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

Development Application for _____
Name of Applicant

Address of site **1 Kanimbla Crescent, Bilgola Plateau**

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

I, Ben White (insert name) *on behalf of* White Geotechnical Group Pty Ltd (Trading or Company Name)

on this the 31/01/22 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least $2million.
I have:

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.

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

Geotechnical Report Details:

Report Title: Geotechnical Report **1 Kanimbla Crescent, Bilgola Plateau**

Report Date: 31/01/22

Author : BEN WHITE

Author's Company/Organisation : WHITE GEOTECHNICAL GROUP PTY LTD

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

Australian Geomechanics Society Landslide Risk Management March 2007.

White Geotechnical Group company archives.

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 Ben White

Chartered Professional Status MScGEOLAusIMM CP GEOL

Membership No. 222757

Company **White Geotechnical Group 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 _____
Name of Applicant

Address of site **1 Kanimbla Crescent, Bilgola Plateau**

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report. This checklist is to accompany the Geotechnical Report and its certification (Form No. 1).

Geotechnical Report Details:

Report Title: Geotechnical Report **1 Kanimbla Crescent, Bilgola Plateau**

Report Date: 31/01/22

Author : BEN WHITE

Author's Company/Organisation WHITE GEOTECHNICAL GROUP PTY LTD

Please mark appropriate box

☒ Comprehensive site mapping conducted 29/04/21 (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 .....
- ☒ Yes Date conducted 29/04/21

☒ 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 ..... specify

☒ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater – 2009 have been specified
☒ Additional action to remove risk where reasonable and practical have been identified and included in the report.
☐ Risk Assessment within Bushfire Asset Protection Zone

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for ensuring that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated, and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature 

Name Ben White

Chartered Professional Status MScGEOLAusIMM CP GEOL

Membership No. 222757

Company **White Geotechnical Group Pty Ltd**

GEOTECHNICAL INVESTIGATION:

Additions and Alterations at **1 Kanimbla Crescent, Bilgola Plateau**

1. Proposed Development

1.1 Construct a first and second floor extension on the downhill side of the house.

1.2 Construct a new first floor addition to the E side of the house.

1.3 Construct a new carport on the uphill side of the property.

1.4 Construct a staircase on the W side of the property by excavating to a maximum depth of ~2.0m.

1.5 Construct a storeroom in the void-space underneath the house by excavating to a maximum depth of ~1.5m.

1.6 Construct a level lawn area on the downhill side of the property by filling to a maximum depth of ~1.2m.

1.7 Various other internal alterations and additions.

1.8 Details of the proposed development are shown on 12 drawings prepared by Lein Architects, project number 2108, drawings numbered A01 and A12, dated 13th January, 2022.

2. Site Description

2.1 The site was inspected on the 29th April, 2021.

2.2 This residential property is on the low side of the road and has a SE aspect. The block is located on the moderate to steeply graded upper reaches of a hillslope. The slope falls across the property at angles averaging ~19°.

2.3 At the road frontage, a gravel driveway runs to a parking area on the uphill side of the property (Photo 1). The slope between the road frontage and the house has been terraced with a series of stable stack rock retaining walls, reaching ~1.5m high (Photo 2). One of these walls was observed to be partially supported directly onto outcropping Medium Strength Sandstone (Photo 3). The part two-storey brick house is supported on brick walls and steel posts. The supporting walls show no significant signs of movement and the supporting posts stand vertical (Photo 4). A stable stack rock wall reaching ~1.2m high and lining the E neighbouring boundary supports the cut for the neighbouring property. A moderate to steeply sloping lawn falls to the lower boundary. A large dislodged sandstone joint block was observed to be sitting in a stable position on the slope under the W side of the house (Photo 6).

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by Hawkesbury Sandstone. It is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

Six Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. The locations of the tests are shown on the site plan attached. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural rock surface. This is not expected to be an issue for the testing on this site. However, excavation and foundation budgets should always allow for the possibility that the interpreted ground conditions in this report vary from those encountered during excavations. See the appended “Important information about your report” for a more comprehensive explanation. The results are as follows:

DCP TEST RESULTS – Dynamic Cone Penetrometer						
Equipment: 9kg hammer, 510mm drop, conical tip.				Standard: AS1289.6.3.2 - 1997		
Depth(m) Blows/0.3m	**DCP 1** (~RL99.6)	**DCP 2** (~RL101.4)	**DCP 3** (~RL98.6)	**DCP 4** (~RL102.1)	**DCP 5** (~RL105.6)	**DCP 6** (~RL107.2)
0.0 to 0.3	17	5	1F	Rock Exposed at Surface	3	9F
0.3 to 0.6	#	#	F		3	F
0.6 to 0.9			4		3	4
0.9 to 1.2			60		10	#
1.2 to 1.5			#		9	
1.5 to 1.8					25	
1.8 to 2.1					#	
	Refusal on Rock @ 0.2m	Refusal on Rock @ 0.1m	Refusal on Rock @ 1.15m		Refusal on Rock @ 1.8m	Refusal on Rock @ 0.95m

#refusal/end of test. F=DCP fell after being struck showing little resistance through all or part of the interval.

DCP Notes:

DCP1 – Refusal on rock @ 0.2m, DCP bouncing off rock surface, clean dry tip.
DCP2 – Refusal on rock @ 0.1m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP3 – Refusal on rock @ 1.15m, DCP bouncing off rock surface, dark brown muddy sand streaking down length of DCP, orange and red mottled sandy clay on wet tip.
DCP4 – Rock exposed at the surface.
DCP5 – Refusal on rock @ 1.8m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP6 – Refusal on rock @ 0.95m, DCP bouncing off rock surface, white impact dust on dry tip.

5. Geological Observations/Interpretation

The surface features of the block are controlled by the outcropping and underlying sandstone bedrock that steps down the property forming sub-horizontal benches between the steps. Where the grade is steeper, the steps are larger and the benches narrower. Where the slope eases, the opposite is true. Where the rock is not exposed, it is overlain by sandy soils and sandy clays that fill the bench step formation. Filling has been placed above and below the

house for landscaping. In the test locations, the depth to rock ranged between 0.1 to 1.8m below the current surface, being slightly deeper due to the presence of fill and the stepped nature of the underlying bedrock. The outcropping sandstone on the property is estimated to be medium strength or better and similar strength rock is expected to underlie the entire site. See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Normal ground water seepage is expected to move over the buried surface of the rock and through the cracks. Due to the slope and elevation of the block, the water table is expected to be many metres below the base of the proposed excavation.

7. Surface Water

No evidence of significant surface flows were observed on the property during the inspection. Normal sheet wash from the slope above will be intercepted by the street drainage system for Kanimbla Crescent above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above or beside the property. The moderate to steeply graded slope that falls across the property and continues below is a potential hazard (**Hazard One**). The vibrations from the proposed excavation are a potential hazard (**Hazard Two**). The proposed excavations are a potential hazard until retaining walls are in place (**Hazard Three**). The proposed excavation undercutting the footings for the house is a potential hazard (**Hazard Four**). The proposed fill for the lawn area is a potential hazard until retaining walls are in place (**Hazard Five**).

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate to steep slope that falls across the property and continues below failing and impacting on the proposed works.	The vibrations produced during the proposed excavation impacting on the surrounding structures.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	9.1×10^{-7}/annum	5.3×10^{-7}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 12** are to be followed.

RISK ANALYSIS CONTINUED ON THE NEXT PAGE

HAZARDS	Hazard Three	Hazard Four	Hazard Five
TYPE	The excavations for the stairs and storeroom (up to a maximum depth of ~2.0m) collapsing onto the work site before retaining structures are in place.	The proposed excavation undercutting the footings of the house causing failure.	The proposed fill (up to a maximum height of 1.2m) failing and impacting the proposed works.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (35%)	'Medium' (15%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	8.3×10^{-6}/annum	5.3×10^{-5}/annum	6.0×10^{-5}/annum
COMMENTS	This level of risk to property is 'TOLERABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 12 and 13** are to be followed.	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13** are to be followed.	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels the recommendations in **Section 14** are to be followed.

(See Aust. Geomech. Jnl. Mar 2007 Vol. 42 No 1, for full explanation of terms)

9. Suitability of the Proposed Development for the Site

The proposed development is suitable for the site. No geotechnical hazards will be created by the completion of the proposed development provided it is carried out in accordance with the requirements of this report and good engineering and building practice.

10. Stormwater

The fall is away from the street. The stormwater engineer is to refer to council stormwater policy for suitable options for stormwater disposal.

11. Excavations

An excavation to a maximum depth of ~2.0m is required for the proposed staircase on the W side of the property. Another excavation to a maximum depth of ~1.5m is required to create a level platform for the storeroom.

These excavations are expected to be through soils and clay with Medium Strength Rock expected at depths of between ~0.1m and ~1.8m below the current surface in the area of the proposed works.

It is envisaged that excavations through sandy soils and sand can be carried out with an excavator and bucket, and excavations through rock will require grinding or rock sawing and breaking.

12. Vibrations

Possible vibrations generated during excavations through soil and clay will be below the threshold limit for building damage. It is expected that most of the excavation will be through Medium Strength Sandstone or better.

Excavations through rock should be carried out to minimise the potential to cause vibration damage to the subject house and neighbouring property to the W. Allowing ~0.5m for backwall drainage, the setbacks are as follows:

- Flush with the existing walls of the subject house.
- ~0.5m from the W common boundary.
- ~1.5m from the W neighbouring carport.

Close controls by the contractor over rock excavation are recommended so excessive vibrations are not generated.

Excavation methods are to be used that limit peak particle velocity to 8mm/sec at the subject walls. Vibration monitoring will be required to verify this is achieved. The vibration monitoring

equipment must include a light/alarm so the operator knows if vibration limits have been exceeded. It also must log and record vibrations throughout the excavation works.

In Medium Strength Rock or better techniques to minimise vibration transmission will be required. These include:

- Rock sawing the excavation perimeter to at least 1.0m deep prior to any rock breaking with hammers, keeping the saw cuts below the rock to be broken throughout the excavation process.
- Limiting rock hammer size.
- Rock hammering in short bursts so vibrations do not amplify.
- Rock breaking with the hammer angled away from the nearby sensitive structures.
- Creating additional saw breaks in the rock where vibration limits are exceeded.

13. Excavation Support Requirements

The excavation for the proposed staircase on the W side of the property will reach a maximum depth of ~2.0m. The excavation for the proposed store room will reach a maximum depth of ~1.5m. Allowing for 0.5m of backwall drainage, the setbacks are as follows:

- Flush with the existing walls of the subject house.
- ~0.5m from the W common boundary.
- ~1.5m from the W neighbouring carport.

As the deepest part of the excavation is ~3.0m from the neighbouring carport, only the existing walls of the subject house and the W common boundary will lie within the zone of influence of the proposed excavations. In this instance, the zone of influence is the area above a theoretical 45° line from the top of Medium Strength Rock, towards the surrounding structures and boundaries.

Where the walls of the subject house fall within the zone of influence of the excavation, exploration pits along the walls will need to be put down by the builder to determine the foundation depth and material. These are to be inspected by the geotechnical consultant.

If the foundations are found to be supported on rock or extend below the zone of influence of the proposed excavation, the excavation may commence. If they are not, the supporting walls will need to be underpinned to rock or to below the zone of influence of the cut prior to the excavation commencing. See the site plan attached for the minimum extent of the required exploration pits/underpinning.

Underpinning is to follow the underpinning sequence 'hit one miss two'. Under no circumstances is the bulk excavation to be taken to the edges of the walls and then underpinned. Underpins are to be constructed from drives that should be proportioned according to footing type and size. Allowances are to be made for drainage through the underpinning to prevent a build-up of hydrostatic pressure. Underpins that are not designed as retaining walls are to be supported by retaining walls. The void between the retaining walls and the underpinning is to be filled with free-draining material such as gravel.

During the excavation for the staircase, the geotechnical consultant is to inspect the excavation to confirm the stability of the cut to go flush with the footings.

Where the W common boundary falls within the zone of influence of the excavation, the cut faces through soil and clay will require the installation of shoring installed before excavation through rock commences. Staged temporary or permanent support installed along the W side as the excavation is progressed in spans not less than 2.0m horizontally is one suitable shoring technique in this location. The support is to be designed by the structural engineer in consultation with the geotechnical consultant. The temporary support is to remain in place until the retaining walls are built. See site plan attached for extent of minimum required shoring.

The remaining sides of the excavation are expected to stand at near-vertical angles for a short period of time until the retaining walls are in place, provided they are kept from becoming saturated.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. Unsupported cut batters through soil, and clay are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The covers are to be tied down with metal pegs or other suitable fixtures so they can't blow off in a storm. The materials and labour to construct the retaining walls are to be organised so on completion of the excavation they can be constructed as soon as possible. The excavation is to be carried out during a dry period. No excavations are to commence if heavy or prolonged rainfall is forecast.

Upon completion of the excavation, it is recommended all cut faces be supported with retaining walls to prevent any potential future movement of joint blocks in the cut face that can occur over time, when unfavourable jointing is obscured behind the excavation face. Additionally, retaining walls will help control seepage and to prevent minor erosion and sediment movement. Excavation spoil may be used for landscaping on site.

All excavation spoil is to be removed from site following the current Environmental Protection Agency (EPA) waste classification guidelines.

14. Fill

A fill to create a level lawn area is to be placed on the downhill side of the property. No fills are to be laid until retaining walls are in place. The fill will reach a maximum depth of between ~1.2m. The surface is to be prepared before any fills are laid by removing any organic matter and topsoil. Fills are to be laid in a loose thickness not exceeding 0.3m before being moderately compacted. Tracking the machine over the loose fill in 1 to 2 passes should be sufficient. Immediately behind the retaining walls (say to 1.5m), the fills are to be compacted with light weight equipment such as a hand-held plate compactor so as not to damage the

retaining walls. Where light weight equipment is used, fills are to be laid in a loose thickness not exceeding 0.2m before being compacted. No structures are to be supported on fill.

15. Retaining Walls

For cantilever or singly-propped retaining walls, it is suggested the design be based on a triangular pressure distribution of lateral pressures using the parameters shown in Table 1.

Table 1 – Likely Earth Pressures for Retaining Walls

Unit	Earth Pressure Coefficients			
	Unit weight (kN/m^3)	'Active' K_a	'At Rest' K_0	Passive
Fill, Sandy Soil, and Residual Clay	20	0.40	0.55	N/A
Medium Strength Sandstone	24	0.00	0.01	4000 kPa

For rock classes refer to Pells et al "Design Loadings for Foundations on Shale and Sandstone in the Sydney Region". Australian Geomechanics Journal 1978.

It is to be noted that the earth pressures in Table 1 assume a level surface above the structure, do not account for any surcharge loads, and assume retaining walls are fully drained. Rock strength and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

It should be noted that passive pressure is an ultimate value and should have an appropriate safety factor applied. No passive resistance should be assumed for the top 0.4m to account for any disturbance from the excavation.

All retaining walls are to have sufficient back-wall drainage and be backfilled immediately behind the structure with free-draining material (such as gravel). This material is to be

wrapped in a non-woven Geotextile fabric (i.e., Bidim A34 or similar), to prevent the drainage from becoming clogged with silt and clay. If no back-wall drainage is installed in retaining walls, the likely hydrostatic pressures are to be accounted for in the structural design.

16. Foundations

Due to the steep grade of the slope below the location of the proposed extensions, piers potted at least 0.3m into Medium Strength Sandstone are suitable footings for the proposed extensions to the house. This material is expected at depths up to a maximum of ~1.2m below the current surface. Where footings are over an exposed sloping rock surface, they may be supported off level pads cut into the rock.

Due to the presence of fill and a downslope retaining wall, the proposed carport is to be supported off piers or pads taken to Medium Strength Sandstone. This material is expected at a maximum depth of ~1.0m below the current surface.

The plans show a soldier pile wall is to be constructed to support the proposed fill on the downhill side of the property. This retaining wall is to be embedded into the underlying Medium Strength Sandstone. Construction of a soldier pile wall embedded into rock will require a mini piling rig or similar capable of drilling through Medium to High Strength Rock. It is to be noted that a standard domestic excavator is not able to drill through Medium Strength Rock and is not suitable for this job. This material is expected at a depth of between ~0.2m and ~1.1m below the current surface.

A maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength Sandstone.

Naturally occurring vertical cracks (known as joints) commonly occur in sandstone. These are generally filled with soil and are the natural seepage paths through the rock. They can extend to depths of several metres and are usually relatively narrow but can range between 0.1 to 0.8m wide. If a footing falls over a joint in the rock, the construction process is simplified if,

with the approval of the structural engineer, the joint can be spanned or, alternatively, the footing can be repositioned so it does not fall over the joint.

NOTE: If the contractor is unsure of the footing material required, it is more cost effective to get the geotechnical consultant on site at the start of the footing excavation to advise on footing depth and material. This mostly prevents unnecessary over-excavation in clay like shaly rock but can be valuable in all types of geology.

17. Geotechnical Review

The structural plans are to be checked and certified by the geotechnical engineer as being in accordance with the geotechnical recommendations. On completion a Form 2B will be issued. This form is required for the Construction Certificate to proceed.

18. Inspections

The client and builder are to familiarise themselves with the following required inspections as well as council geotechnical policy. We cannot provide geotechnical certification for the owners or the regulating authorities if the following inspections have not been carried out during the construction process.

- During the excavation for the staircase, the geotechnical consultant is to inspect the excavation to confirm the stability of the cut to go flush with the footings.
- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment is still onsite and before steel reinforcing is placed or concrete is poured.

White Geotechnical Group Pty Ltd.

Ben White M.Sc. Geol.,
AusIMM., CP GEOL.
No. 222757
Engineering Geologist.

Photo 1

Photo 2

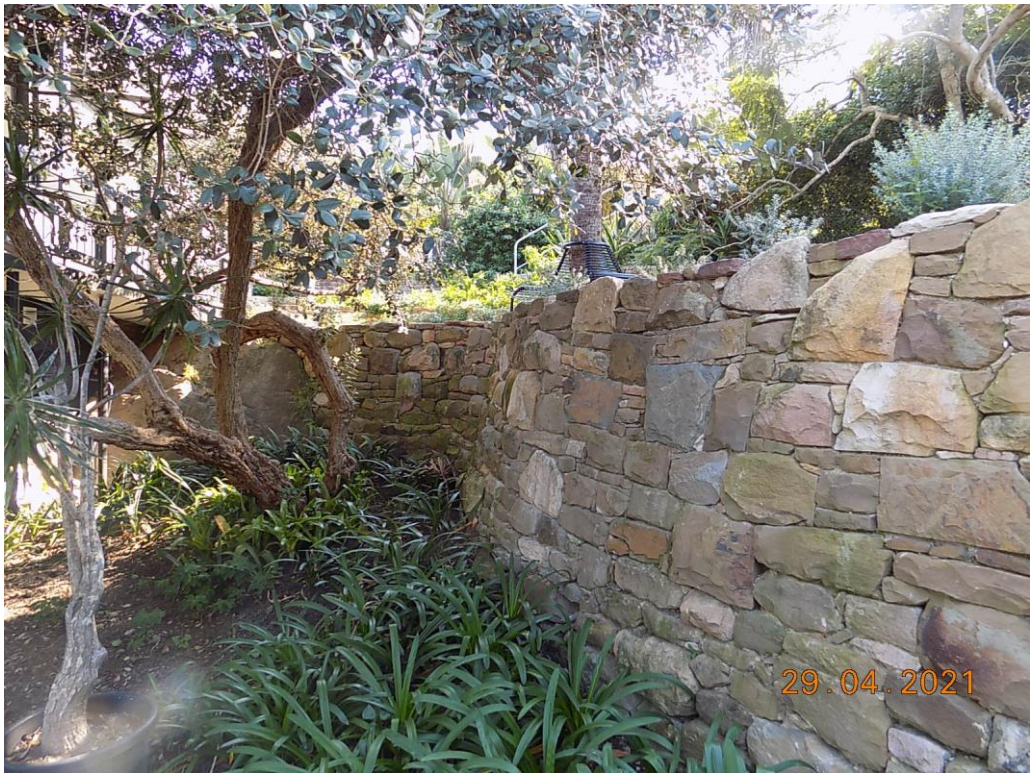


Photo 3

Photo 4

Photo 5

Photo 6

Important Information about Your Report

It should be noted that Geotechnical Reports are documents that build a picture of the subsurface conditions from the observation of surface features and testing carried out at specific points on the site. The spacing and location of the test points can be limited by the location of existing structures on the site or by budget and time constraints of the client. Additionally, the test themselves, although chosen for their suitability for the particular project, have their own limiting factors. The testing gives accurate information at the location of the test, within the confines of the test's capability. A geological interpretation or model is developed by joining these test points using all available data and drawing on previous experience of the geotechnical consultant. Even the most experienced practitioners cannot determine every possible feature or change that may lie below the earth. All of the subsurface features can only be known when they are revealed by excavation. As such, a Geotechnical report can be considered an interpretive document. It is based on factual data but also on opinion and judgement that comes with a level of uncertainty. This information is provided to help explain the nature and limitations of your report.

With this in mind, the following points are to be noted:

- If upon the commencement of the works the subsurface ground or ground water conditions prove different from those described in this report, it is advisable to contact White Geotechnical Group immediately, as problems relating to the ground works phase of construction are far easier and less costly to overcome if they are addressed early.

- If this report is used by other professionals during the design or construction process, any questions should be directed to White Geotechnical Group as only we understand the full methodology behind the report's conclusions.

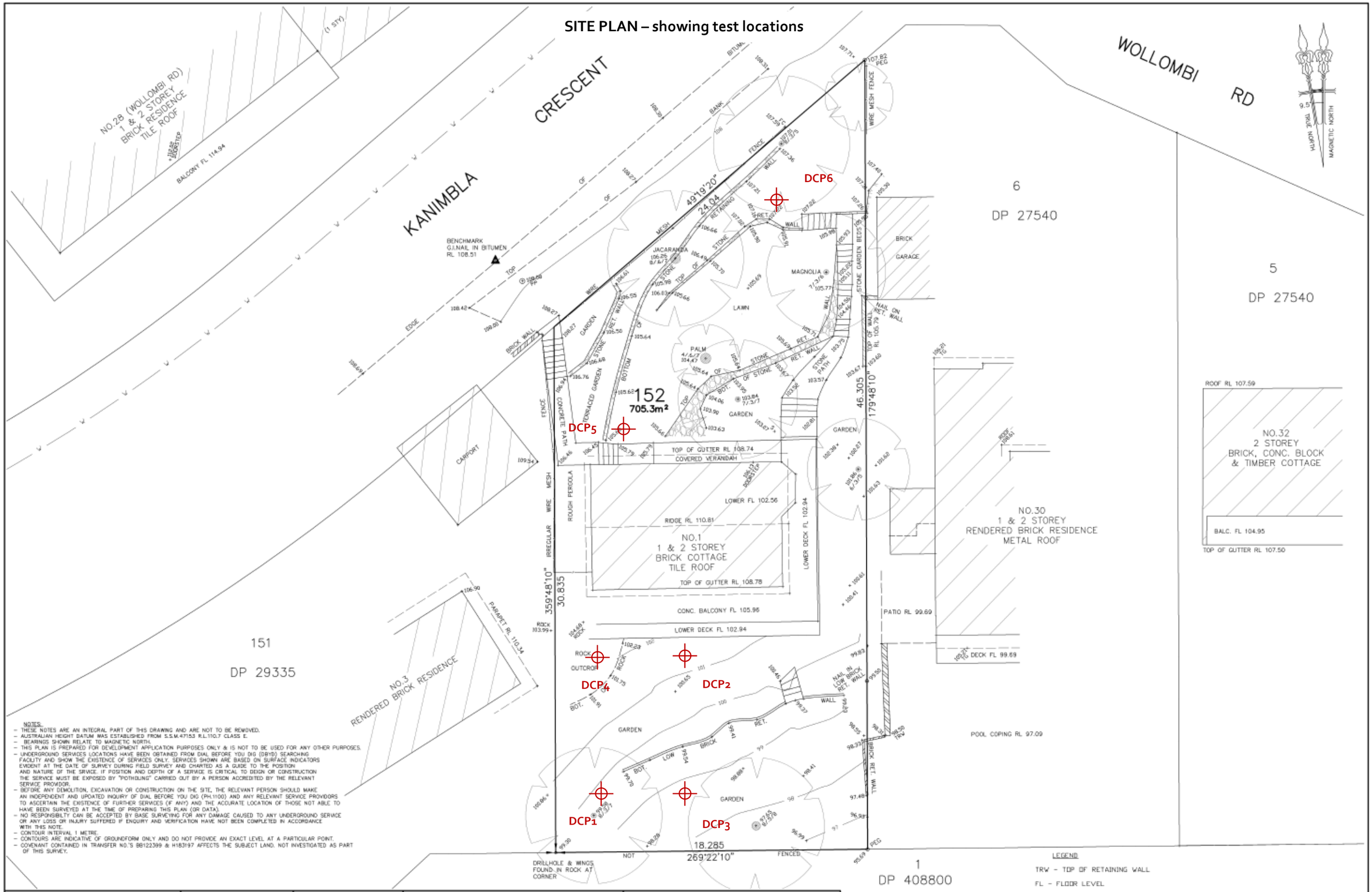
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- This report should not be applied to any other project other than that outlined in section 1.0.

- This report is to be read in full and should not have sections removed or included in other documents as this can result in misinterpretation of the data by others.

- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar with a variety of techniques to reduce risk and can advise if your proposed methods are suitable for the site conditions.

SITE PLAN – showing test locations



NOTES:
- THESE NOTES ARE AN INTEGRAL PART OF THIS DRAWING AND ARE NOT TO BE REMOVED.
- AUSTRALIAN HEIGHT DATUM WAS ESTABLISHED FROM S.S.M.47153 R.L.110.7 CLASS E.
- BEARINGS SHOWN RELATE TO MAGNETIC NORTH.
- THIS PLAN IS PREPARED FOR DEVELOPMENT APPLICATION PURPOSES ONLY & IS NOT TO BE USED FOR ANY OTHER PURPOSES.
- UNDERGROUND SERVICES LOCATIONS HAVE BEEN OBTAINED FROM DIAL BEFORE YOU DIG (DBYD) SEARCHING FACILITY AND SHOW THE EXISTENCE OF SERVICES ONLY. SERVICES SHOWN ARE BASED ON SURFACE INDICATORS EVIDENT AT THE DATE OF SURVEY DURING FIELD SURVEY AND CHARTED AS A GUIDE TO THE POSITION AND NATURE OF THE SRVICE. IF POSITION AND DEPTH OF A SERVICE IS CRITICAL TO DEIGN OR CONSTRUCTION THE SERVICE MUST BE EXPOSED BY "POTHOLING" CARRIED OUT BY A PERSON ACCREDITED BY THE RELEVANT SERVICE PROVIDOR.
- BEFORE ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT PERSON SHOULD MAKE AN INDEPENDENT AND UPDATED INQUIRY OF DIAL BEFORE YOU DIG (PH.1100) AND ANY RELEVANT SERVICE PROVIDORS TO ASCERTAIN THE EXISTENCE OF FURTHER SERVICES (IF ANY) AND THE ACCURATE LOCATION OF THOSE NOT ABLE TO HAVE BEEN SURVEYED AT THE TIME OF PREPARING THIS PLAN (OR DATA).
- NO RESPONSIBILITY CAN BE ACCEPTED BY BASE SURVEYING FOR ANY DAMAGE CAUSED TO ANY UNDERGROUND SERVICE OR ANY LOSS OR INJURY SUFFERED IF ENQUIRY AND VERIFICATION HAVE NOT BEEN COMPLETED IN ACCORDANCE WITH THIS NOTE.
- CONTOUR INTERVAL 1 METRE.
- CONTOURS ARE INDICATIVE OF GROUNDFORM ONLY AND DO NOT PROVIDE AN EXACT LEVEL AT A PARTICULAR POINT.
- COVENANT CONTAINED IN TRANSFER NO.'S BB122399 & H183197 AFFECTS THE SUBJECT LAND. NOT INVESTIGATED AS PART OF THIS SURVEY.

LEGEND
TRW - TOP OF RETAINING WALL
FL - FLOOR LEVEL
TG - TOP OF GUTTER
HYD - HYDRANT
PP - POWER POLE
Ø/S/10 - TREE SPREAD/DIA/HEIGHT
- W - APPROXIMATE POSITION OF WATER MAIN 100mmØ PIPE

Base SURVEYING
Land & Engineering Surveyors
basesurveying@iinet.net.au

Simon Warren
6 Surfview Ave Forster 2428
Phone: 0412448259

Date: 4.10.20
Scale: 1:100 @ A1
Datum AHD
Reference: 17-91A
Sheet 1 of 1

Prepared for:
JOHN WOOD

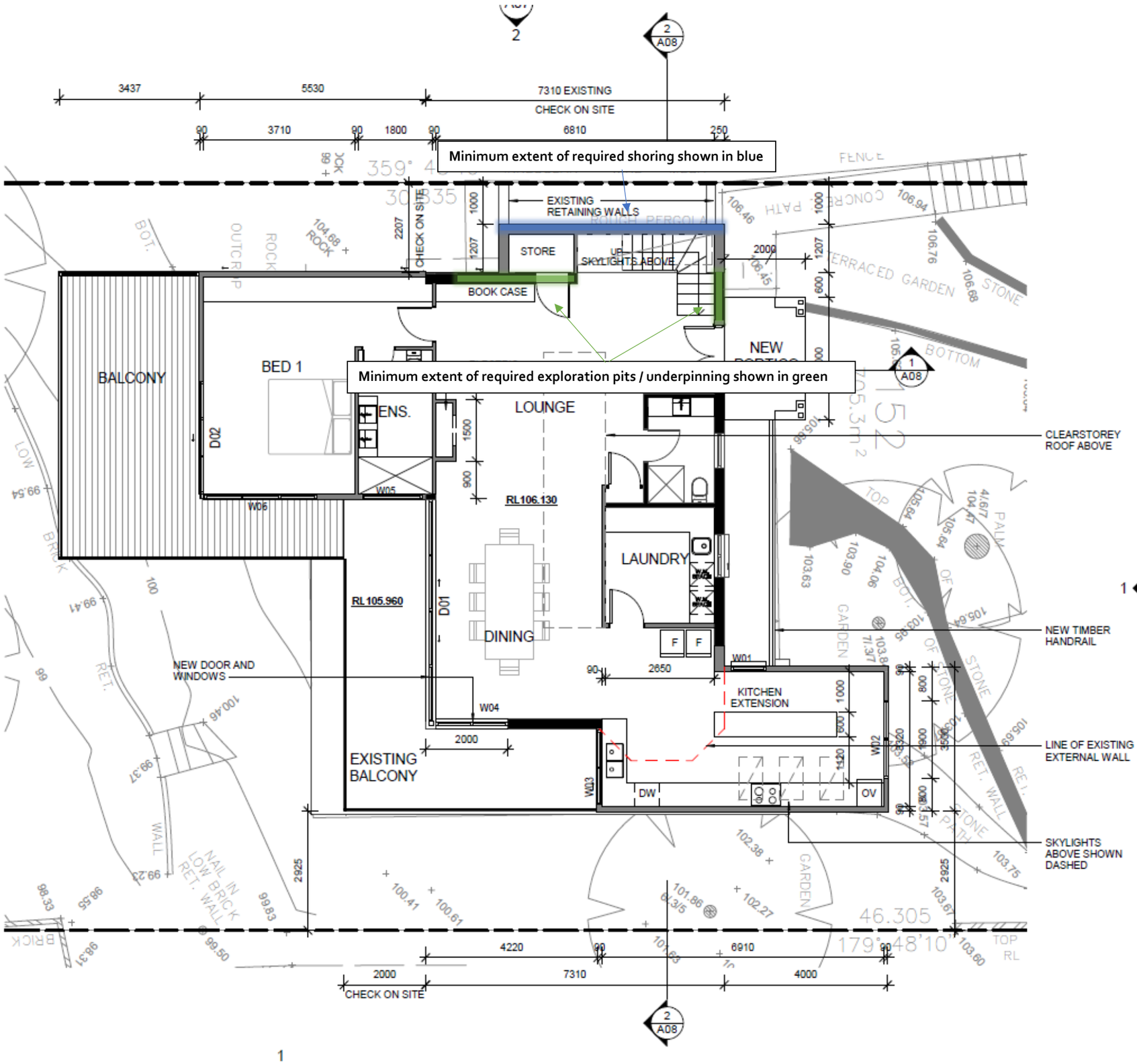
LEVEL & FEATURE SURVEY
1 KANIMBLA CR, BILGOLA PLATEAU
LOT 152 IN DP 29335
LGA: NORTHERN BEACHES

DIAL BEFORE YOU DIG www.1100.com.au

0 1 2 3 4 5 10

THORSTEN HUEBNER
REGISTERED SURVEYOR

SITE PLAN – showing minimum extent of required shoring / exploration pits / underpinning



1 GROUND FLOOR
1 : 100

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LIENARCHITECTS
Ph: 0447 711 977
simon@lienarchitects.com.au

GENERAL NOTES

All dimensions in millimetres.
Levels are in metres.
Use figured dimensions only.
Check dimensions on site.
Do not scale off drawings.

Rev.	Description	Date
1	EXISTING PLAN	11.05.2021
2	PRELIMINARY	13.05.2021
3	PRELIMINARY	18.05.2021
4	FOR COORDINATION	19.05.2021
5	FOR DA REVIEW	24.05.2021
A	FOR DA SUBMISSION	25.05.2021
B	DA AMENDMENT REVIEW	29.09.2021
C	DA AMENDMENT	07.10.2021
D	DA AMENDMENT	13.01.2022

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Client
JOHN AND HELEN WOOD

Project
ALTERATIONS AND ADDITIONS TO EXISTING DWELLING

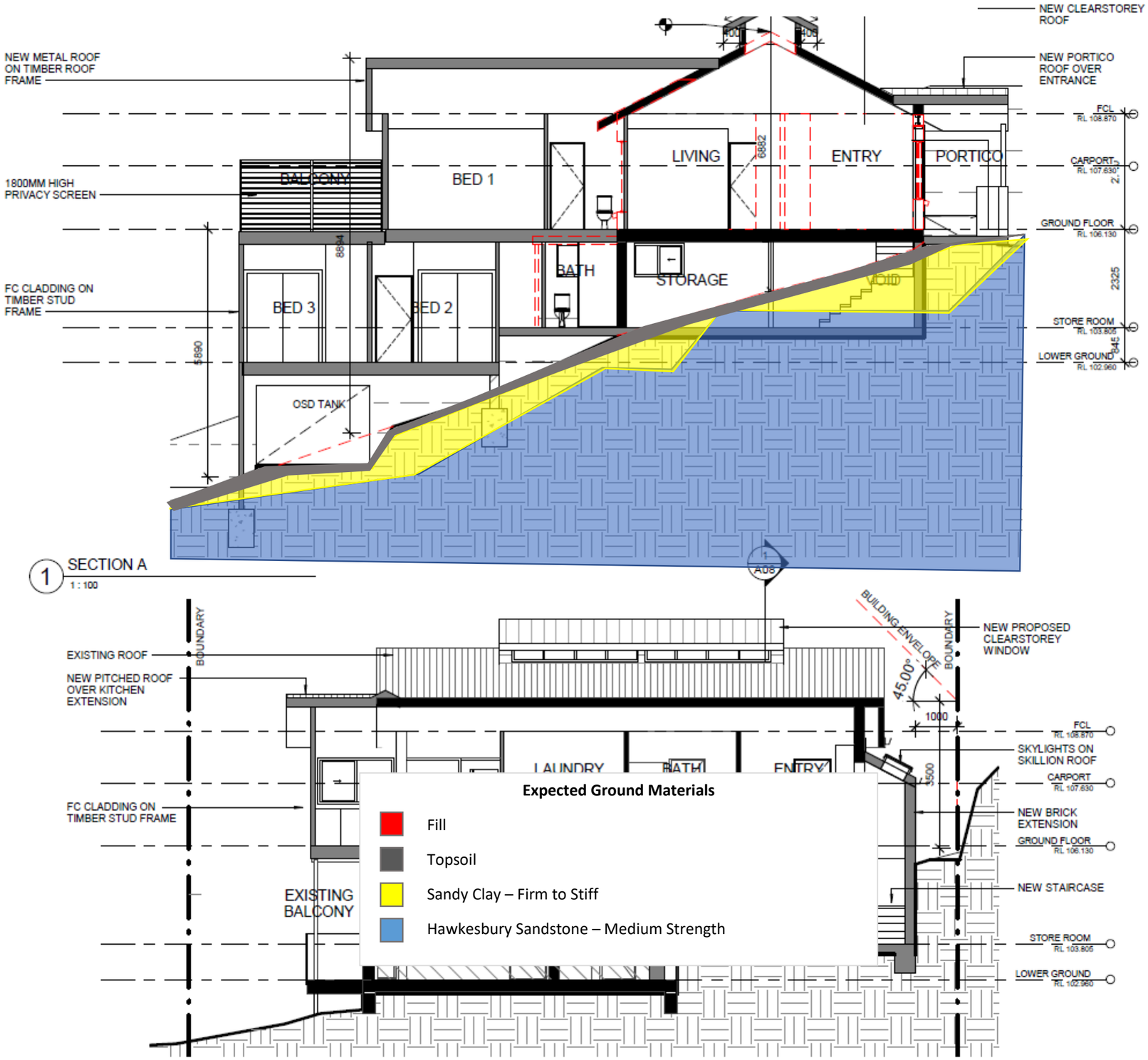
Address
1 KANIMBLA CRES.
BILGOLA PLATEAU NSW 2107
LOT 152 DP 29335

Sheet Name
GROUND LEVEL PLAN

Project no.	Sheet no.	Rev.
2108	A04	D
Scale	Date	
1 : 100	10 / 2021	

DEVELOPMENT APPLICATION

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



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Project

ALTERATIONS AND ADDITIONS TO EXISTING DWELLING

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LOT 152 DP 29335

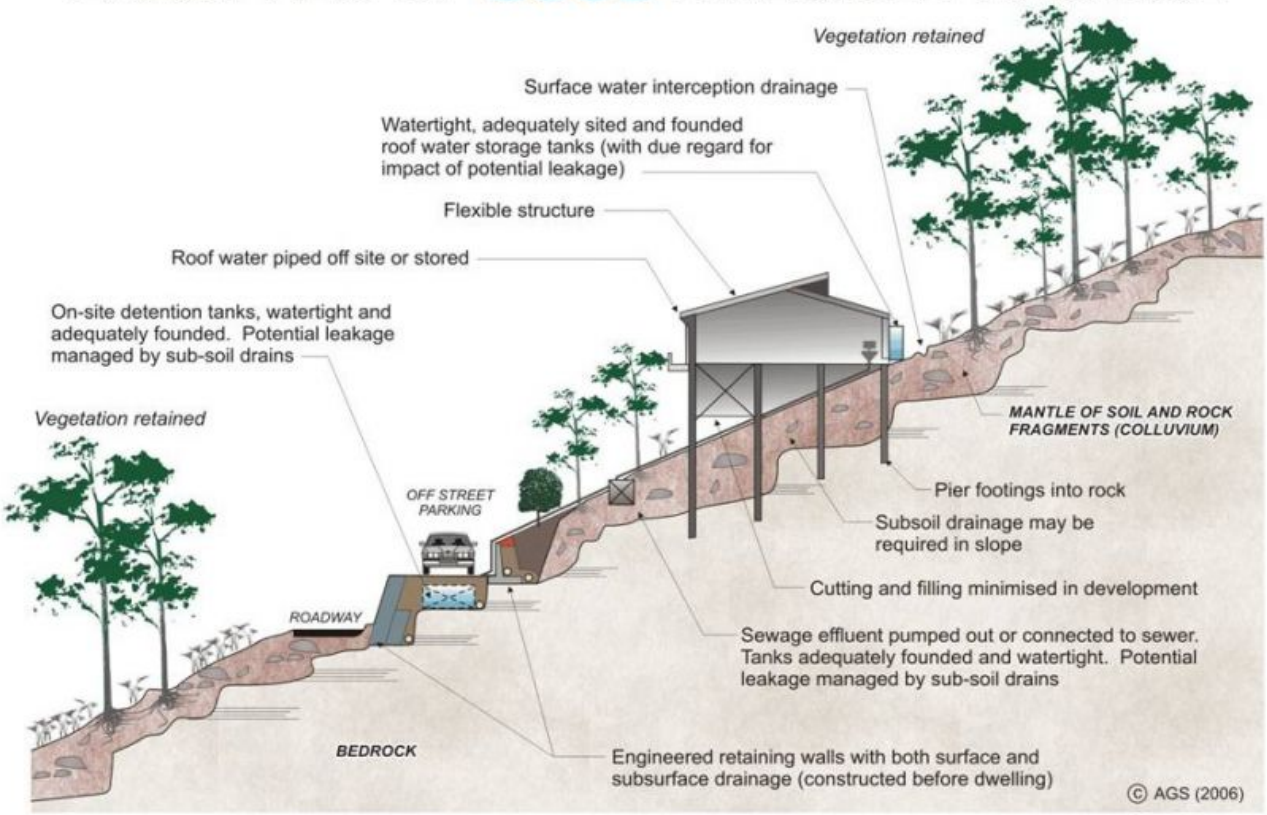
Sheet Name

SECTIONS

Project no.	Sheet no.	Rev.
2108	A08	D
Scale	Date	
1 : 100	10 / 2021	

DEVELOPMENT APPLICATION

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE