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

Development Application for _____
Name of Applicant

Address of site 29 Wandeen Road, Clareville

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk ***Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report***

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

on this the 6/7/22 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 $10million.

I:
Please mark appropriate box

☒ have prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009

☒ am willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009

☐ have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.

☐ have examined the site and the proposed development/alteration in detail and I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

☐ have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

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

Geotechnical Report Details:

Report Title: Geotechnical Report **29 Wandeen Road, Clareville**

Report Date: 6/7/22

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 29 Wandeen Road, Clareville

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 **29 Wandeen Road, Clareville**

Report Date: 6/7/22

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **3/3/20**
(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 **3/3/20**

☒ 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:

Alterations and Additions at **29 Wandeen Road, Clareville**

1. Proposed Development

1.1 Extend the existing driveway to form a turning circle and parking area by excavating to a maximum depth of ~2.8m. Construct a balcony above the parking area.

1.2 Demolish part of the existing house, leaving most of the existing walls and floors intact. Rebuild the house. Extend the ground floor and first floor to the S. Extend the second floor on all sides.

1.3 Construct a lift and extend the ground floor to the E by excavating to a maximum depth of ~2.6m.

1.4 Other minor Internal and external alterations to the house.

1.5 Install a pool on the S side of the house by excavating to a maximum depth of ~1.8m.

1.6 Landscape a lawn area beside the proposed pool by filling to a maximum depth of ~2.8m. Filling will be placed underneath the downhill portion of the proposed pool.

1.7 Details of the proposed development are shown on 26 drawings prepared by Vanessa Miles Design & Draft, Project Number 2013. Drawings numbered A00, A01, A01a, A02 to A20, and A22 to A24 are dated 22/3/22. Drawing number A21 is dated 9/11/21.

2. Site Description

2.1 The site was inspected on the 3rd of March, 2020.

2.2 This residential property is on the high side of the road and encompasses the crest and moderate to steeply graded flanks a hillslope. The natural slope rises from Wandeen Rd at an angle of ~16° before reaching the crest of the hillslope. The slope falls at the S side of the crest at an angle of ~22° towards the S property boundary. The slopes below the N and S boundaries of the property increase in grade.

2.3 At the road frontage a concrete driveway cuts across the slope and leads to a double garage under the house. Low stable sandstone stack rock and keystone retaining walls line the slope either side of the driveway (Photo 1). The part three storey rendered masonry house is supported by masonry walls and a concrete slab (Photos 2 & 3). The external supporting walls are in good condition and show no significant signs of movement.

A ~0.6m high timber retaining wall supports a cut for the downhill property to the W along part of the W common boundary (Photo 4). A ~1.6m high timber retaining wall supports a cut in the slope next to the house along part of the E common boundary. Where the wall changes direction and extends onto the neighbouring property the supporting soldier post is tilting (Photos 5 & 6) some 10° from vertical. Due to its location the wall poses no significant threat to life or property. See '**Section 16** Ongoing maintenance.

A cut and fill in the slope provides a near level lawn which extends from the S side of the house (Photo 7). Above the lawn a stable masonry retaining wall up to ~1.4m high supports the cut (Photo 8). The lawn drops away to the S where the fill batter merges into the natural slope (Photos 9 & 10).

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by the Newport Formation of the Narrabeen Group. This is described as interbedded laminite, shale, and quartz to lithic quartz sandstone.

4. Subsurface Investigation

One hand auger hole (AH) was put down to identify the soil materials. Four Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to weathered rock. The locations of the tests are shown on the site plan. 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 have been an issue for this site. But due to the possibility that the actual ground conditions vary from our interpretation there should be allowances in the excavation and foundation budget to account for this. We refer to the appended "Important Information about Your Report" to further clarify. The results are as follows:

AUGER HOLE 1 (~RL58.4) **–** AH1 (photo 11)

Depth (m)	**Material Encountered**
0.0 to 0.5	**CLAYEY SOIL**, brown and orange, dry.
0.5 to 0.7	**CLAY**, orange, firm to stiff, dry.

End of Hole @ 0.7m in Clay. No watertable encountered.

DCP TEST RESULTS ON NEXT PAGE

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** (~RL63.0)	**DCP 2** (~RL61.8)	**DCP 3** (~RL61.9)	**DCP 4** (~RL58.4)
0.0 to 0.3	7	11	3	9
0.3 to 0.6	9	20	#	18
0.6 to 0.9	20	10		16
0.9 to 1.2	20	#		22
1.2 to 1.5	12			14
1.5 to 1.8	#			#
	Refusal @ 1.4m	Refusal @ 0.8m	Refusal @ 0.1m	Refusal @ 1.5m

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

DCP Notes:

DCP1 – Refusal @ 1.4m, DCP bouncing, orange rock fragments on dry tip.
DCP2 – Refusal @ 0.8m, DCP bouncing, white rock fragments on dry tip.
DCP3 – Refusal @ 0.1m, DCP bouncing, orange and white dust on dry tip.
DCP4 – Refusal @ 1.5m, DCP bouncing, orange and red rock fragments on moist tip.

5. Geological Observations/Interpretation

The slope materials are colluvial at the near surface and residual at depth. In the test locations, the ground materials consist of Clayey Soil up to 0.5m deep over Firm to Very Stiff Clay. The clays merge into the weathered zone of the under lying rocks at depths of between 0.1m to 1.5m below the current surface, being shallower at the downhill side of an existing retaining wall supporting a cut (DCP3). The weathered zone of the underlying rock is interpreted as Very Low to Low Strength Rock. 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 in the rock.

Due to the slope and elevation of the block, the water table in the location is expected to be many metres below the base of the proposed excavations.

7. Surface Water

No evidence of surface flows were observed on the property during the inspection. It is expected that normal sheet wash will move onto the site from above the property during heavy down pours.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The moderate to steeply graded slope that falls across the property and continues above and below is a potential hazard (**Hazard One**). The proposed excavations are a potential hazard (**Hazard Two**). The vibrations produced during the proposed excavations are a potential hazard (**Hazard Three**). The proposed landscaping fill is a potential hazard (**Hazard Four**).

RISK ANALYSIS SUMMARY ON NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate to steep slope that falls across the property and continues above and below failing and impacting on the property.	The proposed excavations for the parking area, lift / house additions and pool collapsing onto the worksite, impacting the neighbouring properties and undercutting the existing subject house during the excavation process.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (25%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	8.3×10^{-7}/annum	7.1×10^{-6}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to life and property is 'UNACCEPTABLE'. To move the risk to 'ACCEPTABLE' levels, the recommendations in **Section 13** are to be followed.

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

RISK ANALYSIS SUMMARY CONTINUES ON NEXT PAGE

HAZARDS	Hazard Three	Hazard Four
TYPE	The vibrations produced during the proposed excavations for the parking area, lift / house additions and pool impacting on the subject house and neighbouring properties.	The proposed landscaping fill failing and impacting on the workers below before the retaining walls are in place.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (15%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	5.3×10^{-7}/annum	3.7×10^{-6}/annum
COMMENTS	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels the recommendations in **Sections 11 & 12** are to be followed.	This level of risk to life and 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 to Wandeen Road. Stormwater from the proposed developments is to be piped to the street drainage system through any tanks that may be required by the regulating authorities.

11. Excavations

An excavation to a maximum depth of ~2.8m is required to construct the proposed parking area. Another excavation to a maximum depth of ~2.6m is required for the proposed new lift and ground floor additions. A third excavation to a maximum depth of ~1.8m is required to install the proposed new pool. The excavations are expected to be through fill, topsoil and clay, with Very Low to Low Strength rock expected at depths from between ~0.8m to ~1.5m below the current surface.

Excavations through fill, soil, clay and rock up to Low Strength can be carried out with an excavator and toothed bucket. If Medium Strength Rock is encountered it will require grinding or rock sawing and breaking.

12. Vibrations

It is expected the proposed excavations will be carried out with an excavator and toothed bucket and the vibrations produced will be below the threshold limit for building or infrastructure damage using a domestic sized excavator up to 20 tonne.

If Medium Strength Rock is encountered, excavations through this ground material should be carried out to minimise the potential to cause vibration damage to structures on the subject house and neighbouring properties to the E and W.

Allowing for backwall drainage, the setbacks are as follows:

- The parking area excavation comes flush with the existing house and is set back ~2.1m from the E neighbouring house.
- The lift / ground floor excavation comes flush with the existing house and is set back ~4.4m from the E neighbouring house.
- The pool excavation is set back ~6.0m from the W neighbouring house.

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 house and property boundaries. Vibration monitoring will be required to verify this is achieved. Vibration monitoring must include a light/alarm so the operator knows if vibration limits have been exceeded. The equipment is to log and record vibrations throughout the excavation works.

If a milling head is used to grind the rock, or if rock sawing is carried out around the perimeter of the excavation boundaries in not less than 1.0m lifts, before a rock hammer up to 300kg is used to break the rock it is likely the peak particle velocity will not be exceeded provided the saw cuts are kept well below the rock to be broken.

It is worth noting that vibrations that are below thresholds for building damage may be felt by the occupants of the subject house and neighbouring properties.

13. Excavation Support Requirements

Bulk Excavation for Parking Area

An excavation to a maximum depth of ~2.8m is required for the proposed parking area. Allowing for backwall drainage, the excavation comes flush with the subject house and is set back ~0.7m from a low timber retaining wall near the E common boundary, ~1.0m from the E common boundary ~2.1 from the E neighbouring house.

The above structures and boundaries will be within the zone of influence of the excavation. In this instance, the zone of influence is the area above a theoretical 45° line (from horizontal) through clay / weathered rock towards the surrounding structures and boundaries.

Due to the depth of the excavation and its proximity to the nearby structures and property boundary, all sides of the excavation will require ground support installed prior to the commencement of the excavation. See the Ground Floor Plan attached for the minimum extent of the required shoring shown in blue.

A spaced piled retaining wall is one of the suitable methods of support. Pier spacing is typically ~2.0m but can vary between 1.6 to 2.4m depending on the design. As the excavation is lowered in 1.5m lifts infill sprayed concrete panels or similar are added between the piers to form the wall. Drainage is to be installed behind the panels. To drill the pier holes for the walls, a pilling rig that can excavate through Medium to High Strength Rock will be required. If a machine of this type is not available, we recommend carrying out core drilling before the construction commences to confirm the strength of the rock and to ensure the excavation equipment is capable of reaching the required depths. The piers can be temporarily supported by embedment below the base of the excavation or with a combination of embedment and propping. The walls are to be tied into the parking area slab to provide permanent bracing after which any temporary bracing can be released.

The geotechnical consultant is to inspect the drilling process of the entire first pile and the ground materials at the base of all pier holes/excavations installed for ground support purposes.

Bulk Excavation for Lift and Ground Floor Additions

An excavation to a maximum depth of ~2.6m is required for the proposed lift and ground floor additions. Allowing for backwall drainage, the setbacks are as follows:

- The lift portion of the excavation comes underneath the first floor of the house and comes flush with the E perimeter masonry wall supporting the house.
- The storage room portion of the excavation comes underneath the first floor of the house and is setback ~1.1m from the E perimeter masonry wall supporting the house.
- The undercroft (connected to the proposed pool pump and water tank room) portion of the excavation is outside the footprint of the house. It comes flush with the S masonry house wall and is set back ~0.2m from a timber retaining wall near the E common boundary (Photo 5) and ~0.6m from the E common boundary.

The above structures and boundary will be within the zone of influence of the excavation.

Due to the depth of the excavation and its proximity to the nearby structures and property boundary, all sides of the excavation will require ground support installed prior to the commencement of the excavation. See the Ground Floor Plan attached for the minimum extent of the required shoring shown in blue. Due to access difficulties, some internal walls will need to be demolished to allow access for the piling rig to come through the garage and ground floor of the house. Additionally, the portion of the existing floor that is directly above the excavation will need to be demolished to allow sufficient headroom for the piling rig.

If the owners want to keep the existing floor above the excavation in place, the house walls that are within the zone of influence of the excavation will need be underpinned to beyond the zone of influence of the excavation, prior to the excavation commencing. As there are vertical limits on the extent of the depth of underpin foundations several stages of underpinning and then excavation lowering will be required.

Bulk Excavation for Pool

An excavation to a maximum depth of ~1.8m is required for the proposed pool. The excavation is set back sufficiently from the surrounding structures and boundaries.

The excavation is expected to stand at near-vertical angles for short periods of time until the pool structure is installed, provided the cut batters are kept from becoming saturated.

All unsupported cut batters are to be covered to prevent access of water in wet weather and loss of moisture in dry weather. The materials and labour to install the pool structure are to be organised so on completion of the excavation it can be installed as soon as possible. If the pool structure is not installed within a few days of the excavation being completed temporary shoring pool shoring such as braced form ply will be required.

Advice Applying to All Excavations

The geotechnical consultant is to inspect any unsupported excavations as they are lowered to depths of 1.5m to ensure the ground materials are as expected and that no temporary support is required.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. The excavations are to be carried out during a dry period. No excavations are to commence if heavy or prolonged rainfall is forecast.

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

14. Fill

Fill will be placed for landscaping purposes on the S side of the house and will be placed underneath the downhill portion of the proposed pool. No fills are to be laid until the retaining walls are in place. The fills will reach a maximum depth of ~2.8m. Filling to this depth without appropriate compaction will result in a significant settlement.

To avoid excessive settlement, the fill is to be placed in loose layers not exceeding 0.3m thick before being compacted as follows:

Before all fills are lain, strip the existing topsoil and remove all organic matter, stockpiling for later use as topsoil or remove from site.

Non-Cohesive Soils (sandy fills)

The proposed fill for landscaping is to be compacted to a Minimum Density Index (ID) of 65%.

Cohesive Soils (clayey fill & excavated bedrock)

The proposed fill for landscaping is to be compacted to at least 95% of Standard Maximum Dry Density.

The geotechnical consultant is to inspect and test the fill as it is laid in 1.0m rises to ensure the required density has been achieved.

Filling within ~1.5m behind retaining walls should be compacted with light weight equipment such as a hand operated plate compacter or similar so as to not damage the wall. Where light weight compaction equipment is used fills are be laid in a loose thickness not exceeding 0.15m. No pavements or structures are to be supported on fill.

15. Retaining Structures

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

Table 1 – Likely Earth Pressures for Retaining Structures

Unit	Earth Pressure Coefficients			
	Unit weight (kN/m^3)	'Active' K_a	'At Rest' K_0	Passive
Fill, Topsoil	20	0.40	0.55	N/A
Residual Clays	20	0.35	0.45	Kp = 2.0 'ultimate'
Very Low to Low Strength Rock	22	0.22	0.35	400kPa 'ultimate'

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 and do not account for any surcharge loads, noting that surcharge loads from existing structures above will act on the wall. It also assumes retaining structures are fully drained. No passive resistance should be assumed for the top 0.4m to account for any disturbance from the excavation. Rock strength and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

All retaining structures 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 structures the full hydrostatic pressures are to be accounted for in the retaining structure design.

16. Foundations

The proposed parking area, lift, ground floor extension and pool are expected to be seated in Very Low to Low Strength Rock on the uphill side. This is a suitable foundation material. On the downhill side, where the weathered rock drops away with the slope, piers taken to weathered rock will be required to maintain a uniform foundation material across the structure. This ground material is expected at depths from between ~0.8m to ~1.5m below the current surface. A maximum allowable bearing pressure of 600kPa can be assumed for footings supported on Very Low to Low Strength rock. It should be noted that this material is a soft rock and a rock auger will cut through it so the builders should not be looking for refusal to end the footings.

The foundation material supporting the existing house is currently unknown. Footings should be founded on the same footing material across the structure. Where the footing material does change across the structure construction joints or similar are to be installed to prevent differential settlement, where the structure cannot tolerate such movement in accordance with a 'Class M' site.

As the bearing capacity of weathered rock reduces when it is wet we recommend the footings be dug, inspected and poured in quick succession (ideally the same day if possible). If the footings get wet, they will have to be drained and the soft layer of weathered rock on the footing surface will have to be removed before concrete is poured.

If a rapid turnaround from footing excavation to the concrete pour is not possible a sealing layer of concrete may be added to the footing surface after it has been cleaned.

NOTE: If the contractor is unsure of the footing material required it is more cost effective to get the geotechnical professional 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. Ongoing Maintenance

The timber retaining wall (Photo 5 & 6) is to be monitored by the owners on an annual basis or after heavy prolonged rainfall events, whichever occurs first. A photographic record these inspections is to be kept. Should further movement occur the wall is to be remediated so it meets current engineering standards. We can carry out these inspections upon request.

18. 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.

REQUIRED INSPECTIONS ON NEXT PAGE

19. 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 Occupation Certificate if the following inspections have not been carried out during the construction process.

- The geotechnical consultant is to inspect the ground materials while the first pier for the ground support is being dug to assess the ground strength and to ensure it is in line with our expectations. All finished pier holes for piled wall/excavations for ground support are to be inspected and measured before concrete is placed.

- The geotechnical consultant is to inspect any unsupported excavations as they are lowered to depths of 1.5m to ensure the ground materials are as expected and that no temporary support is required.

- The geotechnical consultant is to inspect and test the landscaping fill as it is raised to heights not exceeding ~1.0m. This is to ensure the required density has been achieved during compaction.

- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment and contractors are 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

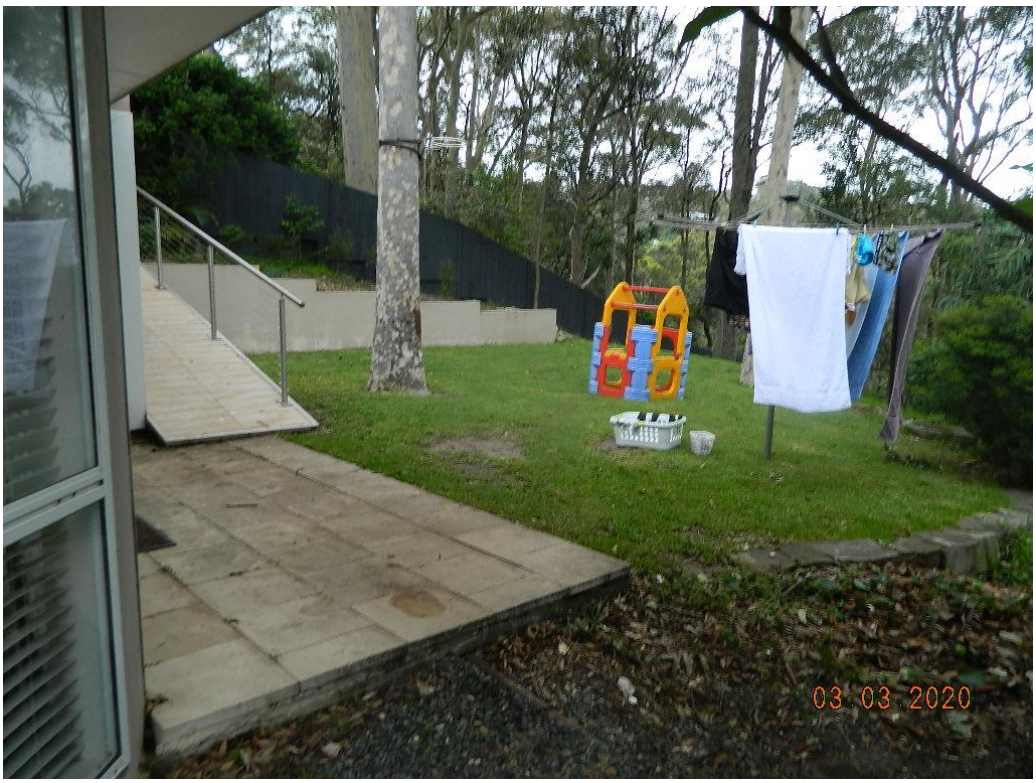


Photo 7

Photo 8

Photo 9

Photo 10

Photo 11: AH1 – Downhole is from top to bottom

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.

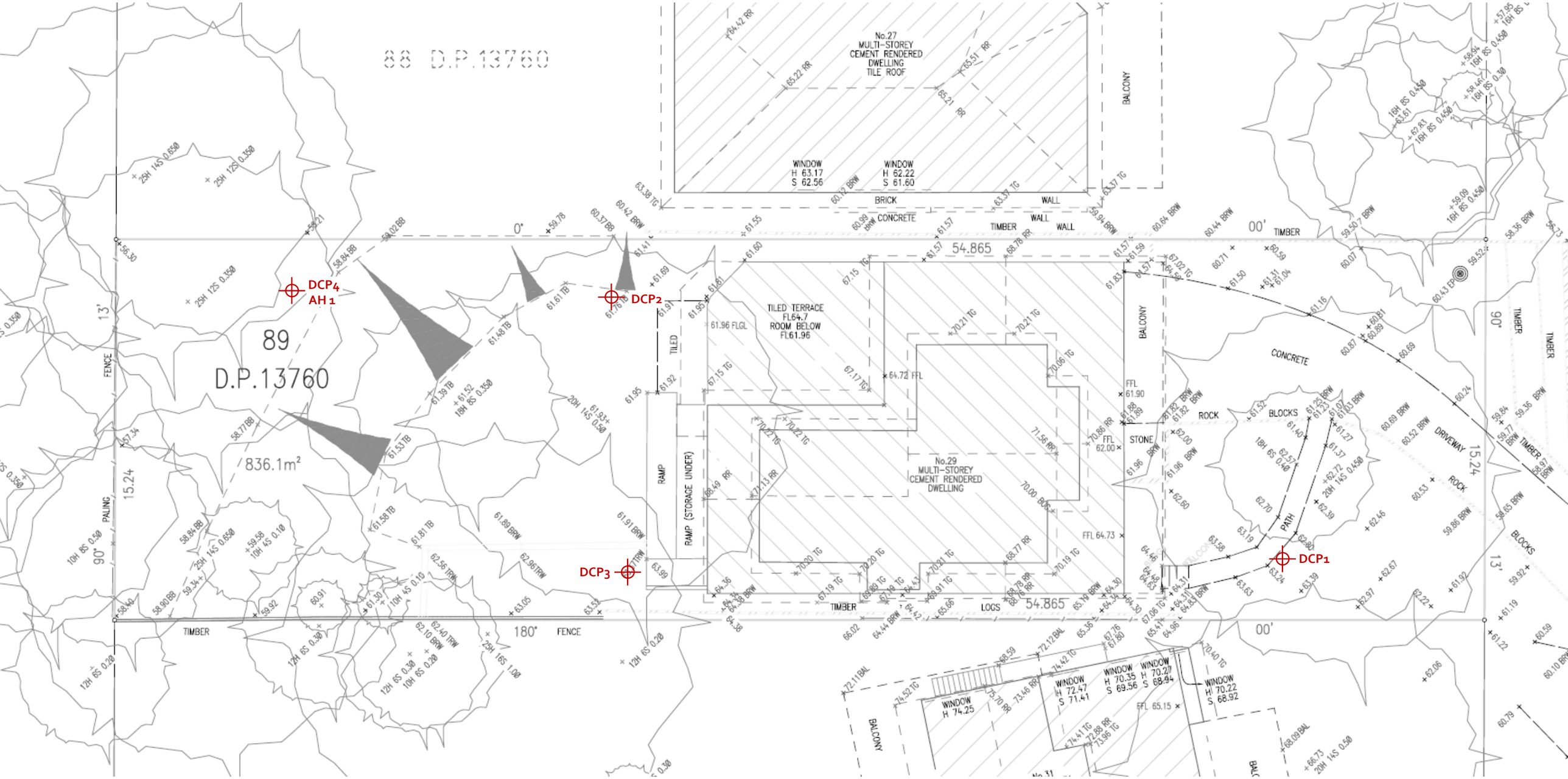
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

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

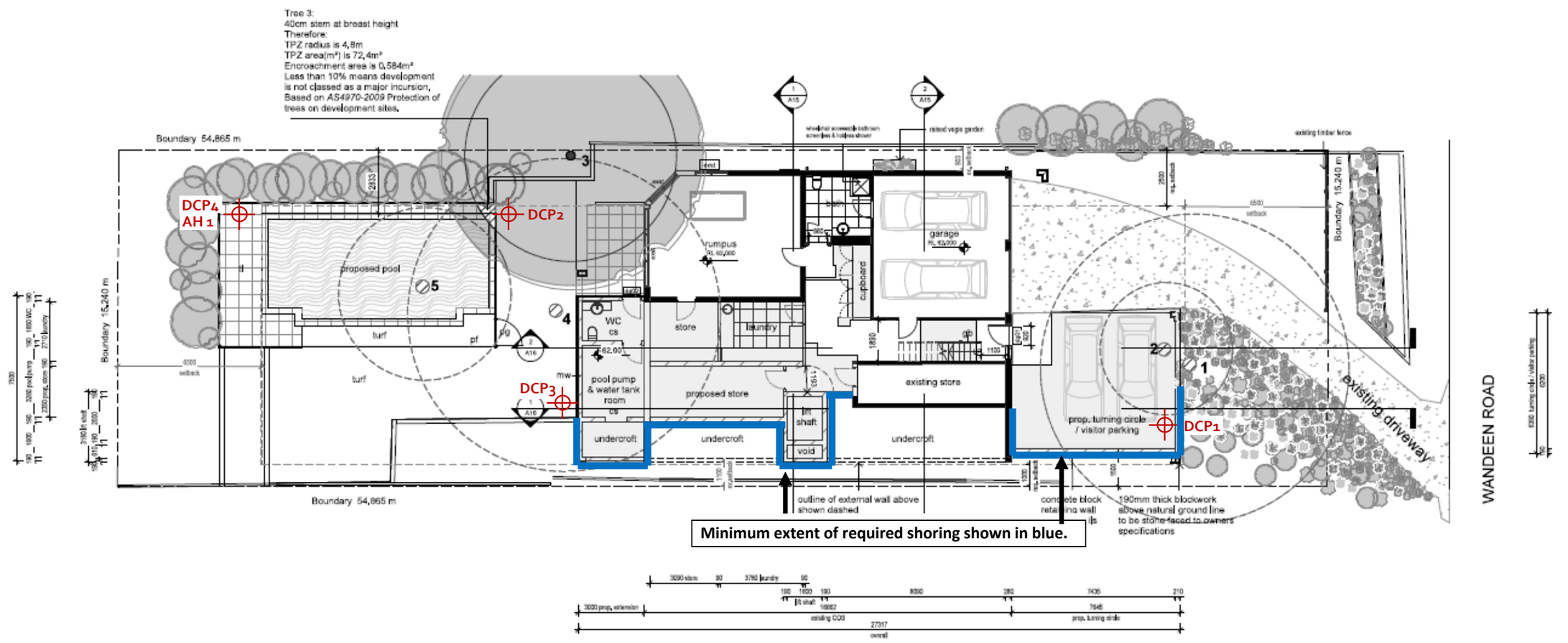
- This report is to be read in full and should not have sections removed or included in other documents as this can result in misinterpretation of the data by others.

- 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.

SURVEY – showing test locations



GROUND FLOOR PLAN – showing test locations



1 01 Ground Level _ Proposed

1 : 100

proposed alterations & additions

afw	aluminium framed window
asd	aluminium sliding door
asw	aluminium sliding door
co	coping stone
cs	concrete slab
dp	downpipe
gb	glass balustrade
pf	pool fence
pg	pool gate
sc	stone cladding
st	stair
tf	timber floor
tl	tile floor

vanessa miles design + draft

VANESSA MILES
DESIGN & DRAFT
41 York Terrace
Bilgola Plateau
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E vanessajmiles@yahoo.co.uk

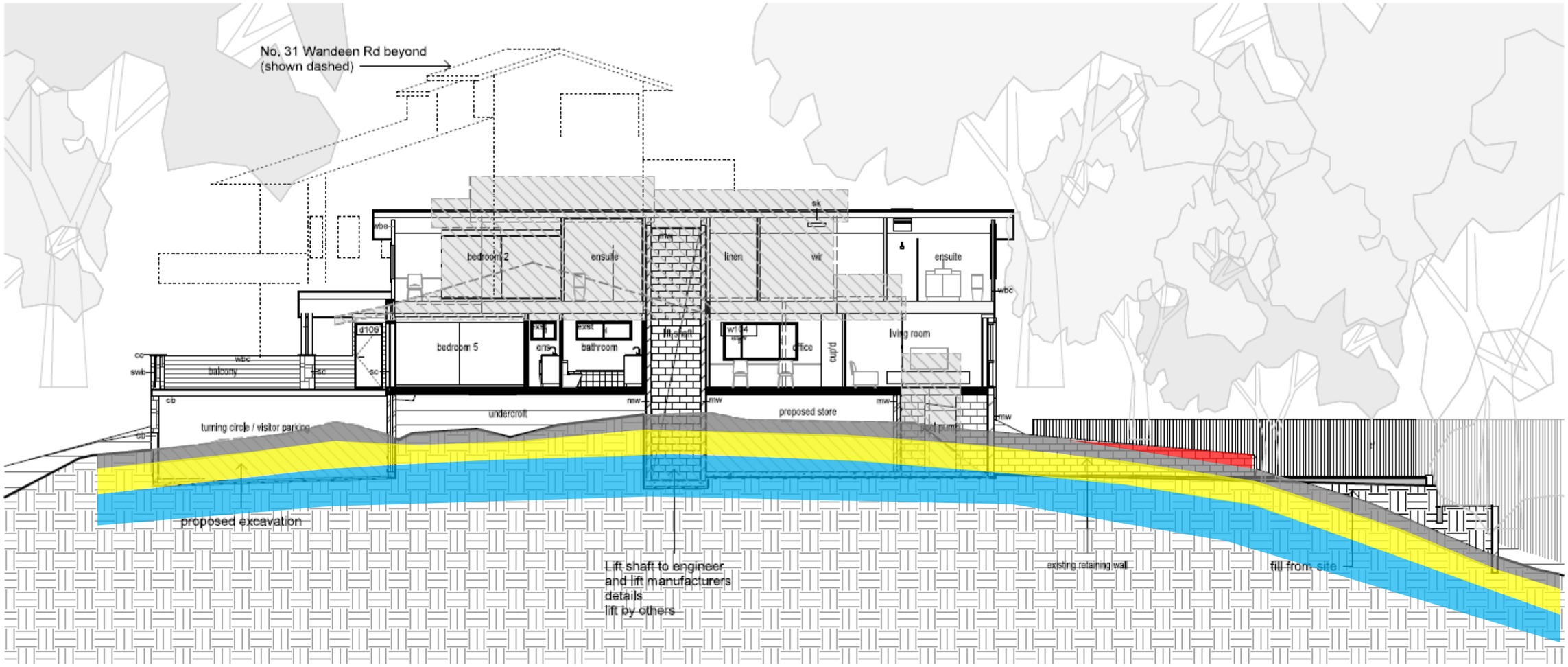
Rev	Description	By	Date
1	Client Revision		9/11/2021
2	Client Revision		23/11/2021
3	Client Revision		22/3/2022

Clareville House
DEVELOPMENT APPLICATION
29 Wandeen Road, Clareville
Lot 69 // DP 13760
for
Trish Quirk

Ground Floor - Proposed

Date	9/11/2021		A05
Project no.	2013		
Drawn by:	VM	Scale	1 : 100

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



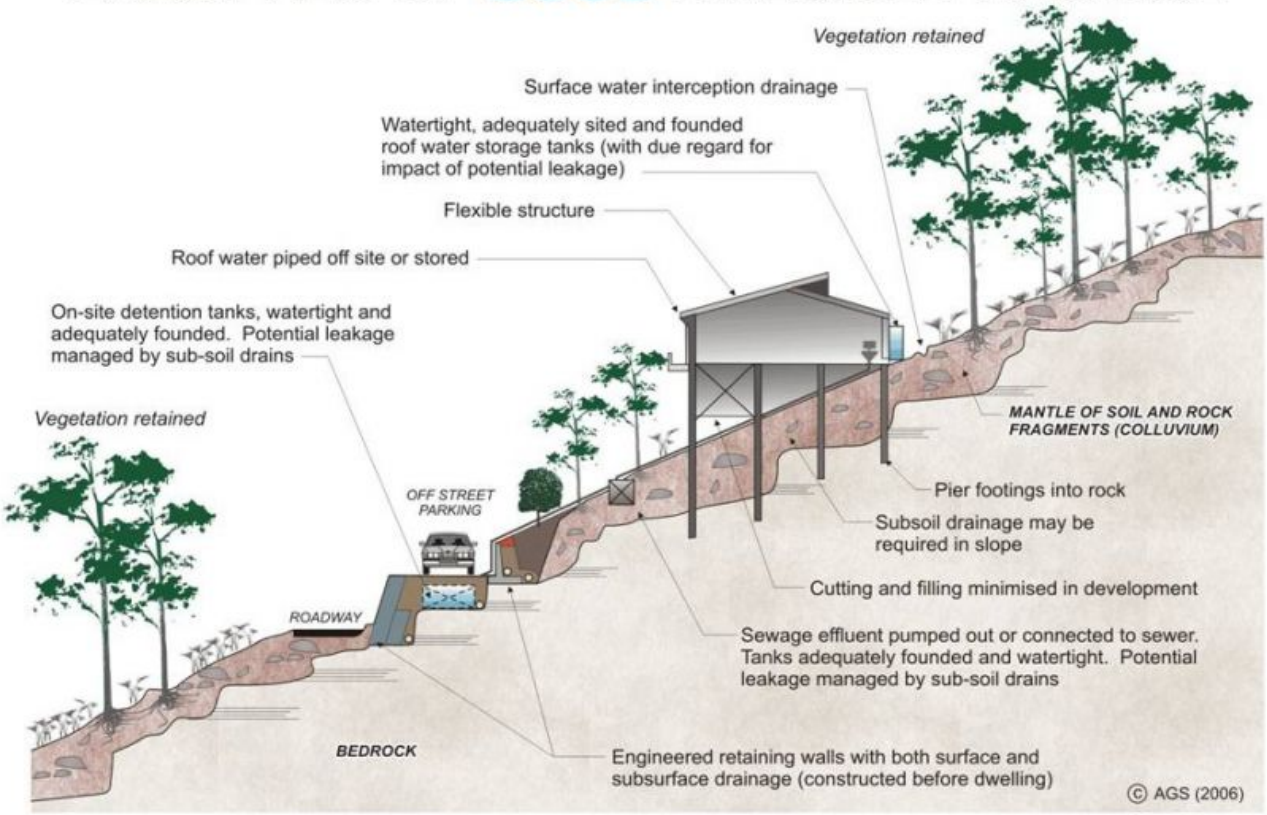
3 **Long Section A-A Demolition**

1 : 100

Fill
Topsoil
Clay
Narrabeen Group Rocks – Very Low to Low Strength Rock

proposed demolition

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE