Douglas Partners
Geotechnics / Environment / Groundwater

Report on
Desktop Geotechnical Assessment

Proposed Hotel Development
1-11 Oxford Street, Paddington

Prepared for
CE Boston Hotels Pty Ltd

Project 86362.00
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Integrated Practical Solutions

Douglas Partners
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

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Table of Contents

Page

Report on Desktop Geotechnical Assessment
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1. Introduction

This report presents the results of a desktop geotechnical assessment undertaken by Douglas Partners Pty Ltd (DP) for proposed hotel development at 1-11 Oxford Street, Paddington. The assessment was commissioned in an email dated 4 April 2018 by Mr Jason Shepherd of Boston Global, on behalf of CE Boston Hotels Pty Ltd and was undertaken for due diligence purposes in accordance with Douglas Partners' proposal SYD180319 dated 29 March 2018.

It is understood that the development of the site will include the demolition of existing structures and the construction of a six storey hotel and retail building with two basement levels. The existing building facades will be retained and incorporated into the new structure.

The objectives of the desktop assessment were aimed at identifying potential geotechnical issues related to the proposed development, provide preliminary design and construction advice and to comment on the need for further investigation. The desktop study included a review of results from previous investigations carried out on nearby sites by DP.

2. Site Description

The site is irregularly shaped and covers an area of approximately 1574 m^2. The site comprises Lots 1 & 2 in DP 130269 and Lot A in DP 377984 and is bounded by Oxford Street to the north, residential terraces to the south, an existing commercial/residential building to the east and South Dowling Street to the west.

Lots 1 & 2 are currently occupied by an existing commercial building that is of rendered brick construction with timber/steel roof framing and sheet metal roof cladding. It is understood that the building was constructed in 1911 and underwent major renovations in 1970. The building was recently used as a twin-cinema complex (no longer in operation), and has continued commercial and restaurant uses. At present, the ground floor is occupied by several small shops (i.e. coffee shop, music store, etc.) with some of the upper floors partially occupied by tenanted commercial offices. The cinemas are currently vacant as are the remainder of the upper floor areas (a previous bar and office spaces). An existing one level basement is present at the eastern end of the building and is currently tenanted as a bar (Goodbar). The basement level also continues below the cinemas as a small plant room. The adjoining Lot A is occupied by plant (air conditioners, etc.) and external stairways that service the main building.

A site walkover was undertaken by a DP engineer on 10 April 2018. The walkover was limited to the external facades on Oxford and South Dowling Streets, and accessible (non-tenanted) internal areas on the ground and upper floor levels and the basement level plant room. A survey drawing for the site, (Drawing No. B1844-1, dated February 2017, prepared by Project Surveyors) is presented in Appendix B and shows the general site area.

The land surrounding the site is relatively flat with an overall gentle fall to the north east. The immediate site perimeter is essentially flat and situated between reduced levels of approximately RL47 and RL48, relative to Australian height datum (AHD). Nearby properties are used for commercial and residential purposes.

3. Desktop Review

3.1 Geology and Groundwater

Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the site is underlain by Ashfield Shale, which typically comprises black to dark grey shale and laminite. The site is close to the geological boundary with Hawkesbury Sandstone, which typically comprises medium to coarse grained quartz sandstone with minor shale and laminite layers. Sometimes there is a layer of the Mittagong Formation, which typically comprises fine to medium grained lithic sandstone, between the Ashfield Shale and Hawkesbury Sandstone formations.

Based on the geology and topography, the regional groundwater table is likely to be well below the site's surface and proposed excavation levels. A perched groundwater table should be expected, however, at the soil/rock interface, which is likely to be evident as an intermittent seepage flow.

3.2 Soil Landscape

Reference was made to the Soil Conservation Service NSW 'Sydney' 1:100,000 Soils Landscape Map to determine the type and extent of each soil landscape present within the site. The map indicates that the entire site is represented by soils of the 'Blacktown Soil Landscape', which is characterised by *"gently undulating rises on Wianamatta Group Shale, with local relief to 30 m and slopes usually less than 5%"*. This is a residual landscape and generally comprises three soil horizons that range from shallow red-brown silty clay soils to deeper orange-brown and yellow-grey silty clay and shaly clay soils. These soils are typically of low fertility, are moderately reactive and have a low wet bearing strength.

3.3 Acid Sulphate Soil

Acid Sulphate Soil Risk Mapping supplied by the NSW Office of Environment and Heritage does not identify the site to be within or close to an area of acid sulphate soils risk.

3.4 Salinity

The site is not located within areas known for soil salinity issues.

4. Previous Investigations

DP has previously completed geotechnical investigations on several nearby sites. The subsurface conditions encountered in the previous nearby investigations are summarised below.

2 to 8 Oxford Street, Paddington (Jan 2002, Project 30266)

This site is located approximately 30 m to the north on the opposite side of Oxford Street. The investigation was conducted within an existing building and included two test pits, one borehole and associated dynamic cone penetrometer tests taken to depths of between 2.5 m and 4 m. The investigation encountered loose to dense but primarily medium dense sand throughout the full investigation depth. Groundwater was not encountered within the investigation depth range.

During this investigation it was noted that the footings for the building in existence at that time were founded directly on the sand.

North West Corner Victoria & Oxford Streets, Darlinghurst (Mar 2006, Project 43812)

This site is located approximately 70 m to the north west on the opposite side of Oxford Street. The investigation was undertaken within the Darlinghurst Campus grounds of the University of Notre Dame close to the intersection of Victoria Street and Oxford Street. The investigation included three cored boreholes which were drilled to depths of between 7 m and 8.6 m. The investigation encountered sand, ripped sandstone and clay filling to depths of 1.5 m to 2.1 m, which was underlain by stiff to very stiff residual sandy/silty clay and then in situ sandstone from typically 3.5 m depth. The sandstone was initially extremely low to low strength to depths of about 5 m and then medium to high strength thereafter. Groundwater seepage was encountered in one borehole only at a depth of 1 m within the filling. Laboratory tests on samples of the clayey soils confirmed they were non-aggressive.

196 to 200 Boundary Street, Paddington (Jan 2008, Project 45233)

This site is located approximately 70 m to the north east on the southern side of Boundary Street. The investigation included three cored boreholes which were drilled to depths of between 6 m and 8 m. In addition, three test pits were excavated to shallower depths to inspect the conditions and foundations below existing footings. The investigation encountered silty sand filling to depths of between 0.5 m and 1 m, which was underlain by very loose to loose sand to 3.4 m depth and then soft to firm sandy clay to 5 m to 6 m depth. Sandstone was encountered between 6 m and 8 m depth and was assessed as extremely low and very low strength near the top of rock, then medium and high strength thereafter. Groundwater was not encountered during the field investigation.

Recreational Park between Napier Street & Greens Road, Paddington (Apr 2013, Project 73414)

This site is located approximately 150 m to the south east on the eastern side of Napier Street. The investigation was undertaken within the open park and included five augered boreholes which were drilled to depths of between 0.2 m and 1.4 m. The investigation encountered sandy topsoil overlying medium dense to dense sand and sandstone at a depth of 1.3 m that was estimated to be of very low strength. Groundwater was not encountered during the field investigation.

College of Fine Arts, Block D, Greens Road, Paddington (Jul 2008, Project 45582)

This site is located approximately 170 m to the south east on the western side of Greens Road. The investigation was undertaken within the grounds of the College of Fine Arts close to the southern edge of the recreational park between Napier Street and Greens Road referred to in the previous past project listing and is one of several previous investigations undertaken within the college grounds. The investigation included three cored boreholes which were drilled to depths of between 13.4 m and 15.6 m. The investigation encountered silty sand/sand/crushed brick/rock filling to depths of 0.5 m to 1.4 m, which was underlain by loose to dense sand to depths of 4 m to 5 m. A layer of stiff to very stiff residual clay was then encountered before in situ Sandstone from depths of 6.2 m to 7.2 m. The sandstone was initially of variable strength (extremely low to medium strength) to depths of about 10.5 m to 13 m and then reliably medium to high strength thereafter. Laboratory tests confirmed the soils were non-aggressive. Groundwater was not encountered during the field investigation, however, was encountered at an approximate depth of 15 m (approx. RL 36 AHD) in Busby's Bore. The following report extract discusses Busby's Bore, as encountered within the College of Fine Arts:

"No rock exposures were visible within the proposed [Block D] *site, but two were visible within the COFA boundaries. One outcrop is exposed at the southern end of the existing Block F car park within a crawl space, and comprises variable strength highly fractured sandstone. The second rock exposure is at the top of Busby's Bore; an approximate 2 m diameter 30 m deep historical water bore located between the existing Block F and Block C North. Busby's Bore exposed approximately 1 m of low to medium strength sandstone underlain by a 1 m protected possible weak zone, overlying low to medium strength slightly fractured sandstone. Busby's Bore is within close proximity to the Douglas Partners 1989 BH2, which describes similar strata. The locations of the exposed rock and Busby's Bore can be seen on Drawing 1."* An excerpt of Drawing 1 is presented as Figure 1.

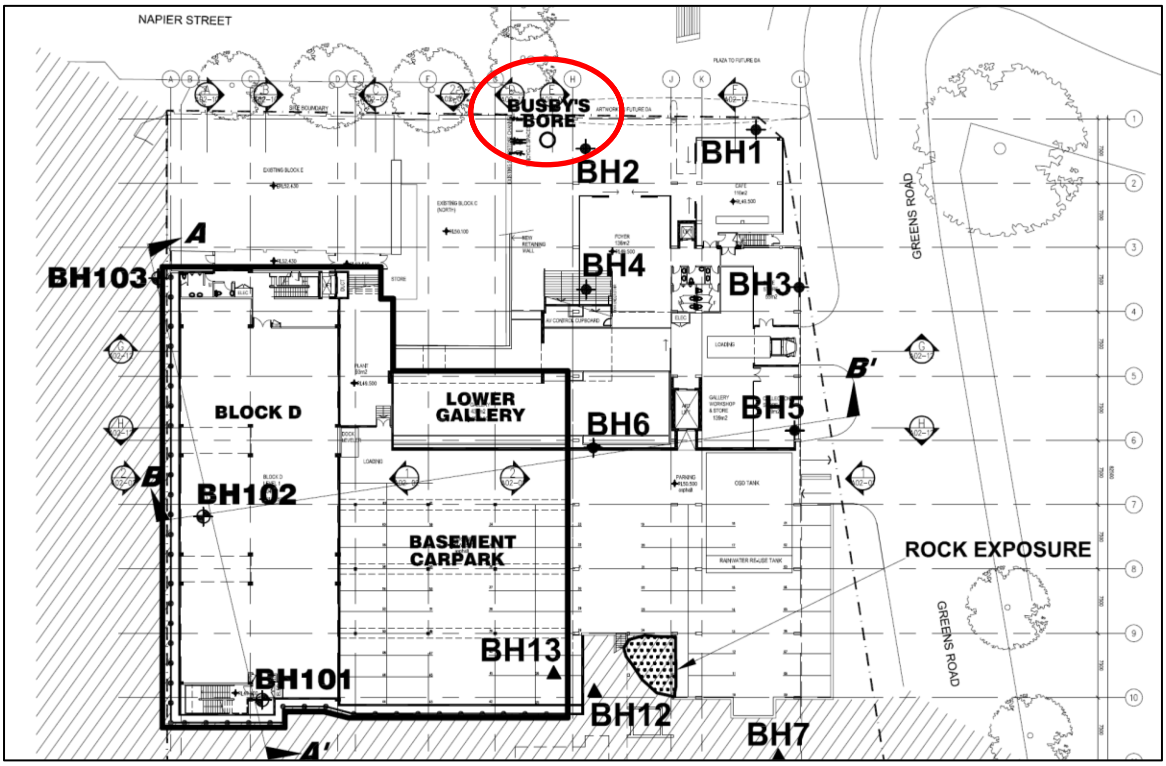

Figure 1: Excerpt from Drawing 1 (DP Project 45582) Showing Location of Busby's Bore

5. Geotechnical Model

Based on the published mapping and DP's experience in the area, the subsurface profile at the site is anticipated to comprise some possible sandy filling overlying residual clay and then sandstone bedrock. The depth to bedrock is anticipated to be 4.5 m to 5.5 m deep. The bedrock is likely to initially be extremely low to low strength and grade to medium to high strength in the upper 2 m to 4 m of rock.

The regional groundwater table is expected to be below the proposed depth of excavation. Some groundwater seepage is expected to occur at the soil and rock interface and within joints and weathered bands in the bedrock.

6. Proposed Development

It is understood that the development of the site will include the demolition of existing structures and the construction of a six storey hotel and retail building with two basement levels. Drawings prepared by Tonkin Zulaikha Greer Architects (TZG) indicate a lower basement floor reduced level of RL 39.56, relative to Australian height datum (AHD). It is anticipated that the lowest basement will require between approximately 7.5 m and 9.7 m of excavation to reach bulk excavation level, plus any additional depth required for footings, lift wells, or similar. The proposed basement will occupy most of the site footprint, with architectural drawings indicating a perimeter contiguous pile shoring wall around the basement perimeter. It is understood that the existing façade will be maintained and will be incorporated into the new hotel.

Copies of four of the current planning proposal development plans (i.e. the site plan, basement floor plan and two sections) are presented in Appendix B. These plans also indicate the approximate location of Busby's Bore, which is further discussed herein.

7. Comments

7.1 Site Walkover

Although several areas of water damage were evident throughout the internal parts of the building and the unoccupied spaces appeared somewhat deteriorated, the overall condition of the structure presented quite well. Inspection of external and internal load bearing walls did not identify any significant cracks or other structural distress or evidence or prior structural repair/patching. All load bearing walls within kitchen and bathroom spaces were apparently sound with tiled walls in relatively good condition.

The inspection did not allow any determination of the footing types and founding depths for the structure however, given the age of the building and the known footing details for nearby structures of similar age, it is likely that the building is founded at relatively shallow depth within the soil profile, and probably the upper sandy layer.

7.2 Site Preparation and Earthworks

7.2.1 Excavation Conditions

It is expected that the basement will require the excavation of soils and extremely low to high strength sandstone.

Excavation of soil and extremely low to low strength rock should be achievable using conventional earthmoving equipment. Excavation of medium and high strength sandstone, however, will require excavator mounted rock hammers, rock saws and/or milling heads.

7.2.2 Dilapidation Surveys

Dilapidation surveys should be carried out on surrounding buildings and pavements/footpaths that may be affected by the basement construction. The dilapidation surveys should be undertaken before the commencement of any excavation work in order to document any existing defects so that any claims for damage due to construction related activities can be accurately assessed.

7.2.3 Vibrations

Noise and vibration will be caused by excavation works. Precautions will be required when excavating close to site boundaries, particularly where adjacent buildings are nearby. The level of acceptable vibration is dependent on various factors including the type of building structure (e.g. reinforced concrete, brick, etc.), its structural condition, the frequency range of vibrations produced by the construction equipment, the natural frequency of the building and the vibration transmitting medium.

Ground vibration can be strongly perceptible to humans at levels above 2.5 mm/s peak particle velocity (PPVi). This is generally much lower than the vibration levels required to cause structural damage to buildings. The Australian Standard AS2670.2-1990 “Evaluation of human exposure to whole-body vibrations – continuous and shock induced vibrations in buildings (1-80 Hz)” indicates an acceptable day time limit of 8 mm/s PPVi for human comfort.

Based on the experience of DP and with reference to AS2670, it is suggested that a maximum PPVi of 8 mm/s (applicable at the foundation level of existing buildings) be adopted at this site for both architectural and human comfort considerations, although this vibration limit may need to be reduced if there are sensitive buildings or equipment in the area. The vibration limit may also need additional consideration in respect to the proposed maintaining of the existing buildings facades, as these will be situated directly at or close to the line of excavation.

As the magnitude of vibration transmission is site specific, it is recommended that a vibration trial be undertaken at the commencement of rock excavation. The trial may indicate that smaller or different types of excavation equipment should be used for bulk (or detailed) excavation purposes.

7.2.4 Disposal of Excavated Material

All excavated materials will need to be disposed of in accordance with the provisions of the current legislation and guidelines including the *Waste Classification Guidelines* (EPA, 2014). This includes filling and natural materials that may be removed from the site.

7.3 Excavation Support

Vertical excavations in filling, soils and extremely low to low strength rock are not expected to be stable. If there is sufficient space available it may be possible to temporarily batter some of the sides of the excavation during construction, although the current architectural drawings (by TZG) suggest this won't be the case for most of the site.

Shoring support will be required in areas of the site where temporary batters are not feasible or are impractical. The existing basement walls, where present, may prove beneficial as permanent shoring walls subject to their structural condition and appropriate connection with adjoining shoring walls and overall shoring requirements.

7.3.1 Batter Slopes

Suggested maximum temporary and permanent batter slopes for unsupported excavations up to a maximum height of 4 m are shown in Table 1. If surcharge loads are applied near the crest of the slope then further geotechnical review and probably flatter batters or stabilisation using rock bolts or soil nails may be required.

Table 1: Recommended Safe Batter Slopes for Exposed Material

Exposed Material	Maximum Temporary Batter Grade (H:V)	Maximum Permanent Batter Grade (H:V)
Filling	1.5:1	2:1
Soils Primarily Containing Sand	2:1	3:1
Stiff to hard Clay and extremely low strength Rock	1:1	2:1
Medium Strength or Stronger Sandstone	Vertical*	Vertical*

*Note: * Subject to jointing assessment by experienced Geotechnical Engineer / Engineering Geologist.*

Competent medium strength or stronger sandstone will generally be stable when cut vertically provided there are no adversely oriented joints or other defects present. All vertical faces in rock should be inspected by a geotechnical engineer at 1.5 m depth intervals to check for adversely inclined joints and to assess whether additional stabilisation measures (such as rock bolts or shotcrete) are required.

Any soil or rock batter slopes that are exposed over the long term will require protection from erosion. Protection may include a mesh-reinforced shotcrete pinned to the excavation face with dowels. Drainage will need to be installed behind the shotcrete to intercept any seepage or groundwater.

7.3.2 Retaining Walls

Where batter slopes cannot be used, shoring walls will be required to support the filling, soils and low strength rock. Anchored soldier pile walls are often used to provide temporary retaining support to soils and weathered rock. The soldier piles are usually spaced at approximately 2 m to 2.5 m centres, however, more closely spaced piles may be required to reduce wall movements, or prevent collapse of infill materials, particularly sandy soils, or where pavements, structures or services are located in close proximity to the excavation.

It is anticipated that at least one row of temporary anchors may be required to provide lateral restraint to shoring piles for the excavation, particularly in areas where deeper soil is encountered and wall movements must be reduced.

Given that the subsurface profile includes a relatively sandy layer that may extend to depths in the order of 4 m, there is the potential for these materials to collapse into the excavation where they are unsupported between soldier piles. Further investigations will be needed to determine the condition and capability of these soils to remain stable between soldier piles or if the spacing between the soldier piles needs to be reduced, possibly reflecting a contiguous or secant pile wall.

7.3.3 Earth Pressures

Design for lateral earth pressures may be based on the parameters given in Table 2. For situations where only minor lateral movements are acceptable, such as the support of sensitive structures or services, a pressure based on 'at-rest' conditions should be adopted.

All surcharge loads should be allowed for in the shoring design including building footings, inclined slopes behind the wall, traffic and construction related activities.

Shoring walls should be designed for full hydrostatic pressures unless drainage of the ground behind impermeable walls can be provided. Drainage could comprise 150 mm wide strip drains pinned to the face at 1 m to 2 m centres behind shotcrete in-fill panels. The base of the strip drains should extend out from the shoring wall to allow any seepage to flow into a perimeter toe drain which is connected to the stormwater drainage system.

Table 2: Recommended Design Parameters for Shoring Systems

Material	Unit Weight (kN/m^3)	Earth Pressure Coefficient		Effective Cohesion c' (kPa)	Effective Friction Angle (Degrees)
		Active (K_a)	At Rest (K_o)		
Filling & Dune Sand	20	0.3	0.5	0	20
Residual Clay	20	0.3	0.5	5	25
Extremely Low to Low Strength Sandstone	22	0.2	0.3	10	25
Medium Strength Sandstone (or better)	24	0*	0*	30	40

Note: * Subject to Geotechnical Inspection.

7.3.4 Passive Resistance

Passive resistance for piles founded below the base of the bulk excavation (including allowance for services or footings) may be based on the ultimate passive restraint values provided in Table 3. These ultimate values will need to incorporate a factor of safety to limit the wall movement that is required to mobilise the full passive resistance. The top 0.5 m of the socket should be ignored due to possible disturbance (e.g. over-excavation) and tolerance effects. The passive restraint adopted in the design must not exceed the shear capacity of the pile.

Table 3: Recommended Passive Resistance Values

Foundation Stratum	Ultimate Passive Pressure (kPa)
Extremely Low to very low strength sandstone	700*
Low strength sandstone	2000*
Medium strength or stronger sandstone	4000*

Note: * Subject to Geotechnical Inspection.

7.3.5 Ground Anchors

The preliminary design of temporary and permanent ground anchors/rock bolts for the support of excavations and/or shoring systems may be carried out on the basis of the maximum bond stresses given in Table 4.

Table 4: Recommended Bond Stresses for Rock Anchor Design

Material Description	Maximum Allowable Bond Stress (kPa)	Maximum Ultimate Bond Stress (kPa)
Very low to low strength rock	100	200
Low strength rock	200	400
Medium strength or stronger rock	500	800

The parameters given in Table 4 assume that the drilled holes are clean and adequately flushed. The anchors should be bonded behind a line drawn up at 45 degrees from the base of the shoring or the top of free standing medium strength or stronger rock, and 'lift-off' tests should be carried out to confirm the anchor capacities. It is suggested that ground anchors should be proof loaded to 125% of the design working load and locked-off at no higher than 80% of the working load.

It is anticipated that the building will support the basement excavation over the long term and therefore the ground anchors are expected to be temporary only. The use of permanent anchors would require careful attention to corrosion protection including full column grouting and the use of an internal corrugated sheathing over the full length of the anchor. A detailed specification would need to be prepared for the installation and stressing of permanent anchors.

7.3.6 Existing Facades

As the existing external facades are to be maintained, consideration will need to be given to designing and constructing an appropriate support frame to secure the facades during and post-demolition. The facades are constructed of rendered brick and are of unknown thickness with the supporting footing system also unknown. It is envisaged that a structural steel frame will be required to support the facades together with inclined steel bracing that is supported by the underlying rock profile. If the supporting system is to be located inside the building perimeter, then it may be necessary to leave appropriately sized sandstone plinths that protrude above the basement bulk excavation level to provide support to the bracing. It is understood, however, that the current structural design includes an external support frame and hence appropriate footings will need to be constructed to transfer the loads from the support frame to the underlying rock stratum.

As part of the overall assessment and design of the façade support system, detailed geotechnical investigations of the existing walls and footings will be needed to confirm whether the existing footings will need to be underpinned before completion of the bulk excavation work. It is noted that underpinning may be necessary to provide consistent support for all footings across the structure and to act as additional retention where soil layers extend below the base of the existing footings.

7.4 Foundations

Bulk excavation for a two level basement is likely to expose at least extremely low strength and possibly medium and/or high strength sandstone. It is expected that the foundations could include pad footings or piles. If shoring piles are founded below the bulk excavation level, the shoring piles may also be designed to carry the proposed building loads. The foundation design parameters provided assume that the footing excavations are clean and free of loose debris.

Recommended maximum pressures for the various rock strata are presented in Table 5. For piles, shaft adhesion values for uplift (tension) may be taken as being equal to 70% of the values for compression. This will be subject to advice by a geotechnical engineer at the time of inspection and following further investigation of the site.

Table 5: Recommended Design Parameters for Foundation Design

Foundation Stratum	Maximum Allowable Pressure		Maximum Ultimate Pressure	
	End Bearing (kPa)	Shaft Adhesion* (Compression) (kPa)	End Bearing (kPa)	Shaft Adhesion* (Compression) (kPa)
Very Low Strength Sandstone	1,000	100	3,000	150
Low Strength Sandstone	1,500	150	6,000	300
Medium Strength Sandstone (or better)	3,500	350	20,000	800

*Note: * Shaft adhesion applies to pile foundations for which the socket sidewalls are adequately cleaned and roughened to "R2" standard (or better) as defined in Pells et. al. (1998)*

Foundations proportioned on the basis of the allowable bearing pressures in Table 5 would be expected to experience total settlements of less than 1% of the footing width / pile diameter under the applied working load, with differential settlements between adjacent columns expected to be less than half of this value.

All footings should be founded below a line extending upwards at an angle of 45° from the base of any adjacent excavations.

All footing/pile excavations should be inspected by a geotechnical engineer to confirm that foundation conditions are suitable for the design parameters.

7.5 Groundwater

Groundwater was generally not encountered at nearby sites during previous investigations by DP, other than as seepage flows near the top of the in situ rock. It is expected that the regional groundwater table would be well below the proposed bulk excavation on the site. Seepage should, however, be expected along the top of the rock and through fractures and beddings in the rock, particularly after periods of wet weather.

During construction and in the long term, it is anticipated that any seepage into the excavation could be controlled by perimeter and subfloor drainage connected to a sump-and-pump system. On this basis, a drained basement is considered appropriate for this site.

It is possible that seepage into the basement may give rise to precipitation of red brown iron oxide residue from the groundwater and therefore perimeter and subfloor drains should be designed for easy access to allow for inspection, maintenance and periodic cleaning.

7.6 Busby's Bore

Busby's Bore is a hand carved tunnel that was excavated in the early 1800s to supply water from the current Centennial Parklands to Hyde Park and formed part of Sydney's early water supply. Its use was relatively short lived.

Limited research into the construction methods adopted for Busby's Bore suggest that the bore followed planes of weakness in the rock mass where excavation could be more easily achieved. Historical records indicate that the bore was on average 1.5 m high (5 feet) and 1.2 m wide (4 feet) and that it day-lighted to an elevated level for drawing of water onto horse-drawn carts near the corner of Park & Elizabeth Streets.

It is understood that the depth of Busby's Bore below the site is not accurately known and previous projects undertaken by DP have determined that the alignment is not always as indicated by easement plans. Our knowledge of this bore from nearby investigations and from research, indicates that the bore lies at an approximate level of RL 35 (AHD). This equates to approximately 12 m below the surrounding footpath level, which is approximately 4 m below the lowest basement floor level. If an additional allowance of 1 m of excavation is made for footing and slab constructions, then it is possible that detailed excavations on this site may be in the order of 3 m from the bore.

In addition to DP's research, AMAC Archaeological (heritage consultant) has undertaken a study into Busby's Bore to determine its likely location and depth with reference to the site, as discernible from information contained in various historical documents. AMAC's inferred location of the Busby's Bore easement, including a 3 m surrounding curtilage, has been identified and noted on the development plans and sections, presented in Appendix B. This location correlates well with DP's research findings.

On the basis of DP's and AMAC's research, it is apparent that the proposed development will lie wholly outside of the anticipated Busby's Bore curtilage. Development of the site, however, will require careful consideration in regards to the actual location of the bore to ensure that the works are kept wholly outside of the curtilage zone and that there are no adverse effects on the bore as a result of development.

Given the relatively close proximity of the proposed basement to the anticipated location of the bore, it is likely that Sydney Water will raise concerns with proposed excavation work over the bore. Accordingly, it is likely that specific investigations will be necessary to determine the bore's actual location and depth. The investigations will be required before the effects of the proposed development on the bore can be determined, however preliminary considerations suggest there is unlikely to be any significant effect if the bore is located where it is currently indicated.

Subject to the actual location and depth of Busby's Bore and the proposed basement geometry, Sydney Water may also require detailed geotechnical modelling to demonstrate that the effects of the development are not significant.

7.7 Further Geotechnical Investigation

Further geotechnical investigation will be required to assess the bedrock over the full depth of proposed excavation in order to confirm the excavation and founding conditions and the adequacy of the preliminary advice presented herein. This should include at least four cored boreholes to around 5 m below the proposed founding level, or the underside of Busby's Bore on the south western side of the site.

In addition, test pits should be undertaken adjacent to the existing footings to determine their construction type and founding depth, as well as the geotechnical conditions of the foundations on which they rest. It is likely that the structural engineering consultant will also require details of the thickness of the walls, so that an assessment of the current and proposed loads acting on the existing footings can be undertaken. It is suggested that as many as six to ten test pits will be required to adequately cover the range of different footing and wall types and founding levels across the site, particularly given the differing existing lowest floor levels.

It is suggested that the investigation scope be prepared in conjunction with the structural engineering consultant and that the investigation is undertaken in advance of the preliminary structural design. Investigation methods will need to use tight access drill rigs and mini-excavators and may require localised internal demolition of the structure to allow access to the desired test locations.

8. Limitations

Douglas Partners (DP) has prepared this report for this project at 1-11 Oxford Street, Paddington in accordance with DP's proposal SYD180319 dated 29 March 2018 and acceptance received from Jason Shepherd of Boston Global Pty Ltd, on behalf of CE Boston Hotels Pty Ltd dated 4 April 2018. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of CE Boston Hotels Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other 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.

DP's advice is based upon the conditions encountered during previous investigations on nearby sites. 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 scope for work for this assessment did not include the assessment of surface or subsurface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

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.

Douglas Partners Pty Ltd

Appendix A

About this Report

About this Report

Douglas Partners

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

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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

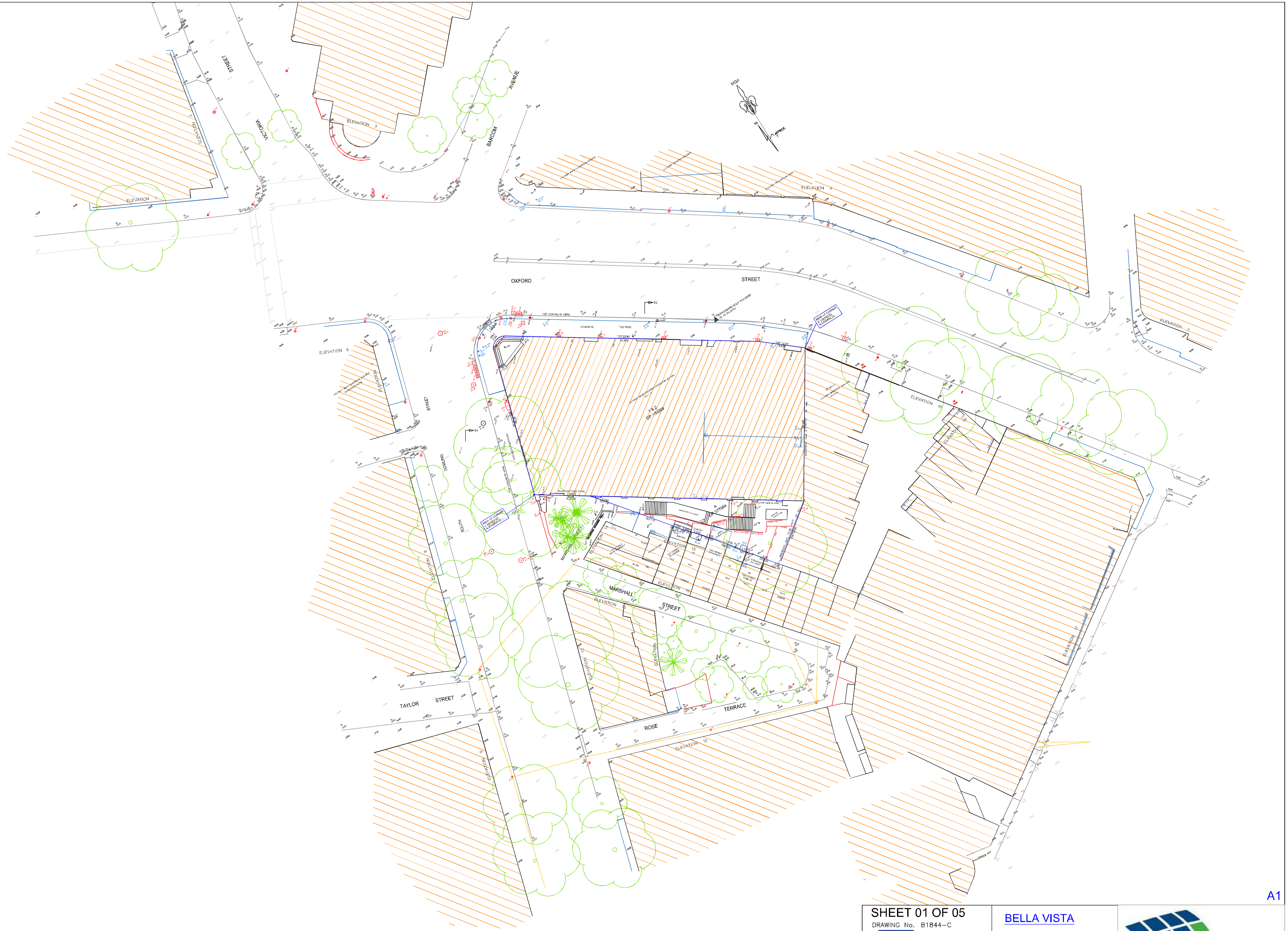
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate 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.

Appendix B

Drawings



SHEET 01 OF 05

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BELLA VISTA

PO Box 7419
BAULKHAM HILLS NSW 2153

SUITE 405, LEVEL 4
14 LEXINGTON DRIVE
BELLA VISTA NSW 2153

PHONE : 9056 1900

email: office@projectsurveyors.com.au
www.projectsurveyors.com.au
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DATE	REV	NOTES
02/11/18	A	Issued for planning proposal
18/04/19	B	Amended planning proposal
22/05/19	C	Updated amended planning proposal

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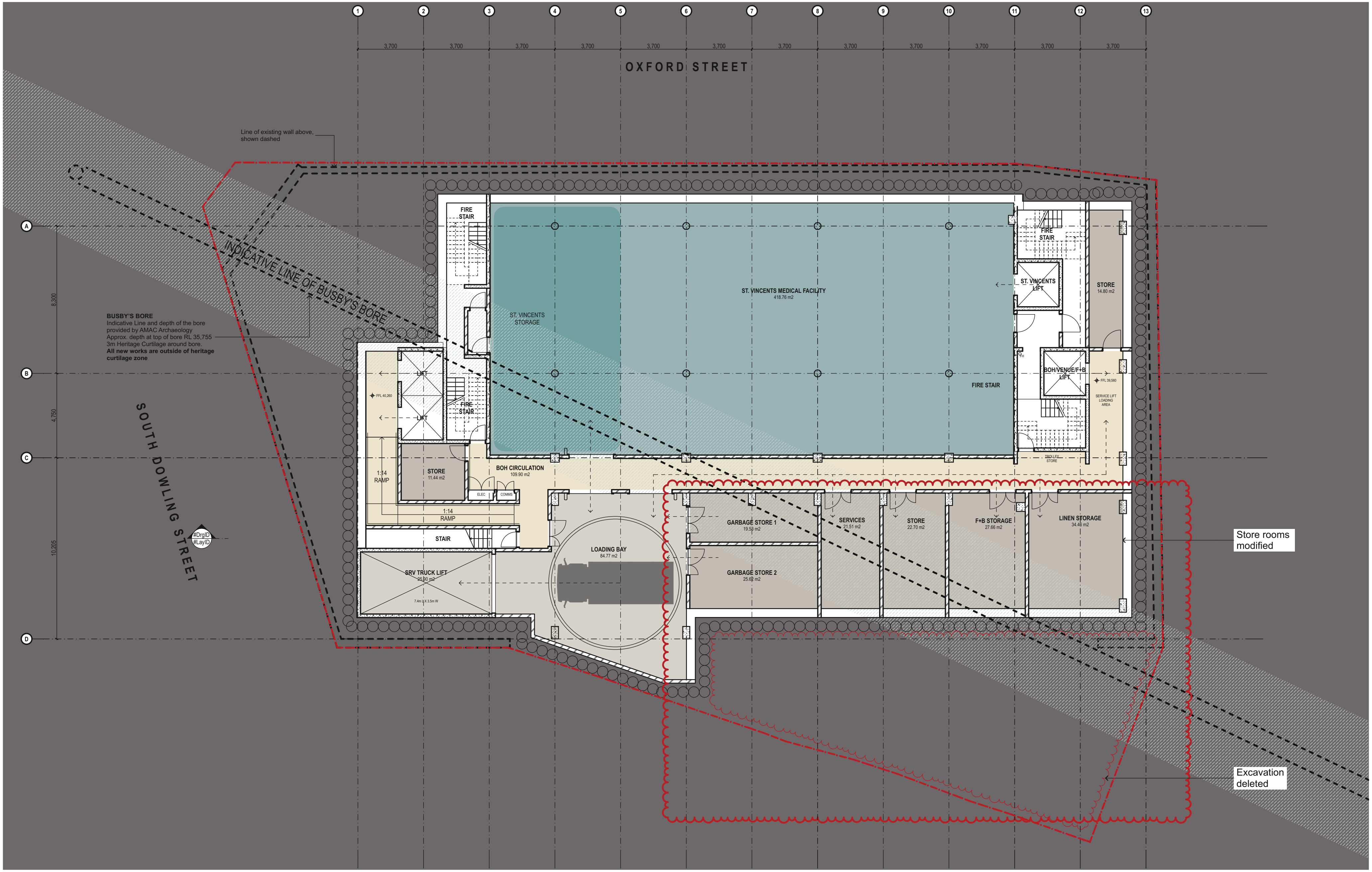
UPDATED AMENDED PLANNING PROPOSAL DRAWINGS

CLIENT:
CE BOSTON HOTELS PTY LTD +
ST. VINCENT'S PRIVATE HOSPITAL
Email: jason.shepherd@bostonglobal.com.au

PROJECT :
OXFORD STREET HOTEL
1-11 Oxford Street Paddington NSW 2021
NORTH
PROJECT NO : 18002

ARCHITECT
TONKIN ZULAIKHA GREER ARCHITECTS
117 Reservoir Street
ABN: 46002722349
P: (02) 9215 4900
F: (02) 9215 4901
EMAIL info@tzg.com.au
WEB www.tzg.com.au

DRAWING TITLE	DRAWN BY
SITE PLAN	JH
	CHECKED TG
SCALES 1:500 @A3	DATE 22/5/19
PHASE PLANNING PROPOSAL / DRAWING NO **PP-01**	REV **A**



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CE BOSTON HOTELS PTY LTD +
ST. VINCENT'S PRIVATE HOSPITAL
Email: jason.shepherd@bostonglobal.com.au

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OXFORD STREET HOTEL
1-11 Oxford Street Paddington NSW 2021
NORTH
PROJECT NO : 18002

ARCHITECT
TONKIN ZULAIKHA GREER ARCHITECTS
117 Reservoir Street
ABN: 46002722349
P: (02) 9215 4900
F: (02) 9215 4901
EMAIL info@tzg.com.au
WEB www.tzg.com.au

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DATE: 22/5/19
PHASE: PLANNING PROPOSAL
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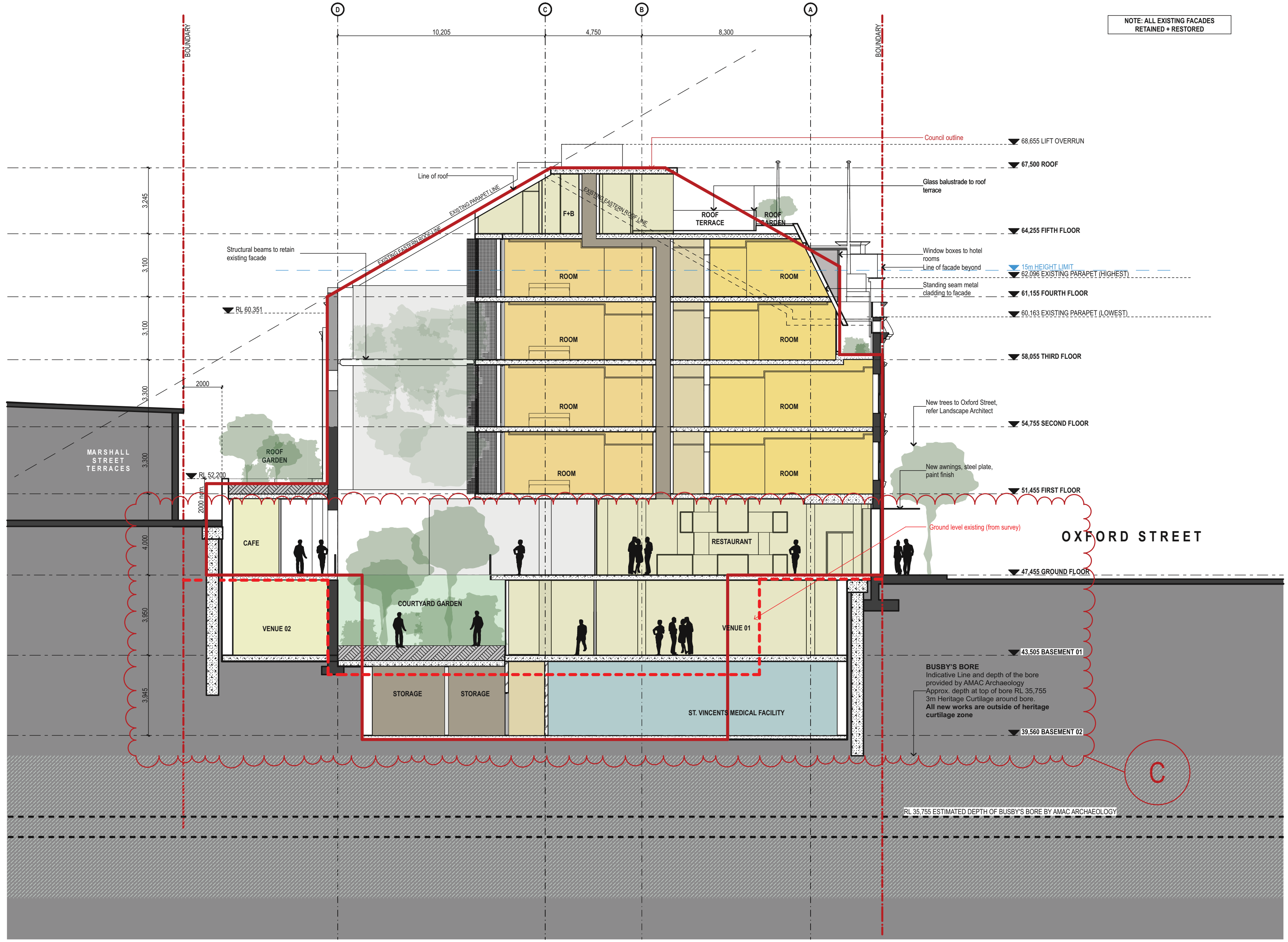
REV: A



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CLIENT:
CE BOSTON HOTELS PTY LTD + ST. VINCENT'S PRIVATE HOSPITAL
Email: jason.shepherd@bostonglobal.com.au

PROJECT :
OXFORD STREET HOTEL
1-11 Oxford Street Paddington NSW 2021
PROJECT NO : 18002

ARCHITECT
TONKIN ZULAIKHA GREER ARCHITECTS
117 Reservoir Street
ABN: 46002722349
P: (02) 9215 4900
F: (02) 9215 4901
EMAIL info@tzg.com.au
WEB www.tzg.com.au

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PHASE	PLANNING PROPOSAL
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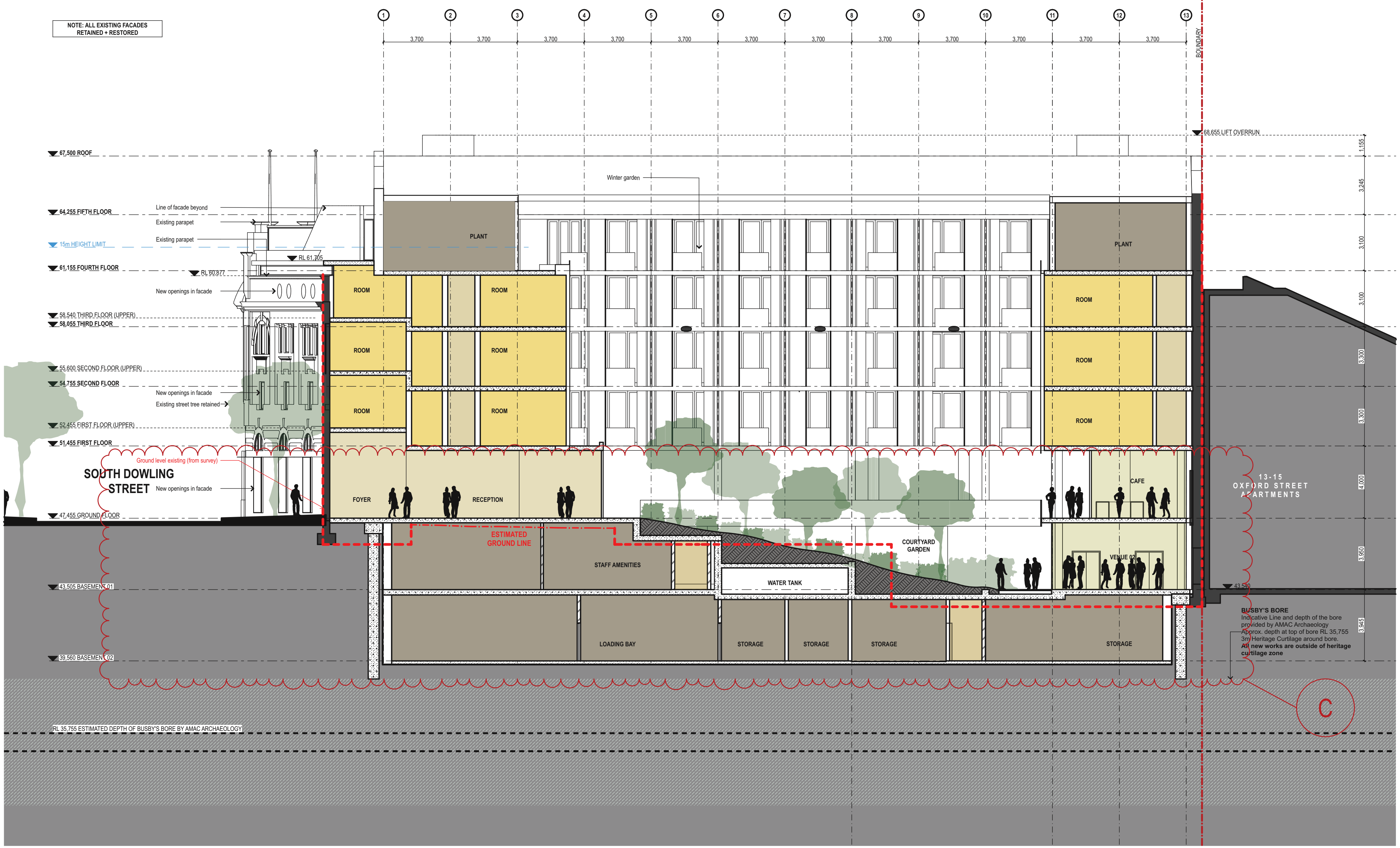
REV	A



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TONKIN ZULAIKHA GREER ARCHITECTS
117 Reservoir Street
ABN: 46002722349
P: (02) 9215 4900
F: (02) 9215 4901
EMAIL info@tzg.com.au
WEB www.tzg.com.au
tonkin zulaikha greer

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DATE
22/5/19

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