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REPORT ON GEOTECHNICAL SITE ASSESSMENT

for

PROPOSED NEW SWIMMING POOL

at

20 NARRABEEN PARK PARADE, WARRIEWOOD, NSW

Prepared For

Bourne Architecture Pty Ltd

Project No.: 2020-180.1

March, 2024

Document Revision Record

Issue No	Date	Details of Revisions
0	4th March 2024	Additional Design Works

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER

FORM NO. 1 – To be submitted with Development Application

Development Application for_____

Name of Applicant

Address of site ___ 20 Narrabeen Park Parade, Warriewood, NSW

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

I, ***Troy Crozier*** *on behalf of* ***Crozier Geotechnical Consultants*** 4th March 2024 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 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

☐ 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 I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

■ have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

☐ have provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details:

Report Title: Geotechnical Report for Proposed new Swimming Pool

Report Date: 4th March 2024 **Project No.:** 2020-180.1

Author: Marvin Lujan & Troy Crozier

Author's Company/Organisation: Crozier Geotechnical Consultants

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

Architectural drawings by Bourne + Blue Architecture Pty Ltd, Project No.: 567, Issue: A, Date: 12/02/24, Drawings: DA01 to DA05.
Engineering Drawing by Bourne + Blue Architecture, Issue: B, Date: 02/09/20, Project No.: 567, Drawing No.: DA01 to DA13.
Survey Plan by Earth Surveying Consulting Surveyors Pty Ltd, Date Surveyed: 20/07/2020 and Reference: 140012.

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.

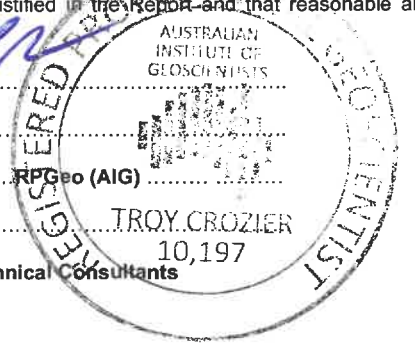
Signature .....

Name ...**Troy Crozier**.....

Chartered Professional Status...**RPGeo (AIG)** .....

Membership No.: ...**10197**.....

Company... **Crozier Geotechnical Consultants**



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

Development Application for_____
Name of Applicant
Address of site ___20 Narrabeen Park Parade, Warriewood, NSW

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: Geotechnical Report for Proposed new Swimming Pool
Report Date: 4th March 2024 **Project No.:** 2020-180.1
Author: Marvin Lujan & Troy Crozier
Author's Company/Organisation: Crozier Geotechnical Consultants

Please mark appropriate box

- ■ Comprehensive site mapping conducted ____30th September 2020_____ (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 …… no bulk excavation……...
  - ☐ Yes Date conducted ……
- ☐ Geotechnical model developed and reported as an inferred subsurface type-section
- ☐ Geotechnical hazards identified
  - ☐ 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 …50 years…… 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 ……

Name …**Troy Crozier**……

Chartered Professional Status…**RPGeo (AIG)** ……

Membership No. …**10197**……

Company… **Crozier Geotechnical Consultants**

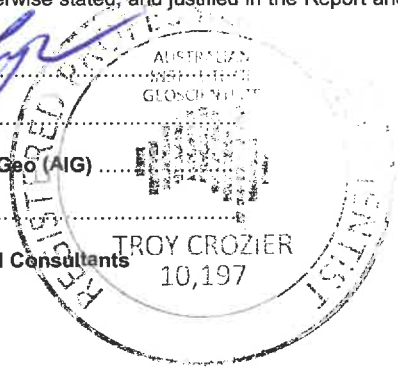


TABLE OF CONTENTS

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GEOTECHNICAL ASSESSMENT FOR PROPOSED NEW SWIMMING POOL AT 20 NARRABEEN PARK PARADE, WARRIEWOOD, NSW

1. INTRODUCTION:

This report details the results of a geotechnical assessment carried out for a proposed new swimming pool at No. 20 Narrabeen Park Parade, Warriewood, NSW. Crozier Geotechnical Consultants (CGC) have previously issued a geotechnical site assessment report for previous alteration and addition works within the site-dwelling that have been finalised. The new assessment was undertaken by Crozier Geotechnical Consultants (CGC) at the request of Bourne Blue Architecture Pty Ltd on behalf of the client Nathan Webster.

It is understood that the proposed new swimming pool will require bulk excavation down 1.50m depth decreasing west down to 0.60m depth. The proposed excavation will be located approximately 1.10m east from an existing sewer and >2.0m from the site boundaries. It is also understood that the construction of a new boundary wall is proposed within the northern rear of the site, hence minor excavation is also expected for the proposed new footings.

Reference to Pittwater Council's LEP 2014 Geotechnical Risk Management Map (GTH_019), the site is intersected by the H2 landslip hazard zone therefore the site requires a Geotechnical Landslip Assessment to be conducted in support of a Development Application. The site is also located within Class 5 acid sulphate zone in Acid Sulfate Soils Map (ASS_019). Therefore, this geotechnical report is provided in support of the Development Application and assesses the landslip risks and acid sulfate soil condition and provides details to ensure 'Acceptable' risk levels are achieved and can be maintained on the site for the life of the development.

The assessment and reporting were undertaken as per request Email by the Architect on the 21st February 2024 at 4:01 PM.

The original investigation and recent geotechnical assessment comprised:

a) A detailed geotechnical inspection and mapping of the site and adjacent properties by a Principal and a Geotechnical Engineer.
b) A photographic record of the site conditions

c) A review of the original geotechnical report, and existing proposed design works.

The following plans and diagrams were supplied for the work:

- Architectural drawings by Bourne + Blue Architecture Pty Ltd, Project No.: 567, Issue: A, Date: 12/02/24, Drawings: DA01 to DA05.
- Engineering Drawing by Bourne + Blue Architecture, Issue: B, Date: 02/09/20, Project No.: 567, Drawing No.: DA01 to DA13.
- Survey Plan by Earth Surveying Consulting Surveyors Pty Ltd, Date Surveyed: 20/07/2020 and Reference: 140012.

2. SITE FEATURES:

2.1. Description:

The site is a rectangular shaped block located on the low west side of Narrabeen Park Parade within gentle west dipping topography. It has a front east boundary of 15.277m, rear west boundary of 15.24m, side north boundary of 41.229m and a side south boundary of 42.285m as referenced from the provided survey plan.

The site is currently occupied by a two-storey brick and weatherboard residence located within the eastern portion of the block and a large lawn bounded by timber fencing at the rear of the block.

2.2. Geology:

Reference to the Sydney 1:100,000 Geological Series sheet (9130) indicates that the site is underlain by Newport Formation (Upper Narrabeen Group) rock (Rnn) which is of middle Triassic Age. The Newport Formation typically comprises interbedded laminite, shale and quartz to lithic quartz sandstones and pink clay pellet sandstones.

Extract of Sydney: 1:100 000 – Geology underlying the site

3. FIELD WORK:

3.1. Methods:

The original field investigation comprised a walk over inspection and mapping of the site and limited inspection of adjacent properties on the 22nd September 2020 by a Principal and a Geotechnical Engineer. It included a photographic record of the site conditions as well as geological/geomorphological mapping of the site and adjacent land with examination of ground levels and existing structures.

The recent geotechnical assessment comprised the revision of the original Geotechnical Report, conversation with the Architect regarding the proposed works and assessment of the proposed design works in relation to the existing site conditions.

3.2. Original Field Observations:

Narrabeen Park Parade contains a gently south dipping bitumen pavement, a low concrete gutter and kerbs where it passes the site. A concrete driveway and a steeply west dipping lawn containing shrubs and small to medium sized trees extend down from the kerb to the front site boundary. Minor creep in slope but no issues of landslip in road reserve or pavement.

The eastern front of the site contains a concrete driveway and a slightly higher (≤0.20m higher) lawn at the southern and northern sides, respectively. The raised lawn is bounded by a timber gate and fence along the south, whilst a low (≤0.65m height) retaining wall along the northern and eastern sides supporting raised gardens above the lawn's Ground Surface Level (GSL). The retaining structures, lawn, raised gardens appeared in good condition. No rotation or signs or movement related to slope instability was observed within these structures.

The site contains a one and two storey brick and weatherboard house, broadly occupying the centre to eastern portion of the block. The dwelling is one storey within the eastern portion (Level 2, comprising weatherboard), and a two storey within the western portion (Level 1, comprising brick) due to the slope with a stone paved patio that extends west (approximately ≤4.00m) from the rear of the dwelling.

The Level 2 within the eastern portion of the dwelling contains a cavity below, having the timber flows supported by brick columns. Whilst the Level 1 (within western portion of the dwelling) is founded directly onto the ground, with a minor excavation (up to ≤ 1.20m depth) into the slope towards the east. The dwelling extends north and south to within approximately 1.30m and 1.50m off the northern and southern site boundaries, with a concrete and a stone paved pathway to the north and south of the site-dwelling. The site-dwelling appeared in good condition, including the supporting brick columns below the house and side

pathways. No signs of footing/ foundation settlement, cracks or movement related to slope instability was observed within these structures.

The western portion of the site is occupied by grass lawn that is supported by a low (≤0.20m heigh) timber lagging retaining wall along the eastern and southern sides, whilst then bounded by shrubs and small sized tress and timber paling fences along the northern, western, and southern sides. An approximately ≤8.00m height tree is located within the southern portion of the lawn. Excessive ground movement was not observed within the western lawn and the retaining structures appeared in good condition. No signs of slope instability were observed within this area.

The neighbouring property to the north (No.22 Narrabeen Park Parade) contains a one and two storey dwelling within the centre of the block. The front east of the block contains a lawn within the southern side and a concrete strip driveway along the northern side that extends west along the northern side of the block. The western portion of the block contains a grass lawn that extends to the rear boundaries. The property-dwelling extends south to within approximately 1.40m off the common boundary and the GSL of the neighbouring block is approximately ≤0.50m higher than the site's GSL. The property dwelling appears in good condition, with no signs of footing/ foundation settlement, cracking or movement related to slope instability.

The neighbouring property to the south (No.18 Narrabeen Park Parade) contains a single storey rendered dwelling with an attached garage to the north, located within the centre of the block. The eastern front of the block contains a grass lawn within the southern side and a strip concrete driveway along the northern side, leading west to the attached garage. The western portion of the block contains a grass lawn that extends west to the rear boundaries of the block. The property dwelling extends north to approximately 1.00m off the common boundary and the GSL of the neighbouring block is approximately ≤0.50m lower than the site's GSL. The property dwelling appears in good condition, with no signs of footing/ foundation settlement, cracking or movement related to slope instability.

The neighbouring property north-west No.11 Sydney Road contains a single storey rendered brick house and carport directly to the north of the dwelling. The eastern portion of the block contains a granny flat (approximately 3.00m off the common boundary) surrounded by a grass lawn extending to the rear boundaries at a slightly lower (≤0.50m) GSL to the site's GSL.

The neighbouring property to the west No.9 Sydney Road contains a one and two storey brick/ rendered brick house located at the centre of the block. The western front of the block contains a grass lawn within the southern side and a concrete driveway at the northern portion leading east to a detached garage to the north-

east of the property-dwelling. Whilst the eastern portion of the block is occupied by a single shed at the south-east corner and a grass lawn that extends to the rear boundaries at a slightly lower (≤0.50m) GSL to the site's GSL

The neighbouring property to the south-west No. 7 Sydney Road contains a one and two storey brick house broadly occupying the centre of the block. The western front of the block contains a concrete driveway and gardens at the southern and northern sides, respectively. Whilst the western portion of the block is occupied by a grass lawn and semi-dense vegetation. The eastern rear end of the block contains a slightly lower GSL to the site's GSL.

The neighbouring buildings and properties were only inspected from within the site or from the road reserve however the visible aspects did not show any significant signs of large-scale slope instability or other major geotechnical concerns which would impact the site or the proposed development.

4. COMMENTS:

4.1. Geotechnical Assessment:

The original inspection and assessment identified no obvious credible landslip hazards within the site or adjacent properties.

The site residence appears to be in good condition, with no signs of excess cracking or settlement. The soil slopes within and around the site are gently sloping and there were no signs of any instability. Most of the retaining walls within the site area appear stable at present. No obvious surface stormwater flow or excess seepage/wet areas were identified.

It is understood that the works within the site-dwelling have been finalized and now the construction of the swimming pool is proposed.

Based on the distances between the proposed pool excavation, site boundaries and nearby sewer, temporary safe batter slopes (1.0V:1.5H) are achievable. Based on depth of excavation and separation distances, the proposed pool excavation is considered unlikely to have a negative impact on the nearby structures.

There were no signs of existing or previous landslip instability within the site or adjacent land whilst the existing house structure shows no signs of settlement or cracking. The proposed works are therefore considered to be not affected by a geotechnical hazard.

Due to the construction of new footings and the proposed excavation, geotechnical testing is recommended within the rear of the site. It is recommended that at least two boreholes be drilled within the footprint of the new pool excavation to assess for any Potential Acid Sulfate Soils (PASS) and provide recommendations should the works require the issue of an Acid Sulfate Soils Management Plan (ASSMP).

The geotechnical testing will also assist in providing bearing capacities that will be required for the structural engineer and builder.

4.2. Slope Stability & Risk Assessment:

Based on our site mapping no credible geological/geotechnical landslip hazards were identified which need to be considered in relation to the existing site and proposed development. As such a risk assessment is not required as the works are considered separate from, and not affected by, a geotechnical landslip hazard.

The entire site and surrounding slopes have been assessed as per the Pittwater Council Geotechnical Risk Management Policy 2009 and no credible landslip hazards were identified, therefore the site is considered to meet the 'Acceptable' risk management criteria.

4.3. Design Life of Future Development:

It is considered that the sites main development will have a design life of 50 years from completion of the proposed alterations and additions and this would apply to the proposed pool.

We have interpreted the design life requirements specified within Councils Risk Management Policy to refer to structural elements designed to support the adjacent slope, control stormwater and maintain the risk of instability within 'Acceptable' limits. Specific structures and features that may affect the maintenance and stability of the site in relation to proposed development are considered to comprise:

- stormwater and subsoil drainage systems,
- excavation, retaining walls and soil slope erosion and instability,
- maintenance of trees/vegetation on this and adjacent properties,

Man-made features should be designed and maintained for a design life consistent with surrounding structures (as per AS2870 – 2011 (50 years)). In order to attain an "Acceptable Risk Management Criteria" for the design life of the development as required by the Councils Risk Management Policy, it will be necessary for the property owner to adopt and implement a maintenance and inspection program.
If a maintenance and inspection schedule are not implemented the "Acceptable" risk levels for the design life of the property may not be attained. A recommended program is given in Table: 1 below and should also include the following guidelines:

- The conditions on the block don't change from those present at the time this report was prepared, except for the changes due to new reviewed and approved development.
- There is no change to the property due to an extraordinary event external to this site, and the property is maintained in good order and in accordance with the guidelines set out in;
    a) CSIRO sheet BTF 18
    b) Australian Geomechanics "Landslide Risk Management" Volume 42, March 2007.
    c) AS 2870 – 2011, Australian Standard for Residential Slabs and Footings

Table 1: Recommended Maintenance and Inspection Program for Future Developments

Structure	Maintenance/ Inspection Item	Frequency
Stormwater Drains.	Owner to inspect to ensure that the drains and pipes are free of debris & sediment build-up. Clear surface grates and litter.	Every year or following each major rainfall event
Retaining Walls or remedial measures	Owner to inspect walls for deviation from as constructed condition or for excess deterioration/rotation or signs of soil settlement/erosion or significant cracking adjacent to crest.	Every two years or following major rainfall events. Replace existing non-engineered walls as required prior to their failure
Large Trees on or adjacent to site	Arbourist to check condition of trees and remove branches and dead trees as required	Every five years

N.B. Provided the above schedule is maintained the design life of the property should conform AS2870 and Councils 100 years stability criteria

Where changes to site conditions are identified during the maintenance and inspection program, reference should be made to relevant professionals (e.g. structural engineer, geotechnical engineer or Council). It is assumed that Northern Beaches Council will control development on neighbouring properties, carry out regular inspections and maintenance of the road verge, stormwater systems and large trees on public land adjacent to the site so as to ensure that stability conditions do not deteriorate with potential increase in risk level to the site. Also, individual Government Departments will maintain public utilities in the form of power lines, water and sewer mains to ensure they don't leak and increase either the local groundwater levels or landslide potential.

5. CONCLUSION:

The original inspection and assessment identified no obvious significant slope movement, excess surface stormwater flow or seepage, erosion or instability within the site or adjacent properties. The entire site and surrounding slopes have been assessed as per the Geotechnical Risk Management Policy 2009 for Pittwater and no credible landslip hazards were identified.

The proposed works are relatively minor from a geotechnical perspective and should not create any new instability, therefore the proposed works are separate from and not affected by a geotechnical hazard. However, it is recommended that sub-surface geotechnical testing be done to assess for PASS and to provide bearing capacities for the proposed new structures.

It is considered that the site will meet the 'Acceptable' risk management criteria for the design life of the upgraded development taken as 50 years from the proposed works provided the works are properly designed and constructed and the properties are maintained as per the recommendations of this and future geotechnical reports.

Prepared By:
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Reviewed By:
Troy Crozier
Principal
ME Aust. CPEng.
MAIG, PRGeo – Geotechnical and Engineering
Registration No.: 10197

6.0. REFERENCES:

1. Australian Geomechanics Society 2007, "Landslide Risk Assessment and Management", Australian Geomechanics Journal Vol 42, No 1, March 2007.
2. Geotechnical Risk Management Policy for Pittwater, 2009.