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

Development Application for _____
Name of Applicant

Address of site 292 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 10/12/24 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 **292 Hudson Parade, Clareville**
Report Date: 10/12/24

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**

REGISTERED PROFESSIONAL GEOSCIENTIST
AUSTRALIAN INSTITUTE OF GEOSCIENTISTS
BENJAMIN WHITE
RPGeo No: 10306

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 292 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 **292 Hudson Parade, Clareville**

Report Date: 10/12/24

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **27/11/24** (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 **27/11/24**

☒ 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:

New Pool and Landscaping at **292 Hudson Parade, Clareville**

1. Proposed Development

1.1 Demolish the existing pool. Construct a new suspended pool with spa and paved area in the N corner of the property.

1.2 Landscaping works at the downhill side of the property requiring filling to an estimated maximum depth of ~3.7m. Construct counterfort retaining walls perpendicular to the landscaping retaining walls. The structural engineer will design the counterfort walls and their layout/placement.

1.3 Details of the proposed development are shown on 7 drawings prepared by Space Landscape Designs, project number 242217, drawings numbered DA-01 to DA-07, Revision B, dated 4/12/24.

2. Site Description

2.1 The site was inspected on the 27th November, 2024.

2.2 This residential property is on the low side of the road and has a NW aspect. It is located on the steeply graded lower reaches of a hillslope. The natural slope falls across the property at an average angle of ~20°. The slope below the property continues at similar steep angles for some 16m before reaching Pittwater. The slope above the property increases in grade and continues at steep angles for some 100m before decreasing in grade.

2.3 The slope at the uphill side of the road and opposite of the subject property rises at very steep angles (Photo 1). Sandstone bedrock outcrops midway up the slope. The slope is densely vegetated where rock is not exposed. At the road frontage, a concrete driveway runs to a double garage at the uphill side of the house (Photo 2).

The part three storey house is supported on masonry walls (Photos 3 & 4). The external supporting walls show no significant signs of movement.

Construction/demolition works are ongoing at the downhill side of the house (Photos 5 & 6). An extreme heavy and prolonged rainfall event occurred during March, 2022. This resulted in movement of the deep fill that had been placed across the downhill side of the property during its development. The posts supporting a timber deck at the downhill side of the existing pool tilted and settled. Severe cracking and defection occurred in a mortared stack rock retaining wall up to ~3.5m, that supported a fill immediately downslope of the pool. The base of the existing pool is undercut at the downhill side, although piers support this side of the pool (Photo 7). The deck, retaining wall and pool have been demolished or partially demolished (Photos 5 & 6). Structural landscaping retaining walls with counterfort returns will be constructed across the downhill side of the property as part of the proposed works to stabilise the slope.

The steep slope below the property is densely vegetated with some rubble from the slope movement (Photos 8 to 10). Detached sandstone joint blocks are scattered across the toe of the slope (Photo 10). A tree has toppled and fallen down the slope in this location (Photo 11). Landslide material is also present at the toe of the slope (Photo 12). It is interpreted that the toppled tree and landslide rubble are the result of the slope movement initiated by the extreme rainfall event in March, 2022, and that was ongoing for some 6 months after.

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. Three 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 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 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 – AH1 (Photo 13)

Depth (m)	Material Encountered
0.0 to 1.2	**FILL**, clay, clayey soil, with some rock fragments, brown, moist to damp, fine to coarse grained.
1.2 to 1.4	**SILTY SAND**, dark brown/grey, damp to wet, fine to medium grained.
1.4 to 1.5	**SANDY CLAY**, grey and maroon, mottled, stiff, damp.

Refusal @ 1.5m, auger grinding on weathered rock. No water table 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**	**DCP 2**	**DCP 3**
0.0 to 0.3	8	1F	1F
0.3 to 0.6	14	2F	1F
0.6 to 0.9	16	6	3
0.9 to 1.2	25	10	3F
1.2 to 1.5	18	42	4
1.5 to 1.8	17	#	8
1.8 to 2.1	28		9
2.1 to 2.4	21		15
2.4 to 2.7	20		24
2.7 to 3.0	32		#
3.0 to 3.3	28		
3.3 to 3.6	#		
	Refusal on Rock @ 3.3m	Refusal on Rock @ 1.5m	Refusal on Rock @ 2.6m

#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 @ 3.3m, DCP bouncing off rock surface, maroon and brown sandy clay on damp tip.

DCP2 – Refusal on Rock @ 1.5m, DCP bouncing off rock surface, brown sandy clay on wet tip, mottled brown and grey sandy clay in collar above tip.

DCP3 – Refusal on Rock @ 2.6m, DCP bouncing off rock surface, brown clay on muddy wet 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 silty sand over firm to stiff clays. Fill to an estimated maximum depth of ~3.5m has been placed across the downhill side of the property. In the test locations, the clays merge into the weathered zone of the underlying rock at depths

of between ~1.5m to ~3.3m below the current surface, being deeper where the fill is deeper. The DCP tests bounced off the rock surface in all three tests. In this instance this does not provide a definitive answer on rock strength as the shale profile is known to have thin sandstone beds through the otherwise 'clay like' rock profile. Until the rock is excavated on site it is assumed the weathered zone of the underlying rock is 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

Ground water seepage is expected to move under the fill and over the denser layers at the natural soil clay interface and over the weathered rock below.

Observations of the slope instability as it was occurring indicates a natural drainage path runs below the fill. This approximates the boundary with No 290 and appears to drain in a WNW direction. The channel was likely filled during the original construction of the road and subdivision.

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

7. Surface Water

Sheet wash from the extreme rainfall event in Feb 2022 and an existing heavily saturated soil profile from persistent higher than average rainfall in the previous year are expected to have been contributing factors leading to the movement of the fill across the downhill side of the property.

Under 'normal' rainfall, 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 existing fill batter at the downhill side of the house is a potential hazard (**Hazard Two**). The proposed landscaping fill is a potential hazard until retaining walls are in place (**Hazard Three**).

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two	Hazard Three
TYPE	The steep slope that falls across the property and continues above and below mass failing and impacting on the house or the proposed works.	The existing fill batter at the downhill side of the house mass failing and impacting on the house or the proposed works.	The proposed landscaping fill failing and impacting on the workers below before the retaining walls are in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (20%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	8.3×10^{-7}/annum	4.2×10^{-5}/annum	3.7×10^{-5}/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 risk to 'ACCEPTABLE' levels the proposed works are to be carried out.	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.

(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. All stormwater runoff is to be collected and piped to Pittwater with reference to council stormwater policy.

11. Excavations

Apart from those for footings and minor levelling, no excavations are required.

12. Fill

Fill will be placed for landscaping across the downhill side of the property. No fills are to be laid until the retaining walls are in place. The fill will reach a maximum depth of ~3.7m. Filling to this depth without appropriate compaction will result in a significant settlement.

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

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

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.

13. 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	Bond Stress
Fill and Topsoil	20	0.40	0.55	N/A	N/A
Residual Clays	20	0.35	0.45	Kp = 2.0 'ultimate'	20kPa 'ultimate'
Extremely Low to Very Low Strength Rock	22	0.25	0.38	Kp = 2.5 'ultimate'	70kPa 'ultimate'
Low Strength Rock	24	0.20	0.35	1000kPa 'ultimate'	300kPa '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, so these will have to be accounted for in wall design. It also assumes retaining structures are fully drained. It should be noted that the

passive pressures and bond stresses are ultimate values 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.

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.

14. Site Classification

The site classification in accordance with AS2870-2011 is Class P due to the depth of the fill and the risk of landslip. The natural clays below the fill / colluvium are interpreted to be moderately reactive.

15. Foundations

The proposed retaining walls are to be supported on piers taken to and embedded no less than 1.5m from the downhill edge of the footing into Extremely Low Strength Rock to Very Low Strength Rock. Should the footing excavation prove the rock is stronger the nominated embedment depth may be reduced accordingly by the Geotechnical Consultant who will confirm the Rock Strength on site as the footing are being dug. Extremely Low Strength Rock is expected at depths of between ~1.5m to ~4.5m below the current surface, being deeper where the fill is deeper. A maximum allowable bearing pressure of 600kPa can be assumed for footings embedded in Extremely Low Strength Rock or better.

The piers that will support the pool are to be embedded at least 1.5m into Extremely Low Strength Rock or better.

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 and inspected.

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 Maintenance

Where slopes are steep and approach or exceed 25°, such as at the downhill side of the property, 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.

- During the drilling of the first pier for the retaining wall foundation, the geotechnical consultant is to be on site to confirm rock strength and the required embedment depth.
- 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) MIEAust NER,
Geotechnical Engineer.

Reviewed By:

Ben White M.Sc. Geol.,
AIG., RPGeo Geotechnical & Engineering.
No. 10306
Engineering Geologist.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13: 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.

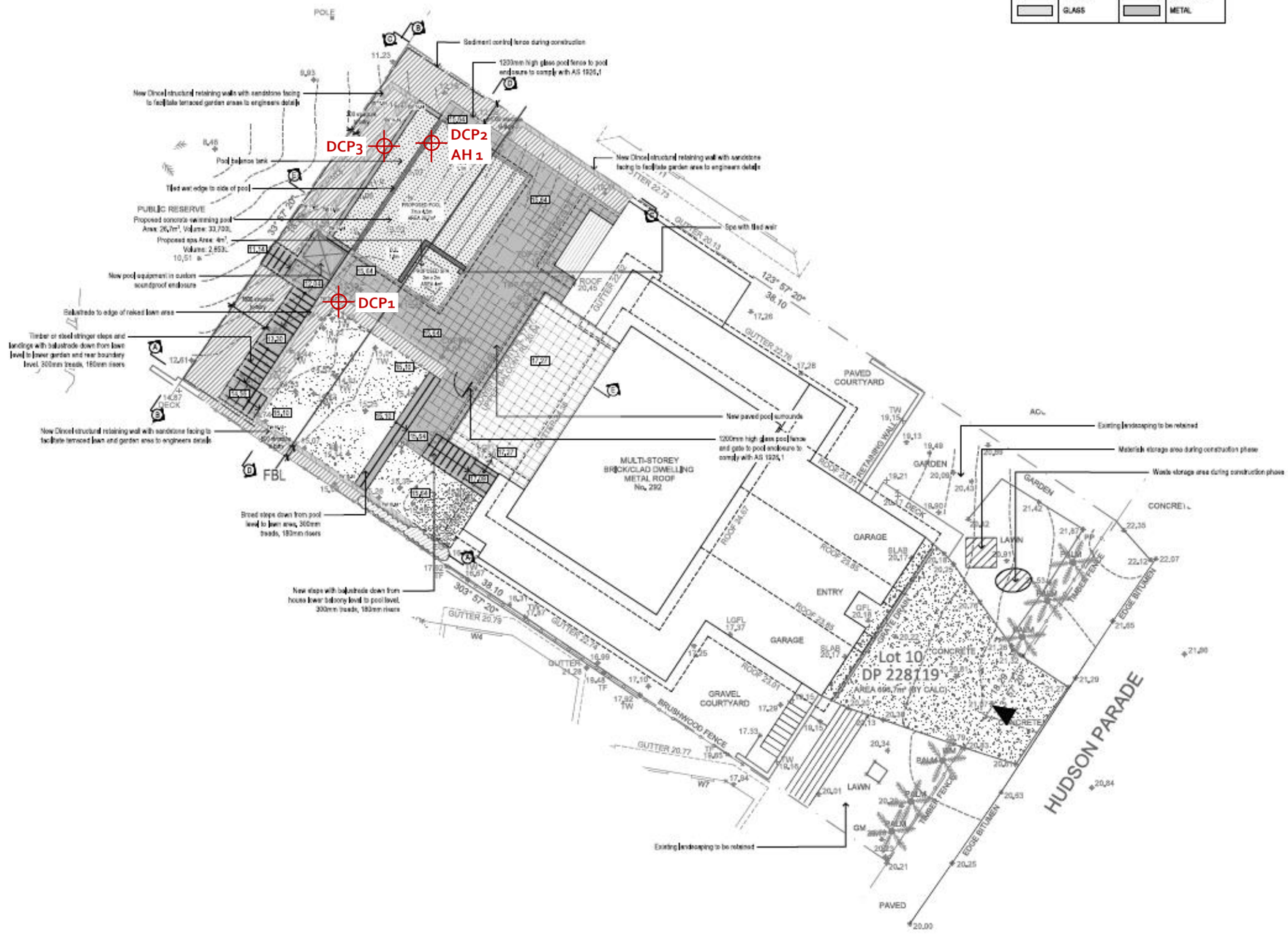
SITE PLAN – showing test locations

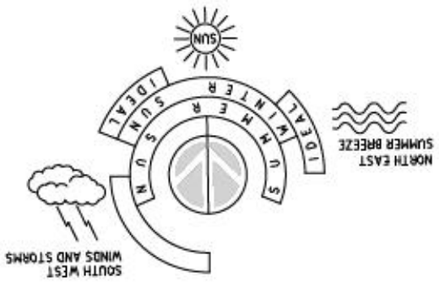
LEGEND

- BOUNDARY
- SEWER
- EX[ST]NG CONTOURS
- BOUNDARY FENCE
- POOL FENCE
- RETA[N]NG WALL
- ALUM[N]UM EDGE
- PROPOSED PAVING
- PROPOSED DECK[N]G
- PROPOSED PLANT[N]G
- TURF
- PROPOSED LEVELS
- SEDIMENT CONTROL FENCE
- TREE TO BE RETAINED

