GEOTECHNICAL INVESTIGATION:

Subdivision and New house at **45 Oxford Falls Road, Beacon Hill**

1. Proposed Development

1.1 Subdivide the existing lot and construct a new two-story house at the Oxford Falls Road frontage by excavating to a maximum depth of ~3.2m.

1.2 Construct a carport at the road frontage by excavating to a maximum depth of ~3.3m.

1.3 Construct a new driveway and crossover at the road frontage.

1.4 Various other minor external additions and alterations.

1.5 Details of the proposed development are shown on 19 drawings prepared by Michal Korecky, drawing number 18080, sheets numbered 1 to 19. All issue 1. All dated 30/05/25.

2. Site Description

2.1 The site was inspected on the 6th June, 2025. And previously in May 2024, Feb 2025, Nov 2018, and July 2019.

2.2 This residential property has dual access. It is on the high side of Oxford Falls Road and is currently accessed via a Right of Carriageway (ROW) off the low side of Dareen Street. The property has a N aspect. It is located on the gentle to steeply graded upper middle reaches of a hillslope. The natural slope falls from Dareen Street across the property at an average angle of ~5° before stepping down at a cliff face reaching up to ~4.5m and increasing to steep angles of ~19° to the downhill common boundary. The slope above the property continues at similar gentle angles. The slope below the property continues at similar steep angles.

2.3 At the Dareen Street frontage, a concrete ROW runs to a timber framed garage on the uphill side of the property (Photo 1). Fill for the uphill neighbouring property is supported by a stable concrete block retaining wall reaching ~1.2m high (Photo 2). Between the garage and the house is a gently graded lawn. The two-story brick house which was being renovated at the time of inspection is supported on brick walls. No significant signs of movement were observed in the visible supporting walls. Between the downhill side of the house and the top of the cliff is a gently graded slope. Low to Medium Strength Sandstone is exposed at the base of a trench which has been dug along the W common boundary in this location (Photo 3). The rock face which steps down the property in this location reaches a maximum height of ~4.5m (Photo 4). No significant geological defects were observed in the rock face and it is considered stable. The remainder of the property between the base of the cliff and the downhill boundary is a steep, densely vegetated slope (Photo 5).

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

The ground materials of an as-dug trench on the site were logged (LOG1). Six 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 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:

LOG 1 (~RL135.3) **–** (Photo 6)

Depth (m)	**Material Encountered**
0.0 to 0.2	**TOPSOIL**, dark brown, Medium Dense, dry, fine to coarse grained, rock fragments included.
0.2 to 0.7	**SANDY CLAY**, brown, Soft, dry, fine to medium grained.
0.7 to 1.0	**LOW TO MEDIUM STRENGTH SANDSTONE**, orange, yellow and grey, sugary texture in places.

Base of Trench at ~1.0m in Low to Medium Strength Sandstone. No water table encountered.

DCP TEST RESULTS – Dynamic Cone Penetrometer

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

Depth(m) Blows/0.3m	**DCP 1** (~RL131.1)	**DCP 2** (~RL133.10)	**DCP 3** (~RL135.6)	**DCP 4** (~RL132.4)	**DCP 5** (~RL127.8)	**DCP 6** (~RL127.5)
0.0 to 0.3	Rock Exposed at Surface	Rock Exposed at Surface	3	6	10	2
0.3 to 0.6			5	24	5	8
0.6 to 0.9			#	#	#	#
			Refusal on Rock @ 0.5m	Refusal on Rock @ 0.5m	Refusal on Rock @ 0.4m	Refusal on Rock @ 0.5m

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

DCP Notes:

DCP1 – Medium Strength Sandstone exposed at surface.
DCP2 – Medium Strength Sandstone exposed at base of trench.
DCP3 – Refusal on Rock @ 0.5m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP4 – Refusal on Rock @ 0.5m, DCP bouncing off rock surface, white impact dust and brown sandy clay on dry tip.
DCP5 – Refusal on Rock @ 0.4m, DCP bouncing off rock surface, white impact dust on dry tip.
DCP6 – Refusal on Rock @ 0.5m, DCP bouncing off rock surface, clean dry tip.

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 shallow soils over clays that fill the bench step formation. In the test locations, where the rock is not exposed, it was encountered at depths of between 0.4 to 0.5m below the current surface. 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 as all the DCP tests bounced at refusal. 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. Due to the slope and site elevation, 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.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed above or beside the property. The steeply graded slope that falls across the downhill side of the property and continues below is a potential hazard (**Hazard One**). The vibrations from the proposed excavations are a potential hazard (**Hazard Two**). A loose boulder, wedge, or similar geological defect toppling onto the work site during the excavation process is a potential hazard (**Hazard Three**). The large sandstone face that steps ~4.5m down the slope is a potential hazard (**Hazard Four**).

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The steep slope that falls across the property and continues below failing and impacting on the proposed works.	The vibrations produced during the proposed excavations impacting on the surrounding structures.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (15%)	'Minor' (10%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (5×10^{-4})
RISK TO LIFE	9.1×10^{-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.

HAZARDS	Hazard Three	Hazard Four
TYPE	A loose boulder, wedge, or similar geological defect toppling onto the work site during the excavation process.	The sandstone face that steps ~4.5m down the slope failing and impacting on the proposed works (Photo 4).
LIKELIHOOD	'Possible' (10^{-3})	'Unlikely' (10^{-4})
CONSEQUENCES TO PROPERTY	'Medium' (20%)	'Medium' (25%)
RISK TO PROPERTY	'Moderate' (2×10^{-4})	'Low' (2×10^{-5})
RISK TO LIFE	6.6×10^{-5}/annum	2.9×10^{-7}/annum
COMMENTS	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels, the recommendations in **Section 13 and 14** are to be followed.	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 to Oxford Falls Road. Roof water from the development is to be piped to the street drainage system through any tanks that may be required by the regulating authorities.

11. Excavations

Two excavations are required for the proposed development:

- An excavation to a maximum depth of ~3.2m is required to create a level platform for the proposed house.
- An excavation to a maximum depth of ~3.3m is required for the proposed carport at the road frontage.

The excavations are expected to be through shallow fill, soil, and sandy clays with Medium Strength Sandstone, where it is not already exposed, expected at depths of between 0.4m to 0.5m below the surface in the area of the proposed excavation.

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

12. Vibrations

Possible vibrations generated during excavations through fill, soil, and clay will be below the threshold limit for building damage utilising a domestic-sized excavator up to 16 tonnes. It is expected that the majority of the excavations will be through Medium Strength Sandstone or better.

Excavations through Medium Strength Rock or better should be carried out to minimise the potential to cause vibration damage to the subject house, the E neighbouring house and carport, and a sewer main that cuts across the property below the footprint of the proposed house. Allowing ~0.5m for backwall drainage, the setbacks from the proposed excavations to the existing structures are as follows:

- ~0.9m from the E neighbouring house.
- ~1.0m from the E neighbouring carport.
- ~1.4m from the sewer main.
- ~8.0m from the subject house.

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.

Close controls by the contractor over rock excavation are recommended so excessive vibrations are not generated.

Excavation methods are to be used that limit peak particle velocity to 5mm/sec at the house walls and 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 and neighbouring houses.

13. Excavation Support Requirements

Allowing 0.5m for back wall drainage, the depths and setbacks for the proposed excavations are as follows:

- The house excavation will reach a maximum depth of ~3.2m and be set back ~flush with the E common boundary, and ~0.9m from the supporting walls of the E neighbouring house.
- The carport excavation will reach a maximum depth of ~3.3m and be set back ~0.4m from the E common boundary and ~0.9m from a concrete block retaining wall which supports a cut for the E neighbouring carport.

Sandstone was encountered at shallow depths of 0.5m or less across the location of the proposed works. As such, no structures or boundaries are expected to lie within the zone of influence of the excavations.

In this instance, the zone of influence is the area above a theoretical 45° line (from horizontal) from the base of the excavation or top of Medium Strength Rock, whichever is encountered first, towards the surrounding structures and boundaries. This line reduces to 30° through the fill and soil.

Due to the depth of the excavations, the overlying fill, soil, and clay portions of the excavation faces are to be scraped back at least 0.5m from the edge of the excavation through rock and battered temporarily at 1.0 Vertical to 1.0 Horizontal (45°) until the retaining walls are in place. Medium Strength Sandstone or better is expected to stand at vertical angles unsupported subject to approval by the geotechnical consultant.

During the excavation process, the geotechnical consultant is to inspect the cuts in 1.5m intervals as they are lowered 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.

Upslope runoff is to be diverted from the cut faces by sandbag mounds or other diversion works. All 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 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.

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.

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

14. Retaining Walls

For cantilever or singly propped retaining walls 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 Walls

Unit	Earth Pressure Coefficients		
	Unit weight (kN/m^3)	'Active' K_a	'At Rest' K_0
Fill and Topsoil	20	0.40	0.55
Residual Clays	20	0.35	0.45
Medium Strength Rock	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 wall, do not account for any surcharge loads and assume retaining walls are fully drained. Rock strength and relevant earth pressure coefficients are to be confirmed on site by the geotechnical consultant.

All retaining walls are to have sufficient back-wall drainage and be backfilled immediately behind the wall 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 walls the full hydrostatic pressures are to be accounted for in the retaining wall design.

15. Site Classification

The site classification is Class A in accordance with AS2870-2011.

16. Foundations

A 300mm earthenware sewer main pipe runs beneath the footprint of the proposed house. The invert is some ~2.0m. See Sydney Water Before You Dig appended. The foundations for the house are to follow Sydney Water guidelines.

The proposed house and carport excavations are expected to be entirely seated in Medium Strength Sandstone or better. This is a suitable foundation material. Where the footprint of the proposed works does not fall over the footprint of the excavations, shallow piers taken to rock will be required to maintain a uniform foundation material across the structure.

A maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength Sandstone.

Where the proposed driveway excavation is cut into Medium Strength Sandstone, it can be supported off this ground material. Where this material is not exposed, the driveway can be supported off the natural clays as well as the natural surface after any organic matter has been stripped. A maximum allowable bearing pressure of 200kPa can be assumed for footings on clays. A maximum allowable bearing pressure of 100kPa can be assumed for soil of the natural surface. Where the foundation material changes across the driveway, construction joints are to be installed to separate the different foundation materials and to accommodate minor differential movement. Alternatively, the entire driveway can be supported on sandstone.

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.

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 owner 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 cut faces 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 and contractors are still onsite and before steel reinforcing is placed or concrete is poured.

White Geotechnical Group Pty Ltd.

Reviewed By:

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REGISTERED PROFESSIONAL GEOSCIENTIST
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Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6 – LOG1

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.

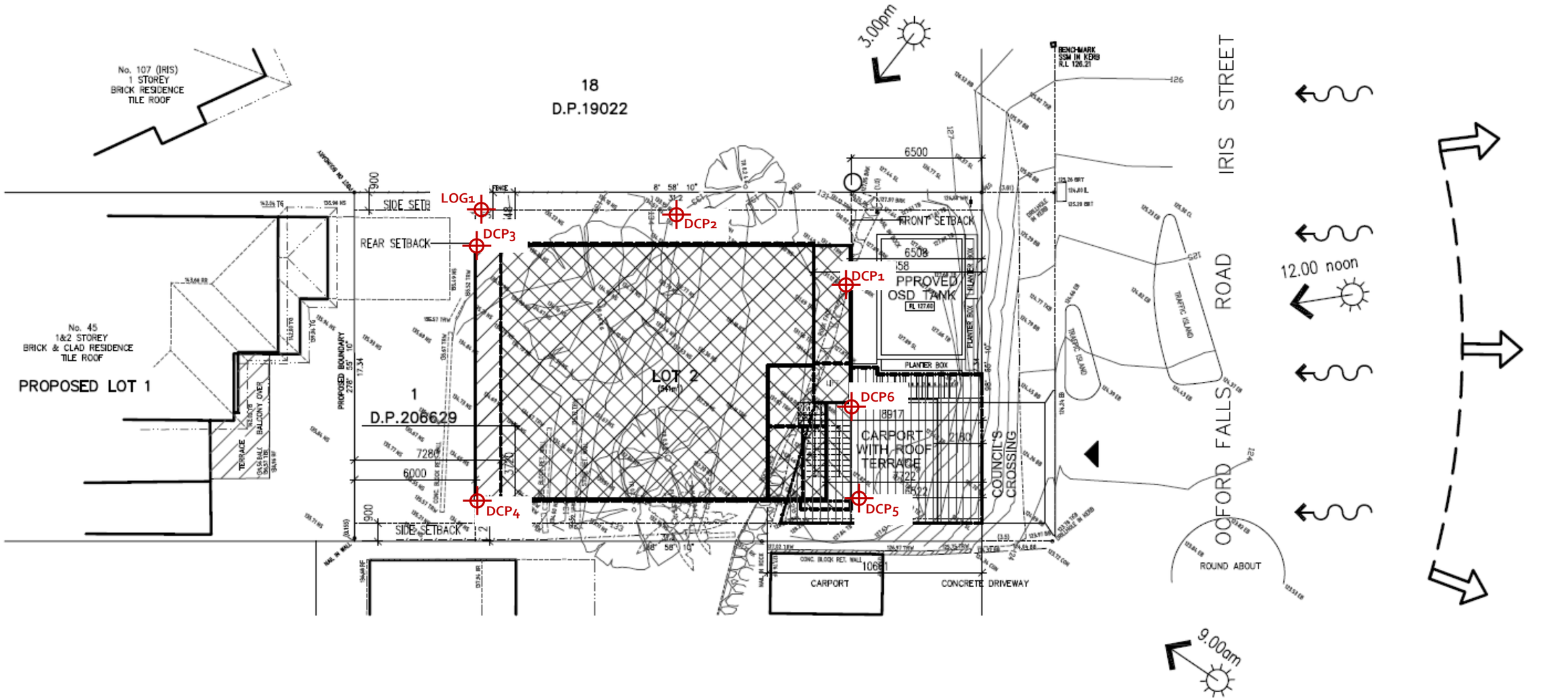
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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



SITE PLAN AND SITE ANALYSIS PLAN

1:200

1ST FLOOR PLAN

GROUND FLOOR

LOWER GROUND FLOOR

DEMOLISH

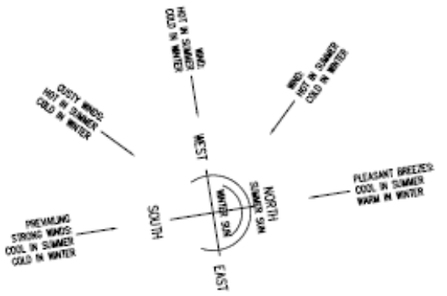
KEY

CAR ENTRY POINT

SUN DIRECTION – 22 JUNE

NOISE SOURCE

DISTRICT VIEWS OVER ADJOINING HOUSES



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SCALE 1:200

GENERAL NOTES:

1 Builder to check and confirm all necessary dimensions on site prior to construction. Do not scale the drawing.
2 All dimensions that relate to site boundaries and easements are subject to verification by site survey.
3 All work to be in accordance with BUILDING CODE of AUSTRALIA & to the satisfaction of local council requirements & other authorities.
4 All timber construction to be in accordance with the "TIMBER FRAMING" code.
5 Any detailing in addition to what in supplied shall be resolved between the owner and the builder to the owner's approval, except for any structural details or design which is to be supplied by Structural Engineer.
6 Roof water & sub-soil drainage to be disposed of in the approved manner or as directed by local council inspectors.
7 All electrical power & light outlets to be determined by owner.
8 Make good and repair all existing finishes damaged by new work. Reuse existing material where possible.

No.	AMENDMENT	DATE
1	ISSUED FOR DA	30/05/25

DESIGN BY:
MICHAL KORECKY
21 NALYA ROAD, NARRAWEENA NSW 2099
ABN: 79 393 130 294
Email: koreckym@gmail.com
Mob: 0438 148 944

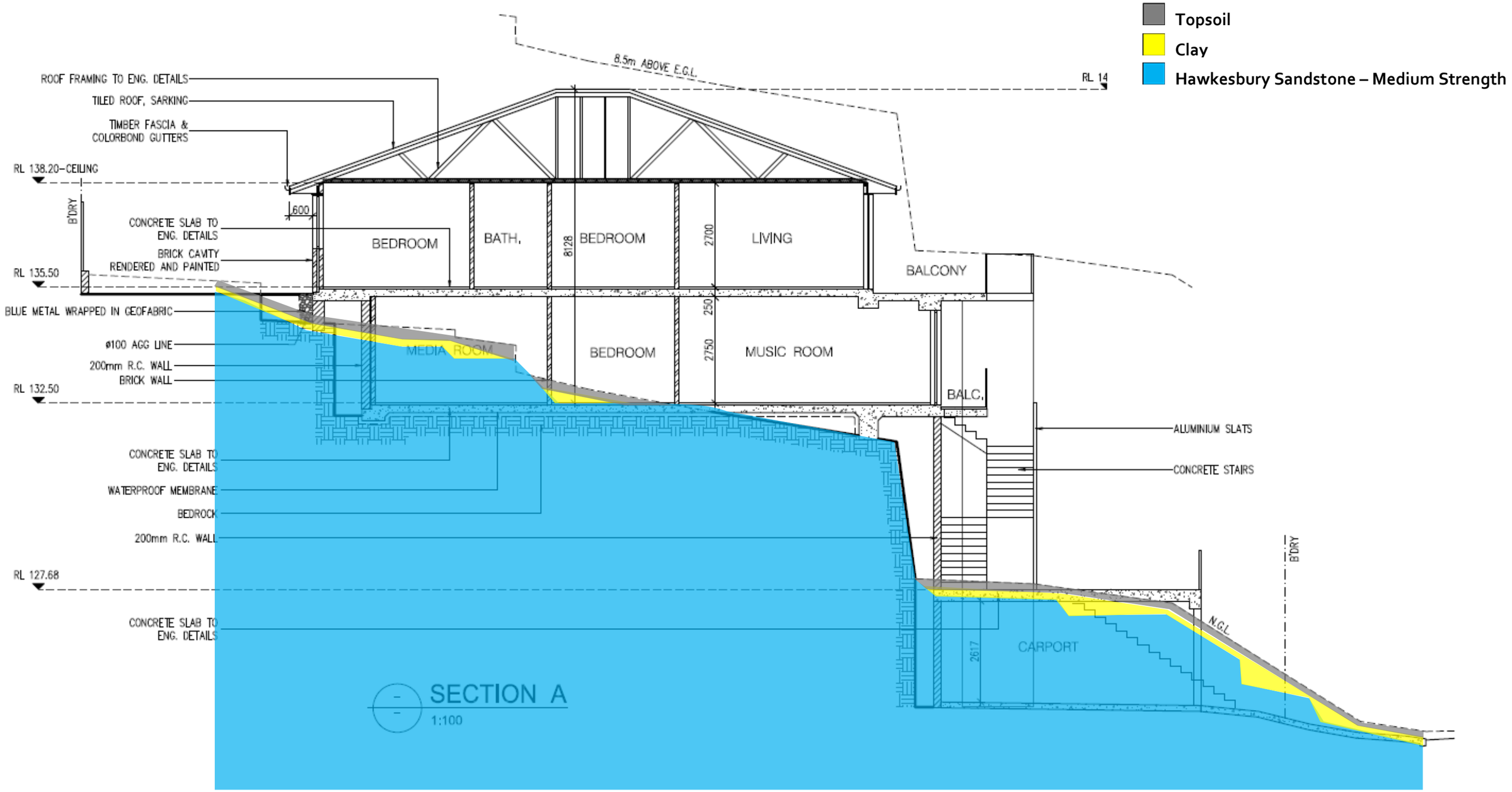
PROJECT:
PROPOSED RESIDENCE
45 OXFORD FALLS ROAD, BEACON HILL
NSW 2100, LOT 2 IN DP.206629
CLIENT:
JIRI AND MARCELA ALBRECHT

DATE: 30/05/25	SCALE: AS NOTED
DRAWN: MK	ISSUE: 1
DRAWING Nr : 18080	SHEET: 1

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials

Expected Ground Materials

- Topsoil
- Clay
- Hawkesbury Sandstone – Medium Strength



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SCALE 1:100

GENERAL NOTES:

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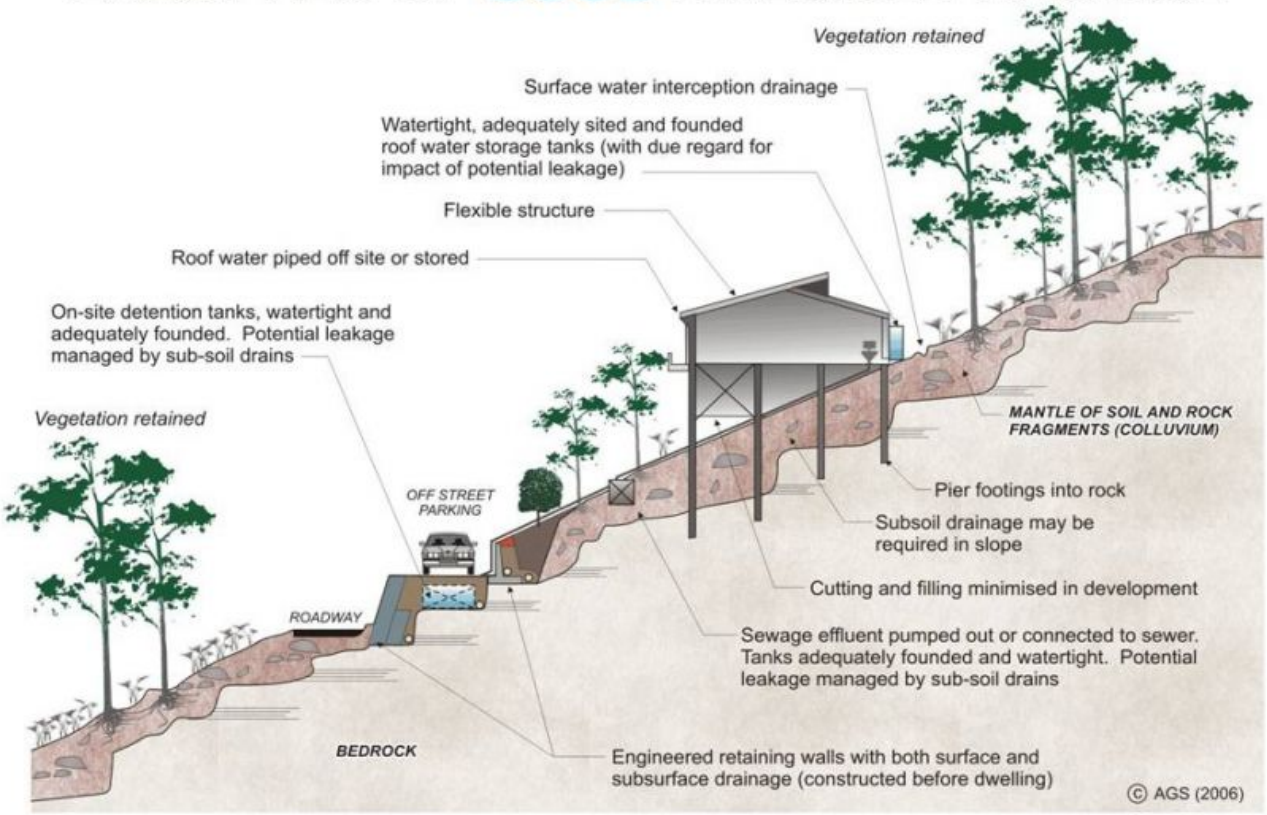
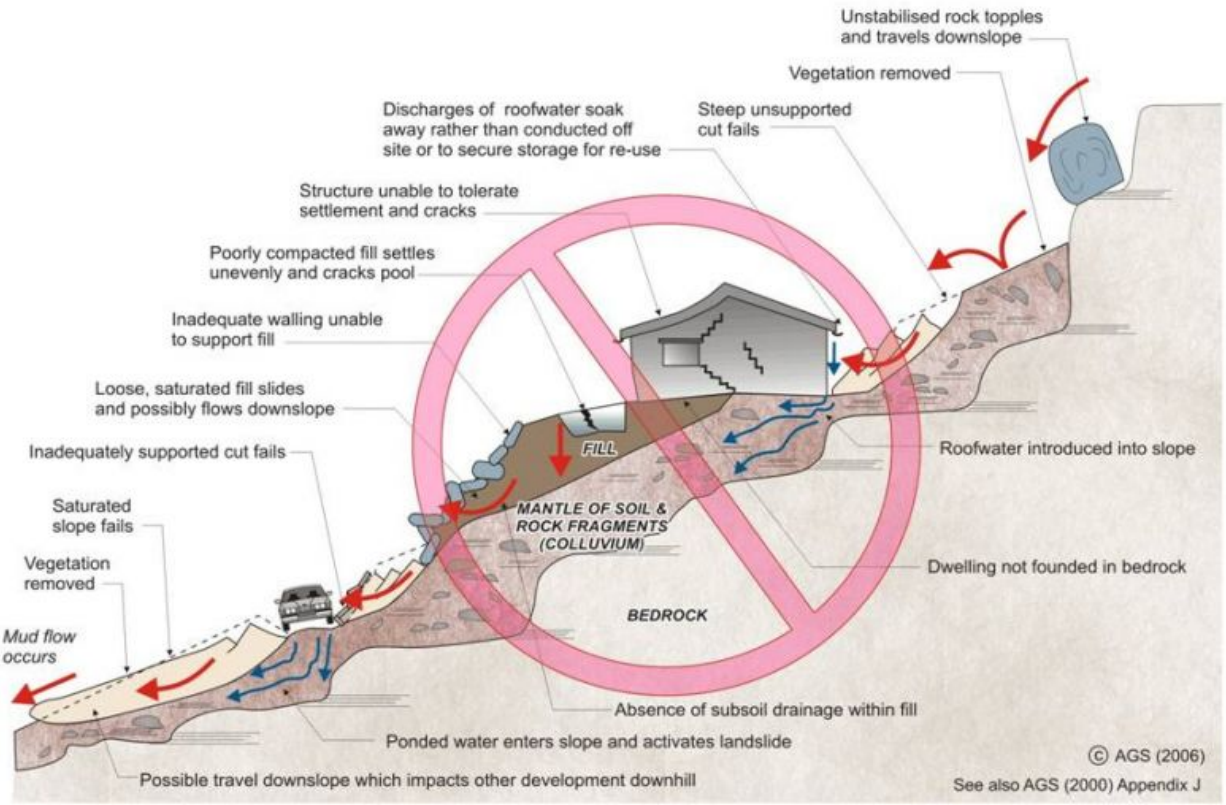
PROJECT:
PROPOSED RESIDENCE
45 OXFORD FALLS ROAD, BEACON HILL
NSW 2100, LOT 2 IN DP.206629
CLIENT:
JIRI AND MARCELA ALBRECHT

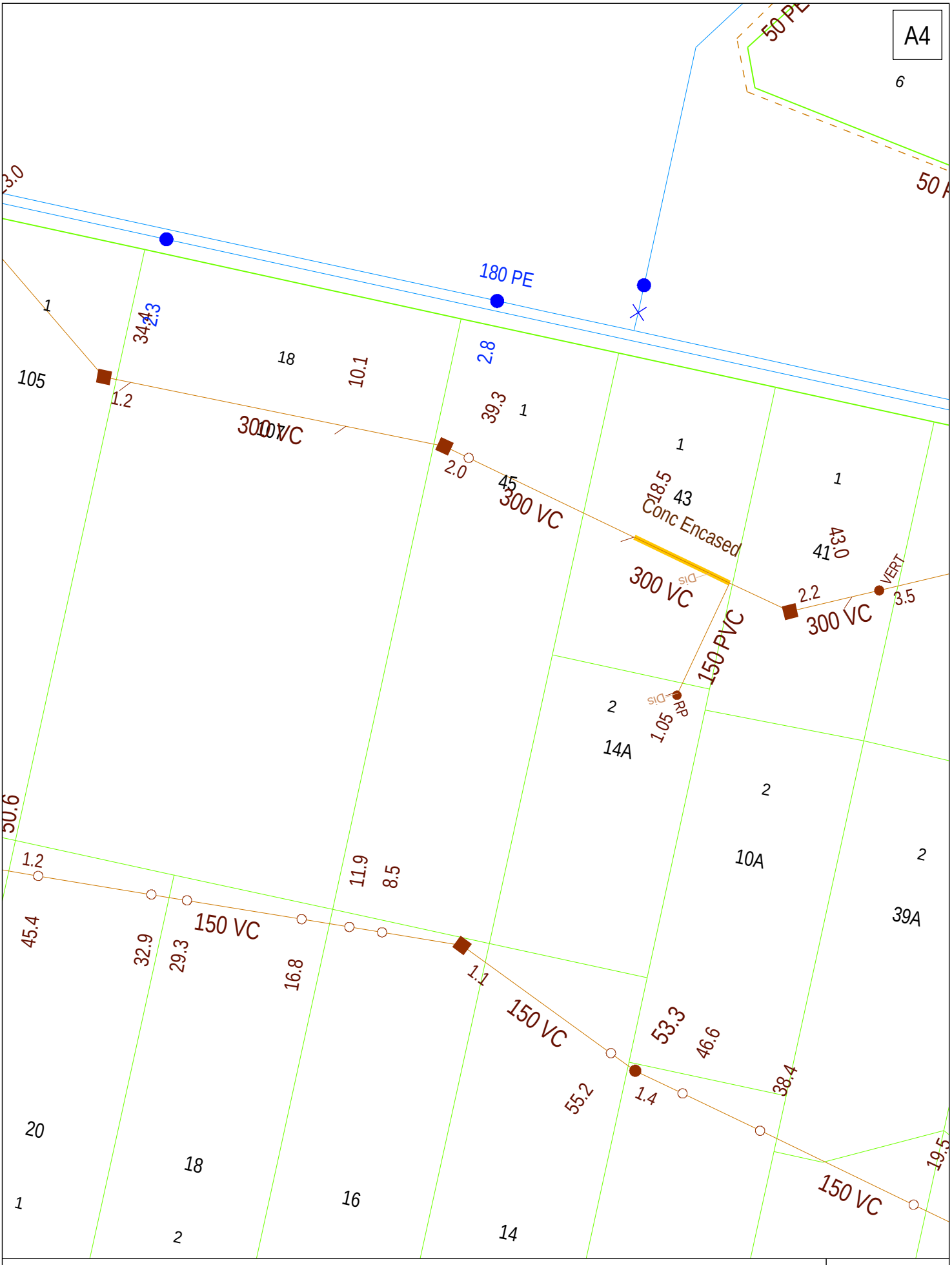
DATE: 30/05/25	SCALE: AS NOTED
DRAWN: MK	ISSUE: 1
DRAWING Nr : 18080	SHEET: 10

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE





DBYD Address:
45 Oxford Falls Rd
Beacon Hill NSW 2100

DBYD Job No: 50347331
DBYD Sequence No: 256036997

No warranty is given that the information shown is complete or accurate.

SYDNEY WATER CORPORATION

Scale: 1:500

Date of Production: 04/06/2025

Plan 1 of 1

N

0m 2m 4m 6m 8m 10m