DOYLE SOIL CONSULTING

# SITE AND SOIL EVALUATION REPORT

# LANDSLIDE ASSESSMENT REPORT

**1886 Bruny Island Main Rd,**

**Great Bay**

**June 2026**

Doyle Soil Consulting: 6/76 Auburn Rd Kingston Beach 7050 – 0488 080 455 – robyn@doylesoilconsulting.com.au

## Founding Statement

Dr Richard Doyle is a highly qualified geologist, geomorphologist and soil scientist with over 40 years work experience in earth sciences. He has a B.Sc. (Hons) in geology and physical geography (Victoria University of Wellington, NZ), an M.Sc. in geology awarded with distinction specialising in geomorphology, erosion and soil development (Victoria University of Wellington, NZ) and a PhD in soil science from UTAS. Dr Doyle is a Certified Professional Soil Scientist (CPSS) of the Australian Society of Soil Science of which he is former state and national president. Richard was a Program Leader with the Soil CRC an Australian Government-supported national cooperative soil research centre (2017 – 2025). Dr Doyle has researched and taught soil and earth science at the Tertiary level for over 30 years and co-supervised >30 honours/master students, and 25 research higher degree completions (PhDs and Masters). He has authored numerous landslides risk, coastal erosion, inundation and other earth-based risk assessments for Tasmanian councils and has over 100 scientific publications in journals, books and conference proceedings. He has been an expert witness in numerous court cases, tribunals and mediation hearings.

## BACKGROUND

There is a proposed change of use at 1886 Bruny Island Main Rd, Great Bay (henceforth referred to as The Property) from residential to visitor accommodation. Doyle Soil Consulting has been engaged by Michael Aird to assess The Property for compliance with E3.6.2 (Vulnerable use) of the Tasmanian Interim Planning Scheme 2015 – Kingborough. There are no additional proposed developments at The Property.

# Site Information

**Client:** Michael Arid

**Address:** 1886 Bruny Island Main Rd, Great Bay (CT 102410/7)

**Site Area:** Approximately 475 $m^2$

**Date of inspection:** 6/5/2026

**Building type:** Existing house – change of use

**Planning Overlays:** Landslide hazard (low); Bushfire prone areas; Coastal erosion hazard (high); Waterway and coastal protection area; Biodiversity protection area

**Mapped Geology:** MRT 1:50k Kingborough sheet: Ts = Tertiary sediments (gravel, sand, silt and clay) and nearby Jdl = Jurassic dolerite and Qb = Quaternary beach and tidal flat deposits

**Soil Depth:** Approximately 2.3 m

**Subsoil Drainage:** Imperfectly drained

**Vegetation:** native bush

**Rainfall in previous 7 days:** Approximately 1 mm

# Introduction

A very small 13$m^2$ section of The Property falls within a Landslide Hazard Area overlay (Class: LOW) – see Figure 1. According to Mineral Resources Tasmania (MRT), these particular modelled areas have "*no known active landslides, however it has been identified as being susceptible to landslide".* In this case, the areas in question have been so classified on the basis of being *"Remaining areas slopes 11-20 deg", meaning the landslide hazard is based on slope average slope of a 10 x 10 m pixel.*

This report addresses the surrounding landform, soil materials and local geomorphology to assess the potential for landslip to occur. The risks (likelihood x consequence) associated with the potential landslide hazard are examined and risk mitigation measures are recommended to help enable a tolerable risk to be achieved and maintained.


*Figure 1: The Landslide Hazard Areas – Low - overlay (yellow) covers approximately 13m² of the site at 1886 Bruny Island Main Rd, Great Bay.*

## Site Conditions

**Landform and Topography**

The site is at the foot of a moderate, waning, slope with a northerly aspect. Maximum (mid-slope) gradients are approximately 15° and 100 m upslope of The Property. The average slope angle on site is approximately 5°. Downslope of the Property are tidal flats/beach. The transition from aggraded colluvial slope deposits to beach is marked by a steep back-shore scarp, approximately 2-3 m high. Clinometer readings on site were up to approximately 10° at the Landslide hazard area and up to approximately 7° within the usable alfresco area (Figure 2)

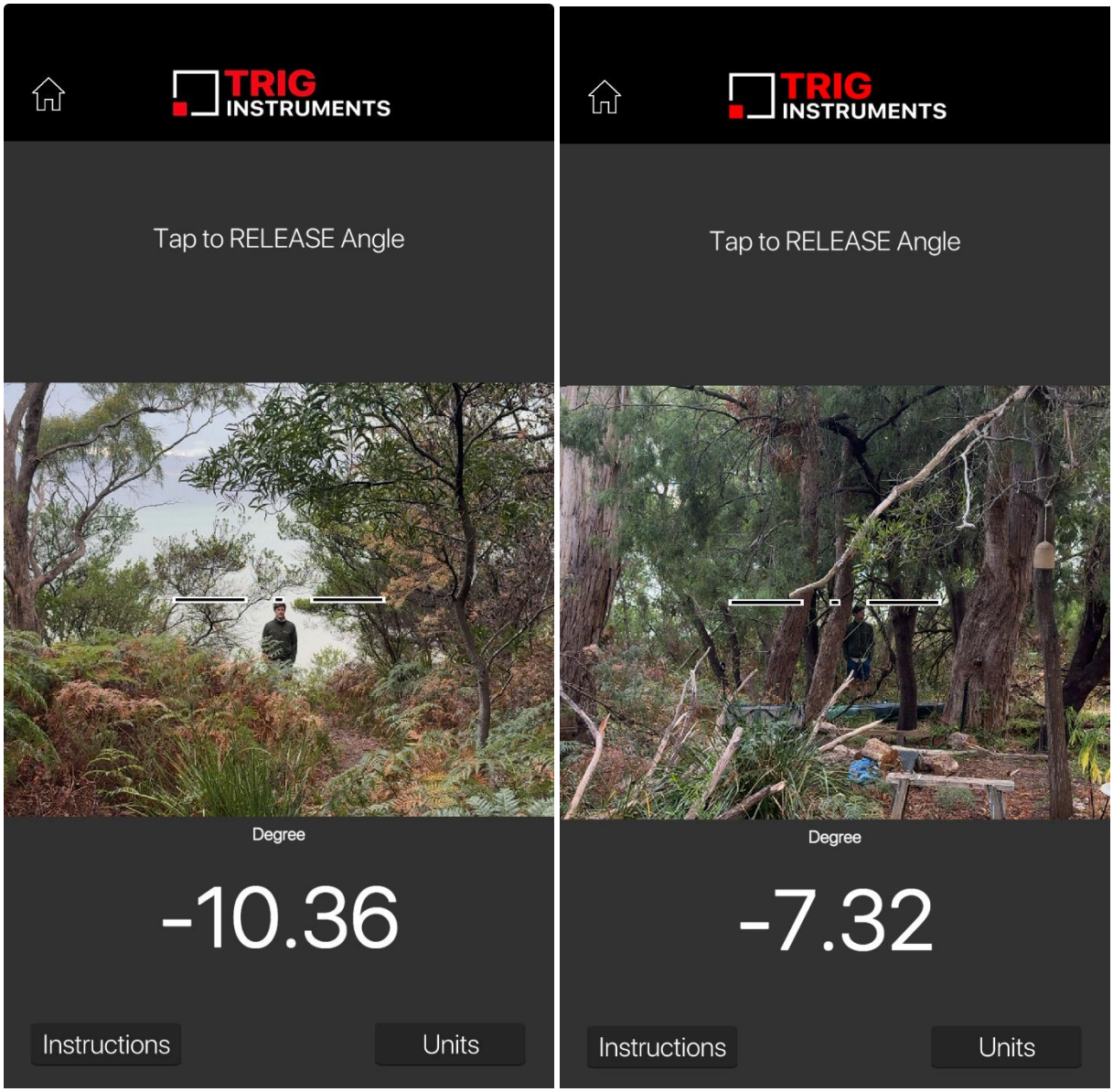



*Figure 2: Clinometer readings from The Property. Left is taken approximately within the mapped Landslide Hazard Area on site. Right is on the edge of the usable "alfresco" area on site.*

**Soils and Geology**

The natural soil profiles comprise windblown sands overlying clayey colluvium derived from Jurassic dolerite. A cemented sand 'hard-pan' is present at the transition from sands to clays. The clays are highly reactive, poorly structured, and moderately dispersive. The dolerite bedrock (mapped, Figure 3) is at approximately 2.4 m depth on the site and is visible in a highly weathered state at the shoreline below (Site Photos – Appendix 5).

**Drainage**

The site is low in the landscape and naturally subject to run-on (surface and subsurface) from upslope areas. The main road, above the site, and associated drain are expected to direct most surface run-on away from The Property (Appendix 4). Subsurface run-on (mass flow) may cause the local subsoils to be poorly drained. The hard pan layer at approximately 1.0 depth is indicative of seasonally perched water table.

**Vegetation**

Well-established dense scrub covers most of the site, stabilising the soil and regolith.

**Existing Earthworks**

The existing building is slightly (<0.5 m) cut in to the gentle slope.

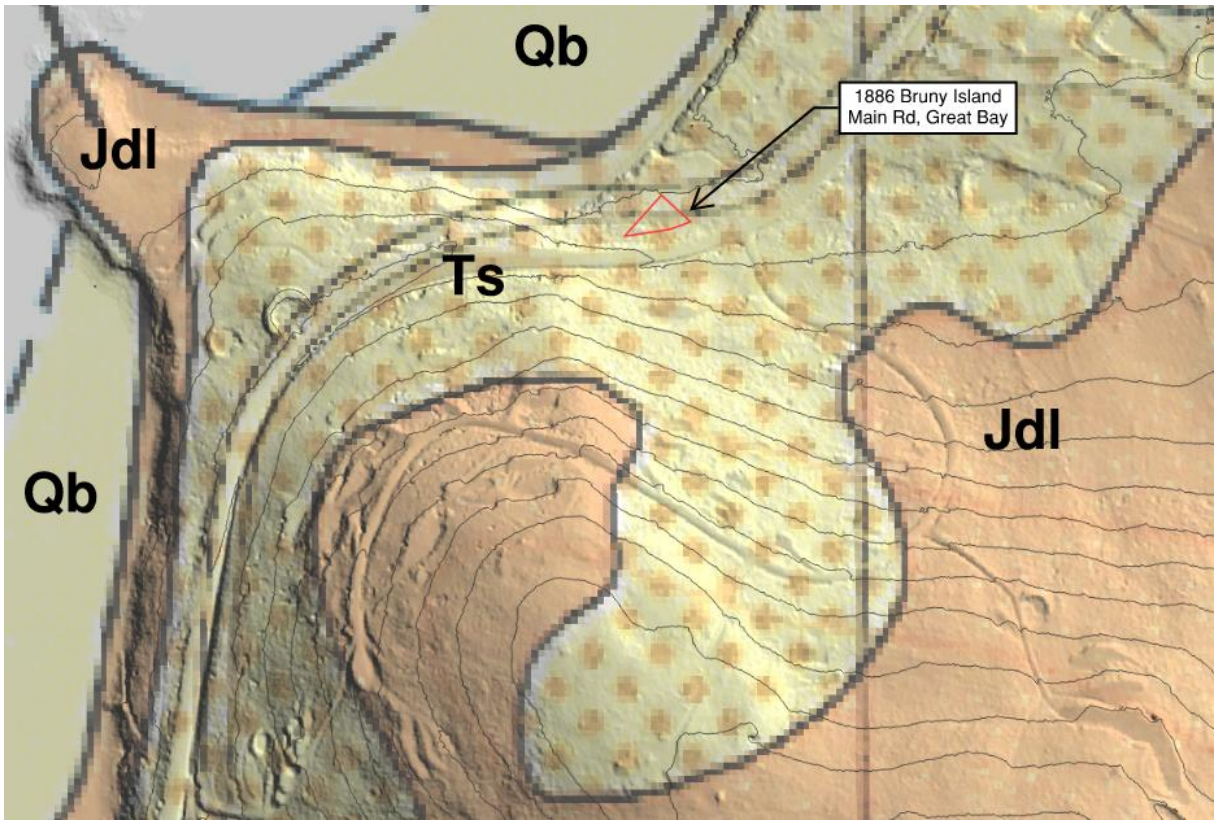



*Figure 3: MRT 1:50k Kingborough Sheet projected over a hill-shade map of the environs around The Property.5m contours. Jdl = Jurassic dolerite, Ts = Tertiary sediments (of gravel, sand, silt and clay), Qb = Quaternary beach and tidal flat deposits. Map created in QGIS by Doyle Soil Consulting*

## Geotechnical Assessment of Slope Stability

The existing building at 1886 Bruny Island Main Rd, Great Bay has a Landslide Hazard Area (Low) overlay. The overlay is produced by:

- Recording observations of land instability in− and surrounding the− study area (the landslide database).
- Analysis of the processes that control each landslide type.
- Computer-assisted modelling that simulates each of the landslide processes to predict areas that could be affected by future landslides.

Part of the Property falls under the Kingborough Interim Planning Scheme 2015, Code E3.0 Landslide Code. According to section E3.2.1, this code applies to:

a) Development for buildings and works or subdivision on land within a Landslide Hazard Area.
b) Use of land for vulnerable use or hazardous use within a Landslide Hazard Area.

The site is assessed according to E3.6.2 (Vulnerable use) of the scheme due to the proposed change in use from residential to visitor accommodation.

## Potential for Mass Movement of Soil Materials at the Site

The site appears stable regarding land sliding with no evidence of active instability; therefore, the geotechnical risk associated with instability in the natural soil and geological materials confirms the LOW ranking for this hazard. The proposed change of use will not affect this ranking so long as the site is not modified – i.e., landscaped, vegetation removed, etc.

## Measures to Mitigate Against Instability

The existing trees and other vegetation should be retained where possible as vegetation helps stabilise soils and associated slopes. The slopes on site are gentle to moderate (<10 degrees).

# To comply with:

## Kingborough Interim Planning Scheme 2015 E3.6.2 Vulnerable Use

**Objective:**

To ensure that:

a) vulnerable use, other than visitor accommodation, is only located on land in a Landslide Hazard Area in exceptional circumstances;

b) if a vulnerable use is located in a Landslide Hazard Area, landslide hazard management measures reflect the risk arising from the landslide hazard and the characteristics, nature and scale of the use taking into consideration the specific circumstances of users of the site.

| **Acceptable Solution A1** | **Comments** |
|---|---|
| Vulnerable use is for visitor accommodation | Complies |
| **Performance Solution P1** | **Comments** |
| Vulnerable use is of an overriding benefit to the community, in terms of significant long term social or economic community benefits. | N/A |

| **Acceptable Solution A2** | **Comments** |
|---|---|
| No acceptable solution. | |
| **Performance Solution P2** | **Comments** |
| Vulnerable use must satisfy all of the following:<br><br>(a) No part of the vulnerable use is in a High Landslide Hazard Area;<br><br>(b) Landslide risk to occupants, staff, visitors and emergency personnel associated with the vulnerable use is either:<br>(i) acceptable risk; or<br>(ii) capable of feasible and effective treatment through hazard management measures, so as to be tolerable risk.<br><br>(c) Landslide risk to occupants, staff and visitors takes into consideration their specific circumstances including their ability to:<br>(i) protect themselves and defend | <br><br>Complies<br><br>Complies – Landslide risk at the site considered low/acceptable.<br><br>Complies<br>- likelihood of landslide occurring on the property and likelihood that the property be affected by landslide |

| | |
|---|---|
| property from landslide;<br>(ii) evacuate in an emergency;<br>(iii) understand and respond to instructions in the event of a landslide; whilst minimising risk to emergency personnel. | originating off-site considered UNLIKELY<br>- evacuation possible via the road to the SE or the beach to the NW. |

## Landslide Risk Analysis

A qualitative assessment of landslide risk has been undertaken for the site in accordance with the principles outlined in the Australian Geomechanics Society Landslide Risk Management Guidelines 2007. The assessment considers both the likelihood of landslide occurrence and the potential consequences to life, property, and infrastructure. The adopted qualitative risk matrix is provided in Appendix 1.

Based on the observed site conditions, the likelihood of any form of slope movement (e.g. soil creep, debris flow, slumping, landslide, or rockfall) occurring at the site is assessed as **Unlikely** under current site conditions.

If a landslide (i.e. earth/debris slide, spread of flow) were to occur upslope (and off-site), e.g. at the steeper slopes, around Blyth Parade, this would likely be minor in scale and the travel-distance confined, owing to the moderate slope angle and probable moderate depth of unconsolidated materials. As such, the likelihood of the site being affected landslides originating off-site is assessed as **Unlikely**.

The consequences to life, property, and services associated with the anticipated forms of slope movement are considered **Very Low**.

On this basis, the overall qualitative landslide risk for the site is assessed as **Low / Tolerable** and there are no further site recommendations, other than to retain the native vegetation where possible.

While the recommendations presented in this report are intended to reduce landslide risk to a tolerable level, it is acknowledged that some residual risk associated with slope movement will remain due to the natural variability of soils, geological conditions, and climatic influences.

**Rowan Mason**
B.Agr.Sc.(Hons).
**Soil Scientist**


**Dr Richard Doyle**
B.Sc.(Hons), M.Sc.(Geol), Ph.D. (Soil Sci.), CPSS (Certified Prof Soil Scientist)
**Geologist and Soil Scientist**

# Appendix 1 – Risk tables

Extracted from *Australian Geomechanics Journal Volume 42 No.1 March 2007 - Australian GeoGuide LR7 (Landslide Risk)*.

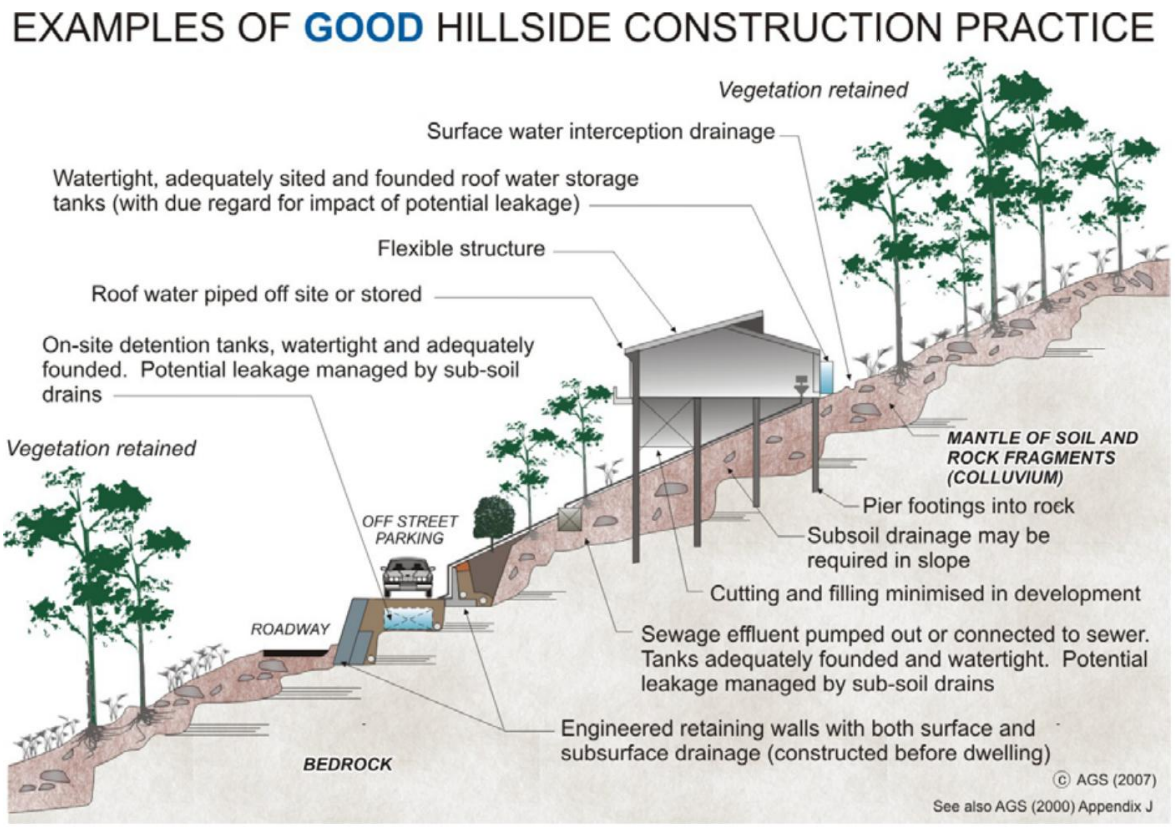
| TABLE 1: RISK TO PROPERTY | | |
|---|---|---|
| **Qualitative Risk** | | **Significance - Geotechnical engineering requirements** |
| Very high | VH | **Unacceptable** without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low. May be too expensive and not practical. Work likely to cost more than the value of the property. |
| High | H | **Unacceptable** without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to acceptable level. Work would cost a substantial sum in relation to the value of the property. |
| Moderate | M | **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 possible. |
| Low | L | **Usually acceptable** to regulators. Where treatment has been needed to reduce the risk to this level, ongoing maintenance is required. |
| Very Low | VL | **Acceptable**. Manage by normal slope maintenance procedures. |

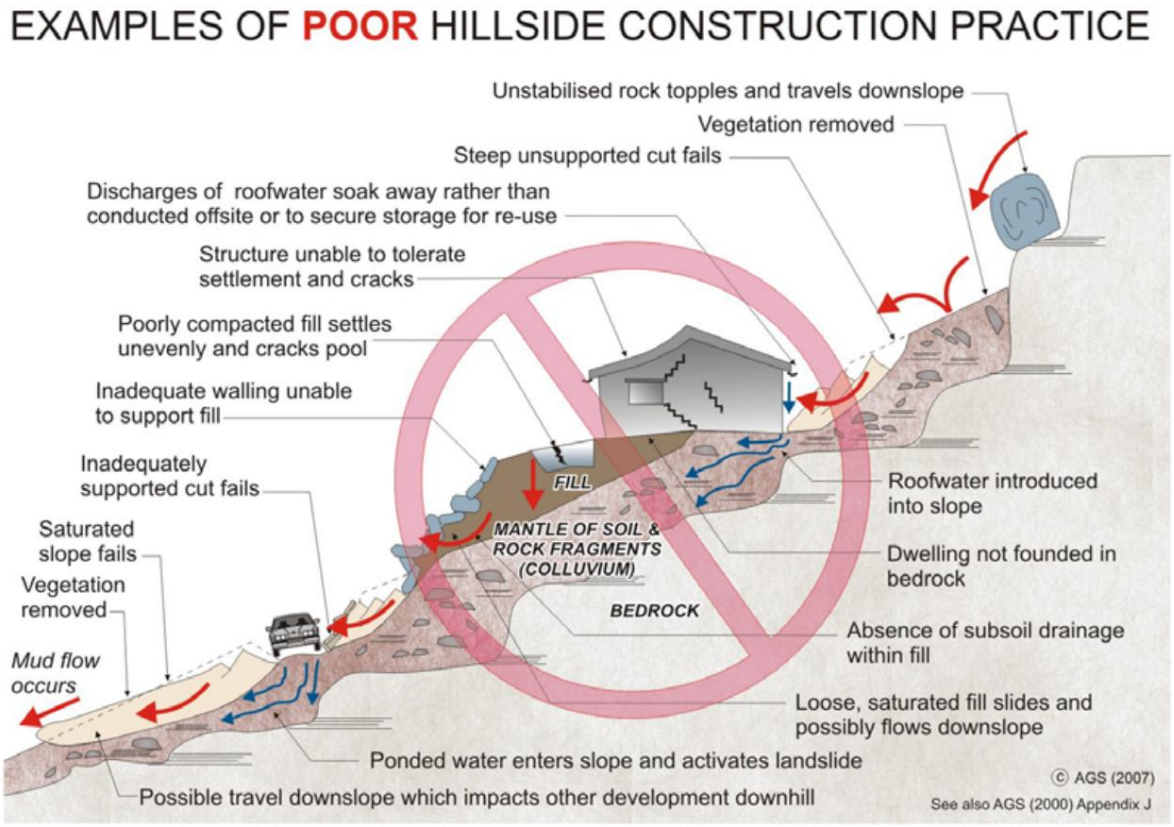
| TABLE 2: LIKELIHOOD | |
|---|---|
| Likelihood | Annual Probability |
| Almost Certain | 1:10 |
| Likely | 1:100 |
| Possible | 1:1,000 |
| Unlikely | 1:10,000 |
| Rare | 1:100,000 |
| Barely Credible | 1:1,000,000 |

| TABLE 3: RISK TO LIFE | |
|---|---|
| **Risk** (deaths per participant per year) | **Activity/Event Leading to Death** (NSW data unless noted) |
| 1:1,000 | Deep sea fishing (UK) |
| 1:1,000 to 1:10,000 | Motor cycling, horse riding, ultra-light flying (Canada) |
| 1:23,000 | Motor vehicle use |
| 1:30,000 | Fall |
| 1:70,000 | Drowning |
| 1:180,000 | Fire/burn |
| 1:660,000 | Choking on food |
| 1:1,000,000 | Scheduled airlines (Canada) |
| 1:2,300,000 | Train travel |
| 1:32,000,000 | Lightning strike |

# Appendix 2 – Guidelines for hillside construction

Extracted from *Australian Geomechanics Journal Volume 42 No.1 March 2007 - Australian GeoGuide LR8 (Construction Practice)*.

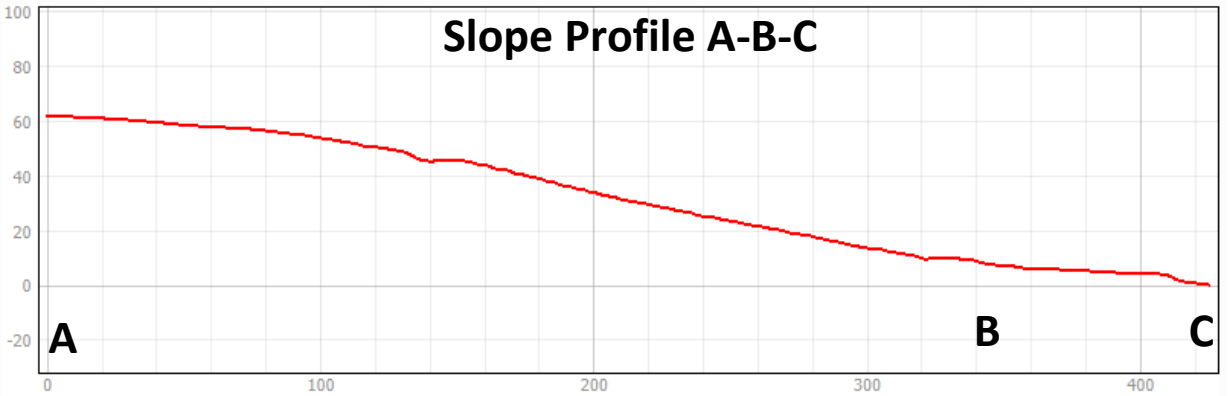


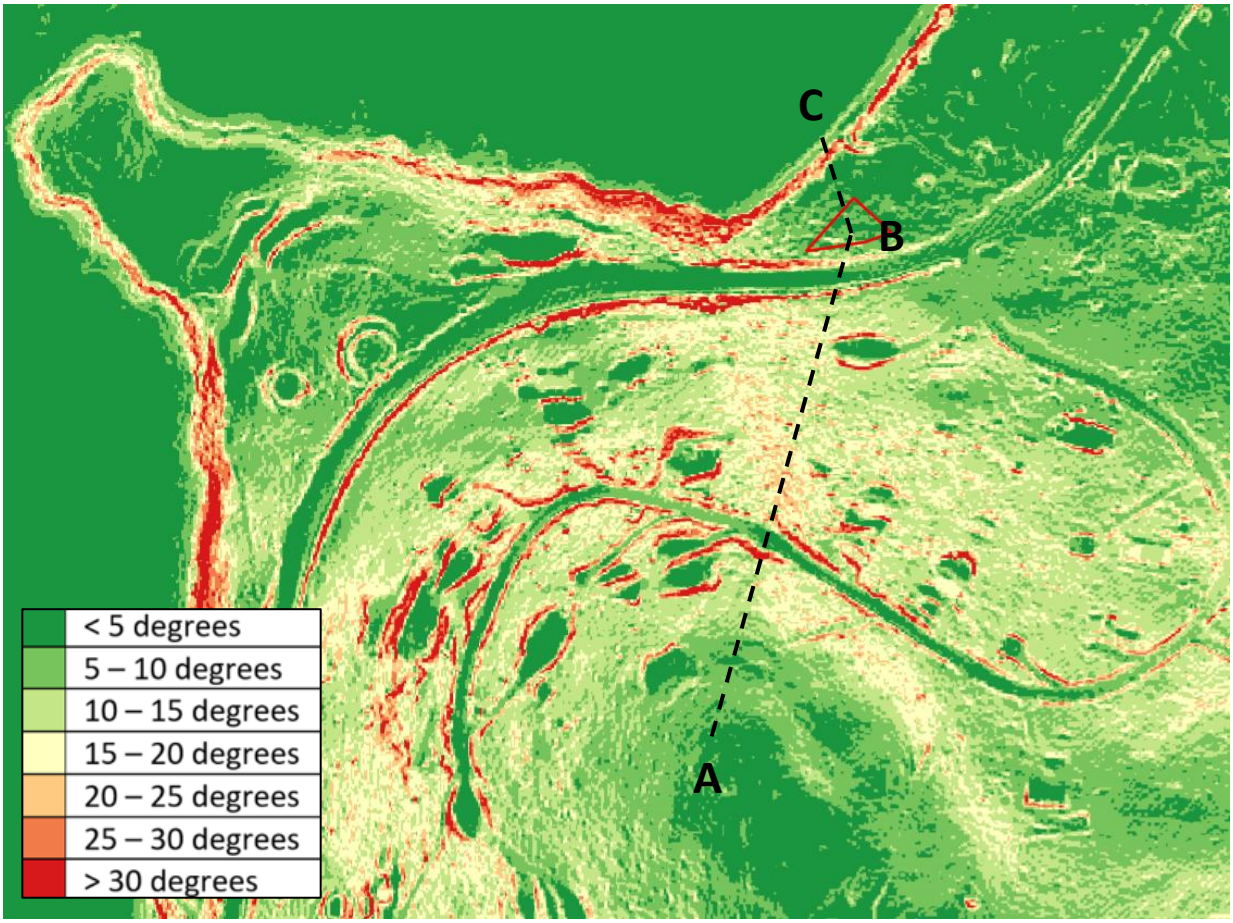



# Appendix 3 – Slope Map

Map created in QGIS by Doyle Soil Consulting using open-source 1 m Digital Elevation Model (DEM) data (source: elevation.fsdf.org.au) and cadastral parcel data from LISTmap.

The maximum slope is approximately 15 degrees and is about 100 m up slope of the property, which is located at point “B”.



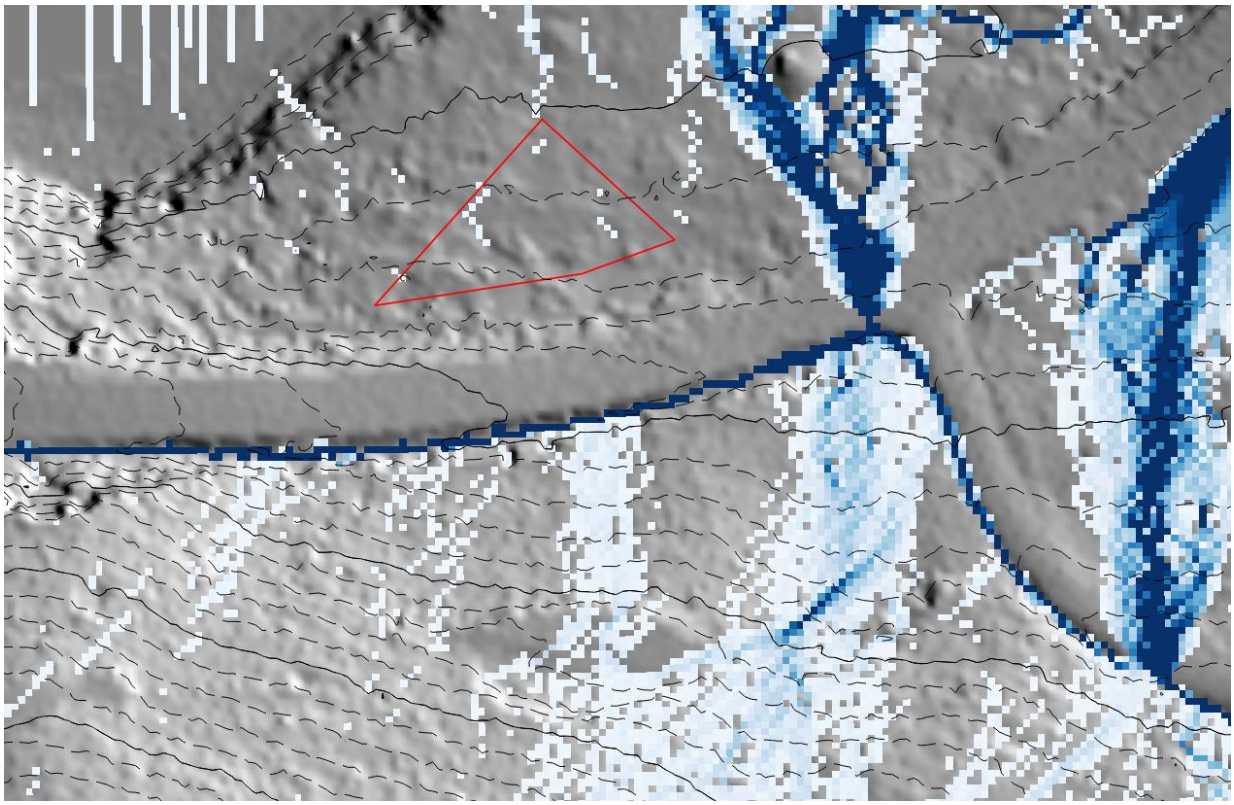



# Appendix 4 – Surface Flow Accumulation Model

Surface water flow accumulation model (qualitative) for the environs around The Property. Map Generated in QGIS by Doyle Soil Consulting using open-source 1 m Digital Elevation Model (DEM) data from 2013.

All modelled surface water flows are diverted away from The Property by upslope road drain. The model does not account for culverts, piping, etc, meaning the spillover at the road to the east of the property is unrealistic.

1 m contours.



# Appendix 5 – Site Photos

P1: Looking SW on the beach, downslope of The Property. Steep back-beach scrap where aggraded sediments have undergone coastal erosion.

P2: weathered Jurassic dolerite bedrock in the base of the beach scarp. Near to the headland and downslope of The Property. DCP2 refused on this material at 2.4 m.

P3: on The Property looking SW and the location of TH1 and DCP 1+2. The edge of the Landslide hazard overlay is approximately 10 m further into the scrub.

P4: looking west along Bruny Island Main Rd, immediately upslope of The Property. A displaced mass from slope failure occuring upslope would likely be held up by the road.

# Appendix 6 – Site Assessment and Sample Testing

A geotechnical site investigation in accordance with AS1726-2017, including:

- One test hole cores with no refusal at 1.8 m in TH1.
- Two Dynamic Cone Penetrometer (DCP) tests, with refusal at 1.1 m on cemented sand 'hard pan' and refusal at 2.4 m on dolerite bedrock.
- Test holes dug using a Christie Post Driver Soil Sampling Kit, comprising CHPD78 Christie Post Driver with Soil Sampling Tube (50 mm OD x 1600/2100 mm).
- Test hole and DCP locations shown in appendix 10.


# Appendix 8 – Soil Profile Descriptions

## Test Hole 1

| Depth (m) | Horizon | Description and field texture grade | USCS Class |
|---|---|---|---|
| 0 – 0.3 | $A1_1$ | Very dark grey (7.5YR 3/1), **Snad,** slightly moist, loose consistency, single grain, common roots | **SW** |
| 0.3 – 0.7 | $A1_2$ | Grey (7.5YR 6/1), **Sand,** single grain, draw loose consistency | **SP** |
| 0.7 – 1.0 | A2 | White (10YR 8/1), **Sand,** single grain, dry medium dense consistency | **SP** |
| 1.0 – 1.1 | A3 | Grey (7.5YR5/1), **Snad,** single grain, dry dense consistency | **SP** |
| 1.1 – 1.25 | $B2_{1hs}$ | Very dark brown (7.5YR 2.5/2) grading to dark brown (7.5YR 3/2), **Cemented Sand,** massive, dry hard consistency | **SC** |
| 1.25 – 1.8 | $B2_2$ | Greyish brown (10YR 5/2), **Sandy Light Clay,** weak coarse blocky structure, dry stiff consistency<br><br>**No Refusal** | **CH** |

# Appendix 9 – DCP Testing

DCP1 refused on the cemented sand hard pan at approximately 1.0 - 1.1 m depth

| DCP 1 | | | | |
|---|---|---|---|---|
| Depth (mm) | DCP n-number (Blows/100 mm) | DCP Penetration Index (mm/Blow) | Estimated Allowable Bearing Capacity (kPa = n x 30) | Likely Variance (+/-) |
| 0 - 100 | 0.5 | 200.0 | 15 | 5 |
| 100 - 200 | 0.5 | 200.0 | 15 | 5 |
| 200 - 300 | 1 | 100.0 | 30 | 10 |
| 300 - 400 | 1 | 100.0 | 30 | 10 |
| 400 - 500 | 1 | 100.0 | 30 | 10 |
| 500 - 600 | 1 | 100.0 | 30 | 10 |
| 600 - 700 | 1 | 100.0 | 30 | 10 |
| 700 - 800 | 2 | 50.0 | 60 | 20 |
| 800 - 900 | 4 | 25.0 | 120 | 40 |
| 900 - 1000 | 38 | 2.6 | 1140 | 380 |
| 1000 - 1100 | 50 | 2.0 | 1500 | 500 |

**DCP2 was completed from the base of TH1** and refused on probable dolerite bedrock at 2.4 m depth.

| DCP 2 | | | | |
|---|---|---|---|---|
| Depth (mm) | DCP n-number (Blows/100 mm) | DCP Penetration Index (mm/Blow) | Estimated Allowable Bearing Capacity (kPa = n x | Likely Variance (+/-) |
| 0 - 100 | Not assessed | Not assessed | Not assessed | Not assessed |
| 100 - 200 | Not assessed | Not assessed | Not assessed | Not assessed |
| 200 - 300 | Not assessed | Not assessed | Not assessed | Not assessed |
| 300 - 400 | Not assessed | Not assessed | Not assessed | Not assessed |
| 400 - 500 | Not assessed | Not assessed | Not assessed | Not assessed |
| 500 - 600 | Not assessed | Not assessed | Not assessed | Not assessed |
| 600 - 700 | Not assessed | Not assessed | Not assessed | Not assessed |
| 700 - 800 | Not assessed | Not assessed | Not assessed | Not assessed |
| 800 - 900 | Not assessed | Not assessed | Not assessed | Not assessed |
| 900 - 1000 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1000 - 1100 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1100 - 1200 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1200 - 1300 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1300 - 1400 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1400 - 1500 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1500 - 1600 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1600 - 1700 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1700 - 1800 | Not assessed | Not assessed | Not assessed | Not assessed |
| 1800 - 1900 | 5 | 20.0 | 150 | 50 |
| 1900 - 2000 | 5 | 20.0 | 150 | 50 |
| 2000 - 2100 | 6 | 16.7 | 180 | 60 |
| 2100 - 2200 | 9 | 11.1 | 270 | 90 |
| 2200 - 2300 | 20 | 5.0 | 600 | 200 |
| 2300 - 2400 | 30 | 3.3 | 900 | 300 |

# CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

**Section 321**

Form **55**

To: Michael Aird *Owner /Agent*

1886 Bruny Island Main Rd *Address*

Great Bay 7150 *Suburb/postcode*

## Qualified person details:

Qualified person: Richard Doyle

Address: 6/76 Auburn Rd

Kingston Beach 7050

Phone No: 0488 080 455

Fax No:

Licence No: N/A

Email address: robyn@doylesoilconsulting.com.au

Qualifications and Insurance details: Geologist and Soil Scientist
Certified Professional Soil Scientist (CPSS)
Professional Indemnity cover –

Probitas Syndicate 1492 at Lloyds
PIPOL11004782

*(description from Column 3 of the Director's Determination - Certificates by Qualified Persons for Assessable Items*

Speciality area of expertise: Geotechnical Assessment

*(description from Column 4 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)*

## Details of work:

Address: 117 Nebraska Road

Dennes Point 7150

Lot No: 7

Certificate of title No: 102410/7

The assessable item related to this certificate: Classification of soil according to AS2870-2011

Geotechnical site investigations AS1726-2017

*(description of the assessable item being certified)*
*Assessable item includes –*
- *a material;*
- *a design*
- *a form of construction*
- *a document*
- *testing of a component, building system or plumbing system*
- *an inspection, or assessment, performed*

## Certificate details:

Certificate type: Geotechnical Assessment

*(description from Column 1 of Schedule 1 of the Director's Determination - Certificates by Qualified Persons for Assessable Items n)*

This certificate is in relation to the above assessable item, at any stage, as part of - *(tick one)*

building work, plumbing work or plumbing installation or demolition work: X

or

a building, temporary structure or plumbing installation: ☐

In issuing this certificate the following matters are relevant –

| | |
|---|---|
| Documents: | The attached Geotechnical Assessment Report for the address detailed above in, 'Details of Work'. |
| Relevant calculations: | Refer to above report. |
| References: | AS2870-2011 Residential slabs and footings<br>AS1726-2017 Geotechnical site investigations<br>CSIRO Building Technology File -18 |

*Substance of Certificate: (what it is that is being certified)*

Geotechnical Assessment -Slope stability

*Scope and/or Limitations*

The classification applies to the site as inspected and does not account for future alteration to foundation conditions as a result of earthworks, drainage condition changes or variations in site maintenance.

**I certify the matters described in this certificate.**

| | *Signed:* | *Certificate No:* | *Date:* |
|---|---|---|---|
| Qualified person: |  | 2015 | 9/6/2026 |