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205400.01
2 Feburary 2023
NB:hb
R.01.Rev2

Mr Patrick & Mrs Nicole Heller
c/o Utz Sanby Architects
Suite 103, 506 Miller Street
Cammeray, NSW 2062

Attention: Duncan Sanby

214 Hudson Parade, Clareville
Proposed Alterations and Additions to Boatshed

1. Introduction

This report presents the results of a geotechnical assessment carried out by Douglas Partners Pty Ltd (DP) for alterations and additions to a boatshed at 214 Hudson Parade, Clareville. The work was carried out at the request of Duncan Sanby of Utz Sanby Architects, acting on behalf of Mr Patrick & Mrs Nicole Heller, owners of the property.

It is understood that a new single boatshed with a storage loft and new decking is to be constructed on the footprint of the existing boatshed and slipway. The new boatshed will re-use the existing boatshed and slipway foundations.

Geotechnical assessment was carried out to provide information on subsurface conditions for preliminary design to support a Development Application. The DA proposal includes a Deck, Boatshed Refurbishment, tidal steps and ramp. This includes the installation of four new pillars into the marine floor

The assessment comprised inspection and photography of the existing boatshed and accessible areas below the high tide mark, together with a series of Dynamic Cone Penetrometer tests (DCP's) at selected locations. Details of the field work are given in this report, together with comments relating to the inferred subsurface profile, as well as preliminary design parameters.

An Architectural plan (see attached) for the boatshed prepared by Utz Sanby Architects (Drawing 2101 DA-01) was provided for use in the assessment.

2. Background

In 2021 Douglas Partners (DP) undertook a geotechnical assessment of the site for the proposed construction of new residences on the site, as described in our report Project 205400.00.R.001.Rev1 dated 9 July 2021. Improvements to the existing boatshed were not included in the original report.

3. Site Description and Geology

The site is a rectangular residential lot located on the low, western side of Hudson Parade, Clareville. It has average plan dimensions of 49.5m by 15.2 m and a total area of approximately 752 m^2. The site is bounded by residential lots to the east and west, Hudson Parade to the north and Pittwater to the south. The boatshed is located at the southern end of the site, adjacent to the shore.

At the location of the boatshed, the ground slopes from about RL[1] 4 to RL 1.0 below sea level. Steps adjacent to a retaining wall lead down from the rear garden of the property to the boatshed (see Photograph 1). There is an existing boatshed with a jetty where the proposed new structure will be located.

Photograph 1: Boatshed looking west

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is underlain by the Newport Formation, which is the upper unit of the Narrabeen Group and typically comprises interbedded siltstone, shale, laminite and lithic to quartz-lithic sandstone. This is consistent with the topography and the rock observed on, and adjacent to the site, as well as in the general area.

4. Site Observations and Field Work

The boatshed was inspected by an engineering geologist on 15 August 2022 and the field assessment comprised detailed geological inspection of the boatshed and areas below the high tide mark as well as four DCP tests. The locations of the DCP tests, are shown on Drawing 1.

[1] Reduced Level in metres relative to Australian Height Datum

The boatshed observations are:

- The boatshed is founded on an existing concrete slab supported in part by either sandstone bricks or concrete cinder blocks possibly founded on rock (see Photograph 2);
- The existing boatshed slab is in relatively good condition with no visible cracking;
- The boatshed walls are made from concrete cinder blocks and have no visible signs of distress or cracking;
- An existing sandstone block retaining wall forms the northern wall of the boatshed. There appears to be some minor cracking with some crack repair in places (see Photograph 3). The existing sandstone block wall is proposed to remain in place;
- The existing wooden jetty appears to be in good condition and constructed in the last 10 years;
- A slipway consisting of steel tracks extends from the boatshed into the water;

Photograph 2: Boatshed looking west

Photograph 3: Sandstone block wall

DCPs were carried out at four locations. Refusal depth is inferred to represent the top of bedrock at depths between RL-0.45 to -1.55 m.

5. Proposed Development

It is understood that a single level boatshed with a storage area in the loft is proposed. The proposed boatshed will be constructed off the existing concrete slab and foundations of the original boatshed. A new wooden deck is proposed to wrap around the boatshed and is to be founded on the existing concrete slip way. A small wooden jetty including stairs will lead from the new deck into the water below. Reference should be made to the architectural drawings prepared by Utz Sanby Architects for the precise layout of the boatshed and decking. No excavations for the boat shed are proposed.

6. Comments

6.1 Geotechnical Model and Inferred Section

The interpreted geotechnical model for the boatshed area consists of shallow unconsolidated marine sediments and a relatively thin residual sandy clay soil underlain by bedrock, (see Drawing 2). Sandstone bedrock was not observed in the vicinity of the boatshed but was noted observed along the lower slope above Pittwater at 216 Hudson Parade in DP previous report. The outcrop included some thinly bedded siltstone and thickly to very thickly bedded sandstone.

