

**Ms Lisa Gravemade
19 Tatiara Crescent
NORTH NARRABEEN NSW 2101**

**Project 99658.00
28 April 2020
R.001.Rev0
DEM:pc**

**Geotechnical Assessment for Proposed Alterations and Additions
19 Tatiara Crescent, North Narrabeen**

1. Introduction

This letter presents the results of a geotechnical assessment undertaken by Douglas Partners Pty Ltd (DP) for proposed alterations and additions at 19 Tatiara Crescent, North Narrabeen. The work was undertaken for Ms Lisa Gravemade, the property owner, acting under instructions from Tony O'Brien of Planning 2 Build, designers.

It is understood that this report will accompany a Development Application (DA) to Northern Beaches (Pittwater) Council and has therefore been compiled to comply with the Council's 'Geotechnical Risk Management Policy' (GRMP) dated July 2009 (Reference 1). The GRMP-2009 identifies the site as partially lying within Hazard Zone H1.

The assessment comprised a geotechnical inspection of the site and a review of design drawings (Pages 1 and 7 dated 5 February 2020) prepared by Planning 2 Build.

Comments relating to geotechnical design issues and constraints are given below and are based on the results of our field inspection and the information shown in the above drawings.

2. Proposed Development

It is understood that the current proposed development on 19 Tatiara Crescent, North Narrabeen will include:

- the construction of an additional storey to the existing residence; and
- various internal modifications to the ground floor level of the existing residence.

No significant excavation below existing site levels is proposed, apart from that which may be required for new or upgraded footings. There is not expected to be any significant increase in surface runoff from the proposed development.

3. Inspection and Assessment

The site was inspected by a senior engineering geologist on 1 April 2020. The following observations were made:

- the site is located on the high, eastern side of Tatiara Crescent and measures 28 m by 20 m in plan dimensions;
- total cross fall from the rear (eastern) boundary towards Tatiara Crescent is in the order of 5 m, although most of the fall is contained within two retaining walls, a 1 m high treated timber wall and a 2 m high sandstone block wall, located below the rear boundary. Both walls appear in a satisfactory condition;
- the existing residence comprises a single storey brick and tile residence with covered external decking and carport at its southern end;
- there was no significant cracking observed with the external walls of the residence;
- the rear and front yards of the site are near-level to gently sloping and are grassed covered or landscaped;
- stormwater from the existing residence is piped to the Council system along Tatiara Crescent without any evidence of adverse geotechnical impacts.

4. Comments

4.1 Risk Assessment

The site in its current state has been assessed in accordance with the methods of the Australian Geomechanics Society 'Practice Note Guidelines for Landslide Risk Management', March 2007 (Reference 2) and the Northern Beaches (Pittwater) Council GRMP Guidelines of 2009.

For the purposes of this assessment, an acceptable level of geotechnical risk for property or loss of life is considered to be the 'Low' risk category for property and an annual probability of loss of life of less than 1×10^{-6} . A tolerable level of risk for existing structures is considered to be 'Moderate' risk for property and an annual probability of loss of life of less than 1×10^{-5} .

Potential hazards affecting the proposed development on the site are summarised in Table 1, together with a qualitative assessment of likelihood, consequence and slope instability risk to the existing and proposed residential structures after completion of construction including appropriate engineering design and construction works.

Table 1: Property Slope Instability Risk Assessment for Proposed and Existing Developments

Hazard	Likelihood	Consequence	Risk
Failure of timber wall or sandstone block wall in the rear yard, impacting residence	Unlikely	Medium	Low

For loss of life, the individual risk can be calculated from:

$$R_{(LoL)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)}$$

where:

$R_{(LoL)}$ is the risk (annual probability of loss of life (death) of an individual)

$P_{(H)}$ is the annual probability of the hazardous event (e.g. failure of retaining wall)

$P_{(S:H)}$ is the probability of spatial impact by the hazard (e.g. of the residence being impacted by the failure of the retaining wall)

$P_{(T:S)}$ is the temporal probability (e.g. of the residence being occupied by the individual) given the spatial impact

$V_{(D:T)}$ is the vulnerability of the individual (probability of loss of life of the individual given the impact).

The assessed individual risk to life (person most at risk) resulting from slope instability is summarised in Table 2.

Table 2: Life Risk Assessment for Proposed Developments

Hazard	$P_{(H)}$	$P_{(S:H)}$	$P_{(T:S)}$	$V_{(D:T)}$	Risk $R_{(LoL)}$
Failure of timber wall or sandstone block wall in the rear yard, impacting residence	10^{-4}	0.5	0.25	0.05	6.25×10^{-7}

Accordingly, when compared to the requirements of the Northern Beaches (Pittwater) Council GRMP, it is considered that geotechnical hazards on the site meets 'Acceptable Risk Management' criteria with respect to both property and life under both current and foreseeable conditions.

Copies of Northern Beaches (Pittwater) Council's Forms 1 and 1A applicable for the current DA are attached to this report.

4.2 Footing Design

The geotechnical assessment of the site did not include any subsurface drilling or testing to determine the foundation conditions below the existing residence. The general lack of cracking or other defects within the external walls however, suggests that the footings for the existing residence have been founded in strata which is adequate to support the existing structural loadings.

To this end, the builder should source any available footing design drawings and undertake exploratory excavations beside selected existing footings to confirm the bearing capacity of the soils below the residence.

All excavations for new footings or exploratory excavations beside existing footings should be inspected by an engineering geologist to confirm that the underlying strata has a sufficient bearing capacity to support any increased loading arising from the proposed development.

4.3 Stormwater Disposal

It is expected that the new works will not lead to any significant increase in the stormwater generated from the on-site development. Nevertheless the builder should, as a minimum, expose and assess the functionality of the existing pits and pipe work.

Modification or replacement of the existing stormwater system may be required if the current system is deemed to be deficient for the stormwater volumes from the proposed development.

5. Conditions Relating to Design and Construction Monitoring

To comply with Council conditions and to enable the completion of Forms 2B and 3 required as part of construction, building and post-construction certificate requirements of the GRMP, it will be necessary for Douglas Partners Pty Ltd to:

Form 2B

review the geotechnical content of all structural drawings.

Form 3

inspect any new or upgraded footing excavations for the new works to confirm compliance to design with respect to allowable bearing pressure and stability.

6. Design Life and Requirement for Future Site Maintenance

Douglas Partners Pty Ltd interprets the reference to design life requirements specified within the GRMP to refer to structural elements designed to retain the subject slope and maintain the risk of instability within acceptable limits.

Specific structures that may affect the maintenance of site stability in relation to the proposed development on this site are considered to comprise:

existing (and any proposed) stormwater surface drains and buried pipes leading to the stormwater disposal system;

existing and proposed retaining walls on the site.

In order to attain a structure life of 100 years as required by Northern Beaches (Pittwater) Council Policy, it may be necessary for the structural engineer to incorporate appropriate construction detailing and for the property owner (and Council) to adopt and implement a maintenance and inspection program. To this end, a provisional maintenance program is provided below in Table 3.

Table 3: Provisional Maintenance and Inspection Program for 19 Tatiara Cres. North Narrabeen

Structure	Maintenance/Inspection Task	Frequency
Stormwater drains, subsoil drains, pipes and pits	Owner to inspect to ensure that the drains, pipes and pits are free of debris & sediment build-up. Clear surface grates of vegetation/litter build-up.	Every year or following each significant rainfall event.
Existing or proposed retaining walls.	Owner to check walls for deviation from as-constructed condition.	Every two to three years or following each significant rainfall event.

Where changes to site conditions are identified during the maintenance and inspection program, reference should be made to a relevant professional (e.g. structural engineer or geotechnical engineer).

Note that the provisional program given in Table 3 will be subject to review and/or deletion at the conclusion of construction.

7. References

1. Pittwater Council's Interim Geotechnical Risk Management Policy (2009)
2. Australian Geomechanics Society, Practice Note Guidelines for Landslide Risk Management, March 2007

8. Limitations

Douglas Partners (DP) has prepared this report for this project at 19 Tatiara Crescent, North Narrabeen in accordance with DP's email proposal SYD200191. The work was carried out DP's Conditions of Engagement. This report is provided for the exclusive use of Ms Lisa Gravemade and her agents for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or another site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The comments provided in the report are indicative of the sub-surface conditions on the site and are based on inspections undertaken by DP. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing or inspections have been completed.

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

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

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

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

The contents of this report do not constitute formal design components such as are required, by Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction of all works (not just geotechnical components) and the controls required to mitigate risk. This report does, however, identify hazards associated with the geotechnical aspects of development and presents the results of risk assessment associated with the management of these hazards. It is suggested that the developer's principal design company may wish to include the geotechnical hazards and risk assessment information contained in this report, in their own Safety Report. If the principal design company, in the preparation of its project Design Report, wishes to undertake such inclusion by use of specific extracts from this subject DP report,

rather than by appending the complete report, then such inclusion of extracts should only be undertaken with DP's express agreement, following DP's review of how any such extracts are to be utilised in the context of the project Safety Report. Any such review shall be undertaken either as an extension to contract for the works associated with this subject DP report or under additional conditions of engagement, with either option subject to agreement between DP and the payee.

We trust that these comments are sufficient for your present requirements. If further assistance is required, please do not hesitate to contact the undersigned.

Yours faithfully

Douglas Partners Pty Ltd

Reviewed by



David Murray
Senior Associate



Fiona MacGregor
Principal

Attachments: Notes About This Report
 Northern Beaches (Pittwater) Council Forms 1 and 1A
 "Landslide Risk Management Concepts and Guidelines"
 (Australian Geomechanics Society, March 2007):

About this Report

Douglas Partners



Introduction

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

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

Copyright

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

Borehole and Test Pit Logs

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

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

Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

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

Reports

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

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

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

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

About this Report

Site Anomalies

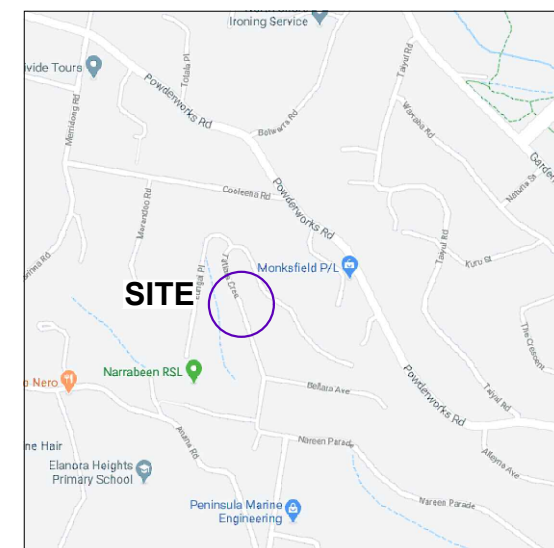
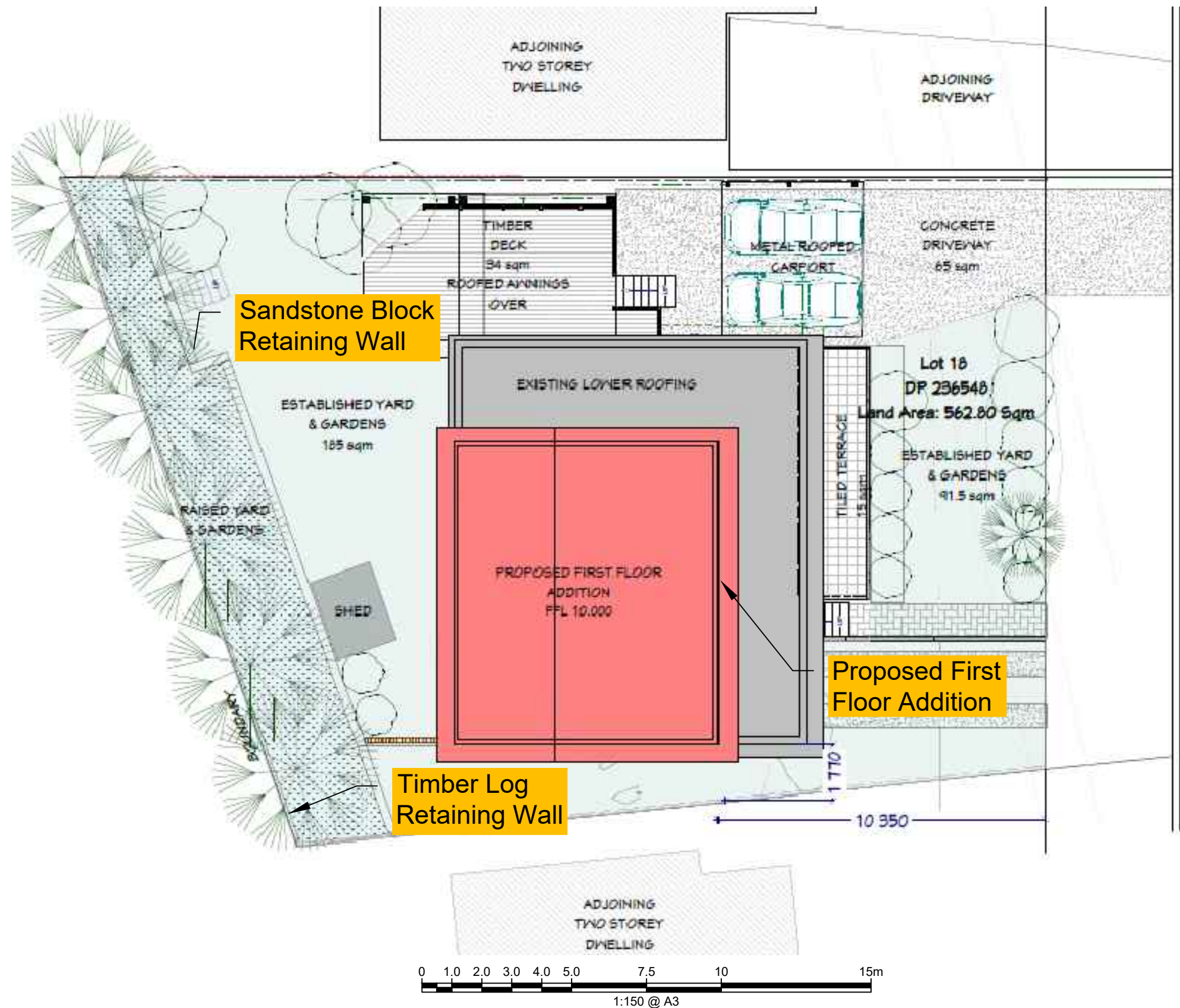
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later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

Information for Contractual Purposes

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

Site Inspection

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



Locality Plan

TATIARA CRESCENT

NOTE:
1: Base image from Page 6 - Site Plan



PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007
APPENDIX C: LANDSLIDE RISK ASSESSMENT
QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY

QUALITATIVE MEASURES OF LIKELIHOOD

Approximate Annual Probability		Implied Indicative Landslide Recurrence Interval		Description	Descriptor	Level
Indicative Value	Notional Boundary					
10 ⁻¹	5x10 ⁻²	10 years	20 years	The event is expected to occur over the design life.	ALMOST CERTAIN	A
10 ⁻²		100 years		The event will probably occur under adverse conditions over the design life.	LIKELY	B
10 ⁻³	5x10 ⁻³	1000 years	200 years	The event could occur under adverse conditions over the design life.	POSSIBLE	C
10 ⁻⁴	5x10 ⁻⁴	10,000 years	2000 years	The event might occur under very adverse circumstances over the design life.	UNLIKELY	D
10 ⁻⁵	5x10 ⁻⁵	100,000 years	20,000 years	The event is conceivable but only under exceptional circumstances over the design life.	RARE	E
10 ⁻⁶	5x10 ⁻⁶	1,000,000 years	200,000 years	The event is inconceivable or fanciful over the design life.	BARELY CREDIBLE	F

Note: (1) The table should be used from left to right; use Approximate Annual Probability or Description to assign Descriptor, not *vice versa*.

QUALITATIVE MEASURES OF CONSEQUENCES TO PROPERTY

Approximate Cost of Damage		Description	Descriptor	Level
Indicative Value	Notional Boundary			
200%	100%	Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation. Could cause at least one adjacent property major consequence damage.	CATASTROPHIC	1
60%		Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works. Could cause at least one adjacent property medium consequence damage.	MAJOR	2
20%	40%	Moderate damage to some of structure, and/or significant part of site requiring large stabilisation works. Could cause at least one adjacent property minor consequence damage.	MEDIUM	3
5%	10%	Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works.	MINOR	4
0.5%	1%	Little damage. (Note for high probability event (Almost Certain), this category may be subdivided at a notional boundary of 0.1%. See Risk Matrix.)	INSIGNIFICANT	5

- Notes:** (2) The Approximate Cost of Damage is expressed as a percentage of market value, being the cost of the improved value of the unaffected property which includes the land plus the unaffected structures.
- (3) The Approximate Cost is to be an estimate of the direct cost of the damage, such as the cost of reinstatement of the damaged portion of the property (land plus structures), stabilisation works required to render the site to tolerable risk level for the landslide which has occurred and professional design fees, and consequential costs such as legal fees, temporary accommodation. It does not include additional stabilisation works to address other landslides which may affect the property.
- (4) The table should be used from left to right; use Approximate Cost of Damage or Description to assign Descriptor, not *vice versa*

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

APPENDIX C: – QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (CONTINUED)

QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY

LIKELIHOOD		CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)				
	Indicative Value of Approximate Annual Probability	1: CATASTROPHIC 200%	2: MAJOR 60%	3: MEDIUM 20%	4: MINOR 5%	5: INSIGNIFICANT 0.5%
A – ALMOST CERTAIN	10 ⁻¹	VH	VH	VH	H	M or L (5)
B - LIKELY	10 ⁻²	VH	VH	H	M	L
C - POSSIBLE	10 ⁻³	VH	H	M	M	VL
D - UNLIKELY	10 ⁻⁴	H	M	L	L	VL
E - RARE	10 ⁻⁵	M	L	L	VL	VL
F - BARELY CREDIBLE	10 ⁻⁶	L	VL	VL	VL	VL

Notes: (5) For Cell A5, may be subdivided such that a consequence of less than 0.1% is Low Risk.

(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time.

RISK LEVEL IMPLICATIONS

Risk Level		Example Implications (7)
VH	VERY HIGH RISK	Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low; may be too expensive and not practical. Work likely to cost more than value of the property.
H	HIGH RISK	Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to Low. Work would cost a substantial sum in relation to the value of the property.
M	MODERATE RISK	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as practicable.
L	LOW RISK	Usually acceptable to regulators. Where treatment has been required to reduce the risk to this level, ongoing maintenance is required.
VL	VERY LOW RISK	Acceptable. Manage by normal slope maintenance procedures.

Note: (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.



PITTWATER COUNCIL

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER FORM NO. 1 – To be submitted with Development Application

Development Application for <u>MS LISA CRAVENADE</u>	Name of Applicant
Address of site <u>19 Tatiara Cres. North Narrabeen</u>	

Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report

I, Fiona MacGregor on behalf of Douglas Partners Pty Ltd
(Insert Name) (Trading or Company Name)

on this the 28/4/2020 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least \$2million.

I have:

Please mark appropriate box

- ☒ Prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ I am willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.
- ☐ Have examined the site and the proposed development/alteration in detail and am of the opinion that the Development Application only involves Minor Development/Alterations that do not require a Detailed Geotechnical Risk Assessment and hence my report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements for Minor Development/Alterations.
- ☒ Provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details:

Report Title:	<u>Proposed Alterations + Additions</u>
Report Date:	<u>27/4/20</u>
Author:	<u>David Murray</u>
Author's Company/Organisation:	<u>Douglas Partners P/L</u>

Documentation which relate to or are relied upon in report preparation:

• <u>Design Drawings 1 to 7</u>
by <u>Planning & 2 Build</u>
• <u>Site Survey Ref 23056 by Clark Dowdle + Assoc.</u>

I am aware that the above Geotechnical Report, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature Fiona MacGregor
Name Fiona MacGregor
Chartered Professional Status FIE Aust CP Eng.
Membership No. 370757
Company Douglas Partners Pty Ltd.





PITTWATER COUNCIL

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER FORM NO. 1(a) - Checklist of Requirements For Geotechnical Risk Management Report for Development Application

Development Application for 19 Tatiara Cres. Nth Narrabeen
Address of site MS Lisa Name of Applicant Gravemade

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report. This checklist is to accompany the Geotechnical Report and its certification (Form No. 1).

Geotechnical Report Details:

Report Title: Proposed Alterations + Additions
Report Date: 27-4-20
Author: David Murray Douglas Partners P/L
Author's Company/Organisation:

Please mark appropriate box

- ☒ Comprehensive site mapping conducted 1/4/20 (date)
- ☒ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)
- ☐ Subsurface investigation required
☒ No Justification Relatively minor works - will inspect during construction
☐ Yes Date conducted
- ☒ Geotechnical model developed and reported as an inferred subsurface type-section
- ☒ Geotechnical hazards identified (land site.)
- ☐ Above the site
☒ On the site
☐ Below the site
☐ Beside the site
- ☒ Geotechnical hazards described and reported
- ☒ Risk assessment conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Consequence analysis
☒ Frequency analysis
- ☒ Risk calculation
- ☒ Risk assessment for property conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Risk assessment for loss of life conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Assessed risks have been compared to "Acceptable Risk Management" criteria as defined in the Geotechnical Risk Management Policy for Pittwater - 2009
- ☒ Opinion has been provided that the design can achieve the "Acceptable Risk Management" criteria provided that the specified conditions are achieved.
- ☐ Design Life Adopted:
☒ 100 years
☐ Other specify
- ☒ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater - 2009 have been specified
- ☒ Additional action to remove risk where reasonable and practical have been identified and included in the report.
- ☐ Risk assessment within Bushfire Asset Protection Zone

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for ensuring that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated, and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature Fiona MacGregor
 Name Fiona MacGregor
 Chartered Professional Status F.I.E. Aust
 Membership No. 370757
 Company Douglas Partners Pty Ltd

