



REPORT TO
INFRASTRUCTURE NSW

ON
GEOTECHNICAL ASSESSMENT

FOR
PROPOSED FORESHORE REDEVELOPMENT

AT
BLACKWATTLE BAY FORESHORE, PYRMONT, NSW

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Table 1: Rock Classification Summary

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Figure 2: Borehole Location Plan

Figure 3: Rock Contour Plan

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Vibration Emission Design Goals

Appendix A: Borehole Logs from Previous Investigations

Report Explanation Notes

1 INTRODUCTION

This report presents the results of a geotechnical assessment for the proposed Blackwattle Bay foreshore redevelopment at Pyrmont, NSW. The location of the site is shown in Figure 1. The assessment was commissioned by Infrastructure NSW and was carried out in general accordance with our fee proposal, Ref: P58584SF Rev1 dated 12 May 2023.

We understand that redevelopment of the above site is likely to comprise demolition of the existing Fish Markets and construction of a waterfront promenade with the remaining area sub-divided for mixed-use development. Details on the potential mixed-use developments are unavailable but for the purposes of this report we have assumed the developments will comprise multi-storey buildings over one or more basement levels.

The purpose of the assessment was to obtain geotechnical information on the subsurface conditions, and to use this as a basis for providing comments and recommendations on additional geotechnical investigations, site preparation, excavation conditions, hydrogeological considerations, design parameters, retention systems, footings and basement slabs.

2 ASSESSMENT PROCEDURE

The assessment comprised:

- A site walkover on 18 May 2023 by our Associate Geotechnical Engineer.
- A search of the JK Geotechnics project database to identify relevant geotechnical investigations completed nearby.
- A review of the provided documents and information, including the Environmental Site Assessment report prepared by JBS&G.
- A review of aerial photography and digital street view (NearMap and Google Earth).
- A review of the regional geology maps.

No subsurface investigations were carried out as part of this assessment.

3 RESULTS OF ASSESSMENT

3.1 Site Description

The subject site is situated on the eastern foreshore of Blackwattle Bay and extends from Pymont Bridge Road at the southern end to the boundary with 17-19 Bank Street at the north-western end. The site is bounded by Bank Street along the northern boundary. The area is shown on the attached Figures 1 to 3. Please note, some areas, such as the Hymix plant, were not inspected due to access constraints.

Behind the seawalls the foreshore area is generally flat, with a gentle slope towards the bay at about 1° to 2°. Ground levels range from about RL 1.5m in the north-west to about RL 3.2m in the south-east, adjacent to the main Fish Markets building. A number of different types of sea wall and revetment are present. These are discussed further below. There were three timber jetties present along the foreshore extending up to 100m into Blackwattle Bay. The Anzac Bridge is present over the north-eastern extent of the site, with the bridge structure being relatively low towards the south-eastern corner of the site over a portion of the Sydney Fish Markets car park.

At the time of the assessment, where buildings were not present, much of the area was paved with asphaltic concrete and used mostly for trafficking, car parking, storage for the fishermen and storage of a number of shipping containers. All of the concrete and AC surfaced areas were generally in fair condition. There were some areas of cracking and a number of repairs had been made to some areas of the AC.

In the southern portion of the foreshore, is the Sydney Fish Markets consisting of the main building covering the southern portion of the subject site. A number of single storey structures are present around the perimeter of the external car park area. North-east of the Sydney Fish Markets property is a Hymix concrete plant. As mentioned above, access was not possible into the Hymix area, however it appears to comprise mostly concrete pavements and a number of structures and silos. The remaining areas north-west of the Hymix plant are one to two storey industrial units that generally appeared in fair condition.

The foreshore walls, where visible, were a hybrid mixture of concrete and sandstone block walls, with some sections where no foreshore walls were present, although there was evidence that walls may have once been present, as shown in Plate 1 below. The face of the present walls varied between roughly 30° to the horizontal and sub-vertical. The walls were generally in poor to moderate condition, with evidence of subsidence and overturning of some sections of wall.



Plate 1 – Foreshore area north of jetty at the existing Fishmarkets

3.2 Previous Investigations

Based on our review of the JK Geotechnics database and project information, the following investigations have relevant geotechnical information at the subject site:

- JK Geotechnics carried out an on-shore and off-shore geotechnical investigations in late 1988 and early 1989 comprising of four augered boreholes extending to depths between 7.0m and 13.7m below existing surface levels. Two boreholes were on-land and two were over-water. The adopted nomenclature of these boreholes is '1-1989', '2-1989', etc.
- JK Geotechnics carried out an on-shore and off-shore geotechnical investigations in 1995 comprising of twelve (12) boreholes, BH201 to BH212, four of which were off-shore. The boreholes extended to depths between 2.0m and 7.5m below existing surface levels. Three boreholes were auger drilled with the remaining nine boreholes core drilled.
- JK Geotechnics carried out an on-shore geotechnical investigations in 1998 comprising of five augered boreholes, BH301 to BH305, to depths between 1.0m and 4.5m below existing surface levels.
- JK Geotechnics carried out an on-shore geotechnical investigations in 2001 comprising of five augered boreholes, BH401 to BH405, extending to depths between 3.0m and 10.5m below existing surface levels.
- JK Geotechnics carried out an on-shore geotechnical investigations in 2010 comprising of twenty-four (24) boreholes, BH501 to BH524, extending to depths between 0.6m and 13.31m below existing

surface levels. Twelve of the boreholes, BH501 to BH512, were core drilled, with the remaining twelve boreholes, BH513 to BH524, auger drilled.

- The JK Group environmental division, JK Environments (formerly Environmental Investigation Services), carried out an on-shore geotechnical investigations in 2010 comprising of ten (10) augered boreholes, BH601 to BH610, extending to depths between 1.5m and 6.0m below existing surface levels. Note that these boreholes were not logged to geotechnical standards but nevertheless provide useful information.
- JK Geotechnics carried out an on-shore and off-shore geotechnical investigations for the proposed Bank Street commercial wharf in 2015 comprising of nineteen (19) cored boreholes extending to depths between 5.1m and 29.0m below existing surface levels. For the inclusion into this report, two boreholes are considered relevant, BH3 and BH12.
- JK Geotechnics carried out an on-shore and off-shore geotechnical investigations for the new fish market in 2017 comprising of thirty-six (36) cored boreholes extending to depths between 8.06m and 29.27m below existing surface/seabed levels. For the purposes of this report, the relevant boreholes are BH15, BH22 to BH27, BH102, BH103 and BH116 to BH118.

Reference was made to the boreholes recently drilled by JBS&G, however the borehole logs are not logged geotechnically and therefore generally yield minimal additional information with respects to the ground conditions. Furthermore, the above previous geotechnical investigations provide extensive data across the subject site with very few data gaps.

Reference should be made to the attached Figures 2 and 3 for the borehole location plan and the top of rock level contour plan. It should be noted that the rock contours (in mAHD) are based on uniform gradients of the rock surface between points of known level; the actual surface may well comprise a series of steps and benches which should be taken into account when considering any future developments. Geotechnical sections have been prepared and presented as the attached Figures 4, 5 and 6. The borehole logs have been attached as Appendix A for further reference.

3.3 General Geology and Subsurface Conditions

The 1:100,000 Geological Map of Sydney shows the site to be underlain by Hawkesbury Sandstone (Tuth) over the north-western portion of the site and from about 100m behind the foreshore over the southern portion of the site, as shown in Plate 1 below. Over the remaining areas the geological map indicates the site is underlain by man-made fill (reclaimed area, QH_hr) over Quaternary age alluvial soils (QH_ebw) comprising silty to peaty sand, silt and clay. A dyke or vein also appears to extend through the site from the north to south, as shown in Plate 1 below.

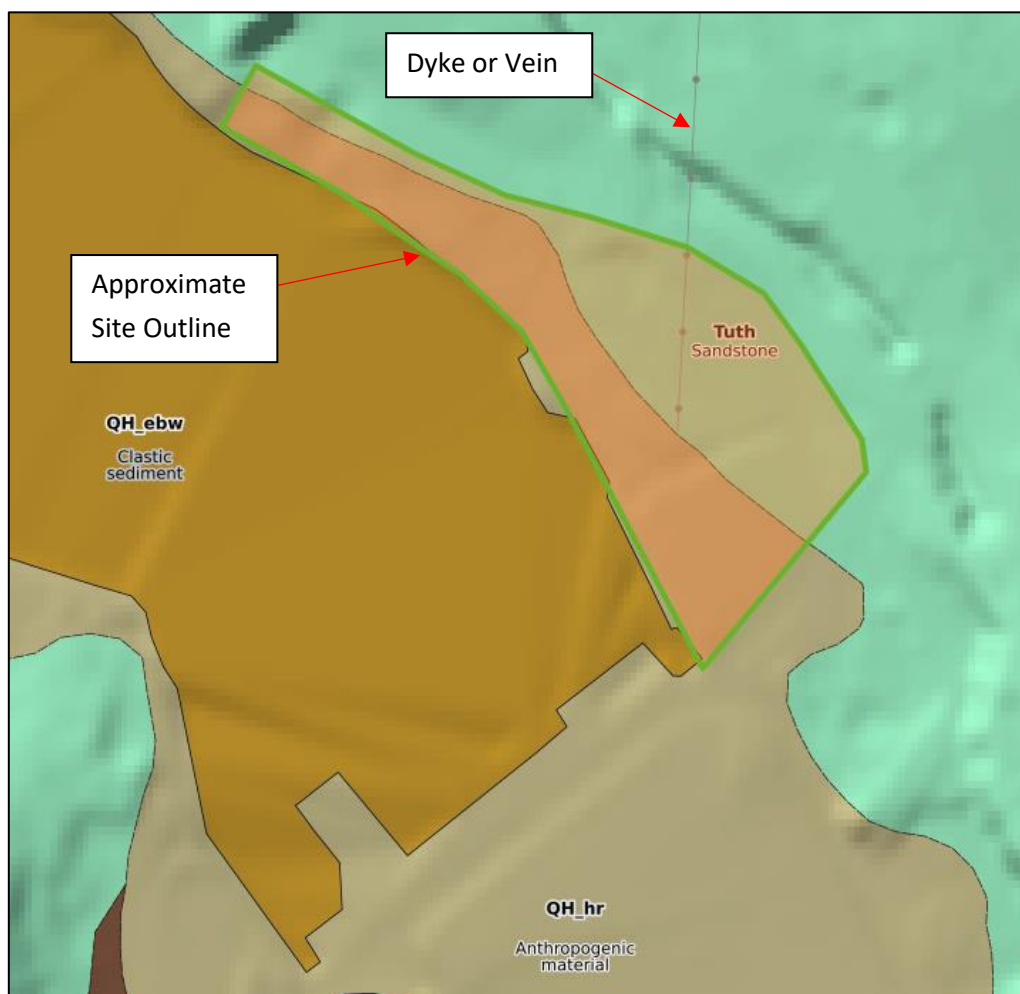


Plate 2 – Geological map overlay (Tuth=Hawkesbury Sandstone, QH_hr=Reclaimed Estuarine areas, QH_ebw=Estuarine Basin and Bay)

In general terms, the on-shore portion of the site is underlain by fill and natural soils overlying sandstone bedrock, while the off-shore area contains both sands and clays over sandstone bedrock. Many of the boreholes closer to the shore have disclosed significant amounts of sandstone rubble of cobble and boulder size, within a matrix of clay and sand; this layer is assumed to be from the reclamation of the site with sandstone rubble being pushed into the bay, and at least some of the lower strength soil being displaced.

The subsurface conditions encountered during the investigations comprise five main units, including one unit, Unit 4, which is split into two sub-units, Units 4A and 4B. Some of the characteristic features of the materials

encountered are described below. For further details of these strata, reference should be made to the attached borehole logs and the sections provided as Figures 4, 5 and 6.

UNIT 1

Unit 1 comprises granular terrestrial fill, mostly sand and gravelly sand with varying proportions of silt, clay and somewhat frequent cobbles and boulders of concrete, rubble and brick. We note some boreholes encountered drilling refusal within the fill, such as BH518, BH519 and BH521. The fill was mostly moist, with the upper material usually being assessed as well compacted, but reducing to moderately or poorly compacted with depth. This unit was not encountered in the boreholes drilled off-shore within Blackwattle Bay.

UNIT 2

Unit 2 comprises predominantly granular fill material present below the high tide level, often comprising clayey sand or gravelly sand, though in places comprises a significant proportion of sandstone cobbles and boulders with an infill of sand or clayey sand. This material was assessed to be poorly compacted, and likely comprises fill material pushed into the bay which has largely displaced the surface layer of very soft clayey soil from the near shore area. These soils appeared to extend to a maximum depth of about 6m in the boreholes.

UNIT 3

The recent marine and estuarine deposits comprise silty and clayey sands with occasional clay and silt bands, although there were areas where sandy clays were also encountered. For convenience these are often referred to as alluvial soils. There were a number of boreholes where Units 1 and 2 directly overlay the sandstone bedrock and Unit 3 was not encountered. The sandy soils were assessed as being very loose or loose and either moist or wet. The sandy clay soils varied from firm, stiff and up to very stiff in strength. Unit 3 typically extended to the top of bedrock at depths between 0.4m and 12.8m.

UNIT 4

Unit 4 comprises sandstone bedrock, and was encountered from depths ranging between 0.4m and 12.8m below the existing surface levels, or between about RL-15.7m and RL6.0m. The top of bedrock is relatively shallow over the north-eastern portion of the site and then has a general gradient down towards Blackwattle Bay, although more likely will comprise a series of buried cliff lines/rock ledges of varying heights as is common with Hawkesbury Sandstone. It must also be noted that some boreholes do not have a surface reduced level and therefore only the depths were included in the above ranges.

At first contact, the bedrock varies across the site with either extremely weathered sandstone of extremely low to very low strength or distinctly weathered sandstone of low to medium strength encountered. There does appear to be a trend of better rock at first contact within the boreholes closer to the shore than those deeper out in the bay. The bedrock strength improves to at least medium strength within all boreholes, although the sandstone within BH14, BH15, BH103, BH111 and BH116 was highly fractured due to suspected presence of a dyke and/or diatreme in the area with the associated faulting. Very high strength rock was also encountered in a few boreholes, potentially due to alteration by the dyke/diatreme intrusion. These

geological features appear to be localised to the southern end of the subject site, with the potential dyke highlighted yellow on the attached Figure 2.

The recovered core within all boreholes generally contained a high number defects which included:

- Sub-horizontal bedding
- A large number of planar (occasionally undulating) joint defects typically dipping at between 50° and 90°, although occasionally less steeply sloping joints dipping at 10° to 30° were encountered. The joint interfaces were typically tight and rough with occasional iron-staining.
- Some generally sub-horizontal extremely weathered and clay seams dipping at between 0° and 10° ranging between 1mm and 150mm in thickness.

Reference to Table 1 accompanying this report shows the depths to the various classes of sandstone bedrock encountered. A rock contour plan representing the top of bedrock is presented in Figure 3; the contour lines have been interpolated from the borehole logs only and some variation of the rock level may be present between borehole locations.

GROUNDWATER

Given the proximity of Blackwattle Bay and the permeable silty and clayey sandy fill and soils, the groundwater will be tidal. High tide levels will typically be under RL1m, although may fluctuate higher during periods of heavy rainfall. The groundwater levels generally will be at or somewhat above the tidal level. Where the bedrock level is high enough to be above the tidal zone, the groundwater is still expected to be tidal although may be less responsive. Perched groundwater is likely to occur over the sandstone bedrock.

3.4 Laboratory Test Results

The results of the Atterberg Limits and Linear Shrinkage tests on the natural clays indicated a range from medium to high plasticity and showed good correlation with the field logging. The moisture content of the soils near the seabed have relatively high moisture contents of up to 62.3% with the deeper soils generally ranging between about 15% and 36%.

The Particle Size Distribution tests indicated that the alluvial clayey sand samples generally comprised medium to coarse grained sands with minor amounts of fine grained sand and between 19% and 49% of silt and clay content.

Hydrometer tests were carried out on samples of the finer grained alluvial soils, the clay contents ranged from 51% to 72% in four samples whilst the remaining test samples indicated lower clay contents. The clay soils contained varying amounts of fine to coarse grained sand, generally varying from 4% to 35%, with one exception in BH22 at 0.0m to 0.5m where the sample contained 44% sand, BH112 that contained 63% sand and BH116 that contained 58%.

The Point Load Strength Index Test results indicated that the rock core ranged between very low strength to very high strength sandstone with estimated Unconfined Compressive Strengths (UCS) varying from 1MPa to 102MPa. The strengths correlated well with the field logging as shown on the borehole logs.

The Emerson Class Number test results indicated that the samples were generally classified as either Emerson Class Number 2 or 4, whereby Class 2 indicates slaking of the samples with some dispersion when placed in water. Class 4 indicates slaking of the sample but no dispersion of the soil. The test completed on a sample taken from BH14 at 4.00m to 4.30m depth returned an Emerson Class 7 indicating no slaking occurred throughout the test. A sample from BH111 at 7.50 to 7.95m depth returned an Emerson Class 3 indicating moderate dispersion of remoulded soil in water.

CBR testing was completed on two samples of the silty sand and gravelly sand fill. These tests returned results of 5% and 25%. The CBR tests on the predominately gravelly silty sand fill ranged from 12% to 15%. The CBR test on the sandy clay (with sandstone bands) was 8%.

The soil pH test results indicate that the fill profile is alkaline with pH values generally of 9.9 to 11.2, while the natural sand is slightly alkaline with pH values generally of 7.3 to 8, although as low as 4.1. The same samples for the natural sand and fill profile had contents of 380mg/kg, 410mg/kg, 44mg/kg, 160mg/kg and 7.9mg/kg for sulphate, 33mg/kg, 61mg/kg, 28mg/kg, 99mg/kg and 23mg/kg for chloride and the electrical resistivity generally ranged from 1.1ohm.m to 7.1ohm.m.

4 COMMENTS AND RECOMMENDATIONS

4.1 Summary of Principal Geotechnical Findings, Issues and Further Work

The geotechnical issues associated with future developments on the subject area will be dependent on the nature of each individual project. As discussed in Section 1, the following advice is on the basis of a waterfront promenade and with the remaining areas comprising multi-storey developments over one or more basement levels.

For the most part, the proposed buildings will involve geotechnical issues such as site preparation, excavation, retention, hydrogeological considerations, footings, basement slabs and pavements. Preliminary comments on each of these likely issues are provided in the following sections and must be reviewed following site-specific investigations and once development details are known. Site-specific are likely to comprise the drilling of additional cored boreholes to sufficient depth based on the development details, as well as the installation of groundwater monitoring wells for longer-term groundwater monitoring.

As discussed in more detail in Section 3.2, the boreholes penetrated a cover of pavement and fill overlying (in some places) marine/estuarine soils and then weathered sandstone bedrock at depths ranging from 0.4m and 12.8m below the existing surface levels, or between about RL-15.7m and RL6.0m. Groundwater is assumed to be tidal with a high tide level below about RL1m, although may fluctuate higher during periods of heavy rainfall.

We have summarised the principal geotechnical findings, issues and recommendations to be considered in the planning and design of the development as follows.

1. Excavation for proposed basements will be through pavements, fill, marine/estuarine soils and then predominantly through sandstone bedrock of up to medium and high strength. Excavation of the sandstone will require the use of “hard rock” excavation equipment for effective excavation, which may transmit vibrations through the rock mass that could affect adjoining infrastructure.
2. The proposed basements will extend below the measured groundwater level, unless the lowest basement level remains above about RL1m, pending long-term groundwater monitoring to confirm the tidal range and response to rainfall. Given the high permeability of the soils, but the expected relatively low permeability of the sandstone bedrock, we expect seepage rates to be manageable using conventional sump and pump methods, provided the retention system achieves a good groundwater cut-off into the good quality sandstone. We envisage that basement will need to be a water-tight (tanked) structure. The retention system should be reviewed following further analysis of expected groundwater seepage into the excavation and the proposed basement construction techniques. Approval of the basement will need to be obtained from WaterNSW/Department of Planning and Environment requiring additional analysis.
3. The retention systems should comprise a relatively impermeable shoring wall that may be terminated in the good quality sandstone bedrock above the bulk excavation level. The sandstone bedrock of medium strength or better may then be excavated vertically without support provided regular inspections by a geotechnical engineer are carried out. A good cut-off will be critical to limit groundwater inflows into the basement excavation during construction. Further investigations of the permeability of the subsurface profile will be required.
4. The footing systems may comprise both high level pad/strip footings where sandstone is exposed within the excavation and piles where sandstone is not encountered so that the structures are uniformly supported on footings founded in the underlying sandstone bedrock. Depending on the allowable bearing pressure adopted for the footings, geotechnical inspections and testing of the footing excavations will have to be scheduled.
5. The proposed pavements will generally overlie sandy fill and so suitable subgrade preparation must be undertaken prior to pavement placement and appropriate drainage installed.
6. We recommend a detailed structural assessment of the existing sea walls be undertaken. However, based on our cursory inspection, we expect for the most part that new sea walls will need to be constructed to support the proposed waterfront promenade.

Further comments on these issues and geotechnical design parameters are provided in the subsequent sections of this report.

Whilst extensive investigations have been undertaken over the Sydney Fish Markets footprint, not all boreholes will be relevant for the proposed mixed-use developments and therefore further detailed geotechnical investigations will be required once details of the developments are known, partly to satisfy

WaterNSW requirements which are very prescriptive. Given the proposed developments will need to be uniformly founded on bedrock, as well as presumably achieve groundwater basement cut-off into the underlying bedrock, the investigations will be targeted at obtaining sufficient information on the bedrock. We expect the following will be required:

- Deep cored boreholes to a depth of either at least 3m below proposed bulk excavation level or into sandstone bedrock of the required classification, whichever is deeper. At least one borehole per development to much greater depth to determine whether a different aquifer system is present at depth.
- Packer tests within the cored boreholes to assess the permeability of the rock.
- Installation of numerous groundwater monitoring wells and long-term monitoring with electronic data loggers.
- Permeability testing within the monitoring wells to assess the permeability of the soils.
- Analysis of shoring wall deflections and groundwater inflows into basements.
- Over-water boreholes may also be required if additional information is required for the new sea wall design to support the proposed waterfront promenade.

4.2 Site Preparation

The following subgrade preparation should be undertaken in any areas where new pavements will be constructed or minor earthworks are undertaken to regrade the site.

Any existing pavement should be removed from the area and disposed of. Any excavation to achieve the required subgrade level should then be readily achieved using conventional earthmoving equipment such as tracked excavators, though we note that the presence of oversize particles such as cobbles in the fill may cause some difficulties in scraping back to a smooth surface and result in a rough excavated surface.

The exposed surface should then be proof rolled using at least six passes of a 10 tonne minimum deadweight smooth drum roller, with the final two passes being completed in the presence of a geotechnical engineer. The purpose of the proof rolling is to improve the near surface compaction and to aid in the identification of any soft or heaving areas. Soft or heaving areas should be excavated to a depth of at least 0.7m below the proposed subgrade level, and will probably have to be replaced with a geogrid and crushed rock bridging layer; this bridging layer or other treatment should be detailed at the time of proof rolling so that it appropriately addresses the issue causing the heaving.

Following successful proof rolling, any fill required to achieve the subgrade level should be placed as engineered fill. Engineered fill should comprise a well graded, select granular material such as ripped or crushed sandstone with a maximum particle size not exceeding 75mm, and containing no organics or other deleterious substances. Much of the fill excavated from the site is likely to be suitable for reuse as engineered fill, subject to confirmation by a geotechnical engineer at the time of the works, provided any oversize

material is removed such as by using a sieve bucket on an excavator and it is moisture conditioned as necessary.

Engineered fill should be placed in layers not exceeding 200mm loose thickness, and be compacted to a density of at least 98% of Standard Maximum Dry Density (SMDD). Clayey fill should preferably not be used as it is a more reactive material where there could be changes in moisture content, and it provides inferior support to structures and pavements than granular fill. However if clayey fill is used, it should be compacted to strictly between 98% and 102% of SMDD, at a moisture content with 2% of the Standard Optimum Moisture Content (SOMC).

In-situ density tests should be completed on each layer of fill to confirm the target density is being achieved. The frequency of tests should be completed in accordance with at least the minimum requirements specified in Table 8.1 of AS3798-2007. If a higher level of quality assurance is required, then consideration should be given to adopting Level 1 inspection and testing in accordance with AS3798-2007.

4.3 Excavation Conditions

Excavation recommendations provided below should be completed by reference to the latest version of the NSW Government “Code of Practice Excavation Work”. We expect the proposed basements will extend through the upper fill and soils, however all or portions of the basements will extend into sandstone bedrock, potentially of up to high strength. Excavation of the soils and bedrock up to very low strength may be completed using conventional earthwork equipment, such as hydraulic excavators with a bucket attachment. However, bedrock of low strength or better will comprise ‘hard rock’ excavation techniques and require the use of rock excavation techniques, such as ripping tynes fitted to excavators or dozers, hydraulic impact hammers, rock saws or rock grinders. Care will need to be taken when excavating using hydraulic impact hammers that vibrations transmitted to adjoining structures do not exceed tolerable levels.

The use of rock excavation plant will cause noise and vibrations. Noise and vibrations should be closely monitored and we recommend that an acoustic consultant be commissioned to prepare a vibration monitoring plan and to undertake any monitoring deemed required. Guideline levels of vibration velocity for evaluating the effects of vibration in structures are given in the attached Vibration Emission Design Goals sheet.

4.4 Hydrogeological Considerations

As discussed in Section 3.3, the groundwater table will be tidal with high tide level expected to extend up to about RL1m, although may fluctuate higher during heavy rainfall periods. As such, at this preliminary stage, we recommend assuming that any proposed basements will encounter groundwater. Furthermore, where bedrock is above sea level we also expect some groundwater seepage flows will occur at the soil-rock interface, particularly after periods of heavy rain.

We expect the groundwater inflows into the basement will be very high where the soil materials extend below the water table and therefore it will be necessary to achieve cut-off with the basement shoring into

the underlying lower permeability bedrock. With that being said, the bedrock in some portions of the site appears to contain a high number of defects and therefore a detailed assessment of the rock permeability should be undertaken, such as Packer tests, in order to accurately assess the estimated groundwater inflows into basements. In the long-term, basements will need to be fully watertight ‘tanked’ structures and designed to resist hydrostatic uplift pressures.

Seepage encountered during construction is expected to be satisfactorily controlled by a sump and pump system that discharges groundwater inflows to the bay/council stormwater system. Discharge to the bay may be subject to environmental considerations. Dewatering can lead to lowering of groundwater levels outside of the site and needs to also be considered. If the modelling indicates that the drawdown may be excessive, or excessive drawdown is experienced during dewatering, recharge of extracted water outside the basement excavation can assist in reducing potential drawdown. However, in practice it is not possible to dispose of all water extracted by recharging to the soils.

Construction of a basement that intersects the groundwater table is considered to be an aquifer interference activity. We note that this also typically includes groundwater seepage over the soil-rock interface. Such activities are subject to the Water Management Act 2000 and NSW Aquifer Interference Policy and are regulated by the Department of Planning and Environment (DPE), WaterNSW and Natural Resource Access Regulator (NRAR). The DPE’s policy on basements is that ongoing or frequent dewatering of basements over their life is inconsistent with the principals of sustainable development and, where such dewatering is required, basements should be tanked. Dewatering during construction is permitted but is regulated through licencing which must either be obtained from WaterNSW or NRAR.

The DPE’s document, “Minimum Requirements for Building Site Groundwater Investigations and Reporting”, dated October 2022 outlines the minimum scope of investigation required where a basement is proposed and may intersect the groundwater table. This scope is quite involved and broadly requires the following:

- Boreholes drilled to a minimum depth, which is defined by the proposed number of basements.
- The installation of a minimum of three groundwater wells installed throughout the site in a triangulated fashion.
- Permeability testing to define the coefficient of permeability of the various soil and bedrock layers.
- Groundwater monitoring for a minimum period of three months in the six months prior to the submission of documentation to the relevant authority.
- Groundwater modelling to predict the groundwater take, groundwater drawdown behind the retention system and potential impact on nearby structures and other groundwater users.
- Chemical analysis of the groundwater to determine its quality.

Following the completion of the above investigation and monitoring, a Site Hydrology Report (SHR) is required which presents the results of the seepage analysis and predicted water take, and impact on surrounding structures and water users. This report is then incorporated in a DMP, which is necessary for submission when applying for the relevant licence(s).

Where dewatering is required, potentially two approvals are required from WaterNSW. These are:

- A Water Access Licence (WAL).
- A Water Supply Works (WSW) approval.

A WAL is a licence that provides an allocation of a certain volume of water in the aquifer to a user. However, it does not provide the right to extract this water. To extract or pump water from an aquifer, such as is required during basement dewatering, a WSW approval is required. The WAL is required where extraction of water from the aquifer exceeds 3ML/annum, where a water year coincides with a financial year. Where extraction volumes are less than this value, a WAL is not required, but a WSW approval is still required to remove any water from a site.

4.5 Retention Systems

As discussed in Section 4.4 above, the basement retention system will need to achieve a groundwater cut-off within the underlying sandstone bedrock. However, potentially on the north-eastern side of the basement furthest from Blackwattle Bay, sandstone bedrock may be encountered above bulk excavation level.

We do not consider that temporary batters are likely to be feasible, except where bedrock is (say) less than 2m deep however this appears to only be possible in localised areas. Therefore we consider an engineered retention system around the full basement perimeter is likely to be most appropriate and should be installed prior to excavation commencing. Given the subsoil conditions and the presence of groundwater, suitable retention systems include a secant piled wall formed using grout injected (CFA) piles, a cutter-soil-mix wall or a diaphragm wall, though the depths of cut-off required are not generally sufficient that a diaphragm wall would be required. Consideration should be given to the cobbles and boulders encountered in the fill layer which may result in difficulties in maintaining verticality during drilling or inhibit penetration. If the cobbles/boulders are shallow enough, then excavating the obstructions may be the effective solution.

Conventional secant pile walls are formed where a closed joint is produced by constructing alternate (soft) piles, followed by boring or cutting away part of the first phase (soft) piles while the concrete is still weak and thus constructing intermediate (hard) piles overlapping with the first phase piles. The overlapping piles reduce the risk of gaps developing and when constructed properly can form an impermeable wall. Due to the sandy soils and the groundwater, bored piers would not be suitable and auger, grout injected (CFA) piles will need to be used except in the eastern areas where soils do not extend below the water table. However, care must be taken when drilling the piles into the sandstone as once the sandstone is encountered the rate of penetration reduces and if the rate of rotation is not also reduced the drilling process can 'draw-in' the sandy soils from around the auger resulting in settlement of the ground surrounding the pile. Difficulties can also be experienced in keeping piles vertical where they are more than about 6m to 7m deep. Consequently, appropriate specialised construction and monitoring techniques, such as the use of cased CFA piling techniques, should be implemented to reduce the risk of soils being 'drawn-in' and such techniques tend to keep the piles vertical and correctly positioned along the line of the basement.

An alternative construction system is where the first phase (hard) piles are joined by jet-grouted columns; these have been successfully used on a number of foreshore projects and are well suited to this site. The

system is relatively straight forward to construct and has the benefit that the jet grouting encompasses any obstructions in the fill and still produces a sealed wall; protuberances can be ground off as excavation advances. Our past experience also indicates that secant walls present difficulties in the seating the wall toe onto a stepped bedrock profile. Potential contractors should advise how they propose to construct a “sealed” cut-off wall socketed into the rock and what problems may arise using their system. We expect that construction of cut-off walls should commence where bedrock is expected to be deepest, i.e. at the eastern and northern sides of the sites, and then gradually constructed towards the southern and western areas, where any steps up in the bedrock profile can be identified which will then allow for a few piles to be drilled to the lower level of bedrock to provide a higher degree of confidence that cut-off has been achieved.

Diaphragm walls in the form of concrete cast-in-place in a trench supported by bentonite slurry are practically impervious if appropriately “sealed” in rock and then extensive dewatering may not be necessary during construction. We note that some difficulties may be encountered where the toe of the walls are to be socketed into the sandstone and advice should be obtained from contractors on the suitability of their system for the site conditions. It is likely that ‘chopping’ techniques would be required in the rock and the resulting vibrations may preclude their use, particularly adjacent to the heritage building. Productivity would also probably be low. The diaphragm wall must be free of any openings such as joints or holes; if these are noted after construction these should be immediately patched by say, injection grouting. The diaphragm wall, if founded in strata of adequate bearing capacity could be used as the permanent wall, supporting peripheral columns, combined with top-down construction techniques (which would then avoid temporary anchors for lateral stability). Diaphragm walls because of their rigid design and the avoidance of severe ground disturbance are advantageous forms of support where the yielding and settlement of the adjacent ground surface or property have to be reduced, and might be needed at the southern end of the site near Pymont Bridge Road. The installation and construction of the diaphragm wall is critically dependent on construction techniques and should only be carried out by contractors of recognised competence in this field of work.

Conventional driven sheet pile walls would probably not be suitable as there is a need to reduce noise and vibrations to nearby buildings and structures. Furthermore, sheet piles would not be able to be incorporated into the footing system and permanent basement retaining walls would need to be constructed following bulk excavation. Sheet piles may also have difficulty penetrating the cobbles and boulders that were encountered in a number of boreholes.

Regardless of the shoring option adopted, achieving a suitable socket into the medium strength or better sandstone bedrock will be difficult and therefore heavy drilling rigs, equipped with rock excavation equipment where appropriate, will be necessary. Subsequently, given the presence of the upper poor quality fill, a suitably thick piling rig working platform will also be required for the installation of the shoring systems.

4.6 Retention Design Parameters

Cantilevered piled walls may be considered however are typically limited to a height of 3m to 4m and a detailed assessment of the wall deflections must be carried out to confirm that wall movements do not have an adverse effect on adjoining structures and services. Otherwise, the walls will need to be designed to be laterally supported by anchors or internal propping/bracing to reduce wall movements. We note that on the

Blackwattle Bay side of the basements, internal propping/bracing will almost certainly be required given the bedrock drops away in that direction. Construction of the retaining system and anchors should be of a high quality and only experienced contractors should be employed. Any gaps between adjacent secant piles must be grouted immediately as soil loss and seepage could cause settlements of the ground adjoining the retention system.

The major consideration in the selection of lateral earth pressures for the design of retaining walls is the need to limit deformations occurring outside the excavation. The following characteristic earth pressure coefficients and subsoil parameters may be adopted for the static design of the proposed basement walls:

- Walls retaining less than about 3m may be designed as cantilevered walls based on a triangular earth pressure distribution. Where the resulting ground movements are of little concern design may be based on an active earth pressure coefficient, K_a , of 0.35.
- Where movements are to be reduced, or where walls are restrained from movement by other structural elements in front of the wall, an 'at rest' earth pressure coefficient, K_0 , of 0.6 should be used for the design of cantilevered walls.
- For progressively anchored or internally propped walls, where minor movements can be tolerated, we recommend the use of a uniform rectangular earth pressure distribution of $6H$ kPa, where 'H' is the retained height in metres.
- For progressively anchored or propped walls which support areas which are highly sensitive to lateral movement, we recommend the use of a uniform rectangular earth pressure distribution of $8H$ kPa, where 'H' is the retained height in metres.
- A bulk unit weight of 20kN/m^3 should be adopted for the sands above the groundwater level and reduced to 10kN/m^3 below the groundwater level.
- For cantilevered walls embedded in soil, passive toe restraint may be adopted for the portion of wall embedded more than 1m below the base of the excavation (including localised excavations for services or footings etc). A net triangular passive earth pressure distribution should be adopted. The following net passive earth pressure coefficients may be adopted for the expected soils.
 - For the very loose and loose sands a bulk unit weight of 18kN/m^3 and net passive earth pressure coefficient of 2.4. This is based on an effective friction angle for the very loose to loose sands of 28° .
 - For the soft to firm silty clays a bulk unit weight of 17kN/m^3 and a net passive earth pressure coefficient of 2.0. This is based on an effective drained friction angle of 24° and cohesion of 0kPa.
 - For medium dense to denser sands a bulk unit weight of 19kN/m^3 and a net passive earth pressure coefficient of 3.1. This is based on an effective friction angle of 33° .
 - Cantilevered walls should also be designed with a factor of safety of at least 2.0 on passive restraint.

- For cantilever walls embedded in bedrock an allowable lateral restraining pressure of 200kPa may be adopted, but where this is used the passive earth pressure must be ignored due to the large strain needed to mobilise passive earth pressure. Higher lateral pressures may be feasible in medium and high strength rock but should be considered in more detail on a case by case basis.
- All surcharge loads affecting the walls (e.g. due to traffic, construction, adjacent high level footings, etc) must be taken into account in the wall design using the earth pressure coefficients given above.
- Soil anchors bonded into the loose or denser sands may be designed based on an effective angle of internal friction, ϕ' , of 28°. Anchors bonded into bedrock of at least low strength may be designed based upon an allowable bond stress of 200kPa. All anchors should be bonded behind a theoretical failure plane projected up for the base of the excavation at an angle of 45°. All anchors should be proof-tested to 1.3 times the working load under the direction of an experienced engineer or construction superintendent, independent of the anchor contractor. We recommend that only experienced contractors be considered for the anchor installation.

Detailed assessment of the retention system could be carried out using computer based analysis using programs such as WALLAP or PLAXIS in order to optimise the design. Any such analysis must be carried out by persons familiar with soil mechanics in order to understand the analysis methods and results.

The actual wall movements are highly dependent on the construction sequence, detailing and quality of installation, and should be closely monitored in critical areas. However, provided the basement retention system and dewatering is designed and constructed in accordance with the recommendations presented in this report movements are expected to be within tolerable limits. On this basis, the neighbouring buildings, structures and the above and below ground utilities are not expected to be impacted by movements outside their tolerable limits. However, this should be verified by completion of computer based analysis of the basement shoring system (say using WALLAP or PLAXIS) in order to assess likely wall deflections.

Based on a cursory inspection of the existing sea walls along Blackwattle Bay, the walls generally appeared to be in a dilapidated state or were not even present along some foreshore sections. As such, we expect new sea walls will be required. Notwithstanding, we recommend a detailed assessment by a structural and/or coastal engineer to assess the condition of the existing walls and provide further advice on whether new walls will be required to support the proposed waterfront promenade. Depending on the height of the sea walls, additional geotechnical investigations within the bay in front of the walls may be required to assist with the detailed design.

4.7 Footings

Given the proposed developments are expected to have high structural loads, we recommend the structures are uniformly founded on the underlying sandstone bedrock. We expect that additional cored boreholes will be required to further assess the bedrock at specific sites once development details are known.

If there are lightweight structures separate to the main developments, the consideration could be given to founding on the underlying natural soils. The existing uncontrolled fill is unlikely to provide a suitable founding stratum regardless of how lightweight or flexible the structures are and would need to be considered on a case by case basis.

4.7.1 Footings on Rock

The sandstone bedrock encountered in each of the boreholes was classified at the time of the investigation and has been classified in accordance with “Foundations on Sandstone and Shale in the Sydney Region” by Pells, Mostyn and Walker, Australian Geomechanics, December 1998, with the classifications provided in the attached Table 1. The classification of the rock using this system is dependent upon the size of the pile, and so to allow this assessment a pile diameter of 0.6m has been assumed. If differing pile sizes are used, the designer should check the rock classification using the information provided in the borehole logs and Table 1. The designer must also note that there may be bands of a lower or higher classification and so any piles founded in the specific strata and location should be assessed by the designer.

Given the anticipated loads, we expect development footings will be uniformly founded within the underlying sandstone bedrock. Depending on the proposed finished levels of developments, high level pad and/or strip footings may be feasible if bedrock is sufficiently shallow, say less than 1m below finished level. If high level footings are not feasible, then piles will need to be adopted. For the subject site, we consider two pile types could be considered as follows:

- Cased Bored Piles: These piles combine conventional bored pile drilling techniques with the use of a heavy steel liner which is drilled down to the top of the bedrock profile using the same drill rig. The liner is typically installed progressively as the bored pile extends down through the soil profile. The liner is used to support the soil profile and keep the hole open so that the pile can be socketed into the bedrock profile. As the piles can be socketed into the bedrock profile, they are then able to transfer both lateral and vertical loads (compression and tension) through the bedrock socket length. Uncased bored piles are unlikely to be suitable over much of the site due to the groundwater ingress and risk of borehole collapse, however a trial pile could be undertaken on commencement to assess the feasibility. At the eastern edge of the site where rock is present at shallow depth then uncased piles may be suitable.
- Continuous Flight Auger Piles: Continuous flight auger (CFA) piles are installed using a hollow stemmed auger through which grout is pumped into the pile hole as the auger is extracted. As the auger flights extend the full length of the pile, the pile hole is fully supported at all times. However, due to limitations with this system, most CFA piling rigs are able to provide only limited crowd force to the auger head, and hence, a large CFA piling rig would be required to socket into the high strength bedrock profile.

Piles socketed a minimum of 0.3m into the appropriate stratum can be designed based on the allowable end bearing pressures presented in the below. For rock sockets longer than 0.3m, the allowable shaft adhesions outlined below may be adopted provided the socket is satisfactorily cleaned and roughened. For all footings, both shallow and piles, the lowest quality bedrock within 1.5 times the width of footing/diameter of the pile

should be taken as the allowable bearing pressure for the design of footings. The allowable bearing pressures and shaft adhesions below are based on serviceability criteria and should result in settlements of less than 1% of the footing width/diameter.

Rock Class	Allowable Bearing Pressure (kPa)	Allowable Shaft Adhesion (compression) (kPa)	Allowable Shaft Adhesion (tension/uplift) (kPa)
IV	1,000	100	50
III	6,000	600	300
II	10,000	1,000	400

Consideration could also be given to design of footings based on limit state design analysis procedures and the ultimate values provided in the table below can be adopted. Ultimate values must be used in conjunction with an appropriate geotechnical strength reduction factor (ϕ_g) which must be calculated in accordance with the methodology outlined in AS2159-2009 '*Piling Design and Installation*'.

Rock Class	Ultimate Bearing Pressure (MPa)	Ultimate Shaft Adhesion (compression) (kPa)	Ultimate Shaft Adhesion (tension/uplift) (kPa)	Elastic Modulus (MPa)
IV	5	150	75	400
III	30	1,000	500	1,000
II	80	2,000	1,000	2,000

Regardless of the pile design method utilised, we recommend the pile design is reviewed by a geotechnical engineer to confirm the recommendations above have been applied correctly. It should be considered that the values given in the table above are only a guide and the consequences of variations (both lower and higher) should be considered in the design.

All bored piles must be clean of any loose or water softened material, and free of any standing water prior to pouring concrete. All bored piles should be poured as soon as practicable following the completion of drilling, clean out and approval, and at least on the same day as drilling. If it is not possible to remove standing water from pile holes, tremie pouring techniques will be required.

The initial stages bored pile drilling should be inspected by a geotechnical engineer to confirm that the appropriate foundation material is being achieved. The need for further inspection can be confirmed at this time. If Class II bedrock parameters are adopted, we strongly recommend that the drilling of all bored piles be inspected by a geotechnical engineer.

In addition to the above we note that the piling contractor may require that a working platform be constructed prior to commencing piling works. The design of such a platform depends on the loading from the piling rig and material used for the platform as well as the subgrade material properties; as such the design cannot be completed until the platform material is selected and a specific piling rig nominated. We can, however, complete the design of such a platform if asked to do so at a later date.

4.7.2 Footings in Soils

The following table presents our recommended design parameters for piles founded within the soils. The pile design parameters for the clayey soils assumes the piles have an embedment into soil (excluding the very soft or soft marine sediment) of at least four pile diameters, and that there are at least three pile diameters of clay of the same or greater strength, or medium dense sand, both above and below the toe of the piles.

The pile design parameters for the sandy soils of at least loose strength are based upon a pile diameter of at least 0.6m, with an embedment of at least 3.6m, and with at least three pile diameters of loose or medium dense sand, or bedrock, below the pile toe.

The pile design parameters for the sandy soils of at least medium dense relative density are based upon a pile diameter of at least 0.6m, with an embedment of at least 4.8m, and with at least three pile diameters of medium dense sand or rock below the pile toe.

Soil Type	Consistency / Relative Density	Assumptions In Parameter Assessment	Pile Type	Ultimate Shaft Adhesion (kPa)	Ultimate End Bearing Pressure (kPa)	Serviceability End Bearing Pressure
Clay	Stiff ($c_u > 50 \text{ kPa}$)	Assumes at least 3 pile diameters embedment into this strength of clay, at least 4 pile diameters embedment into soil and at least 3 pile diameters of this strength of soil below the pile toe	N/A	50	450	150
	Very Stiff ($c_u > 100 \text{ kPa}$)		N/A	50	900	300
Sand	Loose	Pile diameter at least 0.6m, embedment at least 3.6m into soil, with at least 3 pile diameters of loose sand above and below the pile toe	Augered	5	800	250
			Driven	12	1,900	600
Sand	Medium Dense	Pile diameter at least 0.6m, embedment at least 3.6m into soil, with at least 3 pile diameters of loose sand above and below the pile toe	Augered	11	2,500	850
			Driven	22	4,300	1400

The following recommendations for high level footings in fill assume that the performance of the structures can be monitored, and if differential settlement occurs, the structures can be jacked level and appropriate packing placed to regain an appropriate level. If such monitoring and maintenance will not be acceptable, then the structures should be supported on piles founded within the sandstone bedrock.

Structures on uncontrolled fill could be founded on the high level footings founded with an embedment of at least 0.5m below the surrounding surface level, where footings with a width of at least 0.5m may be designed for an allowable bearing pressure of 50kPa. Such footings would be expected to undergo elastic settlements of less than 10mm, though there could be additional long-term creep settlements occurring within the fill and so the performance of these footings should be monitored and the structures relevelled as necessary.

4.8 Basement Slabs

The tanked basements must be designed to withstand full hydrostatic pressures in order to control uplift of the basement floor slab. If the self-weight of the building cannot provide such uplift resistance, then ground anchors will need to be installed to resist such uplift forces.

Care is required with the tanking details particularly at footing locations and at the perimeter pile wall-floor slab connection. In this regard, we note that there are practical difficulties in providing a waterproof seal between floor slabs and the undulating face of secant pile walls. Provision would need to be made for sealing any gaps with a proprietary waterproof sealant.

Basement slabs independent of the footing system should be underlain by a layer of DGB20 or approved alternative of at least 100mm thickness compacted to not less than 98% of Standard Maximum Dry Density. The purpose of the crushed rock layer is to provide a more uniform bearing surface for the basement slab. Prior to placement of the DGB20 layer the exposed surface should be rolled with a minimum 2 tonne dead weight smooth drum roller (no vibrations) to detect any soft or heaving areas. Should such soft or heaving areas be encountered, further advice should be sought from the geotechnical engineers.

4.9 Soil Aggressivity

When assessed in accordance with the criteria for concrete and steel piling exposure classifications given in Tables 6.4.2(C) and 6.5.2(C) of AS2159-2009 '*Piling-Design and Installation*', the soil chemical and pH testing has revealed that the natural sandy soils and fill are non-aggressive towards buried concrete and steel structures. The presence of structures within the splash zone of seawater combine to produce a 'severe' exposure classification.

4.10 Pavement Design Parameters

New pavements, both roads and footpaths, will be required for the proposed developments. The design of new pavements will depend on subgrade preparation, subgrade drainage, the nature and composition of fill excavated or imported to the site, as well as vehicle loadings and use. Various alternative types of construction could be used for the pavements. Concrete construction would undoubtedly be the best in areas where heavy vehicles maneuver. Flexible pavements may have a lower initial cost but maintenance will be higher. These factors should be considered when making the final choice.

Based on the laboratory CBR test results, for the silty sand and the gravelly sand fill subgrade a design soaked CBR value of 6% is appropriate for flexible pavements to allow for the variability of the fill. The exposed subgrade should be inspected and any clay soil removed to a depth of at least 400mm and replaced with good quality granular engineered fill. The pavement sections where imported fill is used to raise site levels by at least 0.5m may be designed on the basis of a four-day soaked CBR value of the imported fill material. However, further geotechnical advice must be sought as there would be the potential for differing pavement construction thicknesses depending on the quality of the fill being imported.

Concrete pavements should have a sub-base layer of at least 100mm thickness of crushed rock to latest revision of Transport for NSW QA specification 3051 unbound base material (or equivalent good quality and durable fine crushed rock) which is compacted using a heavy roller to at least 98% of Modified Maximum Dry Density (MMDD). Adequate moisture conditioning to within 2% of Modified Optimum Moisture Content (MOMC) should be provided during placement so as to reduce the potential for material breakdown during compaction. Concrete pavements should be designed with an effective shear transmission of all joints by way of either doweled or keyed joints.

Subsoil drains should be considered along the perimeter of pavements, with inverts not less than 0.2m below subgrade level, depending on the likelihood of seepage penetration. Drainage trenches should be excavated with a significant longitudinal fall to appropriate discharge points so as to reduce the risk of water ponding. The pavement subgrade should be graded to promote water flow or infiltration towards subsoil drains if used.

It should be recognised that where the subgrade comprises uncontrolled fill of variable depth, there is a slight risk of long term settlements affecting the pavements and minimum cross-falls to drainage points should be avoided.

5 GENERAL COMMENTS

The recommendations presented in this report include specific issues to be addressed during the design and construction phase of the project. In the event that any of the advice presented in this report is not implemented, the general recommendations may become inapplicable and JK Geotechnics accept no responsibility whatsoever for the performance of the structure where recommendations are not implemented in full and properly tested, inspected and documented.

The subsurface conditions between the completed boreholes may be found to be different (or may be interpreted to be different) from those expected. Variation can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact this office.

This report provides advice on geotechnical aspects for the proposed civil and structural design. As part of the documentation stage of this project, Contract Documents and Specifications may be prepared based on

our report. However, there may be design features we are not aware of or have not commented on for a variety of reasons. The designers should satisfy themselves that all the necessary advice has been obtained. If required, we could be commissioned to review the geotechnical aspects of contract documents to confirm the intent of our recommendations has been correctly implemented.

A waste classification is required for any soil and/or bedrock excavated from the site prior to offsite disposal. Subject to the appropriate testing, material can be classified as Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM), General Solid, Restricted Solid or Hazardous Waste. Analysis can take up to seven to ten working days to complete, therefore, an adequate allowance should be included in the construction program unless testing is completed prior to construction. If contamination is encountered, then substantial further testing (and associated delays) could be expected. We strongly recommend that this requirement is addressed prior to the commencement of excavation on site.

This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose. If there is any change in the proposed development described in this report then all recommendations should be reviewed. Copyright in this report is the property of JK Geotechnics. We have used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report. The report shall not be reproduced except in full.



TABLE 1
ROCK CLASSIFICATION SUMMARY

Borehole	Surface RL	Depth/RL to Top of each Rock Class							
		Class V Sandstone		Class IV Sandstone		Class III Sandstone		Class II/I Sandstone	
		Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)
1-1989	2.16	9.3	-7.1	DNE	-	DNE	-	DNE	-
2-1989	2.35	DNE	-	12.8	-10.5	DNE	-	DNE	-
3-1989	-1.09	5.8	-6.9	DNE	-	DNE	-	DNE	-
4-1989	-3.67	11.1	-14.8	DNE	-	DNE	-	DNE	-
3	4.1	3.4	0.7	DNE	-	4.2	-0.1	DNE	-
12	-0.7	DNE	-	DNE	-	DNE	-	8.3	-9.0
15	-3.79	5.5	-9.3	8.6	-12.3	DNE	DNE	DNE	DNE
22	-6.42	9.3	-15.7	DNE	DNE	DNE	DNE	12.5	-18.9
23	-5.94	9.5	-15.4	DNE	DNE	10.0	-16.0	12.1	-18.0
24	-5.04	4.7	-9.7	5.7	-10.8	6.2	-11.2	DNE	DNE
25	-2.73	2.8	-5.5	DNE	DNE	6.1	-8.8	9.1	-11.8
26	-4.57	0.0	-4.6	9.9	-14.5	10.1	-14.7	DNE	DNE
27	-5.35	DNE	DNE	DNE	DNE	5.4	-10.7	7.3	-12.7
102	3.87	6.7	-2.9	4.5	-0.6	5.2	-1.3	8.1	-4.3
103	2.91	10.2	-7.3	10.2	-7.3	12.2	-9.3	DNE	DNE
116	2.45	9.1	-6.6	12.2	-9.7	DNE	DNE	DNE	DNE
117	2.82	DNE	DNE	DNE	DNE	DNE	DNE	9.4	-6.6



Borehole	Surface RL	Depth/RL to Top of each Rock Class							
		Class V Sandstone		Class IV Sandstone		Class III Sandstone		Class II/I Sandstone	
		Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)
118	3.81	DNE	DNE	DNE	DNE	4.4	-0.6	7.0	-3.2
201	-	2.3	-	DNE	-	DNE	-	DNE	-
202	-	2.3	-	DNE	-	DNE	-	DNE	-
203	-	1.7	-	DNE	-	DNE	-	DNE	-
204	-	DNE	-	DNE	-	DNE	-	DNE	-
205	-	DNE	-	DNE	-	DNE	-	DNE	-
206	-2.29	5.8	-8.1	DNE	-	DNE	-	DNE	-
207	0.49	4.1	-3.6	6.3	-5.8	DNE	-	DNE	-
208	0.88	DNE	-	2.4	-1.5	DNE	-	DNE	-
209	0.21	4.1	-3.9	5.4	-5.2	DNE	-	DNE	-
210	-1.52	3	-4.5	DNE	-	DNE	-	DNE	-
211	-1.59	DNE	-	DNE	-	2.26	-3.9	DNE	-
212	-2.14	2.86	-5.0	DNE	-	DNE	-	DNE	-
301	6.4	DNE	-	0.4	6.0	DNE	-	DNE	-
302	5.36	DNE	-	DNE	-	DNE	-	DNE	-
303	6.11	DNE	-	DNE	-	DNE	-	DNE	-
304	4.71	DNE	-	DNE	-	DNE	-	DNE	-
401	2.7	DNE	-	5.4	-2.7	DNE	-	DNE	-
402	2.0	1.2	0.8	2	0.0	DNE	-	DNE	-



Borehole	Surface RL	Depth/RL to Top of each Rock Class							
		Class V Sandstone		Class IV Sandstone		Class III Sandstone		Class II/I Sandstone	
		Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)
403	2.7	0.65	2.1	2.5	0.2	DNE	-	DNE	-
404	4.5	5	-0.5	6.8	-2.3	DNE	-	DNE	-
405	3.1	8.3	-5.2	DNE	-	DNE	-	DNE	-
501	2.7	2.5	0.2	DNE	-	3.0	-0.3	DNE	-
502	3.5	0.8	2.7	DNE	-	3.2	0.3	DNE	-
503	3.8	0.4	3.4	1	2.8	2.9	0.9	DNE	-
504	4.8	5.6	-0.8	6.8	-2.0	8.0	-3.2	DNE	-
505	5.6	5.7	-0.1	7	-1.4	7.7	-2.1	DNE	-
506	3.0	4.3	-1.3	DNE	-	6.3	-3.3	DNE	-
507	3	DNE	-	4.5	-1.5	5.8	-2.8	DNE	-
508	3.8	7.7	-3.9	8.4	-4.6	10.1	-6.3	DNE	-
509	4.6	DNE	-	4.85	-0.3	6.5	-1.9	DNE	-
510	3.3	8.2	-4.9	10.8	-7.5	DNE	-	DNE	-
511	3.3	8.5	-5.2	10.5	-7.2	DNE	-	DNE	-
512	4.3	DNE	-	DNE	-	6.42	-2.1	DNE	-
513	2.3	2.2	0.1	4.1	-1.8	DNE	-	DNE	-
514	2.1	3.6	-1.5	5	-2.9	DNE	-	DNE	-
515	3.9	1	2.9	1.3	2.6	DNE	-	DNE	-
516	3	1.4	1.6	2	1.0	DNE	-	DNE	-



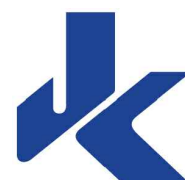
Borehole	Surface RL	Depth/RL to Top of each Rock Class							
		Class V Sandstone		Class IV Sandstone		Class III Sandstone		Class II/I Sandstone	
		Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)	Depth (m)	RL (mAHD)
517	3.3	DNE	-	DNE	-	DNE	-	DNE	-
518	3	DNE	-	DNE	-	DNE	-	DNE	-
519	4.1	DNE	-	DNE	-	DNE	-	DNE	-
601	-	DNE	-	DNE	-	DNE	-	DNE	-
602	-	DNE	-	DNE	-	DNE	-	DNE	-
603	-	DNE	-	DNE	-	DNE	-	DNE	-
604	-	DNE	-	DNE	-	DNE	-	DNE	-
605	-	DNE	-	DNE	-	DNE	-	DNE	-
606	-	DNE	-	2.5	-	DNE	-	DNE	-
607	-	DNE	-	DNE	-	DNE	-	DNE	-
608	-	1.5	-	2.5	-	DNE	-	DNE	-
609	-	1.1	-	DNE	-	DNE	-	DNE	-

Notes: DNE = Did Not Encounter



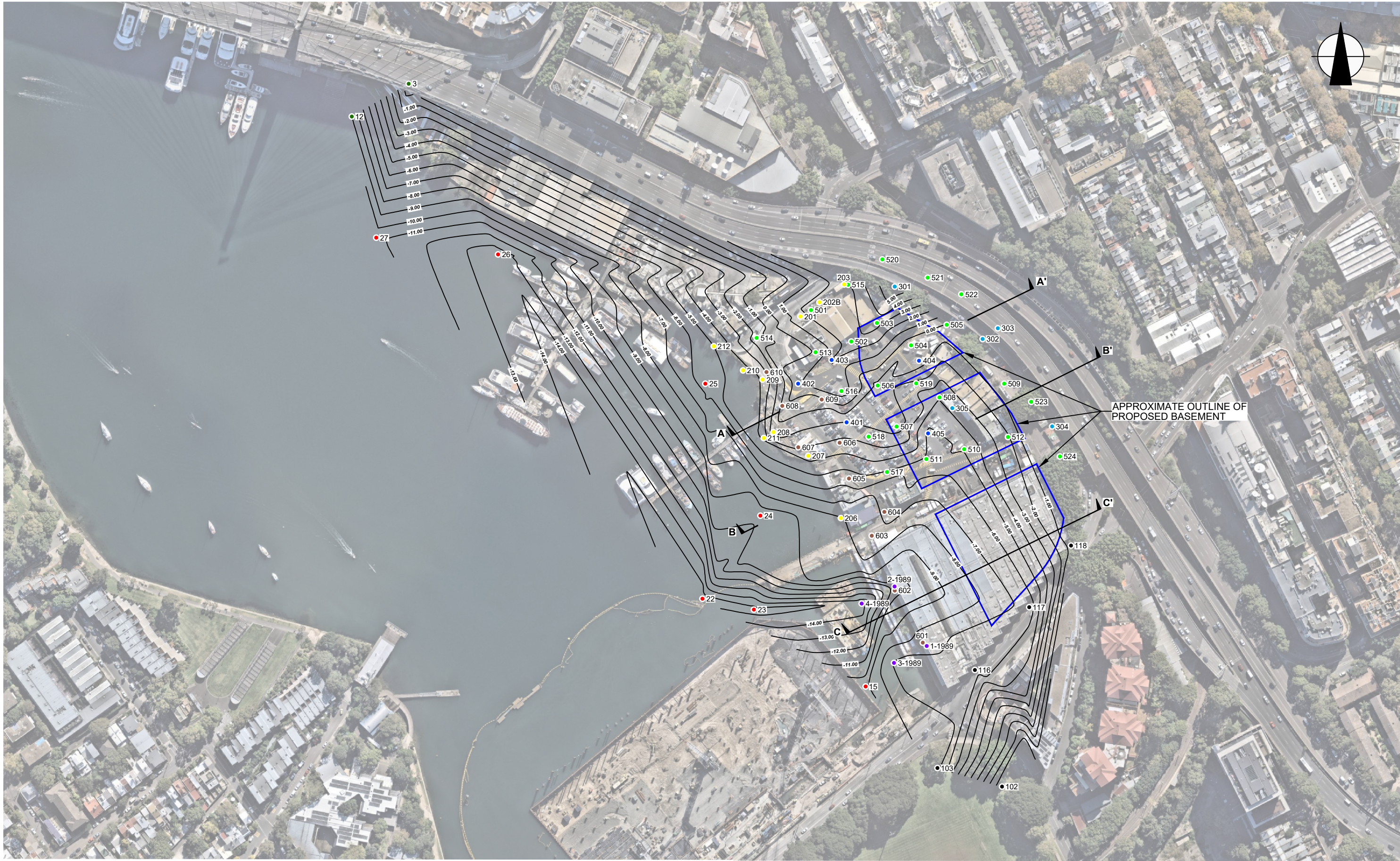
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

Title: SITE LOCATION PLAN	
Location: BLACKWATER BAY FORESHORE, PYRMONT, NSW	
Report No: 36051BF	Figure No: 1
JKGeotechnics	



This plan should be read in conjunction with the JK Geotechnics report.

PLOT DATE: 5/12/2023 4:12:06 PM DWG FILE: S:\6 GEOTECHNICAL\6F GEOTECHNICAL JOBS\36051BF PYRMONT\CAD\36051BF.DWG

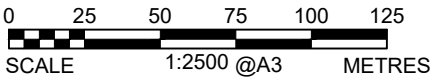


LEGEND
3.00

ROCK CONTOUR IN mAHD

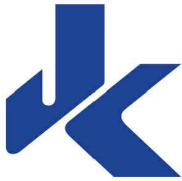
- NOTES:
1. REFER TO FIGURE 4 FOR CROSS SECTION A-A.
 2. REFER TO FIGURE 5 FOR CROSS SECTION B-B.
 3. REFER TO FIGURE 6 FOR CROSS SECTION C-C.

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

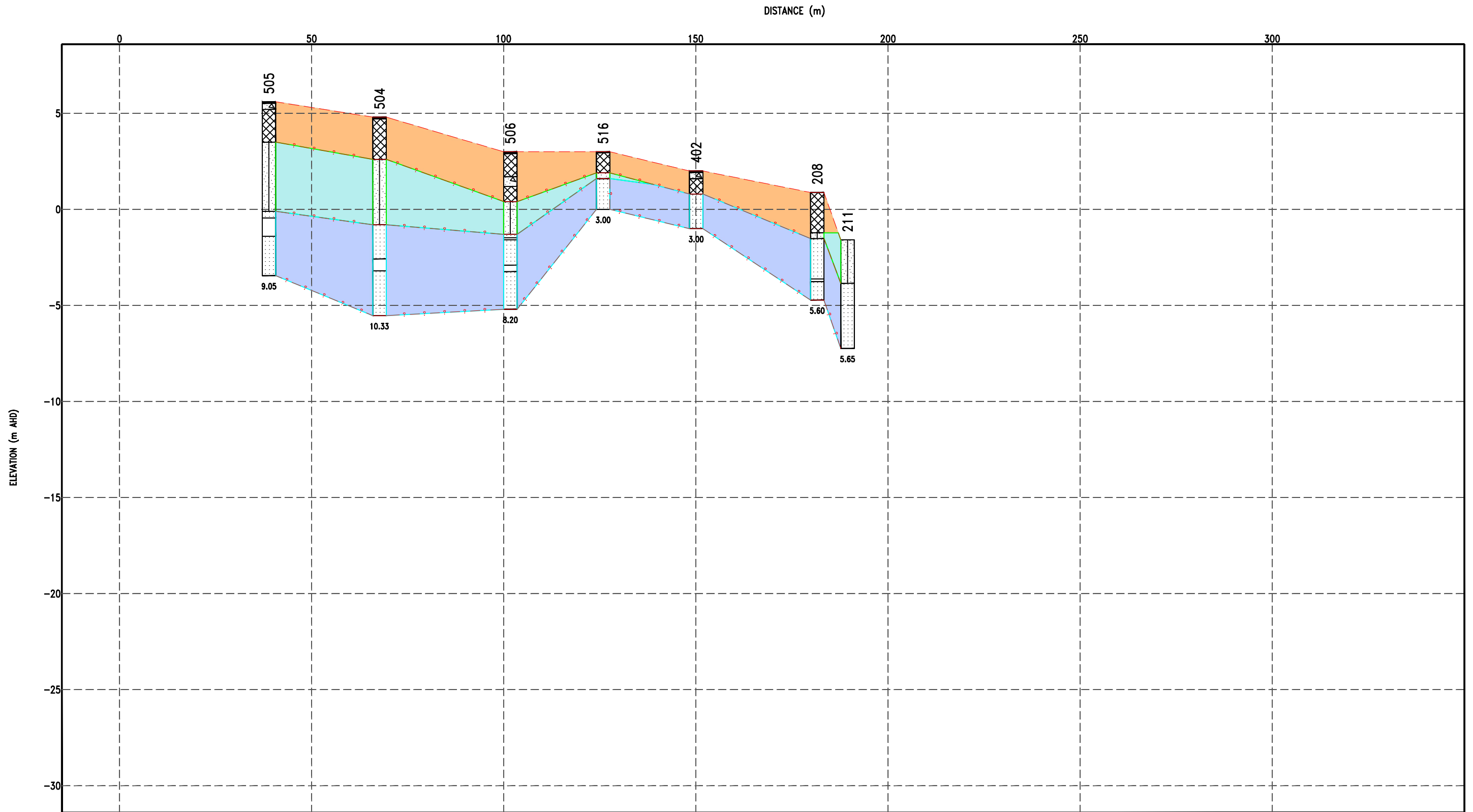


This plan should be read in conjunction with the JK Geotechnics report.

Title: ROCK CONTOUR PLAN	
Location: BLACKWATTLE BAY FORESHORE, PYRMONT, NSW	
Report No: 36051BF	Figure No: 3
JKGeotechnics	



PLOT DATE: 5/12/2023 4:16:30 PM DWG FILE: S:\6 GEOTECHNICAL\6F GEOTECHNICAL JOBS\36000\36051BF PYRMONT\CAD\36051BF.DWG

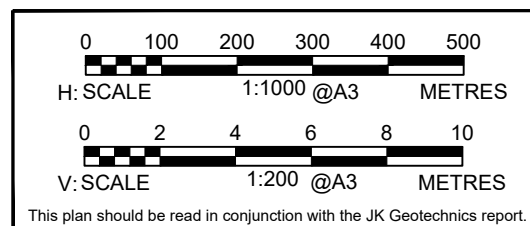


MATERIAL GRAPHIC

ASPHALTIC CONCRETE	SILTY SAND (SM)	SANDSTONE
NO CORE	CONCRETE	
SAND (SP, SW)	FILL	

UNITS 1 & 2	FILL
UNIT 3	MARINE & ESTUARINE DEPOSITS
UNIT 4	SANDSTONE BEDROCK

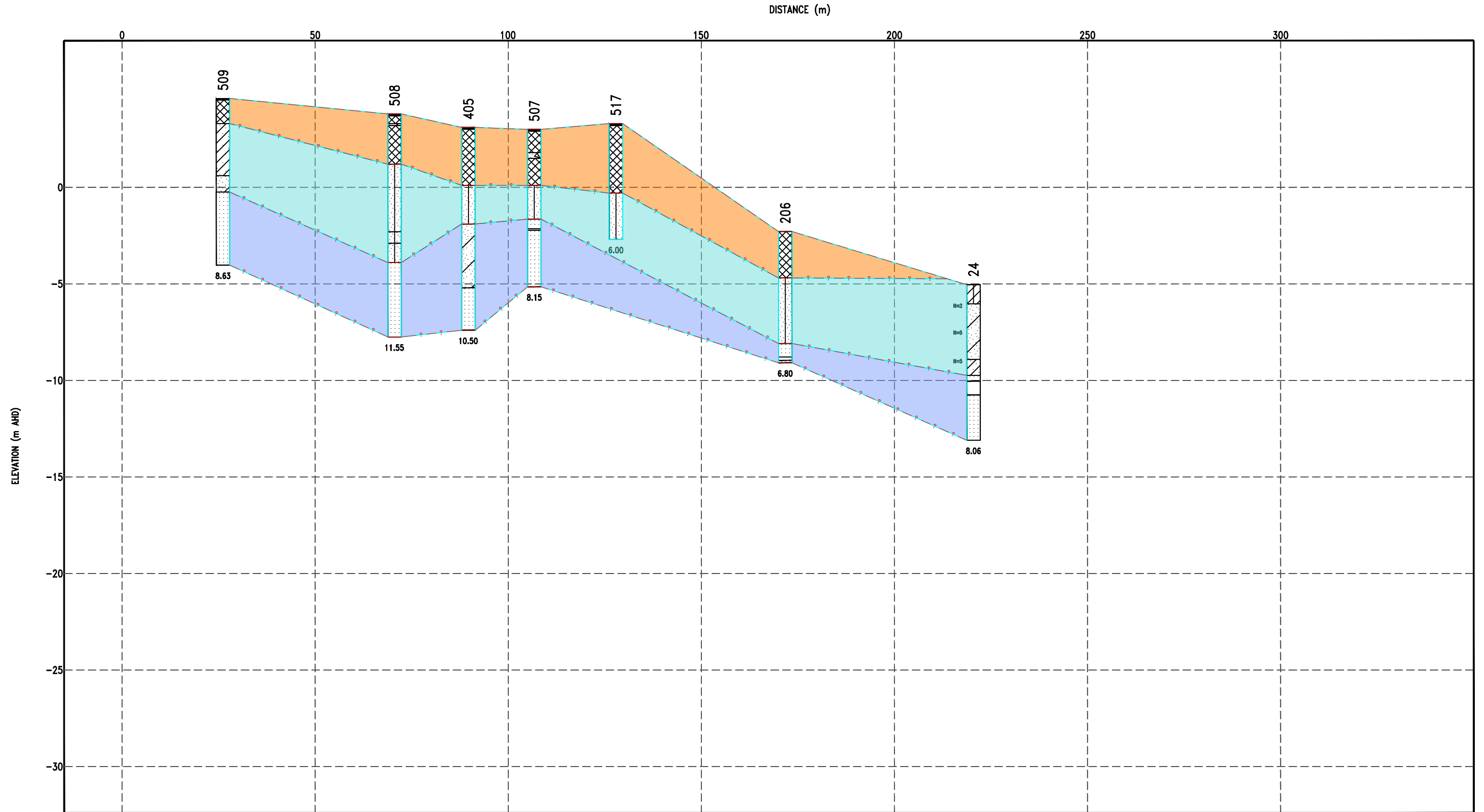
NOTES: REFER TO REPORT SECTION 3.3 FOR FURTHER DETAILS & TABLE 1 FOR ROCK CLASSIFICATION



Title:	SECTION A-A'	
Location:	BLACKWATTLE BAY FORESHORE, PYRMONT, NSW	
Report No:	36051BF	Figure No: 4
JKGeotechnics		



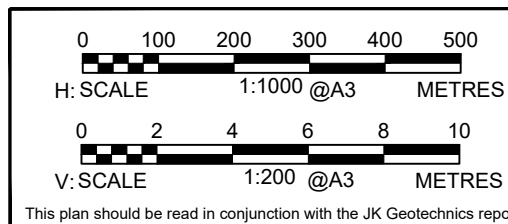
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MATERIAL GRAPHIC

	ASPHALTIC CONCRETE		NO CORE		SILTY SAND (SM)		FILL		UNITS 1 & 2	FILL
	CLAYEY SAND (SC)		SANDY CLAY (CL, CI, CH)		CONCRETE		SANDSTONE		UNIT 3	MARINE & ESTUARINE DEPOSITS
	CLAYEY SILTY SAND (SM, SC)		SILTY CLAY (CL, CI, CH)						UNIT 4	SANDSTONE BEDROCK

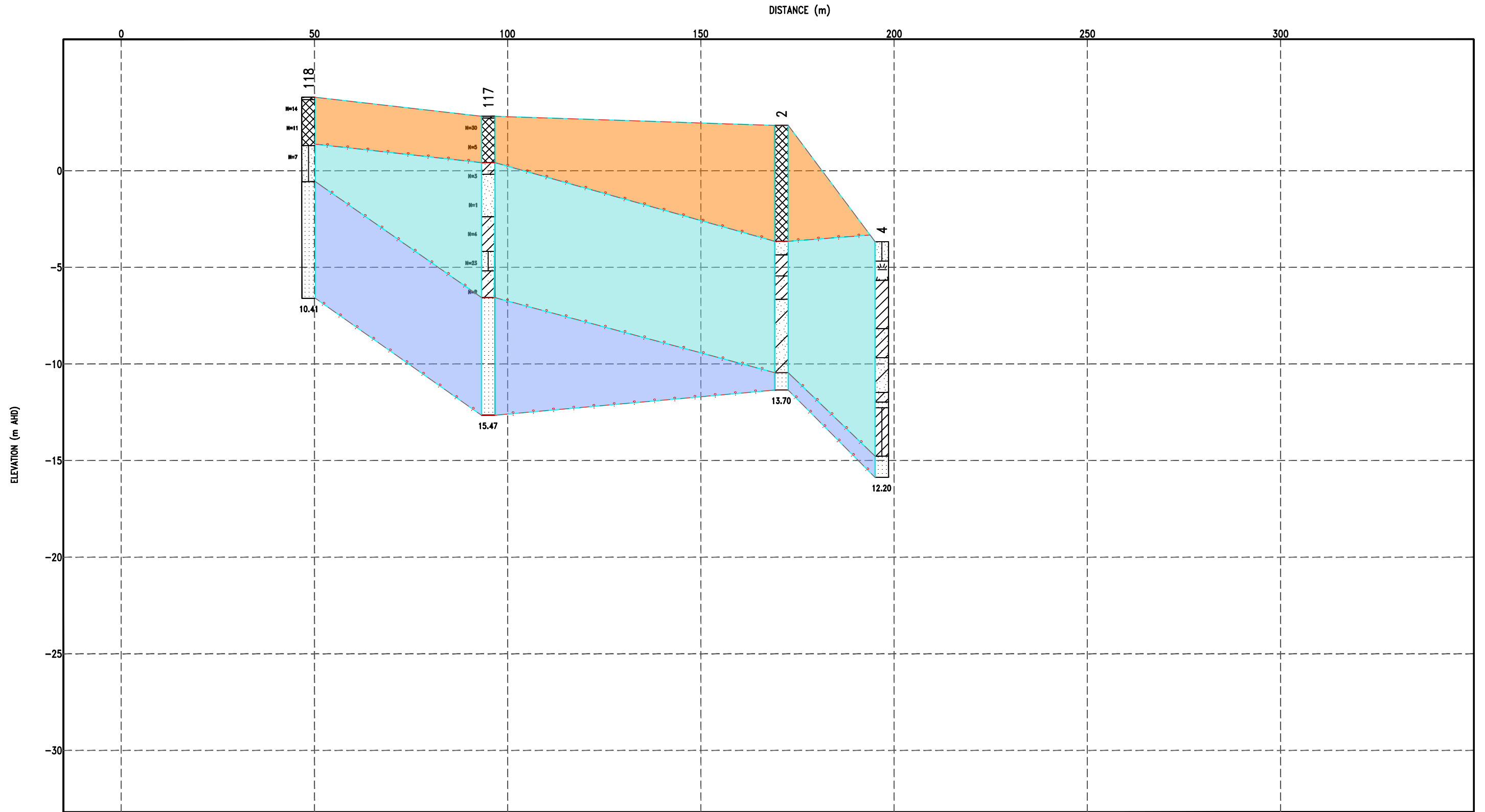
NOTES: REFER TO REPORT SECTION 3.3 FOR FURTHER DETAILS & TABLE 1 FOR ROCK CLASSIFICATION



Title:	SECTION B-B'	
Location:	BLACKWATTLE BAY FORESHORE, PYRMONT, NSW	
Report No:	36051BF	Figure No: 5



PLOT DATE: 5/12/2023 4:14:38 PM DWG FILE: S:\6 GEOTECHNICAL\6F GEOTECHNICAL JOBS\36000\36051BF PYRMONT\CAD\36051BF.DWG

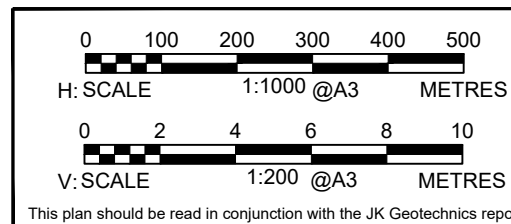


MATERIAL GRAPHIC

CLAY (C, CI, CH)	SANDY CLAY (CL, CI, CH)	CONCRETE	SANDSTONE
CLAYEY SAND (SC)	SILTY CLAY (CL, CI, CH)	FILL PEAT AND HIGHLY ORGANIC SOILS (PI)	
SAND (SP, SW)	SILTY SAND (SM)		

UNITS 1 & 2	FILL
UNIT 3	MARINE & ESTUARINE DEPOSITS
UNIT 4	SANDSTONE BEDROCK

NOTES: REFER TO REPORT SECTION 3.3 FOR FURTHER DETAILS & TABLE 1 FOR ROCK CLASSIFICATION



Title:	SECTION C-C'	
Location:	BLACKWATTLE BAY FORESHORE, PYRMONT, NSW	
Report No:	36051BF	Figure No: 6
JKGeotechnics		





APPENDIX A

BOREHOLE LOG

Client: FISH MARKETING AUTHORITY
 Project: PROPOSED BROADWALK PROJECT
 Location: FISH MARKETS BLACKWATTLE BAY PYRMONT N.S.W.

Job No. 6416 K Method: SPIRAL AUGER / WASH BORE R.L. Surface: + 2.16
 Date: 19.12.88 EDSON RIG Datum: AHD

Groundwater record	Samples	FIELD TESTS	Depth (m.)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/ Rel. Density	Hand Penetrometer Readings kPa.	Remarks
						FILL: ripped and crushed sandstone with gravel, clay and sandy zones mottled brown	D to M			APPEARS POORLY/MODERATELY COMPACTED
	D.S.	N = 30 10, 15, 15	1			--- as above, also with brick fragments				HIGH SPT DUE TO SANDSTONE COBBLES.
						FILL: ripped and crushed sandstone light grey.	M			
	D.S.	N = 8 5, 4, 4	2							
							W			
	D.S.	N = 5 3, 2, 3	3			FILL: ripped and crushed sandstone with gravel cobble, sand and trace of clay, mottled brown.				APPEARS POORLY COMPACTED
	D.S.	N = 3 11, 2, 1	4		SC	PEATY CLAYEY SAND: fine to medium grained, black.	W	ML		STRONG ORGANIC ODOUR
	D.S.		5		PT/CH	PEATY CLAY: high plasticity with numerous root fibres, black.	MC>PL	S		
	D.S.	SUNN 0.1m HAMMER WEIGHT N = 1 1, 1/300mm	6		SC	Grading to CLAYEY SAND: fine to medium grained with shells, grey.	W	VL		WASH BORE TRICONE BIT
	D.S.	N = 3 1, 2, 1	7							

ON
RODS
AFTER
SPT
3m

BOREHOLE LOG

Client: <i>FISH MARKETING AUTHORITY</i> Project: <i>PROPOSED BROADWALK PROJECT</i> Location: <i>FISH MARKETS BLACKWATTLE BAY PYRMONT N.S.W.</i>										
Job No. <i>6416 K</i> Date: <i>19.12.88</i>		Method: <i>SPIRAL AUGER / WASH BORE</i> R.L. Surface: <i>+ 2.16</i> <i>EDSON RIG</i> Datum: <i>AHD</i>								
Groundwater record	Samples	FIELD TESTS	Depth (m.)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/ Rel. Density	Hand Penetrometer Readings kPa.	Remarks
			7		SC	CLAYEY SAND: fine to medium grained with shells, grey	W	VL		WASH BORE
	D.S.	N=4 2, 1, 3			SC/CL	SANDY CLAY/CLAYEY SAND: medium plasticity, fine to medium grained, light grey	MC>PL	F to st VL to L	100 150 150 120	
			8		CL	SANDY CLAY: medium plasticity, light grey	MC>PL	V. st to H	450 2990 350	
	U50		9			red and yellow brown				
			10			SANDSTONE: medium strong to strong? red brown and yellow brown.				HIGH ROLLER BIT RESISTANCE
						as above with interbedded "weaker" zones (possibly clay)				BANDED HIGH AND LOW
			11			Becoming light grey.				
			12			END OF BOREHOLE AT 11.1m				

BOREHOLE LOG

Client: <i>FISH MARKETING AUTHORITY</i> Project: <i>PROPOSED BROADWALK PROJECT</i> Location: <i>FISH MARKETS BLACKWATTLE BAY PYRMONT N.S.W.</i>											
Job No. <i>6416 K</i> Date: <i>19.12.88</i>		Method: <i>SPIRAL AUGER / WASH BORE</i> <i>EDSON RIG</i>		R.L. Surface: <i>+ 2.35</i> Datum: <i>AHD</i>							
Groundwater record	Samples	FIELD TESTS	Depth (m.)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/ Rel. Density	Hand Penetrometer Readings kPa.	Remarks	
ON RODS AFTER SPT AT 4.4m						<i>FILL: crushed and ripped sandstone with sand and clay, brick and concrete rubble mottled brown.</i>	<i>D to M</i>			<i>APPEARS POORLY TO MODERATELY COMPACTED</i> <i>HIGH SPT BLOW COUNT DUE TO SANDSTONE GRAVEL AND COBBLES.</i>	
	D.S.	<i>N > 15</i> <i>15, 15, 150mm</i>	1								
	D.S.	<i>N = 10</i> <i>8, 6, 4</i>	2		<i>as above, but predominantly crushed and ripped sandstone, brown and light grey</i>						
	D.S.	<i>N = 9</i> <i>3, 5, 4</i>	3								
	D.S.	<i>N = 13</i> <i>6, 6, 7</i>	4		<i>as above, also with black peaty clay zones and gravelly and cobbly zones brown and black.</i>						
	D.S.	<i>SUNK 0.6m UNDER HAMMER WEIGHT</i>	5								
	D.S.		6		<i>CLAYEY SAND: fine to medium grained with shells and root fibres</i>			<i>W</i>	<i>VL</i>		<i>WASH BORE AND CASE.</i> <i>SPT ATTEMPTED @ 5.5m BUT TOO MUCH RUBBLE</i>
	D.S.				<i>Grading to</i> <i>CLAY: high plasticity, with root fibres, light grey</i>			<i>MC-PL</i>	<i>F</i>		<i>50 50</i> <i>10 100</i>
	D.S.										
	D.S.										

BOREHOLE LOG

Client: FISH MARKETING AUTHORITY										
Project: PROPOSED BROADWALK PROJECT										
Location: FISH MARKETS BLACKWATTLE BAY PYRMONT N.S.W.										
Job No. 6416 K		Method: SPIRAL AUGER / WASH BORE				R.L. Surface: + 2.35				
Date: 19.12.88		EDSON RIG				Datum: AHD				
Groundwater record	Samples	FIELD TESTS	Depth (m.)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/ Rel. Density	Hand Penetrometer Readings kPa.	Remarks
	U50				CH	CLAY: high plasticity, with some sand no root fibres evident, light grey Grading to	MC>PL	F to St	150 100 80	BASE OF U50
			8		CL/SC	SANDY CLAY/CLAYEY SAND: medium plasticity fine to medium grained, light grey				
	D.S.	N=4 1, 2, 2	9		SC	Grading to CLAYEY SAND: fine to medium grained with interbedded bands of clay, light grey.		L	100 150 125	ON CLAY ZONES
			10						100 120	ON CLAY ZONES
			11							
	D.S.	N=3 1, 1, 2	12					VL	100 100	ON CLAY ZONES
			13			SANDSTONE: medium strong, light grey, brown and red brown.				MODERATE TRICONE RESISTANCE
						END OF BOREHOLE AT 13.7m				

BOREHOLE LOG

Client: FISH MARKETING AUTHORITY										
Project: PROPOSED BROADWALK PROJECT										
Location: FISH MARKETS BLACKWATTLE BAY PYRMONT N.S.W.										
Job No. 6416 K		Method: WASH BORE		R.L. Surface: -1.09						
Date: 4.1.89		BARGE/ PIONEER MOLE		Datum: AHD						
Groundwater record	Samples	FIELD TESTS	Depth (m.)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/ Rel. Density	Hand Penetrometer Readings kPa.	Remarks
	D.S.	N < 1 0/300, 1	1		SM	SILTY SAND: fine to medium grained with pockets of clay, also with leaves, root fibres gravel, and pieces of 'alfoil' black. as above also with shells but no 'alfoil' evident.	W	VL		CONTAMINATED WITH WASH FROM NEARBY STORM WATER OUTLET.
	D.S.	SUNK 0.5m UNDER ROD WEIGHT SUNK 0.45m UNDER HAMMER WEIGHT	2		CH	Grading to CLAY: high plasticity, with interbedded sand zones and some decomposed organics, dark grey	MC >> PL	VS		SPT ATTEMPTED AT 1.5m BUT DRILL RODS SINKING UNDER SELF WEIGHT.
		VS	3		SP	Grading to SAND: fine to medium grained with some gravel	W	VL		
	D.S.	SUNK 1.50m UNDER HAMMER WEIGHT	4		CH/PT	Grading to PEATY CLAY: high plasticity with interbedded sand, gravel and shells, dark grey	MC >> PL	VS		
		VS	5			SANDSTONE: fine to medium grained, highly weathered, weak, light grey red and yellow brown as above, but weak to medium strong				MODERATE ROLLER BIT RESISTANCE MODERATE TO HIGH ROLLER BIT RESISTANCE
	D.S.	N > 20 20/90mm HAMMER BOUNCING	6							

 END OF BOREHOLE AT
 7.0m

BOREHOLE LOG

Client: FISH MARKETING AUTHORITY										
Project: PROPOSED BROADWALK PROJECT										
Location: FISH MARKETS BLACKWATTLE BAY PYRMONT N.S.W.										
Job No. 6416 K		Method: WASH BORE		R.L. Surface: - 3.67						
Date: 4.1.89		BARGE / PIONEER MOLE		Datum: AHD						
Groundwater record	Samples	FIELD TESTS	Depth (m.)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency / Rel. Density	Hand Penetrometer Readings kPa.	Remarks
					SM	SILTY SAND: fine to medium grained with gravel leaves, pieces of plastic, paper and root fibres, some clay, black. Grading to	W	VL		CASING SUNK TO 1.0m UNDER SELF WEIGHT
	D.S.	SUNK 0.45m UNDER HAMMER WEIGHT	1		CH/PL	PEATY CLAY: high plasticity with sand and shells, black.	MC > PL	VS	10 20 100 20	
	D.S.	VS				Grading to				
	USO		2		CH	CLAY: high plasticity, with some fine root fibres also fine sand and gravel, dark grey and grey	MC > PL		50 50 60	USO SUNK UNDER SELF WEIGHT OF RODS
	D.S.	VS								
			3							
	D.S.	VS				Becoming				
	USO		4			light grey with some fine to medium grained sand no root fibres or gravel evident	MC > PL	St.	150 150 160	
						Grading to				
	D.S.	N=4	5		SC/CL	SANDY CLAY / CLAYEY SAND: (INTERBEDDED) fine to medium grained, medium plasticity, light grey.	(MC > PL) W	(F to St) (L)	100 100 100 100	
		3, 2, 2								
	D.S.	SUNK 0.7m UNDER SELF WEIGHT OF RODS ONLY	6		SC	CLAYEY SAND: fine to medium grained, light grey	W	VL		

BOREHOLE LOG

Client: FISH MARKETING AUTHORITY										
Project: PROPOSED BROADWALK PROJECT										
Location: FISH MARKETS BLACKWATTLE BAY PYRMONT N.S.W.										
Job No. 6416 K		Method: WASH BORE		R.L. Surface: - 3.67						
Date: 4.1.89		BARGE / PIONEER MOLE		Datum: AHD						
Groundwater record	Samples	FIELD TESTS	Depth (m.)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency / Rel. Density	Hand Penetrometer Readings kPa.	Remarks
			7		SC	CLAYEY SAND: fine to medium grained, light grey	W	VL		
	D.S.	N = 13 9, 8, 5				as above, but light grey and yellow brown.		MD		
			8		CL	SANDY CLAY: medium plasticity, red brown and light grey	MC>PL	St	150, 130 120	
					CH	SANDSTONE ?? - HARD IRONSTONE GRAVEL BAND ??? - YELLOW BROWN	MC>PL	V.St		HIGH ROLLER BIT RESISTANCE
	D.S.	N = 14 3, 6, 8	9			SILTY CLAY: high plasticity with fine ironstone gravel inclusions light grey and yellow brown			200 250 200 250	
			10			as above, also with brown				
	D.S.	N = 18 3, 7, 11	11						250 250 300 200 300	
						SANDSTONE: fine to medium grained weak to medium strong, brown.				MODERATE TO HIGH ROLLER BIT RESISTANCE
			12							
			13			END OF BOREHOLE AT 12.2m				



Borehole No.

201
1/1

BOREHOLE LOG

Client: McMILLAN BRITTON & KELL PTY LTD

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Method: SPIRAL AUGER
GCH RIG

R.L. Surface: -

Date: 22-5-95

Datum: -

Logged/Checked by: D.J.

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
 AFTER 3 HRS			0		-	ASPHALTIC CONCRETE: 30mm.t.	MC>PL	-	-	APPEARS MODERATELY TO WELL COMPACTED
	DS					FILL: Silty gravelly clay, medium plasticity, dark grey with fine igneous gravel.				
	DS	N > 31 10,15, 16/ 100mm				FILL: Gravelly sand, fine to medium grained, grey with fine igneous gravel.	M			
			1			FILL: Sandy gravel, fine to coarse sandstone gravel.				
	DS									
	DS	N < 1 1/280mm	2		SM	SILTY SAND: fine grained, brown, with many fine grained root fibres.	M	VL	-	-
		BOUNCING			-	SANDSTONE: medium to coarse grained, pale grey, highly weathered, weak with clay bands.	-	-	-	LOW TO MODERATE 'TC' BIT RESISTANCE
	DS									
			3			END OF BOREHOLE AT 3.0m				
			4							
			5							
			6							
			7							



Borehole No.

202A_{1/1}

BOREHOLE LOG

Client: McMILLAN BRITTON & KELL PTY LTD

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Method: SPIRAL AUGER
GCH RIG

R.L. Surface: -

Date: 22-5-95

Datum: -

Logged/Checked by: D.J.

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			ASPHALTIC CONCRETE: 20mm.t. over 230mm roadbase.				
						END OF BOREHOLE AT 0.25m				'TC' BIT REFUSAL ON CONCRETE
			1							
			2							
			3							
			4							
			5							
			6							
			7							



Borehole No.

202B
1/1

BOREHOLE LOG

Client: McMILLAN BRITTON & KELL PTY LTD

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

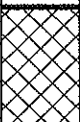
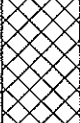
Method: SPIRAL AUGER
GCH RIG

R.L. Surface: -

Date: 22-5-95

Datum: -

Logged/Checked by: D.J./@

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
 AFTER 2.25 HRS			0		-	ASPHALTIC CONCRETE: 20mm.t. FILL: Sandy gravel, fine to coarse gravel, dark grey.	M	-	-	APPEARS MODERATELY COMPACTED
	DS	N = 27 6,10,17	1			FILL: Sand, fine to medium grained, orange brown, with some clay and fine to medium sandstone gravel.				
	DS									
			2		SM	SILTY SAND: fine to medium grained, brown.	W	-	-	-
					-	SANDSTONE: medium to coarse grained, pale grey with yellow mottling, highly weathered, very weak to weak.	-	-	-	LOW 'TC' BIT RESISTANCE
	DS		3			as above, but extremely weathered, extremely weak.				VERY LOW RESISTANCE
						as above, but highly to moderately weathered, weak to medium strong.				LOW TO MODERATE RESISTANCE
	DS		4							
						END OF BOREHOLE AT 4.0m				
			5							
			6							
			7							



Borehole No.

203

1/1

BOREHOLE LOG

Client: McMILLAN BRITTON & KELL PTY LTD

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Method: SPIRAL AUGER
GCH RIG

R.L. Surface: -

Date: 22-5-95

Datum: -

Logged/Checked by: D.J./

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION & AFTER 1.75 HRS			0		-	ASPHALTIC CONCRETE: 30mm.t. over 70mm fine crushed rock.	-	-	-	-
	DS				-	CONCRETE: 120mm.t.	M	-	-	APPEARS MODERATELY COMPACTED
	DS	N > 10 10/ 130mm BOUNCING			-	FILL: Sand, fine to medium grained, yellow brown with fine to medium sandstone gravel.	-	-	-	MODERATE 'TC' BIT RESISTANCE
	DS		1		-	SANDSTONE: medium to coarse grained, pale grey with red and yellow mottling, moderately weathered, weak to medium strong.	-	-	-	HIGH RESISTANCE
	DS		2		-	as above, but moderately to slightly weathered, medium strong to strong.	-	-	-	
			2			END OF BOREHOLE AT 2.0m				
			3							
			4							
			5							
			6							
			7							



Borehole No.

204
1/1

BOREHOLE LOG

Client: McMILLAN BRITTON & KELL PTY LTD

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Method: SPIRAL AUGER
GCH RIG

R.L. Surface: -

Date: 22-5-95

Datum: -

Logged/Checked by: D.J./@

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION & AFTER 30 MINS			0			ASPHALTIC CONCRETE: 40mm.t. over concrete 150mm.t.				
	DS	N = 12 2,6,6				FILL: Silty sand, fine to medium grained, brown with fine to medium sandstone gravel.	M	-	-	APPEARS MODERATELY COMPACTED
	DB		1			FILL: Clayey sand, fine to medium grained, pale grey and brown with some fine to medium sandstone gravel.				
						END OF BOREHOLE AT 1.5m				
			2							
			3							
			4							
			5							
			6							
			7							



Borehole No.

205
1/1

BOREHOLE LOG

Client: McMILLAN BRITTON & KELL PTY LTD

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Method: SPIRAL AUGER
GCH RIG

R.L. Surface: -

Date: 22-5-95

Datum: -

Logged/Checked by: D.J./

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION & AFTER 10 MINS			0			ASPHALTIC CONCRETE: 30mm.t. over 150mm concrete.				10mm REINFORCEMENT
	DS	N = 28 13,9,19				FILL: Clayey sand, fine to medium grained, pale grey and brown with red mottling, with some fine to medium sandstone gravel.	M	-	-	APPEARS MODERATELY TO WELL COMPACTED
	DB		1							
						END OF BOREHOLE AT 1.5m				
			2							
			3							
			4							
			5							
			6							
			7							



Borehole No.
206
1/2

BOREHOLE LOG

Client: _____
Project: FORESHORE DEVELOPMENT
Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S Method: WASH BORING ** R.L. Surface: -2.29m
Date: 30-5-95 Datum: WOODEN JETTY
Logged/Checked by: K.B. *[Signature]*

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0		-	FILL: Silty sand, fine to medium grained, grey.	W			WASHBORING
			1							APPEARS POORLY COMPACTED
			2							METAL PIPE CASING REFUSAL
					SM	SILTY SAND: fine to medium grained, grey.	W	(L)	-	WOOD
			3							
			4							BOREHOLE COLLAPSED AFTER CORING
			5					(MD)		
			6							
			7			REFER TO CORED BOREHOLE LOG ** NOTE: BH's 6, 10, 11 & 12 ALL ADOPT ZERO DEPTH AS BAY FLOOR LEVEL				

COPYRIGHT



 **Jeffery & Katauskas**

Job No 111685

BH206

Start Coring 5.8m

6

core loss 110mm

End of BH 6.8m



Borehole No.

206

2/2

CORED BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISHMARKETS, PYRMONT. NSW.

Job No. 11168S

Core Size: NMLC

R.L. Surface: -2.29m

Date: 30-5-95

Inclination: VERTICAL

Datum: WOODEN JETTY

Drill Type: MELVELLE

Bearing: -

Logged/Checked by: K.B. /

Core Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD INDEX STRENGTH I _s (50)	DEFECT DETAILS									
								DEFECT SPACING (mm)					DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.				
								EW	VW	N	MS	VS	ES	500	300	100	50
		5		START CORING AT 5.8m													
		6		SANDSTONE: fine to medium grained, pale white grey with orange brown staining.	HW-MW	W-MS	X										
				CORE LOSS 0.17m			X										
				SANDSTONE: as above.	MW	MS	X										
				END OF BOREHOLE AT 6.8m													BOREHOLE COLLAPSED
		7															
		8															
		9															
		10															
		11															
		12															



Borehole No.

207
1/2

BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Date: 29-5-95

Method: SPIRAL AUGER
BCD 450

R.L. Surface: +0.49m

Datum: WOODEN
JETTY

Logged/Checked by: K.B.

Underwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0		-	ASPHALTIC CONCRETE: 45mm.f. over roadbase; silty sand, fine grained, grey with crushed igneous rock up to 10mm diameter.				
	DS	N = 2 2/450mm	1			FILL: Sand, fine to medium grained, yellow brown and grey with ripped sandstone.	M	-	-	-
			2			FILL: Silty clay, medium plasticity, pale grey and brown with some ripped sandstone gravel.	MC>PL			STRONG HYDROCARBON ODOUR
	DS	N = 6 6,3,3	3		SM	SILTY SAND: fine to medium grained, grey with a trace of sea shells.	W	-		-
	DS									
	DS									
	DS	SUNK 0.2m N > 15 13,15/ 100m	4							
		BOUNCING				REFER TO CORED BOREHOLE LOG				
			5							
			6							
			7							

 **Jeffery & Katauskas**

Job No 111685 BH207 Start Coring 4.1m

4  Core loss 0.45m

5

6

7

End 7.5m

CORED BOREHOLE LOG

Location: SYDNEY FISHMARKETS, PYRMONT. NSW.

R.L. Surface: +0.49m

Datum: WOODEN

Logged/Checked by: K.B./

[illegible]



Borehole No.
208
1/2

BOREHOLE LOG

Client:
Project: FORESHORE DEVELOPMENT
Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S Method: SPIRAL AUGER R.L. Surface: +0.88m
Date: 29-5-95 BCD450 Datum: WOODEN JETTY

Logged/Checked by: K.B. *[Signature]*

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			FILL: Clayey sand, fine to medium grained, mottled grey and pale brown with a trace of ripped concrete and sandstone gravel.	M			APPEARS POORLY COMPACTED
	DS		1							
	DS	N = 1 1/450mm	2							
	DS									
					SM	SILTY SAND: fine grained, pale grey.	W	(L)		-
					-	SANDSTONE: medium grained, yellow brown, highly weathered, weak.	-	-	-	LOW TO MODERATE 'TC' BIT RESISTANCE
			3			REFER TO CORED BOREHOLE LOG				
			4							
			5							
			6							
			7							

 **Jeffery & Katauskas**

Job No. 11168S BH208 Start Coring 28m

3

4

Core Loss 04

5

End of BH 56m



Borehole No.

208

2/2

CORED BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISHMARKETS, PYRMONT. NSW.

Job No. 11168S

Core Size: NMLC

R.L. Surface: +0.88m

Date: 29-5-95

Inclination: VERTICAL

Datum: WOODEN

Drill Type: BCD 450

Bearing: -

Logged/Checked by: K.B./*JETTY*

Core Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD INDEX STRENGTH I_s (50)	DEFECT DETAILS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
								DEFECT SPACING (mm)						DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
								EW	VW	W	MS	S	VS	ES	500	300	100	50	30	10	Specific	General																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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NOTE: DEFECTS NOT DESCRIBED ARE BEDDING PARTINGS, 0-10°, PLANAR, ROUGH.

EW,EW SEAM, 0°,30mm.



Borehole No.

209

1/2

BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Method: SPIRAL AUGER
BCD 450

R.L. Surface: +0.21m

Date: 25-5-95

Datum: WOODEN
JETTY

Logged/Checked by: T.S./

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	DS		0		-	ASPHALTIC CONCRETE: 70mm.t. over Roadbase gravel and sand.	M			APPEARS POORLY TO MODERATELY COMPACTED TOO FRIABLE FOR H.P.
	DS	N = 17 2,9,8	1			FILL: Sand, fine to medium grained, yellow/orange with some crushed sandstone and igneous gravel. FILL: Sandy silt, fine grained, black, with some fine igneous gravel.				STRONG ORGANIC ODOUR
	DS	N = 2 1,1, 1/500mm	2			FILL: Sand, medium to coarse grained, grey mottled orange with some crushed sandstone gravel.	W			50mm SAMPLE RECOVERED
	DS		3			grading to FILL: Clayey sand, medium grained, grey brown.				SOME SMALL SHELLS
	DS		4		SP	SAND: medium to coarse grained, grey mottled orange.	W	-	-	-
	DS	N > 10 27,10/ 50mm				as above, but grading to grey.				
		BOUNCING			-	SANDSTONE: medium to coarse grained, pale grey.	-	-	-	LOW TO MODERATE 'TC' BIT RESISTANCE
			5			REFER TO CORED BOREHOLE LOG				
			6							
			7							

 Jeffery & Katauskas

Job No. 11168S BH209 Start Coring at 4.08m

4

5

CORE
LOSS 0.19m

CL
0.03

6

7

7.20

END OF BH @ 7.20m



Borehole No.

209

2/2

CORED BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISHMARKETS, PYRMONT. NSW.

Job No. 11168S

Core Size: NMLC

R.L. Surface: +0.21m

Date: 25-5-95

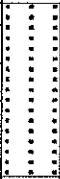
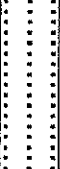
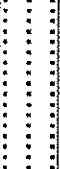
Inclination: VERTICAL

Datum: WOODEN

Drill Type: BCD 450

Bearing: -

Logged/Checked by: T.S. *[Signature]*

Core Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD INDEX STRENGTH I _s (50)	DEFECT DETAILS											
								DEFECT SPACING (mm)										DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.	
								500	300	100	50	20	10	Specific	General				
		4		START CORING AT 4.08m															
FULL RET- URN		5		SANDSTONE: medium to coarse grained, subangular, pale grey.	MW	W	X											- BEDDING PARTING, 0mm, 2° - CLAY SEAM, 20mm.t, SANDY CLAY - CLAY SEAM, 60mm.t. - JOINT, 1mm.t, 80°, PLANAR, ROUGH - CLAY SEAM	
				CORE LOSS 0.19m															
				SANDY CLAY: fine to medium grained, pale grey with some ironstone bands.	MW	W-MS													
		6		SANDSTONE: fine to medium grained, yellow mottled red brown.			X												
				as above, but pale yellow grey.			X											- JOINT, 0mm.t, 4° PLANAR, ROUGH - BEDDING PARTING, 1mm.t, ROUGH - BEDDING PARTING, 1mm.t, ROUGH - JOINT, 75°, PLANAR, ROUGH	
		7					X												
				END OF BOREHOLE AT 7.2m															
		8																	
		9																	



Borehole No.

210

1/2

BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

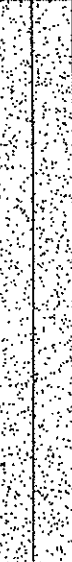
Method: WASH BORING

R.L. Surface: -1.52m

Date: 2-6-95

Datum: WOODEN JETTY

Logged/Checked by: K.B. / *[Signature]*

Underwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		REFER TO SCALA SHEET	0		SM	SILTY SAND: fine to medium grained, grey with some seashells.	W	VL	1	WASHBORING
			1							
			2							
			3			REFER TO CORED BOREHOLE LOG				
			4							
			5							
			6							
			7							

 Jeffery & Katauskas

Job No 11168S BH210 / Start Coring 3.0m

3 Core Loss 0.73m

4 Core Loss 0.88m

5 Core Loss 0.96m

6 End 6.88m



Borehole No.

210

2/2

CORED BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISHMARKETS, PYRMONT. NSW.

Job No. 11168S

Core Size: NMLC

R.L. Surface: -1.52m

Date: 2-6-95

Inclination: VERTICAL

Datum: WOODEN

Drill Type: MELVELLE

Bearing: -

Logged/Checked by: K.B.

Barrel Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD INDEX STRENGTH I _s (50)	DEFECT DETAILS											
								DEFECT SPACING (mm)					DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.						
							EW	VW	MS	VS	ES	500	300	100	50	30	10	Specific	General
		2																	
				START CORING AT 3.0m															
		3	••••	SANDSTONE: fine to medium grained, mottled pale grey yellow brown and red.	HW	VW	X												
				CORE LOSS 0.73m															
		4	••••	SANDSTONE: medium grained, pale grey, yellow brown and red.	EW	EW-VW													
				CORE LOSS 0.88m															
		5	••••	SANDSTONE: as above.	HW	VW	X												
				CORE LOSS 0.96m															
		6	••••	SANDSTONE: medium to coarse grained, yellow brown with red staining.	HW	W	X												
		7		END OF BOREHOLE AT 6.88m															
		8																	
		9																	

JOINT, 90°, PLANAR, ROUGH
- SANDY CLAY SEAM, 15°, 30mm.t.

JOINT, 85°, PLANAR, IRON INDURATED



Borehole No.

211

1/2

BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S

Date: 6-6-95

Method: WASHBORING

Logged/Checked by: K.B.

R.L. Surface: -1.59m

Datum: WOODEN JETTY

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		REFER TO SCALA SHEET	0		SM	SILTY SAND: fine to medium grained, grey and pale brown with some sea shells.	W	VL		BRICKS AND RUBBLE SURFACE COVER
			1							
			2							
			3							
			4							
			5							
			6							
7					REFER TO CORED BOREHOLE LOG					

 **Jeffery & Katauskas**

Job No. 111685

BH211

Start Coring 226m

2

3

4

5

End of BH 565m

Client:												
Project: FORESHORE DEVELOPMENT												
Location: SYDNEY FISHMARKETS, PYRMONT. NSW.												
Job No. 11168S			Core Size: NMLC			R.L. Surface: -1.59m						
Date: 6-6-95			Inclination: VERTICAL			Datum: WOODEN JETTY						
Drill Type: MELVELLE			Bearing: -			Logged/Checked by: K.B. <i>[Signature]</i>						
Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain character- istics, colour, structure, minor components.	Weathering	Strength	POINT LOAD INDEX STRENGTH I _s (50)		DEFECT SPACING (mm)		DEFECT DETAILS	
							VW	MS	VS	ES	500	300
		1										
		2		START CORING AT 2.26m								DEFECTS NOT DESCRIBED ARE BEDDING PARTINGS, 0-20°, PLANAR, ROUGH
		3		SANDSTONE: fine to medium grained, pale white grey with yellow brown staining subhorizontally bedded 0-20°.	HW-MW	MS-S		X				- 2 JOINTS, 80-85°, PLANAR, ROUGH
		4		as above, but yellow brown with a trace of red staining.				X				- JOINT, 70°, PLANAR, ROUGH
		5						X				- JOINT, 60°, PLANAR, ROUGH
		6						X				- SANDY CLAY SEAM, 0°, 1mm.t.
		7										- JOINT, 30°, PLANAR, IRONSTAINED
		8										- CLAY NODULE
		9										- JOINT, 60°, PLANAR, ROUGH
		10		END OF BOREHOLE AT 5.65m								



Borehole No.
212
1/2

BOREHOLE LOG

Client:
Project: FORESHORE DEVELOPMENT
Location: SYDNEY FISH MARKETS. NSW.

Job No. 11168S Method: WASHBORING R.L. Surface: -2.14m
Date: 9-6-95 Datum: WOODEN JETTY
 Logged/Checked by: K.B.

Groundwater Record	Samples	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition	Consistency/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		REFER TO SCALA SHEET	0		SM	SILTY SAND: fine to medium grained, grey with some seashells.	W	VL		WASHBORING
			1							
			2							
			3			REFER TO CORED BOREHOLE LOG				
			4							
			5							
			6							
			7							

 Jeffery & Katauskas

Job No 111685 BH212 Start Coring 2.86

3

4

5

6

Core Loss 0.56m

Core Loss 0.37m



Borehole No.

212

2/2

CORED BOREHOLE LOG

Client:

Project: FORESHORE DEVELOPMENT

Location: SYDNEY FISHMARKETS, PYRMONT, NSW.

Job No. 11168S

Core Size: NMLC

R.L. Surface: -2.14m

Date: 9-6-95

Inclination: VERTICAL

Datum: WOODEN

Drill Type: MELVELLE

Bearing: -

Logged/Checked by: K.B.

Core Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD INDEX STRENGTH I_p (50)										DEFECT DETAILS	
							EW	VH	W	MS	VS	CS	DEFECT SPACING (mm)					DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
													500	300	100	50	10	
		1																
		2																
		3																
		4																
		5																
		6																
		7																
		8																

START CORING AT 2.86m

SANDSTONE: fine to medium grained, pale white grey subhorizontally bedded 0-10°.

EW

EW

EW-VW

X

X

CORE LOSS 0.56m

SANDSTONE: as above.

EW

EW

VW

X

CORE LOSS 0.37m

SANDSTONE: as above, but with some orange brown staining.

EW

EW

VW

X

END OF BOREHOLE AT 7.0m

- JOINT, 85°, INTACT, PLANAR

- CLAY SAND SEAM, 0°, 35mm.t.



Borehole No.

301

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKETS
Project: CARPARK RECONSTRUCTION
Location: SYDNEY FISH MARKETS, BANK STREET, PYRMONT

Job No. 13836SP

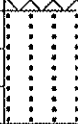
Method: SPIRAL AUGER
BCD 350

R.L. Surface: ~6.4m

Date: 19-10-98

Datum: AHD

Logged/Checked by: B.F./PW

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	FS	USO	DB									
DRY ON COMPLETION & AFTER 15 MINS				REFER TO SCALA SHEET	0			ASPHALTIC CONCRETE: 60mm.t CONCRETE: 220mm.t				
								FILL: Silty sandy gravel, fine to coarse grained, grey and orange brown, sandstone and igneous gravel. SANDSTONE: fine to medium grained, pale grey and orange brown.	M DW	- M-H	- -	MODEERATE TO HIGH 'TC' BIT RESISTANCE
					1			END OF BOREHOLE AT 1.0m				
					2							
					3							
					4							
					5							
					6							
					7							

Borehole No.

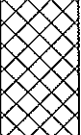
302
1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKETS
Project: CARPARK RECONSTRUCTION
Location: SYDNEY FISH MARKETS, BANK STREET, PYRMONT

Job No. 13836SP **Method:** SPIRAL AUGER
Date: 19-10-98 BCD 350 **R.L. Surface:** ~5.36m
Datum: AHD

Logged/Checked by: B.F./PW

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	FS	USO	DB									
DRY ON COMPLETION & AFTER 5 MINS				REFER TO SCALA SHEET	0		-	ASPHALTIC CONCRETE: 100mm.t				
				N = 32 9,17,15			-	CONCRETE: 250mm.t reinforced at 180mm. FILL: Silty gravelly sand, fine to medium grained, grey. FILL: Gravelly clayey sand, fine to medium grained, brown, grey and red brown, sandstone and ironstone gravel. FILL: Silty gravelly sand, fine to coarse grained, dark brown, igneous gravel.	M	-	-	APPEARS WELL COMPACTED
				N = 6 3,3,3	1		SM	SILTY SAND: fine to medium grained, yellow brown and grey.	M	L	-	-
					2		CL	SANDY CLAY: medium plasticity, pale grey mottled orange brown.	MC>PL	(St-Vst)		
					3			END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							



Borehole No.

303

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKETS
Project: CARPARK RECONSTRUCTION
Location: SYDNEY FISH MARKETS, BANK STREET, PYRMONT

Job No. 13836SP
Date: 19-10-98

Method: SPIRAL AUGER
BCD 350

R.L. Surface: ~6.11m
Datum: AHD

Logged/Checked by: B.F./pw

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	US	DB	DS									
					REFER TO SCALA SHEET	0			FILL: Silty gravelly sand, fine to medium grained, brown, fine to coarse grained igneous gravel.	M			APPEARS MODERATELY COMPACTED
					N > 10 10/ 150mm BOUNCING	1			as above, but with clay fines and concrete fragments. CONCRETE: 100mm.t				
									FILL: Silty gravelly sand, fine to medium grained, brown, fine to coarse grained igneous gravel, with clay fines.	MC>PL			
					N = 6 4,3,3	2		CL	FILL: Silty gravelly clay, medium plasticity, brown and orange brown. SANDY CLAY: medium plasticity, grey, orange brown and brown.	MC>PL	VSt	250 280	
						3			END OF BOREHOLE AT 3.0m				
						4							
						5							
						6							
						7							



Borehole No.

304

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKETS
Project: CARPARK RECONSTRUCTION
Location: SYDNEY FISH MARKETS, BANK STREET, PYRMONT

Job No. 13836SP
Date: 19-10-98

Method: SPIRAL AUGER
BCD 350

R.L. Surface: ~4.71m
Datum: AHD

Logged/Checked by: B.F./pw

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	USO	DB	DS									
DRY ON COMPLETION & AFTER 5 MINS					REFER TO SCALA SHEET	0			CONCRETE: 230mm.t over silty gravelly sand base course 170mm.t.				
					N > 10 10/ 100mm BOUNCING	1		CL	SANDY CLAY: medium plasticity, orange brown and grey, with occasional high strength iron indurated sandstone bands.	MC>PL	VSf	-	-
					N = 9 3,4,5							250 310 380	
						2			END OF BOREHOLE AT 1.95m				
						3							
						4							
						5							
						6							
						7							



Borehole No.

305

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKETS
Project: CARPARK RECONSTRUCTION
Location: SYDNEY FISH MARKETS, BANK STREET, PYRMONT

Job No. 13836SP
Date: 19-10-98

Method: SPIRAL AUGER
BCD 350

R.L. Surface: ~3.49m
Datum: AHD

Logged/Checked by: B.F./PW

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	FS	USO	DB	DS									
					REFER TO SCALA SHEET	0			ASPHALTIC CONCRETE: 90mm.t over silty sandy gravel base course, 150mm.t.	M	-	-	APPEARS MODERATELY COMPACTED
					N = 8 8,4,4	1			FILL: Silty gravelly sand, fine to medium grained, brown, fine to medium grained igneous gravel.	M			
					N < 1 1/300mm,1	2			FILL: Gravelly clayey sand, fine to medium grained, brown mottled various colours fine to coarse grained sandstone and igneous gravel, with sandy clay layers.				APPEARS POORLY COMPACTED
						3		SM	SILTY SAND: fine to medium grained, brown.	W	VL	-	-
					N < 1 1/450mm	4		CL	SANDY CLAY: medium plasticity, pale grey.	MC>PL	(F-St)	-	-
						5			END OF BOREHOLE AT 4.5m				
						6							
						7							



Borehole No.

401 _{1/1}

BOREHOLE LOG

Client: SYDNEY HARBOUR FORESHORE AUTHORITY

Project: PROPOSED UPGRADE

Location: SYDNEY FISH MARKETS, PYRMONT. NSW

Job No. 16325S

Method: SPIRAL AUGER
JK 450

R.L. Surface: $\approx$ 2.7m

Date: 4-12-01

Datum: AHD

Logged/Checked by: P.R./ *PR*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	USO	DB	DS									
ON COMPLETION DURING DRILLING						0		-	ASPHALTIC CONCRETE: 100mm.t	D	-	-	CONCRETE AND SANDSTONE BOULDERS $\approx$ 1.1m.t
					N = 4 2,2,2	1		-	FILL: Silty sand, fine to medium grained, grey brown, with sub angular igneous gravels, fine to medium grained.				
						2			FILL: Clayey sand, fine to medium grained, grey and brown, with bands of sub rounded slag gravels, fine to medium grained.	M-W			STRONG PETROLEUM ODOUR APPEARS POORLY COMPACTED
					N < 1 1/450mm	3		SP	SILTY SAND: fine to medium grained, grey, with a trace of small pieces of decomposed wood.	W	VL	-	SLIGHT PETROLEUM ODOUR TO 3.5m DEPTH
						4		SC	CLAYEY SAND: fine to medium grained, grey.	M-W	(VL)		
					SPT 1/150mm REFUSAL	5		-	SANDSTONE: fine to medium grained, grey with brown mottling and with a trace of clay bands.	DW	L-M	-	LOW 'TC' BIT RESISTANCE WITH MEDIUM BANDS
											M		MODERATE RESISTANCE
						6			END OF BOREHOLE AT 6.0m				
						7							



Borehole No.

402_{1/1}

BOREHOLE LOG

Client: SYDNEY HARBOUR FORESHORE AUTHORITY

Project: PROPOSED UPGRADE

Location: SYDNEY FISH MARKETS, PYRMONT. NSW

Job No. 16325S

Method: SPIRAL AUGER
JK 450

R.L. Surface: $\approx$ 2.0m

Date: 4-12-01

Datum: AHD

Logged/Checked by: P.R./*k*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	USO	DB	DS									
DRY ON COMPLETION AFTER 3 HRS						0			ASPHLATIC CONCRETE: 80mm.t over CONCRETE: 320mm.t				
					N = 13 10,8,5	1		-	FILL: Silty sand, fine to medium grained, dark grey, with sub rounded sandstone gravels and with a trace of clay fines and ash bands.	M	-	-	APPEARS WELL COMPACTED
						2		-	SANDSTONE: fine to medium grained, yellow brown and grey banded and with a trace of clay bands.	XW-DW	VL	-	VERY LOW TO LOW 'TC' BIT RESISTANCE
						3				DW	L-M		LOW RESISTANCE
						3			END OF BOREHOLE AT 3.0m				
						4							
						5							
						6							
						7							



Borehole No.

403_{1/1}

BOREHOLE LOG

Client: SYDNEY HARBOUR FORESHORE AUTHORITY

Project: PROPOSED UPGRADE

Location: SYDNEY FISH MARKETS, PYRMONT. NSW

Job No. 16325S

Method: SPIRAL AUGER
JK 450

R.L. Surface: $\approx$ 2.7m

Date: 4-12-01

Datum: AHD

Logged/Checked by: P.R./*PR*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB	DS									
TRY ON COMPLETION AFTER 3 HRS						0		-	ASPHALTIC CONCRETE: 100mm.t	D	-	-	APPEARS MODERATELY COMPACTED
					SPT 25/150mm	1		-	FILL: Silty sand, fine to medium grained, grey and brown, with sub angular igneous gravels and pieces of wood.	XW	EL-VL	-	VERY LOW 'TC' BIT RESISTANCE
						2		-	SANDSTONE: fine to medium grained, grey and brown banded with clay bands.	DW			
						3		-			L-M		LOW TO MODERATE RESISTANCE
						3			END OF BOREHOLE AT 3.0m				
						4							
						5							
						6							
						7							



Borehole No.

404_{1/2}

BOREHOLE LOG

Client: SYDNEY HARBOUR FORESHORE AUTHORITY

Project: PROPOSED UPGRADE

Location: SYDNEY FISH MARKETS, PYRMONT. NSW

Job No. 16325S

Method: SPIRAL AUGER
JK 450

R.L. Surface: $\approx$ 4.5m

Date: 4-12-01

Datum: AHD

Logged/Checked by: P.R./B

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	USO	DB	DS									
RY ON COMPLET- ION						0			ASPHALTIC CONCRETE: 100mm.t	D	-	-	APPEARS WELL COMPACTED
					N = 22 5,6,16	1			FILL: Silty sand, fine to medium grained, grey, with sub angular igneous gravels, fine to medium grained and with a trace of sandstone cobbles.	M			
					N = 3 3,2,1	2			FILL: Silty sand, fine grained, dark grey, with sub- rounded ash and slag gravels, fine to medium grained and with a trace of clay fines and small pieces of wood.				APPEARS POORLY COMPACTED
									FILL: Silty sand, fine to medium grained, grey brown, with a trace of sub angular sandstone and brick gravels and with a trace of clay fines.	M-W			
DURING DRILLING					N = 4 1,1,3	3		SM	SILTY SAND: fine to medium grained, dark grey, with a trace of slightly organic clayey silt bands and decomposing organic material.	W	L	50	HP TAKEN ON CLAYEY SILT BANDS
						4							
					N = 6 1,1,5	5		SC	CLAYEY SAND: fine to medium grained, grey.	M-W	L	-	VERY LOW 'TC' BIT RESISTANCE
									SANDSTONE: fine to medium grained, grey and yellow brown banded with clay bands.	XW	EL-VL	-	
						6							LOW TO MODERATE
						7				DW	L-M		



Borehole No.

404_{2/2}

BOREHOLE LOG

Client: SYDNEY HARBOUR FORESHORE AUTHORITY Project: PROPOSED UPGRADE Location: SYDNEY FISH MARKETS, PYRMONT. NSW												
Job No. 16325S Date: 4-12-01			Method: SPIRAL AUGER JK 450			R.L. Surface: $\approx$ 4.5m Datum: AHD						
Logged/Checked by: P.R. <i>PK</i>												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	USO	DB									
								SANDSTONE: fine to medium grained, grey and yellow brown banded with clay bands.	DW	L-M		RESISTANCE
								END OF BOREHOLE AT 7.5m				
					8							
					9							
					10							
					11							
					12							
					13							
					14							



Borehole No.

405_{1/2}

BOREHOLE LOG

Client: SYDNEY HARBOUR FORESHORE AUTHORITY

Project: PROPOSED UPGRADE

Location: SYDNEY FISH MARKETS, PYRMONT. NSW

Job No. 16325S

Method: SPIRAL AUGER
JK 450

R.L. Surface: $\approx$ 3.1m

Date: 4-12-01

Datum: AHD

Logged/Checked by: P.R./

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB	DS								
ON COMPLET- ION DURING DRILLIN					0		-	ASPHALTIC CONCRETE: 100mm.t FILL: Silty sand, fine to medium grained, grey, with sub angular brick and igneous gravels, concrete inclusions max 150mm.t	D-M	-	-	APPEARS MODERATELY COMPACTED
				N = 11 8,5,6	1			FILL: Silty sand, fine to medium grained, dark grey, with a trace of sub rounded sandstone gravels and pieces of metal.	M			
				N = 11 2,2,9	2							PETROLEUM ODOUR TO 4.0m
					3		SM	SILTY SAND: fine to medium grained, grey, with a trace of clay fines, shell fragments and fine to medium sub rounded sandstone gravels.	W	VL		
				N = 2 1,1,1	4							
				N = 1 1/300mm, 1	5		SC	CLAYEY SAND: fine to medium grained, grey.	W	(VL)	-	-
				N = 6 1,3,3	6			as above, but with thin clay bands.		L		
					7							



Borehole No.

405_{2/2}

BOREHOLE LOG

Client: SYDNEY HARBOUR FORESHORE AUTHORITY

Project: PROPOSED UPGRADE

Location: SYDNEY FISH MARKETS, PYRMONT. NSW

Job No. 16325S

Method: SPIRAL AUGER
JK 450

R.L. Surface: $\approx$ 3.1m

Date: 4-12-01

Datum: AHD

Logged/Checked by: P.R.

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	US	DB	DS									
								SC	CLAYEY SAND: fine to medium grained, grey, with thin clay bands.	W	L		SPT SANK 300mm UNDER OWN WEIGHT
					N = 3 1,1,2	8		-	as above, but with no clay bands.		VL		
						9			SANDSTONE: fine to medium grained, grey and brown, with a trace of clay bands and medium strength bands.	DW	VL-L		LOW 'TC' BIT RESISTANCE WITH OCCASIONAL VERY LOW AND MODERATE BANDS
						10							
						11			END OF BOREHOLE AT 10.5m				
						12							
						13							
						14							



Borehole No.

501

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 2.7m

Date: 14-5-10

Datum: AHD

Logged/Checked by: A.M./*RB*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
ON COMPLETION DURING DRILLING						0		-	ASPHALTIC CONCRETE: 70mm.t FILL: Sandy gravel, fine to coarse grained igneous gravel.	M	-	-	APPEARS MODERATELY COMPACTED
					N = 8 5,4,4	1			FILL: Sand, fine to medium grained, brown and grey, with clay bands and sub angular to sub rounded fine to medium grained igneous and slag gravel.				
					N = 8 2,3,5	2		SM	SILTY SAND: fine to medium grained, yellow brown and grey.	M	-	-	SLIGHT HYDROCARBON ODOUR
						3		-	SANDSTONE: medium to coarse grained, light grey and orange brown.	XW DW	EL-VL L-M	-	RESIDUAL
									REFER TO CORED BOREHOLE LOG				VERY LOW 'TC' BIT RESISTANCE LOW TO MODERATE RESISTANCE
						4							
						5							
						6							
						7							

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH501

START CORING AT 3.0m

3

4

5

END OF BOREHOLE AT 6.0m





Borehole No.
501
2/2

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD																				
Project: SYDNEY FISH MARKET REDEVELOPMENT																				
Location: SYDNEY FISH MARKETS, PYRMONT, NSW																				
Job No. 23982S				Core Size: NMLC				R.L. Surface: ≈ 2.7m												
Date: 14-5-10				Inclination: VERTICAL				Datum: AHD												
Drill Type: JK350				Bearing: -				Logged/Checked by: A.M./RS												
Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)												DEFECT DETAILS	
							EL	VL	L	M	H	VH	EH	500	300	100	50	30	10	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific General
		2																		
		3		START CORING AT 3.0m																
FULL RET- URN		3		SANDSTONE: fine to medium grained, light grey.	SW	M					X									
		4									X									
		4		SANDSTONE: fine to coarse grained, grey, orange and red brown.	DW						X									
		5									X									
		5									X									
		6		END OF BOREHOLE AT 6.0m		H					X									
		6																		
		7																		
		8																		
		9																		



Borehole No.

502

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 3.5m

Date: 14-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES ASB ASS DS		0		-	ASPHALTIC CONCRETE: 100mm.t FILL: Sandy gravel, fine to coarse grained igneous, brown and grey, fine to coarse grained sand.	M	-	-	APPEARS WELL COMPACTED
		N = 18 11,18/ 150mm	1		-	SANDSTONE: fine to medium grained, yellow brown.	DW	L-M	-	LOW TO MODERATE 'TC' BIT RESISTANCE
						REFER TO CORED BOREHOLE LOG				MODERATE RESISTANCE
			2							
			3							
			4							
			5							
			6							
			7							

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH502

START CORING AT 1.5m

1



2



CORE LOSS 0.82m



3



4



END OF BOREHOLE AT 4.5m





Borehole No.
502
2/2

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD		Job No. 23982S		Core Size: NMLC		R.L. Surface: ≈ 3.5m	
Project: SYDNEY FISH MARKET REDEVELOPMENT		Date: 14-5-10		Inclination: VERTICAL		Datum: AHD	
Location: SYDNEY FISH MARKETS, PYRMONT, NSW		Drill Type: JK350		Bearing: -		Logged/Checked by: A.M./RS	

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$											DEFECT SPACING (mm)		DEFECT DETAILS Type, inclination, thickness, planarity, roughness, coating.	
							EL	VL	L	M	H	VH	EH	500	300	100	50	20	10	Specific	General
		1		START CORING AT 1.50m																	
FULL RET- URN ON COMPLE- TION		2		SANDSTONE: medium to coarse grained, orange and red brown.	DW	L-M															
				as above, but with quartz inclusions, CORE LOSS 0.82m		L															
		3		SANDSTONE: medium to coarse grained, light grey and orange brown, with quartz inclusions.	DW	L												- XWS, 30mm.t			
				SANDSTONE: fine to medium grained, light grey, with dark grey laminae.	SW	M-H												- J, 0°, P, CLAY COATED			
		4																			
		5		END OF BOREHOLE AT 4.5m																	
		6																			
		7																			
		8																			



Borehole No.

503

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 3.8m

Date: 14-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
DRY DURING DRILLING						0		-	ASPHALTIC CONCRETE: 80mm.t FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained sub angular igneous, slag and sandstone gravel.	M	-	-	
					N = 29 7,12,17			-	SANDSTONE: fine to coarse grained, yellow brown and light grey.	XW	EL-VL	-	VERY LOW 'TC' BIT RESISTANCE
						1				DW	VL-L		VERY LOW TO LOW RESISTANCE
						2			SANDSTONE: fine to medium grained, light grey.		L		MODERATE RESISTANCE
											M		HIGH RESISTANCE
						3			REFER TO CORED BOREHOLE LOG				
						4							
						5							
						6							
						7							

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH503

START CORING AT 2.60m

2

3

4

5

END OF BOREHOLE AT 5.60m





Borehole No.
503
2/2

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD																		
Project: SYDNEY FISH MARKET REDEVELOPMENT																		
Location: SYDNEY FISH MARKETS, PYRMONT, NSW																		
Job No. 23982S				Core Size: NMLC				R.L. Surface: ≈ 3.8m										
Date: 17-5-10				Inclination: VERTICAL				Datum: AHD										
Drill Type: JK350				Bearing: -				Logged/Checked by: A.M./										
Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)										DEFECT DETAILS	
							EL	VL	L	M	H	VH	EH	500	300	200	150	100
		2		START CORING AT 2.60m														
ON COMPLETION FULL RETURN		3		SANDSTONE: fine to medium grained, light grey, with dark grey laminae.	DW	M				X								
				SANDSTONE: fine to coarse grained, orange brown and red brown.	SW					X								
		4		SANDSTONE: fine to medium grained, light grey with dark grey laminae.		H				X								- J, 0°, P, S, IS
										X								
		5									X							
				SHALE: dark grey.	DW	L												
				SANDSTONE: fine to medium grained, light grey, with dark grey laminae.	SW	H				X								
		6		SANDSTONE: fine to coarse grained, orange brown and red brown.														
				END OF BOREHOLE AT 5.6m														
		7																
		8																
		9																



Borehole No.

504

1/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 4.8m

Date: 14-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
ON COMPLETION DURING DRILLING						0		-	ASPHALTIC CONCRETE: 100mm.t	M	-	-	APPEARS MODERATELY TO WELL COMPACTED
					N = 6 6,3,3				FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained sub angular to sub rounded sandstone and slag gravel.				
						1			FILL: Gravelly sand, fine to coarse grained, brown, yellow brown and red brown, fine to coarse grained sub angular sandstone, slag and igneous gravel, with clay lenses.				
					N = 16 7,9,7				FILL: Sandy gravel, fine to medium grained sub angular ash and slag gravel, dark brown and black, fine to medium grained sand.				ALLUVIAL
						2		SM	FILL: Silty sand, fine to medium grained, brown and yellow brown, with clay bands and sandstone gravel.	M	L	-	
					N = 6 5,3,3	3			SILTY SAND: fine to medium grained, brown, dark grey and yellow brown, with organic clayey silt bands				SLIGHT HYDROCARBON ODOUR ALLUVIAL
						4			SILTY SAND: fine to coarse grained, dark grey and light grey, with a trace of organic clayey silt bands and decomposed organic material.	W	VL	-	
					N = 3 0,1,2	5							VERY LOW 'TC' BIT RESISTANCE
						6		-	SANDSTONE: fine to medium grained, yellow brown and grey.	XW	EL-VL	-	
						7				DW	L		



Borehole No.
504
2/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD													
Project: SYDNEY FISH MARKET REDEVELOPMENT													
Location: SYDNEY FISH MARKETS, PYRMONT, NSW													
Job No. 23982S			Method: SPIRAL AUGER JK350				R.L. Surface: ≈ 4.8m						
Date: 14-5-10			Logged/Checked by: A.M.				Datum: AHD						
Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
									SANDSTONE: fine to medium grained, yellow brown and grey.	DW	L		MODERATE RESISTANCE
									REFER TO CORED BOREHOLE LOG				
						8							
						9							
						10							
						11							
						12							
						13							
						14							

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH504

START CORING AT 7.33m

7

CORE LOSS 0.67m

8

9

10

END OF BH AT 10.33m





Borehole No.

504

3/3

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Core Size: NMLC

R.L. Surface: ≈ 4.8m

Date: 17-5-10

Inclination: VERTICAL

Datum: AHD

Drill Type: JK350

Bearing: -

Logged/Checked by: A.M./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$											DEFECT DETAILS	
							EL	VL	L	M	H	VH	EH	500	300	100	50	20	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific General
		7		START CORING AT 7.38m															
				CORE LOSS 0.67m															
75% RET-URN		8		SANDSTONE: fine to coarse grained, light grey with red banding.	DW-SW	M													- XWS, 110mm.t
				SANDSTONE: fine to coarse grained, yellow brown, red brown and light grey, with light grey laminae.															- 8.48-9.0m J, SUB VERTICAL, Un, R
		9																	- Be, 20°, P, S, IS
		10																	- Be, 20°, SILTY SAND INFILL
				END OF BOREHOLE AT 10.33m															- Be, 5°, CLAY INFILL
		11																	
		12																	
		13																	



Borehole No.

505

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK500

R.L. Surface: ≈ 5.6m

Date: 20--5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS									
					0			ASPHALTIC CONCRETE: 80mm.t CONCRETE: 220mm.t	-	-	-	
				N = 10 4,4,6	1		-	FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained, sub angular to sub rounded igneous and sandstone gravel and a trace of slag gravel.	M	-	-	APPEARS MODERATELY COMPACTED
				N > 20 7,10, 10/20mm REFUSAL	2							APPEARS WELL COMPACTED
					3		SM	SILTY SAND: fine to medium grained, orange brown, with clayey silt bands.	M	-	-	ALLUVIAL
				N = 11 7,6,5	4			SILTY SAND: fine to coarse grained, grey and dark grey, with clayey silt bands and a trace of decomposed wood.	M	MD		
					5			SILTY SAND: medium to coarse grained, light grey.	M	MD		
				N = 13 2,5,8	6		-	SANDSTONE: fine to medium grained, light grey, with clay bands.	DW	L	-	LOW TO MODERATE 'TC' BIT RESISTANCE
					7			REFER TO CORED BOREHOLE LOG				

▼
DURING
DRILL
ING

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH505 START CORING AT 6.05m

6

CORE LOSS 0.95m

7

8

9

END OF BOREHOLE AT 9.05m





Borehole No.

505

2/2

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Core Size: NMLC

R.L. Surface: ≈ 5.6m

Date: 17-5-10

Inclination: VERTICAL

Datum: AHD

Drill Type: JK500

Bearing: -

Logged/Checked by: A.M./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS	
								DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
							EL VL L M H VH EH	500 300 200 100 50 20 10	Specific General
		5							
		6		START CORING AT 6.05m CORE LOSS 0.95m					
50% LOSS		7							
FULL RETURN		7		SANDSTONE: fine to coarse grained, light grey, with yellow brown and red brown staining and cross bedding.	DW	L	X		- XWS, 80mm.t
		8				M	X		
		8					X		- J, 40°, P, S, CLAY - Be, 20°, P, S, IS - J, 40°, P, S, CLAY COATED - Be, 20°, P, S, IS
		9		END OF BOREHOLE AT 9.05m			X		
		10							
		11							



Borehole No.

506

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK500

R.L. Surface: ≈ 3.0m

Date: 19-5-10

Datum: AHD

Logged/Checked by: A.M./*e*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
DURING DRILLING					SPT 20/20mm REFUSAL	0		-	ASPHALTIC CONCRETE: 100mm.t FILL: Gravelly sand, fine to coarse grained, red brown, fine to medium grained sub angular to sub rounded igneous gravel.	M	-	-	APPEARS WELL COMPACTED
						1		-	CONCRETE: 500mm.t	-	-	-	
					N = 5 2,2,3	2		-	FILL: Gravelly sand, fine to medium grained, yellow brown and grey, fine to medium grained sub angular sandstone, igneous and slag gravel.	M	-	-	APPEARS POORLY COMPACTED
						3		SM	SILTY SAND: fine to medium grained, grey, with a trace of clay fines and decomposing timber fragments.	W	VL	-	HYDROCARBON ODOUR
					N = 2 1,1,1	4		-	SANDSTONE: fine to medium grained, light grey.	DW	VL	-	SLIGHT HYDROCARBON ODOUR
						5			REFER TO CORED BOREHOLE LOG				ALLUVIAL
						6							VERY LOW TO LOW 'TC' BIT RESISTANCE
						7							

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH506

START CORING AT 4.48m

CORE LOSS
0.11m

5

CL

6

CORE LOSS 0.34m.

7

8

END OF BH AT 8.20m



Borehole No.
506
2/2

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD Project: SYDNEY FISH MARKET REDEVELOPMENT Location: SYDNEY FISH MARKETS, PYRMONT, NSW																	
Job No. 23982S Date: 19-5-10 Drill Type: JK500			Core Size: NMLC Inclination: VERTICAL Bearing: -			R.L. Surface: ≈ 3.0m Datum: AHD Logged/Checked by: A.M. <i>RB</i>											
Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS									
								DEFECT SPACING (mm)					DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.				
		3					EL VL L M H VR EH	500 300 100 50 30 10	Specific General								
		4		START CORING AT 4.48m													
ON COMPLETION FULL RET- URN		5		CORE LOSS 0.11m SANDSTONE: fine to medium grained, light grey, with dark grey laminae. as above, but fine to coarse grained.	DW	VL-L	X X		- CS, 45mm.t - CS, 20mm.t								
		6		CORE LOSS 0.34m													
		7		SANDSTONE: fine to medium grained, light grey, with dark grey laminae and cross bedding and orange staining.	DW-SW	M	X X X		- Be, 0°, Un, R, IS - Be, 0°, Un, R, IS - J, 5°, P, S, IS - J, 45°, P, S, IS								
		8				M	X		- Be, 0°, Un, S, IS								
		9		END OF BOREHOLE AT 8.20m													



Borehole No.

507

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK500

R.L. Surface: ≈ 3.0m

Date: 19-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
 DURING DRILLING ON COMPLETION						0		-	ASPHALTIC CONCRETE: 100mm.t FILL: Gravelly sand, fine to coarse grained, red brown, fine to medium grained sub angular igneous gravel.	M	-	-	APPEARS WELL COMPACTED
					SPT 20/10mm REFUSAL	1		-	CONCRETE: 300mm.t	-	-	-	
					N = 9 4,5,4	2		-	FILL: Gravelly sand, fine to medium grained, light grey and dark grey, fine to coarse grained sub angular slag and igneous gravel, with decomposing timber.	M	-	-	HYDROCARBON ODOUR APPEARS MODERATELY COMPACTED
					N = 3 2,1,2	3		SM	SILTY SAND: fine to coarse grained, dark grey and light grey, with a trace of decomposing timber.	W	VL	-	SLIGHT HYDROCARBON ODOUR ALLUVIAL
					N > 19 1,19/ 10mm REFUSAL	4		-	SANDSTONE: fine to medium grained, grey and yellow brown.	DW	L-M	-	LOW 'TC' BIT RESISTANCE
						5			REFER TO CORED BOREHOLE LOG				
						6							
						7							

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH507 START CORING AT 5.15m

5

CORE
LOSS
0.08m

6

7

8

END OF BH @ 8.15m



Borehole No.

507

2/2

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Core Size: NMLC

R.L. Surface: ≈ 3.0m

Date: 19-5-10

Inclination: VERTICAL

Datum: AHD

Drill Type: JK500

Bearing: -

Logged/Checked by: A.M. *R*

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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Borehole No.

508

1/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK500

R.L. Surface: ≈ 3.8m

Date: 20-5-10

Datum: AHD

Logged/Checked by: A.M.

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
						0		-	ASPHALTIC CONCRETE: 100mm.t FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained sub angular to sub rounded igneous and slag gravel.	-	-	-	SLIGHT HYDROCARBON ODOUR
					SPT 10/10mm REFUSAL	1		-	CONCRETE: 100mm.t FILL: Silty sand, fine to coarse grained, dark grey and brown, with fine to coarse grained sub angular igneous, sandstone and slag gravel and clayey silt bands.	M	-	-	SLIGHT HYDROCARBON ODOUR APPEARS WELL COMPACTED
					N = 17 17,11,6	2							
						3		SM	SILTY SAND: medium to coarse grained, dark grey, with organic clayey silt bands and decomposing timber.	M	VL	-	SLIGHT HYDROCARBON ODOUR ALLUVIAL
DURING DRILL-ING					N = 2 1,1,1	4			SILTY SAND: medium to coarse grained, light grey.	W	VL	-	
DURING DRILL-ING					N = 0 1,0,0	5					L		
ON COMPLETION					N = 10 5,5,5	6		SC	SILTY CLAYEY SAND: fine to medium grained, light grey.	W	MD	-	
						7		SM	SILTY SAND: fine to coarse grained, light grey and yellow brown.				



Borehole No.
508
2/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD Project: SYDNEY FISH MARKET REDEVELOPMENT Location: SYDNEY FISH MARKETS, PYRMONT, NSW												
Job No. 23982S Date: 20-5-10		Method: SPIRAL AUGER JK500 Logged/Checked by: A.M./ <i>[Signature]</i>			R.L. Surface: $\approx$ 3.8m Datum: AHD							
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS									
							SM	SILTY SAND: fine to coarse grained, light grey and yellow brown.	W	MD		
				N > 11 5, 11/ 150mm REFUSAL	8		-	SANDSTONE: fine to coarse grained, light grey yellow brown, with clay bands.	XW	EL-VL	-	VERY LOW 'TC' BIT RESISTANCE
									DW	L		LOW TO MODERATE RESISTANCE
					9			REFER TO CORED BOREHOLE LOG				
					10							
					11							
					12							
					13							
					14							

JEFFERY & KATAUSKAS PTY LTD

JOB No. 239825

BH508

START CORING AT 8.55m

8

9

10

11

END OF BH AT 11.55m





Borehole No.

508

3/3

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Core Size: NMLC

R.L. Surface: ≈ 3.8m

Date: 20-5-10

Inclination: VERTICAL

Datum: AHD

Drill Type: JK500

Bearing: -

Logged/Checked by: A.M./*AS*

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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								EL	VL	L	M	H	VH	EH	500	300	100	50	20	Specific	General																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Borehole No.

509

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK300

R.L. Surface: ≈ 4.6m

Date: 21-5-10

Datum: AHD

Logged/Checked by: M.L.T.

Groundwater Record	ES	ASB	ASS	DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASPHALTIC CONCRETE: 70mm.t FILL: Gravelly sand, fine to medium grained, dark brown and brown, fine to coarse grained igneous, concrete, sandstone and quartz gravel and up to cobble size.	M	-	-	APPEARS WELL COMPACTED
					N = 6 2,2,4	1		CL	SANDY CLAY: low to medium plasticity, light brown, orange brown and red brown, fine to medium grained sand, and a trace of roots.	MC > PL	St	-	ALLUVIAL
						2						150 170 170	
					N = 6 5,4,2	3		CL/SC	SANDY CLAY/CLAYEY SAND: low to medium plasticity, fine to medium grained, light grey, orange brown and red brown.	MC < PL/ M	VSt/ H/ L	440 420 220	
						4		SC	CLAYEY SAND: fine to medium grained, pink, red brown and light grey.	M	L		
					N > 21 1,12, 9/50mm REFUSAL	5		-	SANDSTONE: fine to medium grained, light grey. REFER TO CORED BOREHOLE LOG	DW	L-M	-	LOW 'TC' BIT RESISTANCE
						6							
						7							

DURING DRILLING

DURING DRILLING

JEFFERY & KATAUSKAS PTY LTD

239825

BH509

START CORING AT 5.05m

5.05

6

7

8

END BH509 AT 8.63m



Borehole No.

509

2/2

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Core Size: NMLC

R.L. Surface: ≈ 4.6m

Date: 21-5-10

Inclination: VERTICAL

Datum: AHD

Drill Type: JK350

Bearing: -

Logged/Checked by: M.L.T./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS																		
								DEFECT SPACING (mm)												DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.						
								EL	VL	L	M	H	VH	EH	500	300	100	50	10	Specific	General					
		4																								
		5		START CORING AT 5.05m																						
FULL RET- URN		6		SANDSTONE: fine to medium grained, light grey and red stained orange brown, bedded at 0-5°.	DW	M																			- J, 85°, Un, R - J, 75°, P, R - XWS, 10°, 20mm.t	
					L-M																				- XWS, 0°, 5mm.t	
						FR	M																			- Be, 0°, P, R, IS
						DW																				- Be, 0-15°, P, R, IS
						SW																				
		7		SANDSTONE: fine to medium grained, light grey, massive, with a trace of carbonaceous flecks.																						
		8		as above, but light grey, orange brown and red brown.	DW																					
					SW																					
				as above, but light grey massive, to indistinctly bedded at 0-5°.																						
						H																				
		9		END OF BOREHOLE AT 8.63m																						
		10																								



Borehole No.

510

1/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: $\approx$ 3.3m

Date: 21-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	ES	ASB	ASS	DS	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							0		-	ASPHALTIC CONCRETE: 50mm.t CONCRETE: 200mm.t	-	-	-	
							1		-	FILL: Sandy gravel, fine to coarse grained angular igneous gravel. FILL: Gravelly sand, fine to medium grained, brown, yellow brown and grey, with metal wire fragments.	M	-	-	APPEARS WELL COMPACTED SLIGHT HYDROCARBON ODOUR
						N = 24 10,12,12								
							2							
							3							APPEARS POORLY COMPACTED
						N = 7 4,3,4					W			
							4		SM	SILTY SAND: fine to coarse grained, light grey, with organic clayey silt bands.	W	VL	-	ALLUVIAL
						N = 2 1,0,1	5							
							6		SC	SILTY CLAYEY SAND: fine to medium grained, light grey.	M	L		
						N = 8 2,3,5	7							

▼
DURING
DRILL-
ING



Borehole No.

510

2/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: $\approx$ 3.3m

Date: 21-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
ON COMPLETION	ES ASB ASS DS	N = 10 4,4,6	8		SC	SILTY CLAYEY SAND: fine to medium grained, light grey.	M	L		
			9		-	SANDSTONE: fine to coarse grained, light grey, with a trace of yellow.	XW	EL-VL	-	VERY LOW 'TC' BIT RESISTANCE
			10					L		LOW TO MODERATE RESISTANCE
			11			REFER TO CORED BOREHOLE LOG				
			12							
			13							
			14							

JEFFERY & KATAUSKAS PTY LTD

JOB NO. 239825

BH510

START CORING AT 10.32m

CORE LOSS 0.46m

11

12

13

END OF BH AT 13.31m



Borehole No.

510

3/3

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S **Core Size:** NMLC **R.L. Surface:** ≈ 3.3m

Date: 21-5-10 **Inclination:** VERTICAL **Datum:** AHD

Drill Type: JK350 **Bearing:** - **Logged/Checked by:** A.M. *RS*

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
								DEFECT SPACING (mm)						DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
								EL	VL	L	M	H	VH	EH	500	300	100	50	30	10	Specific	General																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Borehole No.

511

1/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
 JK350

R.L. Surface: ≈ 3.3m

Date: 21-5-10

Datum: AHD

Logged/Checked by: A.M. *RS*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
▼ DURING DRILL- ING						0		-	ASPHALTIC CONCRETE: 50mm.t CONCRETE: 180mm.t	-	-	-	
						1		-	FILL: Gravelly sand, fine to coarse grained, dark brown, fine to coarse grained sub angular igneous, concrete, slag and sandstone gravel.	M	-	-	SLIGHT HYDROCARBON ODOUR
					N = 10 8,6,4	2							APPEARS MODERATELY COMPACTED
						3			FILL: Gravelly sand, fine to coarse grained, dark brown and dark grey, fine to coarse grained angular to sub angular slag and sandstone gravel.	W	L		APPEARS POORLY COMPACTED
▼ ON COMPLET- ION					N = 6 1,2,4	4							
						5		SM	SILTY SAND: fine to coarse grained, light grey and dark grey, with clayey silt bands and decomposing wood. as above, but without wood.	W	VL	-	STRONG HYDROCARBON ODOUR
					N = 1 1,0,1	6					L		ALLUVIAL
					N = 7 3,3,4	7							



Borehole No.
511
2/3

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD													
Project: SYDNEY FISH MARKET REDEVELOPMENT													
Location: SYDNEY FISH MARKETS, PYRMONT, NSW													
Job No. 23982S Method: SPIRAL AUGER JK350 R.L. Surface: ≈ 3.3m													
Date: 21-5-10 Datum: AHD													
Logged/Checked by: A.M.													
Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
					N = 6 2,3,3	8		SM	SILTY SAND: fine to coarse grained, light grey and dark grey, with clayey silt bands.	W	L		ALLUVIAL
						9		-	SANDSTONE: medium to coarse grained, grey and yellow brown.	XW	EL-VL	-	VERY LOW 'TC' BIT RESISTANCE
											DW	L	
						10			REFER TO CORED BOREHOLE LOG				
						11							
						12							
						13							
						14							

JEFFERY & KATAUSKAS PTY LTD

JOB No. 239825 BH511 START CORING AT 9.24m

9

CORE LOSS 1.21m

10

11

12

END OF BH AT 12.24m



Borehole No.
511
3/3

CORED BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD Project: SYDNEY FISH MARKET REDEVELOPMENT Location: SYDNEY FISH MARKETS, PYRMONT, NSW														
Job No. 23982S Date: 21-5-10 Drill Type: JK350				Core Size: NMLC Inclination: VERTICAL Bearing: -				R.L. Surface: ≈ 3.3m Datum: AHD Logged/Checked by: A.M./ <i>RS</i>						
Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$		DEFECT SPACING (mm)		DEFECT DETAILS DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.			
							EL	VL	L	M	H	VH	EH	500
		8												
		9		START CORING AT 9.24m										
		10		CORE LOSS 1.21m										
FULL RET- URN		11		SANDSTONE: fine to coarse grained, light grey.	DW	L		X						
		11		SANDSTONE: fine to coarse grained, orange brown and light grey.				X						
		12												
		13		END OF BOREHOLE AT 12.24m										
		14												



Borehole No.

512

1/2

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK300

R.L. Surface: ≈ 4.3m

Date: 21-5-10

Datum: AHD

Logged/Checked by: M.L.T./

Groundwater Record	ES	ASB	ASS	DS	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							0		-	CONCRETE: 320mm.t				4mm DIAMETER REINFORCEMENT, 110mm & 240mm TOP COVER
						N = 1 1,0,1			-	FILL: Gravelly sand, fine to coarse grained, light grey, fine to medium grained sub angular igneous and concrete gravel. FILL: Gravelly sand, fine to coarse grained, dark brown and brown, fine to coarse grained sandstone and igneous gravel and up to cobble size and metal fragments. FILL: Sand, fine to coarse grained, light grey and orange brown, with fine to coarse grained sandstone and ironstone gravel.	W M	VL	-	APPEARS POORLY COMPACTED
						N = 6 2,4,2				FILL: Sandy clay, low plasticity, red brown and orange brown, with fine to medium grained, igneous, sandstone and ironstone gravel and plastic pieces.				
						N = 1 1,0,1			SP	SAND: fine to coarse grained, grey.	M	VL		ALLUVIAL
									CL	SANDY CLAY: low plasticity, dark grey.	MC > PL	S		
									SP	SAND: fine to coarse grained, grey and brown, with clay bands.	W	(VL)		
						SPT 0,0,0								
									CL/SC	SANDY CLAY/CLAYEY SAND: low plasticity, fine to coarse grained, light grey mottled orange brown, with fine to coarse grained sandstone gravel.	MC > PL/ W	(St-L)		
									SC	CLAYEY SAND: fine to coarse grained, light grey.	M	(MD)		
						N > 10 9,10/ 50mm REFUSAL				REFER TO CORED BOREHOLE LOG				
							7							

JEFFERY & KATAUSKAS PTY LTD

239825

BH512

START CORING AT 6.35m

6

6.35m

CORE
LOSS
0.07m

7

8

9

END OF BH AT 9.35m



Borehole No.

513

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
 JK350

R.L. Surface: ≈ 2.3m

Date: 11-5-10

Datum: AHD

Logged/Checked by: A.M. *AK*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	USO	DB	DS									
ON COMPLETION DURING DRILLING						0		-	ASPHALTIC CONCRETE: 50mm.t CONCRETE: 180mm.t CONCRETE/CONCRETE RUBBLE	-	-	-	
						1		-	FILL: Silty clayey sand, fine to medium grained, dark grey.	M	-	-	APPEARS POORLY COMPACTED
					N = 5 2,3,2	2		SP	SAND: fine to coarse grained, grey and dark grey, with quartz.	W	L	-	SLIGHT HYDROCARBON ODOUR ALLUVIAL
						3		-	SANDSTONE: fine to coarse grained, light grey.	DW	VL	-	VERY LOW 'TC' BIT RESISTANCE
						4		-	SANDSTONE: fine to coarse grained, light grey and yellow brown.	DW	VL-L	-	VERY LOW TO LOW RESISTANCE
						5		-			L-M	-	LOW TO MODERATE RESISTANCE
						6			END OF BOREHOLE AT 6.0m				MONITORING WELL INSTALLED TO 4.2m. CLASS 18 50mm DIA. MACHINE SLOTTED PVC FROM 4.2m-1.2m CASING FROM 1.2m TO SURFACE, 2mm SAND FILTER PACK 4.2m-1.0m, BENTONITE SEAL 1.2m-0.3m BACKFILLED WITH SAND & CUTTINGS TO SURFACE, COMPLETED WITH A STEEL GATIC COVER AND LOCKABLE CAP
						7							



Borehole No.

514

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S **Method:** SPIRAL AUGER JK250 **R.L. Surface:** ≈ 2.1m
Date: 11-5-10 **Datum:** AHD
Logged/Checked by: A.M./

Groundwater Record	ES ASB ASS DS	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
				0			CONCRETE: 230mm.t				
						-	ASPHALTIC CONCRETE: 150mm.t	-	-	-	
						-	FILL: Clayey gravelly sand, fine to medium grained, orange brown and grey, fine to coarse grained sub angular to sub rounded igneous and sandstone gravel.	M	-	-	SLIGHT HYDROCARBON ODOUR
			N = 10 5,7,3	1			FILL: Silty sand, fine to medium grained, light grey ad and yellow brown, with fine to coarse grained sub rounded sandstone gravel.				APPEARS MODERATELY COMPACTED
			N = 7 3,3,4			SM	SILTY SAND: fine to medium grained, grey and yellow brown.	M	L	-	
				2			as above, but grey, with shell fragments.	W	L		ALLUVIAL
				3					VL		
			N = 2 0,1,1								
				4		-	SANDSTONE: fine to medium grained, yellow brown, with clay bands.	DW	VL-L	-	LOW 'TC' BIT RESISTANCE
				5			SANDSTONE: fine to medium grained, light brown.		L-M		LOW TO MODERATE RESISTANCE
				6			END OF BOREHOLE AT 6.0m				
				7							

▼
DURING
DRILL-
ING &
ON
COMPLET-
ION



Borehole No.

515

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 3.9m

Date: 11-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	ES	ASB	ASS	DS	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0		-	ASPHALTIC CONCRETE: 100mm.t	-	-	-	
									-	CONCRTE: 140mm.t	M	-	-	
						N = 6 2,2,4				FILL: Gravelly sand, fine to medium grained, orange brown and red brown, fine grained sub angular to sub rounded sandstone gravel.				APPEARS MODERATELY COMPACTED
							1		-	SANDSTONE: fine to medium grained, yellow brown.	XW	EL-L	-	VERY LOW 'TC' BIT RESISTANCE
											DW	L-M		LOW RESISTANCE
							2							MODERATE RESISTANCE
										as above, but light grey.		M		HIGH RESISTANCE
							3			END OF BOREHOLE AT 2.8m				'TC' BIT REFUSAL
							4							
							5							
							6							
							7							



Borehole No.

516

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
 JK350

R.L. Surface: ≈ 3.0m

Date: 11-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB	DS									
DRY ON COMPLETION						0		-	ASPHALTIC CONCRETE: 50mm.t	-	-	-	
								-	CONCRTE: 220mm.t	-	-	-	
					N = 25 7,6,17			-	FILL: Silty sand, fine to coarse grained, dark grey and yellow brown, fine to coarse grained sub angular igneous and sandstone gravel.	M	-	-	APPEARS WELL COMPACTED
						1		SP	SAND: fine to coarse grained, light grey and yellow brown.	M	-	-	HYDROCARBON ODOUR
					N = 43 19,21,22			-	SANDSTONE: fine to medium grained, yellow brown and light grey, with clay bands.	XW	EL-VL	-	RESIDUAL
						2			SANDSTONE: fine to medium grained, light grey.	DW	L		VERY LOW 'TC' BIT RESISTANCE
													LOW TO MODERATE RESISTANCE
											M		MODERATE TO HIGH RESISTANCE
						3			END OF BOREHOLE AT 3.0m				'TC' BIT REFUSAL
						4							MONITORING WELL INSTALLED TO 3.0m. CLASS 18 50mm DIA. MACHINE SLOTTED PVC FROM 3.0m TO 1.0m, CASING FROM 1.0m TO SURFACE, 2mm SAND FILTER PACK TO 3.0m TO 0.8m, BENTONITE SEAL FROM 0.8m TO 0.3m. BACKFILLED WITH SAND AND CUTTINGS TO SURFACE AND COMPLETED WITH A STEEL GATIC COVER AND LOCKABLE CAP
						5							
						6							
						7							



Borehole No.

517

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
 JK350

R.L. Surface: ≈ 3.3m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M. *AR*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	FS	US	DB	DS									
ON COMPLETION DURING DRILLING						0		-	ASPHALTIC CONCRETE: 100mm.t	M	-	-	APPEARS MODERATELY COMPACTED
					N = 11 4,6,5	1			FILL: Gravelly sand, fine to medium grained, grey brown, with fine to coarse grained sub angular to sub rounded igneous and sandstone gravel and ash. FILL: Sand, fine to medium grained, yellow brown, with fine to coarse grained sandstone and sla gravel.				
					N = 14 10,7,7	2			FILL: Gravelly sand, fine to medium grained, yellow brown and dark grey, fine to coarse igneous and sandstone gravel.				
					N = 2 1,1,1	3			FILL: Silty sand, fine to medium grained, grey and dark brown, with clay and fine to coarse grained slag gravel.	W	VL		STRONG HYDROCARBON ODOUR APPEARS POORLY COMPACTED
					N = 4 1,2,2	4		SM	SILTY SAND: fine to medium grained, grey.	W	VL	-	STRONG HYDROCARBON ODOUR ALLUVIAL
						5			SILTY SAND: fine to medium grained, grey and light grey, with shell fragments.		(L)		MONITORING WELL INSTALLED TO 5.5m. CLASS 18 50mm DIA. MACHINE SLOTTED PVC FROM 5.5m-2.5m, CASING 2.5m TO SURFACE, 2mm SAND FILTER PACK TO 1.5m, BENTONITE SEAL FROM 1.5m-0.3m, BACKFILLED WITH SAND & CUTTINGS TO SURFACE & COMPLETED WITH A STEEL GATIC COVER AND LOCKABLE CAP
						6			END OF BOREHOLE AT 6.0m				
						7							

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
 JK350

R.L. Surface: ≈ 3.0m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
DRY ON COMPLETION						0		-	ASPHALTIC CONCRETE: 100mm.t FILL: Sandy gravel, fine to coarse grained sub angular to sub rounded concrete brick and sandstone gravel, red brown and brown, fine to medium grained sand, with ash and slag.	M	-	-	APPEARS WELL COMPACTED
					SPT 18/150m REFUSAL	1			as above, but yellow brown, with concrete gravel and cobbles.	M-D			
						2			END OF BOREHOLE AT 1.6m				'TC' BIT REFUSAL IN FILL
						3							
						4							
						5							
						6							
						7							



Borehole No.

519

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: $\approx$ 4.1m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
DRY ON COMPLETION						0		-	ASPHALTIC CONCRETE: 100mm.t FILL: Sandy gravel, sandstone and igneous gravel, dark brown and grey, fine to coarse grained sand, with sandstone cobbles and boulders.	M	-	-	APPEARS WELL COMPACTED
					N = 43 10,22,21	1			FILL: Sandstone and concrete rubble.	D			
									END OF BOREHOLE AT 1.1m				'TC' BIT REFUSAL IN FILL
						2							
						3							
						4							
						5							
						6							
						7							



Borehole No.

520

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
 JK350

R.L. Surface: ≈ 6.7m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M./*g*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
DRY ON COMPLETION						0		-	ASPHALTIC CONCRETE: 100mm.t	M	-	-	APPEARS WELL COMPACTED
								-	FILL: Sandy gravel, fine to coarse grained sub angular sandstone, igneous and concrete gravel, brown and grey, fine to coarse grained sand, with ash fragments.	-	-	-	
								-	CONCRETE: 220mm.t	M	-	-	VERY LOW 'TC' BIT RESISTANCE
						1		-	FILL: Gravel, medium to coarse grained sub angular igneous. SANDSTONE: fine to medium grained, yellow brown.	XW	EL	-	
									END OF BOREHOLE AT 1.5m	DW	L-M		LOW RESISTANCE
													'TC' BIT REFUSAL
						2							
						3							
						4							
						5							
						6							
						7							

Nc =
 11
 9
 12



Borehole No.

521

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
 JK350

R.L. Surface: ≈ 6.7m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	FS	ASB	ASS	DS									
DRY ON COMPLETION						0		-	ASPHALTIC CONCRETE: 80mm.t FILL: Sandy gravel, sandstone, igneous and concrete gravel, brown and grey, fine to coarse grained sand, with ash fragments. FILL: Concrete and brick cobbles and boulders. END OF BOREHOLE AT 0.6m	M	-	-	
						1							'TC' BIT REFUSAL IN FILL
						2							
						3							
						4							
						5							
						6							
						7							



Borehole No.

522

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 6.3m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M. *RB*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
DRY ON COMPLETION					Nc = 18 22 17 13 10 10 10 6 6	0		-	ASPHALTIC CONCRETE: 100mm.t	-	-	-	
								-	CONCRETE: 200mm.t	-	-	-	
								-	FILL: Gravelly sand, fine to medium grained, brown, fine to medium grained sub angular to sub rounded brick, sandstone and igneous gravel.	M	-	-	APPEARS WELL COMPACTED
						1		-	FILL: Silty sand, fine to medium grained, yellow brown, with fine to coarse grained sub angular to sub rounded sandstone and igneous gravel, and clay bands.	M	-	-	APPEARS MODERATELY COMPACTED
									END OF BOREHOLE AT 1.65m				
						2							
						3							
						4							
						5							
						6							
						7							



Borehole No.

523

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 4.5m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASB	ASS	DS									
DRY ON COMPLETION						0		-	ASPHALTIC CONCRETE: 50mm.t CONCRETE: 750mm.t	-	-	-	
					N = 18 8,9,9	1		-	FILL: Silty sand, fine to coarse grained, yellow and orange brown, with fine to medium grained sub angular igneous gravel.	M	-	-	APPEARS WELL COMPACED
						2			END OF BOREHOLE AT 1.5m				
						3							
						4							
						5							
						6							
						7							



Borehole No.

524

1/1

BOREHOLE LOG

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, PYRMONT, NSW

Job No. 23982S

Method: SPIRAL AUGER
JK350

R.L. Surface: ≈ 4.3m

Date: 13-5-10

Datum: AHD

Logged/Checked by: A.M. *[Signature]*

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASS	DS									
DRY ON COMPLETION					Nc = 35 R 12 12 14 10 8 10	0			ASPHALTIC CONCRETE: 80mm.t	M			APPEARS WELL COMPACTED
						1			FILL: Gravelly sand, fine to medium grained, brown and grey, fine to coarse grained sub angular to sub rounded sandstone, igneous and concrete gravel.				
									FILL: Silty sand, fine to medium grained, yellow brown, fine to medium grained sub angular igneous gravel.				
									END OF BOREHOLE AT 1.6m				
						2							
						3							
						4							
						5							
						6							
						7							

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASB	SAL									
ON COMPLET -ION					N = 15 3,3,12	0		-	FILL: Silty sand, brown. FILL: Silty sandy clay, medium plasticity, grey brown, with igneous gravel and a trace of slag and ash. FILL: Silty clayey sand, fine to medium grained, brown, with a trace of sandstone gravel, ash and slag.	M MC≈PL M	-	-	15mm DIA. REINFORCEMENT, 150mm TOP COVER
					N = 23 8,10,13	1		as above, but also with a trace of organic material.					APPEARS WELL COMPACTED
					N = 12 7,4,8	2							ORGANIC MATERIAL INCLUDED GRASS/ STRAW
						3		FILL: Silty sand, fine to medium grained, light brown, with sandstone gravel.	M				SPT SANK 150mm UNDER SELF WEIGHT
					N = 19 4,9,10	4		as above, but dark grey brown, with sandstone gravel and cobbles.	W				
						5							
						6		CL	SILTY CLAY/CLAYEY SILT: low to medium plasticity, dark grey, with organic material and shell fragments.	MC>PL	-	-	
									END OF BOREHOLE AT 6.0m				

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS



ENVIRONMENTAL LOG

Borehole No.

602

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K

Method: SPIRAL AUGER
JK250

R.L. Surface: N/A

Date: 21-7-10

Datum:

Logged/Checked by: B.P./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASB	SAL									
DRY ON COMPLETION						0			CONCRETE: 220mm.t				15mm DIA. REINFORCEMENT, 150mm TOP COVER
					N = 4 1,2,2	1			FILL: Silty sandy clay, medium plasticity, light brown, with sandstone gravel and a trace of ash.	MC~PL			APPEARS MODERATELY COMPACTED
					N > 50 12,25, 25/130mm REFUSAL	2			FILL: Silty sand, fine to medium grained, brown, with brick and sandstone gravel, and a trace of ash and slag.	M			APPEARS WELL COMPACTED
					N > 28 6,28/ 100mm REFUSAL	3			as above, but light brown, with clay fines, brick, slag and ash absent.				
						4			END OF BOREHOLE AT 3.5m				'TC' BIT REFUSAL ON OBSTRUCTION IN FILL
						5							
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS



ENVIRONMENTAL LOG

Borehole No.

603

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K

Method: SPIRAL AUGER
JK250

R.L. Surface: N/A

Date: 21-7-10

Datum:

Logged/Checked by: B.P./

Groundwater Record	ES	ASS	ASB	SAL	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			CONCRETE: 230mm.t				10mm DIA. REINFORCEMENT, 95mm TOP COVER
						N = 13 3,7,6				FILL: Sandy gravel, fine to medium grained sub angular, grey, igneous gravel, fine to medium grained sand.	M	-	-	APPEARS WELL COMPACTED
							1			FILL: Silty sand, fine to medium grained, light brown.	D-M			APPEARS POORLY COMPACTED
						N = 3 1,1,1		2		as above, but grey, with a trace of igneous gravel.				
										END OF BOREHOLE AT 2.5m				'TC' BIT REFUSAL ON OBSTRUCTION IN FILL (POSSIBLY CONCRETE)
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL LOG

Borehole No.

604

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K**Method:** SPIRAL AUGER
JK250**R.L. Surface:** N/A**Date:** 21-7-10**Datum:****Logged/Checked by:** B.P./

Groundwater Record	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	ES ASS ASB SAL		0		-	CONCRETE: 170mm.t				6mm DIA. REINFORCEMENT, 100mm TOP COVER
			1			FILL: Sandy gravel, fine to coarse grained sub angular igneous gravel, grey, fine to medium grained sand.	M	-	-	APPEARS POORLY COMPACTED
		N = 4 4,1,3	2			FILL: Silty clayey sand, fine to medium grained, brown, with a trace of igneous and sandstone gravel.				SLIGHT HYDROCARBON ODOUR
			3		ML SM	CLAYEY SILT: medium plasticity, dark grey, with a trace of shell fragments and organic material	MC > PL W	-	-	
		N = 2 1,1,1	4			SILTY SAND: fine to medium grained, dark grey brown, with a trace of shell fragments.				
			5			END OF BOREHOLE AT 3.45m				
			6							
			7							

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K

Method: SPIRAL AUGER
JK300

R.L. Surface: N/A

Date: 20-7-10

Datum:

Logged/Checked by: B.P./

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
ON COMPLETION					0			ASPHALTIC CONCRETE: 90mm.t CONCRETE: 200mm.t				
				N = 7 9,4,3				FILL: Silty sand, fine to medium grained, dark brown, with sandstone gravel.	M			APPEARS MODERATELY COMPACTED
					1			FILL: Silty gravel, fine to coarse grained sub angular igneous gravel, grey, fine to medium grained sand.	W			HYDROCARBON ODOUR
				N = 3 1,2,1				FILL: Silty sand, fine to medium grained, dark brown, with sandstone gravel.	M			APPEARS POORLY COMPACTED
					2							
							SM	SILTY SAND: fine to medium grained, dark grey brown, with a trace of shell fragments.	W			HYDROCARBON ODOUR
				SPT 0	3							SPT SUNK 450mm UNDER SELF WEIGHT MONITORING WELL INSTALLED TO 6m, CLASS 18 50mm DIA. PVC FROM 6m TO 3m, CASING FROM 3m TO SURFACE, 2mm SAND FILTER PACK TO 1m, BENTONITE SEAL FROM 1m TO 0.5m, BACKFILLED WITH CUTTINGS TO SURFACE AND COMPLETED WITH A STEEL GATIC COVER AND LOCKABLE CAP
					4							
					5							
							CL	SILTY CLAY: medium plasticity, orange brown, with sand.	MC>PL			
					6			END OF BOREHOLE AT 6.0m				
					7							

ENVIRONMENTAL LOG

Borehole No.

606

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K**Method:** SPIRAL AUGER
JK300**R.L. Surface:** N/A**Date:** 20-7-10**Datum:****Logged/Checked by:** B.P./

Groundwater Record	SAMPLES ES ASS ASB SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		N = 9 7,5,4	0		-	ASPHALTIC CONCRETE: 40mm.t CONCRETE: 150mm.t FILL: Silty clayey sand, fine to medium grained, brown, with sandstone gravel and a trace of ash and slag.	M	-	-	9mm DIAMETER REINFORCEMENT, 60mm TOP COVER
		N = 6 7,3,3	1		-	as above, but grey and brown, ash and slag absent.				APPEARS MODERATELY COMPACTED
			2		-	as above, but dark grey.	W			HYDROCARBON ODOUR
			3		-	SANDSTONE: fine to medium grained, light grey.	DW	L	-	VERY STRONG HYDROCARBON ODOUR LOW TO MODERATE 'TC' BIT RESISTANCE
			4			END OF BOREHOLE AT 4.0m				SLIGHT HYDROCARBON ODOUR
			5							MONITORING WELL INSTALLED TO 4m, CLASS 18 50mm DIA. PVC FROM 4m TO 1m, CASING FROM 1m TO SURFACE, 2mm SAND FILTER PACK TO 4m, BENTONITE SEAL FROM 0.7m TO 0.3m, BACKFILLED WITH CUTTINGS TO SURFACE AND COMPLETED WITH A STEEL GATIC COVER AND LOCKABLE CAP
			6							
			7							

ENVIRONMENTAL LOG

Borehole No.

607

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K

Method: SPIRAL AUGER
JK300

R.L. Surface: N/A

Date: 20-7-10

Datum:

Logged/Checked by: B.P./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASB	SAL									
ON COMPLETION						0			ASPHALTIC CONCRETE: 60mm.t	D			
						1			FILL: Gravelly silty sand, fine to medium grained, red brown, fine to medium grained sub angular igneous gravel, with a trace of slag. FILL: Sandy clay, medium plasticity, brown, fine to medium grained sand, with a trace of sandstone gravel.	MC < PL			
					N = 4 3,3,1	2			as above, but orange brown, red brown and light brown.	MC ≈ PL			
						3		SC	SILTY CLAYEY SAND: fine to medium plasticity, dark grey, with a trace of shell fragments and organic material.	W	VL		SLIGHT HYDROCARBON ODOUR AND ORGANIC ODOUR
					N = 1 1/450mm								SPT SANK 450mm AFTER 1 BLOW
									END OF BOREHOLE AT 3.45m				
						4							
						5							
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS



ENVIRONMENTAL LOG

Borehole No.

608

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K

Method: SPIRAL AUGER
JK250

R.L. Surface: N/A

Date: 20-7-10

Datum:

Logged/Checked by: B.P./

Groundwater Record	ES ASS ASB SAL	SAMPLES	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
				0		-	ASPHALTIC CONCRETE: 150mm.t				
						-	FILL: Silty sand, fine to medium grained, light brown, with sandstone gravel.	D-M	-	-	APPEARS WELL COMPACTED
			N = 25 7,13,12	1		-	as above, but with a trace of slag.	M-W			SLIGHT HYDROCARBON ODOUR
				2		-	SANDSTONE: fine to medium grained, orange brown.	XW-DW	VL-L	-	LOW 'TC' BIT RESISTANCE
				3		-	as above, but light brown.	DW	L-M		MODERATE RESISTANCE
				4		-	SANDSTONE: fine to coarse grained, orange brown.		M		MODERATE TO HIGH RESISTANCE
				5		-					MONITORING WELL INSTALLED TO 6m, CLASS 18 50mm DIA. PVC FROM 6m TO 3m, CASING FROM 3m TO SURFACE, 2mm SAND FILTER PACK FROM 6m TO 2m, BENTONITE SEAL FROM 2m TO 1.6m, BACKFILLED WITH CUTTINGS TO SURFACE AND COMPLETED WITH A STEEL GATIC COVER AND LOCKABLE CAP
				6			END OF BOREHOLE AT 6.0m				
				7							

ON
COMPLETION

ENVIRONMENTAL LOG

Borehole No.

609

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K**Method:** SPIRAL AUGER
JK300**R.L. Surface:** N/A**Date:** 20-7-10**Datum:****Logged/Checked by:** B.P./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASB	SAL									
DRY ON COMPLETION						0		-	ASPHALTIC CONCRETE: 150mm.t				
								-	FILL: Gravelly sand, light brown, fine to coarse grained sub angular igneous and concrete gravel.	D	-	-	
						1		-	FILL: Bricks	-			
								-	SANDSTONE: fine to medium grained, brown.	DW	L	-	LOW TO MODERATE 'TC' BIT RESISTANCE
									END OF BOREHOLE AT 1.5m				
						2							
						3							
						4							
						5							
						6							
						7							

ENVIRONMENTAL LOG

Borehole No.

610

1/1

Environmental logs are not to be used for geotechnical purposes

Client: STATE PROPERTY AUTHORITY C/- GOVERNMENT ARCHITECTS OFFICE
Project: PROPOSED REDEVELOPMENT - WATERFRONT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E24125K

Method: SPIRAL AUGER
JK300

R.L. Surface: N/A

Date: 20-7-10

Datum:

Logged/Checked by: B.P./

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASB	SAL									
 ON COMPLET-ION						0		-	ASPHALTIC CONCRETE: 150mm.t	D-M	-	-	APPEARS MODERATELY COMPACTED
					N = 11 4,5,6				FILL: Gravelly sand, fine to medium grained, dark grey and brown, fine to coarse grained sub angular igneous gravel.	M			
						1			FILL: Silty clayey sand, fine to medium grained, dark brown, with a trace of sandstone gravel and ash.				APPEARS POORLY COMPACTED
					N = 2 1,1,1				FILL: Silty clay, medium to high plasticity, grey and brown, with a trace of sandtone gravel.	MC > PL			
						2							
						3		SM	SILTY SAND: fine to medium grained, dark grey.	W	VL	-	SPT SANK 450mm UNDER SELF WEIGHT
					SANK 450mm								
						4			END OF BOREHOLE AT 3.45m				
						5							
						6							
						7							



Borehole No.
15
1 / 3

EASTING: 332748
NORTHING: 6250362

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -3.79 m
Date: 14/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-4				FILL: Silty clay, high plasticity, black and dark grey, trace of fine to medium grained sand and coal fragments.	MC>PL	(VS)		NO RECOVERY IN U50
					N=0 0,0,0		1							SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-5								
					N=0 0,0,0		2							SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-6								
						-7								
					N=0 0,0,0		3							SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-8								
						-9								
					N = 13 5,5,8		4							
						-10								
							5		SC	CLAYEY SAND: fine to medium grained, light grey, trace of fine to coarse grained gravel and shell fragments.	W	MD		
							6			REFER TO CORED BOREHOLE LOG				

Borehole No.
15
2 / 3

EASTING: 332748
NORTHING: 6250362

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -3.79 m
Date: 14/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-9			START CORING AT 5.49m					
					SANDSTONE: fine to medium grained, light grey, yellow and red brown.	DW	M			(5.51m) Be, 0°, P, R (5.53m) J, 75°, Un, R
					CORE LOSS 1.34m					
			6							
			-10							
			7		SANDSTONE: fine to medium grained, light grey mottled yellow brown, with frequent healed and altered joints up to 90°.	DW	H - VH			(7.02m) FRAGMENTED ZONE, 0°, 560 mm.t
			-11		CORE LOSS 0.20m					
			8		SANDSTONE: fine to medium grained, light grey mottled yellow brown, bedded at 10-30°, with frequent healed and altered joints up to 90°, occasional vesicles.	DW	H			(7.78m) FRAGMENTED ZONE, 0°, 770 mm.t
			-12							
			9							(8.55m) J, 90°, P, R (8.69m) Be, 0°, P, R (8.72m) J, 75°, P, R (8.88m) J, 45°, P, R (9.05m) J, 60°, P, R (9.10m) J, 90°, P, R (9.26m) XWS, 0°, 50 mm.t (9.31m) J, 90°, Un, R (9.58m) J, 80°, P, R (9.76m) Be, 30°, P, R (9.82m) J, 40°, P, R (9.99m) XWS, 0°, 25 mm.t, P (10.02m) J, 90°, Un, R (10.35m) XWS, 15°, 15 mm.t, P (10.41m) J, 80°, P, R (10.43m) J, 50°, P, R (10.55m) J, 50°, P, R (10.75m) J, 65°, P, R (10.90m) J, 70°, P, R
			-13							
			10							
			-14							
			11		CORE LOSS 0.30m					
			-15		SANDSTONE: fine to medium grained, light grey mottled red and yellow brown, bedded at 10-30°, with frequent healed and altered joints up to 90°, occasional vesicles.	DW	H - VH			(11.35m) J, 75°, P, R (11.45m) J, 30°, P, R (11.54m) J, 60°, P, R (11.74m) J, 50°, P, R (11.83m) J, 55°, P, R (11.87m) J, 75°, P, R



Borehole No.

15

3 / 3

EASTING: 332748
NORTHING: 6250362

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -3.79 m
Date: 14/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-16			SANDSTONE: fine to medium grained, light grey mottled red and yellow brown, bedded at 10-30°, with frequent healed and altered joints up to 90°, occasional vesicles.	DW	H - VH			(11.97m) J, 40°, Un, R (12.02m) J, 30°, P, R (12.03m) J, 60°, P, R (12.11m) J, 50°, P, R (12.20m) Be, 20°, P, R (12.23m) Be, 20°, P, R (12.30m) Be, 20°, P, R (12.30m) Be, 20°, P, R (12.47m) J, 55°, P, R (12.52m) J, 75°, P, R (12.53m) J, 75°, P, R (12.60m) J, 85°, P, R (12.79m) J, 80°, P, R
		-17			as above, but light grey and yellow brown.					(13.31m) J, 90°, P, R (13.44m) J, 90°, Un, R (13.66m) XWS, 20°, 3 mm.t (13.72m) J, 60°, P, R (13.84m) J, 60°, P, R (13.90m) J, 50°, P, R (14.05m) XWS, 0°, 5 mm.t (14.07m) J, 60°, P, R (14.26m) J, 70°, P, R (14.32m) J, 70°, P, R (14.50m) J, 50°, P, R (14.68m) J, 90°, P, R (14.70m) J, 50°, P, R (14.80m) J, 50°, P, R (14.93m) J, 50°, P, R (15.01m) J, 50°, P, R (15.17m) J, 75°, Un, R (15.31m) J, 65°, P, R (15.39m) J, 85°, Un, R (15.60m) J, 80°, P, R
		-18			SANDSTONE: fine grained, light yellow brown, with indistinct bedding at 10-30°.					
		-19								
		-20			DOLERITE: fine grained, green grey.	FR	H			(16.30m) J, 75°, Un, R (16.36m) J, 50°, P, R (16.45m) J, 60°, P, R (16.54m) J, 60°, P, R
					CORE LOSS 0.44m					
		-21			DOLERITE: fine grained, green grey.	FR	H - VH			(17.00m) CS, 0° (17.12m) J, 75°, P, R (17.24m) J, 70°, P, R (17.28m) J, 70°, P, R (17.44m) J, 50°, P, R (17.49m) FRAGMENTED ZONE, 0°, 460 mm.t
					as above, but grey.					
		-22			END OF BOREHOLE AT 17.90 m					

JOB No: 29245S

BM15

START CORING AT: 5.49m

5

CORE

6

LOSS: 1.34m

7

CORE LOSS: 0.20m

8

9

10

11

CORE LOSS: 0.3m

12

13

14

15

16

CORE LOSS: 0.44m

17

FINISH AT 17.90m



Borehole No.
22
1 / 3

EASTING: 332636
NORTHING: 6250427

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.42 m
Date: 10/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ES	U50	DB	DS								
						CH	SILTY CLAY: high plasticity, dark grey.	MC>PL	(VS)		ORGANIC ODOUR
						CL-CH	SANDY CLAY: medium to high plasticity, light grey mottled red and yellow brown.		(F - St)		
				-7							
				1							
				-8		SC	CLAYEY SAND: fine to medium grained, yellow brown and light grey mottled red brown.	W	L		
				2							
				-9							
				3							
				-10		CH	as above, but light grey. SILTY CLAY: high plasticity, dark grey, trace of fine to medium grained sand.	MC>PL	VSt - H	360 390 420	
				4							
				-11							
				5					F - St		NO RECOVERY IN SPT
				-12							
				6							
				-13			as above, but grey.			90 100 110	SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE



Borehole No.
22
2 / 3

EASTING: 332636
NORTHING: 6250427

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.42 m
Date: 10/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
							-14		CH	SILTY CLAY: high plasticity, grey.	MC>PL	F - St		
					N = 16 9,9,7		8		SC	CLAYEY SAND: fine to medium grained, light grey.	W	MD		
							-15							
							9							
					N=SPT 6/ 100mm REFUSAL		-16			SANDSTONE: fine to medium grained, light grey.	XW	EL		
							10			REFER TO CORED BOREHOLE LOG				
							-17							
							11							
							-18							
							12							
							-19							
							13							
							-20							

Borehole No.
22
3 / 3

EASTING: 332636
NORTHING: 6250427

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -6.42 m
Date: 10/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 9.40m					
		-16	10		SANDSTONE: fine to coarse grained, red brown and light grey mottled yellow brown, bedded at 0-20°.	DW	M			
		-17								(10.55m) XWS, 5°, 40 mm.t (10.67m) XWS, 20°, 20 mm.t
			11		CORE LOSS 0.56m					
		-18			SHALE: grey, interbedded with fine to medium grained, light grey sandstone.	XW	EL			
		12			SANDSTONE: fine grained, light grey mottled red brown, with grey shale lenses.	DW	M			(11.75m) J, 90°, Un, R (11.80m) XWS, 4°, 70 mm.t (12.04m) J, 45°, P, R (12.07m) XWS, 0°, 80 mm.t (12.16m) Be, 5°, P, R (12.31m) CS, 0°, 30 mm.t (12.41m) XWS, 0°, 30 mm.t (12.47m) XWS, 5°, 30 mm.t
		-19	13		SANDSTONE: fine to coarse grained, light grey and yellow brown, bedded at 0-15°.	SW	H			
		-20								
		14					M			(13.89m) Be, 15°, Un, R (14.13m) J, 75°, P, R (14.21m) J, 80°, Un, R (14.30m) J, 65°, Un, R (14.47m) J, 65°, P, R (14.52m) CS, 5°, 3 mm.t
		-21	15		as above, but light grey, with dark grey laminae.	FR				
										(15.05m) XWS, 5°, 3 mm.t
		-22			END OF BOREHOLE AT 15.23 m					

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JOB NO: 292455

BH22

START CORING AT: 9.40m

9

10

CORE

11

LOSS: 0.56m

12

13

14

15

FINISH AT 15.23m



Borehole No.
23
1 / 3

EASTING: 332671
NORTHING: 6250417

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.94 m
Date: 13/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ES	U50	DB	DS								
				-6		SC	CLAYEY SAND: fine to medium grained, grey and dark grey.	W			
				-7		CL-CH	SILTY CLAY: medium to high plasticity, dark grey, trace of fine to medium grained sand and organic.	MC>PL	(S - F)		ORGANIC ODOUR
				-8					F - St	90 100 110	SPT SANK UNDER WEIGHT OF HAMMER ALONE
				-9							
				-10		SC	CLAYEY SAND: fine to medium grained, grey.	W	L		
				-11							
				-12		CH	SANDY CLAY: high plasticity, grey.	MC>PL	F - St	90 110 150	NO RECOVERY IN SPT



Borehole No.
23
2 / 3

EASTING: 332671
NORTHING: 6250417

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.94 m
Date: 13/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 23 9,13,10	-13			SC	CLAYEY SAND: fine to medium grained, grey.	W	MD		NO RECOVERY IN SPT
							8							
					N = 10 15,5,5	-14				as above, but light grey, yellow and red brown.				
							9							
					N = 28 9,14,14	-15				SANDSTONE: fine to medium grained, light grey, yellow brown and brown.	XW	EL		
						-16	10			REFER TO CORED BOREHOLE LOG				
							11							
							12							
							13							



Borehole No.
23
3 / 3

EASTING: 332671
NORTHING: 6250417

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -5.94 m
Date: 13/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-15								
					START CORING AT 10.01m					
		-16	10		SANDSTONE: fine to medium grained, brown and light grey.	SW	M			
		-17	11		as above, but light brown.					
		-18	12				H			(11.67m) J, 90°, P, R, IS
					as above, but light grey, with dark grey lenses.					(12.03m) XWS, 0°, 30 mm.t
		-19	13							(12.61m) XWS, 0°, 10 mm.t
					END OF BOREHOLE AT 13.11 m					(12.77m) Be, 0°, P, S
		-20	14							
		-21	15							

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JOB NO: 29245S

BH23

START CORING AT: 10.01m

10

11

12

13

FINISH AT 13.11m



Borehole No.
24
1 / 2

EASTING: 332677
NORTHING: 6250483

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.04 m
Date: 15/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									CH	SILTY CLAY: high plasticity, dark grey and black, trace of fine to medium grained sand.	MC>PL	VS		ORGANIC ODOUR
					N = 2 2,1,1	-6	1		SC	CLAYEY SAND: fine to medium grained, light grey mottled dark grey and yellow brown.	W	VL		
						-7	2							
					N = 5 2,2,3	-8	3					L		
						-9	4		CH	SANDY CLAY: high plasticity, light grey and yellow brown, trace of fine to medium grained quartz gravel.	MC>PL	St - VSt	170 210 240	RESIDUAL
						-10	5			SANDSTONE: fine to medium grained, red brown.	XW	(EL)		RESISTANCE OF CASING ADVANCER
						-11	6			REFER TO CORED BOREHOLE LOG				
						-12								

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Borehole No.
24
2 / 2

EASTING: 332677
NORTHING: 6250483

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -5.04 m
Date: 15/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-10	5		START CORING AT 5.00m					
					CORE LOSS 0.71m					
		-11	6		SANDSTONE: fine to medium grained, dark red brown.	DW	L			(5.94m) XWS, 0°, 5 mm.t (6.06m) Be, 0°, P, R (6.16m) CS, 0°, 3 mm.t (6.29m) Be, 0°, P, R
					as above, but light grey, red and yellow brown, bedded at 0-40°.	SW	M			(6.64m) XWS, 20 mm.t
		-12	7		as above, but light brown, with minor dark grey lenses.					
		-13	8		END OF BOREHOLE AT 8.06 m					
		-14	9							
		-15	10							
		-16								

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JK Geotechnics

JOB NO: 292455

BH24

START CORING AT: 5.00m

5 CORE LOSS: 0.71m

6

7

8

FINISH AT 8.06m

1 / 3

BOREHOLE LOG

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	US0	DB	DS										
						-3		SC	CLAYEY SAND: fine to medium grained, dark grey, trace of shell fragments.	W	(VL)		ORGANIC/SULFUR ODOUR	
				N=0 0.0,0	-4	1								
					-5	2		CLAYEY SAND: fine to medium grained, light grey mottled yellow brown.						
						-6			SANDSTONE: fine to medium grained.	DW	(L)		RESISTANCE ON CASING ADVANCER	
						-7			REFER TO CORED BOREHOLE LOG					
						-8								
						-9								

Borehole No.
25
2 / 3

EASTING: 332641
NORTHING: 6250575

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -2.73 m
Date: 15/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
			-5							
			-3		START CORING AT 3.01m					
			-6		SANDSTONE: fine to medium grained, light grey mottled yellow brown.	SW	M			(3.03m) J, 70°, P, R
					as above, but light grey, yellow brown and brown, with quartz inclusions.	DW				(3.25m) Be, 0°, P, R (3.33m) J, 70°, P, R (3.37m) HEALED, J, 85°, Un, R
					CORE LOSS 2.04m					
			-4							
			-7							
			-5							
			-8							
			-6		SANDSTONE: fine to medium grained, light grey.	SW	VL			(5.58m) J, 60°, Un, R (5.73m) XWS, 0°, 40 mm.t
					as above, but light grey, with dark grey laminae and red brown bands, bedded at 0-10°, and quartz inclusions.		L - M			(6.10m) J, 70°, P, R (6.26m) Be, 5°, P, R
			-9		as above, but light grey, with dark grey laminae.					(6.69m) Be, 0°, Un, R
			-7							
			-10							(7.49m) J, 80°, P, R (7.65m) J, 80°, P, R (7.76m) XWS, 0°, 10 mm.t (7.86m) XWS, 0°, 30 mm.t (8.00m) J, 75°, P, R (8.20m) J, 80°, P, R
			-8		as above, but light grey, with dark grey laminae and bands of yellow and red brown iron staining.					
			-11							(8.67m) J, 65°, P, R (8.73m) XWS, 0°, 15 mm.t (8.75m) J, 80°, P, R (8.92m) J, 80°, P, R



Borehole No.
25
3 / 3

EASTING: 332641
NORTHING: 6250575

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -2.73 m
Date: 15/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-12			SANDSTONE: fine to medium grained, light grey, with dark grey laminae at about 15°, bands of yellow and red brown staining.	SW	M			
			10		as above, but light grey with dark grey lenses.		H			(9.64m) XWS, 20°, 5 mm.t
		-13			END OF BOREHOLE AT 10.31 m					
			11							
		-14								
			12							
		-15								
			13							
		-16								
			14							
		-17								
			15							
		-18								

JK Geotechnics

JOB NO: 292455

BH 25

START CORING AT: 3.01m

3

4

CORE LOSS: 2.04m

5

6

7

8

9

10

FINISH AT 10.31m



Borehole No.
26
1 / 3

EASTING: 332499
NORTHING: 6250667

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.57 m
Date: 16/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
							-5		CL	SILTY SANDY CLAY: high plasticity, dark grey, black and grey, trace of ash.	MC>PL	(VS)		ORGANIC/SULFUR ODOUR
					N = 2 4,1,1		1							
							-6							
					N = 5 2,2,3		2		CH	SANDY CLAY: high plasticity, light grey mottled red ad yellow brown, with bands of clayey sand.		VSt	260 320 340	
							-7							
							3							
					N = 3 2,1,2		-8		SC	CLAYEY SAND: fine to medium grained, light grey mottled red and yellow brown.	W	L		
							4							
					N = 4 1,2,2		5							
							-10							
					N = 8 1,2,6		6							
							-11							



Borehole No.
26
2 / 3

EASTING: 332499
NORTHING: 6250667

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.57 m
Date: 16/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-12			SC	CLAYEY SAND: fine to medium grained, light grey mottled red and yellow brown. (continued)	W	L		
					N = 10 4,5,5		8			as above, but light brown and red brown.		MD		
						-13								
							9							
					N=SPT 3/ 80mm REFUSAL	-14				REFER TO CORED BOREHOLE LOG				
							10							
						-15								
							11							
						-16								
							12							
						-17								
							13							
						-18								



Borehole No.
26
3 / 3

EASTING: 332499
NORTHING: 6250667

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -4.57 m
Date: 16/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-13	9		START CORING AT 9.20m					
		-14			SANDSTONE: fine to medium grained, yellow brown mottled red brown and light grey. CORE LOSS 0.37m	DW	M			(9.30m) Be, 5°, P, R (9.49m) CS, 5°, 30 mm.t
		-15	10		SANDSTONE: fine to medium grained, yellow brown, with fine to medium grained quartz inclusions. as above, but light grey, with dark grey shale lenses.	DW SW	L M			(9.95m) J, 90°, P, R (10.12m) XWS, 5°, 5 mm.t (10.13m) J, 90°, Un, R
		-16	11							
		-17	12		Shale band 0.12mt.		H			
		-17	12				M			(12.20m) CS, 0°, 5 mm.t (12.30m) XWS, 0°, 30 mm.t
		-17			END OF BOREHOLE AT 12.50 m					
		-18	13							
		-19	14							

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JK Geotechnics

JOB NO: 292455

BH26

START CORING AT: 9.20m

9

CORE LOSS: 0.37m

10

11

12

FINISH AT: 12.50m



Borehole No.
27
1 / 2

EASTING: 332415
NORTHING: 6250682

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.35 m
Date: 16/2/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									CH	SILTY CLAY: high plasticity, dark grey, with fine grained sand, trace of shell fragments.	MC>PL	(VS)		
							-6							
							1							
									SC	CLAYEY SAND: fine to medium grained, yellow brown mottled brown.	W	VL		
					N = 2 0,0,2		-7							
							2							
							-8							
							3							
					N = 11 3,5,6		-9			as above, but light grey mottled red and yellow brown, trace of shell fragments.		MD		
							4							
							-10							
							5							
					N = 10 3,4,6									
							-11			REFER TO CORED BOREHOLE LOG				
							6							
							-12							

Borehole No.
27
2 / 2

EASTING: 332415
NORTHING: 6250682

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** -5.35 m
Date: 16/2/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 5.38m					
		-11	6		SANDSTONE: fine to medium grained, brown, red brown and light brown, bedded at 0-30°.	SW	M			(6.10m) Be, 20°, P, R
		-12	7				M - H			(7.29m) J, 35°, Un, R
		-13	8							
		-14	9		END OF BOREHOLE AT 8.48 m					
		-15	10							
		-16	11							
		-17								

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JK Geotechnics

JOB NO: 292455

BH27

START CORING AT: 5.38m

5

6

7

8

FINISH AT 8.48m



Borehole No.
102
1 / 3

EASTING: 332840
NORTHING: 6250291

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: WENTWORTH PARK, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 3.87 m
Date: 7/7/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.C./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
DRY ON COMPLETION OF AUGERING	■				N > 4 5,4/ 20mm REFUSAL					FILL: Silty sand, fine to medium grained, dark grey and brown, with root fibres, and trace of medium grained igneous gravel.	M			GRASS COVER
	■									FILL: Sand, fine to coarse grained, orange brown, with sandstone gravel, trace of clay.	M			APPEARS WELL COMPACTED
	■					3	1		-	SANDSTONE: medium grained, orange brown.	XW - DW	EL - VL		
						2	2			SANDSTONE: fine to medium grained, grey.	DW	VL - L		VERY LOW TO LOW 'TC' BIT RESISTANCE
						1						L		LOW RESISTANCE
							3			REFER TO CORED BOREHOLE LOG				
						0	4							
						-1	5							
						-2	6							
						-3								

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EASTING: 332840
NORTHING: 6250291

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Borehole No.
102
3 / 3

EASTING: 332840
NORTHING: 6250291

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: WENTWORTH PARK, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** 3.87 m
Date: 7/7/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** T.C./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
100% RETURN		-6	10		SANDSTONE: fine to medium grained, grey, trace of orange brown laminae at 0-5°.	SW	M - H			(9.10m) J, 90°, P, R (9.19m) J, 45°, P, R, IS (9.44m) XWS, 0°, 10 mm.t (9.60m) J, 80°, Un, R, IS (9.72m) J, 60 - 90°, Un, R, IS (9.82m) XWS, 0°, 30 mm.t (9.90m) Be, 30°, P, R, IS
		-7	11		END OF BOREHOLE AT 11.00 m		H			(10.98m) J, 60°, P, S
		-8	12							
		-9	13							
		-10	14							
		-11	15							
		-12								

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292455

BH102

START CORING AT 2.92m

2

3

4

5

6

7

8

9

10

EASTING: 332795
NORTHING: 6250305

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: WENTWORTH PARK, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 2.91 m
Date: 10/7/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.C./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	US0	DB	DS										
										FILL: Silty sand, fine to medium grained, dark grey, trace of clay.	M			GRASS COVER
					N = 5 4,3,2	2	1			FILL: Sandy clay, low plasticity, orange brown, red brown and dark grey, with fine to medium grained ironstone gravel, trace of glass fragments.	MC~PL		100 75	APPEARS MODERATELY COMPACTED
					N = 8 4,4,4	1	2							
									CH	SANDY CLAY: high plasticity, orange brown.	MC>PL	St	200 150	RESIDUAL
					N = 20 6,8,12	-1	4					VSt	300 350	
					N = 8 3,3,5	-3	6					St - VSt	250 150 150	
						-4								



Borehole No.
103
2 / 3

EASTING: 332795
NORTHING: 6250305

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: WENTWORTH PARK, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 2.91 m
Date: 10/7/17 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.C./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 12 3,5,7		8		CL	SANDY CLAY: low to medium plasticity, grey and orange brown.	MC~PL	VSt		
										CLAYEY SANDY SILT: low plasticity, orange brown, fine to coarse grained sand, trace of fine grained ironstone gravel.	MC>PL	F - St	100 150	
					N = 7 3,2,5		9			SANDY CLAY: medium plasticity, fine to medium grained sand, orange brown and grey, with silt and medium grained sandstone gravel.	MC<PL	St - VSt	200 150 150	
							10		-	SANDSTONE: fine to medium grained, orange brown and grey.	XW - DW	EL - VL		VERY LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
							11				DW	L		LOW TO MODERATE RESISTANCE
							12			REFER TO CORED BOREHOLE LOG				
							13							
							-11							



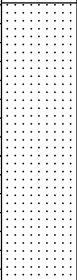
Borehole No.
103
3 / 3

EASTING: 332795
NORTHING: 6250305

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: WENTWORTH PARK, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** 2.91 m
Date: 10/7/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** T.C./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 11.80m					
		-9	12		CORE LOSS 0.39m					
	0% RETURN	-10	13		SANDSTONE: fine to medium grained, grey and orange brown.	SW	H			(12.24m) J, 90°, P, S, IS (12.41m) Be, 10°, P, R, IS (12.51m) Be, 0°, P, R, IS (12.76m) J, 80 - 90°, Un, R, IS (13.10m) Be, 5°, P, R, IS (13.29m) J, 90°, P, R, IS (13.37m) Be, 0°, Un, R, IS (13.43m) Be, 5°, Un, R, IS (13.46m) XWS, 0°, 10 mm.t (13.60m) J, 70 - 80°, Un, R, IS
		-11	14		END OF BOREHOLE AT 13.67 m					
		-12	15							
		-13	16							
		-14	17							
		-15								

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292455 BH103 START CORING AT 6.10m

6 CORE LOSS: 2.08m

7

8

9

JK Geotechnics

292455 BH103 START CORING AT 11.80m

11 CORE LOSS:
0.390m

12

13

END AT 13.67m



Borehole No.
116
1 / 3

EASTING: 332824
NORTHING: 6250372

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 2.45 m
Date: 28/9/17 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** K.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
										CONCRETE: 100mm.t				
										FILL: Silty sand, fine to coarse grained, dark brown, with fine to medium grained sandstone gravel, concrete fragments and clay.	M			NO OBSERVED REINFORCEMENT
					N = 6 2,2,4		2							
							1							
							1			FILL: Clayey sand, fine to coarse grained, yellow brown and red brown, with fine to coarse grained sandstone gravel.				CRUSHED SANDSTONE
					N = 8 4,3,5		2							
							0		CL	SANDY CLAY: low to medium plasticity, dark grey, fine to medium grained sand.	MC>PL	(F - St)		ALLUVIAL
							3							
					N = 3 1,2,1		-1							
							4							
							-2		SC	CLAYEY SAND: fine to coarse grained, light grey mottled red brown, with fine to coarse grained ironstone gravel, XW bands and silt.	W	MD	100 130 170	RESIDUAL
					N = 10 2,3,7		5							
							-3							
					N > 25 5,8,17/ 100mm REFUSAL		6						>600 430 500	
							-4							



Borehole No.
116
2 / 3

EASTING: 332824
NORTHING: 6250372

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 2.45 m
Date: 28/9/17 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** K.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 33 4, 14, 19		-5		CL-CH	SILTY SANDY CLAY: medium to high plasticity, light grey, with XW bands.	MC~PL	VSt	380 320 380	
					N=SPT 5/ 50mm REFUSAL		8							
							-6							
							9							
							-7			REFER TO CORED BOREHOLE LOG				
							10							
							-8							
							11							
							-9							
							12							
							-10							
							13							
							-11							

Borehole No.

116

3 / 3

EASTING: 332824
NORTHING: 6250372

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** 2.45 m
Date: 28/9/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** K.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components. START CORING AT 9.09m	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$ EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific General
			-7		SANDSTONE: fine to coarse grained, light grey and red brown, with iron indurated bands.	XW	EL			
			10			DW	H - VH			(9.77m) Be, 0°, P, S (9.90m) J, 85 - 90°, P, S (9.94m) Be, 5°, P, S (10.03m) XWS, 5°, 2 mm.t (10.18m) Be, 0°, P, S (10.22m) J, 90°, P, S (10.24m) Be, 0°, P, S (10.33m) J, 90°, P, S (10.41m) J, 30°, P, S (10.43m) J, 45°, P, S (10.56m) Be, 5°, Un, S (10.59m) XWS, 0°, 16 mm.t (10.74m) J, 60°, Un, S, IS (10.82m) J, 20°, P, S (10.85m) J, 80°, P, S (10.89m) XWS, 5°, 2 mm.t (11.00m) J, 80°, P, S (11.22m) J, 40°, P, S (11.28m) J, 40°, P, S (11.38m) J, 30°, P, S (11.45m) J, 20°, P, S (11.57m) Be, 0°, P, S (11.78m) Be, 5°, P, S
			12			XW	EL			
			10			DW	H - VH			(12.15m) Be, 0°, P, S (12.22m) Be, 0°, P, S (12.27m) J, 90°, P, S (12.30m) Be, 0°, P, S (12.44m) Be, 0°, P, S (12.57m) Be, 5°, P, S (12.67m) J, 50°, P, S (12.78m) Be, 0°, P, S (12.93m) Be, 0°, P, S (13.05m) Be, 0°, P, S (13.08m) J, 20°, P, S (13.22m) FRAGMENTED ZONE, 65 mm.t (13.31m) Be, 0°, P, S (13.45m) Be, 0°, P, S (13.62m) FRAGMENTED ZONE, 20 mm.t (13.80m) J, 30°, P, S (13.90m) Be, 0°, P, S (13.96m) XWS, 0° (14.21m) J, 30°, P, S (14.25m) J, 30°, P, S (14.32m) J, 45°, P, S (14.51m) J, 30°, P, S (14.55m) J, 20°, P, S (14.68m) Be, 5°, P, S (14.72m) XWS, 5°, 3 mm.t (14.85m) J, 80°, P, S (15.00m) FRAGMENTED ZONE, 40 mm.t (15.10m) J, 90°, Un, S, CLAY INFILL (15.22m) FRAGMENTED ZONE, 60 mm.t (15.42m) FRAGMENTED ZONE, 200 mm.t
			15		END OF BOREHOLE AT 15.65 m					

JK Geotechnics

292455 BH116 START CORING AT 9.09m



END OF BH116 AT 15.65m



Borehole No.
117
1 / 3

EASTING: 332862
NORTHING: 6250415

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 2.82 m
Date: 27/9/17 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** K.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
										CONCRETE: 100mm.t				
					N = 30 5,20,10		2			FILL: Sand, fine to coarse grained, brown, with fine grained igneous gravel and brick fragments.	M			APPEARS MODERATELY TO WELL COMPACTED
							1			FILL: Sand, fine to coarse grained, yellow brown and light grey, with fine to coarse grained sandstone gravel.				
					N = 5 2,3,2		1			FILL: Sandy clay, low to medium plasticity, brown and grey, with fine to coarse grained sandstone gravel and brick fragments.	MC~PL			
							2							
							0		CL	SANDY CLAY: low to medium plasticity, dark grey, fine to medium grained sand.	MC>PL	(F - St)		ALLUVIAL
					N = 3 1,1,2		3		SP	SAND: fine to medium grained, dark grey, with clay and silt.	W	VL		
							-1							
							4							
					N = 1 0,0,1		-2							
							5							
							-3			SANDY CLAY: low to medium plasticity, grey and brown, fine to medium grained sand.	MC>PL	F - St		
							6							
					N = 4 0,1,3								120 90 80	
							-4							

JK_LIB_CURRENT - V8.00.GLB Log JK K AUGERHOLE - MASTER 29245S PYRMONT GPJ <<DrawingFile>> 07/11/2017 16:45 Produced by gINT Professional. Developed by Datagel



Borehole No.
117
2 / 3

EASTING: 332862
NORTHING: 6250415

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 2.82 m
Date: 27/9/17 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** K.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									SM	SILTY SAND: fine to medium grained, grey and red brown, with clay.	W	MD		POSSIBLY RESIDUAL
					N = 23 5,10,13	-5	8		CL-CH	SANDY CLAY: medium to high plasticity, grey mottled orange brown.	MC>PL	VSt		RESIDUAL
					N=SPT 9/ 100mm REFUSAL	-6	9						220 200	
						-7	10			REFER TO CORED BOREHOLE LOG				
						-8	11							
						-9	12							
						-10	13							
						-11								



Borehole No.
117
3 / 3

EASTING: 332862
NORTHING: 6250415

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** 2.82 m
Date: 27/9/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** K.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I _s (50)	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 9.38m					
			-7		SANDSTONE: fine to coarse grained, red brown and orange brown.	DW	M - H			(9.50m) Be, 10°, P, S (9.57m) Be, 10°, P, S
			10		SANDSTONE: fine to coarse grained, grey.	SW				(9.74m) XWS, 0°, 16 mm.t
			-8							(10.35m) XWS, 0°, 4 mm.t (10.53m) XWS, 0°, 10 mm.t
			11							(11.42m) XWS, 0°, 4 mm.t (11.54m) XWS, 0°, 12 mm.t
			-9				H			
			12							(12.52m) Be, 0°, Un, R, IS (12.76m) Be, 0°, P, S
			-10							(13.63m) Be, 5°, P, R
			13							
			-11							
			14							(14.84m) XWS, 0°, 18 mm.t (14.91m) XWS, 5°, 3 mm.t
			-12							(15.37m) XWS, 0°, 30 mm.t
			15							
			-13		END OF BOREHOLE AT 15.47 m					

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JK Geotechnics

292455

BH117

START CORING AT 9.38m

9

10

11

12

13

14

15

END OF BH117 AT 15.47m



Borehole No.
118
1 / 2

EASTING: 332893
NORTHING: 6250457

BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Method:** SPIRAL AUGER **R.L. Surface:** 3.81 m
Date: 26/9/17 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** K.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
DRY ON COMPLETION OF AUGERING										CONCRETE: 130mm.t				NO OBSERVED REINFORCEMENT
					N = 14 7,9,5		3		-	FILL: Silty sand, fine to coarse grained, dark brown, with fine to coarse grained sandstone and igneous gravel, trace of clay.	M			APPEARS WELL COMPACTED
					N = 11 4,5,6		2			FILL: Sandy clay, medium plasticity, yellow brown, grey and red brown, with fine to coarse grained ironstone and sandstone gravel.	MC-PL	St - Vst		
					N = 7 1,4,3		1		SM	SILTY SAND: fine to medium grained, dark brown and grey.	W	L		ALLUVIAL
							0							
							4							
							-1			REFER TO CORED BOREHOLE LOG				
							5							
							-2							
							6							
							-3							

Borehole No.

118

2 / 2

EASTING: 332893
NORTHING: 6250457

CORED BOREHOLE LOG

Client: URBANGROWTH NSW
Project: THE BAYS MARKET DISTRICT
Location: BLACKWATTLE BAY, PYRMONT, NSW

Job No.: 29245S **Core Size:** NMLC **R.L. Surface:** 3.81 m
Date: 26/9/17 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** K.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 4.37m					
			-1		SANDSTONE: fine to coarse grained, grey and orange brown.	SW	M			
			5							
			-2							
			6							
			-3							
			7							
			-4							
			8							
			-5							
			9							
			-6				H			
			10							
			-7		END OF BOREHOLE AT 10.41 m					

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JK Geotechnics

29245S BH118 START CORING AT 4.37m

4

5

6

7

8

9

10

END OF BH118 AT 10.41m

REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 'Geotechnical Site Investigations'. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) is referred to as 'laminite'.

SAMPLING

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

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shrink-swell behaviour, strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

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

N = 13
4, 6, 7

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

N > 30
15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

Cone Penetrometer Testing (CPT) and Interpretation:

The cone penetrometer is sometimes referred to as a Dutch Cone. The test is described in Australian Standard 1289.6.5.1–1999 (R2013) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Static Cone Penetration Resistance of a Soil – Field Test using a Mechanical and Electrical Cone or Friction-Cone Penetrometer'*.

In the tests, a 35mm or 44mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm or 165mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck. The CPT does not provide soil sample recovery.

As penetration occurs (at a rate of approximately 20mm per second), the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa. There are two scales presented for the cone resistance. The lower scale has a range of 0 to 5MPa and the main scale has a range of 0 to 50MPa. For cone resistance values less than 5MPa, the plot will appear on both scales.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between CPT and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of CPT values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

There are limitations when using the CPT in that it may not penetrate obstructions within any fill, thick layers of hard clay and very dense sand, gravel and weathered bedrock. Normally a 'dummy' cone is pushed through fill to protect the equipment. No information is recorded by the 'dummy' probe.

Flat Dilatometer Test: The flat dilatometer (DMT), also known as the Marchetti Dilometer comprises a stainless steel blade having a flat, circular steel membrane mounted flush on one side.

The blade is connected to a control unit at ground surface by a pneumatic-electrical tube running through the insertion rods. A gas tank, connected to the control unit by a pneumatic cable, supplies the gas pressure required to expand the membrane. The control unit is equipped with a pressure regulator, pressure gauges, an audio-visual signal and vent valves.

The blade is advanced into the ground using our CPT rig or one of our drilling rigs, and can be driven into the ground using an SPT hammer. As soon as the blade is in place, the membrane is inflated, and the pressure required to lift the membrane (approximately 0.1mm) is recorded. The pressure then required to lift the centre of the membrane by an additional 1mm is recorded. The membrane is then deflated before pushing to the next depth increment, usually 200mm down. The pressure readings are corrected for membrane stiffness.

The DMT is used to measure material index (I_D), horizontal stress index (K_D), and dilatometer modulus (E_D). Using established correlations, the DMT results can also be used to assess the 'at rest' earth pressure coefficient (K_0), over-consolidation ratio (OCR), undrained shear strength (C_u), friction angle (ϕ), coefficient of consolidation (C_h), coefficient of permeability (K_h), unit weight (γ), and vertical drained constrained modulus (M).

The seismic dilatometer (SDMT) is the combination of the DMT with an add-on seismic module for the measurement of shear wave velocity (V_s). Using established correlations, the SDMT results can also be used to assess the small strain modulus (G_0).

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a 16mm diameter rod with a 20mm diameter cone end with a 9kg hammer dropping 510mm. The test is described in Australian Standard 1289.6.3.2–1997 (R2013) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – 9kg Dynamic Cone Penetrometer Test'*.

The results are used to assess the relative compaction of fill, the relative density of granular soils, and the strength of cohesive soils. Using established correlations, the DCP test results can also be used to assess California Bearing Ratio (CBR).

Refusal of the DCP can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Vane Shear Test: The vane shear test is used to measure the undrained shear strength (C_u) of typically very soft to firm fine grained cohesive soils. The vane shear is normally performed in the bottom of a borehole, but can be completed from surface level, the bottom and sides of test pits, and on recovered undisturbed tube samples (when using a hand vane).

The vane comprises four rectangular blades arranged in the form of a cross on the end of a thin rod, which is coupled to the bottom of a drill rod string when used in a borehole. The size of the vane is dependent on the strength of the fine grained cohesive soils; that is, larger vanes are normally used for very low strength soils. For borehole testing, the size of the vane can be limited by the size of the casing that is used.

For testing inside a borehole, a device is used at the top of the casing, which suspends the vane and rods so that they do not sink under self-weight into the 'soft' soils beyond the depth at which the test is to be carried out. A calibrated torque head is used to rotate the rods and vane and to measure the resistance of the vane to rotation.

With the vane in position, torque is applied to cause rotation of the vane at a constant rate. A rate of 6° per minute is the common rotation rate. Rotation is continued until the soil is sheared and the maximum torque has been recorded. This value is then used to calculate the undrained shear strength. The vane is then rotated rapidly a number of times and the operation repeated until a constant torque reading is obtained. This torque value is used to calculate the remoulded shear strength. Where appropriate, friction on the vane rods is measured and taken into account in the shear strength calculation.

LOGS

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

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it 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 and may not be the same at the time of construction.
- 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 be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to 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 perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soils for Engineering Purposes'* or appropriate NSW Government Roads & Maritime Services (RMS) test methods. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg. to a twenty storey building). If this happens, the Company will be pleased to review the report and the sufficiency of the investigation work.

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

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.
- Details of the development that the Company could not reasonably be expected to anticipate.

If these occur, the Company will be pleased to assist with investigation or advice to resolve any problems occurring.

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, the Company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Where information obtained from this investigation 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. The Company would

be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. Licence to use the documents may be revoked without notice if the Client is in breach of any obligation to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/constraints are quite complex, it is prudent to have a joint design review which involves an experienced geotechnical engineer/engineering geologist.

SITE INSPECTION

The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

- i) a site visit to confirm that conditions exposed are no worse than those interpreted, to
- ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types and appropriate footing or pile founding depths, or
- iii) full time engineering presence on site.

SYMBOL LEGENDS

SOIL



FILL



TOPSOIL



CLAY (CL, CI, CH)



SILT (ML, MH)



SAND (SP, SW)



GRAVEL (GP, GW)



SANDY CLAY (CL, CI, CH)



SILTY CLAY (CL, CI, CH)



CLAYEY SAND (SC)



SILTY SAND (SM)



GRAVELLY CLAY (CL, CI, CH)



CLAYEY GRAVEL (GC)



SANDY SILT (ML, MH)



PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK



CONGLOMERATE



SANDSTONE



SHALE/MUDSTONE



SILTSTONE



CLAYSTONE



COAL



LAMINITE



LIMESTONE



PHYLLITE, SCHIST



TUFF



GRANITE, GABBRO



DOLERITE, DIORITE



BASALT, ANDESITE



QUARTZITE

OTHER MATERIALS



BRICKS OR PAVERS



CONCRETE



ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions	Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm)	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines $C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines $C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey N/A

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $C_u > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_u = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_c = \frac{(D_{30})^2}{D_{10} D_{60}}$$

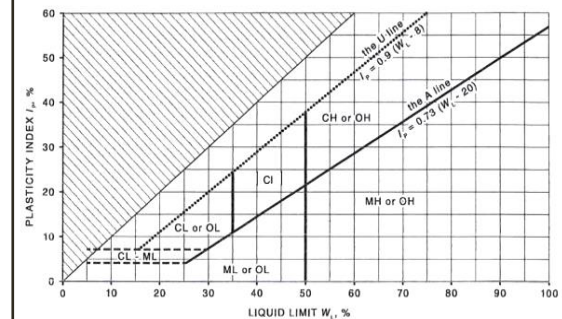
Where D_{10} , D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

- For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.
- Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.
- Clay soils with liquid limits $> 35\%$ and $\leq 50\%$ may be classified as being of medium plasticity.
- The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record	▼	Standing water level. Time delay following completion of drilling/excavation may be shown.
	C	Extent of borehole/test pit collapse shortly after drilling/excavation.
	▶	Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N _c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils) (Coarse Grained Soils)	w > PL	Moisture content estimated to be greater than plastic limit.
	w ≈ PL	Moisture content estimated to be approximately equal to plastic limit.
	w < PL	Moisture content estimated to be less than plastic limit.
	w ≈ LL	Moisture content estimated to be near liquid limit.
	w > LL	Moisture content estimated to be wet of liquid limit.
	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – unconfined compressive strength ≤ 25kPa.
	S	SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa.
	F	FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa.
	St	STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa.
	VSt	VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa.
	Hd	HARD – unconfined compressive strength > 400kPa.
	Fr	FRIABLE – strength not attainable, soil crumbles.
	()	Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)		Density Index (I_D) Range (%)
	VL	VERY LOOSE ≤ 15
	L	LOOSE > 15 and ≤ 35
	MD	MEDIUM DENSE > 35 and ≤ 65
	D	DENSE > 65 and ≤ 85
	VD	VERY DENSE > 85
	()	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
Hand Penetrometer Readings	300	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.
	250	



Log Column	Symbol	Definition
Remarks	'V' bit 'TC' bit T_{60} Soil Origin	Hardened steel 'V' shaped bit. Twin pronged tungsten carbide bit. Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers. The geological origin of the soil can generally be described as: RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock. EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock. ALLUVIAL – soil deposited by creeks and rivers. ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents. MARINE – soil deposited in a marine environment. AEOLIAN – soil carried and deposited by wind. COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits. LITTORAL – beach deposited soil.

Classification of Material Weathering

Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $Is_{(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Abbreviations Used in Defect Description

Cored Borehole Log Column	Symbol Abbreviation	Description
Point Load Strength Index	• 0.6	Axial point load strength index test result (MPa)
	x 0.6	Diametral point load strength index test result (MPa)
Defect Details – Type	Be	Parting – bedding or cleavage
	CS	Clay seam
	Cr	Crushed/sheared seam or zone
	J	Joint
	Jh	Healed joint
	Ji	Incipient joint
	XWS	Extremely weathered seam
	Degrees	Defect orientation is measured relative to normal to the core axis (ie. relative to the horizontal for a vertical borehole)
	P	Planar
	C	Curved
	Un	Undulating
	St	Stepped
	Ir	Irregular
	Vr	Very rough
	R	Rough
	S	Smooth
	Po	Polished
	Sl	Slickensided
	Ca	Calcite
	Cb	Carbonaceous
	Clay	Clay
	Fe	Iron
	Qz	Quartz
	Py	Pyrite
	Cn	Clean
	Sn	Stained – no visible coating, surface is discoloured
	Vn	Veneer – visible, too thin to measure, may be patchy
	Ct	Coating ≤ 1mm thick
	Filled	Coating > 1mm thick
	mm.t	Defect thickness measured in millimetres