SITE ANALYSIS LEGEND

- SITE VEHICLE ENTRY
- WASTE STORAGE AREA
- MATERIALS STORAGE AREA
- NEW WORKS COLOURS
- TIMBER
- GLASS
- BRICK
- CONCRETE
- METAL





Rev.	Date	Issue	Checked
A	28/10/24	Preliminary Issue	AE
D	04/12/24	DA Issue	AC

SPACE LANDSCAPE DESIGNS

Space Landscape Designs Pty Ltd
ABN 60 799 660 674 ACN 166 314 557
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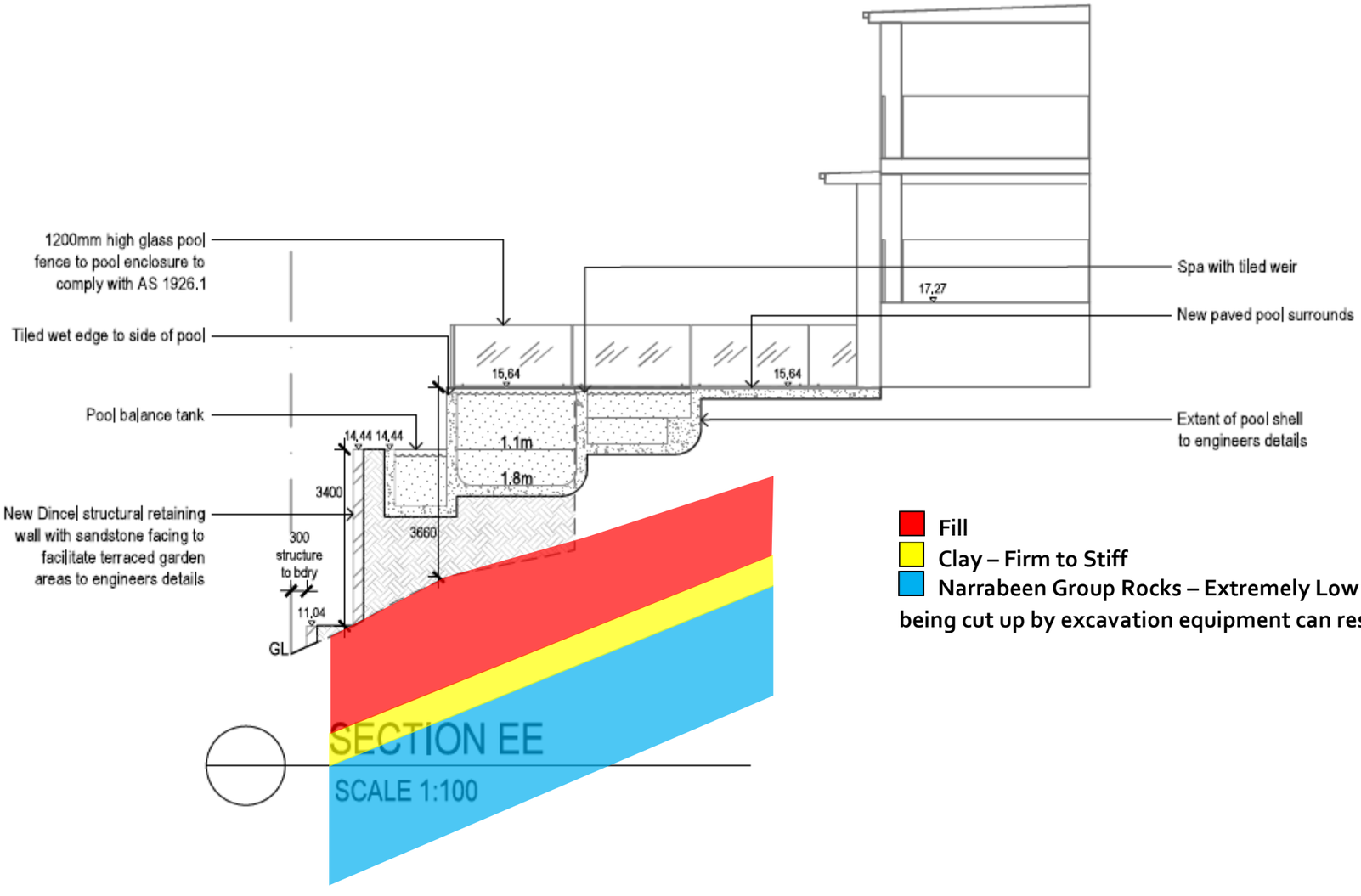
P 02 8905 7970 F 02 8905 7957
Suite 138, 117 Old Pittwater Rd, Brookvale NSW 2100

PROJECT: Landscape & Swimming Pool
SITE ADDRESS: 292 Hudson Parade, CLAREVILLE NSW 2107

CLIENT: Justin Gittoes
DRAWN: T.Browne (BLA#)
SCALE: 1:100@A1
PROJECT NO: 242217

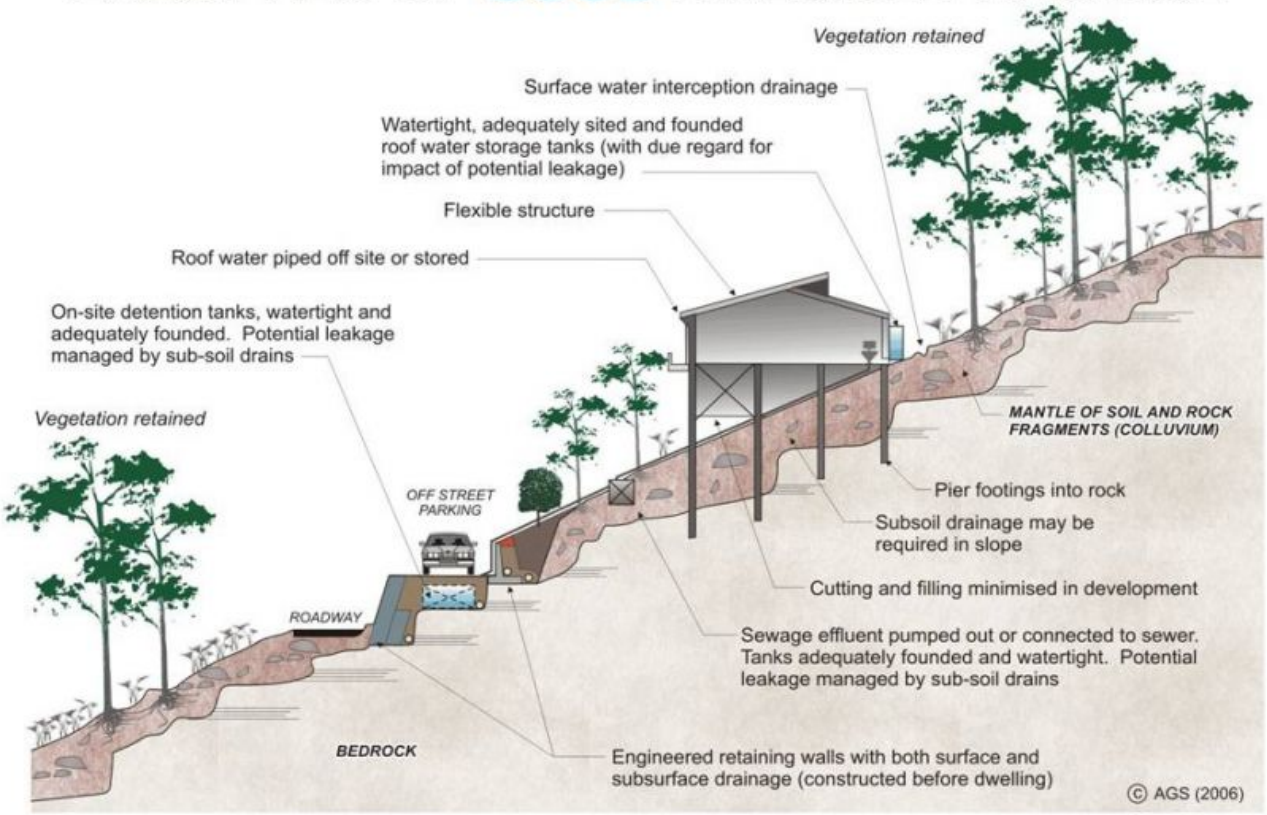
DRAWING TITLE: SITE PLAN & SITE ANALYSIS
DRAWING No: DA-01
Rev: B

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



Fill
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.

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE