PLANNING
BUILDING
HERITAGE
URBAN DESIGN

CITY PLAN SERVICES

5 December, 2013

Joint Regional Planning Panels
Regional Panels Secretariat
GPO Box 39
Sydney NSW 2001

By email: jrppenquiry@jrpp.nsw.gov.au

Dear Sir/Madam,

82 – 106 ANZAC PARADE, KENSINGTON
2013SYE051

Overview

In response to Council's assessment report on this application we wish to submit on behalf of the applicant suggested conditions and supporting information to address what we consider to be the main substantive reasons for refusal as recommended by the Council. We provide these for your consideration and have also referred this correspondence to the Council for its review prior to your meeting.

The suggested conditions address:

- Interface issues along the eastern site boundary
- Basement design and car parking

We have provided additional information in support of these amendments to confirm that their implications and outcomes are certain and therefore may validly and reasonably be given effect via conditions imposed on any consent granted to the application by the Panel.

Whilst not in our view requiring modification, we also address the other main substantive issues raised in the Council report:

- Building height
- Building envelope compliance

Despite our view to the contrary, should the Panel consider modifications are in fact required to address these latter concerns, we suggest conditions may be imposed to give effect to them.

Interface issues to adjoining properties to east

Attached are concept drawings by Site Image describing an additional setback of the ground floor/podium of the building from the eastern property boundary to address Council concerns about interface issues (lack of deep soil planting, landscaping on the site, potential tree loss on adjoining sites, proximity to adjoining residences etc).

The proposed setback at ground level is between 3 – 4.5 metres, above which, the podium level of the building is set back even further through a series of steps. The setback incorporates 1.2 metre depth of *in situ* soil over the basement car park. The concept sketches and details by show extensive ground level and on-structure planting to provide dense and effective screening of the structure and privacy for adjoining residents.

Also **attached** are statements from:

- Urban Forest Australia confirming that the proposed amended development will not remove or adversely affect the trees on the adjoining property.
- Aurecon confirming that basement excavation can be achieved in accordance with the proposed amended scheme without impacting on the root zones of the adjoining trees.

Suggested Condition: Eastern setback

The ground floor/podium level of the building is to be set back between 3 – 4.5 metres from the eastern property boundary and further stepped back to the top of the podium as generally described in the design sketches submitted to JRPP/Council on 4 December 2013. The ground level setback is to retain a soil depth of at least 1 metre to enable dense screen tree planting of suitable species with a mature height of at least 5 metres. Architectural and landscape drawings incorporating these amendments are to be submitted to the Council prior to the issue of the Construction Certificate and will form part of this consent.

Trees on adjoining properties to the east are to be protected in accordance with the recommendations in Section 5 of the Arboricultural Impact prepared by Urban Forestry Australia for this development, dated December 2013.

Basement design and car parking

Whilst the current basement footprint remains the same, the stepping back of the podium wall necessitates some reconfiguration of access and car parking arrangements. **Attached** to this submission is a statement from Parking + Traffic Consultants confirming that basement car parking is of sufficient size and capacity to accommodate the required parking, servicing (including garbage by private contractor), bike and motor bike parking and other identified issues to Council's requirements and relevant Standards.

The attached Aurecon statement referred to earlier also includes confirmation that the proposed structure was assessed in its original report on a three basement scheme in relation to the water table, contrary to the Council assessment officer's statement and can be appropriately managed.

Suggested Condition: Basement design

Amended basement plans are to be submitted showing car, bike parking, servicing (garbage deliveries and the like), access and storage in accordance with Council's requirements and relevant Australian Standards.

Building height

The assessment report erroneously states that an undated Clause 4.6 variation request had not be submitted for the current amended scheme. The updated Clause 4.6 request was submitted to Council in our covering letter to the amended scheme dated 17 November 2013. As outlined in that request, apart from the corner element that expresses the corner with a height exceeding the standard by 4.87 metres, the main extent of the building is only between 2.15 – 2.69 metres above the standard. 1.2 metres of this is caused by the need to comply with flood design levels and the balance is largely the product of the proposed roof garden. The flood design level has unavoidable and necessary consequences for building height. The inclusion of the roof garden also creates the inconsistency with the habitable roof space guideline in the DCP, causing Council to refer to it as 7th floor. The DCP seeks to minimize the visibility of the upper floor. It does not contemplate that a roof top garden could achieve an appropriate design outcome and provide significant amenity for residents of the development, but achieve that by a flat and slightly larger roof form than envisaged by the DCP. It is a very suitable alternative outcome to that described by the DCP.

Contrary to the assessment report's statements, no adverse shadowing or other impacts have been identified as being generated by the proposed height, and strict compliance would create an imperceptible change to the bulk and scale of the building.

Despite our view, if the JRPP is minded to refuse the development on grounds of excessive height, the applicant would accept a condition requiring the removal of the roof garden and the expressed decorative upper level of the corner building. Some minor reduction may also be

achieved by reducing the floor to floor height of each residential level by 100m whilst still achieving a 2.7metre ceiling height.

Building envelope

We have acknowledged that the building did not comply with the DCP envelope in some respects, although those variations did not in our opinion generate any adverse impacts (apart possibly from the eastern interface issue described above).

Above the supermarket level the variation is only 3% above the GFA guideline in the DCP. We submit this is of no consequence since the proposal overwhelmingly achieves SEPP 65 RFDC guidelines on building amenity and external impacts. The main variation is created by the supermarket on the ground floor. The main impact associated with this variation is to bring the podium closer to the eastern boundary. This has now been reduced by the amended setback and the improved ability to screen plant the boundary ameliorates the perceived bulk and scale of the building.

To achieve compliance or near compliance with the envelope would require removal of the supermarket. We submit that the benefit brought about by the proposed supermarket (which the DCP promotes for the centre but identifies it as being located on other unconsolidated sites) outweighs any perceived benefits gained from strict compliance with the guideline.

The report raises concerns that the Anzac Parade frontage does not strictly comply with the setbacks described in the DCP envelope. The architect defends his frontage design as a more appropriate design outcome than would be achieved by strict 'compliance'. We support this opinion, particularly given that strict compliance with the setback above the 4th level of the proposed building would create a street wall height **one storey lower** than the adjoining building to the north rather than (appearing) **one storey higher** than that building as currently designed. If near parity of street wall height is preferred by the Panel, this would be achieved by the removal of the essentially ephemeral materials at the street boundary at 6th level, to reveal the actual setback of the building behind. This can readily be achieved by a suitable condition of consent.

Conclusion

We request the opportunity to address the Panel on this submission and respond to other matters raised in the Council assessment report which we will submit do not warrant refusal of the application. Thank you for your consideration of this submission and please do not hesitate to contact me should you require any further information.

Yours sincerely

David Ryan
Executive Director

CITY PLAN STRATEGY AND DEVELOPMENT

Attachments:
Amended building and landscape concept drawings by *Site Image*
Arborist statement by *Urban Forest Australia*
Traffic and parking statement by *Parking and Traffic Consultants*
Geotechnical statement by *Aurecon*

Kensington Apartments, 84-104 Anzac Parade, Kensington

Landscape Concept Design Report, Development Application

04 December 2013 E - For Approval

APPENDIX A - REVISIONS TO EASTERN BOUNDARY LANDSCAPE SETBACK

SITE IMAGE
Landscape Architects
Sydney | Melbourne | Ho Chi Minh City

Site Image (NSW) Pty Ltd ABN 44 801 262 380 as agent for Site Image NSW Partnership
Level 1, 3-5 Baptist Street Surry Hills NSW 2010 Australia | T +61 2 8332 5600

A.1. LANDSCAPE TO EASTERN BOUNDARY

In response to Council and design review panel comments, the landscape design has responded with significant changes to the eastern boundary relationship and landscape treatments. Features of amendments include:

1. continuous boundary landscape setback and biuffer:
    * 4.3m at northern end of east boundary
    * 3.3m at southern end of east boundary
2. protection of trees on adjoining properties in accordance with Arborist requirements
3. new boundary landscape screen trees and shrubs in buffer zone
4. new tiered landscape treatment to eastern facade with:
    * ground, mid-height, and podium height planting to screen wall /views
    * stone facing treatment as accent panels corresponding podium features
    * timber batten wall facing to facade between stone panels
5. increased podium tree planting

The site photos of boundary trees below demonstrate the significant scale and screening qualities of many of the trees alopng the eastern boundary of the subject site.

Site Image - colour rendered landscape concept plan

Existing trees on eastern boundary

A.2. AMENDED EASTERN BOUNDARY LANDSCAPE

The podium landscape is complimented by a planter set into the eastern frontage with screening shrub species, which will combine with the significant podium edge and podium landscape to create a green edge to the neighbouring residential properties. Existing trees along the boundary, and setback of residential buildings is believed to create a suitable relationship between the proposed building and existing residential buildings. This relationship replicates the recent development of the adjoining property to the north of the subject site.

The podium landscape includes a range of different amenity areas and facilities, including swimming pool, playground, outdoor gym, seating areas, shading pergolas, and series of water features. Significant massed planting to the eastern boundary is in raised planter with soil depth of 600mm on the podium edge for massing shrubs, and sloping up to 1000mm depth for taller planting. Raised planters occur between different amenity areas as shown on the plan, with planters also flanking the water features.

Landscape Masterplan with amended eastern boundary

Site Image - colour rendered landscape concept plan

SITE IMAGE
Landscape Architects

Sydney | Melbourne | Ho Chi Minh City

Landscape Masterplan - with amended Eastern boundary
Kensington Apartments | Landscape Report - APPENDIX A

north

Client	Luxcon Group Pty Ltd	Drawing Number	004
Architect	Bureau of Urban Architecture	Issue	E
Site Image Job Number	SS13-2668	Date	04.12.2013

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The Existing Eucalyptus sp. tree on the adjoining property is complimented by low, medium and high level planting to complete the landscape screen for views from the adjoining area.

Eastern Boundary Landscape Section AA

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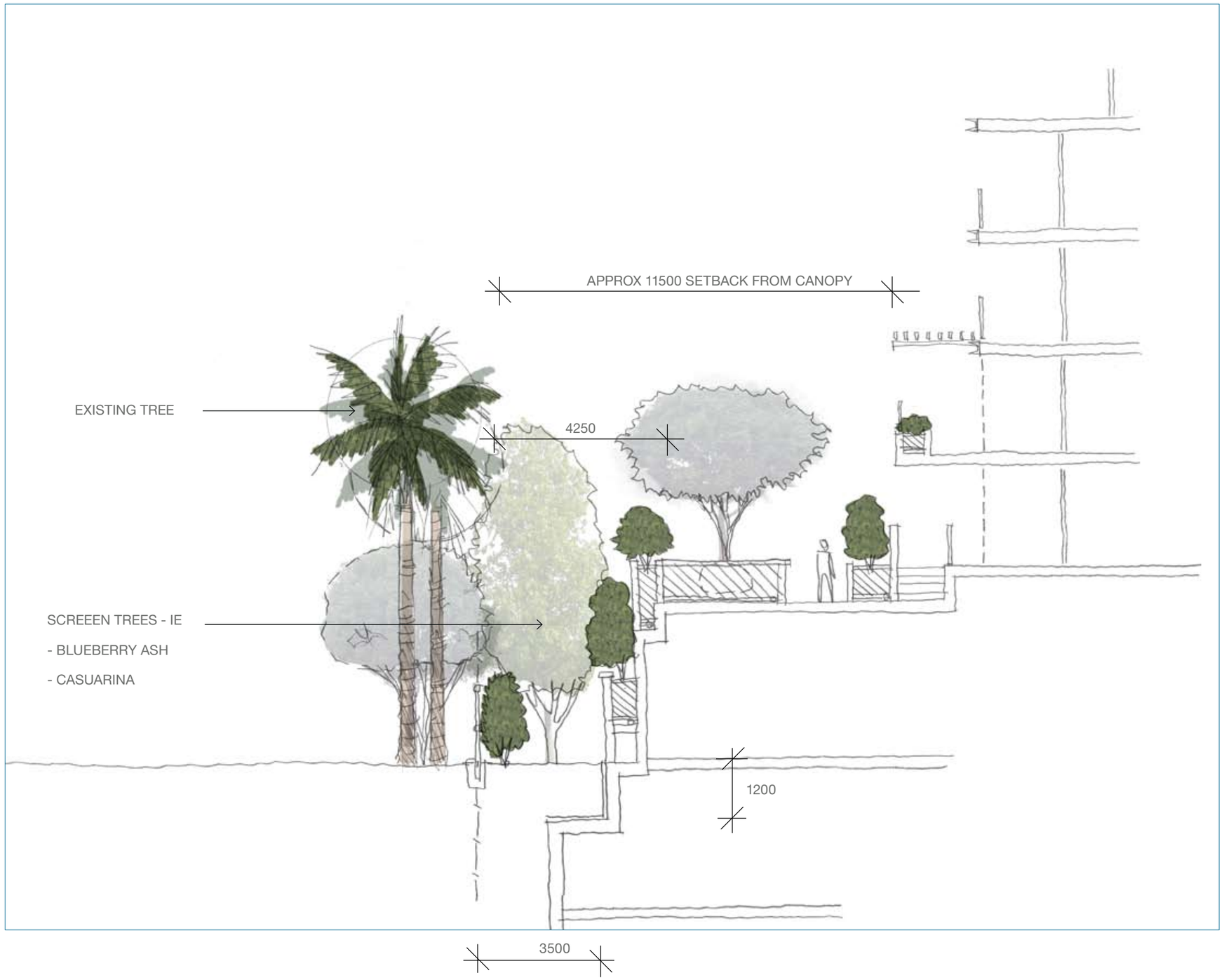


The boundary section BB is similar to AA, but with the open buffer landscape narrowing to 3500, diminishing to a minimum of 3200 at the southern boundary (ie further south from this section).

The existing palm trees, Mango and Eucalyptus sp. trees along this portion of the boundary provide significant visual screening.

Eastern Boundary Landscape Section BB

A.3 SCREEN TREE AND SHRUB SPECIES

Existing Trees to Neighbouring Properties

Catriona Mackenzie, principal of Urban Forestry Australia Arborists has been consulted at length, and amended setbacks and tree protection measures meet with all their requirements and landscape drawings in this Appendix have been reviewed and approved as being suitable to retain the trees on adjoining properties.

These trees provide significant existing visual buffer between the subject properties, and their retention is supplimented with new tree planting along the boundary of the subject site.

Screen Tree Planting

Screen tree species have been selected for their endemic status, and for their substantial foliage from approximately 2m up to approximate 8-10 metres for these species in this location and context. Selected species include:

TREES:

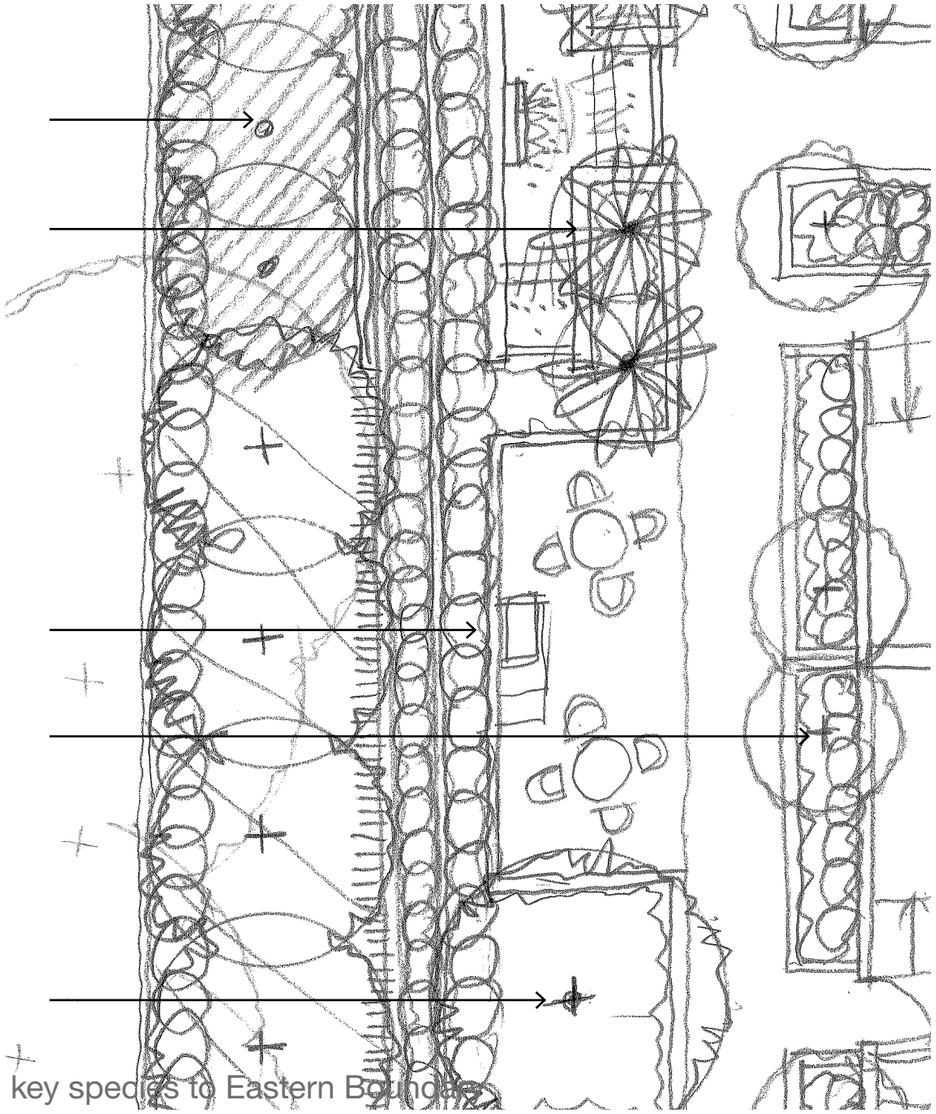
- Casuarina glauca - SWAMP OAK
- Eleocarpus reticulatis - BLUEBERRY ASH
- Syncarpia glomulifera- TURPENTINE
- Waterhousia floribunda WEEPING LILLY PILLY TREE

SHRUBS:

- Syzigium ‘Cascade’ - Weeping Lilly Pilly (shrub)

These layers of boundary shrubs and trees, terraced planters screening the facade, and planting on the podium edge and podium will create a significant landscape screen for views from the adjoining rear garden spaces and residences set well back from the boundary.

In combination, with retained existing trees, there will be significant visual buffer of foliage at all levels along the boundary.



Typical Landscape Plan with key species to Eastern Boundary


Casuarina glauca


Eleocarpus reticulatis


Syncarpia glomulifera


Syzigium ‘Cascade’


Waterhousia floribunda

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PARKING & TRAFFIC CONSULTANTS

Driving success through valuable advice

5 December 2013

Mr Ilya Melnikoff
Luxcon Group Pty Limited
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NSW 2000

1. Proposed Mixed Use Development
84-108 Anzac Parade, Kensington (DA/ 320/2013)

I am writing in relation to the subject Development Application to Randwick City Council associated with the proposed mixed use development at 84-108 Anzac Parade in Kensington. Following submission of the Development Application, the application is being referred to the referred to the Joint Regional Planning Panel (JRPP) for review and as part of that process Willana Planning have prepared a report which summarises Council comments.

We have reviewed comments raised in the Willana report and those pertaining to traffic and parking are summarised in the following.

On-Site Car Parking Provision

The review has concluded that the residential component of the proposed mixed use development has adequate and compliant on-site parking provision including visitor parking spaces however; the commercial component, which is proposed to be occupied by a supermarket, has a parking shortfall.

The Randwick City Council DCP stipulates the on-site parking provision requirements for various land uses. The proposal involves the inclusion of a supermarket within the ground level of the development.

The car parking requirements for the site are presented in Table 1 within Section B7 of the DCP and for a retail use, a rate of 1 space per 40m^2 GFA is required. It is noted that the DCP does not indicate whether the supermarket use is excluded or described separately, furthermore, Table 2 of the DCP specifies identical service vehicle requirements for supermarkets, shops and retail.

The proposed parking provision has therefore been established on the basis of the DCP requirements. It is noted that in Council's comments provided to the JRPP, it is stated that Council relies on the RMS document 'Guide to Traffic Generating Developments', which contains a higher parking requirement. The DCP makes reference to the RMS Guide where a land use is not listed, however, a supermarket clearly falls under the definition of 'retail' unless identified separate (which in this case it is not). It is also noted that the RMS Guide does not reflect the goals of Council in relation to reducing car usage, and does not specifically deal with high density areas (and this is of relevance to the proposal given the planned increased residential density in the area) where lower parking provisions are suitable.

We are of the opinion that the DCP parking rates are more relevant to the development than the RMS rates.

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Peak Period Traffic Assessment

As part of our traffic impact assessment we have referenced the Thursday evening peak period, which represents the worst case scenario during a typical week as it involves the evening commuter peak (background traffic), the peak traffic activity associated with the supermarket (due to traditional late night opening) and the residential development (homebound commuters). While weekend traffic conditions are becoming increasingly busy throughout the metropolitan area, the peak tends to be spread of several hours, rather than the more defined commuter and school peaks that occur during weekdays.

Bicycles

The proposal involves the provision of on-site bicycle parking for both residential and retail users. Typically, cyclists visiting shops or offices prefer to lock bikes within the vicinity of the building entrance or in clear view of activity either within or outside the building. In this regard, the retail bicycle parking provision will be provided along the frontage rather than within the basement.

Residential bicycle parking will be provided within storage cages within the basement levels.

Driveway Widths

It is recognised that the Australian Standard, AS2890.1, provides different design requirements according to the scale and type of car park facility. However, the context of the proposal and other influences on the design must also be taken into account. For example, Council's engineer has considered the car park access as a Category 3 driveway, based on the car park being a Class 3A facility. While a proportion of the car park will represent a Class 3A facility (the retail component) it doesn't necessarily follow that the driveway is a Category 3 driveway (the retail component is less than 100 spaces, so a category 2 driveway would apply). While I agree that the traffic activity should also inform the driveway arrangement, I am not of the view that an unqualified application of the Standard should apply. The strict application of a category 3 driveway would require a 6 metre wide access driveway and a separate 4 metre (minimum) wide egress driveway, separated by a 1 metre island. Overall, this creates an 11 metre wide driveway, adjacent to the proposed 7 metre wide loading dock driveway. This arrangement is not only unmanageable within the site frontage (having regard for a suitable off-set from Anzac Parade) but also does not respond well to the needs of pedestrians, especially in the context of the increased residential and employment density planned for the area.

The provision of a 6.5 metre wide driveway satisfies the requirements of a Category 2 driveway which will adequately cater for the car park activity while maximising the offset from Anzac Parade and minimising the impact on pedestrian movements along the frontage.

Driveway Grades

The driveway grades have been designed to include the flood level threshold, and this has been achieved through a curved transition to create a hump connecting the up and downward grades. This is slightly different to the approach described in AS2890.1, which relies on a series of constant grades, 2 metres in length; however the radius of the hump is based on the ground clearance templates presented in the Standard to ensure that vehicles do not scrape on the crest of the ramp. A long-section of this arrangement is shown on drawings prepared by Bureau Architects.

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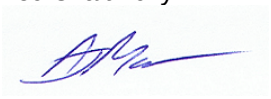
Loading Dock Arrangement

The loading dock has been design to accommodate two separate loading areas, servicing the residential and retail components of the development separately. The provision of the residential servicing area within the ground floor represents good design practice, as it makes use of the commercial driveway, increased height clearance and avoids the need to accommodate commercial vehicles within the basement as suggested in the Willana report.

The loading dock is required to accommodate all movements to and from the driveway in a forward direction, therefore all vehicle, including the large commercial vehicles, must turn around within the loading dock. In this regard, the size of the loading dock is dictated by the associated turning paths and required clearances.

I trust that this response to the issues raised will assist in the determination of the Development Application.

Yours faithfully



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4 December 2013

The General Manager
Randwick City Council
Administration Building & Customer Service Centre
30 Frances Street
Randwick NSW 2031

Dear Sir

DA/320/2013 – Demolition of the existing buildings; excavation works and construction of a part 6, part 7 mixed use development comprising ground level retail space, 109 residential units and 3 basement levels of 277 car spaces and associated landscaping works at 84-108 Anzac Parade

I refer to the items addressed in the Notification outlined in the above document (JRPP report prepared by Willana)

This letter will address the two issues raised within the report

The proposed basement level carparks will be below the water table in Kensington and will necessitate the use of full time pumps to extract the water, which is not an energy efficient practice. As noted in the DCP, the Department of Land and Water Conservation will not endorse continuous extraction of groundwater.

This was addressed in the report submitted along with the DA:

(84-104 Anzac Parade in Kensington, Concepts of Basement Construction. Reference: 238419 Prepared for: Luxcon Revision: 0 - 27 September 2013)

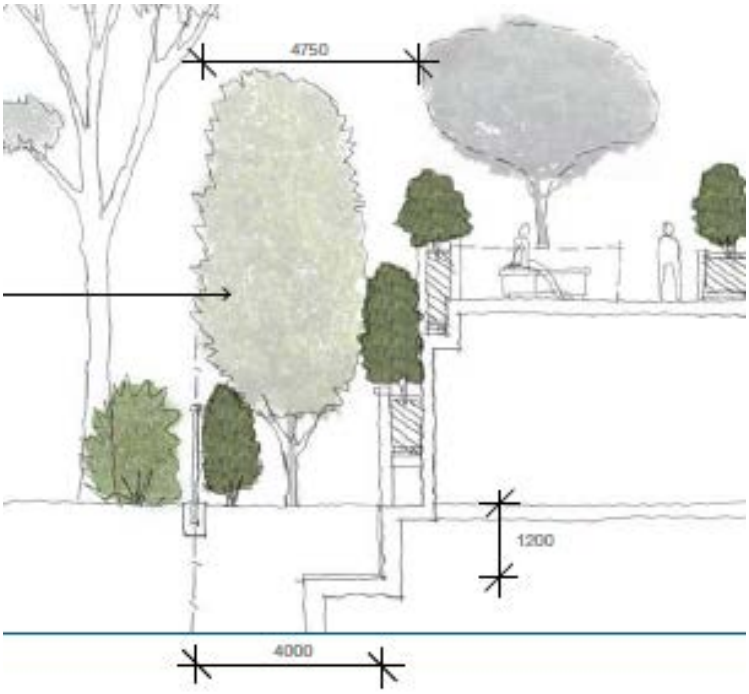
Aurecon have not recommended the use of pumps as a method of extracting water from the site:

Despite Council raising the presence of these trees as a major issue and site constraint for any development, alternative schemes and re-designs to lessen the impacts have not been provided or suggested, neither has the extent of pruning required to avoid damage by a piling rig in such close proximity, as well as the amount required to provide a clearance off the building both during construction as well as upon completion.

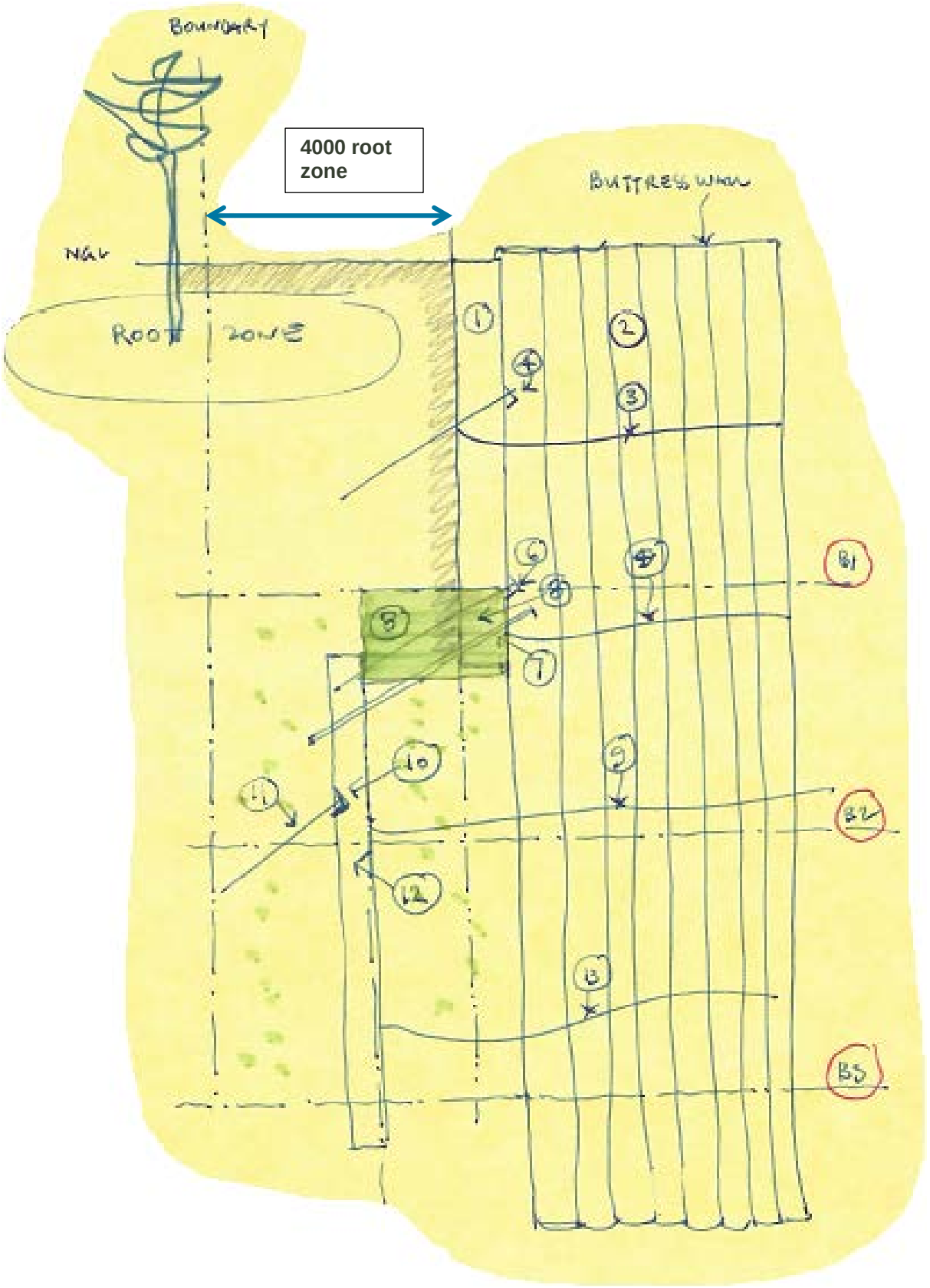
Council's primary focus is to ensure that these neighbouring trees are not compromised in anyway; and unfortunately, on the information provided to date, there is no way that Council can issue consent as the applicant has not been able to prove, with any degree of certainty, that these neighbouring trees will not be seriously and adversely affected by the works.

Aurecon have outlined below our proposed alternative excavation methodology

We have based the following shoring alternative on the Landscape section developed by Site Image.



Proposed section through Eastern Boundary



Proposed Alternative shoring Scheme. Refer Key below

1. Install secant pile walls to the underside of the B1
2. Install Piles to form Buttress walls
3. Excavate first lift approximately 2 metres in depth
4. Install first row of temporary anchors into the secant pile wall
5. Excavate the 2nd level approximately 1.5 metres in depth
6. Install the second row of anchors into the secant pile wall
7. From the base of the second excavation depth of the B1 slab location , inject a grout/soil mix for the entire width of zone A to the depth of the BEL
8. Excavate locally in segments to create a reinforced header beam to provide vertical support to the piles and the area immediately behind the piles
9. Excavate 2 metre down to expose the soil grout mix
10. Excavate the grouted area to a line 300 mm beyond the proposed excavation line
11. Install temporary anchors
12. Construct a 400 mm thick reinforced shotcrete wall and connect the shotcrete wall by a return to join the buttress wall created from the secant piles
13. Repeat the steps 9-12 until the base of the excavation has been reached.

This staged excavation process achieves the following desired outcomes.

- Excavation of the basement without disturbing the roots of the adjacent site.
- Basement excavation to suit the proposed basement dimensions.

Yours sincerely

Tony Lavorato

aurecon

84-104 Anzac Parade in Kensington, New South Wales

Concepts of Basement Construction

Reference: 238419

Prepared for: Luxcon Group

Revision: 0

27 September 2013

Document control record

Document prepared by: Jonathan Durnell

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Client		Luxcon Group	**Client contact**			
Rev	**Date**	**Revision details/status**	**Prepared by**	**Author**	**Verifier**	**Approver**
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Current revision		**0**				

Approval			
Author signature		Approver signature	
Name	Muliadi Merry	Name	Charlie Shackell
Title	Associate	Title	Technical Director

Contents

Appendices

Figures

Tables

1. Introduction

The development proposed by Luxcon Group (LG) involves the construction of a multi-level apartment building, up to ten storeys high and with three basement levels, at 84 – 104 Anzac Parade in Kensington, New South Wales (hereinafter referred to as 'the site').

The site fronts Anzac Parade to the west and is bounded by Goodwood Street to the south and neighbouring properties to the north and the east. We understand that the site, in a rectangular shape, covers an area of about 3,336m^2 and that the basement excavation will extend to a depth of about 8.7m below the existing ground surface.

In support of the Development Application (DA) process, LG has requested Aurecon Australia (Aurecon) to provide initial high-level advice on potential basement construction methods that can be implemented within the site with negligible adverse impacts to the immediate surrounding structures.

Aurecon has prepared this report in consideration of the following documents:

- The available geotechnical information presented in a report prepared by Douglas Partners (DP) titled 'Preliminary Geotechnical Investigation, Proposed Residential Development, 84-104 Anzac Parade, Kensington' reference 73405, dated May 2013.
- The advice given by DP on 19 September 2013 on indicative rock level (in reference to the result from a previous geotechnical investigation at 76 Anzac Parade, Kensington).
- DA Drawings DA11 to D23 prepared by PBD Architects.

Included as part of this report are:

- Preliminary assessment of the subsurface profile within the site taking into account the available geotechnical information.
- Potential methods of basement construction (in concept) accounting for site physical conditions such as high groundwater table, sandy soils and proximity to the neighbouring properties and Anzac Parade.
- Identification of various geotechnical risks at basement construction stage, along with the associated possible risk mitigation measures.

2. Preliminary Assessment of Subsurface Profile

2.1 Existing Geotechnical Information

A limited geotechnical investigation was undertaken in April 2013 by DP, comprising Cone Penetrometer Testing at two locations (namely CPT1 and CPT2) to depths of up to 15m below the existing ground surface. Additionally four hand augered holes (namely BH1 to BH4) were undertaken to depths between 1.1m and 1.2m below the existing ground surface.

A groundwater monitoring well, constructed by others, was also noted to exist within the site. The construction details of the groundwater monitoring well are not known. The well has been named GW1 and measurements of the groundwater level were recorded.

2.2 Preliminary Subsurface Profile

In our assessment, we have adopted the preliminary subsurface profile presented in the DP report, reproduced in Table 1.

Table 1 Preliminary Subsurface Profile

Geotechnical Unit	Unit Thickness (m)	Reduced Level of Top of Unit (m AHD)	
		CPT1	CPT2
Fill	0.4 – 0.5	28	28.9
Loose Sand	1.2 – 2.4	27.6	28.4
Medium Dense to Dense Sand	3.9 – 4.9	25.2	27.2
Dense to Very Dense Sand	8.3*	21.3	22.3

Note: * The unit thickness was calculated up to the depth of testing.

DP has also advised that within the nearby property to the north of the site, rock is at depth, in excess of 50m below the existing ground surface.

DP has measured the groundwater level in GW1 to be at RL 25.6m AHD, some 6.5m above the finished basement excavation level.

3. Concepts of Basement Construction

3.1 Preferred Basement Construction Method

We understand that LG prefers constructing the basements by bottom-up method where sub-structure and super-structure floors are constructed sequentially from the bottom of the sub-structure or lowest level of basement to the top of the super-structure.

Bottom-up construction method requires the basement excavation to be stabilised using retaining structures. These may include contiguous bored pile walls, secant pile walls and diaphragm walls. For ground movement control purposes, either ground anchors or steel struts may be used as alternatives to basement slabs.

Comparison of the various basement excavation support systems is provided in Table 2.

Table 2 Various Basement Excavation Support Systems

Contiguous Bored Pile Walls	Secant Pile Walls	Diaphragm Walls
The contiguous bored pile walls are formed by closely spaced abutting piles, thus a non-water proof form of site retention. The piles are typically soft, made of cement-bentonite. Either Continuous Flight Auger (CFA) drilling technique or drilling rigs equipped with Kelly bar and drilling bucket may be adopted in the retaining wall construction. Common dimension of the contiguous bored pile walls is 0.6m to 0.9m in diameter.	The secant pile walls comprise primary piles and secondary piles. The secondary piles are installed in between two consecutive primary piles, cutting some part of the primary piles, forming relatively impervious walls. Typically primary piles of the secant pile walls are soft, made of low-grade concrete while secondary piles are hard, made of high-grade concrete. Either Continuous Flight Auger (CFA) or bored pile drilling technique may be considered. Similarly, the pile diameters typically range from 0.6m to 0.9m.	Diaphragm walls are best functioning as cut-off walls. Diaphragm walls are constructed by excavating a series of rectangular panels keyed into each other to form a continuous wall. Excavation of the panels in soils and low quality rock are via either rope suspended or Kelly bar mounted grabs. Excavation in more competent rock requires mills. In almost all cases the excavation is supported by drilling fluids such as bentonite or occasionally polymer slurries. The size of the grabber dictates the thickness of the diaphragm walls, typically ranging from 0.45m to 1.2m.

3.2 Recommended Basement Excavation Support System

For the reason that the basement excavation will extend below the groundwater table and that groundwater drawdown and ground movements are required to be controlled to avoid significant disturbances to the immediate surrounding structures, we recommend the adoption of secant pile walls, in conjunction with temporary ground anchors, for supporting the basement excavation.

Permissions from the owners of the neighbouring properties and Roads & Maritime Services (RMS) should be in place prior to installing any ground anchors. Additionally RMS requires ground anchors to be temporary with a minimum design life of two years. No part of a ground anchor must be less than 2m below the surface of a state road reserve and RMS easement. The structural connection between the anchor and retaining wall must be removed once the anchors are redundant. Ground anchors are required to be positioned in such a way that they are not in conflict with the basement slabs.

For the purpose of resisting the uplift pressure (estimated to be about 65kPa), we recommend the formation of a uniform base block, constructed as either a jet grouted or cutter soil mixing block, across the entire basement floor area. This approach was put forward based on the assumption that rock is present at depth, inhibiting the keying into rock for cutting off the path of the water seepage. Indicatively, the thickness of the base block could be in the range of 4m to 5m.

A sketch illustrating the basement excavation support recommended for the site (in concept) is presented in Appendix A.

3.3 Possible Basement Construction Sequencing

The underground basements may be constructed in accordance with the following sequences:

- Enabling works, including the application for the necessary permissions for ground anchor installation.
- Establish movement and groundwater monitoring locations. Note that casting inclinometer monitoring casings into the piles forming the retaining walls may be feasible.
- Construct secant pile walls along the perimeter of the site from the ground surface.

- Construct from the ground surface the base block uniformly across the basement floor by either jet grouting or cutter soil mixing techniques.
- Construct from the ground surface internal load bearing piles (if required). Caution is required during detailed design for the prevention of potential water seepage through the interface of the internal piles with the base block and the lowest basement slab.
- Carry out dewatering (inside the passive side of the excavation) in stages, in line with the excavation increments.
- Install temporary ground anchors as specified in a timely manner in advance of subsequent basement excavations.
- Construction of basement slabs from the bottom to the top.

4. Geotechnical Risks and Mitigation Measures

Table 1 summarises various potential geotechnical risks at basement construction stage and identifies the possible mitigation measures to reduce the adverse impacts of each risk identified.

Table 3 Geotechnical Risks and Mitigation Measures

Geotechnical Risks	Possible Risk Mitigation Measures
Excessive ground movements due to either significant groundwater drawdown or lack of lateral support	• Adequately engineered retaining walls. • Use of ground anchors to support the retaining walls in compliance with RMS Technical Direction GTD 2012/001. • Seepage barrier across the basement floor. • Strict supervision and control of construction activities. • Numerical analyses at detailed design stage for the estimation of potential ground movements due to the excavation, providing a basis to set out the trigger threshold criteria for ground movement monitoring. • Dilapidation surveys of the immediate buildings and RMS infrastructures prior to starting the basement excavation. • Geotechnical instrumentation and monitoring at construction stage, including: - Use of multi-point survey targets and inclinometers for ground movement monitoring. - Use of piezometers for groundwater monitoring. • Desk-top hydrogeological study at detailed design stage to assess temporary and permanent effects on groundwater in response to the excavation. • Pumping test may be considered to assess in-situ groundwater response due to drawdown.
Ground settlements due to the potential presence of soft clays at depth	Drilling of additional boreholes, each drilled to the top of rock. The current investigation has only been extended to depths up to 15m.
Excessive ground movements due to reduction in horizontal stress around the piles forming the secant pile walls	• Use of CFA drilling technique. • Using a drilling rig with adequate torque capacity and operate at proper rate to avoid 'flighting' in which the surrounding soils are drawn towards the flight augers. • Appoint a qualified piling contractor with proven experience in the construction of secant pile walls.
Significant water ingress into basement excavation, leading to significant groundwater drawdown	• Construction of secant piled walls along the perimeter of the site. • Formation of a base block across basement floor using either jet grouting or cutter soil mixing techniques.

Geotechnical Risks	Possible Risk Mitigation Measures
Leakage at the interface of the internal piles (if in use) with the base block and the lowest basement slab	Water proofing measures at the interfaces between the various structural components.
Leakage through the base block	• The base block is required to be constructed by a qualified specialist contractor (i.e. quality workmanship). • Strict quality control process.
Uplift due to groundwater pressure	Design the base block to resist the uplift pressure in the short-term and consider relying on the lowest basement slab for uplift resistance in the long-term.
Ground anchors are in conflict with services	Services searches and scanning for detailed identification of existing buried services within the site and the perimeter areas.
Failure to obtain permissions from neighbouring property owners for ground anchor installation	• Use of steel struts in lieu of ground anchors. • Consideration of 'top-down' construction sequencing.
Over-excavation	• Rigorous construction standards. • Clear communication of the construction sequence.

5. Concluding Remarks

We assess that the proposed development at 84 – 104 Anzac Parade in Kensington, New South Wales, which involves excavations in sandy soils and below groundwater table, is buildable from a geotechnical perspective.

The key objective of completing underground basement excavations with no significant adverse impacts on the immediate surrounding structures as a result of the construction activities can be achieved through a combination of various engineering measures, including but not limited to the following:

- Adequately engineered design solutions in compliance with the relevant standards and specifications. As such the design of the basement excavation support system will be undertaken in consideration of the technical requirements set out in RMS Technical Direction GTD 2012/001 titled 'Excavation adjacent to RMS Infrastructure'.
- High quality of construction workmanship.
- Involvements of specialist contractors, Aurecon (as the project designers) and relevant stakeholders (e.g. Randwick City Council and RMS) in the project development and delivery processes.
- Regular construction site supervision services by the geotechnical designer with regard to the basement excavation works.
- A programme of geotechnical instrumentation and monitoring during construction.

Appendices

Appendix A
Basement Excavation Support System Concepts

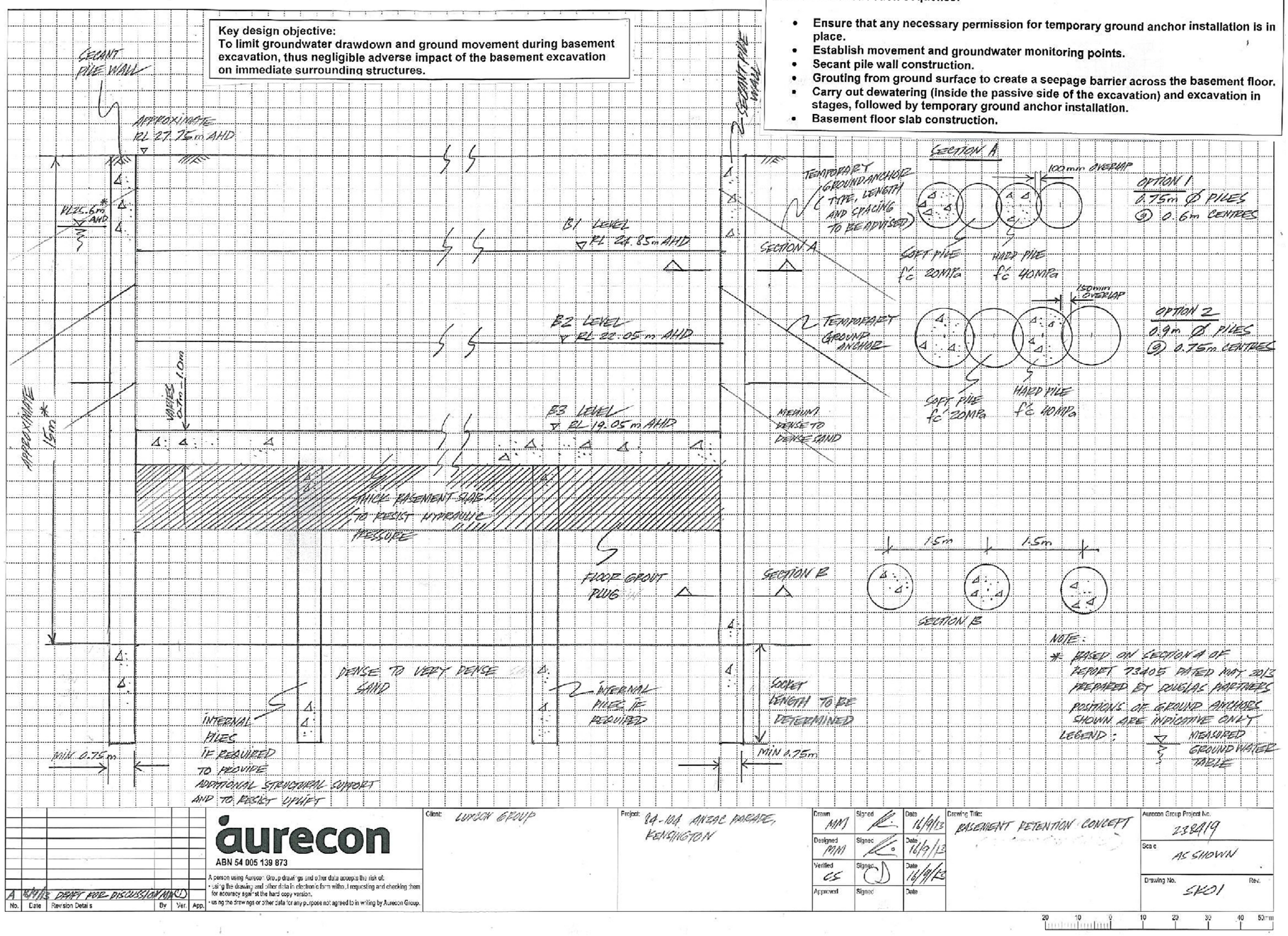

Figure 1 Concepts of Basement Excavation Support System

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