8 Bower Street, Manly

Geotechnical Comments for Section 4.55

We have reviewed the existing geotechnical report, the original architectural plans, the previous Section 4.55 architectural plans, and the 17 amended architectural plans by SketchArc: Project number 1617, drawings numbered S4.56-2 to S4.56-18, dated 11/9/25.

The changes are as follows:

- Alter the roof of the entry floor level.

The changes are considered minor from a geotechnical perspective and do not alter the recommendations or the risk assessment in the original report carried out by this firm numbered J1676A and dated the 27th October, 2023.

White Geotechnical Group Pty Ltd.

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REGISTERED PROFESSIONAL GEOSCIENTIST
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NATHAN GARDNER
RPGeo No: 10307

J1676B.
2nd February, 2024

8 Bower Street, Manly

Geotechnical Comments for Section 4.55

We have reviewed the existing geotechnical report, the original architectural and landscape plans, the 17 amended architectural plans by SketchArc: Project number 1617, drawings numbered C4.55-3 to C4.55-19, dated 1/2/24; and the 7 amended landscape plans by LandArt: Project number 23013, drawings numbered DA-001, DA-100, DA-200 to DA-202, DA-300, and DA-301, Revision A, dated 31/1/24.

The changes are as follows:

- Alter the layout of the landscaping on the downhill side of the property, including reorienting the pool and adding a cabana. This reduces the maximum excavations and fills required for the landscaping works.
- Slightly alter the layout of the house.
- Various other minor modifications to the house and external areas.

The changes are considered minor from a geotechnical perspective and do not alter the recommendations or the risk assessment in the original report carried out by this firm numbered J1676A and dated the 27th October, 2023.

White Geotechnical Group Pty Ltd.

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GEOTECHNICAL INVESTIGATION:

Alterations and Additions, New Pool, and New Outbuilding at **8 Bower Street, Manly**

1. Proposed Development

1.1 Construct a new carport on the uphill side of the house.

1.2 Extend the downhill side of the house and add two new lower floor levels to the house by excavating to a maximum depth of ~6.1m into the slope.

1.3 Install a pool on the downhill side of the property by excavating to a maximum depth of ~1.2m into the slope, and filling to a maximum height of ~1.6m.

1.4 Demolish the existing outbuilding on the downhill side of the property and construct a new outbuilding.

1.5 Various other internal and external modifications.

1.6 Details of the proposed development are shown on 17 architectural drawings prepared by SketchArc, project number 1617, drawings numbered DA3 to 12, 14 to 18, 20, and 21, dated 09/04/18.

1.7 Details of the proposed landscaping are shown on 10 landscape drawings prepared by Serenescapes, project number 18373, drawings numbered L-01 to 10, Revision A, dated 18/01/18.

1.8 Details of the sewer main are shown on 1 drawing prepared by Sydney Water titled "Northern Beaches Sewerage Concrete Encasement", Case number 209293 WW, Revision 1.0, dated 20/10/23.

2. Site Description

2.1 The site was inspected on the 19th March, 2018.

2.2 This residential property is on the low side of the road and has a NW aspect. The block is located on the moderate to steeply graded lower middle reaches of a hillslope. The natural surface falls across the property at a maximum angle of ~20°. The slope above and below the property continues at similar angles.

2.3 At the road frontage, a concrete driveway runs to a garage on the ground floor of the house (Photo 1). The part two-storey brick house is supported on brick walls and brick piers (Photo 2). No signs of movement were observed in its external supporting brick walls and the supporting brick piers stand vertical. Some of the supporting brick piers and portions of the supporting brick walls were observed to be supported directly on competent Medium Strength Sandstone (Photo 3). A fill has been placed on the downhill side of the house for a level patio area. The fill batter is lined with rocks and is considered stable (Photo 4). A gentle to moderately sloping lawn falls below the fill batter. Competent Medium Strength Sandstone outcrops through the upper portion of the lawn (Photo 5). A timber framed and clad outbuilding has been constructed near the lower boundary (Photo 6). The outbuilding will be demolished as part of the proposed works. A fill has been placed at the lower boundary. The fill is supported by a rough but stable stack rock retaining wall reaching ~1.0m high that lines the lower boundary (Photo 7). A creek flows down the slope below the lower boundary (Photo 8). Medium Strength Sandstone outcrops through the creek bed.

3. Geology

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

4. Subsurface Investigation

Eight Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to bedrock. The locations of the tests are shown

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

DCP TEST RESULTS – Dynamic Cone Penetrometer

Equipment: 9kg hammer, 510mm drop, conical tip. Standard: AS1289.6.3.2 - 1997

Depth(m) Blows/0.3m	DCP 1 (~RL25.0)	DCP 2 (~RL25.8)	DCP 3 (~RL21.3)	DCP 4 (~RL15.9)	DCP 5 (~RL15.3)	DCP 6 (~RL14.6)	DCP 7 (~RL13.8)	DCP 8 (~RL12.1)
0.0 to 0.3	10	31	Rock exposed at surface	Rock exposed at surface	3	3F	2	Rock exposed at surface
0.3 to 0.6	7	9			7	4	4	
0.6 to 0.9	3	#			10	13	4	
0.9 to 1.2	16				#	#	9	
1.2 to 1.5	21						#	
1.5 to 1.8	30							
1.8 to 2.1	#							
	End of Test @ 1.8m	Refusal on Rock @ 0.4m			Refusal on Rock @ 0.9m	Refusal on Rock @ 0.9m	Refusal on Rock @ 1.1m	

#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 @ 1.8m, DCP still very slowly going down into possible crack, clean dry tip.
DCP2 – Refusal on rock @ 0.4m, DCP bouncing off rock surface, white and brown sandstone fragments on dry tip.
DCP3 – Rock exposed at surface.
DCP4 – Rock exposed at surface.

DCP5 – Refusal on rock @ 0.9m, DCP bouncing off rock surface, brown sandstone fragments on dry tip.
DCP6 – Refusal on rock @ 0.9m, DCP bouncing off rock surface, maroon sandstone fragments on dry tip.
DCP7 – Refusal on rock @ 1.1m, DCP bouncing off rock surface, brown sandstone fragments on wet tip.
DCP8 – Rock exposed at surface.

5. Geological Observations/Interpretation

The surface features of the block are controlled by the outcropping and underlying sandstone bedrock that steps down the property forming sub-horizontal benches between the steps. Where the grade is steeper, the steps are larger and the benches, narrower. Where the slope eases, the opposite is true. Where the rock is not exposed, it is overlain by sandy soils and sandy clays that fill the bench step formation. Filling has been placed across the downhill side of the property for landscaping purposes. In the test locations, the depth to rock ranged between 0.4 to 1.1m below the current surface, being slightly deeper where filling has been used for landscaping and due to the stepped nature of the underlying bedrock. Given all the other tests encountered rock at shallow depths, it is likely DCP1 was over a joint (crack) in the rock as it reached a depth of 1.8m. The outcropping sandstone on the property is estimated to be medium strength or better and similar strength rock is expected to underlie the entire site. See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Ground water seepage is expected to move over the buried surface of the rock and through the cracks. As a creek flows down the slope below the block, we expect groundwater seepage to be higher across the block as slope seepage will move toward the creek. Due to the slope and elevation of the block, the water table is expected to be many metres below the base of the proposed excavation.

7. Surface Water

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

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The moderate to steeply graded slope that falls across the property and continues above and below at similar angles is a potential hazard (**Hazard One**). The vibrations from the proposed excavations are a potential hazard (**Hazard Two**). The excavations are a potential hazard until the retaining walls are in place (**Hazard Three**).

RISK ANALYSIS SUMMARY ON NEXT PAGE

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two	Hazard Three
TYPE	The moderate to steep slope that falls across the property and continues above and below failing and impacting on the property.	The vibrations produced during the proposed excavation impacting on the surrounding structures.	The excavations (up to a depth of ~6.1m) collapsing onto the work site and impacting on the surrounding structures before retaining walls are in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})	'Likely' (10^{-2})
CONSEQUENCES TO PROPERTY	'Medium' (20%)	'Medium' (15%)	'Medium' (30%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})	'Moderate' (2×10^{-4})
RISK TO LIFE	8.3×10^{-7}/annum	5.3×10^{-7}/annum	6.2×10^{-4}/annum
COMMENTS	'ACCEPTABLE' level of risk to life & property.	This level of risk to property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 12** 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 13** 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

There is fall to the creek below the property (Photo 8). Roof water from the development is to be piped to the creek through any tanks that may be required by the regulating authorities.

11. Excavations

An excavation to a maximum depth of ~6.1m is required to construct the proposed extension to the house. The excavation is expected to be through a fill overlying sandy soils and firm to stiff sandy clays with Medium Strength Sandstone expected at an average depth of ~0.9m below the current surface.

Another excavation to a maximum depth of ~1.2m is required to install the proposed pool. This excavation is expected to be through sandy soils and firm to stiff sandy clays with Medium Strength Sandstone expected at an average depth of ~0.9m below the surface.

It is envisaged that excavations through fill, sandy soil, and sandy clays can be carried out with a bucket and excavations through rock will require grinding or rock sawing and breaking.

12. Vibrations

Possible vibrations generated during excavations through fill, sandy soils, and sandy clays will be below the threshold limit for building damage utilising a domestic sized excavator up to 16 tonnes.

Excavations through Medium Strength Rock or better should be carried out to minimise the potential to cause vibration damage to the subject house, N and S neighbouring houses, and sewer main. The setbacks are as follows:

- Close to flush with the downhill supporting wall of the subject house.
- ~1.4m from the N neighbouring house.
- ~2.2m from the S neighbouring house.
- ~2.3m from the portions of the sewer main to remain.

Dilapidation reporting carried out on the N and S neighbouring properties 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 surrounding structures and 3mm/s at the portions of the sewer main that are to remain. 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 structures.

13. Excavation Support Requirements

The proposed excavation for the extension to the house will come close to flush with the downhill supporting wall of the existing house and to within ~1.0m of the N and S common boundaries. Thus, the supporting wall and the N and S common boundaries will be within the zone of influence of the excavation. We note there is a sewer main running down the S side of the property. However, the Sydney Water plan shows that the pipe within the zones of influence of the excavations is to be replaced and concrete encased during the works. This work is to be conducted to Sydney Water's technical guidelines.

The house was observed to be supported directly onto Medium Strength Sandstone bedrock and so no additional support should be required. Should it become apparent that any portion of the walls are not supported on rock, the walls are to be underpinned to rock before excavations commence.

The overlying fill, soil, and clay is to be removed from the footprint of the proposed excavation and be scraped back a distance of ~0.5m from the perimeter. The cut through soil can be battered at 1.0 Vertical to 2.0 Horizontal (26°) where room permits, and can be temporarily or permanently supported, systematically as the excavation through the soil/clay is progressed where there are no room for batters. The temporary or permanent support is to be approved by the structural engineer in consultation with the geotechnical consultant. The shoring for the soil/clay portion of the cut is to be in place before any excavation through rock commences. Excavations through Medium Strength Sandstone or better will stand at vertical angles unsupported subject to approval by the geotechnical consultant.

During the excavation process, the geotechnical consultant is to inspect the excavations as they approach to not less than 1.0m horizontally from the supporting posts and piers of the house to confirm the stability of the cut to go flush with the footings.

Additionally, during the excavation process, the geotechnical consultant is to inspect the excavation for the extension as it is lowered in 1.5m intervals to ensure the ground materials

are as expected and no wedges or other geological defects are present that could require additional support. Should additional ground support be required this will likely involve the use of mesh, sprayed concrete, and rock bolts.

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

The shallow soil and clay portions of the cut for the pool will stand at near-vertical angles for short periods of time until the pool structure is installed. Excavations through Medium Strength Sandstone or better will stand at vertical angles unsupported subject to approval by the geotechnical consultant.

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

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

14. Fill

A fill will be placed around and downslope of the proposed pool. The fill will reach a maximum depth of ~1.6m. The surface is to be prepared before any fills are laid by removing any organic matter and topsoil. No fills are to be laid until retaining walls are in place. Fills are to be laid

in a loose thickness not exceeding 0.3m before being moderately compacted. Tracking the machine over the loose fill in 1 to 2 passes should be sufficient. Immediately behind the retaining structure (say to 1.5m) the fill is to be compacted with light weight equipment such as a hand-held plate compactor so as not to damage the retaining wall. Where light weight equipment is used fills are to be laid in a loose thickness not exceeding 0.2m before being compacted. No structures are to be supported on fill.

15. Retaining Structures

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

Table 1 – Likely Earth Pressures for Retaining Structures

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

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

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

All retaining structures are to have sufficient back-wall drainage and be backfilled immediately behind the structure with free-draining material (such as gravel). This material is to be wrapped in a non-woven Geotextile fabric (i.e. Bidim A34 or similar), to prevent the

drainage from becoming clogged with silt and clay. If no back-wall drainage is installed in retaining structures, the likely hydrostatic pressures are to be accounted for in the structural design.

16. Foundations

The foundations are to be constructed following Sydney Water Technical Guidelines. A concrete slab and shallow piers supported directly off Medium Strength Sandstone are suitable footings for the proposed carport, extension, and outbuilding. This ground material is expected to be exposed across the majority of the base of the excavation. Where it is not exposed at the base of the excavation, this material is expected at an average depth of ~0.9m below the current surface. A maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength Sandstone. Provided the foundations are taken to this ground material, no additional loads will be transferred onto the existing sewer main.

The pool is expected to be partially seated in Medium Strength Sandstone on the uphill side with the remainder of the pool suspended above the slope. Where it is suspended above the slope, the pool is to be supported on shallow piers taken to the underlying Medium Strength Sandstone. As above, a maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength Sandstone.

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

17. Inspections

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

- During the excavation process, the geotechnical consultant is to inspect the excavations as they approach to no less than 1.0m from the supporting walls of the house to confirm the stability of the cut to go flush with the footings.

- During the excavation process, the geotechnical consultant is to inspect the cut faces for the extension as they are lowered in 1.5m intervals to ensure ground materials are as expected and that there are no wedges or other defects present in the rock that may require additional support.

- All footings are to be inspected and approved by the geotechnical consultant while the excavation equipment is still onsite and before steel reinforcing is placed or concrete is poured.

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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

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

- P — PROPOSED
- POS — PRIVATE OPEN SPACE (EXISTING)
- ED — EXISTING DWELLING
- MS — MATERIAL STOCKPILE
- EXISTING LEVELS
- CAR ENTRY POINT
- CARPORT ENTRY POINT
- BOUNDARY
- WM — WASTE MANAGEMENT

NOTE : REFER TO BUSHFIRE REPORT FOR MATERIALS AND REQUIREMENTS ON ALL DRAWINGS

Site Analysis Plan
1:200

sketchArc	DO NOT SCALE DRAWINGS. CHECK ALL DIMENSIONS ON SITE. FIGURED DIMENSIONS TAKE PRECEDENCE. The builder shall check and verify all dimensions and verify all errors and omissions to the Architect. Do not scale the drawings. Drawings shall not be used for construction purposes until issued by the Architect for construction.	sketchArc Po Box 377 Manly 1655 m : 0422 521 871 e : power@sketcharc.com.au w : www.sketcharc.com.au
REV / DATE / DESCRIPTION		

PROJECT:
8 Bower St, Manly, 2095, NSW
Alterations & Additions / Secondary Dwelling
LOT 34 in DP 8075 - 973m2

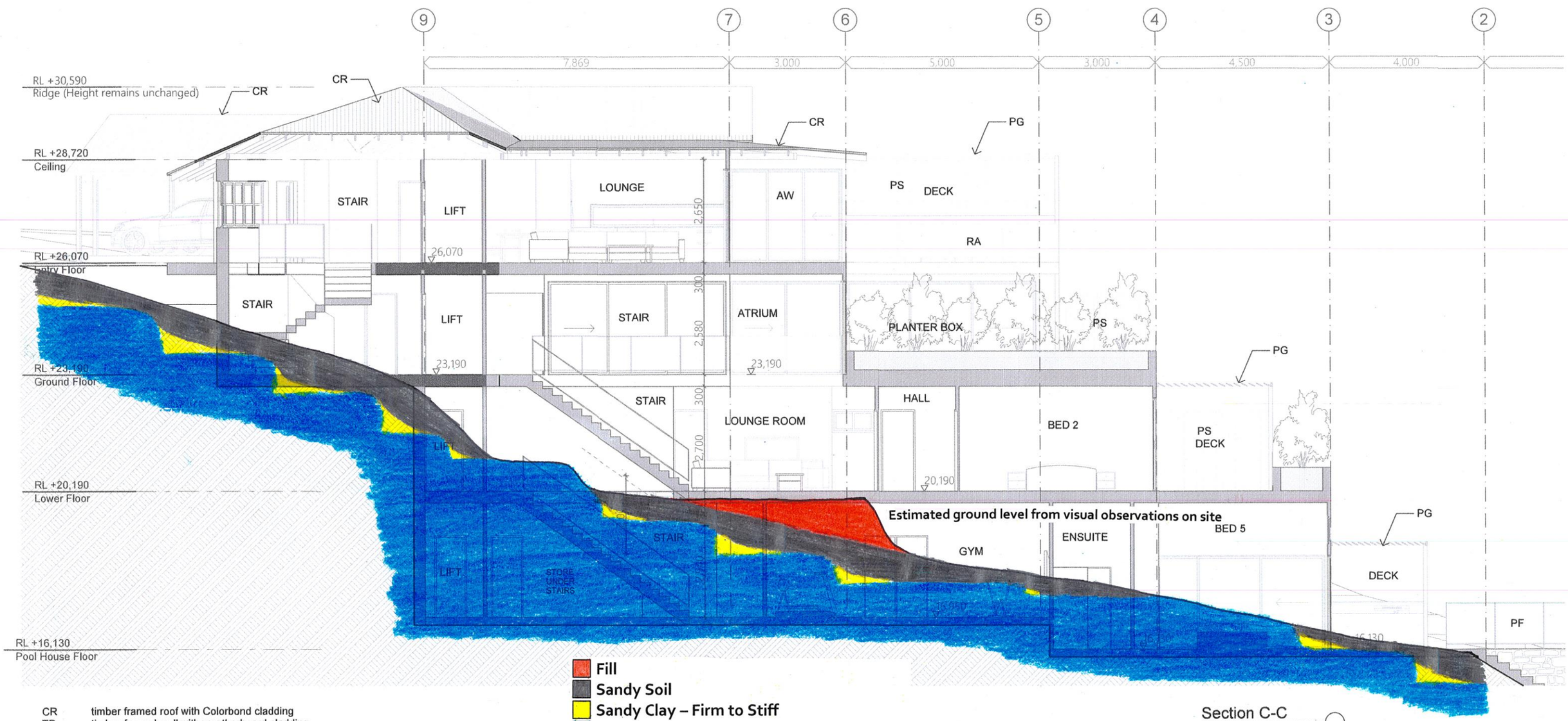
CLIENT:
Private

= Proposed Work
= Demolition
= Existing

STATUS: Design DA		
DATE: 090418	SCALE: 1:100@A3	PROJECT NUMBER: 1617
STAGE: Design DA	DRAWN/DESIGNED: PB / MP	1:200 @ A3 #Keywords
DRAWING NO: DA3		

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

NOTE : REFER TO BUSHFIRE REPORT FOR MATERIALS AND REQUIREMENTS ON ALL DRAWINGS



Section C-C
1:100

0 2 4

CR	timber framed roof with Colorbond cladding
TP	timber framed wall with weatherboard cladding
SC	concrete block or similar with sandstone cladding
AW	aluminium window
NF	natural fireplace flue
RA	rail to AS and BCA/NCC
PF	pool fence and gate to AS1926
PS	privacy screen
PG	pergola
FF	front fence
GR	green roof

sketchArc

DO NOT SCALE DRAWINGS. CHECK ALL DIMENSIONS ON SITE. FIGURED DIMENSIONS TAKE PRECEDENCE.
The builder shall check and verify all dimensions and verify all errors and omissions to the Architect. Do not scale the drawings. Drawings shall not be used for construction purposes until issued by the Architect for construction.

REV	DATE	DESCRIPTION

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Po Box 377 Manly 1655
m : 0422 521 871
e : power@sketcharc.com.au
w : www.sketcharc.com.au

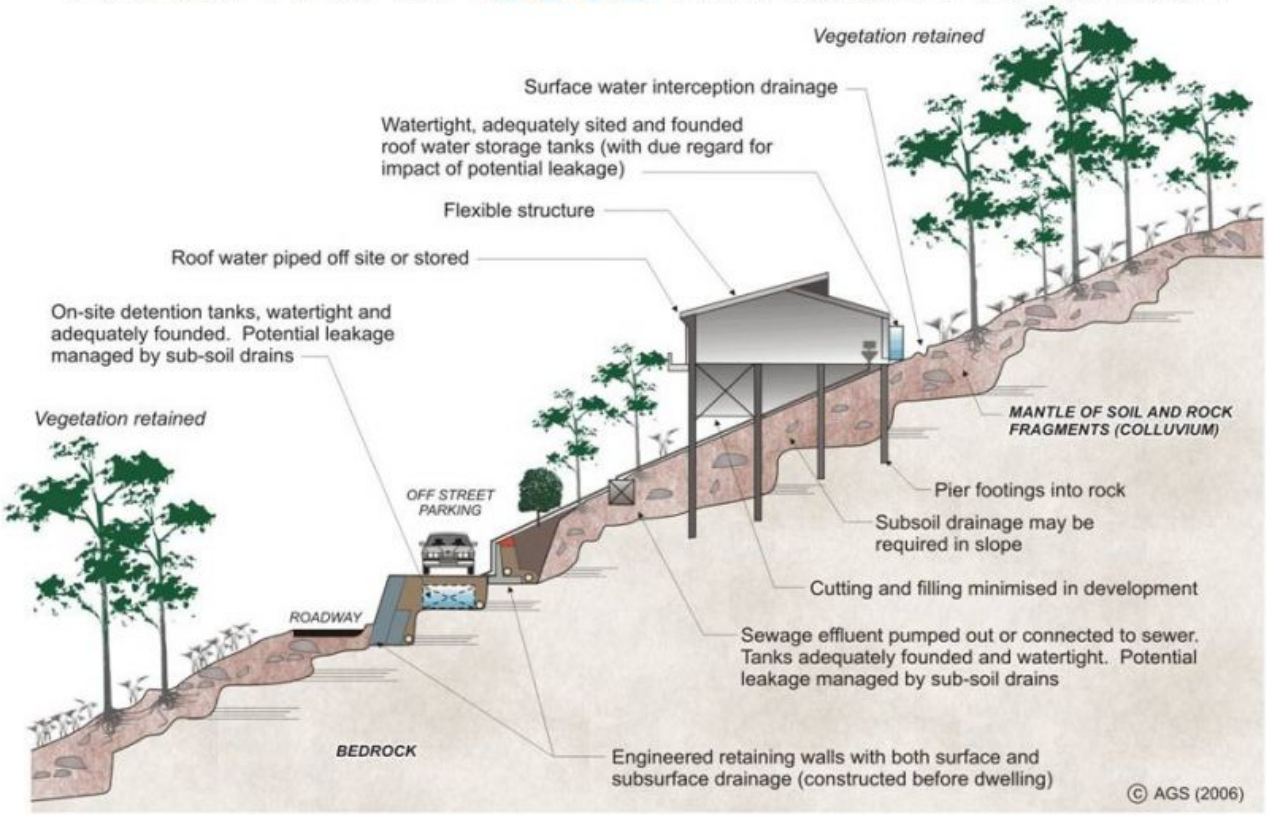
PROJECT:
8 Bower St, Manly, 2095, NSW
Alterations & Additions / Secondary Dwelling
LOT 34 in DP 8075 - 973m2

CLIENT:
Private

= Proposed Work
= Demolition
= Existing

STATUS: Design DA		
DATE: 090418	SCALE: 1:100@A3	PROJECT NUMBER: 1617
STAGE: Design DA	DRAWN/DESIGNED: PB / MP	ISSUE: #Keywords
DRAWING NO: DA16		

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE