

Building Certifiers
Strata Plan Certifiers
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Energy Assessment

RECEIVED

1 0 DEC 2014

PITTWATER COUNCIL

8 December 2014

Our Ref: 10/0569

The General Manager Pittwater Council PO Box 882 Mona Vale NSW 1660

Attention: Planning Department

Dear Sir/Madam,

RE: DA NO: N0274/09

62 & 85 HILLSIDE ROAD, NEWPORT NSW

Please find attached a copy of the Construction Certificate for the proposed development that has been granted by the Accredited Certifier, Stan Spyrou.

The certificate relates to the construction of a driveway at the above address.

Together with the certificate, we have enclosed the following for Council's record:

- 1. Notice of Commencement & Appointment of PCA Form
- Other Documentation relied upon
- Application Form
- Approved Plans

We have attached a cheque for the registration of this certificate. In forwarding the receipt for this cheque it is requested that reference be made to the address of the premises.

If you have any queries regarding the above please do not hesitate to contact the undersigned on 9279 3657 during business hours.

Yours faithfully,

KB.

Kirrily Burnes
Administration Manager
Dix Gardner Group Pty Ltd.

CC:- Mr Peter Roach

Newcastle Tel: 02 4940 0355 HEAD OFFICE

Level 4, 155 Castlereagh Street Sydney NSW 2000 Brisbane Tel: 07 3844 0644

REC: 372128 10/12/14

Gold Coast Tel: 07 5504 7984



Building Certifiers Strata Plan Certifiers **Building Regulations** Fire Safety

Access Consultants Energy Assessment

Construction Certificate

Issued under the Environmental Planning and Assessment Act 1979

Certificate No.:

275/14

Subject Land:

62 & 85 Hillside Road, Newport NSW

Lot & DP:

Lot 1, DP 408800 & Lot 2, DP 1036400

Applicant: Address:

Mr Peter Roach

Contact No.:

PO Box 7099, McMahon's Point NSW 2060

0419-226-016

Owner:

Mr Peter Roach

Description of Building Works:

Construction of a driveway for 62 & 85 Hillside Road,

Newport

BCA Classification:

Class 10b

Cost of Building Works:

\$100,000

Builder:

County Construction (NSW) Pty Ltd.

DA No.:

N0274/09

Determination Date:

14/07/2010

Consent Authority:

Pittwater Council

Date of Receipt of CC application:

Determination:

17/11/2011

Approved

Approved Plans:

Martens & Associates; Project P1002791JD4V05;

Drawing No's 1 to 15.

Attachments:

Other Documentation relied upon

Approved Plans

Accreditation Level:

A1 - Accredited Certifier - Building Surveyor Grade 1.

Registration No.:

BPB1977

Accreditation Body:

Building Professionals Board

I certify that:

the work, if completed in accordance with documentation accompanying the application for the certificate (with such modifications verified by the certifying authority as may be shown on that documentation), will comply with the requirements of Environmental Planning & Assessment (EP&A) Regulation 2000 as are referred to in sec. 81A (5) of the EP&A Act 1979.

Signed:

Stan Spyrou

Accredited Certifier

Determination Date:

8/12/2014

Tel: 02 9279 3657

Newcastle Tel: 02 4940 0355

HEAD OFFICE Job 107669 155 Castlereagh Street Sydney NSW 2000

Brisbane Tel: 07 3844 0644

Gold Coast Tel: 07 5504 7984

Kirrily Burnes

From:

Peter Roach <peterroach8@icloud.com> Friday, December 5, 2014 11:56 AM

Sent: To:

Kirrily Burnes

Subject:

Fwd:62 &85 Hillside Rd, Newport

The Manager, Dix Gardner, your ref 10/0569

Further to our recent correspondence on the release of the CC. This is the response from a contractor, which appears to back up our enquiries.

Can we resolve this?

Peter Roach
peterroach8@icloud.com
PO Box 7099
ICMAHONS POINT 2060
0419226016

Begin forwarded message:

From: David Carruthers < fourthavenue@tpg.com.au>

Subject: Re: Hillside Rd, Newport

Date: 4 December 2014 7:00:35 pm AEDT **To:** Peter Roach peterroach@bigpond.com>

Hello Peter,

HOW is not required for a SCC. Only a licenced (house) builder is required to provide this. It is not required for civil works and I cannot provide it nor could any of my contractors. I don't even believe the insurers would know what they were covering? You need to resolve this with your PCA

If you have the information available, it would be helpful for me to know exactly what I am dealing with so as I can formulate an equitable arrangement.

Regards David Carruthers

Fourth Avenue Developments Pty. Ltd.

162 Prince Alfred Parade NEWPORT NSW 2106. (ph) 0414 65 8282

On 4/12/2014 6:01 PM, Peter Roach wrote:

Hi David,

I have an email from Carl Parkinson saying he can issue the CC on receipt of HOW certificate and long service levy(which has now been paid).

I think the immediate step is to receive your proposal to elicit if an agreement is possible.

Cheers

Peter

On 4 Dec 2014, at 2:59 pm, David Carruthers < fourthavenue@tpg.com.au > wrote:

Hello Peter,

As discussed, could you please email me the information/documents you have in relation to the issue of the construction certificate.

Thanks

Regards David Carruthers

Fourth Avenue Developments Pty. Ltd. 162 Prince Alfred Parade NEWPORT NSW 2106. (ph) 0414 65 8282

Kirrily Burnes

From:

Stan

Sent:

Wednesday, October 8, 2014 5:07 PM

To:

Kirrily Burnes

Subject:

RE: Hillside Newport

HOW Premium applies therefore it should be paid before we issue the CC.

Regards,

Stan Spyrou

Managing Director Mob: 0499 120 355



"UILDING CERTIFICATION - ACCESS CONSULTING - ENERGY ASSESSMENT - FIRE SERVICES AUDITS - DEVELOPMENT ... PPROVALS

SYDNEY

NEWCASTLE

BRISBANE

GOLD COAST

MELBOURNE

DARWIN

02 9279 3657

02 4940 0355

07 3844 0644

07 5504 7984

0499 120 355

0429 538759

From: Kirrily Burnes

Sent: Wednesday, 8 October 2014 4:53 PM

To: Stan

Cc: Maurice Freixas

Subject: FW: Hillside Newport

Hi Stan,

We are in a bit of a dilemma and have decided to let you decide the result seeing as you are the one who is going to be signing the certificate (eventually).

History:

Opened a file in beginning of 2011.

DA for construction of a driveway.

_arl Parkinson issued a CC checklist in Dec 2010.

He had submitted all but 3 items a) our bill b) LSL and c) HOW insurance. Job stopped dead.

Job got resurrected 2 weeks ago.

He paid our bill and LSL 30/09/2014 COW \$100,000 and we got a new Application form.

The issue is the HOW. They don't want to pay for one.

I have attached the extract that Carl referred to in his checklist (also attached).

I have also attached the new builder detail which I received today.

Below is the licence check we did which appears that they can't do work over \$20K.

LD says we should get the HOW (from earlier bad experiences), GB disagrees and MF disagrees and thinks we should let this go.

Please advise.

Regards

Kirrily Burnes

Administration Manager



OUR REPUTATION IS BUILDING

3rd October 2014

Dix Gardener Pty Ltd 4/155 Castlereagh Street SYDNEY NSW 2000

Via Email: admin@dixgardener.com.au

TO WHOM IT MAY CONCERN

Re: 62-85 Hillside Rd Newport

This letter is notification that the we are the builder for the works to be undertaken to the driveway at the above mentioned address.

Our builder's licence number is 181729C with an expiration date of 18 January 2017.

Please do not hesitate to contact the undersigned or Lisa Tuersley should you have any queries.

Yours sincerely

County Construction (NSW) Pty Limited

Robert Hart

B Con Mgt (Bldg) Hons

Level 1, Killara Ridge, 680 Pacific Highway, Killara NSW 2071 PHONE: 9498 2100 FAX: 9498-2300 WEB: www.countyconstruction.com.au

COUNTY CONSTRUCTION (NSW) PTY LIMITED ABN 91 108 379 853 BUILDER'S LICENCE 181729C

Levy Online Payment Receipt



Building and Construction

PETER ROACH PO BOX 7099 MCMAHONS POINT NSW 2060

Application Details:

Applicant Name:

PETER ROACH

Levy Number:

5076564

Application Type:

DA

Application Number:

N0274/09

Approving Authority:

PITTWATER COUNCIL

Work Details:

Site Address:

85 HILLSIDE RD

NEWPORT NSW 2106

Value of work:

\$100,000

Levy Due:

\$350.00

Payment Details:

LSC Receipt Number:

179447

Payment Date:

30/09/2014 11:05:59 AM

Bank Payment Reference:

767397352

Levy Paid:

\$350.00

Credit card surcharge:

\$1.40

Total Payment Received:

\$351.40



Building Certifiers Strata Plan Certifiers **Building Regulations** Consultants Fire Safety Consultants

1 7 NOV 2011

Notification of Mandatory Inspections

Environmental Planning and Assessment Act 1979 Sections 81A & 86 and Regulation 2000 Clauses 103A & 135A

Subject Land	
Address	62285 Hillside Rd Newport
Description of Works	& Construction of Driveway
	γ
Consent	
DA/CDC No.	274/09 CC No.
	Authority
	Accreditation no. ISPIS 0972
The Following are C	critical Stage Mandatory Inspections
	d pursuant to Section 109E (3) (d) of the Act & Clause 162A of the Regs
(c) prior to pouring any (d) prior to covering of (e) prior to covering wa (f) prior to covering any (g) after the building wo (5) In the case of a class 2, 3 (a) after excavation for, (b) waterproofing in any (c) prior to covering any (d) after the building wo (6) In the case of a class 5, 6 (a) after excavation for, (b) prior to covering any (c) after the building wo (7A)Additional inspections of (a) in the case of a swin before filling with wa	r, and prior to the placement of, any footings, and in-situ reinforced concrete building element, and the framework for any floor, wall, roof or other building element, and terproofing in any wet areas, and a stormwater drainage connections, and ork has been completed and prior to any occupation certificate 3 or 4 building, and prior to the placement of any footings; and and prior to the placement of any footings; and are wet areas, for a minimum of 10% of rooms with wet areas are stormwater drainage connections, and ork has been completed and prior to any occupation certificate 5, 7, 8 or 9 building, and prior to the placement of any footings; and are stormwater drainage connections, and ark has been completed and prior to any occupation certificate 5 building work must be made mining pool, after completion and the barrier has been erected, and after
Person with the ben	efit of the Development Consent/CDC
Name PETER Rol	Signature Date 15/11/11
Note 1: If a builder is appoint inspection may result in the	nted the legislation requires you to notify them of these inspections. A missed e PCA being prohibited from issuing an Occupation Certificate.
Note 2: All critical stage ins accredited Certifying Author	spections, excluding the final inspection, may be undertaken by another prity other than the Principal Certifying Authority.

155 Castlereagh Street Sydney NSW 2000

Tel: 02 9279 3657 Fax: 02 9279 3586 ABN 19 090 487 445 | Email, admin∉dixgardner.com.au | Wsp. www.dixgardner.com.au

Level 2, 25 Watt Street P.C. Box 1809 Newcasta NSW 2300 Tel: 02 4927 1822 Fax. 02 4927 1844

particulars of the proposal

What is the area of the land (m²)
Newport Residential
Does the site contain a dual occupancy? What is the gross floor area of the proposed addition or new building (m²). What are the proposed uses of all parts of the building(s)/land?
ocation Use
NEWPORT RESIDENTIFE
lumber of pre-existing dwellings

materials to be used

Place a tick adjacent to the material which best describes what the new work will be constructed of:

walls brick veneer full brick single brick concrete block concrete/masonry concrete steel fibrous cement hardiplank cladding - aluminium curtain glass other unknown	code 12 11 11 11 20 20 60 30 30 70 50 80 90	roof aluminium concrete concrete tile fibrous cement fibreglass masonry/terracotta shingle tiles slate steel terracotta tile other unknown	code 70 20 10 30 80 10 20 60 10 80 90
floor concrete timber other unknown	20 10 80 90	frame timber steel other unknown	40 60 80 90

NA - DRIVENAY Construction



Building Certifiers
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Building Regulations
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Fire Safety Consultants

1.7 NOV 2011

APPLICATION FORM

Environmental Planning & Assessment Act 1979, s.109C Environmental Planning & Assessment Regulation 2000, cl.126 or 139

	Environmental Planning & Assessment Regulation 2000, cl.126 or 139
Constructi	on Certificate (CC)
APPLICANT	
Name	PETER ROACH
Address	PO BOX 7099 MCMAHONS POINT
	NSW 2060
Phone/Email/Fax _	0419 226 016 peterroach @ bigpond.com
Signature & Date	15/11/11
OWNER (PERSON WI	TH THE BENEFIT OF THE DEVELOPMENT CONSENT)
Name	PETER ROACH
Address	AS ABOVE
	e's Agent of the subject property, I/we hereby consent to this Application the proposed development described below.
SUBJECT LAND	
Address	62 & 85 Hillside Rd, Newport
	07 1 DP 408800 & LOT 2 DP 1036400
PROPOSAL	locate to a sign on
Description	Construction of Driveway
Or No. of Lots (if Strata)	
	SENT NOT APPLICABLE FOR APPLICATIONS FOR CDC
	1
DA No.	274/09 Date of Determination 14/7/10
VALUE OF WORKS	
Estimated Cost of Works	oden e dominano
Latimated Cost of We	orks \$ 100,000



23.08.2011

Cariste Pty Ltd Attn: Mr Tim Roach PO Box 7099 McMahons Point NSW, 2060

Dear Tim,

RE: 62 & 85 HILLSIDE ROAD NEWPORT - DESIGN CERTIFICATION FOR CONSTRUCTION CERTIFICATE.

Reference is made to the Construction Certificate Checklist (Ref 10/0569). Responses are as follows:

1. Plans and Certification

- 1a) DA stamped plans, plan ref: P0802169JD04_V5.
- 1b) Architectural Plans N/A, driveway only.

 Structural Plans Structural details are provided within the "Civil Design Plan Set" for OSD tanks and retaining walls, (ref: P1002791JD04V05 110819 PCA).
- 1c) Design Statement Structural Elements:
 Structural Elements of the civil design (OSD tanks and retaining walls) have been designed to satisfy relevant Australian Standards.

2. Consistency of Plans

Civil Design Plans are in accordance with the Development Consent (N0274/09).

3. Development Consent Conditions

- **B1:** Details showing stormwater quality improvement devices are included within the Civil Design Plan Set, on sheets 6, 10 and 14.
- **B2:** Details of piped and natural drainage system works are provided in the Civil Plan Set, on sheets 5, 6, 10 and 14. The Piped and Drainage System has been designed in accordance with Council DCP 21 B5.14.
- **B3:** Driveway pavement details are provided in the Civil Design Plan Set. Driveway surface is Asphaltic Concrete, a stable surface for all weather conditions. It is asphaltic colour (dark grey) thus shall blend with the environment.

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Hydrogeology
Mining
Terrain analysis

Waste management

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Supply & storage
Flooding
Stormwater & drainage
Wetlands
Water quality
Irrigation
Water sensitive design

Wastewater
Treatment
Re-use
Biosolids
Design
Management
Monitoring
Construction

Civil

Earthworks

Excavations
Pipelines
Roads
Pavements
Parking
Structures

Head Office

Unit 6 / 37 Leighton Place Hornsby NSW 2077, Australia **Ph** 02 9476 9999 **Fax** 02 9476 8767

> mail@martens.com.au www.martens.com.au MARTENS & ASSOCIATES P/L ABN 85 070 240 890 ACN 070 240 890 B5: By others.

C1: Geotechnical Report, (Ref: P0802169JR02_V1_16072009) is provided.

C2: Completed Form 2 of the Geotechnical Risk Management Policy is attached.

C3: Onsite detention system design provided in Martens and Associate Civil Design Plan Set, sheets 5, 6 and 14 (inclusive) is certified as complying with B5.14 of Pittwater 2 DCP.

C4: Drainage system design provided in Martens and Associate Civil Design Plan Set, sheets 2 to 15 (inclusive) is certified as complying with B5.14 of Pittwater 2 DCP.

C5: The excavation and landfill details are provided in Martens and Associate Civil Design Plan Set. This is certified as being in accordance with relevant Australian Standards as well as the site Geotechnical requirements.

C6: By others.

D1: By others.

D12: Traffic Management plan by Martens, (Ref: P1002791JC03V01 110211).

Our client (Cariste Pty Ltd) will submit all plans, reports and other documents referred to in the construction certificate checklist. If you require any further information, please do not hesitate to contact Andrew Norris.

For and on behalf of

MARTENS & ASSOCIATES PTY LTD

DR DANIEL MARTENS

BSc(Hons1), MEngSc, PhD, MAWA, FIEAust, CPEng, NPER

Manager, Principal Engineer





ABN 61340837871

Telephone 02 9970 1111 Facsimile 02 9970 7150

Postal Address PO Box 882 Mona Vale NSW 1660

DX 9018, Mona Vale

Ross McWhirter, Project Leader – Road Reserve Management 8am to 4:30pm Mon - Fri Phone 9970 1207 Mobile 0419 629 007

4 November 2011

Cariste Pty Ltd PO Box 7099 McMAHONS POINT NSW 2060

Dear Sir.

Re: SECTION 139 CONSENT (Roads Act 1993) - 62 & 85 Hillside Road, Newport

Council grants the applicant(s), Cariste Pty Ltd, consent to construct a driveway crossing at 62 and 85 Hillside Road, Newport.

This Section 139 Consent is granted, subject to the following conditions: -

- 1. The Applicant(s) shall, at all times, keep indemnified Council from and against all actions, suits, proceedings, losses, costs, damages, changes, claims and demands in any way arising out of or by reason of anything done or omitted to be done by the Applicant(s) in respect of the work in question.
- 2. The Applicant(s), at all times for the duration of this Consent, will not interrupt or otherwise disturb traffic or pedestrian flow in the public road without first obtaining the consent of Council. Lighting, fencing, traffic control and advanced warning signs shall be provided for the protection of the works and for the safety and convenience of the public and others during the currency of the works.
- 3. In the event that the driveway construction requires the use of a mobile concrete pump in the road reserve, separate approval must be obtained from Council for that activity. Form No. UI313 (Application to Stand Construction Plant on a Public Road Reserve) must be lodged with the applicable fees.
- 4. The Applicant(s) shall be responsible for the cost of all service and utility adjustments associated with the construction of the driveway. Contact "Dial Before You Dig" (1100) at least two working days before the works are due to start for information on the location of underground pipes and cables.
- 5. A formwork and steel reinforcement inspection by Council is required prior to construction (provide minimum 24 hours notice).
- 6. The Applicant(s) shall make good any damage caused to the property of any person or any property of Council by reason of the carrying out of any work by the Applicant(s) under the Conditions of this Consent.

1

- 7. Should the Applicant(s) fail to comply with any of these conditions or any requirement of Council as provided, then this Consent shall permanently lapse and any part of the work remaining within the road at that time shall be deemed to be an obstruction or encroachment under Section 107 of the Roads Act 1993.
- 8. This Consent receipt must be held on the job and produced to any Officer of Council when called upon.
- The Applicant(s) shall accept all responsibility for public safety during the construction of the works.
- Compliance with the conditions of Development Consent N0274/09 that relate to the road reserve.
- Landscaping treatment will only be approved if deemed by Council to be appropriate to the local environment.
- 12. COUNCIL IS TO BE ADVISED WHEN THE WORKS HAVE BEEN COMPLETED. Upon receipt of this advice, Council will inspect the works to determine if they are satisfactory. Any works deemed by Council to be unsatisfactory are to be rectified to Council's reasonable satisfaction.

Yours faithfully

Ross McWhirter

P. McWhinter

PROJECT LEADER - ROAD RESERVE MANAGEMENT

Enclosures: - Information for Access Driveway Profiles

- Driveway profile (EH)

 List of Council Authorised Concrete Contractors for Vehicle Footpath Crossings and Associated Works.



ABN61340837871

Telephone 02 9970 1111 Facsimile 02 9970 7150 Postal Address

PO Box 882 Mona Vale NSW 1660

DX 9018, Mona Vale

Matt Hansen 8am to 5pm Mon – Fri Phone 9970 1178

2nd November 2011

C/o Tim Roach Cariste Pty Ltd PO Box 7099 McMahons Point NSW 2060

Dear Mr Roach,

Re: Development Application No.: N0274/09. Property: 62 and 85 Hillside Road, Newport.

I have provided advice to the applicant in relation to a condition of consent on the above DA. This relates to condition C6 "An Ecological Sustainability Plan is required to be provided prior to the issue of the Construction Certificate which provides effective weed control measures, transplanting of Cabbage Tree Palms, regeneration/revegetation where appropriate, and provision of at least six (6) nestboxes for arboreal mammals and birds. A copy of the ESP is to be provided to Council's Natural Resources Assessment Officer for approval."

The applicant has since submitted the required ESP which I have reviewed, and it is acceptable in the context of the property and its natural resources. Therefore this ESP has adequately satisfied condition C6 and should be considered when proceeding in the issue of the Construction Certificate. Please provide a copy of this letter to your certifier in relation to this issue.

If you have any questions, please do not hesitate to contact me.

Yours faithfully

Matt Hansen

Principal Officer Natural Resources

Pittwater Council

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER FORM NO. 2 – To be submitted with detailed design for construction certificate

	Development Application for CARIS	TE PTY L	70	
		Name of Applic	cant	
	Address of site 85 \$62 H	ILLSIDE RO	AS, NEWPORT	
Declaration	n made by Structural or Civil Engineer in relati	on to the incorporation	on of the Geotechnical issues into the projec	t design
1. DANI	(insert name) on behalf of Mr 22/8/2011 (date)	ketens & A	SSOCIMES PM LM	
	(insert name)	(trading o	r company name)	
on this the	22/8/2011			
above organiat least \$2n	(date) I am a Structural or Civil Engineer as defined by inization/company to issue this document and to comillion. I also certify that I have prepared the behnical Report for the above development	ertify that the organizat	t management Policy for Pittwater. I am author tion/company has a current professional indemn	ity policy of
Geotechnic	cal Report Details:			4
	cal Report Details: Report Title: P080216971202 -V Report Date: 16/7/2009	1-16072009	62 F F HILLSIDE RIAD NEVI	PORT NSK
	Report Date: 16/7/2009 Author: MR BEN ROSE		, , , , , , , , , , , , , , , , , , , ,	. , , ,
L	Author: DOK BBO KBSE		7 22.5	
	Structural Documents list:			
Γ		0919		
İ		-01/		
		***************************************	· · · · · · · · · · · · · · · · · · ·	
certification	aware that Pittwater Council relies on the pro as the basis for ensuring that the geotechnical to achieve an "Acceptable Risk Management" lev	risk management asp	ects of the proposed development have been	adequately
DANIFL	MARTONS K			
prince	martens k		(signature)	
Declaration	n made by Geotechnical Engineer or Engineeri	na Geologist in relati	on to Structural Drawings	
viewed the Geotechnica I am aware the basis fo achieve an "	and/or technically verified the abovementioned Grabove listed structural documents prepared for al Report have been appropriate taken into account that Pittwater Council relies on the processes corrensuring that the geotechnical risk managem "Acceptable Risk Management" level for the life of and that reasonable and practical measures have	the same development of the structural enginered by the Geotechnical cered by the Geotechnical cent aspects of the pro- of the structure taken as	nt. I am satisfied that the recommendations g ineer in the preparation of these structural docu- ical Risk Management Policy, including this cert posed development have been adequately ad at least 100 years unless otherwise stated and	iven in the ments. lification as dressed to
	Signature		***************************************	
	Name DR DAWIEL			
	Chartered Professional Status.	CPEng, FIE	Aust NPER	
	Membership No285	379	**********	
	Company MARIONS	ASS P/L		



11.02.2011

Cariste Pty Ltd Attn: Mr Tim Roach PO Box 7099 McMahons Point NSW 2060

Dear Tim,

RE: 62 TO 85 HILLSIDE ROAD, NEWPORT: CONSTRUCTION TRAFFIC MANAGEMENT PLAN

We have prepared this Construction Traffic Management Plan (CTMP) to satisfy Condition D.12 of DA Consent No. N0274/09. Construction traffic details and requirements are as follows:

- o Quantity of material to be transported Estimate = 600 m³
- Proposed truck movements per day -Estimated Maximum of <u>15</u> Return Trips
- Proposed hours of operation (in accordance with Cond. A.4)-7:00am 5:00pm Monday Friday;
 7:00am 1:00pm Saturday;
 No Work Sunday or Public Holidays.
- o Proposed traffic routes As shown on attached map. Trucks are to approach the site utilising Barrenjoey
 Road followed by Neptune Road and Hillside Road. None of the proposed roads
 are subject to 3 tonne load limits.

If you require any further information, please do not hesitate to contact the writer.

For and on behalf of MARTENS & ASSOCIATES PTY LTD

GRANT HARLOW

BE(Hons),BNatRes(Hons, MIEAust Project Manager, Engineer

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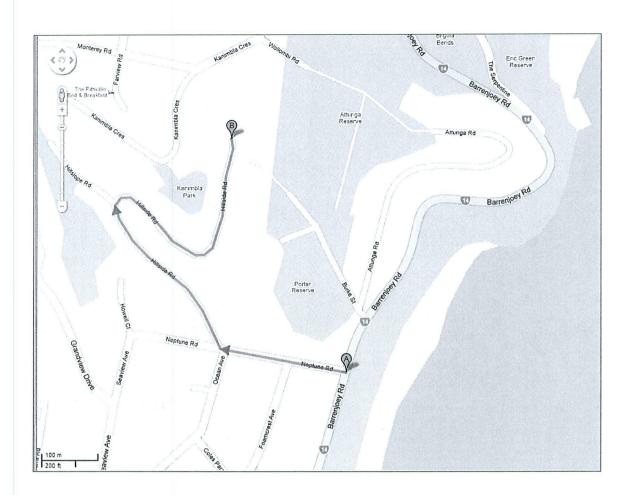
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Unit 6 / 37 Leighton Place Hornsby NSW 2077, Australia **Ph** 02 9476 9999 **Fax** 02 9476 8767

> mail@martens.com.au www.martens.com.au MARTENS & ASSOCIATES P/L ABN 85 070 240 890 ACN 070 240 890





Geotechnical Assessment

85 Hillside Road Newport NSW Proposed Lot 2(a) DP 1036400











November 2010 P1002791JR02V02

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Limitations Statement

The sole purpose of this report and the associated services performed by Martens & Associates Pty. Ltd is to complete a geotechnical assessment of the subject site in accordance with the scope of services set out in the contract / quotation between Martens & Associates Pty Ltd and Cariste Pty Ltd (hereafter known as the Client). That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

Martens & Associates Pty Ltd derived the data in this report primarily from a number of sources including site inspections, correspondence regarding the proposal, examination of records in the public domain, interviews with individuals with information about the site or the popiect, and field explorations conducted on the dates indicated. The passage of time, manifestation of latent conditions or impacts of future events may require further examination / exploration of the site and subsequent data analyses, together with a re-evaluation of the findings, observations and conclusions expressed in this report.

In presparing this report, Martens & Associates Pty. Ltd may have relied upon and presumed accurate certain information (or absence thereof; relative to the site. Except as otherwise stated in the report, Martens & Associates Pty Ltd has not attempted to verify the accuracy of completeness of any such information (including for example survey data supplied by others).

The findings, observations and conclusions expressed by Martens & Associates Pty Ltd in this report are not, and should not be considered an opinion concerning the completeness and accuracy of information supplied by others. No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions are conclusions expressed in this report. Further, such data, findings and conclusions are based solely upon site conditions, information and drawings supplied by the Client etc. in existence at the time of

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Martens & Associates Pty Ltd and the Client. Martens & Associates Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

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All enquiries regarding this project are to be directed to the Project Manager.



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Introduction

1.1 Background

Martens and Associates have prepared this report to support a DA for boundary adjustment and subdivision of Lot 2 DP1036400. The geotechnical testing covers the newly created Lot 2(a). See Attachment A for location.

Relevant Guidelines and Standards

1.2

guidelines and standards: The assessment is prepared in accordance with the following

- Australian Geomechanics Society Landslide Risk Management Concepts and Guidelines (2000);
- Pittwater Council (2009) Geotechnical Risk Management Policy for Pittwater; and
- Australian Standard 1796 (1993) Geofechnical Sife Investigations.

2 Site Description

2.1 Location and Site Description

The subject site is proposed Lot 2(a)_(about 1,220m²) within existing Lot 2 DP 1036400 at 85 Hillside Road, Newport, approximately 600 m west of the headland between Newport Beach and Bilgola Beach, and within the Pittwater Council Local Government Area (Figure 1).



Figure 1: Approximate location of the subject site within its local context (from NSW LPMA 'Six Viewer' online mapping service).

Currently, proposed Lot 2(a) is used for common access, and for the existing residence to the west and is partly vegetated.

The site is bordered by Hillside Road and a vacant lot in the south and neighbouring residential properties to the north, east and west.

2.2 Field Investigations

Site investigations were undertaken on October 1st, 2010, and included the following:

 Walkover inspection of the site to assess existing site conditions and local topography, geology, soil characteristics, hydrology and vegetation;



Geotechnical Assessment:
Proposed Lot 2(a) DP 1036400, 85 Hillside Road, Newport.
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- Excavation of two boreholes to 1.5 2.1 m depth using a hand auger to allow for the characterisation of underlying soils and geology; and
- Penetration testing at three locations to determine preliminary soil strength properties in accordance with AS 1289.6.3.2 (1997).

Sub-surface investigations are shown on Attachment A.

2.3 Topography and Drainage

Site elevation ranges from approximately 66 mAHD in the south to approximately 84 mAHD near the northern boundary. The site maintains slopes of approximately 35% (18 degrees) with a south-east aspect.

No eroded drainage channels or surface water ponding was evident during site investigations. The site appears to maintain acceptable drainage while groundcover vegetation is in place.

2.4 Geology and Soil Profile

The Sydney 1:100,000 Geological Sheet 9130 (NSW Dept. Mineral Resources, 1983) describes the bedrock geology of the site as Newport Formation interbedded laminite, shale and quartz to lithic-quartz sandstone.

Sandstone was observed at the site as both interbedded outcropping and at depths of 2.0-3.3m. Soils generally consist of sand and clayey sand grading to stiff clay. Detailed excavation logs are provided as Attachment B.

2.5 Groundwafer

Site sub-surface investigations did not intercept any groundwater. Based on slope and elevation, we estimate permanent groundwater is within the sandstone bedrock pore space at more than 6 m below ground level at the subject site. We expect that some seepage flows are likely to occur at the soil/rock interface after significant rainfall.



Geotechnical Assessment

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3.1 Geotechnical Risk Management Guidelines

matrices in Appendix A of the guidelines to determine the level of risk to The geotechnical risk assessment for the proposed development has life and property arising from the proposed development. been conducted in accordance with the principles outlined in Pittwater Council's (2009) Geotechnical Risk Management Policy for The assessment employs the qualitative risk assessment

assurances of the following: The objectives of Council's (2009) Geotechnical Risk Management Policy for Pittwater relevant to the proposed development include

- That geotechnical and related structural matters are to the policy; development application to carry out any development subject adequately investigated and documented by applicants or proponents of activities prior to the lodgement of any
- 0 Establishment of whether or not the proposed development should be applied if it is to be carried out, having regard to the activity is appropriate to be carried out, and the conditions that results of the geotechnical and related structural investigations;
- 0 That, in the event that a proposed development activity is only required prior to, during and after the carrying out of the lodgement of the development application including all able to be met and are identified by the applicants prior to the related structural engineering conditions, those conditions are development; appropriate constraints and remedial maintenance actions appropriate to be carried out subject to geotechnical and
- 0 development is carried out in accordance with the policy; and To ensure that effective controls exist to guarantee that a
- 0 addressed and managed for the life of the development. coastal process risks, are identified and can be effectively related structural engineering risks, and, where appropriate, That developments are only carried out if geotechnical and

Pittwater Council Geotechnical Hazard Mapping

3.2

earth which may cause injury or death to persons or damage to, or considered that there is a potential for movement of rock, debris or that the site is classed as being Hazard Zone 1 (Figure 2), meaning it is destruction of property. Pithwater Council's Geotechnical Hazard Mapping (2009) indicates

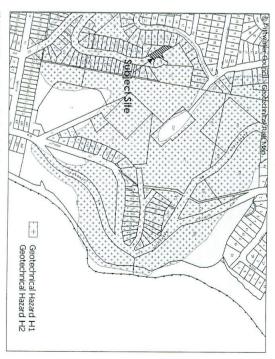


Figure 2: Pittwater Council's Geotechnical Hazard Map (2009) extract showing site.

3.3 Site Classification

as 'Class M' in accordance with AS 2870 (1996) Based on the depth of clay in the soil profile in parts, the site is classified

3.4 Site Stability and Condition of Existing Structures

Field investigations found no evidence of recent gross slope instability

3.5 Soil and Rock Strength

summarised in Table 1. Testing locations are shown on the site plan Soil strength properties for the site have been estimated using *in-situ* DCP testing and borehole derived soil profile data. Results are (Attachment A) and a detailed DCP log sheet is provided as Attachment C.



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Proposed Lot 2(a) DP 1036400, 85 Hillside Road, Newport.

P1002791JR02V02 - November 2010 Geotechnical Assessment:

Table 1: Preliminary estimates of soil strength properties; Lot 2(a) DP 1036400, Hillside Road, Newport.

Soil Description ¹	Typical Depth (m) ²	d ₄ 3 (KN/m³)	Cu4 (kPa)	ςφ	ABC ⁶ (kPa)	ASF7 (KPa)
SILTY SAND and SAND	0.0 - 0.5	15	i	28	09	8
CLAYEY SAND and SANDY CLAY	0.5 – 1.5	15	15		09	35
CLAY	1.5 – 2.0	15	90	E E	100	35
SANDY CLAY	2.0 – 2.5	16	20		120	40
Extremely weathered SANDSTONE	>2.5	20	*	35	400	20

Votes:

- Refer to borehole logs (Attachment B) for soil description details.
- 2 Indicative depth range only. Material depth is subject to variability across the site.
 - 3 In-situ dry unit weight.
- 4 Undrained shear strength.
- ⁵ Internal angle of friction (estimate only for rocks where rock coring has not been
- 4 Allowable end bearing pressure estimate assuming square footing with Dr/B < 0.5. Punching shear effect not assessed.
- 7 Allowable skin friction. Assumes grooves of depth 1-4 mm, width greater than 2mm, spacing at 50 200 mm.

Rock coring and strength testing of bedrock was not undertaken. However, based on available literature regarding local Sydney sandstone and visual inspection of local bedrock outcrops, we consider unweathered sandstone bedrock on-site may be conservatively assumed Class III, classified in accordance with Bertuzzi and Pells (2002). On-site fresh (unweathered) bedrock would have an unconfined compressive strength of approximately 7 MPa and a serviceable bearing capacity of approximately 2 MPa, offset at least 2 m from any scarps. If additional rock engineering properties are required, further testing is recommended prior to construction.

3.6 Risk Assessment of Proposed Development Works

A geotechnical hazard risk assessment for the proposed works has been completed in accordance with the qualitative risk matrices provided in Section 7 of the AGS (2007) guidelines. It is considered that



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Proposed Lot 2(a) DP 1036400, 85 Hilisde Road, Newport.
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three potential forms of geotechnical hazard are possible at the site: gross instability (slump), minor soil creep and rock fall (Table 2). Risk calculation sheets are provided as Attachment E. The indicative dwelling footprint shown on the sub-division plan (Attachment A) has been used for assessing risk to property.

Table 2: Summary of slope instability risk assessment, based on AGS (2007).

			Risk to Life	<u>life</u>	Risk to Property	ĸ
Description	Treatment Measures	Likelihood ¹	Established Probability ²	Risk	Consequence	Risk
	Good hill slope engineering practice.				A	
A: Shallow Rotational Slide	Maintain vegetation cover where possible. Do not over-steepen natural grades. Provide addequate surface and sub-surface drainage.	Unlikely¹	9.4×10-7	Acceptable	Medium	Low
B: Soil creep	Maintain vegetation where possible. Ensure appropriate foundations and footings design.	Almost certain ¹	1.2 × 10-7	Acceptable	Insignificant	Low
C: Rock Fall	Remove or stabilize boulders which may have unacceptable risk. Support rock faces where necessary.	Unlikely¹	8.6 × 10-7	Acceptable	Minor	Low

Note: 1 Based on 'Iteated' site conditions as per recommendations of this report. ² Annual probability of loss of life of an individual.

The proposed development is therefore considered to constitute an acceptable risk to life and a low risk to property resulting from geotechnical hazard and is considered acceptable provided risks are mitigated by good hillslope engineering practices and the recommendations of this report are implemented. A description of good hillslope engineering practices is provided as Attachment F and an inferred geological cross-section is provided in Attachment D.



Geotechnical Risk Management Recommendations

4.1 Excavation

Any temporary or permanent excavations into soil exceeding 0.5 m depth should be supported by suitably designed and installed retaining or shoring structures or, alternatively, using batter slopes of 1 (vertical); 3 (horizontal) if unsupported for less than one month. Unsupported excavations deeper than 1.0 m should be assessed by a geotechnical engineer for slope instability risk. Excavations into fresh bedrock (where required) can be made near vertical. Natural slopes should not be over-steepened without further geotechnical design advice. Open excavations should be backfilled without delay.

Shoring will be required where excavations cannot be completed with botter slopes contained within the properly boundaries. Shoring options may include contiguous piles, geocast walls or solider piles. Depending on the extent of excavation and shoring, temporary soil anchors may also be required. Where soil anchors are required to be installed across the site boundary, consent from neighbours may be required.

4.2 Foundations

It is recommended that all footings are taken to a depth where adequate bearing capacity can be achieved, as determined by a structural engineer and in light of provided soil and rock strength estimates in Table 1.

All footings should be excavated, inspected and poured with minimal delay and should be free from loose or softened materials prior to pouring. If water ponds in the base of the footings, they should be pumped dry and then re-excavated to remove all loose and softened materials. If a delay in pouring is anticipated, we recommend that a blinding layer of at least 50 mm concrete be placed to protect the base of the footing excavation.

4.3 Retaining Structures

Any retaining structures to be constructed as part of site works are to be backfilled with suitable free-draining materials and include suitable drainage measures, such as a geotextile enclosed 100 mm agricultural pipe, to redirect water that may collect behind the retaining walls. Retaining structures are to be constructed such that excessive surface flows do not cause scouring of backfilled materials.

Any new retaining structures greater than 0.5 m high should be designed and inspected by a qualified structural or geotechnical engineer.



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4.4 Soil Erosion Contro

Appropriate soil erosion control methods (in accordance with Landcom, 2004) are required during site works to minimise erosion and provide sediment control in order to reduce the risk of sediment transport off-site and pollution of local stormwater paths. In particular, stockpiles should be covered from the effects of wind and rain when not in use and silt fencing should be installed along the low side of the site. Vegetation cover should be maintained across the site wherever possible during site works.

4.5 Vibrations

Vibrations created during any rock excavation works are to be minimised to reduce potential impacts on neighbouring properties and instability within the surrounding area. Recommended maximum levels of ground vibration (as per AS 2187.2, 1993, Appendix J) are 10 mm/s PPV (peak particle velocity) at the site boundary.

4.6 Surface Boulder Management

In order to minimise the potential for any rock fall during construction of a new dwelling a boulder management plan should be prepared as part of the pre-construction certificate works. The boulder management plan should include the following as a minimum:

- Inspection of boulders likely to be affected by the proposed development as well as any boulders upslope of the proposed dwelling in regards to stability.
- Boulders currently lying within the proposed building envelope should be relocated or removed off-site where required.
- Boulders lying upslope of the proposed building envelope should not be disturbed unless they are identified as particularly unstable.
- Remove or stabilise boulders which may have unacceptable risk.
- If excavation occurs within 2 m downslope of a boulder then the boulder should be stabilised using mass concrete or similar treatment.

4.7 Risk of Dewatering

Proposed excavations are not expected to intercept the permanent water table.

4.9 Waste Disposal

If any soil is to be disposed of off-site, it should be classified in accordance with NSW DEEC (2009) guidelines and disposed of at a suitably licensed waste transfer facility.

4.10 Inspection Schedule

We recommend the following inspections be undertaken (where relevant) by a qualified geotechnical engineer:

- Footing or foundation excavations prior to the pouring of concrete;
- Any rock excavations at 1 m increments; and
- At completion of boulder management works.

4.11 Contingency Plan

In the event that the proposed development works cause an adverse impact on overall site stability, works shall cease immediately. The nature of the impact shall be documented and the reason(s) for the adverse impact investigated. This might require site inspection by a qualified geotechnical or structural engineer.

5

Limitations Statement

The recommendations presented in this report include specific issues to be addressed during the construction phase of the project. In the event that any of the construction phase recommendations presented in this report are not implemented, the general recommendations may become inapplicable and Martens & Associates accept no responsibility whatsoever for the performance of the foundations where recommendations are not implemented in full and property tested, inspected and documented.

A site investigation study cannot be considered a complete and exhaustive characterisation of a site. Occasionally sub-surface soil conditions in areas of the site not specifically tested may be found to be different from those expected. This can also occur with groundwarter conditions, especially after climactic changes. Should, during site works, soil or water conditions be found to be significantly different to those detailed in this report, works shall cease immediately and the new conditions should be addressed by Martens & Associates to determine geotechnical implications before recommencement.

Also, in the event that there are any significant changes to the proposed development described in this report, then all recommendations should be reviewed by Martens & Associates.



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Resistance of a Soil using the 9kg Dynamic Cone Penetrometer. Australia Standard 1289.6.3.2 (1997), Determination of the Penetration

Australian Standard 2187.2 (1993) Explosives - Storage, transport and use Part 2: Use of explosives.

Construction. Australian Standard 2870 (1996) Residential slabs and footings -

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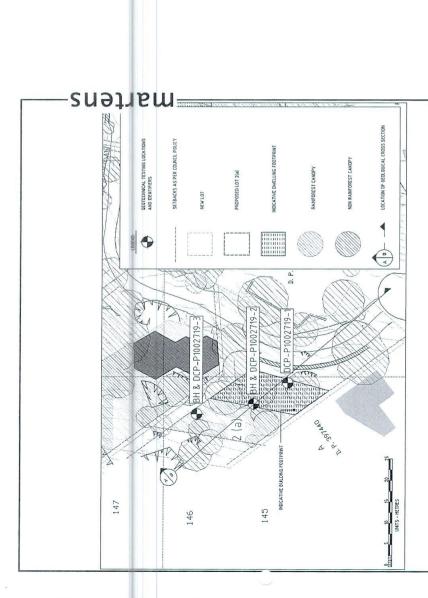
Attachment A - Site Plan

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Attachment B - Excavation Logs

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Attachment C - DCP Log Sheet

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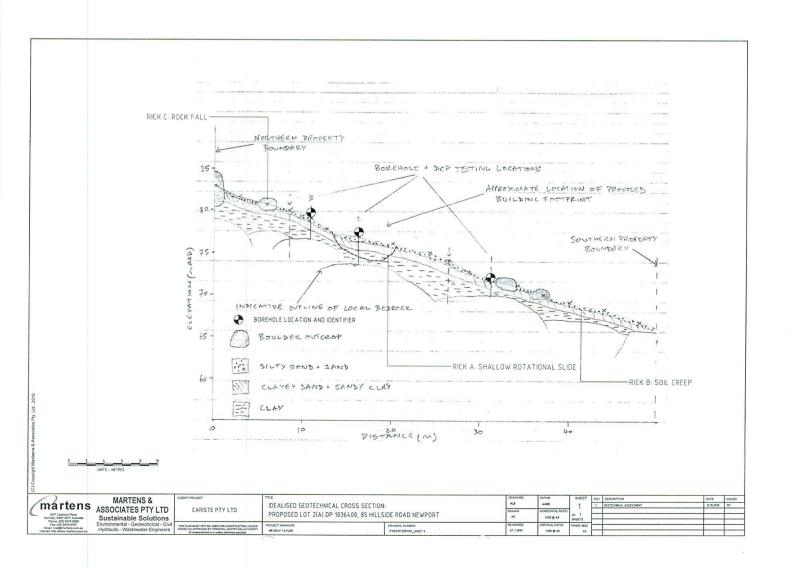
Geotechnical Assessment: Proposed Lot 2(a) DP 1036400, 85 Hillside Road, Newport. P1002791.1802V02 – November 2010 Page 23

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	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	09:0	4	4	5					
5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 5 6 6 6 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	0.75	2 2	4 6	5 6					
		1.05	5	3	3					
20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.20	2	3	9					
10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.50	9	3	3 0					
7 1 3 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	7 1 2 3 2 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1.65	5	3	4					
y (9 p) y (10 p) y (y (9 0 A A A A A A A A A A A A A A A A A A	1.80	=	3	7					
x p = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x p = 0 = 0 = 0 = 0 = 0 = 0 = 0 = 0 = 0 =	21.95	6	4	= 2					
8 8 23 24 25 24 25 25 25 25 25 25 25 25 25 25 25 25 25	8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	2.25	>40	. 80	6					
8 23 24 25 24 25 25 25 25 25 25 25 25 25 25 25 25 25	8 22 23 24 24 24 24 24 24 24 24 24 24 24 24 24	2.40		88	23					
	≥ R R R R R R R R R R R R R R R R R R R	2.55		8	27					
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21 22 3-60 3-60	23 >-60	3.00		25	40					
		3.15		21	40					
		3.30		27						
		040		000						
		100								
		10								

Attachment D – Geological Cross-Section

martens

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11 Attachment E - Geotechnical Risk Calculation Sheets



Geofechnical Assessment:
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Acceptable risk for loss of life for the person(s). Risk level suitable for new developments.

9.40E-07

STEP 2: RISK EVALUATION

1.00

0.9 - 1.0

0.1-0.5

	Method St24 Revised 20,02,08	20	1 6/37 Leighton Place,	(TRAFTENS One 627 Lepten Pear, Hensily, 1877 202, Pr. (27) 1475 209 Fac (22) 1475 1475, malganimas con as, verse marten 4 con as	(02) 9476 9999 Fax: (05	(LH)	MAINMARTERINS	martens c
PROJEC	PROJECT DETAILS							
	Project			85 HillsIde Road, Newport				P1002791JS01V01
STEP 1:	Author STEP 1 : ENTER SITE AND DESIGN DATA	M	M Terel	Reviewed	G Taylor		Created	7.0ct-10
		ATSMI SSOGO	HOLES INSTABILITY (SI IDE)				1	1
Hazaid	and it							
P _(H)	Annual probability of landslide	1.0E-04						
		INDICATIVE VALUE	RECURRENCE	DESCRIPTION	PTION	DESCRIPTOR	LEVEL	
		10,1	10 years	The event is expected to occur over the design	occur over the design	ALMOST CERTAIN	<	
		10.2	100 years	The event will probably occur under adverse conditions over the design life.	occur under adverse	LIKELY	8	
		10,9	1000 years	The event could occur under tadverse condition over the design life.	ider tadverse conditions	POSSIBLE	o	
		10*	10,000 years	The enent might occur circumstances ove	r under very adverse at the design life.	UNCINELY	۵	
		104	100,000 years	The event is concelvex exceptional circumstance	able but only under es over the design life.	RARE	ш	
		10*	1,000,000 years	The event is inconceivable or fanciful over the design life.	ble or fanciful over the	BARELY CREDIBLE	u	
P _(S,Y)	Probabity of spatial impact impacting building location taking into account travel distance and travel direction	0.59						
		FACTOR	DESC	DESCRIPTION	UNITS	VALUE		
† [W,	Likely si	Likely slide/fall width	E	9		
		W ₂	Width of allotmer	Width of all otment / investigation area	E	25		
	Sudernal Investigation Area	Ws	Width of dwelling	Width of dwelling / investigation element	E	15		
		Lsw	Minimum	Minimum run-out length	E	,		
_	Line 	Linea	Maximum	m run-out length	ε	10		
		42	Length of allotme	Length of allotment / investigation area	ε	40		
	1 3	L3	Length of dwelling	Length of dwelling / investigation element	E	18		
		Leven	Probability of run	Probability of runout being 0 - 4 m long	(0-1)	0.75		
	Dwelling / La	LPUM	Probability of runc	Probability of runout being 0 - 10 m long	(0 - 1)	0.25		
	Element	We	Likelihood of across s	Likelihood of across slope strike on risk element	(0 - 1)	1.00		
		Lynn	Likelihood of downsil for minimum	Likelihood of downslope strike on risk element for minimum run-out distance	(0-1)	0.55		
		Lynax	Likelihood of downsk for maximum	Likelihood of downslope strike on risk element for maximum run-out distance	(0 - 1)	0.70		
		Leceson	Likelhood of downsl risk element	Lixelihood of downslope strike (integrated) on risk element run-out distance	(0-1)	65.0		
Prs	Temporal spatial probability given the spatial impact	0.16						
		FACTOR	DESC	DESCRIPTION	UNITS	VALUE		
		T.	Percentage of tim	Percentage of time person(s) are on-site	E	80%		
		Ţ.	Percentage of dwelling	Percentage of dwelling / element that person(s) occupy	B	20%		
V _(VD)	Vulnerability of the individual (ie. probability of loss of life given the impact)	01.0						
		CASE	DES	DESCRIPTION	RANGE IN DATA	RECOMMENDED	COMMENTS	2
			If struck	If struck by a rockfall	0.1 - 0.7	050	May be injured to cause	out unikely eath
		Person in open space		If buried by debris	0.8-1.0	1.00	Death by asphyxia almost certain	kis almost
								T

STEP 2: RISK EVALUATION Landslide Hazard Evaluation - Risk to Life Assessment PROJECT DETAILS TEP 1 : ENTER SITE AND DESIGN DATA azard Type Probabity of spatial impact impacting building location into account travel distance and travel direction Annual probability of landslide spatial probability given the spatial impact 1.18E-07 FACTOR T₁ 0.0001 CASE FACTOR 0.16 Lynn Lynn 0.74 104 0.01 Luna W, 104 M Terel 85 Hillside Road, Newport SOIL CREEP Acceptable risk for loss of life for the person(s). Risk level sultable for new developments. Percentage of dwelling / element that person(s) m RECURRENCE INTERVAL 10 years 100 years 1000 years Probability of runout being 0 - 40 m long Probability of runout being 0 - 1 m long If the vehicle is damaged only DESCRIPTION Likely slide/fell width If buried by debris RANGE IN DATA 0.0-0.3 0.1.0 0.8-1.0 09-10 UNITS M 3 (0-1) (0-1) RECOMMENDED VALUE 0.50 DESCRIPTOR LEVEL ALMOST CERTAIN A VALUE 80% 20% 1.00 0.48 1.00 0.50 25 26 UNLIKELY **a** 5 5 LIKELY 0.30 1.00 0.10 15 RARE POSSIBLE 0.05 1.00 martens May be injured but unlikely to cause death Death by apphysis almost certain High chance of survival Death is almost certain High chance of survival Ref. No. P1002791JS01V01 Created 7-Oct-10

Landslide Hazard Evaluation - Risk to Life Assessment



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PROJECT DETAILS	5	on a composit was, noninely, near year, it is also sees that but a leaf, integralized, com also weathers, com a	Total Louis F	n: (02) 24/0 2222 FAX:	(vz) 9479 8767, mangn	arrens.com.au, ww
Project		851	85 Hillside Road, Newport	port		Ref. No. P1002791J\$01V01
Author	M Terei	erei	Reviewed	610	G Taylor	
STEP 1 : ENTER SITE AND DESIGN DATA						
Hazard Type	ROCK	ROCK FALL				
P _(H) Annual probability of landslide	0.0001					
	INDICATIVE VALUE	RECURRENCE	DESCRIPTION	IPTION	DESCRIPTOR	LEVEL
	10'1	10 years	The event is expected to occur over the design	to occur over the design	ALMOST CERTAIN	>
	10-2	100 years	The event will probabl conditions over	The event will probably occur under adverse conditions over the design life.	LIKELY	0
	10-3	1000 years	The event could occur under tadverse condition over the design life.	nder tadverse conditions lesign life.	POSSIBLE	0
	10*	10,000 years	The enent might occi circumstances ov	The enent might occur under very adverse circumstances over the design life.	UNLIKELY	D
	104	100,000 years	The event is conceivable but only under exceptional circumstances over the design life	vable but only under cas over the design life.	RARE	ш
	10-6	1,000,000 years	The event is inconceivable design life	The event is inconceivable or fanciful over the design life.	BARELY CREDIBLE	n
Probability of spatial impact impacting building location takin into account travel distance and travel direction	0.54					
	FACTOR	DESCRIPTION	PTION	UNITS	VALUE	
W ₂	W,	Likely slide/fall width	vitall width	э	2	
	W ₂	Width of allotment / investigation area	investigation area	3	26	
Area	W ₃	Width of dwelling / investigation element	vestigation element	3	15	
f § J	Lissen	Minimum run-out length	n-out length	m	2	
- L. 100	Lsom	Maximum run-out length	n-out length	m	40	
	5	Length of allotment / investigation area	/ investigation area	3	40	
3 3	5	Length of dwelling / investigation element	nvestigation element	m	18	
	Lower	Probability of runout being 0 - 2 m long	being 0 - 2 m long	(0 - 1)	0.50	
Dwelling /	Leum	Probability of runout being 0 - 40 m long	being 0 - 40 m long	(0 - 1)	0.50	
Element	W,	Likelihood of across slope strike on risk elemen	e strike on risk element	(0 - 1)	0.72	
	Lynn	Likelihood of downslope strike on risk element for minimum run-out distance	strike on risk element n-out distance	(0 - 1)	0.50	
	Levu	Likelihood of downslope strike on risk element for maximum run-out distance	strike on risk element n-out distance	(0 - 1)	1.00	
	Le Desp	Likelihood of downslope strike (integrated) on risk element run-out distance	e strike (integrated) on n-out distance	(0 - 1)	0.75	
P(7:5) Temporal spatial probability given the spatial impact	0.16					
	FACTOR	DESCRIPTION	PTION	UNITS	VALUE	
	1,1	Percentage of time person(s) are on-site	erson(s) are on-site	В	80%	
	Т2	Percentage of dwelling / element that person(s) occupy	/ element that person(s) upy	3	20%	
Vulnerability of the individual (ie, probability of loss of life given the impact)	0.10					
	CASE	DESCRIPTION	PTION	RANGE IN DATA	RECOMMENDED	COMMENTS
		If struck by a rockfall	a rockfall	0.1 - 0.7		May be injured but u
	Person in open space	If buried by debris	y debris	0.8-1.0		Death by asphyxia almost certain

STEP 2: RISK EVALUATION

Risk (annual probability of loss of life of an Individual)

8.64E-07

Acceptable risk for loss of life for the person(s). Risk level suitable for new developments.

0.0-1.0 0.9-1.0 0.8 - 1.0

> 0.30 0.10

High chance of survival
Death is almost certain
High chance of survival
Death is almost certain

1.00 1.00

Death is highly likely.
Very high chance of surviva.

12 Attachment F - Hillside Construction Guidelines (AGS,

2007)



Geotechnical Assessment:
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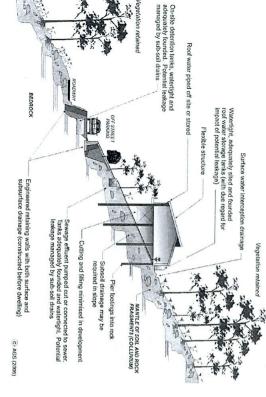
PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

APPENDIX G - SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

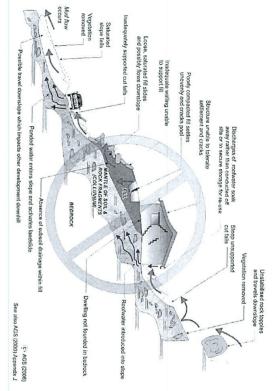
POOR ENGINEERING PRACTICE

GOOD ENGINEERING PRACTICE

RNICAL Suggo of planning and before site works. NUNING Having obtained geotechnical advokes, plan the development with the risk rising from the identified bazards and consequences in mind. AND CONSTRUCTION AND CONSTRUCTION Or steel frames, timber or panel clading. AND CONSTRUCTION Or of steel frames, timber or panel clading. AND CONSTRUCTION Or of steel frames, timber or panel clading. Salishy requirements below for east, fills, retaining walls and drainage. Council specifications for gardes may need to be modified. DENONS National annual vegetation wherever practicable. Support of the diminage measures and erosion control. National controls wherever possible. Retain natural controls wherever possible. Retain natural controls wherever possible. National controls wherever possible. Retain natural controls wherever possible. National controls wherever practicable. Support or fact faces where necessary. INTICON Provide surface drainage and appropriate subsurface drainage on stope or support with majorever pressure in the control of the provide surface drainage and appropriate subsurface drainage on the where practicable. Found on nock where practicable. Support to claims soon as possible after of against and down slope. Found on nock where practicable. Support to claims to nock where practicable. Found on nock	ADVICE	GOOD ENGINEERING PRACTICE	POOR ENGINEERING PRACTICE
transference of the development with the risk has desired hazards and consequences in mind. The identical advice, plan the development with the risk has desired hazards and consequences in mind. Integeration under panel cladding. I regetation wherever practicable. I vegetation wherever practicable where vegetation wherever practicable within wall where vegetation wherever practicable. I vegetation where very practicable where vegetation where vegetation wherever practicable. I vegetation where very paper with engineered retaining wall. A vegetation of and topsel and appropriate subsurface drainage on slope where practicable. I vegetation where very solicle where vegetable risk. I factor where practicable. I veget to reason as possible after cut/fill operation. I rock where practicable. I veget to restain the vegetation where practicable. I very a vegetation where vegetation was one vegetation of the veget	GEOTECHNICAL	Obtain advice from a qualified, experienced geotechnical practitioner at early	Prepare detailed plan and start site works before
ined geotechnical advice, plan the development with the risk this identified hazards and consequences in mind. **st. inher or panel cladding.** of spil levels. **st. inher or panel cladding.** of spil levels. I regelation wherever practicable. I regelation wherever practicable. I regelation wherever practicable. I contours below for cast, fills, retaining walls and draining. I contours below for cast, fills, retaining walls and draining. I contours wherever possible. I contour wherever possible. I contour wherever possible is control. I contour wherever possible is control. I age measures and erosion control. I age measures and erosion control. I age increase and appropriate subsurface draining wall. I age of support with engineered erlaining wall. I ade of the register of the control of th	PLANNING	stage of prainting and octore site works.	georecinical advice.
structures which incoporate properly designed brickwork, timber recreational areas where appropriate. Trecreational areas where appropriate. Integration wherever practicable. In dominus wherever possible. In dominus wherever possible. In departing areas may need to be fully supported on piers. In departing areas may need to be fully supported on piers. In the conjunction for grades may need to be fully supported on piers. In the and topsoil and year was also the propertion of the piers of the	SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk arising from the identified hazards and consequences in mind.	Plan development without regard for the Risk.
redding. redding. redding. redding. redding. redding. red specified blackwork, timber adding. red to be fully supported on piers. red to be fully supported on piers. red to be fully supported on piers. red to expressing standards. red may develop on uptill side whitst there on downlist side. red on downlist side. red conders by silitation and incorporate silt traps. red transpression standards. red maintenance. red conders by selectonical consultant on the flexible where possible. reacceptable. RUCTION RUCTION RUCTION RUCTION red addequately founded. o instability. red advice on consequences.	DESIGN AND CONS	STRUCTION	
Threaticable. Sing, file, retaining would and drainage. May ared to be modified. Therest to end the modified. Therest to engineering standards. Therest to engineering the where possible. Therest than standards of stope and/or direction. This is acceptable. The maintenance. The maintenance. The maintenance of stope and/or direction. This is acceptable to engineering construction. The transportate during construction. The transportate during construction.	HOUSE DESIGN	Use flexible structures which incorporate properly designed brickwork, timber or steel frames, timber or panel cladding. Consider use of spil levels. Use dexis for recreational areas where appropriate.	Floor plans which require extensive cutting and filling. Movement intolerant structures.
with fills, retaining walls and draitinged. Inced to be fully supported on piers. Inced to be fully supported on piers. Inced to be fully supported on piers. Positor control. Walls or batter to appropriate slope. Solio control. In output the regimered retaining wall. Sort with engineered retaining wall. Out with engineered retaining wall. Sort with engineered retaining wall. Fin may have unacceptable risk. Sy. Oil and water forces. In wall backfill and surface drainage on slope and water forces. In wall backfill and surface water. Solio. In wall backfill and surface water. If necessary. If neces	SITE CLEARING	Retain natural vegetation wherever practicable.	Indiscriminately clear the site.
interes to the fairly supported on press. walls for batter to appropriate slope. solion control. walls for batter to appropriate slope. solion control. walls for batter to appropriate slope. solion to an attracting standards. by into natural slopes prior to filling. the to engineering standards. by into natural slopes prior to filling. by into natural slopes prior to filling. by into an anacceptable risk. yoriate subsurface draining wall. by an art forces. in wall backfill and surface draining on slope and an art forces. bit interessay. in recessay. in recessay. interessay develop on uptill side whitst there on downhill side. ces. ces. ces. ces. inter may develop on uptill side whitst there on downhill side. on downhill side. inter may develop on uptill side whiter possible. ces. inter may develop on uptill side whiter than a decentable. for maintenance. inter sewer systems; absorption trenches may are copaled by silitation and decentable founded. o instability. In and adequately founded. o instability. receptable. Tread of the sewer of the section of the standard proparate during construction/ roken joints in drains and leaks in supply are seed advice on consequences.	ACCESS & DRIVEWAYS	Satisfy requirements below for cuts, fills, retaining walls and drainage. Council specifications for grades may need to be modified.	Excavate and fill for site access before geotechnical advice.
walls or batter to appropriate slope. District or control. The state of the state of filling, and to engineering standards. The state or controling standards. The state or controling standards. The state of controling standards. The state of controling standards. The may have unacceptable risk. The state of	EARTHWORKS	Driveways and parking areas may need to be turny supported on piers. Retain natural contours wherever possible.	Indiscriminatory bulk earthworks.
y into natural slopes prior to filling, act to engineering standards. out with engineering standards. out with engineered retaining wall. proper the sugment of the standards. oil and water forces. In wall backfill and surface drainage on slope after cavifill operation. If necessary. chief the standard fown slope. If necessary. chief drain outlet where practicable. ich may develop on uphill side whilst there nich may develop on uphill side. ses. conditions the standard direction. gravity drain outlet where possible. standard where possible. in may develop on uphill side whilst there nich may develop on uphill side whilst there on downhill side. ses. that where possible is that the standard in standard in the standard in the standard on instability. RICCTION RUCTION RESEARCH FORCE OF CORSIGNER IN SUPPLY RESEARCH FORCE OF CORSIGNER OF SUPPLY RESEARCH FORCE OF CORSIGNER OF SUPPLY RESEARCH STANDARD OF SUPPLY R	Curs	Minimise depth. Support with engineered retaining walls or batter to appropriate slope. Support with engineered necessines and erosion control.	Large scale cuts and benching. Unsupported cuts. Jenore drainage requirements
y an on tourns stopes prior to ming- y anto interns stopes prior to ming- y art to organeering standards. For this pagneter of retaining wall. Organise substrated efraining wall. Organise substrated efraining wall. Organise substrated organise. Organise substrate of the substrate substrated by the care cavifil operation. If necessary. If necessary. If necessary clude ingress of surface water, clude ingress of surface water, clude ingress of surface water, and water courses. Ses. Ses. In may develop on uphill side whilst there on downhill side. Ses. In may develop on uphill side whilst there on downhill side. Ses. In man water courses, and envisible where possible. In man water courses, Ses. Set maintenance. In man water courses, and organish substrated organism or instability. SUCCTION SUCCTION RUCTION Rus and leaks in supply It see advice.		Minimise height.	Loose or poorly compacted fill, which if it fails,
yort wan engineered relaming wan. pyrinde subsurface deninge. yo. oil and water forces. in wall backfill and surface drainage on slope after cut/fill operation. lifencessary. filnecessary. filnecessary. finecessary. fine may expert owners. sea. fine may deepen possible of traps. and for finection. fine. fine. fine. fine. fine. fine may exceptable. fine and for direction. and of the viewed by geotechnical consultant propriate during construction/ outd be viewed by geotechnical consultant propriate during construction/ outd be viewed by geotechnical consultant propriate during construction/ outd be viewed by geotechnical consultant propriate during construction/ outd be viewed by geotechnical consultant propriate during construction/ stee advice.	200	Surp vegetation and tobson and key into the adula slobes prior to mining. Use clean fill materials and compact to engineering standards.	may now a considerable distance including onto property below.
th may have unacceptable risk. Ty. In wall backfill and surface drainage on slope and water forces. In wall backfill and surface drainage on slope after cut/fill operation. Bio. Oriented up and down slope. Fill necessary. Clude ingress of surface water. San and down list there on down the surface water. San and downhill side. San and develop on uphill side whilst there on downhill side. San and the surface water. San and counted water possible. San and the face of surface and or direction. Ills. For maintenance. San acceptable. In and adequately founded. Oinstability. To instability. To instability out the water of surface on consequences.	FILLS	bater to appropriate stope of support with etigineered retaining wan. Provide surface drainage and appropriate subsurface drainage.	Block haural drainage lines. Fill over existing vegetation and topsoil. Include stumps, trees, vegetation, topsoil,
in wall backfill and surface drainage on slope after curfill operation. The curfill operation is loop. The curfill operation is loop. The curfill operation of the curfill operation of downhill side. The curfill operation of the curfill operation. The curfill operation of the curfill operation. The maintenance. The maintenance of the geotechnical consultant of instability. The curfill of the curfile curfill of the curfile curfill of the curfilly	ROCK OUTCROPS	Remove or stabilise boulders which may have unacceptable risk.	Disturb or undercut detached blocks or
n wall backfill and surface drainage on slope in wall backfill and surface drainage on slope of coincined up and down slope. If necessary clauface water, clude ingress of surface water, inch may develop on uptill side whitst there on downhill side. se standard courses. and develop on uptill side whitst there of close by silitation and incorporate silt traps. The surface of surface in the surface of silope and/or direction. Ills. for maintenance. for maintenance. for maintenance. for maintenance. of instability. AUCCTION TRUCTION TRUCTIO	& BOULDERS	Support rock faces where necessary. From the resist annied soil and water forces	Construct a structurally inadequate wall such as
bie. If necessary. Clude ingress of surface water. Inchessary. Inchessary. Inchessary with dain outlet where practicable, and ownshill side. Inchessary with dain outlet where prospective will traps. The water courses. Ockage by siltation and incorporate silt traps. The water courses ockage by siltation and incorporate silt traps. The water course of stope and/or direction. Inchessary with the water prospile. For maintenance. In and adequately founded, o instability. AUCTION TOWN TOW	RETAINING WALLS	angueste usaga, no tessa appria sori ana watet notos. Found on rock where practicable. Provide subsurface drainage within wall backfill and surface drainage on slope above. Gostninet wall as soon as nossible after eurifill overnition	consult a succutanty manequate wan stein as sandstone flagging, brick or unreinforced blockwork. Lack of subsurface drains and weepholes.
coriented up and down slope. The necessary. The necessary. The necessary. The necessary develop on upfull side whilst there on downhill side. The necessary develop on upfull side whilst there on downhill side. The necessary develop on upfull side whitst there on downhill side. The necessary develop on upfull side whitst there are for the necessary of the necessary of the necessary of the necessary of slope and/or direction. The name of the necessary of slope and/or direction. The name of the necessary of slope and/or direction. The name of the necessary of slope and/or direction. The name of the necessary of slope and/or direction. The name of the necessary of slope and/or direction. The name of the necessary of slope and/or direction. The name of the necessary of the name		Found within rook where practicable	Found on toneoil loose fill detached boulders
reticable. garyity dain outlet where practicable. ich may develop on uphill side whilst there on downhill side. es. cs. trul water courses, cokage by sillation and nicorporate sill traps, andse flexible where possible. Taln. flex maintenance. flex maintenance. fins sewer systems; absorption trenches may acceptable. fins sewer systems; absorption trenches may acceptable. for maintenance. of instability. CUCTION TOWN TOW	FOOTINGS	count within tock wiree paracteour. Use rows of piers or strip footings oriented up and down slope. Design for lateral creep pressures if necessary. Backfill footing excavations to exclude ingress of surface water.	round on topson, posse 111, detaction bounders or undercut cliffs.
to coke by silention and incorporate silt traps. or cokage by silention and incorporate silt traps. make flexible where possible. Tain. Tain	SWIMMING POOLS	Enginent educing met. Provide with under-drainage and gravity drain outlet where practicable. Provide with under-drainage and gravity drain outlet where practicable. Design for high soil preserves which may develop on upiill side whilst there may be little or no lateral support on downhill side.	
tural water courses. cokage by stillent on and incorporate silt traps. ander flexible where possible. Egy at changes of slope and/or direction. frain. Ils. for maintenance. for maintenance. for maintenance. Seever systems; absorption trenches may acceptable. An adequately founded. It and adequately founded. It and adequately founded. It and adequately founded. TRUCTION TRUCTION TRUCTION TOWN IN THE CONSTRUCTION THE CONSTRU	DRAINAGE		
Ils. for maintenance. for maintenance. ins sewer systems; absorption trenches may acceptable. o instability. RUCTION RUCTION The payoptiate during construction/ proportiate during construction/ roke a viewed by geotechnical consultant proportiate during construction/ roken joints in drains and leaks in supply It see davice.	Surface	Provide at 109s of cut and fill slopes. Discharge to street defininge or natural water courses. Provide general falls to prevent blockage by silution and incorporate silt traps. Line to minimise in fillration and make Robids where possible with the Special structures to dissipate energy at changes of slope and/or direction. Special structures to dissipate energy at changes of slope and/or direction.	Discharge at top of fills and cuts. Allow water to pond on bench areas.
ins severe systems; absorption trenches may acceptable a secondarial or acceptable in and adequately founded. RUCTION RUCTION TOWN viewed by geotechnical consultant ppropriate during construction/ roken joints in drains and leaks in supply as see advice.	SUBSURFACE	Provide filter around subsurface drain. Provide drain behind retaining walls. Use flexible pipelines with access for maintenance. Prevent inflow of surface water.	Discharge roof runoff into absorption trenches.
n and acequatery founded or ansature to observe earthworks recommendations when landscaping the viewed by geotechnical consultant appropriate during construction/ rocken joints in drains and leaks in supply is see advice. 11 see advice. 12 and a manual and leaks in supply is seed advice.	Septic & Sullage	Usually requires pump-out or mains sewer systems; absorption trenches may be possible in some areas if risk is acceptable.	Discharge sullage directly onto and into slopes. Use absorption trenches without consideration
RUCTION ould be viewed by geotechnical consultant ppropriate during construction/ rroken joints in drains and leaks in supply st see advice. uses or seek advice on consequences.	EROSION	Control erosion as this may lead to instability.	Failure to observe earthworks and drainage
DRAWINGS AND SITE VISITS DURING CONSTRUCTION DRAWINGS AND SITE VISITS BURING CONSTRUCTION SITE VISITS Site Visits by consultant may be appropriate during construction INSPECTION AND MAINTENANCE BY OWNER OWNER'S Clean drainage systems; repair broken joints in drains and leaks in supply RESPONSIBILITY Where structural distress is evident see advice on consequences.	CONTROL & LANDSCAPING	Revegetate cleared area.	recommendations when landscaping.
DRAWINGS Building Application drawings should be viewed by geotechnical consultant	DRAWINGS AND SI	ITE VISITS DURING CONSTRUCTION	
INSPECTION AND MAINTENANCE BY OWNER OWNER'S Clean drainage systems; repair broken joints in drains and leaks in supply RESPONSIBILITY pipes. If see structural distress is evident see advice. If seepage observed, determine causes or seek advice on consequences.	DRAWINGS SITE VISITS	Building Application drawings should be viewed by geotechnical consultant Site Visits by consultant may be appropriate during construction/	
	INSPECTION AND	MAINTENANCE BY OWNER	
If seepage observed, determine causes or seek advice on consequences.	OWNER'S RESPONSIBILITY	Clean drainage systems; repair broken joints in drains and leaks in supply pipes. Where structural distress is evident see advice.	и
		If seepage observed, determine causes or seek advice on consequences.	



EXAMPLES OF POOR HILLSIDE PRACTICE



Management Policy Forms 1 and 1a Attachment G - Pittwater Council Geotechnical Risk

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Australian Geomechanics Vol 42 No 1 March 2007



Proposed Lot 2(a) DP 1036400, 85 Hillside Road, Newport. P1002791JR02V02 - November 2010 Geotechnical Assessment:

nformation

Important Information About Your Report

Subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Martens to help you interpret and understand the limitations are necessarily relevant to all reports, but are included as the contract what all of course, are necessarily relevant to all reports.

Engineering Reports - Limitations

Geolechnical reports are based on information gained from limited sub-surface site testing and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretative rather than factual documents, limited to some extent by the scope of information or which the same extent by the scope of intormation on which they rely.

Engineering Reports – Project Specific Criteria

by Mariens. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by obtained, on current engineering standards of interpretation and analysis, and on the basis of your Engineering reports are prepared by qualified personnel and are based on the information the Client. unique project specific requirements as understood

Where the report has been prepared for a specific design proposal (eg. a three storey building), the information and interpretation may not be relative if the design proposal is changed (eg. to a twenty storey building). Your report should not be relied upon if there are changes to the project without first asking Martens to assess how factors that changed design changes if they are not consulted. responsibility for problems that may occur due to report's recommendations. Martens will not accept subsequent to the date of the report affect the

throughout an area. This assumption often cannot be substantiated until project implementation has commenced and therefore your site investigation report recommendations should only be regarded conditions as revealed through selective point sampling are indicative of actual conditions Your report is based on the assumption that the site

recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Martens cannot be held Only Martens, who prepared the report, are fully familiar with the background information needed to assess whether or not the report's esponsible for such misinterpretation

Engineering Reports – Use For Tendering Purposes Where information obtained from this investigation

is provided for tendering purposes, Marriens recommend that all information, including the written report and discussion, be made available. In may be appropriate to prepare a specially edited document. Attention is drawn to the document Guidelines for the Provision of Geotechnical circumstances where the discussion or comments Institution of Engineers, Australia. Information in Tender Documents', published by the section is not relevant to the contractual situation, it

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

Engineering Reports – Data

copied in part or altered in any way. The report as a whole presents the findings of the site assessment and the report should not be

Logs, figures, drawings etc are customarily included in a Martens report and are developed by scientists, engineers or geologists based on their interpretation laboratory evaluation of field samples. These data should not under any circumstances be redrawn for of field logs (assembled by field personnel) and report in any way. inclusion in other documents or separated from the

Engineering Reports – Other Projects

and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was your report it is recommended that you confer with Martens before passing your report on to another party who may not be familiar with the background To avoid misuse of the information contained in

Subsurface Conditions - General

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

- Unexpected variations in ground conditions (eg. excavation or borehole) spacing and sampling frequency which are often limited by project imposed budgetary constraints. the potential for will depend partly on test point
- Changes in guidelines, standards and policy or

policy by statutory authorities.

actions of contractors responding commercial pressures. The

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Actual conditions differing somewhat from those inferred to exist, because no professional, no matter how qualified, can reveal precisely what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions If these conditions occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

Subsurface Conditions - Changes

Natural processes and the activity of man create subsurface conditions. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Reports are based on conditions which existed at the time of the subsurface exploration. Decisions should not be based on a report whose adequacy may have been affected by time. If an extended period of time has elapsed since the report was prepared, consult Martens to be advised now time may have impacted on the project.

Subsurface Conditions - Site Anomalies

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

Report Use By Other Design Professionals
To avoid potentially costly misinterpretations when project professionals who are affected by the report. This may involve Martens explaining the report design implications and then reviewing plans and specifications produced to see how they have other design professionals develop their plans based on a report, retain Martens to work with other ncorporated the report findings.

Subsurface Conditions - Geoenvironmental Issues

Your report generally does not relate to any findings, conclusions, or recommendations about the potential for hazardous or contaminated materials existing at the site unless specifically the potential for hazardous or contaminated materials existing at the site unless specifically required to do so as part of the Company's proposal for works.

create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact equipment, techniques and personnel are typically perform geoenvironmental or site contamination assessments. Contamination can Martens for information relating to such matters. and guidelines sampling 9 Specific nsed

Responsibility

Geotechnical reporting relies on interpretation of factual information based on professional judgment uncertainty attached to it and is typically far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, and opinion and has an inherent level which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate labilities from Martens to other parties but are included to identify where Martens' to help all parties involved to recognize their individual responsibilities. Read all documents from Martens closely and do not hesitate to ask any responsibilities begin and end. Their use is intended questions you may have.

Site Inspections

Martens will always be pleased to provide engineering inspection services for aspects of work to which this report is related. This could range from Martens is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site. construction.

Soil Data

Explanation of Terms (1 of 3)

Definitions

In engineering terms, soil includes every type of uncernented or partially cemented inorganic or against martial found in the ground, in practice, if the moterial dees not exhibit any visible nock properties and can be remoulded or disintegrated by hand in its field condition or in water it is described as a soll. Other materials are described using rock description terms. The methods of description and classification of sals and rocks used in hits report are based on Australian Standard 1726 and the S.AA. Site Investigation Code. In general descriptions, cover the following properties - strength or density, colour, structure, soil or rock type and inclusions

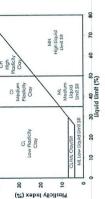
Particle Size

Sail types are described according to the predominating particle size, qualified by the grading of other particles present (eg. snady clidy). Unless otherwise stated, particle size is described in accordance with the following table.

Division	Subdivision	Size
BOULDERS		>200 mm
COBBLES		60 to 200 mm
	Coarse	20 to 60 mm
GRAVEL	Medium	6 to 20 mm
	Fine	2 to 6 mm
	Coarse	0.6 to 2.0 mm
SAND	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2 mm
SILT		0.002 to 0.075 mm
CLAY		< 0.002 mm

Plasticity Properties

Plasticity properties can be assessed either in the field by tactile properties, or by laboratory procedures.



Moisture Condition

- Looks and feels dry, Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands. Duy
- Soil feels cool and damp and is darkened in colour, Cohesive soils can be moulded. Granular soils tend to cohere. Moist
- As for moist but with free water forming on hands when handled. Wet

Consistency of Cohesive Solls
Cohesive soils refer to predominantly clay materials.

Term	C _v (kPa)	Approx SPT "N"	Field Guide
Very	<12	2	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	2 to 4	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	4 - 8	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	8-15	The surface of the soil can be indented with the thumb, but not penetrated.
Very	100 - 200	15-30	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	> 200	> 30	The surface of the soil can be marked only with the thumbnail.
Friable			Crumbles or powders when scraped by thumbnail

Density of Granular Soils

Charles soils are classified on the basis of relative charity, generally from the results of standard penetration test (SPI) or Dutch come penetrometer tests (CPI) as

Relative Density	%	SPT 'N' Value (blows/300mm)	CPT Cone Value (qc Mpa)
Very loose	< 15	< 5	<2
Loose	15-35	5-10	2-5
Medium dense	35 - 65	10 - 30	5-15
Dense	65-85	30 - 50	15-25
Very dense	> 85	> 50	> 25

Minor Components

Minor components in soils may be present and readily detectable, but have little bearing on general geotechnical classification. Terms include:

Ierm	Assessment	Minor component in:
Trace of	Presence just detectable by feel or eye, but soil properties	Coarse grained soils: < 5 %
	little or no different to general properties of primary component:	Fine grained soils: < 15 %
	Presence easily detectable by feel or eve, soil properties little	Coarse grained soils: 5-12%
with some	different to general properties of primary component.	Fine grained soils: 15-30%

Explanation of Terms (2 of 3)

Soil Agricultural Classification Scheme
In some situational agricultural classification scheme.

In some situational agricultural classification schemes. Where a Martens report provides agricultural classification schemes. Where a Martens report provides agricultural classification schemes. Where a Martens report provides agricultural classifications, these are undertaken in accordance with descriptions by Northcote, K.H. (1979) The factual key for the recognition of Australian Soils.

Relim Technical Publications, NSW., p 28 - 28.

Symbol	Field Texture Grade	Behaviour of moist bolus	Ribbon length	Clay content (%)
s	Sand	Coherence nil to very slight; cannot be moulded; single grains adhere to fingers	0 mm	^ G
Ľ	Loamy sand	Slight coherence: discolours lingers with dark organic stain	6.35 mm	C)
CIS	Clayey sand	Slight coherence; slicky when wet; many sand grains stick to fingers; discolours fingers with clay stain	6.35mm - 1.3cm	5-10
SL	Sandy loam	Bolus just coherent but very sandy to touch; dominant sand grains are of medium size and are readily visible	1.3 - 2.5	10 - 15
FSL	Fine sandy loam	Bolus coherent; fine sand can be felt and heard	1.3-2.5	10 - 20
SCI-	Light sandy clay loam	Bolus strongly coherent but sandy to touch, sand grains dominantly medium size and easily visible	2.0	15 - 20
-	Loam	Bolus coherent and rather spongy; smooth feel when manipulated but no obvious sondiness or silkiness; any be somewhat greasy to the touch if much organic matter present	2.5	25
Lfsy	Loam, fine sandy	Bolus coherent and slightly spongy: fine sand can be felt and heard when manipulated	2.5	25
SIL	Silt loam	Coherent bolus, very smooth to silky when manipulated	2.5	25 + > 25 sllt
SCL	Sandy clay loam	Strongly coherent bolus sandy to touch; medium size sand grains visible in a finer matrix	2.5 - 3.8	20 - 30
5	Clay loam	Coherent plastic bolus; smooth to manipulate	3.8 - 5.0	30 - 35
SICL	Silty clay loam	Coherent smooth bolus; plastic and silky to touch	3.8 - 5.0	30- 35 + > 25 slit
FSCL	Fine sandy clay loam	Coherent bolus: fine sand can be felt and heard	3.8 - 5.0	30 - 35
SC	Sandy clay	Plastic bolus; fine to medium sized sands can be seen, felt or heard in a clayey matrix	5.0 - 7.5	35 - 40
SIC	Silty clay	Plastic bolus; smooth and silky	5.0 - 7.5	35 - 40 + > 25 silt
Ю	Light clay	Plastic bolus; smooth to touch; slight resistance to shearing	5.0 - 7.5	35 - 40
LMC	Light medium clay	Plastic bolus; smooth to touch, slightly greater resistance to shearing than LC	7.5	40 - 45
MC	Medium clay	Smooth plastic bolus, handles like plasticine and can be moulded into rods without fracture, some resistance to shearing	> 7.5	45 - 55
~	Heavy clay	Smooth plastic bolus; handles like stiff plasticine; can be moulded into rods without fracture; firm resistance to shearing	> 7.5	> 50



Symbols for Soil and Rock Explanation of Terms (3 of 3)

SOL COSMESS AND GOOD AND COMMENT OF AN OWN SANDSTONE. QUARTZITE SILTSTONE LAMINITE Od conglomerate SEDIMENTARY ROCK CLAYSTONE COAL COAL LIMESTONE H GRANITE H GRANITE BASALT

Unified Soil Classification Scheme (USCS) FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 43 mm and trade to the field of
District of the second	ORGANIC SOILS	٨	Nore ti	nan 50 %	IE GRAI of mat iller thai	erial le	ss than	63 mm	is	More	than 50	CC)% of ma		RAINED s than 6	SOILS 3 mm is l	arger tha	ın 0.075	
	100				(A 0	.075 m	m parti	cle is ab	out	the sma	llest part	icle visible	e to the	naked e	ye)			
	Readil	Medium to High	High	Low to Medium	Low to Medium	Medium to High	None to Low	(Crushing Characteristics)		More t	than half o	NDS of coarse fr nan 2.0 mm		More	than half o	AVELS of coarse t an 2.0 mn		(Excluding pa
	y identified by co	None	None	Slow to Very	Slow to Very Slow	None	Quick to Slow	DILATANCY		(Appr	NES eciable ount of nes)	SAI (Little	EAN NDS or no es)	(Appr	AVELS I FINES reciable ount of nes)	GR/	EAN AVELS e or no nes]	rticles larger than
	olour, odour, spon	Low to Medium	High	Low to Medium	Low	Medium	None	TOUGHNESS	IDENTIFICATI	Plastic fine	Non-plastic fi	Predominantly on	Wide range in grain sizes and	Plastic fine	Non-plastic f	Predominantly or	Wide range in grain	63 mm and basin
	Readily identified by colour, odour, spongy feet and frequently by fibrous texture	Organic clays of medium to high plasticity	Inorganic clays of high plasticity, fat clays	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Organic slits and organic sity clays of low plasticity	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays	Inorganic sits and very line sands, rock flour, sity or clayey line sands with slight plasticity	DESCRIPTION	DENTIFICATION PROCEDURES ON FRACTIONS < 0.2 MM	Plastic fines (for identification procedures see CL below)	Non-plastic fines (for Identification procedures see ML below)	Predominantly one size or a range of sizes with some intermediate sizes missing	rain sizes and substantial amounts of intermediate sizes missing.	Plastic fines (for identification procedures see CL below)	Non-plastic fines (for identification procedures see ML below)	Predominantly one size or a range of sizes with more intermediate sizes missing	Wide range in grain size and substantial amounts of all intermediate particle sizes.	(Excluding particles larger than 63 mm and basing fractions on estimated mass)
	₽	오	СН	H	9	5	¥	uscs		SC	SM	SP	WS	GC	GM	ଦୁ	GW	uscs
	Peat	Organic Silt	Clay	SIII	Organic Silt	Clay	Silt	Primary Name		Clayey Sand	Silly Sand	Sand	Sand	Clayey Gravel	Silty Gravel	Gravel	Gravel	Primary Name

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SUATE, PHYLLITE SCHIST IGNEOUS ROCK

Rock Data Explanation of Terms (1 of 2)

Definitions
Descriptive terms used for Rack by Martens are given below and include rack substance, rack defects and rack mass.

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Rock Substance

In geotechnical engineering terms, rock substance is any naturally occurring aggregate of minerals and arganic matter which comot, unless externely weathered, be dishingrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Rock substance is effectively homogeneous and may be isotopic or enfeather.

Rock Defect

Discontinuity or break in the continuity of a substance or substances.

Rock Mass

Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

Degree of Weathering
Rock weathering is defined as the degree in rock structure and grain property decline and can be readily determined in the field.

Term	Symbol	Definition
Residual Soil	82	Soil derived from the weathering of rock. The mass structure and substance fabric are no longer evident. There is a large change in volume but the soil has not been significantly transported.
Extremely weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits sail properties - le. It can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly weathered	MH	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the next substance and other signs of chemical or physical decomposition are evident. Parasity and strength may be increased and extense compared to the fresh nack usually as a result of iron leaching or deposition. The colour and strength of the original rock substance is no longer recognisable.
Moderately weathered	WW	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
Slightly weathered	SW	Rack substance affected by weathering to the extent that partial staining or discoluration of the rock substance usually by finantie has taken place. The colour and texture of the fesh rock is recognisable.
Fresh	Ŧ	Rock substance unaffected by weathering

Rock Strength
Rock strength is defined by the Point Load Strength Index (is 50) and refers to the strength of the rock substance is the direction normal to the bedding. The test procedure is described by the international Society of Rock Mechanics.

Term	Is (50) MPa	Field Guide	Symbol
Extremely weak	< 0.03	Easily remoulded by hand to a material with soil properties.	EW
Very weak	0.03 - 0.1	May be crumbled in the hand. Sandstone is 'sugary' and frlable.	WA
Weak	0.1 - 0.3	A piece of core 150mm long x 50mm diameter may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	>
Medium strong	0.3 - 1	A piece of core 1 50mm long x 50mm diameter can be broken by hand with considerable difficulty. Readily scored with a knife.	MS
Strong	1-3	A piece of core 150mm long x 50mm diameter cannot be broken by unaided hands, can be slightly scratched or scored with a knife.	S
Very Strong	3-10	A piece of care 150mm long x 50mm diameter may be broken readily with hand held hammer. Cannot be scratched with pen krife.	VS
Extremely strong	01 <	A piece of core 150mm long x 50mm diameter is difficult to break with hand held harmer. A piece of core 150mm long x 50mm diameters of core 150mm long x 50mm diameters.	B

Explanation of Terms (2 of 2)

Explanation of Terms (2 of 2)

Degree of Fracturing
This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rack defects, but excludes fractures such as artifling preaks.

Term

Description

Term	Description
Fragmented	The care is comprised primarily of fragments of length less than 20mm, and mostly of width less than care diameter.
Highly fractured	Core lengths are generally less than 20mm-40mm with occasional fragments.
Fractured	Core lengths are mainly 30mm-100mm with occasional shorter and longer sections.
Slightly fractured	Care lengths are generally 300mm-1000mm with occasional longer sections and occasional sections of 100mm-300mm.
Unbroken	The core does not contain any fractures.



Explanation of Terms (1 of 2) Test Methods

Sempling is corried out during drilling or excavation 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

Undisturbed samples may be taken by pushing a thin-walled sample tube into the soils and withdowing a soil sample in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of steror strength and compressibility. Undisturbed sampling is generally affective only in cohesive soils. Other sampling methods may be used. Details of the type and method of sampling are given in the report.

The following is a brief summary of drilling methods currently adapted by the Company and some comments on their use and application. Drilling Methods The following is a

Hand Excavation – in some situations, excavation using hand tools such as mattack and spade may be required due to limited site access or shallow soil profiles.

Hand Auger - the hole is advanced by pushing and rataling either a sond or cloy auger generally 75-100mm in diameter into the garund. The depth of penetration is ausoly limited to the length of the auger pole, however extender pieces can be added to lengthen this.

<u>Test Pits</u> - these are excavaled with a backhoe or a charced excavalor, allowing Gose examination of the insity salis if it is safe to descend into the pit. The depth of penetration is finited to about 3m for a backhoe and up to 4m for an excavalor. A potential disadvantage is the disturbance caused by the excavalian.

<u>Large Diameter Auger (eg., Penga)</u> - the hole is advanced by a colding plate a shot spidl auger, generally 30mm by or lor greet in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5m) and are disturbed but usually unchanged in moisture content, identification of soil strate is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by accostand undisturbed tube sampling. Continuous Sample Drilling - the hole is advanced by pushing a 100mm diameter socket into the ground and withdrawing it al intervals to extrude the sample. This is the mast reliable method of affilling in soils, since moisture content is unchanged and soil structure, strength etc. is only marginally affected. Continuous <u>Soiral Flight Auges</u> - the hole is advanced using 90 - 115 mm dometer continuous spiral light augests which are withdrawn at intervals to allow sampling or in-situ testing, this to a celatively economical mens of diffling in closy and in sands above the water table. Samples are returned to the surface or, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated, information from the diffling and may be contaminated, information from the diffling samples) is a clieditively lower reliability, due to maisturbed 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 statification can be determined from the cuttings, together with some information from 'feet' and rate of penetration.

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

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

Standard Penetration Tests

Standard penetration tests are used mainly in non-charles sail, but occasionally date in chestive sails as means of determining density or stength and also do obtaining a relatively undisturbed sample. The test procedure is described in AS 1289 Methods of Testing Soils for Engineening Purposes - Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760mm. It is normal for the tube to be diven in three successive 150 mm increments and the IV value is taken as the number of blows for the last 300mm, in dense sands, very hard alops or weak rock, the 141 450mm penetration may not be practicable and the test is discontinued.

the test results are reported in the following form:

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

 $0s\,4,6,7$ N = 13 [II] na cose where the test is discontinued short of full (III) na cose where the lest is blows for the first 150mm and 30 blows for the next 40mm

as 15, 30/40 mm.

The results of the tests can be redade empirically to the empireering properties of the soil. Occasionally, the test method is used to obtain samples in 30mm diament thin winded sample flubes in Cays, in such circumstances, the test results are shown on the bacelogs in brackets.

CONE PENETROMETER TESTING AND INTERPRETATION

Cone penetrometer testing (sometimes referred to as Dutch Cone - abbreviated as CPI) described in this report has been carried out using an electrical friction cone has been carried out using an electrical friction cone penetrometer. The test is described in AS 1289 - Test F4.1. In the test, a 35mm diameter rad with a cone tipped end is pushed confinuously into the soil, the reaction being provided by a specially designed track or rig which is fifted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on separate 136mm long sleeve, immediately behind the cone. Tranduces in the fit of the assembly are connected by electrical wires possing through the centre of the push rads 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 output on continuous chart

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est Methods Explanation of Terms (2 of 2)

recorders. The plotted results given in this report have been traced from the original records.

Cone resistance - the actual end bearing force divided by the cross sectional area of the cone - expressed in MPA.

Sleeve friction - the frictional force of the sleeve divided by the surface area - expressed in kPa.

Friction ratio - the ratio of sleeve friction to cone resistance The information provided on the charts comprises:

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

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

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

qc (Mpa) = (0.4 to 0.6) N (blows/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 statilication as shown on the attached reports is assessed from the cone and fiction traces and from experience and information from nearby bareholes 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 where practice information on soil cossilication is required, direct drilling and sampling may be preferable.

DYNAMIC CONE (HAND) PENEROMETERS
Hand penatrometer tests are confied out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150mm increments of penetration. Namonly, there is a depth limitation of 1.2m but this may be extended in certain conditions by the use of extension rods. Two relatively similar tests are used.

Perith sand penetrometer - a 16 mm diameter flat ended rad is driven with a 9kg hammer, dropping 600mm (AS 1289 - Test 1 3.3). This test was developed for testing the 1289 - Test 6 3.3). This test was developed for testing the density of sands (priginating in Perith) and is mainly used in accountable for the same of
granular soits and filling.

Cone penetrometer (Sometimes known as the Scala Cone penetrometer) - a lamm tod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS 1289 - test = 1.32). The test was developed initially for powement sub-grade investigations, with correlations of the test results with California bearing ratio published by various Scoad Authorities.

Laboratory testing is carried out in accordance with AS 1289 Methods of Testing Soil for Engineering Purposes. Details of the test procedure used are given on the

rest PIT / BORE LOGS
The test pit / bore log(s) 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 excovation / adiling, letedly, confluency undisturbed sampling or excavation / core drilling will provide the most reliable to substitute on the subsurface and the subsurface

Interpretation of the information and it application to design and construction stroud therefore take into account the spacing of boreholes, the frequency discount the spacing of boreholes the frequency of sampling and the possibility of other than 'straight line' variation 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, or perhaps not at all during the time it is left open.

A localised perched water table may lead to an erroneous indication of the true water table. Water table levels will vary from time to time with seasons or recent prior weather changes. They may not be the same at the time of construction as are indicated in the

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

More reliable measurements can be made by installing standpipes which are read at intervats over several days, or perhaps weeks for low permeability sals. Plezameters sealed in a particular stratum, may be advisable in low permeability sals or where there may be interference from a parched water lable.



Geotechnical Investigation:

NSW. 62 and 85, Hillside Road, Newport, Proposed Driveway Upgrade



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P0802169JR02_V1

July, 2009

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Mr Ben Rose Daniel Martens Revision No. Release Date CO. Opp Release Date Release Date Tinal 1607.2009 1E, 1P,1H 19	Author(s)		Reviewer(s)		Project Manager		Signature	fure
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All enquiries regarding this project are to be directed to the Project Manager.



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Overview

:1 Background

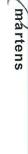
The purpose of this report is to provide a geotechnical assessment to support a development application (DA) for a proposed driveway at 62 (Lot 1, DP 408800) and 85 (Lot 2, DP 1036400) Hillside Road, Newport, the proposed development based on observed site, for the structural/civil design and geotechnical risk management for NSW. The assessment determines preliminary geotechnical parameters environmental conditions.

1.2 Proposed Development

following: is our understanding that the development proposal includes the

- Construction of a driveway with the following properties:
- Approximate length 136m.
- Width generally 3 to 4.5m.
- Shoulder width 1m, unsealed, only on eastern side of road.
- Drainage swale 1m wide, 0.1m deep, located only on western side of driveway.
- Approximate maximum cut depth 2.5 m
- Approximate maximum fill depth 1.9 m
- Turning head at the terminus of the driveway at 62 Hillside
- Culvert crossing for watercourse.
- Retaining wall on western side of road (0 to 2.5 m high), wall reinforced masonry retaining wall at high heights >0.75m. varies from non engineered rock wall at low heights to

A site plan which shows the existing development and proposed development is provided as Attachment A.



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.3 Scope of work

Site investigations were undertaken in accordance with the agreed scope of works as follows:

- Drilling of 2 boreholes via hand methods to 1.5 m or prior refusal on bedrock / stiff clay (drill-rig access was unavailable).
- Completion of Dynamic Cone Penetrometer (DCP) penetration soil strata strength. testing at 8 locations to allow for characterisation of underlying
- 0 Review of previous geotechnical investigations conducted at
- 0 Risk assessment of the proposed works in accordance with the Pittwater Council's Interim Geotechnical Risk Management Policy (2007).

2 Site Description

2.1 Field Investigations

A site inspection was undertaken on 19th November 2008. DCP and borehole locations can be found on the site plan in Attachment A. Borehole logs are provided in Attachment B. Martens and Associates field investigations were in addition to those previously completed by Jeffery and Katauskas (2002 and 2003).

2.2 Previous Field Investigations

This report makes use of previous field investigation data collected from the site by Martens and Associates on 15th February, 2007. The report also makes use of previous field investigation data collected from the site by EIS (division of the Jeffery and Katauskas Group) on 3rd May 2002 and Jeffery and Katauskas on 1st December 2003. This is documented in Jeffery and Katauskas report number 18204SLrpt (12 January, 2004). Relevant previous field sub-surface test locations are shown on the site plan in Attachment A.

2.3 Location and Existing Land-use

The subject site is comprised of 62 and 85 Hillside Rd, Newport NSW and lies within the Pithwater Council local government area. It is comprised of 2 separate residential allotments, Lot 1 DP 408800 (no. 62) and Lot 2 DP 1036400 (no. 85), and occupies an area of approximately 1.06ha. The site is bounded by existing residential dwellings to the north, west and south and Attunga Reserve to the east. Small portions of both allotments are bounded by Hillside Road in the southern region of the site.

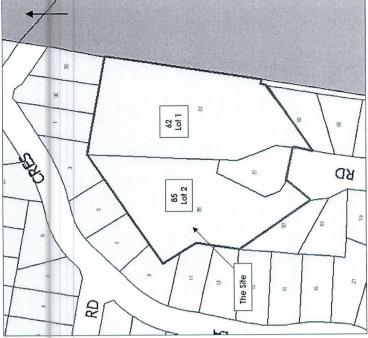


Figure 1: Site location and regional context (Source: Pittwater Council, 2008)

The site is presently utilised for residential purposes. Existing site infrastructure and features consist of the following;

- An existing brick house (Lot 2)
- An existing small fibro cottage (Lot 1)
- An existing small fibro shed (Lot 1)

An existing driveway currently connects the existing dwelling on Lot $2\,\mathrm{to}$ Hillside Road. Currently, no serviceable driveway services the existing fibro cottage on Lot 1.



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2.4 Topography and Drainage

The site slopes predominantly from a north west direction to the southeast. The upper northern perimeter forms part of the Southern edge of the Bilgola Plateau. The majority of the site is relatively steep with an average slope of 44%, although there are some flatter areas with grades lower than 10%. Steeper areas are situated at north and north west of the site with grades in excess of 80%.

2.5 Geology and Soil Profile

The Sydney 1:100,000 Geological Sheet 9130 (NSW Dept. Mineral Resources, 1983) indicates that the site is underlain by interbedded laminite, shale, and quartz, to lithic-quartz sandstone of the Narrabeen Group. Geological mapping also indicates that the site near a second geological group, namely, Hawkesbury Sandstone.

Sub-surface investigations indicate that the site is underlain by silty sands, clayey sands, sandy clays and silty clays with soil profile depths variable but up to 3.35 – 4.05 m. Sub-surface investigations indicated that bedrock beneath the site is comprised of siltstone/shale and sandstone. Sandstone rock outcropping was commonly observed on upper parts of the site. Borehole and DCP test locations can be seen on the site plan in Attachment A, whilst detailed excavation logs can be found in Attachment B.

2.6 Site Classification

Based on the depth of clay the site is preliminary classified as class H in accordance with AS 2870 (1996).

2.7 Groundwater

Previous investigations regarding site groundwater levels are detailed in Martens and Associates report P0601384JR03_V01 (01.03.2007). In summary this report concluded that groundwater levels are likely to be 2 – 4 m below ground level (mBGL) within the study site and average groundwater level ranged from 1.94 – 2.67 mBGL.



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3.1 Geotechnical Risk Management Guidelines

The geotechnical risk assessment for the proposed development has been conducted in accordance with the principles outlined in Pithwater Council's (2007) Geotechnical Risk Management Policy. The assessment employs the qualitative risk assessment matrices in Appendix A(I) of the guidelines to determine the level of risk to life and properly posed by the proposed development.

The objectives of Council's (2007) Geotechnical Risk Management Policy relevant to the proposed development include assurances of the following:

- That geotechnical and related structural matters are adequately investigated and documented by applicants or proponents of activities prior to the lodgement of any development application or Part V activities to carry out any development subject to the guidelines;
- Establishment of whether or not the proposed development activity is appropriate to be carried out, and the conditions that should be applied if it is to be carried out, having regard to the results of the geotechnical and related structural investigations;
- o That, in the event that a proposed development activity is only appropriate to be carried out subject to geotechnical and related structural engineering conditions, those conditions are able to be met and are identified by the applicants prior to the lodgement of the development application including all appropriate constraints and remedial maintenance actions required prior to, during and after the carrying out of the development;
- To ensure that effective controls exist to guarantee that a development is carried out in accordance with the policy;
- To ensure geotechnical and related structural engineering information and certificates required to be lodged are carried out by suitably qualified professionals; and
- That developments are only carried out if geotechnical and related structural engineering risks, and, where appropriate,

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coastal process risks, are identified and can be effectively addressed and managed for the life of the development.

3.2 Existing Hazard Mapping / Classification

Pittwater Council Geotechnical Hazard Mapping, 2007 (Figure 4) indicates that the site is located within Hazard Zone H1. Hazard zone H1 is described as 'An area where the likelihood of instability occurring is assessed as Possible, Likely, or Almost Certain' (Revisions to the Geotechnical Risk Management, December 2007).

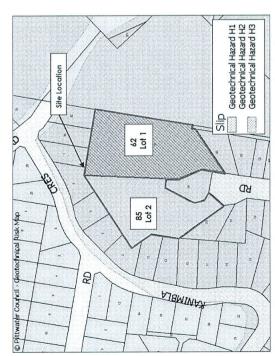


Figure 1: Pittwater Council's Geological Hazard Mapping and the site (Source: Pittwater Council).

3.3 Preliminary Soil and Rock Strength

Preliminary soil strength properties for the soil profile underlying the site have been estimated using *in-situ* DCP testing and borehole investigations. Results are summarised in Table 1 with DCP/borehole locations shown on the site plan (Attachment A) and DCP 'N counts' provided as Attachment D. Note, these are preliminary and vary along the proposed driveway.



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Table 1: Estimates of preliminary soil strength properties for site.

Soil Description	USCS Soil Class.	Depth (m b.g.l.)	Cui (kPa)	ф	ABC³ (KPa)	CBR (%)
Organic Silty Sands, brown, moist, very loose.	SM	0 - 0.3 m		28	20	m
Organic Silty Sands, brown, moist, loose.	SM	0 - 0.7 m	,	59	80	5
Clay, orange to yellow, dry, firm to stiff.	づ	0.7 – 1.8	09		120	7
Clay, orange to yellow, dry, stiff.	Ö	1.8 – 3.1	70	,	150	٥
Extremely weathered sitstone/shale		3.1 – 3.4	75		200	ı
Moderately weathered siltstone/shale		3.4 – 4.05	06	,	250	

Notes: 4 Undrained shear strength, 2 Internal angle of friction, 3 Allowable Bearing Capacity, 4 Assumed based on site observations. Further testing required confirm,

Strength testing of bedrock was not undertaken. However, based on DCP "n" counts and review of available literature, we consider that the strength of shale bedrock beneath the site would generally increase with depth from extremely – highly weathered shale to moderately weathered shale, or from Class IV/V to Class III shale (Bertuzzi & Pels et al., 2002). Rock coring would be required to provide further details on rock strength properties.

3.4 Site Stability and Condition of Existing Structures

The following conditions were observed:

- Evidence of soil creep was observed as certain trees were on a lean indicative of soil creep.
- o Minor soil stripping was observed in exposed/weathered cuts.
- Minor rock fall from the sandstone escarpment was observed.
 However, no boulders appeared to have been recently subjected to mass movement.



3.5 Risk Assessment

Risk assessment for the site and proposed driveway are made in accordance with the Geotechnical Risk Management Policy for Pittwater, 2007 (Table 2). Instability risk has been determined for post-development conditions with assessment made based on the condition that the geotechnical recommendations of this report have been implemented.

Table 2: Summary of slope instability risk assessment following proposed development, based on Geotechnical Risk Management Policy for Pittwater (2007).

!				Risk to Life ¹	Life1	Risk to Property	operty
KISK	Description	Treatment Measures	뒼	P2	₽.	ů	R5
Þ	Soil Creep	Ensure appropriate foundations / retaining walls and footings design for driveway.	Likely	2.49 E-7	>	-	-
В	Shallow Rotational Slide	Ensure appropriate drainage. Maintain all existing vegetation on slopes where possible.	Unlikely	6.16 E-7	>	Me	_
n	Embankment Failure	Ensure appropriate drainage and structural design of retaining walls. Design embankments with reinforcing such as geotextile.	Possible	7.24 E-7	>	Ме	-
D	Rock Fall	Remove or secure boulder sitting on outcrop with rock bolts and grout. See site plan in Attachment A for location.	Possible	9.78 E-7	>	Me	-
	Notes						

Notes

i LH: likelihood based on teated site condition (A=almost certain, L = Likely, P = Possible, U =Unlikely, R= Rare, B= Barely Credible), 3 P. Probability, 3 R. Risk assessment faiting (A= acceptable), L= unacceptable), 4 Consequence (C= Catastrophic, M= Major, Me= Medium, Mi= Minor, I = Insignificant. § Risk (V= Very High, H= High, M=Moderate, L= Low, VL= Very Low).

The proposed development is considered to constitute an <u>acceptable risk to life</u> and a <u>low risk to property</u> provided that the recommendations made in this report are adhered to. Risk assessment calculation spreadsheets are provided in Attachment C.

3.6 Cut and Fill

Proposed cut and fill depths required for road construction were assessed through review of cross sections at chainage intervals of 10 m. Maximum cut depths were assumed to be 0.45 m below the design level which is noted on the sections. This was done to allow for the pavement thickness (225 mm) and an additional depth for drainage measures (also assumed to be 225 mm thick). Maximum cut and fill depths for different chainages are outlined in Table 3.



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Table 3: Proposed maximum cut and fill depths at various chainage distances.

136	130	120	110	100	90	80	70	60	50	40	30	20	10	0	Chainage (m)	
0.661	1.002	1.118	1.083	1.432	NA.	NA	NA	NA.	NA	0.889	2.482	2.039	1.699	0.522	Maximum cut (m)	
0.21	0.544	NA.	NA	0.402	1.554	1.515	1.61	1.918	1.239	1.008	NA.	ZA	0.179	0.071	Maximum fill (m)	

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3.7 Recommendations

Geotechnical recommendations for the development site are provided below in Table 4.

Table 4: Geotechnical recommendations.

Recommendation	Description
Foolings	All foolings, particularly those in soil materials, should be excavated, inspected and powed with minimal delay. All foolings should be free from all losse or softened materials prior to powing. If water ponds in the base of the foolings, they should be pumped any and then re-excavated to remove all losse and softened materials. If a delay in powing is anticipated, we recommend that a blinding layer of all least 50 mm concrete be placed to protect the base of the fooling excavation.
Sediment and Erosion Control	Appropriate design and construction methods shall be required duning site works to minimise erosion and provide sediment control in particular, any stockpiled soil will require erosion control measures.
Soil Excavation	We understand that a maximum excavation depth of approximately 2.5 m will be required at chainage 30 m and that excavation will be required throughout most of the road length.
	Any excavations exceeding 0.75 m in height should be supported by sultably designed and installed retaining or shoring structures. Alternatively, soil overburden may be excavated without structural supports but with a batter slope of 1 (vertical); 2 (horizontal).
Rock Excavation	Excavations into fresh bedrock (if necessary) may be made near vertical (8V:1H).
Fill Placement	Engineered fill should be placed in layers of a maximum of 150-200 mm loose thickness and compacted (as specified herein). For sandy materials, a minimum ID of 70 % should be achieved. For clayey soils (eg. including weathered sandstone), engineered fill should be compacted to at least 78 % SMDD as per AS 3798 (2007).
Retaining Structures	Any retaining structures to be constructed as part of site works are to be backfilled with suitable free-draining materials and include suitable drainage measures, such as a geotextite enclosed 100 mm agricultural pipe, to redirect water that may collect behind the relaining walls.
Vibrations	Vibrations created during excavation works are to be minimised to reduce potential impacts on the neighbouring properties. Recommended maximum levels of ground vibration (as per AS 21872, 1993, Appendix J) are 10 mm/s PV (peck particle velocity) at the site boundary or at closer retained site structures.

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Groundwater	Given that permanent groundwater is estimated to exist at approximately 2 - 4 m below ground level, it is possible that works could at times interact with groundwater. If permanent groundwater is encountered then site works are to cease immediately and a geolechnical engineer is to inspectifactorient groundwater conditions and determine the need for further management. In principle any collected groundwater shall be discharged downstope of the arrevoy or recharged downstope of the drivewary or recharged downstope of the drivewary.
	We do not expect that the proposed works will significantly modify the existing groundwater regime such that site vegetation will be detrimentally affected.
Stormwater	Stormwater collected by the road and subsoil drainage system should be collected and disposed at frequent intervals downstope of the site driveway so as to not cause erosion and to ensure maintenance of the existing groundwater regime.
Boulder Management	We recommend that the boulder that is situated on top of a large outcop (see site plan in Attachment A for location) be removed from the outcrop or secured via rock bolls and grout.
Pavement Specification	We recommend the following for pavement design:

o Surface seal – 25 mm Bitumen

- o Base 100 mm DGB20
- o Sub-base 100 mm DGS40
- o Minimum sub-grade CBR of 7%.

3.8 Monitoring Program During Construction

To ensure site stability, prevent any adverse geotechnical impacts and reduce the risk of sediment transport off-site due to erosion during site works, we recommend the following be monitored regularly (daily or otherwise):

- Seepage rates from any excavated soil/ rock interface;
- Sedimentation downslope of excavated areas during and after rainfall events; and
- All sediment erosion control structures for functioning condition and removal of built-up spail.

3.9 Contingency Plan

In the event that the proposed development works cause an adverse impact on overall site stability or on neighbouring properties, works shall cease immediately. The nature of the impact shall be documented and the reason(s) for the adverse impact investigated. This might



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require site inspection by a qualified geotechnical or structural engineer.

3.10 Inspections and Testing Requirements

During driveway construction, testing requirements are to be as follows:

- 1) All layers are to be proof rolled such that there is no visible deflection.
- Field density testing in accordance with AS3798 (2007) will require whichever requires the most tests from below:
- 1 test per layer per material type per 2,500 m²; or
- 1 test per 500 m³ distributed reasonably evenly throughout full depth and area; or
- 3 tests per lot.
- Pavement Testing (sub-base and base): Required pavement testing frequency is based on a 'Lot' with a 'Lot' described as:
- Covers a single layer of work constructed under uniform conditions.
- For unbound materials may equal a day output using the same material.
- 10 compaction tests per 5000 m² with a minimum 3 tests per lot.

Performance standards for compaction testing to be:

- Pavement materials (base and sub-base) > 97 % modified compactive effort (AusSpec C242).
- Sub-grade > 98 % standard compactive effort (AS 3798, 2007).

3.11 Required Works Prior to Issue of Construction Certificate

All designs of proposed foundations, supports, retaining walls, and drainage measures should be referred to a suitably qualified geotechnical engineer for review and certification that proposed structures have been designed in accordance with Council's (2007) Geotechnical Risk Management Policy and the recommendations given in this report.

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Written certification or documentation acceptable to Council should be provided by the geotechnical engineer to Council, clearly displaying that proposed site works designs comply with requirements.

3.12 Investigation Limitations

Occasionally sub-surface soil conditions during proposed works may be found to be different from those detailed in this report due to investigation limitations. This can also occur with groundwater conditions, especially following different weather conditions. Should, during site works, soil or water conditions be found to be significantly different to those detailed in this report, works shall cease immediately and the new conditions should be assessed by Martens & Associates to determine geotechnical implications before recommencement.



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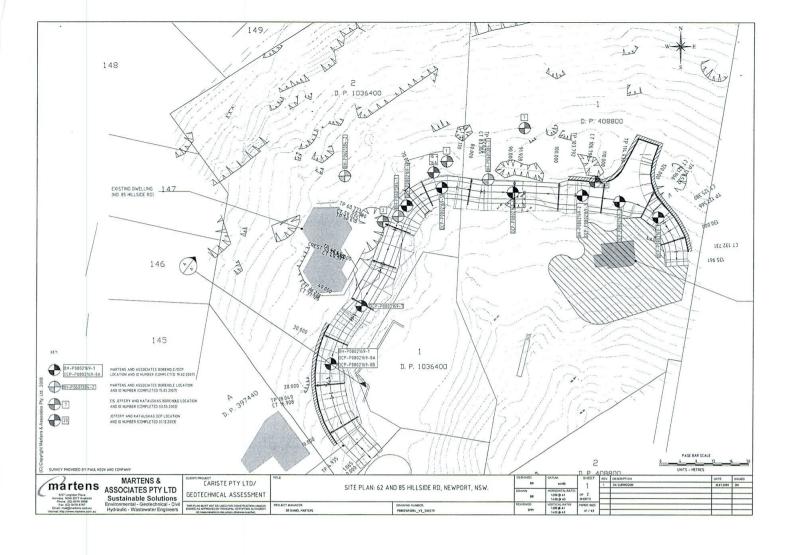
Australian Standard 1289.6.3.2 (1997) Determination of the Penetration Resistance of a Soil using the 9 kg Dynamic Cone Penetrometer

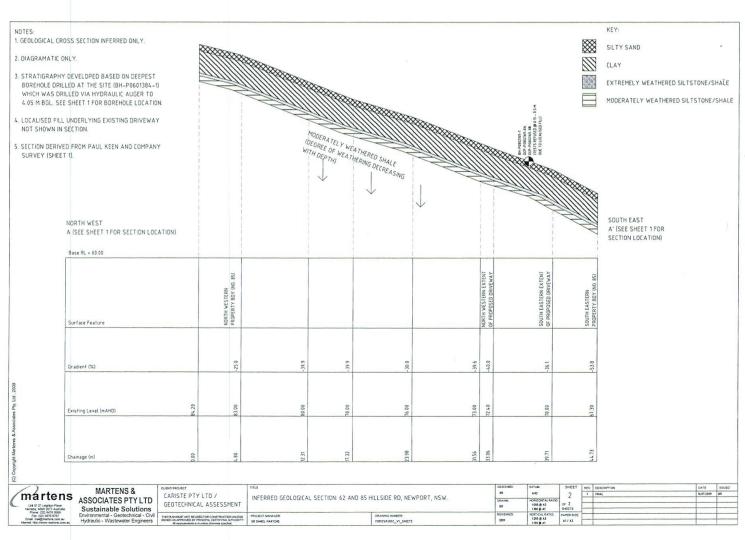
Australian Standard 2187.2 (1993) Explosives – Storage, transport and use – Use of explosives.

Australian Standard 2870 (1996) Residential Slabs and Footings

Pittwater Council (2007), Geotechnical Risk Management Policy for Pittwater. martens

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	GEOLOGY SILTSTONE/SHALE	EASTING .	MATERIAL DATA	DESCRIPTION OF STRATA bis type, surve, roctors, meting, colou, plately, cods, sociation, paniel chareterists, organics, secondar an mucr components, control fit, contamination, edeur	ow to light brown, and content.	nm (30%).	WATER WATER MOSTURE PERFERATION CONSISTENCY DENSITY Notice section of the property of the prop	MARTENS & ASSOCIATES PTY LTD ANY LAIPHOND DISCO
	62 AND 86 HILLSIDE ROAD, NEWPORT, NSW. GE	43 92	MATE	DESCRIPTIO Soil type, texture, actuatives, mobility particle characteristics, organization	CLAY (FILL) - yellow to light brown, appreciable sand content.	Borehole rekused on sandskone gravelt 35-40 mm (30%).	MOSTURE PENETRATION OF DEPARTMENT OF LEW MOST OF LEW MACHINE MEMORIES WE MACHINE MEMORIES WITH LEW MOST OF THE READ IN CONTINUCTION OF TO THE READ IN CONTINUCTION OF THE READ IN CONTINUE OF	OG TO BE READ IN CONJUNG
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ASSE	ROAD	250 mm		GRAPHIC LOG			WATER WASTER WASTER X Not measured A Water with Wat	XCAVA
GEOTECHNICAL ASSESSMENT	HILLSIDI	EQUIPMENT HAND AUGER FXCAVATION DIMENSIONS 70 mm Ø X 250 mm	TA	PENETRATION	1001111111111		PORT Shoring Shokrete Rock Bolts No support	
SEOTEC	2 AND 85	NSIONS	EXCAVATION DATA	(M) HT430	103	, , , , , , , , , , , , , , , , , , , ,	EQUIPMENT / METHOD SUPP X Exiting acceptor SI X Exiting acceptor SI Bellother Bould F Hadden Bould K Had a super F Had a super P Pank spade A Auger	
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Geotechnical Assessment:
Proposed Driveway Upgrade
62 and 85 Hillsde Road, Newport, NSW.
P0802169.IROZ_VI-July, 2009
Page 23

	EQUIPMENT / METHOD Natural exposure X Existing excervation BH Backhoe bucket E Excervation HA Hand suger S Hand suger S Hand suger A Auger				3	₹	3	METHOD	Т	D E	SITE	P
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G TO BE REA	MOISTURE D Dy M Moist W Wel Wp Plastic limit Wn Liquid limit				CLAY - yello red sa		SILTYS	Soil type, lex particle cha			62 AND 85 HILLSIDE ROAD, NEWPORT, NSW.	ENT
D IN CONJUNC MA Phone	PENETRATION L Low M Moderate H High R Refusal				w, sand conte	CLAY - yellow.	ND - light bro	DESCRIPTI ture, structure, moi rracteristics, organi fill, conta	MAT	Z (11)	0	-
RTENS & ASSC 6/37 Leigh Homsby, NSW (02) 9476 8777	V CONSISTENCY VS Very Son S Son F Firm SI Steff VSI Very Sinf H Hand F Friable				CLAY - yellow, sand content increased from above, red sandstone gravels 5-10 mm (2%). Auger refusal at 1.1 m on stiff clay.	rellow.	wn, appreciab	DESCRIPTION OF STRATA Sea type, seem, person, resting, select, paraby, recks, socialized, particle characteristics of the select paraboth rest components, fill, contamination, edge.	MATERIAL DATA	NORTHING -		LOGGED BR
EXCANATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS WAFFENS & ASSOCIATES PT/LID WHO TO BE NOTED AND ABBREVIATIONS PROPERTY OF THE STATE OF THE STA	V DENSITY VI. Very Loose L Loose MO Medium Dense D Dense VD Very Dense				om above, 19%).		SILTY SAND - light brown, appreciable clay content.	hy, rocks, oxidation, moor components,			SILTSTONE/SHALE	87
ORT NOTE	SAMPLING A Auger B Bulk ss B U Undist D Disturt M Molstur Ux Tube s				Z.	7		CONSISTENCY		ASPECT	VEGETATION	CHECKED
HBB ONV S	SAMPLING & TESTING A Auger sample B Burk sample U Undisturbed sample U Undisturbed sample M Moleture content Ux Tube sample (x mm)						K	DENSITY INDEX	Ц	ASPECT SOUTH	ON ORGANIC MATTER	ED 19.11.2008
S I REVV	WE DES							TYPE			MC MA	00
gine	Pockel penet Standard per Vane shear P Dynamic o penetromei Field density Water sampl						+	DEPTH (M)	SAMPLI		TTER	
ering	pp Packal sanetrometer S Standard penetation test VS Vere sheat DCP Opnamic cone penetrometer For Field density WS Water sample							RESI	SAMPLING & TESTING	SLOPE		REF
Engineering Log -	CLASSIFICATION SYMBOLE AND SOIL DESCRIPTION Y USCS N Agricultural							RESULTS AND ADDITIONAL OBSERVATIONS	TING	40%	O. P0802169	BH2
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Clustry Sheet No. 4														
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martens		SC ST SC SC ST SC		8	2	31	10 10	97	02	DEPTH (M)	121	EXCAVATION DIMENSIONS	& 85 H	PROPOS
*	œ.	SUPPORT WAS SKY Shanny X SK Shalmele X RB Rock Bols W								PENETRATION RESISTANCE	Ā	100 MM AUGER	62 & 85 HILLSIDE ROAD, NEWPORT	PROPOSED SUB-DIVISION
2006	CAVATIO	WATER Who hoseved X Not measured X Water level Water level								GRAPHIC LOG		JOER	ROAD,	DIVISIO
	N N	ow ered		WWW	e W	8 5	SC	2	2	CLASSIFICATION			NE	ž
MART H Phone: (0 mail@martens.	EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS	MOISTURE PENETRATION D DY M Moist M Moderate W Wet H Haph Wp Plantic fmit R Refusal WI Liquid finit		Moderalely weathered sillstone(shale	Extremely weathered siltsione/shale	Light clay grading to medium clay, Orangy yellow grading to gray with roots vary infrequent to negligible at depth	Sandy Clay, orangy yellow	Loamy sand, light brown, roots frequent	Loamy sand, brown	DESCRIPTION OF STRATA Soil yps. (sours, stocks, motifing, color, passioly, roos, oddstor partice distracted in contamination, color partice distracted in contamination, color	MATERIAL DATA	NORTHE		CON
ENS a 6/3 omsby (2) 947	N WI	TH CONTROL		ed si	sit sit	one en e	(Bue)	light Hight	nd, br	OF S	P	NORTHING	GEOLOGY	COMMENCED
MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 6777 Fac. (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.	TH ACCOMPANYING REPO	CONSISTENCY DENSITY VS Very Soit VL Very Loose Soit L Loose F Fin MD Median Derive St Staff D Dense VS; Very Stiff VD Very Dense F Frieble F Frieble		stone/shale	sione/shale	edium clay, begrey with 2.5 m, ligible at depth	/ yellow	brown,	own	TRATA , pasticity, rocks, oxidation, iny and mixor components, dour			SHALE	JSF 1522007
om.au	RT NOTES	SAMPLING & TESTING A Augor sample B Buk sample U Undisturbed sample Disturbed sample M Molskire content Ux Tubo sample (x mm)								CONSISTENCY		RL SURFACE	VEGETATION	CHECKED
	AND ABB	& TESTING emple rple bed sample of sample content mple (x mm)	_							DENSITY INDEX		E 70 m AHD		CHECKED DAM
띩	REVA	දෙන පුදු								TYPE		HO (Ap	7	07
gi	ᅙ	Stand Stand Vane Pied Water								DEPTH (M)	SAN	(xex		
Engineering Log Borehole	"	pp Pocket penetrometer S Sandard penotration test VS Varve bear DCP Dynamic come penetrometer FD Field density WS Water sample		PVC and cap	C18 50 mm PVC 4 Broaded screen	sed the poli	- Αυγούλημα		Wellcover	WELL CONST	SAMPLING & TESTING		PROJECT NO.	-77
le le		Z SYM	i						(d.)	- R	ING		00 e	1
og -		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION N USCS Y Agricultural				V 2001 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	:			WELL CONSTRUCTION DETAILS	0 3		P0601384	BH1
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BH2	of 1 O. Postiana	11	TING	0		2					CLASSIFICATION SINE CORRESPOND SOLL DESCRIPTION N USCS Y Agricultural	neering Log -
REF	Sheet 1 o		SAMPLING & TESTING	WELL CONST	Welcowi	Bertorius Seal	Cas Some Pro- Smedylog Wweeled, Supper	Cit Somm PVC Presided screen	Pro and any		pp Prochet persionneter 8 S S S S S S S S S S S S S S S S S S	Engineering Log
101	150	76 mAHD (Approx)		34YT							SNI 90 (mm	H H
15 2.20	FOREST	76 mA	100	DENSILL INDEX							G & TEST sample ample ample bed sample re content sample (x i	SAND
COMPLETED 15 2.2007	CHECKED	RL SURFACE	ASPECT	соизізтемст							SAMPLING & TESTING A Marga sample one O Undahrde sample one O Undahrde sample one O Undahrde sample one O Undahrde sample UK Ticke sample (k mm)	EPORT NOTE
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	TACAN		MA	DESCRIF Soil type, leature, affurbute, in particle characteristics, orga	Loamy sand,	Sandy clay, yello	Light day, yalir roof frequent, col with mottling, s	Light - medium clay roots infreque	Medium-hr whitegre no rools evide	Extramely we	MOSTURE PENETRATION 1 D. Dry L. Low 1 W. West H. High was help with the property of the proper	OG TO BE READ IN CONJ
	NON			СГАЗЗІРІСАТІОМ	4 Kg	9	9 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	¥ 2 €	£		WATER N Nore-observed WATER Waterser Water without	ATION
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	D SUE	100 MM AUGER	2 4	PENETRATION	Ten are	8180888					SUPPORT B Shorte SC Shocke RB Rock Bolk Nil No support	200
ROACH	PROPOSED SUB-DIVISION	200	78	(W) HT430		3		2020			THOD SUPP	martene
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CLIENT	1	ROACH	9	ROACH			COMMENCE	COMMENCED 15.2.2007	COMPLETE	COMPLETED 15.22007	201		REF	BH3	
SITE	-	2 & 85 H	ILLSIDE	ROAD,	NEW	PORT	GEOLOGY	SHALE	VEGETATION	3	15		CT K	. 5	
EQUPMENT	1		100 MM AL	100 MM AUGER			EASTING		RL SURFACE	NGE NGE	71 mAHD (Approx)	prox)	20013	401	П
ZIC	VAT	EXCAVATION DIMENSIONS F	Z Y				MATERIAL DATA	DATA	Aspect			SAMPLI	SAMPLING & TESTING	NG	П
	MOISTURE	DEPTH (M)	PENETRATION	евънис гое	ОСГАЗЗІРІСАТІОМ	DES Soil type, leafure, struct particle characteristics	iCRIPTION OF \$1 for, mottro, cobur. s, organics, secondar (ii), contamination, or	DESCRIPTION OF STRATA DESCRIPTION OF STRATA DESCRIPTION OF STRATA parties cherelentica, replante, anonominy and minor compounts, parties cherelentica, replante, anonominy and minor compounts,	CONSISTENCY	DENSILLA INDEX	34YT	(M) HT930 >	/ELL CONSTR	O	ø
	2	:	-88888		23		Loamy sand, brown	own				Wellca	Welcowin		
	3				53	Loa	Loamy sand, light brown, sandstone floaters, roots frequent	brown, is frequent				e e e e e e e e e e e e e e e e e e e	9.76		
	2	11211111		3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	್ಲಿ 2	Spands Orans Victory	Clay grading ic ngy with gray n int but decreasi	Sandy Clay grading to light clay, orangy with gray motiles, roots frequent but decreasing below 1.2 m				West	week a loopol and floop sal		1 9 1 1 1 1 1 1
	3	500			Š	Medium while modifing	clay , orangy ye g below 2.4 m, ı.	Medium clay , orangy yellow grading. while motiling below 2.4 m, no rools observed				2	C18 SOme PVC		101
	>	6.8		100 pt 10	EW	Extreme	Externely weathered sitstone(shale, grey/sh while with red motites	itatone/shale, ed motiles				0#	PVC end cap		98
		91				Moderali	Moderalely weathered sillstone/shale	siltstone/shale							01
	TT / ME ri expose ri expose pe bucke afor stor spade	ECUIPMENT / METHOD SU N Halural exposure SH N Halural exposure SH BH Backboe Buckel Nil E Example Media S Hand anger S Hand spade Panhitube A Auger	SUPPORT SH Sharing SC Shaling SC Shaling RB Rock Bols Nil No support	WATER N None observed X Not measured Water bavel A water outbow	TER Note observed Not measured Water outlow Water inflow	MOISTURE PE D Dry L M Moist M W Wes H WP Phasic smit R WI Liquid Amit	PENETRATION CON L Low VS M Moderate S H High F R Refusal St R Refusal F H H H H H H H H H H H H H H H H H H H	CONSISTENCY DENSITY Very Soff V. Very Coose S Soff MD Mode Consistency S Seff DO MODE CONSISTENCY Very Seff DO MODE CONSISTENCY New Seff VD Very Dense Frable	SAMP Loose A Au m Dense U U e D D D Sense M MA	SAMPLING & TESTING A Augressmich Bucksamble U Undisturbed sample U Disturbed sample M Molsture content UX Ticke sample (mm)	TING and a sum (mm)	pp Pocket peroirometer S Sandard peroirometer VS Variethabor Comp DCP Dynamic com persirometer FD Fleid dereity WS Water sample	notromater pendration (est to cono meter mple	CASSIFICATION SYMBOLS AND SOIL DESCRIPTION N USCS Y Agricultural	- 5
	1 6	rte	martens	EXCAVAT	ION	DG TO BE READ IN G	MARTEN	EXCANATION LOG TO BE READ IN COMJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVATIONS MARTENS & ASSOCIATES FYLID MARTENS & ASSOCIATES FYLID GROUP OF THE PROPERTY STATEMENT ASSOCIATED FOR THE PROPERTY STATEMENT ASSOCIA	G REPORT NO	OTES AND	ABBR	ngin	Engineering Log		1
	Copyré,	(C) Copyright Markers & Asso	Associates Pty	Ms Ply. Ltd 2006		E	Phone: (02) 9	9476 8777 Fax (02) 9- n.au WEB: http://www.r	176 8767 nariens.com.au	-		9	Borehole	ole	

ENVIRONMENTAL INVESTIGATION SERVICES

Borehole No.

BOREHOLE LOG

Client: Date: 20-3-02 Job No. E16698F Location: Project: 62 AND 85 HILLSIDE ROAD, NEWPORT. NSW PROPOSED RESIDENTIAL SUBDIVISION PLANNING WORKSHOP AUSTRALIA Method: HAND AUGER N/A

Logged/Checked by: T.N./

Datum: R.L. Surface:

Moisture Condition/ Weathering Strength/ Rel. Density Hand Penetrometer Readings (kPa.) Remarks

COMPLET

PID = 0

FILL: Silty sand, fine to medium grained, yellow brown, with a trace of fine to coarse grained sandstone gravel and rootlets.

COLLUVIUM

Groundwater Record

Field Tests

Depth (m)

Unified Classification

DESCRIPTION

SAMPLES

H SILTY CLAY: medium to high Nepasticity, orange mottled grey, with a trace of sand fines and rootlets.

END OF BOREHOLE AT 1.2m (FILL: Clayey sand, fine to medium grained, pale grey, with a trace of rootlets and ceramic pieces. MC≅PL RESIDUAL

PID = 0

CL-CH

1.5

2.5

PID = 0

0.5

3

ENVIRONMENTAL INVESTIGATION SERVICES

Borehole No.

N

BOREHOLE LOG

Client: Project: PROPOSED RESIDENTIAL SUBDIVISION PLANNING WORKSHOP AUSTRALIA

Location:

62 AND 85 HILLSIDE ROAD, NEWPORT. NSW

Logged/Checked by: T.N./ &

Datum: R.L. Surface:

N/A

Method: HAND AUGER

Date: 20-3-02 Job No. E16698F

COMPLET Record SAMPLES PID=0 Field Tests 2.5 1.5 Depth (m) Graphic Log Unified Classification MS SILTY SAND: fine to medium grained, yellow brown, with a trace of sandstone gravel. END OF BOREHOLE AT 0.8m DESCRIPTION Moisture Condition/ Weathering Strength/ Rel. Density Hand Penetrometer Readings (kPa.) AUGER REFUSAL ON INFERRED SANDSTONE COLLUNION Remarks

ENVIRONIMENTAL INVESTIGATION SERVICES CONSULTING ENVIRONMENTAL ENGINEERS

BOREHOLE LOG



Borehole No.

			ace: N/A		Remarks	WILLULANT TO,		AUGER REFUSAL ON INFERRED SANDSTONE								Maria da Cara de Cara		
			R.L. Surface:	Datum:	Hand Penetrometer Readings (kPa.)					• • •				1-1-1				
			E	Д	Strength/ Rel. Density													
					Moisture Condition\ Weathering	Σ												
PLANNING WORKSHOP AUSTRALIA	PROPOSED RESIDENTIAL SUBDIVISION	62 AND 85 HILLSIDE ROAD, NEWPORT. NSW	Method: HAND AUGER	Logged/Checked by: T.N./ 才	DESCRIPTION	SILTY SAND: fine to medium grained, brown, with a trace of rootlets.	as above, but yellow brown, with a trace of sandstone gravel.	END OF BOREHOLE AT 0.6m		,			***					
KSHO	DENTI	SIDE	Meth	Logg	Unified Classification	WS.							٠.					
WOR	RESI	HILL			Graphic Log													
NING	OSED	ND 85			Depth (m)	1 1	0.5		-		1.5	, , , ,	2		2.5	1 1	6	3.5
PLAN	PROF	62 A	6698F	-02	Field Tests	PID = 0	PID = 0											
Client:	Project:	Location:	Job No. E16698F	Date: 20-3-02	SE SAMPLES Becord Groundwater	N E	050											

Attachment C - Risk Assessment Reports 7

martens

Proposed Driveway Upgrade 62 and 85 Hilside Road, Newport, NSW. P0802169.1R02_VI-July, 2009 Page 32 Geotechnical Assessment:

Landslide Hazard Evaluation - Risk to Life Assessment TEP 2: RISK EVALUATION lazard Type 1 : ENTER SITE AND DESIGN DATA Probability of spatial impact impacting building k into account travel distance and travel direction probability given the spatial impact Dwelling / Investigation Element Allohment / Investigation Area probability of loss of life INDICATIVE VALUE FACTOR T, 2.49E-07 FACTOR CASE 0.00 0.04 0.62 Lywes 0.1 Louis Linn W. 10-10'1 04 10-3 10-2 Soll creep (Risk A) GEOTECHNICAL ASSESSMENT - 62 and 85 Hillidde Road, Newport, NSW. MR 8. Rose Reviewed DR D, Martens DESCRIPTION Percentage of time person(s) are on-alia Percentage of dwelling i element that person(s) occupy Likelihood of across slope strike on nick element Likelihood of dominologs strike on nick element but minimum moud distance. Likelihood of dominologs strike on nick element for maximum run-oud distance. Likelihood of dominologs strike (relaginato) on nick element run oud distance. Acceptable risk for loss of life for the person(s). Risk level suitable for new development INTERVAL 10 years Width of dwelling / investigation element Minimum run-out length Probability of runout being 0 - 1 m long Probability of runout being 0 - 61 m long Length of dwelling / investigation element 100 years 1000 years 10,000 years Length of allotment / investigation area 100,000 years Maximum run-out length Likely slide/fall width If buried by debris If not buried The even't is expected to coor over the design AL The even't in probably core under street conditions care for skepp its. The even't could some under street or condition to rest the skepp its. The even't could some under street or condition to rest the skepp its. The even't is conductable to design into the consumbations seem the skepp its. The even't is conductable to deep under the conductable seem or the skepp its. The even't is conductable to the first its than the even't is conductable to the first its than the even't is conductable to the first its than the even't is conductable to the first its than the even't is conductable to the first its than the even't is conductable to the first its than the even't is conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the first its than the even't its conductable to the even't its its conductable to the first its than the even't its conductable to the even't its its conductable to the even't its conductable to the even't its conductable to the even't its its conductable to the even't its its conductable to the even't its conductable to the even't its its conductable to the even't its its conductable to the even't its its conductabl DESCRIPTION RANGE IN DATA 0.8 - 1.0 0.8 - 1.0 0.9 - 1.0 0.1-0.5 0.1 -0.7 UNITS (0-1) 0.0 - 0.3 (0-1) (0-1) (0-1) (0-1) UNITS ALMOST CERTAIN A DESCRIPTOR LEVEL POSSIBLE LIKELY VALUE VALUE RARE 10% 0.62 1.00 0.50 1.00 0.05 0.40 110 61 120 1.8 0.10 1.00 0.05 1.00 0.30 1.00 120 martens Ref. No. o. P0802169JS01_V1 d 25.11.2008

Dwelling / Investigation Element

Lynn Louis

Probability of runout being 0 - 40 m long Probability of runout being 0 - 3 m long

(0-1)

(0-1)

(0-1)

0.07

FACTOR

Parcentage of time person(s) are on-site

DESCRIPTION

UNITS

VALUE

0.31 0.41 1,00 0.70 0.30 8

3 3

10%

0.04 La Design Lynn

Likelihood of across slope stifle on risk element
Likelihood of downstope stille on risk element
for minimum run oud distance
Likelihood of downstope stille on risk element
Likelihood of downstope stille on risk element

CASE 0.50

If the vehicle is damaged only If vehicle is buried / crushed

0.0-0.3 0.1-0.5 0.8 - 1.0 0.1 - 0.7

0.30 0.10 1.00

Death is almost certain High chance of survival

High chance of survival

0.9 - 1.0 0.9 - 1.0

1.8

0.8-1.0

0.05

If buried by debris DESCRIPTION

If struck by a reckfall

If not buried

Allotment / Investigation Area

W₂

Width of dwelling / investigation element

120 120 VALUE

Maximum run-out length

110

Minimum run-out length

Lsan

0.31

10.5 101 10-3 10-2

INTERVAL 10 years

DESCRIPTOR
ALMOST CERTAIN

LEVEL

TO SEARCH STATE OF THE SEA

EP 2: RISK EVALUATION

6.16E-07

Acceptable risk for loss of life for the person(s). Risk level suitable for new developments.



GEOTECHNICAL ASSESSMENT - 62 and 85 Hillside Road, Newport, NSW.

MR B. Rose Reviewed Dr D. MARTENS

Ref. No.

b. P0802169JS01_V1
d 25.11.2008

zard Type

Shallow rotational slide (Risk B)

0.0001

Landslide Hazard Evaluation - Risk to Life Assessment



Project	GEOTECHNICAL ASSESSM	AENT - 62 and 85 Hillsi	TECHNICAL ASSESSMENT - 62 and 85 Hillside Road, Newport, NSW.	Ref. No.	P0802
Author	MR B. Rose	Reviewed	Dr D. MARTENS	Created	25.11.2008

0.001

RECURRENCE DESCRIPTION DESCRIPTOR INTERVAL	10 years The event is expected to occur over the design ALMOST CERTAIN	100 years The event will probably occur under adverse LIKELY conditions over the design life.	1000 years The event could occur under tacherse conditions POSSIBLE over the design life.	10,000 years The enent might occur under very adverse circumstances over the design life.	100,000 years The event is conceivable but only under exceptional circumstances over the design life. RARE	1,000,000 years The event is inconceivable or fanciful over the BARELY CREDIBLE design life.		DESCRIPTION UNITS VALUE	Likely sliderfall width 10	Width of allotment / investigation area m 120	Width of dwelling / Investigation element m 120	Minimum run-out length m	Maximum run-out length m 20	Length of allotment / invastigation area m	Length of dwelling / investigation element m	Probability of runout being 0 - 3 m long (0 - 1) 6.30	Probability of runout being 0 - 20 m long (0 - 1) 0,70	(0 - 1) 1,00	Likelihood of downslope strike on risk element (0 - 1) 0.07 for minimum run-out distance	
INDICATIVE VALUE IN	10,1	103	103	0	001	00'1 00'1	Probabity of spatial impact impacting building boaton taking 0.18 into account travel distance and travel direction	FACTOR		W ₂	Area Ws Wid	Luan	Lyne	- 5	w ₂	Lysan Pro	Dwellog / L ₃ Leven Pro	W	Ly Ma	

																			COMMENTS	May be injured but unlikely to cause death	Death by asphyxia almost certain	High chance of survival	Death is almost certain	High chance of survival	Dealth is almost certain	Death is highly lixely	Very high chance of surviva
VALUE	10	120	120		20	110	9	0.30	0.70	1.00	0.07	0.23	0.18		VALUE	40%	10%		RECOMMENDED	0.50	1.00	0.10	1.00	0:30	1.00	1.00	90.0
UNITS	m	Ε	Е	E	E	E	E	(0 - 1)	(0-1)	(0-1)	(0-1)	(0-1)	(0-1)		UNITS	E	E		RANGE IN DATA	0.1 - 0.7	0.8 - 1.0	0.1 - 0.5	0.9 - 1.0	0.0 - 0.3	0.9 - 1.0	0.8-1.0	0.0 - 0.1
DESCRIPTION	Likely sliderfall width	Width of all otment / investigation area	Width of dwelling / investigation element	Minimum run-out length	Maximum run-out length	Length of allotment / investigation area	Length of dwelling / investigation element	Probability of runout being 0 - 3 m long	Probability of runout being 0 - 20 m long	Likelihood of across slope strike on risk element	Likelihood of downslope strike on risk element for minimum run-out distance	Likelihood of downslope strike on risk element for maximum run-out distance	Likelihood of downslope strike (inlegrated) on risk element run-out distance		DESCRIPTION	Percentage of time person(s) are on-site	Percentage of dwelling / element that person(s) occupy		DESCRIPTION	if struck by a rockfall	If buried by debris	If not buried	If vehicle is buried / crushed	If the vehicle is damaged only	If the building collapses	If the building is inundated with debris and the person is buried	If the debris strikes the building only
FACTOR	w,	W ₂	Ws	Lun	Listen	7	17	Lysin	Levies	W,	Lynn	Lynn	Lf Design	0.04	FACTOR	1,	1,	0.10	CASE		Person in open space					Persons in building	
	, m	Side/Fall	=	Ť š		- 3	1		Dwelling / La	Ekmen				Temporal spatial probability given the spatial impact				Vulnerability of the individual (ie. probability of loss of life given the impact).			No.						
	_											_		P(r.s)				Vero									

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	Author	Mr B. Rose	lose	Reviewed	Dr D. MARTENS	RTENS	Created 25.11.2008
STEP 1: ENTER SITE AND DESIGN DATA	1						
	Ī						
Hazard Type			Rock Fal	Rock Fall (Risk D)			
Ppg Annual probability of landslide		0.001					
		INDICATIVE VALUE	RECURRENCE	DESCRIPTION	NOI	DESCRIPTOR	LEVEL
		101	10 years	The event is expected to occur over the design	occur over the design	ALMOST CERTAIN	<
		102	100 years	The event will probably occur under adverse conditions over the design life.	ccur under adverse e design life.	LIKELY	8
	,	103	1000 years	The event could occur under tadverse conditions over the design life.	er tadverse conditions ign life.	POSSIBLE	U
		+01	10,000 years	The enent might occur under very adverse circumstances over the design life.	ander very adverse the design life.	UNLIKELY	0
		100	100,000 years	The event is conceivable but only under exceptional circumstances over the design life	ble but only under s over the design life.	RARE	E E
		104	1,000,000 years	The event is inconceivable or fanciful over the design life.	e or fanciful over the ife.	BARELY CREDIBLE	u.
P(SH) Into account travel distance and travel direction		6.24 FACTOR	DESC	DESCRIPTION	UNITS	VALUE	
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		W ₂	Width of allotmen	Width of allotment / investigation area	Е	120	
Side/rell investigation Area		Ws	Width of dwelling /	Midth of dwelling / investigation element	E	120	
- F - ≤ - J_		Listo	Minimum	Minimum run-out length	E		
		Lister	Maximum	Maximum run-out length	ш	30	
		17	Length of allotme	Length of allotment / investigation area	E	110	
1 8	·	12	Progh of dwelling	Length of dwelling / investigation element	m	9	
		Lynn	Probability of run	Probability of runout being 0 - 3 m long	(0.1)	0.30	
Dwelling / La		Louise	Probability of runc	Probability of runout being 0 - 30 m long	(0-1)	0.70	
Element		Wr	Uscillood of across s	Likelihood of across slope strike on risk element	(0-1)	1.00	
		Lynn	Likelihood of downsis for minimum	Likelihood of downslope strike on risk element for minimum run-out distance	(0-1)	0.07	
		Lenne	Likelihood of downsh for maximum	Likelihood of downslope strike on risk element for maximum run-out distance	(0 - 1)	0.32	
			Likelihood of downs	Likelihood of downslope strike (integrated) on	(0-1)	0.24	

10	120	120		30	110	10	0.30	0.70	1.00	0.07	0.32	0.24		VALUE	40%	10%		RECOMMENDED	0.50	1.00	0.10	1.00	0.30	1.00	1.00	90.0
E	ε	E	8	E	E	В	(0-1)	(0-1)	(0 - 1)	(0-1)	(0-1)	(0 - 1)		UNITS	E	E		RANGE IN DATA	0.1 -0.7	0.8 - 1.0	0.1 - 0.5	0.9 - 1.0	0.0 - 0.3	0.9 - 1.0	0.8 - 1.0	0.0 - 0.1
Likely slide/fall width	Width of allotment / investigation area	Width of dwelling / investigation element	Minimum run-out length	Maximum run-out length	Length of allotment / investigation area	Length of dwelling / investigation element	Probability of runout being 0 - 3 m long	Probability of runout being 0 - 30 m long	Likelihood of across slope strike on risk element	Likelihood of downslope strike on risk element for minimum run-out distance	Likelihood of downslope strike on risk element for maximum run-out distance	Likelihood of downstope strike (integrated) on risk element run-out distance		DESCRIPTION	Percentage of time person(s) are on-site	Percentage of dwelling / element that person(s) occupy		DESCRIPTION	if struck by a rockfall	If buried by debris	If not buried	If vehicle is buried / crushed	if the vehicle is damaged only	If the building collapses	If the building is inundated with debris and the person is buried	if the debris strikes the building only
w,	W ₂	W ₃	Listo	Lister	7	2	Lynn	Louise	W, L	Lyne	Lexue	Ly Cospi	0.04	FACTOR	F	13	0.10	CASE		Person in open space			Person in a vehicle		Persons in building	
W ₂		Siderrall investigation	F ×		man I	\$		Dweling / Ls					Temporal spatial probability given the spatial impact				Vulnerability of the individual (is. probability of loss of life given the impact)									

ew developments.	el suitable for n	rson(s). Risk lev	Acceptable risk for loss of life for the person(s). Risk level suitable for new developments.	Ā	Risk Assessment
				9.78E-07	$V_{\{D,T\}}$ Risk (annual probability of loss of life of an individual)
					STEP 2: RISK EVALUATION
Very high chance of surviva	0.05	0.0 - 0.1	if the debris strikes the building only		
Death is highly likely	1.00	0.1 - 8.0	If the building is inundated with debris and the person is buried	Persons in building	
Dealth is almost certain	1.00	0.9 - 1.0	If the building collapses		
High chance of survival	0.30	0.0 - 0.3	If the vehicle is damaged only	Person in a venicle	
Death is almost certain	1.00	0.9-1.0	If vehicle is buried / crushed		
High chance of survival	0.10	0.1 - 0.5	If not buried		
Death by asphyxia almost certain	1.00	0.8 - 1.0	If buried by debris	Person in open space	
to cause death	0.50	0.1 - 0.7	if struck by a rockfall		

7.24E-07

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Attachment D - DCP 'N Counts'

Geolechnical Assessment:
Proposed Driveway Upgrade
62 and 85 Hillside Road, Newport, NSW,
P0802169 JR02_V1- July, 2009
Page 37

martens

Dynamic Cone	Dynamic Cone Penetrometer Test Log Summary	mmary (martens consulting engineers since 1989
6/37 Leighton Place, H	6/37 Leighlon Place, Homsby, NSW 2159, Pr. (02) 9476-9999 Fax: (02) 9476-8767, mail@martens.com.au, www.martens.com.au	marlens.com.au, www.marlens.com.au	
Site			
Cllent	62 and 85 Hillside Road, Newport, NSW.	DCP Group Reference	1 of 2
	62 and 85 Hillside Road, Newport, NSW. Cariste Pty Ltd	DCP Group Reference Log Date	1 of 2 9/02/2007
Logged by	62 and 85 Hillside Road, Newport, NSW. Carlste Pty Ltd BR	DCP Group Reference Log Date	1 of 2 9/02/2007
Logged by Checked by	62 and 85 Hillside Road, Newport, NSW. Carlste Pty Ltd BR DMM	DCP Group Reference Log Date	1 of 2 9/02/2007

TEST DATA

Depth Interval (m)	DCP 1	DCP 2	DCP3	DCP4	DCP 5	DCP &	DCF 7	Geomean
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Dynamic Cone Penetrometer Test Log Summary

Martens

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Geotechnical Assessment:
Proposed Driveway Upgrade
62 and 85 Hillside Road, Newport, NSW,
P0802169JR02_V1-July, 2009
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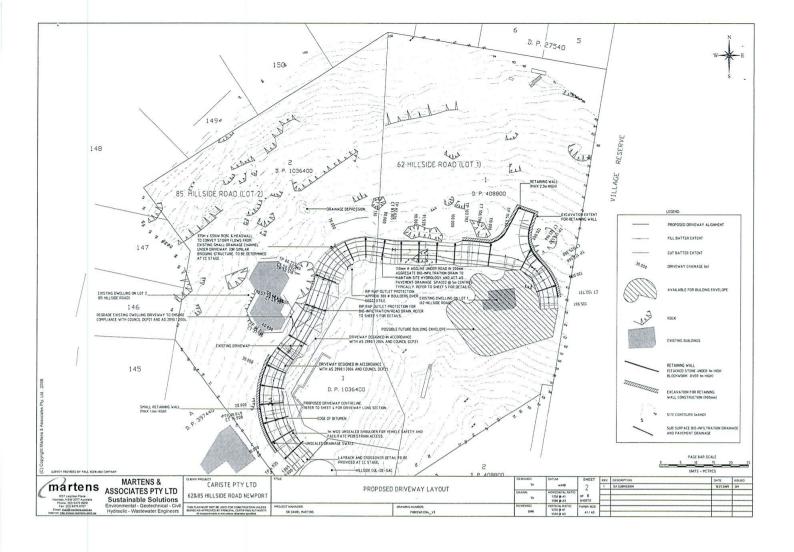
62&85 HILLSIDE ROAD NEWPORT CIVIL DESIGN PLAN SET FOR DEVELOPMENT APPLICATION PROPOSED DRIVEWAY

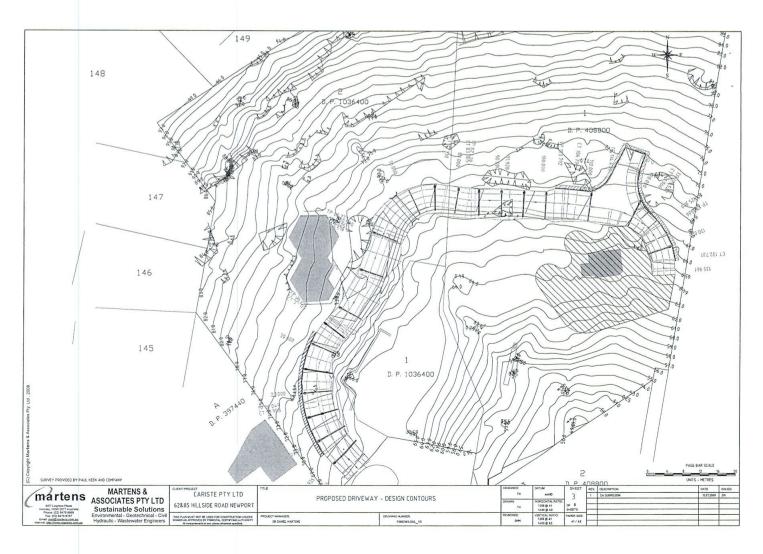
Attachment E - Proposed Driveway Plan set

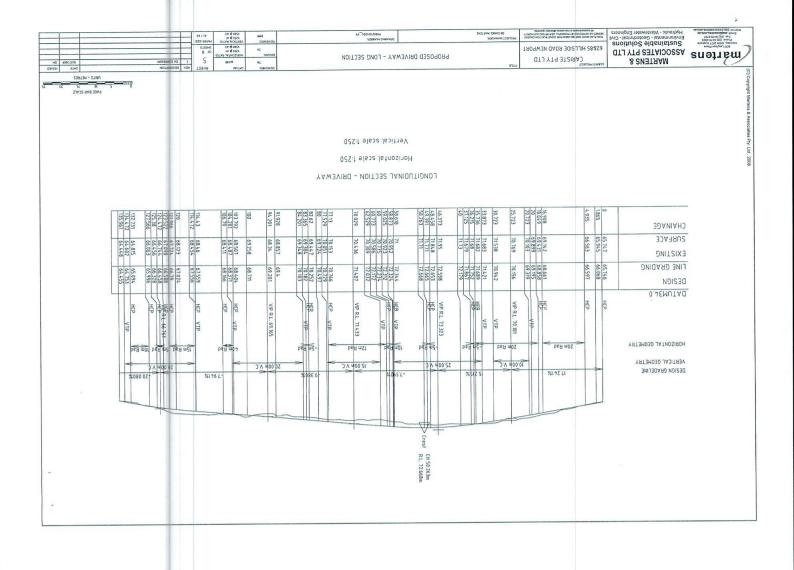
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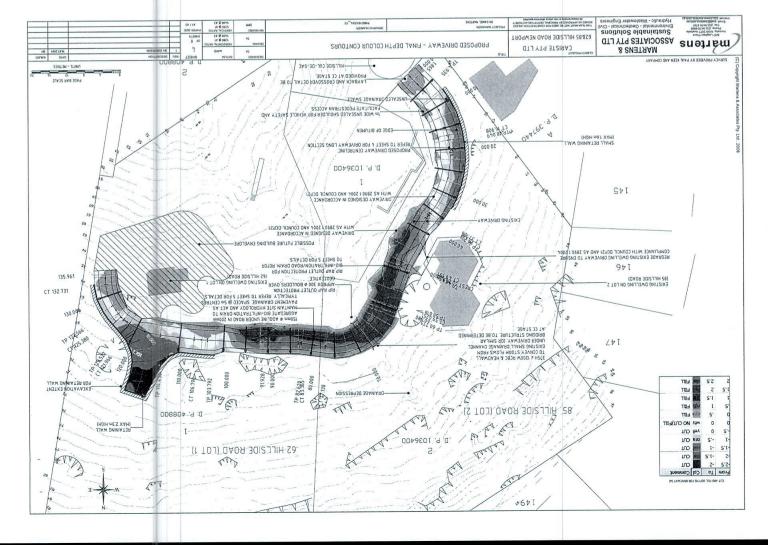
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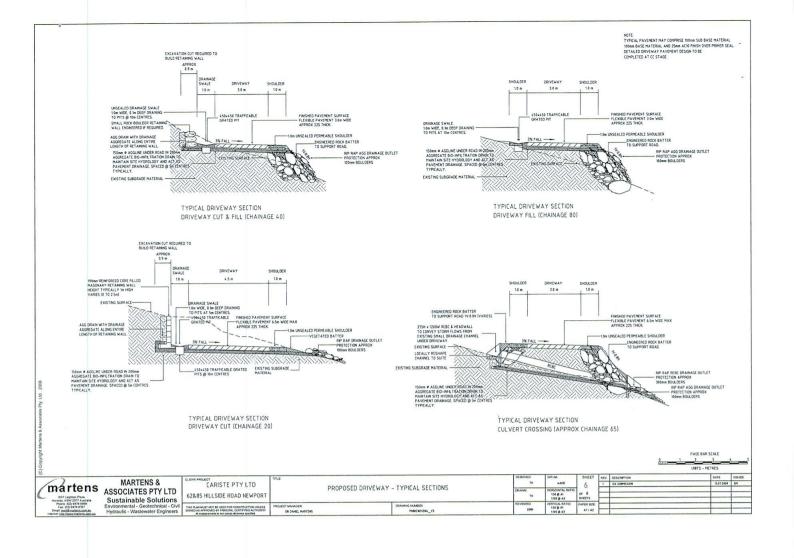
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PROPOSED DRIVEWAY LAYOUT	3711	628,85 HILL SIDE ROAD NEWPORT
·	FILL	15200000

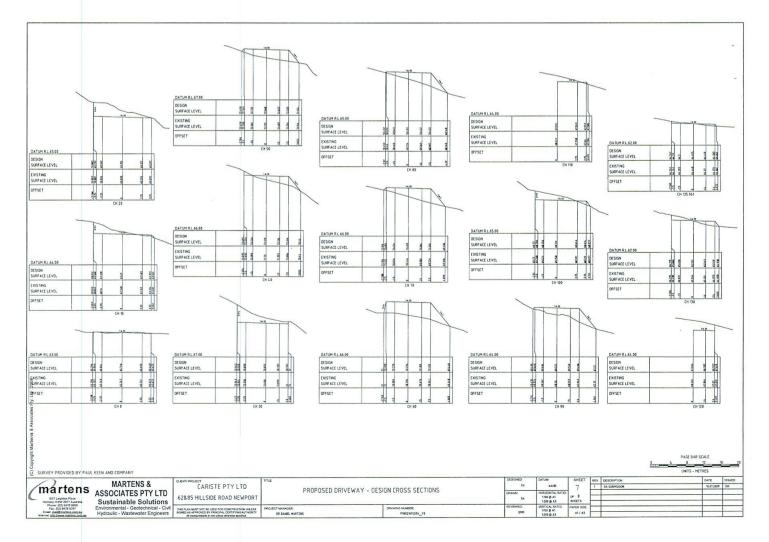












Attachment F - Hillslope Construction Guidelines

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PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

APPENDIX G - SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

GOOD ENGINEERING PRACTICE

ASSESSMENT	Obtain advice from a qualified, experienced geotechnical practitioner at early stage of planning and before site works.	Prepare detailed plan and start site works before geotechnical advice.
PLANNING		
SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk	Plan development without regard for the Risk.
DESIGN AND CONS	STRUCTION	

	Ro.	SITE SITE	
RETAINING WALLS	FILLS ROCK OUTCROPS & BOULDERS	HOUSE DESIGN SITE CLEARING ACCESS & DRIVEWAYS EARTHWORKS CUTS	
Engineer design to resist applied soil and water forces. Found on rock where practicable. Provide subsurface drainage within wall backfill and surface drainage on slope above. Construct wall as soon as possible after cut/fill operation. Found within rock where practicable.	Minimise height. Strip regetation and topsoil and key into natural slopes prior to filling. Strip regetation and topsoil and key into natural slopes prior to filling. Use clean fill materials and compact to engineered retaining wall. Batter to appropriate slope or support with engineered retaining wall. Provide surface drainage and appropriate subsurface drainage. Remove or stabilise boulders which may have unacceptable risk. Support rock faces where necessary.	Use flexible structures which incorporate properly designed brickwork, timber or steel famus, timber or panel chadding. Consider use of split levels. Use deels for recreational stress where appropriate. Retain natural vegetation wherever practicable. Saitsly requirements below for cuts, fills, retaining walls and drainage. Council specifications for grades may need to be modified. Driveways and parking areas may need to be modified. Retain natural contours wherever possible. Minimise depth. Minimise depth. Support with engineered retaining walls or batter to appropriate slope. Provide drainage measures and revosion control.	
Constinct a structurally inindequate wall such as sandstone flagging, brick or unreinforced blockwork. Lack of subsurface drains and weepholes. Found on topsoil, loose fill, detached boulders	Loose or poorly compacted fill, which if it fails, may flow a considerable distance including onto property below. Block natural drainage lines. Fill over existing vegetation and topsoil. Include stumps, trees, vegetation, topsoil, boulders, building rabble etc in fill. Disturb or undercut detached blocks or boulders.	Floor plans which require extensive cutting and filling. Movement intolerant structures. Indiscriminately clear the site. Excavate and fill for site access before geotechnical advice. Indiscriminatory bulk earthworks. Large scale cuts and benching. Unsupported cuts.	

CONTROL &

rage tanks should be water-tight and adequately founded atrol erosion as this may lead to instability.

ly requires pump-out or mains sewer systems; absorption trenches may ssible in some areas if risk is acceptable.

SEPTIC &

SUBSURFACE

Provide drain behind retaining walls.
Use flexible pipelines with access for maintenance
Prevent inflow of surface water.

SWIMMING POOLS

Support on piers to rock where practicable.

Support on piers to rock where practicable.

Provide with under-drainage and gravity drain outlet where practicable.

Design for high soil pressures which may develop on uphill side whilst there

Backfill footing excavations to exclude ingress of surface water

DRAINAGE

SURFACE

Discharge to street drainage or natural water courses.

Provide general falls to prevent blockage by siltation and incorporate silt traps,

Line to minimise infiltration and make flexible where possible.

Discharge at top of fills and cuts.

Allow water to pond on bench areas

structures to dissipate energy at changes of slope and/or direction filter around subsurface drain.

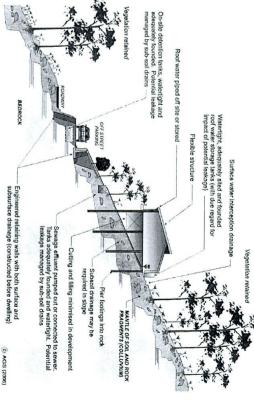
Discharge roof runoff into abs

ide at tops of cut and fill slopes.

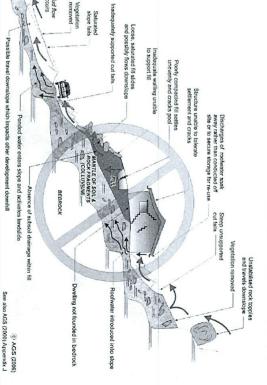
RESI	INSP	S	U
ONSIBILITY	CTION AND I	TE VISITS	DRAWINGS
Clean drainage systems; repair broken joints in drains and leaks in supply pipes.	1AINTENANCE BY OWNER	Site Visits by consultant may be appropriate during construction/	Building Application drawings should be viewed by geotechnical consultant

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

EXAMPLES OF GOOD HILLSIDE PRACTICE



EXAMPLES OF POOR HILLSIDE PRACTICE



7



Attachment H - Notes About This Report

12



Information

Important Information About Your Report

martens consulting engineers construction problems than any other factor. These of your report. Not all of course, are necessarily relevant to all reports, but are included as notes have been prepared by Martens to help you interpret and understand the limitations Subsurface conditions cause more general reference.

Engineering Reports - Limitations

sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretative rather than factual documents, limited to some extent by the scope of gained from limited sub-surface site testing and Geotechnical reports are based on information information on which they rely.

Engineering Reports – Project Specific Criteria

Engineering reports are prepared by qualified personnel and are based on the information configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by obtained, on current engineering standards of interpretation and analysis, and on the basis of your unique project specific requirements as understood by Martens. Project criteria typically include the project; its size and general nature of the

Where the report has been prepared for a specific design proposal (eg. a three storey building), the information and interpretation may not be relative if storey building). Your report should not be relied upon if there are changes to the project without first subsequent to the date of the report affect the report's recommendations. Martens will not accept the design proposal is changed (eg. to a twenty asking Martens to assess how factors that changed responsibility for problems that may occur due to design changes if they are not consulted.

Engineering Reports – Recommendations

throughout an area. This assumption often cannot be substantiated until project implementation has conditions as revealed through selective point Your report is based on the assumption that the site commenced and therefore your site investigation eport recommendations should only be regarded are indicative of actual as preliminary. sampling

assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementalition of the recommendations of this report there is a risk that the report will be misinterpreted and Martens cannot be held familiar with the background information needed to Only Martens, who prepared the report, are fully esponsible for such misinterpretation.

Engineering Reports – Use For Tendering Purposes

Where information obtained from this investigation is provided for lendering purposes, Martens recommend that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. Attention is drawn to the document 'Guidelines for the Provision of Geotechnical Information in Tender Documents', published by the Institution of Engineers, Australia. 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.

Engineering Reports – Data

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings etc are customarily included in a Martens report and are developed by scientists, laboratory evaluation of field samples. These data should not under any circumstances be redrawn for inclusion in other documents or separated from the engineers or geologists based on their interpretation of field logs (assembled by field personnel) and report in any way.

Engineering Reports - Other Projects To avoid misuse of the information contained in

your report it is recommended that you confer with Martens before passing your report on to another and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was party who may not be familiar with the background

Subsurface Conditions - General

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

- the potential for will depend partly on test point (eg. excavation or borehole) spacing and sampling frequency which are often limited by Unexpected variations in ground conditions project imposed budgetary constraints.
- Changes in guidelines, standards and policy or interpretation of guidelines, standards and

policy by statutory authorities.

- 0 actions of contractors responding commercial pressures.
- from those inferred to exist, because no professional, no matter how qualified, can reveal precisely Actual conditions differing somewhat what is hidden by earth, rock and time.

for more gradual or abupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions The actual interface between materials may be

If these conditions occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

Subsurface Conditions - Changes
Natural processes and the activity of man create subsurface conditions. For example, water levels pollutants may migrate with time. Reports are based on conditions which existed at the time of can vary with time, fill may be placed on a site and the subsurface exploration.

adequacy may have been affected by time. If an extended period of time has elapsed since the report was prepared, consult Martens to be advised Decisions should not be based on a report whose how time may have impacted on the project.

Subsurface Conditions - Site Anomalies
In the event that conditions encountreed on site
during construction appear to vany from those that
were expected from the information contained in are exposed, rather than at some later stage well after the event. immediately be notified. Most problems are much more readily resolved at the time when conditions Company report,

Report Use By Other Design Professionals

project professionals who are affected by the report. This may involve Martens explaining the To avoid potentially costly misinterpretations when other design professionals develop their plans based on a report, retain Martens to work with other and specifications produced to see how they have incorporated the report findings. report design implications and then reviewing plans

Subsurface Conditions - Geoenvironmental Issues

Your report generally does not relate to any findings, conclusions, or recommendations about the potential for hazardous or contaminated materials existing at the site unless specifically required to do so as part of the Company's proposal for works.

your site to be contaminated or create an specialist equipment, techniques and personnel are typically used to perform geoenvironmental or site contamination assessments. Contamination can create major health, safety and environmental risks. If you have no information about the potential for environmental hazard, you are advised to contact Martens for information relating to such matters. and sampling guidelines Specific

Responsibility

and opinion and has an inherent level of uncertainty attached to it and is typically far less Geotechnical reporting relies on interpretation of factual information based on professional judgment exact than the design disciplines. This has often resulted in claims being lodged against consultants which are unfounded.

have been developed for use in contracts, reports and other documents. Responsibility clauses do not parties but are included to identify where Martens' responsibilities begin and end. Their use is intended to help all parties involved to recognize their individual responsibilities. Read all documents from Martens closely and do not hesitate to ask any transfer appropriate liabilities from Martens to other To help prevent this problem, a number of clauses questions you may have.

Site Inspections

expected, to full time engineering presence on site. Martens is familiar with a variety of techniques and approaches that can be used to help reduce risk for all parties to a project, from design to engineering inspection services for aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as always be pleased to provide construction.

Explanation of Terms (1 of 3)

Definitions

In engineering terms, soil includes every type of uncernented or partially cemented inaganic or aganic material tound in the ground. In practice, if the material does not exhibit any visible rack properties and can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

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

Particle Size
Soil types are described according to the predominating particle size, qualified by the grading of other particles present leg, sandy clay). Unless otherwise stated, particle size is described in accordance with the following table.

0 8 7

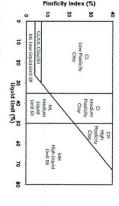
Division	Subdivision	Size
OULDERS		>200 mm
COBBLES		60 to 200 mm
	Coarse	20 to 60 mm
GRAVEL	Medium	6 to 20 mm
	Fine	2 to 6 mm
	Coarse	0.6 to 2.0 mm
AND	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2 mm
SILT		0.002 to 0.075 mm
CLAY		< 0.002 mm

Plasticity Properties

0 8

S

Plasticity properties can be assessed either in the field by tactile properties, or by laboratory procedures.



Moisture Condition

Dry

- Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.
- Moist Soil feels cool and damp and is darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
- As for moist but with free water forming on hands when handled.

Wet

Consistency of Cohesive Soils

Cohesive soils refer to predominantly clay materials.

Hard > 200		Very Stiff 100 - 200	Stiff 50 - 100	Firm 25 - 50	Soft 12 - 25	Very Soft <12	Term (kPa)	
-	5	200	8	8	25	2	n.	
	> 30	15 - 30	8 - 15	4 1 8	2 to 4	2	Approx SPT "N"	
	The surface of the soil can be marked only with the thumbnail.	The surface of the soil can be marked, but not indented with thumb pressure.	The surface of the soil can be indented with the thumb, but not penetrated.	The soil can be indented about 5mm with the thumb, but not penetrated.	A finger can be pushed into the soil to about 25mm depth.	A finger can be pushed well into the soil with little effort.	Field Guide	

Density of Granular Soils

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration test (STI) or Dutch come penetrometer tests (CPI) as below:

Relative Density	%	SPT 'N' Value (blows/300mm)	CPT Cone Value (qc Mpa)
Very loose	< 15	< 5	<2
Loose	15-35	5-10	2-5
Medium dense	35 - 65	10 - 30	5-15
Dense	65-85	30 - 50	15-25
Very dense	> 85	> 50	> 25

Minor Components

Minor components in solls may be present and readily detectable, but have little bearing on general geotechnical classification. Terms include:

Term	Assessment	Proportion of Minor component in:
Trace of	Presence just detectable by feel or eye, but soil properties	Coarse grained soils:
9	little or no different to general properties of primary component.	Fine grained soils: < 15 %
With comp	Presence easily detectable by feel or eye, soil properties little	Coarse grained soils: 5 – 12 %
2010	different to general properties of primary component.	Fine grained soils:

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Explanation of Terms (2 of 3)

Soil Agricultural Classification Scheme
In some situations, such as where soils are to be used for effluent disposal purposes, soils are often more appropriately classified in terms of traditional agricultural classification schemes. Where a Mortens report provides agricultural classifications, these are undertaken in accordance with descriptions by Northcote, K.H. (1979) The factual key for the recognition of Australian Soils, Relim Technical Publications, NSW, p 24 - 28.

Symbol	Field Texture Grade	Behaviour of moist bolus	Ribbon length	Clay content (%)
,		Coherence nil to very slight; cannot be		

НС	MC	LMC	Б	SIC	SC	FSCL	SICL	5	SCL	SIL	Lfsy	-	SCI-	FSL	SL	CR.	ıs	s	Symbol
Heavy clay	Medium clay	Light medium clay	Light clay	Silty clay	Sandy clay	Fine sandy clay loam	Silty clay loam	Clay loam	Sandy clay loam	Silt loam	Loam, fine sandy	Loam	Light sandy clay loam	Fine sandy loam	Sandy loam	Clayey sand	Loamy sand	Sand	Field Texture Grade
Smooth plastic bolus; handles like stiff plasticine; can be moulded into rods without fracture; firm resistance to shearing	Smooth plastic bolus, handles like plasticine and can be moulded into rods without fracture, some resistance to shearing	Plastic bolus; smooth to touch, slightly greater resistance to shearing than LC	Plastic bolus; smooth to touch; slight resistance to shearing	Plastic bolus; smooth and sliky	Plastic bolus; fine to medium sized sands can be seen, felt or heard in a clayey matrix	Coherent bolus; fine sand can be felt and heard	Coherent smooth bolus; plastic and silky to touch	Coherent plastic bolus; smooth to manipulate	Strongly coherent bolus sandy to touch; medium size sand grains visible in a finer matrix	Coherent bolus, very smooth to silky when manipulated	Bolus coherent and slightly spongy; fine sand can be felt and heard when manipulated	Bolus coherent and rather spangy; smooth feel when manipulated but no obvious sandiness or silláness may be somewhat greasy to the touch if much organic matter present	Bolus strongly coherent but sandy to touch, sand grains dominantly medium size and easily visible	Bolus coherent; fine sand can be felt and heard	Bolus just coherent but very sandy to touch; dominant sand grains are of medium size and are readily visible	Slight coherence; sticky when wet; many sand grains stick to fingers; discolours fingers with clay stain	Slight coherence; discolours fingers with dark organic stain	Coherence nil to very slight; cannot be moulded; single grains adhere to lingers	Behaviour of moist bolus
>7.5	>7.5	7.5	5.0 - 7.5	5.0 - 7.5	5.0 - 7.5	3.8 - 5.0	3.8 - 5.0	3.8 - 5.0	2.5 - 3.8	2.5	2.5	2.5	2.0	1.3-2.5	1.3 - 2.5	6.35mm - 1.3cm	6.35 mm	0 mm	Ribbon length
> 50	45 - 55	40 - 45	35 - 40	35 - 40 + > 25 silt	35 - 40	30 - 35	30- 35 + > 25 silt	30 - 35	20 - 30	25 + > 25 slit	25	25	15 - 20	10 - 20	10 - 15	5-10	5	^5	Clay content (%)



Soil Data Explanation of Terms (3 of 3)

Symbols for Soil and Rock

		SEDIMENTARY ROCK		IGNEOUS ROCK	IGNEOUS ROCK
COBBLES / BOULDERS	X SILT (ML or MH)	ON BOULDER	CLAYSTONE	+ + GRANITE	SLATE, P
OO GRAVEL (GP or GW)	CLAY (CL or Cl)	DO CONGLOMERATE	SHALE	DOLERITE /	GNEISS
SILTY GRAVEL (GM)	ALLUVIUM	OOB CONGLOMERATE	COAL		
COO CLAYEY GRAVEL (GC)	Name and the second	SANDSTONE.	LIMESTONE		
SAND (SP or SW)	TALUS	SILTSTONE	TUFF		
SILTY SAND (SM)	TOPSOIL	LAMINITE			
CLAYEY SAND (SC)		MUDSTONE			

Unified Soil Classification Scheme (USCS)

	(Excluding p	particles	larger than 6	3 mm and basing	(Excluding particles larger than 63 mm and basing fractions on estimated mass)	3	anna Linning
920'0	si nottos		(SI	ide range in grain siz	Wide range in grain size and substantial amounts of all intermediate particle stees.	GW	Gravel
.det than	VELS	CLE	GRA/	Predominantly one size or	size or a range of sizes with more intermediate sizes missing	d5	Gravel
iol si mr	GRA to that of		ciable int of	Non-plastic fine	Non-plastic fines (for identification procedures see ML below)	B	Silty Gravel
u	More th	GRA'	anddA)	Plastic fines	Plastic lines (for identification procedures see CL below)	25	Clayey Gravel
t ssəl loin nm			OU J	Wide range in grain	Nide range in grain sizes and substantial amounts of intermediale sizes missing.	SW	Sand
e tom to 8	de visible toonse frag	CLE	NAS (Little o	Predominantly one	Predominantly one size or a range of sizes with some intermediate sizes missing	SP.	Sand
	1A2 to that m		eldold to to	Non-plastic fine	Non-plastic fines (for identification procedures see ML below)	SM	Silty Sand
	Wore tho	SQNA2 BUIT	oenddA) nuomp enil	Plastic fines	Plastic lines (for identification procedures see CL below)	Š	Clayey Sand
Γ	dt tur			IDENTIFICATIO	DENTIFICATION PROCEDURES ON FRACTIONS < 0.2 MM		
si mm &	DRY STRENGTH Crushing Characteristics)	STH B Hics)	DILATANCY	TOUGHNESS	DESCRIPTION	uscs	Primary Name
mm than 6	None to Low	wo	Quick to Slow	None	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	ML	SIIt
2591 lbin 1 270.0	Medium to High	o	None	Medium	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays	ت ت	Clay
et than	Low to Medium		Slow to Very Slow	Low	Organic silts and organic silty clays of low plasticity	ъ	Organic Silt
% 05 up	Low to Medium		Slow to Very Slow	Low to Medium	Inorganic sits, micaceous or diatomaceous line sandy or sity soils, elastic sits	WH	Sit
ore tho	High		None	High	Inorganic clays of high plasticity, fat clays	5	Clay
ow.	Medium to High	Q.	None	Low to Medium	Organic clays of medium to high plasticity	8	Organic Silt
ORGANIC	8	adily ide	antified by co	lour, odour, spong	Readily identified by colour, odour, spongy feel and frequently by fibrous texture	ā	Peat



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Descriptive terms used for Rock by Martens are given below and include rock substance, rock defects and rock mass.

INATÉENS consulting engineers

In geolechnical engineering lerms, rock substance is any naturally occurring aggregate of minerals and organic matter which cornot, unless externally weathered, be dishinggrated or remoulded by hand in air or water. Other motival is it electibed using soil descriptive terms. Rock substance is effectively homogeneous and may be islangpla or analorable. Rock Substance

Discontinuity or break in the continuity of a substance or substances.

Rock Defect Rock Mass

Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects,

Degree of Weathering Rock weathering is defined as the degree in rock structure and grain property decline and can be readily determined in the field.

Term	Symbol	Definition
Residual Soil	82	Soil derived from the weathering of rock. The mass stucture and substance fabric are no longer evident. There is a large change in volume but the soil has not been significantly transported.
Extremely weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits sail properties - ie, it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly weathered	МН	Rock substance affected by weathering to the extent that fimorite staining or bleaching affects the whole of the rock substance and other stars of chemical or physical decomposition are wident. Parasity and strength may be increased or decrease compared to the fresh rock usually as a restrict in leaching or deposition. The colour and strength of the original rock substance is no longer recognisable.
Moderately weathered	WW	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
Slightly weathered	. XS	Rock substance affected by weathening to the extent that panial staining or discolouration of the rock substance usually by fimorile has taken place. The colour and texture of the fresh rock is recognisable.
Fresh	뇬	Rock substance unaffected by weathering

Rock Strength

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance is the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics.

Is (50) MPa	Field Guide	Symbol
< 0.03	Easily remoulded by hand to a material with soil properlies.	EW
0.03 - 0.1	May be crumbled in the hand. Sandstone is 'sugary' and friable.	WA
0.1 - 0.3	A place of core 150mm long x 50mm diameter may be broken by hand and easily scored with a knife. Sharp edges of core may be fridable and break during handling.	*
0.3 - 1	A piece of core 150mm long x 50mm diameter can be broken by hand with considerable difficulty. Readily scored with a krife.	MS
1-3	A piece of core 150nm long x 50nm diameter cannot be broken by unalded hands, can be slightly scratched or scored with a knife.	S
3-10	A piece of core 150mm long x 50mm diameter may be broken readily with hand held hammer. Cannot be scratched with pen knife.	\s
> 10	A piece of core 150mm long x 50mm diameter is difficult to break with hand held hammer. Rings when struck with a hammer.	B

Degree of Fracturing This classification annia

Explanation of Terms (2 of 2)

Degree of Fracturing
This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane portings, joints and other rock defects, but excludes fractures such as drilling process.

Term	Description
Fragmented	The core is comprised primarily of fragments of length less than 20mm, and mostly of width less than core diameter.
Highly fractured	Care lengths are generally less than 20mm-40mm with occasional fragments.
Fractured	Core lengths are mainly 30mm-100mm with occasional shorter and longer sections.
Slightly fractured	Care lengths are generally 300mm-1000mm with occasional longer sections and occasional sections of 100mm-300mm.
Unbroken	The core does not contain any fractures.

Explanation of Terms (1 of 2)

Sampling is carried out during drilling or excavation 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

and compressibility. Undistrurbed sampling is generally effective only in cohesive soils. Other sampling methods may be used. Details of the type and method of sampling Undisturbed samples may be taken by pushing a thin-walled sample tube into the soils and withdrawing a soil sample in a relatively undisturbed state. Such samples spield information on structure and strength, and are necessary for laboratory determination of shear strength and comprovisities. 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.

Hand Excavation - in some situations, excavation using hand tools such as mattack and spade may be required due to limited site access or shallow soil profiles,

Hand Auger - the hole is advanced by pushing and rolding either a sand or clay auger generally 75-100mm in diameter into the ground. The depth of penetration is usually limited to the length of the ouger pole, however extender pieces can be added to lengthen this.

fracked executate, allowing close examination of the in-situ soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 4m for an executate. A potential disadvantage is the disturbance caused by the excavation. <u>[est Pits</u> - these are excavated with a backhoe

ore disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually Lacge Diameter, Auser (e.g., Penga) - the hole is advanced by a rotating plate or shot spiral auger, generally 300mm or larger in diameter. The cuttings are returned to the surface of intervals (generally of not more than 0.5m) and nted by occasional undisturbed tube sampling

Continuous Solial Flight Augers - the hole is advanced using 90 - 115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or institutesting. This is a relatively economical means of dilling in clays and in sands above the water toble. Samples are returned to the surface or, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contominated. Information from the affiliar (as distinct from specific sampling by \$15 or undisturbed samples) is of relatively lower reliability, due to temoulaing Confinuous Samale Diffling - 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 salls, since moisture content is unchanged and sail structure, strength etc. is only marginally affected.

Non-care Rotary Drilling - the hole is advanced by a rotan bit, with water being pumped down the drill rods and

contamination or softening of samples by ground water.

refurned 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.

Reday Mula Drilling - similar to rotary drilling, but using drilling moud as a circulating fluid. The muld tends to mask the curtings and reliable identification is again only possible from separate intact sampling (eg. from SPT). martens

Continuous Care Dalling - a continuous core sample is obtained using a diamond tipped core barret, usually form internal diamoter, Provided full care recovery is cachieved (which is not always possible in very weak rocks and granular salls), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

svandard penetration tests are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also obtaining a relatively undisturbed sample. The test procedure is described in AS 1289 Methods of Testing Soils for Engineering Purposes - Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter spill sample tube under the impact of a 43 kg nammer with a fee fall of 750mm. It is annot for the tube to be driven in three successive 150 mm increments and the "N' value is taken as the number of blows for the last 50mm. In dense sands, very hard clays or weck rack, the 141 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

(i) In the case where full penetration is obtained with successive blow counts for each 150mm of say 4, 6 and 7 $\,$

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

as 15, 30/40 mm.

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

CONE PENETROMETER TESTING AND INTERPRETATION
Come penetrometer testing (sometimes referred to as
Durich Cone - abbreviated as CPT) described in this report
has been carried out using an electrical friction cone
penetrometer. The test is described in AS 1289 - Test F.4.1.

In the test, a 35mm diameter rod with a cone tipped end is pushed continuously into the soil, the reaction being provided by a specially designed fuck or fig which is fitted with an hydroulic rom system. Measurements are made of the end bearing resistance on the cone and the friction resistance on separate 130mm long sleeve, immediately behind the cone; transluces in the tip of the assembly are connected by electrical wrise possing 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 output on continuous char

Test Methods

Explanation of Terms (2 of 2)

recorders. The plotted results given in this report have been traced from the original records.

Cone resistance - the actual end bearing force divided by the cross sectional one of the cone - expressed in MPA. Sleeve friction - the frictional force of the sleeve divided by the surface area - expressed in RP. Friction ratio - the ratio of sleeve friction to cone resistance The information provided on the charts comprises:

expressed in percent.

There are two scales available for measurement of cone resistance. The lower (A) scale (10 - 5 Mpc) is used in very star kins law where increased sensitivity is required and is shown in the graphs as a dathed line. The main (B) scale (1-50 Mpc) is less sensitive and is shown as a full line.

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

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

qc (Mpa) = (0.4 to 0.6) N (blows/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.

assessed from the cone and friction traces and from experience and information from nearby boteholds eff.

This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a confinuous profile of engineering properties, and where precise information on sail classification is required, direct drilling and sampling inferred stratification as shown on the attached reports is may be preferable.

DYNAMIC CONE (HAND) PENETROMETERS

Hand penetrometer tests are carried out by driving a rod into the ground with a folling weight hornmer and meaving the blows for successive 150mm increments of penetration. Namally, there is a depth firmitation of 1.2m but this may be extended in certain conditions by the use of extension rods. Two relatively similar tests are used.

granular soils and filling.

Granular soils and filling.

For the penetrative is the soil of the soil Perth sand penetrometer - a 16 mm diameter flat ended one is driven with a 95g, haramer, dropping 600rm (AS 1269 - Test 5.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in

various Road Authorities ABORATORY TESTING

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

TEST PIT / BORE LOGS
The test pit / boxe log(s) presented herein are an engineering and/or geological interpretation of the sub-surface conditions and their relationly will depend to same securation / drifting. Ideally, continuous undisturbed sampling a excavation / care drifting will provide the most relation consciently. Continuous undisturbed sampling are excavation / drifting. Ideally, continuous undisturbed sampling are excavation. Lat this is not always practicable, or possible to justify on economic grounds, in any case, the baceholes 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' variation between the bareholes.

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, or perhaps not at all during the time it is left open.

A localised perched water table may lead to an erroneous indication of the true water table.

Water table levels will vary from time to time with seasons or recent prior 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 agound water inflow. Water has to be blown out of the hole and affiling mud must first be washed out of the hole if water observations are to be made.

More reliable measurements can be made by installing stratagling stratagles where the verse several days, or perhaps weeks for low permeability soils. Plezameters seaded in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perchap wheter table.

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Application Lodgement Summary

Sydney WATER

Reference Number 3314998

Date Requested: Thu November 3 2011

DOLFIN Number

D11/2-05867

Agent

Reece St. Leonards, 37 Herbert Street St Leonards

Applicant

Pjg Roach, 62 Hillside Rd Newport 2106

Property/Asset

85 Hillside Rd, Newport 2106 (Aag Roach) PNum: 3423211

150 mm DICL Sewer Main - (3135468)

150 mm DICL Sewer Main - (3138196)

Product

Building Plan Approval Application

Charge

Product Cost GST Total

Building Plan Approval Application

\$27.25 \$0.00 \$27.25

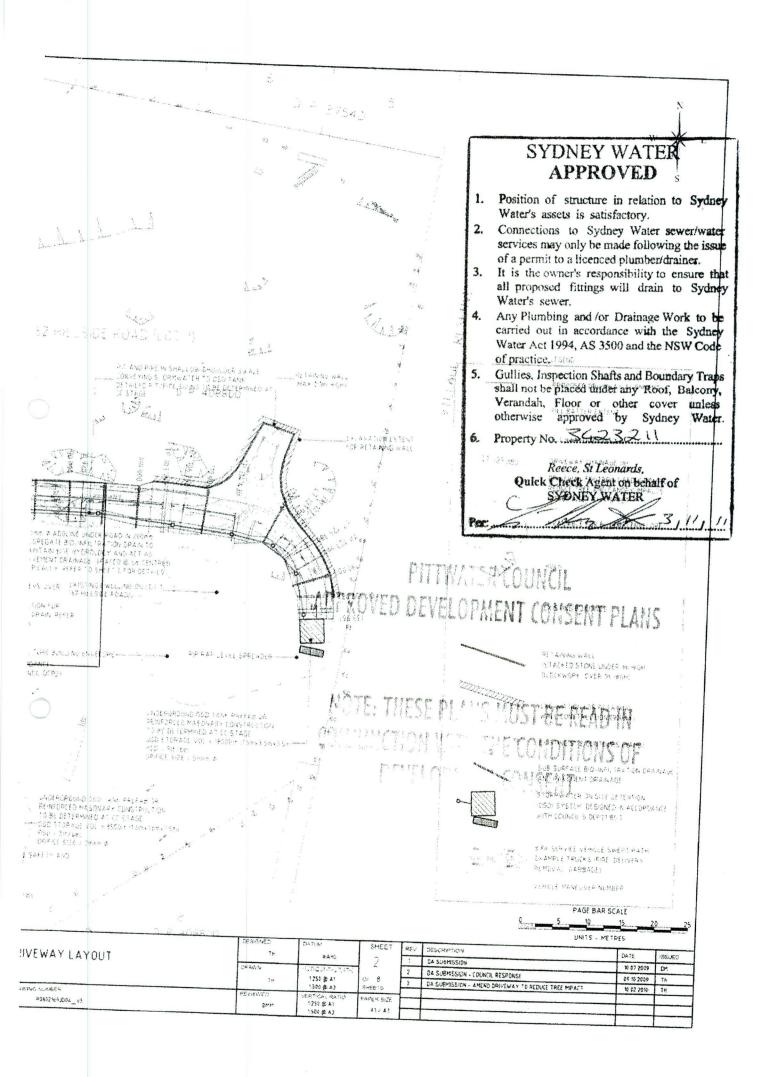
Property Special Conditions for Plumbers

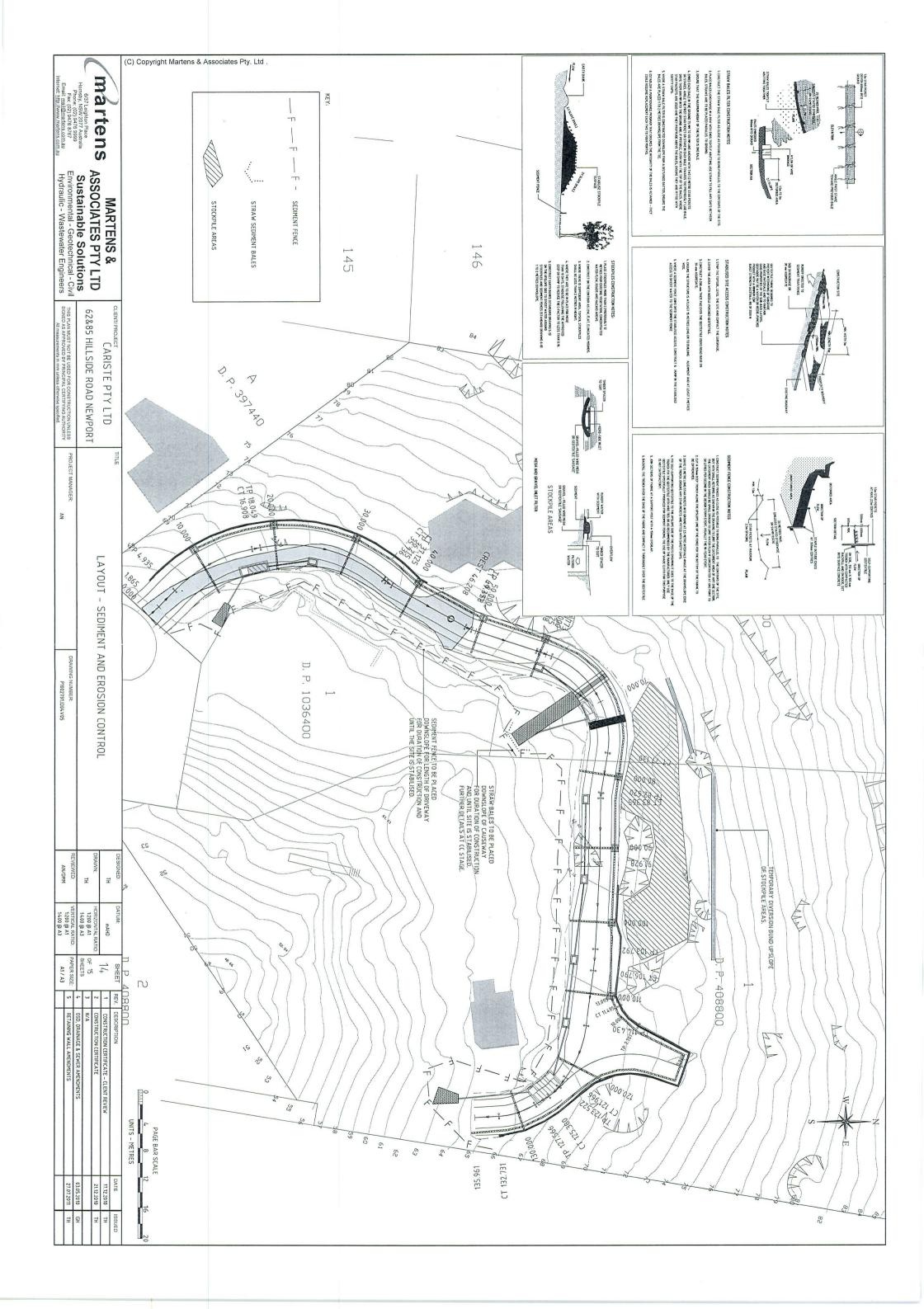
Boundary Trap Required No Watercharged/Tidal area No Partial Drainage area No Aggressive Soil area No Cast Iron Pipe area Yes Sewer Surcharge area No Minimum Gully Height area No Sewer Available Yes Connection Type Gravity

You must contact Sydney Water to clarify the property special conditions where the property special conditions are not shown (yes or no), are shown as "unset", "unknown" or "not available" or if the proposed development is being built over more than one existing property.

Please note that boundary traps must be fitted for all commercial and industrial properties and you must ensure that all plumbing/drainage and building works are carried out in accordance with the relevant codes and standards.

A water meter is required to be fitted to the property during construction. You will need to ensure that your licensed plumber carries out this work in accordance to the relevant codes and standards.





(C) Copyright Martens & Associates Pty. Ltd. martens VIDED BY PAUL KEEN AND COMPANY, DRAWING REF 9499F Sustainable Solutions
Environmental - Geotechnical - Civil
Hydraulic - Wastewater Engineers ASSOCIATES PTY LTD MARTENS & 62&85 HILLSIDE ROAD NEWPORT CARISTE PTY LTD AUTHORITY SHEET ANDREW NORRIS 9 1004 1 10 14 13 62&85 HILLSIDE ROAD NEWPORT COVER DETAILS - RETAINING WALLS DETAILS - OSD TANKS AND CAUSEWAY CROSS SECTIONS - DRIVEWAY: SHEET 1 OF 2 CONSTRUCTION NOTES: SHEET 2 OF 3 LAYOUT - SEDIMENT AND EROSION CONTROL CROSS SECTIONS - DRIVEWAY: SHEET 2 OF 2 CROSS SECTIONS - TYPICAL DRIVEWAY SECTIONS LONGITUDINAL SECTION - SEWER LAYOUT - CUT AND FILL EXTENT LAYOUT - STORMWATER AND SEWER CONSTRUCTION NOTES: SHEET 3 OF 3 CONSTRUCTION NOTES: SHEET 1 OF 3 TITLE LONGITUDINAL SECTION - DRIVEWAY LAYOUT - SITE COVER P1002791JD04V05 AN/DMM Ξ N/A NA A1 / A3 APPROVED
DIX GARDNER GROUP PTY LTD CONSTRUCTION CERTIFICATE Approved Plans & Specifications relating to: CONSTRUCTION CERTIFICATE - CLIENT REVIEW
CONSTRUCTION CERTIFICATE
RETAINING WALL TYPE CHANGED, CONVENTS ADDED
DSD & SERVICES AMENDMENTS, SHEETS \$6.13.14, UPDATED 8 DEC 2014

CONSTRUCTION CERTIFICATE

CIVIL DESIGN PLAN SET

- SURVEY INFORMATION SHOWN, AND DESIGN LEVELS, THE SURVEY BY PAUL KEEN AND COMPANY. BASED 9
- PRIOR TO COMMENCING ANY WORKS, THE CONTRACTOR SHALL CARRY OUT A "DIAL BEFORE YOU DIG" FOR A SERVICES SEARCH. THE CONTRACTOR SHALL THEN ARRANGE FOR ALL SERVICES TO BE PHYSICALLY LOCATED, IDENTIFIED AND CLEARLY MARKED WITHIN THE WORKS AREA PRIOR TO THE COMMENCEMENT OF ANY WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY DAMAGE CAUSED TO SUCH SERVICES DURING THE COURSE OF THE WORKS. ANY SERVICE LOCATION SHOWN ON THE FOLLOWING DRAWNIGS ARE INDICATIVE OUT, AND THE POSITION AND DEPTH NDICATED SHOULD NOT BE RELIED UPON.
- THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS, SPECIFICATIONS AND WRITTEN INSTRUCTIONS THAT MAY BE ISSUED DURING THE COURSE OF THE CONTRACTOR SHALL ENSURE THAT HE HAS THE LATEST DRAWING REVISION PRIOR TO COMMENCING ANY WORKS.

25

- IF THE CONTRACTOR HAS ANY QUESTIONS, REQUIRES CLARIFICATION OF ANY ISSUES, OR FINDS ANY DISCREPANCIES WITHIN THESE DRAWINGS, THE CONTRACTOR SHALL ADVISE THE SUPERINTENDENT BEFORE PROCEEDING. ALL SET OUT DIMENSIONS SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES, DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS, ALL LEVELS ARE IN METTRES AND ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (AHD).
- ALL MATERIALS AND WORKMANSHIP USED SHALL BE IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS, BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES OR GEOTECHNICAL ENGINEER'S SPECIFICATIONS, EXCEPT WHERE VARED BY THE PROJECT SPECIFICATIONS. WHERE THE CONTRACTOR BELEVES THAT INCESSARY DIMENSIONS ARE NOT SHOWN, REFER THE MATTER TO THE DESIGN CONSULTANT.
- ALL ENGINEERING WORK MUST BE INSPECTED AT THE "HOLD POINTS" AS FOLLOWS:
- AFTER SEDIMENT INSTALLED. AND EROSION CONTROL MEASURES
- AFTER POLLUTION EVENTS. AFTER POLLUTION EVENTACTED. 9999). ALL WORKS D. MARTENS & / S TO CEASE ASSOCIATES
- CERTIFICATES SHALL BE IS THAT THE WORKS COMPLY VENEZULATION CERTIFICATE. EACH COMPACTED LAYER IS TO BE PROCEEDING TO THE FOLLOWING LAYER. Y WITH T O ON DEVELOPMENT (PROIR
- DURING CONSTRUCTION, THE WORKS SITE SHALL BE MAINTAINED BAILY IN A SAFE AND STABLE CONDITION. PERMETTER SAFETY FENCING, TEMPORARY BRACING, BENCHING OF EXCAVATIONS AND BATTERS SHALL BE PROVIDED BY THE CONTRACTOR TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.

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- THE CONTRACTOR IS TO NOTIFY THE SUPERINTENDANT AND DESIGN ENGINEER IF IT BECOMES EVIDENT THAT CONDITIONS ON SITE (INCLUDING ENCOUNTERING OF GROUNDWATER) HAVE POTENTIAL TO NEGATIVELY IMPACT ON THE INTENDED ENGINEERING DESIGN.
- ALL CONSTRUCTION WORK SHALL BE CARRIED OUT SO THAT AT ANY TIME. THE AMENITY OF THE ADJOINING PROPERTIES IS NOT COMPROMISED I.E. DISCHARGE OF ADDITIONAL OF POLLUTED STORMWATER RUNOFF, ALL WEATHER ACCESS TO THE PROPERTY, NOISE, DUST, BUILDING WASTE ETC.
- OF SUS F THE WORKS. E CONDUITS WHERE REQUIRED BY THE THORITIES AND SHALL UNDERTAKE ALL DIRECTED NECESSARY FOR THE
- THE CONTRACTOR WHICH MAY HAVE E "WORKS" TO EXIST! UTILITY SERVICES. SHALL MAINTAIN AND BEEN CAUSED BY THE TING ROAD SURFACES, F RESTORE ANY DAMAGE CONSTRUCTION OF THE ROADSIDE DRAINAGE OR
- ALL DISTURBED AREAS ARE TO BE REINSTATED AS I TO THE PRE-CONSTRUCTION CONDITION AND/OR IN A THE SITE'S LANDSCAPING PLAN. S NEAR AS POSSIBLE I ACCORDANCE WITH
- R SHALL ENSURE THAT A EXISTING ENGINEERING AND NATURA
- EROSION AND SEDIMENT CONTROLS IN ACCORDANCE WITH APPROVED EROSION SEDIMENT CONTROL PLAN ARE TO BE IN PLACE AT ALL TIMES, CONTROLS TO BE INSPECTED, MAINTAINED AND REPLACED AS REQUIRED BY THE CONTRACTOR.
- PROVISION IS TO BE MADE FOR MAINTAINING TRAFFIC FLOW IN PUBLIC ROADS AT ALL TIMES. TRAFFIC CONTROL MEASURES ARE TO BE IN ACCORDANCE WITH COUNCIL GUIDELINES.
- THE CONTRACTOR IS TO ENSURE STOCKPILES OR FILL ENCROACHES RETAINED TREES FOR THE DURATION THAT NO BUILDING MATERIA; UPON ADJACENT PROPERTY V OF THE WORKS.

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Environmental - Geotechnical - Civil Hydraulic - Wastewater Engineers Sustainable Solutions

- 20 COUNCIL AND THE PCA MUST BE NOTIFIED IMMEDIATELY, SHOULD THE PRESENCE OF ASBESTOS OR SOIL CONTAMINATION, NOT RECOGNISED DURING THE ORGINAL ASSESSMENT PROCESS, BE IDENTIFIED DURING DEMOLITION OR CONSTRUCTION WORKS.
- A SUFFICIENT SUPPLY OF APPROPRIATE SPILL CONTROL EQUIPMENT MUST BE KEPT ON THE PREMISES AT ALL TIMES, MATERIALS USED IN THE CLEAN UP OF A SPILL MUST BE DISPOSED OF TO AN APPROPRIATELY LICENSED WASTE FACILITY.
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- TEMPORARY CLOSET ACCOMMODATION IS TO BE PROVIDED AT THE WORK SITE AT ALL TIMES AT THE RATE OF ONE CLOSET FOR EVERY 20 PERSONS AND BE LOCATED WHOLLY WITHIN THE BOUNDARIES OF THE PROPERTY. PERMANENT FACILITIES ARE TO BE PROVIDED IN ACCORDANCE WITH PART F2.1, F2.4 AND F 2.5 OF THE BUILDING CODE OF AUSTRALIA.

QUALITY & SAFETY SAFETY ASSURANCE 80 OCCUPATIONAL HEALTH

- AT THE COMPLETION OF CONTRACTOR SHALL CEUNDERTAKEN AND COMPLESPECIFICATIONS, AND INS N OF EACH STAGE OF THE WORKS, THE CERTIFY THAT THOSE WORKS HAVE BEEN MPLETED IN ACCORDANCE WITH THE DRAWINGS, INSTRUCTIONS ISSUED DURING THE COURSE OF
- THE CONTRACTOR SHALL OBTAIN AND KEEP ON SITE AT ALL RELEVANT MATERIAL SAFETY DATA SHEETS (MSDS) THAT AGE APPLICABLE FOR MATERIALS BEING USED ON THE SITE. ALL TRANSPORTATION, STORAGE, USE OF, AND DISPOSAL OF THESE MATERIALS SHALL BE IN ACCORDANCE WITH MSDS. THE LOCATION OF THESE MSDS SHALL BE IN ACCORDANCE WITH MSDS. THE LOCATION OF THESE MSDS SHALL BE IN ACCORDANCE WITH MSDS. THE LOCATION OF THESE MSDUCTION AND ARE TO BE ACCESSIBLE AT ALL TIMES TO ALL SITE PERSONNEL.
- ATTENTION IS DRAWN TO THE OCCUPATIONAL ACT NSW, 2000 NO.40 AND ITS REGULATIONS, V EMPLOYERS ENSURE THE HEALTH, SAFETY A PERSONS WORKING ON OR VISITING THE SITE.
- THE CONTRACTOR SHAND REASONABLE SATHE SAFETY OF ALL FOR THE WORKS. SHALL AT ALL TIMES EXERCISE SAFETY PRECAUTIONS APPROPR L PERSONS ON THE WORK SITE OF SR ALL NATE
- THE CONTRACTOR SHALL PROVIDE AROUND THE SITE TO EXCLUDE THE AROUND EXCAVATIONS WITHIN THE STHAT IS REQUIRED TO ENSURE THE THAT IS REQUIRED TO ENSURE THE VISITOR PEDESTRIANS, ANIMALS AND V DE A SECURE PERIMETER FENCE HE PUBLIC, PLUS SAFETY FENCING IE SITE, AND ANY OTHER FENCING 'HE SAFETY OF SITE PERSONNEL!'
- THE WORK SITE IS TO BE KEPT LIT BETWEEN SUNSET AND SUNRISE IF IT IS LIKELY TO BE A SOURCE OF DANCER TO PERSONS USING PUBLIC PLACE OR UPON INSTRUCTION BY COUNCIL TO ENHANCE THE SAFETY AND SECURITY OF THE AREA IN WHICH THE WORK IS LOCATED.

- ALL ABOVE GROUND STORAGE'S OF HAZARDOUS MA CHEMICALS OR FERTILISERS MUST BE BUNDED. THE E MADE FROM AN IMPERVIOUS MATERIAL AND MUST BE LARGE ENOUGH TO HOLD THE CONTENTS OF CONTAINER PLUS 10%. S MATERIALS, OILS, THE BUND IS TO BE T BE COVERED AND OF THE LARGEST
- NO SITE WORKS, INCLUDING THE REMOVAL OF VEGETATION DEMOLITION WORKS, SHALL BE COMMENCED PRIOR CONSTRUCTION CERTIFICATE BEING ISSUED. OR /
- THE COST OF REPAIRING ANY DAMAGE CAUSED TO COUNCIL'S ASSETS AS A RESULT OF CONSTRUCTION WORKS ASSOCIATED WITH THE APPROVED DEVELOPMENT IS TO BE MET IN FULL BY THE APPLICANT/JOEVELOPER PRIOR TO THE ISSUE OF A SUBDIVISION CERTIFICATE.

- THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN A QUALITY ASSURANCE SYSTEM WHICH COMPLIES WITH THE REQUIREMENTS OF A.S. 9001 (2000) AND AUS-SPEC COC & COS. THE QUALITY SYSTEM SHALL BE SUCH THAT RECORDS ARE KEPT OF ALL ASPECTS AND STAGES OF THE WORK.
- THE RECORDS FOR EACH CONSTRUCTION TASK SHALL BE STACED AND ITEMISED TO THE SATISFACTION OF THE SUPERINTENDENT THE PRO-FORMERS SHALL BE SUBMITTED TO THE SUPERINTENDENT FOR APPROVAL PRIOR TO ANY WORK BEING COMMENCED.
- DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR SHALL MAN ACCURATE AND UP TO DATE RECORDS (SUCH AS GOODS RECEIVED / REFURNED, ALL "ISSUED NOTICES / INSTRUCTIONS / CERTIFICATES", RETAIN ALL DRAWINGS REVISIONS, REPORTS, MARKED UP DRAWINGS OF EITHER AMENDMENTS OR "WAE"); AND SHALL MAKE SUCH RECORDS AVAILABLE TO THE SUPERINTENDENT IF REQUESTED, FAILURE TO MANNTAIN THE APPROPRIATE RECORDS MAY RESULT IN THE CONTRACTOR REMINISTRUCTED BY THE INSPECTING COMPLETED WORKS IF INSTRUCTED BY THE

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- S, WHICH REQUIRES SAFETY ES THAT OF ALL
- NECESSARY
 THE VICINITY
- THE CONTRACTOR SHALL IMPLEMENT AN OH&S SYSTEM AND MAINTAIN ALL THE REQUIREMENTS OF THE RELEVANT OH&S ACT, SUCH AS LOG BOOKS RECORDING OF: PERESONNEL INDUCTIONS, PERSONNEL SIGNAU AND SIGNAOUT, INJURIES ETC, AND FIRST AID STATIONS AND TOOL BOX MEETINGS ETC.
- THE LAND AND ADJOINING AREAS ARE TO BE KEPT IN A CLEAN A TIDPY CONDITION AT ALL TIMES. LITTER AND RUBBISH SHALL PLACED IN CONTAINERS AND REMOVED FROM THE SITE. A WAS STORAGE CONTAINER IS TO BE PROVIDED AT THE COMMENCEMENT THE BUILDING WORK.

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WHEN

NO

EXISTING SERVICES

- PRIOR TO COMMENCING ANY WORKS, THE CONTRACTOR SHALL CARRY OUT A "DIAL BEFORE YOU DIG" FOR A SERVICES SEARCH. THE CONTRACTOR SHALL THEN ARRANGE FOR ALL SERVICES TO BE PHYSICALLY LOCATED, IDENTIFIED AND CLEARLY MARKED WITHIN THE WORKS AREA PRIOR TO THE COMMENCEMENT OF ANY WORK. AND CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY DAMAGE CAUSED TO SUCH SERVICES DURING THE COURSE OF THE WORKS.

- DURING THE EXECUTION OF WORKS, THE CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF ALL EXISTING UTILITY SERVICES. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED TO THE EXISTING SERVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE RELEVANT UTILITY SERVICE PROVIDER, AT NO COST TO THE PRINCIPAL OR OTHER PROPERTY OWNER.
- WHERE IT IS NECESSARY TO REMOVE, DIVERT OR CUT II EXISTING UTILITY SERVICE, AND ON COMPLETION OF TOWNORKS, THE CONTRACTOR SHALL GIVE AT LEAST THREE NOTICE OF THE REQUIREMENTS TO THE SUPERMITENDENT, ADVISE WHAT ARRANGEMENTS SHOULD BE MADE FALTERATION OF SUCH EXISTING WORKS.
- TO THE COMMENCEMENT OF ANY WORKS THE CONTRACTOR
 OBTAIN THE SUPERINTENDENT'S APPROVAL OF THE
 AMME FOR THE RELOCATION / CONSTRUCTION OF TEMPORARY
- ON COMPLETION OF SERVICES INSTILLATION, SHALL BE RESTORED TO THEIR ORIGINAL NATURE STRIPS, FOOTPAITHS, CONCRETE AND AND ROAD PAVEMENTS. ALL DISTURBED AREAS CONDITION, INCLUDING GRAVEL AREAS, KERBS
- OR OR THE ALL AND RARY THE

- ALL NEW AND REPLACEMENT UTILITY SERVICES SHALL BE LAID AT THE DEPTH AND POSITION WITHIN THE SERVICES TRENCH IN ACCORDANCE WITH RELEVANT AUTHORITY REQUIREMENTS AND SPECIFICATIONS OR AS DIRECTED IN THE DETAILED DRAWINGS.

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- ANY SERVICE LOCATION INDICATIVE ONLY AND THE NOT BE RELIED UPON. SHOWN ON T THE DESIGN PLANS ARE DEPTH INDICATED SHOULD
- ALL CARE IS TO BE EXERCISED WHEN EXCAVATING NEAR EXISTING UTILITY SERVICES. MANUAL EXCAVATION PARALLEL TO THE SERVICE IS RECOMMENDED AND. MECHANICAL DIGGING IS NOT TO BE CARRIED OUT OVER OR NEAR ANY ELECTRICAL / TELECOMMUNICATIONS CABLES OR GAS PIPES. EXCAVATIONS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH THE REQUIREMENTS OF THE NSW WORK COVER CODE OF EXCAVATION 2000.
- THE (3) I NEW DAYS WILL THE
- ALL NEW OR EXCAVATED EXISTING UTILITY SERVICES THAT CROSS EXISTING AND FUTURE ROADS/PAVEMENTS SHALL HAVE APPROPRIATE RELEVANCE TAPEIS AND THE PLACE BY A CHILD WITH WITH DIFFER THAT AND AND OR WRES PLACE BY A CHILD WITH WITH DIFFER THAT AND SUBGRADE LEVEL AND COMPACTED TO 98% STANDARD DENISTY RATIO, SUBJECT TO PRIOR APPROVAL FROM THE RELEVANT AUTHORITY.
- THE CONTRACTOR SHALL ALLOW FOR THE EXCAVATION, CAPPING OFF AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREA SHOWN ON THE DRAWINGS WITHIN THE CONTRACT AREA AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALLTO REGULATORY AUTHORITY STANDARDS AND TRANSPERSION.
- THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES REQUIRED TO MAINTAIN THAT SERVICE TO ANY PROPERTY BUILDING IN OPERATION DURING THE CONSTRUCTION WORKS, TO SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. WHEN A NEW WORKS / DIVERSIONS ARE COMPLETED, COMMISSIONED INSPECTED, THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORAL FREMOVE ALL SUCH TEMPORAL UTILITY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SA
- INTERRUPTION TO EXISTING UTILITY SERVICES SHALL BE CARRIED OUT SO AS NOT TO CAUSE ANY INCONVENIENCE OR DAMAGE TO ADJACKINT PROPERTIES. THE CONTRACTOR IS RESPONSIBLE FOR GAINING PERMISSION OF THE SUPERINTENDENT FOR TIME OF INTERRUPTION.
- THE CONTRACTOR SHALL MAINTAIN THE EXISTING DRAINAGE FLOWS THROUGH THE SITE AT ALL TIMES, ALLOWANCE FOR ALL SUCH FLOWS AT ALL TIMES.
- THE CONTRACTOR SHALL ENSURE SERVICES ABOVE GROUND MARKERS WITH SERVICE PROVIDER AND COUNCIL THAT APPROPRIATE UTILITY ARE PLACED IN ACCORDANCE SPECIFICATIONS.
- SERVICES TRENCHES TO BE GRADED AT A MINIMUM OF 1% TO EITHER SUBSOIL OR STORMWATER DRAINAGE LINES.

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CONTRACTOR SHALL ENSURE THAT ALL LOCATED AND I ITY SERVICES WITHIN AND OUTSIDE THE SITE ARE SURVEYED I Y QUALIFIED SURVEYOR AS PART OF THE "WORK AS EXECU" NEW) BY A)TED"

CONS RUCTION MATERIALS

- MATERIALS AND WORKMANISHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT SAA CODES AND WITH THE BY-LAWS AND ORDINANCE REQUIREMENTS OF THE RELEVANT BUILDING AUTHORITY, EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATIONS.
- SUFFICIENT NOTICE SHALL BE GIVEN BY THE CONTRACTOR TO THE SUPERINTENDENT TO ENABLE MATERIALS THAT ARE TO BE BROUGHT ON SITE TO BE EXAMINED, ALL MATERIALS ARE TO BE STACKED IN A SUITABLE MANNER TO FACILITATE EXAMINATION.
- MATERIALS SUCH AS FILL / TOPSOIL / SAND SHALL HAVE A VALIDATION CERTIFICATE FROM AN APPROVED TESTING LABORATORY IF SUCH MATERIAL IS NOT PROCURED FROM THE SITE OR SUPPLIED OR ARRANGED BY THE SUPERINTENDENT.
- WHERE THE CONTRACTOR SUPPLIES MATERIALS OF A MIXED OR POOR QUALITY, THE SUPPRINTENDENT SHALL HAVE THE AUTHORITY TO REQUIRE THE CONTRACTOR TO PICK OUT AND STACK THOSE MATERIALS WHICH IN HIS OPINION ARE SUITABLE FOR THE WORKS, AND TO HAVE THOSE WHICH ARE UNSUITABLE REMOVED FROM THE WORKS SITE AT THE CONTRACTORS COST.
- ANY MATERIAL WHICH IS BROUGHT ONTO THE SITE AND PLACED IN STIU PRIOR TO ANY APPROVAL BY THE SUPERINTENDENT / ENGINEER OR THEIR AGENTS SHALL BE REMOVED AND THE WORKS REMEDIATED TO THEIR PRIOR CONDITION BY THE CONTRACTOR AT HIS COST.

EARTHWORKS GENERAL

- GENERALLY ALL EARTHWORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH THE GUIDELINES FOR EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS AS SET OUT IN A.S.
- THE CONTRACTOR SHALL ENSURE THAT ALL EXCAVATION WORKS COMPLY WITH THE NSW WORK COVER 'CODE OF PRACTICE: EXCAVATION 2000' OR THAT REQUIRED IN THE STATE WHERE THIS CONTRACT IS BEING UNDERTAKEN.
- THE CONTRACTOR SHALL TAKE ALL DUE CARE THAT ONLY THE ABSOLUTE MINIMUM OF AREA FOR CONSTRUCTION IS USED AND THAT NO UNDUE DAMAGE IS DONE TO EXISTING VEGETATION.
- THE CONTRACTOR SHALL PROGRAMME THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION, THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS, ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED BY THE CONTRACTOR AT HIS COST.
- THE CONTRACTOR SHALL BE DEEMED TO HAVE INVESTIGATED THE SITE AND BE SATISFIED AS TO THE QUANTITY AND TYPE OF MATERIAL TO BE EXCAVATED AND THE SUB-SUBFACE CONDITIONS LIKELY TO BE EXCAVATED AND THE SUB-SUBFACE CONDITIONS LIKELY TO BE ENCOUNTERED DURING BULK EARTHWORKS.
- WORKS AREAS SHALL BE STRIPPED OF PAVEMENTS, VEGETATION AND OTHER DELETEROUS MATERIAL. TOPSOIL IS TO BE STOCKPILED ON SITE FOR RE-USE IN LANDSCAPING AREAS, STOCKPILE LOCATION IS TO BE CONFIRMED ON SITE BY THE SUPERINTENDENT AND IN ACCORDANCE WITH THE SECP, STOCKPILES TO BE IN ACCORDANCE WITH THE SECP, STOCKPILES TO BE IN ACCORDANCE WITH THE SECP.
- ALL GENERATED WASTE AND SPOIL TO BE MANAGED IN ACCORDANCE WITH THE APPROVED SITE WASTE MANAGEMENT PLAN ANDOR RELEVANT NSW DEC GUIDELINES. ANY SPOIL OR OTHER MATERIAL SUSPECTED OF BEING CONTAMINATED IS TO BE REFERRED TO THE SUPERINTENDANT.
- EARTHWORKS SHALL INCLUDE THE EXCAVATION, PLACING AND COMPACTION OF CUT MATERIALS TO THE LEVELS AND PROFILES AS DETAILED ON THE BULK EARTHWORKS PLAN, EXCESS SPOIL, IS TO BE MANAGED AS DIRECTED BY THE SUPERINTENDANT, BATTERS SHALL CONTINUE IN REGULAR LINES AROUND CURVES.
- THE PRINCIPAL RESERVES THE RIGHT TO AMEND ALL LEVELS SHOWN ON THE DRAWINGS AT ANY STAGE DURING THE CONTRACT PERIOD, PRIOR TO THE PLACEMENT OF TOPSOIL, SHOULD SUCH AMENDMENT BE DEEMED THE OWNER'S PRESENTATIVE/SUPERINTENDANT PRIOR TO MACKETS THE OWNER'S PRESENTATIVE/SUPERINTENDANT PRIOR TO MACKETS TO THE PRIOR THE
- WHERE BATTERS ARE NOT DETAILED ON PLANS AND SECTIONS, AN EVEN GRADE BETWEEN NOMINATED LEVELS WILL APPLY. THE MAXIMUM UNSUPPORTED BATTER SHALL BE 3H:1V UNLESS NOTED OTHERWISE. BATTERS SHALL BE FREE OF LOOSE MATERIAL AND SHALL BE NEATLY TRIMMED AND ROLLED TO SEAL THE SURFACE (PRIOR TO REVEGETATION AS REQUIRED IN ACCORDANCE WITH SITE VMP).
- FILL BATTERS TO BE CONSTRUCTED BY OVER PLACEMENT OF ENGINEERED FILL AND TRIMMING BACK TO THE FINAL PROFILE.

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EXCAVATION

- THE EXCAVATION SHALL BE CARRIED OUT IN THE LOCATIONS SHOWN AND TO THE LEVELS, WIDTHS AND BATTER SLOPES INDICATED ON THE DRAWINGS.
- EXCAVATED MATERIAL NOT MEETING THE SPECIFICATION FOR FILL MATERIAL AND CLASSIFIED AS UNSUITABLE SHALL BE DISPOSED OF IN AN APPROPRIATE MANNER AND AS DIRECTED BY THE SUPERINTENDANT.
- ALL EXCAVATED MATERIAL REMOVED FROM THE SITE MUST BE CLASSIFIED IN ACCORDANCE WITH NSW DECC (2008) ENVIRONMENTAL GUIDELINES, ASSESSMENT, CLASSIFICATION AND MANAGEMENT OF LIQUID AND NON-LIQUID WASTES PRIOR TO DISPOSAL. ALL EXCAVATED MATERIAL MUST BE DISPOSED OF TO AN APPROVED WASTE MANAGEMENT FACILITY.
- WHERE EXCAVATION WORK IS REQUIRED IN THE VICNITY OF EXISTING UTILITY SERVICES, THE CONTRACTOR SHALL SUPPORT ALL SUCH UTILITY SERVICES DURING THE WORKS. ON COMPLETION OF EXCAVATION WORKS SUCH UTILITY SERVICES SHALL BE BACK FILLED IN SUCH A MANNER AS TO RETAIN THE UTILITY SERVICE IN ITS ORIGINAL GRADE AND POSITION TO THE SATISFACTION OF THE SUPERINTENDENT AND UTILITY SERVICE PROVIDER.
- WHERE ROCK IS EXPOSED DURING EXCAVATION, THE CONTRACT THE SHALL CEASE EXCAVATION AT THIS LOCALITY AND CONTACT THE SUPERINTENDENT WHO WILL THEN DEPENDING ON THE NATURE OF THE CONSTRUCTION, ADVISE ON THE LEVEL TO WHICH THE EXPANATIONIST FACES. WHERE EXCAVATED MATERIAL IS TO BE USED FOR FILLING, MATERIAL SHALL BE INSPECTED AND APPROVED BY SUPERINTENDENT PRIOR TO USE.
- EXCAVATION IS TAKEN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE WAINTENANCE OF ANY EXCAVATIONS AND IS LABLE FOR ANY DAMAGE WHICH MAY BE CAUSED TO ANY WATER, IS SEWER PIPE / STORMWATER, D'BLIC UTILITY SERVICE, CAUSED BY THE COLLAPSE OF THE
- STRIPPED PAVEMENT SUB-GRADES MUST BE PROOF ROLLED (PROOT TO THE ADDITION OF FILL) BY A MINIMUM 12 TONNIE MASS SMOOTH DRUM ROLLER WITHOUT VIBRATION UNDER THE SUPERVISION OF THE GEOTECHNICAL TESTING AUTHORITY (GTA) AND/OR SITE ENGINEER. WHERE DIRECTED BY THE SUPERINTENDENT THE BOTTOM OF TRENCHES OR EXCAVATIONS SHALL BE COMPACTED PRIOR TO PLACING OF ANY PAURIENT SUB-BASE, BEDDING OR CONCRETE MATERIALS. SHOULD THE FOUNDATION MATERIAL, IN THE OPINION OF THE SUPERINTENDENT, BE INCAPABLE OF EFFECTIVE COMPACTION, SUCH MATERIAL SHALL BE REMOVED AND REPLACED WITH APPROPRIATE MATERIAL.
- SUBGRADE IN ROCK IS TO BE RIPPED, SCARIFIED, SPREAD AND COMPACTED TO A MINIMUM DEPTH OF 300MM BELOW THE FINISHED
- IF APPROVED BY THE SUPERINTENDENT EXCAVATED MATERIAL MAY BE USED FOR BACKFILL OVER PPES PROVIDED IT COMPLIES WITH RELEVANT BUILDING AND CONSTRUCTION CODES AND SPECIFICATIONS, THIS MATERIAL SHALL BE SPOILED OR USED FOR THE PRINCIPAL AND ANY EXCESS SHALL BE SPOILED OR USED FOR FILLING WITHIN THE SITE AS DIRECTED BY THE SUPERINTENDENT.
- ALL EXCAVATIONS MUST BE PROPERLY GUARDED AND PROTECTED TO PREVENT THEM FROM BEING DANGEROUS TO LIFE OR PROPERTY.
- RETAINING WALLS OR OTHER APPROVED METHODS NECESSARY TO PREVENT THE MOVEMENT OF EXCAVATED OR FILLED GROUND, ARE TO BE CONSTRUCTED TOGETHER WITH ASSOCIATED STORMWATER O DRAINAGE MEASURES PRIOR TO OCCUPATION OF THE DEVELOPMENT OR BEFORE WHERE SITE CONDITIONS REQUIRE.
- NO BUSH ROCK IS TO BE REMOVED FROM THE SITE WITHOUT PRIOR APPROVAL FROM NSW DECC AND COUNCIL.

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- FOUNDATION MATERIAL DEEMED BY THE GEOTECHNICAL TESTING AUTHORITY (GTA) AS UNSUITABLE IS TO BE REMOVED AS DIRECTED BY THE SUPERMITENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS BELOW.
- ANY IMPORTED SOILS TO THE SUBJECT SITE MUST BE VIRGIN EXCAVATED NATURAL MATERIAL (VENM) AS DEFINED IN SCHEDULE 1 OF THE PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997.
- MATERIAL USED AS FILL SHOULD BE UNIFORM, WELL GRADED SOIL CONTAINING NO ROCK PARTICLES GREATER THAN 175MM UNLESS OTHERWISE SPECIFIED IN THESE DRAWINGS AND SHALL CONTAIN NO BUILDING OR OTHER FOREIGN MATERIAL, IF A MIXED RANGE OF 'CLEAN ROCK' MATERIAL IS SPECIFIED IT SHALL BE UNIFORM AND WELL ROCK' MATERIAL IS SPECIFIED IT SHALL BE UNIFORM AND WELL
- UNLESS OTHERWISE APPROVED OR SPECIFIED, ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING:

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- FREE FROM ORGANIC AND PERISHABLE MATTER AND OTHER DELETERIOUS / UNSUITABLE MATERIAL AS DEFINED BY AS 3798-2007.

- MAXIMUM PARTICLE SIZE 75MM.
 PLASTICITY NIOEX BETWEEN 2% AND 20%.
 PLASTICITY NIOEX BETWEEN 2% AND 20%.
 A MINIMUM GET TO BE DETERMINED DURING CONSTRUCTION OR AS SPECIFIED ON THESE DRAWNIOS.
 SUBGRADIE TO BE COMPACTIED IN 20MM LAYERS AND ACHIEVE 95% MODIFIED COMPACTION @ +1-2% OMC OR AS SPECIFIED ELSEWHERE BY RELEVANT GEOTECHNICAL REPORT.

- MATERIAL ACCEPTANCE AND SELECTION SHOULD BE SUBJECT FULL TIME MONITORING BY THE GTA NOMINATED FOR THE PROJECT.
- PRIOR TO ANY FILL BEING PLACED, TOPSOIL SHALL BE STRIPPED OFF TO A MINIMUM DEPTH OF 150MM AND STOCKPILED AS DIRECTED BY THE SUPERINITENDENT OR AS SPECIFIED IN THE DESIGN DRAWINGS, UNSUITABLE TOPSOIL MATERIAL SO DEEMED BY THE SUPERINITENDENT SHALL BE SEPARATELY STOCKPILED.
- WHERE FILL IS TO BE PLACED ON THE EXISTING SURFACE, THE EXISTING SURFACE WILL BE PREPARED SUCH THAT A SERIES OF LEVEL TERRACES ARE "KEYED INTO" EXISTING STIFF TO VERY STIFF SOILS.
- THE STRIPPED SURFACE MUST BE PROOF ROLLED (PRIOR TO THE ADDITION OF FILL) BY A MINIMUM 12 TONNE STATIC MASS SMOOTH DRUM ROLLER WITHOUT VIBRATION UNDER THE SUPERVISION OF THE GTA.
- FILL TO BE PLACED AND COMPACTED UNDER SUPERVISION OF GEOTECHNICAL ENGINEER WITH LEVEL 2 QUALIFICATION, ACCORDANCE WITH A.S. 3798 (2007).
- DENSITY AND COMPACTION TESTING TO BE UNDERTAKEN ON EACH FILL LAYER BY AWATA'REGISTERED LABORATORY OR AT LEAST TO MINIMUM REQUIREMENTS OF AS.3798 (2007).
- 1 AN INTERNAL ANGLE OF FRICTION OF AT LEAST 25 DEGREES MUST BE ACHIEVED ON ALL FILL MATERIAL.
- S SHALL BE CONSTRUCTED BY 'OVER PLACING' SOILS AND IG BACK TO THE FINAL PROFILE (BEFORE TOP DRESSING) OTHERWISE INSTRUCTED ON THE DESIGN DRAWINGS.
- TOPSOIL WHERE PLACED OR REQUIRED IS TO HAVE A MAXIMUM THICKNESS OF 300MM AND SHALL BE LIGHTLY ROLLED TO ACHIEVE "NATURAL INSTU" COMPACTION TO PREVENT EROSION BUT TO ACHIEVE THE REQUIRED GRADES AS SPECIFIED ON THE DESIGN DEVINENCES.
- RUNOFF AND SCOUR MUST BE CONTROLLED AND BETWEEN LAYERS GRADED WITH A 1% MINIMUM F SLOPE. FREE
- DURING CLEARING AND EXCAVATION FOR SLABS AND FOOTINGS CUT OUT SOFT SPOTS AND FILL AS ABOVE AND AS DIRECTED BY THE GTA.

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REVEGETATION OF SWALES, ROAD SHOULDERS, BUFFER STRIPS AND OTHER DISTURBED AREAS.

- ALL EARTHWORK AREAS ARE TO BE FINISHED WITH 150MM THICK LAYER OF SITE SOURCED OR APPROVED EXTERNAL SUPPLY TOPSOIL AND SPRAY GRASSED ASAP FOLLOWING COMPLETION OF WORKS IN ANY ONE AREA.
- ALL TRAFFIC IS TO BE EXCLUDED FROM NEWLY RE-VEGETATED AREAS BY THE ERECTION OF SUITABLE TEMPORARY BARRIER FENCING.
- SITE SEDIMENT AND EROSION CONTROL MEASURES ARE TO BE MAINTAINED UNTIL THE VEGETATION IS ESTABLISHED OR OTHERWISE DIRECTED BY THE SUPERINTENDANT OR COUNCIL ENGINEER.
- THE CONTRACTOR IS RESPONSIBLE FOR THE REVEGETATED AREAS FOR THE PERIOD SPECIFIED IN THE CONTRACT.

CONCRETE

- ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT SAA CODES AND WITH THE BY-LAWS AND ORDINANCE REQUIREMENTS OF THE RELEVANT BUILDING AUTHORITY EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATIONS OR SUPERINTENDENT.
- ALL CONCRETE SHALL COMPLY WITH A.S. MATERIALS WITH A.S. 1554.3. ALL GLASS SHALL COMPLY WITH A.S.3996. 3600, AND REINFORCING REINFORCED CONCRETE
- CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 25 M/A AT 28 DAYS IN ACCORDANCE WITH A.S. 3800, UNLESS OTHERWISE ADVISED IN WRITING BY THE SUPERINTENDENT.
- EXPANSION JOINTS SHALL BE INSTALLED AS INDICATED ON THE DESIGN DRAWINGS AND IN ACCORDANCE WITH A.S 3600, GENERALY AT EVERY 6.0M, AND SHALL BE TOOL FINISHED, DUMMY JOINTS SHALL BE STRUCK AT 1.2M INTERVALS TO A DEPTH OF 10MM. UNLESS OTHERWISE INDICATED ON DESIGN DRAWINGS.
- CRACK CONTROL JOINTS SHALL BE CUT TO A DEPTH OF 20MM, AT 4.0 M INTERVALS, WITHIN 24 HOURS OF THE CONCRETE BEING POURED.
- CONDUITS SHALL NOT BE PLACED BETWEEN REINFORCEMENT AND CONCRETE SURFACES. PLACEMENT OF CONCRETE -ALL CONCRETE SHALL BE MECHANICALLY VIBRATED TO ACHIEVE COMPACTION WITHOUT SEGREGATION. VIBRATORS SHALL NOT BE USED TO SPREAD THE CONCRETE.
- CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN OR SPECIFICALLY APPROVED BY THE ENGINEER.
- NO HOLES, CHASERS OR EMBEDMENT OF PIPES, OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWING, SHALL BE MADEIN CONCRETE MEMBERS WITHOUT THE PRIOR APPROVAL OF THE ENGINEER,
- ALL CONCRETE SHALL BE PLACED AND 'CURED' IN ACCORDANCE WITH A.S.3500. CONCRETE SHALL BE FINISHED TO THE SPECIFICATIONS ON
- 1 NO CONCRETE SHALL BE PLACED I FORMWORK AND REINFORCING HAS BY THE ENGINEER OR LOCAL COUNCIL UNTIL COMPLETED FALSEWORK, BEEN INSPECTED AND APPROVED

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- 13 ALL CONCRETE UNLESS OTHERWISE NOTED SHALL HAVE A SLUMP OF BOMM AT POINT OF PLACEMENT, A MAX, AGGREGATE SIZE OF ZOMM, NO WATER SHALL BE ADDED TO THE MIX PRIOR TO OR DURING PLACEMENT OF CONCRETE. STRENGTH AS SPECIFIED ON PLANS.

REINFORCEMENT

FOOTINGS, THE AGRICULTURAL DEAIN MUST BE INSTALLED BELOW THE FLUCTUATING SEASONAL ZONE WHICH SHOULD BE IDENTIFIED BY GEOTECHNICAL INVESTIGATION.

ALL REINFORCEMENT SPECIFIED IS GRADE D500 UNLESS NOTED OTHERWISE.

REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY IT IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.

BLOCKWORK 55 FROM APPROPRIATE FACE	BEAMS 25 UNO REFER TO	SLABS/WALLS 25 REFER TO	COLUMNS/PEDESTALS 30 UNO REFER TO PLAN	FOOTINGS	ELEMENTS INTERIOR EXTERIOR
TE FACE	ER TO	ER TO	ER TO		ERIOR
	50	40 ON MEMBRANE	•	50	EXTERIOR CAST AGAINST GROUND

N - GRADE 500N DEFORMED BAR (D500) NORMAL DUCTILITY
R - GRADE 250N PLAIN ROUND BAR (R250) NORMAL DUCTILITY.
SL - GRADE 250N WELDED DEFORMED RIBBED MESH (D500)
SQUARE LOW DUCTILITY.
RL - GRADE 500L WELDED DEFORMED RIBBED MESH (D500)
RECTANGULAR LOW DUCTILITY.
THE NUMBER IMMEDIATELY FOLLOWING THESE SYMBOLS IS THE NUMBER OF MILLIMETERS IN THE BAR DIAMETER.
EXAMPLE: 8 NIZ-250 DENOTES 8, GRADE 500N DEFORMED BARS, 12MM DIAMETER AT 250 CTS.

ALL REINFORCING BARS AND FABRIC SHALL COMPLY WITH AS 4871-2001. PIPES OR CONDUTS SHALL NOT BE PLACED WITHIN THE ZONE OF CONORETE COVERTO STHE REINFORCEMENT WITHOUT THE APPROVAL OF THE ENGINEER.

REINFORCEMENT SYMBOLS:

WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS.

TOP REINFORCEMENT IS TO BE CONTINUOUS OVER SUPPORTS. BOTTOM REINFORCEMENT TO BE LAPPED AT SUPPORTS.

20

- FOOTINGS

- FOUNDATION STRATA IS ASSUMED FOR DESIGN PURPOSES IN ACCORDANCE WITH AS 2870-1996 "RESIDENTIAL SLAB AND FOOTINGS-CONSTRUCTION". SEE FOOTINOTE. CLASSIFICATION TO BE VERNIFIED BY A GEOTECHNICAL ENGINEER COMMISSIONED BY THE CLIENT FOR CERTIFICATION OF FOUNDATIONS.

- SAND FOUNDATIONS:
- REQUIRED BEARING CAPACITY 150 KPA.
 TRENCHES MUST BE CLEARED OF ALL DEBRIS.
 BE CUT OUT AND FILLED AS PER COMPACTED
 TO PLACEMENT OF REINFORCEMENT. S. SOFT SPOTS PRIOR

SHALE FOUNDATIONS:

REQUIRED BEARING CAPACITY 400 KPA.
EXCAVATION FOR FOOTINGS INTO SHALE MUST BE CAPPED WITH PLAIN CONCRETE ON THE SAME EXCAVATION. CAST OR AS

SANDSTONE FOUNDATIONS:

- FUTURE DEVELOPMENT OF NEIGHBORING PROPERTIES MAY EFFECT GROUND WATER CONDITIONS ON THIS SITE. CONSEQUENTLY, REACTIVITY NI SUBGRADE BENEATH FOOTINGS MAY BE LOCALLY ALTERED THEREFORE PUTTING FOOTING AT RISK OF DIFFERENTIAL SETTLEMENT. WE RECOMMEND THAT, PARTICULARLY IN CLAY SUBGRADES, AGRICULTURAL DRAINAGE IS INSTALLED TO THE UPSIREAM PERIMETER OF THE BUILDING AT A DISTANCE FROM THE BUILDING WHICH IS OUTSIDE THE ZONE OF INFLUENCE OF THE

ALL NEW CONCRETE PAVING TO CONSIST MINIMUM 100MM THICK 25MPA REINFORCED CONCRETE SLT2 CENTRALLY PLACED

- 14
- SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS APPLIED FINISHES.

- WHERE VERTICAL SLABBEAM SURFACES ARE FORMED AGAINST A MASONRY (OR OTHER) WALL, PROVIDE 10MM STYRENE SEPARATION MATERIAL.
- ABOVE COVERS MAY HAVE TO BE ADJUSTED IF FIRE RATING IS A REQUIREMENT.

22

- FOOTINGS TO BE CONSTRUCTED AND BACK FILLED AS SOON POSSIBLE FOLLOWING EXCAVATION TO AVOID SOFTENING BY RAIN DRYING OUT BY EXPOSURE.
- AS
- FOOTINGS MUST BEAR INTO UNDISTURBED NATURAL GROUND CLEAR OF ORGANIC MATERIAL, REFER TO DETAILS.
- IF ROCK OR VARIABLE BEARING STRATA IS ENCOUNTERED DURING EXCAVATION OF THE FOOTINGS ALL FOOTINGS/PIERS ARE TO BE EXCAVATED TO SIMILAR MATERIAL OF GREATER BEARING CAPACITY. THE ENGINEER IS TO BE CONTACTED AT THAT TIME FOR APPROVAL OR REVIEW.
- FOOTINGS TO BE CAST IN APPROVED MATERIAL ALLOWABLE CAPACITY AS FOLLOWS: HAVING A
- CLAY FOUNDATIONS: REQUIRED BEARING CAPACITY 100 KPA.
 TRENCHES MUST BE CLEANED OF
 COMPACTED PRIOR TO PLACEMENT OF F ALL DEBRIS AND HAND REINFORCEMENT.

- REQUIRED BEARING CAPACITY 600 KPA.
 SCRAPE WEATHERED SURFACE TO REMOVE CLEAVED SANDSTONE UNDER FOOTINGS.

- CLEAR CONCRETE COVER TO REINFORCEMENT SHALL BE AS FOLLOWS UNLESS OTHERWISE SHOWN-
- ALL CONSTRUCTION JOINT LOCATIONS SHALL BE APPROVED BY THE STRUCTURAL ENGINEER. BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS, IF ANY.
- NO HOLES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE ELEMENTS WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
- SHRINKAGE REDUCING ADMIXTURES SUCH AS 'ECLIPSE' OR APPROVED EQUIVALENT, IF SPECIFIED, MUST BE ADDED TO MIX PRIOR TO POUR.
- WATER REDUCING AGENTS, IF SPECIFIED, MUST BE ADDED TO MIX PRIOR TO POUR. NO EXTRA WATER IS TO BE ADDED TO INCREASE SLUMP.

ORMWORK

FORMWORK MUST BE CLEANED OF ALL DEBRIS PRIOR TO CASTING OF CONCRETE.

ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON BAR CHAIRS SPACED AT A MAXIMUM OF 750 CENTRES BOTH WAYS UNDER ROD AND FABRIC REINFORCEMENT. REINFORCEMENT SHALL BE TIED AT ALTERNATE INTERSECTIONS.

FABRIC REINFORCEMENT TO BE LAPPED 1 COMPLETE SQUARE + 25MM UNLESS NOTED OTHERWISE.

- MINIMUM STRIPPING TIMES FOR FORM WORK SHALL BE A RECOMMENDED IN AS 3610 1990 OR AS DIRECTED BY THE ENGINEER.
- THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORM WORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS, ALL CONCRETE ELEMENTS INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED WITH MECHANICAL VIBRATORS.
- CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF 3 DAYS, FOLLOWED BY PREVENTION OF LOSS OF MOISTURE FOR SEVEN DAYS FOLLOWED BY A GRADUAL DRYING OUT. APPROVED SPRAYED ON CURING COMPOUNDS MAY BE USED WHERE NO FLOOR FINISHES ARE PROPOSED, POLYTHENE SHEETING OR WET HESSIAN MAY BE USED IF PROTECTED FROM WIND

BLOCKWORK

- CONGRETE BLOCKS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 15 MPA AND CONFORM TO AS 1500, MASONRY TO BE CONSTRUCTED TO AS 3700.
- WHERE CORES OF HOLLOW BLOCKS ARE TO BE FILLED, PROPERLY COMPACTED 20MPA CONCRETE WITH 10MM AGGREGATE AND 230MM SLUMP SHALL BE USED, CLEAN OUT OPENINGS MUST BE UTILIZED FOR ALL CORES.
- LOCATION OF ACTUAL STARTERS IS CRITICAL TO SUIT BLOCK CORES, ALLOW 55MM COVER FROM THE OUTSIDE FACE OF BLOCKWORK, ALL REINFORCEMENT LAP LENGTHS TO CONFORM TO AS 3600.
- CONTROL JOINTS TO BE PLACED AT A MAXIMUM OF 8 M CENTRES OR IN ACCORDANCE WITH AS 3700.
- VERTICAL CONTROL JOINT MATERIAL WHERE SPECIFIED ON PLAN BETWEEN SLABS AND BRICK WALLS SHALL BE: 10MM SPANDEX EXTERNAL UNO. BITUMASTIC FIBREBOARD INTERNAL UNO.
- RETAINING WALLS OR ANY REINFORCED AND CONCRETE CORE FILLED BLOCK WALLS TO BE OF DOUBLE 'U' BLOCK CONSTRUCTION.
- NO BLOCKWORK SHALL BE CONSTRUCTED ON SUSPENDED SLABS UNTIL ALL PROPPING HAS BEEN REMOVED FROM THE UNDERSDIE OF THE SLAB AND THE CONCRETE HAS THE SPECHED 28 DAY CYLINDER STRUCTURAL ENGINEER.
- MAX. POUR HEIGHT FOR UNRESTRAINED BLOCKWORK IS 2000; 110



N/A

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CONSTRUCTION NOTES: SHEET 2 OF

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TREES

- A TREE RETENTION PLAN IS TO BE KEPT ON SITE INDICATING TREES BE RETAINED AND AREAS LEFT UNDISTURVED THAT ARE TO CORDONED OFF FROM CONSTRUCTION WORKS.
- PRIOR TO WORK COMMENCING, TREE PROTECTION FENCING MUST BE ERECTED AROUND THE TREES THAT ARE TO BE RETAINED AT A 3M SETBACK, THE TREE FENCING MUST BE CONSTRUCTED OF 1.8 METRE CYCLONE CHAIMMESH FENCE. THE TREE PROTECTION FENCING MUST BE MAINTAINED IN GOOD WORKING ORDER UNTIL THE COMPLETION OF ALL BUILDING OR DEVELOPMENT WORKS, A STATEMENT OF COMPLANCE FROM A OUALIFIED TREE SURGEON OR ENVIRONMENTAL CONSULTANT SHALL BE SUBMITTED TO COUNCIL PRIOR TO THE ISSUE OF THE CONSTRUCTION CERTIFICATE. PENALTIES APPLY FOR NON-
- TO PREVENT DAMAGE TO TREE ROOTS, EXCAVATION (FOR SERVICES AND OTHER WORKS), CHANGE OF SOIL LEVEL (CUT OR FILL), PARKING (WEHICLES OR PLANT), OR PLACEMENT OF BUILDING MATERIALS (INCLUDING DISPOSAL OF CEMENT SLURRY AND WASTE WATER) WITHIN THE SPECIFIED TREE PROTECTION SETBACKS, AND WITHIN 3M OF ALL OTHER TREES TO BE RETAINED ONSITE, IS STRICTLY FORBIDDEN. NO TREE ROOTS LOCATED WITHIN THE SPECIFIED TREE SETBACKYS, SHALL BE SEVERED OR NUURED IN THE SPECIFIED TREE SETBACKYS, SHALL BE SEVERED OR NUURED IN THE PROCESS OF ANY SITE WORKS DURING THE CONSTRUCTION OR LANDSCAPING PHASES OF THE APPROVED PROJECT. THE APPLICANT SHALL RUSURE THAT ALL UNDERGROUND SERVICES (I.E. WATER, DRAINAGE, GAS, AND SEWER) SHALL NOT BE LAID WITHIN 3M OF ANY TREE LOCATED ON THE PROPERTY PROTECTED UNDER COUNCIL'S TREE PRESERVATION ORDER.

SIGNAGE

- ON-SITE SIGNAGE IS REQUIRED TO CLEARLY IDENTIFY THE PCA AND THE PRINCIPAL CONTRACTOR (THE COORDINATOR OF THE BUILDING WORK) PURSUANT TO THE ENVIRONMENTAL PLANNING AND ASSESSMENT AMENDMENT (QUALITY OF CONSTRUCTION)
- WHERE SIGNS ARE TO REUSED THEY ARE TO CLEANED WHERE REQUIRED. BE WASHED
- ALL EXISITNG SIGNS WHICH ARE DAMAGED AND NON LEGIBLE ARE TO BE REPLACED.

SEDIMENT AND EROSION CONTROL PLAN

- BE CONSTRUCTED PRIOR TO COMMENCEMENT OF ANY WORK TO ELIMINATE THE DISCHARGE OF SEDIMENT FROM THE SITE. THE CONTROLS ARE TO BE INSTALLED IN ACCORDANCE WITH THE SOIL AND WATER MANAGEMENT PLAN SITE REMEDIATION WORKS, PREPARED BY MARTENS CONSULTING ENGINEERS DATED NOVEMBER 2008, THE REQUIREMENTS OF LANDCOMYS "MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION", VOLUME 1, 4TH EDITION, MARCH 2004, (THE BLUE BOOK).
- THE CONTRACTOR IS TO INFORM ALL SUBCONTRACTORS OF THEIR RESPONSIBILITIES IN RELATION TO SEC.
- THE CONTRACTOR SHALL REGULARLY MAINTAIN SEC DEVICES AND REMOVE ACCUMULATED SILT FROM SUCH DEVICES BEFORE NO MORE THAN 80% OF THEIR SEDIMENT STORAGE CAPACITY IS LOST. ALL THE SILT REMOVED SHALL BE DISPOSED OF AS DIRECTED BY THE SUPERNITENDENT. NO SILT IS TO BE PLACED OUTSIDE THE LIMIT OF WORKS. THE PERFORD FOR MAINTAINING THESE DEVICES SHALL BE AF LEAST UNTIL ALL DISTURBED AREAS ARE REVEGETATED AND FURTHER AS MAY BE DIRECTED BY THE SUPERNITENDENT OR COLMING.
- AREAS OF SITE DISTURBANCE ARE TO BE MINIMISED AT ANY ONE TIME WITH DEVELOPMENT STAGED SUCH THAT A NEW AREA IS NOT TO COMMENCE UNTIL THE PREVIOUS DISTURBED AREA IS FULLY STABILISEDIREVEGETATED.
- ALL WORKS MUST BE PERFORMED II EROSION AND SEDIMENT CONTROL PLAN. IN ACCORDANCE WITH
- SEDIMENTATION. ACCORDINGLY, SEDIMENT AND EROSION CONTROL MEASURES MUST BE IMPLEMENTED PRIOR TO EXCAVATION, AND MAINTAINED DURING CONSTRUCTION. THE CONTRACTOR SHALL PROTECT OVERLAND FLOW PATHS, DRAINS, ADJOINING LAND AND DOWNSTREAM WATER QUALITY FROM
- ACCESS TO AND EXIT FROM THE SITE SHALL BE RESTRICTED TO ONE DESIGNATED APPROVED AREA, INCLUDE ADEQUATE MEASURES TO REMOVE SOIL FROM VEHICLES LEAVING THE SITE SO AS TO MAINTAIN PUBLIC ROADS IN A CLEAN CONDITION.

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VEGETATION NOT DIRECTLY AFFECTED BY THE PROPOSAL MUST BE PROTECTED BY A "NO GO" BOUNDARY TO FACILITATE THE FILTRATION AND COLLECTION OF RUNOFF POLLUTION EMANATING FROM THE WORKS. CONTRACTOR TO ENSURE THAT NO SPOIL OR FILL ENGROACHES UPON ADJACENT BUSHLAND FOR THE DURATION OF THE

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CONSTRUCTION NOTES: SHEET 3 OF

CERTIFYING AUTHORITY

martens

- DISTURBED AREAS SHALL BE REHABILITATED AND TREATED BY APPROVED METHODS OF EROSION MITGATION SUCH AS MULCHING WITH PREFERABLY INDIGENOUS PLANT SPECIES OR OTHER SUITABLE APPROVED STABILISING PROCESSES WITHIN FIFTEEN DAYS OF THE COMPLETION OF WORKS.
- THE FOLLOWING SEDIMENT CONTROL MEASURES ARE REQUIRED BE PROVIDED IN CONJUNCTION WITH THE ATTACHED SEDIMENT A EROSION CONTROL PLAN.

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- ALL RUNOFF AND EROSION CONTROLS ARE TO NISTALLED BEFORE ANY WORKS ARE CARRIED OUT AT
- ALL CONTAMINATED SURFACE WATERS AND DEBRIS FROM THE SITE MUST BE SCREENED, COLLECTED AND POLLUTANTS CAPTURED WITHIN THE SITE.
- STORMWATER INLETS AND DRAINS RECEIVING STORMWATER MUST BE PROTECTED AT ALL TIMES DURING WORK ON SITE
- MOVEMENT OF WATER MUST BE CONTROLLED DIVERTING UPSLOPE CLEAN SURFACE RUNOFF DIVERSION DRAINS AND SEDIMENT FENCING) AROUND
- CONTAMINATION OF SURFACE WATERS ON DOWNSLOPE LANDS MUST BE MITIGATED BY INSTALLING SEDIMENT CONTROL FENCES DOWNSLOPE OF THE DISTURBED AREAS TO CAPTURE SEDIMENT AND DEBRIS ESCAPING FROM THE SITE.
- GEOFABRIC SEDIMENT FENCING MUST PARALLEL TO THE PROPOSED WORKS NATURAL CONTOURS OF THE SITE. OR / R ALONG THE
- SEDIMENT FENCING MUST BE SECURED BY POST (WHERE METAL STAR PICKETS ARE USED, PLASTIC SAFETY CAPS SHALL BE USED) AT TWO-METRE INTERVALS WITH THE GEOTEXTILE FARRIC EMBEDDED AT 200MM IN SOLL ONE METRE RETURNS MUST BE INSTALLED AT TWENTY-METRE INTERVALS ALONG THE SEDIMENT FENCING.
- STOCKPILES OF TOPSOIL, SAND, AGGREGATE, SPOIL OR OTHER MATERIAL SHALL BE STORED CLEAR OF ANY DRAINAGE PATH OR EASEMENT, NATURAL WATERCOURSE, FOOTPATH, KERB OR ROAD SURFACE AND SHALL HAVE MEASURES IN PLACE TO THE SATISFACTION OF THE COUNCIL ACTING REASONABLY, TO PREVENT THE MOVEMENT OF SUCH MATERIAL OFF SITE.
- DRIVEWAY ACCESS PATHS MUST BE STABILISED WITH NEEDLE-PUNCHED GEOTEXTILE COVERED BY A MINIMUM 50MM THICK LAYER OF COARSE GRAVEL, AGGREGATE, OR RECYCLED CRUSHED CONCRETE.
- KERB INLET SEDIMENT TRAPS ARE TO BE INSTALLED DOWNSLOPE OF THE SITE TO FACILITATE THE CAPTURE OF
- STREET SWEEPING MUST BE UNDERTAKEN AS REQUIRED ALONG HILLSIDE ROAD DURING AND AFTER EXCAVATION AND CONSTRUCTION UNTIL THE SITE IS FULLY AFTER EXCAVATION
 SITE IS FULLY
- THE CONTRACTOR SHALL MAINTAIN DUST CONTROL UNTIL FINAL COMPLETION OF WORKS.
- DURING WINDY WEATHER, LARGE, I UNPROTECTED AREAS SHALL BE KEPT MOIST BY SPRINKLING WITH WATER TO KEEP DU CONTROL. DISTURBED, DIST (NOT WET) DUST UNDER
- EROSION AND SEDIMENT CONTROL MEASURES MUST BE MAINTAINED IN GOOD WORKING ORDER, AND BE REPAIRED OR REPLACED THROUGHOUT THE COURSE OF WORKS ON SITE.
- 0 THE CONTRACTOR'S RESPONSIBILITY IS TO ENSURE ALL NECESSARY MEASURES ARE TAKEN SO AS TO PROTECT ALL DISTURBED AREA. ALL ADDITIONAL COSTS ARE TO BE REFLECTED IN THE TENDER PRICE EVEN IF SUCH MEASURES ARE NOT INDICATED ON THE SEDIMENT AND
- THE CONTRACTOR MUST COMMENCE REHABILITATION IMMEDIATELY FOLLOWING ANY SITE DISTURBANCE NICLUDING REGRADING, FORMATION AND REVEGETATION
- THE CONTRACTOR SHALL REGULARLY WATER REVEGETATED AREAS UNTIL EFFECTIVE COVER HAS PROPERLY ESTABLISHED AND VEGETATION IS GROWING VIGOROUSLY. MAINTENANCE IS TO CONTINUE UNTIL ALL VEGETATION IS WELL ESTABLISHED AND INDEPENDENT OF FURTHER WATER APPLICATIONS.

FLEXIBLE PAVEMENTS

- THE CONTRACTOR SHALL SUBMIT DETAILS OF ALL CONSTITUENTS OF THE PROPOSED BASE AND SUBBASE MATERIALS, INCLUDING SOURCE OF SUPPLY AND THE PROPOSED TYPE AND PROPORTION OF ANY BINDER, TO THE SUPERINCEMENT, SUPPORTED WITH TEST RESULTS FROM A NATA REGISTERED LABORATORY CONFIRMING THAT THE CONSTITUENTS COMPLY WITH COUNCIL REQUIREMENTS.
- THE CONTRACTOR SHALL PROVIDE THE SUPERINTENDENT WITH WRITTEN NOTICE WHEN TESTING IS BEING CARRIED OUT AND COPIES OF ALL TEST REPORTS FOR APPROVAL TO PROCEED.

INSPECTION, SAMPLING AND TESTING

- MSPECTION, SAMPLING AND TESTING OF THE PAVEMENT SHALL UNDERTAKEN BY THE CONTRACTOR IN ACCORDANCE WITH PITTWALL COUNCIL AUS-SPEC DOCUMENT. BEFORE, DURING AND AFTER TONSTRUCTION OF THE PAVEMENT. TESTING SHALL BE CARRIED BY A NATA REGISTERED LADGATORY WITH APPROPRIZA CACREDITATION AND SUITABLY QUALIFIED PERSONNEL.
- THE CONTRACTOR SHALL PROVIDE THE SUPERINTENDENT WITH WRITTEN NOTICE WHEN TESTING IS BEING CARRIED OUT AND COPIES OF ALL TEST REPORTS FOR APPROVAL TO PROCEED.
- FIELD DENSITY TESTS SHALL BE CARRIED OUT IN ACCORDANCE VAS1288,5,3,1, OR, WITH THE SUPERINTENDENT'S CONCURRENCE, VA NUCLEAR DENSITY METER IN ACCORDANCE WITH RELEVISTANDARDS.
- TESTING, OF THE SUBGRADE SHALL BE PERFORMED BY PROOFROLLING, UTILISING A MINIMUM 12 TOWNE STATIC MASS SINGOTH DRIVE
 ROLLER WITHOUT VIBRATION, UNDER THE SUPERVISION OF THE
 SUPERNITENDENT ANDIOR GTA. ADEQUATE COMPACTION IS
 INDICATED BY NO VISIBLE DEFLECTION (WITH THE HUMAN EYE) DURING
 EACH PASS OF THE ROLLER. SUBGRADE PROOF-ROLLING SHOULD BE
 SUPPLEMENTED BY COMPACTIVE TESTING AS PER AS 3798.

SPREADING OF PAVEMENT MATERIALS

- THE COST OF CORRECTING AN UNDERLYING LAYER TO COMPLY SHALL BE BORNE BY THE CONTRACTOR.
- EACH LAYER OF MATERIAL SHALL BE DEPOSITED AND SPREAD IN A CONCURRENT OPERATION AND, AFTER COMPACTION, THE FINISHED SURFACE LEVELS OF THE BASE AND SUBBASE COURSES SHALL BE WITHIN THE PERMITTED TOLERANCES STATED IN COUNCILS SPECIFICATION WITHOUT SUBSEQUENT ADDITION OF MATERIAL. THE THICKNESS OF EACH COMPACTED LAYER SHALL BE NEITHER LESS THAN 100MM NOR MORE THAN 150MM FOR ALL PAVEMENT LAYER TYPES, UNLESS APPROVED BY THE SUPERINTENDENT.
- WHEN SPREAD FOR COMPACTION PROCESS THE MOISTURE CONTENT OF THE BASE OR SUBBASE MATERIALS SHALL BE IN THE RANGE OF 60-90% OF LABORATORY OPTIMUM MOISTURE CONTENT IN ACCORDANCE WITH AS1289.5.2.

TRIMMING AND COMPACTION

- EACH LAYER OF THE BASE AND SUBBASE COURSES UNIFORMLY COMPACTED OVER ITS ENTIRE AREA AND SATISFY THE REQUIREMENT OF RELATIVE COMPACTION COUNCILS AUS-SPEC DOCUMENT. D DEPTH T NOBE
- WATERING AND COMPACTION PLANT SHALL STAND ON THE PAVEMENT BEING COMPACTED. NOT BE ALLOWED TO
- AT LOCATIONS WHERE IT WOULD BE IMPRACTICABLE TO USE SELF PROPELLED COMPACTION PLANT, COMPACTION SHALL BE ACHIEVED BY HAND-OPERATED PLANT APPROVED BY THE SUPERINTENDENT.
- IF ANY UNSTABLE AREAS DEVELOP DURING ROLLING, THE UNSTABLE MATERIAL SHALL BE REJECTED AND REMOVED FOR THE FULL DEPTH OF THE LAYER, DISPOSED OF AND REPLACED WITH FRESH MATERIAL. THIS OPERATION WILL BE AT THE COST OF THE CONTRACTOR.
- THE PLACEMENT OF SUBSEQUENT LAYERS SHALL NOT BE ALLOWED UNTIL. THE REQUISITE TESTING HAS BEEN COMPLETED AND THE TEST RESULTS FOR EACH LAYER HAVE BEEN ACCEPTED BY THE SUPERINTENDENT.
- ANY UNBOUND MATERIAL IN A LAYER SPECIFIED RELATIVE COMPACTION BUT WETTED UP SHALL BE DRIED OUT AND, I RECOMPACTED AND TRIMMED TO MEET REQUIREMENTS AND LEVEL TOLERANCES. R THAT HAS ATTAINED THE
 T SUBSEQUENTLY BECOMES
 I, IF NECESSARY, UNIFORMLY
 ET THE SPECIFIED DENSITY

- GENERAL

- FLEXIBLE OR SEMI-RIGID PAVEMENT MATERIAL TYPES AND LAYER THICKNESSES SHALL BE AS SHOWN IN THE DESIGN DRAWINGS.
- PAVEMENT MATERIALS SHALL COMPLY WITH THE REQUIREMENTS PITTWATER COUNCILS AUS-SPEC DOCUMENT.

- UNBOUND MATERIALS SHALL NOT BE SPREAD UPON AN UNDERLY PAVEMENT LAYER WHICH HAS A MOISTURE CONTENT EXCEEDING OF THE LABORATORY OPTIMUM MOISTURE CONTENT OR WHICH IS BECOME RUTTED OR MIXED WITH FOREIGN MATTER. THE UNDERLY LAYER SHALL BE CORRECTED TO COMPLY BEFORE SPREADING NEXT LAYER OF PAVEMENT.

- ON SECTIONS OF PAVEMENT WITH ONE-WAY CROSSFALL, COMPACTI SHALL BEGIN AT THE LOW SIDE OF THE PAVEMENT AND PROGRESS THE HIGH SIDE. ON CROWNED SECTIONS, COMPACTION SHALL BEG AT THE SIDES AND PROGRESS TOWARDS THE CROWN. EACH PASS THE ROLLERS SHALL BE PARALLEL WITH THE ROADWAY CENTRELS AND UNIFORMLY OVERLAP EACH PRECEDING PASS, THE OUTER MET OF BOTH SIDES OF THE PAVEMENT SHALL RECEIVE AT LEAST THORE PASSES BY THE COMPACTION PLANT THAN THE REMAINDER THE PAVEMENT.

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COVERULVE LOADING REQUIREMENTS IN ACCORDANCE WITH ASINZS 3725:2007, MINIMUM 500MM COMPACTED FILL REQUIRED OVER CLASS 3 PIPE PRIOR TO ACCESS 87 15 TONNE EXCAVATOR AND COMPACTION WHEEL 550MM FOR 10 TONNE VIBRATORY SMOOTH DRUM ROLLER.

- ACCEPTANCE OF COMPACTED LAYERS

- ACCEPTANCE OF WORK, WITH RESPECT TO COMPACTION, SHALL BE BASED ON DENSITY TESTING OF THE WORK IN 'LOTS' WITH A LOT DEFINED AS:
- COVERING A SINGLE LAYER OF WORK CONSTRUCTED UNDER UNIFORM CONDITIONS IN A CONTINUOUS OPERATION; FOR UNBOUND MATERIALS MAY BE EQUAL TO A DAYS OUTPUT USING THE SAME MATERIAL.
- THE SUPERINTENDENT SHALL ASSESS COMPACTION OF EACH LOT BASED ON RAMIDOM SAMPLING OF TEST LOCATIONS FOR IN-SITU DRY DENSITY TESTING.
- THE CONTRACTOR SHALL ARRANGE FOR TESTING TO ASSESS COMPACTION ON THE BASIS OF 10 TESTS PER 5000 SQ.M WITH A MINIMUM OF 6 TESTS PER LOT, AND PRESENT THE RESULTS TO THE SUPERINTENDENT FOR APPROVAL.
- THE COSTS OF ALL TESTING FOR COMPACTION ASSESSMENT SHALL BE BORNE BY THE CONTRACTOR.
- ACCEPTABLE COMPACTION PERFORMANCE STANDARDS ARE SUMMARISED AS FOLLOWS:
- BASE AND SUBBASE MIN 98 % MODIFIED COMPACTIVE EFFORT, SUBGRADE TO BE 100 % STANDARD COMPACTIVE EFFORT, FILL TO BE 95 % STANDARD COMPACTIVE EFFORT, COUNCIL AUS-SPEC COMPACTION REQUIRINENTS SUPERCEDE THE ABOVE WHERE ANY DESCREPANCIES EXIST.

- TOLERANCES

CONSTRUCTION TOLERANCES FOR PAVEMENT WORKS INCLUDING PAVEMENTS WIDTHS AND DEPTHS OF BASE AND SUBBASE LAYES AND FINISHED SURFACE TRIM SHALL BE IN ACCORDANCE WITH COUNCILS AUS-SPEC REQUIREMENTS, FOR SUB-GRADE LEVEL, MINUS NO LIMIT, PLUS TOMM.

- PAVEMENT SEAL

- PAVEMENT SEAL SHALL BE ASPHALTIC CONCRETE AS NOMINATED IN THE DESIGN DRAWINGS.
- THE CONTRACTOR IS TO UNDERTAKE ALL PAVEMENT SEALING WORKS IN ACCORDANCE WITH COUNCILS AUS-SPEC DOCUMENT.
- GENERAL INSPECTIONS BY ENGINEER
- ROCK SOCKET DEPTH FOR ALL PIERS. WHERE ROCK ENCOUNTERED IS >3M, FULL TIME SUPERVISION OF PIERING IS REQUIRED.

48 HOURS NOTICE IS REQUIRED BEFORE ANY SITE INSPECTION

BEARING STRATA OF ALL FOOTINGS PRIOR TO CONCRETE POUR.

- ANY REINFORCEMENT PRIOR TO CONCRETE POUR.
- TIMBER AND STEEL FRAMING PRIOR TO CLADDING OR LINING.
- STEEL LINTELS AFTER INSTALLATION.
- CONTACT YOUR PCA (PRINCIPAL CERTIFYING AUTHORITY) AS TO REQUIREMENTS FOR MANDATORY CRITICAL STAGE INSPECTIONS IN ACCORDANCE WITH REVISED EPRA ACT REGULATIONS EFFECTIVE JULY 1, 2004.

- CLIENT REVIEW

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