EPC 101

NORTHERN BEACHES
COUNCIL

Application for Building Certificate

Environmental Planning & Assessment Act, 1979 (as amended)
Section 149A, B, C, D
Effective from 1/7/16 till 30/6/17

Office Use – BC No: BC0030/17

Please Note: Details provided on this form and documents provided will be made public both at Councils Office and via Application Tracking on Councils website. The information will be kept by Council and will be disposed of in accordance with the Local Government Disposal Authority. You are entitled to review your personal information at any time by contacting Council.

Property Description

Number: 167A Street: McCarrs Creek Rd

Suburb: Church Point

Lot: 15 DP: 243387

Applicant

Applicants Name: Sharon Attwater

Postal Address: 15B Gilwinga Drive

Suburb: Bayview Postcode: 2104

Phone (02) 9940 0411 Daytime Contact No ( )

Mobile ( ) Fax ( )

Email: sharon.attwater@amal.com.au

You can apply for a building Certificate if you are:
(Please tick the appropriate box)

- ☑ I am the owner of the building
- ☐ I have the owners consent to lodge this application (see below)
- ☐ I am the purchaser under a contract for the sale of the property
- ☐ I am the owner's or purchasers solicitor or agent
- ☐ We are a public authority which has notified the owner of its intention to apply for the certificate

Signature: SAttwater Date: 27.03.17

For access to the building please contact: David Attwater

Phone: 9940 0411 Mobile:

Owners Consent

Owner/s Name/s: Sharon Attwater

Postal Address: 15B Gilwinga Drive

Suburb: Bayview Postcode: 2104

Phone (02) 9940 0411 Mobile ( )

Email: sharon.attwater@amal.com.au

I/We consent to the lodgement of this application and permit Council authorised personnel to enter the site for the purpose of inspections:

Signature: SAttwater

Certificate Type

☐ Whole Property

☐ Whole Building i.e:

☐ Part Building i.e

☐ Pool , Fencing & Access

☑ Unauthorised works retaining walls

Processing Fees

Fee Description	Detail	Code	Fee
Class 1 & 10 (& class 2 buildings with only 2 dwellings)	$250	FHEA	✓
Class 2-9 buildings - floor area less than 200m²	$250	FHEA	
Class 2-9 buildings - floor area > 200m² to 2000 m²	$250 + $0.50 per m² > 200 m²	FHEA	
Class 2-9 buildings - floor area > 2000m²	$1165 + $0.75 per m² > 2000 m²	FHEA	
For unauthorised works, one of the above certificate fees will apply in addition to the following:			
Development Application, Construction Certificate and Notification fees OR CDC fees apply based on the cost of works	$860	FHEA	✓
Notification (required for unapproved works)	$280	TADV	✓

Accompanying Information to be submitted with Application

Checklist	Documents Required	Office Use
✓	A detailed survey prepared by a Registered Surveyor clearly showing the location of the structures and/or works on the site. The date of the survey is irrelevant in so far as the information contained therein is still current.	
✓	Where the property is identified on either Councils Geotechnical Risk Management Map 2003 **and/or** Costal Hazard map 97-003 as being Bluff Management Areas A geotechnical Engineers report prepared in accordance with Councils Interim Geotechnical Risk management policy is to be provided, together with completed form 4 pursuant to that policy	
When this application relates to **unapproved structures or works** the following information is required:		
✓	A detailed survey prepared by a Registered Surveyor clearly showing the site & location of the structures on the property and any nearby structures on adjacent properties together with floor levels, finish surface levels and the like.	✓
✓	1 set of Works as constructed plans. These plans should be prepared by a suitably qualified professional e.g. Architect/Draftsman and clearly annotate the unapproved structures and/or works as to their compliance with the relevant Council Development controls.	✓
✓	12 x A4 reduced copies of works as constructed plans for neighbour notification.	✓
✓	Certification as to the structural adequacy of the structures and/or works as built. • all built structures will require certification as to their structural integrity by a qualified Structural Engineer, • all earthworks and foundations will require certification by a qualified & experienced Engineer as to their adequacy.	✓
✓	Where the property is identified on either Councils Geotechnical Risk Management Map 2003 **and/or** Costal Hazard map 97-003 as being Bluff Management Areas A geotechnical Engineers report prepared in accordance with Councils Interim Geotechnical Risk management policy is to be provided, together with completed form 4 pursuant to that policy	✓
✓	Certificate by an appropriately qualified person that the structures and/or works comply with the Building Code of Australia and appropriate Australian Standards.	✓
	Council may require additional information to enable appropriate assessment and determination of the Building Certificate.	

Office Use

Receipt No: 409270 Date: 5.4.2017.

Privacy and Personal Information Protection Notice
This information is provided under the Environmental Planning & Assessment Act 1979 voluntarily by the applicant and is collected for the assessment of the application. Failure to provide this information will prevent Council processing your application and may lead to your application being rejected. This information is intended only for Officers of Northern Beaches Council and will be stored in accordance with Northern Beaches Council's compliant Records Management System (ECM) and the State Records Act 1998 (NSW). This information may be accessed by Council Officers or by requests under the Government Information (Public Access) Act 2009 (NSW). You have a right to access your personal information under the Privacy and Personal Information Protection Act 1998 (NSW) by application to Northern Beaches Council and to have that information updated or corrected.

Jack Hodgson Consultants Pty Limited
CONSULTING CIVIL, GEOTECHNICAL AND STRUCTURAL ENGINEERS
ABN: 94 053 405 011

The General Manager
Northern Beaches Council
Pittwater Area
PO Box 882
MONA VALE NSW 2103

167A McCARRS CREEK ROAD CHURCH POINT
(ALSO KNOWN AS 15B GILWINGA DRIVE BAYVIEW)
Response to Council Order No:- NOT0330/16

On the 25th October, 2016 and 8th March, 2017 we have inspected the subject address in regards to the as built but incomplete rock stacked retaining walls below the existing residence located from Gilwinga Drive. Council has asked for certification as to the structural adequacy of those works is to be provided.

We have received the following declaration describing how the retaining walls were constructed:-

- Each sandstone wall has been built upon solid rock.
- In many cases the rock underneath the walls makes up a large portion of the walls and extends back uphill over a metre.
- The top of each wall is approximately 300mm to 400mm wide.
- Each wall slopes backwards uphill at an angle of approximately 15^0 to 20^0.
- The width at the base of any wall that has been constructed is at least half the height of each wall or wider.
- Behind each wall there is a void approximately 300mm to 400mm to allow for drainage.
- This drainage tapers up to approximately half the height of the walls.
- This drainage is filled with slotted drainage pipe encased in 10mm aggregate and wrapped in geotextile matting.
- The walls have many drainage outlets built into the bases of the walls with large terracotta pipe.
- The maximum height of the rock stacked retaining walls is 1.5-1.6 metres.

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In our opinion the as built rock stacked retaining walls are structurally adequate based on the information provide to us above and applying the likely loads to be placed on the rock stacked retaining walls assesed from our experience and AS4678. The walls are well built and in accordance with best building practices for this type of wall. Rock stacked retaining walls are not specifically covered by the National Construction Code.

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Dwyer Architects Heritage Consultants
J Dwyer NSW 7567 Nominated Architect
104 Mount Pleasant Avenue Normanhurst NSW 2076
M. 0407 22 00 96 E. dwyer.architects@icloud.com
ABN 61 141 772 714

CONTINUUM PLANNING PTY LTD

4th April 2017
Ref: 405-1.01-003

The General Manager
Northern Beaches Council
1 Park Street
Mona Vale NSW 2103

To Whom It May Concern:

Re: Building Certificate Application (Section 149A,B,C,D)
167A McCarrs Creek Road Church Point 2105 (15B Gillwinga Drive Bayview NSW 2104)

The owners of N° 167A Council have undertaken to construct several small retaining walls at the advised that the works undertaken by the 'owner' to form several retaining walls to the rear of the property are unauthorised.

Council has advised that a Building Certificate Application be lodged regarding the retaining walls. The building certificate submission has been prepared by Continuum Planning Pty (Dwyer Architects) on behalf of the owners.

Submission Checklist for Unapproved Works

1. Detailed Survey
2. Works constructed plans (as located on survey)
3. A4 Notification Plan x 12 prints.
4. Certification of structural adequacy of walls
5. Getotech Risk management report.
6. Certificate that works complies with BCA and relevant standards (N/A – no dwelling works) and is addressed by item 4. Structural adequacy of wall.

Council Inspection

The Inspection was undertaken by Council's Development Compliance Officer who observed the following:
The inspection revealed the following:

1. *Fill and excavation located at the rear of the property underneath the swimming pool area greater than 600mm;*
2. *Construction of retaining walls greater than 600mm;*
3. *extraction of rock material to use for the construction of retaining walls, stairs pathways;*

The above mentioned works are not considered to meet the criteria for exempt development standards set out within the State Environmental Planning Policy (Exempt & Complying Development Codes) 2008 for the following reasons:

- *not be a cut or fill of more than 600mm below or above ground level (existing), and*
- *if it is a retaining wall or structural support for excavation or fill, or a combination of both:*

(i) be not be more than 600mm high, measured vertically from the base of the development to its uppermost portion, and

(ii) be separated from any retaining wall or other structural support on the site by at least 2m, measured horizontally, and

(iii) have adequate drainage lines connected to the existing stormwater drainage system for the site…

Works and Compliance

The real property description is Lot 15 in DP 243387 (167A McCarrs Creek Road) and is commonly known as No 15B Gillwinga Drive Bayview. The subject site falls from the southern side of the site (Gillwinga Drive), to the lower levels that form McCarrs Creek frontage. It is surrounded by a pattern of large blocks with detached dwellings of varying storey height, age and design.

The site has a total area of 5130 m2 as indicated by survey prepared by Bee and Lethbridge Pty Ltd. The survey drawings are identified as Job 3072: Sheets 1-4, Scale 1:100 at B1. The works to be approved are located on survey drawing sheet 2.

The land is heavily treed and comprises undisturbed 'bushland', creeks and rock formations. The existing house is situated on a level plateau which drops down to a lower level approximately 7-9m.

The owners have sought to provide access so that the land is accessible from the rear to the front street boundary. This access is necessary to provide safe and secure movement and enable management of the property. Given the nature of the geology and loose materials the owners have remediated portions of the pathway and land to improve drainage and provide stable access.

The lower areas comprise a mix of large sandstone boulders, floaters or loose sandstone rock/debris, and soil that has washed down from the landscape above. Soil has built up on top the rock formations with then edge profile battered to the exposed rock face. The introduction of retaining works have sought to control the movement of soil at selected locations. The owners have not introduced additional fill material to this area of landscape.

Compliance

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

Part 3A Division 3 Subdivision 6

Subdivision 6 Earthworks and drainage

3A.29	**Earthworks, retaining walls and structural support**	3A.29
(1)	Excavation for the purposes of development under this Part must be carried out in accordance with subclauses (5) and (6) and must not exceed a maximum depth measured from ground level (existing) of: (a) if located not more than 1m from any boundary—1m, and (b) if located more than 1m, but not more than 1.5m, from any boundary—2m, and (c) if located more than 1.5m from any boundary—3m.	(1) excavation limited to clearing for agg line drainage.
(2)	Despite subclause (1), the excavation must not be more than 1m below ground level (existing) if the land is identified as Class 3 or 4 on an Acid Sulfate Soils Map or is within 40m of a waterbody (natural).	(2) Minimal excavation required. Clear for 'agg' line draining only.
(3)	Fill, for the purpose of erecting a dwelling house under this Part must: (a) not exceed 1m above ground level (existing), and (b) be contained in accordance with subclauses (5) and (6) by either: (i) a retaining wall or other form of structural support that does not extend more than 1.5m from any external wall of the dwelling house, or (ii) an unprotected sloping embankment or batter that does not extend from the dwelling house by more than 3m, in which case the toe of the embankment or batter must be more than 1m away from a side or rear boundary.	(3) not applicable.
(4)	The finished ground level of the fill must not be used for the purposes of measuring the height of any development erected under this Policy.	(4) not applicable.
(5)	Retaining walls and structural support. Support for earthworks that are more than 600mm above or below ground level (existing) and within 1m of any boundary, or more than 1m above or below ground level (existing) in any	(5) The construction of walls are structurally adequate Refer to Engineers Certification. Engineer certificate attached for walls

other location, must take the form of a retaining wall or other form of structural support that:

(a) has been certified by a professional engineer, and

(b) has adequate drainage lines connected to the existing storm water drainage system for the site, and

(c) does not result in any retaining wall or structural support with a total height measured vertically from the base of the retaining wall or structural support to its uppermost portion that is:

(i) more than 1m in height and within 1m from a side or rear boundary, or

(ii) more than 3m in height in any other location.

(a) walls certified by engineer

(b) drainage provided to rear of walls.

(c) Wall adjacent boundary at 1m. Variable height within site area.

(6) Structural support that must be:

(a) constructed in accordance with subclause (5), and

(b) designed so as not to redirect the flow of any surface water or ground water, or cause sediment to be transported, onto an adjoining property, and

(c) separated from any retaining wall or other structural support on the site by at least 2m, measured horizontally, and

(d) installed in accordance with any manufacturer's specification.

(6) walls constructed in accordance with cl(5).

(a) Drainage discharges to existing creek and fall line.

(b) Ground water controlled and does not affect adjacent property

(c) Retaining walls 1m>are separated by 2m (horizontal)

(d) Not applicable.

Note. Fill and excavation that is not associated with a building may be exempt development under clauses 2.29 and 2.30.

No fill associated with existing building.

No additional fill has been introduced to the site.

3A.30, 3A.31 (Repealed)

3A.32 Drainage

(1) All stormwater drainage collecting as a result of the erection of, or alterations or additions to, a dwelling house or ancillary development must be conveyed by a gravity fed or charged system to:

(a) a public drainage system, or

(b) an inter-allotment drainage system, or

(c) an on-site disposal system.

(1) N/A – no dwelling works

(2) All stormwater drainage systems within a lot and the connection to a public or an inter-allotment drainage system must:

(a) if an approval is required under section 68 of the Local Government Act 1993, be approved under that Act, or

(b) if an approval is not required under section 68 of the Local Government Act 1993, comply with any requirements for the disposal of stormwater drainage contained in a development control plan that is applicable to the land.

(2) N/A – existing drainage to creek

The existing drainage and creek system connects to Council storm water drainage at McCarrs Creek Road.

Conditions of Complying Development

Schedule 6 Conditions apply to the works

The following conditions have been applied to the work.

5 Run-off and erosion controls

Run-off and erosion controls must be implemented to prevent soil erosion, water pollution or the discharge of loose sediment on the surrounding land by:

(a) diverting uncontaminated run-off around cleared or disturbed areas, and

(b) erecting a silt fence and providing any other necessary sediment control measures that will prevent debris escaping into drainage systems, waterways or adjoining properties, and

(c) preventing the tracking of sediment by vehicles onto roads, and

(d) stockpiling top soil, excavated materials, construction and landscaping supplies and debris within the lot.

10 **Earthworks, retaining walls and structural support**

(1) Any earthworks (including any structural support or other related structure for the purposes of the development):

(a) must not cause a danger to life or property or damage to any adjoining building or structure on the lot or to any building or structure on any adjoining lot, and

(b) must not redirect the flow of any surface or ground water or cause sediment to be transported onto an adjoining property, and

(c) that is fill brought to the site—must contain only virgin excavated natural material (VENM) as defined in Part 3 of Schedule 1 to the Protection of the Environment Operations Act 1997, and

(d) that is excavated soil to be removed from the site—must be disposed of in accordance with any requirements under the Protection of the Environment Operations (Waste) Regulation 2005.

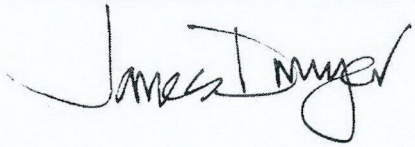
(2) Any excavation must be carried out in accordance with Excavation Work: Code of Practice (ISBN 978-0-642-78544?), published in July 2012 by Safe Work Australia.

End of Compliance Report.

Regarding the SEPP (Exempt and Complying Development Code) 2008 the works are permissible with consent and after inspection by this office and by Jack Hodgson Consultants (Civil, Geotechnical and Structural Engineers) I am satisfied that the works conform to the requirements of the SEPP.

Please advise the undersigned should Council require additional information or clarification to this matter.

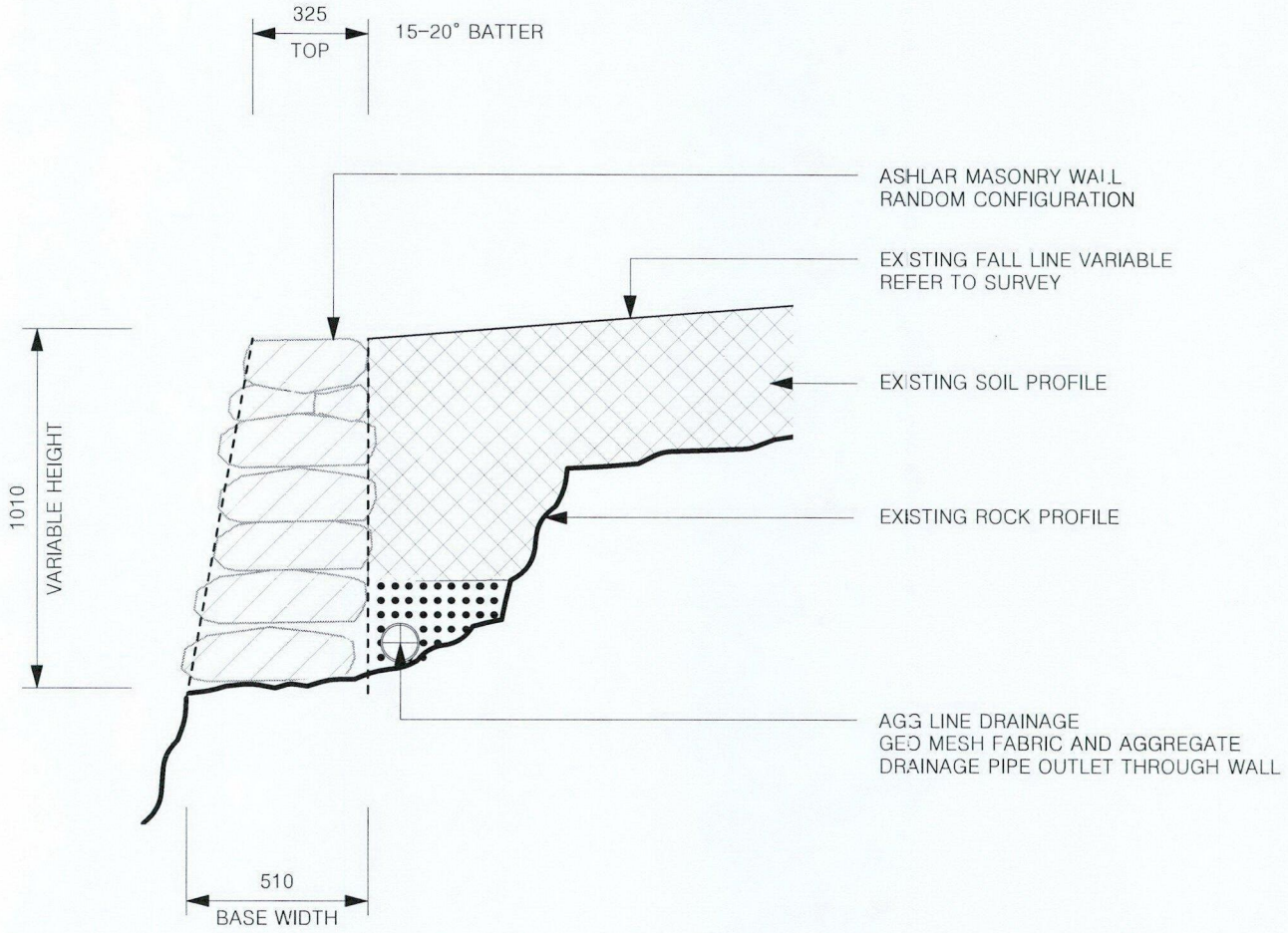
Yours Sincerely,
Continuum Planning Pty Ltd (Dwyer Architects)



James A. Dwyer
Director

Attachements

1. Survey Drawing
2. Geotechnical Report

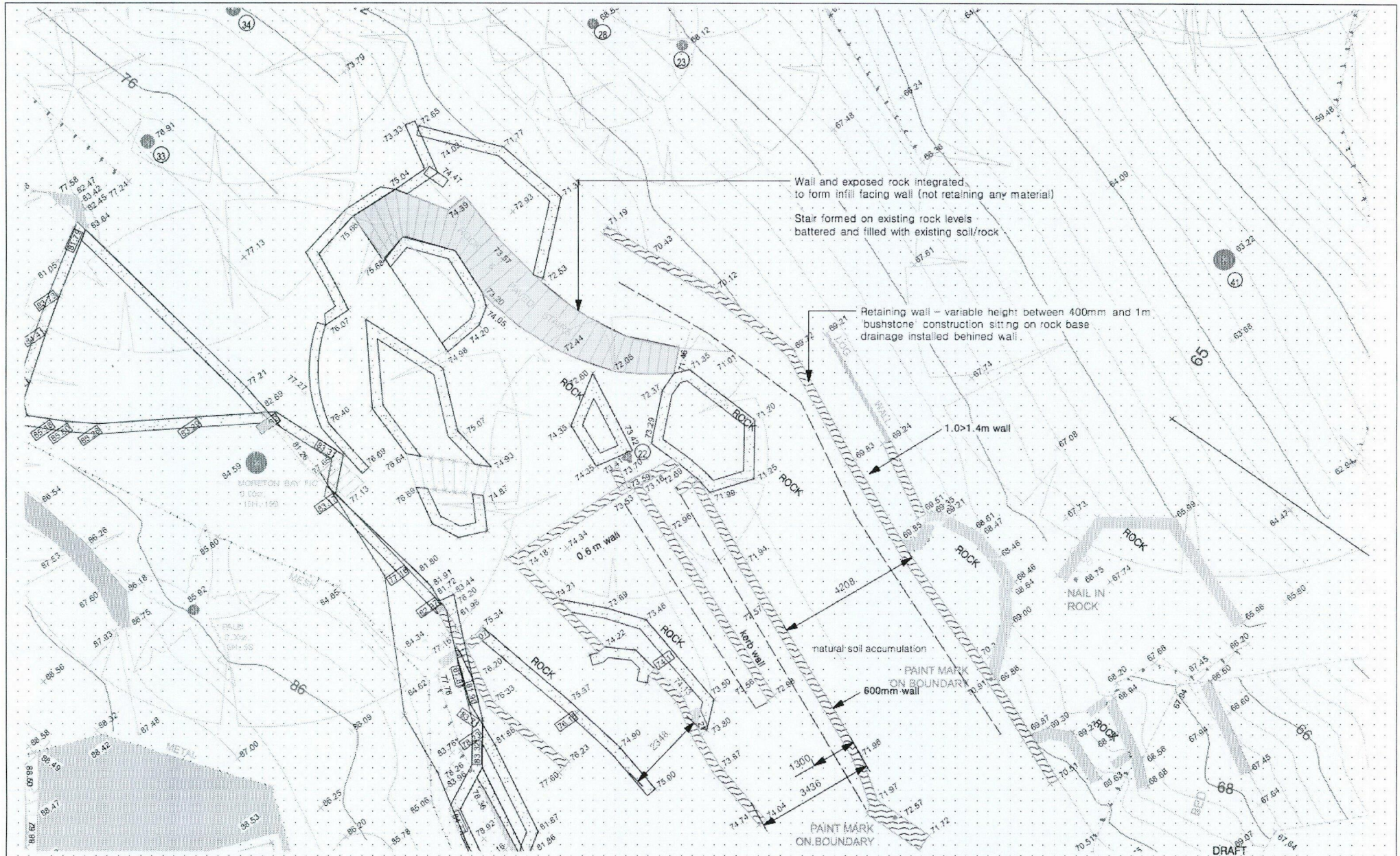


continuum planning pty ltd
dwyer architects
104 Mount Pleasant Avenue Wahroonga NSW 2076
ABN 61 141 772 714
m. 0407 220 066
e. dwyer.architects@icloud.com
Nom Architect: J Dwyer NSW 7567

PROJECT BUILDING CERTIFICATE
DWG TYPICAL ASHLAR WALL
CLIENT ATTWATER
LOCATION 167 McCarrs Creek Rd Church Point

REVISION A
PROJECT # 405
DWG # BA 102 A

DRAWN	CHKD	DATE #	SCALE
JD	JD	APRIL 2017	1:20



Retaining wall – construction notes
1. Toe of wall dimension generally 0.5m x height.
2. Aggpipe geo wrapped in geosock lay in at base of wall
3. provide incremental drainage outlet along length of wall

B	5/4/17	ISSUE FOR APPROVAL
A	30/12/16	Preliminary.

continuum planning pty ltd
dwyer architects
105 Mount Pleasant Avenue Wahroonga NSW 2076
ABN 41 141 772 714
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Nom Architect J Dwyer NSW 7567

PROJECT	BUILDING CERTIFICATE
DWG	RETAINING WALL PLAN
CLIENT	ATTWATER
LOCATION	167A McCarrs Creek Rd Church Point

SCALE	B
PROJECT #	405
DWG #	BA 101 B

Jack Hodgson Consultants Pty Limited
CONSULTING CIVIL, GEOTECHNICAL AND STRUCTURAL ENGINEERS
ABN: 94 053 405 011

MR 30884A
3rd April, 2017

The General Manager
Northern Beaches Council
Pittwater Area
PO Box 882
MONA VALE NSW 2103

167A McCARRS CREEK ROAD CHURCH POINT
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Response to Council Order No:- NOT0330/16

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- The maximum height of the rock stacked retaining walls is 1.5-1.6 metres.

In our opinion the as built rock stacked retaining walls are structurally adequate based on the information provide to us above and applying the likely loads to be placed on the rock stacked retaining walls.

JACK HODGSON CONSULTANTS PTY. LIMITED.

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JACK HODGSON CONSULTANTS PTY. LIMITED.

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER - 2009
FORM NO. 4 (As per Pittwater Council's Geotechnical Risk Management Policy) – To be submitted with Application for a Building Certificate/Response to an Order

Response to an Order
applicable) for _____
Name of Applicant

Address of Site 167A MCCARRS CREEK ROAD CHURCH POINT

Order No. NOT0330/16

Declaration made by geotechnical engineer in relation to the submission of an application for a Response to an Order

I, PETER THOMPSON (Insert Name) on behalf of JACK HODGSON CONSULTANTS PTY LTD (Trading or Company Name)

on this the 16/03/2017 (Date)

certify that I am a geotechnical engineer as defined by the Geotechnical Risk Management Policy for Pittwater 2009. I am authorised by the above organization/company to issue this document and to certify that the organization/company has a current professional indemnity policy of at least $2million.

☒ I have inspected the site and the existing development and am satisfied that both the site and the development achieves at least the "Tolerable Risk Management" requirement of the Geotechnical Risk Management Policy for Pittwater - 2009. The attached report provides details of the assessment in accordance with the Geotechnical Risk Management Policy for Pittwater – 2009. The report also contains recommendations as to any reasonable and practical measures that can be undertaken to remove foreseeable risk. I am aware the Council will rely on this certification as the basis for ensuring that the geotechnical risk management aspects of the site and the development have been adequately addressed to achieve at least a "Tolerable Risk Management" level for the life of the structure taken as 100 years unless otherwise stated and justified in the Report.*

or

☐ I have inspected the site of the existing development. The attached report details the remedial actions required to be undertaken prior to me being prepared to certify that the site and the development achieves at least the "Tolerable Risk Management" criteria required in accordance with the Policy.

Geotechnical Report Details:

Report Title: RISK ANALYSIS & MANAGEMENT FOR ORDER AT 167A MCCARRS CREEK ROAD CHURCH POINT (ALSO KNOWN AS 15B GILWINGA DRIVE BAYVIEW)

Report Date: 16/03/2017

Author : PETER THOMPSON

Signature Peter Thompson

Name PETER THOMPSON

Chartered Professional Status MIE Aust CPEng

Membership No. 146800

Company Jack Hodgson Consultants Pty Ltd

* Note: If life of structure taken as less than 100 years, please indicate ..... years

Jack Hodgson Consultants Pty Limited
CONSULTING CIVIL, GEOTECHNICAL AND STRUCTURAL ENGINEERS
ABN: 94 053 405 011

RISK ANALYSIS & MANAGEMENT FOR BUILDING CERTIFICATE FOR ORDER AT 167A MCCARRS CREEK ROAD CHURCH POINT (ALSO KNOWN AS 15B GILWINGA DRIVE BAYVIEW

1. INTRODUCTION.

1.1 This report is in response to a notice of proposed order that has been issued to the owner of 167A McCarrs Creek Road, Church Point (NOT0330/16). The Order relates to the unauthorised excavation and filling relating to the construction of landscaped terraces supported by sandstone walls. Excavated sandstone has also be utilised to construct stairs and pathways.

1.2 The definitions and 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.

1.3 The experience of Jack Hodgson Consultants spans a time period over 40 years in the Pittwater area and Greater Sydney Region.

2. EXISTING DEVELOPMENT.

2.1 The site was inspected on the 8th March, 2017.

2.2 This property is on the high side of McCarrs Creek Road and has a north-easterly aspect. It is located approximately halfway up the slope that descends from the crest of the north trending ridge that extends roughly parallel to Barcoola Place to the toe of the slope at the foreshore of McCarrs Creek. From the road frontage the site rises to the southern boundary at approximate average angles of 20 degrees. The site is also subject to a cross fall to east. No vehicle or pedestrian access to the residence is currently available from the McCarrs Creek Road frontage. Access is via a Right of Carriageway from the Gilwinga Drive frontage.

2.3 An area below the sandstone escarpment, situated below the pool area, to the east of the house, has been landscaped into numerous small terraces (Photo 1). The terracing of this area has involved the breaking up of a number of large sandstone floaters. This broken up rock has been used to construct the numerous low mortared sandstone stack-rock walls that support the terraces (Photo 2). The sandstone has also been utilised to construct sandstone paved pathways and stairs (Photo 3). The walls range in height from approximately 0.2m to 0.8m. The walls have been constructed

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with terracotta drainage pipe sections and weep holes that appear to be functioning well. The walls appear to be battered back slightly from vertical and are primarily founded on sandstone bedrock and large, stable floaters. The as built landscaping works and walls are considered stable at the time of our inspection. These works are not considered to present a significant risk to the ongoing stability of the land.

3. DESCRIPTION OF SURROUNDING AREA.

The Pittwater Council Geotechnical Risk Map indicates that the subject property and those surrounding are considered H1 hazard areas. Our observations indicate the surrounding properties contain no significant geotechnical hazards likely to adversely affect the subject property.

4. GEOLOGY OF THE SITE.

4.1 The Sydney geological series sheet, at a scale of 1:100,000 indicates the site is at the transition between the capping Hawkesbury Sandstone and the underlying Narrabeen Group rocks. 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 on the portion of the block under question are colluvial in origin at the surface and become residual with depth. They consist of sandy organic topsoil over sandy clays and clays that merge into the weathered rock. The slope is populated with numerous sandstone floaters of varying sizes.

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.

6. DRAINAGE OF THE SITE.

6.1 ON THE SITE.

The site is naturally well drained. No evidence of significant ground water was identified at the time of our inspection. A creek runs roughly parallel to the eastern boundary of the block.

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 downpours.

7. GEOTECHNICAL HAZARDS.

The slope that falls across the block is considered a potential hazard **(HAZARD ONE)**.

8. RISK ASSESSMENT.

8.1 HAZARD ONE Qualitative Risk Assessment on Property

From the southern boundary the slope drops toward the north at approximate average angles of some 20 degrees. The supporting walls of the house display no evidence of significant cracking or movement. The natural landforms and landscaping works across the site, including the as built terrace area are considered stable at the time of our inspection. The landscaped terraces and supporting sandstone stack-rock walls show no evidence of significant settlement or movement that could be attributed to slope instability. The likelihood of the slope failing and impacting the property is assessed as 'Unlikely' (10^{-4}). The consequences to property of such a failure are assessed as 'Minor' (5%). The risk to property is 'Low' (5×10^{-6}).

8.2 HAZARD ONE Quantitative Risk Assessment on 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)

8.2.1 Annual Probability

No significant evidence of significant slope instability was observed at the time of our inspection.
$\mathbf{P_{(H)}} = 0.0001$/annum

8.2.2 Probability of Spatial Impact

The house is situated toward the middle of a moderate to steep slope.
$\mathbf{P_{(SH)}} = 0.1$

8.2.3 Possibility of the Location Being Occupied During Failure

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 12hrs a day, 5 days a week.
For the person most at risk:

$\frac{20}{24} x \frac{7}{7} = 0.83$ $P_{(TS)} = 0.83$

8.2.4 Probability of Loss of Life on Impact of Failure

Based on the volume of land subsiding, it is estimated that the vulnerability of a person being killed in the house when subsidence occurs is 0.05

$V_{(DT)} = 0.05$

8.2.5 Risk Estimation

$R_{(Lol)} = 0.0001 \times 0.1 \times 0.83 \times 0.05$

$= 0.000000415$

$R_{(Lol)} = 4.15 \times 10^{-7}$/annum **NOTE:** This level of risk is **'ACCEPTABLE'**.

9. REMEDIAL/REQUIRED WORKS.

No remedial works are required.

10. RISK ASSESSMENT SUMMARY.

HAZARDS	Hazard One
TYPE	The slope that falls across the block is considered a potential hazard
LIKELIHOOD	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	'Minor' (5%)
RISK TO PROPERTY	'Low' (5×10^{-6})
RISK TO LIFE	4.15×10^{-7}/annum
COMMENTS	This level of risk is **'ACCEPTABLE'**

11. CONCLUSION.

The house and land, and the specified works as executed achieve an **'Acceptable Risk Level'** in accordance with the 2009 Geotechnical Risk Management Policy for Pittwater.

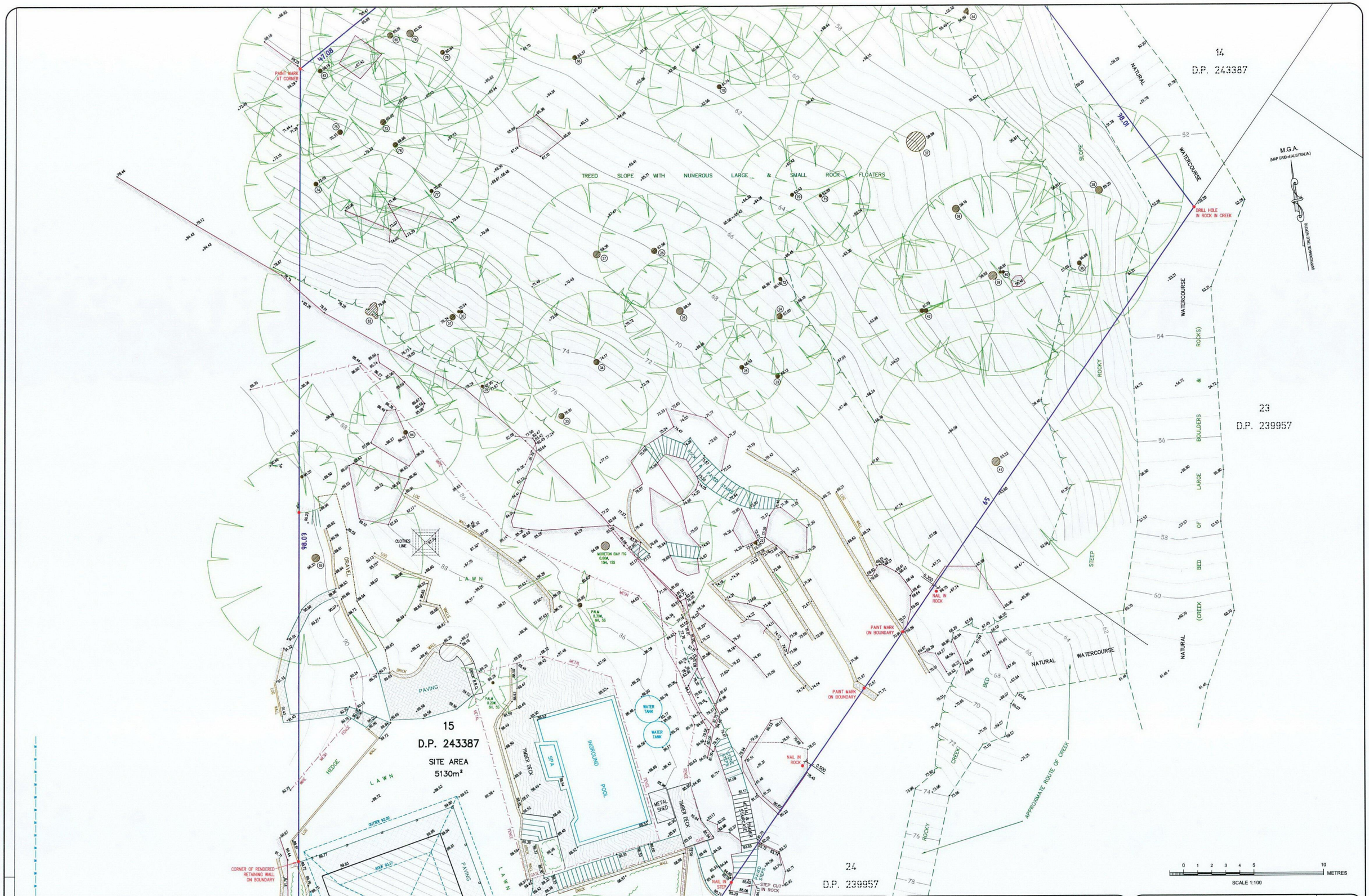
JACK HODGSON CONSULTANTS PTY. LIMITED.

Peter Thompson MIE Aust CPEng
Member No. 146800
Civil/Geotechnical Engineer

Photo 1

Photo 2

Photo 3



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LEGEND

- TREE & TAG NUMBER (SEE TABLE ON SHEET 3)
- GUTTER — DENOTES TOP OF GUTTER
- DENOTES STONE WALL
- DENOTES ROCK
- O/HEAD ELECTRIC LINES
- BOARDS SEWER
- WATER LINES
- TOP OF BANK — BOTTOM OF BANK
- DENOTES GRATE

(A) RIGHT OF CARRIAGEWAY 6.095 WIDE & VARIABLE VIDE D.P. 243387
(B) RIGHT OF CARRIAGEWAY VARIABLE WIDTH VIDE D.P. 243387
(C) RIGHT OF CARRIAGEWAY 4.57 WIDE VIDE D.P. 243387

PLAN SHOWING BOUNDARIES, RELATIVE HEIGHTS & PHYSICAL FEATURES OVER LOT 15 IN D.P. 243387 KNOWN AS No. 15B GILWINGA DRIVE, BAYVIEW.

L.G.A.: NORTHERN BEACHES

CLIENT	Ms S. ATTWATER			REF No.	3072
PROPERTY	No. 15B GILWINGA DRIVE, BAYVIEW				
DATUM	A.H.D.	SCALE	1:100 @ B1	DATE	23/01/2017
SURVEYED	G.C.	DRAWN	H.H.	DWG No.	3072
				SHEET No.	2 of 4
				REV No.	00