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

Development Application for _____
Name of Applicant

Address of site 146 Whale Beach Road, Whale Beach

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 12/12/24 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 **146 Whale Beach Road, Whale Beach**
Report Date: 12/12/24

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**

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 146 Whale Beach Road, Whale Beach

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 **146 Whale Beach Road, Whale Beach**

Report Date: 12/12/24

Author: BEN WHITE

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

Please mark appropriate box

☒ Comprehensive site mapping conducted **17/2/16 & 25/6/18**
(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 **17/2/16 & 25/6/18**

☒ 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 Ld**

GEOTECHNICAL INVESTIGATION:

Alterations and Additions at **146 Whale Beach Road, Whale Beach**

1. Proposed Development

1.1 Demolish the existing driveway and inclined lift. Construct a new widened driveway, carport with studio above and pathway/steps with stair lift by excavating to a maximum depth of ~5.5m.

1.2 Construct a new pool with deck at the downhill side of the house by excavating to a maximum depth of ~2.1m.

1.3 Extend the ground floor of the existing house to the SW by excavating to a maximum depth of ~1.4m.

1.4 Various other minor internal and external alterations and additions.

1.5 Details of the proposed development are shown on 28 drawings prepared by Woodward Architects, drawings numbered A.00 to A.09, B.01 to B.06, C.01, C.02, D.01, D.02 and E.01 to E.08, Revision A, dated 9/12/24.

2. Site Description

2.1 The site was inspected on the 26th July, 2024 and several times previously.

2.2 This residential property is on the high side of the road and has an NE aspect. It is positioned on the moderate to steeply graded upper middle reaches of a hillslope. From the road, the natural slope rises at an average angle of ~18° to the upper boundary where sandstone beds outcrop and form a small rock face. The slope above and below the property continues at similar angles.

2.3 At the road frontage, a concrete driveway runs up the slope to a paved parking area downhill of the house (Photos 1 & 2). A stable sandstone block retaining wall up

to ~1.7m high supports a cut for the driveway and the toe of a fill batter for a garden area above (Photo 1). The fill for the driveway and garden area above are battered at stable angles where they are not supported by retaining walls (Photos 2 & 3). The cut for the parking area is supported by a sandstone block retaining wall that reaches a maximum height of ~3.0m that will be demolished as part of the proposed works (Photo 4). A detached sandstone joint block outcrops above the parking area (Photo 5). The joint block will be removed as part of the proposed works. The single storey brick house is in good condition for its age (Photo 6). A cut to a maximum height of ~1.5m has been made into the slope to provide a level platform for the uphill side of the house (Photo 7). The area above the wall is sparsely-vegetated and rises to a Medium Strength Sandstone bed that outcrops along the upper boundary of the subject property (Photo 8). No signs of slope instability were observed on the property that could have occurred since the property was developed. The adjoining neighbouring properties were observed to be in good order as seen from the street and subject property.

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. Medium Strength Sandstone bands underlie the middle of the site and near the upper boundary and extend through the otherwise shale-dominated profile.

4. Subsurface Investigation

Four Bore Holes (BH) were put down on the site by All Access Drilling as part of a previous report. The holes were carried out with a man portable drill rig using an NMLC core barrel through the softer material and a TT56 barrel through the more competent rock. Photos of the recovered cores are attached (Photos 9 to 12) as well as the drill log summaries. Ten Dynamic Cone Penetrometer (DCP) tests were put down as part of a previous report 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 may have occurred for DCPs 2, 3, 5, & 8. 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:

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** (~RL54.1)	**DCP 2** (~RL54.4)	**DCP 3** (~RL53.5)	**DCP 4** (~RL51.6)	**DCP 5** (~RL53.0)
0.0 to 0.3	6	1F	1F	1F	1F
0.3 to 0.6	4F	6	7	16	4F
0.6 to 0.9	7	19	14	3F	8
0.9 to 1.2	12	21	#	6	30
1.2 to 1.5	17	#		11	#
1.5 to 1.8	34			19	
1.8 to 2.1	#			24	
2.1 to 2.4				11	
2.4 to 2.7				#	
	End of Test @ 1.7m	Refusal on Rock @ 1.1m	Refusal on Rock @ 0.9m	Refusal on Rock @ 2.2m	Refusal on Rock @ 1.2m

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

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 6** (~RL51.5)	**DCP 7** (~RL49.4)	**DCP 8** (~RL54.4)	**DCP 9** (~RL63.4)	**DCP 10** (~RL63.4)
0.0 to 0.3	1F	1F	1F	28	6
0.3 to 0.6	3	2F	6	10	22
0.6 to 0.9	5F	11	19	14	38
0.9 to 1.2	7	36	#	50	#
1.2 to 1.5	14	#		#	
1.5 to 1.8	42				
1.8 to 2.1	#				
	End of Test @ 1.6m	End of test @ 1.2m	Refusal on Rock @ 0.9m	Refusal @ 1.2m	End of Test @ 0.9m

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

DCP Notes:

DCP1 – End of test @ 1.7m, DCP thudding on rock, clean dry tip.
DCP2 – Refusal on rock @ 1.1m, DCP bouncing off rock surface, white and orange rock fragments on dry tip.
DCP3 – Refusal on rock @ 0.9m, DCP bouncing off rock surface, orange rock fragments on dry tip.
DCP4 – Refusal on rock @ 2.2m, DCP bouncing off rock surface, clean dry tip.
DCP5 – Refusal on rock @ 1.2m, DCP bouncing off rock surface, red and white rock fragments on dry tip.
DCP6 – End of test @ 1.6m, DCP still very slowly going down, clean dry tip.
DCP7 – End of test @ 1.2m, DCP still very slowly going down, orange shale fragments on dry tip.
DCP8 – Refusal on rock @ 0.9m, DCP bouncing off rock surface, clean dry tip.
DCP9 – Refusal @ 1.2m, DCP thudding, white impact dust on dry tip.
DCP10 – End of test @ 0.9m, DCP still very slowly going down, white impact dust on dry tip.

5. Geological Observations/Interpretation

In the test locations, shallow sandy soil overlies a Firm to Stiff Clay that extends to depths of ~2.0m. This is underlain by Extremely Low to Low Strength Shale and Laminite with occasional clay zones. The rock quality generally improves beyond 4.0m with Low to Medium Strength Laminite encountered in most holes. Fine grained Very Low to High Strength Sandstone was present beyond 5.0m. The profile in BH 4 varied from the others and appeared to consist of a dislodged sandstone joint block from the rock face above through the first 3.0m. The DCP tests that encountered refusal at shallow depths likely refused on buried sandstone boulders as an unusually high number of sandstone boulders lay embedded and exposed on the slope. See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Ground water seepage is expected to move over the denser and less permeable clay and weathered rock layers in the sub-surface profile and through the cracks in the rock. 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

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 so drainage should be installed to capture these flows and pipe them to the road.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The moderate to steeply graded slope that rises across the property and continues above and below is a potential hazard (**Hazard One**). The vibrations from the proposed excavations are a potential hazard (**Hazard Two**). The proposed excavations are a potential hazard until retaining structures are

in place (**Hazard Three**). The surcharge loads from the proposed pool acting on the proposed retaining wall below is a potential hazard (**Hazard Four**).

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The moderate to steep slope that rises across the property and continues above and below failing and impacting on the property.	The vibrations produced during the proposed excavations impacting on the surrounding structures.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (15%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	8.3×10^{-7}/annum	5.3×10^{-7}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'	This level of risk to 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)

RISK ANALYSIS SUMMARY CONTINUES ON NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard Three	Hazard Four
TYPE	The proposed excavations (up to a depth of ~5.5m) collapsing onto the work site and impacting the neighbouring properties before the retaining structures are in place.	The proposed pool surcharge loads acting on the proposed retaining wall below causing failure.
LIKELIHOOD	'Possible' (10^{-3})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (30%)	'Medium' (12%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	3.7×10^{-4}/annum	5.0×10^{-5}/annum
COMMENTS	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 'UNACCEPTABLE'. To move the risk to 'ACCEPTABLE' levels, the recommendations in **Section 15** 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 Whale Beach Road. All stormwater from the proposed development 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 ~5.5m will be required to construct the proposed new widened driveway, carport with studio above and pathway/steps with stair lift.

Another excavation to a maximum depth of ~2.1m will be required to construct the proposed pool with deck.

A third excavation to a maximum depth of ~1.4m will be required to extend the existing house to the SW.

The excavations are expected to be through fill, colluvium, sandy soil and Firm to Stiff Sandy Clays with large sandstone boulders throughout the profile. Extremely Low to Low Strength Shale and Laminite is expected at an average depth of ~2.0m below the current surface. Very Low to High Strength Sandstone may be encountered near the base of the excavation for the inclined lift and carport.

It is envisaged that excavations through fill, colluvium, sandy soil, sandy clays, and rock up to Low Strength can be carried out with an excavator and toothed bucket and excavations through Medium Strength Rock or better will require grinding or rock sawing and breaking.

12. Vibrations

Possible vibrations generated during excavations through fill, colluvium, soil, clay, and rock up to Low Strength will be below the threshold limit for building damage utilising a domestic sized excavator up to 16 tonne.

Excavations through Medium Strength Rock or better should be carried out to minimise the potential to cause vibration damage to the E neighbouring property and the sewer main (150mm diameter ductile iron cement (mortar) lined pipe). Allowing 0.5m for backwall drainage, the proposed carport, studio and pathway/steps excavation is set back ~3.8m from the E neighbouring house and ~0.5m from the sewer main.

Dilapidation reporting carried out on the E neighbouring property is recommended prior to the excavation works commencing to minimise the potential for spurious building damage claims.

Excavation methods are to be used that limit peak particle velocity to 5mm/sec at the E neighbouring house and 10mm/sec at the sewer main. 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.

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

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

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 houses.

13. Excavation Support Requirements

Bulk Excavation for Driveway, Carport, Studio and Pathway/Steps

An excavation to a maximum depth of ~5.5m will be required to construct the proposed new widened driveway, carport with studio above and pathway/steps with stair lift. Allowing 0.5m for backwall drainage, the setbacks are as follows:

- The carport and pathway/steps portion of the excavation is set back ~0.5m from the sewer main, ~2.0m from the E common boundary and ~3.8m from the E neighbouring house.
- The demolition of the existing retaining wall (Photo 4) will expose a cut batter that comes flush with the W common boundary.

The above structures and property boundaries will be within the zone of influence of the excavation. 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 or the top of Medium Strength Rock, whichever comes first, towards the surrounding structures and boundaries.

Due to the depth of the excavation and its proximity to the surrounding structures and property boundaries, all sides of the excavation will require ground support prior to the commencement of the excavation and prior to the demolition of the existing sandstone block retaining wall (Photo 4).

