PRIVATE CERTIFIERS AUSTRALIA
Certainty through precision

Address: Suite 1a / 226 Condamine Street PO Box 907 Balgowlah Manly Vale NSW 2093
Tel: 02 9907 6300
Fax: 02 9907 6344
Email: grant@pcaservices.com.au
Web: www.pcaservices.com.au

24 November 2010

Our ref.: 090275

The General Manager
Manly Council
PO Box 82,
Manly NSW 1655

MANLY COUNCIL
REGISTERED BY RECORDS
25 NOV 2010
RESPONSIBLE OFFICER
DOCUMENT NUMBER KX50

DA 435/08
Michael G
e-143560

Dear Sir/Madam,

Re: 9 Bligh Crescent Seaforth
Occupation Certificate No. 090275

Development application No.: DA435/08, ,

Private Certifiers Australia have issued an Occupation Certificate for the above-mentioned project under Section 109H of the Environmental Planning and Assessment Act 1979.

Please find enclosed the following documentation:

- Occupancy Certificate No. 090275
- Documentation used to determine the occupancy certificate.
- A cheque for Council's registration fee.

Should you need to discuss any issues, please do not hesitate to contact the Accredited Building Surveyor Grant Harrington on the above numbers.

Yours faithfully,

CERTIFIER

$30

R 737005

25-11-10

Grant Harrington
Accredited Building Surveyor
Private Certifiers Australia

AUTH OC ✓
PMT ✓
NAME ✓
✓

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FINAL OCCUPATION CERTIFICATE 090275 (RESIDENTIAL)

Issued under Part 4A of the Environmental Planning and Assessment Act 1979 Sections 109C(1)(C) and 109H (Occupation/Use of a New Building)

APPLICANT DETAILS

Applicant:	Mark & Dianne Spiers
Address:	9 Bligh Crescent Seaforth NSW 2092
Contact Details:	**Phone:** 99493959 **Fax:**

OWNER DETAILS

Name of person having benefit of the development consent:	Mark & Dianne Spiers
Address:	9 Bligh Crescent Seaforth NSW 2092
Contact Details:	**Phone:** 0402059625 **Fax:**

RELEVANT CONSENTS

Consent Authority/Local Government Area:	Manly Council
Development Consent No:	DA435/08, , **Date Issued:** 14/05/2009, ,
Construction Certificate No:	090275 **Date Issued:** 1/12/2009

PROPOSAL

Address of Development:	9 Bligh Crescent Seaforth NSW 2092
Building Classification:	1a
Scope of building works covered by this Notice:	New concrete terrace to existing dwelling and concrete steps to waterfront
Attachments:	Schedule 1
Fire Safety Schedule:	Nil
Exclusions:	

PRINCIPAL CERTIFYING AUTHORITY

Principal certifying authority:	Grant Harrington
Accreditation Body:	Building Professionals Board Registration No. BPB0170

I, Grant Harrington as the certifying authority, certify that:

- *I have been appointed as the Principal Certifying Authority under s109E;*
- *A current Development Consent or Complying Development Certificate is in force with respect to the building;*
- *A Construction Certificate has been issued with respect to the plans and specifications for the building;*
- *The building is suitable for occupation or use in accordance with its Classification under the Building Code of Australia;*
- *Where required, a final Fire Safety Certificate has been issued for the building;*
- *Where required, a report from the Commissioner of Fire Brigades has been considered.*

DETERMINATION

Approval dated this: 24/11/2010

Grant Harrington
Accredited Building Surveyor
Right of Appeal: Under s109K where the Certifying Authority is Council an applicant may appeal to the land & Environment Court against the refusal to issue an Occupation Certificate within 12 months from the date of the decision.

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Balgowlah
Manly Vale NSW 2093
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Email: grant@pcaservices.com.au
Web: www.pcaservices.com.au

SCHEDULE 1

DOCUMENT	PREPARED BY	REFERENCE	DATE
Occupation Certificate Application Form	PCA		19/11/2010
Final Inspection Domestic	PCA		15/10/2010
Landscaping Inspection	CROZIER - Geotechnical Consultants		4/05/2010
Geotechnical Assessment - Changes to Design for DA	CROZIER - Geotechnical Consultants		8/09/2010
Structural Certificate	CHE Consulting High-Grade Engineering		2/02/2010
Report on Geotechnical Investigation	CROZIER - Geotechnical Consultants		1/08/2009
Balustrade & Handrails Warranty	JustBright Handrails		8/06/2010
Balustrade & Handrails Premilinary Quotation	JustBright Handrails		11/02/2010

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Email: grant@pcaservices.com.au
Web: www.pcaservices.com.au

24 November 2010

Our ref.: 090275

Mark & Dianne Spiers
9 Bligh Crescent
Seaforth NSW 2092

Dear Sir/Madam,

Re: 9 Bligh Crescent Seaforth
Occupation Certificate No. 090275

In accordance with Section 109H of the Environmental Planning and Assessment Act 1979, we enclose an Occupation Certificate relating to the construction of the above project.

As required under the legislation copies of the same have been forwarded to Manly Council for their records and the Final Fire Safety Certificate, where appropriate, issued to NSW Fire Brigades. Please note that annual certification of the fire safety measures is a statutory responsibility of the building owner. Private Certifiers Australia would be pleased to offer our assistance.

We would like to take this opportunity to thank you for using our services. Should you need to discuss any issues, please do not hesitate to contact the Accredited Building Surveyor Grant Harrington on the above numbers.

Yours faithfully,

Grant Harrington
Accredited Building Surveyor
Private Certifiers Australia

Building Regulations Consultant

Principle Certifying Authority

Construction Certification

Fire Upgrade Surveys

Planning

Private Certifiers Australia

OCCUPATION CERTIFICATE APPLICATION DEVELOPMENT CONSENT

Made under the *Environmental Planning and Assessment Act 1979*
Sections 109C(1)(c) & 109H

TYPE OF APPLICATION
Tick Appropriate Boxes

- ☐ Interim Certificate
- ☐ Final Certificate
- ☐ Change of Building Use of an Existing Building
- ☑ Occupation/Use of a New Building

IDENTIFICATION OF BUILDING

Address 9 Bligh Cres Seaforth
Lot, DP/MPS etc
Suburb or town Seaforth Post Code 2092

DESCRIPTION OF DEVELOPMENT

Detailed Description: New concrete terrace to existing dwelling & new concrete stairs.

REVELEVANT CONSENTS

Development Consent: DA No. 435/08 Date 13/5/09

Construction Certificate: CC No. 090275 Date 1/12/09
Section 96 (23.9.09)

Owner

Name M + D SPIERS Company -

Note; only the owner can apply for an OC

Address 9 BLIGH CRES

Suburb or town SEAFORTH Post Code 2092

Phone B/H 99493959 Fax No -

Mobile 402 059 625 Email mdspiers@bigpond.com

As the applicant/ owner , I/we hereby;

1. *Submit this Occupation Certificate Application under the Environmental Planning & Assessment Act 1979, for determination by the Principal Certifyng Authority.*
2. *Certify that the works have been completed in accordance with the relevant Development Consent.*
3. *Attach a Fire Safety Certificate, where relevant, for the subject building work in accordance with the Fire Safety Schedule.*

Signature of Owner: Sign M Spiers Date 19.11.10.

Ph 99076300 f 99076344 admin@pcaservices.com.au po box 907 balgowlah nsw 2093

CROZIER - *Geotechnical Consultants*

Engineering Geologists & Geotechnical Engineers
(A Division of PJC Geo-Engineering Pty Ltd)
A.B.N 96 113 453 624
Suite 202/30 Fisher Road, Dee Why, NSW, 2099.
Phone: 9972 9578 Fax: 9401 9206

Date:4th May 2010

To: Di Spears **From:** Troy Crozier

Email: mdspiers@bigpond.com **Project No:** 2119A

Re: 9 Bligh Crescent, Seaforth. **No. of Pages:** 1

CC: **Fax:**

• **Comments:** Landscaping works at rear of 9 Bligh Crescent

The inspection yesterday 3rd May 2010 identified that the three rock bolts that were requested for stabilising the lower boulders had been installed. The lower bedrock infill panel had not been completed however it is understood that this was completed after my inspection. These boulders are now considered stable and should assist to stabilise the entire slope extending up towards the rear deck.

The landscaper had removed most vegetation prior to my arrival and cleaned away some soil from the slope. The slope is very steep to undercut and contains numerous small boulders that are of very limited stability. It is recommended that the safety of all workers be considered priority as this slope is a significant risk in its current state. As such it was recommended that a steel mesh be placed across the slope to the rear of the boatshed, anchored to the slope, to prevent the sudden failure of these boulders down slope when workers are below. A series of retaining walls are proposed for the slope. It is recommended that the lower wall at the rear of the boatshed be founded down to the bedrock outcrops at the base of the slope and that it be tied in to the two large boulders located either side for stability. The backfilling of this wall will help stabilise the upper portion of the slope. This slope should be considered unstable until the retaining walls are completed, including backfill. All retaining walls must be free draining and it is recommended that we inspect the foundations of the walls prior to construction.

It is recommended that until construction works are complete that the slope be covered in plastic sheeting when ever there is a chance of rain as the wetting of the slope will result in its instability.

Yours faithfully,

Troy Crozier
Senior Engineering Geologist

CROZIER - *Geotechnical Consultants*

Engineering Geologists & Geotechnical Engineers
(A Division of PJC Geo-Engineering Pty Ltd)
A.B.N 96 113 453 624
Suite 202/30 Fisher Road, Dee Why, NSW, 2099.
Phone: 9972 9578 Fax: 9401 9206

Date: 8th September 2009
No Pages: 1
Project No.: 2119A

Development Officer
Manly Council.

Changes to Design for Development Application for 9 Bligh Crescent, Seaforth.

We have been engaged by the client/owner of the above site to provide a geotechnical assessment of the site for a development application for a new terrace at the rear lower floor level of the house. This assessment identified that the hill slope at the rear of the site requires a minor level of remedial/stabilizing works to ensure its stability and achieve an "acceptable" risk level.

Whilst the measures we have detailed to the client can provide long term stability to the slope it would be preferable to minimize the disturbance of the slope from the construction works. This includes the excavation and construction of new footings. This is partially achieved by re-designing the terrace as a cantilever structure supported through the lower floor level slab and footings. However a concrete stairway for access to the lower foreshore area will require new footings.

It is understood that the proposed alignment for the stairway extends across the slope in an 'S' shape with its lower footings located in an area which is considered unsuitable for founding as it will require significant disturbance and excavation. Therefore we would recommend that the proposed design be altered to allow founding of the stairway structure within locations which we have identified as suitable within our reports, Dated: 14th and 27th August 2009.

Hope the above comments meet Council's requirements; if we can be of further assistance please don't hesitate to contact the undersigned.

Yours faithfully.

Troy Crozier
Senior Engineering Geologist

Hugo G.Garcia

B.E.M.I.E.(AUST)
Chartered Professional Engineer
hugo@cheengineering.com.au

58 Oratava Avenue
West Pennant Hills NSW 2125
Phone & Fax : 9873 5944
Mobile : 0425 350 549
www.cheengineering.com.au

CONSULTING HIGH-GRADE ENGINEERING

RESIDENTIAL, COMMERCIAL & INDUSTRIAL - PACKAGE - STRUCTURAL ENGINEERING DESIGN - FEASIBILITY STUDIES

2nd. February 2010 Our Ref.: 1540-09

E. T. S. Pty. Ltd.
10 Truscott Street,
North Ryde, NSW, 2113

ATTENTION: Mr. Stuart Ward

CERTIFICATE

REF.: Proposed new Deck and Stairs addition at 9 Blight Crescent, Seaforth, NSW, 2092 for Mr. and Mrs. Spiers.

Following your instructions, two site inspections were carried out of the proposed new reinforced concrete deck and stairs at the rear of the property at the above address. These site inspections were carried out by Mr. Hugo Garcia from this office on the 29th. of January and the 1st February 2010.

Our site inspection revealed that all work has been carried out satisfactorily and it is in accordance with good building practice and / or our site instructions.

All building works related to the reinforcement of the edge thickenings the Deck slab as well as the stairs as above mentioned comply with the provisions of the relevant SAA Codes, in particular with AS 2870, the Residential Slabs and Footings Code and AS 3600, the Concrete Code.

Trusting all of the above is to your satisfaction and approval, please do not hesitate to contact me should you require any further assistance.
Yours faithfully,

Hugo Garcia
Structural Engineer.

Warranty

Workmanship Warranty

ABN : 59 753 743 290
PO BOX 682
AVALON NSW 2107

M 0408662583
F (02) 9741380

Email

Just Bright Handrails warrants for a period of seven (7) years from the date of completion, that the work done by it at the address set out below has been carried out in a good and workmanlike manner.

If a pursuant to this warranty it is necessary for Just Bright Handrails to replace any products installed at the address set out below and such products are not then available, Just Bright Handrails may substitute other products of equal grade and quality.

The benefits of this warranty shall accrue to any transferee from the person ti whom it was issued provided that Just Bright Handrails is given written notice of such transfer within thirty (30) days thereof.

Installed By:	Jess McAndrew
Name of person whom Warranty Issued to:	Di and Mark Spiers
Address of subject property:	9 Bligh Cres Seaforth
Description of works carried out:	As per attached quote #979frameless
Warranty period commenced on:	8th June 2010

For and Behalf of Just Bright Handrails

Signed.....

preliminary quotation

Attention: Di Spiers
9 Bligh Cr
Seaforth
mdspiers@bigpond.com

Date 11/02/10
PROJECT TITLE: Di-Bligh Cres
QUOTATION NUMBER: 00000979 Frameless

ABN NUMBER **59 753 743 290**

Description	Quantity	Unit Price	Cost
FRAMELESS OPTION - 11.5m deck area balustrade. 48mm round/160mm high mirror finish stainless steel spigots to secure 12mm toughened glass panel infills - polished 4 edges. Offset handrail mirror finish tube 38mm diameter fixed to inside of glass panels. Fabricate supply and install.	1	$9,200.00	$9,200.00
STAIRS - 21m handrail for stairs down to boat shed. Stainless steel mirror finish 38mm upright posts. Mirror finish 50mm top rail fixed by 12mm stainless steel rod spigots. Swaged 1/8 wire infills between posts to current building standard specifications. Fabricate supply and install.	1	$9,950.00	$9,950.00
GATE - 1200mmx1000m Mirror finish 38mm diameter stainless steel post framed gate with swaged 1/8 wire infills. Stainless steel spring hinges with magnalatch locking mechanism on sidewall of house Fabricate supply and install.	1	$1,200.00	$1,200.00
		Subtotal	$20,350.00
		GST Tax 10.00%	$2,035.00
		Total	**$22,385.00**

All stainless steel products used by Just Bright Handrails are 316 grade Marine quality stainless steel. Glass used is to australian safely standards. A 7 year workmanship warranty is provided by Just Bright Handrails, a certificate will be issued to you on completion of the job.

A surface protectant is applied to the stainless steel and Just Bright Handrails will advise you of a regular maintenance schedule to maintain its 'stain-free' appearance.

Our Quotations are valid 30 days from issue date. Should you have any enquiries regarding the above mentioned quote please don't hesitate to phone / email us on the details listed above.

At Just bright Handrails we provide quality and service next to none. We value your custom and will strive to offer a competitive price compared with other valid quotations,

Yours Faithfully

Jess McAndrew

Should you agree to this quotation ***{00000979 Frameless Option}*** *and wish for Just Bright Handrails to commence work on the outlined job above, please sign and date below and return by fax or email.* **A deposit of 20%** *is due on acceptance to cover material costs. Please direst transfer into the nominated account below.*

.....

BSB 012-222 ***a/c # 483398569***

CROZIER - *Geotechnical Consultants*

Engineering Geologists & Geotechnical Engineers

REPORT ON GEOTECHNICAL INVESTIGATION

for

ALTERATIONS AND ADDITIONS

at

9 BLIGH CRESCENT, SEAFORTH.

Prepared for

Spiers

Project: 2911A
August, 2009

CROZIER - *Geotechnical Consultants*

Engineering Geologists & Geotechnical Engineers
(A Division of PJC Geo-Engineering Pty Ltd)
A.B.N 96 113 453 624
Suite 202/30 Fisher Road, Dee Why, NSW, 2099.
Phone: 9972 9578 Fax: 9401 9206

Date: 14th August 2009
No. Pages: 1of 6
Project No.: 2119A

REPORT ON GEOTECHNICAL INVESTIGATION FOR ALTERATIONS AND ADDITIONS AT 9 BLIGH CRESCENT, SEAFORTH.

1. INTRODUCTION:

This report details the results of a geotechnical investigation carried out for a proposed new terrace at 9 Bligh Crescent, Seaforth. The investigation was undertaken at the request of Kira Robson, Architect, on behalf of the owners of the property, M. and D. Spiers.

It is proposed to build a new concrete terrace extending out from the lowest floor level of the house structure and a set of concrete stairs to the existing boatshed and foreshore deck. The terrace will be cantilevered however the stairs will require new footings extending down to the foreshore.

The investigation was carried out to provide information for Development Application purposes and for the design of site works. It comprised;

a) A detailed geological inspection and mapping of the site and adjacent properties by Senior Engineering Geologist.
b) Review of previous Geotechnical Report, Proposed House Alterations, Project No. 2119, Dated: 20th June 2001 by Crozier Geotechnical Consultants.

Details of the fieldwork are given in the report, together with comments relating to design and construction practice.
The following plans and diagrams were supplied by the Architect and owner for this work;

- Architectural Plan by Kira Robson Architect, Job No.: 108, Drawings No.: CC 01 – CC 06, Dated: June 2009.
- Site Survey by K.H. Zeggelink and Associates, Ref. No.: TP 2213, Dated: 15th February 1999.

2. SITE FEATURES:

2.1. Location:

The site is located at the base of a steep south facing slope close to Powder Hulk Bay, Middle Harbour, Sydney, NSW. It is situated on the lower southern side of Bligh Crescent and extends to the foreshore.

The property is located within Zone 'C' for landslip instability as detailed in Manly Council's DCP.

2.2. Description:

The site is a rectangular shaped block with a front boundary to Bligh Crescent of 27.43m and side boundary of 19.0m. A multi-level house extends down the site from a garage at street level and covers most of the property. A short very steep slope extends down from the rear of the lower floor level to a deck and boat shed formed over the foreshore. The lower floor level is partially excavated into the hill slope and was undergoing renovations at the time of the inspection. It was for this work that the previous geotechnical report was undertaken.

2.3. Geology:

Reference to the Sydney 1: 100,000 Geological Series sheet indicates that the site is underlain by Hawkesbury Sandstone which is of Triassic Age. The rock unit typically comprises medium to coarse grained quartz sandstone with minor lenses of shale and laminite. This rock unit was identified in outcrop on this and adjacent properties.

Morphological features often associated with the weathering of Hawkesbury Sandstone are the formation of near flat ridge tops with steep angular side slopes. These slopes often consist of sandstone terraces and cliffs with steep colluvial slopes below. The terraced areas above these cliffs often contain thin sandy (low plasticity) soil profiles with intervening rock (ledge) outcrops. The outline of the cliff areas are often rectilinear in plan view, controlled by large bed thickness and wide spaced near vertical joint pattern, many cliff areas are undercut by differential weathering. Slopes below these cliffs are often steep 15 to 23° with moderately thick sandy colluvial soil profile that are randomly covered by sandstone boulders.

3. FIELD WORK:

3.1 Method:

The field investigation comprised a walk over inspection of the site on the 22nd July 2009. It involved geological/geomorphological mapping of the site and adjacent land with examination of soil slopes, bedrock outcrops and existing structures for stability. The borehole location and geotechnical mapping information are included on Figure 1.

3.2. Results:

3.2.1. Field Observations:

The existing house is a multi-level structure located across the upper portion of the site with the garage and entrance area at the crest extending outside of the property boundary to Bligh Crescent. A very limited inspection was undertaken of the upper portion of the site, as this was covered in the previous inspection. The lower floor level addition is almost complete, an inspection of the narrow cavity at the rear of this level along the exposed excavation face, identified that some minor remedial works have been undertaken to the rock face however further works are required. It was also noted for the eastern half of the cut that the excavation extends through soil material and extremely weathered bedrock at the crest (<1.0m depth), which is cut vertically and is not supported by the newly constructed lower floor level external walls. A small suspended concrete slab has recently been formed at the eastern end for what is understood to be pest control however it does not support the exposed soil.

The rear 4-5m of the site, in the location of the proposed terrace, is occupied by a very steep to extreme (53°), densely vegetated soil slope containing several dry packed rock retaining walls and outcrops of the sandstone bedrock and boulders. The sandstone bedrock outcrops at the base of the slope as a foreshore terrace below the existing timber deck and boatshed. The boatshed is a timber structure formed at the level of the deck, on the eastern side of the site.

Inspection of the soil slope was limited due to the very dense vegetation, mostly consisting of ferns that cover this part of the site. However it was noted that most of the old rock retaining walls, which are dry stacked and overgrown, are failing down slope due to soil creep processes. It was noted on the eastern side of this area, close to the slope crest, that a small section of the slope is undercut and supported only by the roots of a small tree. There are several large sections of sandstone rock outcropping on the eastern side of the site, at the base of the slope directly adjacent to the rear northern wall of the boatshed. There are also several other large boulders located at the base of the slope in the centre and western side of the site. Most of these boulders appear to have partially stabilized themselves on the foreshore rock platform at present. The large boulder in the centre of the site, within which stairs have been cut, has stabilized itself on another boulder that sits on the foreshore bedrock.

3. FIELD WORK:

3.2. Results:

3.2.1. Field Observations:

However a large joint defect adjacent to the eastern boundary has become extensively weathered and eroded leaving a 300-450mm wide near vertical void at the base of the slope. One small block of rock (approx. 200mm thick) is still located within the outer southern extent of this joint, wedged in place by the load from sections of rock to the west.

A number of similarly oriented joint defects were mapped through the rock outcrop to the west of this larger defect, resulting in at least two elongated and near vertically oriented blocks of rock that extend into the base of the slope. These two blocks have partially rotated away from their insitu position, towards the east, and are subsequently supported from further movement and collapse by the small block wedged within the large joint. Directly above and supported by these two elongated blocks is a large (>3m^3) sandstone boulder which then supports the soil slope above. Another sandstone boulder is located at the eastern property boundary, extending across above the large open joint defect into the neighbouring property. This boulder is also partially supported by the first boulder and by the garden slope in the neighbouring property. There is evidence of soil creep affecting the soil slope in the neighbouring property, adjacent to the common boundary.

The western half of this lower slope contains several sections of the soil slope which are extremely steep to near vertical and appear to have had some minor soil slump failure as a result of soil creep. One boulder at the base of this slope, within the neighbouring property directly on the property boundary, is rotated from its insitu position, though it appears to have stabilized itself on the rock platform and the sites rock sea wall at the base of the slope.

4. COMMENTS:

4.1. Geotechnical Assessment:

The majority of the upper portion of the site appears stable and does not show any obvious signs of impending or potential slope instability. We were not called to site during the construction phase to provide advice on remedial works prior to or during construction of the lower floor level addition. The soil located at the crest of the lower floor level excavation is of limited long term stability as are several small sections of exposed rock within the excavation face, even though this cut has remained relatively stable for at least 10 years. These sections will require remedial measures to be installed prior to completion of building works. It is unknown whether any footings for the above lying floor level are supported within this material above the excavation face, if so these could be significantly affected by any collapse of the cut face. It was noted that the lower floor level walls are constructed as retaining walls and that sub-surface drainage was in place at the base of the cut, however it is understood that the excavation is proposed to remain free-standing therefore these measures are compulsory to maintain its long term stability.

The lower slope is also of concern regarding landslip instability due to its very steep nature, the existing poor retaining walls and the stability of the boulders at the base, especially to the rear of the boatshed. It appears that the elongated blocks at the rear of the boatshed are currently being surcharged by the boulder and soil slope above them. Their collapse into the large joint defect, and subsequently the collapse of the boulder and slope above, is only being prevented by a very small block of rock within the open joint which is weathering and showing signs of stress from the load it supports. This entire lower slope should be cleared of vegetation and supported appropriately. The boulders at the base of the slope will likely require underpinning and rock bolting whilst engineered retaining walls or battering may be required to support the soil slopes above.

As the proposed works are located within and adjacent to this very steep lower slope and will require new footings it is recommended to complete the stabilizing works prior to any construction works being undertaken to ensure the safety of persons working within this area.

The field geotechnical mapping identified several areas of insitu sandstone bedrock which should be considered as suitable locations for new footings. We would therefore recommend that the stairway design be based on the location of these footings to reduce the impact on the steep soil slope.

4. COMMENTS:

4.2. Design and Construction Requirements:

4.2.1. New Development Footings:

It is understood that the terrace will be cantilevered off the existing lower floor level slab and will not require new footings however new footings will be required for the stairway. Geology mapped across the rear of the site suggests that medium strength sandstone bedrock is located at <2.0m depth and is covered in soil and sandstone boulders of limited stability. It is therefore recommended to found all new footings into insitu sandstone bedrock. As the insitu nature of these footings may be difficult to determine on inspection these footings may require core holes and spoon testing upon excavation.

It is likely that pier or pad footings with support columns will be required for the new stairs. New footings founded on medium strength insitu sandstone bedrock are suitable for a maximum allowable bearing pressure of 2000 kPa.

All footing trenches and piers should be inspected by an experienced engineering geologist or geotechnical engineer before concrete or steel are placed to verify their bearing capacity and the insitu nature of the founding strata, particularly if they are to be 'Certified' at the end of the project. If the insitu nature can not be confirmed on inspection then further testing (i.e. cored holes and/or spoon testing) will be required.

4.2.2. Retaining Walls:

Cut batters or fill in soil with steeper gradients than 1:1, may be retained by walls constructed from concrete or crib-block, stone or concrete block work or reinforced concrete. In designing any retaining walls for the proposed development which are less than 3 metres in height the following parameters are suggested for the soils on this site. Coefficient of active earth pressure (Ka) for:

loose soil sloping up at 20°	- 0.94
backfill horizontal	- 0.33
backfill sloping up at 20 degrees	- 0.42
backfill density	- 18 kN/m³

In suggesting these parameters it is assumed that the retaining walls will be fully drained, have no point loading from boulders with the slope and it is envisaged that suitable subsoil drains would be provided at the rear of the wall footings. If drainage is not included then the walls should be designed to support full hydrostatic pressure in addition to pressures due to the soil backfill. It is suggested that the retaining walls should be back filled with free-draining granular material (preferably not recycled concrete) which is only lightly compacted in order to minimize horizontal stresses. For retaining wall heights > 3 m, the design parameters should comply with the design criteria set out in the Australian Standard AS4678- 2002.

5. CONCLUSIONS:

The site has been assessed using the Australian Geomechanics Society publication titled "Landslide Risk Management" Volume: 42, No: 1, as having a 'Tolerable' risk to persons and a 'Moderate' risk to property (boatshed) at present. However provided the recommendations outlined in this report are followed during and after construction then this risk level should be reduced to 'Acceptable/Low'.

Prepared by:	Reviewed by:
Troy Crozier	Peter Crozier
Senior Engineering Geologist	Principal

References:

1. Australian Geomechanics Society, March 2007, Titled "Landslide Risk Management" in the Journal and News of the Australian Geomechanics Society, Volume 42, No 1.
2. Manly Councils Development Control Plan for Landslip and Subsidence 2001, updated March 2003.

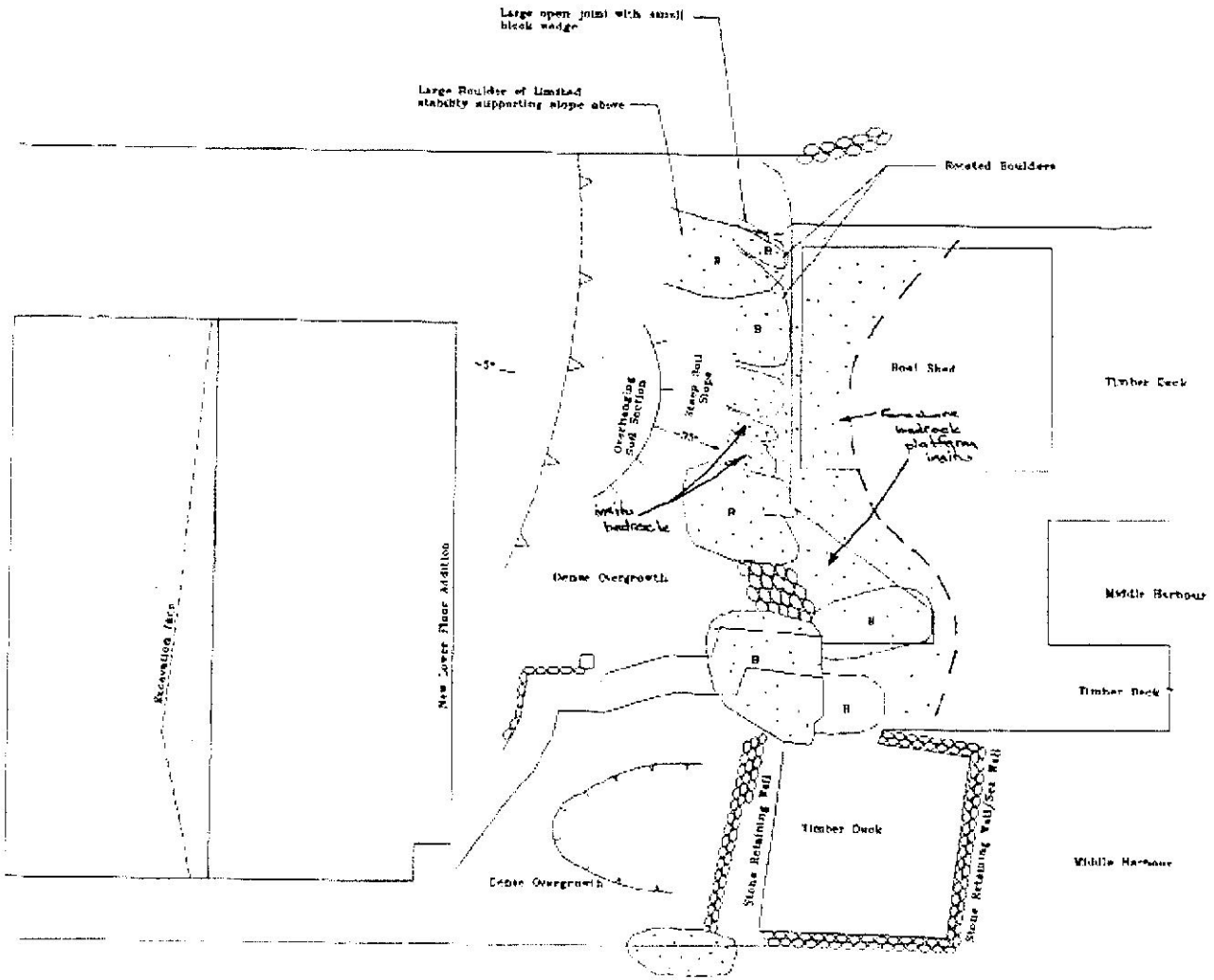


FIGURE 1

CROZIER - GEOTECHNICAL CONSULTANTS

ENGINEERING GEOLOGISTS & GEOTECHNICAL ENGINEERS
A DIVISION OF PJC GEO-ENGINEERING PTY LTD

LEGEND

Top of Slope

AUGER LOCATIONS

DYNAMIC PENETROMETER TEST

SCALE: A3
DRAWING: 2119A
DRAWN: D. CROZIER

APPROVED BY

PREPARED FOR:
SPIERS

PROPOSED ALTERATIONS & ADDITIONS

Appendix 1

NOTES RELATING TO THIS REPORT

Introduction

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

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

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, Geotechnical Site Investigations Code. In general, descriptions cover the following properties – strength or density, colour, structure, soil or rock and inclusions.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. Sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	Less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Under drained Shear Strength kPa
Very soft	Less the 12
Soft	12-25
Firm	25-50
Stiff	50-100
Very Stiff	100-200
Hard	Greater than 200

None-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300mm)	CPT Cone Value (qc-MPa)
Very Loose	Less than 5	Less than 2
Loose	5-10	2-5
Medium dense	10-30	5-15
Dense	30-50	15-25
Very Dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

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

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing with a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling are given in the report.

Drilling Methods

The following is a brief summary of drilling methods currently adopted by the company and some comments on their use and application.

Test Pits – these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3m for a back hole and up to 6m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) – the hole is advanced by a rotating plate of short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more that 0.5m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable that with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling – the hole is advanced by pushing a 100mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, ect is only marginally affected.

Continuous Spiral Flight Augers – the hole is advanced using 90-115mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling of in-situ testing. This is a relatively economical means of drilling in Clays and in sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed

Samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling – the hole is advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from 'feel' and rate of penetration.

Rotary Mud Drilling – similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tend to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. From SPT).

Continuous Core Drilling – a continuous core sample is obtained using a diamond-tipped core barrel, usually 50mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

Standard penetration tests (abbreviated as SPT) are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes – Test 6.3.1

The test is carried out in a borehole by driving a 50mm diameter split sample tube under the impact of a 63kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N" value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

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

  As 4,6,7
  N = 13

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

  As 15,30/40 mm

- The results of the tests can be related empirically to the engineering properties of the soil.
  Occasionally, the test method is used to obtain samples in 50mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets

Cone and Penetrometer Testing and Interpretation

Cone penetrometer testing (sometimes referred to as Dutch cone – abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in Australian Standard 1289, Test 6.4.1.

In the tests, a 35mm diameter rod with a cone-tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the core and the friction resistance on a separate 130mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is plotted on a computer screen and at the end of the test is stored on the computer for later plotting of the results.

The information provided on the plotted results comprises:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface are – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed in percent.

There are two scales available for measurement of cone resistance. The lower scale (0-5 MPa) is used in very soft soils in the graphs as a dotted line. The main scale (0-50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve friction to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% - 2% are commonly encountered in sands and very soft clays rising to 4% - 10 % in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:-

qc (MPa) = (0.4 to 0.6) N (blow per 300mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:-

qc = (12 to 18) cu

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

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes, etc. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and precise information on soil classification is required, direct drilling and sampling may be preferable.

Hand Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150mm increments of penetration. Normally, there is a depth limitation of 1.2m but this may be extended in certain conditions by the use of extension roads.

Two relatively similar tests are used.

- Perth sand penetrometer – a 16mm diameter flat-ended rod is driven with a 9kg hammer, dropping 600mm (AS 1289, test 6.3.3). This test was developed for testing the desity of sands (originating in Perth) and is mainly used in granular soils and filling.

- Cone penetrometer (sometimes known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS 1289, Test 6.3.2). The test was developed initially for pavement subgrade investigations, and published correlations of the test results with California bearing ration have been published by various road Authorities.

Laboratory Testing

Laboratory testing is carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedure used are given on the individual report forms.

Bore Logs

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

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

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems.

- In low permeability soils, ground water although present, may enter the hole slowly of perhaps not at all during the time it is left open.
- A localized perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons of recent weather changes. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

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

Engineering Reports

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg a three storey building), the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company will be pleased to review the report and the sufficiency of the investigation work. Every care is taken with the report as it relates to interpretation of subsurface condition, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the company cannot always anticipate or assume responsibility for

- Unexpected variations in ground conditions – the potential for this will depend partly on bore spacing and sampling frequency.
- Changes in policy or interpretation of policy by statutory authorities.
- The action of contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advise to resolve the matter.

Site Anomalies

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

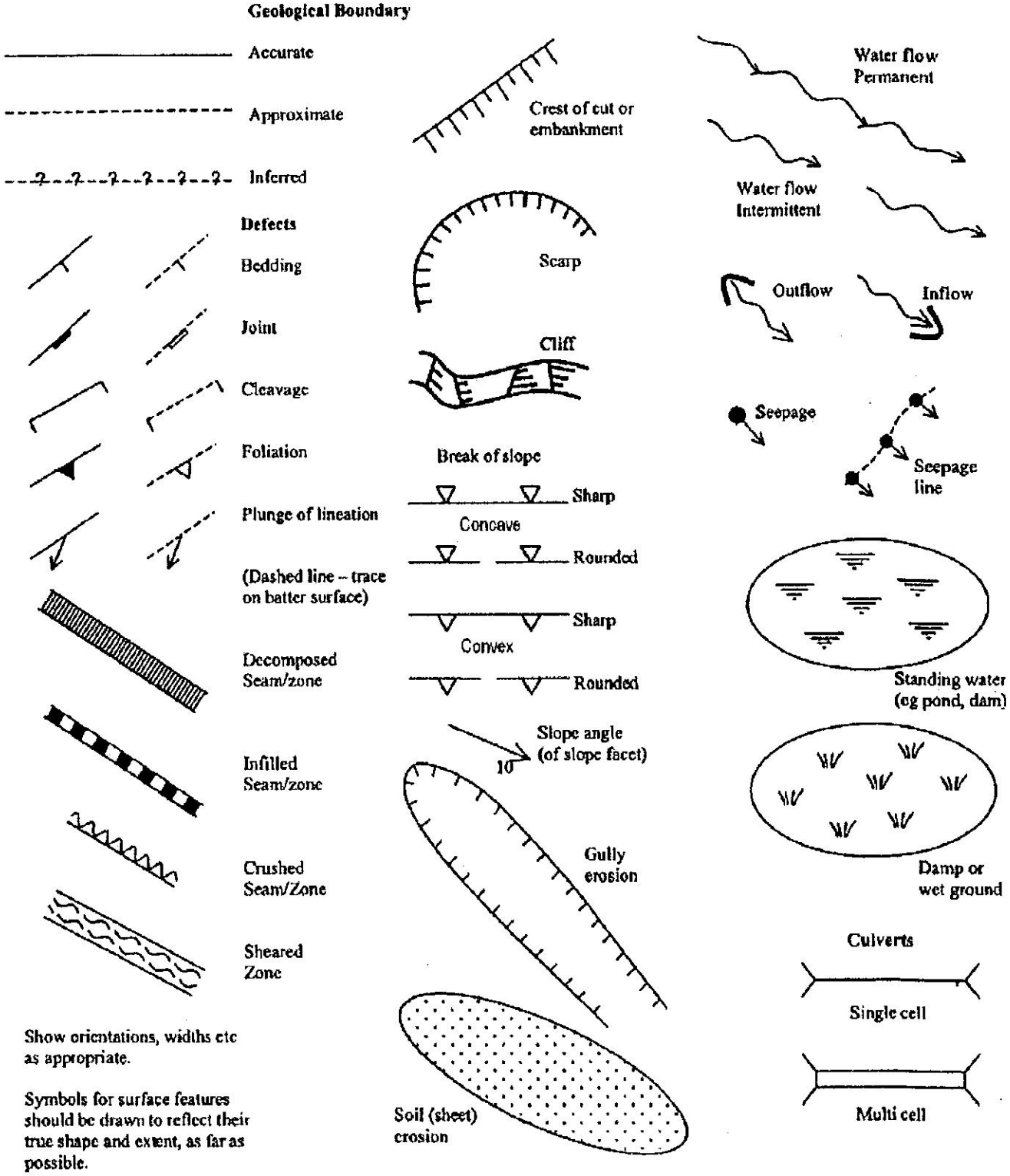
Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guideline for the Provision of Geotechnical Information in Tender Documents". Published by the institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

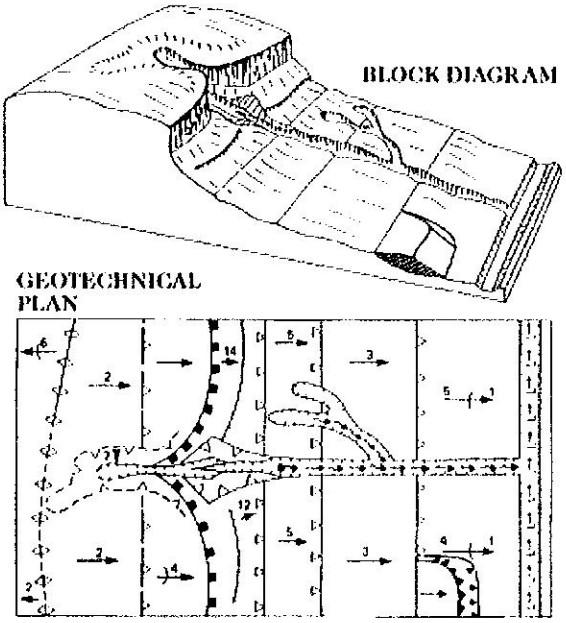
Site Inspection

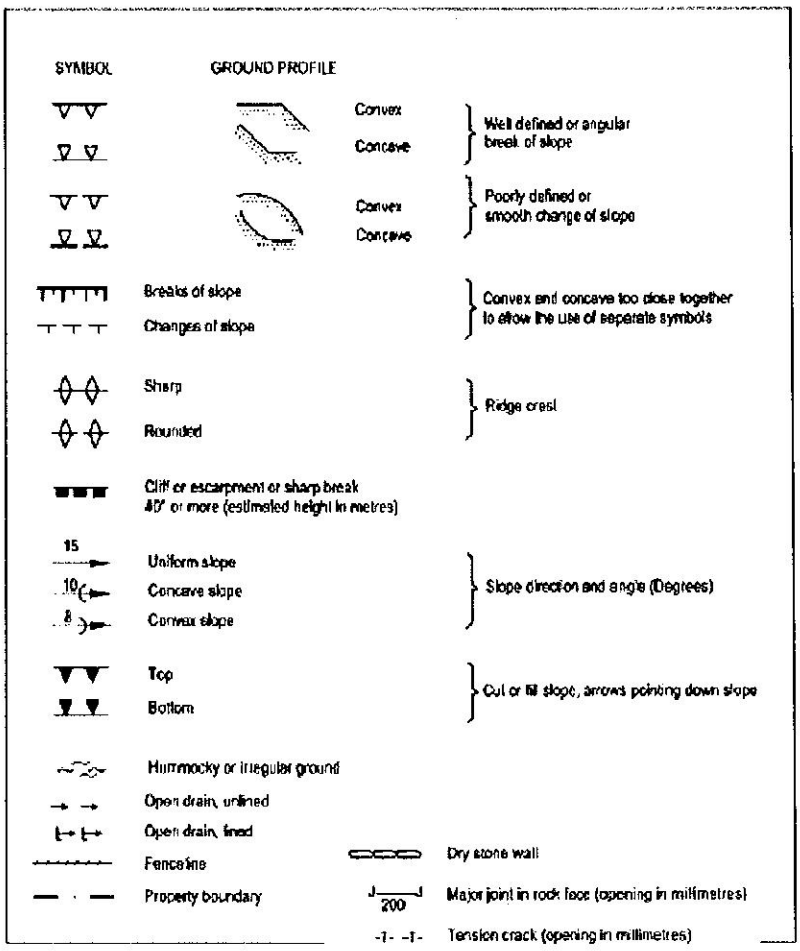
The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

APPENDIX E - GEOLOGICAL AND GEOMORPHOLOGICAL MAPPING SYMBOLS AND TERMINOLOGY



Examples of Mapping Symbols (after Guide to Slope Risk Analysis Version 3.1 November 2001, Roads and Traffic Authority of New South Wales).





Example of Mapping Symbols
(after V Gardiner & R V Dackombe (1983).Geomorphological Field Manual. George Allen & Unwin).

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MANDATORY AND CRITICAL STAGE INSPECTION REPORT - FINAL INSPECTION DOMESTIC

OWNER DETAILS

Name of person having benefit of the development consent:	Mark & Dianne Spiers
Address:	9 Bligh Crescent Seaforth NSW 2092
Contact Details:	0402059625

RELEVANT CONSENTS

Consent Authority/Local Government Area:	Manly Council
Development Consent No:	DA435/08, , **Date Issued:** 14/05/2009
Construction Certificate Number: 090275	**Date Issued:** 1/12/2009

PROPOSAL

Address of Development:	9 Bligh Crescent Seaforth NSW 2092
Building Classification:	1a
Type of Construction:	n/a
Scope of building works covered by this Notice:	New concrete terrace to existing dwelling and concrete steps to waterfront

INSPECTION DETAILS

Principal Certifying Authority:	Grant Harrington **No.:** BPB0170
Inspector:	Grant Harrington **No.:** BPB0170
Inspection date and time:	15/10/2010 **Inspection time:** 11:00 AM

INSPECTION RESULTS

We have attended the above property and completed an inspection. Each area inspection and the inspection result is listed below.

- **Inspection area:** ✓ **Final Inspection domestic** - Satisfactory

ADDITIONAL COMMENTS

Plant tree as per condition of consent,

provide the following certification;

balustrade glazing

structural inspections

geotechnical engineering

owner to make application for final Occupation certificate - here http://pcaservices.com.au/documents/documents.html

Grant Harrington
Inspector