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REPORT

on

GEOTECHNICAL INVESTIGATION

**PROPOSED SYDNEY SUPER YACHT MARINA
REDEVELOPMENT**

JAMES CRAIG ROAD, ROZELLE BAY

Prepared for

**SYDNEY SUPER YACHT MARINA PTY LTD
AND NSW MARITIME**

Project 71816.01

September 2010

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GRB:III

Project 71816.01

3 September 2010

REPORT ON GEOTECHNICAL INVESTIGATION
PROPOSED SYDNEY SUPER YACHT MARINA REDEVELOPMENT
JAMES CRAIG ROAD, ROZELLE BAY

1. INTRODUCTION

This report details the results of a geotechnical investigation carried out by Douglas Partners Pty Ltd (DP) for the proposed Sydney Super Yacht Marina Redevelopment at James Criag Road, Rozelle Bay. The work was requested by Mr Tony Ellis of the Sydney Super Yacht Marina Pty Ltd.

The proposed development involves the construction of two new double storey mixed-use buildings together with the upgrading of the existing pavements. Site investigation was carried out to provide information on subsurface conditions for the design of earthworks, foundations and pavements.

The investigation included the drilling of twenty bores, the installation of five groundwater wells followed by laboratory testing of soil samples recovered from the bores. Details of the field and laboratory work are given in this report together with comments relating to design and construction practice.

The field work was carried out concurrently with a baseline contamination investigation by DP. The results of DP's baseline contamination investigation have been reported separately in a report dated 12 August 2010.

2. BACKGROUND

It is understood that the site was originally reclaimed in 1891 but remained unused until the early twentieth century. After further reclamations were carried out, the site was used as timber yards and became one of the largest timber handling wharves in the Sydney region. The area was also used for ship building and maintenance in the past. The timber handling operation was gradually phased out and container storage and transportation activities were introduced in the 1960s. The site has been owned by the Maritime Services Board since the site was first used and has been leased to various operators.

It is understood that the site has been investigated for geotechnical and environmental purposes in the past. These previous investigations carried out on the site include:

- Sinclair Knight Merz (SKM), May 1998. *Rozelle Bay Maritime Precincts Inspection Report No 4, James Craig Road, Rozelle Bay, Stage 2 Environmental Assessment, Final*; and
- Parsons Brinckerhoff (PB), February 2009. *Assessment of soil and Groundwater Conditions adjacent to Maritime Underground Storage, Rozelle Bay, NSW*, Letter Report prepared for NSW Maritime.
- Coffey Partners International (CPI), January 1991. *Mareng Workshops, Rozelle Bay*, Geotechnical Investigation prepared for Maritime Services Board of NSW
- CPI, March 1991, *Mareng Workshops, Rozelle Bay*, Additional Geotechnical Investigation prepared for Maritime Services Board of NSW

Relevant geotechnical findings of these investigations include:

- The general geological profile comprises filling overlying residual sands and clays overlying sandstone bedrock. The sandstone bedrock was encountered from near surface levels to RL -20 m AHD.
- An underground storage tank farm on the eastern side of the site that is understood to still be present on-site.

Test bore locations from these previous investigations within the subject site are indicated on Drawing 1, Appendix A. Test Bore Logs have been referenced in Section 4.2.

3. SITE DESCRIPTION AND GEOLOGY

The site is an irregular shaped area with maximum dimensions in both a north–south and east–west direction of 100 m. The ground surface is a relatively level area (RL 1.8 to 3.0 m AHD).

The site is currently utilised as a marina, parking lot, offices and café (Liquidity Café). The surface of the site is covered by a building (Liquidity Café), demountables, an asphalt and concrete covered carpark and driveways, shipping containers, refuelling area, sewerage holding tank, some garden areas and numerous medium sized trees. It is understood that a few USTs are also present on site. On the northern boundary there is evidence of a disused railway line. The strip of land along the southern shoreline is a suspended concrete deck directly over the waters of Rozelle Bay, supported by a number of piers that are understood to include tie-back anchors.

The site is bounded by an access road to the north with vacant land and James Craig Road further to the north, NSW Maritime offices to the east, Rozelle Bay to the south and an asphalt covered area occupied as a carpark and container storage to the west.

Reference to the Sydney 1:100 000 Geological Series Sheet shows that the site is located in an area underlain by man-made fill overlying alluvial/estuarine sediments. The site is located near an area mapped as Hawkesbury Sandstone to the north-east. Field investigation confirmed the presence of man-made fill overlying alluvial/estuarine sediments overlying Hawkesbury Sandstone on site.

4. FIELD WORK

4.1 Methods

The field work involved the following:

- Twenty bores (Bores 1, 2, 2A, 3 to 15 and 101 to 104) drilled with either a truck or bobcat mounted auger/rotary drilling and sampling rig. The boreholes were typically drilled to depths of 0.5 – 4.5 m with 110 mm spiral flight augers, being either practical refusal depth or the limit of investigation. Diacoring of concrete of slabs encountered in Bores 11 and 13 was required. Disturbed soil samples retrieved from the cuttings returned by the auger blade were used for identification and classification purposes.
- Three bores (Bores 2, 11 and 13) were extended to final depths of 4.8 – 31.0 m. All bores were advanced for a depth of 2.9 – 3.4 m into the underlying rock using NMLC (52 mm diameter) sized diamond drilling equipment to obtain core samples for classification and laboratory testing purposes. Bore 2 was drilled to a depth of 27.9 m by rotary drilling techniques. Standard Penetration Tests (SPTs) were carried out at 1.5 m depth intervals within the soils to obtain samples for identification and classification purposes and for estimation of the consistency/density of the soils. An undisturbed sample was collected in a U50 tube in the natural clays in Bore 2 for subsequent laboratory testing.
- Piezometers were installed in Bores 2A, 6, 9, 14 and 103 to depths of 2.0 – 4.5 m for subsequent monitoring of the ground water level and sampling of the ground water for contamination testing. These piezometers were purged of water and allowed to recharge over a period of 7 days and groundwater levels re-measured by means of an electronic interface probe.
- Inspection of the condition of existing pavements was carried out by a senior geotechnical engineer.

All field work was carried out under the direction of an experienced geo-environmental engineer.

The locations of the current and previous bores are given in Drawing 1, Appendix A. The collar levels relative to Australian Height Datum (AHD), shown on the borehole logs, were estimated from the survey plan dated 12 February 2010 by StrataSurv Surveyors (Drawing No. 2398DA Rev C).

4.2 Results

Details of the conditions encountered in the test bores are presented in Appendix B. Notes defining classification methods and descriptive terms used in logging the bores are also given in the appendix.

The material strata encountered are described below:

PAVEMENT (Unit 1)	Asphaltic Concrete (AC) to 0.1 m depth generally overlying roadbase materials to depths of 0.1 – 0.4 m in all bores except Bore 9. The AC was placed directly over timber planks in Bore 7 and sand in Bores 8, 14, 15 and 103; overlying,
FILLING (Unit 2)	Poorly and moderately compacted, brown and grey, sand, crushed sandstone, sandstone cobbles and boulders, gravel, timber and concrete filling with some charcoal, clayey sand, sandy clay, building rubble to depths of 0.6 - 3.1 m in Bores 4 to 7, 9, 11 and 14 and 9.7 m in Bore 2. Concrete was encountered at depths of 0.2 - 0.5 m in Bores 8, 10 to 15, 102 and 104. Practical refusal on sandstone boulders or concrete was encountered at depths of 0.4 - 2.2 m in Bores 1, 10, 15, 101 and 102,
RESIDUAL SOILS (Unit 3)	Interbedded silty clay and clay, organic and sandy clay and clayey sand layers to 26.8 m in Bore 2. Silty clays and clays were typically firm to very stiff, orange, brown and black clays with some ironstone gravel. Organic and sandy clays were typically very soft to firm and grey and black. The clayey sand was medium dense and fine to medium grained; overlying,
WEATHERED SANDSTONE (Unit 4)	extremely low to very low strength, brown, red brown and light grey sandstone at depths of 0.6 – 3.1 m in Bores 4 to 7, 9 and 11 to 13. The sandstone encountered in Bores 4 and 5 was possibly a boulder. Practical refusal on sandstone of at least low strength was encountered at depths of 1.3 – 4.5 m in Bores 6, 7, 9, 14, 103 and 104; overlying,

SANDSTONE (Unit 5) medium strength and high strength layers, moderately weathered to fresh, fractured to slightly fractured, brown, grey brown and red brown, medium and coarse grained sandstone with some very high strength ironstone bands at depths of 1.9 – 3.3 m In Bores 11 and 13 and 27.9 m in Bore 2.

The results of the CPI and SKM investigations generally correspond to DP's investigation. However, some of the results from the PB investigation are slightly different to the results of DP, CPI and SKM investigations in terms of the presence of natural materials on site and the depth of bedrock. DP, CPI and SKM do not record any natural materials on the eastern side of the site. DP's cored bores are considered the most reliable method of confirming the bedrock levels. The CPI, SKM and PB results are included in Appendix C.

Groundwater was observed at depths of 1.5 – 2.8 m (RL -0.8 to +0.9 m) during auger drilling in Bores 2, 2A, 3 to 6, 9, 13, 14 and 103. No free groundwater was observed in other test bores during auger drilling. The use of water as a drilling fluid during diamond coring, and the immediate backfilling of the test bore, precluded measurement of the groundwater level in Bore 11.

The water levels measured in the piezometers are shown in Table 1

Table 1 – Well Development Details

Bore No.	Groundwater level measured during auger drilling		Pre-development standing water levels		Standing water levels after well development	
	Depth (m bgl)	RL (m AHD)	Depth (m bgl)	RL (m AHD)	Depth (m bgl)	RL (m AHD)
Bore 2A	2.3	-0.4	1.7	0.5	1.7	0.5
Bore 6	2.2	0.7	Dry	<0.2	Dry	<0.2
Bore 9	1.6	0.9	1.9	0.6	1.9	0.6
Bore 14	2.5	0.1	2.1	0.1	2.1	0.1
Bore 103	2.1	0.3	2.1	0.3	2.4	0.0

Photographs of the pavements are included in Appendix D. Inspection of the pavements indicated the following:

- Pavements are generally in a fair condition (Photos 1 and 2).

- Some minor cracking is present (Photo 3).
- They appear to have been constructed in sections (Photo 4).
- There is a mixture of concrete and asphaltic concrete pavements (Photos 1, 6 and 8).
- Patching has been carried out at a few locations (Photo 5) and where service trenches have been installed (Photo 6).
- Differential settlement has occurred across the site (Photos 9 and 10).
- Some areas of pavement do not grade to a drainage point (Photos 7 and 8).
- Ponding of water is occurring where poorly graded pavements and differential settlement is occurring (Photos 7 to 10).
- Drainage of surface water is poor to fair.

5. LABORATORY TESTING

Samples recovered from the field investigation were tested in the laboratory to determine compaction properties, California bearing ratio (CBR) values, moisture contents, and aggressivity values (pH, resistivity, chloride and sulphate content). The detailed results are given in Appendix E and are summarised in Table 2.

Table 2 – Summary of CBR and Aggressivity Test Results

Test Bore	Depth (m)	Material Description	W (%)	OMC (%)	MDD (t/m ³)	CBR (%)	pH	Cl (ppm)	SO ₄ (ppm)	Resistivity (ohm.m)
2	2.0 – 2.5	Filling	-	-	-	-	8.1	4100	740	3.3
6	0.4 – 1.5	Filling	9.2	11.0	1.99	30	-	-	-	-
7	0.2-0.5	Filling	9.4	11.5	1.93	20	-	-	-	-
7	0.7-1.2	Sandstone	8.3	11.5	1.94	30	-	-	-	-
9	0.5-1.5	Filling	12.2	12.5	1.94	45	-	-	-	-
13	3.0 – 3.5	Sandstone	-	-	-	-	7.5	4100	1100	3.2

Where:
w = Moisture Content
MDD = Maximum Dry Density
W_L – Liquid Limit
PI = Plasticity Index

OMC = Optimum Moisture Content
CBR = California Bearing Ratio
W_p = Plastic Limit

The results of aggressivity testing, and comparison with Table 6.4.2(C) and Table 6.5.2 (C) in AS2159-2009 “Piling: Design and Installation” indicate that an exposure classification of ‘Mildly Aggressive’ is appropriate for subsurface concrete elements and “Moderately Aggressive” for subsurface steel elements.

Point Load Strength Index (IS_{50}) testing was carried out on selected rock core specimens. The results of the tests are given on the test borehole logs at the appropriate depth, indicating values mainly in the range of 0.4 MPa and 1.0 MPa within medium strength sandstone, 1.1 MPa and 1.9 MPa in the high strength sandstone and 5 MPa for the very high strength ironstone band.

6. PROPOSED DEVELOPMENT

The proposed development is to include two double storey buildings with associated driveways and car parks. The eastern building is to be semi - circular in shape with maximum north – south and east – west dimensions of about 100 m by 60m, respectively. The western building is to be a near rectangular shape with maximum north-south and east-west dimensions of about 50 m by 75 m, respectively. It is understood that up to 0.5 m of excavation is proposed for the buildings to create the building platforms.

Existing pavements are understood to be retained, where possible.

7. COMMENTS

7.1 Geotechnical Model

The site can be split up into two separate areas. The eastern side, which covers the footprint on the eastern building, and the western side, which covers the footprint of the western building. The geology of these two areas varies significantly and is described separately below.

Eastern Side

The eastern side of the site is underlain by the following subsurface conditions:

- Unit 1 - Pavement Materials to depths of 0.1 – 0.4 m at most locations.
- Unit 2 – Filling to depths of 0.6 – 3.1 m. A layer of concrete was encountered at depths of 0.2 – 0.5 m across the footprint of the proposed eastern building.
- Unit 4 - Weathered Sandstone beneath the filling. The depth of sandstone appears to increase with proximity to Rozelle Bay. Natural soils (Unit 3) were not encountered above the sandstone on this side of the site.
- Unit 5 - Sandstone of medium to high strength at depths of 1.9 – 3.3 m.

Western Side

The western side of the site is underlain by the following subsurface conditions:

- Unit 1 - Pavement Materials to 0.2 m depth.
- Unit 2 – Filling to depths of 2.5 – 2.6 m on the eastern side and 9.7 m depth on the western side. The filling includes sandstone cobbles and boulders.
- Unit 3 – interbedded sands and clays of variable strength to 26.8 m on the western side of the site.
- Unit 4 - Weathered Sandstone beneath the filling. The sandstone encountered in Bores 4 and 5 was possibly sandstone boulder filling.
- Unit 5 - Sandstone of medium to high strength at 27.9 m in Bore 2.

Bedrock levels appear to fall at least 24 m across the western side of the site. It is recommended that once the Liquidity Café building is demolished, that further core drilling be carried out across the building footprint to accurately determine the bedrock level on the western and central sections of the site so as to be confident as to founding depths for piling purposes.

Groundwater Levels

Groundwater levels were recorded between RL -0.4 m AHD and RL 0.9 m AHD. Variations in water levels are expected with tidal fluctuations.

7.2 Geotechnical Issues

The presence of deep, uncontrolled filling with an associated high groundwater level presents some geotechnical issues that will need to be carefully considered when designing the building.

The filling is unsuitable to support any foundation or floor slab loads. Therefore, all foundation loads will need to be supported on footings founded on bedrock. A combination of shallow and deep foundations will be required to support the eastern building. Deep foundations, capable of penetrating sandstone boulders, will be required to support the western building.

Floor slabs will need to be fully suspended on footings founded on bedrock.

Existing pavements have shown some signs of differential settlement. Regardless of the treatment, pavements are anticipated to continue to settle with time and require ongoing repair and maintenance. Therefore, where possible it is recommended to retain the existing pavements and place asphaltic concrete overlays over the top of the existing pavements to attain design levels. Overlays should be designed to allow all surface water to efficiently flow to drainage points.

Underground services may also be subjected to large differential settlements. Design should allow for potential differential settlements across short distances.

7.3 Site Preparation Measures

At the locations where a new pavement is to be constructed or UST excavations are to be backfilled, the following site preparation measures for a subgrade platform are recommended:

- Excavate to the design level.
- Proof roll the exposed surface using a minimum 10 tonne smooth drum roller in non-vibration mode. The subgrade should be rolled a minimum of six times with the last two passes observed by an experienced geotechnical engineer to detect any 'soft spots'.
- Any heaving materials identified during proof rolling should be removed as directed by the geotechnical engineer. Heaving materials may be to a depth and extent that excavation is not feasible. In such a scenario, the geotechnical engineer may recommend the placement of a geogrid, or similar, to reduce the amount of deflection occurring across "soft spots".
- Replacement filling, which is expected to be required only within 0.5 m of the subgrade level, should then be placed in layers of 250 mm maximum loose thickness and compacted to a minimum dry density ratio (DDR) of 100% (Standard) with moisture contents maintained within 2% of Standard optimum moisture content (SOMC). The select fill should be free of oversize particles (>100 mm) and deleterious material and should have a CBR of at least 20%.
- The existing fill material on site is considered suitable for re-use provided all vegetation, oversize pieces (>100 mm) and other deleterious materials are removed.
- Density testing of the filling should be carried out at Level 1 or Level 2 responsibility, as defined in AS3798 "Guidelines for earthworks for commercial and residential developments."

For the proposed piling platforms, it is recommended that the existing pavements be retained as a piling platform subject to testing immediately prior to trafficking.

7.4 Excavation Conditions

Bulk excavation will probably encounter Units 1, 2 and 4 (Pavement materials, filling, and weathered rock) when excavating to 0.5 m depth with the possibility of minor amounts of Unit 5 (medium and high strength sandstone) within some footing excavations for the eastern building.

Excavation within Units 1, 2 and 4 should be readily achievable by bulldozer blade or hydraulic excavator. Some light to medium ripping assistance or the use of rock hammers may be required for layers of any stronger rock that are interbedded within Unit 4.

Any excavation within medium and high strength sandstone (Unit 5) will require medium to heavy rock breaking equipment. Some bands of the high strength sandstone is expected to have an unconfined compressive strength (UCS) of 30 – 40 MPa. Rock breaking equipment will generally cause noise and vibrations that could be disturbing to surrounding personnel. Vibration levels should therefore be kept below a peak particle velocity of 5 mm/s. Monitoring of vibration levels may be required to manage vibration levels when excavating Unit 5 sandstone.

All excavated materials will need to be disposed in accordance with current Department of Environment Climate Change and Water policies namely the *Waste Classification Guidelines* (2008) revised July 2009. Further, under the Waste Avoidance and Resource Recovery Act (NSW EPA, 2001) a waste/fill receiving site must be satisfied that materials received meet the environmental criteria for proposed land use. This includes filling and virgin excavated natural materials (VENM), such as the material which may be removed from site. In this regard it is noted that a preliminary waste classification assessment was undertaken as part of the DP baseline contamination assessment (dated 12 August, 2010). Therefore, for waste disposal purposes, the results of the preliminary waste classification assessment should be referred to. Further, for materials not classified in the DP preliminary waste classification assessment, testing will need to be carried out to classify spoil prior to disposal. The type and extent of testing undertaken will depend on the final use or destination of the spoil, and requirements of the receiving site.

7.5 Foundations

It is anticipated that differing foundations column loads for the proposed structures will be up to 1000 kN.

Due to the variable rock levels across the two building footprints, the foundation options for the two areas are different and have been addressed in separate sections below.

Prior to any footing construction, the location of any anchors supporting the adjacent wharf piers should be determined so that piling/footings do not intersect these tensioned anchors.

Eastern Building

Foundations for the eastern building are generally anticipated to be piles bearing on medium or high strength sandstone. However, shallow footings on the northern side of the building (e.g. near Bore 12) may be appropriate.

Due to the presence of filling and a high groundwater table either continuous flight auger (CFA) or driven piles (e.g. concrete, steel or timber piles) would be appropriate. Driven piles have the advantage of not producing spoil, however, more noise and vibration occurs than with the CFA piling method. Both methods would require any concrete slabs to be broken, cored or penetrated prior to commencing piling.

A maximum allowable bearing pressure of 3.5 MPa is suggested for design of shallow footings and CFA piles founded on medium strength (or stronger) sandstone. An allowable shaft adhesion of 350 kPa is recommended for piles socketed into medium strength sandstone. Reference to the comments below for driven piles for the western building should be made for the foundation design of driven piles. Settlements are not expected to exceed 1% of the footing width for footings loaded to the above recommended maximum values.

The foundation design parameters assume that the foundation excavations (e.g. pads or piles) are clean and free of loose debris, with pile sockets free of smear and adequately roughened immediately prior to the placement of concrete.

Western Building

Due to the depth and type of filling together with the depth of bedrock, driven steel displacement piles are considered the only effective method of penetrating the filling and founding on sandstone bedrock to support all loads. Driven piles do create some noise and vibrations which will need to be considered during construction.

The ultimate compression capacity of driven piles is normally determined from the pile driving records using the Hiley or Janbu formulae. However, it is common practice for driven piles to be driven to virtual refusal and then to adopt the structural capacity of the pile shaft as the ultimate geotechnical strength. For preliminary design purposes, it is recommended that the structural capacity of the piles with a 50 mm load eccentricity be adopted for H piles driven to rock. For example, 2500C 89 piles with adequate corrosion protection are estimated to have an allowable load capacity of 1100 kN.

The level and strength of bedrock across the site would need to be confirmed prior to pile construction so that the overall length of pile driving can be estimated. The investigation indicates the possibility of sandstone boulders above bedrock level at some of the bore locations. If steel piles refuse above the bedrock, it will be necessary to drive replacement 'H' piles or to chop through the boulders with a drop hammer so that there is a low risk of unacceptable foundation movement.

While the results of laboratory testing indicate “mildly” and “moderately” aggressive conditions, it is considered prudent to allow for “severe” aggressive conditions due to the close proximity to seawater. Reference should be made to Tables 6.4.2 and 6.5.2 of AS2159-2009 for the aggressivity design.

7.6 Seismic Design

In accordance with the Earthquake Loading Standard, AS1170.4 - 2007 the site is assessed to have a Site Sub-Soil Class of “Ce”. This assumes that all loads are transferred to at least medium strength sandstone.

7.7 Pavement Design Parameters

Based on the results of the field assessment and experience within the local area, a soaked CBR value of 5 % is considered appropriate for the design of pavements constructed on the filling. While laboratory test results were significantly higher, this value was predominately for crushed sandstone filling. The lower design value is considered more appropriate to include the

presence of sand and clay filling also at the subgrade level. Subgrade preparation should be undertaken in accordance with the recommendations outlined in Section 7.3.

7.8 Drainage

Surface and subsurface drainage for the buildings and pavement structures should be incorporated into the design.

8. LIMITATIONS

Douglas Partners (DP) has prepared this report for the proposed Sydney Super Yacht Marina redevelopment (the site), located at James Craig Road, Rozelle. The work was performed in accordance with DP's proposal dated 17 June 2010 and acceptance received from the Sydney Super Yacht Marina (SSYM), under DP's Conditions of Engagement. This report is provided for the exclusive use of the SSYM (Client) and NSW Maritime for the specific project and purpose as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other sites or by a third party.

The results provided in the report are considered to be indicative of the sub-surface conditions on the site only to the depths investigated at the specific sampling and/or testing locations, and only at the time the work was carried out. DP's advice is based on observations, measurements, tests or derived interpretations. The accuracy of the advice provided by DP in this report may be limited by unobserved features and variations in ground conditions across the site in areas between test locations and beyond the site boundaries or by variations with time. The advice may also be limited by restrictions in the sampling and testing which was able to be carried out, as well as by the amount of data that could be collected given the project and site constraints. Actual ground conditions and materials behaviour observed or inferred at the test locations may differ from those which may be encountered elsewhere on the site. Should variations in subsurface conditions be encountered, then additional advice should be sought from DP and, if required, amendments made.

This report must be read in conjunction with the attached “Notes Relating to This Report” and any other attached explanatory notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion in this report. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

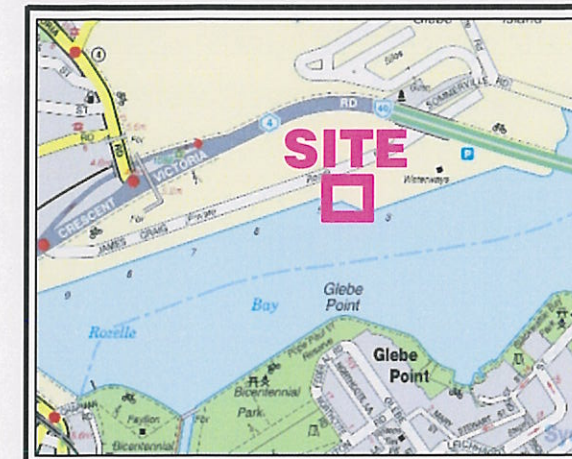
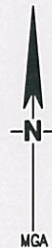
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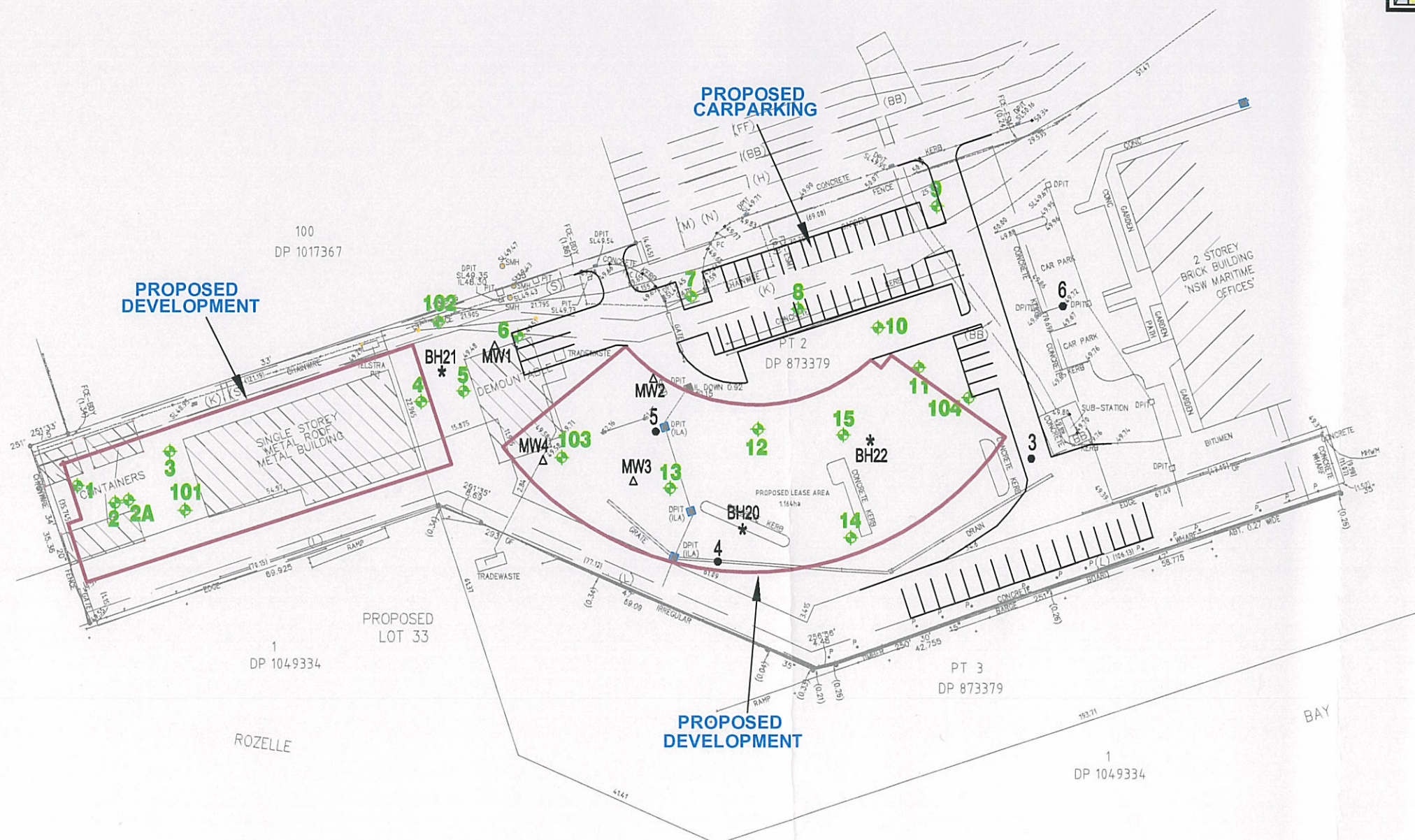
Gavin Boyd
Geotechnical Engineer

Michael J Thom
Principal

APPENDIX A
Drawing 1



LOCALITY PLAN



LEGEND

- ◆ TEST BORE LOCATION
- COFFEY TEST BORE LOCATION (1991)
- * SKM 1998 SAMPLING LOCATION
- △ PB 2009 SAMPLING LOCATION

APPENDIX B
Notes Relating to this Report
Results of Field Work

BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 1
PROJECT No: 71816
DATE: 22/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE								
	0.2	ROADBASE								
		FILLING - brown, coarse grained sand filling with some gravel and trace amounts of charcoal, damp		A/E*	0.2		PID<1ppm			
					0.5					
		- sandstone cobbles and boulders from 0.8m								
	0.9	FILLING - brown, coarse grained sand filling with some sandstone fragments, damp		A/E	1.0		PID<1ppm			
					1.5					
					2.0		PID<1ppm			
	2.2	Bore discontinued at 2.2m - practical refusal on sandstone boulder		A/E	2.2					

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 2.2m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Denotes field replicate samples BD2/220610 and BD2A/220610 collected
 E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		≡	Water level

CHECKED

Initials: GRB

Date: 4/8/10



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 Geotechnics • Environment • Groundwater

BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 1.9 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 2
PROJECT No: 71816.01
DATE: 24 - 26/6/2010
SHEET 1 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)				Discontinuities		Sampling & In Situ Testing				Test Results & Comments																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
			EW	FW	MW	SW	FS		FR	Ex Low	Very Low	Low	Medium		High	Very High	Ex High	0.01	0.05	0.10	0.50	1.00	B - Bedding S - Shear	J - Joint D - Drill Break		Type	Core Rec. %	RQD %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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RIG: Scout 4

DRILLER: KE

LOGGED: SI

CASING: HW to 8.5m; HQ to 28.0m

TYPE OF BORING: Solid flight auger to 3.5m; Rotary (mud) to 27.9m; NMLC-Coring to 31.0m

WATER OBSERVATIONS: Free groundwater observed at 2.3m whilst augering

REMARKS: E = Environmental sample
*Dentoes field replicate samples BD3/240610 and BD3A/240610 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		▽	Water level

CHECKED	
Initials:	GRB
Date:	4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 1.9 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 2
PROJECT No: 71816.01
DATE: 24 - 26/6/2010
SHEET 2 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering				Graphic Log	Rock Strength					Water	Fracture Spacing (m)			Discontinuities		Sampling & In Situ Testing			
			EW	HW	NW	SW		FS	FR	Ex Low	Low	Medium		High	Very High	Ex High	B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
		SILTY CLAY - firm, grey, silty clay, saturated (continued)																U ₅₀			pp = 50kPa	
	11																	W				
	12	CLAY - very stiff, mottled orange and light grey, clay with a trace of ironstone gravel, saturated																S			2,2,4 N = 6	
	13																	W				
	14																	S			5,12,17 N = 29	
	15																	W				
	16	CLAY - stiff, dark grey to black clay, saturated																S			4,7,10 N = 17	
	17	SANDY CLAY - very soft to soft, dark grey, fine to medium grained sandy clay, saturated																W				
	18																	S			1/600mm refusal	
	19	SANDY CLAY - stiff to very stiff, dark grey, fine to medium grained, sandy clay, saturated																W				
																		S			5,3,13 N = 16	
																		W				

RIG: Scout 4

DRILLER: KE

LOGGED: SI

CASING: HW to 8.5m; HQ to 28.0m

TYPE OF BORING: Solid flight auger to 3.5m; Rotary (mud) to 27.9m; NMLC-Coring to 31.0m

WATER OBSERVATIONS: Free groundwater observed at 2.3m whilst augering

REMARKS: E = Environmental sample
 *Dentoes field replicate samples BD3/240610 and BD3A/240610 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
			Water level

CHECKED	
Initials:	SRB
Date:	4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 1.9 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 71816.01
DATE: 24 - 26/6/2010
SHEET 3 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering						Graphic Log	Rock Strength						Water	Fracture Spacing (m)				Discontinuities		Sampling & In Situ Testing							
			EW	HW	MW	SW	FS	FR		Ex Low	Very Low	Low	Medium	High	Very High		Ex High	0.01	0.05	0.10	0.50	1.00	B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments		
	20.6	SANDY CLAY - stiff to very stiff, dark grey, fine to medium grained, sandy clay, saturated (<i>continued</i>)																												
	21	ORGANIC CLAY - soft to firm, dark grey to black, organic clay, saturated																												
	22																													
	23																													
	24	CLAYEY SAND - medium dense, dark grey, fine to medium grained, clayey sand, saturated																												
	25																													
	26	SANDY CLAY - stiff to very stiff, dark grey to black, organic rich, fine to medium grained sandy clay, saturated																												
	26.8	SANDSTONE - very low strength, light grey and brown, medium grained sandstone																												
	27.9	SANDSTONE - medium strength, fresh, fractured and slightly fractured, light grey, medium grained sandstone. Some extremely low strength bands																												
	28.82	SANDSTONE - high strength, fresh, slightly fractured, light grey, medium to coarse grained sandstone 29.22 & 29.62m: 40mm to 70mm thick siltstone bands																												
	29																													
	29.22																													
	29.62																													
	29.82																													
	30																													
	30.22																													
	30.62																													
	30.82																													
	31																													
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	47.62																													
	47.82																													
	48																													
	48.22																													
	48.62																													
	48.8																													

RIG: Scout 4

DRILLER:KE

LOGGED: SI

CASING: HW to 8.5m; HQ to 28.0m

TYPE OF BORING: Solid flight auger to 3.5m; Rotary (mud) to 27.9m; NMLC-Coring to 31.0m

WATER OBSERVATIONS: Free groundwater observed at 2.3m whilst augering

REMARKS: E = Environmental sample
*Dentoes field replicate samples BD3/240610 and BD3A/240610 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		≡	Water level

CHECKED
Initials: <i>GPB</i>
Date: <i>4/8/10</i>



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 1.9 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 71816.01
DATE: 24 - 26/6/2010
SHEET 4 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing						
			EW	HW	MW	SW	FS		FR	Ext Low	Very Low	Low	Medium				High	Very High	Ext High	B - Bedding	J - Joint	S - Shear	D - Drill Break
	31.0	SANDSTONE - high strength, fresh, slightly fractured, light grey, medium to coarse grained sandstone 29.22 & 29.62m: 40mm to 70mm thick siltstone bands (continued)														29.7m: J40°, smooth							
		Bore discontinued at 31.0m																					
	32																						
	33																						
	34																						
	35																						
	36																						
	37																						
	38																						
	39																						
	38																						

RIG: Scout 4

DRILLER:KE

LOGGED: SI

CASING: HW to 8.5m; HQ to 28.0m

TYPE OF BORING: Solid flight auger to 3.5m; Rotary (mud) to 27.9m; NMLC-Coring to 31.0m

WATER OBSERVATIONS: Free groundwater observed at 2.3m whilst augering

REMARKS: E = Environmental sample

*Dentoes field replicate samples BD3/240610 and BD3A/240610 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength ls(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		≡	Water level

CHECKED
Initials: <i>GRB</i>
Date: <i>4/8/10</i>



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 1.9 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 2A
PROJECT No: 71816
DATE: 26/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.1	ASPHALTIC CONCRETE							Gatic cover
	0.2	ROADBASE							Backfill
		FILLING - light grey brown clay and crushed sandstone, damp							Bentonite
	1.3	FILLING - brown crushed sandstone cobbles and boulder filling with some clayey sand, damp							Backfilled with gravel
		- saturated from 2.3m							Machine slotted PVC screen
	4.25	Bore discontinued at 4.25m							End cap

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 4.25m

WATER OBSERVATIONS: Free groundwater observed at 2.3m

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED	
Initials:	GRB
Date:	4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/-

BORE No: 3
PROJECT No: 71816
DATE: 22/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE								
	0.2	ROADBASE								
		FILLING - black sand filling with some gravel, moist		A/E	0.2		PID<1ppm			
					0.5					
	0.6	FILLING - grey gravel filling, moist								
	0.8	FILLING - brown, coarse grained sand filling with some sandstone fragments and trace amounts of shale fragments, moist		A/E	0.9		PID<2ppm			
					1.4					
	1.5	FILLING - black with a tinge of green discoloration, medium to coarse grained sand filling and some gravel, moist		A/E	1.5		PID<1ppm			
	1.8	FILLING - brown sandstone cobble and boulder filling, moist			1.8					
				A/E	2.0		PID<1ppm			
					2.5					
	2.8	FILLING - grey, medium to coarse grained sand filling with trace amounts of sandstone fragments, saturated								
				A/E	3.0		PID<1ppm			
	3.5	Bore discontinued at 3.5m - target depth achieved			3.5					

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 3.5m

WATER OBSERVATIONS: Free groundwater observed at 2.8m

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		▽	Water level

CHECKED
Initials: GRB
Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/---

BORE No: 4
PROJECT No: 71816
DATE: 23/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE								
	0.2	ROADBASE								
		FILLING - brown to black, fine to medium grained, silty sand filling with some gravel and timber pieces, moist		A/E	0.2		PID<3ppm			
					0.5					
	0.8	FILLING - dark grey, coarse grained sand filling with some gravel and trace amounts of asphaltic concrete and slag, moist								
				A/E	0.9		PID<1ppm			
					1.4					
	1.6	FILLING - grey, medium grained sand filling with some gravel, moist								
					1.8					
		- saturated from 2.0m		A/E			PID<1ppm			
					2.3					
	2.6	SANDSTONE - extremely low to very low strength, grey sandstone (possible sandstone boulder filling)								
					3.0					
				A/E			PID<1ppm			
	3.5	Bore discontinued at 3.5m - target depth achieved			3.5					

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 3.5m

WATER OBSERVATIONS: Free groundwater observed at 2.0m

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
		W	Water level

CHECKED
Initials: <i>GRB</i>
Date: <i>4/8/10</i>



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 5
PROJECT No: 71816
DATE: 22/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE								
	0.2	ROADBASE								
	0.3	FILLING - grey gravel filling, moist								
		FILLING - brown timber plank filling			0.4					
	0.5	FILLING - brown sandstone cobble and boulder filling with trace amount of sand, moist		A/E			PID<1ppm			
					0.8					
	1.1	FILLING - brown, coarse grained sand filling with trace amounts of sandstone fragments, moist		A/E			PID<1ppm			
					1.1					
					1.5					
		- saturated from 1.8m								
	2.5	Bore discontinued at 2.5m - refusal on sandstone (possible boulder)								
	3									
	4									

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 2.5m

WATER OBSERVATIONS: Free groundwater observed at 1.8m

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	PP	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	>	Water seep
		≡	Water level

CHECKED
Initials: GRB
Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 6
PROJECT No: 71816
DATE: 23/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details					
				Type	Depth	Sample	Results & Comments							
0.05	0.1	ASPHALTIC CONCRETE		A/E	0.1		PID<1ppm							
		ROADBASE												
		FILLING - black to brown, medium to coarse grained, sand filling with some gravel, damp to moist												

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 2.0m

WATER OBSERVATIONS: Free groundwater observed at 1.5m

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		≡	Water level

CHECKED
Initials: GRB
Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 7
PROJECT No: 71816
DATE: 24/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing			Water	Well Construction Details	
				Type	Depth	Sample			
-2 -1 0 1 2	0.1	ASPHALTIC CONCRETE		A/E*	0.2		PID<1ppm		
	0.2	FILLING - timber plank filling							
		FILLING - brown, silty sand filling with some timber fragments, moist							
	0.6	SANDSTONE - extremely low to very low strength sandstone		A/E	0.7		PID<1ppm	1	
					1.2				
1.3	Bore discontinued at 1.3m - practical refusal on at least low strength sandstone								
						</			

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 1.3m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample. *Denotes field replicate samples BD2/240610 and BD2A/240610 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		≡	Water level

CHECKED
Initials: GRB
Date: 4/8/60



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.7 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/---

BORE No: 8
PROJECT No: 71816
DATE: 24/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE		A/E	0.1		PID<1ppm			
		FILLING - brown, fine to medium grained, silty sand filling with some gravel, humid								
	0.52	CONCRETE			0.5					
	0.52	Bore discontinued at 0.52m - practical refusal on concrete								
	1									
	2									
	3									
	4									
	5									
	6									
	7									
	8									
	9									
	10									
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	12									
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RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 0.52m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED
Initials: <i>GRB</i>
Date: <i>4/8/10</i>



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 9
PROJECT No: 71816
DATE: 24/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.0	FILLING - dark brown, fine to medium grained, silty sand filling with some organic matter and gravel, moist		A/E	0.0		PID<1ppm		Galic cover Backfill
	0.5				0.5				Bentonite
	0.6	FILLING - brown, medium grained, sand filling with some sandstone fragments and trace amounts of gravel		A/E	0.6		PID<2ppm		Backfilled with gravel
	1.0				1.0				
	1.1	FILLING - brown gravel and coarse grained sand filling with some metal, wire and brick fragments		A/E	1.1		PID<1ppm		Machine slotted PVC screen
	1.5	SANDSTONE - very low strength, grey sandstone			1.5				
	2.1	Bore discontinued at 2.1m - practical refusal on at least low strength sandstone							End cap
	2.5								
	3.0								
	3.5								
	4.0								
	4.5								
	5.0								

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 2.1m

WATER OBSERVATIONS: Free groundwater observed at 1.6m

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
		W	Water level

CHECKED	
Initials:	GRB
Date:	4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.7 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 10
PROJECT No: 71816
DATE: 24/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE								
		ROADBASE								
	0.4	Bore discontinued at 0.4m - refusal on concrete								
	1									
	2									
	3									
	4									

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 0.4m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED
Initials: <i>GRB</i>
Date: <i>4/8/10</i>



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.9 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 11
PROJECT No: 71816.01
DATE: 25/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing			
			EW	HW	MW	SW	FS		FR	Ex Low	Very Low	Low	Medium			High	Very High	Ex High	B - Bedding S - Shear	J - Joint D - Drill Break	Type
	0.1	ASPHALTIC CONCRETE																A			
	0.3	ROADBASE																			
	0.5	CONCRETE																A/E*			PID<2ppm
	1.1	FILLING - grey, fine to medium grained, sand filling with some crushed sandstone and gravel, moist																A			5,19,20 N = 39
	1.85	SANDSTONE - very low strength, light grey brown, medium to coarse grained sandstone																S			PID<1ppm
	2	SANDSTONE - medium then medium to high strength, slightly weathered, slightly fractured, light grey brown, medium to coarse grained sandstone. Some very low strength bands																A/E			PL(A) = 5MPa PL(A) = 0.8MPa
	3.5	SANDSTONE - high strength, moderately weathered, slightly fractured, brown, medium to coarse grained sandstone																C	100	94	PL(A) = 1MPa PL(A) = 1.2MPa
	4.75	Bore discontinued at 4.75m																			
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RIG: Bobcat

DRILLER:SS

LOGGED: SI

CASING: HW to 1.8m

TYPE OF BORING: Solid flight auger to 0.3m; Diatube to 0.5m; Solid flight auger to 1.85m; NMLC-Coring to 4.75m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field replicate samples BD1/250610 and BD1A/250610 collected
E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
		W	Water level

CHECKED

Initials: GRB

Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.7 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 12
PROJECT No: 71816
DATE: 24/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE			0.1					
		FILLING - brown, fine to medium grained, sand filling with some gravel, moist		A/E	0.3		PID<1ppm			
	0.4	CONCRETE								
	0.6	SANDSTONE - very low to low strength, yellow brown sandstone								
	0.8	Bore discontinued at 0.8m								
	1									
	2									
	3									
	4									
	5									

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 0.8m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED
Initials: <i>GRB</i>
Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 13
PROJECT No: 71816.01
DATE: 24/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing				
			EW	HW	MW	SW	FS		FR	Ex Low	Very Low	Low	Medium			High	Very High	Ex High	B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %
	0.1	ASPHALTIC CONCRETE																				
	0.2	ROADBASE																				
	0.4	CONCRETE																A/E				PID<1ppm
		FILLING - poorly compacted, dark grey to black, fine to medium grained sand and slag filling with some ash and charcoal, moist																A				2,2,2 N = 4 PID<2ppm
	1																	A/E/S				
	2	- saturated from 2.1m																				PID<1ppm
	2.6	FILLING - moderately compacted, grey brown, gravelly sand filling with crushed sandstone, saturated																A/E				
	3																	A	S			3,1,9 N = 10
	3.1	SANDSTONE - very low strength, light grey brown, medium grained sandstone																				PID<1ppm
	3.3																	A/E				
		SANDSTONE - medium strength, moderately weathered, fractured and slightly fractured, light brown to red brown, medium to coarse grained sandstone with some very high strength ironstone bands																				
	4																	C	100	100		PL(A) = 0.9MPa
	5																					PL(A) = 0.7MPa
	5.6	SANDSTONE - high strength, moderately weathered, unbroken, brown, medium to coarse grained sandstone																C	100	86		PL(A) = 0.9MPa
	6																					PL(A) = 1.2MPa
	6.75	Bore discontinued at 6.75m																				
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RIG: Bobcat

DRILLER: SS

LOGGED: SI

CASING: HW to 3.3m

TYPE OF BORING: Solid flight auger to 0.2m; Diatube to 0.4m; Solid flight auger to 3.3m; NMLC-Coring to 6.75m

WATER OBSERVATIONS: Free groundwater observed at 2.1m whilst augering

REMARKS: Water loss from 3.4m. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	W	Water seep
		WL	Water level

CHECKED

Initials: GRB

Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.6 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 14
PROJECT No: 71816
DATE: 24/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.1	ASPHALTIC CONCRETE							Gatic cover
	0.2	FILLING - brown, medium grained, sand filling with some gravel, humid		A/E*	0.1		PID<1ppm		Backfill
	0.4	CONCRETE			0.2				Bentonite
		FILLING - dark grey and black, medium grained sand and crushed sandstone filling with some charcoal, gravel, ironstone gravel and trace amounts of brick fragments, damp		A/E	0.5		PID<2ppm		
					1.0				
	1.3	FILLING - brown, coarse grained, sand filling with some crushed sandstone, moist		A/E	1.4		PID<1ppm		Backfilled with gravel
					2.0				Machine slotted PVC screen
	2.6	- saturated at 2.5m							End cap
	2.7	SANDSTONE - very low strength, white and yellow brown sandstone							
		Bore discontinued at 2.7m							
		- refusal on at least low strength sandstone							

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 2.7m

WATER OBSERVATIONS: Free groundwater observed at 2.5m

REMARKS: E = Environmental sample. *Denotes field replicate samples BD1A/240610 and BD1B/240610 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED	
Initials:	GRB
Date:	4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.6 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 15
PROJECT No: 71816
DATE: 24/6/2010
SHEET 1 OF 1

[illegible]

RIG: Bobcat

DRILLER:Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 0.2m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND	
A	Auger sample
D	Disturbed sample
B	Bulk sample
U _i	Tube sample (x mm dia.)
W	Water sample
C	Core drilling
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
S	Standard penetration test
PL	Point load strength Is(50) MPa
V	Shear Vane (kPa)
▷	Water seep
≡	Water level

CHECKED
Initials: GRB
Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 1.8 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 101
PROJECT No: 71816
DATE: 25/6/2010
SHEET 1 OF 1

[illegible]

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 1.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND	
A	Auger sample
D	Disturbed sample
B	Bulk sample
U	Tube sample (x mm dia.)
W	Water sample
C	Core drilling
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
S	Standard penetration test
PL	Point load strength Is(50) MPa
V	Shear Vane (kPa)
▷	Water seep
≡	Water level

CHECKED
Initials: GRB
Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 102
PROJECT No: 71816
DATE: 23/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing			Water	Well Construction Details	
				Type	Depth	Sample		Results & Comments	
2	0.05	ASPHALTIC CONCRETE							
	0.1	ROADBASE							
		FILLING - black, fine to medium grained, silty sand with some gravel		A/E			PID<1ppm		
	0.6	CONCRETE			0.5				
	0.7			A/E	0.6		PID<1ppm		
		Bore discontinued at 0.7m - refusal on concrete			0.7				
1									
1									
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4									
-2									

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 0.70m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	piD	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		↑	Water level

CHECKED
Initials: GRB
Date: 4/8/10



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BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.4 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/-

BORE No: 103
PROJECT No: 71816
DATE: 23/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.1	ASPHALTIC CONCRETE							Gatic cover
		FILLING - brown, coarse grained, sand filling with some gravel, humid		A/E*	0.1		PID<1ppm		Backfilled with gravel
	0.5	FILLING - yellow brown, sandstone cobbles and boulder filling, moist			0.5				
	0.8	FILLING - brown, coarse grained, sand filling with some crushed sandstone fragments, moist			0.9		PID<1ppm		Bentonite
				A/E	1.4				
	1.6	FILLING - brown grey, sandstone cobble and boulder filling with some sand, moist			1.8				
		- saturated from 2.1m - faint hydrocarbon odour at 2.1m		A/E	2.4		PID<3ppm		Backfilled with gravel
					3.0				Machine slotted PVC screen
				A/E	3.5		PID<2ppm		
	4.5	Bore discontinued at 4.5m - refusal on at least low strength sandstone							End cap

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 4.5m

WATER OBSERVATIONS: Free groundwater observed at 2.1m

REMARKS: E = Environmental sample. *Denotes field replicate samples BD1/230610 and BD1A/230610 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength ts(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	>	Water seep
		≡	Water level

CHECKED	
Initials:	GRB
Date:	4/8/10



Douglas Partners
Geotechnics • Environment • Groundwater

BOREHOLE LOG

CLIENT: Sydney Super Yacht Marina Pty Ltd
PROJECT: Sydney Super Yacht Marina Redevelopment
LOCATION: James Craig Road, Rozelle Bay

SURFACE LEVEL: 2.6 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 104
PROJECT No: 71816
DATE: 23/6/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	ASPHALTIC CONCRETE								
	0.2	ROADBASE								
		CONCRETE - reinforced								
	0.4	FILLING - dark grey, fine to medium grained, sand filling with some gravel			0.4					
				A/E			PID<1ppm			
	0.8	SANDSTONE - extremely low to very low strength, grey and yellow brown sandstone			0.8					
	0.85	Bore discontinued at 0.85m - refusal on at least low strength sandstone								

RIG: Bobcat

DRILLER: Salib

LOGGED: NSA

CASING: Uncased

TYPE OF BORING: 110mm diameter spiral flight auger to 0.85m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

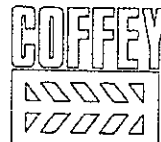
SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED
Initials: GRB
Date: 4/8/10



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APPENDIX C
Results of Relevant CPI, PB and SKM Field Work



borehole no:
BH3
sheet 1 of 1

engineering log - borehole

office job no: S9439/1

client: EJE ARCHITECTURE
principal: MARITIME SERVICES BOARD
project: MARENG WORKSHOPS
borehole location: SEE DRAWING No S9439.1-1

hole commenced: 13/12/90
hole completed: 13/12/90
logged by: SRM
checked by: JGL

drill model and mounting: B40 - TRUCK MOUNTED DRILL RIG

slope: -90 DEG

R.L. Surface:

hole diameter: 100mm

bearing:

datum:

method	1 2 3 4 5 6 7 8 9 10 11 12	notes samples, test, etc	RL	depth metres	graphic log	classification symbol	material soil type; plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetration meter	structure and additional observation
AD1							CONCRETE RL: Gravelly sand, light grey brown	M			FILL sandstone gravel in sand
		N=R		1			SANDSTONE: fine to medium grained, light grey orange brown No not jumping, seems very even & smooth therefore probably not a fill boulder				SPT refusal on sandstone boulders SANDSTONE BEDROCK
				2							
				3							
				4							
				5							
				6							
				7							
				8							
				9							
				10							
				11							
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				16							



borehole no:

BH4

sheet 1 of 1

engineering log - borehole

office job no: S9439/1

client: EJE ARCHITECTURE
principal: MARITIME SERVICES BOARD
project: MARENG WORKSHOPS
borehole location: SEE DRAWING No S9439.1-1

hole commenced: 13/12/90
hole completed: 13/12/90
logged by: SRM
checked by: JGL

drill model and mounting: B40 - TRUCK MOUNTED DRILL RIG

slope: -90 DEG R.L. Surface:

hole diameter: 100mm

bearing:

datum:

method	penetration	support	water	notes samples, test, etc	R.L.	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetration meter	structure and additional observations
ADT		NIL							FILL: Bitumen and gravel	M			Road & road base
									FILL: Sandstone boulders in crushed sandstone matrix				FILL
				4 . 3 . 2 N*=5		1					MD		
						2							
				2 . 2 . 2 N*=4		3				W	L		Water level may fluctuate with tides
						4							
						5			Borehole BH4 Terminated at	4.10	m		
						6							
						7							
						8							

METHOD

AS auger screwing
AD auger drilling
R roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT

C casing
M mud
PENETRATION
1 2 3
no resistance
ranging to
refusal
WATER
* not measured
water level
water outflow
water inflow

NOTES

samples and tests
U50 undisturbed sample 50 mm
diameter
D disturbed sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
V vane shear
P pressuremeter
Bs bulk sample
R refusal

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

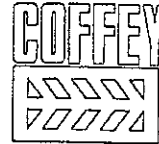
based on unified
classification system

MOISTURE

D dry
M moist
W wet
Wp plastic limit

CONSISTENCY/DENSITY INDEX

VS very soft
S soft
F firm
St stiff
VSI very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense



borehole no:

BH5

sheet 1 of 1

engineering log - borehole

office job no: S9439/1

client:	EJE ARCHITECTURE	hole commenced:	13/12/90
principal:	MARITIME SERVICES BOARD	hole completed:	13/12/90
project:	MARENG WORKSHOPS	logged by:	SRM
borehole location:	SEE DRAWING No S9439/1-1	checked by:	JGL

drill model and mounting:	B40 - TRUCK MOUNTED DRILL RIG	slope:	-90 DEG	R.L. Surface:
hole diameter:	100mm	bearing:		datum:

method	penetration	support	water	notes samples, test, etc	R.L.	depth metres	graphic lit. g	classification symbol	material soil type: plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency density index	hand penetration meter	structure and additional observations
AD1	2	III							CONCRETE: FILL: Sandstone boulders in crushed sandstone SANDSTONE: medium grained, medium strength	M			FILL - large boulders MW SANDSTONE Rig grinding sandstone smoothly for 1.4m
						2			Borehole BH5 VIRTUAL TC SANDSTONE	Terminated at	1.90	m	
						3							
						4							
						5							
						6							
						7							
						8							

METHOD AS auger screwing AD auger drilling R roller/tricone W washbore CT cable tool HA hand auger DI dialube *bit shown by suffix B blank bit V V bit I IC bit e.g. AD1	SUPPORT C casing M mud PENETRATION 1 no resistance 2 ranging to 3 refusal WATER * not measured water level water outflow water inflow	NOTES samples and tests U50 undisturbed sample 50 mm diameter D disturbed sample N standard penetration test: N- SPT + sample recovered Nc SPT with solid cone V vane shear P pressuremeter Bs bulk sample R refusal	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION based on unified classification system MOISTURE D dry M moist W wet Wp plastic limit	CONSISTENCY/DENSITY INDEX VS very soft S soft F firm St stiff VS1 very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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borehole no:
BH6
sheet 1 of 1

engineering log - borehole

office job no: S9439/1

client: EJE ARCHITECTURE
principal: MARITIME SERVICES BOARD
project: MARENG WORKSHOP
borehole location: SEE DRAWING No S9439/1

hole commenced: 13/12/90
hole completed: 13/12/90
logged by: SRM
checked by: JGL

drill model and mounting: B40 - TRUCK MOUNTED DRILL RIG
hole diameter: 100mm
slope: -90 DEG
bearing:
R.L. Surface:
datum:

method	penetration	support	water	notes samples, test, etc	R.L.	depth metres	graphic log	classification symbol	material soil type; plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency/ density index	hand penetro- meter	structure and additional observations
ADT	1 2 3	NIL				1			FILL: Bitumen plus 200mm thick gravel FILL: Sandstone boulders in crushed sandstone	M			Road & road base FILL - boulders easily penetrated
				16, 11. N*=R		2			SANDSTONE BEDROCK? medium to high strength	W			SPT refusal on sandstone boulders Rig cutting smoothly below 2.6m. Probably not in boulders
						3			Borehole BH6 Terminated at 3.00 m NEAR REFUSAL IN SANDSTONE BEDROCK				
						4							
						5							
						6							
						7							

METHOD	SUPPORT	NOTES	CLASSIFICATION	CONSISTENCY/DENSITY INDEX
AS auger screwing AD auger drilling R roller/tircone W washbore CT cable tool HA hand auger DT dialube *bit shown by suffix B blank bit V V bit T 1C bit e.g. ADT	C casing M mud PENETRATION 1 2 3 no resistance ranging to refusal WATER * not measured water level water outflow water inflow	US0 undisturbed sample 50 mm diameter D disturbed sample N standard penetration test: N* SPT + sample recovered Nc SPT with solid cone V vane shear P pressuremeter Bs bulk sample R refusal	based on unified classification system MOISTURE D dry M moist W wet Wp plastic limit	VS very soft S soft F firm SI stiff VSI very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

PROJECT: ENVIRONMENTAL ASSESSMENT
ROZELLE/BLACKWATTLE

BORE HOLE: BH21

SHEET 1 of 1

Bore Hole Inclination:
(from horizontal) 90°

Bore Hole Direction: VERT

Surface Elevation: G5

Bore Hole Location:

Drill type:

Drilling method:

Date: 30/3/98

Job No: EN00627

AUGER

ROTARY

Logged by: RG

SOIL DESCRIPTION	GROUND WATER	CONSISTENCY RELATIVE DENSITY	MOISTURE COND.	DEPTH (M)	GRAPHIC LOG	CLASSIFICATION SYMBOL	CONTAMINATION SUMMARY	SAMPLE INTERVALS
Ashpalt								
FILL: sandy fill gravel brown slight clay weathered sandstone				0.5		SP		S60
TERMINATED at 1.1m				1.0				
Sandstone bedrock				1.5				

CONTAMINATION
ASSESSMENT

ENGINEERING LOG
TEST PIT

SINCLAIR KNIGHT MERZ

SIGNATURE

DATE: 03-04-1998 12:39

ARCHIVE CODE: K:\HYDR\EN00627\ JOB N°: HHYDR/110

FILE NAME: EN027-30

PROJECT: ENVIRONMENTAL ASSESSMENT
ROZELLE/BLACKWATTLE

BORE HOLE: BH20

SHEET 1 of 1

Bore Hole Inclination: 90°
(from horizontal)

Bore Hole Direction: VERT

Surface Elevation: G5

Bore Hole Location:

Drill type:

Drilling method:

Date: 30/3/98

Job No: EN00627

AUGER

ROTARY

Logged by: BG

SOIL DESCRIPTION	GROUND WATER	CONSISTENCY RELATIVE DENSITY	MOISTURE COND.	DEPTH (M)	GRAPHIC LOG	CLASSIFICATION SYMBOL	CONTAMINATION SUMMARY	SAMPLE INTERVALS
Ashpall								S58
FILL: brown sandy slight clay some building rubble weathered sandstone				0.5		SP		S59
REFUSAL at 0.75m				1.0				
				1.5				

CONTAMINATION
ASSESSMENT

ENGINEERING LOG
TEST PIT

SINCLAIR KNIGHT MERZ

SIGNATURE

DATE: 03-04-1998 12:38

JOB N°: HHYDR/110

ARCHIVE CODE: K:\HYDR\EN00627\

FILE NAME: EN627-29



BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

MW1

SHEET 1 OF 1

Client: NSW Maritime
Project: Rozelle Bay Groundwater Sampling
Borehole Location: Rozelle Bay, NSW
Project Number: 2116988A

PB Borehole No.:
Date Commenced: 10.02.2009
Date Completed: 10.02.2009
Recorded By: DV
Log Checked By: MW

Drill Model/Mounting: Hydrapower
Borehole Diameter: 100 mm

Driller: Macquarie
Driller Lic No:
TOC (RL):

Surface RL:
Co-ords:
Local Co-ords:

Borehole Information							Field Material Description													
1	2	3	4		5	6	7	8	9	10		11	12	13						
METHOD	SUPPORT	WATER	25mm CASING	50mm CASING	WELL CONSTRUCTION	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION		MOISTURE	RELATIVE DENSITY /CONSISTENCY	STRUCTURE AND ADDITIONAL OBSERVATIONS				
												VS	FB	VL	LD	ST	VST	VD		
TC					Flush Galio and Lockable Cap Cement Seal		0.10	PID=0.0 ppm	J			BITUMEN		D						MW1_0.1-0.2
							0.30	PID=0.0 ppm	J		SC	FILL; Silty Sand, fine grained, some gravels, dark brown/dark grey, moist		M						
								PID=0.0 ppm	J			SAND; fine to medium grained, light brown/brown white, moist								MW1_0.5-0.6
								PID=0.0 ppm	J											MW1_1.0-1.1
					Bentonite Seal															
							2	PID=0.0 ppm	J											MW1_2.0-2.1
					50mm uPVC Casing		2.20					SANDSTONE; brown, moderate weathering, moist								
							2.80					as above, red								MW1_3.0-3.1
							3.50					SANDSTONE; weathered, fine grained, sandstone gravels up to 30mm diameter, light brown/yellow, moist								MW1_4.0-4.1
						50mm uPVC Screen		4	PID=0.5 ppm	J										
								PID=0.0 ppm	J											MW1_5.0-5.1
					End Cap		5.10				END OF BOREHOLE AT 5.10 m									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



BOREHOLE ENVIRONMENTAL LOG

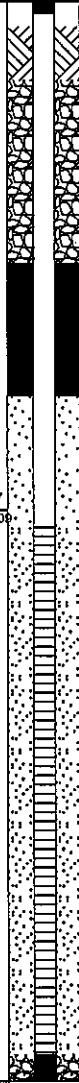
BOREHOLE NO.

MW2

SHEET 1 OF 1

Client: **NSW Maritime** PB Borehole No.: Date Commenced: **10.02.2009**
 Project: **Rozelle Bay Groundwater Sampling** Date Completed: **10.02.2009**
 Borehole Location: **Rozelle Bay, NSW** Recorded By: **DV**
 Project Number: **2116988A** Log Checked By: **MW**

Drill Model/Mounting: **Hydrapower** Driller: **Macquarie** Surface RL:
 Borehole Diameter: **100 mm** Driller Lic No: Co-ords:
 TOC (RL): Local Co-ords:

Borehole Information							Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13	
METHOD	SUPPORT	WATER	25mm CASING 50mm CASING WELL CONSTRUCTION	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY /CONSISTENCY	STRUCTURE AND ADDITIONAL OBSERVATIONS
TC			Flush Gate and Lockable Cap Cement Seal							BITUMEN; with underlying Roadbase (old)	D		
					0.50	PID=0.0 ppm	J			FILL; Silty Sand; fine grained, dark brown, organic, moist	M		MW2_0.5-0.6
					0.70					SANDSTONE; weathered, fine grained, light grey becoming white/yellow, slight odour (possibly organic)			MW2_1.0-1.1
						PID=13.0 ppm	J						
					2.00	PID=2.7 ppm	J			SANDSTONE; hard bedrock, fine grained, light yellow			MW2_2.0-2.1
					2.80					as above, becoming light orange			MW2_3.0-3.1

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

MW3

SHEET 1 OF 1

Client: NSW Maritime PB Borehole No.: Date Commenced: 10.02.2009
Project: Rozelle Bay Groundwater Sampling Date Completed: 10.02.2009
Borehole Location: Rozelle Bay, NSW Recorded By: DV
Project Number: 2116988A Log Checked By: MW

Drill Model/Mounting: Hydrapower
Borehole Diameter: 100 mm

Driller: Macquarie
Driller Lic No:
TOC (RL):

Surface RL:
Co-ords:
Local Co-ords:

Borehole Information							Field Material Description							
1	2	3	4		5	6	7	8	9	10	11	12	13	
METHOD	SUPPORT	WATER	25mm CASING	WELL CONSTRUCTION	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY /CONSISTENCY	STRUCTURE AND ADDITIONAL OBSERVATIONS
TC				Flush Gate and Lockable Cap Cement Seal		0.05	PID=0.0 ppm	J			BITUMEN	D		
							PID=0.0 ppm	J			FILL; Silty Sand, fine grained, dark brown, some sandstone gravels up to 40mm diameter, moist	M		MW3_0.1-0.2
														MW3_0.3-0.5
						0.80	PID=0.0 ppm	J		SP	SAND; medium grained, brown, white and orange, some sandstone gravels up to 30mm diameter, moist			MW3_1.0-1.1
				Bentonite Seal										
						1.80				SP	as above, but medium to coarse grained and more consistent, light brown, moist			
				50mm uPVC Casing		2.10	PID=0.0 ppm	J		SC	Clayey SAND; fine to medium grained, wet	W		MW3_2.0-2.1
						3.10	PID=0.0 ppm	J		SC	as above, but higher clay content, moderate plasticity, dark brown			MW3_3.0-3.1
					4.50	PID=0.0 ppm	J						MW3_4.0-4.1	
				End Cap					SC	SANDSTONE bedrock, orange				
											END OF BOREHOLE AT 4.50 m			

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



BOREHOLE ENVIRONMENTAL LOG

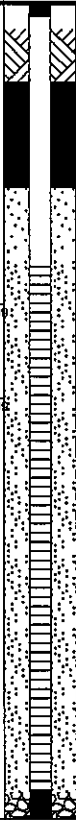
BOREHOLE NO.

MW4

SHEET 1 OF 1

Client: **NSW Maritime** PB Borehole No.: **10.02.2009**
 Project: **Rozelle Bay Groundwater Sampling** Date Completed: **10.02.2009**
 Borehole Location: **Rozelle Bay, NSW** Recorded By: **DV**
 Project Number: **2116988A** Log Checked By: **MW**

Drill Model/Mounting: **Hydrapower** Driller: **Macquarie** Surface RL:
 Borehole Diameter: **100 mm** Driller Lic No: Co-ords:
 TOC (RL): Local Co-ords:

Borehole Information							Field Material Description							
1	2	3	4	5	6	7	8	9	10	11	12	13		
METHOD	SUPPORT	WATER	25mm CASING 50mm CASING WELL CONSTRUCTION	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE VS FB VL SL ST MD VST VD H	RELATIVE DENSITY /CONSISTENCY	STRUCTURE AND ADDITIONAL OBSERVATIONS	
TC			Flush Gate and Lockable Seal Cement Seal Bentonite Seal 50mm uPVC Casing 50mm uPVC Screen End Cap	0.05		PID=0.6 ppm	J			BITUMEN	D			
						PID=0.0 ppm	J		FILL; silty sand; fine grained, light grey, loose, dry					
				0.60							as above but becoming dark brown with some shale gravel and cobbles			
				0.80							FILL; sand; medium grained, brown, white and orange, some sandstone gravels up to 30mm diameter, becoming moist	M		
						PID=insufficient sample								
				1.50		PID=0.0 ppm	J		FILL; sand, as above but slightly more clay, with larger sandstone gravels/cobbles					
				2.00-2		PID=0.0 ppm	J		FILL; clayey sand; fine grained, grey to dark grey, sandstone gravels present					
						PID=0.0 ppm	J							
				3.10		PID=0.0 ppm	J		END OF BOREHOLE AT 3.10 m					

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

APPENDIX D
Pavement Photographs



Photo 1: Concrete and Asphalt Pavements on site



Photo 2: Asphalt Pavement on the eastern side of the site

Plate

1

Sydney Super Yacht Marina Development
James Craig Road, Rozelle Bay

July-10



Photo 3: Some Minor Cracking



Photo 2: Asphalt Pavement constructed in different sections

Plate

2

Sydney Super Yacht Marina Development
James Craig Road, Rozelle Bay

July-10



Photo 5: Patching



Photo 6: Patching of service trench

Plate

3

Sydney Super Yacht Marina Development
James Craig Road, Rozelle Bay

July-10

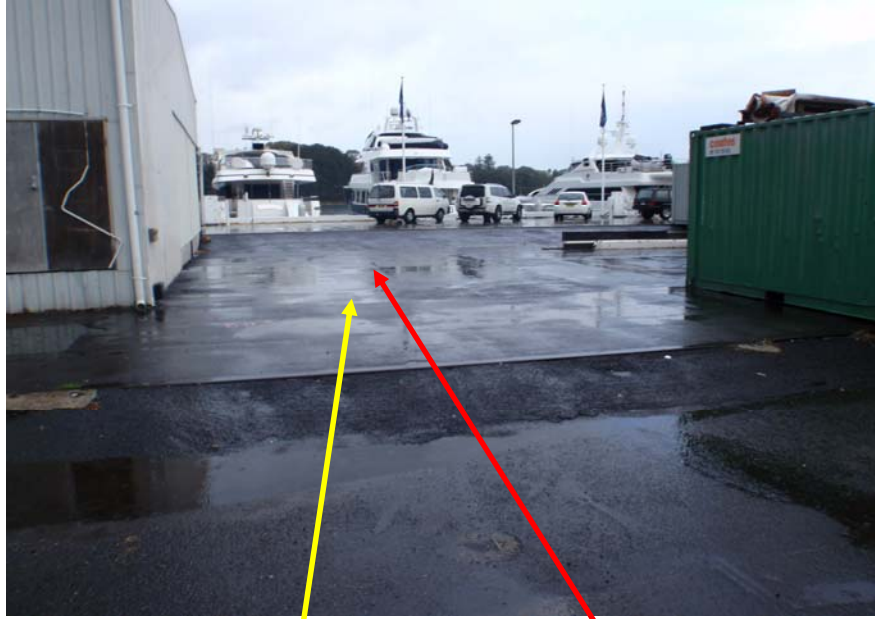


Photo 7:

Poorly graded pavement

Ponding of water

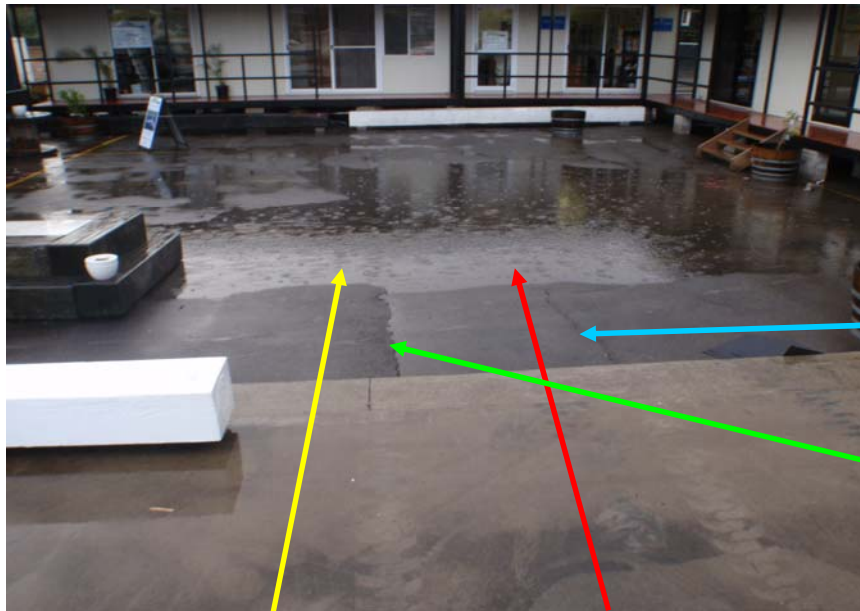


Photo 8:

Poorly graded pavement

Ponding of water

Cracking

Patching

Plate

4

Sydney Super Yacht Marina Development
James Craig Road, Rozelle Bay

July-10



Photo 9: Differential Settlement



Photo 10: Differential Settlement

Plate

5

Sydney Super Yacht Marina Development
James Craig Road, Rozelle Bay

July-10

APPENDIX E
Results of Laboratory Tests



EnviroLab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 42914-A

Client:

Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Nizam Ahamed

Sample log in details:

Your Reference:

71816, Rozelle Baseline

No. of samples:

Additional Testing on 2 Soils

Date samples received:

01/07/10

Date completed instructions received:

02/07/10

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:

9/07/10

Date of Preliminary Report:

Not Issued

Issue Date:

9/07/10

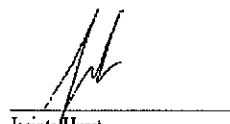
NATA accreditation number 2901. This document shall not be reproduced except in full.

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Tests not covered by NATA are denoted with *.

Results Approved By:


Jacinta Horst
Laboratory Manager

EnviroLab Reference: 42914-A
Revision No: R 00



Miscellaneous Inorg - soil			
Our Reference:	UNITS	42914-A-8	42914-A-25
Your Reference	-----	BH2/2-2.5	BH13/3-3.5
Date Sampled	-----	22/06/2010	22/06/2010
Type of sample		Soil	Soil
Date prepared	-	7/7/2010	7/7/2010
Date analysed	-	7/7/2010	7/7/2010
pH 1:5 soil:water	pH Units	8.1	7.5
Chloride, Cl 1:5 soil:water	mg/kg	4,100	4,100
Sulphate, SO ₄ 1:5 soil:water	mg/kg	740	1,100
Resistivity in soil*	ohm m	3.3	3.2

Method ID	Methodology Summary
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
LAB.81	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 21st ED, 4110-B.
LAB.2	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA2510 20th ED and Rayment & Higginson.

Client Reference: 71816, Rozelle Baseline

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorg - soil						Base II Duplicate II %RPD		
Date prepared	-			7/7/2010	[NT]	[NT]	LCS-1	7/7/2010
Date analysed	-			7/7/2010	[NT]	[NT]	LCS-1	7/7/2010
pH 1:5 soil:water	pH Units		LAB.1	[NT]	[NT]	[NT]	LCS-1	100%
Chloride, Cl 1:5 soil:water	mg/kg	2	LAB.81	<2.0	[NT]	[NT]	LCS-1	104%
Sulphate, SO4 1:5 soil:water	mg/kg	2	LAB.81	<2.0	[NT]	[NT]	LCS-1	106%
Resistivity in soil*	ohm m	1	LAB.2	<1.0	[NT]	[NT]	LCS-1	98%

Report Comments:

Asbestos was analysed by Approved Identifier: Not applicable for this job
Asbestos was authorised by Approved Signatory: Not applicable for this job
INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than
RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

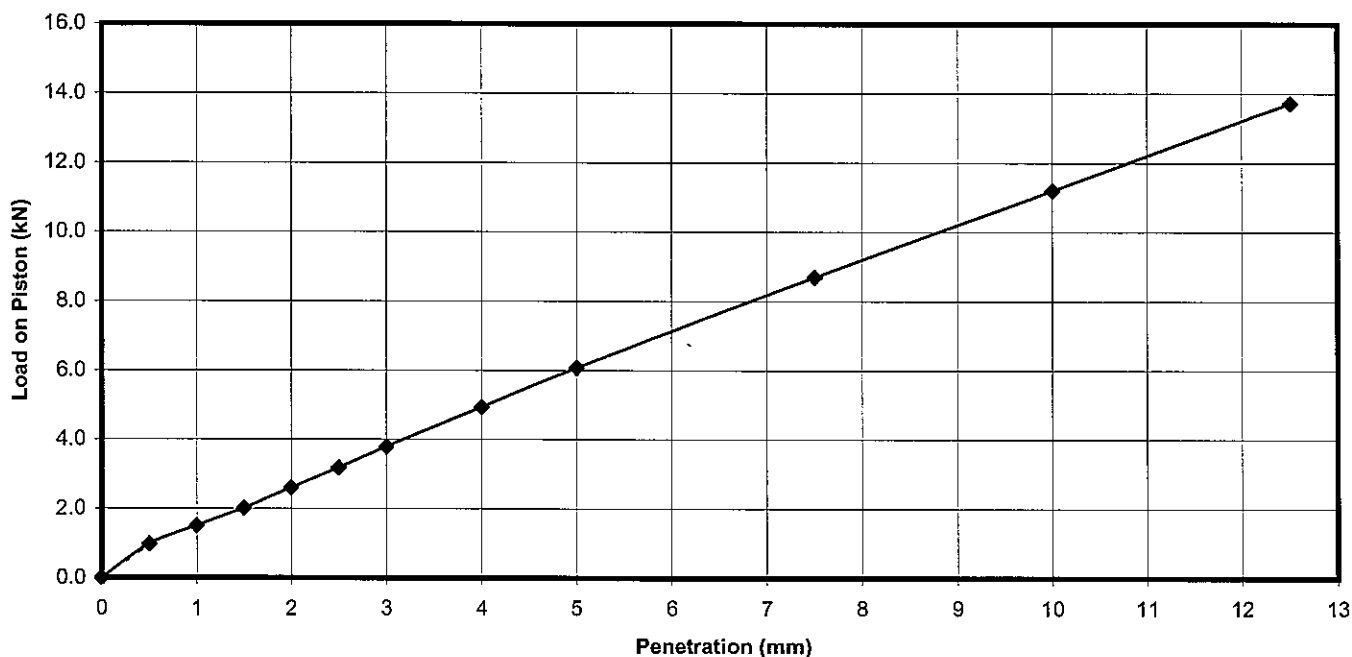
Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for



RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 A
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	12/07/10
Test Location :	BH 6	Date Sampled :	-
Depth / Layer :	0.4-1.5m	Date of Test:	02/07/10
		Page:	1 of 1



Description: GRAVEL AND SAND - Grey fine to medium gravel and sand with some clay

Test Method(s): AS 1289.6.1.1, AS 1289.2.1.1

Sampling Method(s): Sampled by Engineering Department

Percentage > 19mm: 1.0%
(Excluded)

LEVEL OF COMPACTION: 100% of STD MDD

SURCHARGE: 4.5 kg

SWELL: -0.1%

MOISTURE RATIO: 104% of STD OMC

SOAKING PERIOD: 4 days

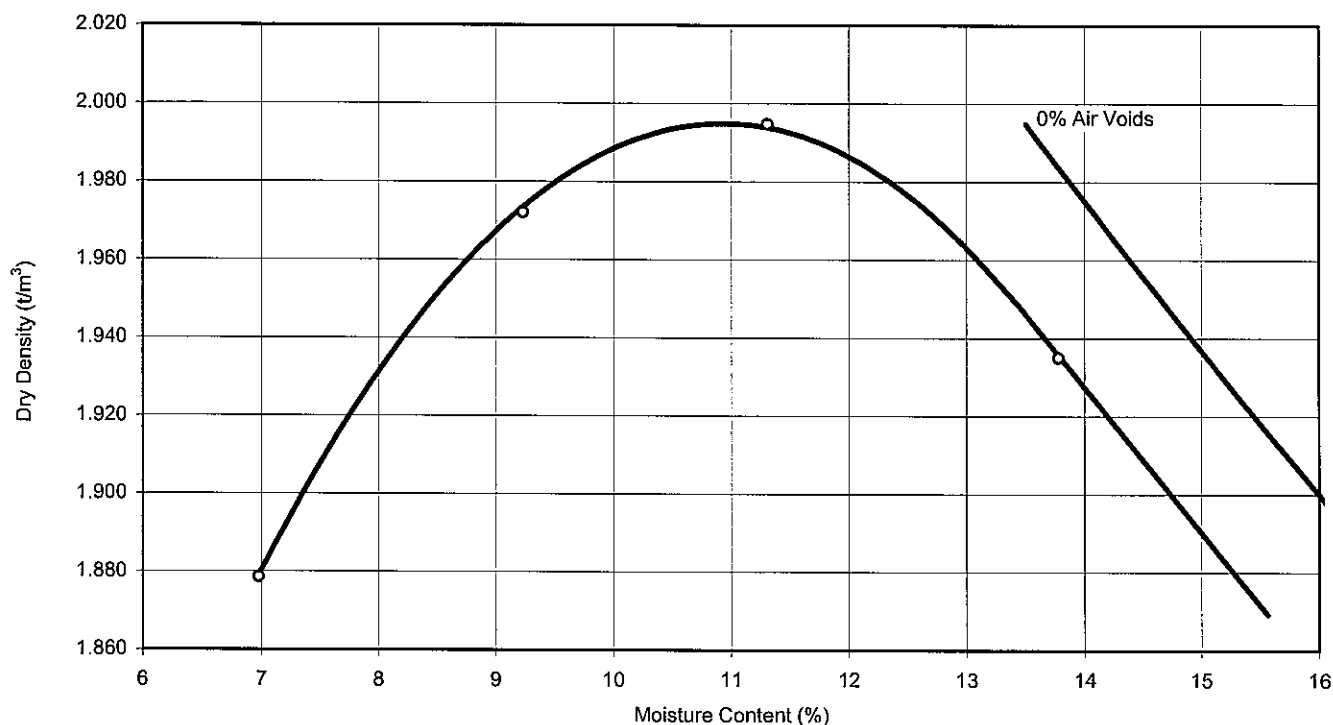
CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m ³
At compaction	11.3	1.99
After soaking	12.8	1.99
After test		
Top 30mm of sample	11.8	-
Remainder of sample	11.9	-
Field values	9.2	-
Standard Compaction	10.9	2.00

RESULTS		
TYPE	PENETRATION	CBR (%)
TOP	2.5 mm	25
	5.0 mm	30



RESULTS OF COMPACTION TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 A2
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	05/07/2010
		Date of Test:	02/07/2010
		Page:	1 of 1



Sample Details **Location:** BH 6
Depth: 0.4 - 1.5m

Particles > 19mm: 1%

Description: GRAVEL AND SAND - Grey fine to medium gravel and sand with some clay

Maximum Dry Density:	1.99 t/m^3
Optimum Moisture Content:	11.0 %

Remarks:

Test Methods: AS 1289.2.1.1, AS 1289.5.1.1

Sampling Methods: Sampled by Engineering Department



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Approved Signatory:

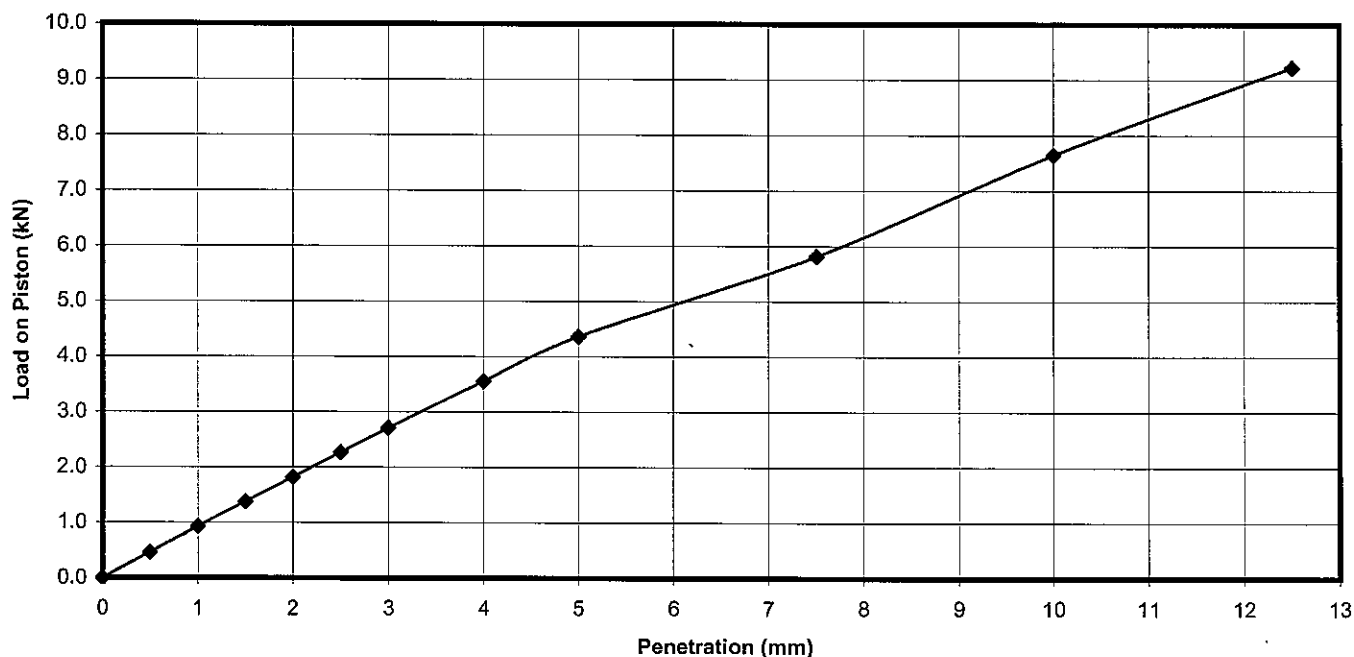
Tested:	AY
Checked:	NW

Norman Weimann
Laboratory Manager



RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 B
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	12/07/10
Test Location :	BH 7	Date Sampled :	-
Depth / Layer :	0.2-0.5m	Date of Test:	02/07/10
		Page:	1 of 1



Description: GRAVELLY SAND - Dark grey gravelly sand with some clay

Test Method(s): AS 1289.6.1.1, AS 1289.2.1.1

Sampling Method(s): Sampled by Engineering Department

Percentage > 19mm: 6.0%
(Excluded)

LEVEL OF COMPACTION: 101% of STD MDD

SURCHARGE: 4.5 kg

SWELL: -0.1%

MOISTURE RATIO: 98% of STD OMC

SOAKING PERIOD: 4 days

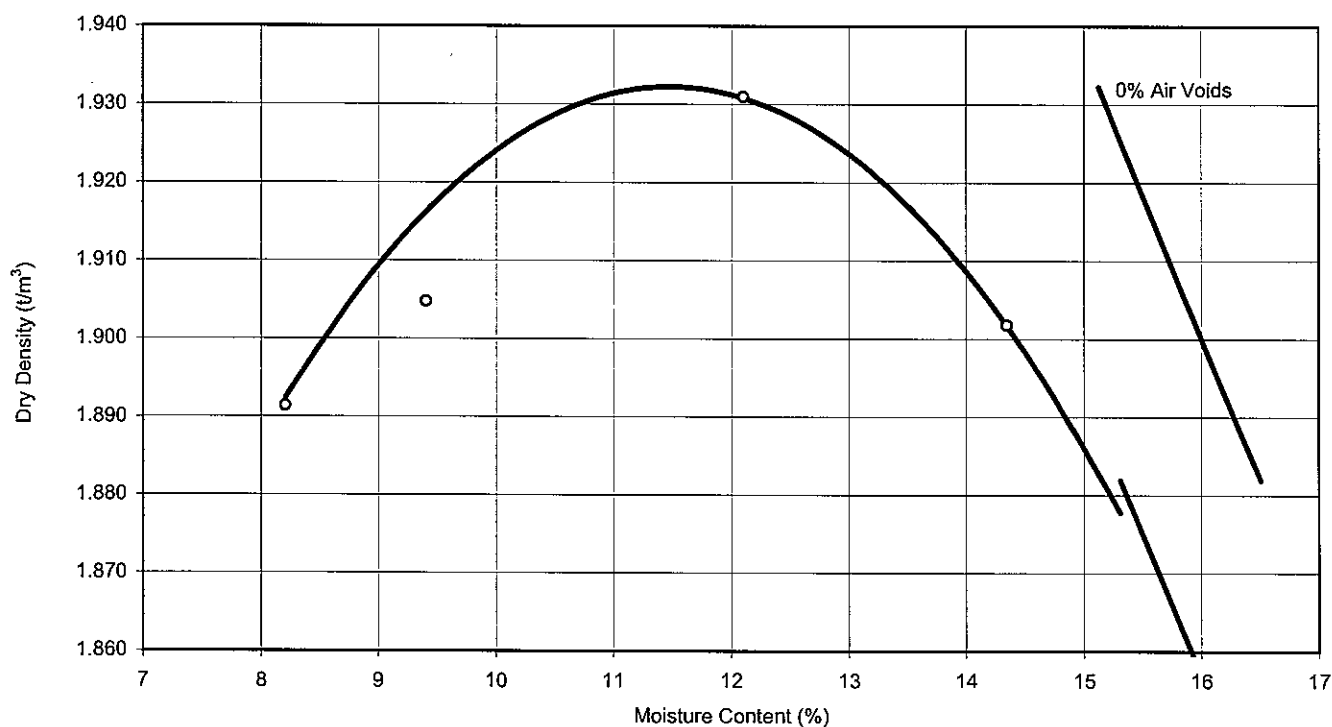
CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m ³
At compaction	11.2	1.95
After soaking	12.6	1.95
After test		
Top 30mm of sample	12.4	-
Remainder of sample	11.9	-
Field values	9.4	-
Standard Compaction	11.5	1.93

RESULTS		
TYPE	PENETRATION	CBR (%)
TOP	2.5 mm	17
	5.0 mm	20



RESULTS OF COMPACTION TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 B2
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	05/07/2010
		Date of Test:	02/07/2010
		Page:	1 of 1



Sample Details **Location:** BH 7
Depth: 0.2 - 0.5m

Particles > 19mm: 6%

Description: GRAVELLY SAND - Dark grey gravelly sand with some clay

Maximum Dry Density:	1.93 t/m³
Optimum Moisture Content:	11.5 %

Remarks:

Test Methods: AS 1289.2.1.1, AS 1289.5.1.1

Sampling Methods: Sampled by Engineering Department



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Approved Signatory:

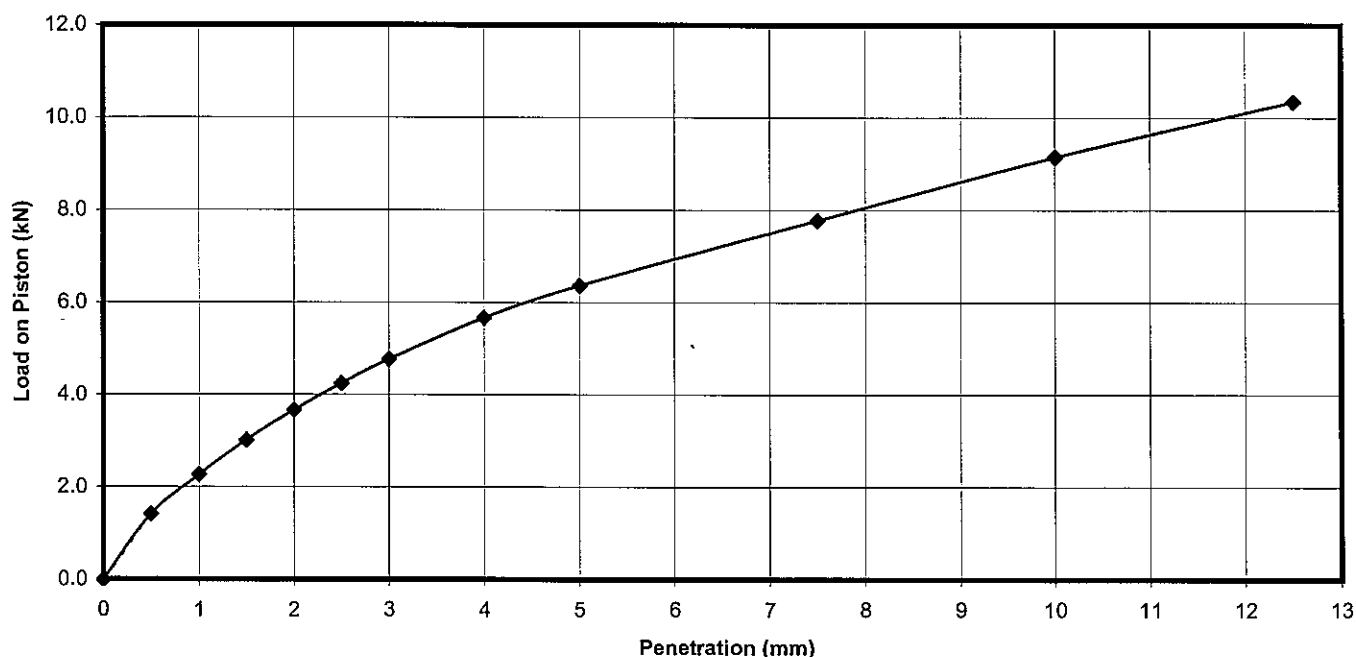
Tested:	AY
Checked:	NW

Norman Weimann
Laboratory Manager



RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 C
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	12/07/2010
Test Location :	BH 7	Date Sampled :	-
Depth / Layer :	0.7-1.2m	Date of Test:	02/07/2010
		Page:	1 of 1



Description: SANDY SILT - Light brown sandy silt

Test Method(s): AS 1289.6.1.1, AS 1289.2.1.1

Sampling Method(s): Sampled by Engineering Department

Percentage > 19mm: 0.0%

LEVEL OF COMPACTION: 101% of STD MDD

SURCHARGE: 4.5 kg

SWELL: 0.1%

MOISTURE RATIO: 92% of STD OMC

SOAKING PERIOD: 4 days

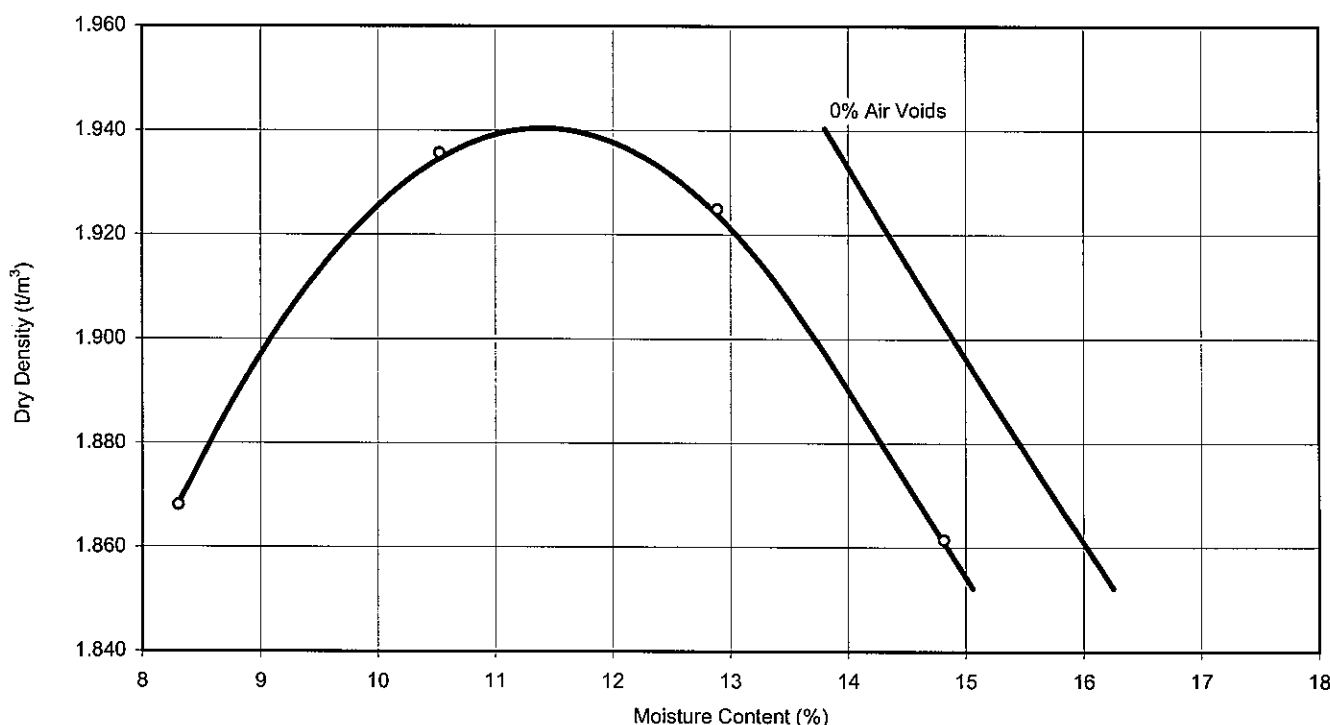
CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m ³
At compaction	10.5	1.95
After soaking	12.8	1.95
After test		
Top 30mm of sample	14.9	-
Remainder of sample	12.5	-
Field values	8.3	-
Standard Compaction	11.4	1.94

RESULTS		
TYPE	PENETRATION	CBR (%)
TOP	2.5 mm	30
	5.0 mm	30



RESULTS OF COMPACTION TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 C2
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	05/07/2010
		Date of Test:	02/07/2010
		Page:	1 of 1



Sample Details **Location:** BH 7
Depth: 0.7 - 1.2m

Particles > 19mm: 0%

Description: SANDY SILT - Light brown sandy silt

Maximum Dry Density: 1.94 t/m^3

Optimum Moisture Content: 11.5 %

Remarks:

Test Methods: AS 1289.2.1.1, AS 1289.5.1.1

Sampling Methods: Sampled by Engineering Department



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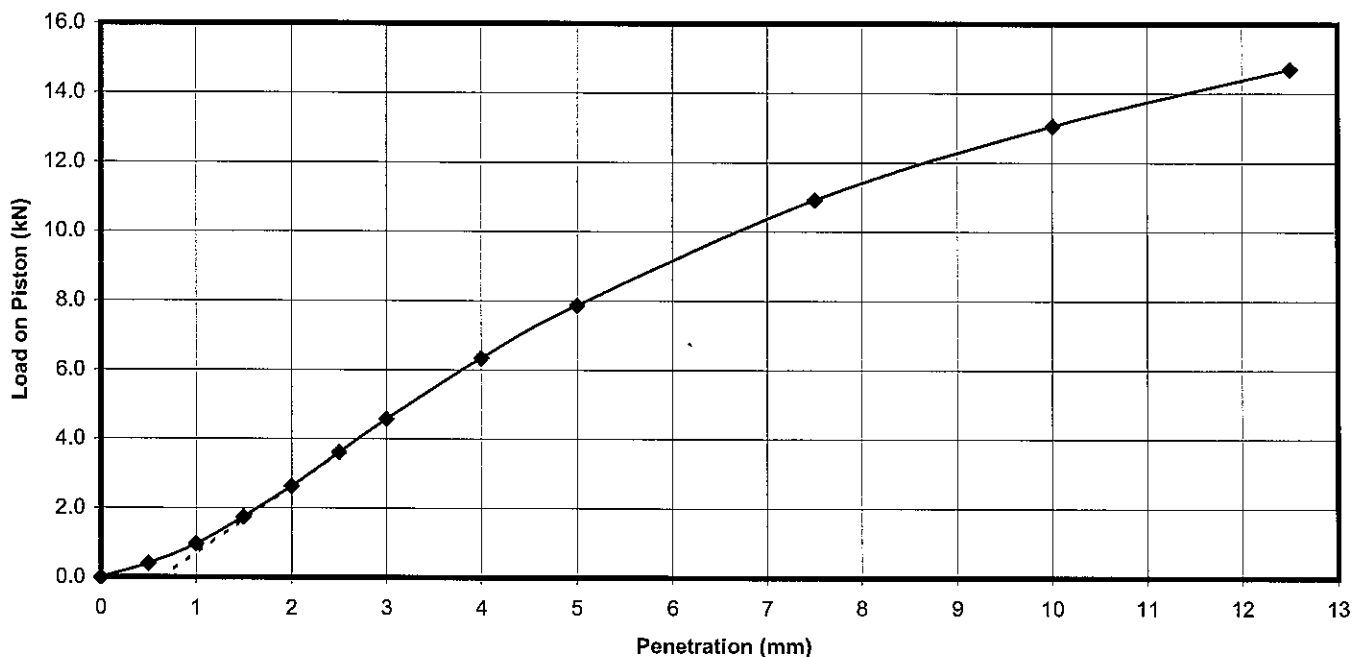
Tested:	AY
Checked:	NW

Norman Weimann
Laboratory Manager



RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 D
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	12/07/2010
Test Location :	BH 9	Date Sampled :	-
Depth / Layer :	0.5-1.5m	Date of Test:	02/07/2010
		Page:	1 of 1



Description: CLAYEY SAND - Brown clayey sand with some gravel

Test Method(s): AS 1289.6.1.1, AS 1289.2.1.1

Sampling Method(s): Sampled by Engineering Department

Percentage > 19mm: 3.1%
(Excluded)

LEVEL OF COMPACTION: 100% of STD MDD

SURCHARGE: 4.5 kg

SWELL: -0.2%

MOISTURE RATIO: 99% of STD OMC

SOAKING PERIOD: 4 days

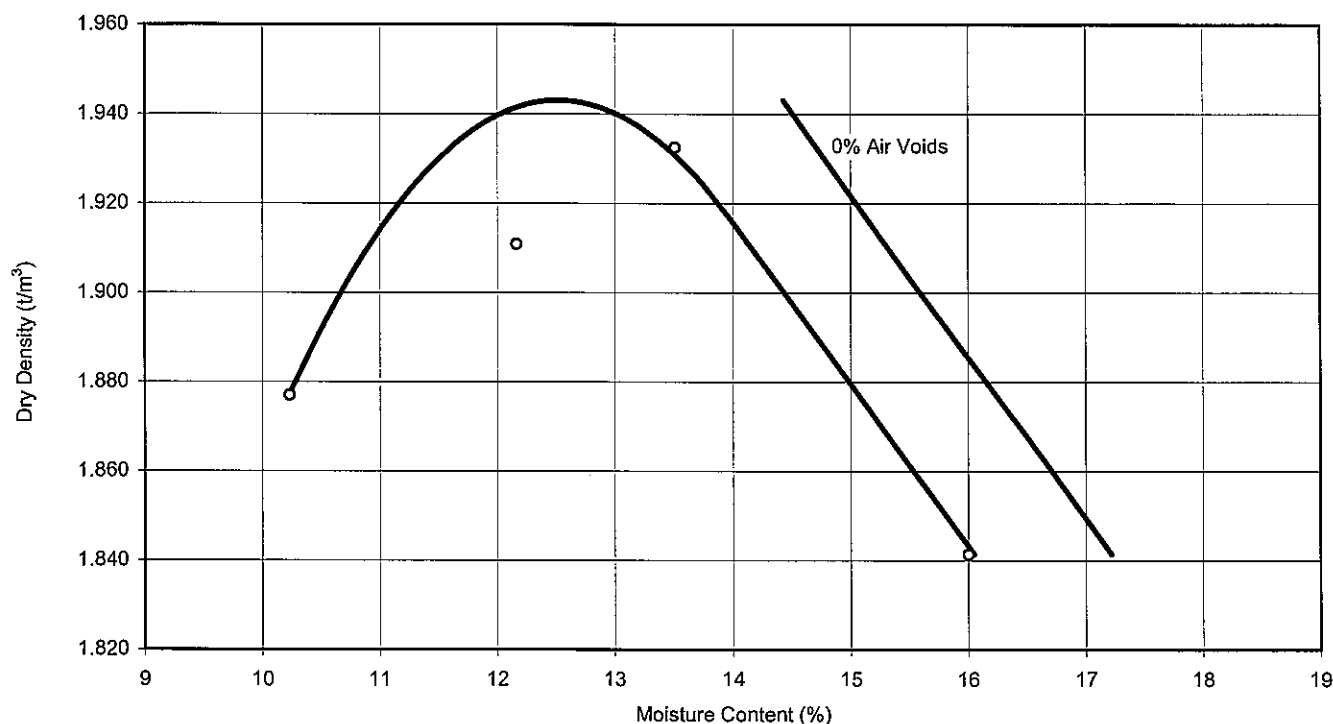
CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m ³
At compaction	12.4	1.95
After soaking	13.2	1.95
After test		
Top 30mm of sample	13.4	-
Remainder of sample	12.6	-
Field values	12.2	-
Standard Compaction	12.5	1.94

RESULTS		
TYPE	PENETRATION	CBR (%)
TOP	2.5 mm	35
	5.0 mm	45



RESULTS OF COMPACTION TEST

Client :	SYDNEY SUPERYACHT MARINA PTY LTD	Project No. :	71816.01
Project :	SYD SUPERYACHT MARINA REDEVELOPMENT	Report No. :	S10-135 D2
Location :	JAMES CRAIG ROAD, ROZELLE BAY	Report Date :	05/07/2010
		Date of Test:	02/07/2010
		Page:	1 of 1



Sample Details **Location:** BH 9
Depth: 0.5 - 1.5m

Particles > 19mm: 3%

Description: CLAYEY SAND - Brown clayey sand with some gravel

Maximum Dry Density:	1.94 t/m³
Optimum Moisture Content:	12.5 %

Remarks:

Test Methods: AS 1289.2.1.1, AS 1289.5.1.1

Sampling Methods: Sampled by Engineering Department



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Approved Signatory:

Tested:	AY
Checked:	NW

Norman Weimann
Norman Weimann
Laboratory Manager