A spaced pile retaining wall is one of the suitable methods of support. See the Carport Level and Studio Level plans attached for the minimum extent of the required piling shown in blue. 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. 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 pool shell and tied into the driveway, carport, pathway and studio 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 pile holes/excavations installed for ground support purposes.

Bulk Excavation for Pool

Another excavation to a maximum depth of ~2.1m will be required to construct the proposed pool with deck. The excavation is set back sufficiently from the surrounding structures and property 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.

Bulk Excavation for Ground Floor Extension

A third excavation to a maximum depth of ~1.4m will be required to extend the existing house to the SW. Allowing 0.5m for backwall drainage, the excavation comes close to flush with the W common boundary.

The W side of the cut will need to be temporarily or permanently supported prior to the commencement of the excavation, or during the excavation process in a staged manner, so cut batters are not left unsupported. The support will need to be designed by the structural engineer. See the Ground Level plan attached for the minimum extent of the required shoring shown in green.

Where shoring is not required, the fill/topsoil 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.

Advice Applying to All Excavations

During the excavation process, the geotechnical consultant is to inspect the cut face in 1.5m intervals as it is lowered to ensure ground materials are as expected and that additional support is not required.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. 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 cannot blow off in a storm. The materials and labour to construct the retaining walls are to be organised so shoring walls can be installed as required. The excavations are to be carried out during a dry period. No excavations are to commence if heavy or prolonged rainfall is forecast. If the cut batters remain unsupported for more than a few days before the construction of the retaining walls / pool structure they are to be temporarily supported until the retaining walls / pool structure are in place.

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 ON NEXT PAGE

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, and Sand	20	0.40	0.55	N/A
Residual Clays	20	0.35	0.45	Kp = 2.0 'ultimate'
Extremely Low to Low Strength Rock	22	0.25	0.38	Kp = 2.5 'ultimate'
Medium to High Strength Rock	24	0.00	0.01	2000kPa '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 slope and structures above will be acting on the wall that will need to be accounted for in the design. 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.

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. Site Classification

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

16. Foundations

The proposed carport, studio, pool, and ground floor addition are expected to be seated in Extremely Low Strength Rock or better on the uphill side. This is a suitable foundation material. Where the proposed structures are not seated in this ground material, piers taken to and embedded no less than 0.6m into Extremely Low Strength Rock or better will be required to maintain a uniform foundation material across the structure. This ground material is expected at depths of between ~0.9m to ~3.8m below the current surface, being deeper where the fill/colluvium is deeper (BH1) and slightly variable due to a variable weathering profile. 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 proposed new retaining wall downhill of the proposed pool is to be designed to cope with the surcharge loads from the pool. Alternatively, the footings that will support the pool are to be taken to below the base of the retaining wall.

The foundations supporting the existing house are currently unknown. Ideally, footings should be founded on the same footing material across the old and new portions of 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 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.

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.

REQUIRED INSPECTIONS ON NEXT PAGE

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.

- During the excavation process, the geotechnical consultant is to inspect the cut face in 1.5m intervals as it is lowered to ensure ground materials are as expected and that additional support is not required.

- 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.

Reviewed By:

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

Nathan Gardner B.Sc. (Geol. & Geophys. & Env. Stud.)
AIG., RPGeo Geotechnical & Engineering.
No. 10307
Engineering Geologist & Environmental Scientist.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9: BH1

Photo 10: BH2

Photo 11: BH3

Photo 12: BH4

Drill Log Summary

BORE HOLE 1 (~RL57.7) **–** BH1 (Photo 9)

Depth (m)	Material Encountered
0.0 to 0.3	**FILL**: dark brown, silty sand with sandstone fragments, damp
0.3 to 0.6	**SAND**: grey, damp
0.6 to 1.0	**CLAYEY SAND**: grey, damp
1.0 to 2.1	**CLAY**: grey and brown mottled, damp
2.1 to 3.1	**EXTREMLY LOW STRENGTH SHALE**: red brown to grey
3.1 to 3.5	**CORE LOSS**
3.5 to 4.5	**SANDY CLAY**: red brown
4.5 to 5.2	**VERY LOW STRENGTH SHALE**: brown to grey laminite Class III with occasional alternate thin bands <0.05m class V
5.2 to 6.2	**MEDIUM TO HIGH STRENGTH SANDSTONE**: brown to grey fine grained

End of hole @ 6.2m sandstone. No watertable encountered.

BORE HOLE 2 (~RL60.5) **–** BH2 (Photo 10)

Depth (m)	Material Encountered
0.0 - 0.1	**BRICK PAVING**
0.1 - 0.7	**FILL**: brown, sandy clay, damp
0.7 - 1.3	**CLAYEY SAND**: brown, damp
1.3 - 1.9	**SANDY CLAY**: brown, damp
1.9 - 2.2	**CLAY**: grey and brown mottled, damp
2.2 to 2.5	**EXTREMLY LOW STRENGTH SHALE**: yellow brown to grey
2.5 to 4.4	**VERY LOW STRENGTH SHALE**: brown to grey laminite Class III with occasional alternate bands of Class V
4.4 to 5.2	**LOW STRENGTH SHALE**: brown to grey laminite
5.2 to 5.6	**VERY LOW STRENGTH SHALE**: brown to grey laminite Class III with occasional alternate thin bands <0.05m class V
5.6 to 6.0	**MEDIUM STRENGTH SANDSTONE**: brown fine grained

End of hole @ 6.0m sandstone. No watertable encountered.

BORE HOLE 3 (~RL60.5) **–** BH2 (Photo 11)

Depth (m)	Material Encountered
0.0 - 0.1	**SANDSTONE PAVING**
0.1 - 0.5	**FILL**: dark brown, silty sand, damp
0.5 - 1.0	**SAND**: dark grey, damp
1.1 - 1.5	**CORE LOSS**
1.5 to 2.1	**SANDY CLAY**: yellow brown
2.1 to 2.6	**CLAY**: grey firm to stiff
2.6 to 4.2	**VERY LOW STRENGTH SHALE**: brown to grey laminite Class III with occasional alternate thin bands <0.08m class V
4.2 to 5.0	**LOW STRENGTH SHALE**: grey to brown laminite
5.0 to 6.0	**MEDIUM STRENGTH SANDSTONE**: grey/brown fine grained

End of hole @ 6.0m sandstone. No watertable encountered.

BORE HOLE 4 (~RL58.7) **–** BH1 (Photo 12)

Depth (m)	Material Encountered
0.0 to 0.5	**FILL**: dark brown, silty sand with sandstone fragments, damp
0.5 to 0.9	**SAND**: grey, damp
0.9 to 1.3	**SANDY CLAY**: grey, damp
1.3 to 3.0	**FLOATING BOULDER**: medium strength sandstone, possibly dislodges joint block from rock face above.
3.0 to 3.5	**CORE LOSS**
3.5 to 3.8	**CLAY**: grey firm to stiff
3.8 to 4.2	**VERY LOW STREGNTH SANSTONE**: grey fine grained
4.2 to 5.0	**LOW STRENGTH SANDSTONE**: grey to maroon Class III with occasional alternate bands <0.12m of class V
5.0 to 5.6	**MEDIUM STRENGTH SANDSTONE**: red brown to grey fine grained

End of hole @ 5.6m sandstone. No watertable encountered.

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.

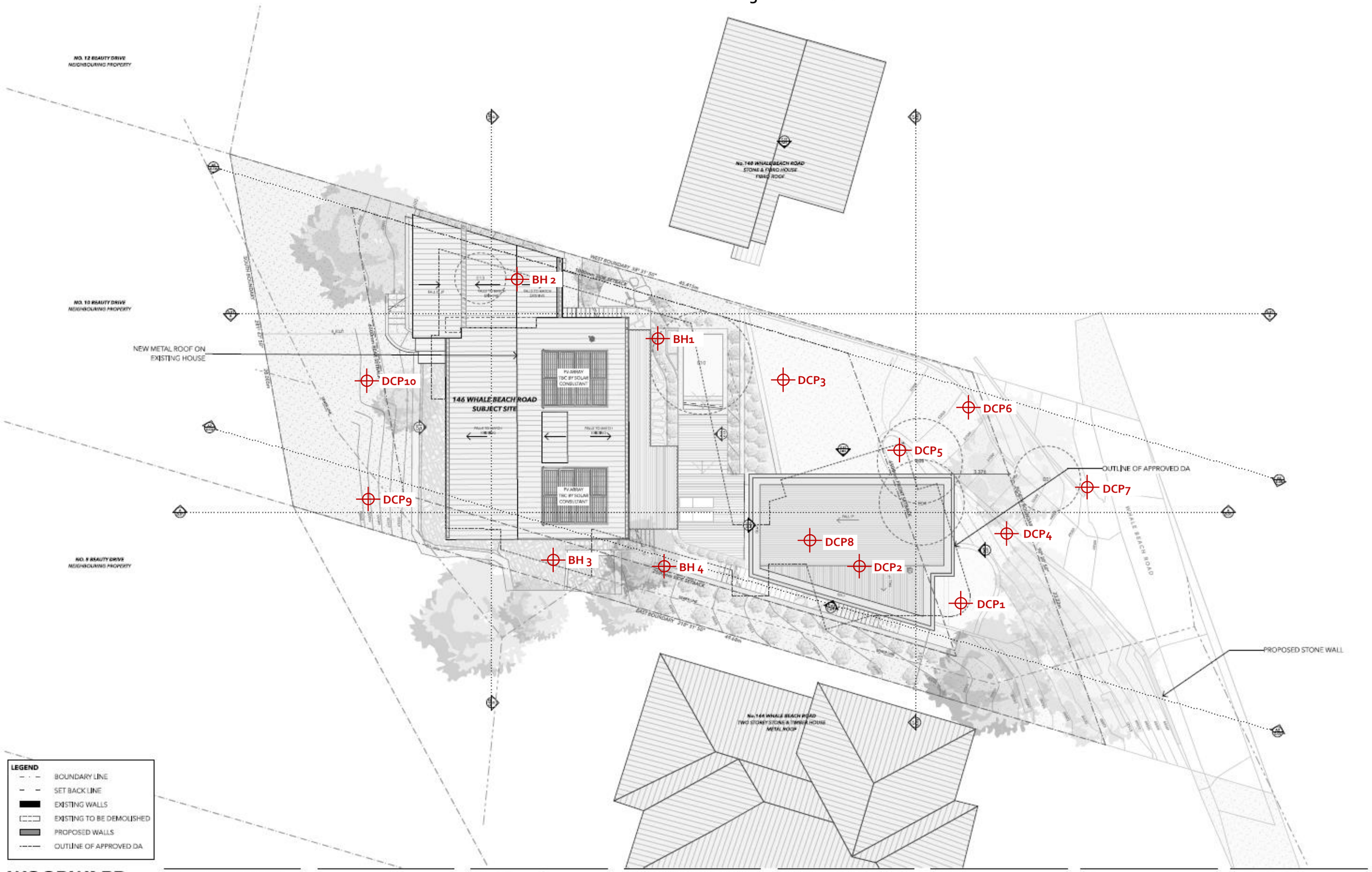
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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 LINE
- SET BACK LINE
- EXISTING WALLS
- EXISTING TO BE DEMOLISHED
- PROPOSED WALLS
- OUTLINE OF APPROVED DA

WOODWARD ARCHITECTS

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REV	DATE	FOR
A	9/12/2024	DA

CLIENT: TIM & FRANCK DYROFF

PROJECT: 146 WHALE BEACH

STATUS: DEVELOPMENT APPLICATION

TRUE NORTH

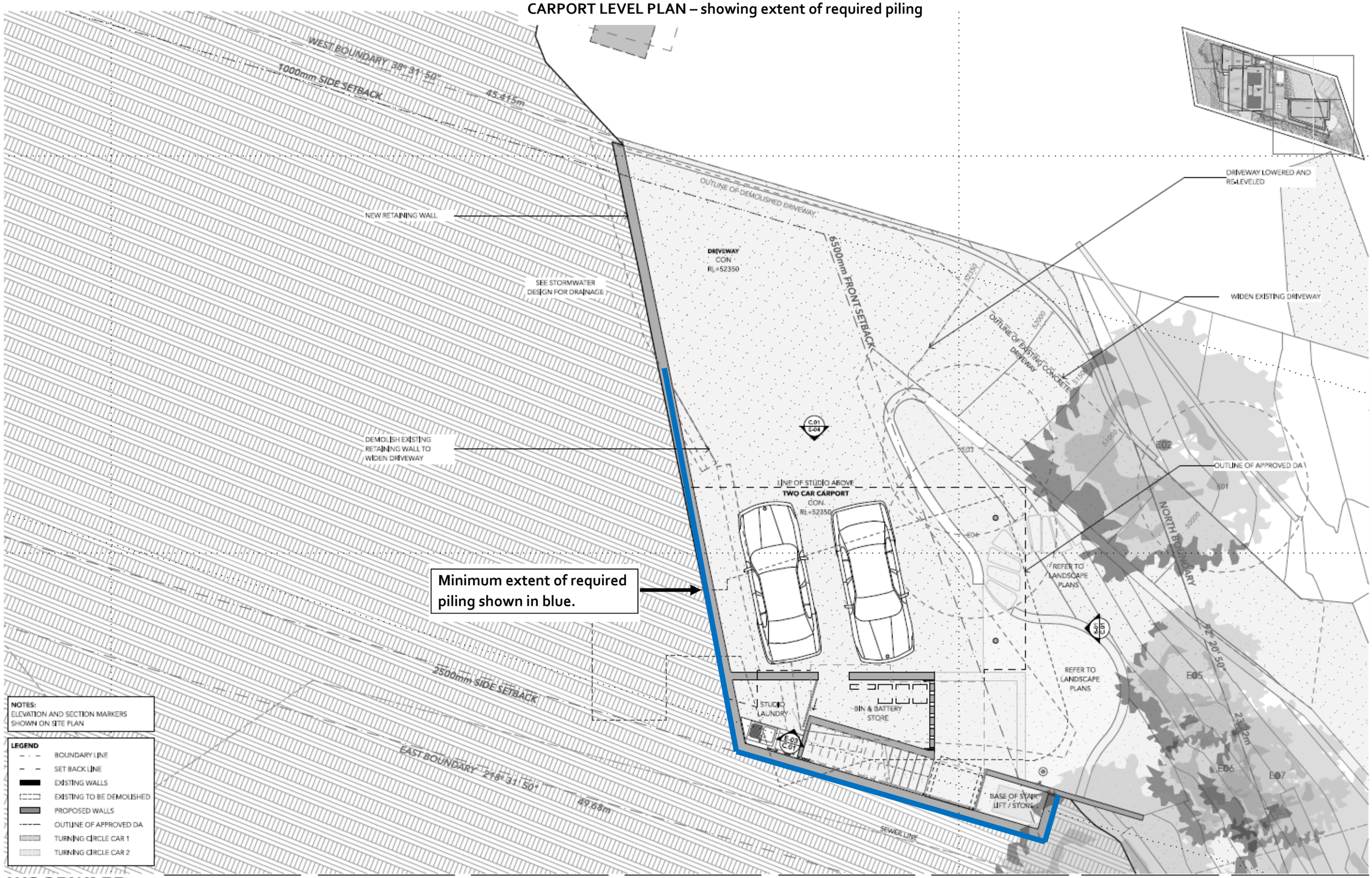
SCALE: 1:200 at A3

DRAWING: PROPOSED SITE PLAN

DRAWING NUMBER: 8.01

ISSUE: A

CARPORT LEVEL PLAN – showing extent of required piling



NOTES:
ELEVATION AND SECTION MARKERS SHOWN ON SITE PLAN

LEGEND

- BOUNDARY LINE
- SET BACK LINE
- EXISTING WALLS
- EXISTING TO BE DEMOLISHED
- PROPOSED WALLS
- OUTLINE OF APPROVED DA
- TURNING CIRCLE CAR 1
- TURNING CIRCLE CAR 2

