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

Development Application for GRANT VALLACK BUILDER
Name of Applicant

Address of site **14 PRINCE ALFRED PARADE, NEWPORT**

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

I, Garth Hodgson (insert name) *on behalf of* Hodgson Consulting Engineers Pty Ltd (Trading or Company Name)

on this the 24th October, 2021 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.

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 paragraph 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy fro 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.

☐ Have examined the site and the proposed development/alteration is separate form and 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

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

Geotechnical Report Details:

Report Title: RISK ANALYSIS & MANAGEMENT FOR PROPOSED ALTERATIONS AND ADDITIONS AT 14 PRINCE ALFRED PARADE, NEWPORT – PX 00040A

Report Date: 24th October, 2021

Author : GARTH HODGSON

Author's Company/Organisation : HODGSON CONSULTING ENGINEERS PTY LTD

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

Architectural drawings prepared by Matt Thitchener Architect, Project No: 14PA, Drawing Nos:- 0.1(b) to 0.3(b), 0.4 to 0.5, 0.6(a) to 0.7(a) and dated 28th October, 2021..

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 Garth Hodgson

Chartered Professional Status MIE Aust

Membership No. 2211514

Company Hodgson Consulting Engineers Pty Ltd

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

Development Application for GRANT VALLACK BUILDER
Name of Applicant

Address of site **14 PRINCE ALFRED PARADE, NEWPORT**

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: RISK ANALYSIS & MANAGEMENT FOR PROPOSED ALTERATIONS AND ADDITIONS AT 14 PRINCE ALFRED PARADE, NEWPORT – PX 00040A

Report Date: 24th October, 2021

Author : GARTH HODGSON

Author's Company/Organisation: HODGSON CONSULTING ENGINEERS PTY LTD

Please mark appropriate box

☐ Comprehensive site mapping conducted 1
(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 Exposed rock
- ☐ 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 15 to 20
  Specify Less than 25 Year for some retaining walls timber material

☒ 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 Garth Hodgson

Chartered Professional Status MIE Aust

Membership No. 2211514

Company Hodgson Consulting Engineers Pty Ltd

RISK ANALYSIS & MANAGEMENT REPORT
FOR
PROPOSED ALTERATIONS AND ADDITIONS
AT
14 PRINCE ALFRED PARADE, NEWPORT

1. INTRODUCTION.

1.1 This assessment has been prepared to accompany an application for Development Approval with Northern Beaches Council - Pittwater. The requirements of the Geotechnical Risk Management Policy for Pittwater, 2009 have been met.

1.2 The definitions used in this Report are those used in the Geotechnical Risk Management Policy for Pittwater, 2009.

1.3 The methods used in this Assessment are based on those described in Landslide Risk Management March 2007, published by the Australian Geomechanics Society and as modified by the Geotechnical Risk Management Policy for Pittwater, 2009.

1.4 The experience of the principal of Hodgson Consulting Engineers spans a time period over 25 years in the Northern Beaches Council area and Greater Sydney Region.

2. PROPOSED DEVELOPMENT.

2.1 Construct a new elevated carport over existing hardstand and new access driveway.

2.2 Construct a new elevated pedestrian bridge and external lift.

2.3 Details of the proposed development are shown on a series of architectural drawings prepared by Matt Thitchener Architect, Project No: 14PA, Drawing Nos:- 0.1(b) to 0.3(b), 0.4 to 0.5, 0.6(a) to 0.7(a) and dated 28th October, 2021.

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3. EXISTING DEVELOPMENT.

3.1 The site was inspected on the 29th June, 2020.

3.2 The rectangular property is located on the low side of the road and has a westerly aspect. The block is situated towards the middle of a slope that rises up from Pittwater to the crest of the ridge on the western side of Prince Alfred Parade. The slope across the property rises toward the east at average angles of some 20-25 degrees. The slope above the property continues after the cut of the road at similar angles before the crest of the hill is approached. A fill batter is on the downhill side of the road where the existing concrete driveway winds it's way down the site providing access to the subject property and the rear property as well.

3.3 Vehicular access is via the right of carriage concrete drives that starts near the south eastern front corner of the property heads north east to the northern side boundary before turning south west and heading to and flowing parallel the southern side boundary down to the lower property. Pedestrian access is via the concrete driveway to the main entry and the eastern side of the existing residence. A patio and swimming pool surrounded by a retaining wall on the eastern side is also at the eastern front side of the existing residence. The retaining wall adjacent the driveway along the southern boundary was observed with signs of deterioration mainly cracked render. The render on the retaining wall would need to be removed to determine the condition of the existing retaining wall. The rear of the existing residence is an elevated tiled balcony. An inclinator runs between the existing residence and northern side boundary down the to the rear boundary lower property in a right carriage way.

3.4 The multi storey brick residence and is supported on concrete suspended and raft slabs, strip and pad footings and is good condition. There was some cracking in the existing render observed but in our opinion was due to the age of the finish and due to the movement of the existing residence. No signs of significant movement attributed slope instability were observed in the existing residence.

3.5 The subject property and adjoining properties are mapped as H1 hazard areas on the Council Geotechnical Hazard Map. Our observations indicate the surrounding slopes do not present a significant risk of instability to the subject property.

4. GEOLOGY OF THE SITE.

4.1 The site is underlain by interbedded sandstones, siltstones and shales of the Narrabeen Group that do not outcrop on the site. The Narrabeen Group Rocks are Late Permian to Middle Triassic in age with the early rocks not outcropping in the area under discussion. The materials from which the rocks were formed consist of gravels, coarse to fine sands, silts and clays. They were deposited in a riverine type environment with larger floods causing fans of finer materials. The direction of deposition changed during the period of formation. The lower beds are very variable with the variations decreasing as the junction with the Hawkesbury Sandstones is approached. This is marked by the highest of persistent shale beds over thicker sandstone beds which are similar in composition to the Hawkesbury Sandstones.

4.2 The slope materials are colluvial at the surface and residual at depth. They consist of sandy loam topsoil over sandy clays and clays with rock fragments and some floaters throughout the profile. The sandy clays and clays merge into the weathered zone of the under lying rocks at depths expected to be in the range 0.9 to 2.5 metres.

5. SUBSURFACE INVESTIGATION.

For purposes of this assessment, observation of the surface features, as described in this Report are considered to be sufficient information to prepare the building certificate; therefore no subsurface investigation was undertaken. Additionally the author of this report observed pier holes for the as built hardstand area.

6. DRAINAGE OF THE SITE.

6.1 ON THE SITE.

The site has adequate drainage with no natural water courses. Stormwater is conveyed to the waters of Pittwater.

6.2 SURROUNDING AREA.

Overland stormwater flow entering the site from the adjoining properties was not evident. Normal overland runoff could enter the site from above during heavy or extended rainfall.

7. GEOTECHNICAL HAZARDS.

Table 7.1 GEOTECHNICAL HAZARDS

HAZARDS	DESCRIPTION	POSSIBLE IMPACTS
ABOVE THE SITE	No geotechnical hazards likely to affect the subject property were observed above the property	N/A
ON THE SITE		
HAZARD ONE	The site is classed slip affected under Council's Policy and a H1 Hazard. A failure of the slope across the property is considered to be a potential hazard.	Damage to property and life.
BELOW THE SITE	No geotechnical hazards likely to affect the subject property were observed above the property	N/A
BESIDE THE SITE	The properties beside the site are at similar elevations and have similar geomorphology to the subject property. The house and grounds of the properties beside the site were in good condition as observed from the subject property and street. No geotechnical hazards likely to adversely affect the subject property were observed beside the site.	N/A

8. RISK ASSESSMENT.

Table 8.1 SUMMARY OF QUALITATIVE RISK ASSESSMENT TO PROPERTY

Hazard	Assessed Likelihood	Assessed Consequence	Risk
HAZARD ONE The main slope of the land surface falls across the subject property at approximate average angles of 20 to 25 degrees. While considered stable in its current condition the likelihood of the slope failing and impacting on the house is assessed as	'Unlikely' (10^{-4})	'Minor' (5%)	**'Low' ($5x10^{-6}$)**

NOTE: The level of these risks are **'ACCEPTABLE'** provided the recommendations given in **Section 10** are undertaken.

Table 8.2 SUMMARY OF QUALITATIVE RISK ASSESSMENT TO LIFE

For loss of life, risk can be calculated as follows:

$\mathbf{R_{(LoI)} = P_{(H)} \times P_{(SH)} \times P_{(TS)} \times V_{(DT)}}$ (See Appendix for full explanation of terms)

$P_{(H)}$ - Annual Probability
$P_{(SH)}$ - Probability of Spatial Impact
$P_{(TS)}$ - Possibility of the Location Being Occupied During Failure
$V_{(DT)}$ - Probability of Loss of Life on Impact of Failure
$R_{(LoI)}$ - Risk Estimation

Hazard	Description		Value
HAZARD ONE	The main slope of the land surface falls across the subject property at approximate average angles of 20 to 25 degrees. Provided good engineering and building practices are followed and the recommendations given in Section 10 are undertaken the likelihood of the slope failing and impacting on the site		
	$P_{(H)}$	No evidence of significant movement was observed on the site, a slope failure is considered unlikely.	0.0001/annum
	$P_{(SH)}$	The house is situated towards the toe of the steep slope.	0.2
	$P_{(TS)}$	The average household is taken to be occupied by 4 people. It is estimated that 1 person is in the house for 20 hours a day, 7 days a week. It is estimated 3 people are in the house 12 hours a day, 5 days a week. For the person most at risk: $\frac{20}{24} x \frac{7}{7}$	0.83
	$V_{(DT)}$	Based on the volume of land sliding and its likely velocity when it hits the house, it is estimated that the vulnerability of a person to being killed in the house when a landslide hits is	0.1
	Risk $R_{(LoI)}$	0.0001 x 0.2 x 0.83 x 0.1 = 0.00000166, 1.66 x 10^{-6}/annum	**1.66 x 10^{-6}**

NOTE: The level of these risks are **'ACCEPTABLE'** provided the recommendations given in **Section 10** are undertaken.

9. SUITABILITY OF DEVELOPMENT FOR SITE.

9.1 GENERAL COMMENTS.

The proposed development is considered suitable for the site.

9.2 GEOTECHNICAL COMMENTS.

No geotechnical hazards will be created by the completion of the proposed development in accordance with the requirements of this Report and good engineering and building practice.

9.3 CONCLUSIONS.

The site and the proposed development can achieve the Acceptable Risk Management criteria outlined in the Pittwater Geotechnical Risk Policy provided the recommendations given in **Section 10** are undertaken.

10. RISK MANAGEMENT.

10.1. TYPE OF STRUCTURE.

The proposed structures are considered suitable for this site.

10.2. EXCAVATIONS.

10.2.1 All excavation recommendations as outlined below should be read in conjunction with Safe Work Australia's *'Excavation Work – Code of Practice'*, published January, 2020.

10.2.2 The foundations for the proposed alterations and additions will require excavation for the piered footings. These piered footings will encounter fill and soil material and clays overlying the weathered rock of the Narrabeen Group to approximate depths of 1.0 to 2.0 metres or deeper where filling has been carried out. The piered footings are to be socketed into a minimum of 0.3 metres into weathered rock.

10.2.3 All excavated materials left onsite will need to comply with the conditions in Section 10.3 or be retained by an engineer designed retaining wall or structure.

10.2.4 All excavated material is to be removed from the site in accordance with current Office of Environment and Heritage (OEH) regulations.

10. RISK MANAGEMENT. (Continued)

10.3. FILLS.

10.3.1 If filling is required, all fills are to be placed in layers not more than 250 mm thick and compacted to not less than 95% of Standard Optimum Dry Density at plus or minus 2% of Standard Optimum Moisture Content.

10.3.2 The fill batters are to be not steeper than 1 vertical to 1.7 horizontal or they are to be supported by properly designed and constructed retaining walls.

10.4. FOUNDATION MATERIALS AND FOOTINGS.

It is recommended that the footings of the proposed alterations and additions are to be supported on and socketed a minimum of 0.3m into the underlying bedrock, using piers as necessary. The design allowable bearing pressures are 850 kPa for spread footings or shallow piers. All footings are to be founded on material of similar consistency to minimise potential for differential settlement.

Note: The local geology is comprised of highly variable interbedded clays, shales and sandstones, with abundant detached joint blocks and sandstone floaters at surface and in the upper profile. Conditions may alter significantly across short distances. This variability should be anticipated and accounted for in the design and construction of any new foundations.

10.5. STORM WATER DRAINAGE.

All storm water runoff from the development is to be connected to the existing storm water system to Pittwater for the block through any tanks or onsite detention systems that may be required by the regulating authorities. This drainage work is to comply with the relevant Australian standards (AS/NZS 3500 Plumbing and Drainage).

10.6. SUBSURFACE DRAINAGE.

Any retaining walls are to be back filled with non-cohesive free draining material to provide a drainage layer immediately behind the wall. The free draining material is to be separated from the ground materials by geotextile fabric.

10. RISK MANAGEMENT. (Continued)

10.7. INSPECTIONS.

10.7.1 It is essential that the foundation materials of all footing excavations be inspected and approved before concrete is placed. This includes retaining wall footings. Failure to advise the geotechnical engineer for these inspections could delay or stop the issuance of relevant certificates.

11. GEOTECHNICAL CONDITIONS FOR ISSUE OF CONSTRUCTION CERTIFICATE.

It is recommended that the following geotechnical conditions be applied to the Development Approval:-

The work is to be carried out in accordance with the Risk Management Report PX 00040A dated 24th October, 2021.

The Geotechnical Engineer is to inspect and approve the foundation materials of any footing excavations before concrete is placed.

12. GEOTECHNICAL CONDITIONS FOR ISSUE OF OCCUPATION CERTIFICATE.

The Geotechnical Engineer is to certify the following geotechnical aspects of the development:-

The work was carried out in accordance with the Risk Management Report PX 00040A dated 24th October, 2021.

The Geotechnical Engineer inspected and approved the foundation material of all footing excavations.

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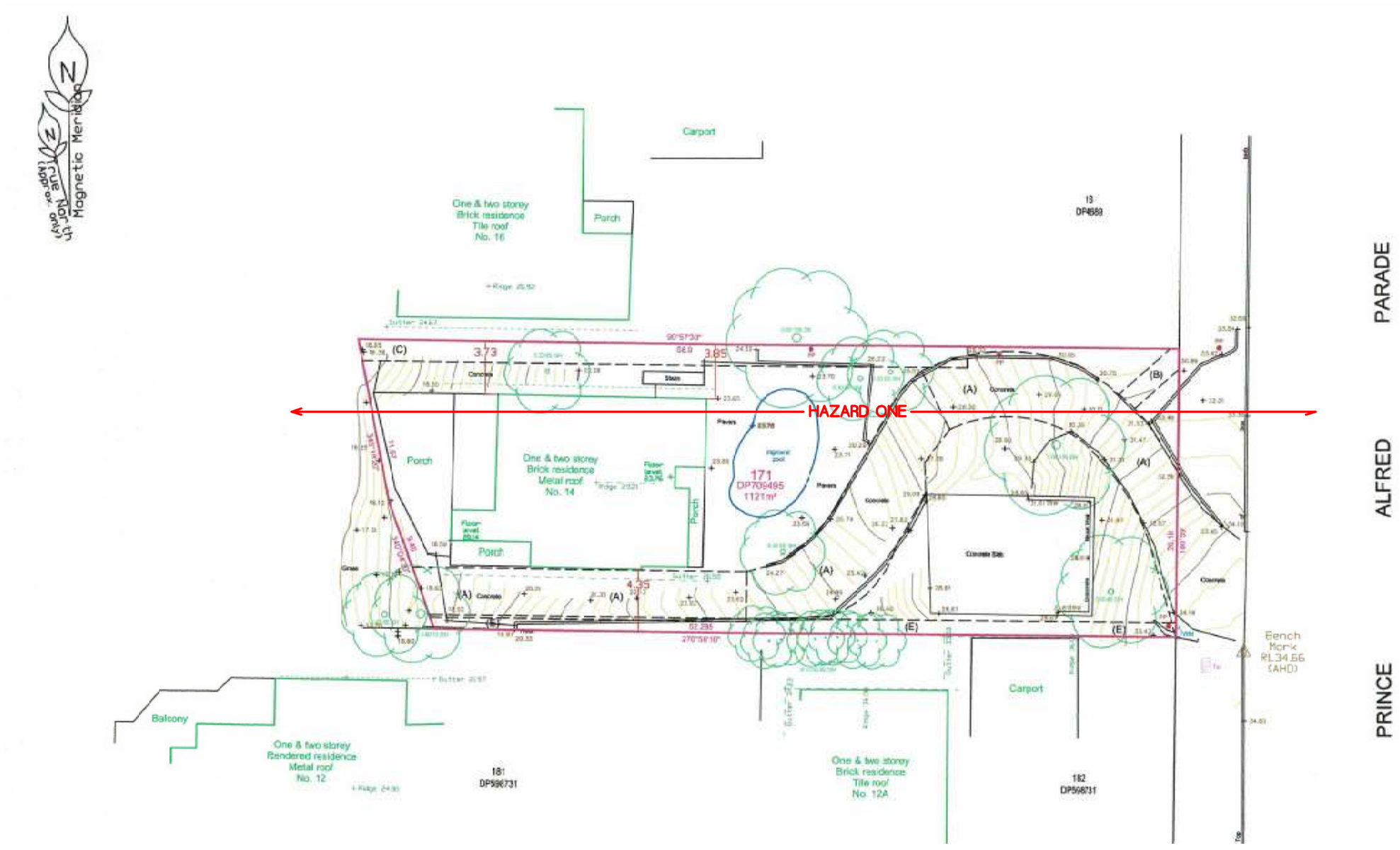
13. RISK ANALYSIS SUMMARY.

HAZARDS	Hazard One
TYPE	The slope that extends across the property and above failing.
LIKELIHOOD	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	Minor (5%)
RISK TO PROPERTY	'Low'(5×10^{-6})
RISK TO LIFE	1.66×10^{-6}/annum
COMMENTS	'**Acceptable**' level of risk as long as the works required in Section 9 have been addressed

HODGSON CONSULTING ENGINEERS PTY. LTD.

Garth Hodgson MIE Aust
Member No. 2211514
Civil/Geotechnical & Structural
Engineer



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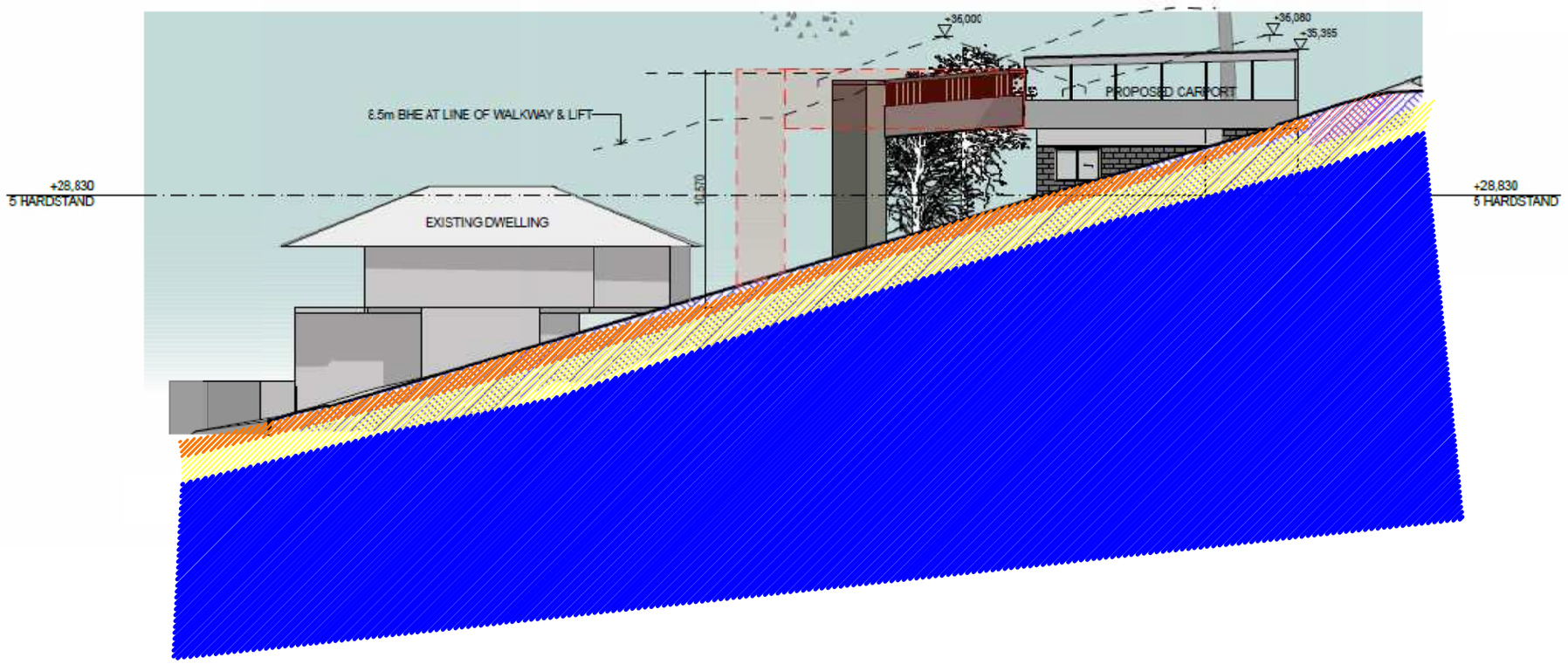
SITE PLAN - HAZARD

Job No	Address
PX 00040	14 PRINCE ALFRED PARADE
Scale	NEWPORT
NTS	NSW



NOTE
INTERPRETED SUB SURFACE SECTION ONLY.
ACTUAL GROUND CONDITIONS MAY VARY.

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TYPE SECTION

Job No	Address
PX 00040	14 PRINCE ALFRED PARADE
Scale	NEWPORT
NTS	NSW

STRATA PROFILE LEGEND

- Fill
- Sandy Topsoil
- Sandy Loam
- Narrabeen Group Rocks
- Hawkesbury Sandstone

7 RISK ESTIMATION

7.1 QUANTITATIVE RISK ESTIMATION

Quantitative risk estimation involves integration of the frequency analysis and the consequences.
For property, the risk can be calculated from:
$\mathbf{R}_{(Prop)} = \mathbf{P}_{(H)} \times \mathbf{P}_{(S:H)} \times \mathbf{P}_{(T:S)} \times \mathbf{V}_{(Prop:S)} \times \mathbf{E}$ **(1)**

Where
$\mathbf{R}_{(Prop)}$ is the risk (annual loss of property value).

$\mathbf{P}_{(H)}$ is the annual probability of the landslide.

$\mathbf{P}_{(S:H)}$ is the probability of spatial impact by the landslide on the property, taking into account the travel distance and travel direction.

$\mathbf{P}_{(T:S)}$ is the temporal spatial probability. For houses and other buildings $\mathbf{P}_{(T:S)}$= 1.0. For Vehicles and other moving elements at risk$1.0 < \mathbf{P}_{(T:S)} > 0$.

$\mathbf{V}_{(Prop:S)}$ is the vulnerability of the property to the spatial impact (proportion of property value lost).

E is the element at risk (e.g. the value or net present value of the property).
For loss of life, the individual risk can be calculated from:

$\mathbf{R}_{(LoL)} = \mathbf{P}_{(H)} \times \mathbf{P}_{(S:H)} \times \mathbf{P}_{(T:S)} \times \mathbf{V}_{(D:T)}$ **(2)**
Where

$\mathbf{R}_{(LoL)}$ is the risk (annual probability of loss of life (death) of an individual).

$\mathbf{P}_{(H)}$ is the annual probability of the landslide.

$\mathbf{P}_{(S:H)}$ is the probability of spatial impact of the landslide impacting a building (location) taking into account the travel distance and travel direction given the event.

$\mathbf{P}_{(T:S)}$ is the temporal spatial probability (e.g. of the building or location being occupied by the individual) given the spatial impact and allowing for the possibility of evacuation given there is warning of the landslide occurrence.

$\mathbf{V}_{(D:T)}$ is the vulnerability of the individual (probability of loss of life of the individual given the impact).
A full risk analysis involves consideration of all landslide hazards for the site (e.g. large, deep seated landsliding, smaller slides, boulder falls, debris flows) and all the elements at risk.

For comparison with tolerable risk criteria, the individual risk from all the landslide hazards affecting the person most at risk, or the property, should be summed.

The assessment must clearly state whether it pertains to ‘as existing’ conditions or following implementation of recommended risk mitigation measures, thereby giving the ‘residual risk’.