6.2 Foundations

It should be noted that the existing foundations of the boatshed and slipway were not exposed nor investigated during the site walk-over. The condition and suitability of the foundations to support the proposed new boatshed and decking should be assessed and commented on by the structural engineer. Further investigation maybe required to confirm their suitability.

It is recommended that any new foundations (proposed jetty stairs) be taken down to and socketed or dowelled into the underlying, in situ bedrock. A design allowable bearing pressure of up to 1000 kPa is considered appropriate for bedrock of at least low strength.

Inspection of footing excavations for all new foundations, will be required to enable completion of a Pittwater Council GRMP Form 3 (Final Geotechnical Certificate – Post Construction Geotechnical Certificate) to obtain a final occupation and Building Certificate upon completion of the works.

7. Limitations

Douglas Partners (DP) has prepared this report for this project at 214 Hudson Parade, Clareville in accordance with DP's email proposal 10 August 2022, and acceptance received from Mr Patrick & Mrs Nicole Heller dated 10 August 2022. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Mr Patrick & Mrs Nicole Heller and their agents for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or another site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires a risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Yours faithfully
Douglas Partners Pty Ltd

Reviewed by

Nick Burrows
Engineering Geologist

Hugh Burbidge
Principal

Attachments: Notes About this Report
Drawing 1 & 2
Architectural plan
Dynamic Cone Penetrating Tests Results

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

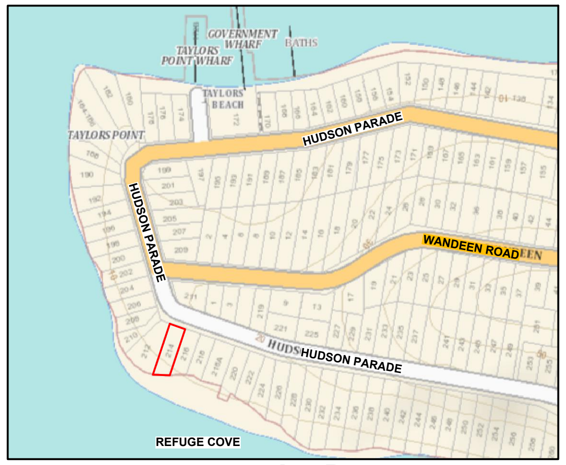
  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.



Locality Plan

NOTE:
1: Base image from MetroMap.com.au (Dated 29.05.2022)

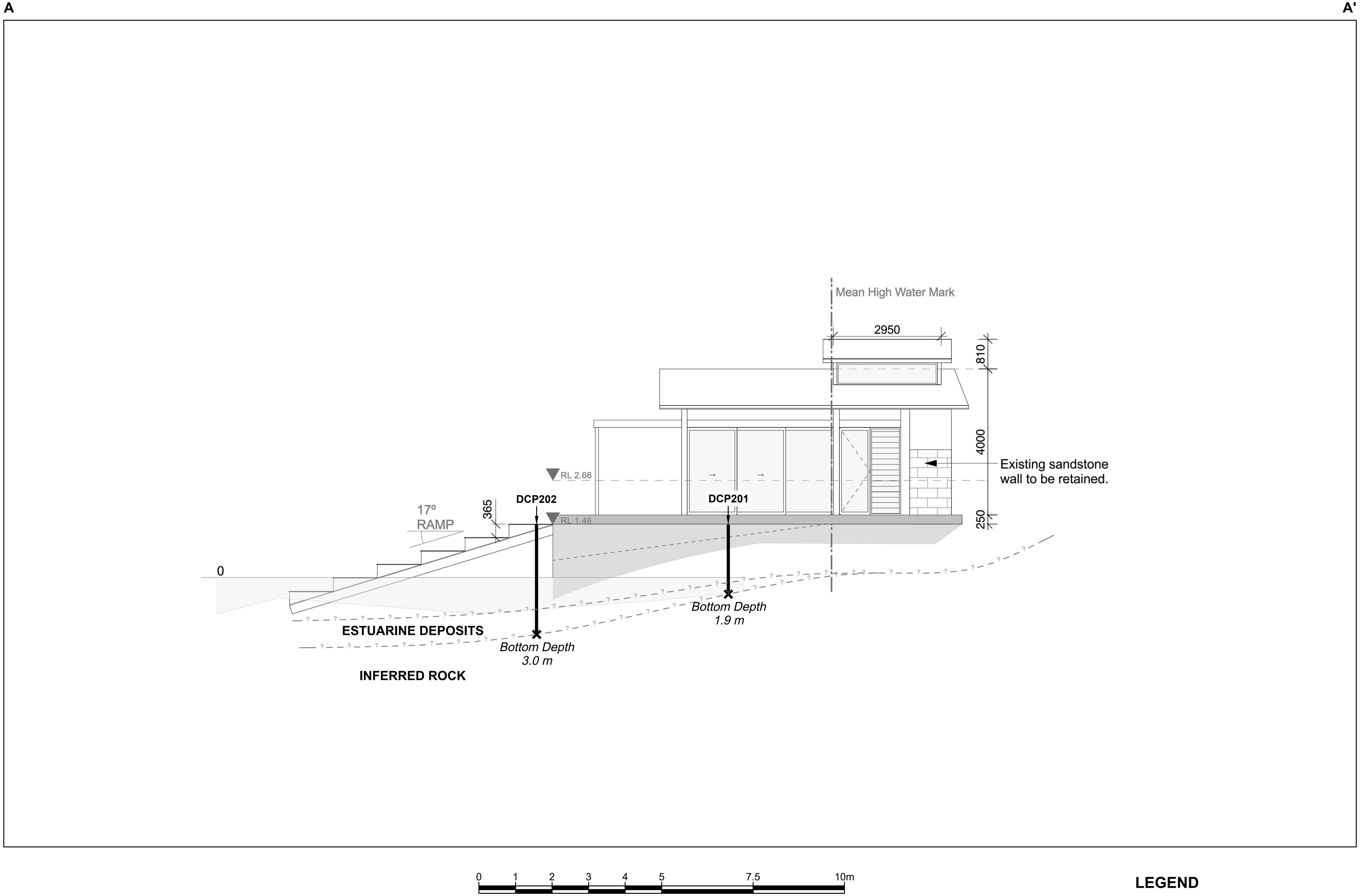
0 1 2 4 6 8 10 15 20 30m
1:300 @ A3

LEGEND

- Approximate Site Boundary
- DCP Location
- (14.0) RL Inferred top of rock
- Geological Cross Section

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: UTZ Sanby Architects		TITLE: **Test Location Plan** **Alterations and Additions to Boatshed** **214 Hudson Parade , Clareville**
	OFFICE: Sydney	DRAWN BY: CC	
	SCALE: 1:300 @ A3	DATE: 07.09.2022	

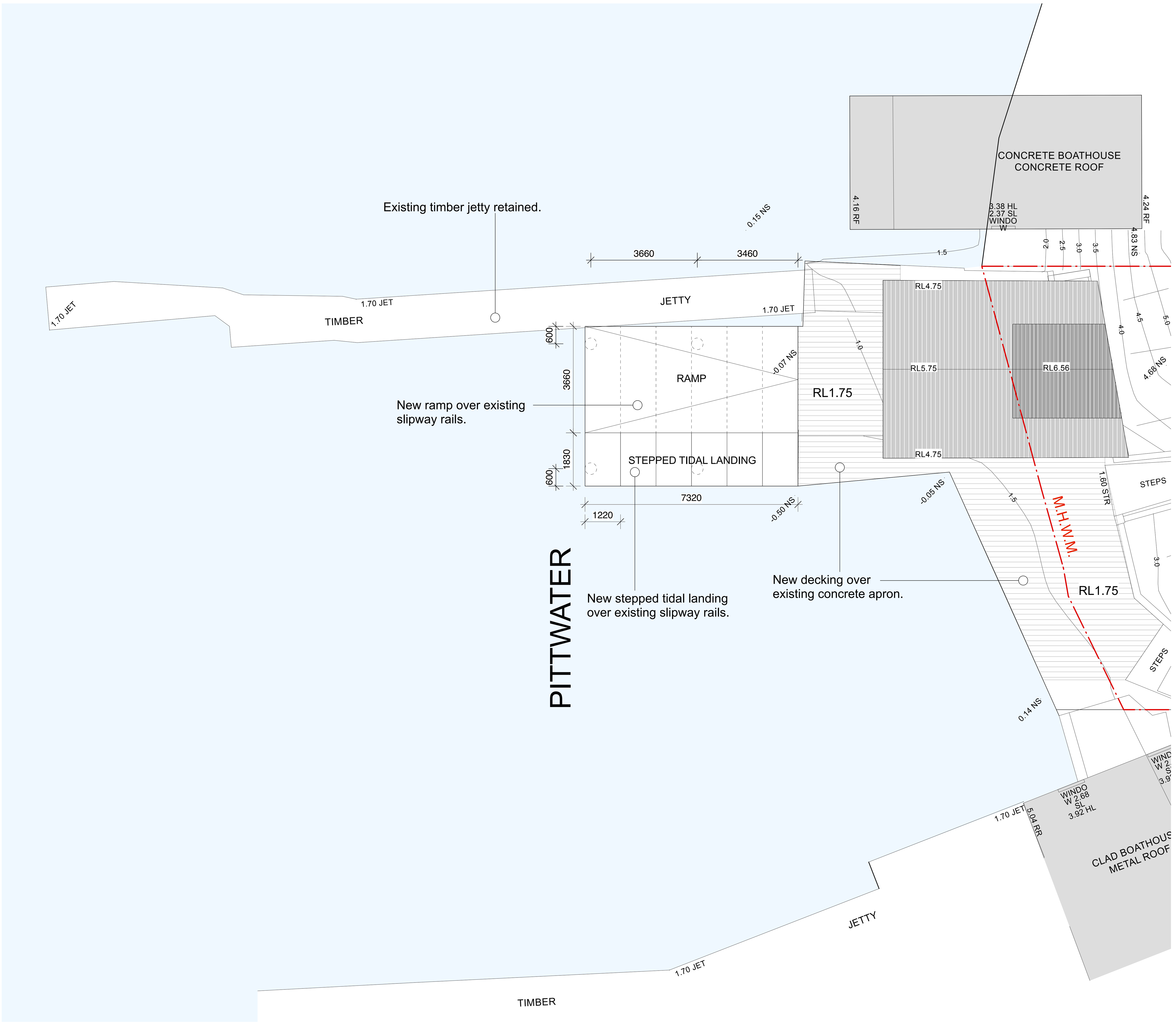
PROJECT No:	205400.01
DRAWING No:	1
REVISION:	0



LEGEND

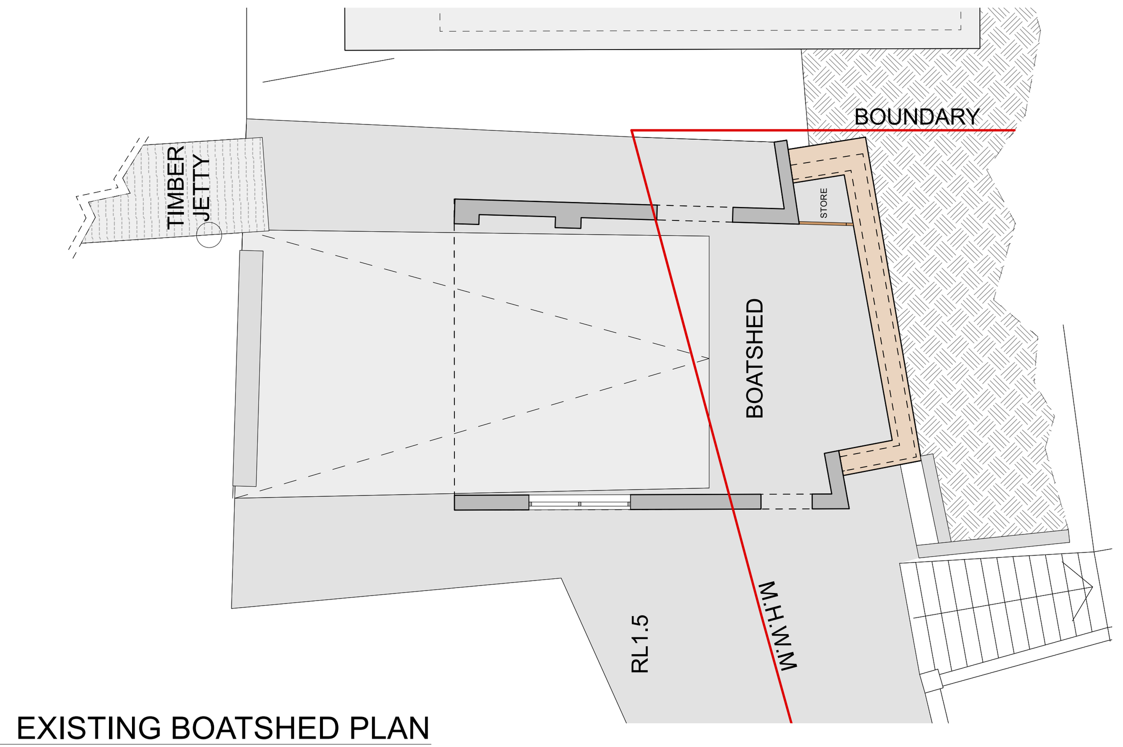
— ? — — Interpreted Geotechnical Boundary

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: UTZ Sanby Architects	TITLE: **Geological Section A-A'**	PROJECT No: 205400.01
	OFFICE: Sydney / DRAWN BY: MG	**Alterations and Additions to Boatshed**	DRAWING No: 2
	SCALE: 1:100 @ A3 / DATE: 07.09.2022	**214 Hudson Parade , Clareville**	REVISION: 0

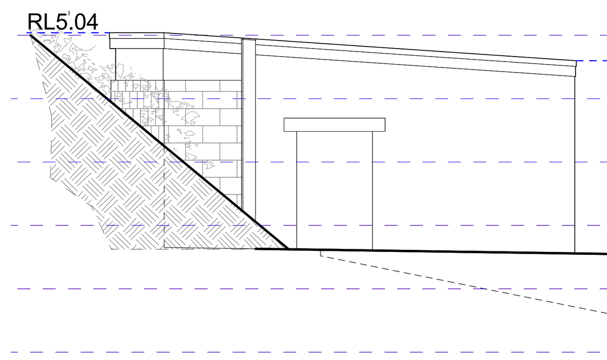


1 PROPOSED SITE PLAN
Scale: 1:100

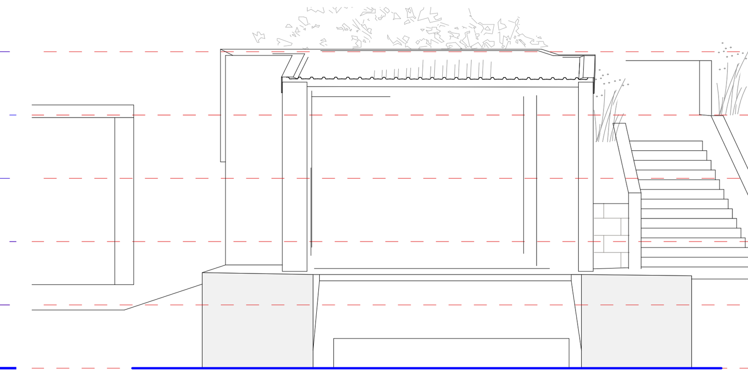
EXISTING BOATSHED.



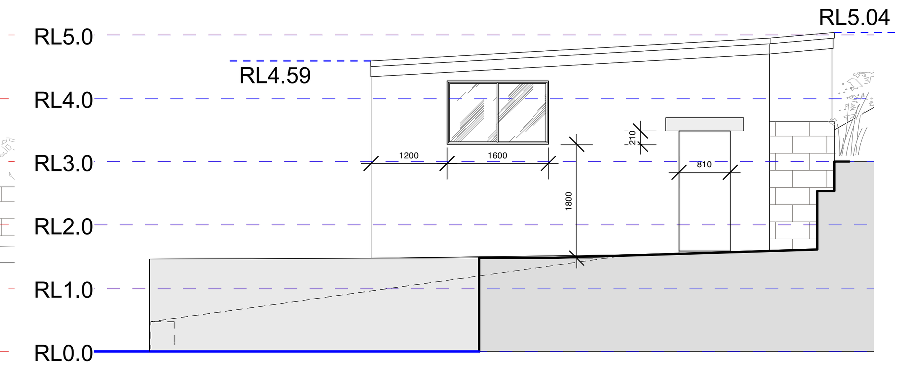
8 EXISTING BOATSHED PLAN
Scale: 1:100



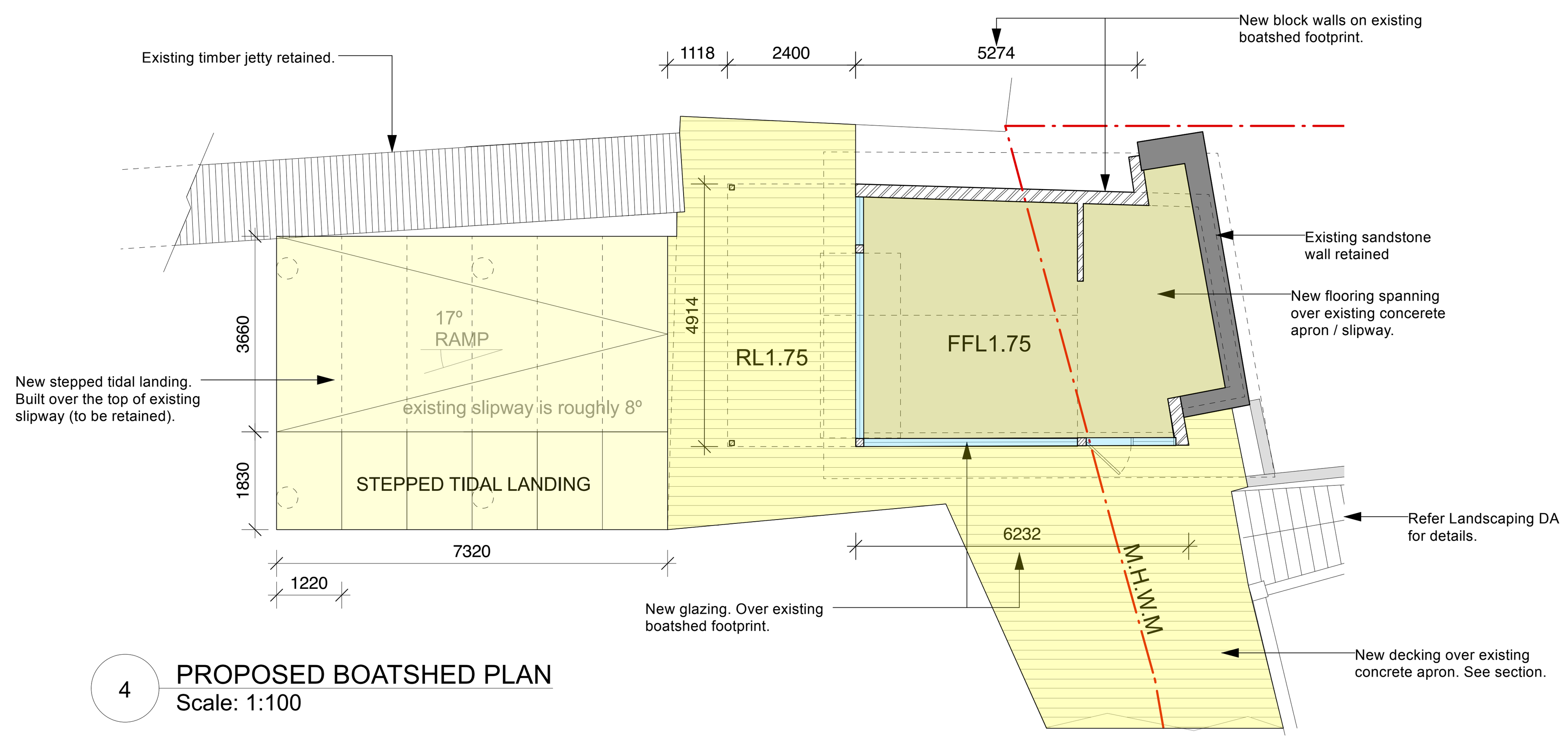
9 EXISTING WEST ELEVATION
Scale: 1:100



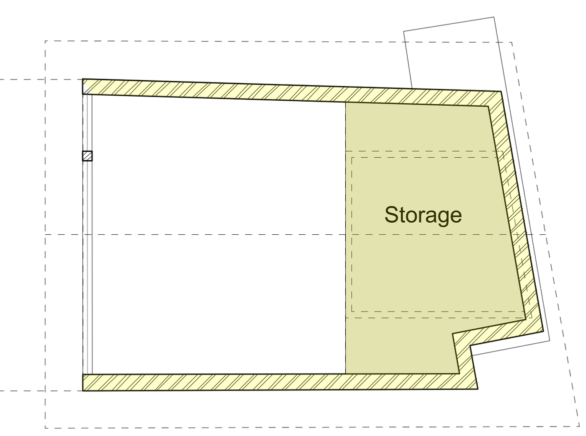
10 EXISTING SOUTH ELEVATION
Scale: 1:100



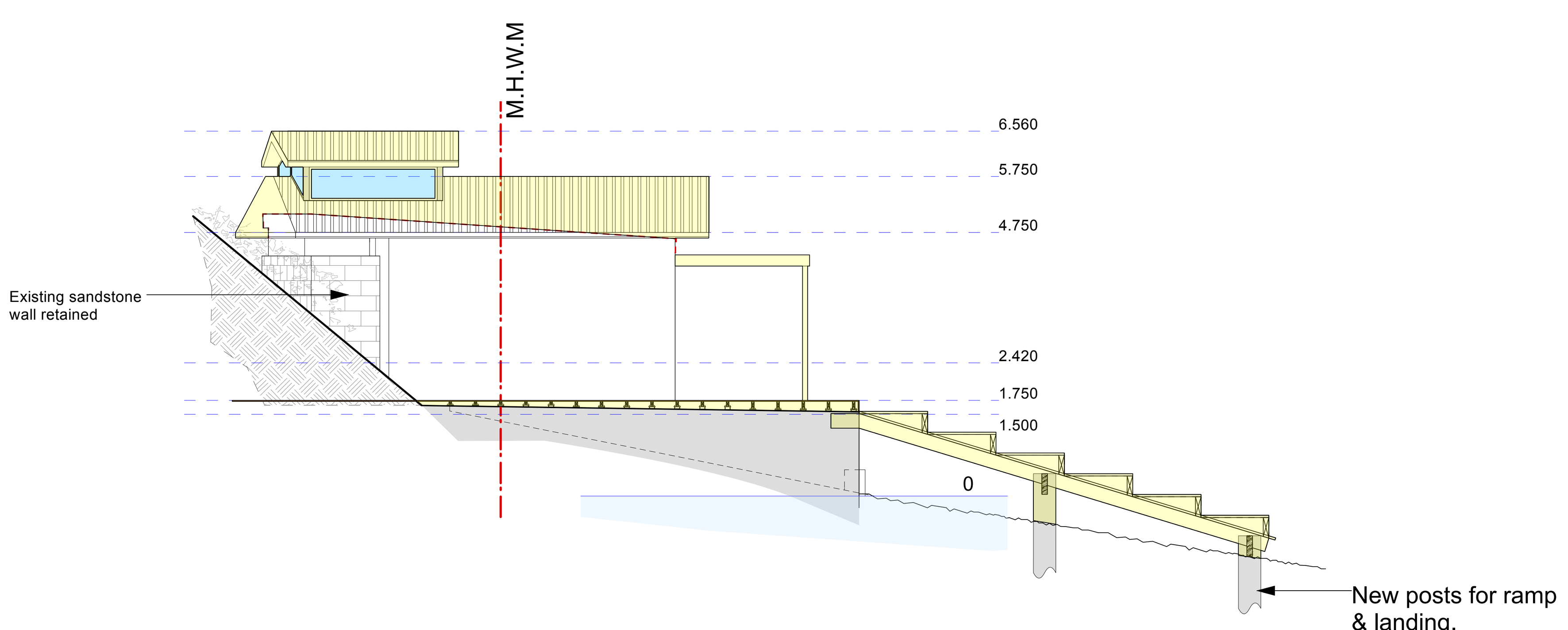
11 EXISTING EAST ELEVATION
Scale: 1:100



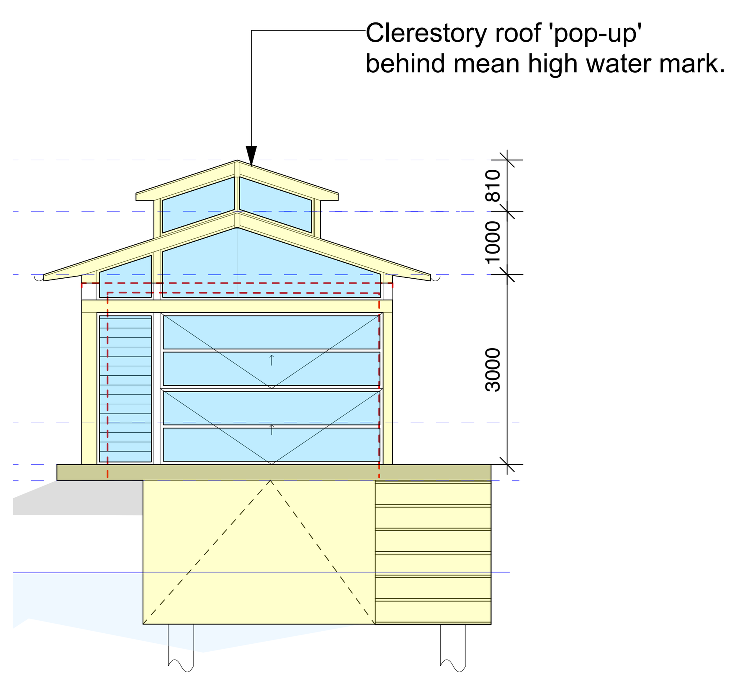
4 PROPOSED BOATSHED PLAN
Scale: 1:100



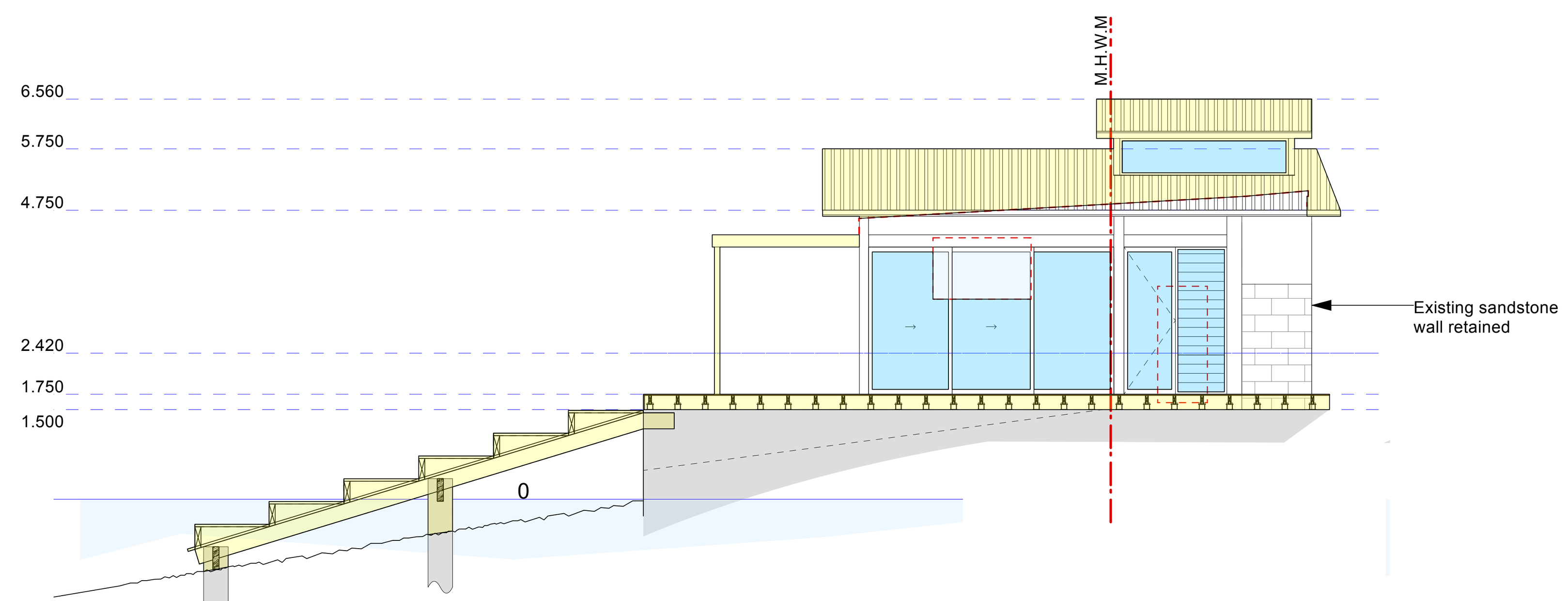
6 STORAGE PLAN
Scale: 1:100



2 WEST ELEVATION
Scale: 1:100



3 SOUTH ELEVATION
Scale: 1:100



5 EAST ELEVATION
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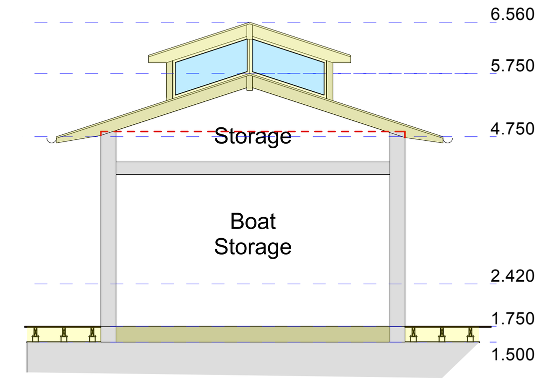

7 SECTION
Scale: 1:100

Rev	Date	Note	By

General Notes:

Reason For Issue:

Boatshed

Alterations & Additions

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-Northern Beaches Council-

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Project No.	Drawing No.	Rev No.
2101	DA-01	
SCALE	Drawn By	Checked By
1:100@A1	TD	DS

Douglas Partners
Geotechnics / Environment / Groundwater

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Results of Dynamic Penetrometer Tests

Client Mr Patrick & Mrs Nicole Heller — Project No. 205400.01
Project Additions and Renocations - Boat Shed — Date 15-08-22
Location Clareville — Page No. 1of 1

Test	DCP201	DCP202	DCP203	DCP203						
RL (m AHD)	1.45	1.45	1.45	1.45						
Depth (m)	**Penetration Resistance** Blows/150 mm									
0 - 0.15										
0.15 - 0.30										
0.30 - 0.45										
0.45 - 0.60										
0.60 - 0.75										
0.75 - 0.90										
0.90 - 1.05										
1.05 - 1.20										
1.20 - 1.35										
1.35 - 1.50										
1.50 - 1.65	1	1	2	1						
1.65 - 1.80	2	1	1	1						
1.80 - 1.95	10/100	1	3	3						
1.95 - 2.10		3	4	B						
2.10 - 2.25		4	4							
2.25 - 2.40		7	6							
2.40 - 2.55		7	9							
2.55 - 2.70		9	10/50							
2.70 - 2.85		9								
2.85 - 3.00		B								
3.00 - 3.15										
3.15 - 3.30										
3.30 - 3.45										
3.45 - 3.60										

Test Method AS 1289.6.3.2, Cone Penetrometer
AS 1289.6.3.3, Flat End Penetrometer

Tested By NB
Checked By DEM

Remarks R = Refusal, 25/100 indicates 25 blows for 100 mm penetration
B = Bouncing