J4186.
19th May, 2022.

GEOTECHNICAL INVESTIGATION for CC:

New House at **Lot 2 in Master Subdivision Site Plan for 12-14 Gladys Avenue, Frenchs Forest**

1. Proposed Development

1.1 Construct a new house and garage.

1.2 Install an OSD tank requiring minor levelling.

1.3 Details of the proposed development are shown on 25 design drawings prepared by NKP Architecture, drawings numbered DA200, DA304, DA400 to DA405, DA500 to DA505, DA600 to DA602, DA700, DA701, DA800, DA900 and DA901, dated 30/3/22.

2. Site Description

2.1 The site was inspected on the 22nd April, 2022.

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 upper reaches of a hillslope. The natural slope falls at gentle angles before reaching top of outcropping Hawkesbury Sandstone bedrock that steps down the slope. The outcropping rock is estimated (from the site survey) to range from ~2m to ~4m high. The slope below the rock face falls at an average angle of ~18°. The slope above the property decreases in grade. The slope below the property gradually decreases in grade.

2.3 A near level lawn area is located near the uphill boundary of Lot 2 and at the downhill side of the existing house at Lot 1 (Photo 1). Sandstone bedrock steps down the slope on downhill side of the lawn (Photo 2). The outcropping rock is estimated to be up to ~4m high. The upper portion of the rock is obscured by vegetation. The rock face is undercut at the base slightly, but has a thick cantilever arm in relation to its overhang length and is currently considered to be stable. A pool that shows no

significant signs of movement is located on the downhill side of the rock face (Photo 3). The pool was partially empty at the time of inspection. The slope below the pool is thickly vegetated (Photo 4). Sandstone bedrock outcrops in places on the slope. Sandstone joint blocks are embedded in stable positions in the slope. 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 Hawkesbury Sandstone. It is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

Two 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. 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:

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** (~RL142.1)	**DCP 2** (~RL141.6)
0.0 to 0.3	4	23
0.3 to 0.6	4	24
0.6 to 0.9	4	2
0.9 to 1.2	#	#
	Refusal on rock @ 0.8m	Refusal on rock @ 0.7m

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

DCP Notes:

DCP1 – Refusal on rock @ 0.8m, DCP bouncing off rock surface, dark brown soil and brown orange clayey sand on wet tip.

DCP2 – Refusal on rock @ 0.7m, DCP bouncing off rock surface, orange and grey clayey sand and sandy clay and dark brown soil on muddy wet tip.

5. Geological Observations/Interpretation

The surface features of the block are controlled by the 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. The rock is overlain by a thin sandy topsoil, sand and sandy clay that fills the bench step formation. Rock is exposed at the surface at the downhill side of the proposed garage and above and below the proposed new house. In the test locations, the depth to rock ranged from ~0.7m to ~0.8m below the current surface. A geotechnical report completed by another firm on the property indicates that the depth to rock at the location of the proposed house reaches a maximum depth of ~1.4m on the downhill edge of the existing pool and a maximum depth of ~0.6m at the location of the proposed garage. The sandstone underlying

the property is estimated to be Medium Strength or better. See Type Section attached for a diagrammatical representation of the expected ground materials.

6. Groundwater

Normal ground water seepage is expected to move over the buried surface of the rock and through the cracks in the rock.

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

7. Surface Water

Evidence of recent surface flows were observed on the outcropping sandstone bedrock on the uphill side of the proposed new house (Photo 2). It is recommended that drainage measures be installed on the uphill side of the house to capture and divert any surface water that flows over the rock face.

If the owners know or become aware in the future of any other overland flows that enter the property during heavy prolonged rainfall events our office is to be informed so appropriate drainage measures can be recommended and installed. It is a condition of the slope stability assessment in Section 8 (**Hazard One**) that this be done.

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**).

RISK ANALYSIS SUMMARY ON NEXT PAGE

Geotechnical Hazards and Risk Analysis - Risk Analysis Summary

HAZARDS	Hazard One
TYPE	The steeply graded slope that falls across the property and continues above and below failing and impacting on the property.
LIKELIHOOD	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	'Medium' (12%)
RISK TO PROPERTY	'Low' (2×10^{-5})
RISK TO LIFE	8.3×10^{-7}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.

(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. The stormwater plans show that the stormwater from the proposed development will be piped to an easement via OSD tanks. We consider this suitable.

11. Excavations

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

12. Foundations

The proposed new house, garage, stairs and OSD tank are to be supported on footings taken to Medium Strength Sandstone. This ground material is expected at the surface or at a maximum depth of ~1.4m below the current surface. A maximum allowable bearing pressure of 1000kPa can be assumed for footings supported on Medium Strength Sandstone.

Footings can include piers, strip footings, pad footings, or a thickened edge slab supported off Medium Strength Sandstone. It is the responsibility of the structural engineer to determine the type of footings to be used and their placement/layout.

Part of the house will be constructed over the footprint of the existing pool. If the pool shell is to remain in place, the portion of the proposed house that will be over the footprint of the pool is to be supported on piers drilled through the base of the pool shell and taken to the rock below the base of the pool. Drainage holes are to be core drilled through the side of the pool near the base on the downhill side.

All footings supported on Medium Strength Sandstone are to be set back from any steps in the rock (at least 0.6m).

No footings are to be supported on undercut rock. If during the markout footings are over undercut rock, they are to be moved back upslope beyond the undercut.

Naturally occurring vertical cracks (known as joints) commonly occur in sandstone. These are generally filled with soil and are the natural seepage paths through the rock. They can extend to depths of several metres and are usually relatively narrow but can range between 0.1 to 0.8m wide. If a footing falls over a joint in the rock, the construction process is simplified if with the approval of the structural engineer the joint can be spanned or alternatively the footing can be repositioned so it does not fall over the joint.

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.

13. Inspection

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

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

White Geotechnical Group Pty Ltd.

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

Photo 1

Photo 2

Photo 3

Photo 4

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.

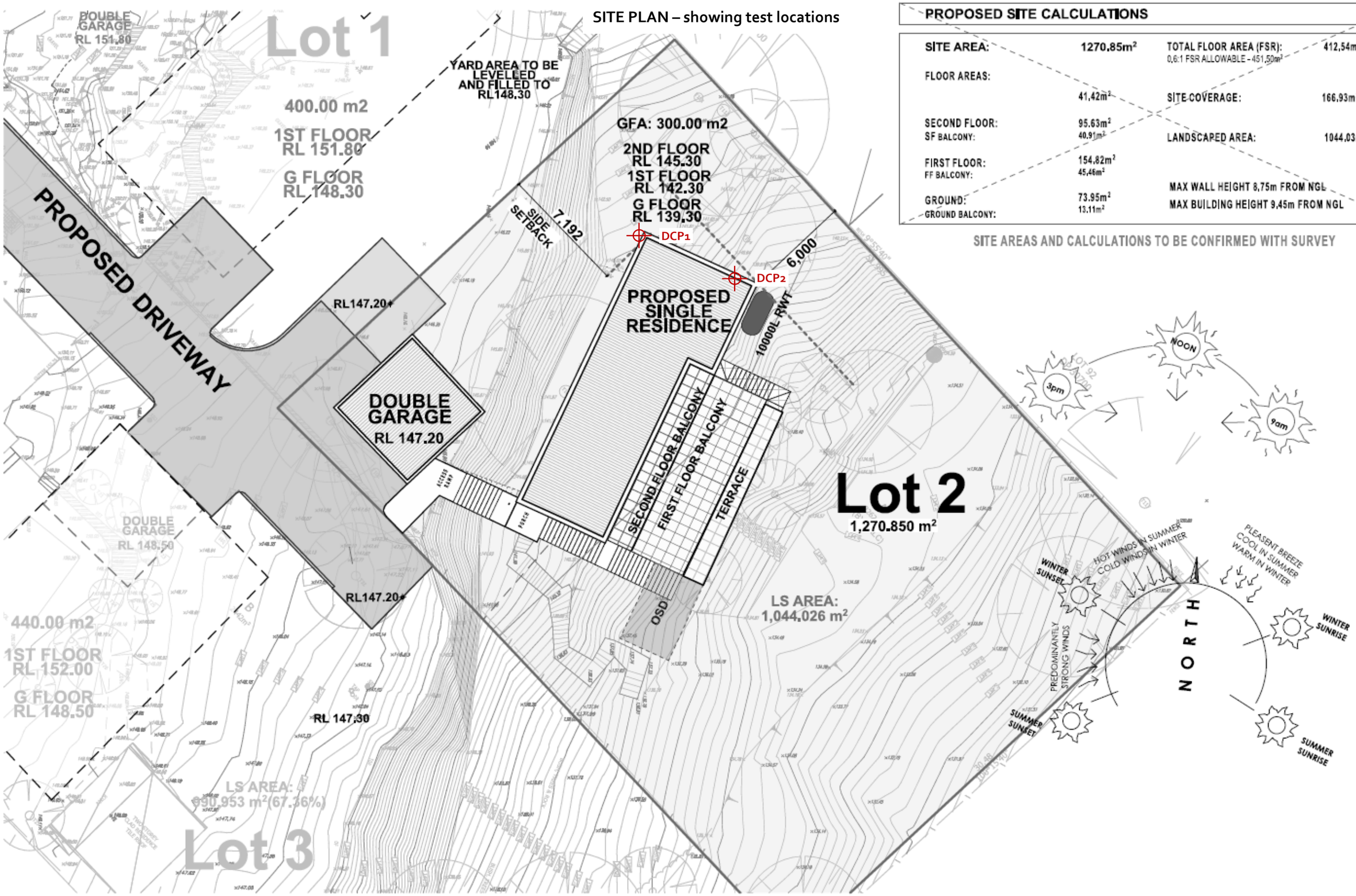
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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



PROPOSED SITE CALCULATIONS

SITE AREA:	1270.85m²	TOTAL FLOOR AREA (FSR): 0.6:1 FSR ALLOWABLE - 451.50m²	412.54m² (0.55:1)
FLOOR AREAS:			
	41.42m²	SITE COVERAGE:	166.93m² (22.1%)
SECOND FLOOR:	95.63m²		
SF BALCONY:	40.91m²	LANDSCAPED AREA:	1044.03m²
FIRST FLOOR:	154.82m²		
FF BALCONY:	45.46m²		
		MAX WALL HEIGHT 8.75m FROM NGL	
GROUND:	73.95m²	MAX BUILDING HEIGHT 9.45m FROM NGL	
GROUND BALCONY:	13.11m²		

SITE AREAS AND CALCULATIONS TO BE CONFIRMED WITH SURVEY

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CLIENT: **MR JACK ZHANG**

PROJECT ADDRESS: **No. 12-14 GLADYS AVENUE, FRENCHS FOREST NSW 2030**

REVISION HISTORY:

DATE	COMMENT	REV.
16/03/22	FOR CONSULTANTS	A
23/03/22	FOR CONSULTANTS	A
30/03/22	FOR CONSULTANTS	A

GENERAL NOTES:

- These plans are subject copyright and must not be used, copied or reproduced without the authority of the designer.
- The Builder is to verify dimensions prior to commencement.
- If any discrepancies arise they are to be reported to the designer prior to the commencement of the works.
- Do not scale, use figured dimensions only. If a dimension is not shown or is required consult with the designer.
- Do not alter the design either architecturally or structurally without prior consultation with the designer or engineer.

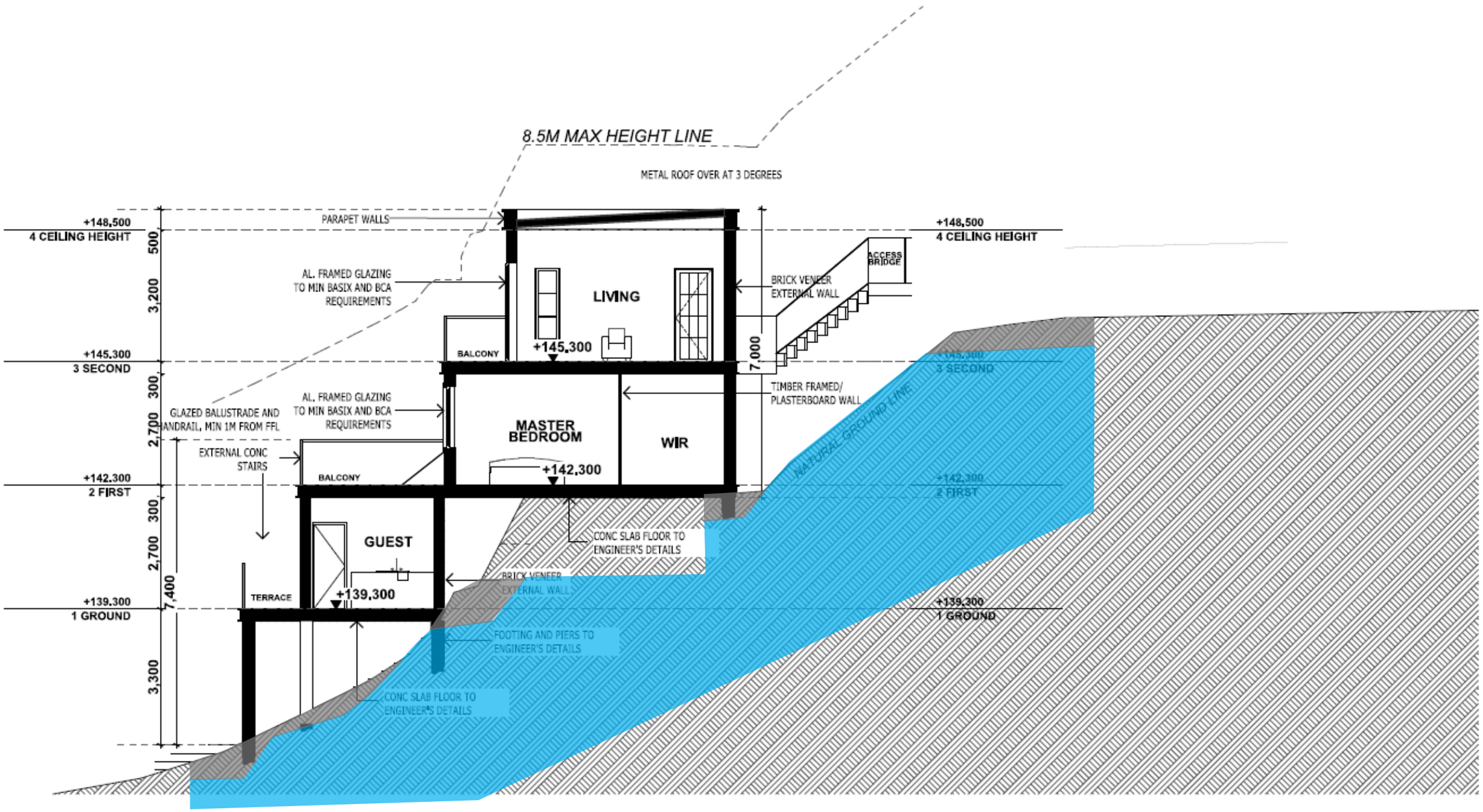
DRAWING: LOT 2 - SITE PLAN & ANALYSIS

NORTH

SCALE: 1:200@ A3

DRAWING NO. DA304

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



Topsoil, Sand, Sandy Clay

Hawkesbury Sandstone – Medium Strength

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GENERAL NOTES:

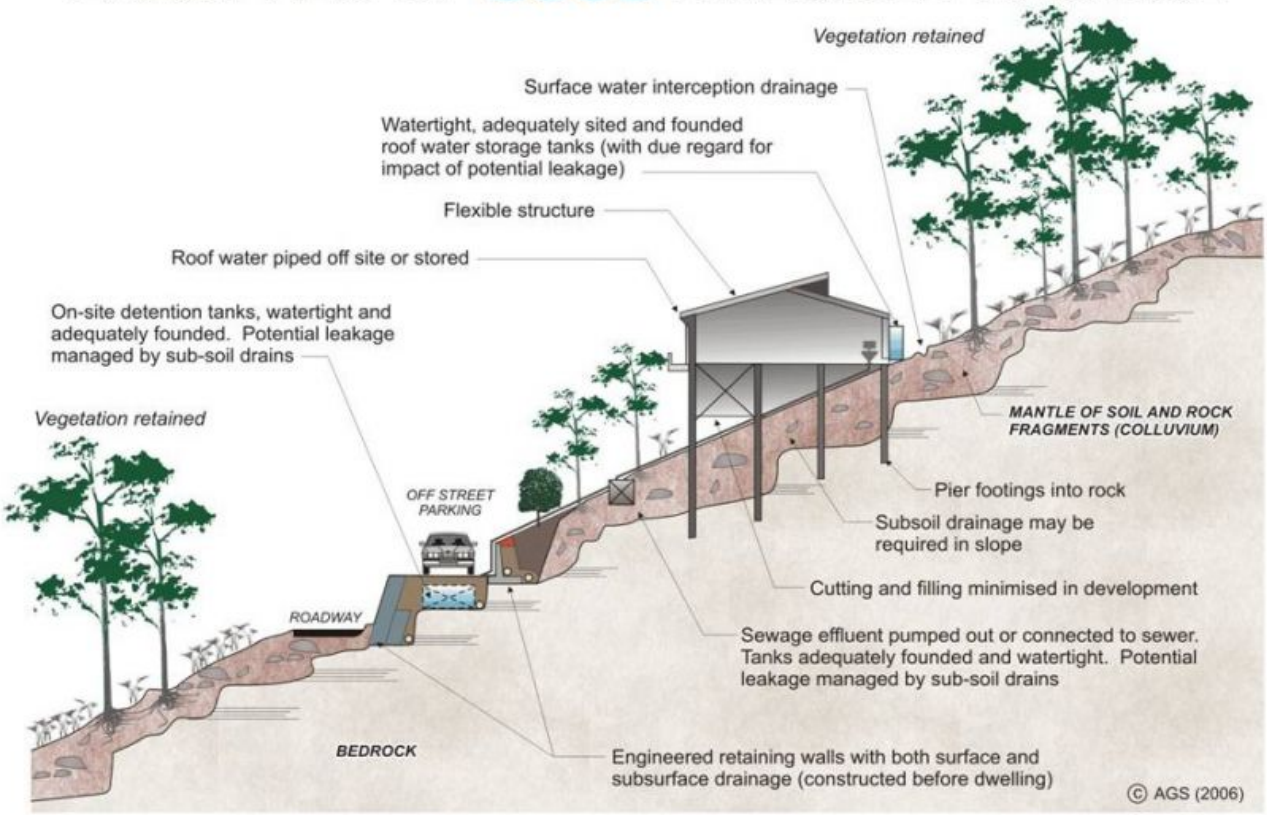
DRAWING:
LOT 2 - SECTION A-A

NORTH

SCALE:
1:100@ A3

DRAWING NO.
DA502

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE