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

Development Application for _____
Name of Applicant

Address of site 316 Hudson Parade, 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 1/12/22 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 **316 Hudson Parade, Clareville**

Report Date: 1/12/22

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 316 Hudson Parade, 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 **316 Hudson Parade, Clareville**

Report Date: 1/12/22

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **2/10/20 and 25/11/22**
(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 **2/10/20 and 25/11/22**

☒ 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 **316 Hudson Parade, Clareville**

1. Proposed Development

1.1 Demolish the existing sandstone block and brick retaining walls on the uphill side of the house.

1.2 Extend the existing driveway and garage attached to the house on the uphill side and construct a new entertainment area with roof above and new pond by excavating to a maximum depth of ~4.0m.

1.3 Demolish part of the detached garage with studio above, leaving the S wall intact. Rebuild the garage/studio and extend on the E and W sides requiring an excavation to a maximum depth of ~1.6m.

1.4 Demolish part of the existing house, leaving most of the existing floors and walls intact.

1.5 Add a new first floor addition to the existing house.

1.6 Add store rooms on either side of the existing lower ground floor with accessway by excavating to a maximum depth of ~4.7m. Construct a lift connecting the first floor with the upper and lower ground floors of the house.

1.7 Various other internal and external alterations to the existing house.

1.8 Details of the proposed development are shown on 18 drawings prepared by Baxter and Jacobson Architects, job number 346-02, drawings numbered DA Mod 2.00 to DA Mod 2.02, DA Mod 10.00, DA Mod 10.01, DA Mod 10.03 to DA Mod 10.08, DA Mod 20.00 to DA Mod 20.03, DA Mod 30.03, DA Mod 30.11 and DA Mod 30.20, dated 2/11/22.

2. Site Description

2.1 The site was inspected on the 25th November, 2022 and previously on the 2nd October, 2020.

2.2 This residential property is on the low side of the road and has a W aspect. From the upper boundary the natural slope falls at an average angle of ~35° to the uphill side of the house. The natural slope above, beside and below the house has been altered with cut and fills to create level platforms. The cut depths reach a maximum of ~1.8m and the fill height reaches a maximum height ~5.0m. The natural slope below the property falls at an average angle of ~30° that increases to ~45° where the slope falls to the waterfront.

2.3 At the road frontage a steeply graded slope falls to the uphill side of the subject house (Photos 1 & 2). No significant signs of movement were observed in this area. Vehicular access to the property is provided by a shared driveway from the S that cuts across the slope and runs to the existing house and a detached brick garage/studio beside the house (Photos 2 & 3). On the downhill, external supporting wall of the detached garage a vertical crack runs through the supporting concrete footing and brick wall (Photo 4). No deflection was measured in the wall. The structure is currently considered stable and will be demolished as part of the proposed works. Below the detached garage/studio is a sandstone flagging retaining wall that is estimated to be battered back at an angle of ~40° from vertical (Photo 5).

The two storey brick house displays no significant movement in the external supporting walls that could be associated with slope instability (Photo 6). A concrete pool is located below the N side of the house. The pool shell displays no visible signs of movement. The area below the house and beside the pool has been filled for a level lawn area. From visual observations on site the fill reaches a maximum height of ~5.0m on the S side and reduces to ~1.4m on the N end. The S side of the fill is supported by

a gabion basket retaining wall (Photos 7 & 8). Where the wall lines the S common boundary the baskets are slightly bulging. To ensure the ongoing stability of the wall into the future the recommendation in **Section 16** are to be followed. The remaining areas of the wall show no obvious bulging. The N side of the fill is supported by a concrete crib retaining wall that is obscured by thick vegetation (Photo 9). From what could be seen of the wall it appears stable.

2.4 The area below the property has been partly terraced with treated pine retaining walls that appear well constructed. Below the walls the slope falls steeply to the waterfront. Bands of medium strength sandstone outcrop in this area (Photo 10). The exposed sandstone is fractured and is relatively thinly bedded. The exposed rock does not display any significant undercutting or geological defects that could lead to a significant failure that could impact the retaining walls or house above.

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. Seven Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to weathered rock. The location 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 may have occurred for DCP5. 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 (~RL19.2) **–** AH1

Depth (m)	**Material Encountered**
0.0 to 1.2	**FILL**, soil and clay, with rock fragments, brown, dry, fine to course grained.

Refusal @ 1.2m in fill. No watertable encountered.

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** (~RL21.2)	**DCP 2** (~RL21.2)	**DCP 3** (~RL21.2)	**DCP 4** (~RL21.3)	**DCP 5** (~RL21.8)	**DCP 6** (~RL18.0)	**DCP 7** (~RL19.2)
0.0 to 0.3	12	23	20	20	18	4	8
0.3 to 0.6	23	36	21	34	10	5	10
0.6 to 0.9	38	40	25	46	#	5	12
0.9 to 1.2	#	#	#	#		#	15
1.2 to 1.5							15
1.5 to 1.8							17
1.8 to 2.1							21
2.1 to 2.4							25
2.4 to 2.7							25
2.7 to 3.0							24
3.0 to 3.3							26
3.3 to 3.6							#
	Refusal on Rock @ 0.8m	Refusal on Rock @ 0.9m	Refusal on Rock @ 0.8m	Refusal on Rock @ 0.8m	Refusal @ 0.4m	Refusal on Rock @ 0.7m	Refusal @ 3.2m

#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 @ 0.8m, DCP bouncing off rock surface, orange clay on dry tip.
DCP2 – Refusal on rock @ 0.9m, DCP bouncing off rock surface, orange clay on dry tip.
DCP3 – Refusal on rock @ 0.8m, DCP bouncing off rock surface, clean dry tip.
DCP4 – Refusal on rock @ 0.8m, DCP bouncing off rock surface, orange shale fragments on dry tip.
DCP5 – Refusal @ 0.4m, DCP bouncing, light brown clay or rock fragments on dry tip.
DCP6 – Refusal on rock @ 0.7m, DCP bouncing off rock surface, orange clay on wet tip.

DCP7 – Refusal on rock @ 3.2m, DCP bouncing off rock surface, orange shale fragments on dry 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 fill and a thin sandy topsoil over firm to stiff clays. Fill to a maximum depth of ~5.0m provides level platforms for lawn, garden and paved areas across the property. In the test locations, the clays merge into the weathered zone of the under lying rocks at depths of between ~0.7m to ~2.4m below the current surface, being deeper in the filled area (DCP7). The weathered zone of the underlying rock is interpreted as Extremely Low to Low Strength Rock. It is to be noted that this material is a soft rock and can appear as a mottled stiff clay when it is cut up by excavation equipment. 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 clay and 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 works.

7. Surface Water

No evidence of 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 Hudson Parade above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The 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 until retaining structures are in place (**Hazard Two**). The portion of the gabion basket retaining wall that lines the S boundary is a potential hazard (**Hazard Three**).

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two	Hazard Three
TYPE	The steeply graded slope falls across the property and continues above and below failing and impacting on the property.	The proposed excavations for the driveway extension, attached garage extension, new entertainment area, detached garage/studio and storage rooms with accessway collapsing onto the worksite and impacting the neighbouring properties before retaining walls are in place.	Further movement of the gabion basket retaining wall that lines the S common boundary and leads to failure (Photo 8).
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Medium' (20%)	'Medium' (20%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})	'Low' (2×10^{-5})
RISK TO LIFE	8.3×10^{-7}/annum	3.7×10^{-5}/annum	5.6×10^{-6}/annum
COMMENTS	This level of risk is 'ACCEPTABLE', provided the recommendations in **Section 16** are carried out.	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.	This level of risk to life and property is 'ACCEPTABLE' provided the recommendations in **Section 16** are 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

All stormwater from the proposed development is to be piped to Pittwater through any tanks that may be required by the regulating authorities.

11. Excavations

Three excavations are required for the proposed works:

- An excavation to a maximum depth of ~4.0m is required to extend the existing driveway, extend the existing garage attached to the house and construct an entertainment area with pond.
- An excavation to a maximum depth of ~1.6m is required to extend the existing detached garage with studio above.
- An excavation to a maximum depth of ~4.7m is required to construct store rooms either side of the lower ground floor of the house with accessway.

The excavations are interpreted to be through fill, topsoil and clay with Extremely Low to Low Strength Rock expected from depths of between ~0.7m to ~2.4m below the current surface, being deeper in the filled areas.

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. The accessway excavation will likely need to be carried out with hand tools due to access difficulties.

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.

If Medium Strength Rock or better is encountered, excavations through this material should be carried out to minimise the potential to cause vibration damage to the subject house, subject garages and neighbouring structures to the N and S. Allowing for backwall drainage, the setbacks are as follows:

- The excavations come flush or close to flush with the existing house and garages.
- The excavation for the store rooms is set back ~6.5m from the S neighbouring house and ~3.8m from the N neighbouring house.
- The entertainment area with pond excavation is set back ~3.0m from the N 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 5mm/sec at the subject house, subject garages and property boundaries. Vibration monitoring will be required to verify this is achieved.

If a milling head is used to grind the rock, vibration monitoring will not be required. Alternatively, if rock sawing is carried out around the perimeter of the excavation boundaries in not less than 1.0m lifts, a rock hammer up to 300kg could be used to break the rock without vibration monitoring. Peak particle velocity will be less than 5mm/sec at the subject house, subject garages and property boundaries using this method provided the saw cuts are kept well below the rock to be broken.

Should excavation induced vibrations exceed vibration limits after the recommendations above have been implemented, excavation works are to cease immediately and our office is to be contacted.

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

On steep sites such as this one, to help maintain excavation stability before retaining walls are in place, it is critical upslope runoff be diverted from the proposed excavations with temporary or permanent drainage measures. Temporary measures may be trenches and sandbag mounds and permanent measures could be a wide diameter dish drain or similar. These are to be installed before any excavation work commences.

As this job is considered technically complex and due to the depths of the excavations, we recommend it be carried out by builders and contractors who are well experienced in similar work and can provide a proven history of completed work. We recommend a pre-construction meeting between the structural engineer, the builder, and the geotechnical consultant to discuss and confirm the excavation plan and to ensure suitable excavation equipment will be on site.

Bulk Excavations for Garage Extension, Driveway, Entertainment Area and Store Rooms

Allowing for backwall drainage, the setbacks are as follows:

- The entertainment area excavation is set back ~1.3m from the N common boundary.
- The excavation for the store rooms comes underneath the existing subject attached garage and the ground floor of the existing house. This excavation also comes flush with the existing subject detached garage and is set back ~2.3m from the N common boundary, ~3.8m from the N neighbouring house and ~0.5m from the S common boundary.

The above structures and boundaries will be within the zone of influence of the excavations. In this instance, the zone of influence is the area above a theoretical 30° line (from horizontal) through fill/soil and a 45° line through clay/weathered rock from the base of the excavation towards the surrounding structures and boundaries.

Any trees immediately above the proposed cuts are to be assessed by an arborist and removed if their stability will be detrimentally impacted by the excavation.

Due to the depths of the excavations and their proximity to the surrounding structures and boundaries all sides of the excavations will require ground support installed prior to the commencement of the excavations and prior to the demolition of the existing retaining walls. See the Garage/Studio, House/Pavilion and Lower Ground Floor plans attached for the minimum extent of the required shoring shown in blue.

A spaced pile 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 driveway, garage, entertainment area, lower ground floor and ground floor slabs 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.

The proposed accessway runs between the two proposed store rooms. The existing lower ground floor retaining wall that runs beside the accessway will be demolished. The retaining wall is to be demolished from the top down as the excavation is progressed and the ground floor above propped. The portion of the existing garage that is located directly above the excavation is to be demolished.

Excavation for detached garage/studio

Another excavation to a maximum depth of ~1.6m is required to extend the detached garage/studio. The excavation is set back sufficiently from the surrounding structures and boundaries. The soil portion of the excavation is to be battered temporarily at 1.0 Vertical to 2.0 Horizontal (26°) until the retaining walls are in place. Excavations through clay and weathered rock are expected to stand at near vertical angles for short periods of time until the retaining walls are in place, 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 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. If the retaining walls are not constructed within a few days of the excavation being completed temporary shoring will be required.

Advice applying to all excavations

As pointed out above 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. 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 and Topsoil	20	0.40	0.55	N/A
Residual Clays	20	0.35	0.45	K_p = 2.0 'ultimate'
Extremely Low to Very Low Strength Rock	22	0.25	0.38	K_p = 2.5 'ultimate'
Low Strength Rock	24	0.20	0.35	1000kPa '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 the structures above will be acting on the wall. It also assumes retaining structures are fully drained. 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. Ground materials and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

A multi-propped or anchored shoring system can be designed using a rectangular lateral earth pressure distribution using a pressure of 4H kPa for soil/clay and 3H kPa for rock up to low strength, where H is the depth of the excavation in metres (or to the top of competent

medium strength rock). Where small movements are not tolerable, the wall can be designed using a pressure of 6H kPa for soil/clay and 4H kPa for rock up to low strength. Using these values will give relatively conservative support. More refined design can be obtained using an appropriate retaining wall design program.

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 likely hydrostatic pressures are to be accounted for in the structural design.

15. Foundations

The proposed store rooms, garage extensions and pond are expected to be seated in Extremely Low Strength Rock or better on the uphill side. This is a suitable foundation material. On the downhill side where the weathered rock drops away with the slope piers embedded into this ground material will be required to maintain a uniform foundation material across the structure. This ground material is expected at depths of between ~0.7m to ~2.4m below the current surface. A maximum allowable bearing pressure of 600kPa can be assumed for footings embedded in Extremely Low Strength Rock or better. 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 foundations of the existing house and garages are currently unknown, but are expected to be supported on weathered rock. Ideally, 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.

The proposed driveway extension is expected to be seated in Extremely Low Strength Rock or better. The existing driveway is expected to be supported on clay on the downhill side. Construction joints are to be installed between the new and old portions of the driveway to separate the different foundation materials and to accommodate minor differential movement.

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.

16. Ongoing Site Maintenance

The S side of the gabion basket retaining wall is slightly bulging (Photo 8). This structure is currently considered stable but to ensure the ongoing stability into the future we recommend they be inspected by the owners on a biennial basis or after heavy prolonged rainfall, whichever occurs first. A photographic record of the inspections is to be kept. Should further movement be observed the Geotechnical Consultant is to be engaged to assess the structure and provide remedial advice should it be required.

Where slopes are steep and approach or exceed 30°, such as on this site, it is prudent for the owners to occasionally inspect the slope (say annually or after heavy and prolonged rainfall events, whichever occurs first). Should any of the following be observed: movement or

cracking in retaining walls, cracking in any structures, cracking or movement in the slope surface, tilting or movement in established trees, leaking pipes, or newly observed flowing water, or changes in the erosional process or drainage regime, then a geotechnical consultant should be engaged to assess the slope.

We can carry out these inspections upon request. The risk assessment in **Section 8** is subject to this ongoing maintenance being carried out.

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 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 pile for the ground support is being dug to assess the ground strength and to ensure it is in line with our expectations. All finished pile holes for piled wall/excavations for ground support are to be inspected and measured before concrete is placed.

- 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.

Dion Sheldon
BEng(Civil)(Hons),
Geotechnical Engineer.

Reviewed By:

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

Photo 1

Photo 2

Photo 3

Photo 4

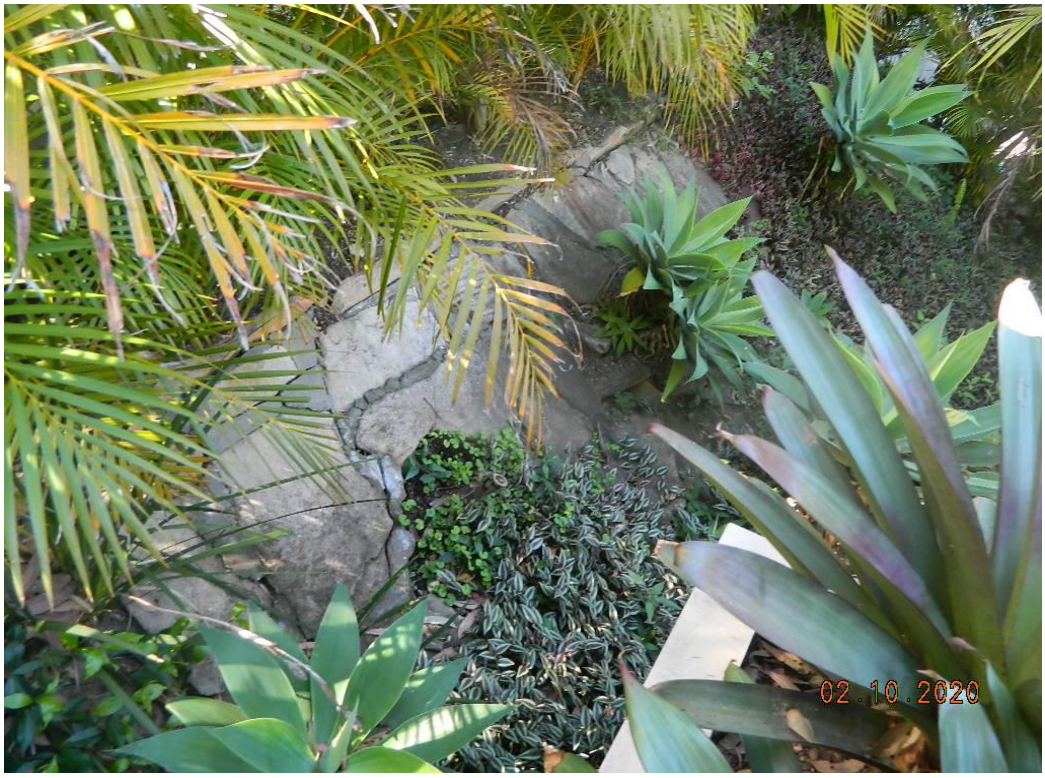


Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

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 tests 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 professional. 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.

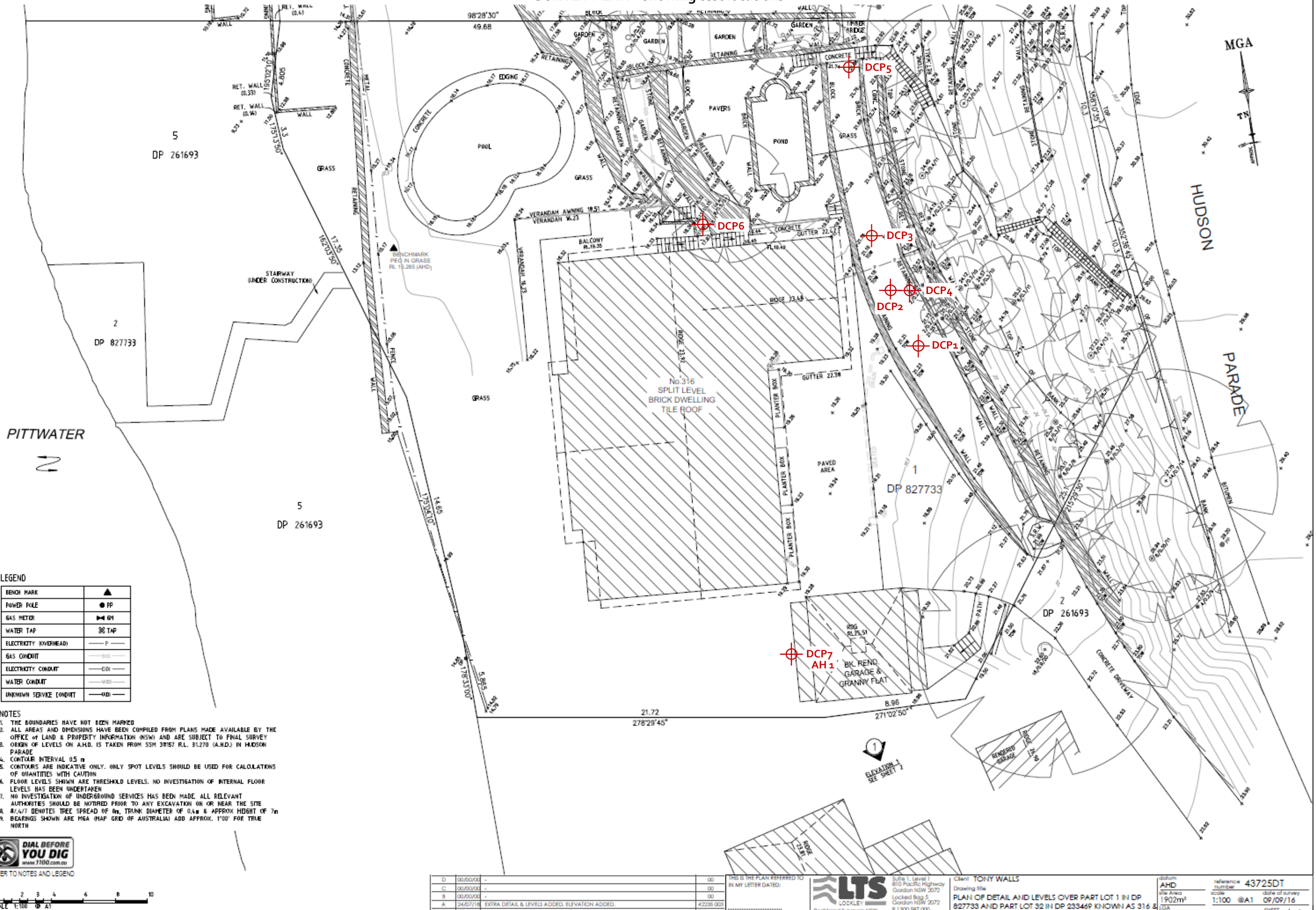
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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 PLAN – showing test locations



LEGEND

BENCH MARK	▲
POWER POLE	● PP
GAS METER	GM
WATER TAP	TAP
ELECTRICITY (OVERHEAD)	—— P ——
GAS CONDUIT	—— G ——
ELECTRICITY CONDUIT	—— ED ——
WATER CONDUIT	—— W ——
UNKNOWN SERVICE CONDUIT	—— UD ——

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED
2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY THE OFFICE of LAND & PROPERTY INFORMATION (NSW) AND ARE SUBJECT TO FINAL SURVEY
3. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM SSM 38157 R.L. 31.270 (A.H.D.) IN HUDSON PARADE
4. CONTOUR INTERVAL 0.5 m
5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
6. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
7. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
8. #/4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
9. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

DIAL BEFORE YOU DIG www.1100.com.au

REFER TO NOTES AND LEGEND

SCALE 1:100 @ A1

Revision	Date	Description	Reference
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	24/07/16	EXTRA DETAIL & LEVELS ADDED. ELEVATION ADDED.	42235 003

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

Registered Surveyor NSW

LTS LOCKLEY
Registered Surveyors NSW
www.lts.com.au
Suite 1, Level 1
810 Pacific Highway
Gordon NSW 2072
Locked Bag 5
Gordon NSW 2072
P 1300 587 000
F 02 9499 7760

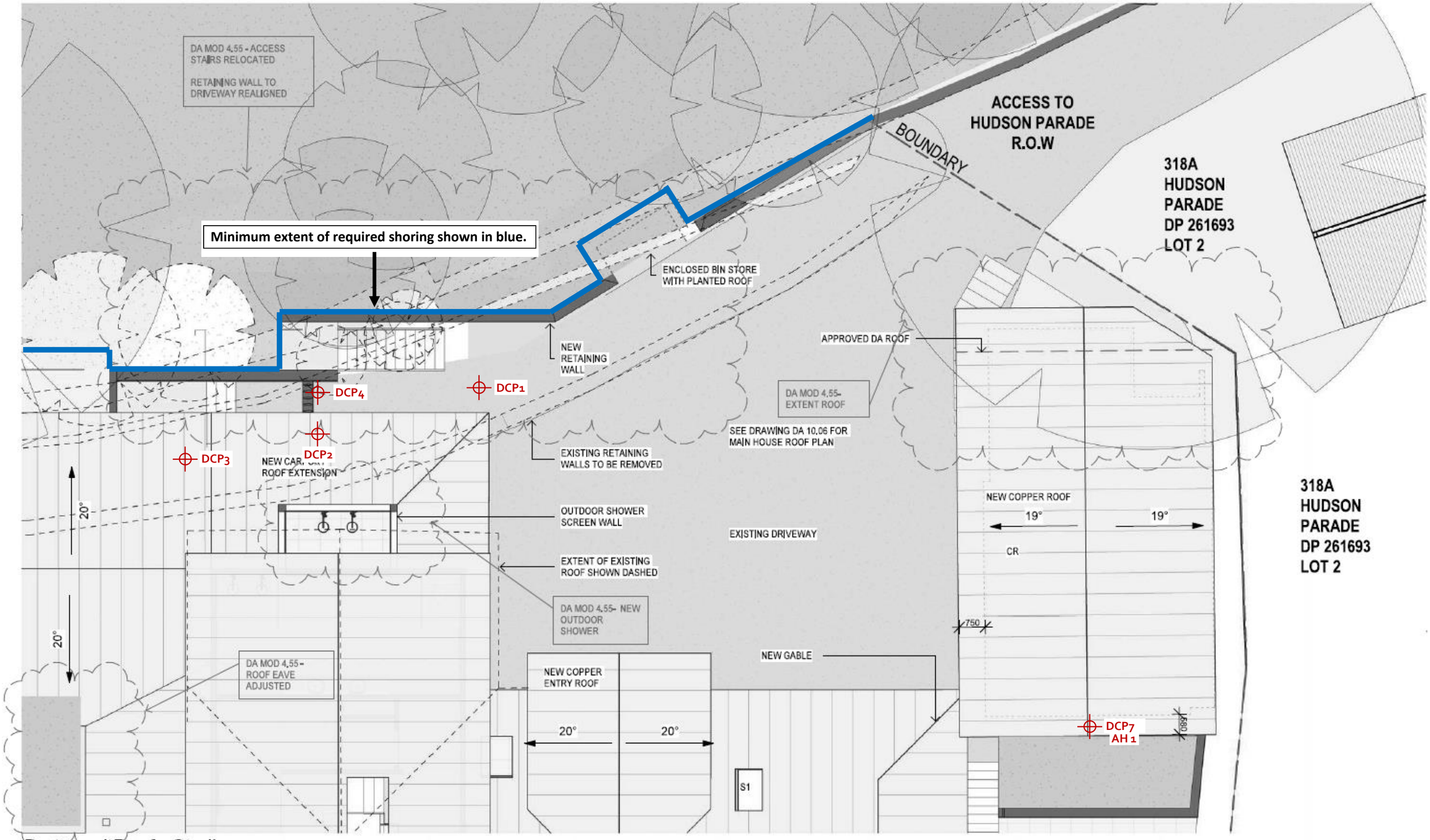
Client TONY WALLS

Drawing title

PLAN OF DETAIL AND LEVELS OVER PART LOT 1 IN DP 827733 AND PART LOT 32 IN DP 233469 KNOWN AS 316 & 314 HUDSON PARADE, CLAREVILLE

datum	AHD
site Area	1902m²
LGA	NORTHERN BEACHES
reference number	43725DT
scale	1:100 @A1
date of survey	09/09/16
SHEET	1 of 2

ROOF PLAN (Garage and Studio) – showing test locations



Proposed Roof - Studio

1 : 100 @ A3

General Notes:

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1	02/11/22	DA MOD 4.55
Issue	Date	Amendment

North Point

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PHONE +612 9977 7648
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Project	316 Hudson Parade
Client	TONY WALLS
Address	316 Hudson Parade Lot 1 DP827733
Design Stage	DA MODIFICATION
Title	ROOF PLAN – GARAGE / STUDIO
Job No	346-02
Drawn	GV
Checked	ls
Scale	1 : 100
Drawing no.	DA Mod 10.07
Issue	1 02/11/22

3/11/2022 12:11:55 PM

ROOF PLAN (House and Pavilion) – showing test locations

Minimum extent of required shoring shown in blue.

STONE CLAD CONCRETE RETAINING WALLS

PROPERTY BOUNDARY

DCP1

DCP2

DCP3

DCP4

DCP5

NEW CARPORT ROOF BELOW

EXISTING RETAINING WALLS TO BE REMOVED

EXTENT OF EXISTING ROOF SHOWN DASHED

DA MOD 4.55- NEW OUTDOOR SHOWER

EXISTING DRIVEWAY

STUDIO

DA MOD 4,55 - ROOF ADJUSTED

REMOVE EXISTING DOWNPIPE. REDIRECT TO NEW DOWNPIPE

NEW GABLE

SKYLIGHT U Value 2.5 SHGC 0.456

NEW PAVILION ROOF

20°

NEW COPPER ENTRY ROOF

DA MOD 4,55 - ROOFLIGHT ADDED

S1

S2

S3

LAWN TERRACE

DA MOD 4,55 - ROOF EAVE ADJUSTED

11°

EXISTING WATER SLIDE

CR

DECK

12°

10°

EXISTING POOL

NEW COPPER ROOF CLADDING

NEW VERANDAH ROOF BELOW

NEW VERANDAH ROOF BELOW

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Issue	Date	Amendment
1	02/11/22	DA MOD 4,55

North Point

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Project	316 Hudson Parade
Client	TONY WALLS
Address	316 Hudson Parade Lot 1 DP827733
Design Stage	DA MODIFICATION
Title	ROOF PLAN - HOUSE AND PAVILION
Job No	346-02
Drawn	GV
Checked	MFB
Scale	1 : 100
Drawing no.	DA Mod 10.06
Issue	1 02/11/22

3/11/2022 12:11:52 PM

LOWER GROUND FLOOR PLAN – showing test locations

DCP4
DCP1
DCP2
DCP3
DCP5
DCP6
DCP7
AH 1

DA MOD 4.55 - INTERNAL LAYOUT ADJUSTED TO SUIT NEW STAIR LAYOUT. DOOR DIMENSIONS ADJUSTED. PLANT STORE AND SAUNA ADDED

Minimum extent of required shoring shown in blue.

26m² TURFED AREA

Existing stair removed

area converted to conditioned space.

Retaining wall access

Retaining wall access

STORE/POOL EQUIPMENT 33 m²

SAUNA 7 m²

LIFT

Bathroom 13 m²

Wine Cellar

BIFOLD DOOR POCKET

SLIDING DOOR POCKET

GAMES ROOM 112 m²

BAR 44 m²

Electrical PLANT 16 m²

WC 3 m²

STORE/PLANT ROOM 18 m²

Louvres

WIR 7 m²

ENSUITE 9 m²

BEDROOM 4

Line of Verandah roof above

Verandah roof above

New double sliding doors

Windows replaced by timber sliding doors

Doors slide in front of fixed glazing

EXISTING DP

EXISTING DP

CHECK ON SITE

4670 210 600 1300 105 2400

6945 DOOR 330 1480 WINDOW 380 5400 DOOR 365 1480 WINDOW 340 240 3840 DOOR 455 1775

4115 4615

4825 4165 6240 4000 DOOR 270 1570 600 220 3000 915 4385 1000

C1 C2 C3 C4 C5 C6 C7 C8 C9 C10

D30 D31 D32 D33 D34 D40 D41 D42

W10 W11

2 DA Mod 10.04

2 DA 30.02

1 DA 30.02

Y DA 30.02

1 DA 30.02

LEGEND

EXISTING WALLS

NEW WALLS

* EXISTING EXTERNAL WALLS GENERALLY DOUBLE SKIN BRICK

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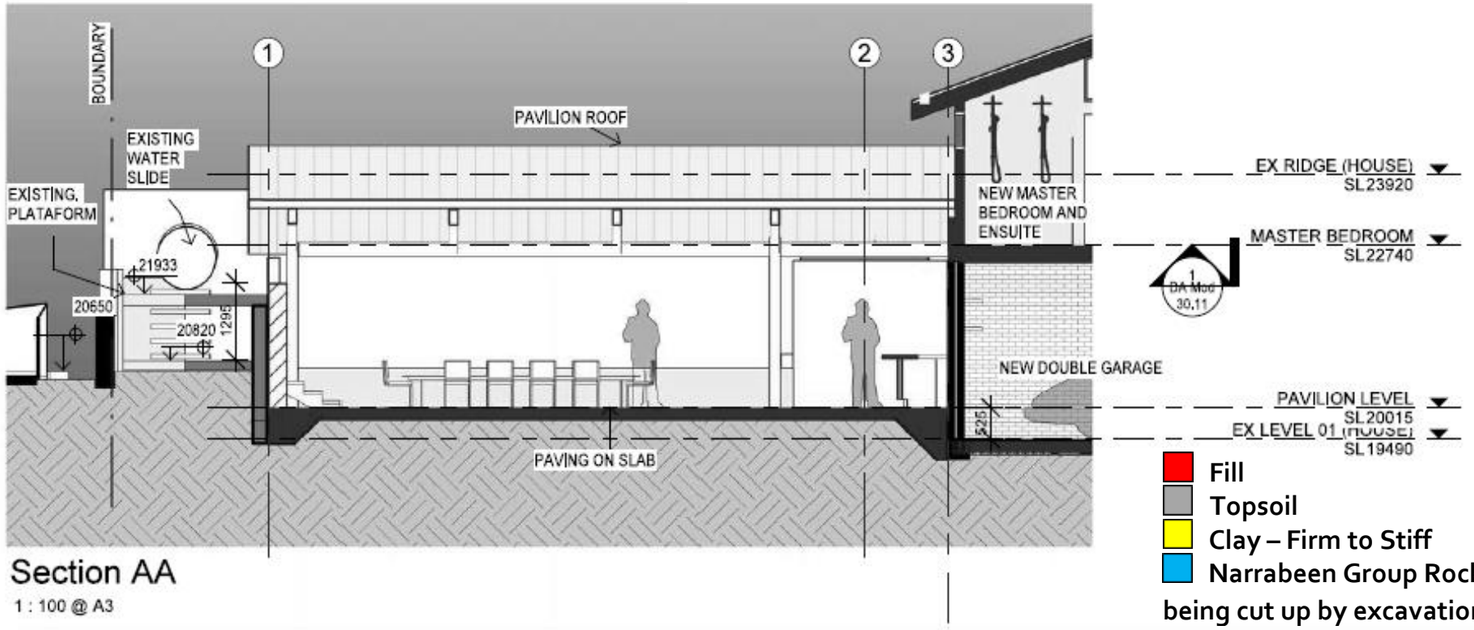
1	02/11/22	DA MOD 4.55	
Issue	Date	Amendment	

Project	316 Hudson Parade	Design Stage	DA MODIFICATION	Job No	346-02
Client	TONY WALLS			Drawn	gv
Address	316 Hudson Parade Lot 1 DP827733	Title	Proposed Lower ground Floor	Checked	MFB
				Scale	1 : 100

Drawing no. DA Mod 10.04
Issue 1 02/11/22

3/11/2022 12:11:42 PM

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



Section AA

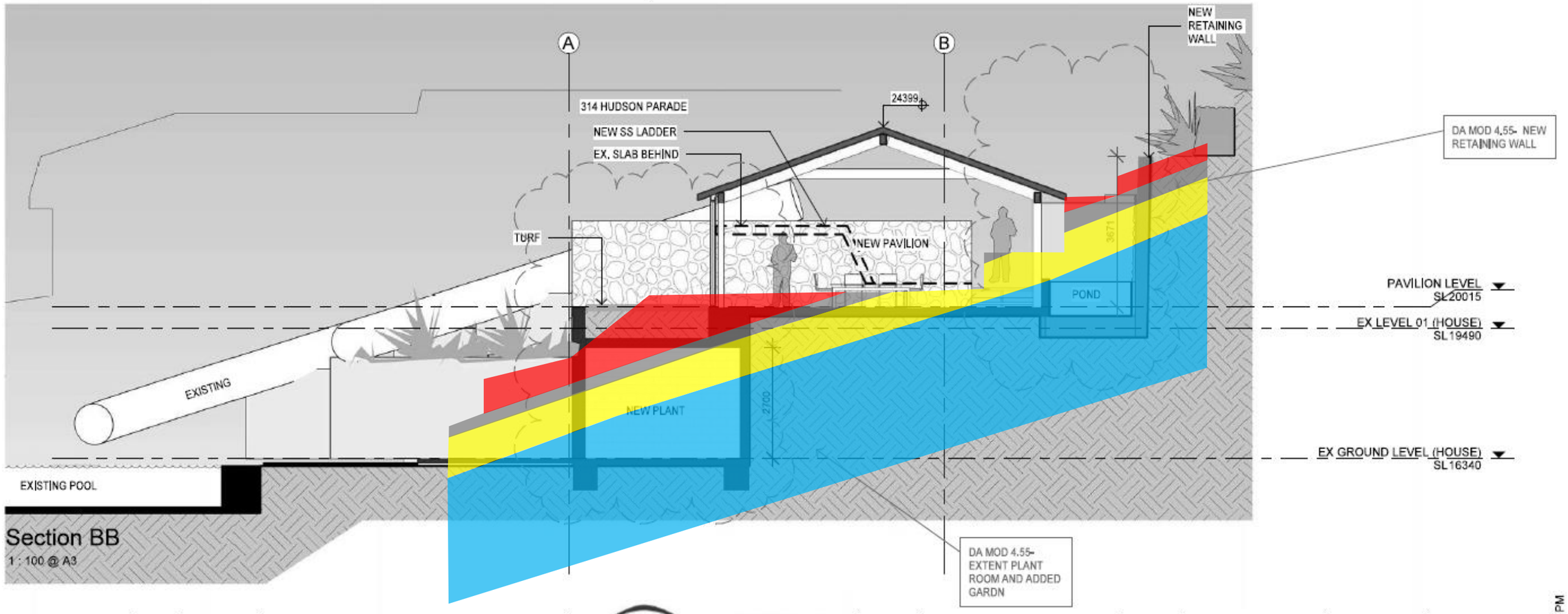
1 : 100 @ A3

Fill

Topsoil

Clay – Firm to Stiff

Narrabeen Group Rocks – Extremely Low to Low Strength Rock - after being cut up by excavation equipment can resemble a stiff to hard clay.



Section BB

1 : 100 @ A3

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Issue	Date	Amendment
1	02/11/22	DA MOD 4,55

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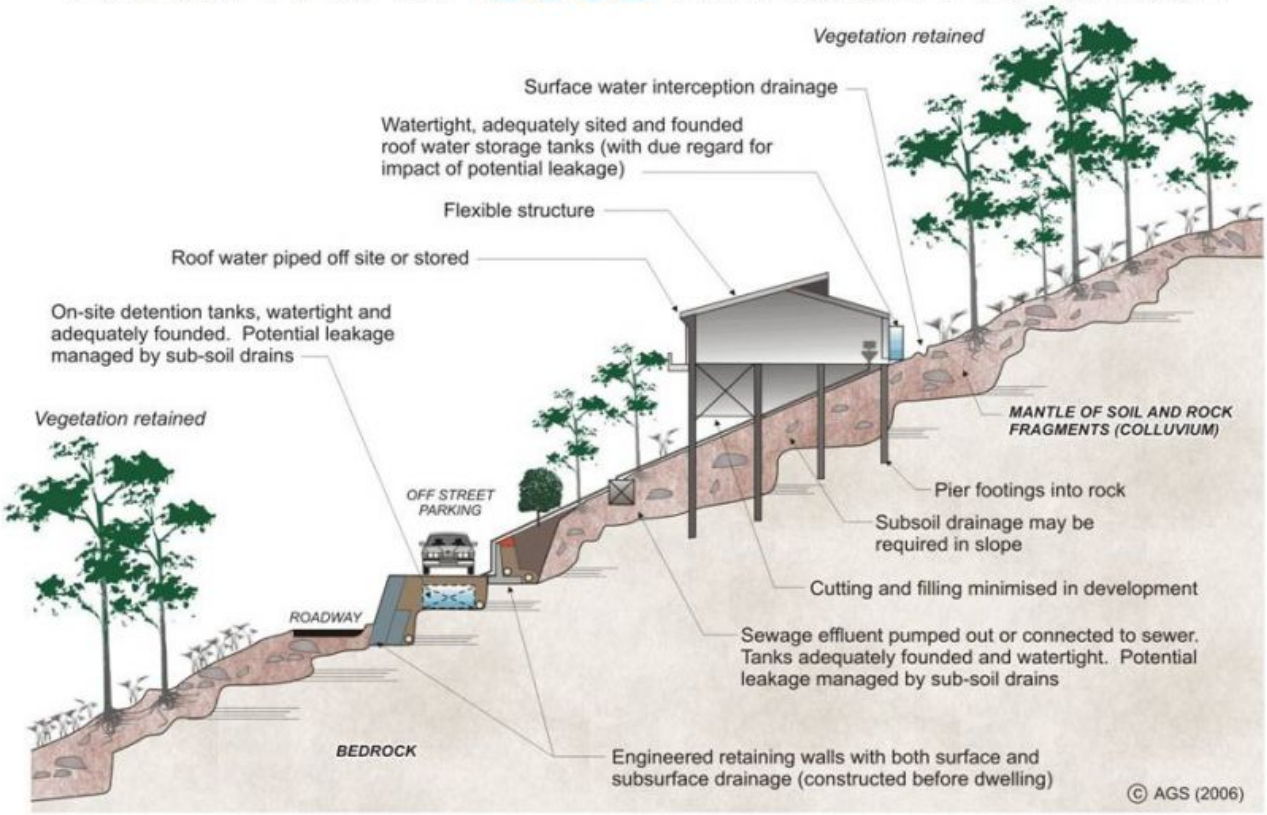
Project	316 Hudson Parade
Client	TONY WALLS
Address	316 Hudson Parade Lot 1 DP827733
Design Stage	DA MODIFICATION
Title	SECTION - PAVILION - AA AND BB
Job No	346-02
Drawn	GV
Checked	MFB
Scale	1 : 100
Drawing no.	DA Mod 30.11
Issue	1 02/11/22

3/11/2022 12:12:43 PM

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE