

HARBOURSIDE SHOPPING CENTRE

FLOODING, STORMWATER & WSUD FOR STAGE 1 DA



16 SEPTEMBER 2020

Incorporating



MIRVAC HARBOURSIDE SHOPPING CENTRE

Flooding, Stormwater & WSUD for Stage 1 DA

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REVISIONS

Revision	Date	Description	Prepared by	Approved by
A	16/09/2020	Issue for amended DA	Bruce Caldwell	Joe Heydon

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1 INTRODUCTION

This report provides a response to submissions (as relevant) and assessment of the proposed amended Concept Proposal in relation to the State Significant Development (SSD) Development Application (DA) for the redevelopment of the Harbourside Shopping Centre (Harbourside) (SSD 7874).

The SSD DA was publicly exhibited for a second time from 2 April to 29 April 2020. During this time, six (6) submissions were received from government agencies and City of Sydney Council and 57 submissions were received from the general public and organisations.

This report should be read in conjunction with the previous assessments prepared by Arcadis dated 28th September 2016 and dated 18th February 2020 to support the Harbourside Concept Proposal.

1.1 BACKGROUND

Mirvac acquired Harbourside, a key location within the Darling Harbour precinct, in November 2013. Harbourside, which was opened in 1988 as part of the Bicentennial Program, has played a key role to the success of Darling Harbour as Australia's premier gathering and entertainment precinct.

Despite its success, with an annual pedestrian visitation of around 13 million people, Harbourside is now outdated and in decline. The building lacks a quality interface to the Darling Harbour public domain and Cockle Bay and does not integrate well with the major transformation projects underway and planned for across Darling Harbour.

Harbourside is at risk of being left behind and undermining the significant investment being made in Darling Harbour that will see it return to the world stage as a destination for events and entertainment.

Accordingly, Mirvac are taking a carefully considered and staged approach to the complete revitalisation of the site and its surrounds.

1.2 SITE DESCRIPTION

The Site is located within Darling Harbour. Darling Harbour is a 60-hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

More generally the site is bound by Pyrmont Bridge to the north, the Sydney International Convention, Exhibition and Entertainment Centre Precinct (SICEEP) to the south, Darling Drive and the alignment of the Light Rail to the west and Cockle Bay to the east.

A locational context area plan and site location plan are provided in **Figures 1 and 2** below.

The Darling Harbour precinct is undergoing significant redevelopment as part of the SICEEP, Darling Square, and IMAX renewal projects. The urban, built form and public transport / pedestrian context for Harbourside will fundamentally change as these developments are progressively completed.

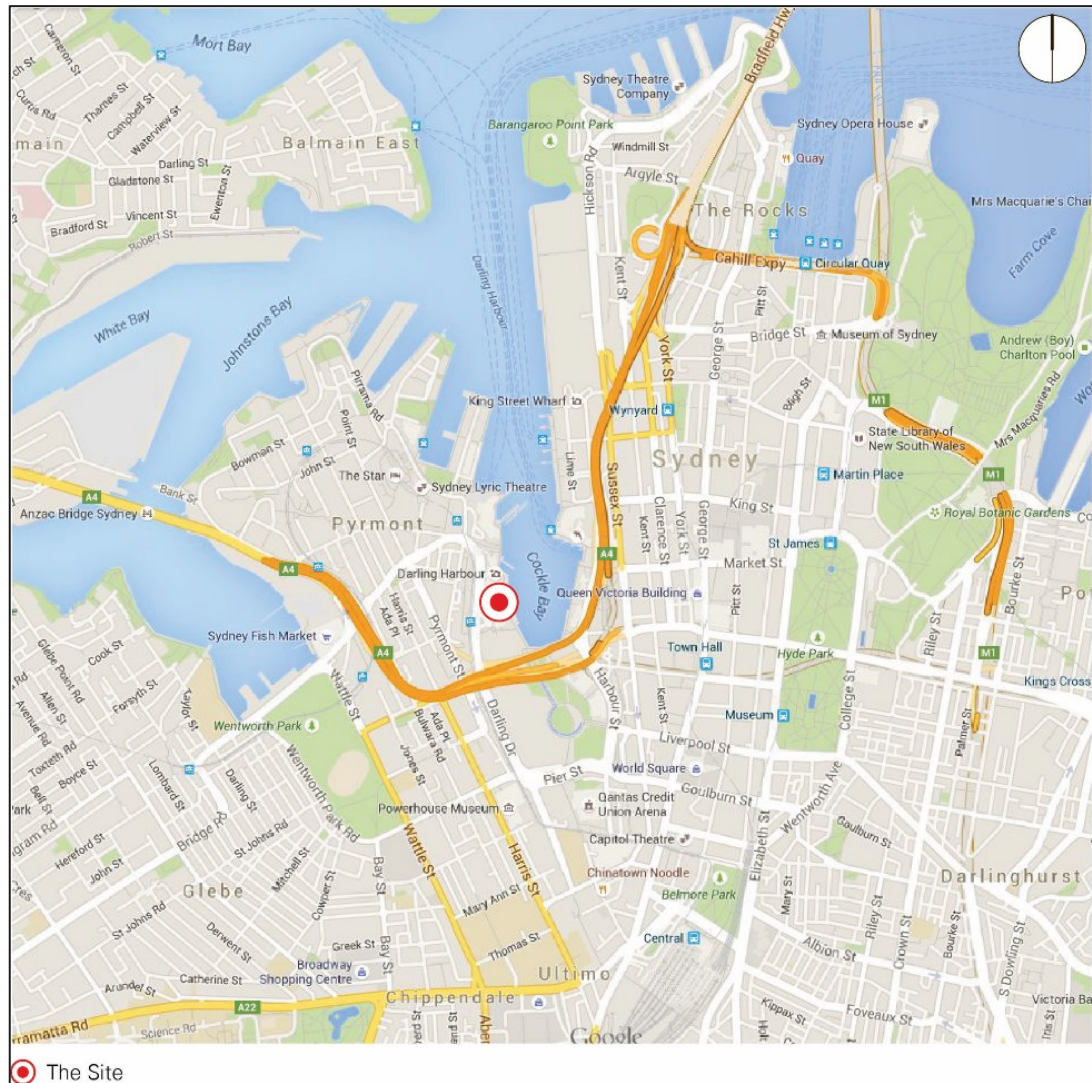
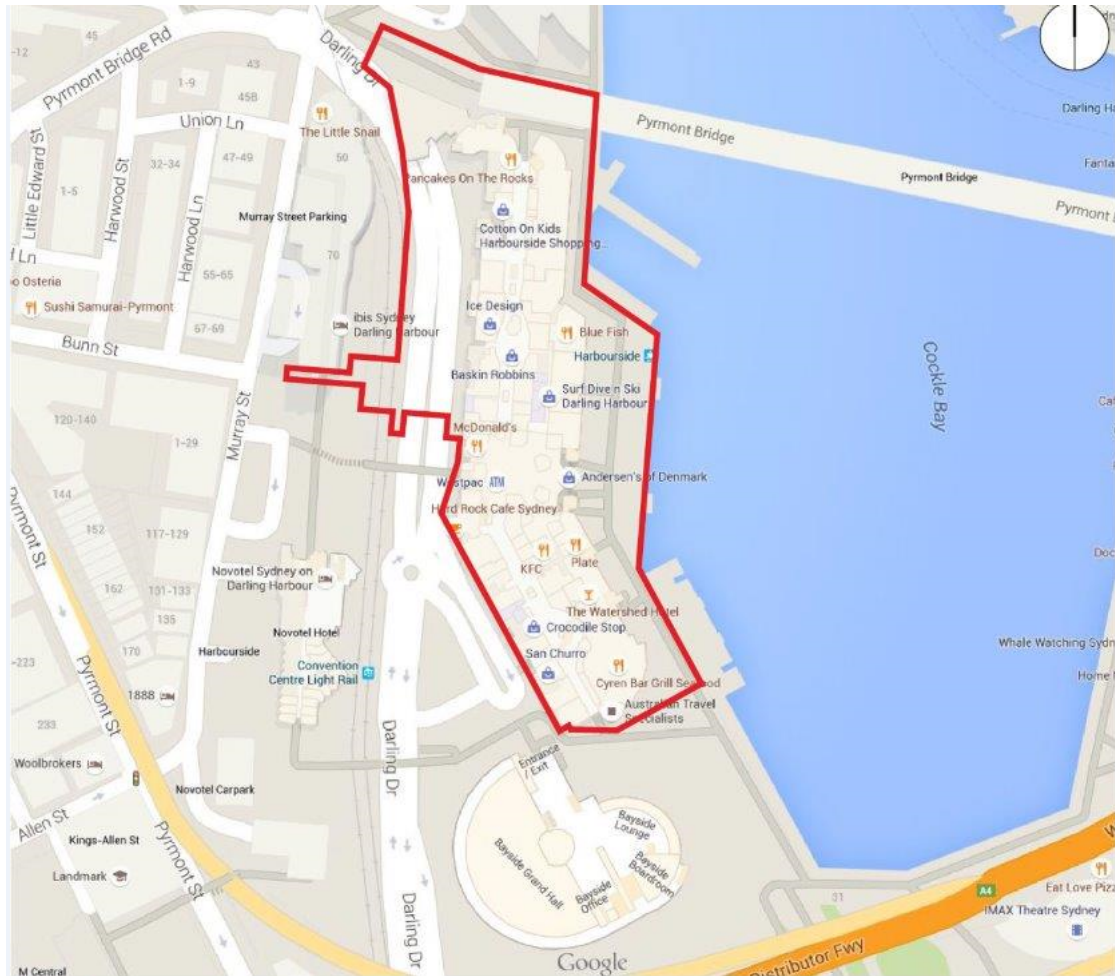


Figure 1: Location Context Area Plan (Source: Google Maps)



Indicative Site Boundary

Figure 2: Site Location Plan (Source: Google Maps)

1.3 PROPOSED AMENDED DEVELOPMENT

Introduction

This report provides a response to submissions (as relevant) and assessment of the proposed amended Concept Proposal in relation to the State Significant Development (SSD) Development Application (DA) for the redevelopment of the Harbourside Shopping Centre (SSD 7874).

The SSD DA was publicly exhibited for a second time from 2 April to 29 April 2020. During this time, six (6) submissions were received from government agencies and City of Sydney Council and 57 submissions were received from the general public and organisations.

This report should be read in conjunction with previous assessments prepared by Arcadis Consulting and dated 18th March 2016 and 04th February 2020 to support the Harbourside Concept Proposal.

Proposed Amended Development

Following the second exhibition of the proposal in April 2020 and given the nature and range of submissions made from agencies and the public, Mirvac has again reviewed the overall approach and elements of the Concept Proposal. This has accordingly led to developing a Further Amended Concept Proposal. This further and final Concept Proposal therefore includes amendments made by Mirvac pursuant to Clause 55 of the Environmental Planning & Assessment Regulation, in the main to address matters raised in the submissions and deliver an overall significantly improved outcome on the site and for the broader Darling Harbour precinct and Pyrmont Peninsula.

In addition to the further amendments made to the Concept Proposal, Mirvac are also now including detailed Stage 1 Early Works, comprising demolition of existing site improvements down to ground slab level (no ground disturbance). Revised SEARs were accordingly issued by the Department on 12 May 2020.

The following further key amendments have been made to the Concept Proposal since its April 2020 public exhibition:

Increase in Height of the Tower

The height of the tower has been increased to be consistent with the height originally proposed (from RL 153.75 to RL 166.95). The tower height has been increased in order to better align with the place outcomes identified within the Draft Pyrmont Place Strategy for Harbourside. This opportunity for additional height is supported with the provision of additional public benefit through the creation of a new significant public accessible area of open space on the northern podium rooftop.

Reduction in Height of Northern Podium

A portion of the podium height at its northern extent has been further reduced from RL 25 to part RL 17.6 and part 13.75. The reduction in height provides for an improved relationship to the state heritage listed Pyrmont Bridge, further improve view sharing from 50 Murray Street, along with providing an opportunity to create a new publicly accessible open space area.

Gross Floor Area / Land use Mix

A portion of the podium height at its northern extent has been partly reduced from 30.5 RL to RL 25. The reduction in height provides for improved view sharing from 50 Murray Street.

The amended proposal retains the same overall 87,000sqm of GFA, however there is a minor adjustment in the split between non-residential and residential. The final proposal now includes:

- Non-residential uses floor space – 45,000sqm; and
- Residential uses floor space – 42,000sqm

In response to market demand and the focus of local and regional strategic planning policies, it is proposed for the podium to now include predominantly commercial land uses along with supporting retail. Indicatively, comprising ~28,000sqm net lettable area of commercial office and ~8,500sqm gross lettable area of retail.

The podium enables large campus sized commercial floor plates that are favoured by large multinational tech, media, finance, and professional services companies.

Apartment Numbers

No change is proposed to the indicative number of apartments (357), with the minor increase in the tower height resulting in a review of the mix and sizing of apartments. Note, this yield is on the 'Indicative Design' only and will be subject to future design development and a Stage 2 DA. This Stage 1 DA only seeks approval for land uses and the building envelope comprising a total of 87,000sqm GFA.

Car Parking

The overall footprint of the basement has been reduced, but there is proposed to be an additional basement level of parking (increase from 3 levels to 4 levels). There is no change to proposed indicative parking spaces, remaining at 306 spaces. As above, this is based on the 'Indicative Design' only.

Landscaped Open Space and Public Domain

The key concepts and public benefits as originally proposed are retained under the amended Concept Proposal, with the addition of a new significant area of publicly accessible open space created on the rooftop of the northern podium (referred to as "Guardian Square

Final Description of Development

As a result of a review of the mix and sizing of apartments, there is a minor reduction in the indicative number of apartments, from 364 to 357. Note, this yield is on the 'Indicative Design' only and will be subject to future design development and a Stage 2 DA. This Stage 1 DA only seeks approval for land uses and the building envelope comprising a total of 87,000sqm GFA.

The Harbourside Shopping Centre Redevelopment application will include a Concept Proposal and detailed Stage 1 Early Works.

The final Concept Proposal seeks approval for the following key components and development parameters:

- A network of open space areas and links generally as shown within the Public Domain Concept Proposal, to facilitate re-integration of the site into the wider urban context;
- Building envelopes;
- Land uses across the site, non-residential and residential uses;
- A maximum total Gross Floor Area (GFA) across the Harbourside site of 87,000sqm for mixed use development (45,000sqm non-residential and 42,000sqm residential development);
- Basement car parking;
- Car parking rates to be utilised in subsequent detailed (Stage 2) Development Applications);
- Urban Design and Public Realm Guidelines to guide future development and the public domain; and
- Strategies for utilities and services provision, drainage and flooding, and ecological sustainable development.

The Stage 1 Early Works comprises:

- Demolition of the existing site improvements, including the Harbourside Shopping Centre, obsolete monorail infrastructure, and associated tree removal.

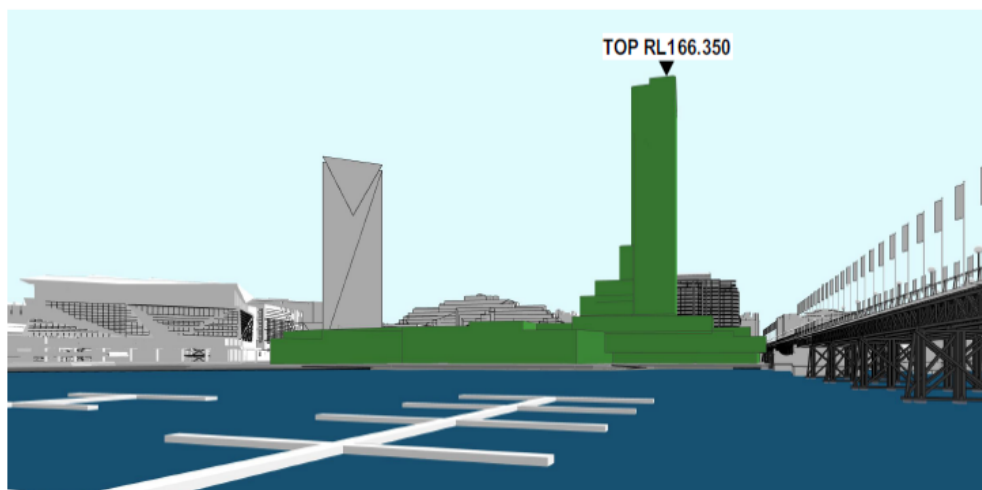


Figure 3: Original submitted Concept Plan

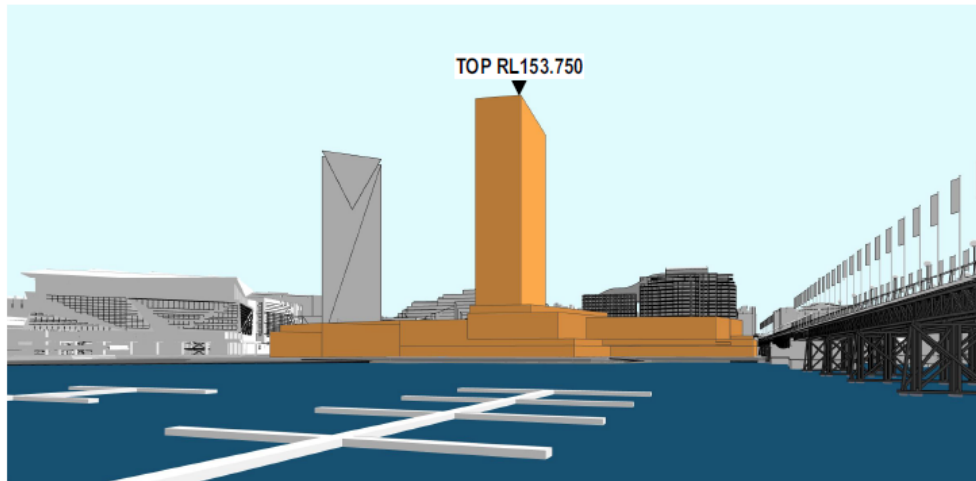


Figure 4: Amended Concept Plan

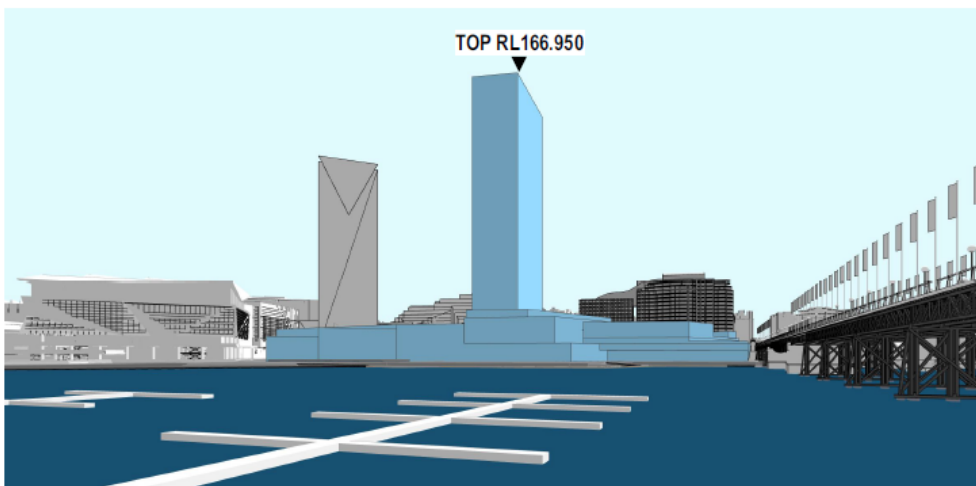


Figure 5: Further and Final Amended Concept Plan

1.4 PLANNING APPROVAL STRATEGY

The Site is located within the Darling Harbour precinct, which is identified as a State Significant Site in Schedule 2 of State Environmental Planning Policy (State and Regional Development) 2011. As the proposed development will have a capital investment exceeding \$10 million, it is declared to be State Significant Development (SSD) for the purposes of the Environmental Planning and Assessment Act 1979 (EP&A Act), with the Minister for Planning the consent authority for the project.

This State Significant Development Application (DA) is a staged development application made under section 83B of the EP&A Act. It seeks approval for the concept proposal for the entire site and its surrounds.

More specifically this staged DA includes establishing land uses, gross floor area, building envelopes, public domain concept, pedestrian and vehicle access and circulation arrangements and associated car parking provision.

Detailed development application/s (Stage 2 DAs) will accordingly follow seeking approval for the detailed design and construction of all or specific aspects of the proposal in accordance with the approved staged development application.

The Department of Planning and Environment provided the Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement for the proposed development on 30 August 2016. This report has been prepared having regard to the SEARs as relevant.

2.0 PURPOSE OF THE REPORT

This report has been prepared to accompany the Stage 1 DA for Harbourside. It addresses the relevant requirements of the Draft SEARs for the project, issued on the 9 December 2015. A summary of the relevant SEARs is listed below.

2.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

SEARs Reference	Key Assessment	Relevant Section in This Report	Comments
7. Drainage, Flooding, Climate Change and Sea Level Rise	Identify potential flood risk from groundwater, wastewater, stormwater, and sea level rise on site.	Section 3	This report relates to Harbourside as shown in Figure 2 and provides a drainage concept for the site which addresses the flooding and sea-level rise risks on the site. However, this report does not address potential groundwater risks or impacts (as these are of a geotechnical nature), nor wastewater risks or impacts (as these relate to waste disposal).
7. Drainage, Flooding, Climate Change and Sea Level Rise	Include proposals to mitigate any potential impacts such as water sensitive urban design within the public domain and landscaping.	Section 4	This report provides initial WSUD analysis and discussion of initiatives proposed to be adopted to achieve pollutant reduction targets.
Plans and Documents	<p>The EIS must include the following:</p> <ul style="list-style-type: none"> flood assessment stormwater concept plan sediment and erosion control plan 	<p>Section 3</p> <p>Drawings</p>	

Table 1: Secretary's Environmental Assessment Requirements

1.1 Response to Submissions

This report provides a Response to Submissions to submissions received on the Stage 1 DA that was exhibited in April 2020. **Table 2** below provides a summary of the relevant agency submissions received, and corresponding references to how they have been responded to within the Report. **Appendix A** of this report contains a copy of the received agency submissions relevant to this Report.

Table 2 Agency Response to Submissions

Agency Response to Submission Reference	Agency Response to Submission	Relevant Section in This Report	Comment
Stormwater (Sydney Water)	<p>Within the current site footprint there is an existing Sydney Water 2700×1725 RC stormwater channel. As the redevelopment is understood to utilise this same footprint, requirements for Sydney Water's stormwater assets will apply to this site. The proponent should ensure that satisfactory steps/measures are taken to protect existing stormwater assets, such as avoiding building over and/or adjacent to stormwater assets and building bridges over stormwater assets. Particular considerations regarding protection during demolition and construction will be also be required.</p> <p>The proponent is required to liaise with Sydney Water regarding measures which must be taken prior to commencement of any works and the required protection measures which are to be implemented as a part of this development.</p>	Section 3.3.2 & Appendix B	<p>Noted. The proponent has already met with Sydney Water to discuss the build over of this stormwater channel.</p> <p>At his meeting, Sydney Water explained that at that moment Sydney Water would permit the future build over on condition that Sydney Water polices are adhered to and no direct loads were placed on the culvert, and any damage during construction be rectified.</p> <p>Further consultation will be undertaken during future design stages of the development. Any future design will be undertaken in accordance with Sydney Water build over policy.</p>
Recycled Water (Sydney Water)	<p>While there is no existing Sydney Water recycled water supply to this area, Sydney Water is open to working in partnership with developers to consider potential decentralised recycled water servicing solutions that may offset potable water demands for irrigation, toilet flushing and domestic</p>	Section 4.2 & Appendix B	<p>Indicative sizing of rainwater tanks has been considered as part of the Water Sensitive Urban Design (WSUD) strategy. This will</p>

Agency Response to Submission Reference	Agency Response to Submission	Relevant Section in This Report	Comment
	<p>washing machines, as well as air cooling towers. Consideration can also be given for rainwater capture and stormwater runoff reduction.</p> <p>Please contact your Sydney Water Account Manager to investigate the potential for a commercial arrangement to supply recycled water to your development.</p>		<p>be further investigated during future design stages of the development.</p> <p>A meeting was held between the Proponent and Sydney Water on the 16th of April 2020 to discuss the development and water recycling opportunities at high level.</p>

3.0 FLOODING & STORMWATER DRAINAGE

3.1 SITE FLOODING

The Harbourside Shopping Centre site is located downstream of significant urban catchment areas as identified in **Figure 6**, making the site vulnerable to overland flows during major rainfall storm events. Furthermore, the underground stormwater conduits conveying catchment runoff and discharging into Cockle Bay are influenced by tidal sea levels, which can reduce the discharge capacity of the stormwater conduits, resulting in increased flows and flooding above ground.

These influences have been taken into account in the City of Sydney (CoS) Darling Harbour Catchment Flood Study (BMT WBM, 2014) with the resulting Harbourside site flood levels presented as follows in Section 3.2 of this Report.

The Darling Harbour Catchment Flood Study (2014) was carried out to define existing flood behaviour for the Darling Harbour catchment in terms of flood levels, depth, velocities, flows, hydraulic categories and provisional hazard. A 1D/2D TUFLOW hydraulic model was established and verified by a calibration/verification process. Following this, the model was used to define flood liability for the range of design flood events.

The associated final report for the Darling Harbour Catchment Flood Study was issued in September 2016.



Figure 6: Darling Harbour Catchment Study Area

3.2 SITE FLOOD LEVELS

Figure 7 presents a part plan of the CoS 2014 100 year ARI flood figure (i.e. 1%AEP, refer to **Appendix H** for information on terminology).

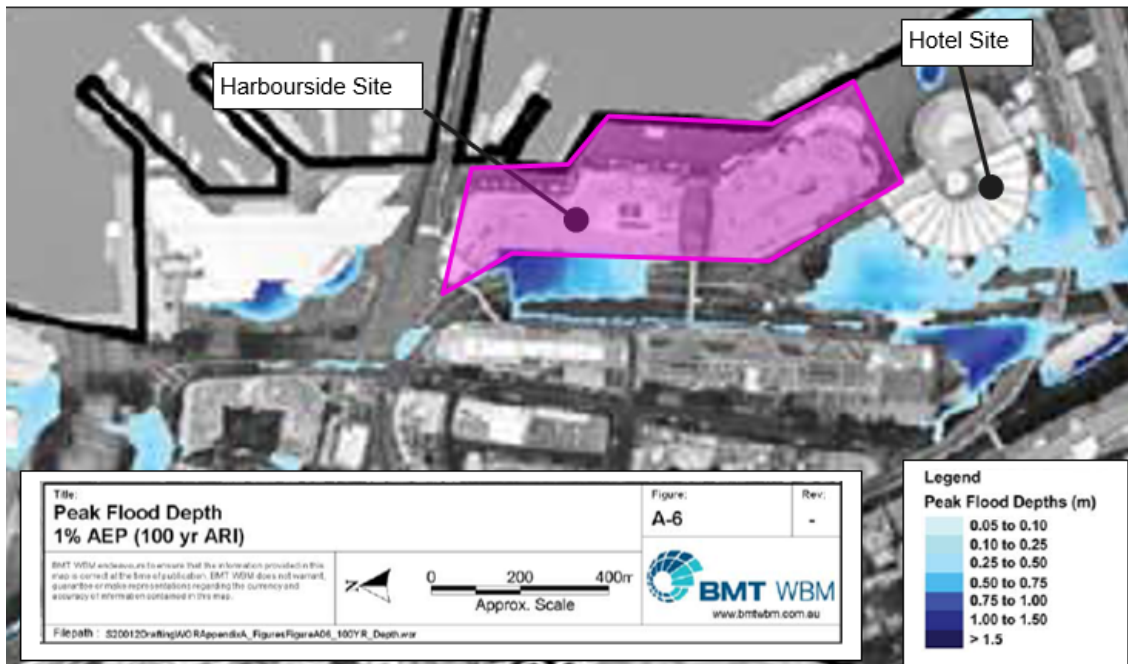


Figure 7: 1% AEP Peak Flood Depths Part Plan ('Darling Harbour Catchment Flood Study – Final Report' by BMT WBM, 23 October 2014)

In addition, CoS (through WMAWater Consultants) have provided a flood certificate for the Harbourside site (which is included in **Appendix C**). **Tables 3 & 4** summaries the flood certificate site flood depths and levels under existing development conditions (at the time of the flood study), and **Figure 8** presents 100-year flood extent information.

Table 3: Harbourside Site Flood Levels (Northern end of Harbourside, Location 'A')

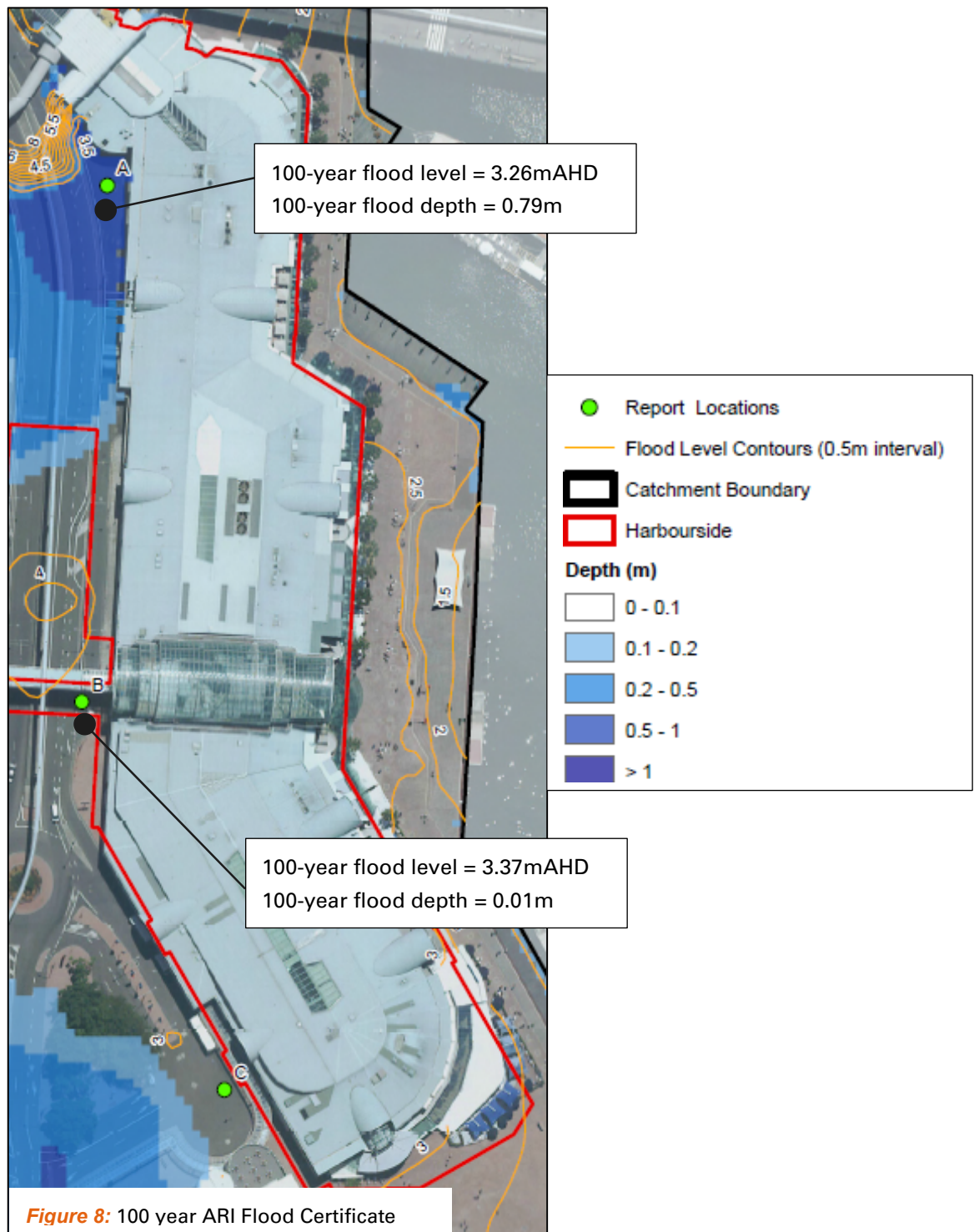
Average Recurrence Interval (year)	Water Depth* (m)	Water Level* (mAHD)
2	0.51	2.98
100	0.79	3.26
PMF	1.3	4.30

* see **Appendix A** for full flood certificate figure. See **Appendix F** for flood frequency terminology.

Table 4: Harbourside Site Flood Levels (Northern end of Harbourside, Location 'B')

Average Recurrence Interval (year)	Water Depth* (m)	Water Level* (mAHD)
2	0.0	3.36
100	0.01	3.37
PMF	0.94	4.30

* see **Appendix A** for full flood certificate figure. See **Appendix F** for flood frequency terminology.



While the CoS 2014 flood study and the associated flood levels at the Harbourside site may be considered adequate for determining flood planning levels for site re-development, it should be noted that:

- as a 'regional' flood study, the assessed flood regimes at the local Harbourside site may not have adequately considered/incorporated local catchment details that may influence the site flooding; and
- the CoS 2014 flood study has been based on the existing site development, and the associated site flood regimes could be altered by re-development.

3.3 PROPOSED FLOODING & STORMWATER MANAGEMENT

3.3.1 Modifications to Existing Stormwater System

The accompanying concept design plans outline the proposed stormwater management for the Harbourside complex. The proposed flooding and stormwater management for this development is expected to include:

- Modifications to the existing trunk drainage and local stormwater systems;
- Building over the existing Sydney Water culvert that conveys flows through the Harbourside site and discharges into Cockle Bay (this culvert passes below the existing Harbourside development, prior to discharging to Cockle Bay);
- Demolition of existing stormwater infrastructure and inclusion of new drainage systems to accommodate the proposed Harbourside development, particularly in the southern area of the development where new external laneways are proposed;
- Retention of existing neighbouring property stormwater connections, during construction and completion of the Harbourside complex;
- Re-use of existing drainage systems and connections where possible; and
- Sediment and Erosion Control measures during construction.

It should be noted that the accompanying drainage concept plan indicates the potential re-use of an existing pit and conduit stormwater system running along the western side of Harbourside (of which the existence, configuration, capacity and integrity, is yet to be confirmed on-site). Furthermore, the re-use of this system will most likely require no adverse impact on its hydraulic capacity.

3.3.2 Works that Impact on Sydney Water Conduits

Although not directly related to the assessment of stormwater drainage and flooding, we provide the following commentary to describe potential impacts of the proposed development on the existing Sydney Water stormwater system(s).

The Harbourside development includes the demolition and the existing building, pavements, kerbs, and landscaping currently located over the Sydney Water culvert. Where the proposed Harbourside building crosses over the existing stormwater culvert (see **Figure 9**), the building structure is to be designed to ensure that building loads are not supported by the culvert and the culvert is not affected in terms of structural integrity and function. In addition, the construction methodology is to be developed to ensure excessive temporary construction loadings are not imposed on the existing culvert. Consultation with relevant authorities to secure approval for these works has commenced and is on-going.

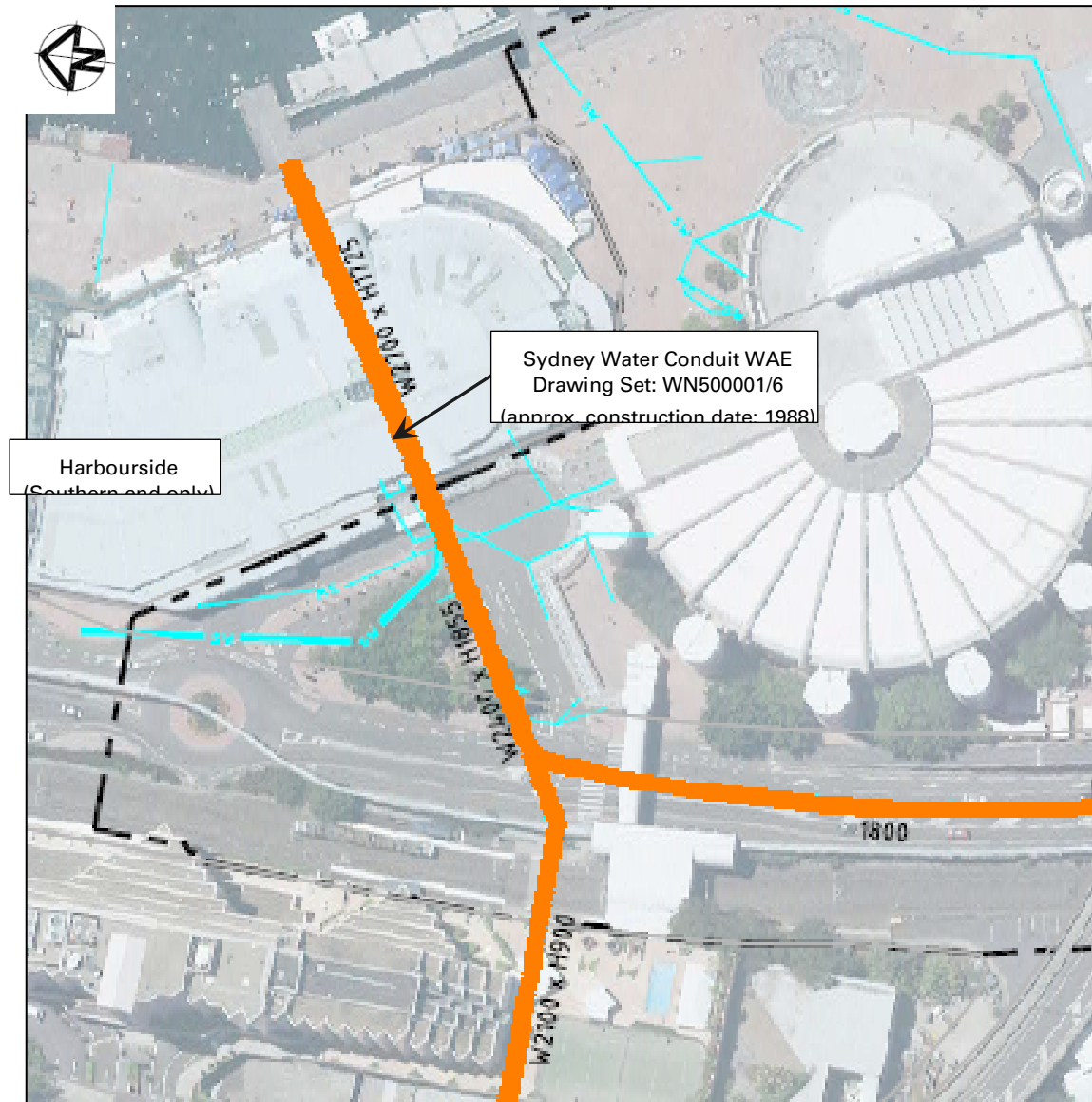


Figure 9 – Sydney Water Closed Conduit Information

3.3.3 Modelling and Analysis

Arcadis has obtained and reviewed the ‘Darling Harbour Catchment Flood Study – Final Report’ (23 October 2014) prepared by BMT WBM Pty Ltd for City of Sydney (CoS) and associated direct rainfall TUFLOW model developed by BMT WBM Pty Ltd for the CoS 2014 flood study.

It is noted that the model represents the catchment stormwater pits and conduits as 1D elements which are dynamically linked to the 2D domain at specified pit locations for inflow and surcharging. The 2D domain is a 2m x 2m gridded Digital Terrain Model derived from Aerial Laser Survey provided by Council.

The modelled pit and conduit set is outlined in **Figure 10**, with **Figure 11** showing the systems and catchment features more locally around the Harbourside site.

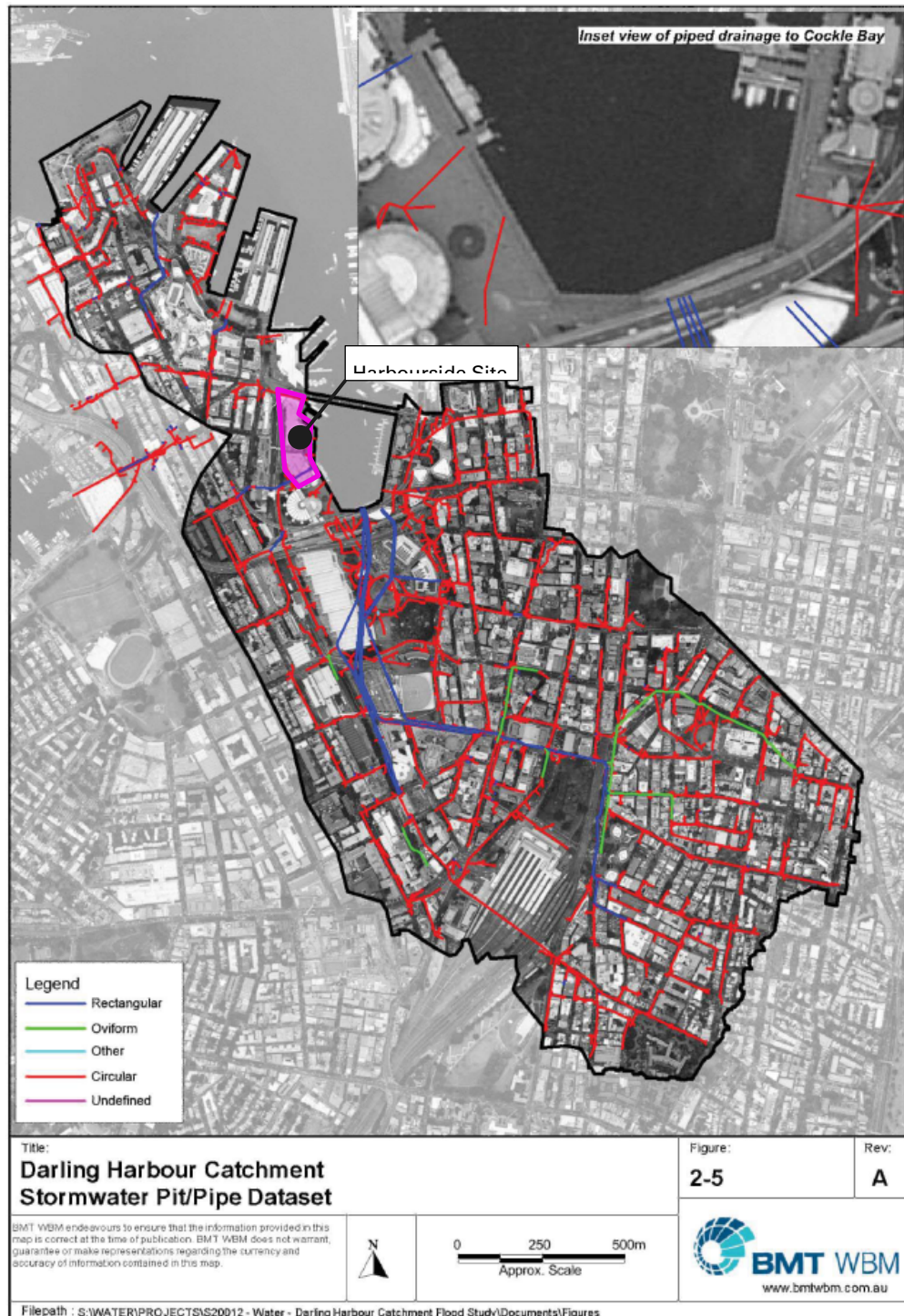


Figure 10: Darling Harbour Stormwater Pit/Pipe Data Set (CoS 2014 Flood Study)

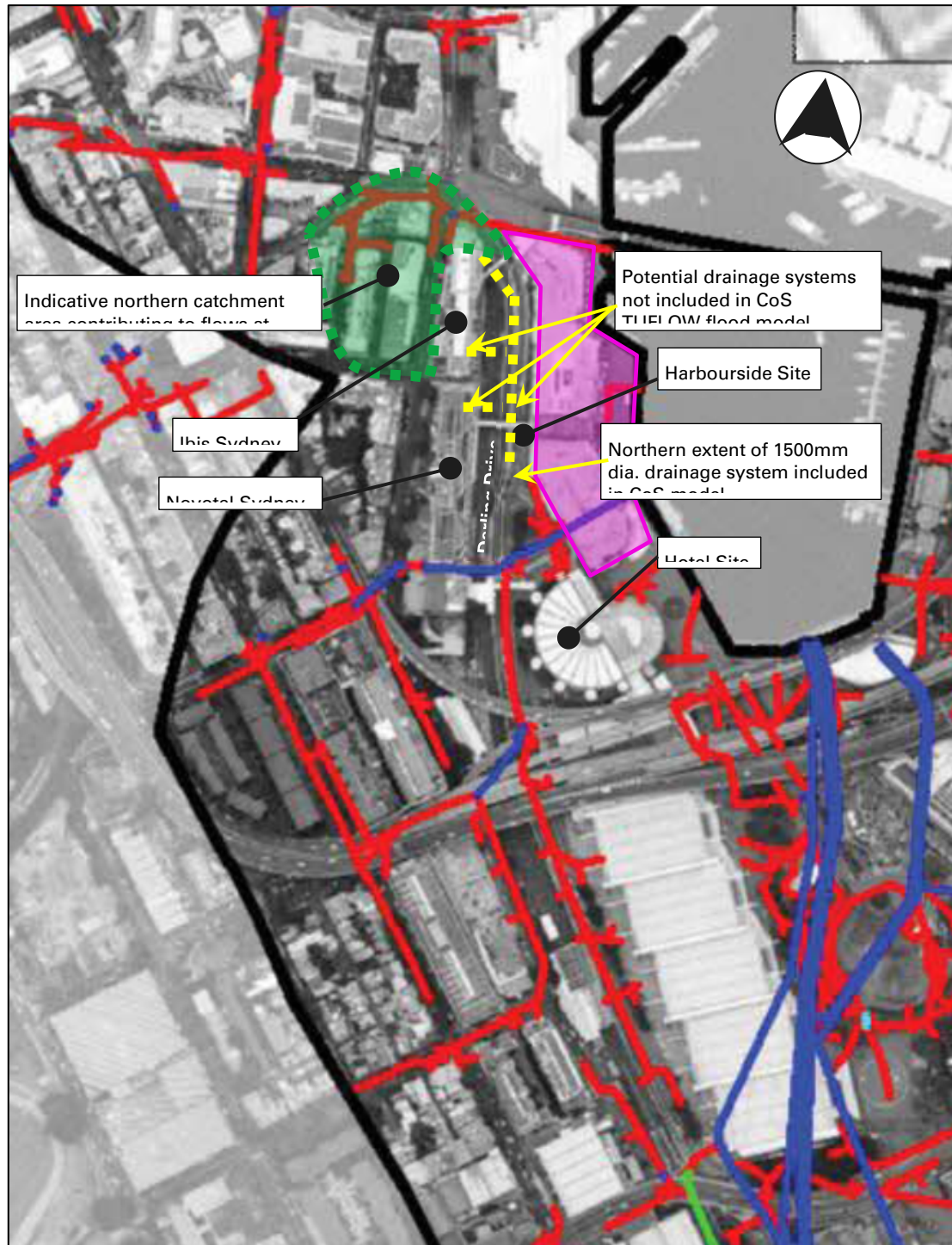


Figure 11: Stormwater Pit/Pipe Data Set at Harbourside Area (CoS 2014 Flood Study)

DRAINAGE SYSTEMS

'As Built' stormwater system drawings (included in **Appendix E**) indicate that there is a 290m long 825mm / 1050mm / 1200mm / 1350mm diameter system under the Harbourside access road which would capture and convey flows from the Location 'A' street sag (and associated neighbouring areas) to Cockle Bay via a 1500mm diameter conduit and Sydney Water box culvert system. It is noted on the 'As Built' drawings that this access road drainage system was not part of the construction contract at that time.

Site inspections by Arcadis indicated that associated grated stormwater inlet pits are located along the access road (see **Appendix D** Photos 6 to 10). However, as indicated in **Figure 11**, no such conduit system has been included in the CoS flood model.

Similarly, catchment inspection also indicates connecting drainage systems extending westward under Darling Drive to the Novotel building (see **Appendix D** Photos 4, 5, 16 and 17) and Ibis building that have not been included in the CoS flood model.

BUILDING HYDRAULICS

Direct connection of building stormwater hydraulics systems is not accounted for in the CoS TUFLOW flood model. Instead building rainfall-runoff is discharged adjacent to building at ground surface levels, then relying on street inlet systems to capture flows (see 'Pit Blockages' comments below).

The 'As Built' stormwater system drawings (**Appendix E**) indicate that external catchment area inflows are accommodated for from the Harbourside site, Ibis Sydney and Novotel Sydney areas. Site inspection indicated extensive building downpipe systems for the Ibis and Novotel buildings (see **Appendix D** photos).

It is likely that stormwater drainage systems from these buildings would be directly connected to adjacent underground stormwater systems.

PIT BLOCKAGES

The CoS flood study modelling is based on CoS stormwater pit blockage assumptions which includes 100% blockage of sag pits for events rarer than the 5 year ARI, a decision which is referred to as 'extreme' and which may increase 100 year flood levels by up to '0.7m' (CoS 2014 flood study page 89).

Due to such blocking of street inlet pits identified in the CoS flood study model, and the ignoring of building hydraulic systems that directly connect to underground street drainage systems, while increasing flood levels at the local street sags (as indicated in **Figure 12**), also has the potential to reduce downstream flows and under-estimate downstream flood levels/depths.

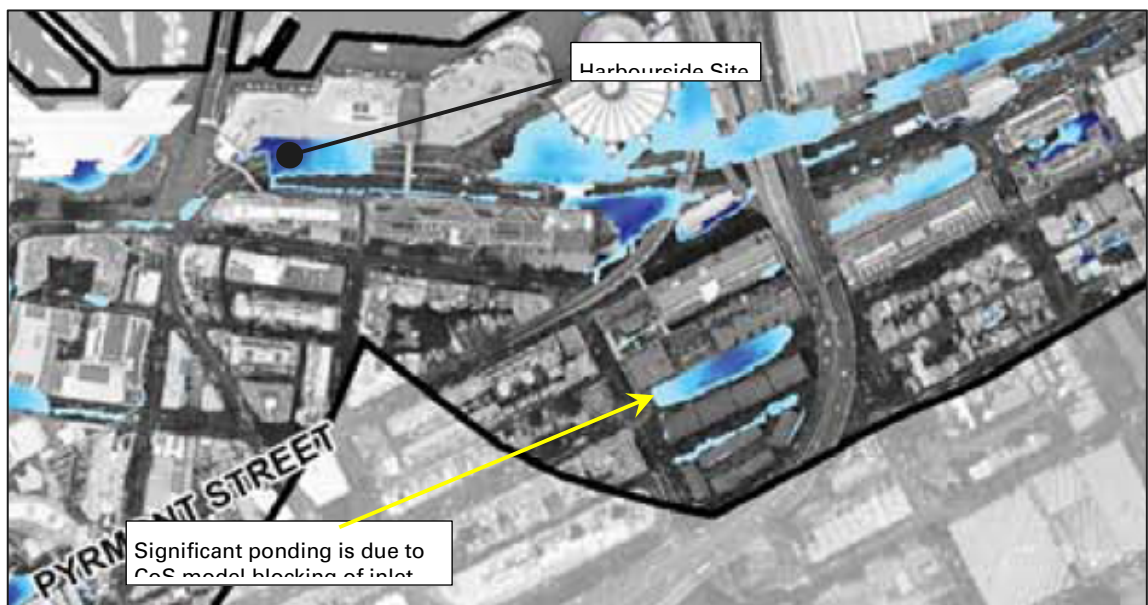


Figure 12: Darling Harbour Part Figure A-6, 100 year Peak Flood Depth (CoS 2014 Flood Study)

CLIMATE CHANGE

The CoS flood study assesses rainfall increases (of 10%, 20% and 30%) and sea level rise of 0.4m (for 2050 horizon) and 0.9m (for 2100 horizon) in accordance with the NSW Sea Level Rise Policy Statement (DECCW, 2009). While not stated in the CoS flood study, a 10% rainfall increase would seem appropriate to Arcadis for the Harbourside site (being consistent with NSW Department of

Environment and Climate Change (DECC) 'Flood Risk Management Guideline – Practical Consideration of Climate Change' (October 2007) Table 1 for Sydney Metropolitan Catchments).

COMMENTS

Existing condition flood levels surrounding the Harbourside site have been assessed by City of Sydney (CoS), 'Darling Harbour Catchment Flood Study – Final Report' (BMT WBM Pty Ltd, 23 October 2014). While the flood study states that:

'The principal outcome of the flood study is an understanding of flood behaviour in the catchment and in particular the design flood level information that will be used to set appropriate flood planning levels.'

It is apparent from our review of the 2014 flood study report and associated TUFLOW model that there are a number of refinements that could, and should (in the opinion of Arcadis), be made to the CoS model so as to adequately represent flood levels and flow regimes in and around the Harbourside site. In particular:

- the Harbourside access road drainage system and associated direct building drainage systems (to be confirmed by survey) should be included,
- local ground level survey be incorporated into the TUFLOW modelling (replacing the CoS model's aerial survey),
- upstream stormwater pit blockages reduced/removed, and
- design ocean boundary and climate change assumptions further investigated.

Such TUFLOW model adjustments to represent existing development conditions would likely result in reduced Harbourside site flood levels, however such adjustments are also considered necessary to:

- inform on flood risk with respect to the re-development itself;
- facilitate the assessment of potential flood impacts and flood mitigation measures;
- adequately demonstrate that existing neighbouring catchment areas would not be adversely impacted by the proposed development.

3.3.4 Construction Sediment & Erosion Controls

An erosion and sediment control plan (refer to accompanying Drawings) has been prepared to assist the implementation of erosion and sedimentation control measures in accordance with 'Managing Urban Stormwater: Soils and Construction' Landcom 2004 publication. These measures include:

- Hay Bales;
- Silt Fences;
- Inlet filters;
- Diversion channels;
- Sediment basin; and
- Stabilised site access and truck wash-down area.

3.3.5 Local Stormwater Management

WATER QUANTITY

In addition to the modifications outlined in **Section 3.3.1**, the accompanying drainage concept plan proposes stormwater management that:

- includes building hydraulic and ground surface connections which discharge into the Sydney Water conduits. While these local drainage systems will be sized to convey up to

20 year ARI flows, their performance may be limited by the Sydney Water system capacities.

- excludes on-site detention for the Harbourside Complex.

The above-noted stormwater management is subject to hydrological and hydraulic analysis of existing and proposed stormwater systems to determine capacities, overland flow regimes and works that may be necessary to mitigate potential adverse flood impacts, as a result of the Harbourside re-development. Such stormwater options may include the introduction of relief overland flow path(s) and system amplification(s).

Also, should a new stormwater system be necessary on the eastern side of Harbourside, the discharge into Cockle will require approval.

WATER QUALITY

Water sensitive design elements are discussed in Section 4 of this Report, but water quality measures that are likely to be considered for the re-development include:

- roof level raingardens;
- rainwater reuse; and
- stormwater quality improvement devices.

3.4 FLOOD PLANNING LEVELS

The City of Sydney (CoS) flood mapping and associated site flood levels (provided in the **Appendix C**) has been provided to allow Architects and the developer to determine initial floor levels. Floor levels are prescribed through the flood planning level requirements of the local authority through their flood risk management plan, which is developed with the input of stakeholders in order to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods.

The CoS 'Interim Floodplain Management Policy' (adopted 12 May 2014) included in **Appendix F** is the current floodplain management policy applicable to the Harbourside site. Key re-development requirements include:

Performance Criteria (section 3.1, p8)

That adequate consideration be given to the impact of climate change, including for a minimum 10% rainfall increase, and 0.9m sea level rise (by 2100 from the 2009 mean sea level) in accordance with the NSW Government Coastal Planning Guideline: Adopting Sea Level Rise 2010'. (p12)

General Requirements (section 4, p10-12)

Filling of flood prone land must be supported by a flood assessment report from a suitably qualified engineer which certifies that the filling will not increase flood affectation elsewhere.

Flood Planning Levels (section 5, p13-16)

The minimum level at each access point for:

- Business and Retail is to be based on a merits approach presented by the applicant with a minimum of the 1% AEP flood level;
- Residential floors within tourist establishments are to be 1% AEP flood level + 0.5 m
- All below-ground car parks are to be 1% AEP flood level + 0.5 m or the PMF (whichever is the higher). The below ground garage/car park level applies to all possible ingress points to the car park such as vehicle entrances and exits, ventilation ducts, windows, light wells, lift shaft openings, risers and stairwells.

In addition, adequate flooding and stormwater analysis will be required to demonstrate that:

- New development will not experience undue flood risk; and
- Existing development will not be adversely flood affected through increased damage or hazard as a result of any new development (p1).

3.5 RE-DEVELOPMENT IMPLICATIONS

Based on CoS flood study levels for the Harbourside site, and the Harbourside re-development concept plans dated the 15th October 2019, prepared by FJMT Architects (included in **Appendix G**) it is noted that:

- In general, since the re-development includes retail at ground level, the CoS minimum floor level of no lower than the 100 year (1% AEP) flood level applies.
- The maximum 1% AEP flood level adjacent to the buildings is 3.37mAHD (at location B, see **Figure 6** and **Appendix A**). Minimum floor levels should be higher than the adjacent 1% AEP flood level, to be compliant with CoS requirements.
- The Harbourside access road/'Shared Exit Route'/'Car Park Entry', Back of House and loading dock area would appear to have excessive inundation. Typically, expected minor system capacity would be 20 year, with inundation limited to 0.2m in a 100 year event. CoS flood levels (Location A) indicates that for current conditions, inundation would be up to approximately 0.8m in a 100 year event.
- The above noted inundation is for existing conditions and further investigations are recommended in the Stage 2 DA, to assess if flood conditions can be improved.
- The proposed Back of House and cold storage room areas will require flood mitigation measures up to the 100 year flood event, for any area located within the 100 year floodplain and below the 100 year (1% AEP) flood level, following determination of the 100 year floodplain in future detailed flood modelling.
- The proposed basement car park requires protection from probable maximum flood (PMF) inundation. CoS flood levels (Location A) indicates that for current conditions, inundation would be up to approximately 1.3m in a PMF event (based on PMF flood level of 4.3mAHD and current ground level of 3.0mAHD near the proposed access, noting **Figure 13** flood extents). The current Architectural concept design has considered protection measures for the basement car park up to PMF flood level, by providing a ramp crest RL no lower than the PMF flood level, to prevent the car park from overland flow flooding up to this flood event. This will be reviewed in the future following more detailed flood modelling and investigations.
- The proposed potential location for the truck lifts to exit the basement loading dock, requires protection from probable maximum flood (PMF) inundation. CoS flood levels (Location B) indicates that for current conditions, inundation would be up to approximately 0.85m in a PMF event (based on PMF flood level of 4.3mAHD and current ground level of 3.45mAHD near the proposed potential access, noting **Figure 13** flood extents). The current Architectural concept design provides space for an external ramp to be provided that would link the truck lift shaft exit with the external ground levels, to provide protection up to the PMF flood event from overland flow flooding. This will be reviewed in the future following more detailed flood modelling and investigations.
- All basement ventilations and car park exhaust systems will need to provide openings to the external surroundings at levels higher than the PMF flood level. This will be reviewed in the future following more detailed flood modelling and investigations.
- Any proposed electrical infrastructure such as proposed substations will be set no lower than the 100 year (1% AEP) flood level.
- Any entrances/lobbies that lead directly to the residential development above the retail area should be set no lower than the 100 year (1%AEP) flood level allowing for a freeboard of 0.5m.



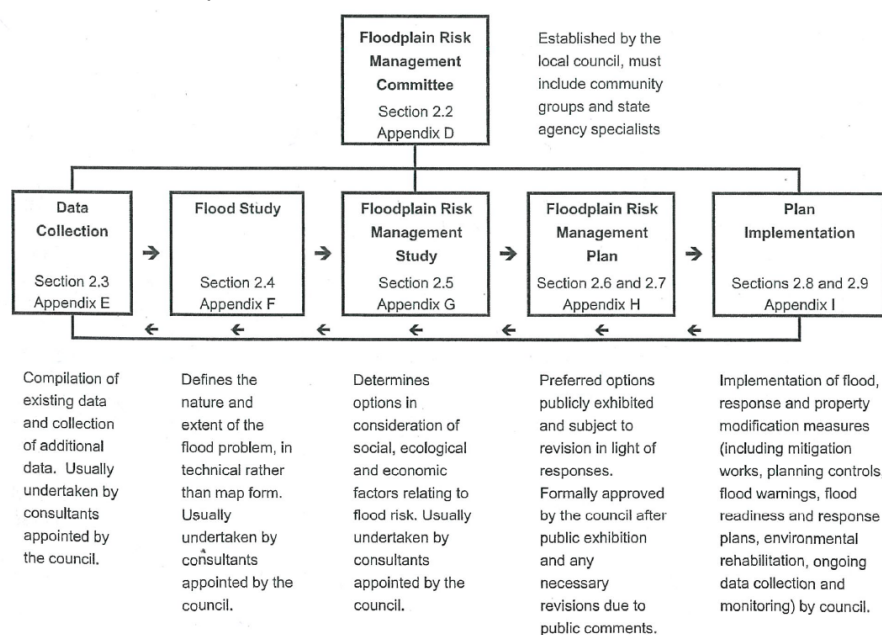
Figure 13: Darling Harbour Part Figure A-8, Probable Maximum Flood (PMF) Peak Flood Depth (CoS 2014 Flood Study)

If final flood levels and flow regimes change as a result of future flood model refinements and site reconfiguration, then the proposed building floor level, access road/'Shared Exit Route'/'Car Park Entry' are to be reassessed against the revised flood modelling.

3.6 FLOODPLAIN RISK MANAGEMENT PLAN

It is noted that WMA Water has recently issued additional flood risk management study and floodplain risk management plan reports in May 2016 on behalf of the City of Sydney.

The 2014 City of Sydney flood study along with the floodplain risk management study is an input into the process of determining the floodplain risk management plan. See flowchart figure below which outlines this process.



The results of the 2014 City of Sydney flood study have not changed. As such, these additional 2016 floodplain risk management reports do not change the findings of this SSDA1 stormwater and flood report.

4 WATER QUALITY AND WATER SENSITIVE URBAN DESIGN (WSUD)

4.1 WATER SENSITIVE URBAN DESIGN

Water Sensitive Urban Design aims to minimise the hydrological impacts of urban development and maximise the multiple use benefits of a stormwater system.

Australian Runoff Quality (Engineer's Australia, 2006) identifies the objectives of WSUD to include:

- Reducing potable water demand through water efficient appliances, rainwater and grey water reuse.
- Minimising wastewater generation and treatment of wastewater to a standard suitable for effluent reuse opportunities and/or release to receiving waters.
- Treating urban stormwater to meet water quality objectives for reuse and/or discharge to surface waters.
- Preserving the natural hydrological regime of catchments.
- Australian Runoff Quality also identifies WSUD as the adoption of the following planning and design approaches that integrate the following opportunities into the built form of cities and towns:
 - Detention, rather than rapid conveyance of stormwater.
 - Capture and use of stormwater as an alternative source of water to conserve potable water.
 - Use of vegetation for filtering purposes.
 - Protection of water-related environmental, recreational and cultural values.
 - Localised water harvesting for various use.

The stormwater management strategy proposed for the site focuses on minimising the impacts of the development on the total water cycle, and maximising the environmental, social and economic benefits achievable by utilising responsible and sustainable stormwater management practices. The proposed water strategy will be designed during the detailed design stage. However, key features of the proposed water quality strategy are likely to include the following measures:

- Rainwater tank(s).
- Green roofs.
- Proprietary devices such as Gross Pollutant Traps (GPTs)

4.2 RAINWATER TANKS

Rain falling on roof areas of the building (other than green roofs) will be collected and stored in a rainwater tank(s). The proposed hydraulics of the building and the ground levels within the site will be configured to allow this rainwater to be available for non-potable uses including toilet flushing and irrigation of landscaped areas. These numbers will be confirmed with the building hydraulic engineers at a future stage of the project.

In addition to water savings, rainwater tanks help reduce runoff volumes from the Harbourside development during small storms and associated stormwater pollutants that would discharge into Darling Harbour.

The tributary roof area and properties of the rainwater tank are summarised in **Table 5**.

Table 5: Tank Properties and Tributary Roof Area

Tank	Tributary Roof Area (ha)	Tank Properties			
		Cross-Sectional Area (m ²)	Tank Height (m)	Tank Volume* (m ³)	Roof area per m ³ of Storage
Retail / Commercial	0.15	75	2,25	150	10
Residential	0.1	25	2.25	50	20

* - effective volume

For the purpose of the above assessment, it is assumed that all roof areas (excluding green roofs) drain to the rainwater tank(s). This will be reviewed during future detailed design stages.

4.3 RAINWATER TANK MODELLING

The rainwater tank analysis for this study was undertaken using the industry standard software model MUSIC (Model for Urban Stormwater Improvement Conceptualisation) Version 6.1 (Build 16). This water quality modelling software was first released in July 2002, and was developed by the Cooperative Research Centre (CRC) for Catchment Hydrology (CRC for Catchment Hydrology, 2005), which is based at Monash University in Melbourne, Australia.

4.3.1 Rainfall Data

The nearest rainfall station to the site with a reasonable period of 6 minute rainfall data is Sydney Observatory Hill (Station 066062) which is about 1.8 km north of the site. In MUSIC, rainfall data is available for this station from 1913 to 2010. However, for the rainwater tank MUSIC modelling purposes, only rainfall data for the 1957-1966 period was used. The mean annual rainfall during this 10 year period is 1288 mm which is similar to the long term mean annual rainfall of 1215 mm which was calculated from the 1859 to 2012 rainfall data sourced from the Bureau of Meteorology (BOM) website. During this decade, there occurred 1 La Niña (wet) year, 3 El Niño (dry) years and 6 Neutral years. Based on these observations, this decade can be considered as average in terms of rainfall.

4.3.2 Evapotranspiration Data

Monthly average potential evapotranspiration (PET) data was used in the rainwater tank model. These PET values for Sydney are shown in **Table 6**.

Table 6: Monthly potential evapotranspiration (PET) values for Sydney

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET (mm)	180	135	128	85	58	43	43	58	88	127	152	163

4.3.3 Non-Potable Water Demands

Except for the first flush flows, rainwater harvested from the roofs of the Harbourside development will be directed to tank(s) located within or adjoining the building. From these tank(s), water is conveyed either by gravity or pressure to service the following uses within the development:

- Toilet flushing and urinals.

- Irrigation.
- Sinks will be connected to mains water only.

The use of rainwater for flushing is assumed to take precedence over irrigation. Watering of landscaped areas using rainwater will only occur when there is adequate volume available in the tanks, and for the purpose of sizing the rainwater tank(s), only toilet flushing demands are assessed.

4.3.4 Daily Water Demand Volume

Water re-use demand volumes will be determined during detailed design of the project in conjunction with the Architect, Building Hydraulics Engineer, Landscape Architect and ESD Consultant, which will help inform the number and size of rainwater tanks required.

Should the Harbourside development be provided with water efficient toilets and urinals as recommended in the ESD Statement prepared by Cundall Consulting, the following water usage rates are applied in estimating the volume of water for flushing purposes:

- Toilet flushing: 4/3.5 L per flush
- Urinal flushing: 0.8 L per flush

4.3.5 Population

The proposed rainwater tank model has assumed one person per 5m² of retail area and one person per 10m² of commercial office space. **Table 7** below outlines expected daily usage patterns for both the retail and commercial element of the propose development.

Table 7: Daily Usage Pattern of Toilets and Urinals

Building	Percentage of Use - Toilets and Urinals (%)						
	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Retail	80%	80%	100%	100%	100%	100%	100%
Commercial	100%	100%	100%	100%	100%	10%	10%

We note that the above assumptions are considered acceptable in practice and will be confirmed with the building hydraulic engineers in the detailed design stage.

To calculate the retail toilet flushing and urinal demand, it has been assumed there is one person per 5m² of retail. For a retail area allowing for two flushes per day gives a toilet flushing demand of 6.6 L/day/ep, after adjusting for daily fluctuations in population. In total the retail demand for toilet flushing and urinals assuming a retail area of 15,000m² is 19.8 kL/day.

To calculate the commercial toilet flushing and urinal demand, it has been assumed there is one person per 10m² of retail. For a commercial area allowing for two flushes per day gives a toilet flushing demand of 5.2 L/day/ep, after adjusting for daily fluctuations in population. In total the retail demand for toilet flushing and urinals assuming a commercial area of 23,000m² is 12.0 kL/day.

The residential toilet flushing demand has been calculated as per the draft NSW MUSIC Modelling Guidelines (August 2015). The total toilet flushing demand was calculated to be 18.5 kL/day, as summarised in **Table 8**.

Table 8: Residential Toilet Flushing Demand

Apartment Type (No. of Bedrooms)	Number of Apartments	Toilet Flushing Demand (kL/yr/dwelling)	Toilet Flushing Demand (kL/day)
1	94	0.027	2.5
2	202	0.054	10.9
3	55	0.081	4.5
4	6	0.108	0.6
Total	357	-	18.5

The above assumptions will be confirmed with the building hydraulic engineers in the detailed design stage.

4.3.6 Tank Configuration

The Harbourside rainwater tanks will be supplemented by mains water during dry periods or days of no rainfall. The tanks will be provided with a floating switch mechanism that activates mains water to top up when the critical level in the tank is reached. Activation of the mains water occurs when the volume of stored water in the tank reduces to 10% of the total tank volume.

A first-flush diverter will be installed for all tanks. The diverter ensures that the initial (often dirty) quantity of rain water collected from the roofs is diverted away from the tank. In this study, we have assumed the first 1 mm of rain to bypass the tank.

A screen will be provided at the inlet to prevent the ingress of debris and vermin into the tank. An overflow pipe will allow excess flows to discharge, and take with them accumulated sediments at the pump out take area.

A typical configuration of the building tanks is shown in **Figure 14**.

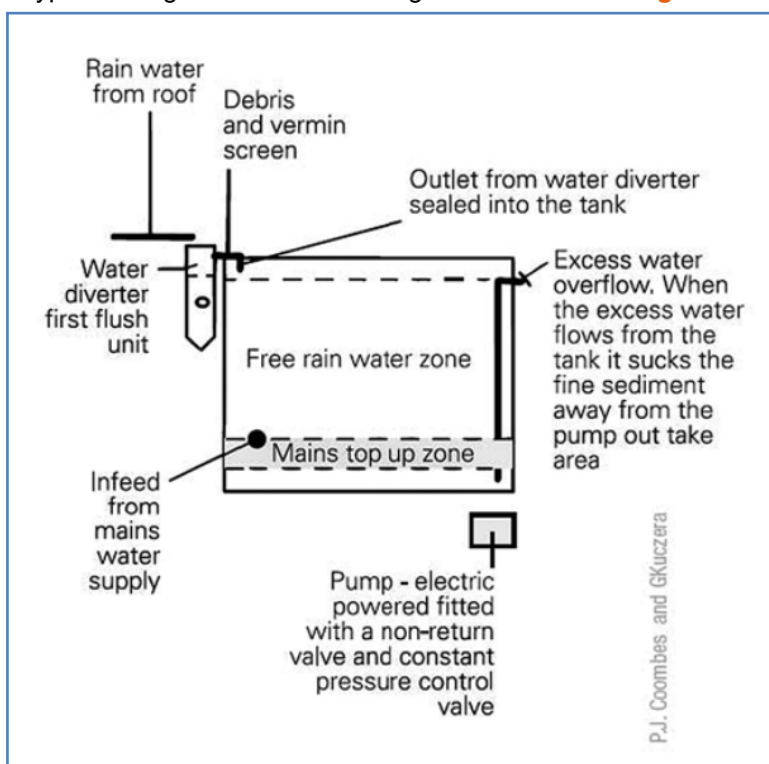


Figure 14: A typical configuration of a rainwater tank (Source: Coomes and Kuczera, 2001)

4.3.7 Tank Reliability

The reliability of a reuse tank is typically reported as the percentage of the total demand that is supplied from the tank. The results of the tank reliability analysis are summarised in **Table 9** and **Figure 15**.

Table 9: Reliability of the rainwater tanks

Scenario	Reliability (% total demand supplied from rainwater tanks)
Retail, Commercial and Residential	36
Retail & Commercial Only	50

The above rainwater tank reliability calculations are indicative only at this concept stage of the design process, and will be subject to further review during more detailed design stages, when a better understanding of the building hydraulics is available with regard to roof drainage catchments, demands and tank sizes and locations. The reliability of the rainwater reuse system is subject to the total roof area available for reuse. Given the high density of the development a larger tank volume will not greatly increase the tanks reliability as there is not enough runoff generated from the roof area to meet the demand. This is compounded when the toilet flushes of the residential tower are added in.

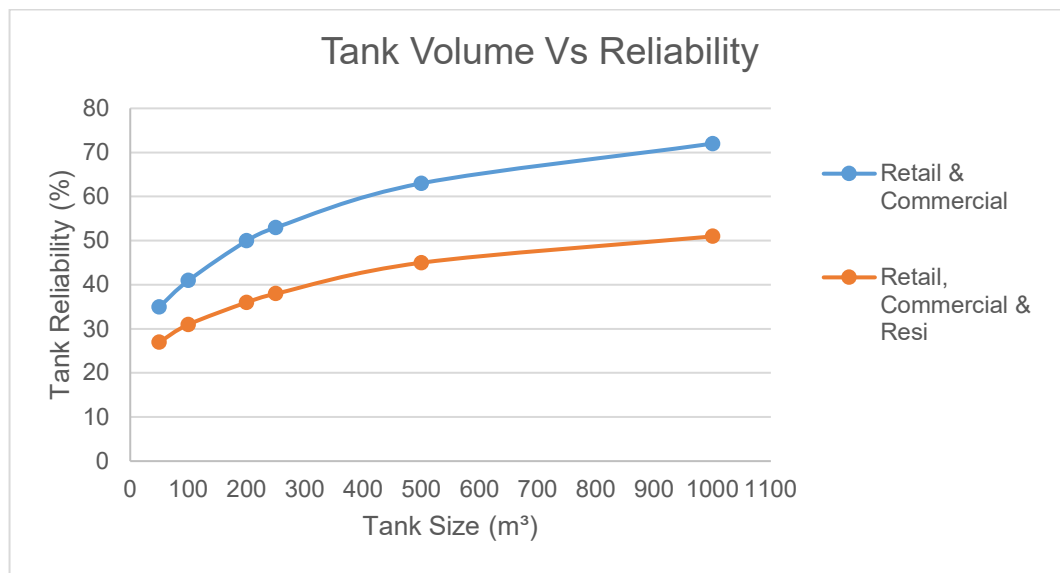


Figure 15: Rainwater tank reliability

A meeting was also held between the Proponent and Sydney Water on the 16th of April 2020 to discuss the development and water recycling opportunities at high level. Evidence of that meeting is outlined in **Appendix B** of this Report.

4.4 GREEN ROOFS

The proposed water quality strategy for the development may include green roof areas, which would likely be located within the retail element of the proposed development masterplan.

A green roof is typically a modular, pre-vegetated engineered bio-retention system that is easily installed onto the roofing membrane in a similar manner to readymade lawn products. These systems are prepared at local nurseries using localised plant stock for a few months prior to installation. This means that only strong, mature plants are installed onto the roof top.

4.5 PROPRIETARY DEVICES

4.5.1 Gross Pollution Traps (GPTs)

GPTs will be incorporated into the proposed stormwater design network and will be located on all systems directly upstream of all outlets into the Harbour, in accordance with best practice design principles.

CDS gross pollutant traps (GPT) are designed to capture and retain gross pollutants, litter, grit, sediments and associated oils. GPTs utilise continuous deflection separation (CDS) technology to isolate the pollutants from the incoming flows. The CDS units are sized and designed by taking into account the catchment's characteristics, pollution load, hydraulic site constraints and opportunities, system capacities, velocity, backwater, as well as the location of the services and access for cleaning. Cleaning of the CDS unit will be undertaken using a small vacuum truck. The cleaning frequency depends on the catchment type, size and expected pollutant loading.

4.5.2 Pit Inserts

Pit inserts, also known as litter baskets, are also a potential Stormwater Quality Improvement Devices (SQID) that may be proposed for this development and could be provided in stormwater pits within the development site, where they can be appropriately provided. A pit insert, which is considered as an at-source primary treatment solution, is an efficient and cost-effective pre-screening primary treatment system that captures and retains solid pollutants at drainage entry points. These pit inserts, consisting of a capture basket and a filter mesh liner, are usually fitted below the road invert or surface of the pit and are visually unobtrusive.

4.5.3 Filter Cartridge Systems

A filter cartridge system is a best management practice designed to remove a range of target pollutants including fine solids, soluble heavy metals, oils and total nutrients. Apart from meeting stringent regulatory requirements, these systems are usually installed below ground allowing savings in land space and increase development yield. These devices may also be considered as part of the proposed water quality treatment design for the proposed development.

APPENDIX A

Sydney Water Response to Submissions

Case Number: 182788

4 May 2020

WAYNE MOENTING
MIRVAC PROJECT PTY LTD
c/- ARCADIS AUSTRALIA PACIFIC PTY LTD

FEASIBILITY LETTER

Developer: MIRVAC PROJECT PTY LTD
Your reference: AA008883
Development: Lot 1 DP776815 2-10 DARLING DR, Sydney
Development Description: Redevelopment of existing harbourside shopping precinct into a 40 storey retail/residential/commercial mixed development.
Your application date: 2 March 2020

Note: Level 1 water restrictions are now in place, which limits how and when water can be used outdoors. This can impact you and your contractors in the activities they need to undertake for this proposal.

Using water to suppress dust is not restricted, but this does mean that you/your contractors will need to apply for an exemption permit to use water for most outdoor uses including:

- Cleaning equipment and the exterior of new buildings
- Drilling and boring, and
- Batching concrete on-site

Fines for deliberate breaches of restriction rules apply from 1 September 2019.

For more information on the restrictions and for applying for an exemption, visit our web site at <http://www.sydneywater.com.au/SW/water-the-environment/what-we-re-doing/water-restrictions/index.htm>

The more water everyone saves, the longer we can stave off the progression to stricter restrictions or emergency measures.

Please provide this information to your contractors and delivery partners to inform them of their obligations.

Dear Wayne Moenting,

This Feasibility Letter is a guide only. It provides general information about what Sydney Water's requirements could be if you applied to us for a Section 73 Certificate for your proposed

development. **The information is accurate at today's date only.**

If you obtain development consent for that development from your consent authority (this is usually your local Council) they will require you to apply to us for a Section 73 Certificate. You will need to submit a new application (and pay another application fee) to us for that Certificate by using your current or another Water Servicing Coordinator.

Sydney Water will then send you either a:

- Notice of Requirements (Notice) and Developer Works Deed (Deed); or
- Certificate.

These documents will be the definitive statement of Sydney Water's requirements.

There may be changes in Sydney Water's requirements between the issue dates of this Letter and the Notice or Certificate. The changes may be:

1. Developer Charges

- (a) Adjustment of charges due to the Consumer Price Index (CPI);
- (b) Adjustment of charges because of a scheduled review by the Independent Pricing and Review Tribunal (IPART). After that review and registration of the new charges, Sydney Water has to apply those charges; or
- (c) If there is rezoning of any land within the development proposal then new charges will apply.

2. Changing the Proposed Development

- If you change your proposed development, e.g. the development description or the plan/site layout, after today, the requirements in this Letter could change when you submit your new application; and
- if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

What You Must Do To Get A Section 73 Certificate in the Future

To get a Section 73 Certificate in the future you must do the following things. You can also find out about this process by visiting www.sydneywater.com.au > Plumbing, building & developing > Developing > Land Development.

1. **Obtain Development Consent from the consent authority for your development proposal.**
2. **Engage a Water Servicing Coordinator (Coordinator).**

You must engage your current or another authorised Coordinator to manage the design and construction of works that you must provide, at your cost, to service your development. If you wish to engage another Coordinator (at any point in this process) you must write and tell Sydney Water.

For a list of authorised Coordinators, either visit www.sydneywater.com.au > Plumbing, building & developing > Developing > Providers > Lists or call **13 20 92**.

The Coordinator will be your point of contact with Sydney Water. They can answer most questions that you might have about the process and developer charges and can give you a quote or information about costs for services/works (including Sydney Water costs).

3. **Developer Works Deed**

It would appear that your feasibility application is served from existing mains and does not require any works to be constructed at this time. Sydney Water will confirm this with you after you have received Development Approval from Council and your Coordinator has submitted a new Development application and Sydney Water has issued you with a formal Notice of Requirements.

4. **Drinking Water, Recycled Water , Sewer and Stormwater Works**

4.1 Drinking Water

Your development must have a frontage to a water main that is the right size and can be used for connection.

Sydney Water has assessed your application and found the proposed development will not have a significant additional impact on the existing drinking system.

- A service connection and property service must be provided for your development off the drinking water main in Darling Drive Sydney.

4.2 Recycled Water

While there is no existing Sydney Water recycled water supply to this area, Sydney Water is open to working in partnership with developers to consider potential decentralised recycled water servicing solutions that may offset potable water demands for irrigation, toilet flushing

and domestic washing machines, as well as air cooling towers. Consideration can also be given for rainwater capture and stormwater runoff reduction.

Please contact your Sydney Water Account Manager to investigate the potential for a commercial arrangement to supply recycled water to your development.

4.3 Sewer

Your development must have a sewer main that is the right size and can be used for connection. That sewer must also have a connection point within your development's boundaries.

Sydney Water has assessed your application and found that the proposed development will not have a significant additional impact on the existing wastewater system.

However, please note that there are no gravity connections to anything below 4m from the ground level. If the Reduced Level is below 4m of the connection point (e.g. in a basement) design alternatives should be considered e.g. reflux valve on the CSD or private pumping/storage.

4.4 Stormwater

Base on the information provided with this Application, it is understood that the proposed development will use the existing footprint. The existing structure is presently over an existing Sydney Water 2700 x 1725 RC Stormwater Channel and the proposed redevelopment is apparently also expected to be constructed over this stormwater channel.

Sydney Water has assessed your application and made the following findings;

The proposed development requires following stormwater work on Sydney Water's stormwater assets:

- Modification to existing pit to suit the new building
- Provision of one Gross Pollutant trap across Sydney Waters stormwater channel, between Harbourside Shopping Centre and Cockle Bay.
- Ensure the existing stormwater channel is protected and operational. Please refer to Sydney [Water's Guidelines for constructing buildings over or adjacent to stormwater assets](#).

Protection of Stormwater asset:

- Ensure the proposed redevelopment structure is independent of the stormwater channel. There must be no loading on the channel. A CCTV inspection /asset condition assessment of the asset will be required before and after construction to ensure it has not been damaged or disturbed for it to be fully operational.
- No building or permanent structure is to be constructed within 1m from the outside wall of the stormwater asset. This should be demonstrated in a detailed survey plan

showing all the existing services and proposed culvert amplification. The plans should indicate:

- existing and new building footprints
- detailed existing infrastructure and services.
- at least three X-Sections along the route of the proposed culvert (X-Sections for each connection point and midpoint where it is considered the closest or highest hazard to the proposed building).

Proposals to build over, or adjacent to, Sydney Water stormwater assets will be consistent with the Building Over and Adjacent to Stormwater Assets policy and guidelines, unless otherwise agreed. Proposals to build over and adjacent to stormwater assets will be developed, assessed and agreed with Sydney Water before plans are lodged or building construction commences.

Flood Impact Assessment (FIA)

The applicant is required to submit a Flood Impact Assessment report based on a current flood model which can be obtained from the local Council, if there is none available the customer will need to create one for the proposed development and identify flood hazards. The FIA must:

- demonstrate that there are no potential adverse flood impacts offsite due to the development; and
- evaluate the impacts of flooding on the proposed development.

Liaising with Sydney Water

As the proposed stormwater work is associated with a major stormwater trunk drainage system, the applicant and their service providers are required to liaise with Sydney Water continuously until the ownership of the stormwater work is transferred to Sydney Water according to the Asset Creation Process.

Flow Management Plan and Safe Work Plan

It is the constructor's responsibility to ensure to maintain continuous stormwater flow through the existing pipes or through temporary stormwater pipe during the construction period. The nominated constructor is required to submit a Flow Management Plan and will need to obtain approval prior to commencement of any work on the site.

Design and Construction

Design and construction of the work is to be according to the Sewerage Code of Australia, Sydney Water's Technical Specification Part 1 Civil Works / AUS-SPEC as appropriate.

Design of the required stormwater modification work/Gross Pollutant Trap

Design of the required stormwater modification work/ Gross Pollutant Trap are to be carried out by Sydney Water accredited providers for stormwater design. Structural aspect of the proposed stormwater work is to be carried out by a qualified structural engineer. A copy of the structural engineer's certificate is to be attached with the design drawing.

Structural details of the stormwater modification work/ Gross Pollutant Trap are to be submitted with the design drawings and would be referred to Sydney Water's Engineering Services for comments. Any requirements as determined by Engineering Services must be complied with.

Construction of the Stormwater work

Construction of the stormwater work is to be carried out by Sydney Water accredited providers for construction for sewer and water and based on their capability S2, W2 & W3 for any size of connection.

Creation of Easement

Easement is to be created as per the meeting discussion on 04 February 2016 as per "Appendix F" of the document title "Harbour Site Shopping Centre, Utilities Report SSDA1 – Stage 1" prepared by Arcadis dated 04 February 2020. Easement is to be minimum 5m wide. The applicant is required to liaise with Sydney Water's property services to create the required easement.

Direct Stormwater Connection

If direct stormwater connection is required to Sydney Water's stormwater system then the connection details should also be included in the design drawings and the connection must satisfy Sydney Water's connection requirements.

Proposed connections that are 300mm or more in diameter require a qualified structural engineer to design the connection details. Structural details of the connections are to be submitted with the design drawing. A structural engineer's certificate is to be attached with the design drawings.

Dilapidation Survey/CCTV Inspection

Dilapidation survey/ CCTV inspection of the stormwater pipe/ channel within the development site is to be carried out prior to commencement of any work (pre-construction dilapidation survey). The length of the inspection is to be extended at least 5m from the property boundary on both ends.

Similar dilapidation survey / CCTV inspection is to be carried out once the entire construction work is completed (post-construction dilapidation survey).

A report comparing both pre-and post-dilapidation / CCTV reports is to be prepared by a qualified person to ascertain that no damage occurs to Sydney Water's asset during the construction. A copy of this report is to be made available to Sydney Water for review.

Lodgement of a Bond for Stormwater work

A Bond is required to be submitted prior to releasing the design drawings for construction or prior to stamping the plans for construction. The value of the Bond cannot be determined until the design is accepted and your providers have submitted their quotations for review.

The amount of bond is assessed based on the likely risk to Sydney Water due to the proposed stormwater work. Please refer to [Sydney Water's Bonding Guidelines/Policy](#) for more information.

Refund of the bond money is subject to the acceptance of the Work As Constructed drawing and the review of final CCTV inspection/ dilapidation report which is required to undertake upon completion of the construction work and payment of all outstanding fees.

Crossing the services

Any service crossing across the Sydney Water's stormwater pipe/ culvert is to be perpendicular to the stormwater pipe/ culvert and must have minimum 500mm vertical clearance between the services and Sydney Water's stormwater assets.

Review of Design by Sydney Water

Review of the design by Sydney Water shall be not construed as relieving the Designer of their responsibility. Note, Sydney Water examine only the supplied information and provide comment for consideration. Sydney Water does not verify, approve or endorse the design. Design responsibility remains with the Designer.

5. Ancillary Matters

5.1 Asset adjustments

If any Sydney Water drinking water main, recycled water main, sewer or stormwater asset constructed or under construction is found, after the issue of this Notice, to require adjustment or deviation because of your development; then you will need to do this work as well as any other works we have detailed above at your cost. The work must meet the conditions of this Notice and you will need to complete it **before we can issue the Certificate**. Sydney Water will need to see the completed designs for the work and we will require you to lodge a security. The security will be refunded once the work is completed.

6. Developer Charges

Development Servicing Plan (DSP)	Basis of Calculation	Charge (\$) for Applicable Period (4/05/20-30/06/20)
DEVELOPER CHARGES TOTAL:		\$Nil

7. Special Requirements

Multi-level individual metering requirements

Your development must either allow for or provide individual metering. This means that you

must:

1. comply at all times and in all respects with the requirements of Sydney Water's "*Multi-level Individual Metering Guide*" (version 6 dated 1 July 2015);
2. provide and install plumbing and space for individual metering in accordance with Sydney Water's "*Multi-level Individual Metering Guide*";
3. if and when you implement a strata/ stratum plan (or strata/ stratum subdivide) you must:
 - a. engage an Accredited Metering Supplier ("**AMS**") to provide individual metering in accordance with the "*Multi-level Individual Metering Guide*" and meet the cost of the meters and metering system;
 - b. transfer the meters and metering system to Sydney Water once the Testing Certificate has been issued by Sydney Water to the AMS and the AMS has confirmed that payment for the meters and metering system has been paid in full.

Before the Section 73 Certificate can be issued, you will be required to sign an undertaking to show that you understand and accept these metering requirements and associated costs.

Visit www.sydneywater.com.au > Plumbing, Building & Developing > Plumbing > Meters & metered standpipes to see the *Multi-level individual metering guide* and find out more.

OTHER THINGS YOU NEED TO DO:

Shown below are other things you need to do that are NOT a requirement for the Certificate. They may well be a requirement of Sydney Water in the future because of the impact of your development on our assets. You must read them before you go any further.

Approval of your building plans

Please note that the building plans must be approved when each lot is developed. This can be done at Sydney Water Tap inTM. Visit www.sydneywater.com.au > Plumbing, building & developing > Building > Sydney Water Tap inTM.

This is not a requirement for the Certificate but the approval is needed because the construction/building works may affect Sydney Water's assets (e.g. water, sewer and stormwater mains).

Where a Sydney Water stormwater channel, pipe or culvert is located within ten (10) metres of your development site it must be referred to Sydney Water for further assessment.

Your Coordinator can tell you about the approval process including:

- Possible requirements;
- Costs; and
- Timeframes.

Please note that your building plans must be approved. This can be done at Sydney Water Tap in™. Visit www.sydneywater.com.au > Plumbing, building & developing > Building > Sydney Water Tap in™ or call 13 20 92.

Note: You must obtain our written approval before you do any work on Sydney Water's systems. Sydney Water will take action to have work stopped on the site if you do not have that approval. We will apply Section 44 of the *Sydney Water Act 1994*.

Disused Sewerage Service Sealing

Please do not forget that you must pay to disconnect all disused private sewerage services and seal them at the point of connection to a Sydney Water sewer main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed drainer. The licensed drainer must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Soffit Requirements

Please be aware that floor levels must be able to meet Sydney Water's soffit requirements for property connection and drainage.

Requirements for Business Customers for Commercial and Industrial Property Developments

If this property is to be developed for Industrial or Commercial operations, it may need to meet the following requirements:

Trade Wastewater Requirements

If this development is going to generate trade wastewater, the property owner must submit an application requesting permission to discharge trade wastewater to Sydney Water's sewerage system. You must wait for approval of this permit before any business activities can commence.

The permit application should be emailed to Sydney Water's Business Customer Services at businesscustomers@sydneywater.com.au

It is illegal to discharge Trade Wastewater into the Sydney Water sewerage system without permission.

A **Boundary Trap** is required for all developments that discharge trade wastewater where arrestors and special units are installed for trade wastewater pre-treatment.

If the property development is for Industrial operations, the wastewater may discharge into a sewerage area that is subject to wastewater reuse. Find out from Business Customer Services if this is applicable to your development.

Backflow Prevention Requirements

Backflow is when there is unintentional flow of water in the wrong direction from a potentially polluted source into the drinking water supply.

All properties connected to Sydney Water's supply must install a testable **Backflow Prevention Containment Device** appropriate to the property's hazard rating. Property with a high or medium hazard rating must have the backflow prevention containment device tested annually. Properties identified as having a low hazard rating must install a non-testable device, as a minimum.

Separate hydrant and sprinkler fire services on non-residential properties, require the installation of a testable double check detector assembly. The device is to be located at the boundary of the property.

Before you install a backflow prevention device:

1. Get your hydraulic consultant or plumber to check the available water pressure versus the property's required pressure and flow requirements.
2. Conduct a site assessment to confirm the hazard rating of the property and its services. Contact PIAS at NSW Fair Trading on **1300 889 099**.

For installation you will need to engage a licensed plumber with backflow accreditation who can be found on the Sydney Water website:

<http://www.sydneywater.com.au/Plumbing/BackflowPrevention/>

Water Efficiency Recommendations

Water is our most precious resource and every customer can play a role in its conservation. By working together with Sydney Water, business customers are able to reduce their water consumption. This will help your business save money, improve productivity and protect the environment.

Some water efficiency measures that can be easily implemented in your business are:

- Install water efficiency fixtures to help increase your water efficiency, refer to WELS (Water Efficiency Labelling and Standards (WELS) Scheme, <http://www.waterrating.gov.au/>
- Consider installing rainwater tanks to capture rainwater runoff, and reusing it, where cost effective. Refer to <http://www.sydneywater.com.au/Water4Life/InYourBusiness/RWTCalculator.cfm>
- Install water-monitoring devices on your meter to identify water usage patterns and leaks.
- Develop a water efficiency plan for your business.

It is cheaper to install water efficiency appliances while you are developing than retrofitting them later.

Contingency Plan Recommendations

Under Sydney Water's [customer contract](#) Sydney Water aims to provide Business Customers with a continuous supply of clean water at a minimum pressure of 15meters head at the main tap. This is equivalent to 146.8kpa or 21.29psi to meet reasonable business usage needs.

Sometimes Sydney Water may need to interrupt, postpone or limit the supply of water services to your property for maintenance or other reasons. These interruptions can be planned or unplanned.

Water supply is critical to some businesses and Sydney Water will treat vulnerable customers, such as hospitals, as a high priority.

Have you thought about a **contingency plan** for your business? Your Business Customer Representative will help you to develop a plan that is tailored to your business and minimises productivity losses in the event of a water service disruption.

For further information please visit the Sydney Water website at: <http://www.sydneywater.com.au/OurSystemsandOperations/TradeWaste/> or contact Business Customer Services on **1300 985 227** or businesscustomers@sydneywater.com.au

Fire Fighting

Definition of firefighting systems is the responsibility of the developer and is not part of the Section 73 process. It is recommended that a consultant should advise the developer regarding the firefighting flow of the development and the ability of Sydney Water's system to provide that flow in an emergency. Sydney Water's Operating Licence directs that Sydney Water's mains are only required to provide domestic supply at a minimum pressure of 15 m head.

A report supplying modelled pressures called the Statement of Available pressure can be purchased on-line through Sydney Water Tap inTM and may be of some assistance when defining the firefighting system. The Statement of Available pressure, may advise flow limits that relate to system capacity or diameter of the main and pressure limits according to pressure management initiatives. If mains are required for firefighting purposes, the mains shall be arranged through the water main extension process and not the Section 73 process.

Large Water Service Connections

A drinking water main is available to serve your development. The size of your development means that you will need water connections larger than the standard domestic 20 mm size.

To get approval for your connection, you will need to lodge an application with Sydney Water Tap inTM. You, or your hydraulic consultant, may need to supply the following:

- A plan of the hydraulic layout;
- A list of all the fixtures/fittings within the property;
- A copy of the fire flow pressure inquiry issued by Sydney Water;
- A pump application form (if a pump is required);
- All pump details (if a pump is required).

You will have to pay an application fee.

The service connection will need to meet with:

Administrative requirements of the Plumbing Code of Australia; and
Technical requirements of the Water Drawings Set within the Code.

Sydney Water does not consider whether a water main is adequate for firefighting purposes for your development. We cannot guarantee that this water supply will meet your Council's firefighting requirements. The Council and your hydraulic consultant can help.

Disused Water Service Sealing

You must pay to disconnect all disused private water services and seal them at the point of connection to a Sydney Water water main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed plumber. The licensed plumber must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Other fees and requirements

The requirements in this Advice Letter relate to your future Certificate application only. Sydney Water may be involved with other aspects of your development and there may be other fees or requirements. These include:

- construction/building plan approval fees;
- plumbing and drainage inspection costs;
- the installation of backflow prevention devices;
- trade waste requirements;
- large water connections and
- council firefighting requirements. (It will help you to know what the firefighting requirements are for your development as soon as possible. Your hydraulic consultant can help you here.)

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from Sydney Water and to the extent that it is able, Sydney Water limits its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

END

APPENDIX B

Sydney Water Consultation

Issue date 5/02/2016
Issue to Fernando Ortega – Sydney Water (FO)
Issued by Joe Heydon – Arcadis (JH)
Subject Harbourside Shopping Centre – Culvert Build over
Reference Harbourside-MM-001
Client Mirvac
Meeting date 4/02/2016
Time 10:00am
Location Sydney Water, 39 St Martin Place
Present Joe Heydon (JH) – Arcadis
 Fernando Ortega (FO) – Sydney Water
 Lachlan Attiwell – Mirvac (LA)
Copy to David Hogendijk – Mirvac

ITEM	COMMENTS	ACTION
1	JH and LA introduced the proposed development to FO	
2	JH informed FO that Rob Dowey of Cardno was acting as WSC	
3	JH outlined the existing build-over that was required by the ICC Hotel	
4	JH outlined the proposed build over associated with Harbourside to FO	
5	FO explained that SW has requested that the ICC Hotel provide an easement located to the south of Harbourside for potential future diversion of the culvert	
6	FO explained that SW has in the past requested NSW State funding to divert this culvert but this request was denied at this moment as the existing culvert is in reasonable condition	
7	FO explained that the ICC Hotel team undertook a dilapidation report on the condition of the existing culvert and it was deemed to be in reasonable condition	
8	FO explained that at the moment Sydney Water would permit the future build over on condition that Sydney Water polices are adhered to and no direct load placed on culvert, and any damage during construction be rectified.	
9	FO recommended that Mirvac undertake their own dilapidation report or discuss with Lend Lease potential for using recent LL one with regard to copyright etc.	

10	FO suggested that Sydney Water may impose some conditions on DA for Mirvac to provide Sydney Water with additional access pit to the culvert in space located between eastern building façade and harbour.
11	FO suggested that Sydney Water may also condition the DA that some form of mesh be installed after culvert outlet to mitigate pollution e.g. plastic bottles etc. entering the harbour. This detail would be similar to that imposed on Lend Lease at Barangaroo.
12	LA confirmed that those requests are reasonable and Mirvac would consider in future.
13	LA and JH agreed to keep FO informed in future of any related issues to this culvert.

Heydon, Joe

From: GONSALVES, SHALINI <SHALINI.GONSALVES@sydneywater.com.au>
Sent: Friday, 17 April 2020 11:42 AM
To: Lachlan Attiwill
Cc: THALIB, LUBNA; CAMILLERI, LUKE
Subject: RE: Mirvac | Harbourside - intro and background
Attachments: 2020 01 29 - Mirvac Industrial - NDA signed.pdf

Hi Lachlan

Thanks for your time yesterday – it was good to get a sense of the scale and scope of the project, and to hear you're keen to consider WSUD principles for this development. We're looking forward to working with you on realising this.

As discussed, we're finalising the feasibility assessment now, and should be able to send this to you next week. Sydney Water is also providing a response to DPIE for the SSDA.

I'll touch base with you in a few months to check in, and to see how we can work with you to offer input into the design scope from WSUD perspective.

Until then, if you can send us indicative layout and the high level plans you shared with us yesterday, Luke and I can start to have a think about potential recycled / integrated water servicing options – and can bring our recommendation back to you. We understand the plans will change – it won't go further than our team. I'm attaching the NDA for Mirvac O&I, to give you additional comfort 😊

Have a great weekend.

Cheers
Shalini

[Shalini Gonsalves](#)

Account Manager, City Growth and Development

Sydney
WATER

Ph 02 8849 6864
Mob 0434 756 999

-----Original Appointment-----

From: GONSALVES, SHALINI
Sent: Tuesday, 14 April 2020 2:40 PM
To: GONSALVES, SHALINI; THALIB, LUBNA; CAMILLERI, LUKE; 'Lachlan Attiwill'
Subject: Mirvac | Harbourside - intro and background
When: Thursday, 16 April 2020 4:30 PM-5:00 PM (UTC+10:00) Canberra, Melbourne, Sydney.
Where: Microsoft Teams (see notes)

As discussed, quick meeting for Lachlan Attiwill from Mirvac to give us background on this development, and discuss opportunities for integrated water servicing/partnership with Sydney Water.

[Join Microsoft Teams Meeting](#)

+61 2 9053 4881 Australia, Sydney (Toll)

Conference ID: 788 161 855#

[Local numbers](#) | [Reset PIN](#) | [Learn more about Teams](#)



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APPENDIX C

**Harbourside Site Flood Levels (Flood Certificate provided by
WMA on behalf of City of Sydney)**

Arcadis
Level 5/141 Walker Street
North Sydney
NSW 2060

22 December 2015

Attention: Bruce Caldwell

Dear Bruce,

Re: Flood Certificate for Harbourside, Darling Harbour

Thank you for contacting WMAwater in regard to a flood certificate for possible development at the above referenced address. WMAwater are currently undertaking the Darling Harbour Floodplain Risk Management Study (WMAwater, 2015), covering the area within which the property is located. The description of results we supply herein is based on detailed modelling carried out for the floodplain risk management study.

Harbourside shopping centre is located in the very downstream of the catchment and has flood affectation at some points on its perimeter. Figure 1 shows the site and the 1% AEP flood behaviour. In a flood event, runoff pools on the western side of the site, originating from Union Street/Darling Drive and from local catchment inflows (i.e. rainfall immediately west of the building). The east side of the property is adjacent to Darling Harbour, and flooding is limited to very shallow (<0.1 m) depth of flow discharging into the harbour. Elevated sea levels do not directly flood the site, although there is very minor exacerbation of the runoff depth under an elevated sea level.

Table 1 lists the peak flood depth and level for the 1% AEP event, the PMF and the climate change sea level rise scenarios modelled in the Darling Harbour Flood Study (2014). The peak flood level and depth is given for three locations on the west side of the property, as shown on Figure 1. As described, flooding is limited to shallow flow on the eastern side, including under sea level rise scenarios. Flood levels given for location 'A' are representative of the peak flood level of the ponding in that area, which is of constant height.

WMAwater Pty Ltd (Formerly Webb McKeown and Associates)

DIRECTORS

M K Babister
R W Dewar
E J Askew
S D Gray

BE(Hons), MEngSc GradDipMgt, FIEAust
BSc(Hons), MEngSc, MAIG, MIEAust
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BE, MEng

ASSOCIATES

R Hardwick Jones
M E Retallick

BE(Hons), MEngSc, MIEAust
BE(Hons), BSc, MIEAust

ABN 14 600 315 053

Level 2, 160 Clarence St, SYDNEY NSW 2000
Phone: 02 9299 2855 Fax: 02 9262 6208
Email: enquiry@wmawater.com.au
Website: wmawater.com.au

Table 1 Flood Behaviour – Locations shown on Figure 1

Location	A		B		C	
Design Event	Depth (m)	Level (mAHD)	Depth (m)	Level (mAHD)	Depth (m)	Level (mAHD)
50% AEP	0.51	2.98	0.00	3.36	0.01	3.07
20% AEP	0.61	3.08	0.00	3.36	0.01	3.07
10% AEP	0.65	3.12	0.00	3.36	0.01	3.07
5% AEP	0.71	3.18	0.00	3.36	0.01	3.07
2% AEP	0.77	3.24	0.01	3.37	0.01	3.07
1% AEP	0.79	3.26	0.01	3.37	0.01	3.07
0.2% AEP	0.82	3.29	0.01	3.37	0.09	3.15
PMF	1.83	4.30	0.94	4.30	1.25	4.31
1% AEP – 2050 Tailwater	0.85	3.32	0.01	3.37	0.02	3.08
1% AEP – 2100 Tailwater	0.85	3.32	0.01	3.37	0.04	3.1
1% AEP - 10% Rainfall Increase	0.89	3.36	0.01	3.37	0.02	3.08
1% AEP - 20% Rainfall Increase	0.93	3.40	0.01	3.37	0.06	3.12
1% AEP - 30% Rainfall Increase	0.96	3.43	0.01	3.37	0.11	3.17

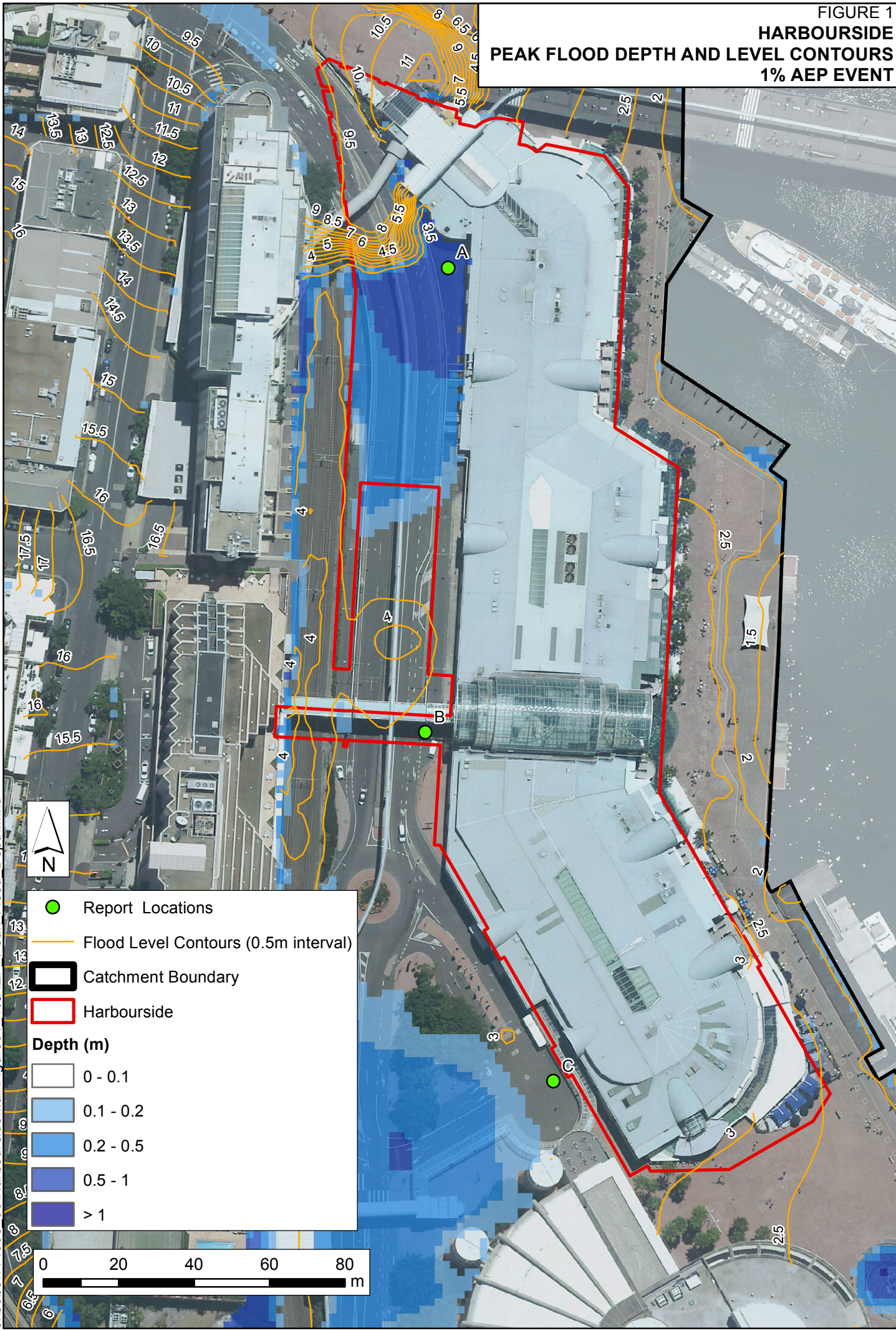
Yours Sincerely,
WMAwater

Felix Taaffe

Felix Taaffe
 Project Engineer

FIGURE 1

HARBOURSIDE **PEAK FLOOD DEPTH AND LEVEL CONTOURS** **1% AEP EVENT**



APPENDIX D

Catchment and Site Photos



Figure B1: Photo locations (Google Earth)

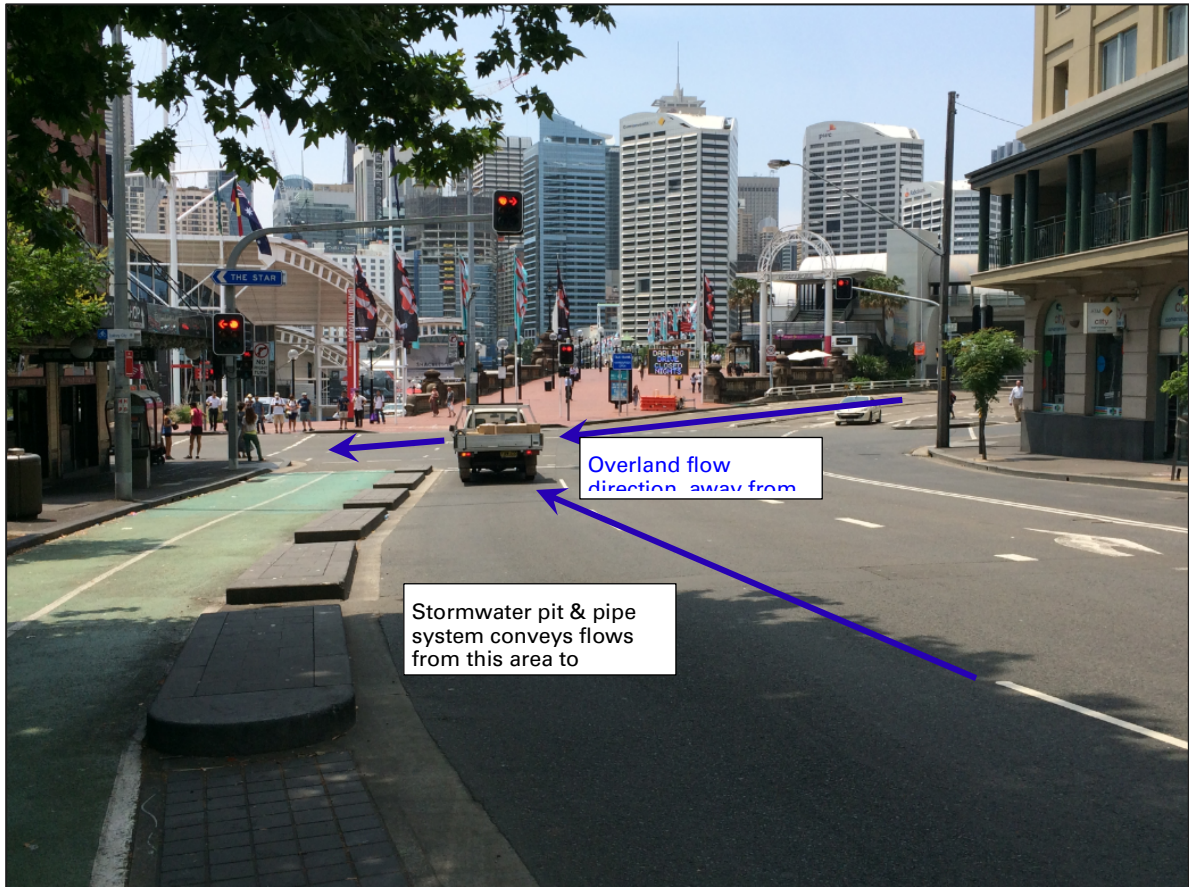


Photo 1: Pyrmont Bridge/Darling Drive, viewing eastward to IBIS Sydney



Photo 2: Darling Drive Road Crest, viewing south-eastward to Harbourside



Photo 3: Darling Drive Road Crest, viewing Northward from Harbourside

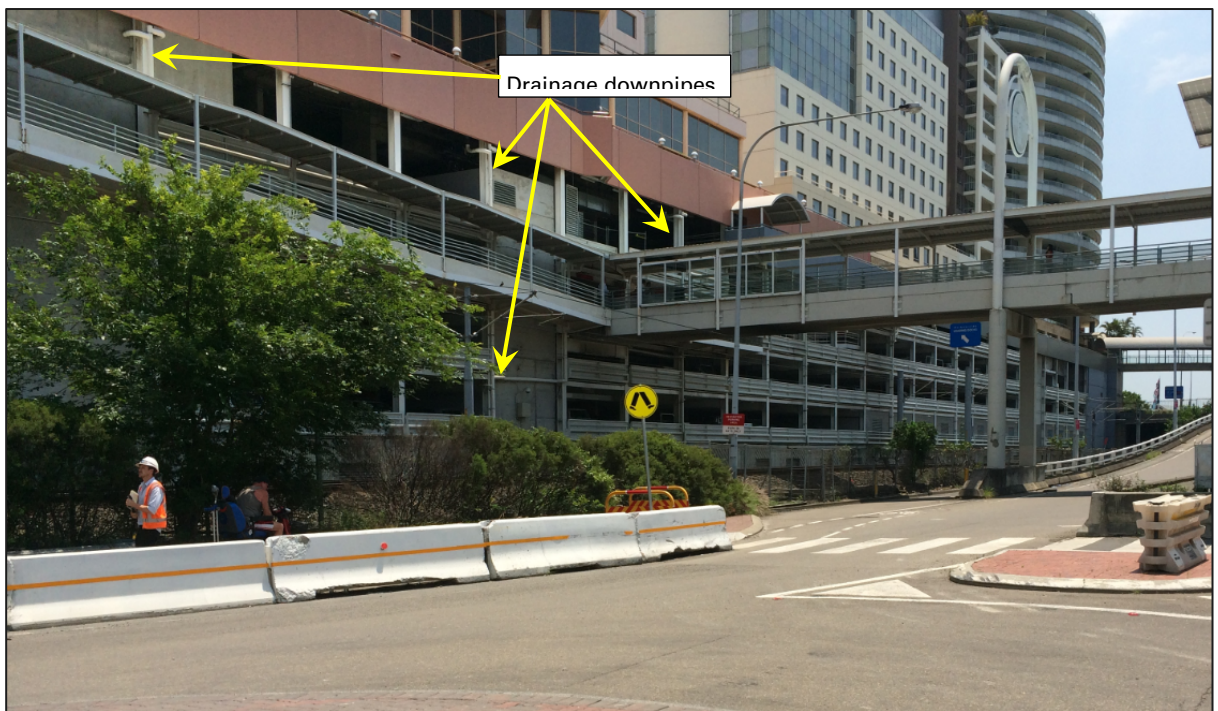


Photo 4: Darling Drive, viewing north-westward to Novotel Sydney and IBIS Sydney

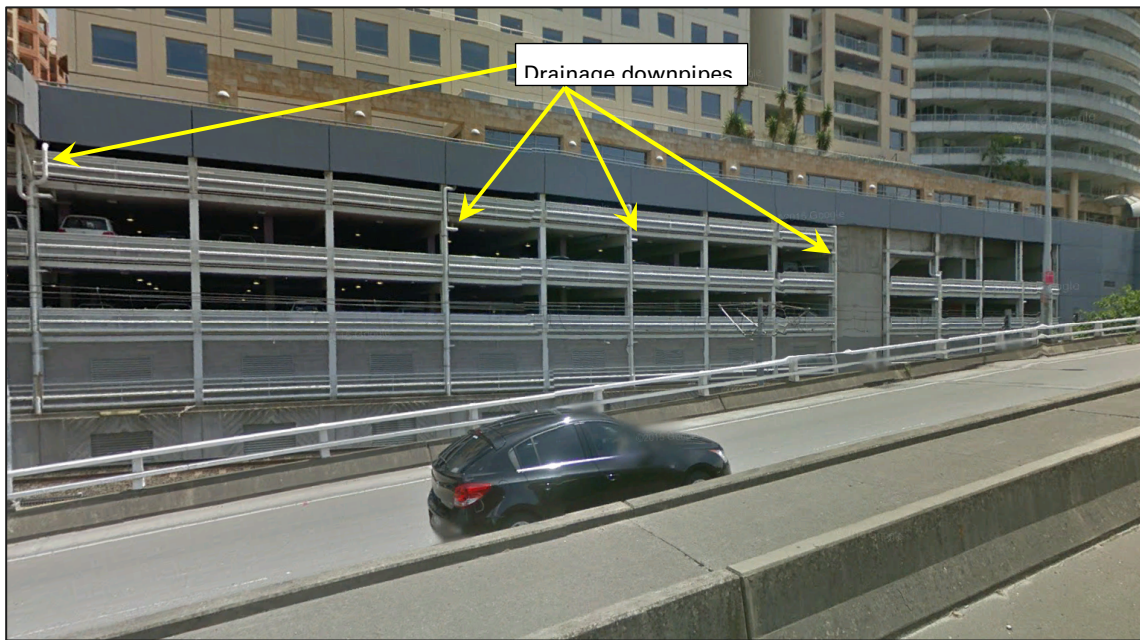


Photo 5: Darling Drive, viewing north-westward to IBIS Sydney (Google street view)

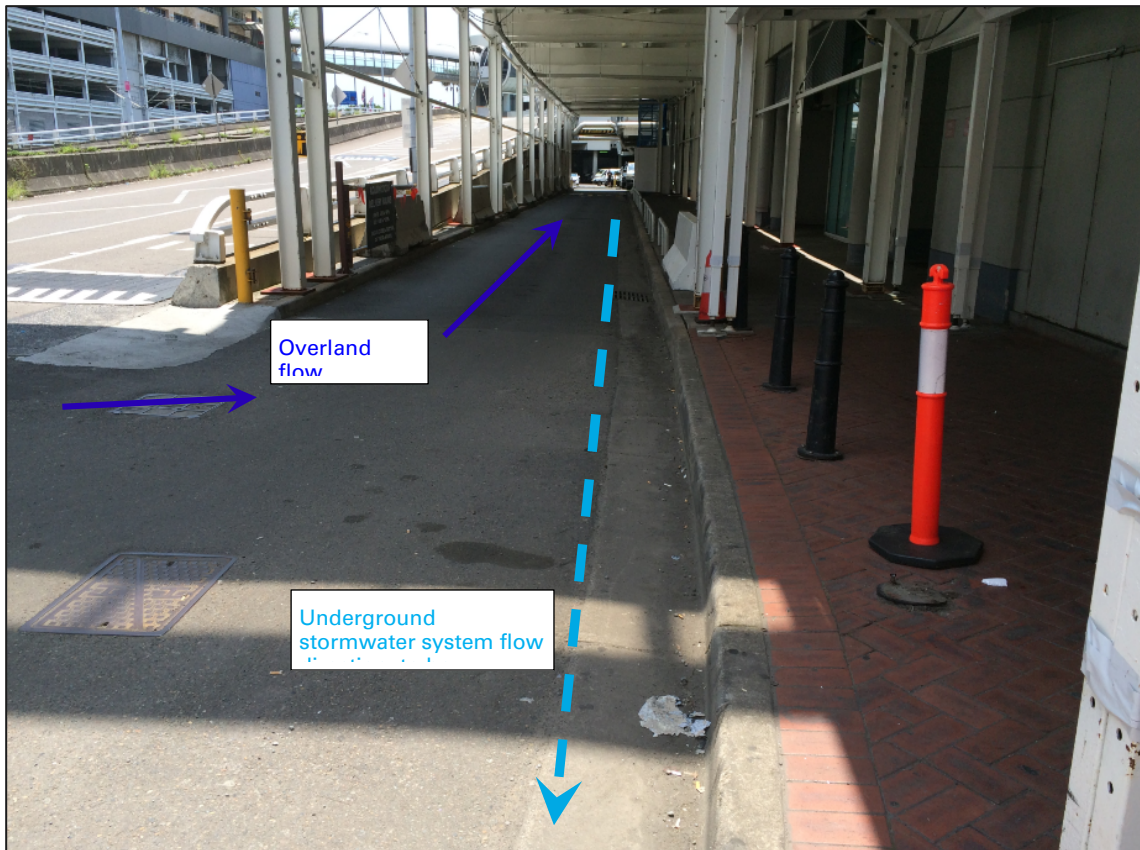


Photo 6: Harbourside, access road viewing Northward

Photos 6 to 10 show stormwater inlet pits likely to discharge into conduit system(s) (not included in CoS flood model)

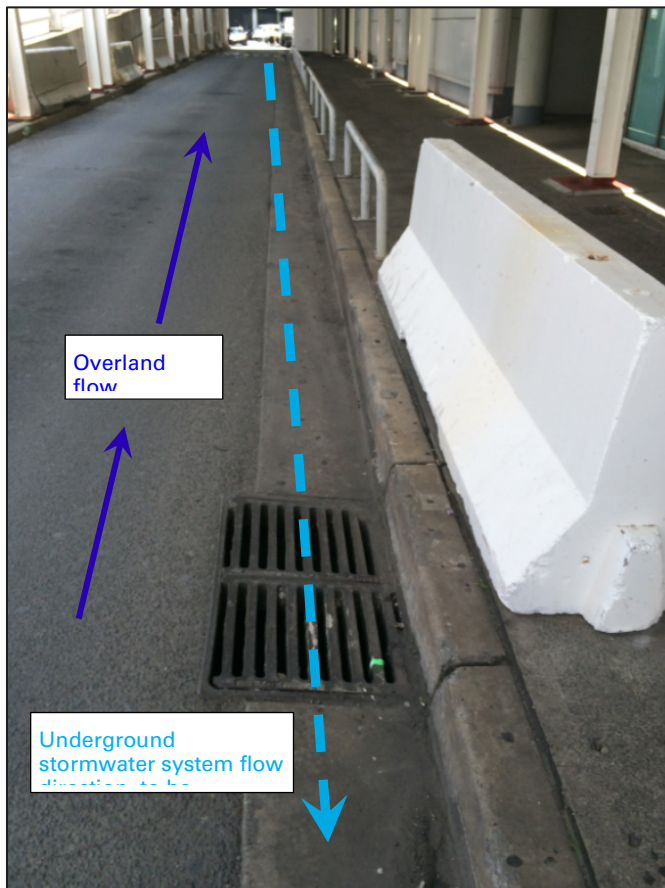


Photo 7: Harbourside, access road viewing Northward

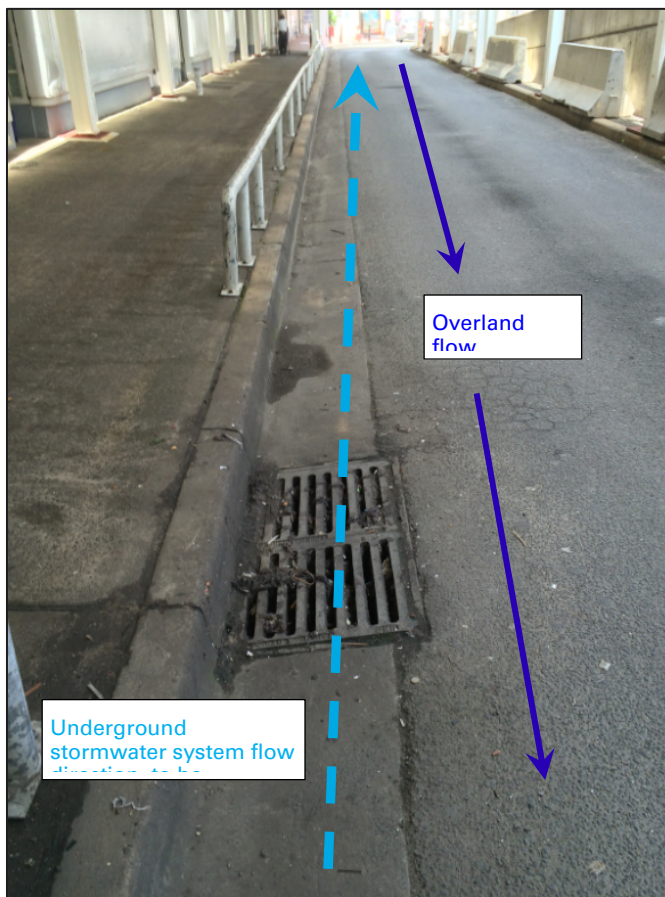


Photo 8: Harbourside, access road viewing Southward

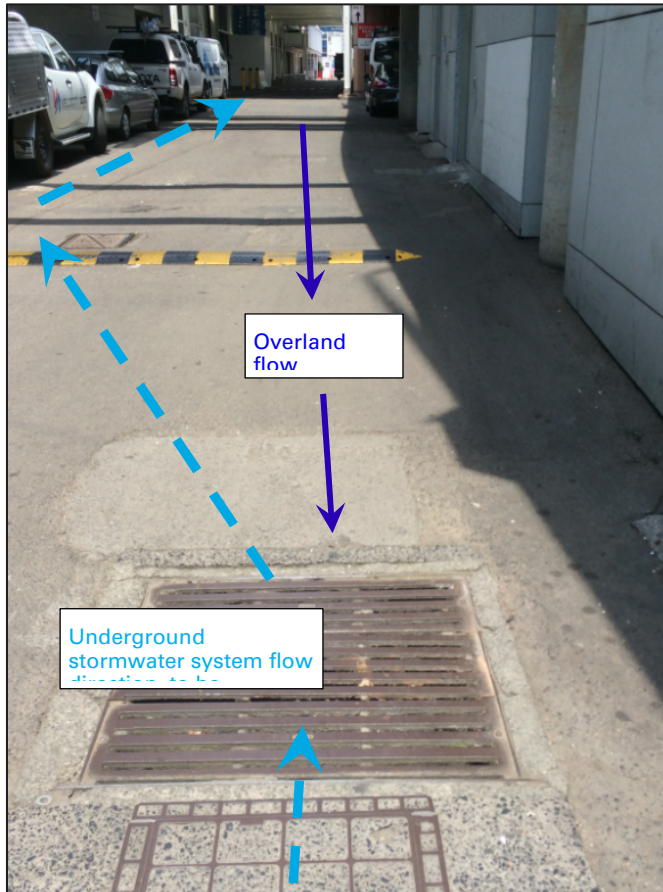


Photo 9: Harbourside, access road viewing Southward

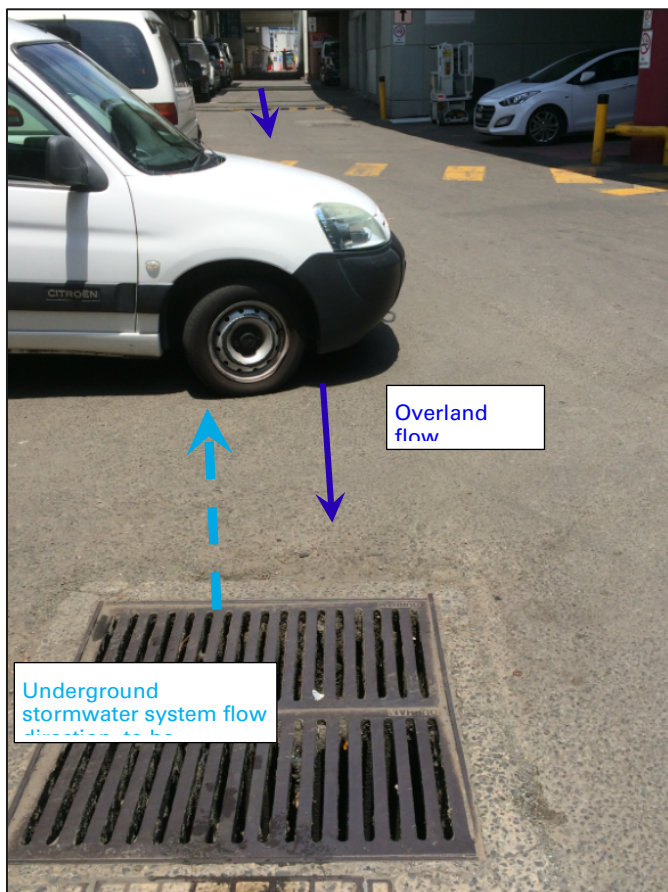


Photo 10: Harbourside, access road viewing Southward from street sag.



Photo 11: Harbourside, Loading Dock.



Photo 12: Harbourside, northern end adjacent to Pymont Bridge.



Potential overland flow path (not included in the CoS flood study). However, the relief 'flow path' is high level (~3.5mAHD?), narrow, and potential to block.

Photo 13: Harbourside, northern end (viewing out towards Pymont Bridge, not seen).

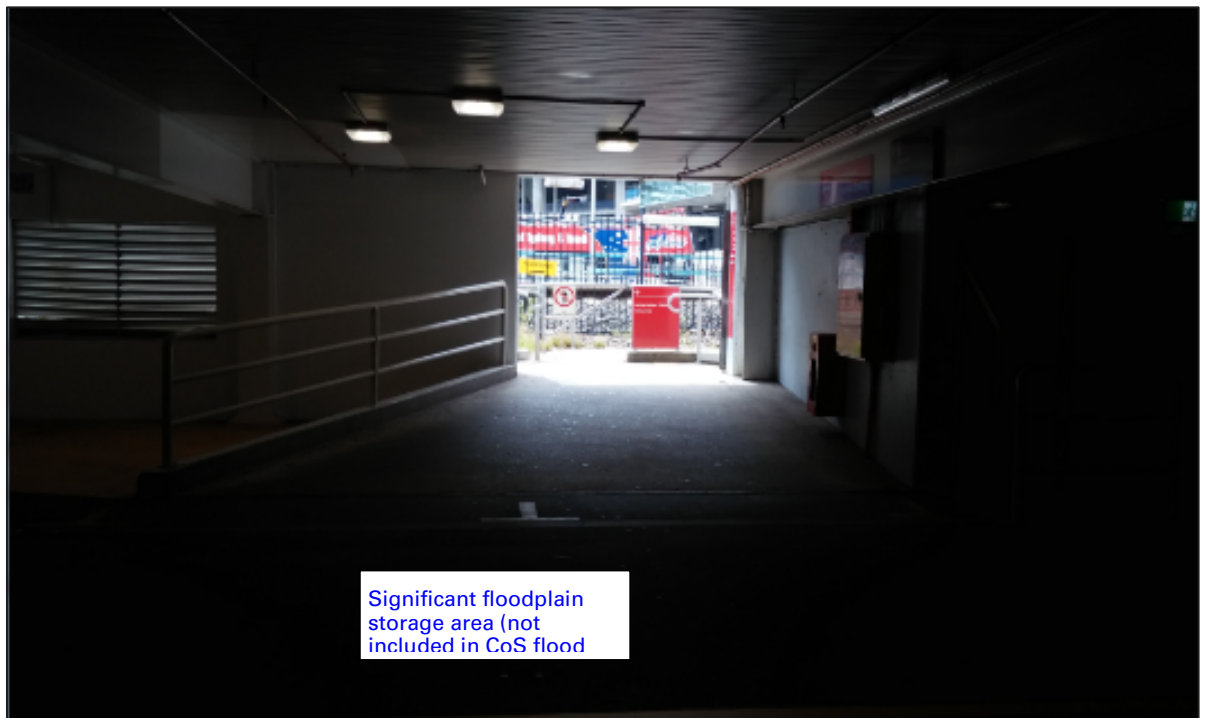


Photo 14: Novotel, Wilson lower level carpark eastern entrance viewing east towards light rail platform.

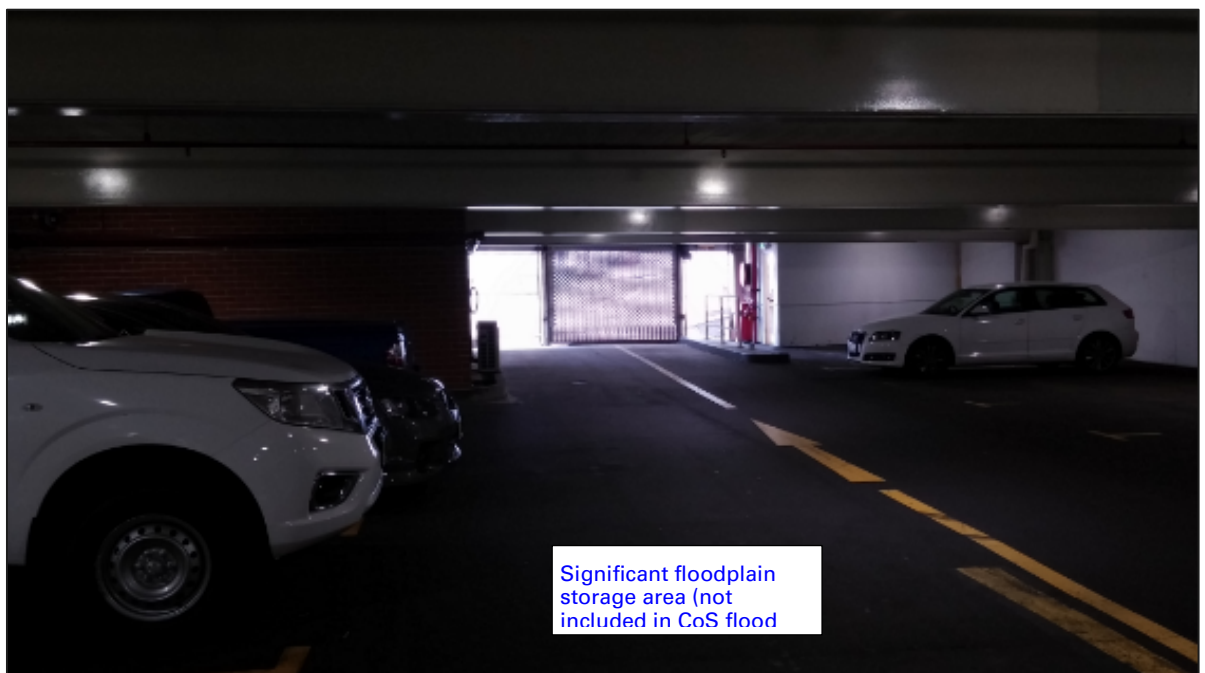


Photo 15: Novotel, Wilson lower level carpark southern entrance viewing south.



Photo 16: Novotel, Wilson lower level carpark viewing west.

This pit and associated stormwater conduits (to be confirmed) do not appear to be included in the CoS flood study).



Photo 17: Novotel, Wilson lower level carpark viewing down from Murray Street.

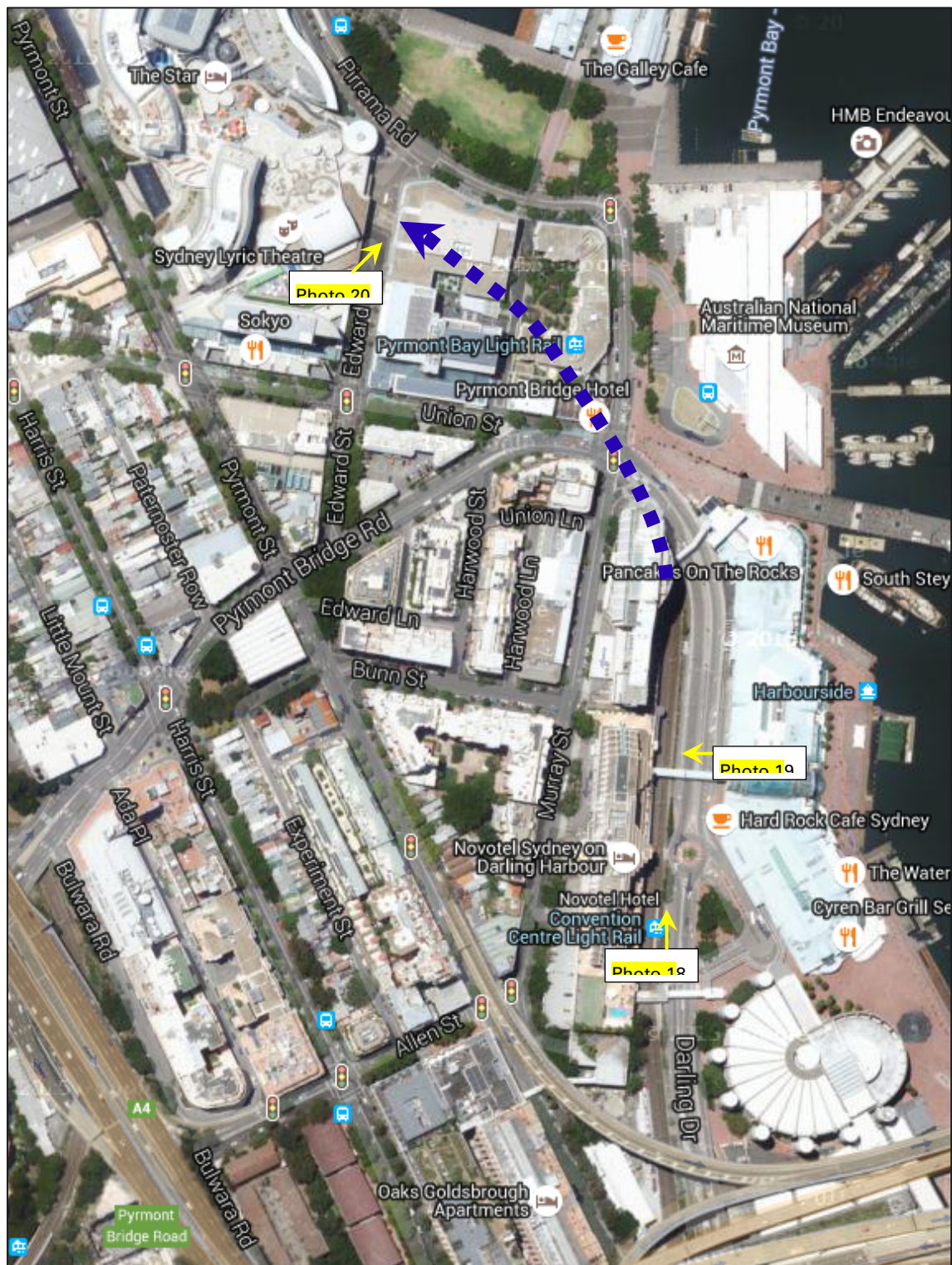


Figure B2: Light Rail tunnel Alignment & Photo locations (Google Earth)



Light rail tunnel

Light rail tunnel provides
flow relief for PMF event
(CoS flood study)

Photo 18: Light rail viewing north to tunnel entrance.

PMF water level 4.3mAHN
(CoS flood study)



Rail level approximately
3.5mAHN

Photo 19: Viewing west from Harbourside access road to light rail (south of tunnel entrance).

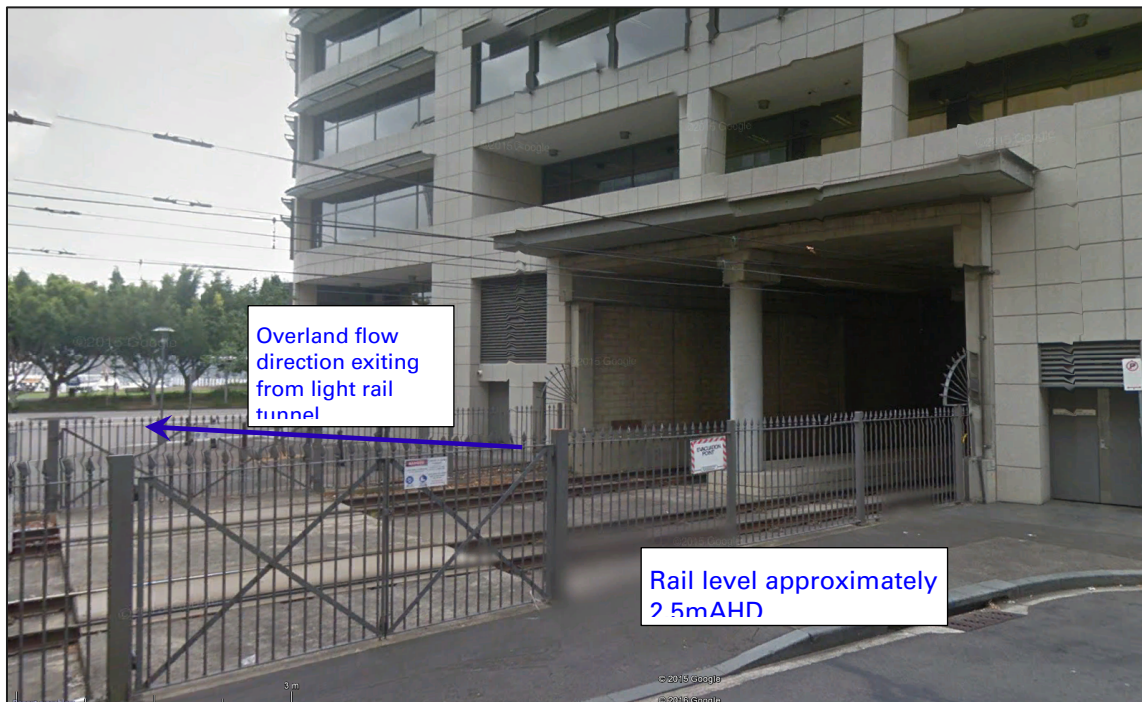
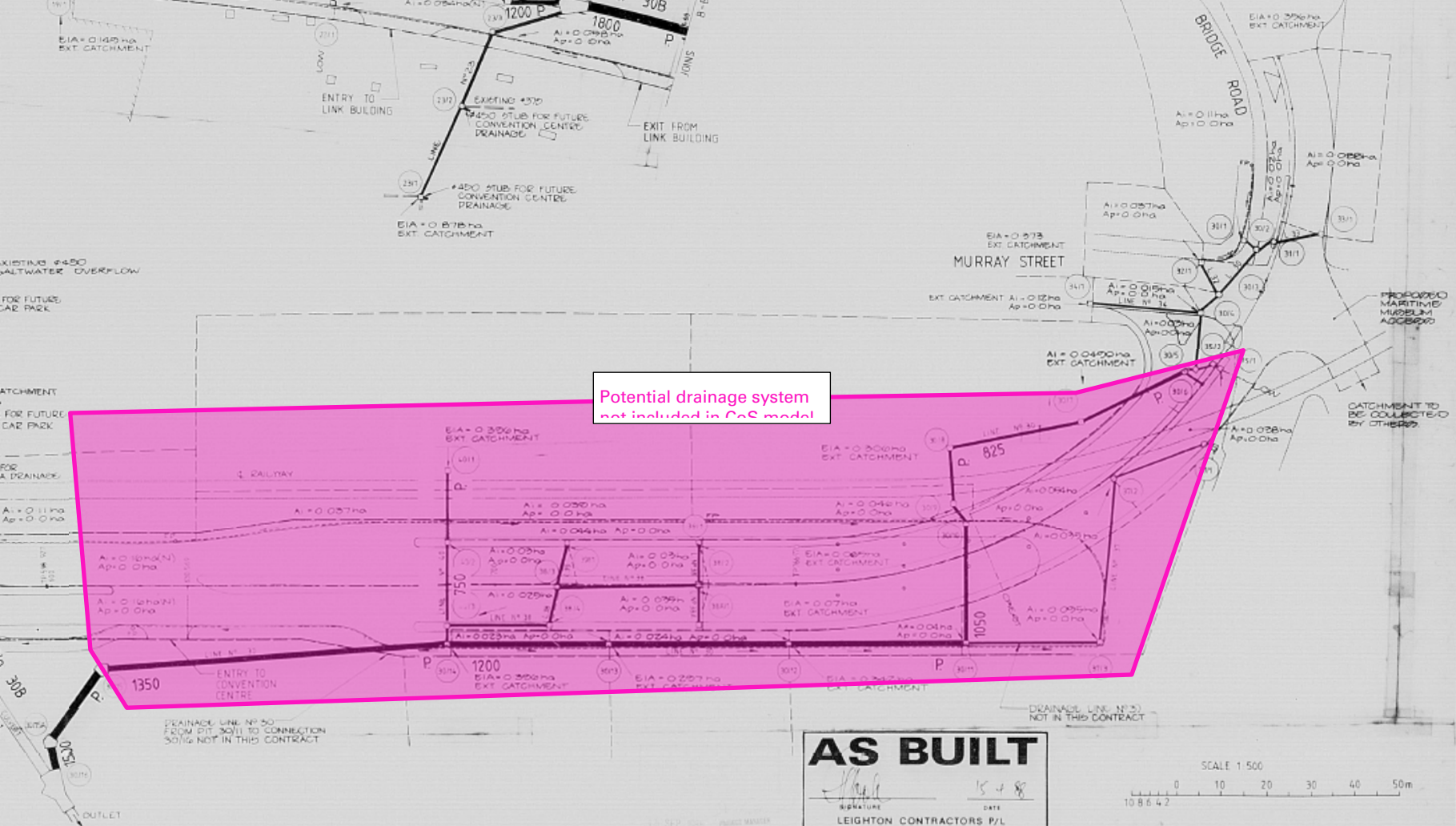


Photo 20: Light rail tunnel, viewing northward from Edward Street (Google street view)

APPENDIX E

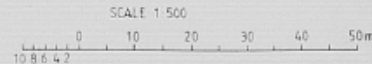
Drainage 'As Built' Part Plans



Potential drainage system
not included in C&S model


AS BUILT

SIGNATURE: [Signature] DATE: 15/4/88
LEIGHTON CONTRACTORS P/L
For DARLING HARBOUR AUTHORITY



CHECKED CON. MC	REV	DATE	AMENDMENT DETAILS
	A	15/4/88	AS BUILT

MANAGING CONTRACTOR LEIGHTON CONTRACTORS PTY LTD P.O. BOX C 349 SYDNEY NSW 2000		
		
MANAGING CONTRACTOR APPROVAL NAME: [Signature] TITLE: [Signature] DATE: [Signature]	NAME TITLE SIGNATURE DATE	DATE
CONSULTANT / CONTRACTOR SINCLAIR KNIGHT & PARTNERS CONSULTING ENGINEERS Sinclair Knight & Partners Pty Ltd Incorporated in NSW 11 Chancery Street St Leonards NSW 2060 Australia Telephone (02) 436 7222 Telex AA25462		

NEW DARLING HARBOUR AUTHORITY  CHINATOWN CENTRE 25-29 DIXON STREET HAYMARKET NSW 2000
--

DARLING HARBOUR DEVELOPMENT PROJECT W.N. 500001/6
--

DRAWING TITLE FIG. STREET HERING BOULEVARD SWC No. 30B2 DRAINAGE CATCHMENT PLAN AND ROAD DRAINAGE			
SCALE AS SHOWN	DRAWN LJB	CHECKED [Signature]	DATE [Signature]
DRAWING No DHA/AB/CSC/03/41/3112 /A			

SHEET 2 OF 9

W.N. 500001/6

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Potential drainage system
not included in CoS model

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Potential drainage system
not included in C&S model

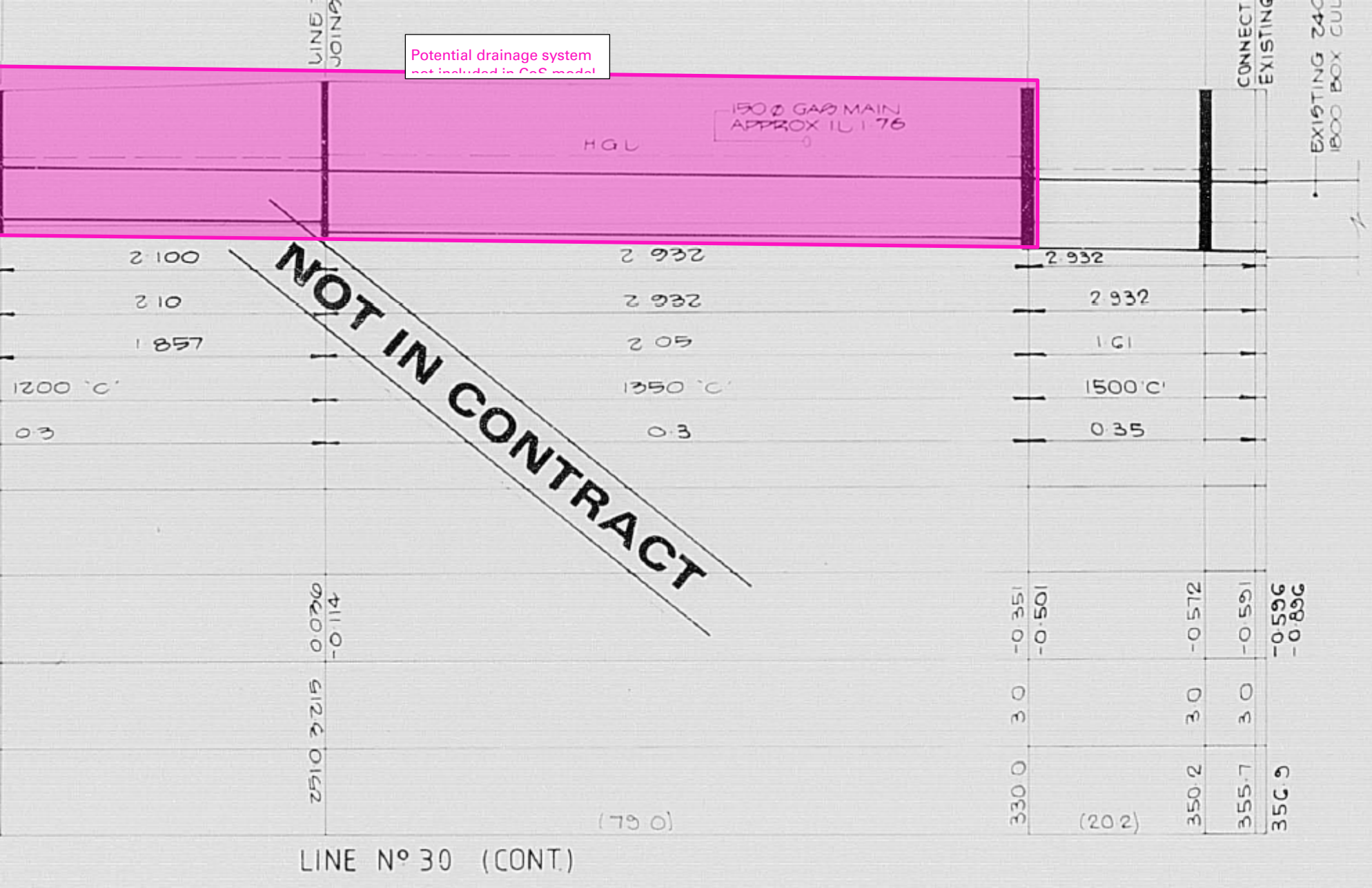
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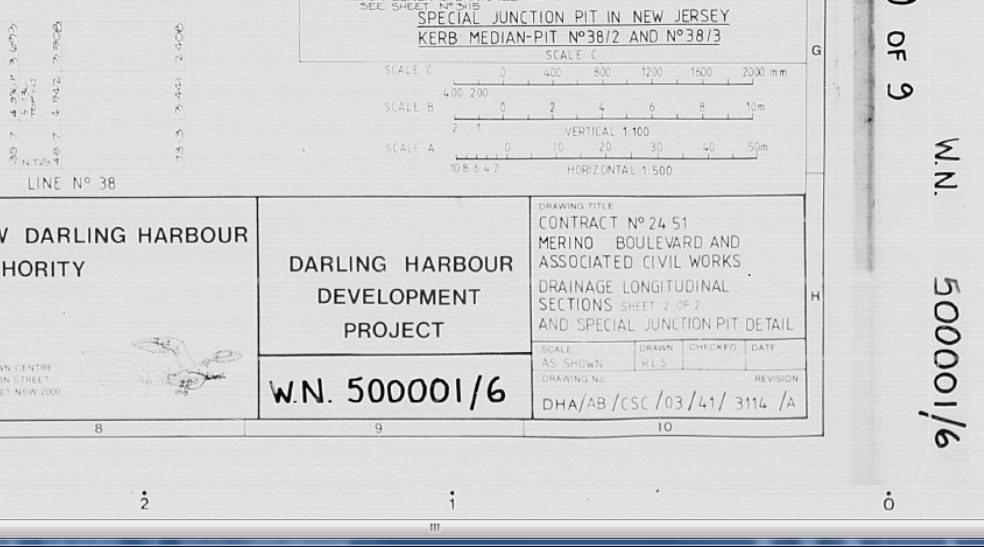
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APPENDIX F

City of Sydney's 'Interim Floodplain Management Policy'

Interim Floodplain Management Policy

Purpose

The Floodplain Management Policy provides direction with respect to how floodplains are managed within the Local Government Area (LGA) of the City of Sydney Council (the City).

The City has a responsibility to manage floodplains to ensure that any:

- new development will not experience undue flood risk; and
- existing development will not be adversely flood affected through increased damage or hazard as a result of any new development.

The Policy provides controls to facilitate a consistent, technically sound and best practice approach for the management of flood risk within the City's LGA. In forthcoming years the City will complete Floodplain Risk Management Plans and then integrate outcomes from these plans into planning controls. Once this process is completed this interim policy will be withdrawn.

Scope

This Policy applies to all new developments within the City of Sydney.

Definitions

Term	Meaning
Annual Exceedance Probability (AEP)	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. 1% AEP flood is approximately equal to 1 in 100 year Average Recurrent Interval (ARI) flood event (or simply 100 year flood). It has 1% chance to occur in a given year.
Australian Height Datum (AHD)	A common national plan of level corresponding approximately to mean sea level.
Average Recurrence Interval (ARI)	The long-term average number of years between the occurrence of a flood as big as or larger than, the selected event. For example, floods with a discharge as great as, or greater than, the 20 year ARI flood event may occur on average once every 20 years.

Term	Meaning
Basement Car Parking or Below-Ground Car Parking	The car parking area generally below ground level where inundation of the surrounding areas may raise water levels above the entry level to the basement, resulting in inundation. Basement car parks are areas where the means of drainage of accumulated water in the car park has an outflow discharge capacity significantly less than the potential inflow capacity.
Below-Ground Garage/Car park	Applies where the floor of the parking and/or access surface is more than 1 m below the surrounding natural ground.)
Carport	A structure used to house motor vehicles, which has a minimum of two sides "open" and not less than one third of its perimeter "open".
Critical Facilities	Includes hospitals and ancillary services, communication centres, police, fire SES, major transport facilities, sewerage and electricity plants; any installations containing critical infrastructure control equipment and any operational centres for use in a flood.
Effective Warning Time	The time available after receiving advice of an impending flood and before the floodwaters prevent appropriate flood response actions being undertaken. The effective warning time is typically used to raise furniture, evacuate people and transport their possessions.
Evacuation	The transfer of people and or stock from areas where flooding is likely, either close to, or during a flood event. It is affected not only by warning time available, but also the suitability of the road network, available infrastructure, and the number of people that have to evacuate during floods.
Extreme Flood	An estimate of the probable maximum flood (PMF), which is the largest flood that could conceivably occur at a particular location, generally estimated from the probable maximum precipitation (PMP). Generally it is not physically or economically possible to provide complete protection against this event.
Flood	A relatively high stream flow that overtops the natural or artificial banks in any part of a stream, channel, river, estuary, lake or dam, and/or local overland flooding associated with major drainage as defined by the NSW Floodplain Development Manual (FDM) before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
Flood Compatible Materials	Those materials used in building which are resistant to damage when inundated. A list of flood compatible materials is attached.
Flood Evacuation Strategy	The proposed strategy for the evacuation of areas with effective warning time during periods of flood as specified within any policy of Council, the floodplain risk management plan (FRMP), the relevant state government disaster plan, by advices received from the State Emergency Services (SES) or as determined in the assessment of individual proposals.
Floodplain	The area of land which is subject to inundation by floods up to and including the probable maximum flood (PMF) event.

Term	Meaning
Floodplain Development Manual (FDM)	The document dated April 2005, published by the New South Wales Government and entitled 'Floodplain Development Manual: the management of flood liable land'.
Flood Planning Area	The area of land below the FPL and thus subject to flood related development controls.
Flood Planning Level (FPL)	The combinations of flood levels and freeboards selected for floodplain risk management purposes, as determined in flood studies and floodplain risk management studies and plans.
Floodplain Risk Management Plan (FRMP)	A plan prepared for one or more floodplains in accordance with the requirements of the FDM or its predecessor.
Floodplain Risk Management Study (FRMS)	A study prepared for one or more floodplains in accordance with the requirements of the FDM or its predecessor.
Flood Storage	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.
Floodway	Those areas, often aligned with obvious naturally defined channels, where a significant discharge of water occurs during floods. They are also areas where, if only partially blocked, will cause a significant redistribution of flood flow or significant increase in flood levels, which many impact on other properties.
Freeboard	A factor of safety expressed as the height above the design flood level. Freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain, such as wave action; localised hydraulic behaviour and impacts that are specific event related, such as levee and embankment settlement; cumulative impacts of fill in floodplains and other effects such as changes in rainfall patterns as a result of climate change.
Garage	A private building or part of a building used to park or keep a motor vehicle and that is not defined as a carport.
Habitable Floor Area	<ul style="list-style-type: none"> in a residential situation: a living or working area, such as a lounge room, dining room, rumpus room, kitchen, bedroom or workroom; in an industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to flood damage in the event of a flood.
Hazardous Materials	Solids, liquids, or gases that can harm people, other living organisms, property, or the environment. These may include materials that are radioactive, flammable, explosive, corrosive, oxidizing, asphyxiating, bio-hazardous, toxic, pathogenic, or allergenic. Also included are physical conditions such as compressed gases and liquids or hot materials, including all goods containing such materials or chemicals, or may have other characteristics that render them hazardous in specific circumstances.
Large Scale Development	For the purposes of this document refers to a proposal that involves site disturbance 1000m ² of land or greater.

Term	Meaning
Local Overland Flooding Flow Path	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
Probable Maximum Flood (PMF)	The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation.
Probable Maximum Precipitation (PMP)	The greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (World Meteorological Organisation, 1986). It is the primary input to the estimation of the probable maximum flood.
Reliable Access During A Flood	The ability for people to safely evacuate an area subject to imminent flooding within effective warning time, having regard to the depth and velocity of flood waters, the suitability of the evacuation route, and without a need to travel through areas where flood hazard increases
Section 149 Planning Certificate	Information, including the statutory planning controls that apply to a parcel of land on the date the certificate is issued.
Shed	Includes machinery sheds, garden and storage sheds but does not include a garage or car park.
Suitably Qualified Engineer	An engineer who is included in the National Professional Engineers Register, administered by the Institution of Engineers Australia.
Survey plan	A plan prepared by a Registered Surveyor which shows the information required for the assessment of an application in accordance with the provisions of this Policy.

Policy statement

1 Introduction

The Policy has been prepared in accordance with the guidelines provided in the NSW Government Floodplain Development Manual (2005) (FDM). This manual guides Council in the development and implementation of local Floodplain Risk Management Plans to produce robust and effective floodplain risk management outcomes.

In accordance with the FDM, the Flood Risk Management Process entails four sequential stages:

- Stage 1: Flood Study
- Stage 2: Floodplain Risk Management Study
- Stage 3: Floodplain Risk Management Plan
- Stage 4: Implementation of the Plan

The City is progressively producing Floodplain Risk Management Plans for each of the individual drainage catchments within the City's LGA. Floodplain Risk Management Plans consider the existing flood environment and recommend specific measures to manage the impact of flooding. In assessing the flood environment, elements such as known flood behaviour, evacuation issues, site access and the potential impact of sea level rise are taken into consideration. This information is used to create floodplain risk mapping for each catchment.

Floodplain Risk Management Plans provide a range of measures that can be used to mitigate the impact of flooding. Invariably one of the most successful measures is the implementation of effective land use planning. This document provides the means for implementing the Floodplain Risk Management Plans and associated mapping for the control of development on the floodplain within the City.

1.1 Aims and Objectives of the Policy

- To inform the community of the City's Policy with regard to the use of flood prone land;
- To establish guidelines for the development of flood prone land that are consistent with the NSW Flood Policy and NSW Floodplain Development Manual (2005) as updated by the Floodplain Management Guides;
- To control development and activity within each of the individual floodplains within the City having regard to the characteristics and level of information available for each of the floodplains;
- To minimise the risk to human life and damage to property by controlling development on flood prone land;
- To apply a merit based approach to all development decisions taking into account ecological, social and environmental considerations;
- To ensure that the development or use of floodplains does not adversely impact upon the aesthetic, recreational and ecological values of the waterway corridors;
- To ensure that all land uses and essential services are appropriately sited and designed in recognition of all potential floods;
- To ensure that all development on the floodplain complies with Ecologically Sustainable Development (ESD) principles and guidelines; and
- To promote building design that considers requirements for the development of flood prone land and to ensure that the development of flood prone land does not have significant impacts upon the amenity of an area.

1.2 Background

This Policy has been prepared having regard to the provisions of the NSW Flood Policy and NSW Floodplain Development Manual (2005).

Sydney Local Environmental Plan 2012 (Sydney LEP 2012) requires the consent authority to be satisfied that all new development adequately protects the safety of property and life, and avoid significant adverse impacts on flood behaviour and the environment. Specified flood planning controls apply to all land which is at or below the flood planning level. The requirements set out in Sydney LEP 2012 must be met before development consent is granted.

This Policy is to be read in conjunction with the provisions of Sydney LEP 2012 and Sydney DCP 2012.

1.3 Relationship to other Policies

This Policy is to be read in conjunction with Sydney LEP 2012 and Sydney DCP 2012. It includes but is not limited to the development types listed below:

- Single dwellings, terraces, and dual occupancy buildings;
- Residential flat, commercial and mixed use developments;
- Industrial developments; and
- Other development types and uses, as detailed in the Sydney DCP 2012.

In conjunction with the development type requirements, the Sydney LEP 2012 and Sydney DCP 2012 also require:

- Sustainable water use practices;
- The reduction of stormwater pollution on receiving waterways; and
- That development does not exacerbate the potential for flood damage or hazard for existing development or public domain.

1.4 Application of Policy

The policy is written in an objectives/requirements format. Where an applicant seeks variation from the requirements, appropriate written justification indicating how the proposal meets the relevant objectives, must be provided for the consideration of Council.

2 Application Requirements

2.1 Required Information

Applications must include information that addresses all relevant controls listed within this document and the following matters as applicable:

- a Development applications affected by this Policy shall be accompanied by a survey plan showing:
 - i the position of the existing building/s or proposed building/s;
 - ii the existing ground levels and features to Australian Height Datum around the perimeter of the site and contours of the site; and
 - iii the existing or proposed floor levels to Australian Height Datum.
- b Applications for earthworks, filling of land, infrastructure and subdivision shall be accompanied by a survey plan (with a minimum contour interval of 0.25m) showing relative levels to Australian Height Datum.
- c For large scale developments, or developments that in the opinion of the City are in critical situations, where an existing catchment based flood study is not available, a flood assessment report prepared by a suitably qualified engineer using a hydrologic and hydraulic dynamic one or two dimensional computer model.
- d Where the controls for a particular development proposal require an assessment of structural soundness during potential floods, the following impacts must be addressed:
 - iv hydrostatic pressure;
 - v hydrodynamic pressure;
 - vi impact of debris; and
 - vii buoyancy forces.

Foundations need to be included in the structural analysis. Scour protection may be required at foundations.

3 Development Provisions

The Department of Planning and Infrastructure has produced a group of Model Local Provisions for inclusion in Local Environmental Plans. The Model Local Provisions have been produced to address common topics raised by Councils in Local Environmental Plan preparation and provide them with guidance in what is to be considered in the assessment of development proposals. The Model Clause for Flood Planning has been adopted as clause 7.15 in Sydney LEP 2012. The Performance Criteria listed under Section 3.2 below reflects the considerations specified in Sydney LEP 2012.

Sydney DCP 2012 provides prescriptive planning controls in Section 3.7. The objectives of these planning controls are to:

- Ensure an integrated approach to water management across the City through the use of water sensitive urban design principles.
- Encourage sustainable water use practices.
- Assist in the management of stormwater to minimise flooding and reduce the effects of stormwater pollution on receiving waterways.
- Ensure that development manages and mitigates flood risk, and does not exacerbate the potential for flood damage or hazard to existing development and to the public domain.
- Ensure that development above the flood planning level as defined in the Sydney LEP 2012 will minimise the impact of stormwater and flooding on other developments and the public domain both during the event and after the event.

Note: A number of flood studies and associated flood risk management plans are currently under development. New development will be required to conform to the requirements of these flood studies and associated flood risk management plans once endorsed by Council.

3.1 Performance Criteria

If a proposal does not meet the requirements of the relevant Prescriptive Provisions, consent must not be granted to development unless the consent authority is satisfied with the following the provision and assessment of information relating to the development. The development:

- a is compatible with the established flood hazard of the land. In areas where flood hazard has not been established through previous studies or reports, the flood hazard must be established in accordance with the Floodplain Development Manual considering the following:
 - i Impact of flooding and flood liability is to be managed ensuring the development does not divert floodwaters or interfere with flood storage or the natural function of the waterway;
 - ii Flood behaviour (for example, flood depths reached, flood flow velocities, flood hazard, rate of rise of floodwater);
 - iii Duration of flooding for a full range of events;
 - iv Appropriate flood mitigation works;
 - v Freeboard;
 - vi Council's duty of care – Proposals to address or limit; and
 - vii Depth and velocity of flood waters for relevant flood events.
- b will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties;
- c incorporates appropriate measures to manage risk to life from flood considering the followings:
 - i The proposed development should not result in any increased risk to human life
 - ii Controls for risk to life for floods up to the Flood Planning Level
 - iii Controls for risk to life for floods greater than the Flood Planning Level

- iv Existing floor levels of development in relation to the Flood Planning Level and floods greater than the Flood Planning level
 - v Council's duty of care – Proposals to address and limit
 - vi What level of flooding should apply to the development e.g. 1 in 100 year, etc
 - vii Effective flood access and evacuation issues
 - viii Flood readiness – Methods to ensure relative flood information is available to current and future occupants and visitors;
- d will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of creek or channel banks or watercourses;
 - e is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding;
 - f is consistent with the principles of Ecologically Sustainable Development; and
 - g adequately considers the impact of climate change.

It is to be noted that with regard to climate change, appropriate benchmarks based on the best available current information have been used in producing the flood risk management plans that inform this document.

Some prescriptive requirements such as flood planning level requirements may be relaxed if Council can be satisfied that the projected life of the proposed development is for a relatively short-term and therefore does not warrant the imposition of controls that consider impacts beyond the cessation of the proposed development. This will only be considered for uses where the residual risk to the occupation of the development is considered to be low. This may include certain temporary or demountable structures but would not include residential developments.

3.2 Concessional Development – Minor Additions

- a. The City acknowledges that in some instances, relatively minor building additions will have minimal impact on the floodplain and will not present an unmanageable risk to life. Council will give consideration for the following forms of development on suitable sites:
 - i attached dwelling additions of up to 40m² of habitable floor area at or above the same level as the existing adjoining approved floor level for habitable floor area. The allowance for additions shall be made no more than once for any given development;
 - ii additions to Commercial and Industrial Uses of up to an additional 100 m² or 20% (whichever the less) of the Gross Floor Area of the existing building at no less than the same level as the existing adjoining approved floor level. The allowance for additions shall be made no more than once for any given development.
- b. As part of any consent issued pursuant to this section Council will require:
 - i a restriction on the property title requiring compliance with the flood studies and associated flood risk management plans.
 - ii the existing development is to be suitably upgraded to address the potential impacts of flooding.

3.3 Heritage Considerations

The City acknowledges that certain buildings or structures require preservation due to their heritage significance. Developments with heritage significance can be assessed on a merit based approach provided the following requirements are satisfied:

- i. Expert assessment has identified the structure or development as having heritage conservation value;

- ii. Planning instruments have specifically identified the existing developments having heritage conservation value and provide the appropriate level of statutory protection;
- iii. The highest practical level of flood protection is provided while maintaining an appropriate balance with heritage conservation;
- iv. The proposed development will not be subject to frequent flooding risk that may jeopardise the long term viability or heritage conservation of the development. Comprehensive assessment would be required where the development is subject to flooding in storms more frequent than the 5% AEP flood;
- v. A restriction shall be placed on the property title, identifying the flooding risk and requiring conservation of heritage values.

4 General Requirements

The following ancillary development issues are to be considered in the assessment of proposed development of flood prone land.

Development Type/ Aspect	Objective	Requirement
Fencing	<ul style="list-style-type: none"> • To ensure that fencing does not result in any significant obstruction to the free flow of floodwaters; and • To ensure that fencing will remain safe during floods and not become moving debris that potentially threatens the security of structures or the safety of people. 	Fencing is to be designed and constructed in such a manner that it will not modify the flow of floodwaters and cause damage to surrounding land.
Residential Properties	<ul style="list-style-type: none"> • To minimise the damage to residential properties from flooding; and • To minimise risk to human life from the inundation of residential properties and to minimise economic cost to the community resulting from flooding. 	<ul style="list-style-type: none"> • The proposed residential building or dwelling must be free from flooding up to and including the 1% AEP flood and must meet the Flood Planning Level Requirements detailed in Section 5; and • The proposed residential building or dwelling should not increase the likelihood of flooding on other developments, properties or infrastructure.
Industrial and Commercial Properties	<ul style="list-style-type: none"> • To minimise the damage to industrial and commercial properties from flooding; and • To minimise risk to human life from the inundation of industrial and commercial properties and to minimise economic cost to the community resulting from flooding. 	<ul style="list-style-type: none"> • The City may consider merits-based approaches presented by the applicant. The proposed industrial or commercial buildings must meet the Flood Planning Level Requirements detailed in Section 5; and • The proposed industrial or commercial development should not increase the likelihood of flooding on other developments, properties or infrastructure.

Development Type/ Aspect	Objective	Requirement
Car Parking	<ul style="list-style-type: none"> • To minimise the damage to motor vehicles from flooding; • To ensure that motor vehicles do not become moving debris during floods, which threaten the integrity or blockage of structures or the safety of people, or damage other property; and • To minimise risk to human life from the inundation of basement and other car park or driveway areas. 	<ul style="list-style-type: none"> • The proposed car park should not increase the risk of vehicle damage by flooding inundation; • The proposed garage or car park should not increase the likelihood of flooding on other developments, properties or infrastructure; • The proposed garage or car park must meet the Flood Planning Level Requirements detailed in <i>Section 5</i>; and • Open car parking - The minimum surface level of open space car parking subject to inundation should be designed giving regard to vehicle stability in terms of depths and velocity during inundation by flood waters. Where this is not possible, it shall be demonstrated how the objectives will be met.
Filling of Flood Prone Land	To ensure that any filling of land that is permitted as part of a development consent does not have a negative impact on the floodplain.	Unless a floodplain risk management plan for the catchment has been adopted, which allows filling to occur, filling for any purpose, including the raising of a building platform in flood-prone areas is not permitted without Council approval. Application for any filling must be supported by a flood assessment report from a suitably qualified engineer which certifies that the filling will not increase flood affectation elsewhere.
On-Site Sewer Management (Sewer mining)	<ul style="list-style-type: none"> • To prevent the spread of pollution from on-site sewer management systems during periods of flood; and • To assist in the ongoing operation of on-site sewer management systems during periods of flood. 	The treatment facility must be located above the 1% AEP flood level and must comply with Flood Planning Level requirements, or are otherwise protected and may function if below this level.
Storage of Hazardous Substances	To prevent the potential spread of pollution from hazardous substances.	The storage of products which, in the opinion of the City, may be hazardous or pollute floodwaters, must be placed above the 1% AEP flood level or placed within an area protected by bunds or levels such that no flood waters can enter the bunded area and must comply with the Flood Planning Level requirement for such a facility.

Development Type/ Aspect	Objective	Requirement
Consideration of the Impact of Climate Change	To prevent the potential impact of climate change.	<ul style="list-style-type: none"> • For those developments which have a lifespan of more than fifty years the impact due to sea level rise and impacts due to increased rainfall intensities shall be considered. • Meet the allowances for sea level rise as recommended in the NSW Government Coastal Planning Guideline: Adopting Sea Level Rise 2010 (recently withdrawn from publication). Specifically, this shall include and allowance of 40cm by 2050 and a 90cm by 2100 from the 2009 Mean Sea Level. • Where in the opinion of the City the proposed development is of reasonable impact to regional or catchment trunk drainage, the drainage system design shall allow for a minimum of 10% increased rainfall.

5 Flood Planning Levels

A Flood Planning Level refers to the permissible minimum building floor levels. For below-ground parking or other forms of below-ground development, the Flood Planning Level refers to the minimum level at each access point. Where more than one flood planning level is applicable the higher of the applicable Flood Planning Levels shall prevail.

Development		Type of flooding	Flood Planning Level
Residential	Habitable rooms	Mainstream flooding	1% AEP flood level + 0.5 m
		Local drainage flooding (Refer to Note 2)	1% AEP flood level + 0.5 m or Two times the depth of flow with a minimum of 0.3 m above the surrounding surface if the depth of flow in the 1% AEP flood is less than 0.25 m
		Outside floodplain	0.3 m above surrounding ground
	Non-habitable rooms such as a laundry or garage (excluding below-ground car parks)	Mainstream or local drainage flooding	1% AEP flood level
Industrial or Commercial	Business	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level
	Schools and child care facilities	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level + 0.5m
	Residential floors within tourist establishments	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m
	Housing for older people or people with disabilities	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or a the PMF, whichever is the higher
	On-site sewer management (sewer mining)	Mainstream or local drainage flooding	1% AEP flood level
	Retail Floor Levels	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood. The proposal must demonstrate a reasonable balance between flood protection and urban design outcomes for street level activation.
Below-ground garage/ car park	Single property owner with not more than 2 car spaces.	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m

Development		Type of flooding	Flood Planning Level
	All other below-ground car parks	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or the PMF (whichever is the higher) See Note 1
	Below-ground car park outside floodplain	Outside floodplain	0.3 m above the surrounding surface
Above ground car park	Enclosed car parks	Mainstream or local drainage flooding	1% AEP flood level
	Open car parks	Mainstream or local drainage	5% AEP flood level
Critical Facilities	Floor level	Mainstream or local drainage flooding	1% AEP flood level + 0.5m or the PMF (whichever is higher)
	Access to and from critical facility within development site	Mainstream or local drainage flooding	1% AEP flood level

Notes

- 1) The below ground garage/car park level applies to all possible ingress points to the car park such as vehicle entrances and exits, ventilation ducts, windows, light wells, lift shaft openings, risers and stairwells.
- 2) Local drainage flooding occurs where:
 - The maximum cross sectional depth of flooding in the local overland flow path through and upstream of the site is less than 0.25m for the 1% AEP flood; and
 - The development is at least 0.5m above the 1% AEP flood level at the nearest downstream trapped low point; and
 - The development does not adjoin the nearest upstream trapped low point; and
 - Blockage of an upstream trapped low point is unlikely to increase the depth of flow past the property to greater than 0.25m in the 1% AEP flood.
- 3) Mainstream flooding occurs where the local drainage flooding criteria cannot be satisfied.
- 4) A property is considered to be outside the floodplain where it is above the mainstream and local drainage flood planning levels including freeboard.

6 Flood Compatible Materials

Where required for development, the following materials are to be applied. Materials not listed may be accepted by Council subject to certification of the suitability of the material of the manufacturer.

Component	Flood Compatible Material
Flooring and Sub-floor	<ul style="list-style-type: none"> Concrete slab-on-ground monolith construction Suspended reinforced concrete slab
Wall Structure	<ul style="list-style-type: none"> Solid brickwork, blockwork, reinforced concrete or mass concrete
Wall and Ceiling Linings	<ul style="list-style-type: none"> Fibro-cement board Brick, face or glazed Clay tile glazed in waterproof mortar Concrete Concrete block Steel with waterproof applications Stone, natural solid or veneer, waterproof grout Glass blocks Glass Plastic sheeting or wall with waterproof adhesive
Roof Structure	<ul style="list-style-type: none"> Reinforced concrete construction Galvanised metal construction
Doors	<ul style="list-style-type: none"> Solid panel with water proof adhesives Flush door with marine ply filled with closed cell foam Painted metal construction Aluminium or galvanised steel frame
Insulation	<ul style="list-style-type: none"> Closed cell solid insulation Plastic/polystyrene boards
Windows	<ul style="list-style-type: none"> Aluminium frame with stainless steel rollers or similar corrosion and water resistant material.
Nails, Bolts, Hinges and Fittings	<ul style="list-style-type: none"> Brass, nylon or stainless steel Removable pin hinges Hot dipped galvanised steel wire nails or similar
Main Power Supply	<ul style="list-style-type: none"> Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, shall be located above the designated flood planning level. Means shall be available to easily disconnect the dwelling from the main power supply.
Wiring	<ul style="list-style-type: none"> All wiring, power outlets, switches, etc., should be located above the designated flood planning level. All electrical wiring installed below this level should be suitable for continuous underwater immersion and should contain no fibrous components. This will not be applicable for below-ground car parks where the car park complies with flood planning level requirements. Earth leakage circuit-breakers (core balance relays) or Residual Current Devices (RCD) must be installed. Only submersible type splices should be used below maximum flood level. All conduits located below the relevant designated flood level should be so installed that they will be self-draining if subjected to flooding.
Electrical Equipment	<ul style="list-style-type: none"> All equipment installed below or partially below the designated flood planning level should be capable of disconnection by a single plug and socket assembly.

Component	Flood Compatible Material
Heating and Air Conditioning Systems	<ul style="list-style-type: none"> Heating and air conditioning systems should be installed in areas and spaces of the house above the designated flood planning level.
Fuel storage for heating purposes	<ul style="list-style-type: none"> Heating systems using gas or oil as a fuel should have a manually operated valve located in the fuel supply line to enable fuel cut-off. The heating equipment and related fuel storage tanks should be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. The tanks should be vented above the flood planning level.
Ducting for heating/cooling purposes	<ul style="list-style-type: none"> All ductwork located below the relevant flood level should be provided with openings for drainage and cleaning. Self-draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the relevant flood level, a closure assembly operated from above relevant flood level should protect the ductwork.

Responsibilities

The Technical Services Manager is responsible for the development and revision of the policy. The City's Planning team together with the Public Domain team are responsible for communicating the policy and ensuring systems are in place to validate its compliance.

Consultation

The initial draft edition of the Interim Floodplain Management Policy was first reviewed by internal stakeholders of the City including City Operations and City Planning divisions. The Policy was then revised to take account of this input.

The City's Floodplain Risk Management Committee was initially informed regarding the need for the interim policy in December 2012. During the March 2013 Floodplain Risk Management Committee meeting a presentation was made by City staff regarding the draft policy. Copies of the policy were then provided to all Committee members for comment. Some minor changes were then made to the draft policy following feedback from committee members.

References

Laws and standards	<ul style="list-style-type: none">• Local Government Act 1993, Section 733• Environment Planning and Assessment Act 1979
Policies and procedures	<ul style="list-style-type: none">• <i>Floodplain Development Manual: the management of flood liable land</i>, New South Wales Government, Published April 2005• Sydney LEP 2012• Sydney DCP 2012• South Sydney DCP 1997, Green Square precinct amended 2006

Approval

Council approved this policy on 12 May 2014.

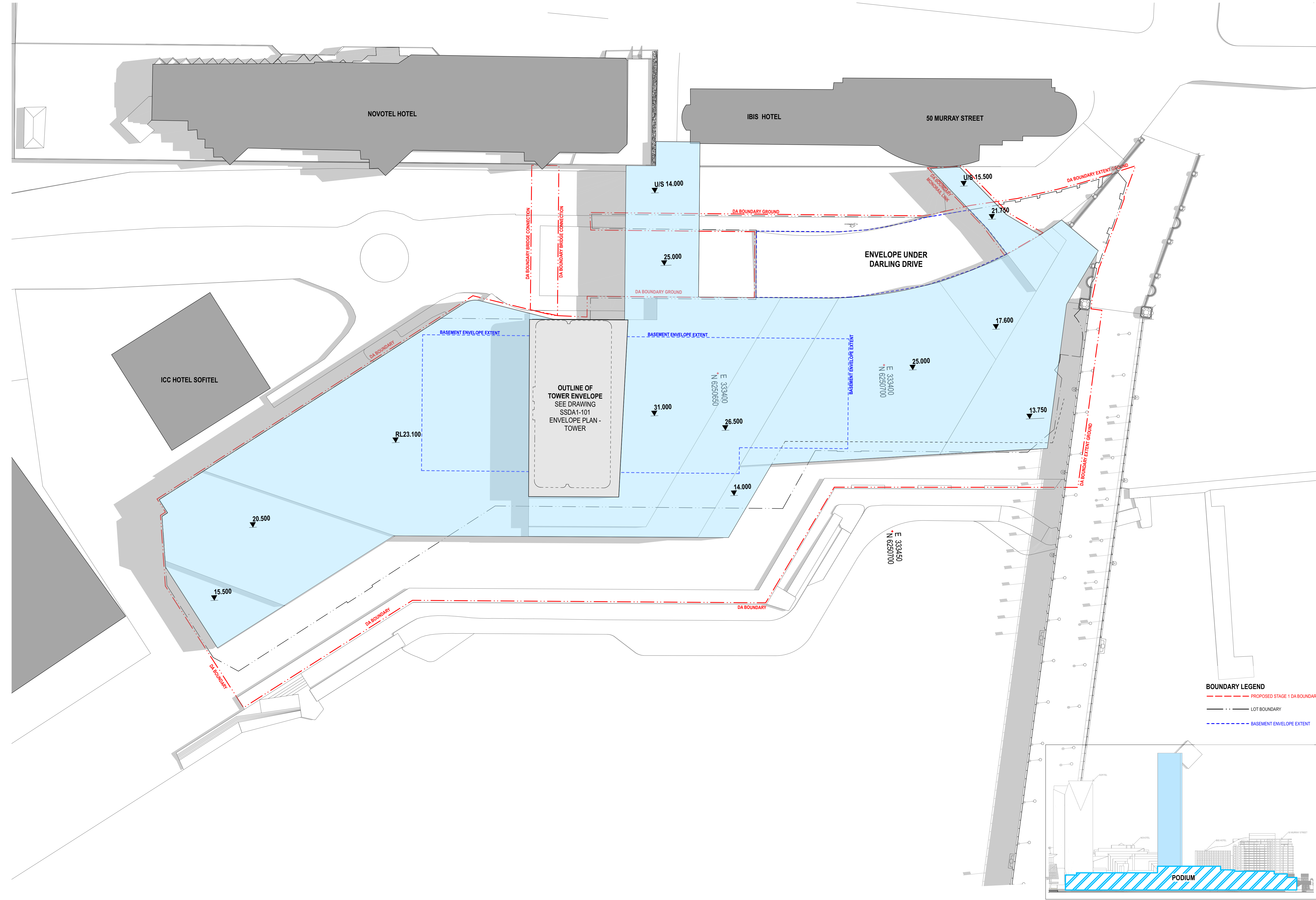
Review

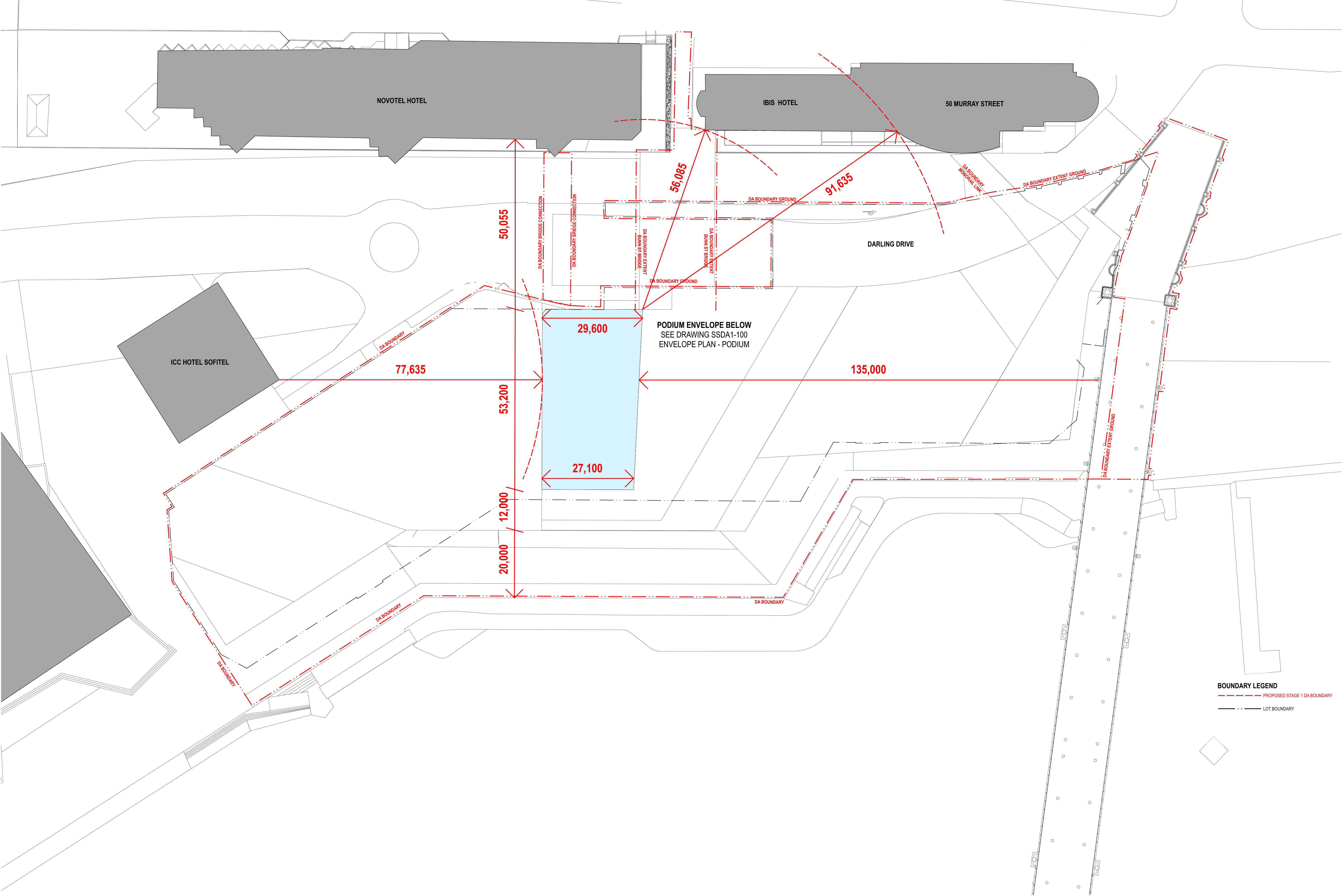
Review period	Next review date	TRIM reference
City Operations will review this policy every 2 years	May 2016	2014/216277

APPENDIX G

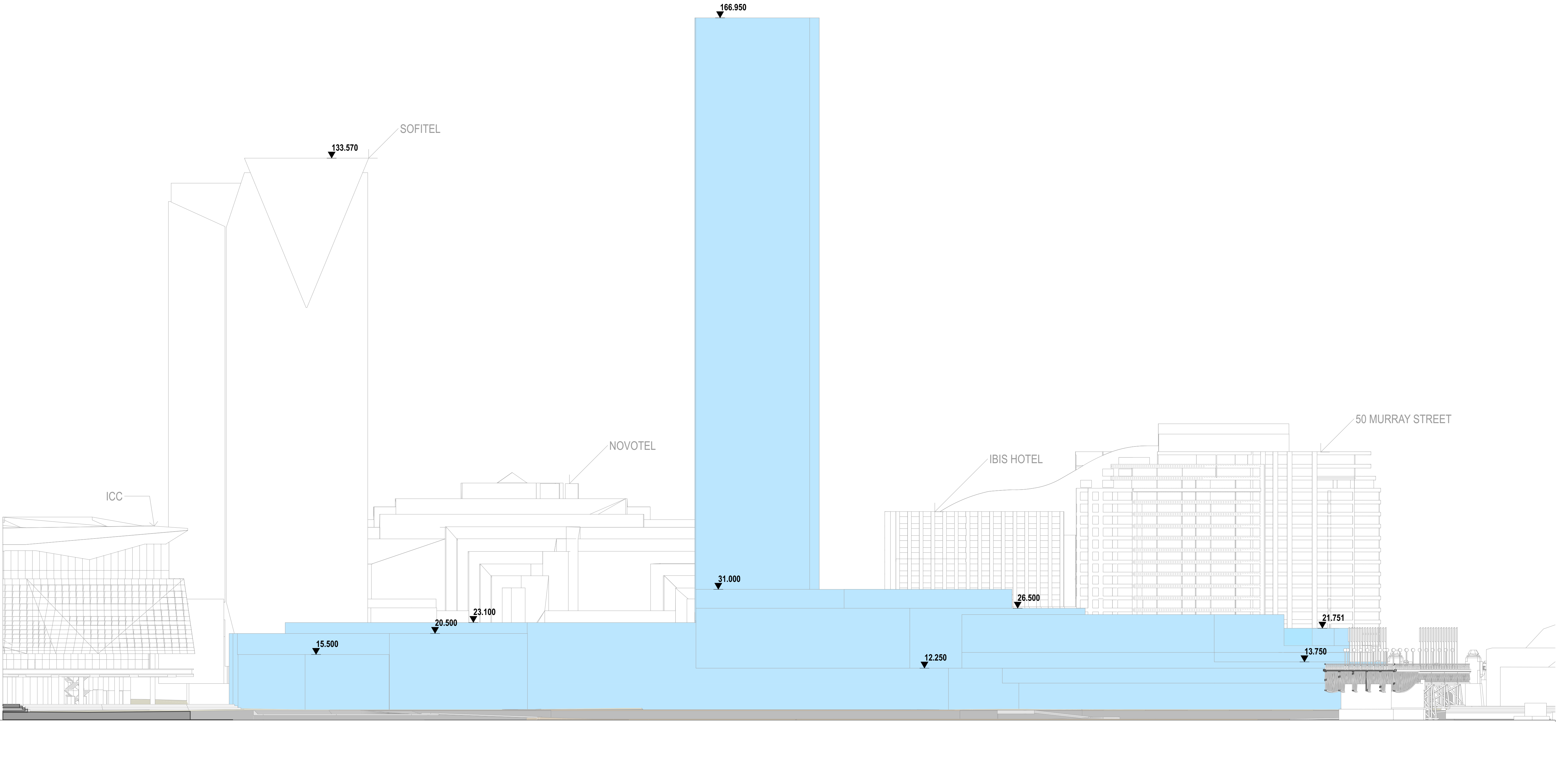
Harbourside Re-development Concept Plan

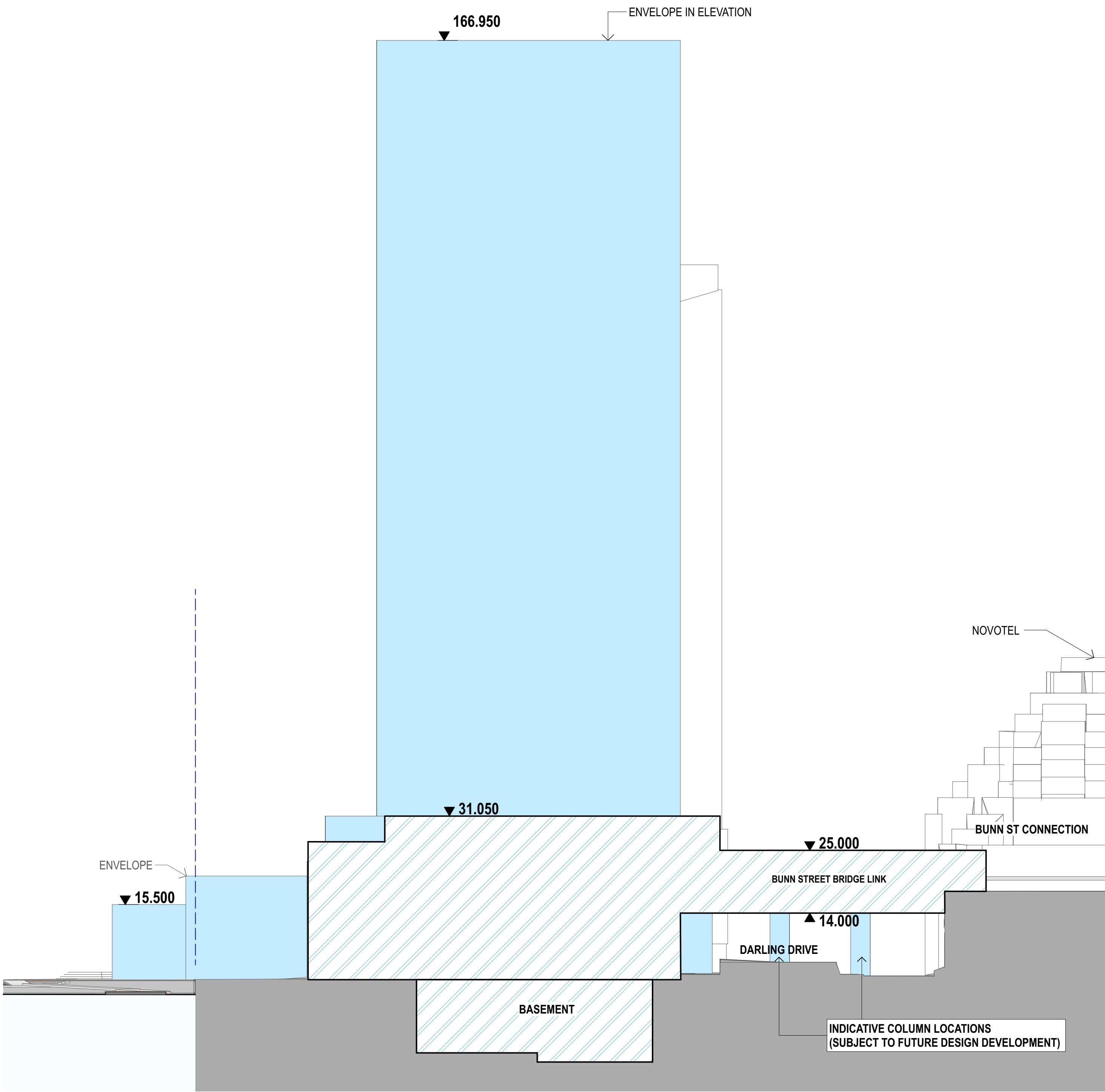
(concept plan 'Harbourside Shopping Centre Sydney, Australia' September 2020, prepared by FJMT Architects) Proposed development plans shown in this report are indicative only and are subject to change in future design stages.



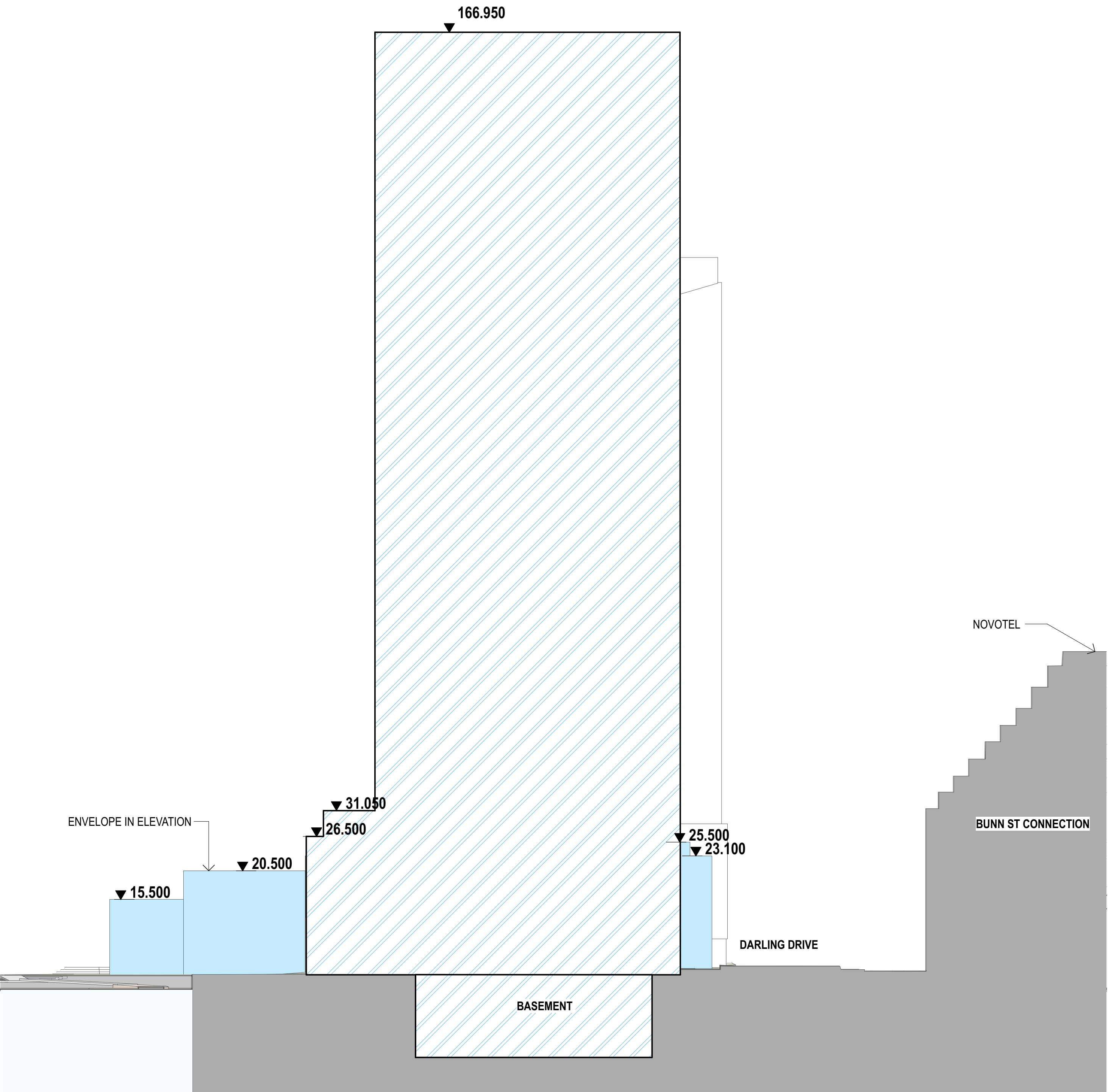


BOUNDARY LEGEND
- - - - - PROPOSED STAGE 1 DA BOUNDARY
... .. LOT BOUNDARY

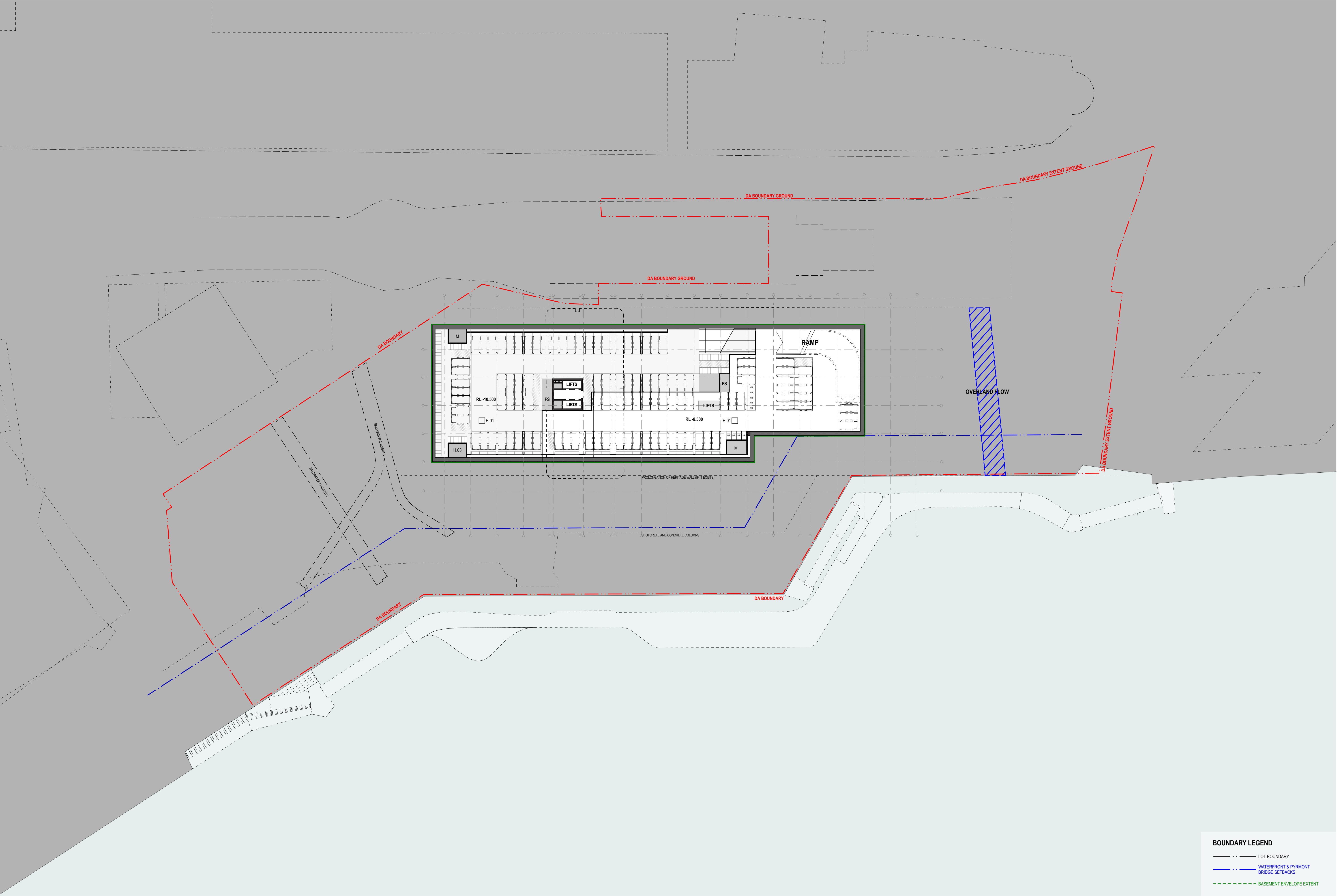


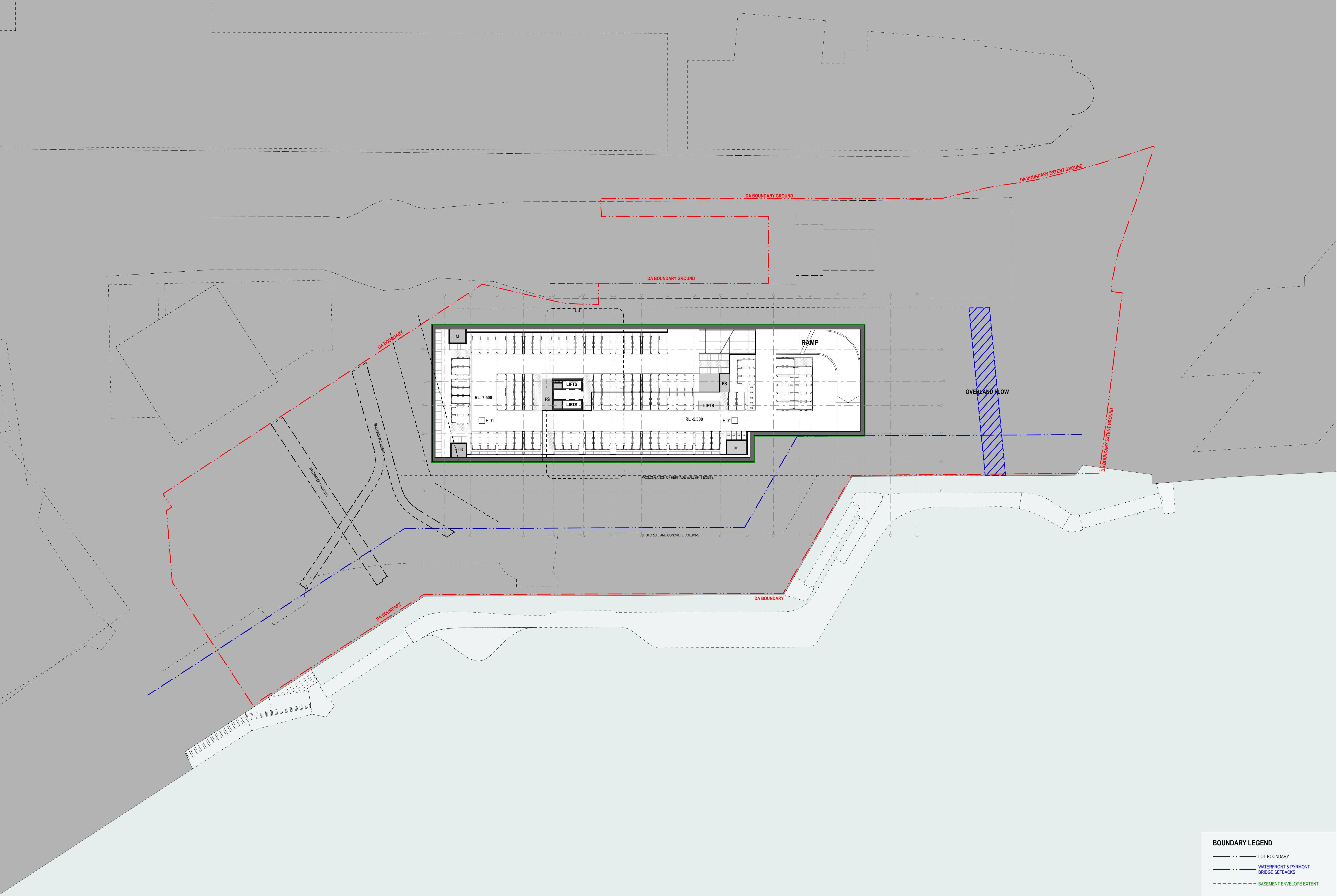


SECTION ENVELOPE Section 1
1:500



SECTION ENVELOPE SECTION 2
1:500





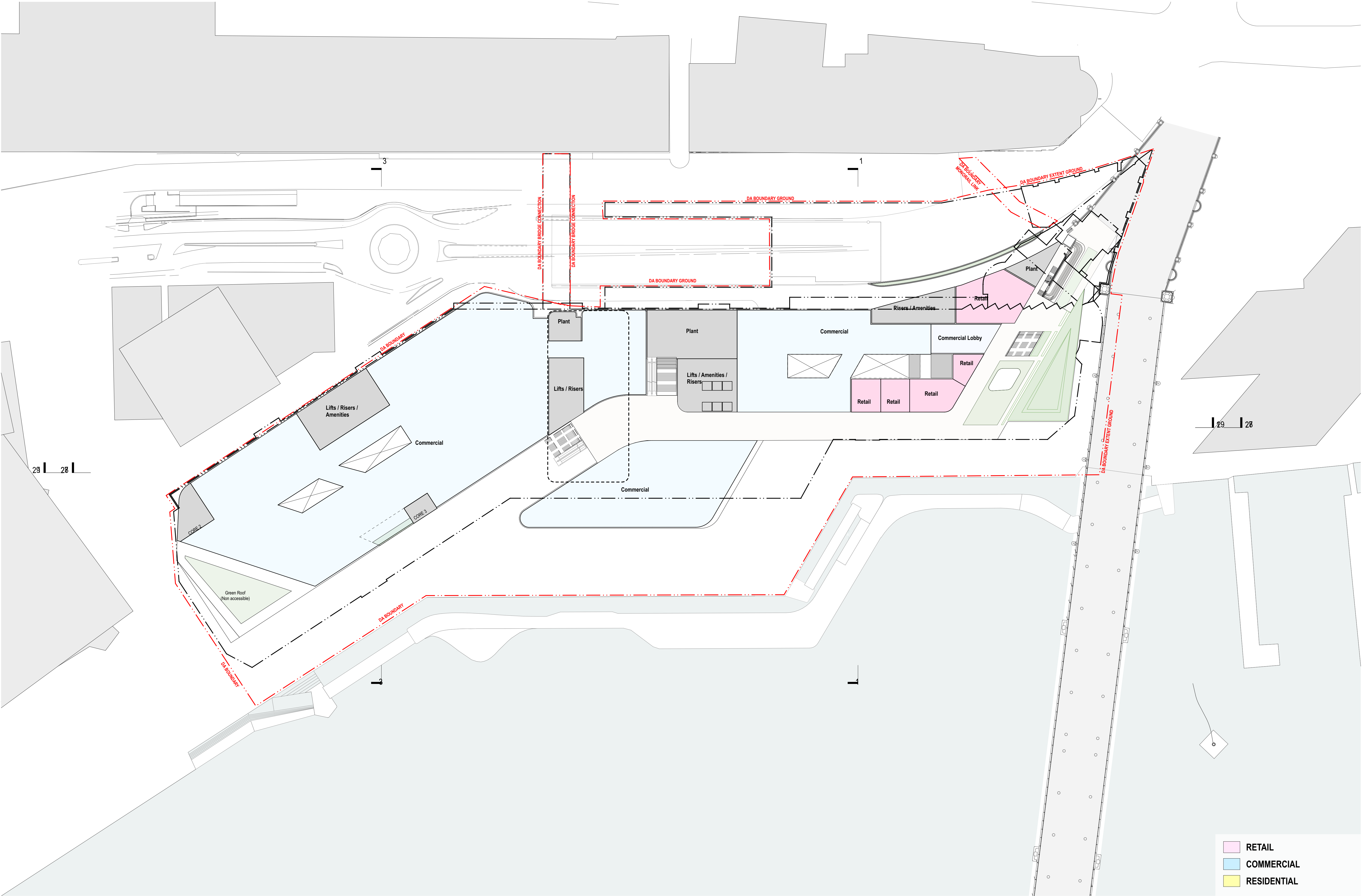
BOUNDARY LEGEND

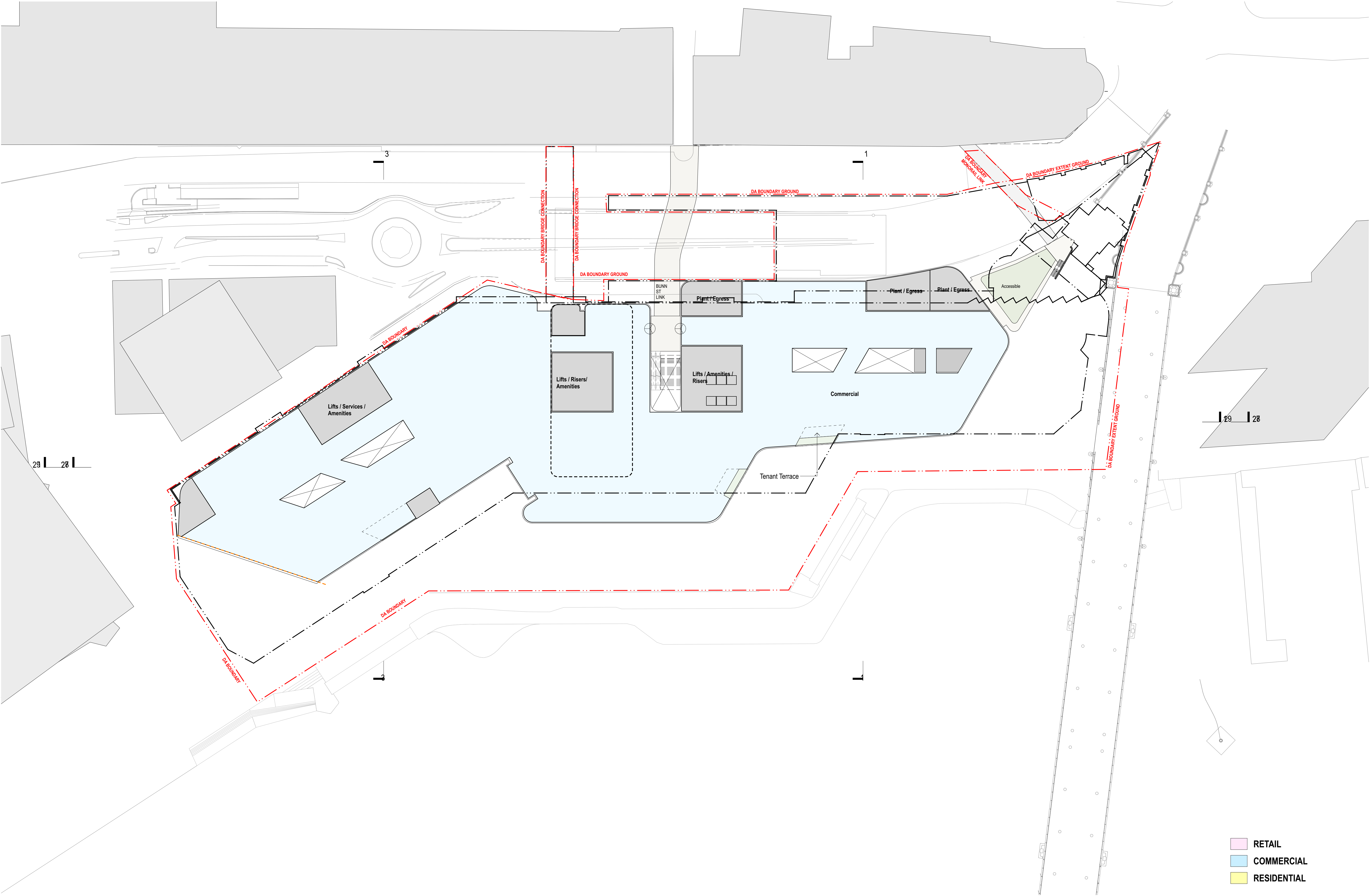
- LOT BOUNDARY
- WATERFRONT & PYRMONT BRIDGE SETBACKS
- BASEMENT ENVELOPE EXTENT

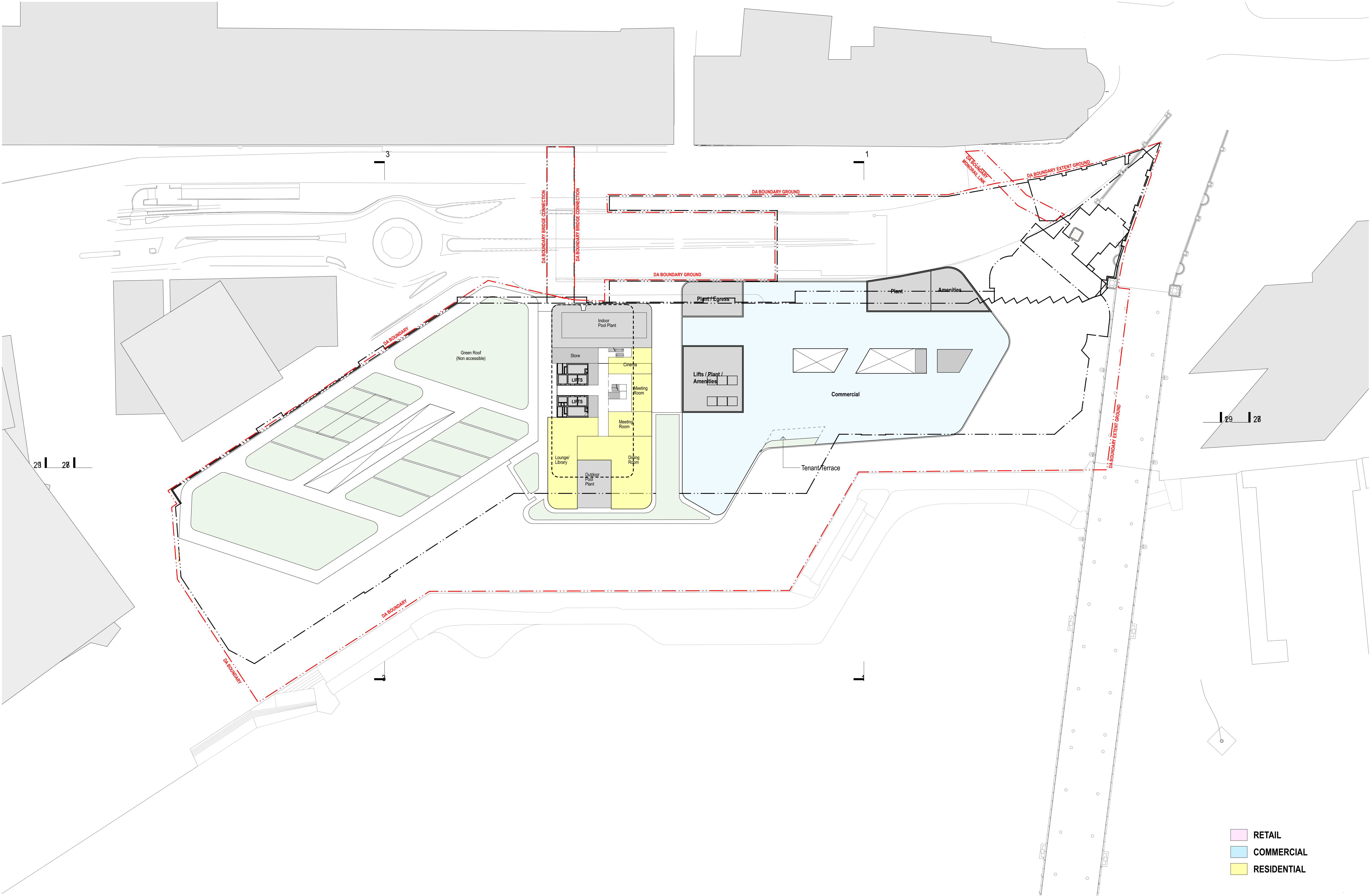


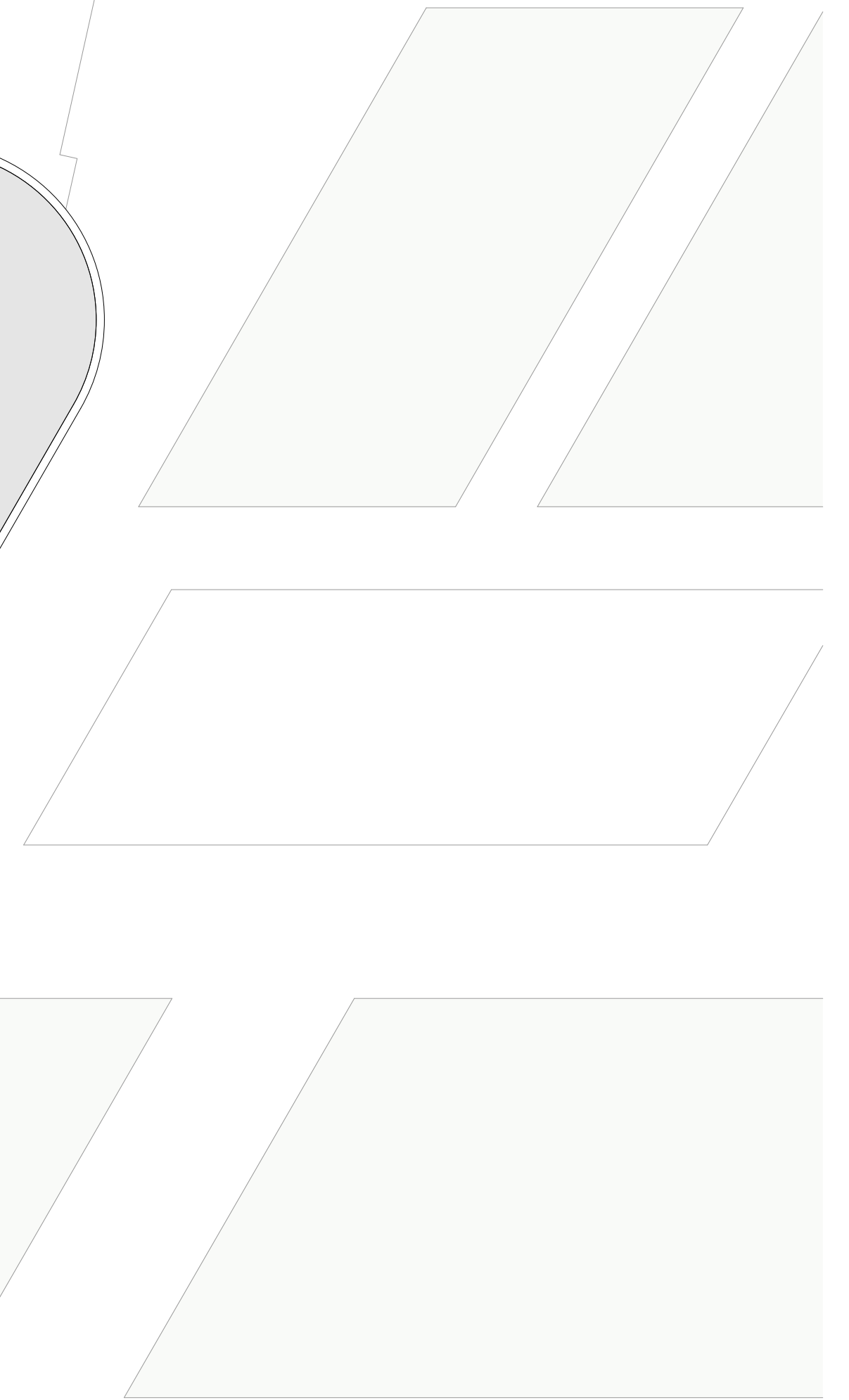
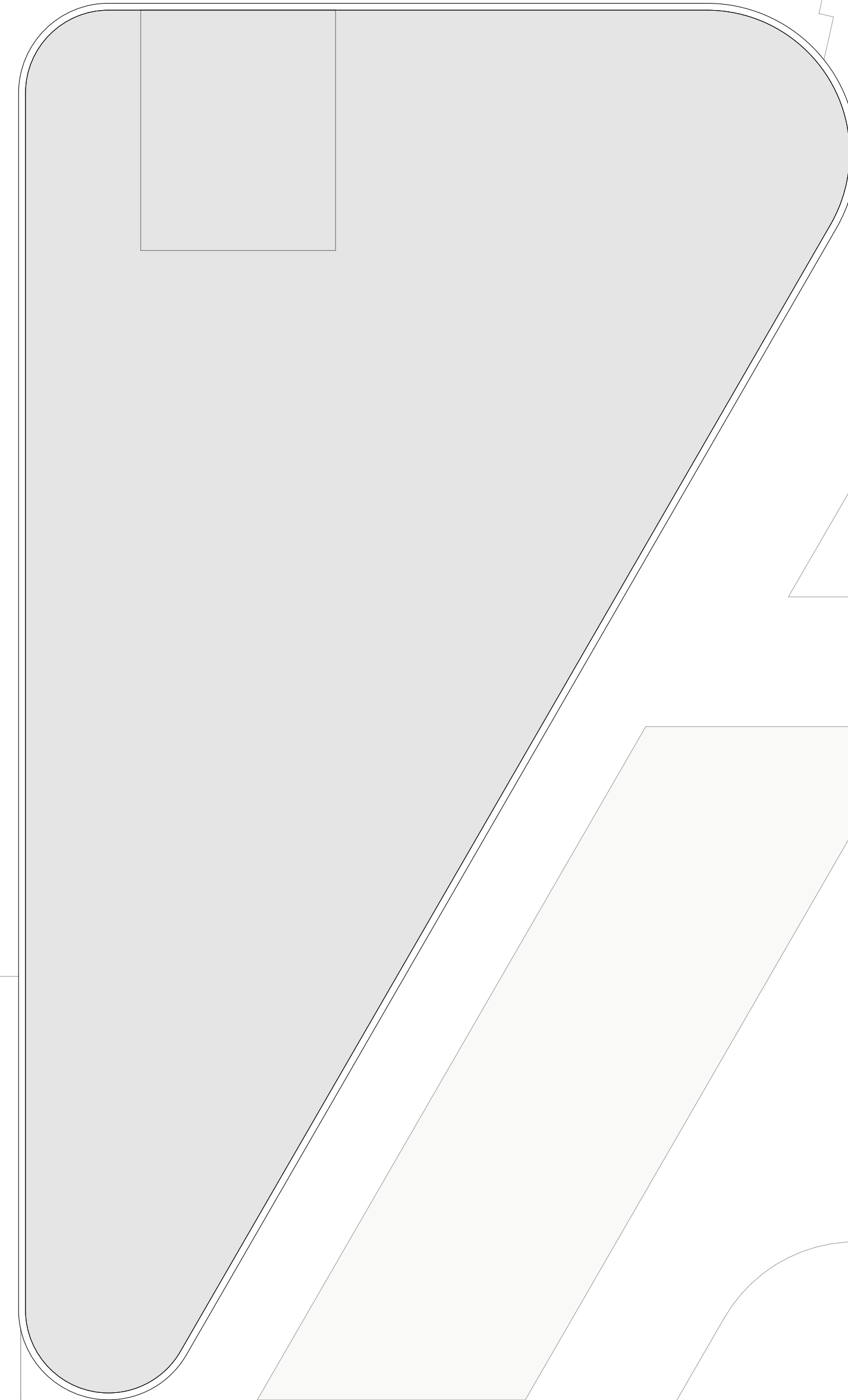
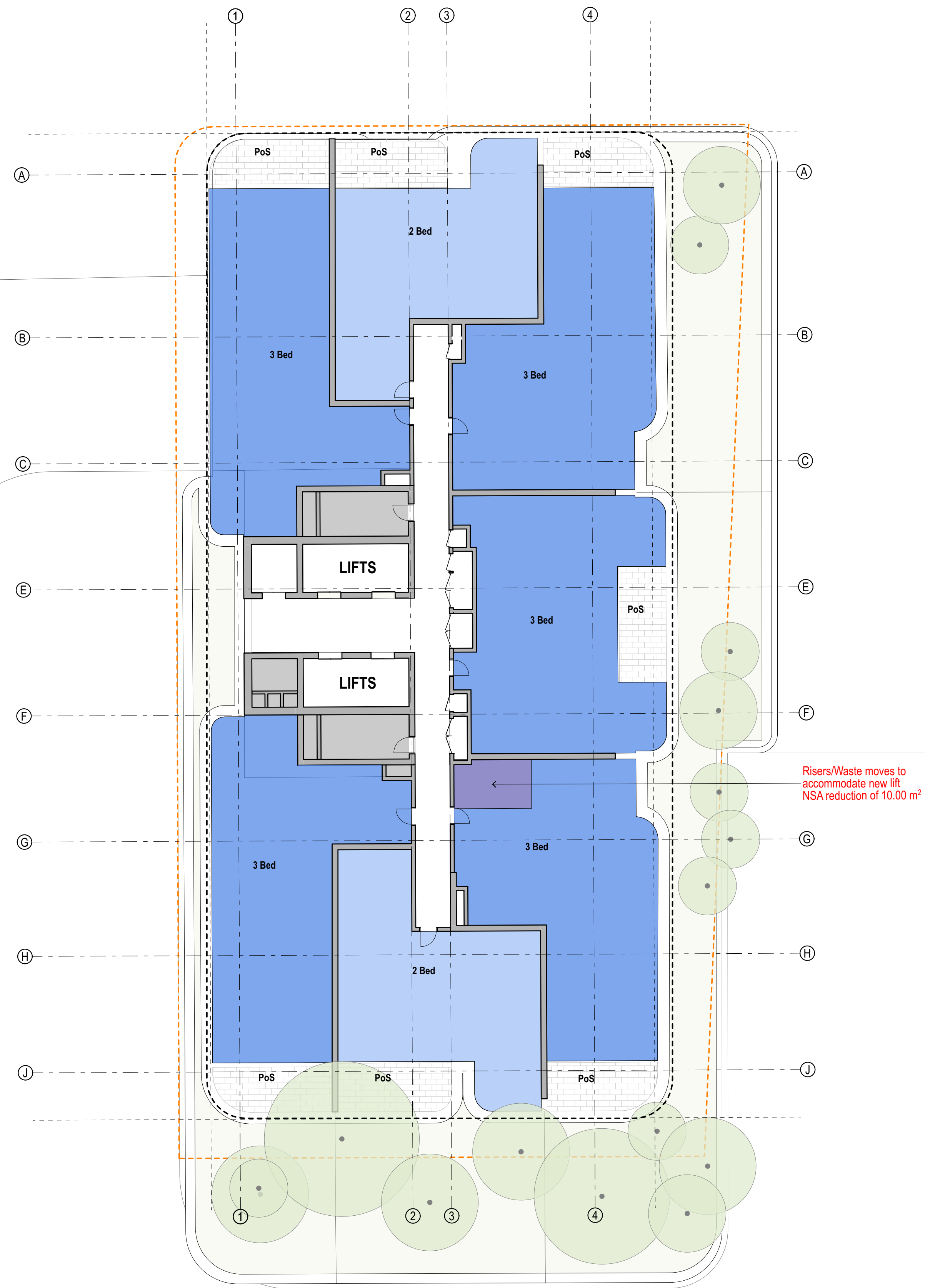
BOUNDARY LEGEND

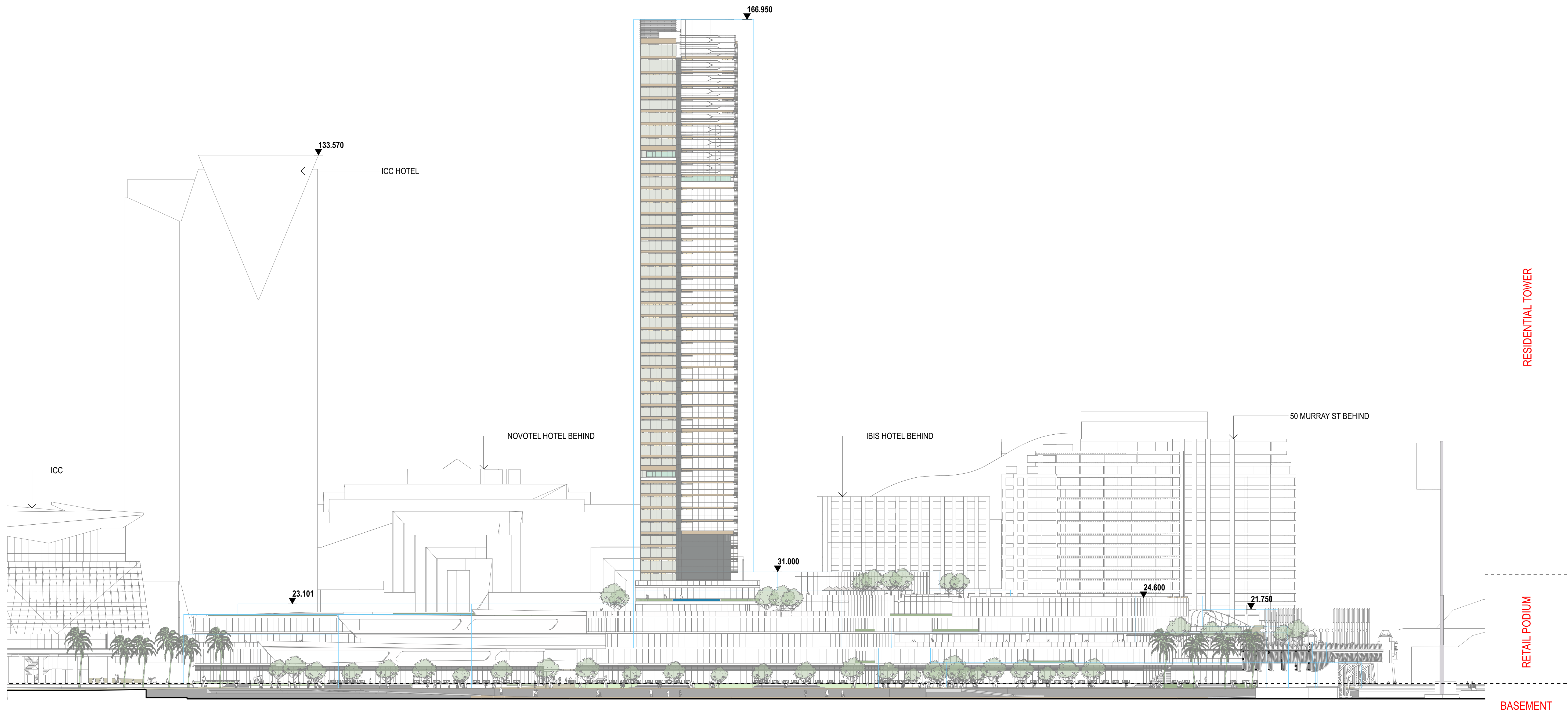
- LOT BOUNDARY
- WATERFRONT & PYRMONT BRIDGE SETBACKS
- BASEMENT ENVELOPE EXTENT

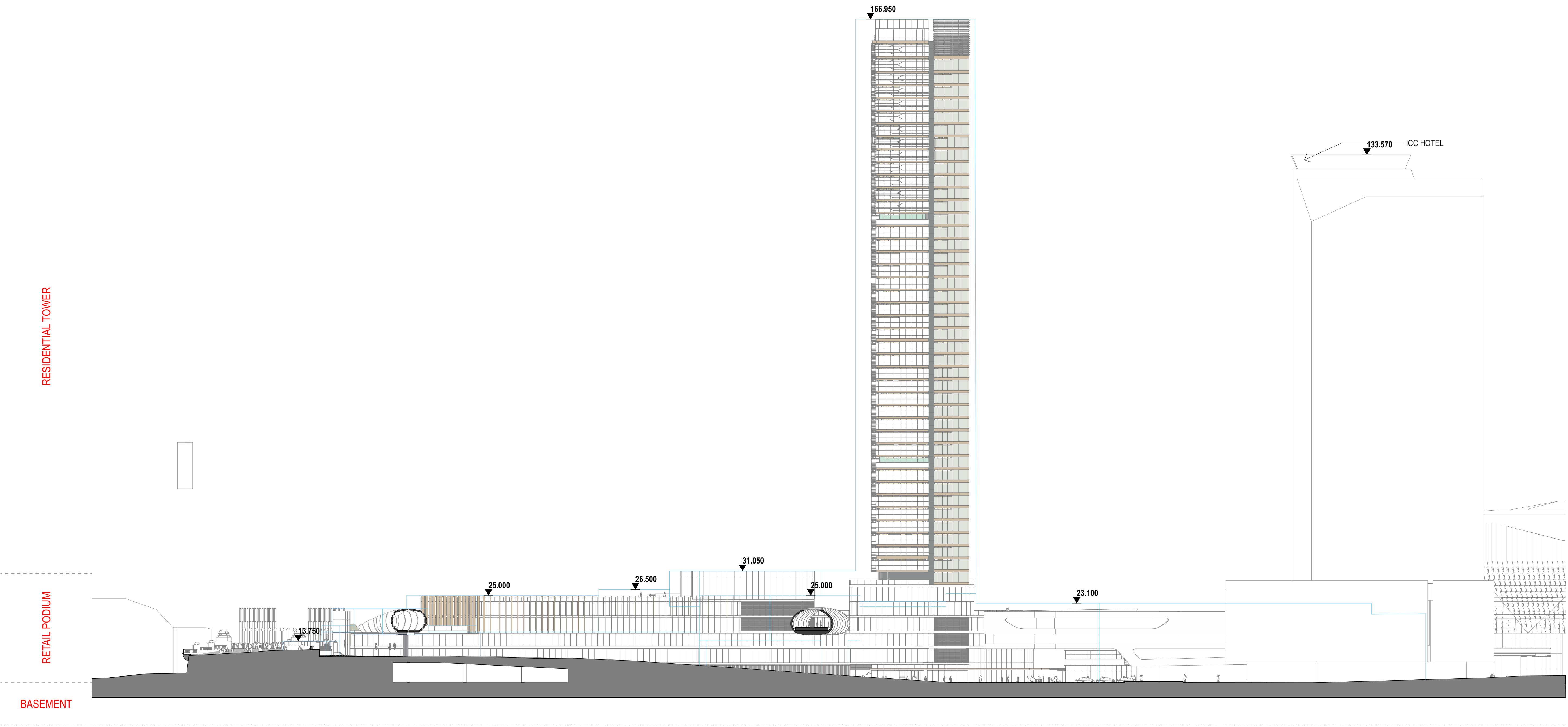


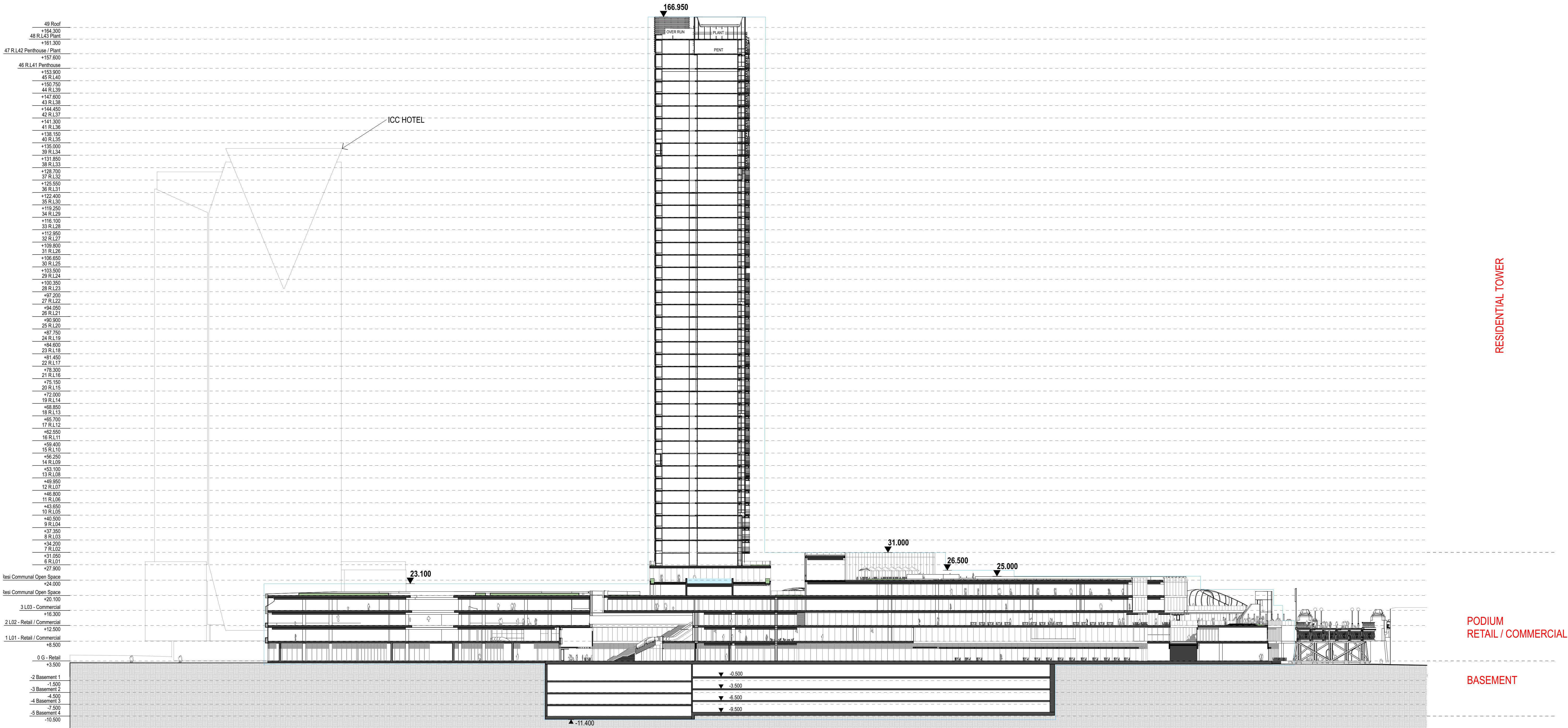












APPENDIX H

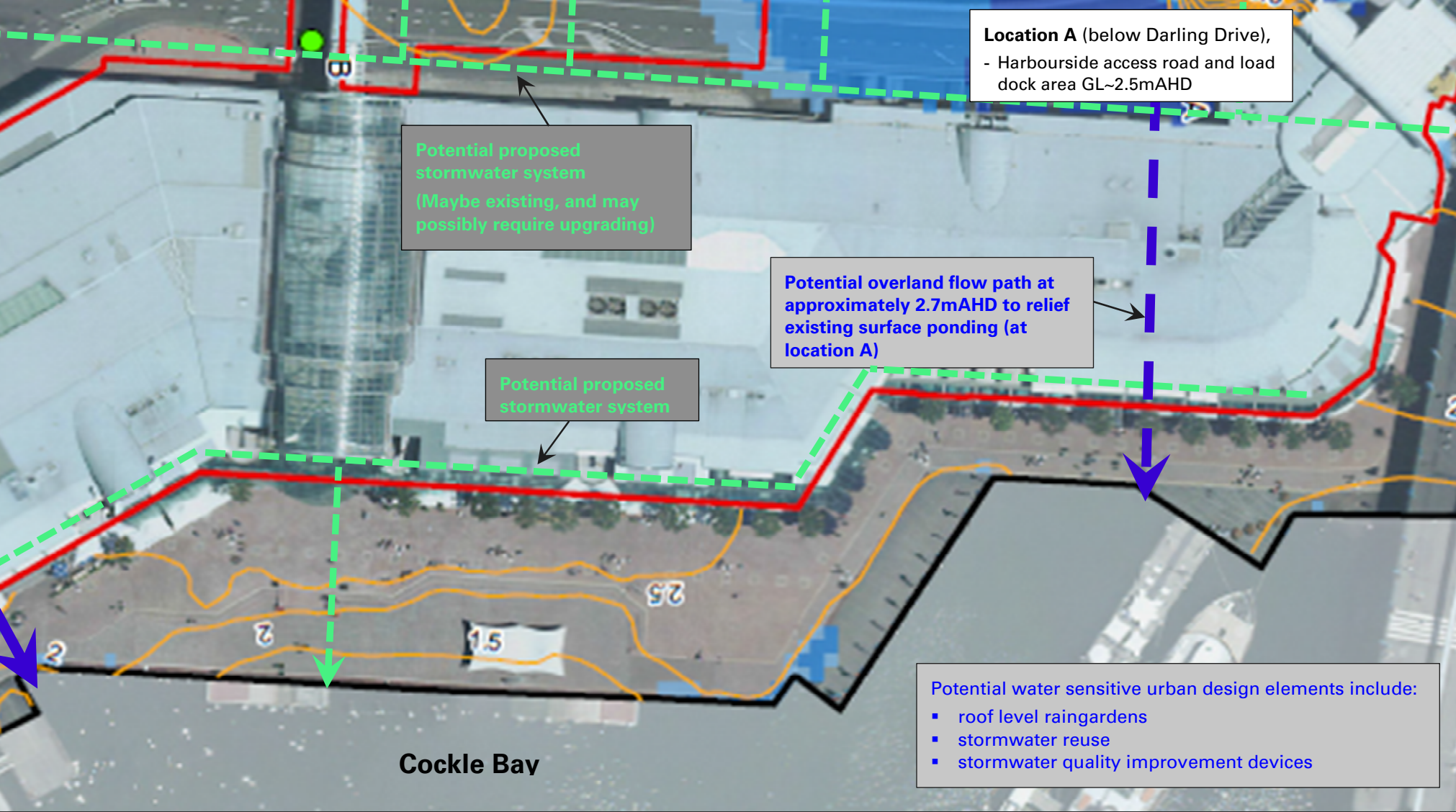
Flood Estimation Terminology

(Extract from Australian Rainfall and Runoff 'Terminology Draft Discussion Paper' ARR Website 18/06/2015)

Table 1.1 Australian Rainfall and Runoff Preferred Terminology

EY	AEP (%)	AEP (1 in x)	ARI	Use
6	99.75	1.002	0.17	WSUD
4	98.17	1.02	0.25	
3	95.02	1.05	0.33	
2	86.47	1.16	0.50	
1	63.21	1.58	1.00	
0.69	50.00	2	1.44	Stormwater/pit and pipe design
0.5	39.35	2.54	2.00	
0.22	20.00	5	4.48	
0.2	18.13	5.52	5.00	
0.11	10.00	10	9.49	Flooding
0.05	5.00	20	20	
0.02	2.00	50	50	
0.01	1.00	100	100	
0.005	0.50	200	200	
0.002	0.20	500	500	
0.001	0.10	1000	1000	
0.0005	0.05	2000	2000	
0.0002	0.02	5000	5000	
				Limit CRC FORGE
				Extreme risk /Dams

DRAWINGS



own)

