J3941A.
23rd October, 2023

21 Moore Street, Clontarf

Comments on Updates to Plans

We have reviewed the existing geotechnical report, the plans used to carry out the report, and the updated plans for DA shown on 11 drawings prepared by Natalie Scilerras, drawings numbered DA-08 to DA-18, Issue A, dated 15/10/23.

The changes include:

- Extending the carport to the E.
- Reducing the extent of the proposed extension to the downhill side of the lower level and replacing this with a deck.
- Removing the ground level deck and replacing this with a minor extension.
- Reducing the extent of level 1.
- Various other minor internal and external modifications.

The changes to the plans are minor from a geotechnical perspective and do not alter the recommendations or the risk assessment in the report carried out by this firm numbered J3941 and dated the 9th December, 2021.

White Geotechnical Group Pty Ltd.

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GEOTECHNICAL INVESTIGATION:

Alterations and Additions and New Pool at **21 Moore Street, Clontarf**

1. Proposed Development

1.1 Extend the downhill side of the house.

1.2 Demolish the existing pool and construct a new pool on the downhill side of the property.

1.3 Re-landscape the downhill side of the property by filling to a maximum height of ~2.2m.

1.4 Various other internal and external alterations.

1.5 Details of the proposed development are shown on 11 drawings prepared by Natalie Sciberras, drawings numbered DA-08 to DA-18, Issue A, dated 7/11/21.

2. Site Description

2.1 The site was inspected on the 8th December, 2021.

2.2 This residential property is on the low side of the road and has a SW aspect. The block runs longways to the S so the slope is a cross-fall. It is located on the gentle to moderately graded middle reaches of a hillslope. The slope above the property continues at similar angles. The slope below the property gradually increases in grade.

2.3 At the road frontage, a concrete driveway runs to a stable carport attached to the uphill side of the house (Photo 1). Between the road frontage and the house is a gently sloping tile-paved patio (Photo 2). The part three-storey brick house is supported on brick walls (Photo 3). No significant signs of movement were observed in the supporting brick walls. A level terrace extends off the downhill side of the house that will be demolished as part of the proposed works (Photo 4). A void was observed under the W end of the terrace. A pool has been cut into the slope below the terrace

(Photo 5). The pool will also be demolished as part of the proposed works. A gently sloping lawn-covered fill extends off the downhill side of the pool to a garden area near the lower common boundary (Photo 6). The fill is battered to stable angles and will be removed as part of the proposed works.

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

One hand Auger Hole (AH) was put down to identify the soil materials. Four Dynamic Cone Penetrometer (DCP) tests were put down to determine the relative density of the overlying soil and the depth to rock. The locations of the tests are shown on the site plan attached. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural rock surface. This is not expected to 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:

AUGER HOLE 1 (~RL43.8) **–** AH1 (Photo 7)

Depth (m)	**Material Encountered**
0.0 to 0.4	**FILL**, disturbed gravelly soil, dark brown, medium dense to dense, dry, fine to coarse grained with fine trace organic matter.

Refusal @ 0.4m on obstruction within fill. 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** (~RL43.7)	**DCP 2** (~RL43.4)	**DCP 3** (~RL44.0)	**DCP 4** (~RL44.1)
0.0 to 0.3	5	6	3	7
0.3 to 0.6	10	19	1	11
0.6 to 0.9	11	24	#	12
0.9 to 1.2	20	19		6
1.2 to 1.5	#	12		#
1.5 to 1.8		#		
	Refusal on Rock @ 1.2m	Refusal on Rock @ 1.5m	Refusal on Rock @ 0.4m	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 – Refusal on rock @ 1.2m, DCP bouncing off rock surface, brown sand on wet tip.
DCP2 – Refusal on rock @ 1.5m, DCP bouncing off rock surface, dark brown soil on dry tip.
DCP3 – Refusal on rock @ 0.4m, DCP bouncing off rock surface, orange sandstone fragments on dry tip.
DCP4 – Refusal on rock @ 1.1m, DCP bouncing off rock surface, brown sand on dry 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 sandy soils over firm to stiff clays that fill the bench step formation. Manmade filling has been placed across the downhill side of the property. In the test locations, the depth to rock ranged between 0.4 to 1.5m below the current surface, being deeper due to the stepped nature of the underlying bedrock and where fill is present. As the DCP bounced at the end of the tests, the underlying sandstone on 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. Due to the slope and elevation of the block, the water table is expected to be many metres below the base of the proposed excavations.

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 Moore Street above.

8. Geotechnical Hazards and Risk Analysis

No geotechnical hazards were observed beside the property. The gentle to moderately graded slope that rises across the property and continues above and below is a potential hazard (**Hazard One**). The proposed fill across the downhill side of the property is a potential hazard until retaining walls are in place (**Hazard Two**).

RISK ANALYSIS SUMMARY IS ON THE NEXT PAGE

Risk Analysis Summary

HAZARDS	Hazard One	Hazard Two
TYPE	The gentle to moderate slope that rises across the site and continues above and below failing and impacting on the proposed works.	The proposed fill failing and impacting on the subject and neighbouring properties below before the retaining walls are in place.
LIKELIHOOD	'Unlikely' (10^{-4})	'Possible' (10^{-3})
CONSEQUENCES TO PROPERTY	'Medium' (12%)	'Medium' (25%)
RISK TO PROPERTY	'Low' (2×10^{-5})	'Moderate' (2×10^{-4})
RISK TO LIFE	5.5×10^{-7}/annum	5.8×10^{-5}/annum
COMMENTS	This level of risk is 'ACCEPTABLE'.	This level of risk to life and property is 'UNACCEPTABLE'. To move risk to 'ACCEPTABLE' levels the recommendations in **Section 12** are to be followed.

(See Aust. Geomech. Jnl. Mar 2007 Vol. 42 No 1, for full explanation of terms)

9. Suitability of the Proposed Development for the Site

The proposed development is suitable for the site. No geotechnical hazards will be created by the completion of the proposed development provided it is carried out in accordance with the requirements of this report and good engineering and building practice.

10. Stormwater

The fall is away from the street. The stormwater engineer is to refer to council stormwater policy for suitable options.

11. Excavations

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

12. Fill

From the plans, it is apparent that filling to maximum height of ~2.2m will be placed on the downhill side of the property to fill in the existing pool and to re-landscape the slope. The existing pool shell is to have drainage holes punched through its base to allow groundwater to flow through. All fill brought onto site is to be certified as 'clean fill' with a VENM certificate or similar documentation in accordance with EPA guidelines.

No fill is to be laid until retaining walls are in place. Filling to this depth without appropriate compaction will result in a significant settlement.

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

The surface is to be prepared before fills are lain. Strip the existing topsoil and remove all organic matter, stockpiling for later use as topsoil or remove from site.

Non-Cohesive Soils (sandy fills)
The proposed fill for landscaping is to be compacted over the prepared surface to a Minimum Density Index (ID) of 65%.

Cohesive Soils (clayey fill & excavated bedrock)
The proposed fill for landscaping is to be compacted over the prepared surface to at least 95% of Standard Maximum Dry Density.

The geotechnical consultant is to inspect and test the fill as it is laid in not more than 0.9m rises to ensure the required density has been achieved.

Filling within 1.5m behind retaining walls should be compacted with light weight equipment such as a hand-operated plate compacter or similar so as to not damage the wall. Where hand-held equipment is used, the loose depth of placed fill should not exceed 150mm before compaction occurs. No pavements or 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	20	0.40	0.55

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 proposed extension to the downhill side of the house, pool, and any retaining walls for the proposed landscaping are all to be supported on piers taken to the underlying Medium Strength Sandstone. This material is expected at variable depths of between 0.4 to 1.5m

below the current surface. A maximum allowable bearing pressure of 1000kPa can be assumed for footings on Medium Strength 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. 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 owner or the regulating authorities if the following inspection has not been carried out during the construction process.

- The geotechnical consultant is to inspect and test the fill in not more than 0.9m rises. This is to ensure the required density has been achieved during compaction.

- 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.

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Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7: AH1 – Downhole is from left to right

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.

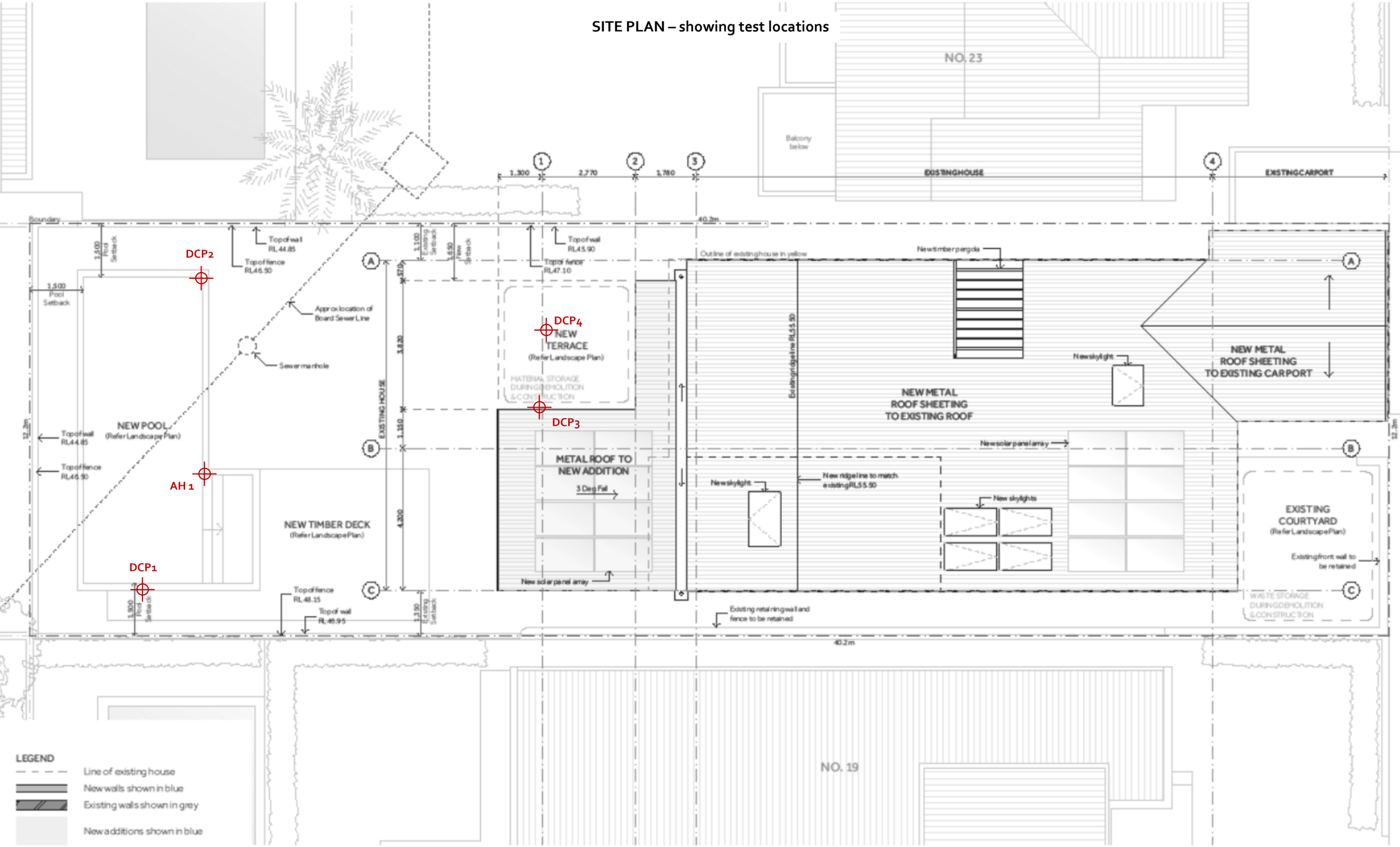
- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- 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

- Line of existing house
- New walls shown in blue
- Existing walls shown in grey
- New additions shown in blue

Natalie Sciberras
Architecture and Interior Design

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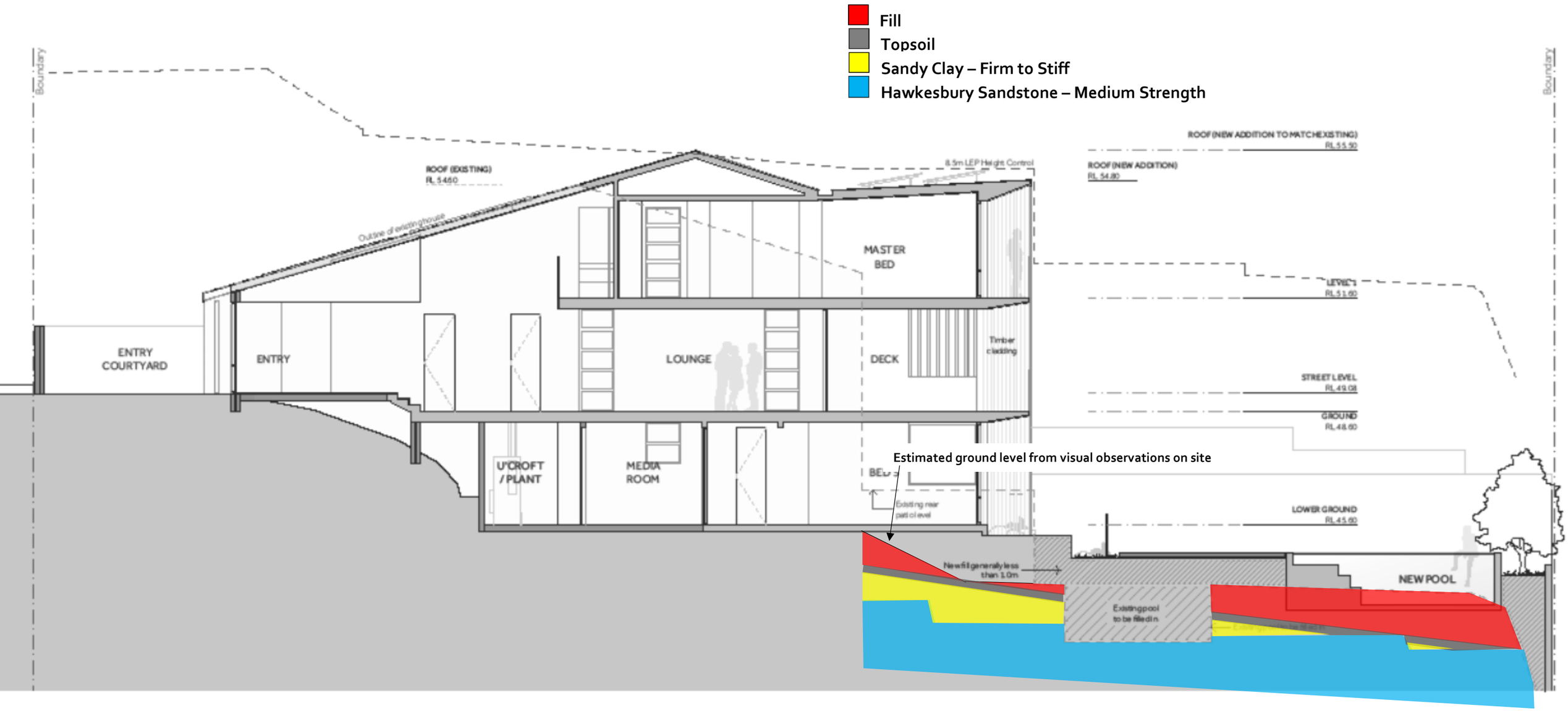
project	Alterations & Additions
address	21 Moore Street Clontarf
client	Rod & Natalie Pindar

Do not scale these drawings. Verify all dimensions on site.

title	Site & Roof Level Plan
scale	1:100@A3
date	07 November 2021
drawing no.	DA-08
issue	A

TYPE SECTION – Diagrammatical Interpretation of expected Ground Materials



LEGEND

- Outline of existing house
- Existing house shown in yellow
- New additions shown in blue
- New walls shown in blue
- Existing walls shown in grey

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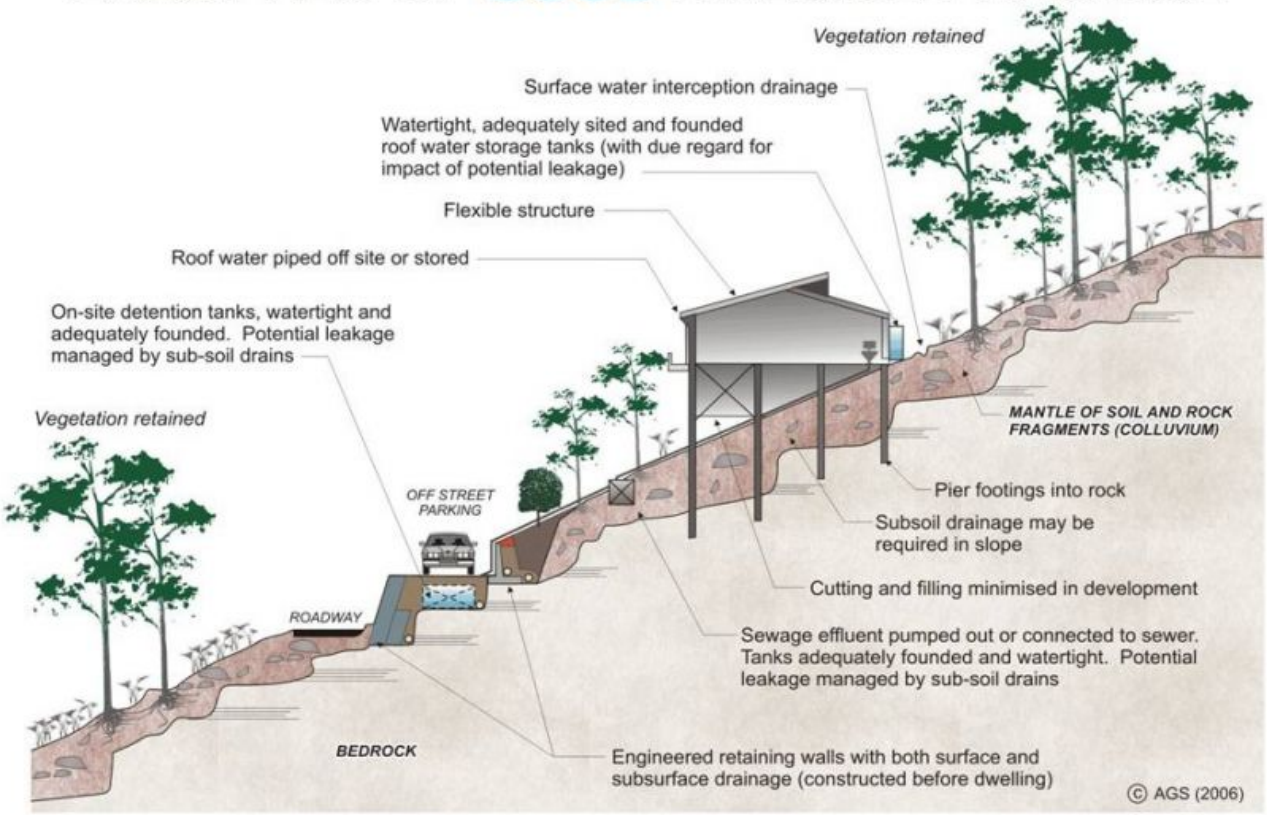
Do not scale these drawings. Verify all dimensions on site.

title	Section BB
scale	1:100@A3
date	07 November 2021
drawing no.	DA-17
issue	A

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE