Date: 31 January 2023
Ref: 33618Ylet2rev3

Reform Projects Pty Ltd
15/108 Dunning Ave
ROSEBERY NSW 2018

Attention: Alex Swiney
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GEOTECHNICAL ADVICE
PROPOSED MIXED USE DEVELOPMENT
1102 BARRENJOEY ROAD, PALM BEACH, NSW

1 INTRODUCTION

Construction of the proposed development will result in a finished floor level of RL-0.65m along the southern boundary of 1102 Barrenjoey Road, Palm Beach. Construction of the basement will typically result in excavation to a maximum depth of about 3.2m, although immediately adjacent to the southern boundary the existing cut is up to about 7m higher than current excavated levels and excavation on this existing cut will also be required. On Thursday 19 January 2023 JK Geotechnics met with Warwick Davies of EI Australia to discuss and understand the geotechnical comments relating to the development.

Investigations completed by JK Geotechnics, Witt Consulting, DF Dickson & Associates and Davies Geotechnical Consulting Engineers (DG) have revealed that the site is underlain by two different subsurface profiles. Over roughly the western half of the proposed basement excavation sandy soils are present that overlie an interbedded siltstone and sandstone bedrock which lies at approximately the proposed bulk excavation level. Groundwater was present within these sandy soils and was measured at levels as high as RL0.9m. Over the eastern portion of the site interbedded siltstone and sandstone bedrock was encountered at relatively shallow depth.

Excavation of the western portion of the site has previously been completed and current levels are at approximately RL2.7 to RL2.8m. A soldier pile retaining wall approximately 4.6m in height is present approximately 7.5m in from the eastern boundary. Along the southern boundary excavation has been completed to a maximum depth of about 6.5m. Along this boundary, just at the western extent of the shallow bedrock profile, is a large boulder (B1) that straddles the boundary between 1100 and 1102 Barrenjoey Road. This boulder is approximately 2m thick and is present at ground level and has toppled from higher up in the topography where Hawkesbury Sandstone is present. Below the boulder shotcrete is present and provides support to these materials from just above the current excavation level to the underside of the boulder. A second apparently smaller boulder (B2) is also exposed below the western end of this upper boulder at the

current bulk excavation level. Low to medium strength siltstone is exposed at the base of the excavation below the shotcrete and it is assumed that siltstone is predominantly present behind the shotcrete, although it is likely that soils are present directly below the boulders. The Dynamic Cone Penetration tests completed by DG just to the south of the site in 1100 Barrenjoey Road suggests that bedrock is present at about RL3.4m, which is the depth refusal occurred. Investigation completed by DG suggests that B2 also straddles the boundary and that a third boulder (B3) is present immediately to the south of this lower boulder and is located wholly within 1100 Barrenjoey Road. Based on the investigation completed and the extent of the three boulders shown on the produced plan, DG confirmed that none of the three boulders extended below the house located on 1100 Barrenjoey Road. The attached Sections A-A, B-B and C-C indicate the approximate dimensions of the boulders, the materials present and the proposed extent of the development. The attached plan indicates the location of the sections.

Prior to the commencement of excavation, some form of shoring/retention will need to be installed. Over the western portion of the site where water charged sands are present, a cantilevered secant pile wall is proposed. This wall will extend along the northern and southern site boundaries to the point where shallow bedrock is encountered beyond which point a soldier pile wall is proposed. Over heights of about 3m to 4m this soldier pile wall will either be anchored or internally propped. Over the length of the southern boundary where B1 is present the following practically achievable retention scheme is proposed. This is:

- Remove that portion B1 that extends into the alignment of the proposed excavation and construct an anchored or propped soldier pile retaining wall.

Below we have considered in more detail the potential construction methodology that may be adopted for this short section of the southern boundary and a possible inspection and testing regime that may also be adopted. In this regard the regime only relates to this short section of the southern boundary.

2 ANCHORED OR PROPPED SOLDIER PILE RETAINING WALL

2.1 ANTICIPATED CONSTRUCTION METHODOLOGY

The anticipated construction methodology comprises the following:

- Construct a working platform to the underside of B1.
- Cut back B1 to the alignment of the rear of the proposed basement shoring system to expose the materials below.
- Cutting back of B1 would be completed using non-percussive excavation techniques, such as rock saws, rotary grinders, rock splitting etc.
- Install the soldier piles from the platform to the underside of B1. This would include the installation of piles through B2 and the underlying soils and sandstone and siltstone bedrock.
- Progressively remove the working platform and deepen the excavation to bulk excavation level to allow the construction of shotcrete and mesh panels and the installation of anchors or internal props. This will result in the excavation of clayey soils, siltstone and sandstone bedrock and that part of B2 that extends beyond the proposed cutline. It is anticipated that excavation would extend to depths

of no greater than about 2m before the shotcrete and mesh panels are progressively installed. Anchors or props would be installed at the depths nominated on the structural drawings with excavation extending to depths no greater than those shown on the structural drawings. This would typically be expected to be no greater than about 0.5m to 1m below the proposed anchor/prop locations.

- Once excavation is completed and the retaining walls are supported by the built structure the anchors/props may be destressed.

2.2 POSSIBLE INSPECTION AND TESTING REGIME

The geotechnical monitoring program aims to monitor the following:

- Placement of the working platform.
- Cutting back of upper boulder.
- Installation of the soldier pile wall.
- That excavation is appropriately completed in a staged manner to allow ground anchors/props to be installed.
- Confirm the ability of the temporary ground anchors to carry their design loads (if used).
- That excavation is completed to bulk excavation level.

2.2.1 DILPIDATION SURVEY OF ADJACENT PROPERTY AND INSTALLATION OF VIBRATION MONITORS

Prior to the commencement of works a dilapidation survey of the property at 1100 Barrenjoey Road must be completed. In addition, continuous vibration monitors must also be installed. These should be solidly fixed to the property at 1100 Barrenjoey Road. The vibration monitors must measure transverse, vertical and longitudinal ground vibrations and their vector sum. The monitoring equipment must measure the vibration in terms of peak particle velocity as specified in AS2187. The equipment must be equipped with computer loggers which provide a graphical presentation of vibration velocity versus vibration frequency.

An alarm must be raised instantaneously when any of the three vibration components or their vector sum reaches the preset trigger level. The alarm can take any form provided the plant operator is made aware, in real time, when the vibration limit is being approached.

The completion of a dilapidation survey and installation of vibration monitors comprises a hold point.

2.2.2 PLACEMENT OF WORKING PLATFORM

The working platform must be placed as engineered fill. In this regard Level 1 earthworks testing must be completed in accordance with AS3798-2007 over the full height of the platform. Earthworks testing comprises a hold point.

Contingency
Where the fill is not placed under Level 1 earthworks control it must be removed and placed under Level 1 earthworks control. Where testing indicates that the density or moisture of the material does not comply with the specification the layer placed in which the test failure occurred must be re-worked until the layer complies with the earthworks specification.

2.2.3 CUTTING BACK OF UPPER AND LOWER BOULDERS (B1 AND B2)

During the cutting back of B1 and B2 vibration monitoring must be completed continuously. No percussive excavation techniques other than hand-held jackhammers are to be adopted and prior to the commencement of works the excavation contractors work methodology must be submitted to the geotechnical engineer for review and approval. This will constitute a hold point. This work methodology must include an initial start-up meeting immediately prior to the commencement of excavation between the operator, builder and geotechnical engineer, which will allow all parties to confirm that they understand the risks present, the excavation technique that will be adopted and the mitigation measures that will be applied. This will constitute a hold point.

Contingency
Should transmitted vibrations exceed preset limits all work shall cease immediately. Details of the activities occurring at the time of the exceedance must be logged and the manager informed immediately. The work methods causing the exceedance must be identified and an alternative work strategy must be devised in conjunction with the plant operator and manager or geotechnical engineer.

2.2.4 INSTALLATION OF SOLDIER PILE WALL

The geotechnical consultant must be on site during the drilling of at least 30% of all piles along the southern shoring elevation to provide a degree of confidence that the piles have been satisfactorily constructed. The inspected piles must be evenly spaced over the full length of the wall with inspections commencing with the drilling of the first pile. It will be the contractor's responsibility to coordinate site visits by the geotechnical consultant to satisfy these requirements. The geotechnical consultant will observe drilling performance and record the final pile depths. The geotechnical consultant will prepare a written site report for each daily inspection. The piles are not deemed approved until the written site report has been issued by the geotechnical consultant.

During piling the contractor must, as a minimum, keep a record of the pile location, diameter and toe RL. These records must be progressively supplied to the geotechnical engineer at not greater than weekly intervals starting from the commencement of piling. These records will then be compared to those recorded by the geotechnical engineer whilst they were on site during piling.

On completion of installation, the contractor must certify that the soldier pile walls have been constructed in accordance with the approved drawings.

Contingency
Where piles have been poured but are not considered to be satisfactory, excavation shall not commence until approval is provided by both the structural and geotechnical engineer. Where further analysis indicates that the pile(s) will not perform satisfactorily, additional piles, anchors and/or rock bolts may need to be incorporated in the design. The design of remedial measures will be provided by the geotechnical and structural engineers on an 'as needed' basis.

2.2.5 EXCAVATION

Excavation must be completed in a staged manner to allow the installation and stressing of each row of anchors/props. In this regard, excavation must be completed to no lower than the level detailed on the structural drawings and extend no deeper until all anchors/props have been installed, successfully stressed/jacked (in accordance with the requirements of Section 2.2.6 below) and locked off. This will comprise a hold point. At this stage, the geotechnical consultant must confirm that the excavation depth has not been exceeded and that geotechnical conditions are similar to those described in the geotechnical report. Further excavation cannot commence until the geotechnical consultant has confirmed, in writing, that excavation can continue.

This process must be repeated for all rows of anchors/props.

Contingency
If it appears that excavation extends below the approved level, then the geotechnical consultant may require that the excavation be backfilled to restore stability.

2.2.6 ANCHORS/PROPS

Prior to the installation of any anchors/props, the contractor's proposed anchor/prop specification must be reviewed and approved by the geotechnical consultant and structural engineer in accordance with the structural drawings.

Anchors/props will be installed in accordance with the structural drawings and the first excavation hold point reached. For each anchor, the contractor must record, as a minimum, the anchor number, the drilled diameter of the hole, the anchor inclination, the total drilled depth, the number of strands in each anchor, the diameter and yield stress of each strand, the working load of each anchor, the total anchor length, the free length and the bond length (and in accordance with any requirements shown on the structural drawings). These records must be progressively supplied to the geotechnical consultant and structural engineer at not greater than weekly intervals, starting from the commencement of anchoring.

Once each row of anchors is installed, a hold point is reached. This hold point ends once the grout reaches sufficient strength (and in accordance with any requirements shown on the structural drawings) to allow the stressing of the anchors and the contractor certifies that the anchors/props have been installed in accordance with the approved drawings. One third of all anchors evenly spaced along the length and height of the retaining wall must be stressed in the presence of the geotechnical consultant or structural engineer (and in

accordance with any requirements shown on the structural drawings). Records of stressing for all anchors and jacking of all props must be supplied to the geotechnical engineer no later than 72 hours after stressing and lock off. Where multi-strand anchors are used, all strands must be proof-loaded simultaneously. All anchors must be proof-loaded to 1.3 times the design working load in a minimum of four equal increments with the load and extension of the anchors recorded (and in accordance with any requirements shown on the structural drawings). Once the proof-load is successfully held for a period of time specified by the structural drawings, the anchors must be locked off. Following the locking off of each row of anchors, the contractor and structural engineer (or geotechnical consultant) must certify that the anchors have been successfully proof-tested. At least 10% should be subjected to lift-off testing 72 hours after initial stressing. If any anchor fails the lift-off test, all anchors should be re-tested.

Contingency

Where anchors are not successfully stressed and do not hold their proof-load, the anchor will be replaced as directed by the geotechnical consultant or structural engineer (and in accordance with any requirements shown on the structural drawings). These replacement anchors must be proof-loaded as detailed above to confirm that they have the capacity to carry the design loads. Where props have not been installed at the correct location or cannot hold the jock load they will be reinstalled at the correct location and a the jack replaced or repaired such that it is capable of carrying the design load.

De-Stressing

The anchors and props must be de-stressed once the permanent structure has been completed and provides adequate lateral support to the soldier pile wall and in accordance with the requirements of the structural drawings. The structural engineer or geotechnical consultant must inspect the de-stressing of at least 10% of all anchors, evenly spaced over the length and height of the wall. The contractor must certify that all anchors have been de-stressed.

3 PROPOSED CONSENT CONDITION

In the development of the Construction Certificate plans required to be submitted to the Certifying Authority, the structural engineer is to consider the content of JK Geotechnics letter and earlier geotechnical report (Ref: 33618Ylet3, dated 31 January 2023 and Ref: 33618YJrptrev3, dated 16 September 2022). A detailed construction methodology for the retention of the southern boundary is to be included in the structural drawings.

4 GENERAL COMMENTS

The proposed construction methodology and inspection and test regime presented above is of a generalised nature. There will inevitably be some amendment of both the construction methodology and inspection and test regimes during the development of the structural drawings.

Should you require any further information regarding the above, please do not hesitate to contact the undersigned.

Yours faithfully
For and on behalf of
JK GEOTECHNICS

Woodie Theunissen

BARRENJOEY

(BITUMEN FORMATION)

APPROXIMATE OUTLINE OF PROPOSED BASEMENT LEVEL FFL RL-0.615m TO RL-0.65m

BENCH MARK
NAIL IN KERB
RL 2.35 (AHD)

1m LENGTH, 0.8m VERTICAL CUT IN FILL (GRAVELLY SILTY SAND)

B3 LARGE BOULDER

B2 LARGE SANDSTONE BOULDER LOWER 0.7m TO 1.3m

SLOPE IS SHOTCRETED BELOW BOULDER AREA

30 TO 35°

B1 UPPER LARGE BOULDER

MAXIMUM 1m TO 1.5m DEEP OVERHANG

101

102

3

1

2

A A'

B B'

C C'

No.1100
2 STOREY
CLAD HOUSE
METAL ROOF

No.1102-1104
RENDERED, TIMBER
& GLASS SHOP
"PALM BEACH FISH & CHIPS"

No.1108
RENDERED BUILDING
TILE ROOF
"BARRENJOEY HOUSE"

D.P.1207743
1138m² CALC.

PAVED AREA UNDER ROOF

CONTAINER

CONTAINER

STEEL ROOF OVER STORAGE & SHIPPING CONTAINER

GRASS SLOPE

SOLDIER PILE WALL

FLAT GRASS AREA

45°

45°

45°

41
D.P.6746

103
D.P.1256016

102
D.P.1256016

LEGEND

- BOREHOLE AND WELL (JK GEOTECHNICS, 2020)
- BOREHOLE AND WELL (WITT CONSULTING, 2019)
- A A' CROSS SECTION

SCALE 1:200 @A3 METRES
0 2 4 6 8 10

This plan should be read in conjunction with the JK Geotechnics report.

Title:	**PLAN SHOWING LOCATION OF SECTIONS**
Location:	1102 - 1106 BARRENJOEY ROAD, PALM BEACH, NSW
Report No:	33618YJrptrev2
Figure No:	1

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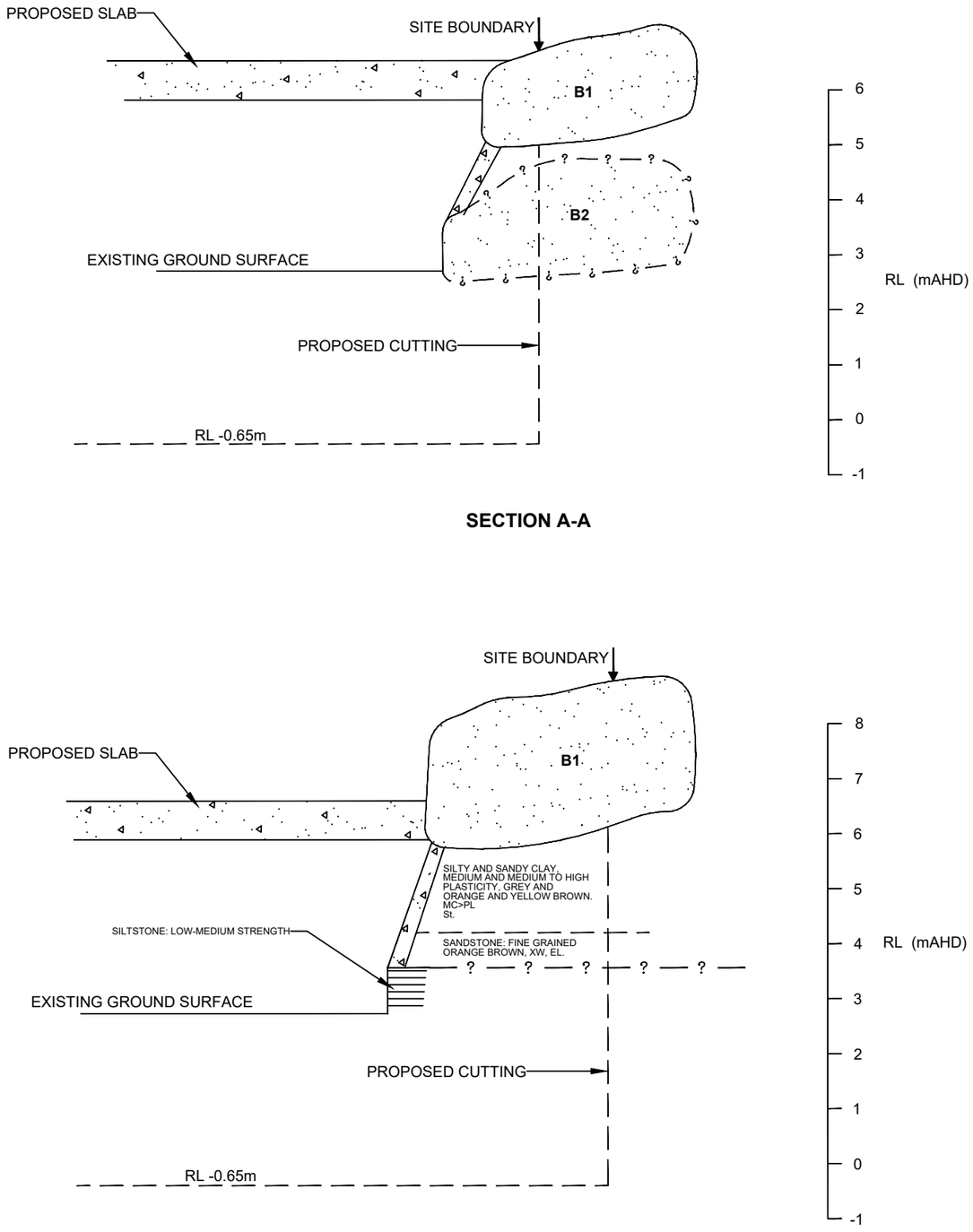
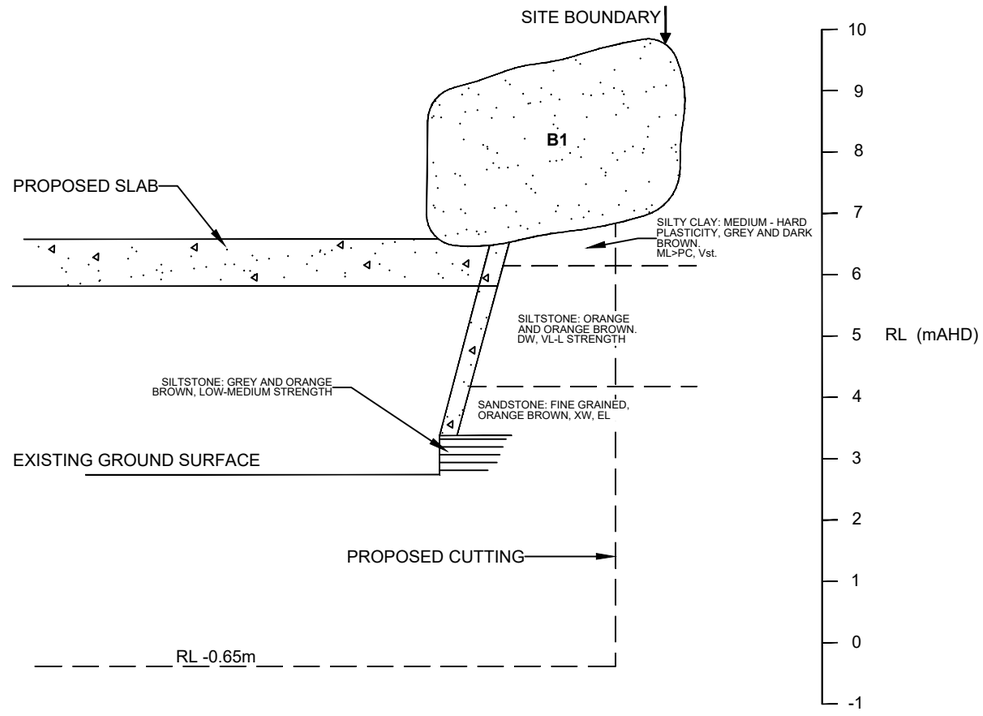
PLOT DATE: 1/02/2023 10:43:34 AM DWG FILE: S:\6 GEOTECHNICAL\6F GEOTECHNICAL JOBS\33000'S\33618YJ PALM BEACH\CAD\33618YJRPTREV2.DWG



SECTION A-A



SECTION C-C

SECTION B-B

0 1 2 3 4 5

SCALE 1:100 @A3 METRES

This plan should be read in conjunction with the JK Geotechnics report.

Title: **SECTION VIEWS**

Location: 1102 - 1106 BARRENJOEY ROAD, PALM BEACH, NSW

Report No: 33618YJrptrev2

Figure No: 2

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PLOT DATE: 1/02/2023 10:43:49 AM DWG FILE: S:\6 GEOTECHNICAL\6F GEOTECHNICAL JOBS\33000'S\33618YJ PALM BEACH\CAD\33618YJRPTREV2.DWG