANDSTONE: pale grey, medium to coarse grained, cross bedded at 10°.														6.17m: B, 0°, PR, CN, SM					
		7																				
		8															7.60m: B, 10°, PR, INF Clay 10mm, SM					
		9															8.18m: B, 0°, PR, INF Clay 5mm, SM					
																	8.49-8.58m: EW					
																	8.76-8.82m: EW					
																	8.96-9.05m: IS, Clay 90mm					
																	9.47m: B, 10°, PR, CN, SM					
NOTES: [#] Soil origin is "probable" unless otherwise stated. ^(*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.																						

NOTES: [#] Soil origin is "probable" unless otherwise stated. [†] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 3.2m

METHOD: AD/T to 2.0 m, WB to 5.6 m, NMLC to 11.44 m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329833.9, N:6243513.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH402
PROJECT No: 223528.01
DATE: 09/10/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED													SAMPLE			TESTING							
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND	REMARKS	BACKFILL	WELL PIPE
					ORIGIN(%)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)									
	5		[CONT] SANDSTONE: pale grey, medium to coarse grained, cross bedded at 10°. Hawkesbury Sandstone.																				
	10		11.27m-11.31m: Siltstone bed																				
	11																						
	12		Borehole discontinued at 11.44m depth. Target Depth Reached.																				
	13																						
	14																						
	15																						
	16																						
	17																						
	18																						
	19																						

NOTES: ^(A)Soil origin is "probable" unless otherwise stated. ^(C)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

Generated with CORE-GS by GeroC - Combined Log

PLANT: Geo 305
METHOD: AD/T to 2.0 m, WB to 5.6 m, NMLC to 11.44 m
REMARKS:

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 3.2m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

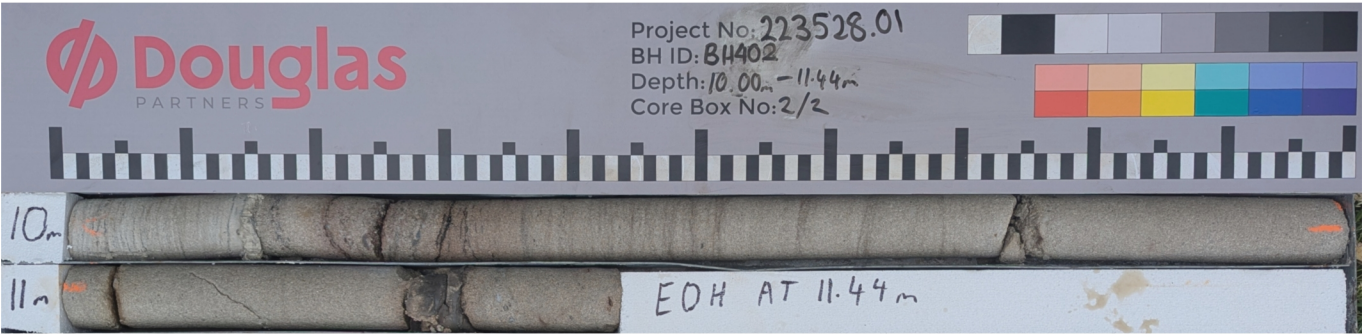
CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329833.9, N:6243513.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH402
PROJECT No: 223528.01
DATE: 09/10/25
SHEET: 1 of 1



5.60-10.00 m depth



10.00-11.44 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329743.2, N:6243408.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH403
PROJECT No: 223528.01
DATE: 08/10/25 - 09/10/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE		TESTING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
					ORIGIN (#)	CONSIS. (%) DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
0.8/0.25	1	0.10	FILL / SAND trace silt: grey; fine to medium; heavy roots to 0.08m, trace roots to 0.15m; Topsoil.			ND	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam

METHOD: AD/T to 2.5 m, WB to 8.0 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 0.7 AHD
COORDINATE: E:329987.2, N:6243418.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH404
PROJECT No: 223528.01
DATE: 02/10/25 - 03/10/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				ORIGIN ^(#)	CONSIS. ⁽¹⁾	DENSITY. ⁽²⁾	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)								
02/10/25	0.10	TOPSOIL / SAND with silt: dark grey; fine to medium; Heavy roots to 0.03 m, trace roots to 0.2 m.	TS	TOP	ND	M								ASS	D	0.10					
	0.55	FILL / SAND: grey; fine to medium.	FILL				w>PL														
	1	Sandy SILT (ML): grey and dark grey; low plasticity; fine to medium sand; faint sulphurous odour.		EST	(VS)		w=LL							ASS	D	0.90					
														SPT		1.00	SPT	0,0,0 N=0 (HW)			
																1.45					
	2													ASS	SPT	2.00	SPT	0,0,1 N=1			
	2.60	SAND (SP): pale grey; fine to medium.														2.45					
	3			EST	(VL)	W								ASS	SPT	3.00	SPT	1,0,1 N=1			
																3.45					
	4.00	SANDSTONE: pale grey and yellow-brown, medium to coarse grained. Hawkesbury Sandstone.															4	PLT	PL(A)=0.46MPa		
5								100	100			5.04m: B, 5°, PR, INF Clay 10mm, SM			5						
												5.17m: B, 0°, PR, INF Clay 5mm, SM				PLT	PL(A)=0.59MPa				
6												5.91m: B, 10°, PR, CN, SM			6						
												6.04m: B, 0°, PR, CN, SM									
												6.31m: B, 15°, PR, VNR Clay, SM				PLT	PL(A)=0.60MPa				
												6.59m: B, 10°, ST, CN, RF									
7												6.75m: B, 5°, PR, CN, RF			7						
												6.86m: EW, Clay 60mm				PLT	PL(A)=0.50MPa				
8												7.84m: B, 20°, PR, VNR Clay, SM			8						
												8.18m: B, 5°, PR, VNR Clay, RF				PLT	PL(A)=0.68MPa				
												8.44m: B, 0°, IR, CN, RF									
9												8.86m: B, 10°, ST, CN, SM			9						
												9.67m: B, 15°, PR, CN, SM				PLT	PL(A)=0.32MPa				

NOTES: ^(#) Soil origin is "probable" unless otherwise stated. ⁽¹⁾ Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Coo 305 OPERATOR: J. H. H. LOGGED: J. H. H.

PLANT: Geo 305
METHOD: AD/T to 2.0 m, WB to 4.0 m, NMLC to 11.48 m
REMARKS:

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 4m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 0.7 AHD
COORDINATE: E:329987.2, N:6243418.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH404
PROJECT No: 223528.01
DATE: 02/10/25 - 03/10/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																			SAMPLE			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	TESTING	
					ORIGIN(%)	CONSIS. (%) 	DENSITY (%) 	MOISTURE	WEATH.	DEPTH (m)	STRENGTH 	RECOVERY (%)	RQD	FRACTURE SPACING (m) 							DEFECTS & REMARKS	BACKFILL
	-6	11	[CONT] SANDSTONE: pale grey and yellow-brown, medium to coarse grained. Hawkesbury Sandstone. From 10.14m: Pale grey					SW	10.14						10.11m: EW, Clay 30mm 10.43m: B, 0-5°, IR, VNR M, RF 10.60m: B, 0°, PR, INF Clay 10mm, SM 11.14m: B, 10°, PR, CN, SM			11	PLT	PL(A)=0.88MPa		
		12	Borehole discontinued at 11.48m depth. Target Depth Reached.																			
		13																				
		14																				
		15																				
		16																				
		17																				
		18																				
		19																				

NOTES: ^(#)Soil origin is "probable" unless otherwise stated. ^(%)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Coo 305 OPERATOR: J. L. H. 1000 LOGGED: 1000

PLANT: Geo 305
METHOD: AD/T to 2.0 m, WB to 4.0 m, NMLC to 11.48 m
REMARKS:

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 4m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 0.7 AHD
COORDINATE: E:329987.2, N:6243418.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH404
PROJECT No: 223528.01
DATE: 02/10/25 - 03/10/25
SHEET: 1 of 1



4.00-8.00 m depth



8.00-11.48 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329823.0, N:6243298.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405
PROJECT No: 223528.01
DATE: 08/10/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN(%)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)						
		0.15	TOPSOIL / SAND trace silt: dark brown; fine to medium; heavy roots to 0.04m, trace roots to 0.15m.	TS	TOP	ND		D												
		1	FILL / SAND: brown; fine to medium. From 0.60m: pale grey From 0.80m: grey, trace silt	FILL	PC		M													
		1.60																		
		2	Sandy SILT (ML): grey; low plasticity; fine to medium sand; trace shell fragments; sulphurous odour.			VS														
		2.45		EST			W=LL													
		3				F														
		3.30	SAND (SP): brown; fine to medium; trace shell fragments.																	
		4				VL														
		5		EST		MD		W												
		6				D														
		6.90	CLAY (CI-CH) with sand: grey mottled yellow-brown; medium to high plasticity.		EST			W>PL												
		8.00	SAND (SP): grey; fine to medium.																	
		9		EST		D		W												
NOTES: %Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.																				

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stembridge)

LOGGED: J. Flynn

METHOD: AD/T to 2.0 m, WB to 16.85 m, NMLC to 24.70 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329823.0, N:6243298.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405
PROJECT No: 223528.01
DATE: 08/10/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED													SAMPLE		TESTING			
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
				ORIGIN (#)	CONSIS. (°)	DENSITY (t)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD						
RL (m)																		
9		[CONT] SAND (SP): grey; fine to medium.		EST	D	W												
10.60		Sandy CLAY (CI): grey; medium plasticity; fine to medium sand.																
11																		
12																		
13																		
14				ALV	(VS)	w>PL												
15																		
16																		
16.85		SANDSTONE: pale grey and orange-brown, fine to medium grained; crossbedded.																
17							MW									PLT	PL(A)=0.49MPa	
17.61							SW									PLT	PL(A)=0.11MPa	
17.79																		
18							SW									PLT	PL(A)=0.11MPa	
19							MW									PLT	PL(A)=1.1MPa	

NOTES: ° Soil origin is "probable" unless otherwise stated. ° Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Coo 305 OPERATOR: J. L. H. LOGGED: J. L. H.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stemberge)

LOGGED: J. Flynn

METHOD: AD/T to 2.0 m, WB to 16.85 m, NMLC to 24.70 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329823.0, N:6243298.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405
PROJECT No: 223528.01
DATE: 08/10/25
SHEET: 3 of 3

GROUNDWATER		CONDITIONS ENCOUNTERED														SAMPLE			TESTING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL				ROCK						SAMPLE REMARKS	TYPE	INTERVAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
					ORIGIN (#)	CONSIS. (%)	DENSITY (t)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)				DEFECTS & REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Generated with CORE-GS by Geroc - Combined Log

PLANT: Geo 305
METHOD: AD/T to 2.0 m, WB to 16.85 m, NMLC to 24.70 m
REMARKS:

OPERATOR: Ground Test (S. Stemberge)

LOGGED: J. Flynn
CASING: HWT to 3.2m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited

PROJECT: Kogarah Golf Course Redevelopment

LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD

COORDINATE: E:329823.0, N:6243298.2

DATUM/GRID: MGA2020 Zone 56

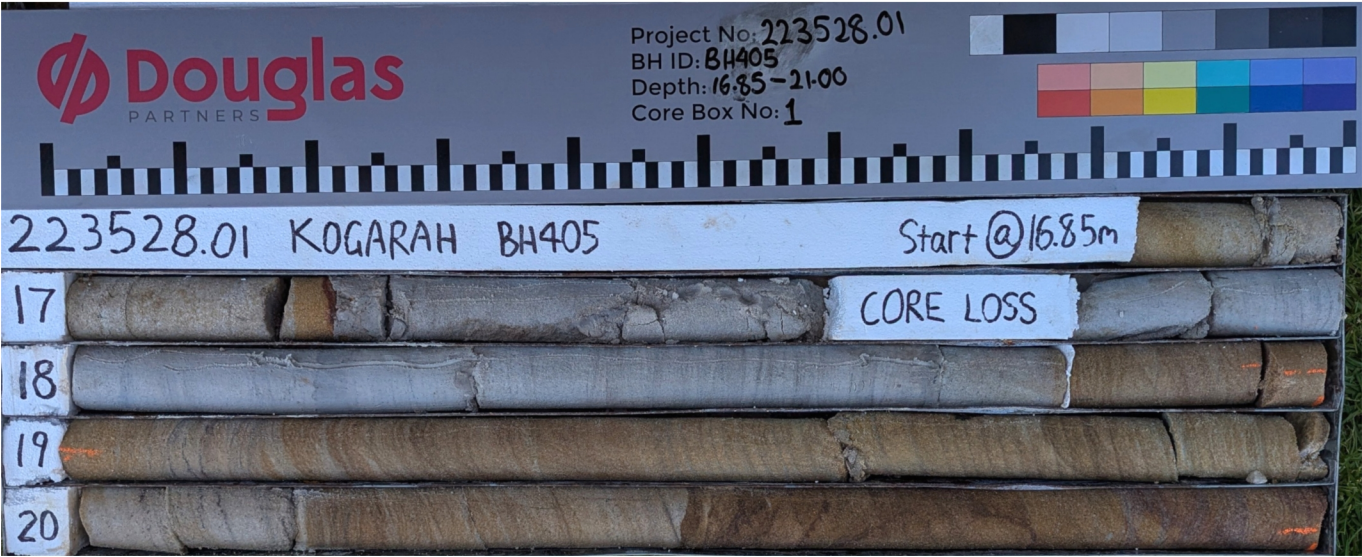
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405

PROJECT No: 223528.01

DATE: 08/10/25

SHEET: 1 of 1



16.85-21.00 m depth



21.00-24.78 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.1 AHD
COORDINATE: E:329980.7, N:6243223.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH406
PROJECT No: 223528.01
DATE: 02/10/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE		TESTING						
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
					ORIGIN(%)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)								
02/10/25	0.10	0.10	FILL / SAND with silt: dark grey; fine to medium; Heavy roots to 0.05 m, trace roots to 0.2 m; Topsoil.		FILL	PC	M									ASS	D	0.10-0.20				
	0.60	0.60	FILL / SAND: grey mottled orange-brown; fine to medium; frequent shells.													x2 ASS	D	0.40-0.50				
	1	1	SAND (SP): grey and dark grey; fine to medium; faint sulphurous odour .		EST. or possibly FILL	VL	W									ASS	D	0.90-1.00				
	2	2	From 0.60m: grey and dark grey, faint sulphur odour																			
	2.40	2.40	Sandy SILT (ML): dark grey and black; low plasticity; fine to medium sand; frequent shells, sulphur odour.		EST	S	W=LL									SPT		2.20-2.50	SPT	1,0,0 N=0 (HW)		
	3	3													ASS	D	2.50-2.80					
	3.80	3.80	SAND (SP): grey; fine to medium; trace shells.													ASS	SPT	3.00-3.45	SPT	0,0,0 N=0 (HW)		
	4	4																				
	5	5			VL											ASS	SPT	4.00-4.45	SPT	0,0,0 N=0		
	6	6			EST		W															
7	7	7	From 6.70m: With silt, dark grey																			
7.10	7.10	CLAY (CI) with sand: grey; medium plasticity; medium sand.	EST		S	W>PL									ASS	D	7.00-7.10					
7.60	7.60	SAND (SP): pale grey and yellow-grey; medium.																				
8	8			EST	MD + D	W									ASS	SPT	7.55-8.00	SPT	7,13,17 N=30			
		9	Borehole discontinued at 8.45m depth. Target Depth Reached.																			

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

METHOD: AD/T to 1.0 m, WB to 8.45 m

REMARKS:

OPERATOR: Ground Test (L. Cooper / S. Stembridge)

LOGGED: I. Howsam
CASING: HWT to 2.2m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.7 AHD
COORDINATE: E:330030.2, N:6243107.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH407
PROJECT No: 223528.01
DATE: 29/09/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE		TESTING			
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
				ORIGIN (#)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)						
	0.20	FILL / SAND: grey; medium; trace charcoal, heavy roots to 0.01 m, trace roots to 0.2 m.		FILL	ND										D	0.10			
	1	FILL / SAND: pale grey and white; medium. From 0.60m: dark grey, trace silt		FILL			M								D	0.40			
	1.60														SPT	0.90			
	2	Sandy SILT (ML): dark grey and black; fine to medium sand; trace shells, strong sulphur odour.			VL											1.45		SPT	2,1,0 N=1
	2.55			EST. possibly FILL											SPT	2.10		SPT	1,0,0 N=0
	3						W									2.55			
	3.60														SPT	3.00		SPT	1,0,0 N=0
	4	Silty CLAY (OH): dark grey; high plasticity; strong sulphur odour, possibly peat.														3.45			
	5														SPT	4.00		SPT	1,0,0 N=0
	5.45			EST	VS	W=LL										4.45			
	6														SPT	5.00		SPT	1,0,0 N=0
	6.40	Silty SAND (SM): grey; medium; trace shells, strong sulphur odour.														5.45			
	7														SPT	6.00		SPT	1,0,0 N=0
	7.45			EST	VL	W										6.45			
	8														SPT	7.00		SPT	1,0,0 N=0
	8.45															7.45			
	9	Borehole discontinued at 8.45m depth. Target Depth Reached.													SPT	8.00		SPT	1,0,0 N=0
																8.45			

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 8.0 m

CASING: Uncased

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:329840.2, N:6243009.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH408
PROJECT No: 223528.01
DATE: 01/10/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING						
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
					ORIGIN(##)	CONSIS. (V) DENSITY (C)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS								
0.0/10.25 ▼		0.10	FILL / Silty SAND: dark brown; fine to coarse; with rootlets.	TS	FILL	(PC)	M									D	0.10					
		0.70	FILL / SAND trace silt: grey, brown and orange - brown; fine to coarse; trace shell fragments.		FILL	(MC)											D	0.40				
		1	Silty CLAY: dark grey; medium plasticity; trace shells, organic odour.														D	0.90				
		1.45													ASS	SPT		1.45	SPT	1,0,0 N=0		
		2													ASS	SPT		2.00	SPT	0,0,0 N=0 (HW)		
		2.45																2.45				
		3				EST	(VS) - (S)	w>PL							no recovery	SPT		3.00	SPT	0,0,0 N=0 (HW)		
		3.45																3.45				
		4													ASS	SPT		4.00	SPT	0,0,0 N=0 (HW)		
		4.45																4.45				
		5													ASS	SPT		5.00	SPT	0,0,0 N=0 (HW)		
		5.45																5.45				
		6.00	Silty SAND: dark grey; fine to medium; trace shells, organic odour.												ASS	SPT		6.00	SPT	0,0,0 N=0 (HW)		
		6.45																6.45				
		7				EST	VL	W							ASS	SPT		7.00	SPT	0,0,0 N=0 (HW)		
		7.45																7.45				
		7.90	Sandy CLAY (CI-CH): grey; medium to high plasticity; fine to medium sand.												ASS	SPT		8.00	SPT	2,1,1 N=2		
		8.45			ALV	S	w>PL											8.45				
	9																9.00					
	9.30	SAND (SP): grey; fine to medium.		ALV	D	W								ASS	SPT		9.45	SPT	2,4,19 N=23			

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305 **OPERATOR:** Ground Test (L. Cooper) **LOGGED:** L. Straney/R. Taylor
METHOD: AD/T to 2.0 m, WB to 10.5 m, NMLC to 18.78 m **CASING:** HWT to 3.2m, then HQ to 10.45m
REMARKS: grass overlay

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:329840.2, N:6243009.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH408
PROJECT No: 223528.01
DATE: 01/10/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED													SAMPLE							
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				ORIGIN ^(#)	CONSIS. ^(*)	DENSITY ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD								
	RL (m)																			
	5	10.20	[CONT] SAND (SP): grey; fine to medium.	ALV	D	W														
	10	10.50	Clayey SAND (SC): grey; fine to medium; low plasticity clay.	XWM																
	11		SANDSTONE: pale grey, medium to coarse grained, cross bedding, 5 to 10°. Hawkesbury sandstone.																	
	12																			
	13																			
	14																			
	15																			
	16																			
	17																			
	18																			
	19																			
	19	Borehole discontinued at 18.78m depth. Target Depth Reached.																		

NOTES: ^(#)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: L. Straney/R. Taylor

METHOD: AD/T to 2.0 m, WB to 10.5 m, NMLC to 18.78 m

CASING: HWT to 3.2m, then HQ to 10.45m

REMARKS: grass overlay

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited

PROJECT: Kogarah Golf Course Redevelopment

LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD

COORDINATE: E:329840.2, N:6243009.6

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH408

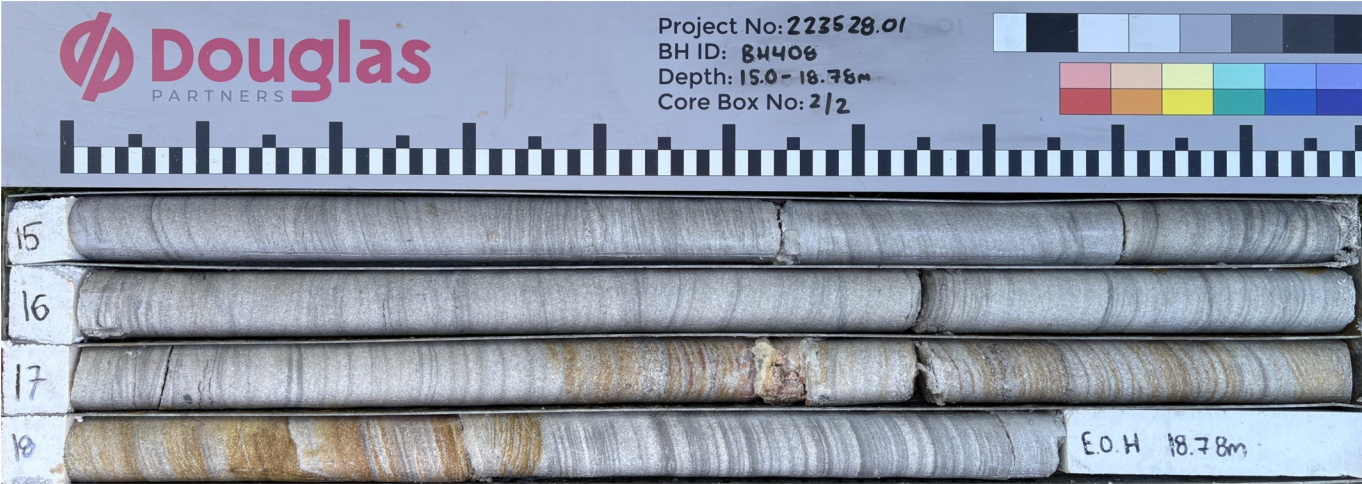
PROJECT No: 223528.01

DATE: 01/10/25

SHEET: 1 of 1



10.50-15.00 m depth



15.00-18.78 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:330007.5, N:6242950.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH409
PROJECT No: 223528.01
DATE: 29/09/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE			TESTING					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
				ORIGIN(1)	CONSIS. (1) DENSITY. (1)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS									
29/10/25 No Free Groundwater Observed Whilst Augering	0.30	FILL / SAND: brown; medium; trace wood chips, heavy roots to 0.01 m, trace roots to 0.3 m.		FILL		ND	M								ASS	D	0.10 0.20					
	0.80	FILL / SAND: yellow-brown; fine to medium.		FILL											ASS	D	0.40 0.50					
	1	Sandy SILT (ML): dark grey; low plasticity; fine to medium sand.													ASS	D	0.90 1.00					
	2			EST possibly FILL		S	w>PL															
	2.90	Silty CLAY (OH): dark grey; high plasticity; possibly peat, strong sulphur odour.																				
	4														ASS	SPT	2.50 2.95	SPT	1,0,0 N=0			
	5														ASS	SPT	2.95 3.45	SPT	1,0,0 N=0			
	6														ASS	SPT	4.00 4.45	SPT	1,0,0 N=0			
	7														ASS	SPT	6.00 6.45	SPT	1,0,0 N=0			
	8	CLAY (CH): grey and yellow - brown; high plasticity; interbedded with bands of medium grained Sandy CLAY.													ASS	SPT	7.00 7.45	SPT	0,0,0 N=0 (HW)			
	9														ASS	SPT	8.00 8.45	SPT	1,4,7 N=11			
	9.45														ASS	SPT	9.00 9.45	SPT	3,3,7 N=10			
	NOTES: (1) Soil origin is "probable" unless otherwise stated. (1) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.																					

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 1.0 m, WB to 13.94 m, NMLC to 20.0 m

CASING: HWT to 2.6m, then HQ to 13.94m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited

PROJECT: Kogarah Golf Course Redevelopment

LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD

COORDINATE: E:330007.5, N:6242950.6

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH409

PROJECT No: 223528.01

DATE: 29/09/25

SHEET: 2 of 2

CONDITIONS ENCOUNTERED													SAMPLE		TESTING						
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				ORIGIN(%)	CONSIS. (1) DENSITY (2)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS								
RL (m)																					
5		[CONT] CLAY (CH): grey and yellow - brown; high plasticity; interbedded with bands of medium grained Sandy CLAY.																			
11				ALV	St	w>PL															
12																					
12.80																					
13		SAND (SP): pale grey; medium.		ALV	D	M															
13.94																					
13.94		SANDSTONE: pale grey - yellow, medium to coarse grained. Hawkesbury Sandstone.																			
14																					
14.42																					
14.48																					
14.92																					
15.00																					
15																					
16																					
17																					
17.23																					
17.23		SANDSTONE: pale grey, medium to coarse grained. Hawkesbury Sandstone.																			
18																					
19																					
19.94																					
19.94																					
20		Borehole discontinued at 20.00m depth. Target Depth Reached.																			
NOTES: (1) Soil origin is "probable" unless otherwise stated. (2) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.																					

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 1.0 m, WB to 13.94 m, NMLC to 20.0 m

CASING: HWT to 2.6m, then HQ to 13.94m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:330007.5, N:6242950.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH409
PROJECT No: 223528.01
DATE: 29/09/25
SHEET: 1 of 1



13.94-18.00 m depth



18.00-20.00 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.3 AHD
COORDINATE: E:329882.9, N:6242859.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH410
PROJECT No: 223528.01
DATE: 30/09/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN (#)	CONSIS. (1) DENSITY (1)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS						
▼	30/10/25	0.40	FILL / SAND: brown; medium; heavy roots to 0.05 m, trace roots to 0.4 m.		FILL	ND	M													
		1	Sandy SILT (ML): dark grey; low plasticity; fine to medium sand; trace shell fragments, sulphur odour.																	
		2																		
		2.80	Silty CLAY (OH): dark grey; high plasticity; possibly peat, strong sulphur odour.				w=LL													
		3																		
		4																		
		5																		
		5.50	Silty SAND (SM): dark grey; fine to medium; occasional shells, sulphur odour.																	
		6																		
		7																		
		7.80	Sandy CLAY (CL-CI): grey; low to medium plasticity; fine to medium sand.																	
		8																		
		9																		
		9.70	From 9.70m: orange-brown																	

NOTES: [#]Soil origin is "probable" unless otherwise stated. ¹Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 2.0 m, WB to 10.48 m, NMLC to 17.45 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.3 AHD
COORDINATE: E:329882.9, N:6242859.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH410
PROJECT No: 223528.01
DATE: 30/09/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN (#)	CONSIS. (°)	DENSITY (°)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)						
					RS	St	w>PL													
		10.48	SANDSTONE: orange - brown and grey, medium to coarse grained. Hawkesbury sandstone.					HW	10.48	VL								10.05	SPT	4,7,25/110mm (HB)
		10.46								10.77	SEAM							10.46		
		11						MW				100	65		10.85m: B, 0°, PR, CN, SM			11	PLT	PL(A)=0.29MPa
		12													11.47m: B, 20°, PR, CN, RF 11.54m: B, 20°, PR, VNR Clay 11.59m: B, 20°, PR, CT Clay, RF			12		
		12						SW							12.07m: B, 25°, PR, CN, SM				PLT	PL(A)=0.62MPa
		12.85								12.85					12.44m: B, 20°, PR, CN, RF					
		12.95						HW	12.95	L								13		
		13						XW	13.16	SEAM					13.16-13.25m: EW, Clay 90mm				PLT	PL(A)=0.13MPa
		14						HW	13.25	VL	95	61			13.44m: B, 15°, PR, INF Clay 10mm, RF 13.58m: EW, Clay 40mm 13.83m: B, 10°, PR, CT Clay, SM			14		
		15						HW	13.67						14.40m: EW, Clay 40mm			15	PLT	PL(A)=0.16MPa
		16								15.10m: B, 0-5°, PR, CN, SM 15.40m: B, 0°, PR, CN, SM 15.59m: IS, Clay 30mm							16	PLT	PL(A)=0.59MPa	
		17						MW	16.07		100	86			16.07m: B, 10°, PR, SN M, SM 16.61m: B, 0-10°, IR, CT Clay, RF			17	PLT	PL(A)=0.33MPa
		18	Borehole discontinued at 17.45m depth. Target Depth Reached.																	
		19																		

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 2.0 m, WB to 10.48 m, NMLC to 17.45 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT:

Stockland Development Pty Limited

PROJECT:

Kogarah Golf Course Redevelopment

LOCATION:

Marsh Street, Arncliffe, NSW

SURFACE LEVEL:

1.3 AHD

COORDINATE:

E:329882.9, N:6242859.3

DATUM/GRID:

MGA2020 Zone 56

DIP/AZIMUTH:

90°/---°

LOCATION ID:

BH410

PROJECT No:

223528.01

DATE:

30/09/25

SHEET:

1 of 1



10.48-15.00 m depth



15.00-17.45 m depth

Appendix F

Laboratory Test Certificates

CERTIFICATE OF ANALYSIS 392291

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01 Arncliffe</u>
Number of Samples	54 Soil
Date samples received	03/10/2025
Date completed instructions received	03/10/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	13/10/2025
Date of Issue	13/10/2025

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Diego Bigolin, Inorganics Supervisor
Giovanni Agosti, Group Technical Manager

Authorised By

Nancy Zhang, Laboratory Manager

Misc Inorg - Soil

Our Reference		392291-1	392291-2	392291-3	392291-4	392291-5
Your Reference	UNITS	BH404	BH404	BH404	BH404	BH406
Depth		0.4-0.5	0.9-1	2-2.45	3.2-3.65	0.4-0.5
Date Sampled		02/10/2025	02/10/2025	02/10/2025	02/10/2025	02/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	08/10/2025	08/10/2025	08/10/2025	9/10/2025
Date analysed	-	9/10/2025	08/10/2025	08/10/2025	08/10/2025	9/10/2025
pH 1:5 soil:water	pH Units	7.8	7.2	7.1	8.0	8.8
Electrical Conductivity 1:5 soil:water	µS/cm	150	120	140	100	140
Chloride, Cl 1:5 soil:water	mg/kg	10	[NA]	[NA]	[NA]	56
Sulphate, SO4 1:5 soil:water	mg/kg	10	[NA]	[NA]	[NA]	33

Misc Inorg - Soil

Our Reference		392291-6	392291-7	392291-14	392291-15	392291-16
Your Reference	UNITS	BH406	BH406	BH407	BH407	BH407
Depth		0.9-1	2.5-2.8	0-0.1	0.4-0.5	0.9-1
Date Sampled		02/10/2025	02/10/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2025	08/10/2025	9/10/2025	9/10/2025	08/10/2025
Date analysed	-	08/10/2025	08/10/2025	9/10/2025	9/10/2025	08/10/2025
pH 1:5 soil:water	pH Units	8.6	7.2	7.2	8.7	7.9
Electrical Conductivity 1:5 soil:water	µS/cm	210	720	120	46	170
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	<10	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	<10	[NA]	[NA]

Misc Inorg - Soil

Our Reference		392291-17	392291-24	392291-25	392291-26	392291-27
Your Reference	UNITS	BH407	BH408	BH408	BH408	BH408
Depth		2.1-2.55	0.4-0.5	0.9-1	2-2.45	3-3.45
Date Sampled		29/09/2025	01/10/2025	01/10/2025	01/10/2025	01/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2025	9/10/2025	9/10/2025	08/10/2025	08/10/2025
Date analysed	-	08/10/2025	9/10/2025	9/10/2025	08/10/2025	08/10/2025
pH 1:5 soil:water	pH Units	7.5	8.4	7.7	7.8	7.6
Electrical Conductivity 1:5 soil:water	µS/cm	810	260	5,500	10,000	12,000
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	14,000	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	850	[NA]

Misc Inorg - Soil						
Our Reference		392291-34	392291-35	392291-36	392291-37	392291-44
Your Reference	UNITS	BH409	BH409	BH409	BH409	BH410
Depth		0.1-0.2	0.4-0.5	0.9-1	2.5-2.95	0.1-0.2
Date Sampled		29/09/2025	29/09/2025	29/09/2025	29/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	9/10/2025	08/10/2025	08/10/2025	9/10/2025
Date analysed	-	9/10/2025	9/10/2025	08/10/2025	08/10/2025	9/10/2025
pH 1:5 soil:water	pH Units	5.0	4.4	5.5	5.0	7.5
Electrical Conductivity 1:5 soil:water	µS/cm	150	200	1,100	660	250
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	320	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	1,600	[NA]	[NA]

Misc Inorg - Soil				
Our Reference		392291-45	392291-46	392291-47
Your Reference	UNITS	BH410	BH410	BH410
Depth		0.4-0.5	0.9-1	2-2.45
Date Sampled		30/09/2025	30/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	9/10/2025	08/10/2025	08/10/2025
Date analysed	-	9/10/2025	08/10/2025	08/10/2025
pH 1:5 soil:water	pH Units	6.7	7.1	7.8
Electrical Conductivity 1:5 soil:water	µS/cm	420	730	5,300
Chloride, Cl 1:5 soil:water	mg/kg	99	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	280	[NA]	[NA]

ESP/CEC				
Our Reference		392291-1	392291-15	392291-45
Your Reference	UNITS	BH404	BH407	BH410
Depth		0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		02/10/2025	29/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	13/10/2025	13/10/2025	13/10/2025
Date analysed	-	13/10/2025	13/10/2025	13/10/2025
Exchangeable Ca	meq/100g	13	1.7	14
Exchangeable K	meq/100g	<0.1	<0.1	0.5
Exchangeable Mg	meq/100g	0.2	<0.1	1.7
Exchangeable Na	meq/100g	<0.1	<0.1	0.1
Cation Exchange Capacity	meq/100g	13	1.8	17
ESP	%	<1	<1	<1

sPOCAS field test

Our Reference		392291-2	392291-3	392291-4	392291-6	392291-7
Your Reference	UNITS	BH404	BH404	BH404	BH406	BH406
Depth		0.9-1	2-2.45	3.2-3.65	0.9-1	2.5-2.8
Date Sampled		02/10/2025	02/10/2025	02/10/2025	02/10/2025	02/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	9/10/2025	9/10/2025	9/10/2025	9/10/2025
Date analysed	-	9/10/2025	9/10/2025	9/10/2025	9/10/2025	9/10/2025
pH _F (field pH test)	pH Units	7.6	7.4	7.5	8.1	7.8
pH _{FOX} (field peroxide test)	pH Units	5.7	2.8	2.3	6.4	2.3
Reaction Rate*	-	High reaction	Medium reaction	Extreme reaction	Low reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-8	392291-9	392291-10	392291-11	392291-12
Your Reference	UNITS	BH406	BH406	BH406	BH406	BH406
Depth		3-3.45	4-4.45	5-5.45	6-6.45	7-7.1
Date Sampled		02/10/2025	02/10/2025	02/10/2025	02/10/2025	02/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.5	8.1	8.4	8.7	7.4
pH _{FOX} (field peroxide test)	pH Units	5.7	6.1	6.2	6.5	1.8
Reaction Rate*	-	Low reaction	Low reaction	Low reaction	Low reaction	Extreme reaction

sPOCAS field test

Our Reference		392291-13	392291-16	392291-17	392291-18	392291-19
Your Reference	UNITS	BH406	BH407	BH407	BH407	BH407
Depth		8-8.45	0.9-1	2.1-2.55	3-3.45	4-4.45
Date Sampled		02/10/2025	29/09/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	9/10/2025	9/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	9/10/2025	9/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.6	8.3	8.3	8.4	8.2
pH _{FOX} (field peroxide test)	pH Units	6.1	5.7	3.4	2.8	2.6
Reaction Rate*	-	Low reaction	Medium reaction	Medium reaction	High reaction	High reaction

sPOCAS field test

Our Reference		392291-20	392291-21	392291-22	392291-23	392291-26
Your Reference	UNITS	BH407	BH407	BH407	BH407	BH408
Depth		5-5.45	6-6.45	7-7.45	8-8.45	2-2.45
Date Sampled		29/09/2025	29/09/2025	29/09/2025	29/09/2025	01/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025	9/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025	9/10/2025
pH _F (field pH test)	pH Units	8.1	8.4	8.3	8.1	8.3
pH _{FOX} (field peroxide test)	pH Units	3.3	5.5	2.4	2.4	2.9
Reaction Rate*	-	Extreme reaction	Medium reaction	Extreme reaction	Volcanic reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-27	392291-28	392291-29	392291-30	392291-31
Your Reference	UNITS	BH408	BH408	BH408	BH408	BH408
Depth		3-3.45	4-4.45	5-5.45	6-6.45	7-7.45
Date Sampled		01/10/2025	01/10/2025	01/10/2025	01/10/2025	01/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	9/10/2025	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	7.8	7.9	8.2	8.4	8.3
pH _{FOX} (field peroxide test)	pH Units	2.7	3.2	3.2	6.1	1.6
Reaction Rate*	-	Extreme reaction	Volcanic reaction	Volcanic reaction	Low reaction	Extreme reaction

sPOCAS field test

Our Reference		392291-32	392291-33	392291-36	392291-37	392291-38
Your Reference	UNITS	BH408	BH408	BH409	BH409	BH409
Depth		8-8.45	9-9.45	0.9-1	2.5-2.95	3-3.45
Date Sampled		01/10/2025	01/10/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	9/10/2025	9/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	9/10/2025	9/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.3	7.6	5.4	5.9	6.3
pH _{FOX} (field peroxide test)	pH Units	2.4	2.4	2.0	1.8	1.8
Reaction Rate*	-	Extreme reaction	Low reaction	High reaction	Volcanic reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-39	392291-40	392291-41	392291-42	392291-43
Your Reference	UNITS	BH409	BH409	BH409	BH409	BH409
Depth		4-4.45	6-6.45	7-7.45	8-8.45	9-9.45
Date Sampled		29/09/2025	29/09/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	7.6	8.4	8.2	8.8	8.1
pH _{FOX} (field peroxide test)	pH Units	5.5	4.4	2.5	6.5	6.2
Reaction Rate*	-	Volcanic reaction	Volcanic reaction	Volcanic reaction	Extreme reaction	High reaction

sPOCAS field test

Our Reference		392291-46	392291-47	392291-48	392291-49	392291-50
Your Reference	UNITS	BH410	BH410	BH410	BH410	BH410
Depth		0.9-1	2-2.45	3.2-3.65	4-4.45	5-5.45
Date Sampled		30/09/2025	30/09/2025	30/09/2025	30/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	9/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	9/10/2025	9/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	7.5	8.4	7.6	7.7	7.9
pH _{FOX} (field peroxide test)	pH Units	4.7	2.0	2.4	3.9	4.8
Reaction Rate*	-	High reaction	Volcanic reaction	Volcanic reaction	Volcanic reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-51	392291-52	392291-53	392291-54
Your Reference	UNITS	BH410	BH410	BH410	BH410
Depth		6-6.45	7-7.45	8-8.45	9-9.45
Date Sampled		30/09/2025	30/09/2025	30/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.3	8.1	8.2	8.4
pH _{FOX} (field peroxide test)	pH Units	6.3	6.2	2.4	5.1
Reaction Rate*	-	Low reaction	Low reaction	Extreme reaction	Medium reaction

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/10/2025	5	9/10/2025	9/10/2025		08/10/2025	[NT]
Date analysed	-			08/10/2025	5	9/10/2025	9/10/2025		08/10/2025	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	5	8.8	8.7	1	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	5	140	120	15	109	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	5	56	49	13	86	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	5	33	31	6	97	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	27	08/10/2025	9/10/2025		[NT]	[NT]
Date analysed	-			[NT]	27	08/10/2025	9/10/2025		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	27	7.6	7.6	0	[NT]	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	27	12000	12000	0	[NT]	[NT]

QUALITY CONTROL: ESP/CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			13/10/2025	[NT]	[NT]	[NT]	[NT]	13/10/2025	[NT]
Date analysed	-			13/10/2025	[NT]	[NT]	[NT]	[NT]	13/10/2025	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/10/2025	[NT]	[NT]	[NT]	[NT]	03/10/2025	[NT]
Date analysed	-			07/10/2025	[NT]	[NT]	[NT]	[NT]	07/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	03/10/2025	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	07/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	03/10/2025	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	07/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

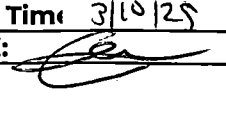
Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Project No:	223528.01	Suburb:	Arncliffe	To:	Envirolab Services
Project Manager:	Matthew Bennett	Order Number:		Sampler:	IH/RT
Email:	Matthew.Bennett@douglaspartners.com.au			Attn:	Sample Receipt
Turnaround time:	☒ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day			(02) 9910 6200 samplereceipt@envirolab.com	

Prior Storage:
☐ Fridge
 ☒ Freezer
 ☐ Esky
 ☐ Shelf
 Do samples contain 'potential' HBM?
☒ No
 ☐ Yes If YES, then handle, transport and store in accordance with FPM HAZID

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl							
1	BH404	0.4	0.5	2/10/25	S	P		x	x	x							
2	BH404	0.9	1	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
3	BH404	2	2.45	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
4	BH404	3.2	3.65	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
5	BH406	0.4	0.5	2/10/25	S	P			x	x							
6	BH406	0.9	1	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
7	BH406	2.5	2.8	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
8	BH406	3	3.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
9	BH406	4	4.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
10	BH406	5	5.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
11	BH406	6	6.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
12	BH406	7	7.1	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
13	BH406	8	8.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
14	BH407	0	0.1	29/09/25	S	P			x	x							

ENVIROLAB
 12 Ashley St
 Chatswood NSW 2067
 Ph: (02) 9910 6200
 Job No: 392291
 Date Received: 3/10/25
 Time Received: 1600
 Received By: C. CHAN
 Temp: Cool/Ambient
 Cooling: Icepack
 Security: Intact/Broken/None

Metals to analyse:		LAB RECEIPT	
Number of samples in container:		Transported to laboratory by:	Lab Ref. No: 392291
Send results to:	Douglas Partners Pty Ltd		Received by: Envirolab C. CHAN
Address:	96 Hermitage Road, West Ryde NSW 2114	Phone: (02) 9809 0666	Date & Time: 3/10/25 1600
Relinquished by: R. TAYLOR	Date: 03/10/25	Signed: 	Signed: 

#392291
3/10/25 1600 CC

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 223528.01				Suburb: Arncliffe				To: Envirolab Services									
Project Manager: Matthew Bennett				Dispatch date: 0/01/1900													
Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl							
15	BH407	0.4	0.5	29/09/25	S	P		x	x								
16	BH407	0.9	1	29/09/25	S	P	X		x								Keep sample for possible SCr Suite after screening results
17	BH407	2.1	2.55	29/09/25	S	P	X		x								Keep sample for possible SCr Suite after screening results
18	BH407	3	3.45	29/09/25	S	P	X										Keep sample for possible SCr Suite after screening results
19	BH407	4	4.45	29/09/25	S	P	X										Keep sample for possible SCr Suite after screening results
20	BH407	5	5.45	29/09/25	S	P	X										Keep sample for possible SCr Suite after screening results
21	BH407	6	6.45	29/09/25	S	P	X										Keep sample for possible SCr Suite after screening results
22	BH407	7	7.45	29/09/25	S	P	X										Keep sample for possible SCr Suite after screening results
23	BH407	8	8.45	29/09/25	S	P	X										Keep sample for possible SCr Suite after screening results
24	BH408	0.4	0.5	1/10/25	S	P			x								
25	BH408	0.9	1	1/10/25	S	P			x								
26	BH408	2	2.45	1/10/25	S	P	X		x	x							Keep sample for possible SCr Suite after screening results
27	BH408	3	3.45	1/10/25	S	P	X		x								Keep sample for possible SCr Suite after screening results
28	BH408	4	4.45	1/10/25	S	P	X										Keep sample for possible SCr Suite after screening results
29	BH408	5	5.45	1/10/25	S	P	X										Keep sample for possible SCr Suite after screening results
30	BH408	6	6.45	1/10/25	S	P	X										Keep sample for possible SCr Suite after screening results
31	BH408	7	7.45	1/10/25	S	P	X										Keep sample for possible SCr Suite after screening results

#392291
3/10/25 1600 CC

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 223528.01		Suburb: Arncliffe										To: Envirolab Services					
Project Manager: Matthew Bennett												Dispatch date: 0/01/1900					
Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl							
32	BH408	8	8.45	1/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
33	BH408	9	9.45	1/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
34	BH409	0.1	0.2	29/09/25	S	P				x							
35	BH409	0.4	0.5	29/09/25	S	P				x							
36	BH409	0.9	1	29/09/25	S	P	X			x	x						Keep sample for possible SCR Suite after screening results
37	BH409	2.5	2.95	29/09/25	S	P	X			x							Keep sample for possible SCR Suite after screening results
38	BH409	3	3.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
39	BH409	4	4.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
40	BH409	6	6.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
41	BH409	7	7.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
42	BH409	8	8.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
43	BH409	9	9.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
44	BH410	0.1	0.2	30/09/25	S	P				x							
45	BH410	0.4	0.5	30/09/25	S	P			x	x	x						
46	BH410	0.9	1	30/09/25	S	P	X			x							Keep sample for possible SCR Suite after screening results
47	BH410	2	2.45	30/09/25	S	P	X			x							Keep sample for possible SCR Suite after screening results
48	BH410	3.2	3.65	30/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
49	BH410	4	4.45	30/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
50	BH410	5	5.45	30/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
Project No: 223528.01		Suburb: Arncliffe										To: Envirolab Services					
Project Manager: Matthew Bennett												Dispatch date: 0/01/1900					

#392291
3/10/25 1600 cc

CHAIN OF CUSTODY DESPATCH SHEET

[illegible]

CERTIFICATE OF ANALYSIS 392715

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01, Arncliffe</u>
Number of Samples	31 Soil
Date samples received	10/10/2025
Date completed instructions received	10/10/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	20/10/2025
Date of Issue	20/10/2025

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Diego Bigolin, Inorganics Supervisor
Priya Samarawickrama, Senior Chemist
Tabitha Roberts, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

sPOCAS field test

Our Reference		392715-2	392715-3	392715-4	392715-5	392715-6
Your Reference	UNITS	BH403	BH403	BH403	BH403	BH403
Depth		0.9-1	2-2.2	3.2-3.65	4-4.45	5-5.45
Date Sampled		8/09/2025	8/09/2025	9/09/2025	9/09/2025	9/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	8.0	6.3	5.8	6.5	6.8
pH _{FOX} (field peroxide test)	pH Units	6.0	1.6	3.2	2.3	2.2
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction	Medium reaction

sPOCAS field test

Our Reference		392715-7	392715-8	392715-9	392715-11	392715-12
Your Reference	UNITS	BH403	BH403	BH403	BH402	BH402
Depth		6-6.45	7-7.45	8-8.45	0.9-1	2-2.45
Date Sampled		9/09/2025	9/09/2025	9/09/2025	9/10/2025	9/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	6.0	7.5	5.9	6.5	5.3
pH _{FOX} (field peroxide test)	pH Units	2.3	6.0	4.0	4.1	2.9
Reaction Rate*	-	Medium reaction	Volcanic reaction	Medium reaction	Medium reaction	Medium reaction

sPOCAS field test

Our Reference		392715-13	392715-14	392715-15	392715-17	392715-18
Your Reference	UNITS	BH402	BH402	BH402	BH401	BH401
Depth		3.2-3.65	4-4.45	5.12-5.5	0.9-1	2-2.2
Date Sampled		9/10/2025	9/10/2025	9/10/2025	3/10/2025	3/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	4.4	5.0	4.8	7.7	7/5
pH _{FOX} (field peroxide test)	pH Units	2.2	2.6	2.9	6.0	3.1
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction	Extreme reaction

sPOCAS field test

Our Reference		392715-19	392715-20	392715-21	392715-22	392715-23
Your Reference	UNITS	BH401	BH401	BH401	BH401	BH401
Depth		3-3.45	5-5.45	6-6.45	7-7.45	8-8.45
Date Sampled		3/10/2025	3/10/2025	3/10/2025	3/10/2025	3/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	7.0	7.8	7.8	7.1	8.1
pH _{FOX} (field peroxide test)	pH Units	2.7	2.6	2.3	1.8	2.4
Reaction Rate*	-	High reaction	Medium reaction	Medium reaction	High reaction	Volcanic reaction

sPOCAS field test

Our Reference		392715-25	392715-26	392715-27	392715-28	392715-29
Your Reference	UNITS	BH405	BH405	BH405	BH405	BH405
Depth		0.9-1	3-3.45	4-4.45	5-5.45	6-6.45
Date Sampled		8/10/2025	8/10/2025	8/10/2025	8/10/2025	8/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	8.7	7.6	8.3	7.8	7.7
pH _{FOX} (field peroxide test)	pH Units	6.4	2.3	2.4	2.5	2.2
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction	Medium reaction

sPOCAS field test

Our Reference		392715-30	392715-31
Your Reference	UNITS	BH405	BH405
Depth		7-7.45	8-8.45
Date Sampled		8/10/2025	8/10/2025
Type of sample		Soil	Soil
Date prepared	-	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	7.8	7.3
pH _{FOX} (field peroxide test)	pH Units	5.6	2.1
Reaction Rate*	-	Medium reaction	Medium reaction

ESP/CEC		
Our Reference		392715-1
Your Reference	UNITS	BH403
Depth		0.4-0.5
Date Sampled		8/09/2025
Type of sample		Soil
Date prepared	-	15/10/2025
Date analysed	-	15/10/2025
Exchangeable Ca	meq/100g	21
Exchangeable K	meq/100g	0.1
Exchangeable Mg	meq/100g	0.4
Exchangeable Na	meq/100g	0.1
Cation Exchange Capacity	meq/100g	22
ESP	%	<1

Misc Inorg - Soil

Our Reference		392715-1	392715-2	392715-3	392715-4	392715-10
Your Reference	UNITS	BH403	BH403	BH403	BH403	BH402
Depth		0.4-0.5	0.9-1	2-2.2	3.2-3.65	0.4-0.5
Date Sampled		8/09/2025	8/09/2025	8/09/2025	9/09/2025	9/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units	8.2	7.9	7.0	7.0	6.9
Electrical Conductivity 1:5 soil:water	µS/cm	330	290	270	190	140
Chloride, Cl 1:5 soil:water	mg/kg	10	[NA]	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	39	[NA]	[NA]	[NA]	[NA]

Misc Inorg - Soil

Our Reference		392715-11	392715-12	392715-16	392715-17	392715-18
Your Reference	UNITS	BH402	BH402	BH401	BH401	BH401
Depth		0.9-1	2-2.45	0.4-0.5	0.9-1	2-2.2
Date Sampled		9/10/2025	9/10/2025	3/10/2025	3/10/2025	3/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units	7.1	7.0	7.3	7.5	7.6
Electrical Conductivity 1:5 soil:water	µS/cm	60	20	190	190	350
Chloride, Cl 1:5 soil:water	mg/kg	<10	[NA]	20	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	20	[NA]	78	[NA]	[NA]

Misc Inorg - Soil

Our Reference		392715-24	392715-25	392715-26
Your Reference	UNITS	BH405	BH405	BH405
Depth		0.4-0.5	0.9-1	3-3.45
Date Sampled		8/10/2025	8/10/2025	8/10/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	15/10/2025	15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units	7.9	8.6	8.0
Electrical Conductivity 1:5 soil:water	µS/cm	120	44	290
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	73
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	330

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			10/10/2025	[NT]	[NT]	[NT]	[NT]	10/10/2025	[NT]
Date analysed	-			14/10/2025	[NT]	[NT]	[NT]	[NT]	14/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	10/10/2025	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	14/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: ESP/CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			15/10/2025	[NT]	[NT]	[NT]	[NT]	15/10/2025	[NT]
Date analysed	-			15/10/2025	[NT]	[NT]	[NT]	[NT]	15/10/2025	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	392715-11
Date prepared	-			15/10/2025	1	15/10/2025	15/10/2025		15/10/2025	15/10/2025
Date analysed	-			15/10/2025	1	15/10/2025	15/10/2025		15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	8.2	8.1	1	99	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	330	300	10	110	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	10	20	67	103	86
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	39	37	5	114	99

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	24	15/10/2025	15/10/2025		[NT]	[NT]
Date analysed	-			[NT]	24	15/10/2025	15/10/2025		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	24	7.9	8.0	1	[NT]	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	24	120	100	18	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Project No: 223528.01	Suburb: Arncliffe	To: Envirolab Services
Project Manager: Matthew Bennett	Order Number:	12 Ashley St, Chatswood NSW 2067
Email: Matthew.Bennett@douglaspartners.com.au		Attn: Sample Receipt
Turnaround time: ☒ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day		(02) 9910 6200 samplereceipt@envirolab.com

Prior storage: ☒ Fridge ☒ Freezer ☐ Esky ☐ Shelf **Do samples contain 'potential' HBM?** ☒ No ☐ Yes If YES, then handle, transport and store in accordance with FPM HAZID)

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO4, Cl							
1	 BH403	0.4	0.5	8/09/25	S	P		x	x	x							
2	 BH403	0.9	1	8/09/25	S	P	X		x								Keep sample for possible SCR
3	 BH403	2	2.2	8/09/25	S	P	X		x								Suite after screening results Keep sample for possible SCR
4	 BH403	3.2	3.65	9/09/25	S	P	X		x								Suite after screening results Keep sample for possible SCR
5	 BH403	4	4.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
6	 BH403	5	5.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
7	 BH403	6	6.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
8	 BH403	7	7.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
9	 BH403	8	8.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
10	 BH402	0.4	0.5	9/10/25	S	P			x								Suite after screening results Keep sample for possible SCR
11	 BH402	0.9	1	9/10/25	S	P	X		x	x							Suite after screening results Keep sample for possible SCR
12	 BH402	2	2.45	9/10/25	S	P	X		x								Suite after screening results Keep sample for possible SCR
13	 BH402	3.2	3.65	9/10/25	S	P	X										Suite after screening results Keep sample for possible SCR
14	 BH402	4	4.45	9/10/25	S	P	X										Suite after screening results

Metals to analyse:		LAB RECEIPT	
Number of samples in container:		Transported to laboratory by:	
Send results to: Douglas Partners Pty Ltd		Lab Ref. No: 392715	
Address: 96 Hermitage Road, West Ryde NSW 2114		Received by: Sharon Tok	
Relinquished by:		Date & Time: 10/10/25 1630	
Phone: (02) 9809 0666		Signed: [Signature]	
Date: 10/10/25		Signed: [Signature]	

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 223528.01		Suburb: Arncliffe		To: EnviroLab Services														
Project Manager: Matthew Bennett				Dispatch date: 07/01/2020														
Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements	
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl								
15	BH402	5.12	5.5	9/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
16	BH401	0.4	0.5	3/10/25	S	P			x	x								Keep sample for possible SCR Suite after screening results
17	BH401	0.9	1	3/10/25	S	P	X		x									Keep sample for possible SCR Suite after screening results
18	BH401	2	2.2	3/10/25	S	P	X		x									Keep sample for possible SCR Suite after screening results
19	BH401	3	3.45	3/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
NR	BH401	4	4.45	3/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
20	BH401	5	5.45	3/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
21	BH401	6	6.45	3/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
22	BH401	7	7.45	3/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
23	BH401	8	8.45	3/10/25	S	P	x											Keep sample for possible SCR Suite after screening results
24	BH405	0.4	0.5	8/10/25	S	P			x									Keep sample for possible SCR Suite after screening results
25	BH405	0.9	1	8/10/25	S	P	X		x									Keep sample for possible SCR Suite after screening results
26	BH405	3	3.45	8/10/25	S	P	X		x	x								Keep sample for possible SCR Suite after screening results
27	BH405	4	4.45	8/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
28	BH405	5	5.45	8/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
29	BH405	6	6.45	8/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
30	BH405	7	7.45	8/10/25	S	P	X											Keep sample for possible SCR Suite after screening results
31	BH405	8	8.45	8/10/25	S	P	X											Keep sample for possible SCR Suite after screening results

#392715
10/10/25
57

CERTIFICATE OF ANALYSIS 392291-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01 Arncliffe</u>
Number of Samples	Additional analysis
Date samples received	03/10/2025
Date completed instructions received	15/10/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	22/10/2025
Date of Issue	22/10/2025

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Nick Sarlamis, Assistant Operation Manager

Authorised By

Nancy Zhang, Laboratory Manager

Acid Sulphate Soil Suite - Extended

Our Reference		392291-A-3	392291-A-4	392291-A-7	392291-A-12	392291-A-19
Your Reference	UNITS	BH404	BH404	BH406	BH406	BH407
Depth		2-2.45	3.2-3.65	2.5-2.8	7-7.1	4-4.45
Date Sampled		02/10/2025	02/10/2025	02/10/2025	02/10/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	16/10/2025	16/10/2025	16/10/2025	16/10/2025	16/10/2025
pH _{KCl}	pH units	6.3	6.2	8.2	5.5	8.5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5	<5
a-Chromium Reducible Sulfur	moles H ⁺ /t	72	280	120	180	280
Chromium Reducible Sulfur	%w/w	0.12	0.45	0.20	0.28	0.46
S _{KCl}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
S _{HCl}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
S _{NAS}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
ANC _{BT}	% CaCO ₃	[NT]	[NT]	1.3	[NT]	4.7
s-ANC _{BT}	%w/w S	[NT]	[NT]	0.42	[NT]	1.5
s-Net Acidity excluding ANC	%w/w S	0.12	0.45	0.20	0.29	0.46
a-Net Acidity excluding ANC	moles H ⁺ /t	72	280	120	180	280
Liming rate excluding ANC	kg CaCO ₃ /t	5.5	21	9.2	14	21
s-Net Acidity including ANC	%w/w S	0.12	0.45	<0.005	0.29	<0.005
a-Net Acidity including ANC	moles H ⁺ /t	72	280	<5	180	<5
Liming rate including ANC	kg CaCO ₃ /t	5	21	<0.75	14	<0.75
pH _{ox}	pH units	2.6	2.4	2.6	2.1	3.6
TPA pH 6.5	moles H ⁺ /t	58	130	250	840	280
s-TPA pH 6.5	%w/w S	0.09	0.20	0.40	1.3	0.44

Acid Sulphate Soil Suite - Extended

Our Reference		392291-A-23	392291-A-27	392291-A-33	392291-A-36	392291-A-37
Your Reference	UNITS	BH407	BH408	BH408	BH409	BH409
Depth		8-8.45	3-3.45	9-9.45	0.9-1	2.5-2.95
Date Sampled		29/09/2025	01/10/2025	01/10/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	16/10/2025	16/10/2025	16/10/2025	16/10/2025	16/10/2025
pH _{KCl}	pH units	8.9	8.7	6.9	5.3	7.0
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	6	<5
a-Chromium Reducible Sulfur	moles H ⁺ /t	250	380	550	30	70
Chromium Reducible Sulfur	%w/w	0.40	0.61	0.88	0.05	0.11
S _{KCl}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
S _{HCl}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
S _{NAS}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.80	4.2	0.35	[NT]	0.20
s-ANC _{BT}	%w/w S	0.26	1.3	0.11	[NT]	0.06
s-Net Acidity excluding ANC	%w/w S	0.40	0.61	0.88	0.059	0.11
a-Net Acidity excluding ANC	moles H ⁺ /t	250	380	550	36	70
Liming rate excluding ANC	kg CaCO ₃ /t	19	29	41	2.7	5.3
s-Net Acidity including ANC	%w/w S	0.15	<0.005	0.77	0.059	0.048
a-Net Acidity including ANC	moles H ⁺ /t	93	<5	480	36	30
Liming rate including ANC	kg CaCO ₃ /t	7	<0.75	36	3	2
pH _{ox}	pH units	2.5	2.7	3.2	2.2	2.3
TPA pH 6.5	moles H ⁺ /t	230	430	34	220	220
s-TPA pH 6.5	%w/w S	0.36	0.68	0.06	0.35	0.34

Acid Sulphate Soil Suite - Extended			
Our Reference		392291-A-47	392291-A-53
Your Reference	UNITS	BH410	BH410
Depth		2-2.45	8-8.45
Date Sampled		30/09/2025	30/09/2025
Type of sample		Soil	Soil
Date prepared	-	15/10/2025	15/10/2025
Date analysed	-	16/10/2025	16/10/2025
pH _{KCl}	pH units	8.5	7.6
s-TAA pH 6.5	%w/w S	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5
a-Chromium Reducible Sulfur	moles H ⁺ /t	210	60
Chromium Reducible Sulfur	%w/w	0.34	0.1
S _{KCl}	%w/w S	[NT]	[NT]
S _{HCl}	%w/w S	[NT]	[NT]
S _{NAS}	%w/w S	[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.90	0.45
s-ANC _{BT}	%w/w S	0.29	0.14
s-Net Acidity excluding ANC	%w/w S	0.34	0.096
a-Net Acidity excluding ANC	moles H ⁺ /t	210	60
Liming rate excluding ANC	kg CaCO ₃ /t	16	4.5
s-Net Acidity including ANC	%w/w S	0.048	<0.005
a-Net Acidity including ANC	moles H ⁺ /t	30	<5
Liming rate including ANC	kg CaCO ₃ /t	2	<0.75
pH _{ox}	pH units	2.6	2.6
TPA pH 6.5	moles H ⁺ /t	330	120
s-TPA pH 6.5	%w/w S	0.53	0.18

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Ideally samples should be received in the laboratory at <4°C. Please refer to SRA for sample temperature on receipt. Samples should also ideally be received within 24 hrs of sampling, otherwise there is the potential for oxidation to occur (as indicated by the lowering of the pH). Freezing the samples may help mitigate the potential for oxidation. Net acidity including ANC currently has no safety factor applied, however, some jurisdictions will apply a safety factor of 1.5. Neutralising value (NV) of 100% is assumed for liming rate The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: $\text{SNAS \%} = (\text{SHCL} - \text{SKCL}) \times 2$

Method ID	Methodology Summary
Inorg-068	Determination of Acid Sulphate Soil analysis - a sample is analysed by traditional titration method and ICP-OES analysis. Based on Acid Sulfate Soils Laboratory Methods Guidelines, latest edition. Ideally samples should be received in the laboratory at <4°C. Please refer to SRA for sample temperature on receipt. Samples should also ideally be received within 24 hrs of sampling, otherwise there is the potential for oxidation to occur (as indicated by the lowering of the pH). Freezing the samples may help mitigate the potential for oxidation. There is no documented official holding time for frozen samples, we have assigned an arbitrary 180 days to frozen samples. Neutralising value (NV) of 100% is assumed for liming rate. Net Acidity with ANC calculation should only be used when corroborated by other data that demonstrates the soil material does not experience acidification during complete oxidation under field conditions. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL results reported.

QUALITY CONTROL: Acid Sulphate Soil Suite - Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			15/10/2025	3	15/10/2025	15/10/2025		15/10/2025	[NT]
Date analysed	-			16/10/2025	3	16/10/2025	16/10/2025		16/10/2025	[NT]
pH _{kcl}	pH units		Inorg-068	[NT]	3	6.3	6.4	2	97.0	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	3	<0.01	<0.01	0	[NT]	[NT]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	<5	3	<5	<5	0	101	[NT]
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	<3	3	72	75	4	[NT]	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	3	0.12	0.12	0	96	[NT]
S _{KCl}	%w/w S	0.005	Inorg-068	<0.005	3	[NT]	[NT]		[NT]	[NT]
S _{HCl}	%w/w S	0.005	Inorg-068	<0.005	3	[NT]	[NT]		[NT]	[NT]
S _{NAS}	%w/w S	0.005	Inorg-068	<0.005	3	[NT]	[NT]		[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.05	Inorg-068	<0.05	3	[NT]	[NT]		98	[NT]
s-ANC _{BT}	%w/w S	0.05	Inorg-068	<0.05	3	[NT]	[NT]		[NT]	[NT]
s-Net Acidity excluding ANC	%w/w S	0.005	Inorg-068	<0.005	3	0.12	0.12	0	[NT]	[NT]
a-Net Acidity excluding ANC	moles H ⁺ /t	5	Inorg-068	<5	3	72	75	4	[NT]	[NT]
Liming rate excluding ANC	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	3	5.5	5.6	2	[NT]	[NT]
s-Net Acidity including ANC	%w/w S	0.005	Inorg-068	<0.005	3	0.12	0.12	0	[NT]	[NT]
a-Net Acidity including ANC	moles H ⁺ /t	5	Inorg-068	<5	3	72	75	4	[NT]	[NT]
Liming rate including ANC	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	3	5	6	18	[NT]	[NT]
pH _{ox}	pH units		Inorg-064	[NT]	3	2.6	2.6	0	102.0	[NT]
TPA pH 6.5	moles H ⁺ /t	5	Inorg-064	<5	3	58	58	0	[NT]	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	3	0.09	0.09	0	[NT]	[NT]

QUALITY CONTROL: Acid Sulphate Soil Suite - Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	53	15/10/2025	15/10/2025		[NT]	[NT]
Date analysed	-			[NT]	53	16/10/2025	16/10/2025		[NT]	[NT]
pH _{Kcl}	pH units		Inorg-068	[NT]	53	7.6	7.5	1	[NT]	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	[NT]	53	<0.01	<0.01	0	[NT]	[NT]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	[NT]	53	<5	<5	0	[NT]	[NT]
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	[NT]	53	60	55	9	[NT]	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	[NT]	53	0.1	0.09	11	[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.05	Inorg-068	[NT]	53	0.45	0.35	25	[NT]	[NT]
s-ANC _{BT}	%w/w S	0.05	Inorg-068	[NT]	53	0.14	0.11	24	[NT]	[NT]
s-Net Acidity excluding ANC	%w/w S	0.005	Inorg-068	[NT]	53	0.096	0.088	9	[NT]	[NT]
a-Net Acidity excluding ANC	moles H ⁺ /t	5	Inorg-068	[NT]	53	60	55	9	[NT]	[NT]
Liming rate excluding ANC	kg CaCO ₃ /t	0.75	Inorg-068	[NT]	53	4.5	4.1	9	[NT]	[NT]
s-Net Acidity including ANC	%w/w S	0.005	Inorg-068	[NT]	53	<0.005	<0.005	0	[NT]	[NT]
a-Net Acidity including ANC	moles H ⁺ /t	5	Inorg-068	[NT]	53	<5	<5	0	[NT]	[NT]
Liming rate including ANC	kg CaCO ₃ /t	0.75	Inorg-068	[NT]	53	<0.75	<0.75	0	[NT]	[NT]
pH _{ox}	pH units		Inorg-064	[NT]	53	2.6	2.6	0	[NT]	[NT]
TPA pH 6.5	moles H ⁺ /t	5	Inorg-064	[NT]	53	120	120	0	[NT]	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	[NT]	53	0.18	0.19	5	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Project No: 223528.01		Suburb: Arncliffe		To: Envirolab Services														
Project Manager: Matthew Bennett		Order Number:		Sampler: IH/RT														
Email: Matthew.Bennett@douglaspartners.com.au				Attn: Sample Receipt														
Turnaround time: ☒ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.com														
Prior Storage: ☐ Fridge ☒ Freezer ☐ Esky ☐ Shelf		Do samples contain 'potential' HBM? ☒ No ☐ Yes (If YES, then handle, transport and store in accordance with FPM HAZID)																
Lab ID	Sample ID			Date Sampled	Sample Type S - soil W - water M - Material	Container Type G - glass P - plastic	SCR Suite - Extended	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To															
21	BH401	6	6.45	3/10/25	S	P	X											
22	BH401	7	7.45	3/10/25	S	P	X											
13	BH402	3.2	3.65	9/10/25	S	P	X											
14	BH402	4	4.45	9/10/25	S	P	X											
6	BH403	5	5.45	9/10/25	S	P	X											
7	BH403	6	6.45	9/10/25	S	P	X											
28	BH405	5	5.45	8/10/25	S	P	X											
31	BH405	8	8.45	8/10/25	S	P	X											
Metals to analyse:														LAB RECEIPT				
Number of samples in container:						Transported to laboratory by:								Lab Ref. No: 392715-A				
Send results to: Douglas Partners Pty Ltd														Received by: A.B.M.				
Address: 96 Hermitage Road, West Ryde NSW 2114						Phone: (02) 9809 0666								Date & Time: 21/10/25 1006				
Relinquished by:						Date:				Signed:				Signed:				

CERTIFICATE OF ANALYSIS 392715-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01, Arncliffe</u>
Number of Samples	Additional analysis
Date samples received	10/10/2025
Date completed instructions received	21/10/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	28/10/2025
Date of Issue	28/10/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Nick Sarlamis, Assistant Operation Manager

Authorised By

Nancy Zhang, Laboratory Manager

Acid Sulphate Soil Suite - Extended

Our Reference		392715-A-6	392715-A-7	392715-A-13	392715-A-14	392715-A-21
Your Reference	UNITS	BH403	BH403	BH402	BH402	BH401
Depth		5-5.45	6-6.45	3.2-3.65	4-4.45	6-6.45
Date Sampled		9/09/2025	9/09/2025	9/10/2025	9/10/2025	3/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/10/2025	22/10/2025	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	23/10/2025	23/10/2025	23/10/2025	23/10/2025	23/10/2025
pH _{kcl}	pH units	7.0	5.8	4.8	4.3	6.7
s-TAA pH 6.5	%w/w S	<0.01	<0.01	0.02	0.04	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	14	23	<5
a-Chromium Reducible Sulfur	moles H ⁺ /t	50	50	77	62	75
Chromium Reducible Sulfur	%w/w	0.08	0.08	0.12	0.10	0.12
S _{KCl}	%w/w S	[NT]	[NT]	[NT]	0.017	[NT]
S _{HCl}	%w/w S	[NT]	[NT]	[NT]	<0.005	[NT]
S _{NAS}	%w/w S	[NT]	[NT]	[NT]	<0.005	[NT]
ANC _{BT}	% CaCO ₃	0.55	[NT]	[NT]	[NT]	[NT]
s-ANC _{BT}	%w/w S	0.18	[NT]	[NT]	[NT]	0.1
s-Net Acidity excluding ANC	%w/w S	0.080	0.081	0.15	0.14	0.12
a-Net Acidity excluding ANC	moles H ⁺ /t	50	50	92	86	75
Liming rate excluding ANC	kg CaCO ₃ /t	3.8	3.8	6.9	6.4	5.6
s-Net Acidity including ANC	%w/w S	<0.005	0.081	0.15	0.14	0.024
a-Net Acidity including ANC	moles H ⁺ /t	<5	50	92	86	15
Liming rate including ANC	kg CaCO ₃ /t	<0.75	4	7	6	1
pH _{ox}	pH units	3.1	2.5	2.5	3.0	2.9
TPA pH 6.5	moles H ⁺ /t	14	90	82	40	24
s-TPA pH 6.5	%w/w S	0.02	0.14	0.13	0.06	0.04

Acid Sulphate Soil Suite - Extended				
Our Reference		392715-A-22	392715-A-28	392715-A-31
Your Reference	UNITS	BH401	BH405	BH405
Depth		7-7.45	5-5.45	8-8.45
Date Sampled		3/10/2025	8/10/2025	8/10/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	23/10/2025	23/10/2025	23/10/2025
pH _{KCl}	pH units	6.6	7.2	6.7
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5
a-Chromium Reducible Sulfur	moles H ⁺ /t	1,000	37	42
Chromium Reducible Sulfur	%w/w	1.6	0.06	0.07
S _{KCl}	%w/w S	[NT]	[NT]	[NT]
S _{HCl}	%w/w S	[NT]	[NT]	[NT]
S _{NAS}	%w/w S	[NT]	[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.10	0.45	0.20
s-ANC _{BT}	%w/w S	<0.05	0.14	0.06
s-Net Acidity excluding ANC	%w/w S	1.6	0.060	0.068
a-Net Acidity excluding ANC	moles H ⁺ /t	1,000	37	42
Liming rate excluding ANC	kg CaCO ₃ /t	76	2.8	3.2
s-Net Acidity including ANC	%w/w S	1.6	<0.005	<0.005
a-Net Acidity including ANC	moles H ⁺ /t	990	<5	<5
Liming rate including ANC	kg CaCO ₃ /t	74	<0.75	<0.75
pH _{ox}	pH units	2.4	2.8	2.7
TPA pH 6.5	moles H ⁺ /t	980	41	25
s-TPA pH 6.5	%w/w S	1.6	0.07	0.04

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Ideally samples should be received in the laboratory at <4°C. Please refer to SRA for sample temperature on receipt. Samples should also ideally be received within 24 hrs of sampling, otherwise there is the potential for oxidation to occur (as indicated by the lowering of the pH). Freezing the samples may help mitigate the potential for oxidation. Net acidity including ANC currently has no safety factor applied, however, some jurisdictions will apply a safety factor of 1.5. Neutralising value (NV) of 100% is assumed for liming rate The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: $\text{SNAS \%} = (\text{SHCL} - \text{SKCL}) \times 2$

Method ID	Methodology Summary
Inorg-068	Determination of Acid Sulphate Soil analysis - a sample is analysed by traditional titration method and ICP-OES analysis. Based on Acid Sulfate Soils Laboratory Methods Guidelines, latest edition. Ideally samples should be received in the laboratory at <4°C. Please refer to SRA for sample temperature on receipt. Samples should also ideally be received within 24 hrs of sampling, otherwise there is the potential for oxidation to occur (as indicated by the lowering of the pH). Freezing the samples may help mitigate the potential for oxidation. There is no documented official holding time for frozen samples, we have assigned an arbitrary 180 days to frozen samples. Neutralising value (NV) of 100% is assumed for liming rate. Net Acidity with ANC calculation should only be used when corroborated by other data that demonstrates the soil material does not experience acidification during complete oxidation under field conditions. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL results reported.

QUALITY CONTROL: Acid Sulphate Soil Suite - Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			22/10/2025	13	22/10/2025	22/10/2025		22/10/2025	[NT]
Date analysed	-			23/10/2025	13	23/10/2025	23/10/2025		23/10/2025	[NT]
pH _{KCl}	pH units		Inorg-068	[NT]	13	4.8	4.9	2	99.0	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	13	0.02	0.02	0	[NT]	[NT]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	<5	13	14	12	15	102	[NT]
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	<3	13	77	72	7	[NT]	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	13	0.12	0.12	0	103	[NT]
S _{KCl}	%w/w S	0.005	Inorg-068	<0.005	13	[NT]	[NT]		[NT]	[NT]
S _{HCl}	%w/w S	0.005	Inorg-068	<0.005	13	[NT]	[NT]		[NT]	[NT]
S _{NAS}	%w/w S	0.005	Inorg-068	<0.005	13	[NT]	[NT]		[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.05	Inorg-068	<0.05	13	[NT]	[NT]		97	[NT]
s-ANC _{BT}	%w/w S	0.05	Inorg-068	<0.05	13	[NT]	[NT]		[NT]	[NT]
s-Net Acidity excluding ANC	%w/w S	0.005	Inorg-068	<0.005	13	0.15	0.14	7	[NT]	[NT]
a-Net Acidity excluding ANC	moles H ⁺ /t	5	Inorg-068	<5	13	92	85	8	[NT]	[NT]
Liming rate excluding ANC	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	13	6.9	6.4	8	[NT]	[NT]
s-Net Acidity including ANC	%w/w S	0.005	Inorg-068	<0.005	13	0.15	0.14	7	[NT]	[NT]
a-Net Acidity including ANC	moles H ⁺ /t	5	Inorg-068	<5	13	92	85	8	[NT]	[NT]
Liming rate including ANC	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	13	7	6	15	[NT]	[NT]
pH _{ox}	pH units		Inorg-064	[NT]	13	2.5	2.5	0	100.0	[NT]
TPA pH 6.5	moles H ⁺ /t	5	Inorg-064	<5	13	82	82	0	[NT]	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	13	0.13	0.13	0	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

CERTIFICATE OF ANALYSIS 396205

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01 Arncliffe</u>
Number of Samples	4 Soil
Date samples received	21/11/2025
Date completed instructions received	21/11/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	28/11/2025
Date of Issue	27/11/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Nick Sarlamis, Assistant Operation Manager

Authorised By

Nancy Zhang, Laboratory Manager

Acid Sulphate Soil Suite					
Our Reference		396205-1	396205-2	396205-3	396205-4
Your Reference	UNITS	BH401	BH401	BH405	BH409
Depth		11-11.45	17-17.45	14-14.45	13-13.45
Date Sampled		03/10/2025	03/10/2025	08/10/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	21/11/2025	21/11/2025	21/11/2025	21/11/2025
Date analysed	-	24/11/2025	24/11/2025	24/11/2025	24/11/2025
pH _{KCl}	pH units	7.2	6.4	6.0	6.0
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5
a-Chromium Reducible Sulfur	moles H ⁺ /t	<3	4	<3	<3
Chromium Reducible Sulfur	%w/w	<0.005	0.006	<0.005	<0.005
S _{KCl}	%w/w S	[NT]	[NT]	[NT]	[NT]
S _{HCl}	%w/w S	[NT]	[NT]	[NT]	[NT]
S _{NAS}	%w/w S	[NT]	[NT]	[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.20	[NT]	[NT]	[NT]
s-ANC _{BT}	%w/w S	0.06	[NT]	[NT]	[NT]
s-Net Acidity excluding ANC	%w/w S	<0.005	0.0060	<0.005	<0.005
a-Net Acidity excluding ANC	moles H ⁺ /t	<5	<5	<5	<5
Liming rate excluding ANC	kg CaCO ₃ /t	<0.75	<0.75	<0.75	<0.75
s-Net Acidity including ANC	%w/w S	<0.005	0.0060	<0.005	<0.005
a-Net Acidity including ANC	moles H ⁺ /t	<5	<5	<5	<5
Liming rate including ANC	kg CaCO ₃ /t	<0.75	<0.75	<0.75	<0.75
pH _{ox}	pH units	6.5	6.2	5.7	3.5
TPA pH 6.5	moles H ⁺ /t	<5	6	13	14
s-TPA pH 6.5	%w/w S	<0.01	0.01	0.02	0.02

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Ideally samples should be received in the laboratory at <4oC. Please refer to SRA for sample temperature on receipt. Samples should also ideally be received within 24 hrs of sampling, otherwise there is the potential for oxidation to occur (as indicated by the lowering of the pH). Freezing the samples may help mitigate the potential for oxidation. Net acidity including ANC currently has no safety factor applied, however, some jurisdictions will apply a safety factor of 1.5. Neutralising value (NV) of 100% is assumed for liming rate The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: $\text{SNAS \%} = (\text{SHCL} - \text{SKCL}) \times 2$

Method ID	Methodology Summary
Inorg-068	Determination of Acid Sulphate Soil analysis - a sample is analysed by traditional titration method and ICP-OES analysis. Based on Acid Sulfate Soils Laboratory Methods Guidelines, latest edition. Ideally samples should be received in the laboratory at <4°C. Please refer to SRA for sample temperature on receipt. Samples should also ideally be received within 24 hrs of sampling, otherwise there is the potential for oxidation to occur (as indicated by the lowering of the pH). Freezing the samples may help mitigate the potential for oxidation. There is no documented official holding time for frozen samples, we have assigned an arbitrary 180 days to frozen samples. Neutralising value (NV) of 100% is assumed for liming rate. Net Acidity with ANC calculation should only be used when corroborated by other data that demonstrates the soil material does not experience acidification during complete oxidation under field conditions. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL results reported.

QUALITY CONTROL: Acid Sulphate Soil Suite						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			21/11/2025	3	21/11/2025	21/11/2025		21/11/2025	[NT]
Date analysed	-			24/11/2025	3	24/11/2025	24/11/2025		24/11/2025	[NT]
pH _{KCl}	pH units		Inorg-068	[NT]	3	6.0	6.0	0	98	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	3	<0.01	<0.01	0	[NT]	[NT]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	<5	3	<5	<5	0	101	[NT]
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	<3	3	<3	<3	0	[NT]	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	3	<0.005	<0.005	0	99	[NT]
S _{KCl}	%w/w S	0.005	Inorg-068	<0.005	3	[NT]	[NT]		[NT]	[NT]
S _{HCl}	%w/w S	0.005	Inorg-068	<0.005	3	[NT]	[NT]		[NT]	[NT]
S _{NAS}	%w/w S	0.005	Inorg-068	<0.005	3	[NT]	[NT]		[NT]	[NT]
ANC _{BT}	% CaCO ₃	0.05	Inorg-068	<0.05	3	[NT]	[NT]		100	[NT]
s-ANC _{BT}	%w/w S	0.05	Inorg-068	<0.05	3	[NT]	[NT]		[NT]	[NT]
s-Net Acidity excluding ANC	%w/w S	0.005	Inorg-068	<0.005	3	<0.005	<0.005	0	[NT]	[NT]
a-Net Acidity excluding ANC	moles H ⁺ /t	5	Inorg-068	<5	3	<5	<5	0	[NT]	[NT]
Liming rate excluding ANC	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	3	<0.75	<0.75	0	[NT]	[NT]
s-Net Acidity including ANC	%w/w S	0.005	Inorg-068	<0.005	3	<0.005	<0.005	0	[NT]	[NT]
a-Net Acidity including ANC	moles H ⁺ /t	5	Inorg-068	<5	3	<5	<5	0	[NT]	[NT]
Liming rate including ANC	kg CaCO ₃ /t	0.75	Inorg-068	<0.75	3	<0.75	<0.75	0	[NT]	[NT]
pH _{ox}	pH units		Inorg-064	[NT]	3	5.7	5.7	0	[NT]	[NT]
TPA pH 6.5	moles H ⁺ /t	5	Inorg-064	<5	3	13	11	17	[NT]	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	3	0.02	0.02	0	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates can be downloaded from the [Envirolab Resources website](#) or obtained directly by contacting the laboratory.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Rev 0/April 2024

Appendix G

Liming Rate Calculation

1. Introduction

This Appendix provides background information on selection of liming material and the equations for the calculation of liming rates.

2. Neutralising materials

Agricultural lime (aglime) is the preferred neutralisation material for the management of ASS, as this material is usually the cheapest and most readily available product for acid neutralisation. Furthermore, aglime is slightly alkaline (pH of 8.5 to 9), non-corrosive, of low solubility and does not present handling problems or generate high pH leachate and it only liberates alkalinity in the presence of acid.

Dolomite and calcined magnesias also have low solubility, however, they produce magnesium sulfate during neutralisation reactions which is quite soluble and may degrade water quality in waterways if large quantities are produced. Aglime on the other hand hydrates to gypsum which is less soluble and therefore less likely to affect water quality and also has other beneficial impacts on soil properties particularly soil structure.

- Aglime comprises calcium carbonate (CaCO_3), typically made from limestone that has been finely ground and sieved to a fine powder. Aglime with the following properties are the preferred neutralising agent:
- Purity of at least 98% or better (i.e. $\text{NV} > 98$, where NV is the neutralising value, a term used to rate the neutralising power of different forms of materials relative to pure, fine calcium carbonate which is designated $\text{NV} = 100$);
- NOTE: There could be economic justification for using a less pure grade of aglime, however, under these circumstances, the individual lime dosing rates described in Section 13.3.3 would need to be carefully considered, as the cost savings from using less pure material may be offset by the corresponding increase in the required dosing rates (lime volumes required), and the transport and disposal costs; and
- Fine ground (at least <0.5 mm) and dry, as texture and moisture can decrease the effective NV.

Aglime requires no specialised handling, however, use of safe work practices and good hygiene practices are recommended to avoid eye or skin contact and inhalation. Aglime should be stored in a cool, dry, well-ventilated area inaccessible to the general public (refer to aglime safety data sheets (SDS) for further details). Any aglime stockpiles (where relevant) should be covered by a tarpaulin both to minimise wind erosion and wetting, as the material is more difficult to spread when wet.

Due to its low solubility in water, aglime is not suitable for the neutralisation of leachate, which requires a product with a very quick reaction and high solubility. The most suitable neutralising agent for leachate and retained drainage water/groundwater is slaked lime or hydrated lime (calcium hydroxide ($\text{Ca}(\text{OH})_2$)). This is made by treating burnt lime (calcium oxide (CaO)) with water (slaking) and comes as a fine white powder. It has a typical NV of about 135. Due to its very strong alkalinity (pH of about 12.5 to 13.5), slaked lime or hydrated lime should not be allowed to come into contact with the skin or be inhaled and care must be taken to not overshoot pH

adjustment with such alkaline agents. Hydrated lime is not recommended for soil neutralisation. Hydrated lime should be stored in cool protected place (e.g. locked store inaccessible to the general public) away from moisture, strong oxidants or acids and to minimise dust emissions and (refer to hydrated lime SDS for further details).

3. Liming rates

The required liming rate can be calculated from the following formula (per tonne or per m³).

Table 1: Liming rate equations

Equation 1 for kg lime /m ³ PASS	Equation 2 for kg lime /tonne PASS
$\left(\frac{\% S \times 623.7}{19.98} \right) \times \frac{100}{ENV(\%)} \times D \times FOS$	$\left(\frac{\% S \times 623.7}{19.98} \right) \times \frac{100}{ENV(\%)} \times FOS$

Notes:

Net acidity (%S) is derived using the maximum net acidity (%S) using the methods in Appendix C

623.7 = % S to mol H⁺ / t

19.98 converts mol H⁺ / t to kg CaCO₃/tonne

FOS = (factor of safety) = a minimum value of 1.5 needs to be adopted, although values of up to 2 can be suitable

ENV = Effective Neutralising Value (e.g. Approx. 98% for fine (0.3 mm grain size) aglime with an NV of 98%)

D = Bulk density, site specific results can be used, or the bulk densities in ASSMAC (1998)

The ENV is calculated based on the molecular weight, particle size and purity of the neutralising agent and should be assessed for proposed materials in accordance with ASSMAC (1998)

An initial liming rate (kg CaCO₃/t) based on the laboratory result calculation (excluding ANC) is considered appropriate based on it including a safety factor of 1.5 and the use of aglime with an NV of at least 98% and a grain size of less than 0.3 mm. The laboratory result must be multiplied by the soils bulk density (D) to convert to lime rate per volume of soil (kg CaCO₃/m³).

Depending upon the source of the aglime and ultimately the representative ENV of the aglime selected, the minimum lime dosing rate may be increased or decreased. Prior to the commencement of works, the minimum lime dosing rate should be finalised following review of the ENV of the selected aglime.

The liming rate to be calculated from the analytical results should therefore be considered as a 'starting point', and pH monitoring should be done during treatment to assess the progress of the neutralisation and the need for additional mixing and/or addition of aglime. Soil will only be considered to have been successfully treated when all soil has been verified in accordance with Section 14 of the ASSMP and Appendix C.

4. References

Stone, Y., Ahern, C. R., & Blunden, B. (1998). *Acid Sulfate Soil Manual*. Acid Sulfate Soil Management Committee (ASSMAC).

Appendix H

Contingency Options to On-Site Treatment

1. Introduction

This Appendix provides the contingency options to the selected management option.

For the purpose of this ASSMP, PASS are defined by NSW EPA *Waste Classification Guidelines Part 4: Acid Sulfate Soils* (NSW EPA, 2014). PASS are defined as:

- 'Soils that contain iron sulfides or sulfidic materials that have not been exposed to air and thus are not oxidised. The pH of these soils in their undisturbed state is 5.5 or more, making them neutral or slightly alkaline.'

2. Off-site treatment and disposal

Where on site treatment of PASS is not possible and / or practical then off-site treatment at a facility appropriately licenced to accept and treat such soil can be considered. The following general procedure is recommended for off-site treatment:

The below works will be undertaken:

- Loading the soil into trucks. If the soils are wet, they will be heavier than soils as normally transported at field moisture. This should be taken into consideration when loading trucks to ensure that trucks are not overloaded;
- Transport must be conducted in a sealed truck which prevents water leaking from the truck during transport;
- Completion of site records of the above and all information required by the treatment facility, and provision of copies of these records to the treatment facility;
- Transporting of soil to the treatment facility;
- Once the ASS have been accepted by the treatment facility they will treat and manage it in accordance with their EPL conditions, subject to the verification procedures documented herein. The liming rate will be based on the liming rate specified in this ASSMP;
- Verification of the treatment of the ASS and classification of the soil by the Environmental Consultant; and
- Transport of the treated, classified ASS to the final receiving site / disposal facility.

3. Off-site disposal as potential acid sulfate soil

3.1 Potential acid sulfate soil criteria

NSW EPA (2014) states that PASS may be disposed of in water below the permanent water table, provided:

- The soils meet the definition of VENM in all aspects other than the presence of sulfidic soils or ores;
- The pH of soils in their undisturbed state is pH 5.5 or more;

- The soil has not dried out or undergone any oxidation of its sulfidic minerals;
- Soil is received at the disposal point within 16 hours of excavation, and kept wet at all times between excavation and reburial at the disposal point;
- Appropriate records are provided to the receiving site with every truck load confirming that it meets the above criteria; and
- The receiving site meets its obligations under NSW EPA (2014) and its EPL conditions.

This is applicable for direct disposal of untreated PASS to a facility licenced by the EPA to accept untreated PASS.

Prior approval from the relevant licensed facility and the NSW EPA is recommended prior to implementation of this disposal option.

3.2 Disposal as potential acid sulfate soil

The below works will be undertaken by appropriately trained staff:

- Agreement with receiving site on acceptance times for trucks, and allowable time lapse between excavation and acceptance by receiving site;
- Soils will be kept wet at all times, and should be sprayed with water if required to keep them wet;
- Recording of the excavation date, time and source chainage of the excavated soil;
- Inspection of the excavated soil for moisture content, material texture/ signs of contamination concern, such as anthropogenic odours, staining or inclusions by all personnel involved in the management / handling of the spoil;
- If visual inspection of the spoil identifies materials not consistent with the materials assessed in situ (e.g. anthropogenic impact or fill are observed), then the spoil will be segregated for further assessment;
- Measuring the pH in at least one sample per 50 m³, or a minimum of 10 per shift, using a calibrated pH meter;
- If the pH is less than 5.5, the soil will not be classified as PASS, and the soil will be segregated for further assessment and treatment;
- Loading the soil into trucks and ensuring the soil is moist enough to prevent it drying out during transport. Note: due to the soils being wet, they will be heavier than soils as normally transported at field moisture (PASS estimated to be approximately 2 t/m³). This should be taken into consideration when loading trucks to ensure that trucks are not overloaded;
- Soil should be loaded and transported as soon as possible to minimise the risk of oxidation, which prevents it from being classified as PASS;
- Transport must be conducted in a sealed truck which prevents water leaking from the truck during transport;

Completion of site records of the above;

- Completion of records of all information required by the receiving site, and provision of copies of these records to the receiving site, including copies sent with the truck driver for the load being carried;

- Transporting of soil meeting the PASS requirements to the receiving site within 16 hours of excavation (or earlier if required by the receiving site);
- Once the PASS have been accepted by the receiving site, they are required to manage it in accordance with their EPL conditions and NSW EPA (2014). It is not the role of this document to discuss management of soil once they have been accepted by the receiving site; and
- Any soil which is rejected by the receiving facility will be transported back to the site and managed in accordance with the ASSMP.

4. Reburial on-site

Where possible (and if practical to do so) the ASS can be reburied on site, several metres below the permanent water line / at least 1 m deeper than the seasonally lowest water table provided the soil meets the definition of PASS and the soil is reburied before the soil has a chance to oxidise. Strategic reburial.

There are a number of risks associated with this management option including:

- Maintaining oxygen exclusion at all stages during the burial process;
- Ability to keep oxygen away from final placement area in the long term;
- Difficulty in locating the seasonally lowest water table (ideally established through long-term monitoring prior to works commencing);
- Difficulties in placement and compaction of soils beneath a permanent water table; and
- Potential resuspension of materials.

If reburial is proposed, development of site-specific management procedures, monitoring requirements and verification testing will be required with reference to Dear et al., (2024).

5. References

Dear, S. E., Williams, K. M., McElnea, A. E., Ahern, C. R., Dobos, S. K., Moore, N. G., & O'Brien, L. E. (2024). *Queensland acid sulfate soil technical manual : soil management guidelines version 5.1*. Department of Environment, Science and Innovation.

NSW EPA. (2014). *Waste Classification Guidelines, Part 4: Acid Sulfate Soils*. NSW Environment Protection Authority.

Appendix I

Water and Groundwater Management

1. Introduction

Water is the main mechanism by which acid and metals from oxidised ASS are mobilised and transported. Careful management of water is therefore important to the effective management of potential adverse impacts from ASS disturbance. Management is required to provide control of treated waters for discharge and provide some margin for heavy rain periods.

The below sections provide potential strategies for management, assessment and disposal of water leaching from ASS, surface water and water from groundwater dewatering.

2. Leachate and surface water collection

All water that has been in contact with ASS / assumed ASS must be managed, assessed, treated and appropriately disposed of in accordance with the environment protection licence (EPL) and ASSMP.

3. Water storage and treatment

Water from dewatering and the ASS leachate should either be pumped directly to an on-site treatment plant for treatment or should be stored in a tank or lined drains / detention basin prior to assessment / treatment.

At a minimum, the combined storage should be designed to store enough water to contain leachate and extracted water from a 1 in 10-year (1 hour) storm event.

4. Water assessment for disposal

Water which has come into contact with ASS requires assessment (monitoring) and if necessary, treatment. The consent authority in the local jurisdiction should be consulted for specific approvals and target levels for disposal. It is further recommended that pre-disposal water assessment of groundwater and receiving bodies is done to ensure the target levels in Table II are suitable (i.e., adjustment of these target levels may be appropriate, subject to approval by the consent authority, where background concentrations for the receiving environment differ from the target levels in Table II). The minimum monitoring requirements are outlined in Table II, below.

Table II: Water monitoring analytes and frequency

Test	Parameters	Comments
Groundwater		
Physical parameters	Water level, discharge rate	Monitored daily during discharge.
Field parameters	pH, EC, Eh (redox), DO, smell of noxious gases (qualitative)	Monitored daily during discharge, reducing over time. The pH of should be 6.5 to 8.5 or one pH unit from the

Test	Parameters	Comments
		background pH of the receiving surface water body.
Major cations, anions and nutrients	Major cations, anions and nutrients	Monitored monthly initially to characterise groundwater facies (types), and if field parameters indicate a risk, for example decreasing pH.
Metals	Total and dissolved metals (including Al and Fe)	Monitored monthly initially and if field parameters indicate a risk, for example decreasing pH.
Nutrients	Nitrogen, Ammonia	Monitored daily during discharge. Assessed against the Default Guideline Values in ANZG (2018). Reference should be made to Douglas' DSI Report 92400.01.R.001.Rev0.
Soil materials within dewatered zone(s)	Net Acidity, peroxide pH	This may be useful if acidic conditions are formed to assess the loss and continued existing hazard in the area of dewatering, which may improve the CSM and understanding of the site. May or may not be necessary depending on degree of risk.
Soil materials within dewatered zone(s)	Visual observations	The formation of easily identifiable minerals such as straw-yellow jarosite occurs at an advanced stage of acidification. Once formed, these sparingly soluble minerals are difficult to remove and may prolong remediation efforts.
Surface water		
Field parameters	pH, EC, DO	Monitored daily during discharge, reducing frequency over time.
Metals	Total and dissolved metals (including Al and Fe)	Monitored monthly initially and if field parameters indicate a risk, for example decreasing pH.

5. Treatment

5.1 General

The potential impacts of ASS on water generally comprise a decrease in pH, possible elevated TSS / turbidity, iron, aluminium and other metals.

Treatment of water from construction sites is commonly required for pH and TSS. Aeration and removal of TSS also generally decreases metal concentrations in the water. Therefore an on-site water treatment plant is considered likely to be suitable for treatment of ASS impacted water that has not been oxidised.

An alternative treatment method for pH is provided in Section 5.2 in case treatment of excess water above the capacity of the treatment plant is required.

If a suitable treatment method for man-made contaminants in the water (e.g. PFAS, VOC, PAH, TPH, BTEX, OCP, metals etc) cannot be implemented, an alternative disposal method may be required (e.g. trucking off-site to a liquid waste disposal facility or disposal to sewer in accordance with a specific Trade Waste Agreement which would need to be obtained from the relevant water / wastewater authority).

5.2 Alternative pH treatment method

It is noted that aglime is generally not suitable for the treatment of leachate / dewatering effluent due to its low solubility in water. A commercial pH adjustment product can be used, or else slaked lime (hydrated lime) as discussed below.

Alternative neutralisation materials include calcined magnesia (magnesium hydroxide, burnt magnesite, or magnesia) and calcium hydroxide (commonly called slaked or hydrated lime).

Calcined magnesia (magnesium hydroxide, burnt magnesite, or magnesia) produces a two-step reaction, which proceeds rapidly at acidic pH and slows down as higher pH is approached, and hence reduces the potential for over-neutralisation. It should be added to the leachate as a slurry and mixing achieved via use of an agitator.

A calcium hydroxide (commonly called slaked or hydrated lime) solution can be produced by stirring calcium oxide (commonly called quicklime) into water, in a container of sufficient volume (for example, a plastic 200 litre drum). The slurry should be allowed to settle, and the clear solution (which will be caustic, with a pH of approximately 12.5 to 13) can be pumped or sprayed into the standing water in small amounts, with some agitation and monitoring. This procedure should be continued until the pH is adjusted to acceptable levels. Adequate care should be taken not to 'overshoot' the desired pH with calcium hydroxide.

Quicklime is very reactive, and relatively corrosive (due to its caustic nature). When quicklime is mixed with water, the resulting reaction generates heat. Therefore, if used, the material should be added in increments to a large amount of water to control the reaction. Slaked or quicklime should not be allowed to come into contact with the skin or be inhaled during use.

As a guide, the approximate quantities of slaked lime required to neutralise acidic water (i.e. to raise the existing pH to approximately pH 7 / neutral) are provided in Table I2.

Table I2: Approximate liming rates for water for slaked lime (kg slaked lime)

Water pH	Volume of water		
	10 m ³	50 m ³	100 m ³
2	3.7	18.5	37

3	0.37	1.85	3.7
4	0.037	0.185	0.37
5	0.0037	0.0185	0.037
6	0.00037	0.00185	0.0037

6. Water discharge

Following treatment (if required) the water should be assessed to determine if it meets the EPL conditions / discharge criteria. Water meeting the conditions can then be disposed of accordingly.

Depending on site conditions, alternative options for water disposal include on-site reinjection, overland infiltration or infiltration via excavation or surface water body.