



15 December 2022

**Lightning Constructions (Aust) Pty Limited**

Attention: Steve Djogo

RE: Geotechnical Assessment and Forms for Proposed Development  
45 Tatiara Crescent, North Narrabeen NSW 2101  
Report No. 2223016-R1

## 1. INTRODUCTION

At the request of Lightning Constructions (Aust) Pty Limited (client), Willows Engineering Consultants Pty Ltd (Willows Engineering) carried out a review of the geotechnical engineering issues for the proposed development at 45 Tatiara Crescent, North Narrabeen.

The client advised that the Development Application (DA), (ref: N0494/15) was approved by the Northern Beaches Council (Council) in 2015 for the "*Construction of new two storey dwelling and double garage*". The client advised that the architectural drawings for the development had been recently modified as part of a Section 4.55 Application.

Council's geotechnical risk management policy requires geotechnical reports to be accompanied by Forms 1-4 signed by a geotechnical engineer at different stages of development. Form 1 is to be signed by the geotechnical engineer for the landslide risk assessment. Form 2A is signed by the structural engineer and Form 2B is signed by the geotechnical engineer to confirm implementation of the geotechnical report recommendations in the engineering drawings.

Form 1 is attached to confirm review of the 2015 geotechnical risk assessment report. Form 2B is attached to confirm the structural engineering design drawings.

The 2015 geotechnical risk assessment report recommendations are discussed in this report with reference to the modified development proposal. Recommendations are provided for construction, temporary drainage, excavation support and inspections for geotechnical review.

## 2. SUPPLIED DOCUMENTS

The client supplied the following documents:

- Geotechnical Risk Management report, by Jack Hodgson Consultants Pty Limited (ref: MQ 30036), dated 25/05/2015).
- Section 4.55 drawings by Fortey & Grant Architecture Pty Ltd (ref: S445-01 to S445-13, dated 9/11/2022).
- Drawings by Structural Engineering Services Pty Ltd (ref: 220558, dated 6/12/2022) and "*Certificate of Structural Design*" (ref: 220558.SDC1, dated 8/12/2022).

### 3. GEOTECHNICAL REPORT

The Jack Hodgson Consultants geotechnical report was based on subsurface investigations and mapping at the site on 25/05/2015. Dynamic Cone Penetrometer (DCP) tests were undertaken to assess the subsurface profile. No boreholes, test pits or laboratory tests were carried out.

However, the geotechnical model has been interpreted in the 2015 report based on the site locality with respect to the Hawkesbury Sandstone and Narrabeen Group geological units. The subsurface conditions and hazards indicated are consistent with sloping land in the region.

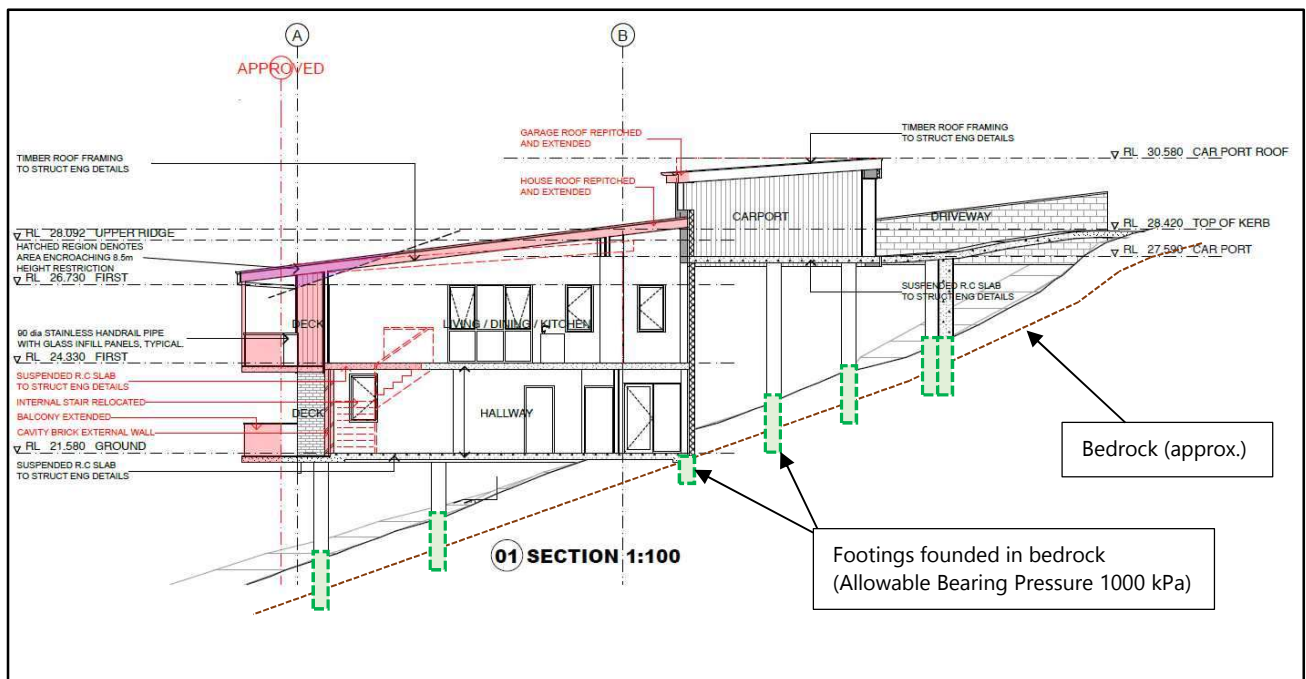
The Jack Hodgson Consultants report provides a 'risk to property' and 'risk to life' assessment in accordance with the Australian Geomechanics Society *"Practice Note Guidelines for Landslide Risk Management"* (AGS 2007c).

The recommendations under *"Section 10. Risk Management"* in the Jack Hodgson Consultants report are generally considered suitable for implementation at the site. This report provides additional geotechnical recommendations to verify the conditions encountered during construction.

Form 1 is attached to confirm review of the 2015 geotechnical risk assessment report.

### 4. PROPOSED DEVELOPMENT

An extract from the Fortey & Grant Architecture drawings showing a cross section through the proposed development is presented in Figure 1:



**Figure 1 – Extract from Fortey & Grant Architecture Drawing No. S445-11**

The approximate bedrock is annotated on the cross section. The footings for the proposed development are to be founded in bedrock, verified by geotechnical engineer to be suitable for the Allowable Bearing Pressure of 1000 kPa used in the structural engineering design.

## **5. RECOMMENDATIONS**

Recommendations for the detailed design and construction stages are set out in Sections 5.1 to 5.5.

### **5.1. Geotechnical Review**

Geotechnical inspections can be scheduled at targeted times during the development, in conjunction with the builder. It is recommended that geotechnical engineer visually assess the cut/fill batters, excavations, foundation conditions, temporary drainage and shoring. If required, visual inspections can be supplemented by on-site tests or laboratory tests.

### **5.2. Surface Drainage**

The site is located on sloping land. During construction, temporary drainage is recommended to re-direct surface water within the site by shallow earth mounds, in conjunction with plastic sheets, silt fences, hay bales, etc. at stormwater pits. After excavation, the sandstone bedrock is anticipated to resist erosion by surface water flows. The permanent drainage system be designed to function by gravity. Surface water drainage systems should operate separately from subsoil drainage systems (e.g. retaining walls).

### **5.3. Temporary Earthworks**

It is recommended that a geotechnical engineer inspect and advise on unsupported excavations and temporary support systems during construction.

Proposed cut and fill earthworks are to be planned and undertaken with appropriate measures to manage stability. It is recommended that a geotechnical engineer inspect the site at suitable construction stages to review and advise on the temporary earthworks and risk management.

The surface fill / soil and weathered bedrock can be readily excavated by earthmoving machinery. Shoring may need to be provided to temporary excavations, subject to geotechnical engineer inspection, or if the excavation is to remain open for an extended period. Excavations in sandstone bedrock are expected to remain standing unsupported.

It is recommended that excavation support be provided by temporary shoring (e.g. star pickets, timber, etc.) during construction.

For unsupported earthworks, it is recommended that:

- Excavations in soil, or fill placed at the site do not exceed 1.5 metres.
- Sloping soil excavations, or fill slopes do not exceed 1H:1V (45°).
- Benched excavations be planned for 1H:1V, with maximum bench heights of 1 metre.
- Temporary erosion protection be provided over the excavation and fill surfaces.

## 5.4. Foundation

An Allowable Bearing Pressure (ABP) of 1000 kPa is recommended for footing design on sandstone bedrock (Class V, low to medium strength). However, an ABP of 100 kPa can be used for the design of shallow footings, founded on surficial soil materials or compacted fill.

An Allowable Bearing (ABP) of 1000 kPa can be used for footings bearing on Class IV shale bedrock (if encountered), or 700 kPa ABP for footings on Class V shale bedrock.

It is recommended that:

- Footings for the proposed development be founded on bedrock, free from loose, wet and unsuitable materials. Boulders, topsoil and loose fill are not suitable.
- The foundation and ABP for proposed new footings be verified during construction by geotechnical engineer inspection, prior to concrete pour.

## 5.5. Retaining Structures

It is recommended that retaining walls be designed by a structural engineer in accordance with the provisions of *"AS 4678 – Earth-retaining structures"*.

The engineering design drawings, details and notes should indicate the proposed surface and subsoil drainage, footings and required earthworks.

Geotechnical parameters are proposed based on experience with geological conditions in the Sydney region. Soil samples can be tested in a NATA registered soil laboratory if required.

Parameters for the engineering design of retaining walls and shoring are provided in Table 1:

**Table 1 – Geotechnical Parameters for Retaining Wall Design**

Geotechnical Parameter	Fill	Residual Soil	Sandstone (Class V)
Effective Cohesion $c'$ (kPa)	0	0	5
Effective Friction Angle $\phi'$ (degrees)	20	22	42
Effective Unit Weight $\gamma'$ (kN/m <sup>3</sup> )	16	19	24
'Active' Earth Pressure ( $K_a$ )	0.49	0.45	0.2
'At-rest' Earth Pressure ( $K_0$ )	0.66	0.63	0.33
'Passive' Earth Pressure ( $K_p$ )	2.04	2.2	5.04

Note: Earth pressures have been calculated by the Rankine method, assuming normally consolidated soil and relatively level backfill behind the wall. Refer to *AS 4678 – Earth-retaining structures Appendix D* for typical soil parameters and *Appendix E* for information on earth pressure calculation methods.

## **6. STRUCTURAL DRAWINGS**

The drawings by Structural Engineering Services Pty Ltd indicate reinforced concrete pier footings for the development, with an Allowable Bearing Pressure (ABP) of 1000 kPa on bedrock foundation.

The drawings are considered to implement the geotechnical report recommendations.

Form 2B is attached to confirm geotechnical review of the structural engineering drawings.

## **7. LIMITATIONS**

This geotechnical report has been prepared for Lightning Constructions (Aust) Pty Limited, for the purposes in the introduction. The interpreted geotechnical model in this report is based on experience with review of similar developments on sloping land.

Geotechnical engineering inspections are required during construction and on completion to confirm that 'Acceptable' or 'Tolerable' risk levels are maintained. The design life of the structure is estimated to be 70 years. The geotechnical recommendations in this report are provided for use by the client, structural engineer and builder. Further geotechnical advice should be obtained if the conditions encountered on site vary substantially from the conditions described in this report.

If you would like to discuss this report, please contact the undersigned.

Regards



David Willows  
BE(Hons), CPEng(Civil), MIEAust, NER, A.CIRCEA

### **Attachments:**

Form 1 and Form 2B – Council's Geotechnical Risk Management Policy

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

Development Application for Maiya Levitch & Andrew Stubenbock

Name of Applicant

Address of site 45 Tatiara Crescent, North Narrabeen NSW 2101

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

I, David Willows on behalf of Willows Engineering Consultants Pty Ltd  
(Insert Name) (Trading or Company Name)

on this the 15 December 2022 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:

**Please mark appropriate box**

- ☐ 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 Assessment and Forms for Proposed Development (ref: 2223016-R1)

Report Date: 15 December 2022

Author: David Willows

Author's Company/Organisation: Willows Engineering Consultants Pty Ltd

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

Section 4.55 drawings by Fortey & Grant Architecture Pty Ltd (ref: S445-01 to S445-13, 9/11/2022)

Geotechnical Risk Management report, by Jack Hodgson Consultants Pty Limited (ref: MQ 30036), 25/05/2015)

Drawings by Structural Engineering Services Pty Ltd (ref: 220558, 6/12/2022)

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 DWillows

Name David Willows

Chartered Professional Status CPEng (civil)

Membership No. 2417109

Company Willows Engineering Consultants Pty Ltd



**GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER**  
**FORM NO. 2 – PART B – To be submitted with detailed design for Construction Certificate**

**PART B Declaration made by Geotechnical Engineer or Engineering Geologist and/or Coastal Engineer (where applicable) in relation to the incorporation of the Geotechnical issues into the project design**

I, David Willows on behalf of Willows Engineering Consultants Pty Ltd  
(insert name) (trading or company name)

on this the 15 December 2022  
(date)

certify that I am a Geotechnical Engineer or Engineering Geologist and/or Coastal Engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2099 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 also certify that I have reviewed the design plans and structural design plans for the Construction Certificate Stage and that I am satisfied that:

**Please mark appropriate box**

- ☒ the structural design meets the recommendations as set out in the Geotechnical Report or any revision thereto.  
☐ the structural design has considered the requirements set out in the Geotechnical Report for Excavation and Landfill both for the excavation/construction phase and the final installation in accordance with Clause 3.2 (b)(iv) of the Geotechnical Risk Management Policy.

**Geotechnical Report Details:**

Report Title: Geotechnical Assessment and Forms for Proposed Development

Report Date: 15 December 2022 (2223016-R1)

Author: David Willows Willows Engineering Consultants Pty Ltd

**Documentation which relates to or is relied upon in report preparation:**

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Structural Engineering Services Pty Ltd drawings (ref: 220558, 6/12/22) and Certificate of Structural Design (8/12/22)

Section 4.55 drawings by Fortey & Grant Architecture Pty Ltd (ref: S445-01 to S445-13, 9/11/22)

I am also aware that Pittwater Council relies on the processes covered by the Geotechnical Risk Management Policy, including this certification 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.

Signature DWillows

Name David Willows

Chartered Professional Status CPEng(civil), MIEAust, NER

Membership No. 2417109

Company Willows Engineering Consultants Pty Ltd