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REV	DATE	FOR
A	9/12/2024	DA

CLIENT: TIM & FRANCK DYROFF

PROJECT: 146 WHALE BEACH

STATUS: DEVELOPMENT APPLICATION

TRUE NORTH

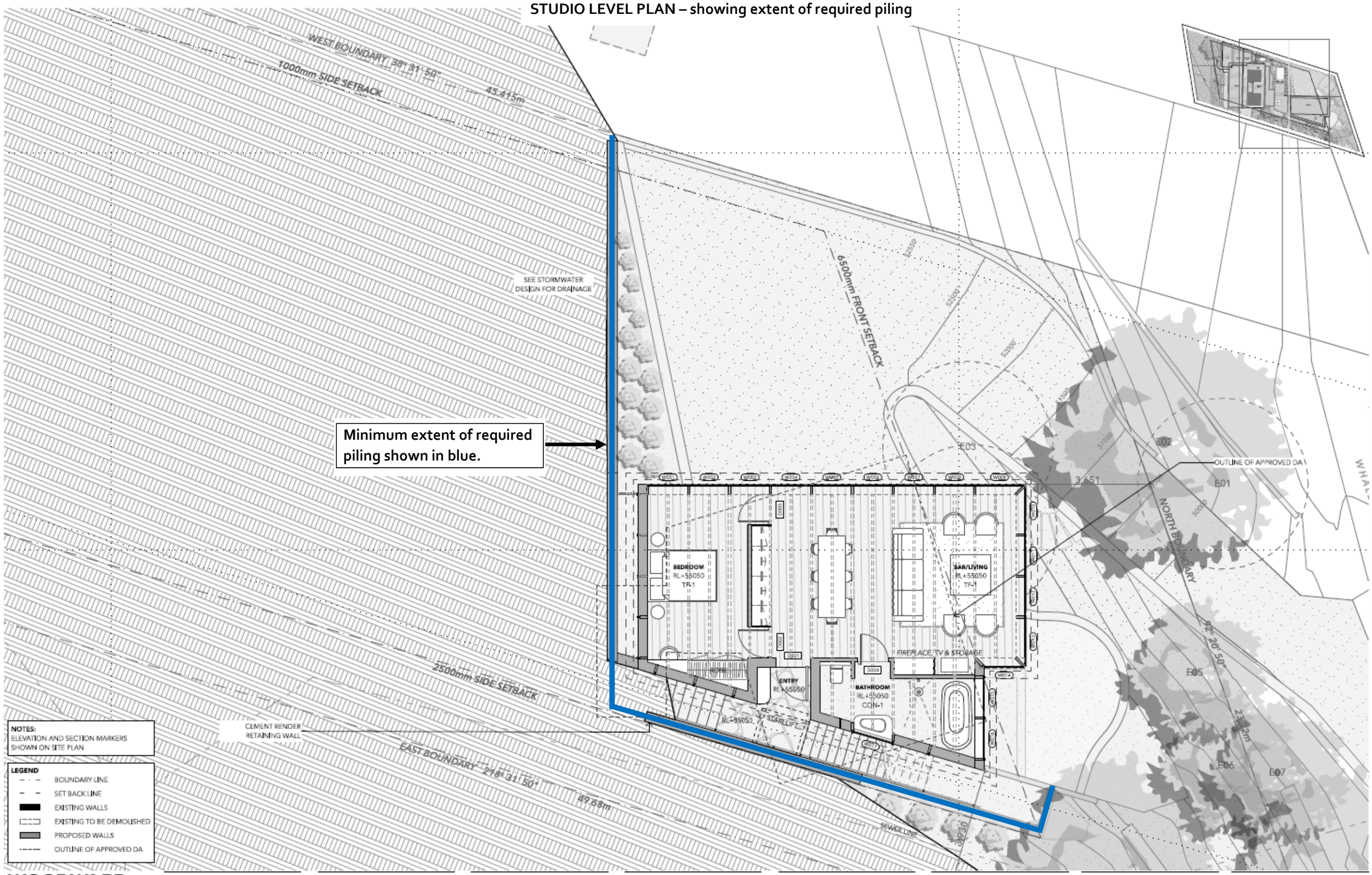
SCALE: 1:100 at A3

DRAWING: CARPORT LEVEL

DRAWING NUMBER: B.02

ISSUE: A

STUDIO LEVEL PLAN – showing extent of required piling



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REV	DATE	FOR
A	9/12/2024	DA

CLIENT: TIM & FRANCK DYROFF

PROJECT: 146 WHALE BEACH

STATUS: DEVELOPMENT APPLICATION

TRUE NORTH

SCALE: 1:100 at A3

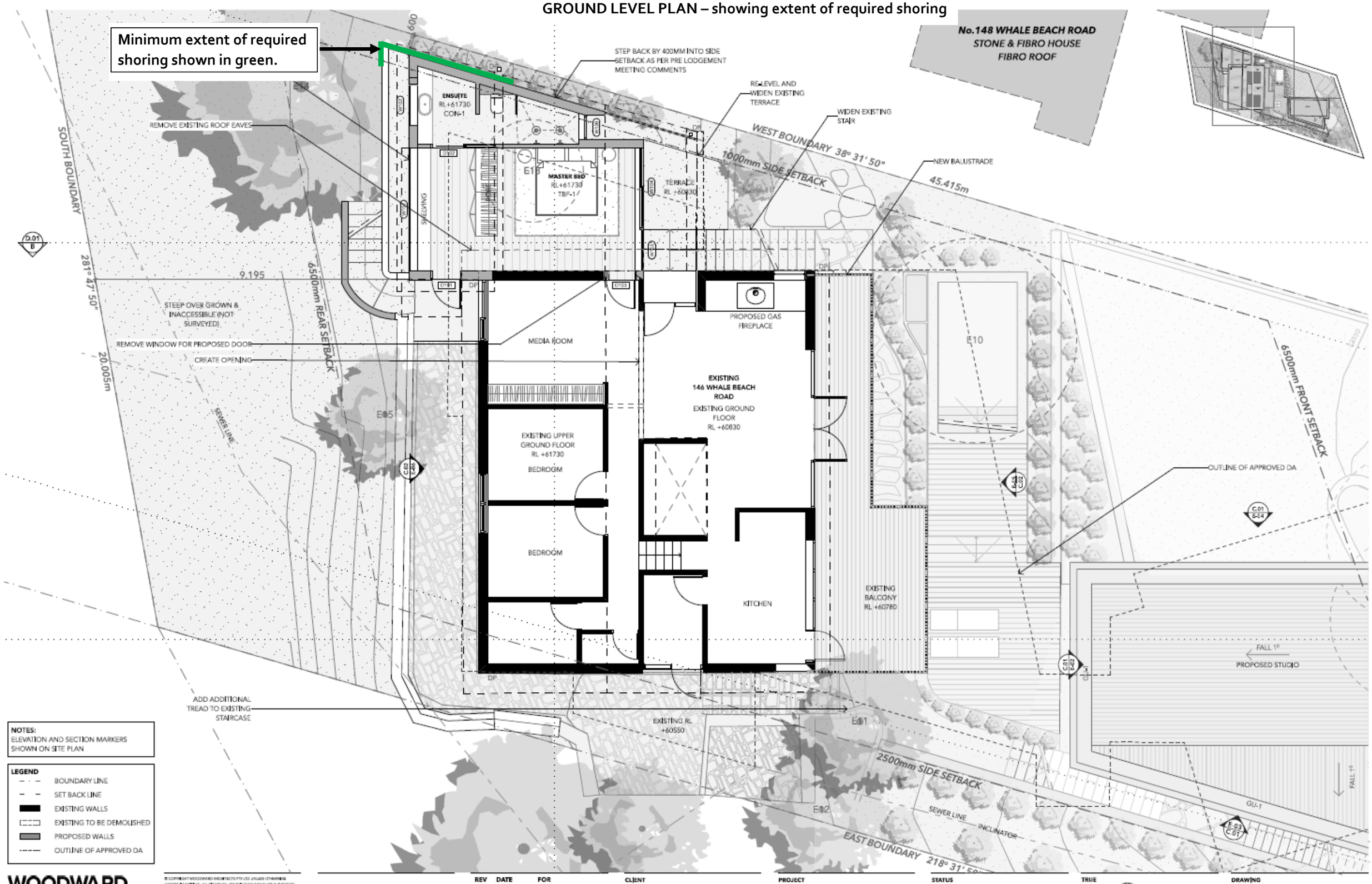
DRAWING: STUDIO LEVEL

DRAWING NUMBER: B.03

ISSUE: A

GROUND LEVEL PLAN – showing extent of required shoring

Minimum extent of required shoring shown in green.



NOTES:
ELEVATION AND SECTION MARKERS SHOWN ON SITE PLAN

LEGEND

- BOUNDARY LINE
- SET BACK LINE
- EXISTING WALLS
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REV	DATE	FOR
A	9/12/2024	DA

CLIENT: TIM & FRANCK DYROFF

PROJECT: 146 WHALE BEACH

STATUS: DEVELOPMENT APPLICATION

TRUE NORTH

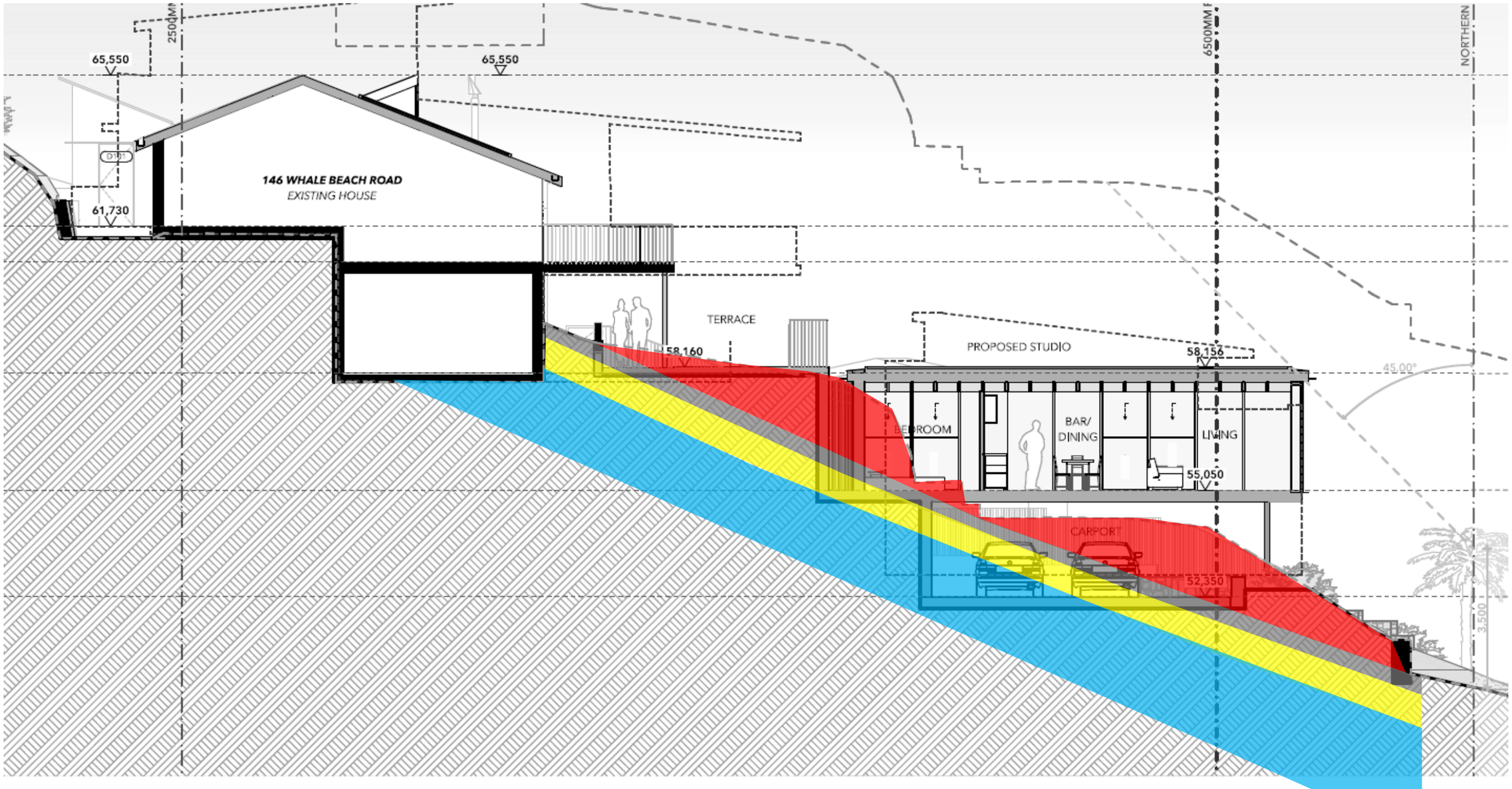
SCALE: 1:100 at A3

DRAWING: GROUND LEVEL

DRAWING NUMBER: B.05

ISSUE: A

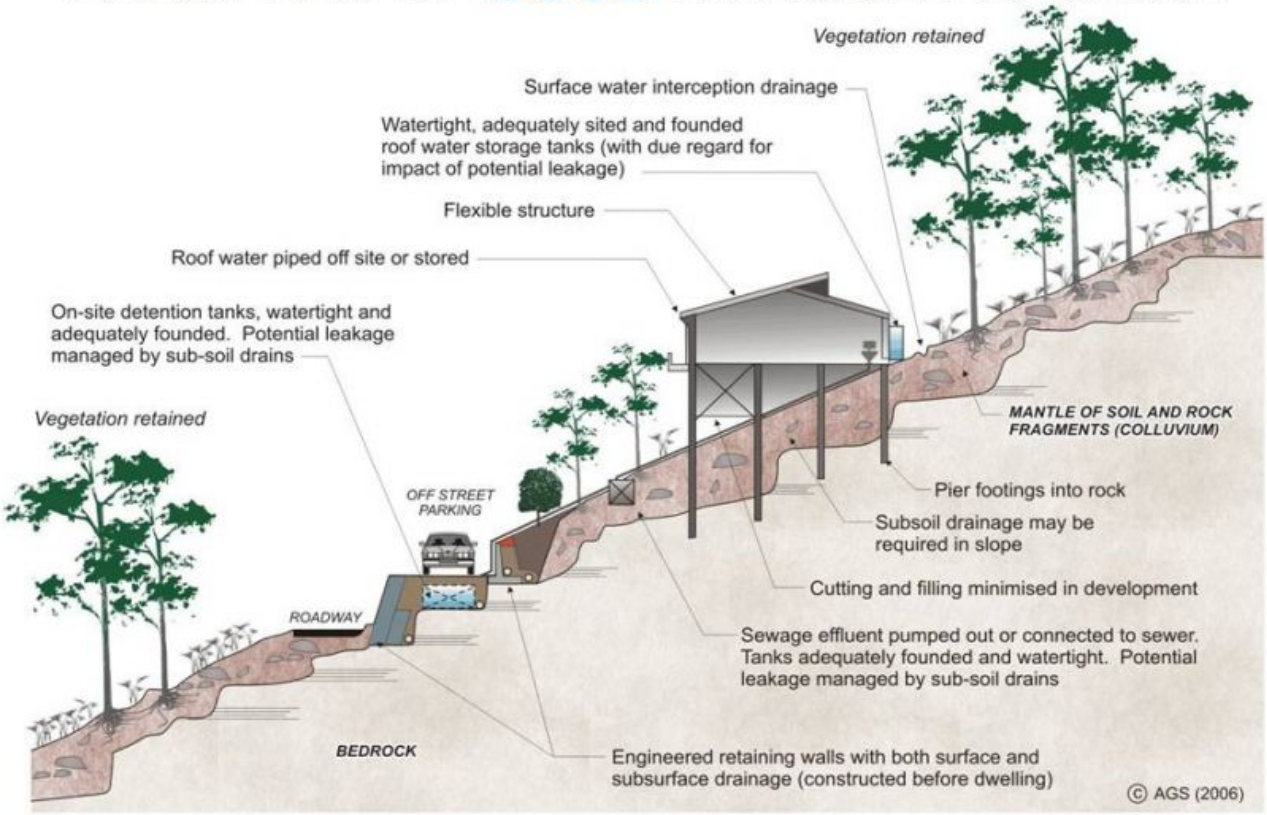
TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



SECTION A

- Fill and Colluvium
- Topsoil
- Clay – Firm to Stiff
- Narrabeen Group Rocks – Extremely Low to Low Strength Shale, Very Low to Medium Strength Sandstone at depths greater than ~4.om.

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE