STRATEGIC PLANNING AND DEVELOPMENT COMMITTEE MEETING

ATTACHMENTS UNDER SEPARATE COVER

7.30 PM, TUESDAY 4 NOVEMBER 2025

Waverley Council
PO Box 9
Bondi Junction NSW 1355
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Tel: 9083 8000
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ATTACHMENTS

PD/5.2/25.11 Planning Proposal - 69-71 Roscoe Street and 49-59 Hall Street, Bondi Beach

1 Council Planning Proposal Report 2
2 Proponent Planning Proposal Report 18
3 Urban Design and Architecture Report 64
4 Traffic Impact Assessment 109
5 Economic Land Use Report 172

PD/5.3/25.11 Flood Risk Management Study and Plan and Waverley Development Control Plan 2022 – Exhibition

1 Draft Flood Risk Management Study and Plan 182



PLANNING PROPOSAL

Permissible uses at 49-59 Hall Street & 69-71 Roscoe Street Bondi Beach

PP-1/2025

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Planning proposal Information

Table 1 – Council Versions

No.	Date	Version
1	15 August 2025	Waverley Local Planning Panel
2	3 September 2025	Council for Gateway determination (deferred)
3.	29 October 2025	Council for Gateway determination

EXECUTIVE SUMMARY

This planning proposal seeks to amend the Waverley Local Environmental Plan (WLEP) 2012 to introduce additional permitted uses at 49–59 Hall Street and 69–71 Roscoe Street, Bondi Beach. Specifically, the amendment would allow 'residential flat building' as an additional permitted use on the E1 Local Centre zoned lots on Hall Street, and 'shop top housing' as an additional permitted use on the R3 Medium Density Residential zoned lots at Roscoe Street.

This will enable the mixed-use development with basement to span all of the lots within the site, improving urban design outcomes and enabling housing supply in Bondi Beach.

The key matters contemplated in the consideration of the planning proposal were urban design and streetscape, site isolation and traffic. The planning proposal would facilitate the redevelopment of the site in an orderly manner. Traffic generated from the proposal would not be significantly altered compared to a compliant scheme or the currently approved development scheme. The proponent has made attempts in good faith to avoid the isolation of sites on Roscoe Street. The site is located within a prominent location in the Bondi Village and the incorporation of sites on Roscoe Street is considered to be a logical expansion of the footprint of this centre. In summary, Council officers consider that the proposal can be supported to proceed to a gateway determination.

INTRODUCTION

A planning proposal has been prepared by LK Planning on behalf of Hall Street by HSN Pty Ltd and Hall Street Property A Pty Ltd and Hall Street Property B Pty Ltd (herein referred to as HSN Property Group / the Proponent) and submitted to Waverley Council as the planning proposal Authority.

The purpose of the amendment is to introduce additional permitted uses to allow:

- 'Shop top housing' on the Roscoe Street (R3 zoned) land; and
- 'Residential flat building' on the Hall Street (E1 zoned) land.

No changes are proposed to the zoning, building height, or floor space ratio maps. The proposal is supported by urban design, architectural, and economic studies and is consistent with relevant local and regional strategies.

The planning proposal is considered a Standard planning proposal under the LEP Making Guidelines (August 2023).

AFFECTED LAND

This planning proposal applies to the following land parcels:

- 49 Hall Street (Lot 11, Section 4, DP 747)
- 51 Hall Street (SP 21058)
- 53–55 Hall Street (Lot 4, Section 8, DP 747)
- 57 Hall Street (Lot 1, DP 516525)
- 59 Hall Street (Lot 2, DP 516525)

- 69 Roscoe Street (Lot 2, DP 506227); and
- 71 Roscoe Street (Lot 1, DP 506227).

Combined, the subject site spans approximately 2,911m² and has dual frontages to Hall Street and Roscoe Street.

BACKGROUND AND EXISTING CONTROLS

An existing development consent (DA-501/2022) applies to part of the subject site at 53–59 Hall Street. This approval permits a four-storey shop top housing development comprising:

- Basement car parking accessed from Hall Street;
- Ground floor commercial premises activating Hall Street;
- Three storeys of residential apartments above, including both market and affordable housing;
- Private balconies and communal open space; and
- Associated landscaping and public domain improvements.

Since the granting of DA-501/2022, the Proponent has acquired adjoining sites at 49–51 Hall Street and 69–71 Roscoe Street, enabling a larger consolidated development footprint.

A subsequent development application (DA-327/2025) is currently under consideration for the expanded site. This revised scheme proposes:

- A single basement level extending beneath the entire consolidated site;
- Relocation of the entrance to the basement carpark from Hall Street to Roscoe Street, removing the existing crossover from the main retail frontage;
- Continuous ground floor commercial activation along Hall Street;
- A mix of market and affordable housing in the upper levels; and
- Public domain works.

The planning proposal seeks an amendment to facilitate these changes by allowing the consolidated scheme to proceed under the same key development parameters.

Under WLEP 2012 the Hall Street site is zoned *E1 Local Centre*, which permits commercial premises and shop top housing, but prohibits residential flat buildings. The Roscoe Street site is zoned *R3 Medium Density Residential*, which permits residential flat buildings but prohibits shop top housing. This arrangement prohibits the necessary crossover of land uses to allow for shared basement access proposed under DA-501/2022. This planning proposal seeks to resolve this through a site-specific amendment (Additional Permitted Uses) to Schedule 1 of WLEP 2012.

SITE CONTEXT

Hall Street is a vibrant retail street and is one of the main hubs of activity in the Bondi Beach village centre. It forms part of Council's pedestrian-priority network and is identified for enhancement in the Waverley Centres Strategy. The section of Hall Street where the site is located is characterised by single lot retail tenancies ranging from 11m to 14 metres in width. A notable exception to this is the Adina Hotel, which has a longer frontage of approximately 58 metres. The street level interface of the Adina hotel is two retail tenancies (Bill's all-day café and restaurant and Gelato Messina) and the entrance to "The Hub" retail arcade.

Roscoe Street is primarily a residential street, although "The Hub" provides a pedestrian thoroughfare that links through from Hall Street to Roscoe Street, and at the Roscoe-end there is a restaurant which has glass louvres opening onto Roscoe Street. To the east of the restaurant are terrace dwellings and the Iluka childcare centre. To the west of the retail tenancies are residential dwellings.

The site is located approximately 300m northwest of Bondi Beach.

PART 1 – OBJECTIVES AND INTENDED OUTCOMES

1.1 Description Statement

This planning proposal seeks to amend Schedule 1 of WLEP 2012 to introduce additional permitted uses that will:

- Enable a single basement and integrated vehicle access from Roscoe Street
- Remove four existing vehicular crossings from Hall Street to improve walkability and retail continuity
- Deliver diverse and affordable housing in a well-located centre
- Enhance the public domain and urban character of Hall Street
- Contribute to housing supply and strategic targets identified in the LSPS and Housing Strategy.

PART 2 – EXPLANATION OF PROVISIONS

2.1 Intended Provisions

The wording of the provisions aims to introduce the additional permitted uses while effectively still requiring the Hall Street frontage to present as "shop top housing" i.e. retail retained on the ground and similarly require development on Roscoe Street to present as a "residential flat building" to integrate with the site's context and mimic what could be achieved under a compliant scheme. This proposed changes to the Waverley Local Environmental Plan 2012 are summarised in **Table 2**.

Table 2 – Proposed changes to WLEP 2012

Section of the WLEP 2012	Existing	Proposed
Schedule 1	-	Insert new clause: ***For 69–71 Roscoe Street (Lot 1 & Lot 2, DP 506227):***

		Development for the purposes of shop top housing is permitted with consent if: *a) the ground floor is used for residential accommodation only, except for access arrangements; and* *b) the use facilitates basement access associated with the Hall Street site.*
Schedule 1	-	Insert new clause: ***For 49–59 Hall Street (Lot 11, Sec 4, DP 747; SP 21058; Lot 4, Sec 8, DP 747; Lots 1–2, DP 516525):*** *Development for the purposes of a residential flat building is permitted with consent if:* *a) the ground floor is used for commercial premises only, except for access arrangements; and* *b) the use facilitates basement parking associated with the Roscoe Street site.*

Note: The specific wording to be added to Schedule 1 is subject to drafting by NSW Parliamentary Counsel. The above is an example for discussion purposes.

PART 3 – JUSTIFICATION OF STRATEGIC AND SITE-SPECIFIC MERIT

This section details the reasons for the proposed LEP amendment and is based on a series of questions and matters for consideration as outlined in the LEP Making Guidelines (August 2023). The issues to be addressed include the strategic planning context of the amendments, Strategic Merit, Site-Specific Merit, potential State and Commonwealth agency interests, and environmental, social and economic impacts.

Table 3 – Assessment of Proposal against Strategic Merit Test

a) Does the proposal:	
Give effect to the relevant regional plan outside of the Greater Sydney Region, the relevant district plan within the Greater Sydney Region, and/or a corridor/precinct plan applying to the site. This includes any draft regional, district or corridor/precinct plans released for public comment or a place strategy for a strategic precinct including any draft place strategy; or	Yes, it is consistent with the Greater Sydney Regional Plan and Eastern City District Plan as discussed later in this report.
Demonstrate consistency with the relevant LSPS or strategy that has been endorsed by the Department or required as part of a regional or district plan; or	Yes, it is consistent with the Waverley Local Strategic Planning Statement as discussed later in this report.
Respond to a change in circumstances that has not been recognised by the existing planning framework.	Yes, the proposal responds to the amalgamations of the sites which were previously under separate ownership and identified as separate sites.

Factors that lead to responding to a change in circumstances may include, but not exclusively relate to: • Key infrastructure investment or opportunity to plan for future infrastructure unanticipated by the existing strategic planning framework • Response to key Government priorities – Premier's Priorities, climate change, or a shift in government policy (e.g. NSW Government's Net Zero Plan) • Changes to population and demographic trends and associated needs such as housing or jobs.	

Table 4 – Assessment of Proposal against Site Specific Merit Test

b) Does the proposal have site-specific merit, having regard to the following:	
The natural environment on the site to which the proposal relates and other affected land (including known significant environmental areas, resources or hazards).	There are no identified environmental constraints. The site is not heritage listed and is already developed. Urban design assessments support its suitability.
Existing uses, approved uses, and likely future uses of land in the vicinity of the land to which the proposal relates	Existing and approved uses are a mix of residential and commercial premises. The proposal will deliver a compatible built form and land use mix in line with the local character and planning controls.
Services and infrastructure that are or will be available to meet the demands arising from the proposal and any proposed financial arrangements for infrastructure provision.	Existing infrastructure is sufficient to support the proposal. Any additional demand will be addressed through contributions under the relevant section 7.12 plan.

3.1 Is the planning proposal a result of any strategic study or report?

No, the planning proposal is not a result of any strategic study or report.

3.2 Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

Yes. Introducing additional permitted uses for the site via a Schedule 1 amendment is the most appropriate mechanism as it enables site-specific flexibility without altering zoning, height, or FSR. Given it is site specific it does not change the overall land use character of the area.

If the planning proposed did not progress, the site could be developed in a similar fashion however any basement carpark servicing both retail and residential uses could not span both sites. The sites could still be redeveloped as one building, with a split basement with a carpark entrance on Hall Street for the retail uses and a separate carpark on Roscoe Street for the residential uses. This is considered to be a worse outcome given this would mean there were two vehicle / carpark entrances associated with the development.

An alternative approach would be to either rezone the Roscoe Street lots to match the zoning of the Hall Street lots or rezone the Hall Street sites to match the zoning of the Roscoe Street lots.

The rezoning of the Hall Street lots to R3 was quickly dismissed, as this would mean that residential flat buildings would be permitted on Hall Street and therefore that the ground floor could be residential uses instead of retail. This could degrade the feel of Hall Street which is currently predominantly made up of active retail frontages.

Secondly, it would be possible to rezone the lots on Roscoe Street to E1, however this would mean that residential flat buildings would be prohibited.

Additionally, rezoning the sites on Roscoe Street from Medium Density Residential to Local Centre would raise the question as to whether the FSR or HOB on the site in the LEP should also be updated, as typically the Local Centre zoning is associated with a slightly higher HOB and FSR control compared to Medium Density Residential, to allow for one level of retail to be accommodated.

On the basis of the above, the current approach in the planning proposal is the best way forward as it allows for a reduction in vehicle access (and potential vehicle/pedestrian conflict) points on the site, without the need to alter the overall land use character of the area.

3.3 Will the planning proposal give effect to the objectives and actions of the applicable regional or district plan or strategy (including any exhibited draft plans or strategies)?

The proposal is consistent with the objectives of a Metropolis of Three Cities Region Plan and the Eastern City District Plan as it is consistent with the applicable objectives and planning priorities as per the following tables.

Table 5 – Metropolis of Three Cities

Relevant Objectives	Comment
Objective 10 – Greater housing supply	The proposal enables additional dwellings in a well-located area by facilitating a residential use across the site.
Objective 11 – Housing diversity and affordability	The proposal will permit residential development including affordable housing which will contribute toward housing diversity.
Objective 12 – Great places that bring people together	The proposal improves pedestrian outcomes on Hall Street.
Directive 6 – Walkable neighbourhoods	Supports walkability by removing crossovers on Hall Street and improving active frontages.

Table 6 – Eastern City District Plan

Relevant Planning Priorities	Comment
E5 – Providing housing supply, choice and affordability, with access to jobs, services and public transport	The planning proposal enables residential development including affordable housing in a highly accessible location.
E6 – Creating and renewing centres and respecting local character	The proposal revitalises Hall Street's retail edge and supports a more active, pedestrian-friendly environment.

Relevant Planning Priorities	Comment
E11 – Growing investment, business opportunities and jobs in strategic centres	The proposal will provide ground-floor commercial activity on Hall Street to support local employment.
E12 – Delivering housing supply, choice and affordability	Adds to the housing supply, particularly in a high-demand, transit-accessible area.

3.4 Is the planning proposal consistent with a council LSPS that has been endorsed by the Planning Secretary or GCC, or another endorsed local strategy or strategic plan?

The planning proposal is consistent with applicable local strategies and plans, as per the following tables. It is noted that the Waverley Affordable Housing Contributions Scheme (AHCS) applies to proponent led planning proposals sites that propose uplift as part of the proposal. As there is no proposed changed to the height of building or floor space ratio permitted on the site the AHCS does not apply.

Table 7 - Waverley Local Environmental Plan 2012

Relevant Aims	Comment
(a) to promote and co-ordinate a range of commercial, retail, residential, tourism, entertainment, cultural and community uses to service the local and wider community	Enables a mixed-use design that integrates commercial and residential forms with pedestrian-friendly interfaces.
(c) to provide for a range of residential densities and range of housing types to meet the changing housing needs of the community	The proposal would enable the proposed four storey building.
(ca) to encourage the development of a variety of housing on land close to public transport, essential goods and services and open space.	Supports housing variety and includes affordable housing provision.

Table 8 – Waverley Local Strategic Planning Statement (March 2020)

Relevant Planning Priorities	Comment
6. Facilitate a range of housing opportunities in the right places to support and retain a diverse community	Provides a mix of market and affordable dwellings in a highly accessible location.
8. Connect people to inspiring and vibrant places, and provide easy access to shops, services, and public transport	Enables mixed-use outcomes in a local centre.

Table 9 – Waverley Local Housing Strategy

Relevant Priorities	Comment
H1 – Manage housing growth sustainably and in the right location	The subject site is within a centre, close to services and transport.
H3 – Increase amount of affordable rental and social housing	It is understood that the Proponent intends to include affordable housing on the site, utilising the bonuses available in the Housing SEPP, however this is a matter for consideration in the DA phase.

Table 10 – Waverley Community Strategic Plan 2025-2035

Relevant Direction or Strategy	Comment
1.5 – Protect and grow affordable housing stock	The proposal delivers a mix of affordable and market housing.
2.3.4 – Create vibrant, liveable and accessible mixed-use centres	Provides a mix of retail and residential uses in a highly accessible local centre.
3.5 – An inclusive and diverse economy where we focus on local businesses, visitor economy, nighttime activation and well-maintained commercial centres.	Integrates housing, retail, and infrastructure in a way that supports the local economy.

3.5 Is the planning proposal consistent with any other applicable State and regional studies or strategies?

Yes. While there are no additional State or regional strategies specifically targeting the subject site beyond those already addressed under Sections 3.3 and 3.4, the Planning proposal is consistent with broader NSW Government policies and programs that encourage housing supply, diversity, and affordability in well-located centres.

The proposal aligns with:

- *Future Transport Strategy 2061*, by supporting development in a location with high public transport accessibility, thereby encouraging sustainable travel patterns;
- *Housing 2041*, by enabling affordable housing and increased density in established, serviced areas;
- *NSW 2040 Economic Blueprint*, by contributing to the vitality of local centres and supporting employment in retail and service sectors.

The Planning proposal does not conflict with any other State or regional strategic documents.

3.6 Is the planning proposal consistent with applicable SEPPs?

This Planning proposal is consistent with applicable State Environmental Planning Policies. Assessed the Planning proposal against the State Environmental Planning Policies SEPPs:

Table 9 – Assessment of Proposal against the SEPPs

Title	Applicable	Comment
Housing SEPP	Yes	Facilitates delivery of additional dwellings, including affordable housing, in a location well served by public transport and services. Supports housing diversity and tenure mix.
Exempt and Complying Development Codes SEPP	N/A	Not directly applicable; future minor works may be carried out under this SEPP, where compliant.
Transport and Infrastructure SEPP	Yes	Consistent with objectives to integrate land use and transport and will improve pedestrian safety by removing Hall Street vehicle access.
Primary Production SEPP	N/A	
Biodiversity and Conservation SEPP	N/A	

Title	Applicable	Comment
Resilience and Hazards SEPP	N/A	
Industry and Employment SEPP	N/A	
Resources and Energy SEPP	N/A	
Planning Systems SEPP	Yes	
Sustainable Buildings SEPP	Yes	Future development will be required to meet BASIX and energy efficiency targets under this SEPP.
Harbour City SEPP	N/A	No precinct-specific provisions apply to the site.

3.7 Is the planning proposal consistent with applicable Ministerial Directions (section 9.1 Directions) or key government priority?

The proposal is consistent with applicable Ministerial Direction(s) under Section 9.1 of the Environmental Planning and Assessment Act 1979 as outlined in the below table.

Table 10 – Assessment of Proposal against Ministerial Direction

Ministerial Direction	Relevance	Consistency
6.1 Residential Zones	Requires proposals to broaden housing choice, make efficient use of existing infrastructure, reduce land consumption on the urban fringe, and ensure good design.	The proposal enables a mix of market and affordable housing in a walkable centre, close to transport and services, supporting housing diversity and reducing pressure on fringe areas.
4.1 Flooding	Requires proposals to ensure that the provisions of an LEP that apply to flood prone land are commensurate with flood behaviour and includes consideration of the potential flood impacts both on and off the subject land.	The subject site is identified as being located in the Flood Planning Area (FPA) and affected by predominantly low flood risk with a small level of medium flood risk. The planning proposal will not facilitate an intensification of development on the site beyond the existing permissible standards in the WLEP and relevant SEPPs. A Flood Impact Assessment has been completed under the DA process and outline that the applicant believes the development satisfies the relevant flooding provisions of the Waverley Council LEP, DCP, and Flood Policy. Therefore the proposed LEP changes are not considered to result in any adverse flood behaviour on the site and further consideration will occur as part of the assessment of the DA.

3.8 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected because of the proposal?

No. The site is fully urbanised and already developed. There is no known presence of critical habitat or threatened species, populations, or ecological communities on or adjacent to the land. The proposal will not result in adverse environmental impacts.

3.9 Are there any other likely environmental effects of the Planning proposal and how are they proposed to be managed?

There are no other likely environmental effects associated with the proposal. The site is not subject to flooding, bushfire, or other natural hazards. Any minor environmental impacts arising from future development (e.g. during construction) can be addressed through the standard development assessment process.

3.10 Has the planning proposal adequately addressed any social and economic effects?

Yes. The Planning proposal will deliver positive social and economic outcomes, including:

- Supporting additional housing supply in a highly accessible and desirable location;
- Delivering affordable housing in accordance with Council's Affordable Housing Program, contributing to social diversity;
- Retaining and enhancing active ground-floor commercial uses along Hall Street, supporting local business vitality and employment opportunities;
- Improving pedestrian safety, connectivity, and amenity by removing vehicle crossovers on Hall Street;
- Creating a continuous active frontage that reinforces Hall Street's role as a key destination in the Bondi Beach village centre.

The Proponent has completed an Economic Impact Assessment (EIA) (**Attachment 5**) to determine whether Bondi Village can accommodate additional retail space based on current market conditions, and what the overall economic impacts would be of a mixed uses development spanning the six lots. The Assessment states that the proposal would meet some of the centres' retail needs over the coming decades (14 to 34 per cent) without creating an oversupply or adversely affecting retail viability within or surrounding the centre. The EIA also cites social impact associated with additional residential uses including affordable housing being provided on the site.

The proposal will strengthen the economic resilience of the centre by encouraging more foot traffic and longer dwell times, which in turn benefits surrounding businesses and services. The introduction of additional residents will also increase local spending and support public transport usage.

3.11 Is there adequate public infrastructure for the planning proposal?

Yes. The site is located within an established urban centre with access to public transport, utilities, roads, and community facilities. No infrastructure upgrades are required beyond those managed through the development process and contributions plans.

The Traffic Impact Assessment (**Attachment 4**) states that the parking associated with the concept plans for the site would generate 32 vehicle movements in the AM peak and 31 in the PM peak. This represent one additional vehicle trip being generated approximately every 6-7 minutes during the

weekday morning and afternoon peak periods. This is considered minimal and is unlikely to noticeably alter the traffic conditions of the area. As a result, no upgrades to nearby road infrastructure are considered necessary.

3.12 What are the views of state and federal public authorities and government agencies consulted in order to inform the Gateway determination?

The site is located within an established urban centre and is fully serviced by existing public infrastructure, including water, sewer, electricity, and telecommunications. It is within walking distance of high-frequency bus services that connect to Bondi Junction, the CBD, and surrounding suburbs. The site also benefits from proximity to public open space, community facilities, and schools.

Developer contributions under Council's Contributions Plan will assist in funding any broader infrastructure needs.

Formal consultation with public authorities will be undertaken following the Gateway determination, in accordance with Section 3.34 of the *Environmental Planning and Assessment Act 1979*. Agencies likely to be consulted include:

- Transport for NSW – in relation to pedestrian, cycling, and traffic network integration;
- Sydney Water – in relation to water and sewer infrastructure capacity;
- Ausgrid – for electricity supply considerations;
- Department of Planning, Housing and Infrastructure – for policy and statutory compliance; and
- Any other agency as directed by the Gateway determination.

Early discussions with Council's internal traffic and urban design teams indicate general support for the consolidation of vehicle access on Roscoe Street and the retention of active frontages on Hall Street. Feedback from external agencies will be considered in finalising the planning proposal and may inform additional conditions or design refinements.

3.13 Waverley Local Planning Panel

The Waverley Local Planning Panel (the Panel) provided advice on 27 August 2025 under Schedule 2, Part 5, Item 26 of the Environmental Planning and Assessment Act 1979. The Panel, after considering the relevant materials and hearing from Council Officers, supported the Planning Proposal as provided in Council's planning proposal report. The panel also recommended in their advice, that Council give consideration to precedent the planning proposal could set in relation to the adjoining properties on Roscoe Street, in particular those properties located between the subject sites and the Adina development, located at 8,6,4 and 2 O'Brien Street. The context of this discussion was that this could occur as part of a further review of the local area as part of any future update of the WLEP or associated local strategy or policy and that this matter would not prevent the planning proposal proceeding to a Gateway determination.

In summary, the Panel provided the following advice:

1. *The Panel considers that the Planning Proposal may proceed to Gateway Determination, as*

the proposal demonstrates Strategic Merit and Site-Specific Merit as described in Council's Planning Proposal Report.

2. *The Council gives consideration to the precedent established by this Planning Proposal in relation to the adjoining properties on Roscoe Street.*

The resolution provided by the Panel was unanimous.

Council Officers have reviewed the feedback provided at the WLPP and reflected in the minutes and are of the opinion that the planning proposal should proceed as is to a gateway determination. Feedback regarding the precedent in relation to Roscoe Street is noted and will be considered as part of the next review of relevant planning controls for the area.

The full minutes are provided in Appendix A.

PART 4 – COMMUNITY CONSULTATION

Public exhibition would include at minimum a display on the Council's website. The gateway determination will specify the level of public consultation that must be undertaken in relation to the planning proposal.

Pursuant to Division 3.4 of the Act, a planning proposal must be placed on public exhibition for a minimum of 28 days, or as specified in the gateway determination for the proposal. The Responsible Planning Authority must consider any submissions made concerning the proposed instrument and the report of any public hearing.

PART 5 – PROJECT TIMELINE

The following indicative project timeline will assist with tracking the progress of the planning proposal through its various stages of consultation and approval. It is estimated that this amendment to WLEP will be completed by approximately July 2026.

The detail around the project timeline is expected to be prepared following the referral to DPE for a Gateway Determination.

Table 11 – Indicative project timeline

Tasks	Timeframe and/or date
Consideration by Council	November 2025
Gateway determination	December 2025 / January 2026
Commencement and completion of public exhibition period	February 2026
Consideration of submissions and post-exhibition review	March 2026
Post-Gateway Council decision	April 2026
Submission to the Department for finalisation (where applicable)	May 2026

Gazettal of LEP amendment	July 2026

APPENDIX A – MINUTES OF THE WAVERLEY LOCAL PLANNING PANEL

ADVICE OF THE WAVERLEY LOCAL PLANNING PANEL
49-59 Hall Street and 69-71 Roscoe Street, Bondi Beach – Planning Proposal
27 August 2025
SCHEDULE 2, PART 5, ITEM 26 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 (NSW)

Panel members:
David Ryan (Chair)
Megan Jones
Clare Swan
Jesse Lockhart-Krause (Community Representative)

Declarations of Interest
One panel member declared a conflict of interest.

Briefing

The following Council Officers from the Urban Planning team were present during the meeting to answer any questions:

Tim Sneesby	A/ Executive Manager, Urban Planning
Patrick Hay	A/Manager Strategic Town Planning, Strategic Town Planning
Genevieve Hastwell	Senior Strategic Planner, Strategic Town Planning

The Panel then discussed the Planning Proposal and provided advice on 27 August 2025 under Schedule 2, Part 5, Item 26 of the Environmental Planning and Assessment Act 1979.

The Panel has considered the information that was circulated to it by Council email on 14 August 2025, which included:

- Local Planning Panel – Summary Report and Recommendations.
- Council Planning Proposal report.
- Proponent's Planning Proposal Report.
- Urban Design and Architectural Report.
- Traffic Impact Assessment.
- Economic Land Use Report.

Resolution

The Panel after considering the above material and hearing from Council Officers supports the Planning Proposal and provides the following further advice:

1. *The Panel considers that the Planning Proposal may proceed to Gateway Determination, as the proposal demonstrates Strategic Merit and Site-Specific Merit as described in Council's Planning Proposal Report.*
2. *The Council gives consideration to the precedent established by this Planning Proposal in relation to the adjoining properties on Roscoe Street.*

The resolution provided by the Panel was unanimous.

LK PLANNING

Planning Proposal

Amendment to Waverley Local Environmental Plan 2012



For additional permitted uses at 69 -71 Roscoe Street and 49-59 Hall Street, Bondi Beach

Waverley Council

4 July 2025

Report prepared by	LK Planning
On behalf of	HSN Property Group
Author	Elena Sliogeris
Director	Lee Kosnetter
Project	22032
Date/ Revision	4 July 2025 Rev 1 (Planning Portal Lodgement)

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1. Introduction

1.1 Preamble

This Planning Proposal (PP) has been prepared by LK Planning on behalf of Hall Street by HSN Pty Ltd and Hall Street Property A Pty Ltd and Hall Street Property B Pty Ltd (known as HSN Property Group/ the Applicant) in support of a site-specific Planning Proposal at 69-71 Roscoe Street and 49-59 Hall Street Bondi Beach (herein known as the 'redevelopment' and/or 'subject' site).

The total combined area of the subject site which comprises 6 properties is 2,911m^2 with a larger rectangular shaped section on Hall Street and adjoining smaller rectangular shaped section on Roscoe Street. The lots on Hall Street have a combined southern frontage to Hall Street of 48.76m and a length of 47.83m, with a site area of 2,331.2m^2, whilst the lots on Roscoe Street have a combined northern frontage to Roscoe Street of 12.18m and a length of 47.83m, with a site area of 579.8m^2.

The zoning is E1 Local Centre for the sites along Hall Street and R3 Medium Density Residential for the sites along Roscoe Street, pursuant to *Waverley Local Environmental Plan 2012* (WLEP).

The PP seeks to amend WLEP as it applies to the subject site and introduce new additional permitted land uses in schedule 1 of the LEP, as follows:

- 'shop-top housing' on land at 69-71 Roscoe Street, Bondi Beach; and
- 'residential flat building' on land at 49-59 Hall Street, Bondi Beach.

The purpose of the PP is to facilitate the redevelopment of the subject site for a mixed use and residential development; and to relocate all vehicular access from the primary street frontage at Hall Street to the secondary street frontage at Roscoe Street, as part of the redevelopment.

The PP does not propose any changes to the development standards that apply to the subject site.

To assist stakeholders and the community of the intended development outcomes for the subject site, the Planning Proposal is to be considered concurrently with a pending Development Application (DA) (by HSN) at 69-71 Roscoe Street and 49-59 Hall Street, Bondi Beach. It is the intention that both applications be considered and exhibited concurrently.

The PP has been informed by pre-lodgement consultation in April 2025 with Council officers from Waverley Council. Advice from Council officers during the pre-lodgement consultation noted 'in-principle' support for the reduction of vehicular crossovers along Hall Street and the relocation of vehicular access to Roscoe Street. Other matters raised by Council officers included the need for further analysis on the impact of the proposal on Bondi Village and the character of Hall and Roscoe Streets.

As a result, this PP is supported by the following technical reports provided in the Appendix including:

- Traffic, Parking and Pedestrian Impact Assessment;
- Urban Design and Architectural report; and
- Economic Impact Assessment.

This report demonstrates the strategic and site-specific merit of the proposal and its consistency with the local and strategic planning framework. In particular, the proposal's strategic alignment with Council's '*Our Liveable Places Centres Strategy*' for Bondi Beach, and the pedestrianisation of Hall Street.

The PP has been prepared in accordance with Section 3.33 of the *Environmental Planning and Assessment Act 1979* (EPA Act 1979) and the Department of Planning, Housing and Infrastructure's *Local Environmental Plan Making Guideline* (August 2023).

This report addresses the provisions under Section 3.33 which sets out what must be included in the preparation of the PP, in Section 2 of the report. The report is structured as follows:

- Section 1: provides the relevant background and context to this proposal, site description, existing planning framework and overview of the proposed development.

- Section 2: outlines the planning proposal details in accordance with Section 3.33 of the EP&A Act and the Department's LEP making guideline, including:
    - Part 1 – Objectives and intended outcomes
    - Part 2 – Explanation of provisions
    - Part 3 – Justification of strategic and site-specific merit
    - Part 4 – Maps
    - Part 5 – Community Consultation
    - Part 6 – Project timeline

- Section 3: Conclusion

1.2 Background and context

HSN have an existing approval on part of this site, at 53-59 Hall Street Bondi Beach, for a shop top housing development (DA-501/2022).

Since consent was granted, HSN has been successful in the acquisition of 69-71 Roscoe Street, Bondi Beach and has included 49-51 Hall Street. The inclusion of these properties has led to a rethink and review of the approved development under DA-501/2022. Specifically, the opportunity to remove the main vehicular access from Hall Street (the primary street frontage) and relocate it to Roscoe Street (the secondary street frontage) to provide continuous retail street activation along Hall Street, delivering a better urban design outcome for the Bondi Beach Local Village Centre.

The acquisition of 69-71 Roscoe Street which directly adjoins the Hall Street site provides an opportunity to remove all four crossovers from Hall Street and enable the main vehicle access to the site and basement parking from a secondary road being Roscoe Street. However, the existing R3 Medium Density Residential zoning of 69-71 Roscoe Street currently prohibits 'shop top housing'; and as a result, the site cannot serve as the main vehicular access associated with a shop top housing development on Hall Street, zoned E1 Local Centre. Similarly, the prohibition works in reverse on the Hall Street site, which does not allow for residential flat buildings within the E1 Local Centre. That would mean that any parking associated with the property at 69-71 Roscoe Street (the residential flat building) cannot be contained within a basement in Hall Street.

The only mechanism available to overcome this administrative land use barrier is to seek an amendment to the WLEP to allow shop top housing as a permitted land use on the Roscoe Street site and a residential flat building permitted land use on the Hall Street site.

This PP therefore seeks to amend WLEP and to introduce the following additional permitted uses in Schedule 1 of the WLEP for the subject land, including:

- 'shop top housing' for the land at 69-71 Roscoe Street, Bondi Beach; and
- 'residential flat buildings' for the land at 49-59 Hall Street, Bondi Beach.

To maintain the desired future character of the area, the PP restricts the additional permitted uses to require the ground floor of any buildings on the land at 69-71 Roscoe Street be used for residential accommodation and, for 49-59 Hall Street, for commercial premises with the exception of access arrangements to the adjoining sites. Further information on the explanation of the provisions is provided in Section 2 of this report.

1.3 The Site and Locality

This planning proposal applies to land at:

- 49 Hall Street - Lot 11, Section 4, DP 747;
- 51 Hall Street - SP 21058;
- 53-55 Hall Street - Lot 4, Section 8, DP 747;
- 57-59 Hall Street - Lots 1 and 2, DP 516525;
- 69 Roscoe Street - Lot 2 DP 506227; and
- 71 Roscoe Street - Lot 1 DP 506227.

The site is located on the north side of Hall Street, a local mixed-use commercial and residential Town Centre that extends west from Campbell Parade, and extends into properties on the southern side of Roscoe Street, a residential street that terminates into a cul-de-sac at its eastern end.

The site is irregular in shape, with a larger rectangular shaped section on Hall Street and adjoining smaller rectangular shaped section on Roscoe Street. The lots on Hall Street have a combined southern frontage to Hall Street of 48.76m and a length of 47.83m, with a site area of 2,331.2m^2, whilst the lots on Roscoe Street have a combined northern frontage to Roscoe Street of 12.18m and a length of 47.83m, with a site area of 579.8m^2.

The total combined site area of all 6 properties is 2,911m^2.



Figure 1 *– Cadastral Map of No. 69-71 Roscoe Street, Bondi Beach and 49-59 Hall Street (Source: Six Maps)*



Figure 2 *– Aerial view of the subject sites at No. 69-71 Roscoe Street, Bondi Beach and No. 49-59 Hall Street (Source: Six Maps)*

Roscoe Street site

Existing on the Roscoe Street site is a pair of semi-detached dwellings. The site adjoins to the east, a childcare centre 'Uniting Iluka Early Learning' at 73-75 Roscoe Street; and to the west a row of semi--detached dwellings at 2-8 O'Brien Street. To the south, the site adjoins a row of 3-4 storey shop top housing from 49-59 Hall Street and the Adina Serviced apartments at 69-73 Hall Street Bondi Beach.

The locality is characterised by a mix of residential and commercial development including medium to high rise shop top housing, residential flat buildings interspersed with semi-detached dwellings and the occasional dwelling house. The locality also includes community services such as childcare centres, churches and retail including hairdressers, cafes and tourist and visitor accommodation.

The Roscoe Street R3 Medium Density Residential zone abruptly concludes at the Toga development at 61-79 Hall Street, being the last building that extends through the block from Hall Street to O'Brien Street. The building's severe, blank 3-4 storey boundary wall adjacent to No.8 O'Brien Street, fails to provide any transition in scale between the E1 Local Centre and R3 Medium Density Residential zones. Further, the buildings' ground floor use as a loading dock and plant room fails to provide any streetscape transition as shown in Figure 3 below.

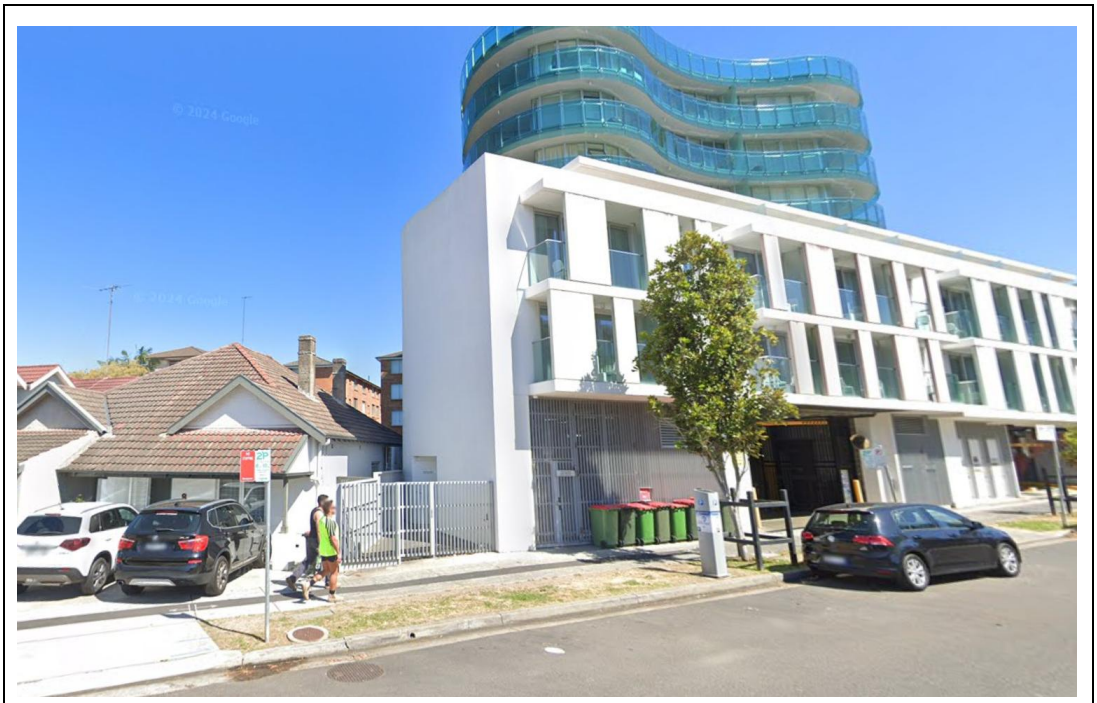

***Figure 3** – Streetscape view of the poor building transition between the existing semi-detached dwelling at No. 8 O'Brien Street (left) and the Toga development (right), at No. 61-79 Hall Street, Bondi Beach.*

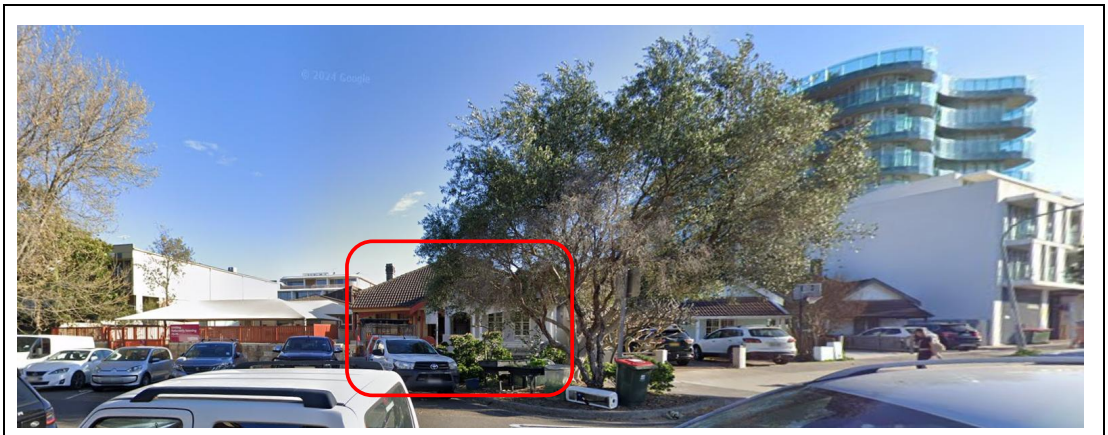

***Figure 4** – Streetscape view of the subject dwellings at No. 69-71 Roscoe Street as marked.*

Hall Street Site

The Hall Street site is occupied by a row of 1970/1980s shop top housing buildings with a scale of 3-4 storeys to Hall Street and 4-5 storeys at the rear, where the residential units sit above an at-grade parking level underneath the building. The buildings are notably set back from the street boundary for their whole length along Hall Street.

Each building has a separate driveway that accesses the rear parking areas, along the outer edges of the combined site and two central driveways. The whole rear yard area is dedicated to parking and is a concrete hardstand.

The buildings at 53-59 Hall Street contain 14 studio apartments each. 53-55 Hall Street has a real estate agent on the ground floor and 57-59 Hall Street has a nail salon. These buildings have been approved for demolition to allow for the construction of a new shop top housing development, as seen in Figures 5 and 6 below.

The buildings at 49-51 Hall Street contain a retail shop at 49 Hall Street with three levels of residential units above (23 x studios); and a café at 51 Hall Street with two levels of residential units above (18 units – 4 x studios, 10 x 1 bedroom and 4 x 2 bedrooms).



Figure 5 *– Streetscape view of 53-59 Hall Street Bondi Beach (left) and 49-51 Hall Street (right) which are to be amalgamated and developed together.*



Figure 6 *– Photomontage of the approved development at 53-59 Hall Street Bondi Beach.*

1.4 Existing Planning Controls

The land at 69-71 Roscoe Street is zoned R3 Medium Density Residential and is located within a pocket of R3 Medium Density Residential zoned land surrounded by the Bondi Beach local centre, zoned E1.

The land at 49-59 Hall Street site is zoned E1 Local Centre, located with a long E1 Local Centre strip that extends off Campbell Parade and continues into Glenayr Avenue (Figure 7 below).

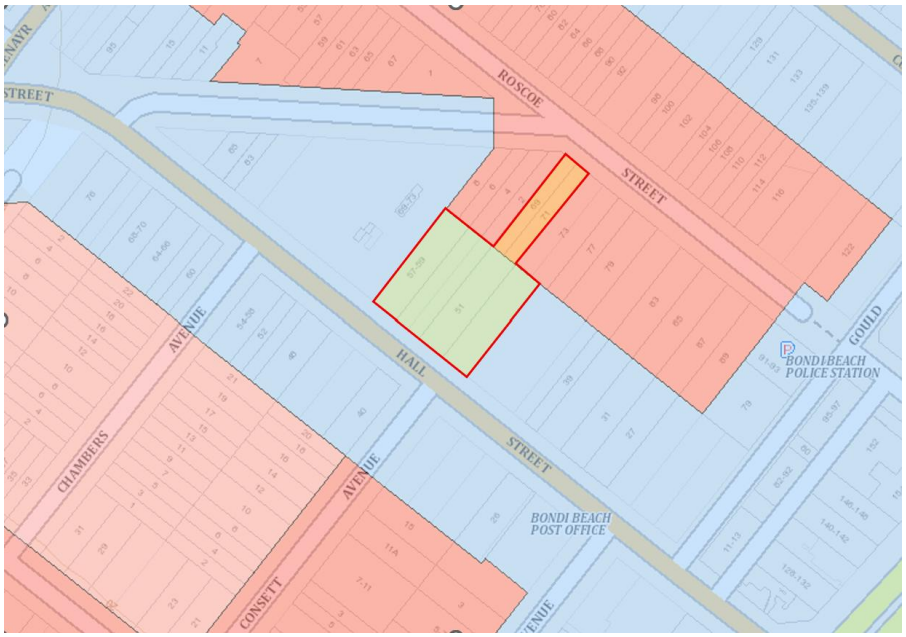

***Figure 7** – Extract of WLEP2012 Zoning Map – Roscoe Street site outlined in red which adjoins the larger Hall Street site at No. 49-59 Hall Street, highlighted yellow (Source: NSW Planning Portal, Digital EPI viewer)*

The following Waverley Local Environmental Plan 2012 provisions and development standards apply to the land at 69-71 Roscoe Street:

- Zone R3 Medium Density Residential;
- Maximum Floor Space Ratio – 0.9:1;
- Maximum Building Height – 12.5 metres;
- Minimum lot size – 325 sqm; and
- Located within Acid Sulfate Soils – Class 5 Area.

The following Waverley Local Environmental Plan 2012 provisions and development standards apply to the land at 49-59 Hall Street:

- Zone E1 Local Centre;
- Maximum Floor Space Ratio – 2:1;
- Maximum Building Height – 13 metres;
- Minimum lot size – N/A; and
- Located within Acid Sulfate Soils – Class 5 Area.

1.5 The Development

The proposal involves the demolition of the existing structures on the site and the construction of a new shop-top housing development fronting Hall Street and a residential flat building fronting Hall Street, including Affordable Rental Housing, with shared basement parking accessed from Roscoe Street.

The proposal is facilitated by the *State Environmental Planning Policy (Housing) 2021* planning incentives which provide up to 30% to the height and floor space ratio development standards that seek to facilitate the delivery of new in-fill affordable rental housing to meet the needs of very low, low and moderate income households.

The following provides an overview to the development proposal as detailed in the accompanying Development Application.

69-71 Roscoe Street, Bondi Beach

The proposed development layout of 69-71 Roscoe Street is illustrated below in Figure 8.

The proposed development is for a four-storey residential flat building development with a total of 6 units (comprising 5 x 2 bedroom and 1 x 3 bedroom) of which 5 of the units will be dedicated as affordable rental housing, to be managed by a Registered Community Housing Provider.

The proposed floor plan below demonstrates how the site will also serve as the main vehicular access point to the Hall Street portion of the redevelopment site. As shown, access to basement parking is to be provided via a 6.1m driveway located at the front of the site from Roscoe Street which then leads to the underground basement that will accommodate parking, loading and servicing for both sites. This will require works to Roscoe Street to remove the traffic island with the tree immediately at the front of the site including 2-on-street parking spaces to provide access. Proposed streetscape upgrades as part of the proposal include new tree and landscape plantings and the realignment of the traffic island.

A Traffic Impact Assessment (TIA) is provided with the PP and the accompanying DA (see Appendix A). The TIA concludes that the proposed development has been designed in accordance with the relevant Australian Standards and is supportable on vehicular access, traffic, parking and servicing ground and will not result in any unacceptable implications.

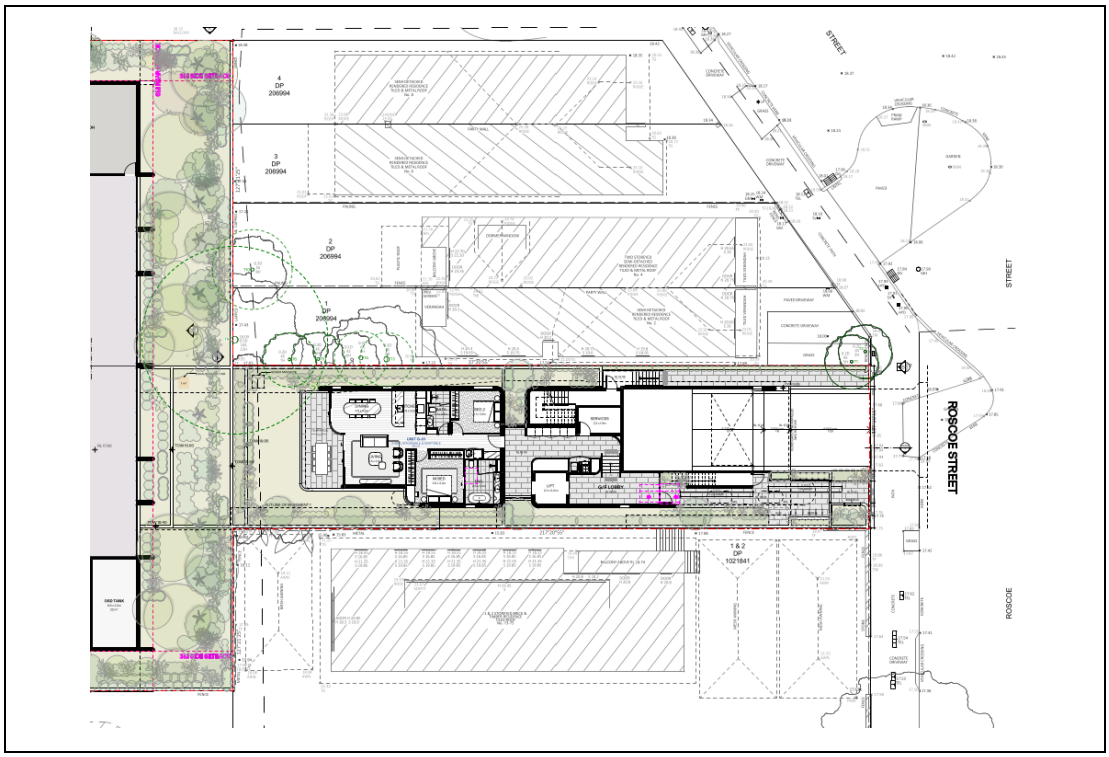

Figure 8 – *Proposed development for 69-71 Roscoe Street – Ground floor*

49-59 Hall Street, Bondi Beach

The proposed development layout of 49-59 Hall Street is outlined below in Figure 9.

The proposal involves the construction of a part four, part five-storey shop-top housing building comprising 6 retail premises on the lower ground and ground floor levels (equating to 1,227 sqm of retail floorspace), with 3-4 levels of residential apartments above containing 31 residential units including 6 units dedicated as affordable rental housing.

Off-street parking is proposed for a total of 103 cars, comprising 63 residential spaces, 7 visitor spaces and 33 retail spaces, within a new two-level basement parking area located within the shared basement of the redevelopment site. Loading and servicing facilities including waste collection for the retail premises will be provided via on-site loading bays within the basement. Access to the loading bays will be provided via the vehicular access ramp from Roscoe Street.

Importantly, the proposal involves the removal of all four existing driveway crossovers from the Hall Street site frontage which will be permanently closed and restored to kerb and gutter. On-street parking to the equivalent of 4 spaces may be restored along Hall Street. And as the TIA concludes, the removal of the existing driveway crossovers from the Hall Street site frontage will significantly improve the Hall Street streetscape and increase pedestrian safety.

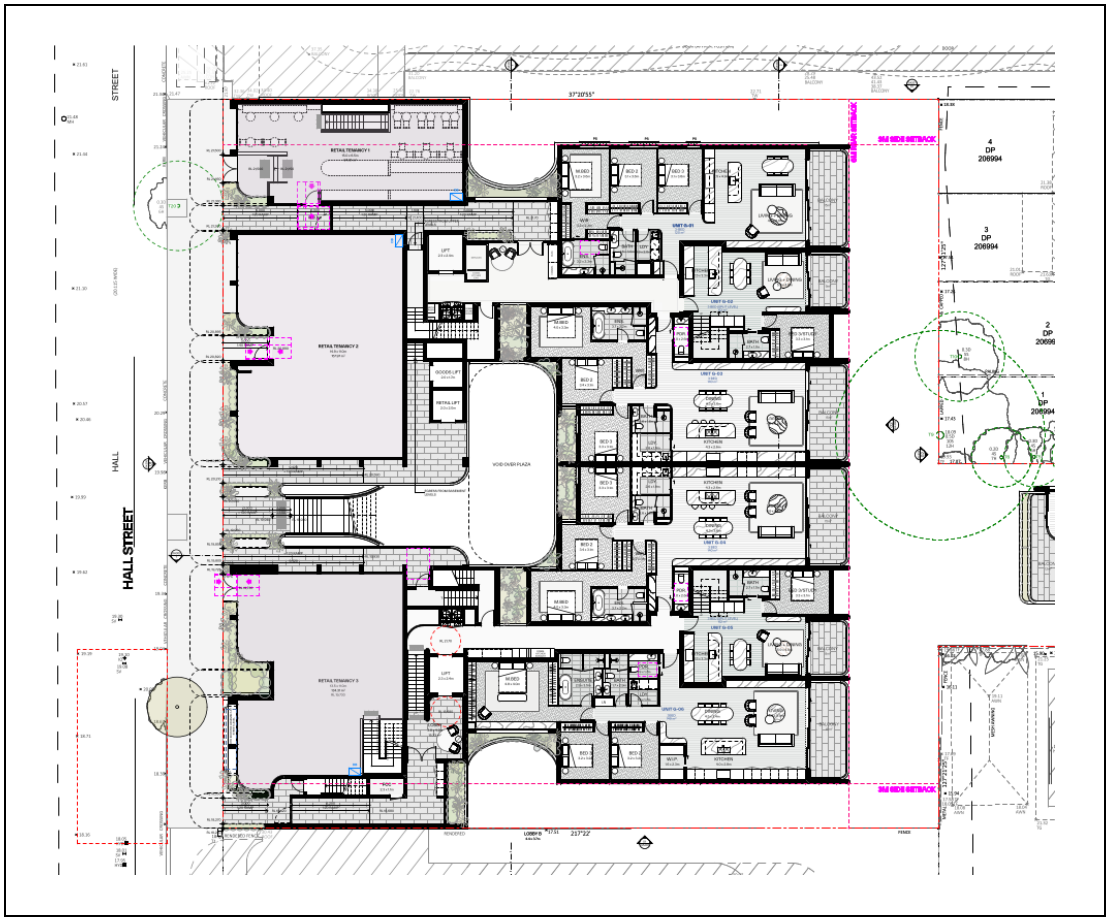

Figure 9 – *Proposed development for 49-59 Hall Street – Ground Floor*

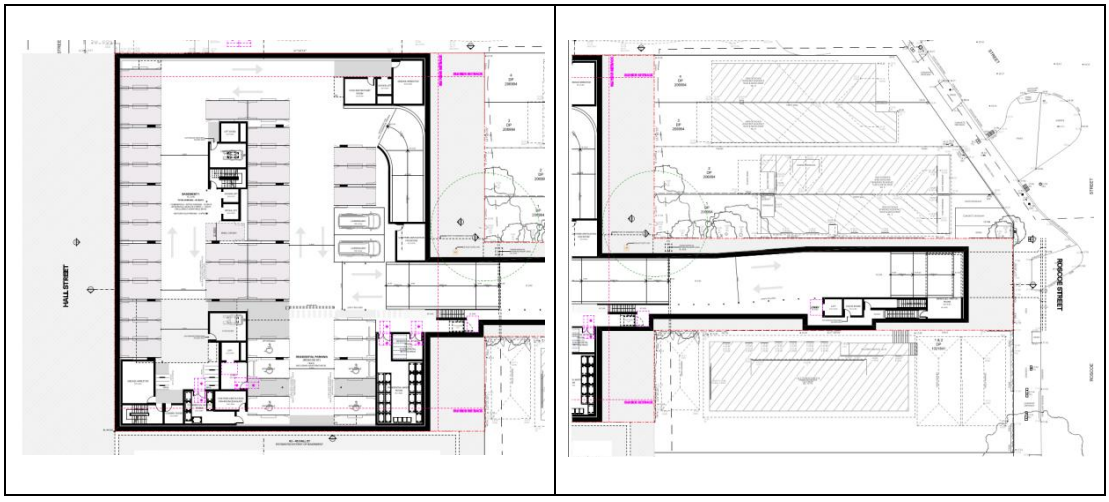

Figure 10 – *Proposed basement plan for 49-59 Hall Street (left) and 49-59 Hall Street (right)*

2. Planning Proposal Details

Part 1 – Objectives and intended outcomes

Objective

The objective of the PP is to provide for the urban renewal of the subject site at 49-59 Hall Street, Bondi Beach and 69-71 Roscoe Street, Bondi Beach, for the purposes of mixed use and residential development and to provide vehicular access from Roscoe Street and basement connection to Hall Street as part of the redevelopment of the site.

Intended outcomes

The intended outcomes of the proposed amendment to the WLEP are to:

- Provide the main vehicular access from the Roscoe Street site (zoned R3 Medium Density Residential) and basement connection to the Hall Street site (zoned E1 Local Centre),
- Remove four existing vehicular access from Hall Street and enhance pedestrian amenity and safety along Hall Street,
- Facilitate continuous active street frontage along Hall Street,
- Strengthen the role of Bondi Beach (Hall Street) local centre providing housing, jobs and services in a mixed use and residential development, and
- Deliver new housing supply, housing diversity and choice within Waverley LGA.

The intended outcomes are consistent with Council's (2020) Local Strategic Planning Statement 2020-2036, (2020) *Our Liveable Places Centres Strategy 2020-2036*, and (2020) Local Housing Strategy.

Part 2 - Explanation of provisions

Intended Provisions

This PP seeks to amend Schedule 1 of the WLEP to include the following additional permitted uses on the subject site as outlined in Table 1 below, noting that any specific wording is subject to drafting by NSW Parliamentary Counsel.

Table 1 – Proposed changes to Schedule 1 'Additional Permitted Uses' of WLEP 2012

Waverley LEP 2012 **Schedule 1 Additional permitted uses**	
7 Use of certain land at 69-71 Roscoe Street Bondi Beach	**8 Use of certain land at 49-59 Hall Street Bondi Beach**
(1) This clause applies to the following land at 69-71 Roscoe Street Bondi Beach — (a) Lot 1, DP 506227, (b) Lot 2, DP 506227, (2) Development for the purposes of shop top housing is permitted with development consent if the consent authority is satisfied of the following— (a) The ground floor of any buildings on the land are to be used for residential accommodation only, with the exception access arrangements including vehicular access to adjoining E1 zoned land (b) The additional permitted use facilitates a driveway and/or basement connection to traverse into land on Hall Street.	This clause applies to the following land at 49-59 Hall Street Bondi Beach — (a) Lot 11, Section 4, DP 747, (b) Lot 9, SP 21058, (c) Lots 1-2, DP 516525 (d) Lot 8, Section 4, DP 747 (2) Development for the purposes of a residential flat building is permitted with development consent if the consent authority is satisfied of the following— (a) The ground floor of any buildings on the land are to be used for commercial premises only, with the exception of access arrangements including vehicular access to adjoining R3 zoned land (b) The additional permitted use facilitates parking associated with the residential flat building on Roscoe Street within a basement located on land on Hall Street.

The additional uses are proposed to be restricted for the purposes of vehicular access and parking only.

It is the intention to deliver a built form as anticipated by the existing land use planning framework that applies to the site, that is a residential flat building on the Roscoe Street sites and a shop top housing development on the Hall Street sites. It is not proposed to construct a shop top housing development on Roscoe Street. Facilitating shop top housing development on the site would require greater height and FSR, and this is not proposed.

It is therefore proposed that the ground floor of any buildings at 69-71 Roscoe Street be restricted to 'residential accommodation', and the ground floor of any buildings at 49-59 Hall Street, be restricted to 'commercial premises 'only.

The proposed amendment to Schedule 1 does not include any changes to the development standards that apply to the subject site and/ or LEP mapping requirements, as summarised in table 2 below.

Note this table does not include the planning provisions that are available under the *State Environmental Planning Policy (Housing) 2021*. Further detail on the planning provisions that apply under both the State and Local planning framework are detailed in the accompanying DA including compliance with the relevant provisions.

Table 2 - Comparison of current and proposed zoning and key controls

Roscoe Street Site

WLEP Clause	Existing	Proposed	Amendment to LEP
2.1 Land use zoning	Zone R3 Medium Density Residential	Zone R3 Medium Density Residential	Unchanged by this proposal
4.1 Minimum lot size	325m	325m	Unchanged by this proposal
4.3 Maximum Building Height	12.5 metres	12.5 metres	Unchanged by this proposal
4.4 Maximum Floor Space Ratio	0.9:1	0.9:1	Unchanged by this proposal
6.9 Design Excellence	N/A for this site	N/A for this site	Unchanged by this proposal
Schedule 1 – Additional Permitted Use	N/A	Shop top housing	Addition of shop-top housing as a permitted use

Hall Street Site

WLEP Clause	Existing	Proposed	Amendment to LEP
2.1 Land use zoning	Zone E1 Local Centre	Zone E1 Local Centre	Unchanged by this proposal
4.1 Minimum lot size	N/A	N/A	Unchanged by this proposal
4.3 Maximum Building Height	13 metres	13 metres	Unchanged by this proposal
4.4 Maximum Floor Space Ratio	2:1	2:1	Unchanged by this proposal
6.9 Design Excellence	Applicable for this site, subject to 15m building height	Applicable for this site, subject to 15m building height	Unchanged by this proposal
Schedule 1 – Additional Permitted Use	N/A	Residential Flat Building	Addition of residential flat building as a permitted use

Part 3 – Justification of strategic and site-specific merit

Strategic Merit

Section A – Need for the Planning Proposal

1. Is the Planning Proposal a result of an endorsed Local Strategic Planning Statement (LSPS), strategic study or report?

The PP is a result of Council's endorsed LSPS, Local Housing Strategy and, Centres Strategy *'Our Liveable Places – Centres Strategy 2020-2036*', including:

- Council's LSPS which identifies Bondi Beach as a key local centre for housing, jobs, tourism, transport and services;
- Council's Local Housing Strategy which identifies Bondi Beach as a highly sort after area to live with a high demand for rental accommodation in the area;
- Council's Centres Strategy that identifies Bondi Beach Village Centre and Hall Street as a pedestrianised zone; and
- Supporting technical studies submitted with this Planning Proposal including the Urban Design report, Traffic Impact Assessment and Economic Impact Assessment, which demonstrate the site's capability and suitability to accommodate the proposed development.

2. Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

An amendment to WLEP is required to provide vehicular access from Roscoe Street (zoned R3 Medium Density Residential) and basement connection to Hall Street (zoned E1 Local Centre).

There are no other mechanisms available to overcome the land use prohibition to provide vehicular access and a shared basement between the sites, than to seek an amendment to WLEP to permit development for the purposes of 'shop-top' housing on the Roscoe Street sites and 'Residential Flat Building' on the Hall Street sites.

Introducing additional permitted uses for the site is the most efficient approach of achieving the objectives and intended outcomes for the redevelopment of the site, as it is site specific and does not change the overall land use character of the area. Any potential impact is further reduced by ensuring that the additional permitted use is restricted for the purposes of vehicular access only.

Other rezoning options available could include a larger rezoning review of the Roscoe Street block or Hall Street however, this would require significant resources, affect many landowners and has the potential to change the land use character of the area. It is not intended to change the character of Roscoe Street to a local centre with shop-top housing, and as such, seeking additional permitted uses ensures protection of the existing residential character.

Therefore, an amendment to the WLEP as described in this report is both necessary and appropriate of achieving the intended outcomes.

Section B – Relationship to strategic planning framework

3. Will the Planning Proposal give effect to the objectives and actions of the applicable regional, or district plan or strategy (including any exhibited draft plans or strategies)?

Greater Sydney Region Plan – A Metropolis of Three Cities

The Greater Sydney Region Plan, A Metropolis of Three Cities (the Plan) sets a 40-year vision (to 2056) where the people of Greater Sydney live within 30 minutes of their jobs, education and health facilities. The Plan has been prepared concurrently with Future Transport 2056 and State Infrastructure Strategy 2018-2038 to align land use, transport and infrastructure outcomes for Greater Sydney. The Plan envisages Sydney as a metropolis of three (3) cities, including:

- The Western Sydney Parkland City;
- The Central River City; and
- The Eastern Harbour City.

The site is located within the Eastern Harbour City and in proximity to the Strategic Centre of Bondi Junction. The proposal is consistent with the Greater Sydney Region Plan in that it will help to implement the following relevant Objectives:

- **A City for People** – The proposal supports the ongoing viability of Bondi Beach Hall Street local centre, through the renewal of the subject site. The proposal will provide new retail, commercial and housing opportunities and an improved pedestrian environment that supports social cohesion.

- **Housing the City** - The proposal will facilitate the redevelopment of the subject site to provide increased housing choice within a highly accessible, well serviced and desirable location. The proposal will provide 31 dwellings on Hall Street and 6 dwellings on Roscoe Street, of which 11 of the total number of dwellings are dedicated for affordable housing.

- **A City of Great Places** – The proposal supports a vibrant local centre along Hall Street by prioritising pedestrian movement, accessibility and walkability and activating the ground plane with fine grain retail**.**

- **A City in its Landscape –** The proposal facilitates greening of a highly urbanised area with planter boxes and trees, increasing the urban tree canopy cover and reducing the urban heat island effect.

- **Jobs and skills for the City** - The proposal will provide greater capacity and opportunities for jobs and services for the Local Centre. The supporting economic impact analysis (Appendix C) identifies that the proposal will contribute towards projected retail floor space demand in the area and job creation close to home.

Eastern City District Plan

The Eastern City District Plan (the District Plan) identifies planning priorities and actions to guide growth, development and change, relating to infrastructure and collaboration, liveability, productivity and sustainability within the Eastern District. The PP has strategic merit and is consistent with the District Plan in that it will help to implement the following Planning Priorities:

- Planning for a city supported by infrastructure (Planning Priority E1)
- Providing services and social infrastructure to meet people's changing needs (Planning Priority E3)
- Fostering healthy, creative, culturally rich and socially connected communities (Planning Priority E4)
- Providing housing supply, choice and affordability, with access to jobs, services and public transport (Planning Priority E5)
- Creating and renewing great places and local centres, and respecting the District's heritage (Planning Priority E6)

The proposal provides an opportunity to capitalise on the high amenity and accessibility of the site. The proposal will increase diversity in the centre and provide essential access to day-to-day goods and services close to where people live. Local centres also play an important role in providing local employment and there will be net additional jobs created from the proposal, as well as new housing supply.

The District Plan identifies Bondi Beach as an important local centre for Waverley. The Plan notes that councils will need to consider which centres will need to grow to provide for the required goods and services of the community. The PP responds to the following place-based principles for local centres in the District Plan:

- ***deliver transit-oriented development*** *and co-locate facilities and social infrastructure*
- *protect or* ***expand retail and/or commercial floor space***
- ***protect or expand employment opportunities***

Waverley Centres Strategy 'Our Liveable Places – Centres Strategy 2020-2036'

Waverley Council's Centres Strategy outlines a future for Hall Street and Bondi Beach Centre as an iconic destination that is lively, green and sustainable, catering to both locals and internation visitors. The aim is to foster a community feel that is creative and diverse, enhancing the street's appeal as a central hub in Bondi Beach. Part of this vision is for shop-top housing that ensures an adequate supply of commercial services while creating an active, vibrant and viable centre through its resident population.

The PP is consistent with the centre's strategy for Bondi Beach, and the vision and place-based objectives for the centre, as follows:

People, Place and Prosperity

- To promote a diversity of uses, businesses and retail offerings in smaller shopfronts with active frontages to maximize interactions and interest.
- To increase urban greening around Bondi Beach.
- To promote walkability to and along Bondi Beach to entice people to meet, linger and foster community connections.
- To ensure ground floor premises provide active and inviting street frontages.

Environment

- To ensure development incorporates best practice sustainability initiatives.
- To encourage heat-reflective materials and increased shading to create a cooler climate for pedestrians.

Access

- To create safe and walkable public realm, where pedestrian mobility and experience is prioritised over vehicle access and movements.
- To balance the shared use of the public domain between pedestrian movements, landscaping, outdoor dining and vehicle access and parking.

Built form

- To ensure infill development is well designed and responsive to existing built form, history and heritage, with appropriate street frontage heights and upper storey setback
- To retain the distinctive historic urban fabric including the fine grain shopfront pattern.

An Urban Design analysis in Appendix B demonstrates the proposal's alignment with the place-based objectives of the strategy. As outlined in the report, the subject site is a key site within the strategy for Bondi Beach which identifies Hall Street as a pedestrianised zone. The proposal presents an opportunity to implement the Centre's vision for Hall Street by removing four points of vehicular access and relocating it to a single point on Roscoe Street. By removing vehicular access, the proposal improves pedestrian safety and promotes walkability along Hall Street to Bondi Beach.

The removal of these four points of vehicular access also enables continuous ground floor retail street activationThe proposal maintains the fine grain shops along Hall Street by breaking up the pedestrian experience of the building into a number of bays and retail offerings that open out onto the street. The proposal also retains the residential character along Roscoe Street by presenting as a regular residential flat building with basement parking, despite its connection through to the shared basement under the Hall Street building. The proposal will increase tree canopy and the 'greening' of the area through street tree plantings, planter boxes and roof gardens.

The proposal also includes continuous awnings along Hall Street for weather protection, and it demonstrates best practice sustainability by achieving a 7.7 NatHERS star rating and a commitment to the provision of an Energy Assessment Report that will outline actions so that the building will achieve greenhouse gas emissions that are 30% less than those of a reference building

4. Is the planning proposal consistent with a council LSPS that has been endorsed by the Planning Secretary or GDD, or another endorsed local strategy or strategic plan?

Waverley Local Strategic Planning Statement (LSPS)

The Waverley Local Strategic Planning Statement 2020-2036 (Waverley LSPS) identifies planning priorities and actions to protect and support infrastructure, the environment, the economy and provide housing to achieve the vision of a sustainable and well-connected community, living in a stunning natural environment.

The PP is consistent with the following planning priorities in Council's LSPS:

- Planning Priority 6. Facilitate a range of housing opportunities in the right places to support and retain a diverse community
- Planning Priority 8. Connect people to inspiring and vibrant places, and provide easy access to shops, services, and public transport
- Planning Priority 9. Support and grow Waverley's local economy with a focus on wellbeing, knowledge and innovation

The PP facilitates urban renewal of the subject site,the delivery of new housing including affordable housing and housing choice, in a highly accessible and well serviced area. The provision of affordable housing for key workers supports the socio-economic functions of the centre, providing essential services and supporting local businesses.

The proposal facilitates improved street activation along Hall Street through retail uses that connects more people to more vibrant and inspiring places; and provides for new retail floorspace to grow Waverley's local economy.

Waverley LSPS 'Principles for Change'

The Waverley LSPS also includes a 'principles for change' local merits test to guide the Council and Local Planning Panel in the consideration of, and consistent decision-making about, planning proposals in the local area. Consideration of the proposal against the principles for change is provided in Tables 3 and 4 below:

Table 3 – Assessment of Proposal against the strategic merit test

Waverley LSPS local strategic principles for change	
Principle	**Comments**
Proposals should be consistent with the Greater Sydney Region Plan and Eastern City District Plan.	The proposal is consistent with the Greater Sydney Region Plan and Eastern City District Plan, as discussed above.
Proposals for sites in Bondi Junction Strategic Centre should be consistent with the objectives for the centre in the Eastern City District Plan and in this Local Strategic Planning Statement.	The site is not within the Bondi Junction Strategic Centre.
Proposals should be consistent with the relevant directions, objectives and actions of the Waverley Community Strategic Plan.	The proposal is consistent with Council's Community Strategic Plan (2025-2035), specifically the theme 'Place' in that the proposal will facilitate affordable housing; support businesses through new retail offerings; provide a high standard of design and sustainability; increase urban canopy; create a vibrant and pedestrianised Hall Street Bondi Beach local centre; and improve pedestrian safety.
Aims of the Waverley Local Environmental Plan.	The proposal is consistent with the following aims of the WLEP: *(a) to promote and co-ordinate a range of commercial, retail, residential, tourism, entertainment, cultural and community uses to service the local and wider community,* *(c) to provide for a range of residential densities and range of housing types to meet the changing housing needs of the community,* *(ca) to encourage the development of a variety of housing on land close to public transport, essential goods and services and open space,* *(i) to achieve high quality public domain with significant tree canopy and accessible open space,* *(l) to improve connectivity and accessibility in Waverley and prioritise development that enables walking, cycling and the use of public transport,*
Proposals should be consistent with the relevant liveability, productivity, infrastructure and sustainability priorities, objectives and actions in this Local Strategic Planning Statement.	See discussion regarding the proposal's consistency with Waverley LSPS priorities above.

Principle	Comments
Proposals should be consistent with the relevant priorities, objectives and actions of any relevant strategies. A list of strategies is available at the end of this document.	The proposal is consistent with Council's Centres Strategy for Bondi Beach and specifically, facilitates the pedestrianisation of Hall Street and the retention of the fine grain village character.
Proposals should support the strategic objectives in Council's adopted strategies and action plans.	See discussion above regarding the proposal's consistency with Council's Centres Strategy.
Proposals should not compromise non-residential development to meet employment targets for Bondi Junction Strategic Centre.	Not applicable.
Proposals which seek to respond to a significant investment in infrastructure should be considered in a wider strategic context with other sites.	Not applicable.
Proposals should give consideration to strategically valuable land uses that are under-provided by the market, such as but not limited to hotels, cultural space (including performance and production space), medical and health-related uses, education uses and childcare centres, and urban services such as mechanics and bulky goods retailers, and have regard to the appropriateness of the use for the context.	The proposal provides new housing including affordable housing to meet some of the demand for key worker housing to support the land uses as listed.

Table 4 – Assessment of Proposal against Site Specific Merit Test

Waverley local site-specific principles for change	
Principle	**Comments**
Proposals should locate development within reasonable walking distance of public transport that has capacity (assuming development capacity will be delivered) and is frequent and reliable	The subject site is located in an area that is well served by public transport; and provision is made in the DA for cycling facilities.
Proposals should meet high sustainability standards, improve urban resilience, and mitigate negative externalities. Proposals can satisfy these high standards by committing all development on the subject site to achieve a 5+ Green Star rating with the Green Building Council of Australia,	The DA demonstrates that the proposal achieves a high sustainability standards including a commitment to the provision of an Energy Assessment Report that will outline actions so that the building will achieve greenhouse gas emissions that are 30% less than those of a reference building.
Proposals should include an amount and type of non-residential floor space appropriate to the site's strategic location and proximity to, or location within, a centre or activity street.	The proposal will provide around 1,227sqm of retail floorspace which results in a net increase of retail space in the centre by 927sqm. An Economic Impact Assessment (Appendix C) accompanies this PP which concludes that the provision of additional retail floorspace from this proposal will help meet some of the centres' forecasted retail needs over the coming decades.
Proposals should create demonstrable public benefit	The proposal will offer a significant public benefit in the removal of four points of vehicular access from Hall Street, an improvement to public domain, pedestrian safety and the delivery of new housing including affordable housing.
Proposals should be supported by an infrastructure assessment and demonstrate any demand for infrastructure generated can be satisfied, assuming existing development capacity in the area will be delivered.	The proposal is not seeking a change in the development standards; and as a result, it is not anticipated to create any extra demand for infrastructure than what is expected under the current planning framework. The proposal will however generate developer contributions (s7.12) to fund infrastructure as identified by Council's s7.12 developer contributions plan, of approximately $1m. In addition, it is expected that any further infrastructure requirements that are identified to be delivered to support the proposal will be imposed as a condition of consent on the DA.

Principle	Comments
Proposals should make a positive contribution to the built environment and result in an overall better urban design outcome than existing planning controls.	The proposal will make a positive contribution to the built environment through the renewal of the site which is currently in a poor condition. As outlined in the Urban Design report (Appendix B) and the DA, the proposal will deliver a high quality design with fine grain retail offerings on the street level that will facilitate a vibrant and active street front.
Proposals should result in high amenity for occupants or users.	As outlined in the accompanying DA, the proposal achieves a high standard of amenity for the occupants and users by offering generously proportioned units with higher than required solar access and cross-ventilation attributes, as well as other amenities including generous private open spaces, storage, parking and the like.
Proposals should optimise the provision and improvement of public space and public connections.	The proposal makes a positive improvement to the public space and public domain of Hall Street by removing the four existing vehicular access points, improving pedestrian safety and the street and ground floor plane.

Waverley Local Housing Strategy

The Waverley Local Housing Strategy guides future housing growth in Waverley over the next 20 years. The Planning Proposal is consistent with the strategy and the following priorities:

- Priority H2 Encourage a range of housing options to support and retain a diverse community.
- Priority H3 Increase amount of affordable rental and social housing.
- Priority H5 Ensure new development is consistent with desired future character.

The proposal facilitates the urban renewal of the subject site which unlocks new housing opportunities including choice and diversity for the area. The proposal will contribute to providing a range of housing options, resulting in a total of 37 units comprising 2 and 3-bedroom units across the two sites, 11 of which will be dedicated as affordable housing for essential key workers. The provision of larger units is identified as a need in the Housing Strategy to accommodate more family households in the area.

The proposal is consistent with the desired future character of the area, in that the proposal will retain a development form and scale as expected under the existing planning controls, being a shop top housing development along Hall Street and a residential flat building along Roscoe Street. The proposal also maintains the fine grain village character of Hall Street, through small retail offerings and streetscape activation.

5. Is the planning proposal consistent with any other applicable State and regional studies or strategies?

There are no other relevant State or regional studies or strategies.

6. Is the planning proposal consistent with applicable SEPPs?

The following State Environmental Planning Policies (SEPPs) are of relevance to the site, as outlined in the table below.

Table 5 – Consistency table of PP against SEPPs

SEPPs	Consistency	Comment
SEPP (Housing) 2021	Yes	The PP supports the delivery of housing choice including affordable housing as provided under the SEPP. Detailed compliance with the Apartment Design Guide (ADG) and the Infill Affordable Housing provisions in the SEPP is included in the accompanying DA.
SEPP (Transport and Infrastructure) 2021	Yes	The PP does not change the way in which the SEPP would apply to the subject site or to future development on the site. The accompanying DA has considered the relevant provisions of this SEPP relating to Electricity Distribution and Transmission.
SEPP (Sustainable Buildings) 2022	Yes	The PP does not change the way in which the SEPP would apply to the subject site or to future development on the site. Detailed compliance with SEPP (Sustainable Buildings) is demonstrated by the BASIX certificate included with the accompanying DA.
SEPP (Exempt and Complying Development Codes) 2008	Yes	The PP will not affect the application of the SEPP to future development of the site.
SEPP (Resilience and Hazards) 2021	Yes	A Stage 1 Preliminary Environmental Site Investigation Report accompanied the approved development at 53-59 Hall Street that concluded the site is suitable from a contamination perspective, as required. The inclusion of the neighbouring properties, with similar uses as the shop top housing development on the previous site, and residential dwellings at the rear at Roscoe Steet, with no known uses that

		would give rise to contamination concerns, demonstrates that the site is suitable for the intended use as a shop-top housing and residential flat development, satisfying the relevant considerations for this SEPP. The PP is consistent with the SEPP (Resilience and Hazards).
SEPP (Industry and Employment) 2021	Yes	The PP will not affect the application of the SEPP. Future DAs relevant to individual uses will consider the relevant provisions of the SEPP relating to advertising and signage.
SEPP (Biodiversity and Conservation) 2021	Yes	The PP will not affect the application of the SEPP. The accompanying DA has considered the relevant provisions of the SEPP relating to vegetation and tree removal.
State Environmental Planning Policies	**Consistency**	**Comment**
SEPP (Planning Systems) 2021	Yes	This PP does not contain any provisions that would hinder or contradict the application of the SEPP (Planning Systems) 2021. Under the provisions of the SEPP, the accompanying DA is categorised as regionally significant development.
SEPP (Resources and Energy) 2021	N/A	The SEPP (Resources and Energy) 2021 does not apply to this PP.
SEPP (Primary Production) 2021	N/A	The SEPP (Primary Production) 2021 does not apply to this PP.

7. Is the planning proposal consistent with applicable Ministerial Directions (section 9.1 Directions) or key government priority?

In accordance with Clause 9.1 of the EP&A Act 1979 the Minister issues directions for the relevant planning authorities to follow when preparing Planning Proposals for new LEPs. The relevant directions are listed under 9 Focus Areas in the following table:

Table 6 – Assessment of Proposal against Ministerial Directions (Section 9.1 Directions)

Direction	Comment	Compliance
1. Planning Systems		
Direction 1.1 – Implementation of regional plans The objective of this direction is to give legal effect to the vision, land use strategy, goals, directions and actions contained in Regional Plans.	The PP applies to land within the Eastern Harbour City as identified in the Greater Sydney Region Plan. The PP is consistent with the goals, directions and actions contained in the Greater Sydney Region Plan.	Yes
Direction 1.3 – Approval and referral requirements The objective of this direction is to ensure that LEP provisions encourage the efficient and appropriate assessment of development.	The PP does not introduce any provisions that require any additional concurrence, consultation or referral.	Yes
Direction 1.4 – Site Specific Provisions The objective of this direction is to discourage unnecessarily restrictive site specific planning controls.	The PP will introduce new site specific provisions to the WLEP to overcome the land use administrative barrier of restricting vehicular access and parking between the sites. In accordance with the direction, the PP will allow the specified land use on the relevant land without imposing any development standards, and as a result is consistent with the Direction.	Yes
2. Design and Place		
Note: This Focus Area was blank when the Directions were made		

Direction	Comment	Compliance
3. Biodiversity and Conservation		
Direction 3.1 – Conservation Zones The objective of this direction is to protect and conserve environmentally sensitive areas.	The PP is consistent with this direction, in that it does not apply to environmentally sensitive areas or alter provisions for land in a conservation zone.	Yes
Direction 3.2 – Heritage Conservation The objective of this direction is to conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance.	The subject land to this PP is not heritage listed. The impacts of this PP will not have any adverse impacts on nearby heritage items. Any environmental amenity impacts (e.g. visual impacts, solar access, overshadowing, wind effects, etc) has been addressed in the accompanying DA.	Yes
Direction 3.5 Recreation Vehicle Areas The objective of this direction is to protect sensitive land or land with significant conservation values from adverse impacts from recreation vehicles.	The PP is consistent with this direction, in that it is not proposing to enable land to be developed for the purpose of a recreation vehicle area.	Yes
Direction 3.6 Strategic Conservation Planning The objective of this direction is to protect, conserve or enhance areas with high biodiversity value.	The subject land to this PP is not identified as avoided land or a strategic conservation area.	N/A
Direction 3.7 Public Bushland The objective of this direction is to protect bushland in urban areas, including rehabilitated areas, and ensure the ecological viability of the bushland.	The PP is consistent with this direction, in that it is not proposing to enable public bushland to be developed.	Yes

Direction	Comment	Compliance
4. Resilience and Hazards		
Direction 4.1 Flooding The objectives of this direction are to: (a) ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005; (b) ensure that the provisions of an LEP that apply to flood prone land are commensurate with flood behaviour and includes consideration of the potential flood impacts both on and off the subject land.	The subject land to this PP is identified on Council's online flood planning area map as being located within a low and medium flood risk precinct. A Flood Impact Assessment accompanies the DA which concludes the development satisfies the relevant flooding provisions of the Waverley Council LEP, DCP, and Flood Policy.	Yes
Direction 4.2 Coastal Management The objective of this direction is to protect and manage coastal areas of NSW.	The subject land to this PP is not identified as being within the coastal zone, as defined under the *Coastal Management Act 2016.*	N/A
Direction 4.4 Remediation of Contaminated Land The objective of this direction is to reduce the risk of harm to human health and the environment by ensuring that contamination and remediation are considered by planning proposal authorities.	The subject land to this PP is not identified as being, land that is within an investigation area within the meaning of the Contaminated Land Management Act 1997; and has not been subject to development as described in Table 1 of the contaminated land planning guidelines.	Yes
Direction 4.5 Acid Sulfate Soils The objective of this direction is to avoid significant adverse environmental impacts from the use of land that has a probability of containing acid sulfate soils.	The subject land to this PP is identified as Class 5 on the Acid Sulfate Soils Map in WLEP. For land categorised as Class 5, this indicates that Acid Sulfate Soil is unlikely to be found in the specific area but its proximity to other classes requires careful planning and consideration of potential impacts from nearby Acid Sulfate Soils.	Yes

Direction	Comment	Compliance
5. Transport and Infrastructure		
Direction 5.1 Integrating Land Use and Transport The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives: (a) improving access to housing, jobs and services by walking, cycling and public transport, and (b) increasing the choice of available transport and reducing dependence on cars, and (c) reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and (d) supporting the efficient and viable operation of public transport services, and (e) providing for the efficient movement of freight.	This PP is consistent with this Direction as the proposal is for infill development that increases density on site, that will benefit from being in an area that is well serviced by public transport with high amenity and access to jobs and services. The accompanying DA demonstrates acceptable parking provision that will assist in reducing on-street parking demands from the development. The proposed development also includes bicycle parking to encourage modal shift in transport. This PP supports the efficient and viable operation of public transport services and the efficient movement of freight by concentrating vehicular access to the secondary street frontage at Roscoe Street.	Yes
Direction 5.2 – Reserving Land for Public Purposes The objectives of this direction are to facilitate the provision pf public services and facilities by reserving land for public purposes and facilitate the removal of reservations where the land is no longer required for acquisition.	The PP does not include the identification of, or removal of any land required for acquisition.	Yes
Direction 5.3 – Development near Regulated Airports and Defence Airfields	The PP is not next to any existing or proposed regulated airport or known defence airfield. The PP does not propose a change in the planning controls and the accompanying DA does not provide for development that warrants consultation with the Department responsible for airports or to obtain their permission, to allow any development that constitutes a controlled activity as defined in section 182 of the Airports Act 1996.	Yes

Direction	Comment	Compliance
Direction 5.5 High pressure dangerous goods pipelines The objective of this direction is to reduce the risk of harm to human health and the environment by ensuring high pressure dangerous goods pipelines (relevant pipelines) are considered by planning proposal authorities	The subject land to this PP is not identified as being located within the application area of a dangerous goods pipeline.	Yes
6. Housing		
6.1 Residential Zones The objectives of this direction are to: (a) encourage a variety and choice of housing types to provide for existing and future housing needs, (b) make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and (c) minimise the impact of residential development on the environment and resource lands.	The PP will facilitate the delivery of 37 units including diverse and affordable housing to meet housing needs of the community. The PP supports the efficient use of existing infrastructure and services through the urban renewal of the subject site, minimising the impact on the environment. The proposal does not affect resource lands.	Yes
7. Industry and Employment		
7.1 Employment Zones The objectives of this direction are to: (a) encourage employment growth in suitable locations, (b) protect employment land in employment zones, and (c) support the viability of identified centres.	This PP is consistent with the direction as it encourages employment growth within a thriving local centre. The relocation of all vehicular access from Hall Street enables more commercial floor space to be realised on the redevelopment site.	Yes
8. Resources and Energy		
Note the direction under this focus area relating to Mining, Petroleum and Extractive Industries is not applicable to this planning proposal.		

Direction	Comment	Compliance
9. Primary Production		
9.1 Rural Zones This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed rural zone (including the alteration of any existing rural zone boundary).	The subject land to this PP is not located within and/or adjacent to a rural zone.	Yes

Section C – environmental, social and economic impact

8. Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected because of the proposal?

No, there is no likelihood that any critical habitat or threatened species will be adversely affected by this PP.

9. Are there any other likely environmental effects of the planning proposal and how are they proposed to be managed?

An assessment of the potential environmental impacts as a result of this proposal are discussed below and within the accompanying DA.

Traffic, parking, servicing and pedestrian impact

The PP and accompanying DA is supported by a Traffic Impact Assessment (in Appendix A).

The purpose of the TIA is to assess the traffic, parking, access, transport and servicing characteristics of the DA, and the associated impacts of the proposal on the surrounding road network, parking and transport environment.

The assessment concludes that the proposed vehicular access, traffic and parking arrangements is satisfactory. The proposed development is expected to result in a *nett increase* of 9 vehicle trips per hour during the weekday morning peak, and 10 vehicle trips per hour during the weekday afternoon peak. The cumulative traffic flows in Roscoe Street as a consequence of the development proposal are therefore, expected to be well below the threshold of 200 vph which is the environmental goal for a local residential street.

Traffic modelling of the Roscoe Street and O'Brien Street intersection confirms that the intersection is currently operating at Levels of Service A (Good Operation) on the approaches and will continue to do so under the proposed development scenario.

The TIA considered the impact of the proposal on pedestrian movement and safety within the vicinity of the proposed driveway location on Roscoe Street and the Roscoe and O'Brien Street/s intersection. It noted that total pedestrian volumes using the intersection were in the order of 100-110 pedestrians during the AM and PM peak hour periods, with half of the pedestrian movements across the proposed driveway location. The TIA concludes that the proposed vehicular access driveway off Roscoe Street will result in minimal impact to existing traffic and pedestrian movements in the vicinity.

In relation to waste servicing, a positive outcome from this combined development approach is the ability to internalise garbage collection for the retail component of the shop top housing development on Hall Street. It is proposed to accommodate all retail waste collection processes within the basement. This removes a significant number of bins from being left out on Hall Street on collection day. This outcome is otherwise not possible if the properties are developed independently, or if the land use permissibility burden is not overcome by this PP.

Further detail on the proposal's vehicular access, waste servicing and parking arrangements is provided in the accompanying DA. The TIA therefore concludes that the PP and proposed development provides an acceptable environmental impact in relation to traffic, parking and pedestrian considerations.

Urban Design and Design Excellence

The potential impacts to urban design relate to the desired future character and streetscape character of the area. This PP does not seek to change the existing development standards that apply to the site. The PP retains a built form as expected under the existing land use planning framework, that is a residential flat building on the Roscoe Street site and a shop top housing building on the Hall Street site. The PP facilitates access and basement connection only within the redevelopment site. As a result, the PP does not affect the desired future character, as anticipated under the existing planning framework.

An Urban Design and Architectural Report (in Appendix B) has been prepared by PBD Architects that accompanies both the DA and PP that demonstrates the strategic merit and compatibility of the proposed development as part of the desired future character of the Hall Street Local Centre and the Roscoe Street edge. The Urban Design report includes streetscape elevations of the existing and proposed context for both Hall Street and Roscoe Street. It demonstrates that the proposed development on Roscoe Street does not adversely affect the Roscoe streetscape character. The design of the basement entry point ensures that the building presents to the Roscoe Street as a regular residential flat building with basement parkingmaintaining the predominant residential and built form character of the area, that adjoins a local centre.

Similarly, the design report demonstrates that the Hall Street proposed development retains the fine grain village character of the centre, by providing an appropriate built form transition along Hall Street from the adjoining 9 storey Adina serviced apartments on its western side to the recently approved 3-5 storey developments to its eastern side; and an active street frontage with retail shop fronts. Importantly, the proposal for both Roscoe Street and Hall Street will improve the streetscape through public domain improvements and new landscaping.

The PP also does not change Council's existing design excellence provisions. The proposed development is subject to the WLEP design excellence provisions and ADG. The accompanying DA demonstrates the proposal's attainment of design excellence including compliance with the ADG and other key design provisions.

Flooding

The site is identified on Council's online flood planning area map as being located within a low and medium flood risk precinct. A Flood Impact Assessment (FIA) is provided as part of the accompanying DA. The assessment concludes that through the implementation of appropriate flood risk management strategies and compliance measures, the development is considered to satisfy the relevant flooding provisions of the Waverley Council LEP, DCP, and Flood Policy. Furthermore, there are no significant constraints in relation to flood evacuation during extreme storm events, and the proposal is deemed to be compliant from a flood risk perspective.

Excavation, Contamination and Geotechnical considerations

Excavation is proposed for the subject site. The Roscoe Street site has historically been used for residential purposes since at least 1943. There is no known history of contamination applicable to the site and no known prior use that would suggest potential contamination. Accordingly, site land contamination is unlikely. Prior investigations of the Hall Street site (in part, relevant to 53-59 Hall Street) concluded that there were no contamination issues.

In relation to the excavation of the proposed basement levels, this will likely interfere with the water table and dewatering may be required. This activity requires approval under Part 3 of Chapter 3 of the Water Management Act 2000. The accompanying DA seeks approval for the proposed works as part of the Development Application process. This will require Waverley Council to refer the application to Water NSW for their approval. As a result, the DA constitutes an Integrated Development Application as defined under Part 4, Division 4.8 of the EP&A Act.

A detailed Geotechnical Investigation report is provided with the accompanying DA. The report provides recommendations in relation to dilapidation reporting, excavation support and groundwater conditions, structural design and environmental sensitivity. These recommendations will form part of the conditions of any consent on the land.

10. Has the planning proposal adequately addressed any social and economic effects?

Social Impact

The PP will facilitate the urban renewal of the subject site to deliver 37 residential units including 11 units to be dedicated as affordable housing (and managed by a Registered Community Housing Provider) to meet the housing needs of the community. This will involve the demolition of the existing structures on site which include a pair of semi-detached dwellings and an existing shop top housing development that are in poor condition, have poor amenity and in need of renewal. The existing housing stock is not classified as 'low cost housing' and as a result the provision of new housing stock that meets current development and amenity standards is a social benefit.

In addition, the delivery of key worker housing allows essential workers to remain in the area close to jobs and services, supports the economic stability of a local centre and improves social cohesion and stability which represents a positive social impact. The development proposes a mix of 2 and 3-bedroom units which will provide housing stock for more family households which is an identified housing need in Council's Housing Strategy.

The PP will also deliver a social benefit in the pedestrianisation of Hall Street by removing four vehicular access points and improving pedestrian safety. The opportunity to further pedestrianise Hall Street promotes walkability and social interaction within a thriving local centre that would not be able to be achieved without this proposal.

The PP does not seek a change to the development controls and as a result, the proposal's impact on the existing social infrastructure is as anticipated by the existing planning framework.

Economic Impact

The PP is supported by an Economic Impact Assessment in Appendix C which assesses the proposal's economic impact on the local and state economy. The assessment estimates that the proposal would generate and support during its design and construction phase:

- Employment: 173 job years generated on the site.
- Output: an estimated at $269 million in direct and indirect output for the State economy.
- Wages: A total of $14 million in wages generated by construction activities onsite.
- Gross Value Add (GVA): Construction activities onsite are estimated to directly contribute $24 million in GVA to the region's Gross Regional Product.

In relation to the proposal's operational phase, the proposal would generate:

- Employment: 37 full-time equivalent (FTE) jobs on the site.
- Output: A total of $5 million in output.
- Wages: A total of $2 million in wages
- Gross Value Add: The proposed uses onsite are estimated to directly contribute $2 million in GVA to the region's GRP.

Other economic benefits include additional business opportunities associated with the employment floorspace provided in this locality and providing jobs closer to home. The economic impact of the PP not proceeding would result in a significantly reduced area of retail space through the provision of provision of basement parking from Hall Street and as a result a loss of full time jobs. This is in addition to a break in the continuity of active retail uses along Hall Street and increased pedestrian-vehicular conflict zones.

As outlined, the proposal results in a positive economic impact to Waverley's local economy and the State of NSW economy.

Site isolation

Concern was raised by Council officers during the pre-lodgement consultation in relation to site isolation of the row of semi-detached dwellings at 2-8 O' Brien Street which adjoins the subject site at 69-71 Roscoe Street. The concern was that these sites may be perceived as 'isolated sites' based on the assumption that as individual parcels they would be too small to be developed in its own right, and/or there are no longer any remaining adjacent/ contiguous sites that it will be able to amalgamate with in the future.

However, there *is* potential for these sites to amalgamate to facilitate a residential flat building development. Collectively, these sites have a frontage width of 30m which exceeds the WDCP minimum frontage width for a residential flat building. Individually, these sites could also be redeveloped as permitted under the land use zone.

Urban design testing by PBD Architects on a future development envelope for 2-8 O'Brien Street in Figure 10 below, confirms that the site could accommodate a proposed residential flat building of up to 4 storeys that also complies with Council's setback controls.

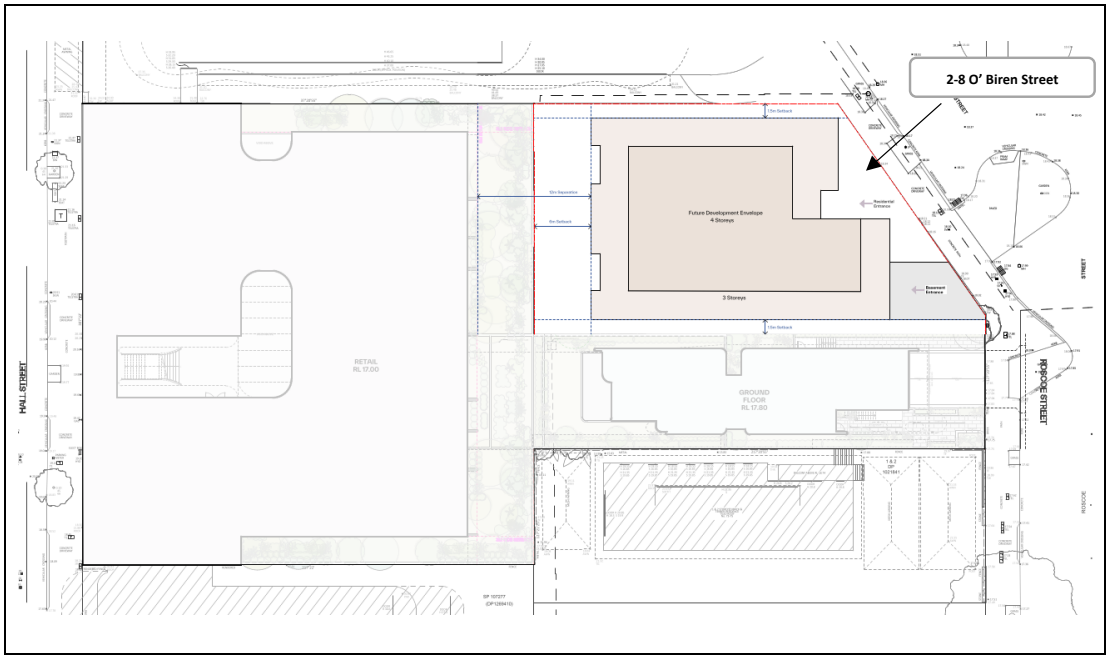

Figure 11: *Proposed development envelope for 2-8 O' Brien Street in relation to the subject site*

Section D – Infrastructure (Local, State and Commonwealth)

11. Is there adequate public infrastructure for the planning proposal?

The proposal is in an established urban area which is well connected to existing public services and utilities. Specifically, the development site has access to:

- Electricity
- Telecommunications
- Sewer
- Water
- Gas

This planning proposal is not seeking an uplift through a change in planning controls for the site. As a result, it is considered that the existing infrastructure of the area can accommodate the needs of the proposal.

The accompanying DA to this proposal also considers infrastructure provision for the proposal. It is expected that any additional service provision and/or infrastructure augmentation identified will be addressed through the assessment process.

12. What are the views of state and federal public authorities and government agencies consulted in order to inform the Gateway determination?

Consultation with the relevant State and Commonwealth public authorities will be undertaken once the Gateway determination has been issued.

Part 4 – Maps

This PP does not require a change to the existing LEP maps that apply to the subject sites and/or the addition of a new map. The WLEP does not contain an 'Additional Permitted Uses' map for the additional permitted uses that are listed in schedule 1 of the LEP.

The following maps illustrates the current WLEP controls including land use zone, floor space ratio and height of buildings which apply to the subject lands. As outlined, no new and/or updated maps are required by this Planning Proposal.

Existing controls – Land use zoning

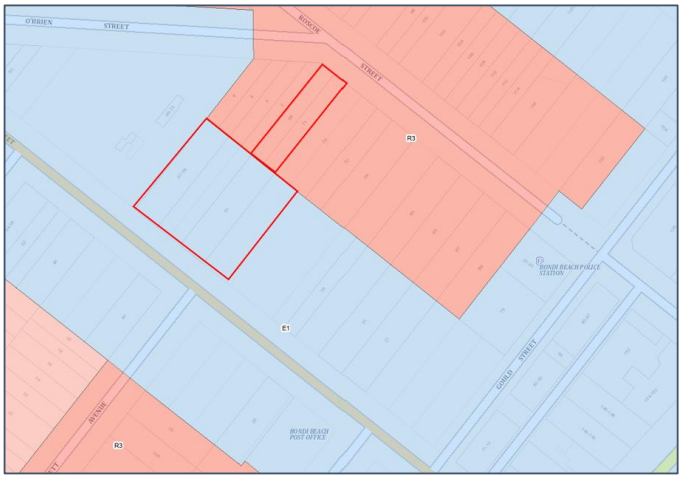

Figure 12: *Existing Land Use Zoning Map for land at 69-71 Roscoe Street, Bondi Beach and 49-59 Roscoe Street, Bondi Beach*

No change to the existing land use zoning map is required.

Floor Space Ratio

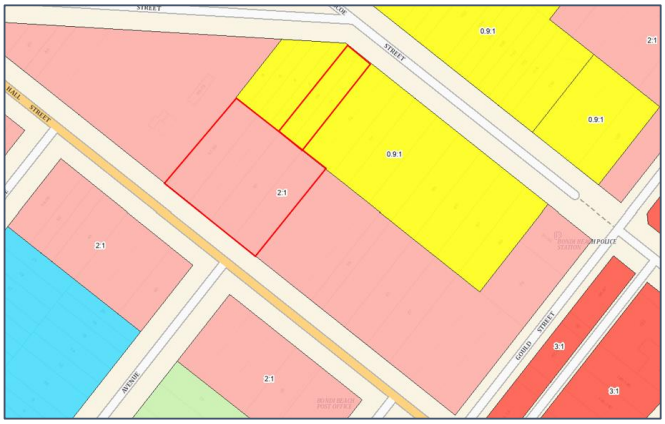

Figure 13: *Existing Floor Space Ratio Map for land at 69-71 Roscoe Street, Bondi Beach and 49-59 Roscoe Street, Bondi Beach*

No change is proposed to the existing FSR map.

Height of Buildings



Figure 14: *Existing Height of Building Map for land at 69-71 Roscoe Street, Bondi Beach and 49-59 Roscoe Street, Bondi Beach*

No change is proposed to the existing Height of Buildings Map.

Active street frontage

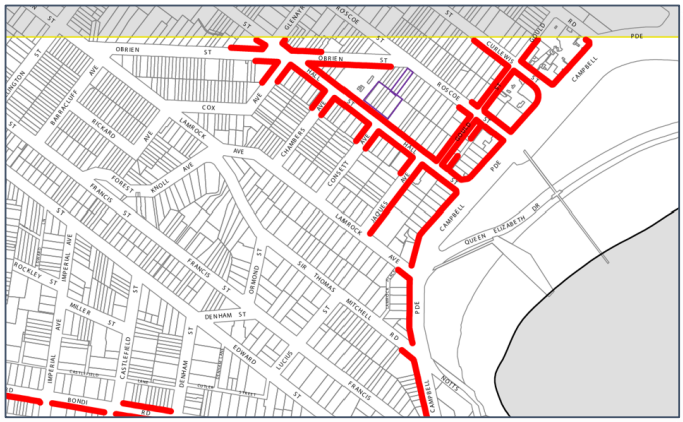

Figure 15: *Existing Active Street Frontages Map for land at 69-71 Roscoe Street, Bondi Beach and 49-59 Roscoe Street, Bondi Beach with the subject site marked in purple*

No change is proposed to the Active Street Frontages Map.

Part 5 – Community consultation

Pre-lodgement Consultation
Consultation with Council officers was carried out in April 2025 as part of the pre-lodgement stage of preparing this planning proposal. The advice from council officers noted that the PP would be classified as a 'standard' planning proposal in accordance with the Department's LEP making guideline. The advice from Council officers also noted the strategic alignment of the PP with Council's Centres Strategy. Specifically, outlining that:

'The relocation of vehicle access to Roscoe Street is a key benefit and is supported in principle. A reduction in the number of crossovers along Hall Street is a substantial positive from a pedestrian movement and streetscape continuity perspective.'

Council officers however raised concern that the amalgamation of sites with a long continuous frontage has the potential to disrupt the prevailing fine grain village character of Hall Street.

Council officers also requested further information be provided as part of the strategic and site-specific justifications in the planning proposal, specifically in relation to:

- The feasibility of the Roscoe Street frontage supporting this role.
- Traffic and access modelling, including pedestrian impact assessment.
- Urban design testing for both street frontages with clear articulation of how village character will be retained.

This PP has addressed the additional information requested and Council's concerns in relation to the impact on the character of Hall and Roscoe Streets.

Public exhibition
It is intended that this PP is to be exhibited concurrently with the accompanying DA under Division 3.5 of the EP&A Act, such that they can be considered together.

The Gateway determination will specify the level of public consultation that must be undertaken in relation to the PP including those with government agencies. The engagement activities for the consultation will be in accordance with Waverley's Community Engagement Strategy (2023), which is likely to include display on the Council's website and written notification to adjoining landowners.

Part 6 – Project timeline

An indicative project timeline for the concurrent DA and PP is provided in Table 7 below. The timeline has taken into consideration the Department of Planning, Housing and Infrastructure's (the Department) PP Benchmark Timeframes for a standard PP, as outlined in the LEP making guideline.

However, once the PP has been referred to the Minister for Planning and the Department for review and a Gateway determination is received with the relevant plan-making authority confirmed, the anticipated project timeline will be further adjusted.

Table 7 – Project timeline for the concurrent DA and Planning Proposal

Timing	Planning Proposal	Development Application
Stage 1	**Pre-lodgement** (50 days)*	**Pre-lodgement**
April 2025	Lodgement of scoping proposal, scoping meeting and issue of planning proposal requirements	Preparation of DA
May - June 2025	Preparation of Planning Proposal and technical studies	Preparation of DA and technical studies
Stage 2	**Planning Proposal** (95 days)*	**Council Review**
July 2025	Lodgement of Planning Proposal	Lodgement, notification and referral
	Review of Planning Proposal	Review of submission and technical referral responses from internal departments within Council
August 2025	Report to Council for formal consideration and submission to Department of Planning, Infrastructure and Housing for Gateway determination.	Planning Officer and Managers of Development Assessment (MoDA) review
September 2025		Feedback and refinement period
Stage 3	**Gateway determination** (25 days)*	**Re-lodgement/Refinement**
October 2025	Department's review of the planning proposal and issue of Gateway Determination.	Finalised plans and documentation provided to Council. Renotification if required, and to accompany PP gateway determination documentation. Technical re-referral to internal departments within Council

Timing	Planning Proposal	Development Application
Stage 4	**Post-Gateway** (50 days)*	**Council re-review**
November 2025	Satisfying the gateway conditions including any additional information required.	Re-review of submission and technical referral responses from internal departments within Council
December 2025		Planning Officer and Managers of Development Assessment (MoDA) review.
Stage 5	**Public Exhibition and Assessment** (95 days)*	**Preparation of Council report**
January 2026	Preparation for exhibition, public exhibition of 20 days and post-exhibition evaluation and report to Council for finalisation.	Preparation of Development Assessment Report, with recommendations made to the Local Planning Panel.
February 2026		
March 2026		
Stage 6	**Finalisation** (55 days)*	**Local Planning Panel Finalisation**
April 2026	Legal drafting of the LEP amendment and notification.	Application determined by the Local Planning Panel, noting the PP would be imminent and certain at this point. A deferred commencement consent may be granted pending gazettal of the LEP amendment if required.
May 2026		

**Planning Proposal benchmark timeframes as per the Department's LEP Making Guidelines based on the 'standard' planning proposal category and Council as the Local Plan Making Authority.*

3. Conclusion

The proposed amendment to WLEP would facilitate the urban renewal of the subject site to deliver high-amenity housing and retail floor space to support a vibrant and iconic local centre. Importantly, it would support the implementation of Council's Centres Strategy vision and place-based objectives for Bondi Beach and Hall Street.

As demonstrated in this report, the PP is appropriate for the following reasons:

- It aligns with the priorities of the Region Plan, District Plan, Council's LSPS, LHS and Centre's Strategy, in providing jobs closer to home, supporting the local economy and delivering more housing choice including affordable housing for the local area,
- The proposed LEP amendment aligns with the relevant Section 9.1 Ministerial Directions,
- It removes existing vehicular access on Hall Street, improves pedestrian safety along Hall Street and facilitates the implementation of a pedestrianised zone as identified in Council's Centres Strategy,
- It provides continuous ground floor retail street activation which retains the fine grain village character of Hall Street, and
- Supports a thriving and iconic local centre.

It is therefore recommended that the proposed amendment to WLEP is supported by the Council, and that it proceeds to Gateway Determination under Section 3.34 of the EP&A Act.

4. Appendices

Appendix A - Traffic and Parking Assessment prepared by CJP Consulting Engineers

Appendix B - Urban Design and Architectural Report prepared by PBD Architects

Appendix C - Economic Impact Assessment prepared by Hill PDA



REVISION	DATE	DESCRIPTION
A	16/06/2025	DA Issue

URBAN DESIGN AND ARCHITECTURAL REPORT

LOCATION

49-59 Hall Street & 69-71 Roscoe Street Bondi Beach NSW

DATE

JUNE 2025

CLIENT

HSN

NOMINATED ARCHITECT

Paul Buljevic
No. 7768



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11. Principle 9
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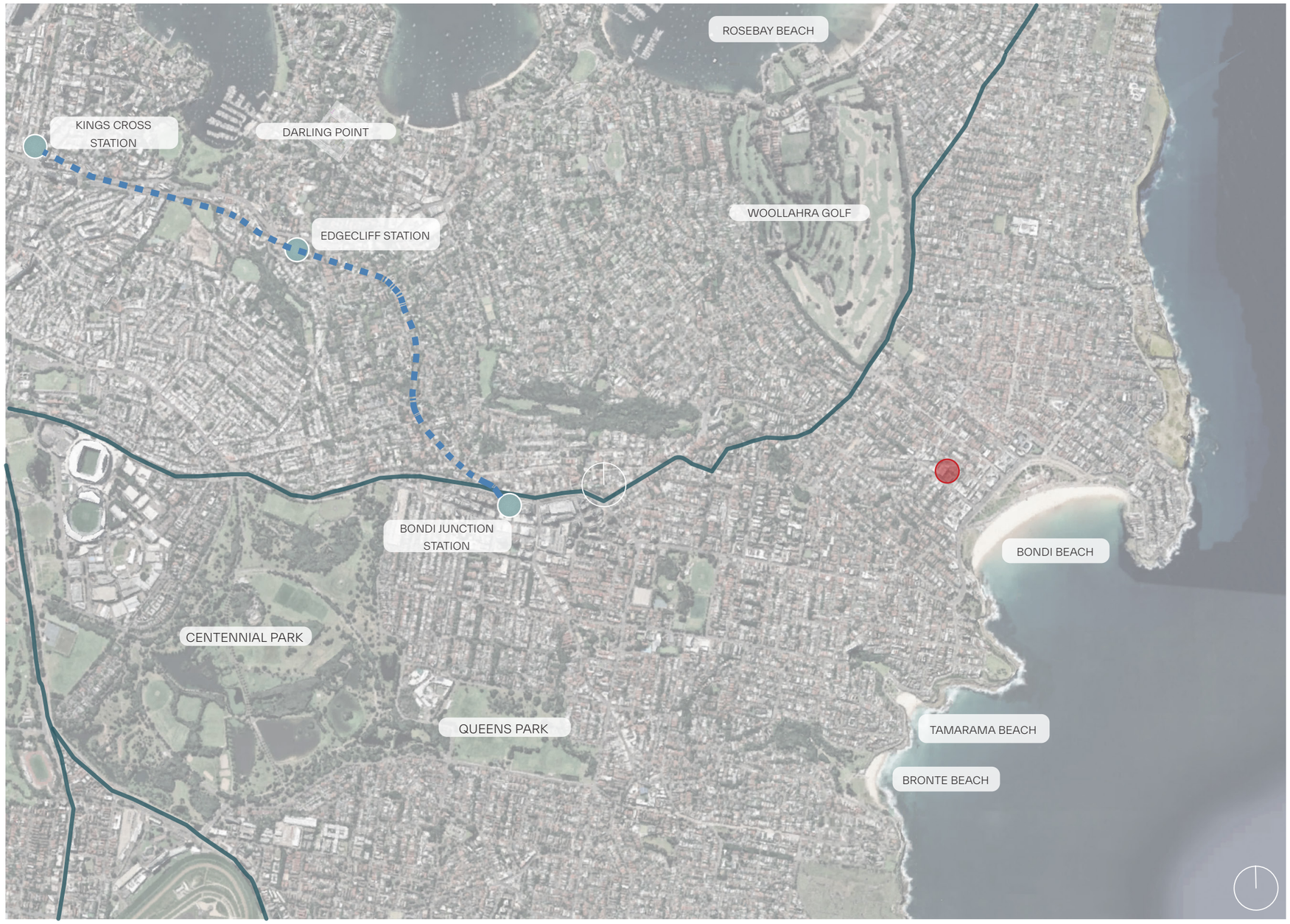
: Proposal

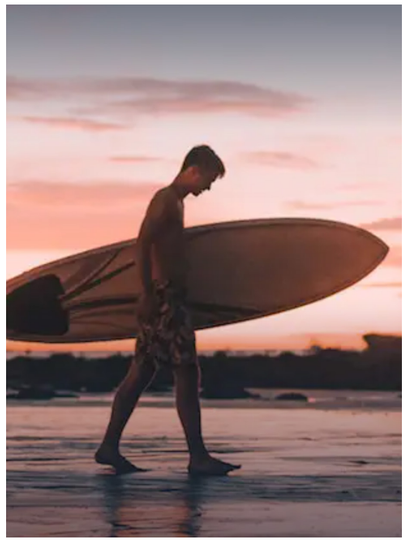
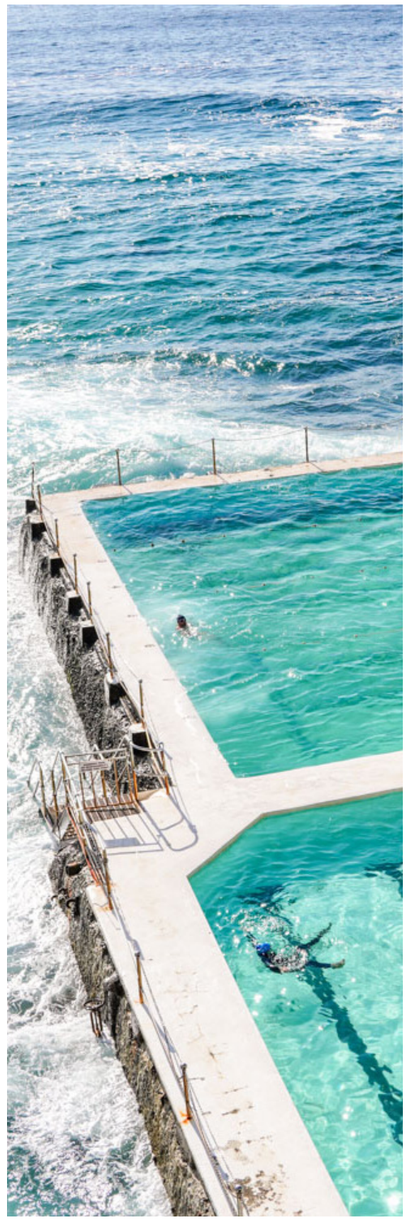
12. ADG - Response to objectives

01. URBAN DESIGN ANALYSIS

Greater Context



Local Character




LOCATION

49-59 HALL STREET &
69-71 ROSCOE STREET, BONDI BEACH

THE SITE

The site is located in Eastern Stydney within the Waverly Council and is located 7km from Sydney CBD

The existing site is an amalgamation of 5 existing site where the proposed Hall Street frontage to be shoptop housing and Roscoe Street frontage to be residential flat building.

The Site is in close proximity with a number of restaurants and shops , beaches and natural hiking paths.

SITE AREA: 2,913m²
ZONE : E¹ Local Centre & R³ Medium Density

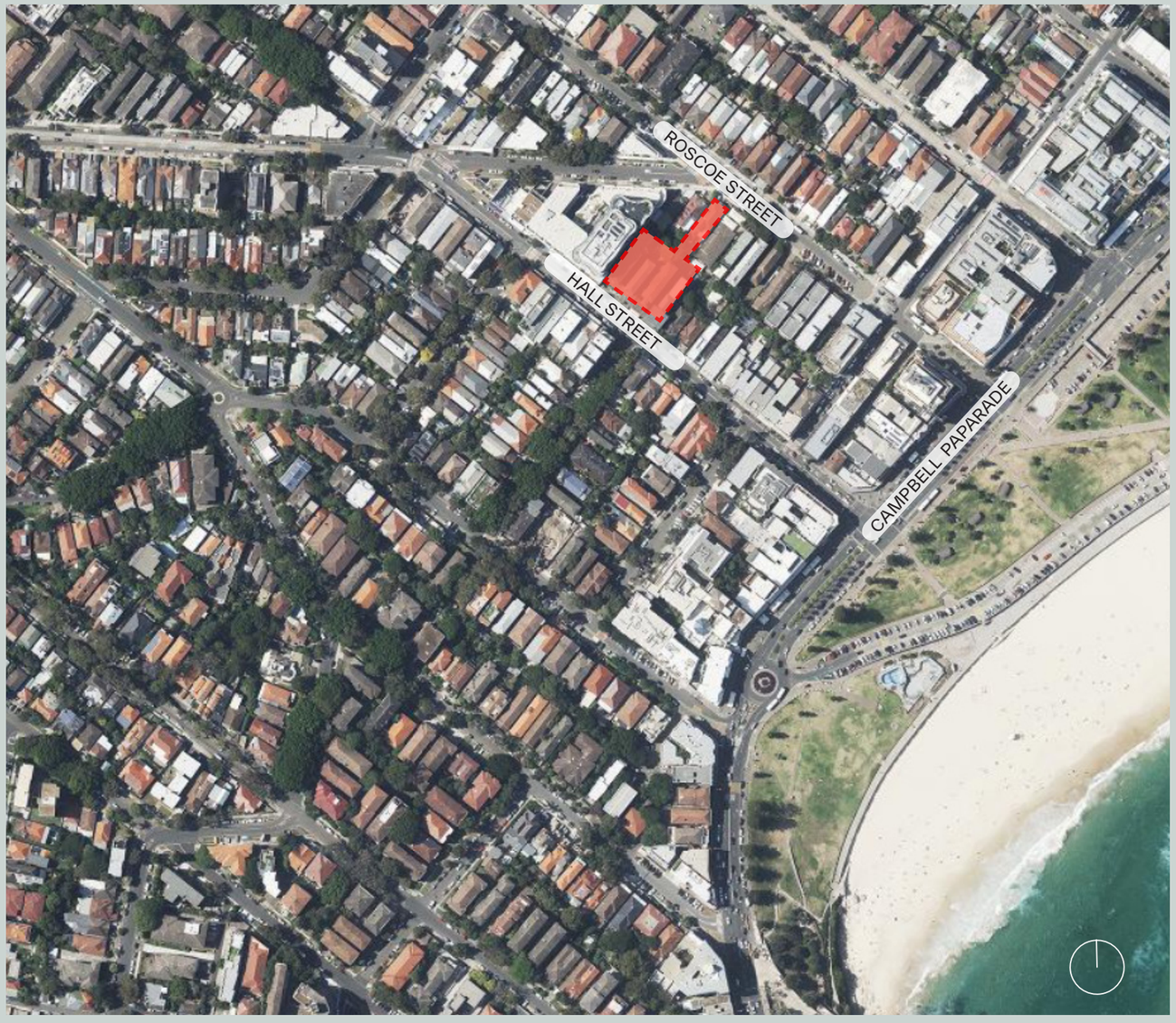
PERMISSIBLE FSR: 2:1 & 0.9:1
PERMISSIBLE Height: 13m & 12.5

PERMISSIBLE WITH CONSENT Shoptop Housing & RFB

AFFORDABLE INFILL SCHEME

BASE PERMISSIBLE FSR + 30%: 2.6:1 & 1.17:1

BASE PERMISSIBLE HEIGHT + 30% 16.9m & 16.25m



Key Ideas

Public Realm



Pedestrianised or shared zone along Hall Street + Gould Street

Additional sun and weather protection

Continuity of signage, landscaping and street furniture

Further activation, night markets, entertainment and creative lighting

Built Form



Encourage design and development of iconic buildings

Adaptive re-use of heritage and historic character buildings

Minimum non-residential FSR on 1st and 2nd floors to encourage commercial uses

Access



Calm traffic through increased pedestrianisation of streets

Public electric bike loading docks to encourage the use of bicycles

Prioritise active and public transport through cycle lanes and facilities

Dynamic and managed use of street environment: delivery times, emergency vehicle access.

Electric cycling station for drop off and pick up

Environment



Increased planting and greenery such as planter boxes and community gardens

New pocket parks at the intersections of secondary north-south streets and Hall Street

Underground waste system for commercial and residential properties

Encourage uptake of Solar Power and battery storage to support this centre as a RNC

Sources : Our Liveable Places - Bondi Beach Strategy Pg 141

Desired Future Character

Character

Character Descriptor: Enhance Existing

Building typologies
Inconsistent — Consistent

Height of buildings
Low-rise — High-rise

Subdivision pattern
Small lots — Large lots

Heritage significance
Low — High

Historic character
Historic — Modern

Active frontages
Low-activation — High-activation

Community and civic space
Low — High

Access and connectivity
Poorly connected — Well-connected

Vegetation coverage
Low-coverage — High-coverage

Views
Low — High

Existing character
Future character

Functionality

Centre Typology: Local's and Visitor's Centre

Pedestrian Activity
Low — High

Transport level of service
Low — High

Opportunities for interaction
Low — High

Range of Goods and Services
Few choices — Good variety

Capacity to support resilience
Low — High

Vitality

Bondi Beach is a thriving centre with both locals and visitors regularly frequenting the centre. Bondi Beach centre is busy throughout the day and into the evening, and has a variety of businesses to support this activity.

Viability

Bondi Beach has an eclectic mix of goods and services on offer, with a range of interesting shops and local businesses. There are a number of supermarkets for locals to complete their weekly shop, as well as cafes, restaurants and take away stores. With the beach nearby, there will always be visitors to this centre, and the centre's ability to be accessible, walkable and attractive is important to the success of businesses. This needs to be balanced with the centre's ability to serve local residents. This centre has a high capacity to support resilience, with a range of essential goods and services, and good open space to gather.

Capacity for evolution

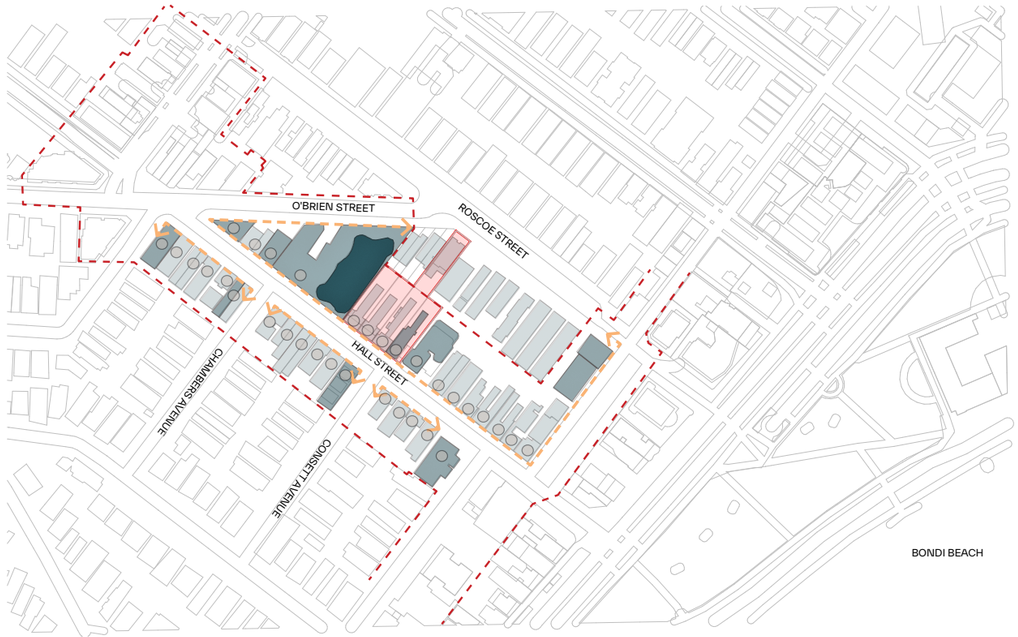
Bondi Beach has the capacity to be a world class centre. Workshop attendees identified that Bondi centre needs an icon that locals can be proud of, and that visitors can identify with Bondi. Increasing the walkability and pedestrian safety within the centre, as well as access to the centre is a key opportunity for Bondi to evolve into a 21st century urban beachside destination that showcases sustainability and culture done well. Supporting a night-life that supports culture and events is also an opportunity for Bondi Beach.



Sources : Our Liveable Places - Bondi Beach Strategy Pg 142

DESIGN STRATEGY AND RESPONSE

Built Form , Zoning and Uses



Existing Context



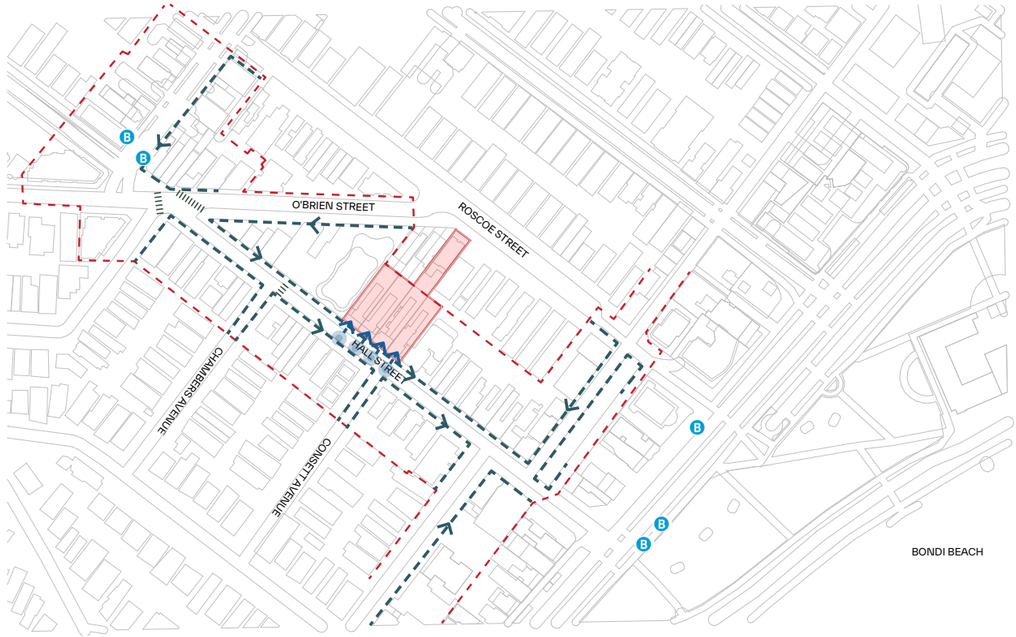
Proposed Context

- Roscoe Street contains a mix of medium density residential housing types including residential flat buildings , semi-detached dwellings and a child care centre of mainly 1-3 storeys
- Hall Street contains a variety of mixed use buildings ranging from 2-4 storeys in height and architectural style with shop fronts along the ground floor

- Hall Street currently under transition
- Maintain consistent street frontage
- Additional New developments along Hall Street that maintains the street character
- Continuous Awning along Hall Street Frontage to keep consistency with existing strategy
- Maintaining Fine Grain of Shop frontages along Hall Street

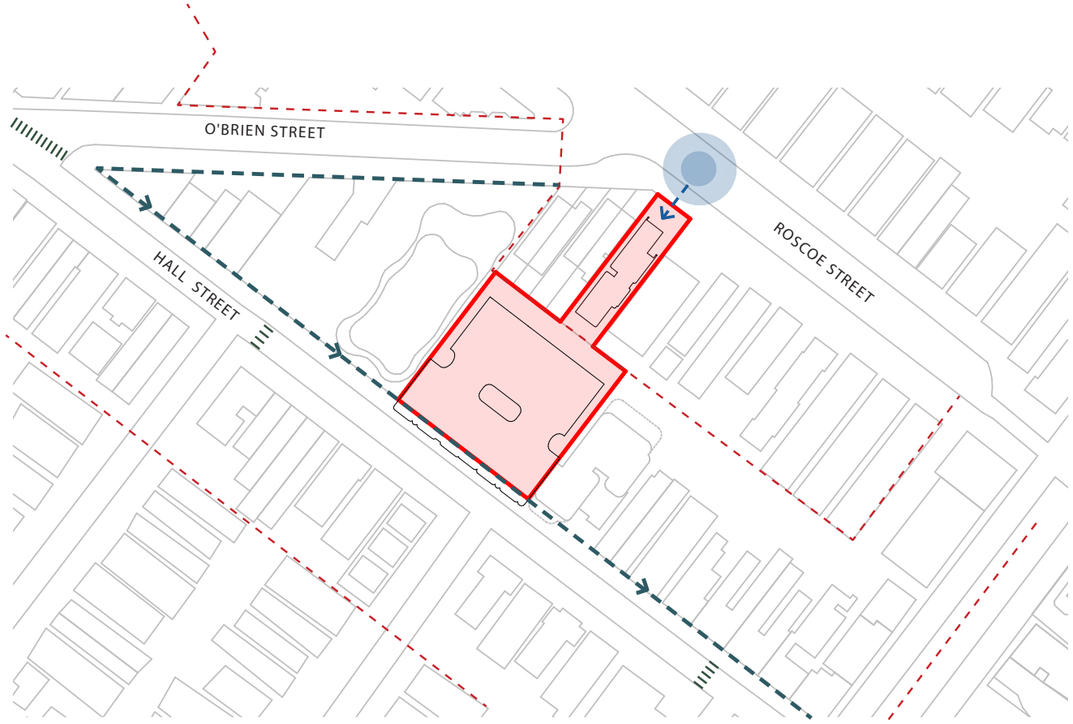
Subject Site
1-3 Storeys
4-6 Storeys
7-10 Storeys
Future New Development
Shop Frontage
Continuous Awning

Pedestrian and Vehicular Movement



Existing Context

- There are currently 4x driveways along the Hall Street Site
- The driveway interrupt pedestrian flow and safety along Hall Street
- The driveways interrupt the fine grain retail along Hall Street



Proposed Context

- Removal of 4 x driveway entries along Hall Street and proposed 1 x driveway entry to Roscoe Street on a less busier street
- Improved traffic safety
- Opportunities for Hall Street to be pedestrianized
- Opportunities for greater amounts of fine grain retail

Subject Site
Pedestrian Movement
Vehicular Entry
Local Centre Boundary

Landscape , Sustainability and Environment



Existing Context

- Limited green roofs and rooftop gardens

-Limited greenery within the subject site



Proposed Context

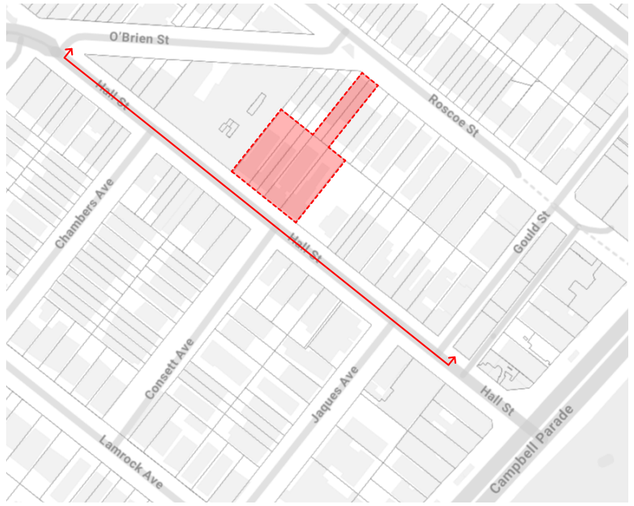
- Increased green roofs and rooftop gardens

- Increased planting and greenery on Hall Street streetscape and within the subject site

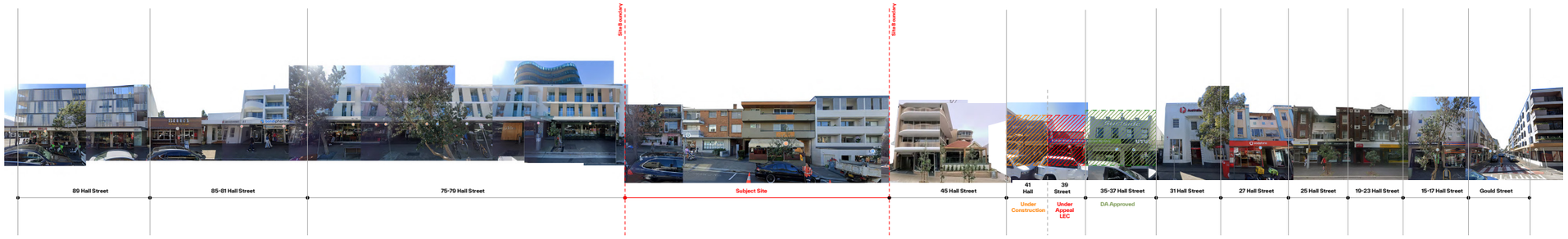
- Introduced 50% of native plant species within the subject site

Subject Site
Existing Trees
New Landscaping
Local Centre Boundary

Streetscape Analysis Hall Street



Context Plan

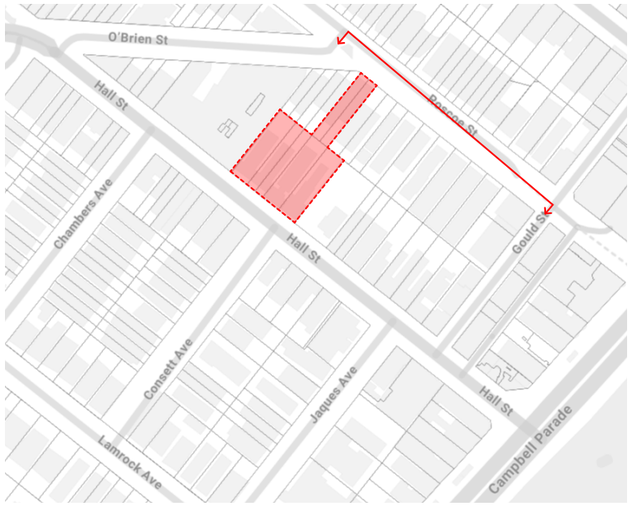


Existing Context



Proposed Context

Streetscape Analysis Roscoe Street



Context Plan



Existing Context



Proposed Context

02. DESIGN VERIFICATION

“The design quality principles for residential flat development are the principles set out in this Part.

Good design is a creative process which, when applied to towns and cities, results in the development of great urban places: buildings, streets, squares and parks.

Good design is inextricably linked to its site and locality, responding to the landscape, existing built form, culture and attitudes. It provides sustainable living environments, both in private and public areas.

Good design serves the public interest and includes appropriate innovation to respond to technical, social, aesthetic, economic and environmental challenges.

The design quality principles do not generate design solutions, but provide a guide to achieving good design and the means of evaluating the merit of proposed solutions.”SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

TO DESIGN QUALITY PRINCIPLES

DESIGN VERIFICATION STATEMENT

PBD Architects has been responsible for the design of the project since its inception and have worked with related professional and experts in respect of the matter. The project has been designed to provide a development that is respectful of local planning and design controls and that responds to the best practice design principles of SEPP Housing No. 21. PBD Architects verify that the design quality principles set out in Schedule 9, Design quality principles of the State Environmental Planning Policy (Housing) No. 21 – Design Quality of Residential Apartment Development are achieved for the proposed development described in the following document.



Paul Buljevic

Managing Director
Registered Architect NSW, No. 7768

pbd
architects

PBD | Paul Buljevic Design

Paul Buljevic is a Registered Architect in New South Wales and a member of the Australian Institute of Architects Registration number is 7768. He is a qualified Architect with extensive experience in the design of residential housing developments of varying scale. Paul Buljevic has been responsible for the design of this project since its inception and has worked with a professional consultant team in preparing the Development Application.



PROPOSAL

In this Report the proposal for a Shoptop Housing at 49-59 Hall Street, Bondi and Residential Flat Building at 69-71 Roscoe Street , Bondi is explained by using the Design Quality Principles listed in the State Environmental Planning Policy Housing No 21 - Design Quality of Residential Apartment Development under the Environmental Planning and Assessment Act 1979.

The design proposal is as follows:

- Construction of a 5 storey Shoptop Housing at Hall Street, a total of 31 apartments and 4 storey Residential Flat Building at Roscoe Street in connection with 2 levels of basements

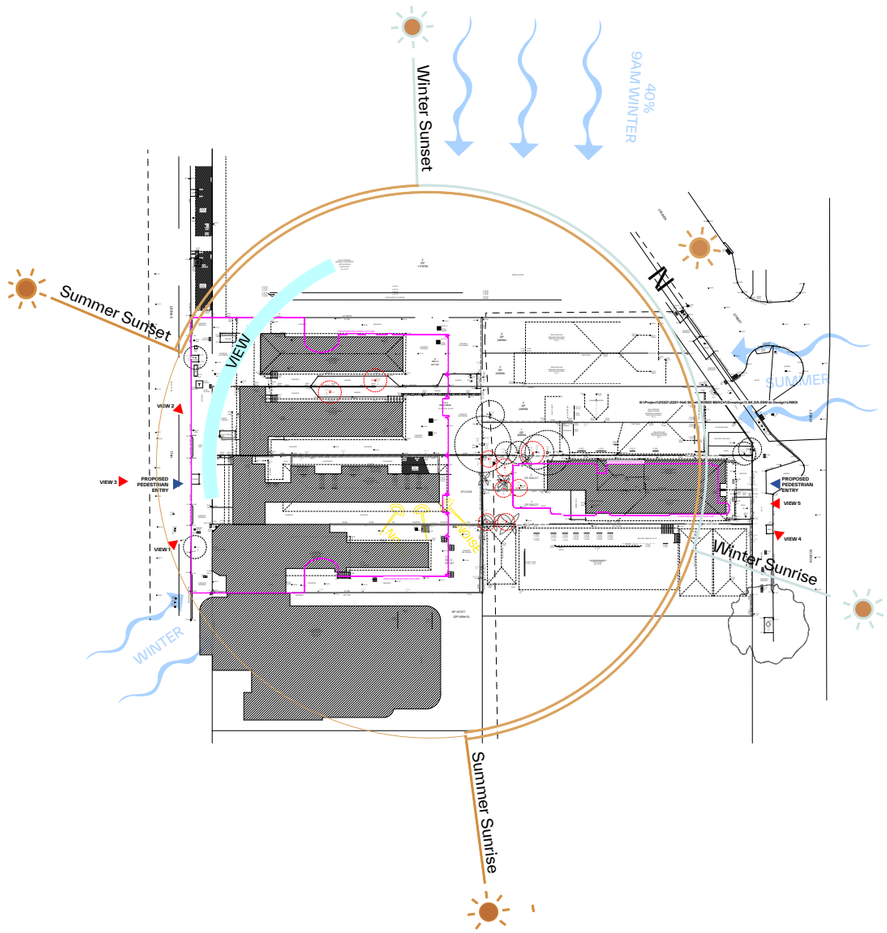
03. PRINCIPLE 1

CONTEXT AND NEIGHBOURHOOD CHARACTER

"Good design responds and contributes to its context, which is the key natural and built features of an area, their relationship and the character they create when combined and also includes social, economic, health and environmental conditions.

Responding to context involves identifying the desirable elements of a location's current character or, in the case of precincts undergoing a transition, the desired future character as stated in planning and design policies. New buildings will thereby contribute to the quality and identity of the area."

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY (HOUSING) NO 21 - DESIGN PRINCIPLES OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979




View 1


View 2


View 3


View 4


View 5

PRINCIPLE 1

CONTEXT + NEIGHBOURHOOD CHARACTER

The subject site is located at 49-59 Hall Street & 69-71 Roscoe Street Bondi

The immediate context of the site is characterized by a mixture of:

- Bondi Shopping Village : Restaurants , retail , cafe and supermarket

- Recreational areas such as beaches, parklands and sporting area

The proposed residential flat building is designed to integrate seamlessly with the existing neighborhood and streetscape. It thoughtfully incorporates elements such as setbacks, building forms, landscaping, and alignment to address the immediate area. The design features a consistent setback where a 6m rear and 3m side setback of Hall Street.

The proposed vehicular access has been strategically located on a less busier street on Roscoe Street to minimise pedestrian disruption on Hall Street. A cohesive palette building integrates elegantly into the existing context.

04. PRINCIPLE 2

BUILT FORM AND SCALE

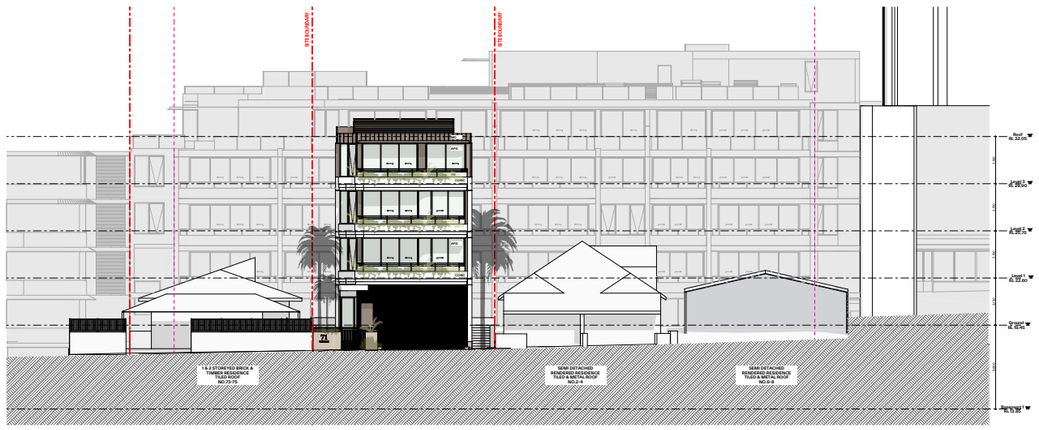
"Good design achieves a scale, bulk and height appropriate to the existing or desired future character of the street and surrounding buildings.

Establishing an appropriate scale requires a considered response to the scale of existing development. In precincts undergoing a transition, proposed bulk and height needs to achieve the scale identified for the desired future character of the area."

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL FLAT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979



West Elevation - Hall Street



East Elevation - Roscoe Street

PRINCIPLE 2

BUILT FORM & SCALE

The proposed shoptop housing development on Hall Street features a 5 storey building where lower levels are retail spaces. The building are articulated where the indentation reduces the bulk of the massing and creates opportunities for landscape planters. This further articulation highlights the building entry point. The proposed residential development on Roscoe Street features a 4 storey building. These design approach not only respects the existing streetscape but also adopts a sense of openness and light. By carefully considering the height and massing of the building, the proposal aims to create a harmonious balance between design and liveability, promoting a welcoming atmosphere for residents and their visitors. The use of high-quality materials and thoughtful landscaping will enhance the overall aesthetic, contributing to a vibrant and cohesive community environment

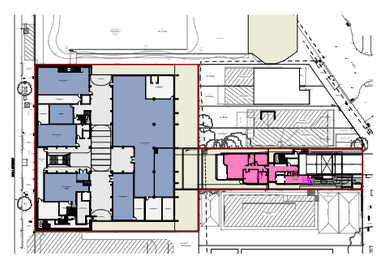
05. PRINCIPLE 3

DENSITY

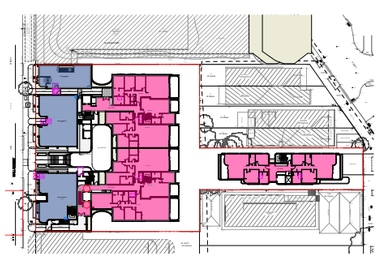
"Good design achieves a high level of amenity for residents and each apartment, resulting in a density appropriate to the site and its context.

Appropriate densities are sustainable and consistent with the existing density in an area or, in precincts undergoing a transition, are consistent with the stated desired future density. Sustainable densities respond to the regional context, availability of infrastructure, public transport, community facilities and environmental quality."

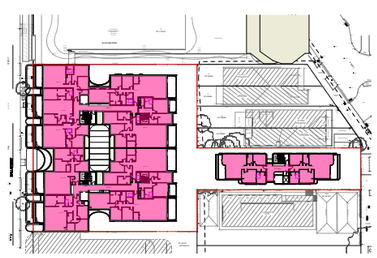
SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979



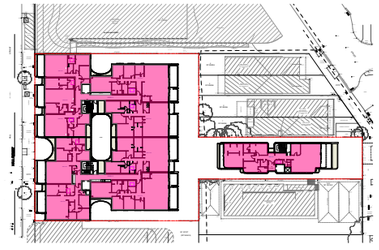
1 Lower Ground 1:500



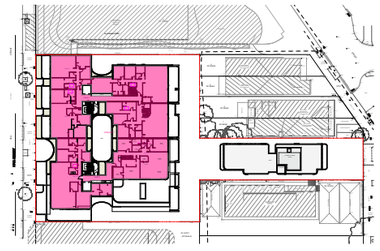
2 Ground 1:500



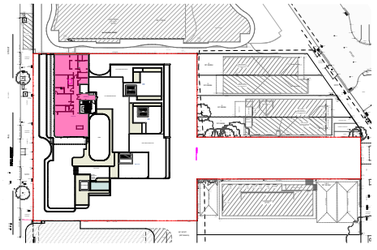
3 Level 1 1:500



4 Level 2 1:500



5 Level 3 1:500



6 Level 4 1:500

45-49 Hall Street	
Site Area:	2331.2
Permissible FSR:	2:1
Permissible GFA:	4662.4
In-fill Affordable House Scheme	
SEPP (Housing) 2021	
Permissible FSR + 30%	2.6:1
Permissible GFA + 30%	**6061.1**

69-71 Roscoe Street	
Site Area:	579.8
Permissible FSR:	0.9:1
Permissible GFA:	521.8
In-fill Affordable House Scheme	
SEPP (Housing) 2021	
Permissible FSR + 30%	1.17:1
Permissible GFA + 30%	**678.4**

Total GFA:	**6739.5**

GROSS FLOOR AREA

COMMERCIAL		
	Lower Ground	882.3
	Ground	385.7
		1,268.0 m
RESIDENTIAL		
	Lower Ground	135.5
	Ground	1,001.6
	Level 1	1,542.0
	Level 2	1,518.1
	Level 3	1,055.0
	Level 4	219.3
		5,471.5 m²
	TOTAL GFA	**6,739.5 m**

PRINCIPLE 3

DENSITY

The proposed development offers medium-density urban housing with 37 apartments consisting of 2 and 3 bedroom apartments. This density is deemed sustainable, given the existing and anticipated availability of infrastructure, public transport, and community and culturally significant facilities, as well as the environmental qualities of the site.

The proposed apartments are spacious and have been designed to align with current market demands regarding housing types and living patterns prevalent in the local community. By providing a range of thoughtfully designed layouts, the development caters to diverse lifestyles and promotes a vibrant, inclusive neighborhood. This approach not only enhances the residential offering but also contributes positively to the overall character of the area, encouraging a sense of community and well-being among residents.

The proposal is consistent with the max. 30% affordable housing sepp bonus permissible FSR (LEP) at 1.17:1.

06. PRINCIPLE 4

SUSTAINABILITY

“Good design combines positive environmental, social and economic outcomes. The use of natural cross ventilation and sunlight for the amenity and liveability of residents.

Sustainability is integral to the design process. Aspects include demolition of existing structures, recycling of materials, selection of appropriate and sustainable materials, adaptability and reuse of buildings, layouts and built form, passive solar design principles, efficient appliances and mechanical services, soil zones for vegetation and reuse of water.”

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

PRINCIPLE 4

SUSTAINABILITY

A comprehensive analysis of the building has been conducted as part of the BASIX assessment. The following general features are included in the proposal:

- Cross-Flow Ventilation: The design incorporates a high degree of cross-flow ventilation, utilizing corner unit typologies and operable lourvre screens in the breezeway corridors. This approach minimises reliance on natural ventilation and lighting, reducing energy demands.

- Natural Light and Solar Access: Internal layouts and orientations have been optimised to ensure ample natural daylight and solar access to primary living areas, as well as to external private open spaces and courtyards.

- Overhangs and Awnings: Appropriate overhang depths, balcony dimensions, and awnings have been designed for the northern facades to enhance comfort and energy efficiency.

- Water Efficiency: Energy-efficient appliances and fixtures are included in the internal fit-out to minimise water consumption.

- Solar Energy Provisions: The proposal includes provisions for solar energy systems, promoting a shift towards more energy-efficient living for the community.

- Sustainable Landscaping: Native plants that are suitable for the climate and location will be selected to support local biodiversity.

- Bicycle Parking: Adequate provisions for bicycle parking will be included to encourage sustainable transport options.

These features collectively aim to create a sustainable, energy-efficient living environment that meets the needs of the community while minimizing environmental impact.



2.



4.





3.





Source: Wyer & Co

07. PRINCIPLE 5

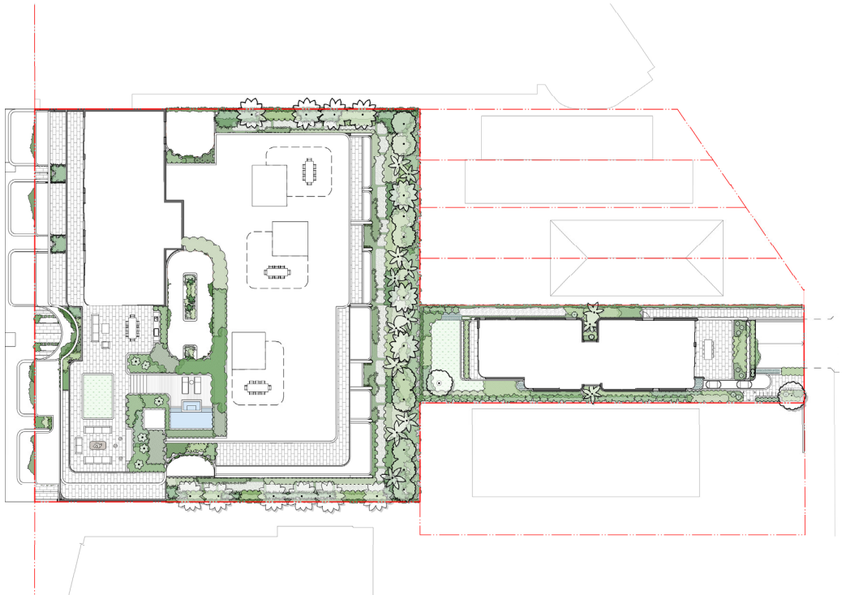
"Good design recognises that together landscape and buildings operate as an integrated and sustainable system, resulting in greater aesthetic quality and amenity for both occupants and the adjoining public domain.

Landscape design builds on the existing site's natural and cultural features in responsible and creative ways. It enhances the development's natural environmental performance by co-ordinating water and soil management, solar access, micro-climate, tree canopy and habitat values. It contributes to the positive image and contextual fit of development through respect for streetscape and neighbourhood character, or desired future character.

Landscape design should optimise useability, privacy and social opportunity, equitable access and respect for neighbours' amenity, and provide for practical establishment and long term management".

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

LANDSCAPE



Ground Floor landscape strategy (Source: Wyer & Co)

PRINCIPLE 5

LANDSCAPE

- Generous common areas and outdoor spaces: Each apartment features spacious balconies or terraces that flow seamlessly from the primary living areas, optimized for orientation and views.

- Low Maintenance Landscaping: The proposal emphasises low maintenance, incorporating a selective mix of plantings at varying heights and densities to harmonize with the surrounding characteristics.

- Deep Soil Landscaping: Large area of deep soil landscaping with existing trees along the boundary will help filter views to and from the development further enhancing the site's aesthetics.

These design elements collectively promote a balanced integration of indoor and outdoor living, fostering a pleasant and sustainable environment for residents.

INSPIRATION PALETTE - ROSCOE STREET

1. Silvery foliage olive situated in rear garden
2. Low maintenance native grasses
3. Silvery, blue shrubs
4. Hardy succulents with colour accent
5. Spilling plants to upper levels
6. Sculptural agave



2.



1.



3.



4.



5.



6.

INSPIRATION PALETTE - HALL STREET REAR

1. Palms to provide green outlook and vertical scale
2. Large foliage species for visual interest
3. Layered planting scheme
4. Decorative gravel / pebble pathway with groundcovers
5. Shade tolerant species with varied foliage and texture



2.



1.

Landscape strategy (Source: Wyer & Co)

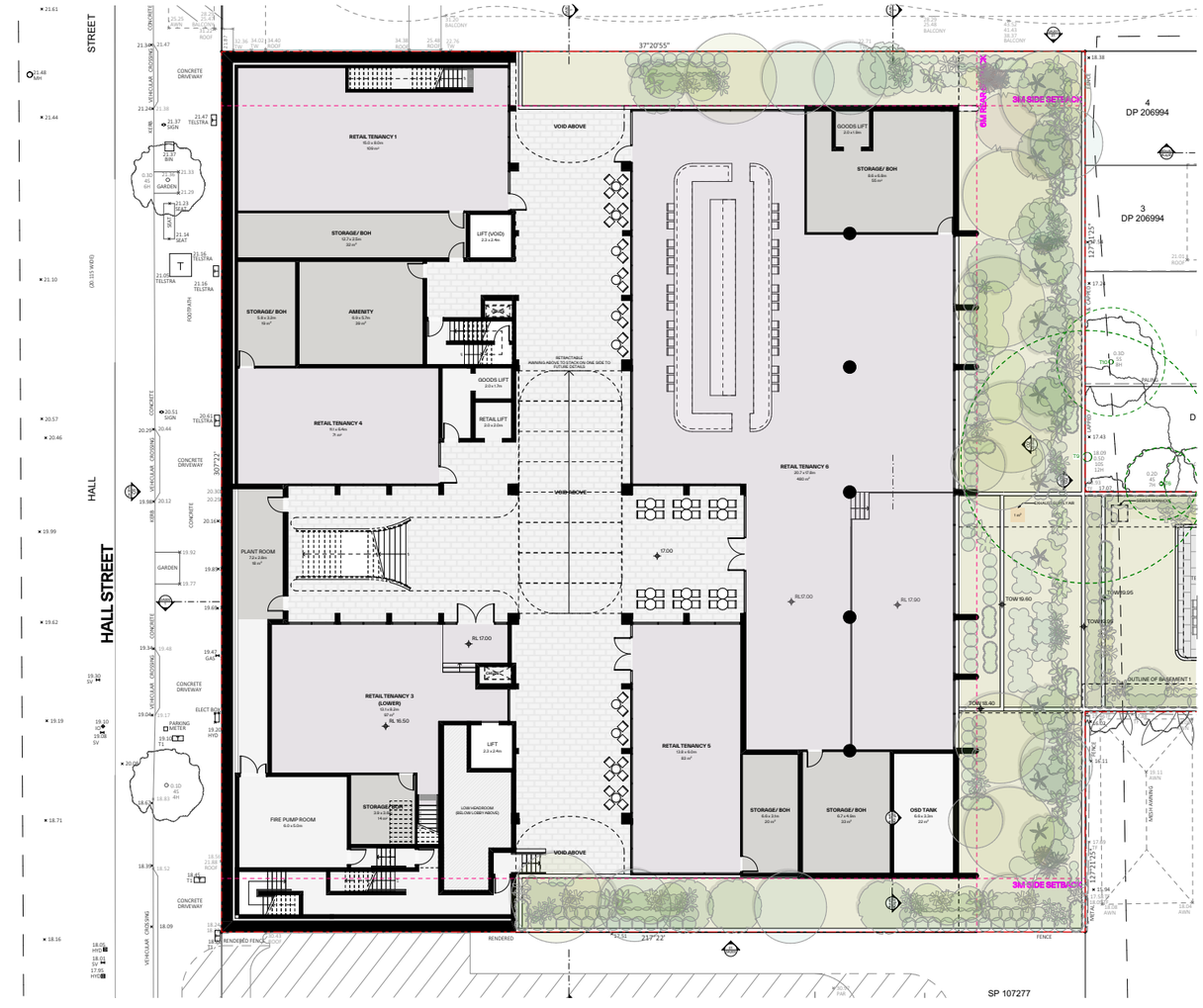
08. PRINCIPLE 6

AMENITY

“Good design positively influences internal and external amenity for residents and neighbours and contributes to positive living environments and resident well-being

Optimising amenity requires appropriate room dimensions and shapes, access to sunlight, natural ventilation, visual and acoustic privacy, storage, indoor and outdoor space, efficient layouts and service areas, outlook and ease of access for all age groups and degrees of mobility.”

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979



Lower Ground Floor - Hall Street

PRINCIPLE 6

AMENITY

Future residents of this development will enjoy a high level of amenity, including:

- Diverse Apartment Offerings: A variety of apartment sizes, layouts, and configurations to suit different preferences and lifestyles.

- Thoughtful Space Design: Appropriate connections and subtle separations within the apartments are designed to capture northern light effectively.

- Optimal Building Orientation: The building is generally oriented to face north, providing excellent solar amenity for 70.3% of the apartments.

- Enhanced Ventilation: The layout allows for ventilation in all bedrooms and habitable spaces, with 89% of apartments achieving cross ventilation. Features such as awning windows, sliding doors to balconies, and generous living areas facing east, north, and west offer residents multiple options to adjust their internal environment.

- Private Recreational Areas: Each apartment has direct access to private recreational spaces from the main living areas.

- Close proximity to retail areas on the lower ground and ground floor access

- Abundant Natural Light: All rooms within the apartments receive adequate daylight and solar access.

- Carefully Planned Separation: Building separation distances are thoughtfully considered, particularly for proposed balconies and bedroom windows facing adjacent properties.

These features collectively create a comfortable and inviting living environment that promotes well-being and community engagement

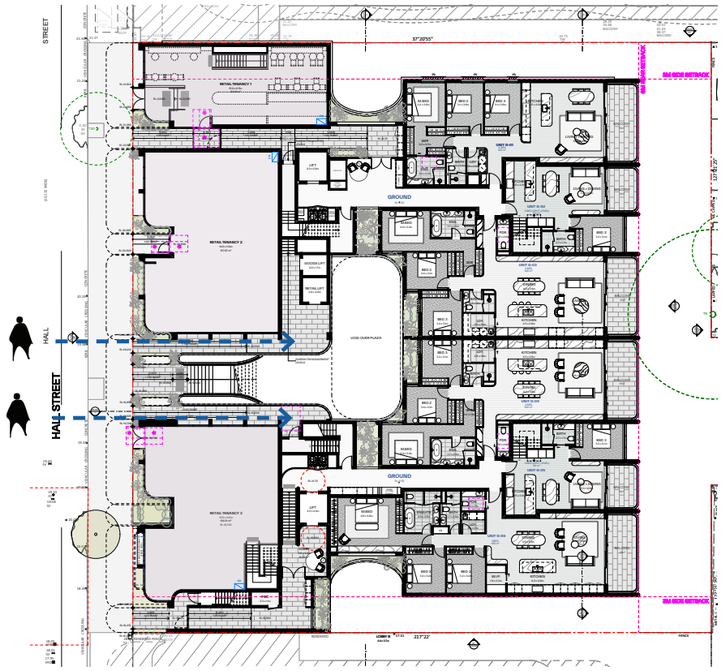
09. PRINCIPLE 7

"Good design optimises safety and security, both internal to the development and for the public domain.

This is achieved by maximising overlooking of public and communal spaces while maintaining internal privacy, avoiding dark and non-visible areas, maximising activity on streets, providing clear, safe access points, providing quality public spaces that cater for desired recreational uses, providing lighting appropriate to the location and desired activities, and clear definition between public and private spaces."

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

SAFETY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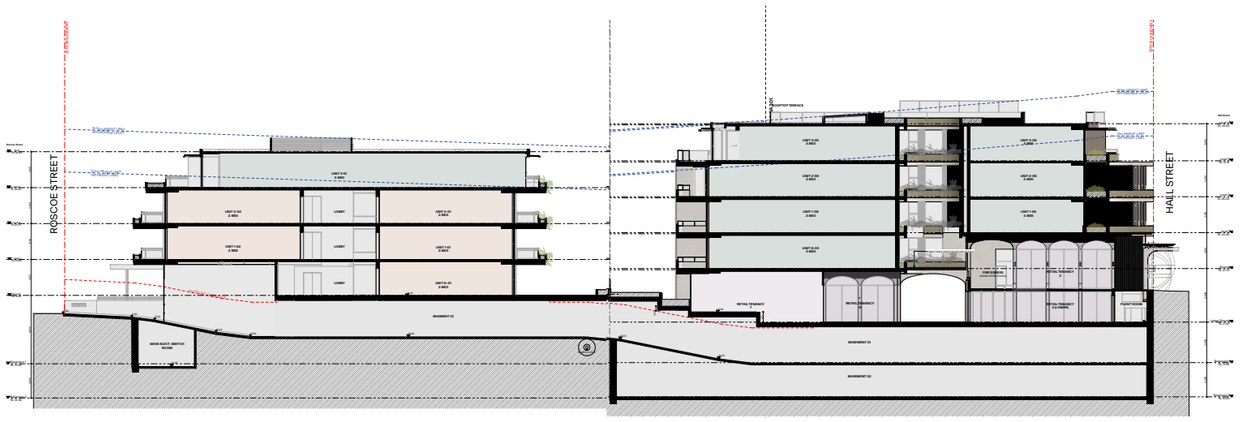
10. PRINCIPLE 8

"Good design achieves a mix of apartment sizes, providing housing choice for different demographics, living needs and household budgets.

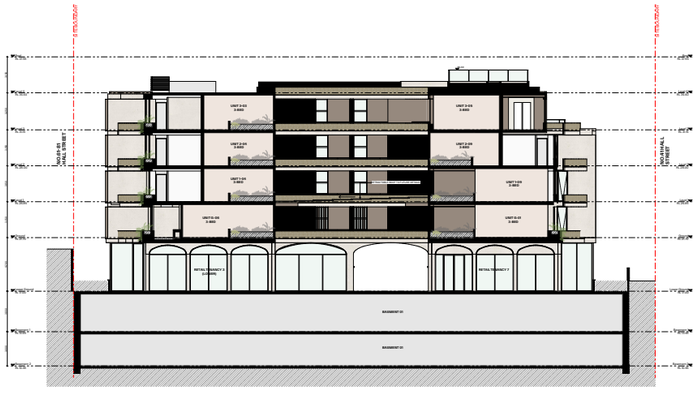
New developments should optimise the provision of housing to suit the social mix and needs in the neighbourhood or, in the case of precincts undergoing transition, provide for the desired future community. New developments should address housing affordability by optimising the provision of economic housing choices and providing a mix of housing types to cater for different budgets and housing needs."

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

HOUSING DIVERSITY AND SOCIAL INTERACTION



SECTION A



SECTION B

PRINCIPLE 8

HOUSING DIVERSITY & SOCIAL INTERACTION

The propositions and configuration of the apartments associated with the development provides an appropriate response to the market demand of future occupants.

- Appropriate Apartment Mix: The size, configuration, and variety of 2 and 3 bedroom apartments in the development effectively respond to the market demand of future occupants.

- Liveable Housing Design: at least 15% of the units will be designed to meet Silver Level of the Liveable Housing Code and 20% of the units will be adaptable units.

- Generous Communal Open Space: The development includes ample communal open spaces, fostering interaction and community engagement among future residents.

- Proximity to Amenities: The site is strategically located near essential facilities, including public transport, food and recreational amenities

11. PRINCIPLE 9

AESTHETICS

"Quality aesthetics require the appropriate composition of building elements, textures, materials and colours and reflect the use, internal design and structure of the development.

Aesthetics should respond to the environment and context, particularly to desirable elements of the existing streetscape or, in precincts undergoing transition, contribute to the desired future character of the area."

SOURCE: STATE ENVIRONMENTAL PLANNING POLICY NO 21 - DESIGN QUALITY OF RESIDENTIAL APARTMENT DEVELOPMENT UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979



HALL STREET



ROSCOE STREET

PRINCIPLE 9

AESTHETICS

The contemporary architectural style, along with the orientation and configuration of the site, results in a highly articulated aesthetic characterized by the following elements:

Varied Elevations: The building's elevations are thoughtfully designed to respond to northern aspect, existing trees, setbacks, and the overall site context. The modern and clean aesthetic is balanced with environmental controls and landscape elements.

Articulated Facade: The facade features a dynamic interplay of elements, including slender vertical articulation, recessed indentation and chocies of materials that creates interest in the facade .

Material Dynamics: The facade's design employs variations in planes, slab projections, thickness, and textures, creating an engaging visual experience.

Architectural Interest: Each external corner and facade section is defined by its articulated form, including indentations and planter boxes, which help reduce bulk and introduce intriguing architectural patterns in proportion and scale.

Environmental Protection: Balconies and slab projections are designed to shield residents from the harsh western sun and rain driven by southern winds.

Consistent Colour and Material Palette: Careful selections of color and materials contribute to a cohesive building language throughout the development, creating a strong visual link from the street and a seamless transition to the surrounding environment.

Native Planting: New landscaping featuring native species will provide a visual buffer between the street and neighbouring buildings, enhancing the natural environment currently present on the site.

Light and Shade Play: The design incorporates various reveals, planes, and recesses to create an interplay of light and shade, helping to soften the building's massing.

These elements work together to create a distinctive and harmonious architectural presence that enhances the overall character of the area

ADG - RESPONSE TO OBJECTIVES

TABLE 1 - APARTMENT DESIGN GUIDE - DESIGN OBJECTIVES AND DESIGN CRITERIA

OBJECTIVE	DESIGN CRITERIA		PROPOSED	COMMENT
PART 3- SITTING THE DEVELOPMENT				
Site Analysis	Objective 3A-1 Site analysis illustrates that design decisions have been based on opportunities and constraints of the site conditions and their relationship to the surrounding context		Complies	The proposed development has been designed to respond to the surrounding context as well as future planning of Bondi. The current site constraints including level differences, irregular shaped lot, noise and wind have been taken into consideration and is evident in the final proposed design strategy.
Orientation	Objective 3B-1 Building types and layouts respond to the streetscape and site while optimising solar access within the development		Complies	The proposal is a Shoptop Housing and Residential Flat Building for Hall Street and Roscoe Street respectively . It aims to contribute to the overall transformation of Bondi precinct and address housing needs in NSW. The proposal has been setback from all boudaries, consistent with the predominantly street setback. It has also been oriented to maximise solar access.
	Objective 3B-2 Overshadowing of neighbouring properties is minimised during mid winter		Complies	The building form has been shaped by the predominant street setback and ADG building seperation setback. Minimise overshadowing to the neighboring properties.
Public Domain Interface	Objective 3C-1 Transition between private and public domain is achieved without compromising safety and security		Complies	The residential access points/lobbies for both Hall Street and Roscoe Street are carefully and appropriately located on Hall Street and Roscoe Street respectively through which are highly visible for residents and visitors. The residential lobbies are designed to be secured by card access. Street facing apartments have direct entrance from street level , adding a passive surveillance over the public domain.
	Objective 3C-2 Amenity of the public domain is retained and enhanced		Complies	The proposed adds to the public realm by enhancing street experience through adequate street setback, landscaping and street activation.
Communal and Public Open Space	Objective 3D-1 An adequate area of communal open space is provided to enhance residential amenity and to provide opportunities for landscaping	1. Communal open space has a minimum area equal to 25% of the site 2. Developments achieve a minimum of 50% direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid winter)	N/A	
	Objective 3D-2 Communal open space is designed to allow for a range of activities, respond to site conditions and be attractive and inviting		N/A	
	Objective 3D-3		N/A	

Deep Soil Zones	Objective 3E-1 Deep soil zones provide areas on the site that allow for and support healthy plant and tree growth. They improve residential amenity and promote management of water and air quality	Deep soil zones are to meet the following minimum requirements: Site area >1,500 sqm Deep soil zone 15% | 742.6sqm	Complies	The proposal includes Deep Soil Area **Ground : 246sqm(8.45%)** Refer to architectural drawing DA510.
Visual privacy	Objective 3F-1 Adequate building separation distances are shared equitably between neighbouring sites, to achieve reasonable levels of external and internal visual privacy	Separation between windows and balconies is provided to ensure visual privacy is achieved. Minimum required separation distances from buildings to the side and rear boundaries are as follows: Building height / Hab and balcony / Non-hab up to 12m (4 storeys) 6m 3m up to 25m (5-8 storeys) 9m 4.5m over 25m (9+ storeys) 12m 6m	Complies	The proposed rear setback is consistent with ADG building separation and the desired future character of in the area.
	Objective 3F-2 Site and building design elements increase privacy without compromising access to light and air and balance outlook and views from habitable rooms and private open space		Complies	Building elements such as solid articulation posed as privacy screen, solid upstand and planting buffers area helps ensure visual privacy and amenity.
Pedestrian Access and Entries	Objective 3G-1 Building entries and pedestrian access connects to and addresses the public domain		Complies	Residential main entries from Hall Street and Roscoe Street connects to and addresses the public domain
	Objective 3G-2 Access, entries and pathways are accessible and easy to identify		Complies	All proposed entries are clearly identified through the use of building break, recessive façade elements and architectural features.
	Objective 3G-3 Large sites provide pedestrian links for access to streets and connection to destinations		Complies	All proposed entries are clearly identified through the use of building break and streamline fencing details.

Vehicle Access	Objective 3H-1 Vehicle access points are designed and located to achieve safety, minimise conflicts between pedestrians and vehicles and create high quality streetscapes		Complies	The proposed vehicle access points have been strategically placed at Roscoe Street to reduce the impact on ground floor activation on Hall Street. It has also been carefully located to minimise traffic congestion and provide clear visibility.
Bicycle and Car Parking	Objective 3J-1 Car parking is provided based on proximity to public transport in metropolitan Sydney and centres in regional areas	For development in the following locations: - on sites that are within 800 metres of a railway station or light rail stop in the Sydney Metropolitan Area; or - on land zoned, and sites within 400 metres of land zoned, B3 Commercial Core, B4 Mixed Use or equivalent in a nominated regional centre The minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or the car parking requirement prescribed by the relevant council, whichever is less The car parking needs for a development must be provided off street	Complies	The proposed basement car parking is provided in accordance with traffic engineer's calculations and complies with the requirement under the current SEPP Housing 2021 - Chapter 4 In-fill Affordable Housing and TfNSW.
	Objective 3J-2 Parking and facilities are provided for other modes of transport		Complies	Bicycle parking is provided at rate recommended in the traffic report for both residents and visitors, to encourage this mode of transport. Bicycle racks are easily accessible through Basement 1 and 2.
	Objective 3J-3 Car park design and access is safe and secure		Complies	Good sightlines and surveillance have been incorporated throughout the design.
	Objective 3J-4		Complies	Basements parking access via Roscoe Street for Hall Street and Roscoe Street residents
	Objective 3J-5 Visual and environmental impacts of on-grade car parking are minimised		N/A	No on-grade parking provided
	Objective 3J-6 Visual and environmental impacts of above ground enclosed car parking are minimised		N/A	Enclosed car parking spaces are proposed in the basement level and not visible from the ground level

PART 4 - DESIGNING THE BUILDING				
Solar and Daylight Access	Objective 4A-1 To optimise the number of apartments receiving sunlight to habitable rooms, primary windows and private open space	1. Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas	Complies	70% (26/37) of the apartments will achieve the ADG. Recommendation for 2HR solar access.
		2. In all other areas, living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 3 hours direct sunlight between 9 am and 3 pm at mid winter	N/A	
		3. A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid winter	Complies	5/37 (13.5%) apartments do not receive direct sunlight Refer to architectural drawing DA600-DA601 for compliance summary
	Objective 4A-2 Daylight access is maximised where sunlight is limited		Complies	Building envelopes have been developed to minimise the quanity of apartments with no diret sunlight during mid-winter and maximise north-west and north east facing apartments. South oriented apartments have wide frontage for daylight acces.
	Objective 4A-3 Design incorporates shading and glare control, particularly for warmer months		Complies	Balconies on north facades sit within the building envelope, together with architectural features allows for adequate shading in the warmer months.
Natural Ventilation	Objective 4B-1 All habitable rooms are naturally ventilated		Complies	Windows and doors are designed to ADG and BCA requirements for natural ventilation
	Objective 4B-2 The layout and design of single aspect apartments maximises natural ventilation		Complies	The apartment layouts include open plan kitchen, dining and living room. The depth of rooms from external windows is less than the maximum 3x the ceiling height.
	Objective 4B-3 The number of apartments with natural cross ventilation is maximised to create a comfortable indoor environment for residents	1. At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural	Complies	33/37(89%) apartments achieve cross ventilation Refer to architectural drawing DA540 for compliance summary
		2. Overall depth of a cross-over or cross-through apartment does not exceed 18m, measured glass line to glass line	Complies	
Ceiling Heights	Objective 4C-1 Ceiling height achieves sufficient natural ventilation and daylight access	Measured from finished floor level to finished ceiling level, minimum ceiling heights are: Minimum ceiling height for apartment and mixed use buildings: Habitable rooms 2.7m Non-habitable 2.4m If located in mixed used areas: 3.6m for ground and first floor to promote future flexibility of use These minimums do not preclude higher ceilings if desired	Complies	Floor-to-Floor exceeds ADG requirement - 3.15m All habitable rooms have a ceiling height of 2.7m All non-habitable rooms have a ceiling height not less than 2.4m Refer to architectural drawing DA300.

	Objective 4C-2 Ceiling height increases the sense of space in apartments and provides for well proportioned rooms		Complies	Internal layouts have well porportioned rooms with good access to daylight and natural ventilation and maximise the feeling of spaciousness.
	Objective 4C-3 Ceiling heights contribute to the flexibility of building use over the life of the building		Complies	
Apartment Size and Layout	Objective 4D-1 The layout of rooms within an apartment is functional, well organised and provides a high standard of amenity	1. Apartments are required to have the following minimum internal areas: Apartment type — Minimum internal area Studio — 35m^2 1 bedroom — 50m^2 2 bedroom — 70m^2 3 bedroom — 90m^2 The minimum internal areas include only one bathroom. Additional bathrooms increase the minimum internal area by 5m^2 each. A fourth bedroom and further additional bedrooms increase the minimum internal area by 12m^2 each	Complies	A range og apartment typologies are provided adding to the flexibility and affordability of the development. The proposal includes apartments with studies, dual aspect apartments and intergeneration living arrangement. 2 Bedroom size ranging from 85m^2 - 95m^2 3 Bedroom size ranging from 120m^2 - 215m^2 Refer to architectural drawings
		2. Every habitable room must have a window in an external wall with a total minimum glass area of not less than 10% of the floor area of the room. Daylight and air may not be borrowed from other rooms	Complies	External glazing to all habitable room is greater than the min. 10% required
	Objective 4D-2 Environmental performance of the apartment is maximised	1. Habitable room depths are limited to a maximum of 2.5 x the ceiling height	Complies	Refer to Objective 4C-1 for ceiling heights.
		2. In open plan layouts (where the living, dining and kitchen are combined) the maximum habitable room depth is 8m from a window	Complies	Living room depth do not exceed required min. dims
	Objective 4D-3 Apartment layouts are designed to accommodate a variety of household activities and needs	1. Master bedrooms have a minimum area of 10m^2 and other bedrooms 9m^2 (excluding wardrobe space)	Complies	Master bedrooms and bedrooms provided are larger than minimum size required.
		2. Bedrooms have a minimum dimension of 3m (excluding wardrobe space)	Complies	All bedroom meets ADG minimum bedroom dimension Refer to architectural drawings
		3. Living rooms or combined living/dining rooms have a minimum width of: • 3.6m for studio and 1 bedroom apartments • 4m for 2 and 3 bedroom apartments	Complies	Apartments meet ADG minimum living/ dining room width Refer to architectural drawings
		4.The width of cross-over or cross-through apartments are at least 4m internally to avoid deep narrow apartment layouts	Complies	No cross-through apartments are proposed

Private Open Space and Balconies	Objective 4E-1 Apartments provide appropriately sized private open space and balconies to enhance residential amenity	1. All apartments are required to have primary balconies as follows: Dwelling type / Min. area / Min. depth Studio / 4m^2 / - 1 bedroom / 8m^2 / 2m 2 bedroom / 10m^2 / 2m 3+ bedroom / 12m^2 / 2.4m The minimum balcony depth to be counted as contributing to the balcony area is 1m	Complies	All oversized balconies are provided with usual area. Balconies areas are free from A/C units and are provided within dedicated plant areas. Refer to architectural drawings
		2. For apartments at ground level or on a podium or similar structure, a private open space is provided instead of a balcony. It must have a minimum area of 15m^2 and a minimum depth of 3m	Complies	Terrace are provided at Roscoe Street Refer to architectural drawings
	Objective 4E-2 Primary private open space and balconies are appropriately located to enhance liveability for residents		Complies	Balconies are located in front or adjacent to living spaces in all apartments.
	Objective 4E-3 Private open space and balcony design is integrated into and contributes to the overall architectural form and detail of the building		Complies	The balconies are an integral part of the building façade and incorporate architectural horizontal and vertical features, screens and planter boxes.
	Objective 4E-4 Private open space and balcony design maximises safety		Complies	Design and detailing of balconies avoid opportunities for climbing and falls.
Common Circulation and Spaces	Objective 4F-1 Common circulation spaces achieve good amenity and properly service the number of apartments	1. The maximum number of apartments off a circulation core on a single level is eight	Complies	Max. 6 units sharing 1 core on the typical levels.
		2. For buildings of 10 storeys and over, the maximum number of apartments sharing a single lift is 40	N/A	
	Objective 4F-2 Common circulation spaces promote safety and provide for social interaction between residents		Complies	Common circulation spaces are designed to provide safe, legible spaces to foster interaction and harmony between residents. Communal open space provided at ground level and rooftop on level 8 can be accessed through the main lobbies.

Storage	Objective 4G-1 Adequate, well designed storage is provided in each apartment	In addition to storage in kitchens, bathrooms and bedrooms, the following storage is provided: Dwelling type — Storage size volume Studio — 4m^3 1 bedroom — 6m^3 2 bedroom — 8m^3 3+ bedroom — 10m^3 At least 50% of the required storage is to be located within the apartment	Complies	All apartments exceed ADG minimum storage requirements with 50% of the storage located within the apartment. Refer to architectural drawings DA001 and DA570 for compliance summary.
	Objective 4G-2 Additional storage is conveniently located, accessible and nominated for individual apartments		Complies	Extra storage is provided to all apartments on basement levels.
Acoustic Privacy	Objective 4H-1 Noise transfer is minimised through the siting of buildings and building layout		Complies	Adequate setback and introduction to solid upstand to lower units have been incorporated to minimise noise from the public domain. Proposed balconies have been appropriately located to minimise noise transmission between apartments. Internal apartment layout have been designed to ensure where possible non-habitable room to act as buffer noise to common corridors.
	Objective 4H-2 Noise impacts are mitigated within apartments through layout and acoustic treatments		Complies	
Noise and Pollution	Objective 4J-1 In noisy or hostile environments the impacts of external noise and pollution are minimised through the careful siting and layout of buildings		Complies	Balcony openings in façade have been carefully considered in regards to height, width and materiality to assist acoustic design. Refer to acoustic report for details.
	Objective 4J-2 Appropriate noise shielding or attenuation techniques for the building design, construction and choice of materials are used to mitigate noise transmission		Complies	Façade and glazing systems have been carefully considered within the development. Refer to acoustic report for details.
Apartment Mix	Objective 4K-1 A range of apartment types and sizes is provided to cater for different household types now and		Complies	A mixture of 2, and 3 bedroom apartments have been provided. Refer to architectural drawings DA001 for further information
	Objective 4K-2 The apartment mix is distributed to suitable locations within the building		Complies	A variety of apartments type has been provided within each floor plate.
Ground Floor Apartments	Objective 4L-1 Street frontage activity is maximised where ground floor apartments are located		Complies	Street frontage is activated by ground apartments and entry courtyards. Moreover an abundance of greenery/raise planterboxes are provided.
	Objective 4L-2 Design of ground floor apartments delivers amenity and safety for residents		Complies	Direct access from street level and streamline fencing details are carfully designed with key access to delivers safety and amenity for residents as well as being easily identifies.
Facades	Objective 4M-1 Building facades provide visual interest along the street while respecting the character of the local area		Complies	The façade treatment draws on local and future character, expressed in varying complimentary ways across the development.
	Objective 4M-2 Building functions are expressed by the façade		Complies	Building entrances are clearly defined with signages and façade treatment , this provide a welcoming and inviting entry experience to the residential lobbies. All elevations are rationally designed and respond to their use.

Energy Efficiency	Objective 4U-1 Development incorporates passive environmental design	Complies	Natural light is provided to all habitable rooms, outdoor communal open space areas are designed to provide residents with a range of spaces offering flexibility and choice demonstrating a high level of passive environmental design.
	Objective 4U-2 Development incorporates passive solar design to optimise heat storage in winter and reduce heat transfer in summer	Complies	
	Objective 4U-3 Adequate natural ventilation minimises the need for mechanical ventilation	Complies	
Water Management and Conservation	Objective 4V-1 Potable water use is minimised	Complies	Refer to BASIX report for details
	Objective 4V-2 Urban stormwater is treated on site before being discharged to receiving waters	Complies	Refer to stormwater details
	Objective 4V-3 Flood management systems are integrated into site design	Complies	Refer to civil/ flood report for details
Waste Management	Objective 4W-1 Waste storage facilities are designed to minimise impacts on the streetscape, building entry and amenity of residents	Complies	The waste holding room are located on basement 1 and not visible from the street.
	Objective 4W-2 Domestic waste is minimised by providing safe and convenient source separation and recycling	Complies	2 garbage chute per core and co-mingle compartment on each level of the residential building are provided for Hall Street. 1 garbage chute for Roscoe Street
Building Maintenance	Objective 4X-1 Building design detail provides protection from weathering	Complies	The facade is detailed including overhangs to prevent staining and protect wall below. Planter boxes are designed to sit above paving levels for drainage and to minimise maintenance of waterproof membranes. Overhang slabs will be detailed with drip lines to avoid staining.
	Objective 4X-2 Systems and access enable ease of maintenance	Complies	Access to all maintenance areas provided.
	Objective 4X-3 Material selection reduces ongoing maintenance costs	Complies	Durable materials are proposed externally.

THANK YOU!

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Traffic & Parking Assessment Report

49-59 Hall Street & 69-71 Roscoe Street, Bondi Beach

Proposed Mixed Use Development

Ref 25025

4th July 2025

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Document Control

Project Number	25025			
Project Address	49-59 Hall Street & 69-71 Roscoe Street, Bondi Beach			
Revision	**Date**	**Details**	**Author**	**Approved By**
Draft V1	19.06.25	First draft	D. Aloc	C. Palmer
Draft V2	01.07.25	Final draft	D. Aloc	C. Palmer
Final	04.07.25	Final for submission	D. Aloc	C. Palmer

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1. Introduction

1.1 Project Summary

CJP has been engaged by HSN Property Group to prepare a Traffic & Parking Assessment Report (TPAR) in support of a Development Application (DA) and Planning Proposal (PP) to Waverley Council, involving a new mixed use development to be located at 49-59 Hall Street & 69-71 Roscoe Street, Bondi Beach.

By way of background, in June 2023, the Waverley Local Planning Panel approved DA-501/2022, involving the demolition of existing structures at 53-59 Hall Street and the construction of a new shop-top housing building, comprising 491m^2 of ground floor retail space, with 17 residential apartments on the levels above.

Off-street parking in the DA-501/2022 is approved for a total of 35 cars within a new two-level basement parking area, accessed via a single-lane two-way driveway located off the Hall Street site frontage.



Figure 1.1 – Site Location (Source: OpenStreetMap)

Since then, HSN Property Group has acquired the adjoining site at 49-51 Hall Street and also the site to the rear at 69-71 Roscoe Street.

This new DA therefore involves the demolition of the existing structures on the consolidated site and the construction of a new mixed use development set across two buildings, one fronting Hall Street and one fronting Roscoe Street. The proposed development comprises 1,227m^2 of retail floor area (confined to the Hall Street building only) and 37 residential apartments, including 11 affordable housing units in accordance with the SEPP (Housing) 2021.

Off-street parking is proposed for a total of 103 cars within a new two-level basement parking area located beneath the Hall Street building.

Vehicular access to the site is proposed to be provided via a new 6.1m wide entry/exit driveway located off the Roscoe Street site frontage. Importantly, the four existing driveway crossovers located off the Hall Street site frontage are to be permanently closed and restored to kerb & gutter.

Preliminary advice has been received from Council, including their support for the closure of driveway crossovers off Hall Street as it will be substantially positive from a pedestrian movement and streetscape continuity perspective. Council's advice was for the application to include traffic and access modelling, including pedestrian impact assessment. As such, traffic and pedestrian surveys have been undertaken as part of this assessment to understand the impact of the proposal in the vicinity of the proposed driveway off Roscoe Street.

Plans of the proposed development have been prepared by PBD Architects and are reproduced in Appendix A.

Based on State Environmental Planning Policy (Transport & Infrastructure) 2021, Schedule 3, the proposed development is not classified as a *traffic generating development*, as the site does not meet any of the specified thresholds, therefore concurrence by Transport for NSW is not required.

1.2 Assessment Tasks

The purpose of this TPAR is to assess the traffic, parking, access, transport and servicing characteristics of the DA, and the associated impacts of the proposal on the surrounding road network, parking and transport environment. This can be briefly summarised as follows:

- Description of the existing site and its location
- Existing traffic, parking & pedestrian conditions
- Public and active transport infrastructure
- Traffic generation potential of the proposal and its impacts on the surrounding road network
- Off-street parking/loading/access requirements and provisions
- Design of access driveway, parking, and loading area layout

1.3 Relevant Planning Controls

The site lies within the Waverley Council (Council) Local Government Area (LGA), such that the relevant Council planning controls and strategies referenced in this TPAR include:

- Waverley Local Environmental Plan 2012 (WLEP 2012)
- Waverley Development Control Plan 2022 (WDCP 2022)

1.4 Traffic, Transport & Parking Guidelines & Standards

In preparing this TPAR, references are also made to the following site access, traffic and parking guidelines:

- Roads & Maritime Service's Guide to Traffic Generating Developments 2002 (RMS Guide)
- Roads & Maritime Service's Technical Direction Updated Traffic Surveys 2013 (TDT)
- Transport for NSW's Guide to Transport Impact Assessment (GTIA) 2024
- Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments
- State Environmental Planning Policy (Transport & Infrastructure) 2021
- State Environmental Planning Policy (Housing) 2021
- Australian Standards 2890.1:2004 – Off-Street Car Parking (AS2890.1)

- Australian Standards 2890.2:2018 – Off-Street Commercial Vehicle Facilities (AS2890.2)
- Australian Standards 2890.3:2015 – Bicycle Parking (AS2890.3)
- Australian Standards 2890.6:2022 – Off-Street Parking for People with Disabilities (AS2890.6)
- NSW Government's Planning Guidelines for Walking & Cycling (December 2004)
- National Construction Code (NCC)
- Building Code of Australia (BCA)

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2. Existing Conditions

2.1 Site Location & Description

The development site is located on the northern side of Hall Street, just west of Consett Avenue, extending through to Roscoe Street. It comprises the following properties:

- 49 Hall Street, Bondi Beach
- 51 Hall Street, Bondi Beach
- 53-55 Hall Street, Bondi Beach
- 57-59 Hall Street, Bondi Beach
- 69 Roscoe Street, Bondi Beach
- 71 Roscoe Street, Bondi Beach

The site has street frontages of approximately 49m in length to Hall Street, approximately 12m in length to Roscoe Street, and occupies a total area of approximately 2,331m^2.

A copy of the survey plan, prepared by ESA Survey, is reproduced below.

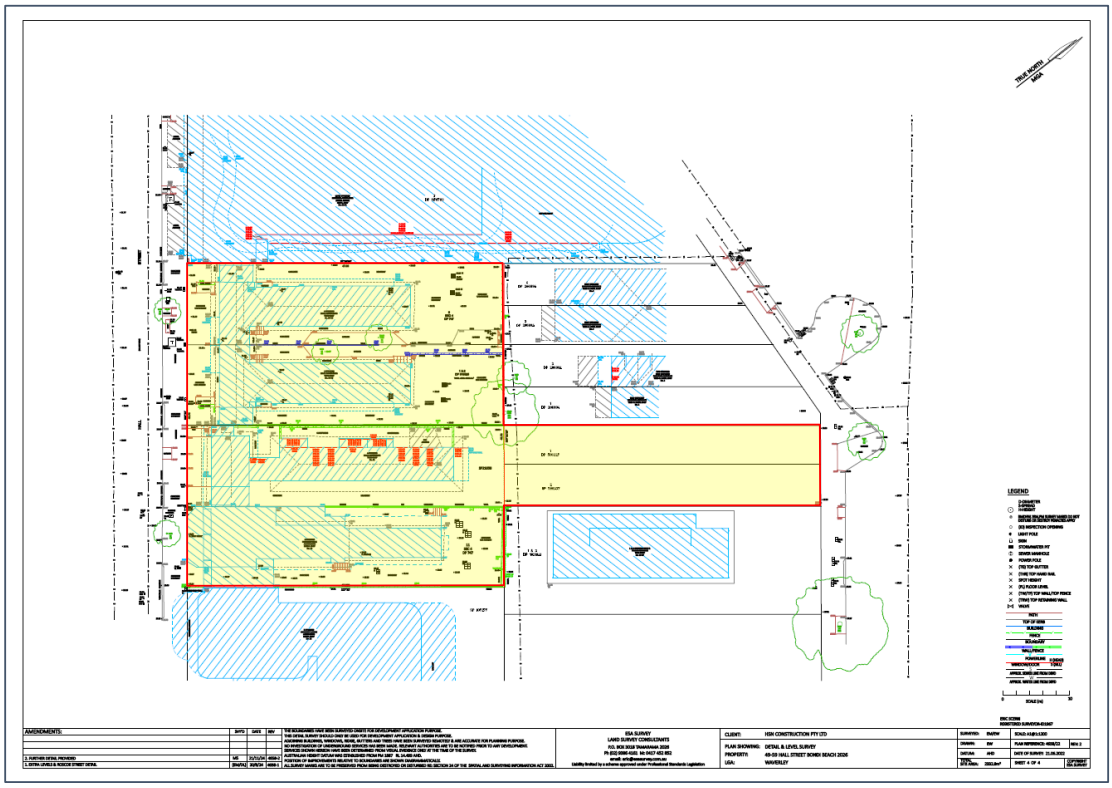

Figure 2.1 – Survey plan (Source: ESA Survey)

No.49 Hall Street is currently occupied by a four-storey shop-top housing building, comprising 18 x studio apartments (with DA approval for an additional 5 studios) and 1 x 40m^2 shop. Off-street parking is provided for 8 cars within the site, accessed via a single lane entry/exit driveway located at the eastern end of its Hall Street site frontage.

No.51 Hall Street is also currently occupied by a four-storey shop-top building, comprising 20 apartments (in a mix one studios, 1 & 2 bedroom units), and 1 x 40m^2 shop. Off-street parking is provided within the site, accessed via a single lane entry/exit driveway located at the eastern end of its Hall Street site frontage.

No.53-59 Hall Street is currently occupied by two shop-top housing buildings, comprising 28 x studio apartment units and 2 x 40m^2 shops. Off-street parking is provided for 18 cars within the site. Vehicular access to the site is provided via two separate 3m wide driveways located at opposite ends of the Hall Street site frontage.

No.69-71 Roscoe Street is currently occupied by a semi-detached residential building. Off-street parking for No.69 is provided for 1 car and accessed via Roscoe Street. No off-street parking is provided for No.71 Roscoe Street.

A recent aerial image of the site and its surroundings is reproduced on the following page, followed by a series of Streetview images.



Figure 2.2 – Aerial map (Source: Nearmap)



Figure 2.3 – Streetview image of Hall Street site frontage, looking north-west (Source: Google Maps)



Figure 2.4 – Streetview image of Hall Street site frontage, looking south-east (Source: Google Maps)

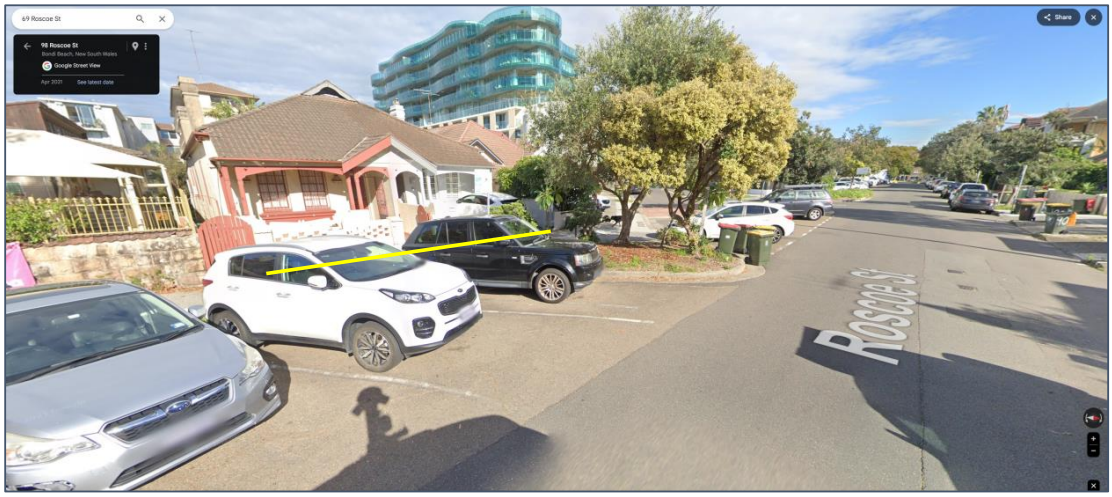

Figure 2.5 – Streetview image of Roscoe Street site frontage, looking north-west (Source: Google Maps)



Figure 2.6 – Streetview image of Roscoe Street site frontage, looking south-east (Source: Google Maps)

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2.2 Planning Context

No.69-71 Roscoe Street is zoned R3 Medium Density Residential under Waverley LEP 2012, with a maximum height of building control of 12.5m and a maximum floor space ratio (FSR) control of 0.9:1.

No.49-59 Hall Street is zoned E1 Local Centre under Waverley LEP 2012, with a maximum height of building control of 13m and a maximum FSR control of 2:1.

The proposed mixed use development is permissible in the zone, subject to development consent.

Notwithstanding the above, SEPP (Housing) 2021 permits an FSR bonus of 20-30% and a height bonus of 20-30% if providing 10-15% of the gross floor area (GFA) as affordable housing.

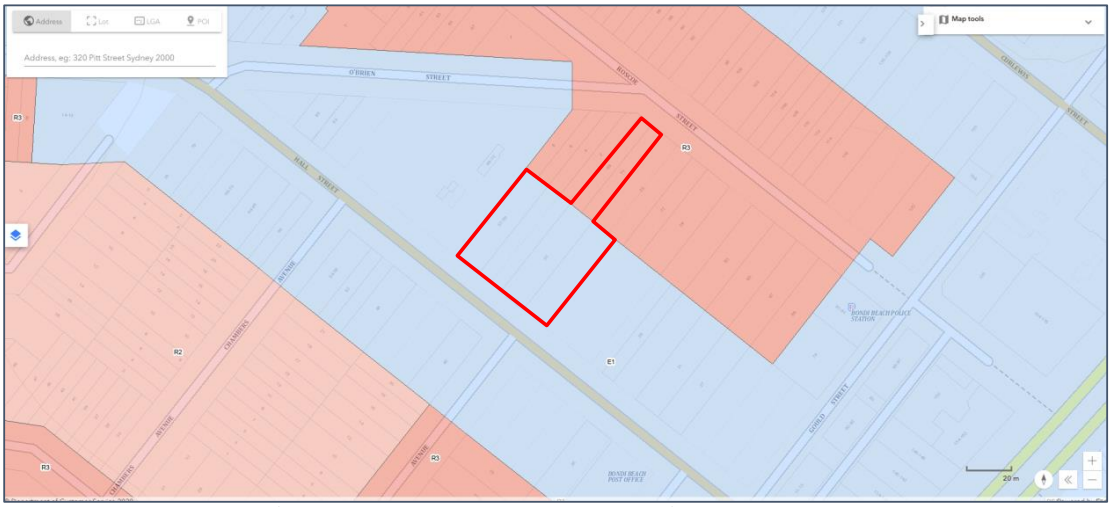

Figure 2.7 – Land Zoning Map (Source: NSW Planning Portal Spatial Viewer)

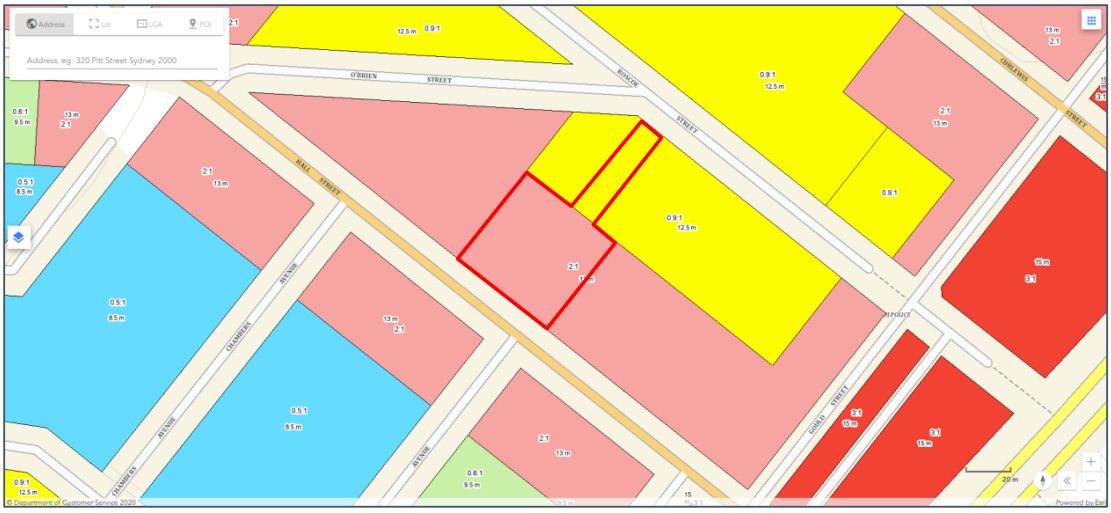

Figure 2.8 – Floor Space Ratio and Height of buildings map (Source: NSW Planning Portal Spatial Viewer)

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2.3 Hall Street Town Centre

The Hall Street portion of the site lies within the Hall Street Town Centre, as defined in Council's WDCP 2012 Part E3 Local Village Centres, and indicated in the plan extract below.

Whilst Hall Street is located in the vicinity of Bondi Beach and is physically linked to Campbell Parade, extending into Glenayr Avenue, it has its own character and local identity. It has a separate function to Campbell Parade, catering more to the daily needs of the local community, whilst still being influenced by the existence of visitors and tourists.

Due to the popularity of Bondi Beach and Hall Street, the extent of regional and local traffic and car parking has a strong influence on the character and use of the area, particularly the public domain.

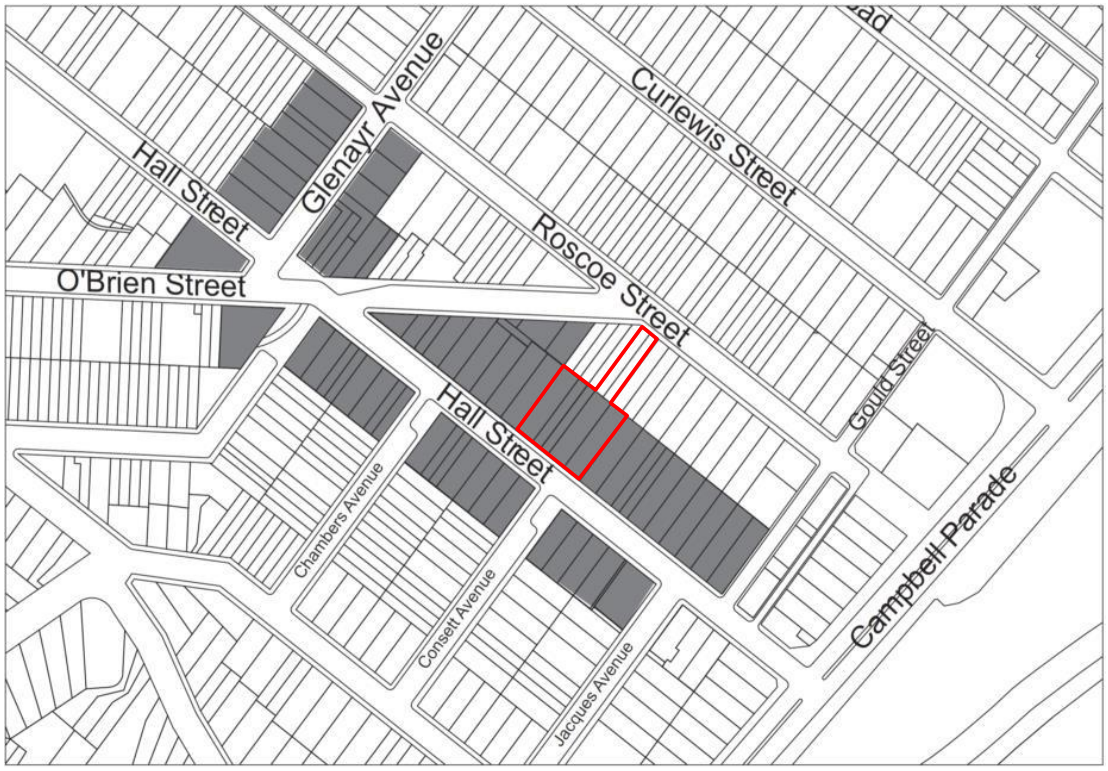

Figure 2.9 – Hall Street Town Centre boundary (Source: Waverley DCP 2012)

Waverley Council were also considering converting Hall Street into one-way only between Gould Street and O'Brien Street, and provide more space for people to shop, dine and relax, opposite Bondi Beach. Changes to the street included:

- increased dedicated outdoor dining space
- traffic moving one-way, heading west (from Gould Street towards O'Brien Street)
- widened footpaths
- increased greenery and public seating
- improved lighting and street signage

Council coined the works, "Destination Hall Street", and undertook an extensive consultation process with local residents and business owners. Council envisaged the conversion to be undertaken on a trial basis between 1 October 2022 to 31 March 2023. Concept plans of Destination Hall Street are provided on the following page.

Notwithstanding, following mixed community feedback, Council decided at the 6 September 2022 Ops Meeting not to proceed with Streets as Shared Spaces (SASS) trial at Hall Street. Instead, a report went to Council in February 2023 detailing further community and business consultation and engagement strategy to determine parameters for a full streetscape upgrade of Hall Street between Glenayr Avenue and Campbell Parade.

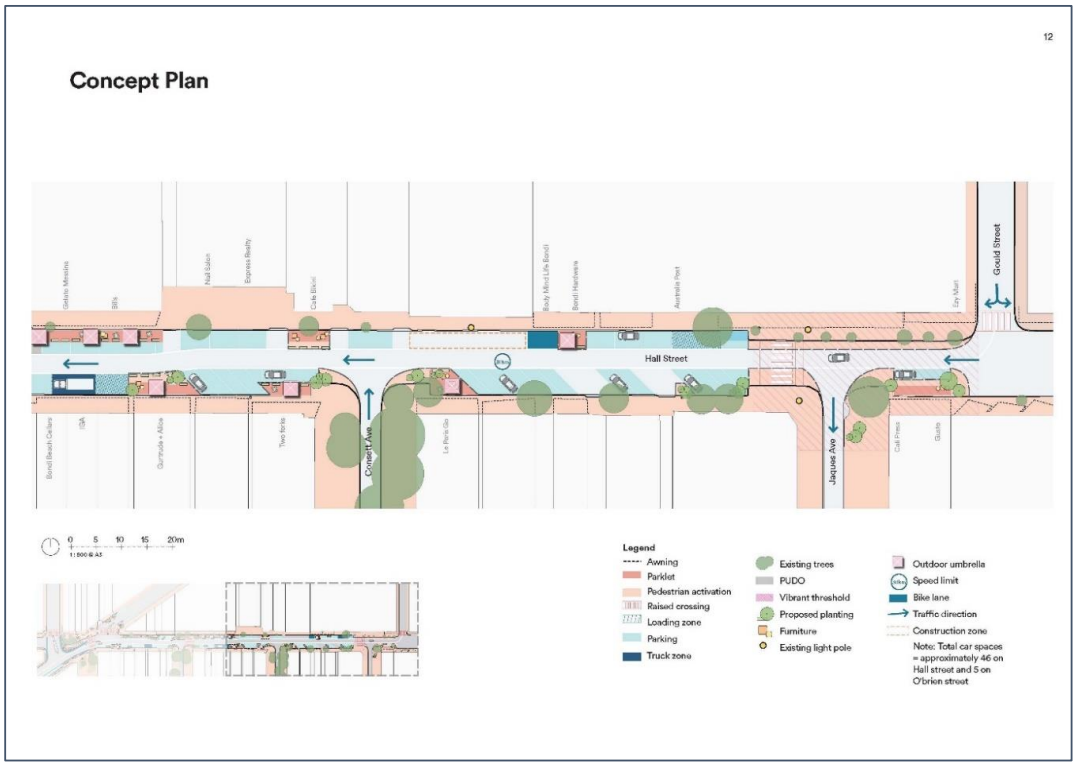

Figure 2.10 – Destination Hall Street concept plan – Part 1 (Source: Waverley Council)

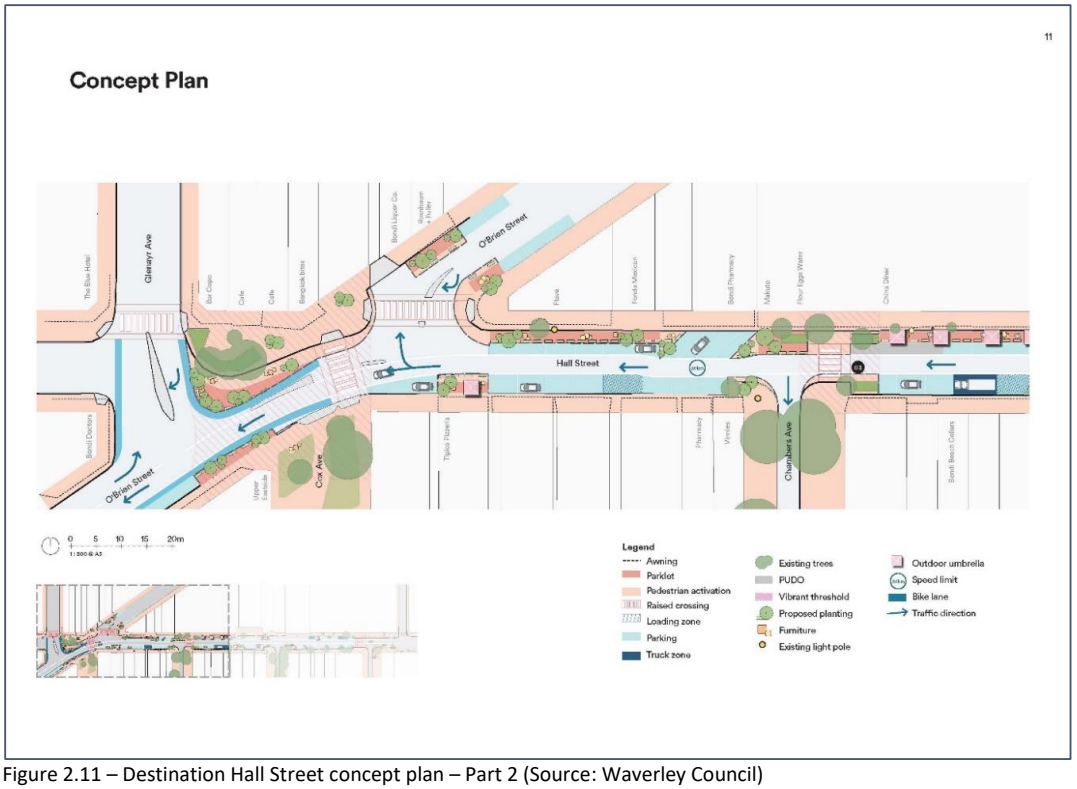

Figure 2.11 – Destination Hall Street concept plan – Part 2 (Source: Waverley Council)

2.4 Road Network

The Transport for NSW (TfNSW) road hierarchy comprises the following road classifications:

- State Roads: Freeways, Motorways and Primary Arterial Roads (TfNSW managed)
- Regional Roads: Secondary or Sub-Arterial (Council managed, partly funded by the State)
- Local Roads: Collector and Local Access Roads (Council managed)

The road hierarchy in the vicinity of the site is shown in the figure below, whilst the key roads are summarised as follows:

- Syd Einfeld Drive is classified as a State Road which provides a key east-west road link through the Bondi Junction area, Oxford Street to Old South Head Road and Bondi Road. It carries three traffic lanes in each direction and subject to Clearway restrictions during peak periods. Kerbside parking is not permitted.

- Old South Head Road is also classified as a State Road which provides a key north-south road link in the area, linking Bondi Junction to Watsons Bay. It typically carries one traffic lane in each direction, with additional lanes provided at key locations.

- Curlewis Street is classified as a Regional Road which provides an east-west road link through the Bond Beach area, linking Old South Head Road to Campbell Parade. They typically carry one traffic lane in each direction, with additional lanes provided at key intersections.

- Hall Street is a local road which provides vehicular and pedestrian access to frontage properties. Two-way traffic flow is (currently) permitted, whilst kerbside parking is also generally permitted, subject to signposted restrictions.

- Roscoe Street is also a local road which provides vehicular and pedestrian access to frontage properties, terminating at its south-eastern end at Gould Street with a cul-de-sac turning head. The north-western portion is restricted to one-way south-eastbound traffic flow only, whilst the central portion is restricted to one-way north-westbound traffic flow only. Kerbside parking is permitted along Roscoe Street, subject to signposted restrictions.

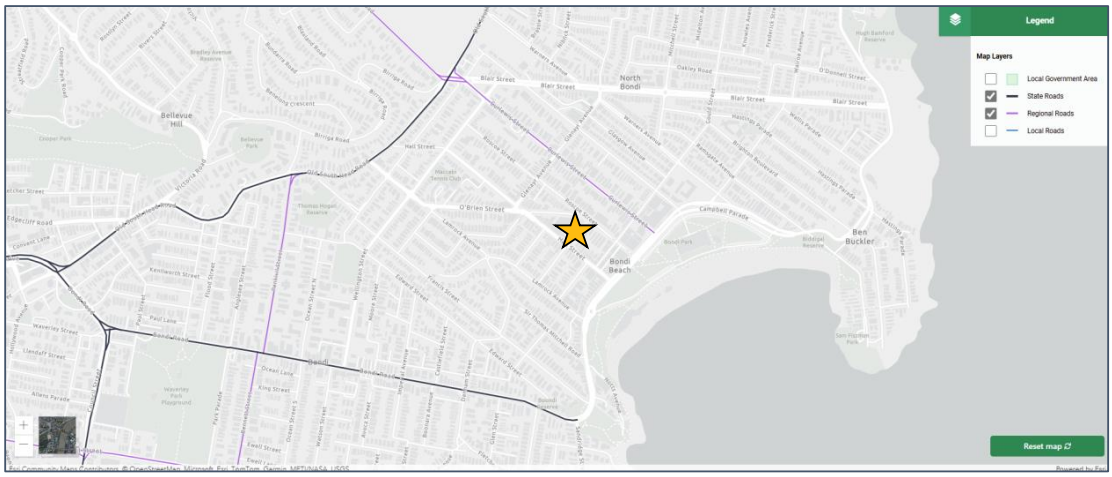

Figure 2.12 – Road Hierarchy (Source: Transport for NSW)

2.5 Existing Traffic & Pedestrian Volumes

In order to understand the existing traffic volumes on the surrounding road network, traffic surveys were undertaken at the Roscoe Street & O'Brien Street intersection during the weekday AM & PM road network peak periods on Tuesday 20th May 2025. The results of the surveys are reproduced in Appendix B and summarised in the diagram below.

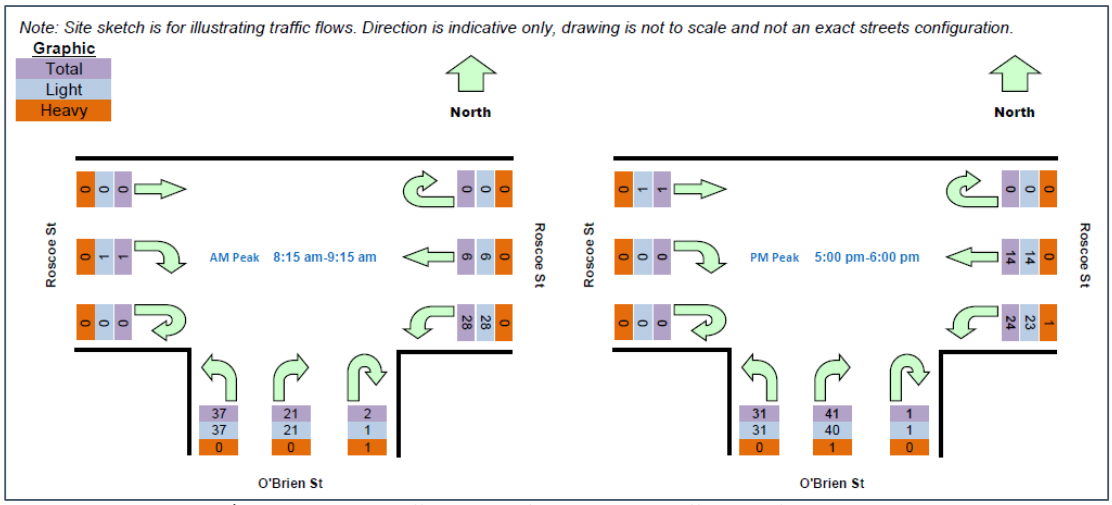

Figure 2.13 – Existing AM/PM Peak Period Traffic Volumes (Source: Trans Traffic Survey)

In summary, on the day of the survey, two-way traffic volumes along the respective roads were as follows:

- Two-way traffic volumes along Roscoe Street (SE leg) were in the order of 55-80 vehicles per hour (vph) during the AM & PM peak hour periods
- Two-way traffic volumes along Roscoe Street (NW leg) were in the order of 45 vph during the AM & PM peak hour period
- Two-way traffic volumes along O'Brien Street (SW leg) were in the order of 90-100 vph during the AM & PM peak hour periods

Furthermore, a pedestrian volume survey was also undertaken on the same day during the weekday AM & PM peak periods to better understand the existing pedestrian activity and movement patterns in the vicinity of the proposed driveway location. Figure 2.14 shows the selected survey zones used for the origin-destination analysis of pedestrian movements. In summary, the following pedestrian movements were observed:

- Total pedestrian volumes using the intersection were in the order of 100-110 pedestrians during the AM & PM peak hour periods
- Movements A to D and D to A, which is a continuation of the path of travel across the proposed future site access driveway, recorded the greatest number of pedestrian volumes, with 50-60 pedestrian movements during the AM & PM peak hour periods
- All other pedestrian movements had comparatively lower pedestrian activity by comparison, during the AM & PM peak hour periods



Figure 2.14 – Selected survey zones used for the pedestrian volume survey (Source: Trans Traffic Survey)

2.6 Public & Active Transport

The nearby public transport services are shown in the figure below. The site is situated within 250m (3 minutes) walking distance to the nearest bus stops which are located on Campbell Parade and serviced by the bus routes 333, 362 & 380. These bus routes also connect with Bondi Junction, Museum, Martin Place, St James and Circular Quay railway stations.

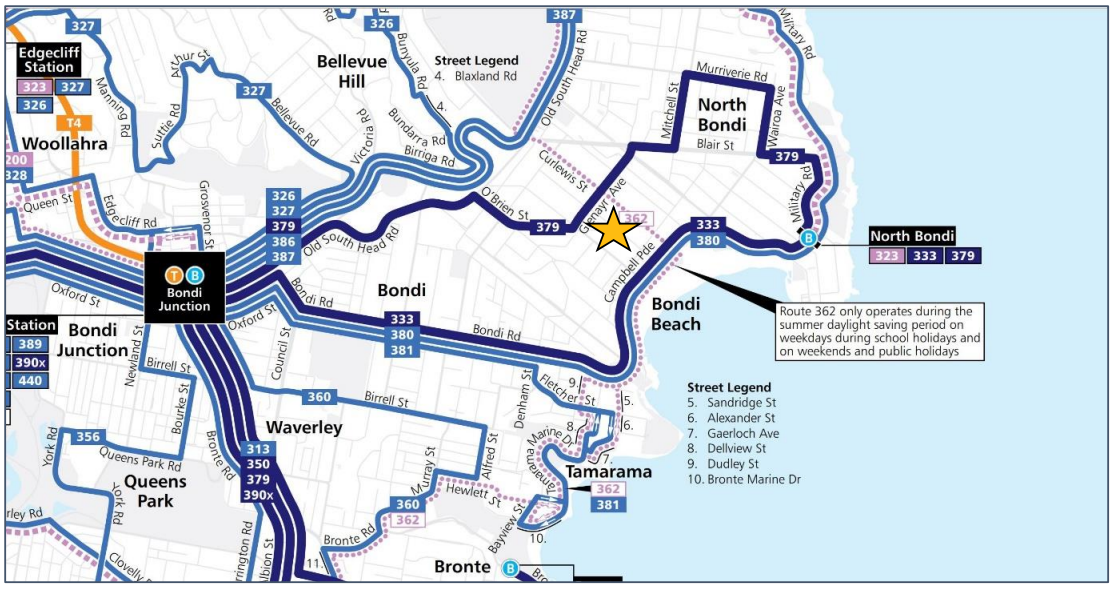

Figure 2.15 – Existing Public Transport Map (Source: Transport for NSW)

Research suggests that proximity to bus services influence the travel mode choice for areas within 400m walking distance (approximately 5 minutes) of a bus stop. As such, the proposed development has excellent potential for future residents, visitors, retail staff and customers within the development to utilise bus for their commute to/from the development.

Another bus stop is located approximately 450m walking distance west of the site along O'Brien Street, which is serviced by the bus route 379, operating between North Bondi and Bronte, via Bondi Beach, Bondi Junction and Waverley.

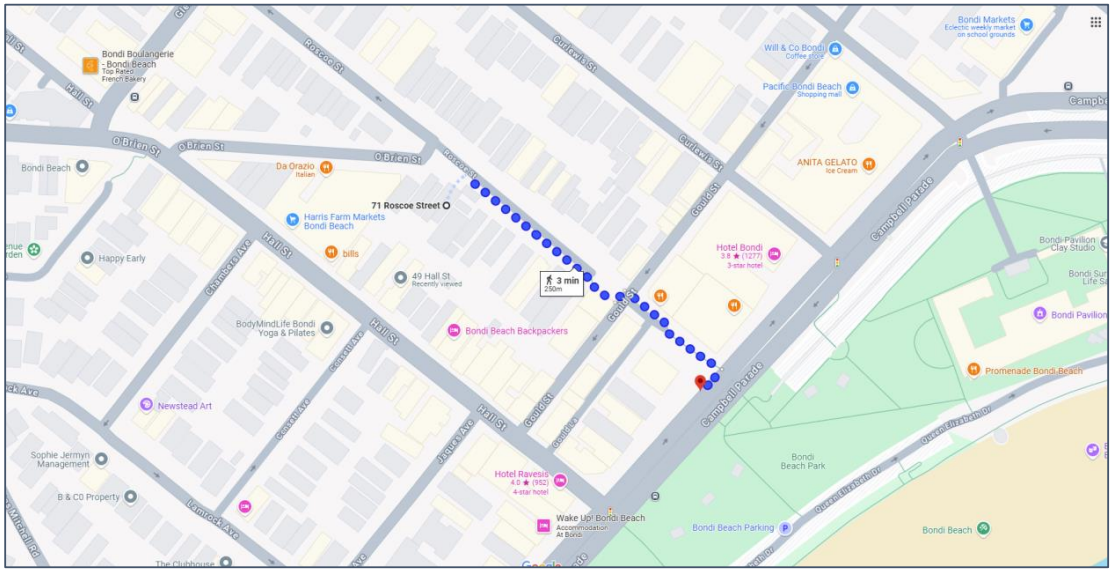

Figure 2.16 –Walking distance between site and Campbell Parade bus stop (Source: Google Maps)

In addition to the public transport services available in the vicinity of the site, there is also a good level of pedestrian connectivity, including safe and convenient footpaths to the abovementioned bus stops. All existing footpaths in the surrounding area are of good quality, with appropriate widths and pram ramps provided at most intersections.

The existing bicycle network in the vicinity of the site is reproduced in the figure on the following page, which shows there are a number of formal and informal on-road cycle routes and bicycle parking within the Eastern Suburbs area.

The Planning Guidelines for Walking and Cycling identify a number of city-scale design principles that can assist the creation of walkable and cyclable cities and neighbourhoods. These principles emphasise urban renewal and the creation of compact, mixed use, accessible centres around public transport stops. At the neighbourhood scale, design principles can be reinforced through the creation of local and accessible centres and neighbourhoods with connected street patterns and road design which aim to reinforce local walking and cycling networks.

In particular, the Guidelines note that increased population density is an important element in creating a walkable and cyclable city. A compact development brings activities close together, making them more accessible by foot or by bicycle, without the need to use a car. Increased population density also enhances the viability of public transport services.

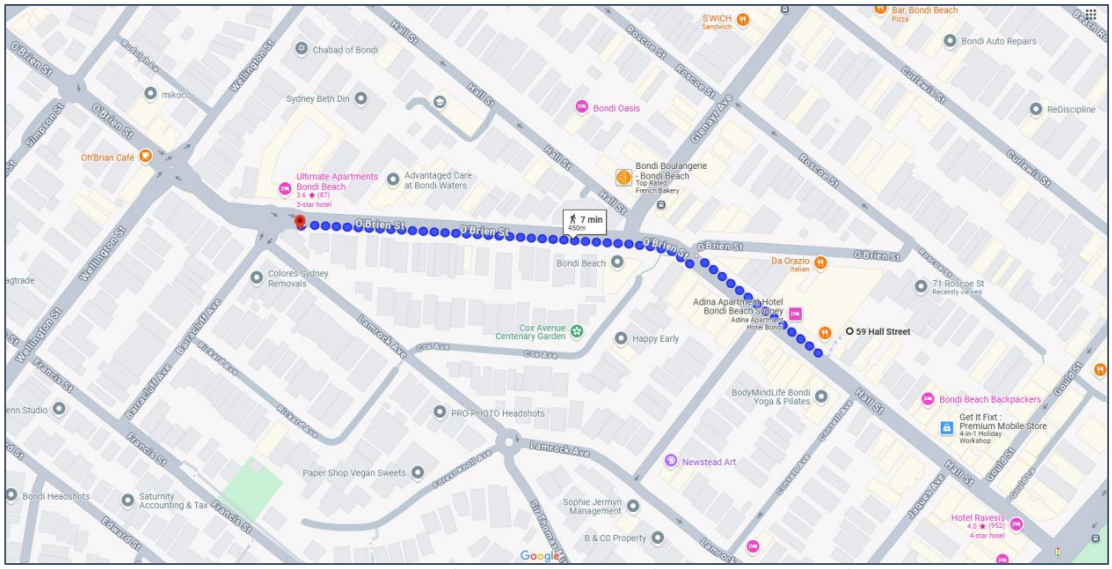

Figure 2.17 –Walking distance between site and O'Brien Street bus stop (Source: Google Maps)

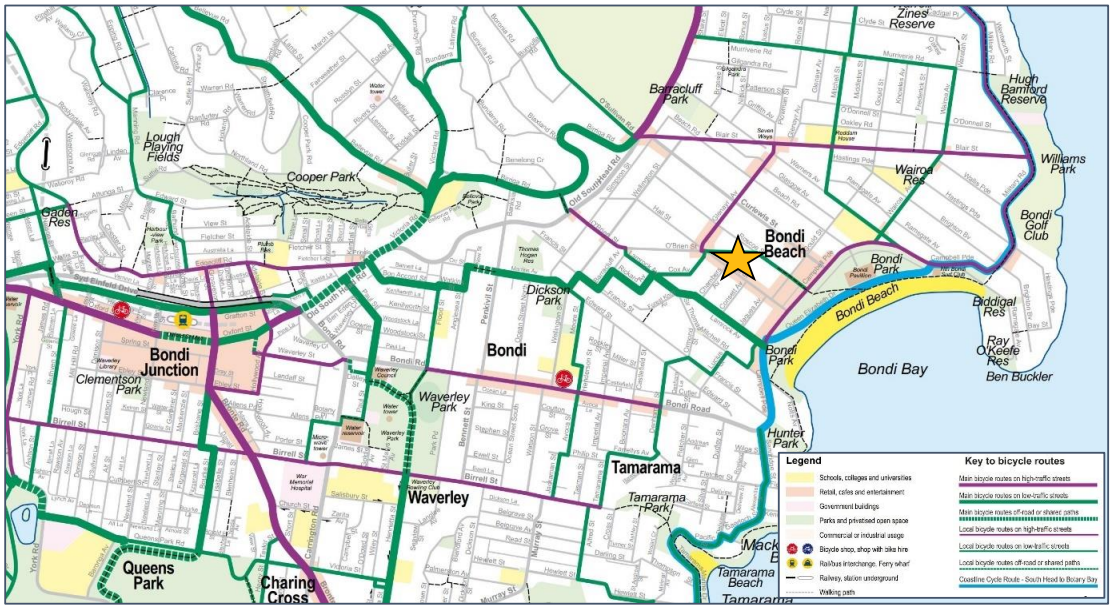

Figure 2.18 – Cycle Map (Source: Waverley Council)

2.7 Existing Surrounding Traffic Controls

The existing traffic controls in the vicinity of the site comprise of:

- Traffic signals at the Campbell Parade & Hall Street intersection, with all turning movements permitted and pedestrian crossings on all approaches
- A signalised pedestrian crossing in Campbell Parade, directly outside the Roscoe Street corso
- A 40km/h speed limit in High Pedestrian Activity areas, including the Campbell Parade beach front and Hall Street
- A 50km/h speed limit along other local roads in the surrounding area
- Raised pedestrian crossings at the Hall Street & O'Brien Street intersection

- Raised pedestrian crossings in Hall Street, just east of Chambers Avenue, and just west of Jacques Avenue
- An at-grade pedestrian crossing at the eastern end of O'Brien Street, at the Roscoe Street intersection
- A No Through Road restriction at the south-eastern end of Roscoe Street which precludes vehicular movements to/from Gould Street and also Campbell Parade
- A one-way north-westbound restriction in Roscoe Street for vehicular traffic between O'Brien Street and Glenayr Avenue
- A one-way south-eastbound restriction in Roscoe Street for vehicular traffic between Wellington Street and Glenayr Avenue

2.8 Existing Surrounding Parking Restrictions

The existing parking restrictions in the vicinity of the site comprise of:

- 15 Minute Parking restrictions along the Hall Street site frontage
- Loading Zones & Truck Zones located at regular intervals along Hall Street
- 1 Hour Parking restrictions elsewhere along Hall Street between 8am-6pm
- 3 Hour Parking restrictions elsewhere along Hall Street between 6pm-9pm
- A No Parking – Pick Up & Drop Off Zone – located outside the adjoining Adina Serviced Apartment development in Hall Street
- 2P Metered restrictions along both sides of Roscoe Street (Permit Holders Excepted)

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3. Proposed Development

3.1 Development Description

The proposal involves the demolition of the existing structures on the site and the construction of a new mixed use development set across two buildings, one fronting Hall Street and one fronting Roscoe Street. The Hall Street building comprises 7 retail premises on the lower ground and ground floor levels, with residential units on the ground and upper floors, whilst the Roscoe Street building is entirely residential.

Key parameters for each component of the proposed development are set out in Table 3.1 below.

Table 3.1 – Proposed Development Schedule

Land Use	Quantum	Key Parameters
Retail premises	Lower ground floor tenancies Ground floor tenancies Total	840m^2 387m^2 1,227m^2
Residential	45-49 Hall Street 31 units (inc. 6 affordable) 69-71 Roscoe Street 6 units (inc. 5 affordable) Total 37 units	Built-to-Sell 2 x 2 Bedroom 24 x 3 Bedroom Affordable Rental Housing 11 x 2 Bedroom Total 37 units

The proposed ground floor plans of the two buildings are shown below and on the following page.

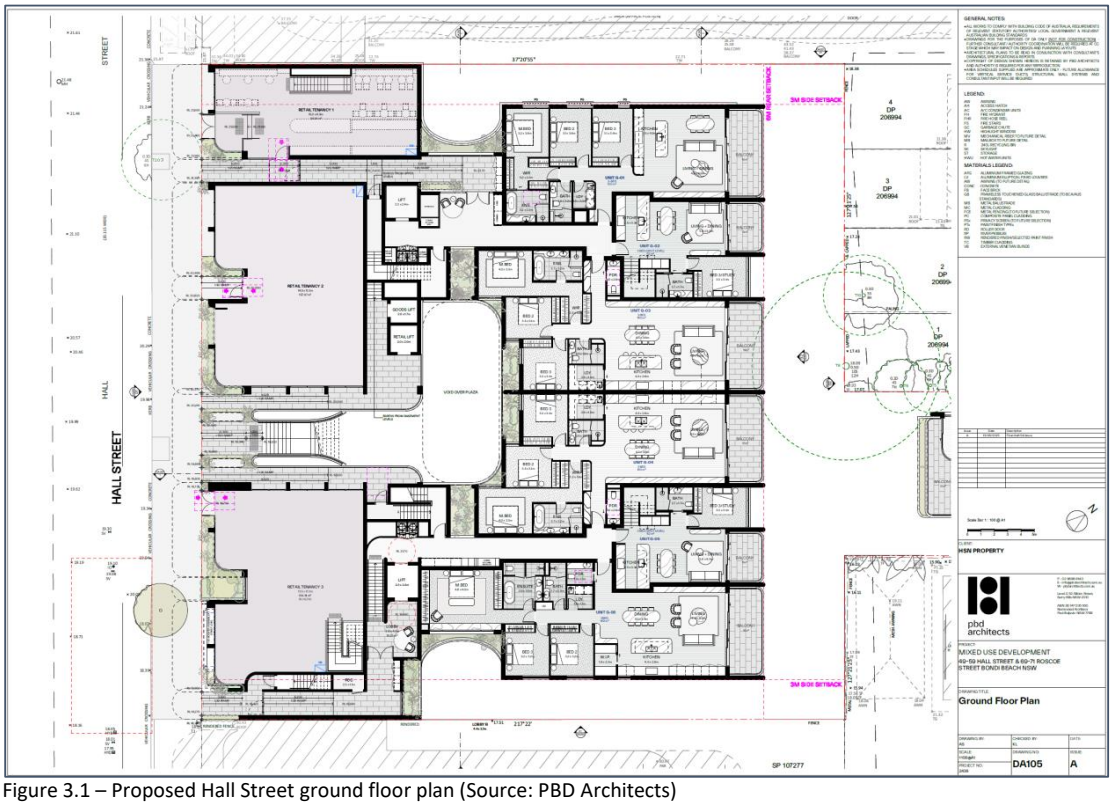

Figure 3.1 – Proposed Hall Street ground floor plan (Source: PBD Architects)

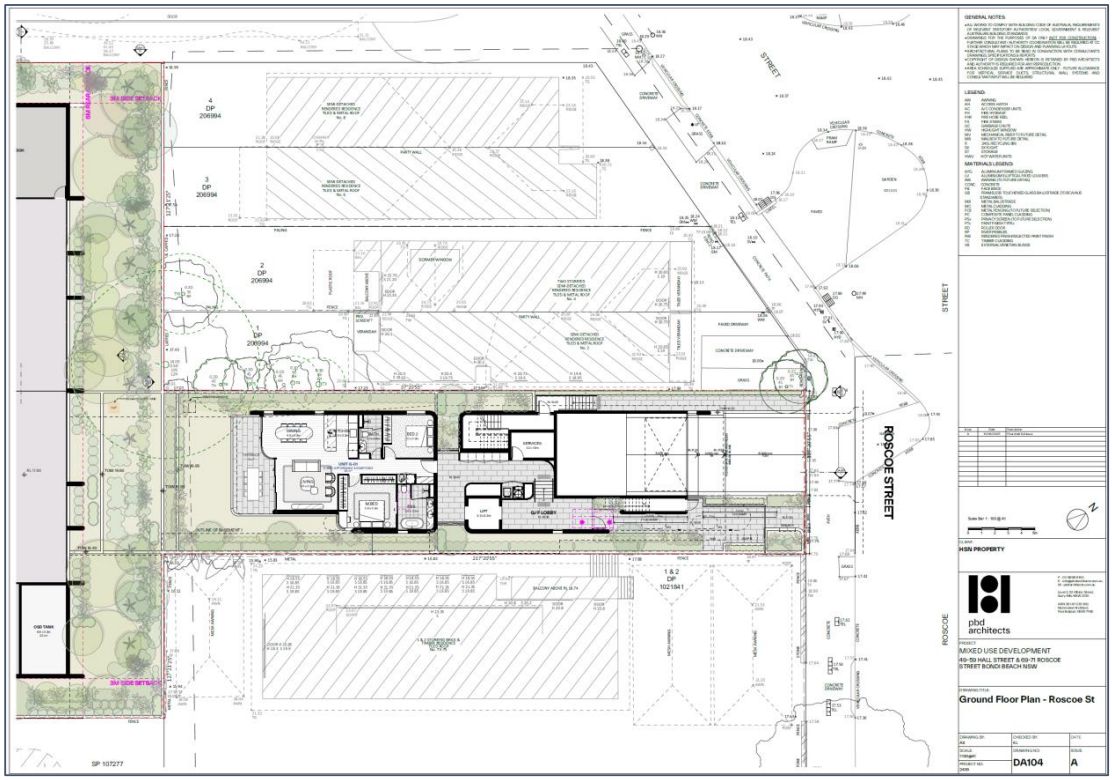

Figure 3.2 – Proposed Roscoe Street ground floor plan (Source: PBD Architects)

3.2 Parking Arrangements

Off-street parking is proposed for a total of 103 cars, comprising 63 residential spaces, 7 visitor spaces and 33 retail spaces, within a new two-level basement parking area located within the 49-59 Hall Street site.

Additionally, 25 motorcycle spaces will be provided across the two-level basement parking area.

3.3 Loading & Servicing Facilities

Deliveries and servicing to the proposed development will be undertaken by a variety of light commercial vehicles such as vans, utilities and the like.

Waste collection is proposed to be undertaken by a private contractor using a compact low-clearance small rigid truck, consistent with other similar approved and completed mixed use developments located within the Bondi Beach area. In this regard, 2 x dedicated on-site loading bays are proposed to be provided within basement level 1, at the bottom of the vehicular access ramp from Roscoe Street. Importantly, retail bins will not be lined up along the kerbside for collection.

3.4 Vehicular Access

Vehicular access to the site is proposed to be provided via a new 6.1m wide entry/exit driveway located off the Roscoe Street site frontage, noting the existing landscape bed and street tree will require relocation or removal, as well as 2 on-street parking spaces.

Furthermore, all existing driveway crossovers located off the Hall Street site frontage will be permanently closed and restored to kerb & gutter, thereby significantly improving the Hall Street streetscape and increasing pedestrian safety.

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4. Traffic Impact Assessment

4.1 Traffic Generation Guidelines

The traffic implications of development proposals primarily concern the *nett change* in the traffic generation potential of a site compared to its existing and/or approved uses, and its impact on the operational performance of the surrounding road network, particularly during the weekday morning and afternoon road network peak periods. An indication of the traffic generation potential of the existing and proposed uses on the site is provided by reference to the following documents:

- Transport for NSW's Guide to Transport Impact Assessment 2024 (GTIA)
- RMS Guide to Traffic Generating Developments 2002 (RMS Guide)
- RMS Technical Direction 2013/04a (TDT)

4.2 Proposed Development Traffic Generation

The land uses within the proposed development on the site are defined as "high density residential dwellings" and "commercial premises".

Based on the prescribed TfNSW trip generation rates, the proposed development has a traffic generation potential of 32 vehicle trips during the weekday morning peak hour and 31 vehicle trips during the weekday afternoon peak hour, as set out in the table below.

Table 4.1 – Proposed Peak Period Traffic Generation

Land Use	Quantum	Trip Rate		Traffic Generation*	
		AM	PM	AM	PM
Retail shops	1,227 m²	2 trips/100m²	2 trips/100m²	25 vph	25 vph
Residential	37 units	0.19 trips/unit	0.15 trips/unit	7 vph	6 vph
Total				**32 vph**	**31 vph**

* entry/exit combined

4.3 Existing Development Traffic Generation

Consideration should also be given to the existing and approved land uses and yields of the subject site. Based on the abovementioned prescribed TfNSW trip generation rates, the existing and approved land uses have a traffic generation potential of 23 vehicle trips during the weekday morning peak hour and 21 vehicle trips during the weekday afternoon peak hour, as set out in the table below.

Table 4.2 – Existing & Approved Peak Period Traffic Generation

Land Use	Quantum	Trip Rate		Traffic Generation*	
		AM	PM	AM	PM
Approved DA-501/2022 – 53-59 Hall Street					
Residential	17 units	0.19 trips/unit	0.15 trips/unit	3 vph	3 vph
Retail shops	491m²	2 trips/100m²	2 trips/100m²	10 vph	10 vph
Existing 49 & 51 Hall Street and 69 & 71 Roscoe Street					
Residential	40 dwellings	0.19 trips/unit	0.15 trips/unit	8 vph	6 vph
Retail shops	80m²	2 trips/100m²	2 trips/100m²	2 vph	2 vph
Total				**23 vph**	**21 vph**

* entry/exit combined

4.4 Traffic Implications – Road Network & Environmental Capacity

As noted in the foregoing, the traffic implications of development proposals primarily concern the *nett change* in the traffic generation potential of a site compared to its existing and/or approved uses.

Based on the GTIA trip generation rates and the aforementioned tables, the proposed development is expected to result in a *nett increase* of 9 vehicle trips per hour during the weekday morning peak, and 10 vehicle trips per hour during the weekday afternoon peak.

Table 4.3 – Nett Peak Traffic Generation			
Period	**Proposed Peak Trips**	**Existing & Approved Peak Trips**	**Nett Peak Trips**
AM Peak Hour	32 vph	23 vph	+9 vph
PM Peak Hour	31 vph	21 vph	+10 vph

The above peak period traffic volumes associated with the proposed development are minimal and represent 1 additional vehicle trip being generated approximately every 6-7 minutes during the weekday morning and afternoon peak periods.

Research undertaken by the former Roads and Maritime Services has identified a number of environmental capacity performance standards for different types of residential streets, as set out in the table below.

Table 4.4 - Environmental capacity performance standards on residential streets (Table 4.6 of RMS Guide)			
Road class	**Road type**	**Maximum Speed (km/hr)**	**Maximum peak hour volume (veh/hr)**
Local	Access way	25	100
	Street	40	200 environmental goal
			300 maximum
Collector	Street	50	300 environmental goal
			500 maximum

Note: Maximum speed relates to the appropriate design maximum speeds in new residential developments. In existing areas maximum speed relates to 85th percentile speed.

As noted in Section 2.5 of this TPAR, traffic surveys were previously undertaken at Roscoe Street & O'Brien Street intersection, and the existing traffic flows in Roscoe Street are typically in the order of 55-80 weekday network peak trips, whilst the proposed mixed use development is expected to generate a *nett increase* of only 9-10 weekday network peak trips.

The cumulative traffic flows in Roscoe Street as a consequence of the development proposal are therefore expected to be *well below* the threshold of 200 vph which is the environmental goal for a local residential street.

An important consideration in determining the impact of a development proposal on the road network is to assess the effect on traffic efficiency, the objective of which is to maintain the existing level of service. Adverse effects must be identified and corrective measures designed. The level of service is used as the performance standard and is broken down into six ratings.

This is a qualitative assessment of the quantitative effect of factors such as speed, volume of traffic, geometric features, traffic interruptions, delays and freedom of manoeuvres.

The traffic implications of development proposals primarily concern the effects that any *additional* traffic flows may have on the operational performance of the nearby road network. Those effects can be assessed using the SIDRA 9 program which is widely used by TfNSW and most LGAs for this purpose. TfNSW's criteria for evaluating the results of SIDRA analysis are summarised in the table below.

Table 4.5 – Level of Service Criteria for Intersections (Table 4.2 of RMS Guide)

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabouts	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode or major treatment

The SIDRA movements summaries of the Roscoe Street & O'Brien Street intersection are reproduced in Appendix C and summarised in Table 4.6 below. In essence, the SIDRA modelling confirms that the intersection is currently operating at Levels of Service A on the approaches and will continue to do so under the proposed development scenario, with less than 1 second increases in Average Vehicle Delays.

Table 4.6 – Summary of SIDRA analysis of the Roscoe Street & O'Brien Street intersection

	Existing Base Case Scenario		Proposed Scenario with Development	
	AM	PM	AM	PM
Roscoe St (SE)				
LOS	A	A	A	A
DOS	0.018	0.020	0.029	0.016
AVD (sec/veh)	2.8	2.2	2.6	2.2
O'Brien St (W)				
LOS	A	A	A	A
DOS	0.038	0.048	0.046	0.063
AVD (sec/veh)	3.7	3.5	3.6	3.3
Overall				
LOS	A	A	A	A
DOS	0.038	0.048	0.046	0.063
AVD (sec/veh)	3.4	3.0	3.2	2.9

LOS – Level of Service; DOS – Degree of Saturation; AVD – Average Vehicle Delays

Accordingly, the proposal is therefore supportable on traffic grounds.

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5. Access, Parking & Servicing Assessment

5.1 Applicable Car Parking Rates

As the development proposal includes a portion of affordable rental units, the minimum (non-discretionary) off-street car parking requirements applicable to the residential component are specified in the State Environmental Planning Policy (Housing) 2021, Division 1 In-fill affordable housing, Clause 19 Non-discretionary development standards—the Act, s. 4.15, as set out below.

19 Non-discretionary development standards—the Act, s 4.15

(1) The object of this section is to identify development standards for particular matters relating to residential development under this division that, if complied with, prevent the consent authority from requiring more onerous standards for the matters.

Note – See the Act, section 4.15(3), which does not prevent development consent being granted if a non-discretionary development standard is not complied with.

(2) The following are non-discretionary development standards in relation to the residential development to which this division applies—

(e) the following number of parking spaces for dwellings used for affordable housing—

(i) for each dwelling containing 1 bedroom—at least 0.4 parking spaces,

(ii) for each dwelling containing 2 bedrooms—at least 0.5 parking spaces,

(iii) for each dwelling containing at least 3 bedrooms— at least 1 parking space,

(f) the following number of parking spaces for dwellings not used for affordable housing—

(i) for each dwelling containing 1 bedroom—at least 0.5 parking spaces,

(ii) for each dwelling containing 2 bedrooms—at least 1 parking space,

(iii) for each dwelling containing at least 3 bedrooms—at least 1.5 parking spaces,

(Source: SEPP (Housing) 2021, Division 1, Clause 19)

The off-street parking rates applicable to the retail component of the proposed development are specified in Council's Waverley DCP 2022, Part B7, Transport, Table 4, as set out below. The site is not located within 800m of Bondi Junction railway station, therefore the Parking Zone 2 rates apply.

Land Use	Parking Zone 1	Parking Zone 2
Private Vehicle Parking		
Retail premises	Minimum 0 Maximum 2.0/100m² GFA	Minimum 0 Maximum 3.3/100m² GFA

(Source: Waverley DCP 2022, Part B7, Transport, Table 4)

5.2 Car Parking Requirements

Based on the proposal for a new mixed use development, comprising 37 apartments (including 11 affordable rental units) and 1,227m^2 of retail space, the proposed development requires a minimum parking provision of 51 car parking spaces, as set out in Table 5.1 below. Notwithstanding the above, WDCP also sets a maximum rate for retail parking, which in this instance, is 41 car parking spaces.

Table 5.1 – Off-Street Car Parking Requirements

Use	Affordable/ Built-to-Sell*	Quantum	SEPP 2021/WDCP 2022		WDCP 2022	
			Minimum Rate	Minimum Requirement	Maximum Rate	Maximum Requirement
2 Bedroom	Built-to-Sell	2	1 space / unit	2.0 spaces	N/A	-
3 Bedroom	Built-to-Sell	24	1.5 spaces / unit	36 spaces	N/A	-
2 Bedroom	Affordable	11	0.5 spaces / unit	5.5 spaces	N/A	-
Visitors	-	37	1 space / 5 units*	7.4 spaces	1 space / 5 units	7.4 spaces
Sub-total				50.9 spaces		-
Retail	N/A	1,227m^2	0 spaces	0 spaces	3.3 spaces / 100m^2	40.5 spaces
Total				**50.9 spaces**		**90.9 spaces**

* No visitor parking requirement for SEPP affordable rental/built-to-sell apartments, therefore WDCP visitor rate applied

5.3 Proposed Car Parking Provisions

The proposed development makes provision for a total of 103 car parking spaces, comprising 63 residential spaces, 7 visitor spaces and 33 retail spaces, thereby satisfying the minimum residential requirements under the SEPP and the maximum retail requirements under the WDCP 2022.

Table 5.2 – Proposed Off-Street Car Parking Provision

Land Use	SEPP 2021 minimum parking requirement	WDCP 2022 maximum parking requirement	Proposed car parking provision
Residential	43.5 spaces	N/A	63 spaces
Visitors	7.4 spaces*	7.4 spaces	7 spaces
Retail	-	40.5 spaces	33 spaces
Total	**50.9 spaces**	**90.9 spaces**	**103 spaces**

* No specified rate for visitor parking under SEPP (Housing) 2021, therefore WDCP visitor rate applied

5.4 Accessible Parking

Waverley DCP 2022, Part B6, Accessibility & Adaptability, sets out the design requirements for new development. With respect to the proposed development, Section 6.2 Control (c) requires that *in all developments with 10 or more dwellings, 20% of dwellings (rounded to the nearest whole number) shall comply with the provisions of an adaptable unit as specified in accordance with the Australian Standard AS4299:1995 Adaptable Housing.* In turn, each adaptable apartment requires an accessible car space.

Accordingly, based on the WDCP 2022, the proposed development with 37 units requires the provision of 8 adaptable units, which, in turn, require the provision of 8 accessible car parking spaces (plus 1 visitor accessible space).

In addition, the BCA/NCC requires the provision of 4% of the retail car parking to be allocated as accessible. As such, of the 33 proposed retail parking spaces, 1 of them is required to be accessible.

That requirement is satisfied by the proposed provision of 9 accessible parking spaces.

5.5 Bicycle & Motorcycle Parking

The off-street bicycle parking rates applicable to the development proposal are specified in the Waverley DCP 2022, Part B7, Transport, Table 5, as set out below.

Land Use	Bicycle Parking Rates	
	Long-stay / resident/ employee	Short-stay/ Visitor
Residential Development	*All residential development* 1 space per dwelling	*Medium and High Density (3+ dwellings)* 1 space per 10 dwellings
Office	*Employee* 0.45 spaces per 100m^2 GFA	*Visitor* 1 space per 2000m^2 GFA
Retail	*Employee* 0.1 spaces per 100m^2 NFA	*Visitor* 0.4 spaces per 100m^2 GFA

(Source: Waverley DCP 2022, Part B7, Transport, Table 5)

Accordingly, based on the proposal for 37 residential apartments and 1,227m^2 of retail space, the development requires the provision of 37 residential bicycle spaces, 4 visitor bicycle spaces, 1 retail staff bicycle space and 5 retail customer bicycle spaces.

That requirement is satisfied by the proposed provision of 37 residential bicycle spaces, 4 visitor bicycle spaces, 1 retail staff bicycle space and 5 retail customer bicycle spaces located throughout the site, primarily within the basement, in the form of lockable racks and private storage rooms.

WDCP 2022 also specifies motorcycle parking is required to be provided, as stipulated below.

Other Parking	
Motorcycles	1 motorcycle parking bay per 3 car parking bays (including visitor)

(Source: Waverley DCP 2022, Part B7, Transport, Table 4)

Accordingly, based on the proposed car parking provision of 103 spaces, the development requires the provision of 34 motorcycle spaces. The proposed development makes provision for 25 motorcycle spaces, thereby resulting in a numerical shortfall of 9 spaces when assessed under the WDCP rate. The proposed provision of 25 motorcycle spaces is considered acceptable in this instance, however, as the equivalent rate of *1 motorcycle space per 4 car spaces* is, by comparison to other similar developments, onerous.

5.6 Electric Vehicle Parking

Waverley DCP 2022, Part B7, Section 7.8, Table 7 sets out the design requirements for electric vehicle charging points in new development, as set out on the following page.

Based on the WDCP EV rates and the proposed parking mix, the proposed development requires the provision of 13 residential charging stations, 7 visitor charging stations and 7 retail charging stations. In addition, all 63 residential spaces, 7 visitor spaces, and 13 retail spaces must be EV ready.

In addition, a dedicated space and charging point for electric bicycles and mobility scooters to be charged must also be provided.

Building Class	Car Space Type	Minimum Charging Stations Installed (% of spaces)	Minimum Number of EV Ready Spaces (%)	Minimum Current per Space (A)	Minimum Energy Capacity per Space Day = 9am-5pm Night = 11pm-7am (kWh)
Medium and high density residential (3 + dwellings)	Resident	20	100	16	Night 15
	Visitor	100	100	32	Day 15
Business and office premises	Any	20	40	32	Day 15
Retail premises	Any	20	40	32	Day 15

(Source: Waverley DCP 2022, Part B7, Transport, Table 7)

All charging point locations will also be identified on the Construction Certificate plans should the development receive approval.

5.7 Loading & Servicing

The off-street loading requirements applicable to the development proposal are specified in the Waverley DCP 2012, Part B8, Transport, Table 5, as set out below.

Use	Rate
Offices, commercial premises & professional consulting rooms	1 per 4000m² up to 20,000m² plus 1 per 8000m² thereafter
Residential flat buildings	1 per 50+ dwellings
Retail	1 per 400m² GFA
Other uses	Merit Assessment

(Source: Waverley DCP 2012, Part B8, Transport, Table 3)

Based on the proposal for 37 residential apartments and 1,227m² of retail space, the development requires the provision of 3 loading bays.

In this regard, 2 dedicated loading bays are proposed to be provided within basement level 1, at the bottom of the entry ramp and with easy access to the lift. Whilst this represents a numerical shortfall of 1 loading bay, the proposed provision of 2 loading bays is considered acceptable as there are a number of on-street Loading Zones & Truck Zones located along Hall Street which delivery drivers may also utilise, typical of high street town centre retail/commercial locations.

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6. Design Assessment

6.1 Applicable Design Standards

The following design standards have been used as the basis for compliance with respect to the vehicular access, parking & loading requirements:

- Australian Standards 2890.1:2004 – Off-Street Car Parking (AS2890.1)
- Australian Standards 2890.2:2018 – Off-Street Commercial Vehicle Facilities (AS2890.2)
- Australian Standards 2890.6:2022 – Off-Street Parking for People with Disabilities (AS2890.6)
- Australian Standards 2890.3:2015 – Bicycle Parking (AS2890.3)

Whilst the vehicular access and parking area has been designed in accordance with the above Australian Standards, it is expected that a condition of consent would be imposed requiring reconfirmation of compliance at the Construction Certificate stage (CC). Any minor amendments required to the current DA design can therefore be addressed at the CC stage.

6.2 Vehicular Access & Circulation Design

The following key compliances are noted with respect to the vehicular access design and circulation system:

- a 6.1m wide (inc. kerbs) entry/exit driveway off the Roscoe Street site frontage, in accordance with “Category 2” requirements which requires a width of 6.0m-9.0m
- driveway located outside of the 6m “prohibited” tangent points of an intersection
- first 6m within the property boundary @ maximum grade of 5% (1:20)
- top 2m & bottom 3m entry ramp transitions @ 12.5% (1:8)
- maximum ramp gradients of 25% (1:4)
- top & bottom 2m internal ramp transitions @ 12.5% (1:8)
- 4.6m (inc. kerbs) two-way single lane internal ramp
- 5.8m wide parking aisles with an additional 300mm offset to walls opposite
- minimum 1m “aisle extension” at the end of the dead-end parking aisles
- minimum 3.0m overhead clearance provided throughout the service vehicle path of travel to/from Roscoe Street and manoeuvring area on B1
- minimum 2.2m overhead clearance provided elsewhere throughout the vehicular circulation system
- 2.5m x 2.0m pedestrian sight triangle on the exit side of the driveway at the boundary line

6.3 Parking and Loading Design

The following key compliances are noted with respect to the parking area design and the AS2890 series:

- 5.4m long x 2.4m wide car parking spaces
- 5m long x 2.3m wide small car parking space
- 5.4m long x 2.4m wide accessible car parking spaces *plus* 5.4m long x 2.4m wide “shared areas”, in accordance with AS2890.6
- 5.4m long x 3.8m wide adaptable car parking space, in accordance with AS4299
- minimum 3.0m overhead clearance provided above the loading bays on B1

- minimum 2.5m overhead clearance provided above accessible parking spaces and adjacent shared areas
- minimum 2.2m overhead clearance provided above all other parking spaces
- additional 300mm width for parking spaces located against walls
- columns in parking areas generally located ~750mm back from the edge of the parking aisles
- no obstructions within the “design envelope” of any car parking spaces
- motorcycle parking spaces designed in accordance with AS2890.1
- bicycle parking areas designed in accordance with AS2890.3
- all vehicles are able to enter and exit the basement parking area in a forward direction at all times

As noted in the foregoing, waste collection is to be undertaken by private contractor using a compact small rigid truck with a physical overhead clearance of 2.1m, from within two dedicated loading bays within the basement level 1 of the building, adjacent to the lift and in close proximity to the bin room.

Waste collection will be scheduled to occur *outside* of the weekday morning and afternoon peak periods, meaning resident vehicular traffic into/out of the basement will be less during these periods, and the likelihood of a waste truck and resident car meeting in opposing directions will be very low.

In terms of the provision of sufficient headroom, waste collection is proposed to be undertaken by a compact low-clearance vehicle, similar to the diagram below and on the following page.

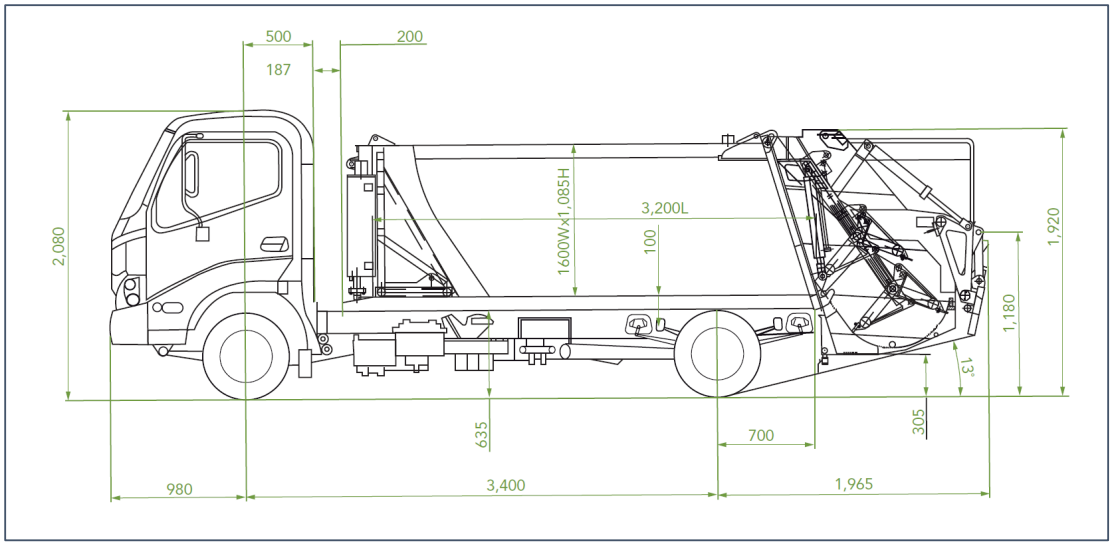

Figure 6.1 – Private waste contractor compact truck dimensions (Source: Garwood International)

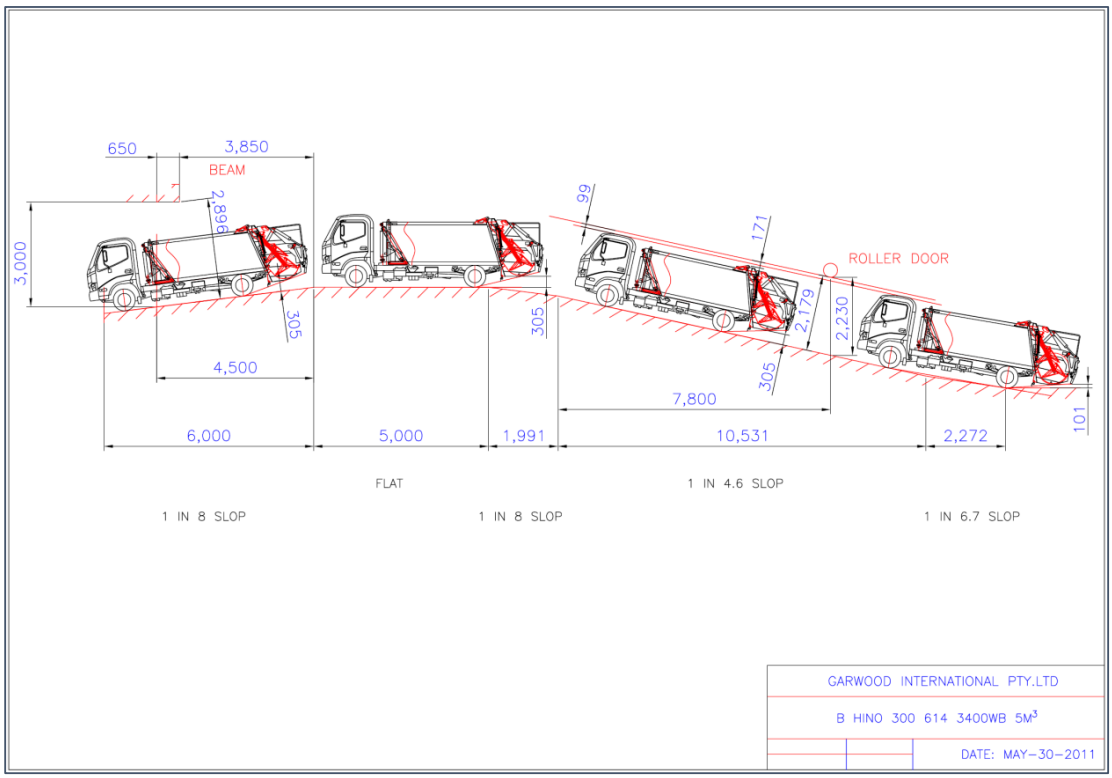

Figure 6.2 – Private waste contractor compact truck ramp requirements (Source: Garwood International)

As can be seen in the dimensions in Figure 6.1, these types of compact low-clearance private contractor "trucks" are more akin to a 4WD B99, noting that whilst the overall length of the vehicle is 6.35m, this includes the 5m^3 waste compactor on the back. The actual length of the vehicle without the compactor is 5.08m, whilst the height of the vehicle is 2.08m. One of the Australian suppliers of these compactor units is Garwood International, who operate from Wetherill Park, NSW. With respect to the waste compactor unit, Garwood International note the following:

> *"The whole concept, design of this unit is to go underneath apartments, office blocks, shops and even sports stadiums - exhibition halls, anywhere with a height restriction of 2100mm. This has revolutionized the way waste is being collected at these sites. The unit maximum height is 2080mm and that's the height of the cab chassis roof, our body on the cab sits at 2000mm. Our low profile 5m^3 compactor has solved the problem. It will go anywhere a standard 4x4 car like a Prado-Land Cruiser will go which has opened up the waste collection process."*

Ramp design guidelines from Garwood International are provided in Figure 6.2 above, which the proposed ramp design has been generally modelled, including a maximum ramp gradient of 1:4.6 (22.2%).

It is pertinent to note that there are a number of private waste contractors in the Sydney metropolitan market who have these compact low-clearance vehicles in their fleet, including:

- URM
- Veolia
- Remondis
- Waste Wise
- Bingo
- Capital City Waste Services

The vehicular access arrangements have been designed to accommodate the swept turning path requirements of the SRV design vehicle, as specified in AS2890.2, allowing them to enter and exit the site whilst travelling in a forward direction at all times as well as manoeuvre into/out of the loading bays on B1.

Furthermore, the vehicular access arrangements have also been designed to accommodate the swept turning path requirements of the B99 design vehicle, as specified in AS2890.1, allowing them to enter and exit the site whilst travelling in a forward direction at all times, circulate throughout the basement parking area without difficulty, and pass another vehicle.

Swept turning path diagrams are reproduced in Appendix D.

7. Conclusion

In summary, this TPAR has been prepared in support of a DA and PP, assessing the traffic, parking and pedestrian impacts of a new mixed use development on the subject site, comprising 1,227m^2 of lower ground and ground floor retail space and 37 residential apartments, including 11 affordable rental units, in accordance with the SEPP (Housing) 2021.

Off-street parking is proposed for a total of 103 cars within a new two-level basement parking area beneath the buildings.

Vehicular access to the site is proposed to be provided via a new 6.1m wide entry/exit driveway located off the Roscoe Street site frontage, leading to the two-level basement parking area. It is noted that preliminary advice from Council included exploring the possibility of having a single-lane two-way driveway off the roscoe Street frontage, however, due to the proposed driveway "category", a minimum 6.0m wide driveway is required under AS2890.2.

Based on the findings contained within this report, the following conclusions are made:

- the site is located within 250m to the nearest bus stop on Campbell Parade
- No.49-59 Hall Street properties are located within the Hall Street Town Centre
- the proposed development is expected to generate just 31-32 vehicle trips during the weekday morning and afternoon peak periods, less at other times
- when compared to the existing uses of the site, the proposal is expected to result in a *nett increase* of 9-10 vehicle trips during the weekday morning and afternoon peak periods
- the proposed development makes provision for 103 car parking spaces which satisfies the minimum SEPP rates for the residential component as well as the maximum WDCP rates for the retail component
- the proposed development also makes provision for 47 bicycle spaces and 25 motorcycle spaces
- the proposed vehicular access and parking area design complies with the relevant requirements of the AS2890 series
- the closure of driveway crossovers off Hall Street will be substantially positive from a pedestrian movement and streetscape continuity perspective
- the proposed vehicular access driveway off Roscoe Street will result in minimal impact to existing traffic and pedestrian movements in the vicinity
- waste collection is to be undertaken by private contractor using a compact low-clearance vehicle from the dedicated loading bay within B1

In light of the foregoing assessment, it is therefore concluded that the proposed development is supportable on vehicular access, traffic, parking and servicing grounds and will not result in any unacceptable implications.

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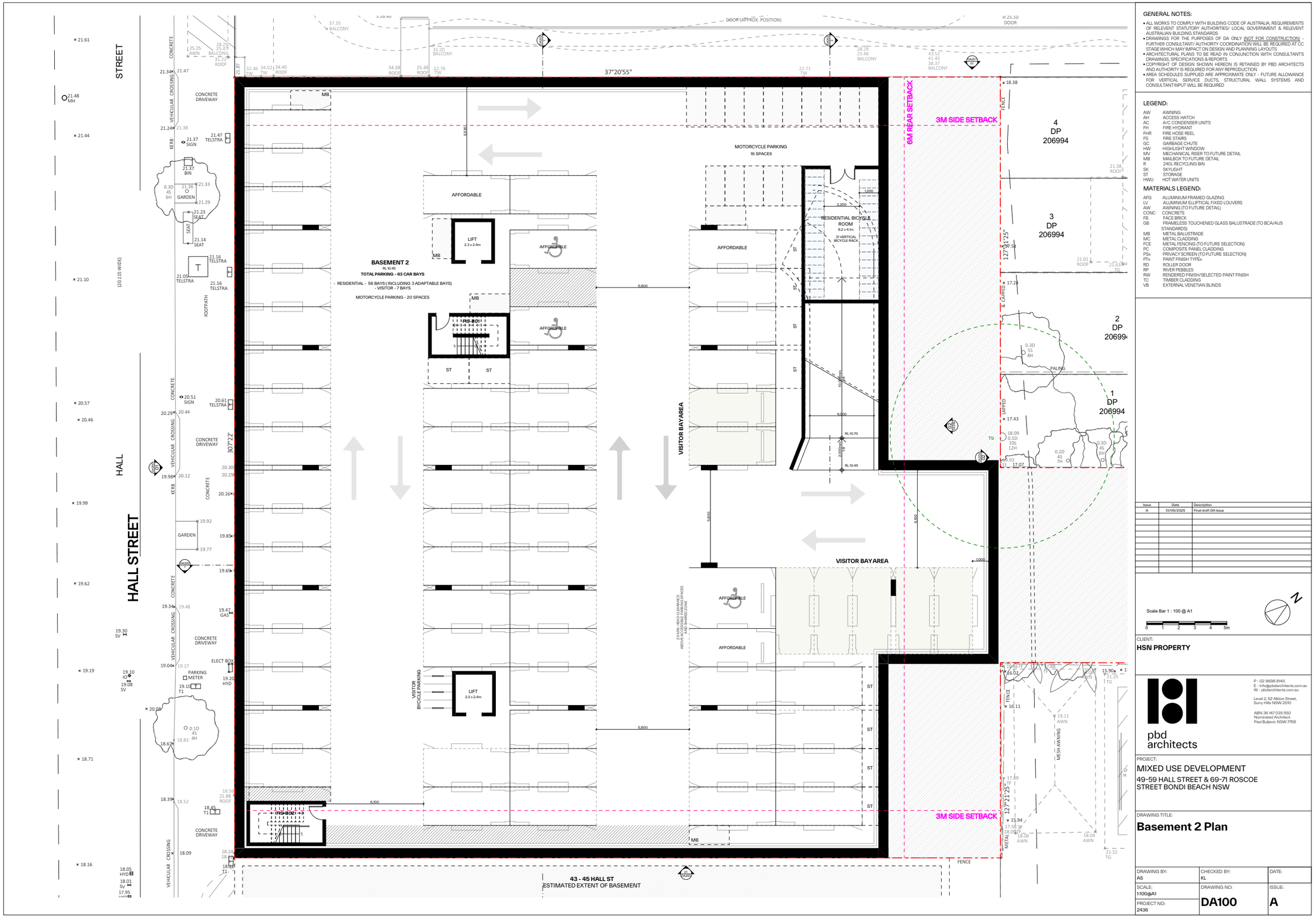
Appendix A

Architectural Plans



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LEGEND:

AW	AWNING
AH	ACCESS HATCH
AC	A/C CONDENSER UNITS
FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HW	HIGHLIGHT WINDOW
MV	MECHANICAL RISER TO FUTURE DETAIL
MB	MAILBOX TO FUTURE DETAIL
R	240L RECYCLING BIN
SK	SKYLIGHT
ST	STORAGE
HWU	HOT WATER UNITS

MATERIALS LEGEND:

AFG	ALUMINIUM FRAMED GLAZING
LV	ALUMINIUM ELLIPTICAL FIXED LOUVERS
AW	AWNING (TO FUTURE DETAIL)
CONC	CONCRETE
FB	FACE BRICK
GB	FRAMELESS TOUCHENED GLASS BALUSTRADE (TO BCA/AUS STANDARDS)
MB	METAL BALUSTRADE
MC	METAL CLADDING
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PSx	PRIVACY SCREEN (TO FUTURE SELECTION)
PTx	PAINT FINISH TYPEx
RD	ROLLER DOOR
RP	RIVER PEBBLES
RW	RENDERED FINISH/SELECTED PAINT FINISH
TC	TIMBER CLADDING
VB	EXTERNAL VENETIAN BLINDS

Issue	Date	Description
A	13/06/2025	Final draft DA Issue

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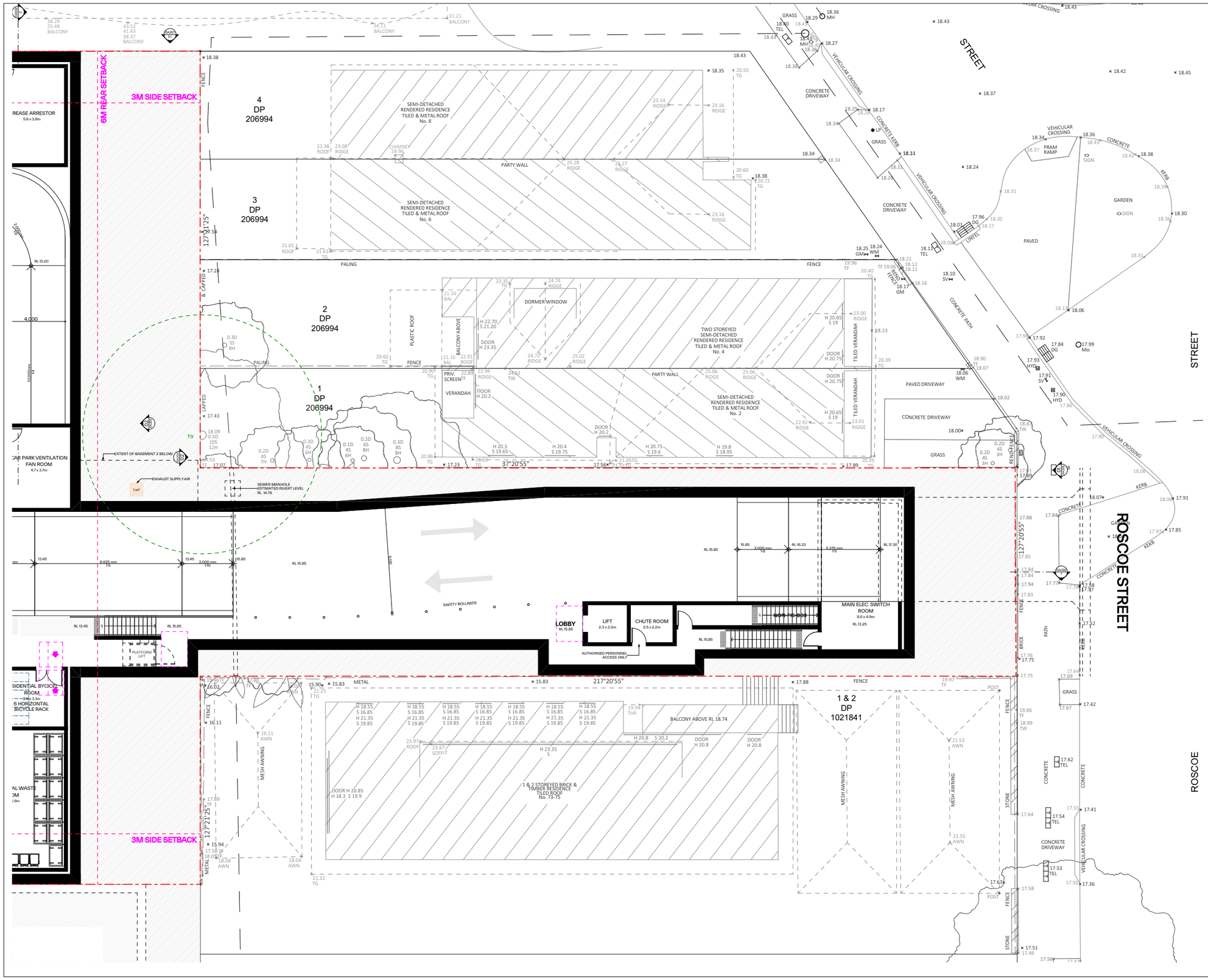
PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Basement 2 Plan

DRAWING BY: AS	CHECKED BY: KL	DATE:
SCALE: 1:100@A1	DRAWING NO: **DA100**	ISSUE: **A**
PROJECT NO: 2436		



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LEGEND:

AW	AWNING
AH	ACCESS HATCH
AC	A/C CONDENSER UNITS
FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HW	HIGHLIGHT WINDOW
MV	MECHANICAL RISER TO FUTURE DETAIL
MB	MAILBOX TO FUTURE DETAIL
R	240L RECYCLING BIN
SK	SKYLIGHT
ST	STORAGE
HWU	HOT WATER UNITS

MATERIALS LEGEND:

AFG	ALUMINIUM FRAMED GLAZING
LV	ALUMINIUM ELLIPTICAL FIXED LOUVERS
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CONC	CONCRETE
FB	FACE BRICK
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RD	ROLLER DOOR
RP	RIVER PEBBLES
RW	RENDERED FINISH/SELECTED PAINT FINISH
TC	TIMBER CLADDING
VB	EXTERNAL VENETIAN BLINDS

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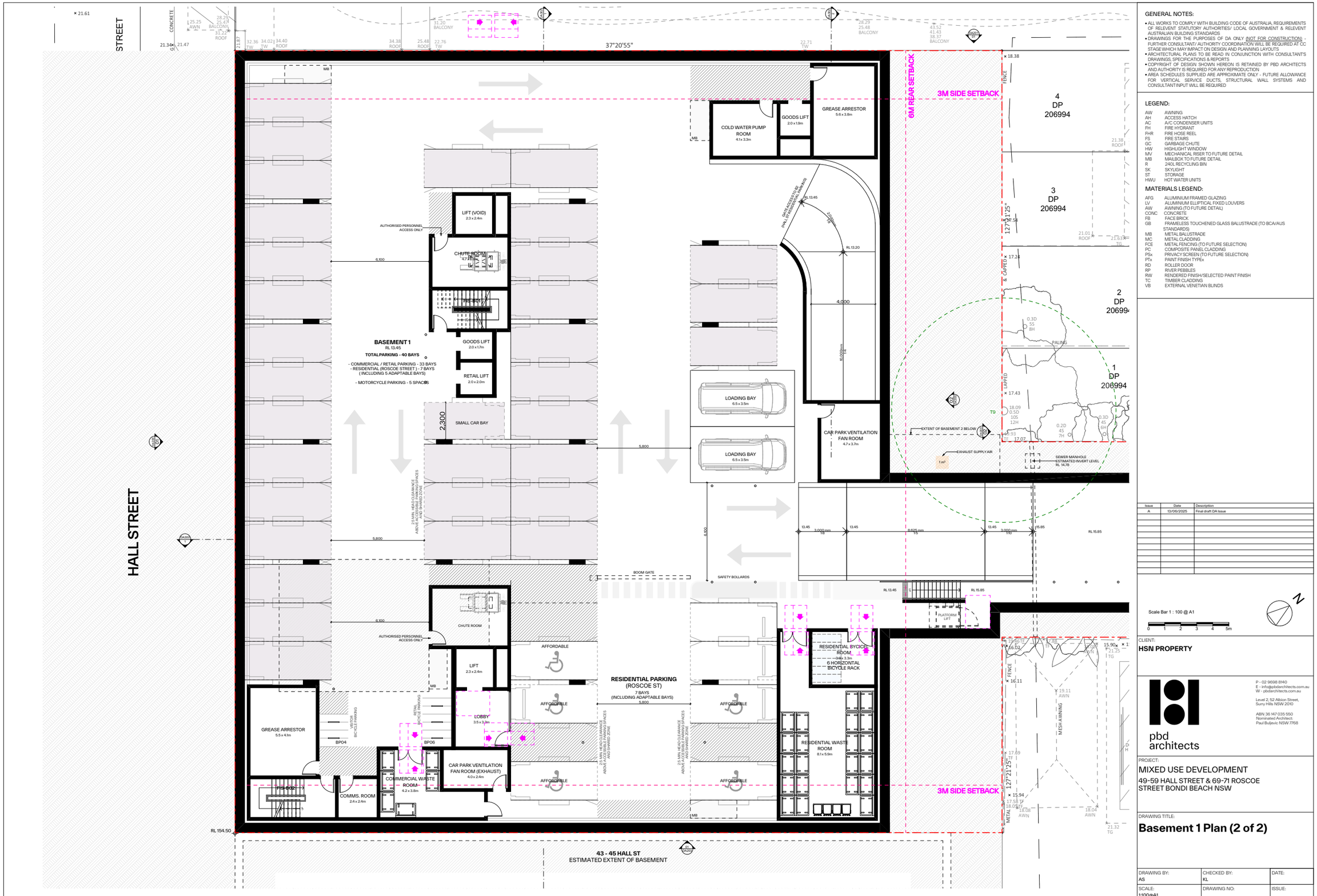
PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Basement 1 Plan (1 of 2)

DRAWING BY: AS	CHECKED BY: KL	DATE:
SCALE: 1:100@A1	DRAWING NO: **DA101**	ISSUE: **A**
PROJECT NO: 2436		



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PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Basement 1 Plan (2 of 2)

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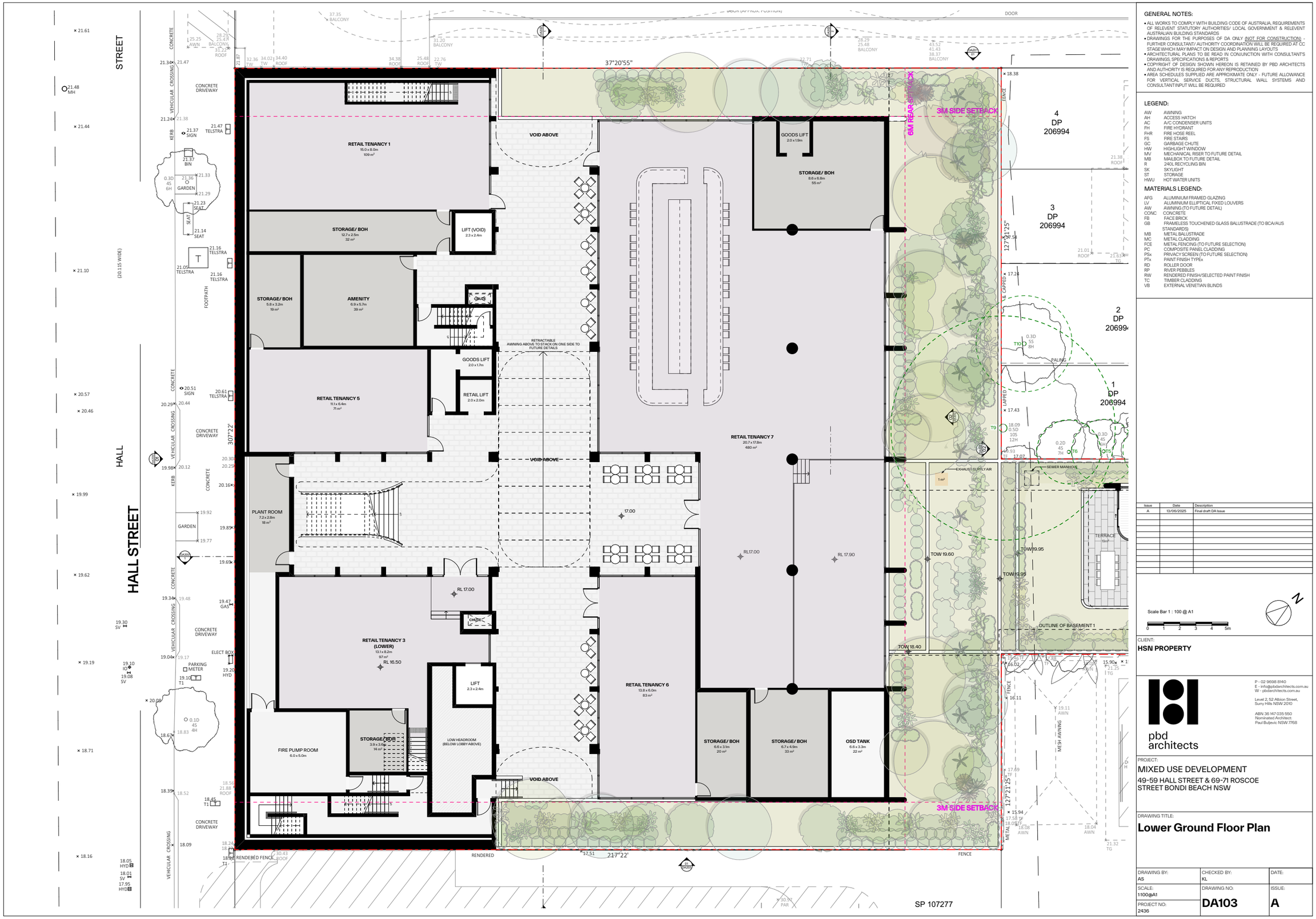
SCALE: 1:100@A1	DRAWING NO: **DA102**	ISSUE: **A**
PROJECT NO: 2436		



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PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Lower Ground Floor Plan

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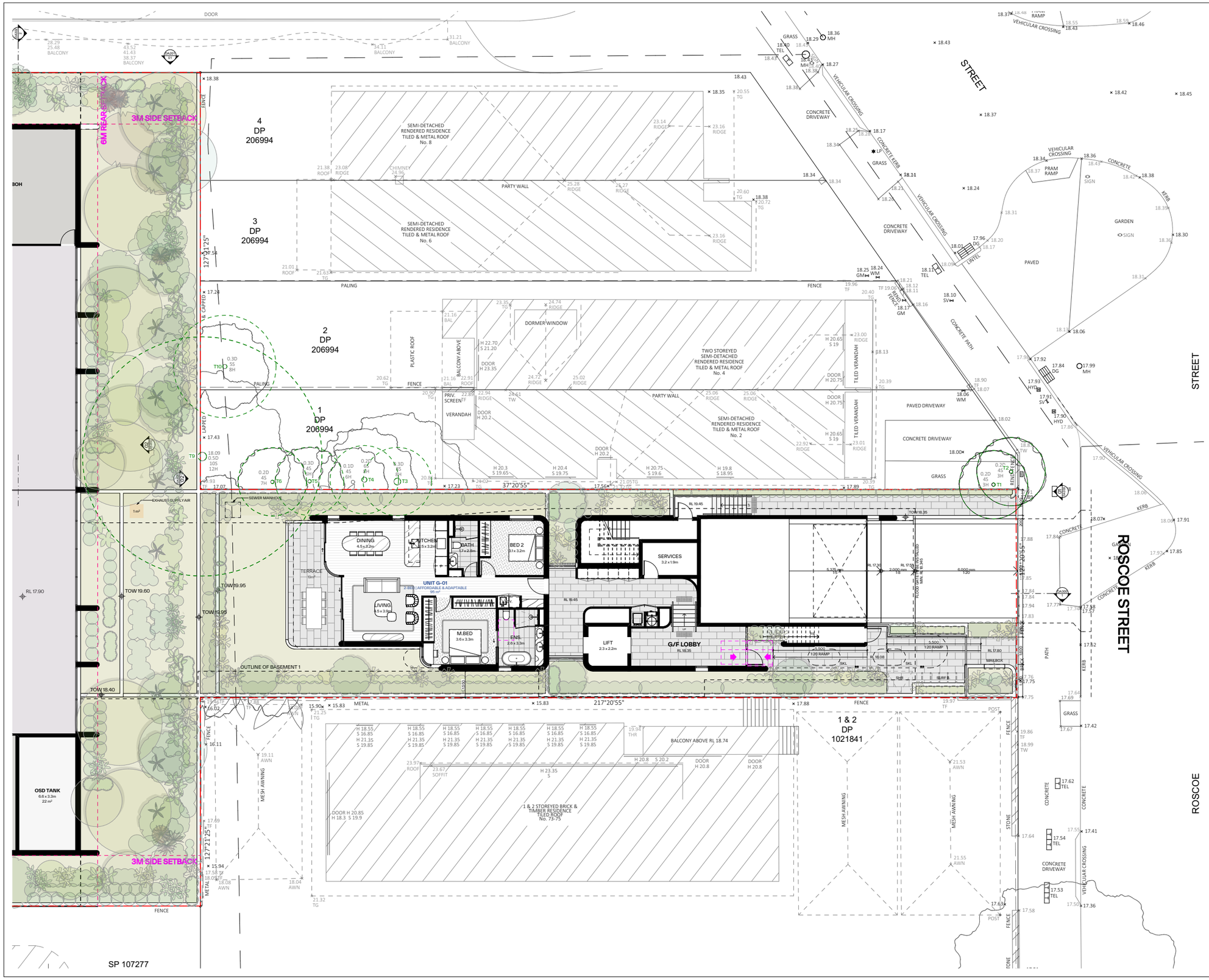
SCALE: 1:100@A1	DRAWING NO: **DA103**	ISSUE: **A**
PROJECT NO: 2436		



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Nominated Architect: Paul Buljevic NSW 7768

PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Ground Floor Plan - Roscoe St

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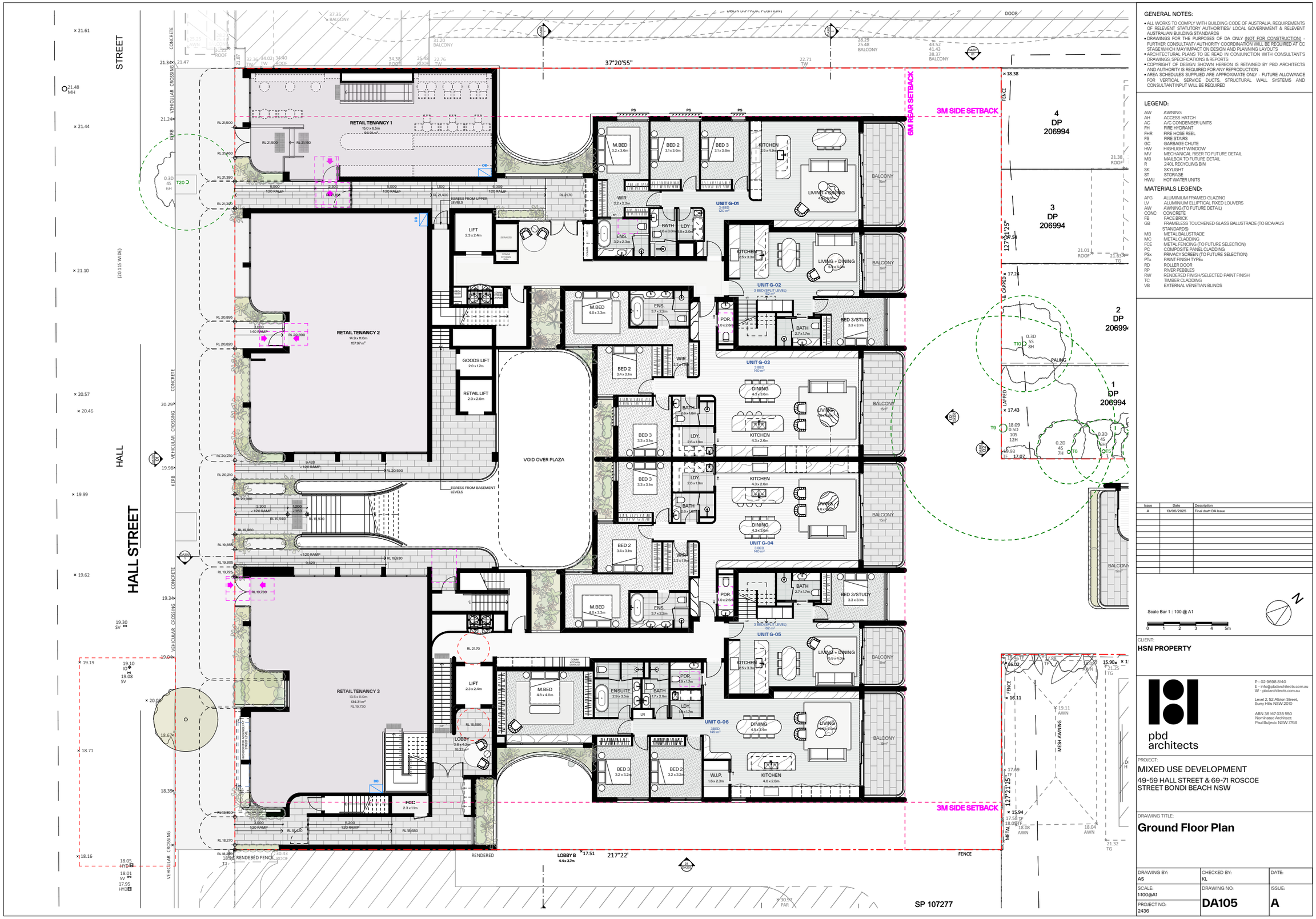
SCALE: 1:100@A1	DRAWING NO: DA104	ISSUE: A
PROJECT NO: 2436		



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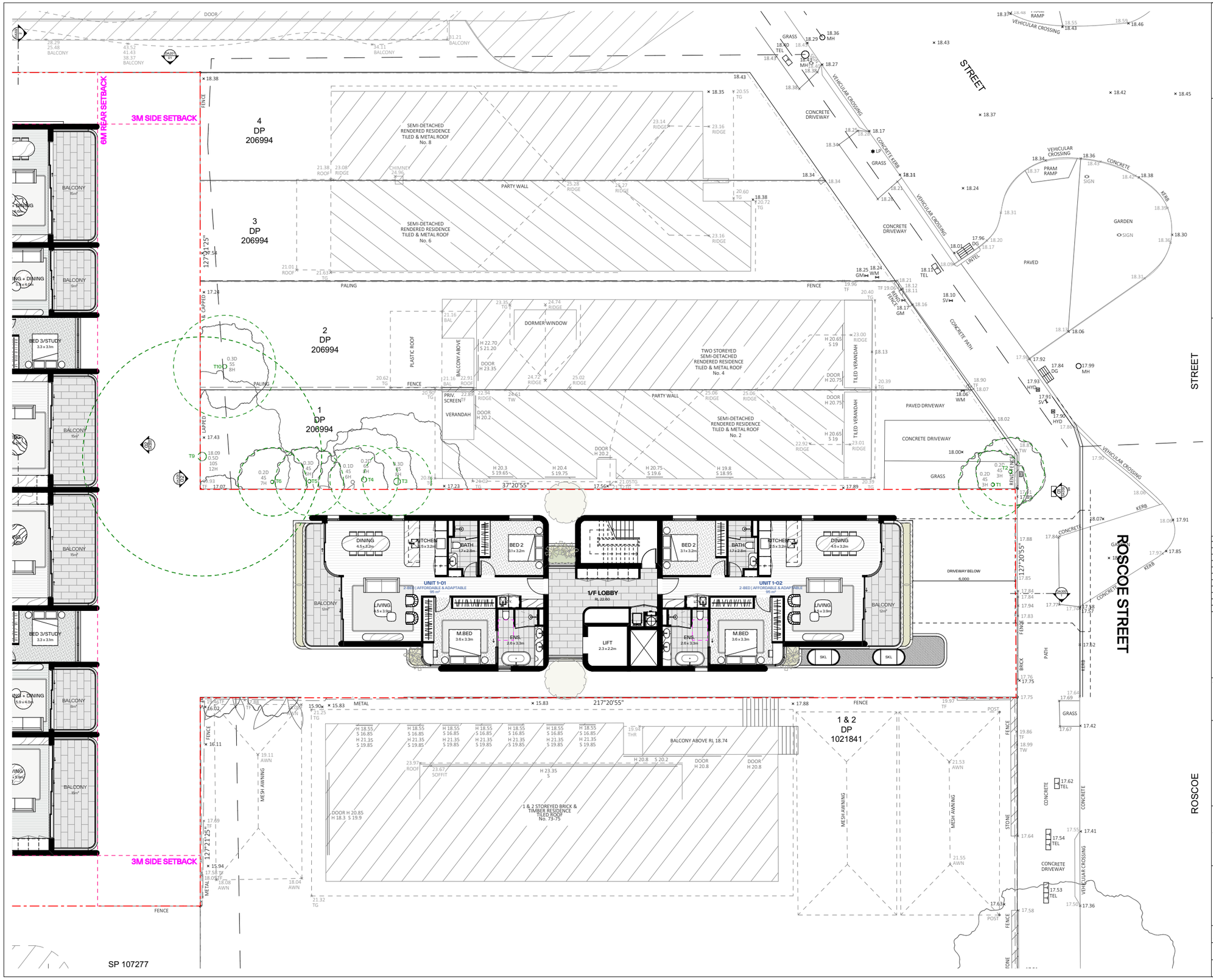
Nominated Architect
Paul Buljevic NSW 7768

PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Ground Floor Plan

DRAWING BY: AS	CHECKED BY: KL	DATE:
SCALE: 1:100@A1	DRAWING NO: **DA105**	ISSUE: **A**
PROJECT NO: 2436		



GENERAL NOTES:

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LEGEND:

AW	AWNING
AH	ACCESS HATCH
AC	A/C CONDENSER UNITS
FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HW	HIGHLIGHT WINDOW
MV	MECHANICAL RISER TO FUTURE DETAIL
MB	MAILBOX TO FUTURE DETAIL
R	240L RECYCLING BIN
SK	SKYLIGHT
ST	STORAGE
HWU	HOT WATER UNITS

MATERIALS LEGEND:

AFG	ALUMINIUM FRAMED GLAZING
LV	ALUMINIUM ELLIPTICAL FIXED LOUVERS
AW	AWNING (TO FUTURE DETAIL)
CONC	CONCRETE
FB	FACE BRICK
GB	FRAMELESS TOUCHENED GLASS BALUSTRADE (TO BCA/AUS STANDARDS)
MB	METAL BALUSTRADE
MC	METAL CLADDING
FCE	METAL FENCING (TO FUTURE SELECTION)
PC	COMPOSITE PANEL CLADDING
PSx	PRIVACY SCREEN (TO FUTURE SELECTION)
PTx	PAINT FINISH TYPEx
RD	ROLLER DOOR
RP	RIVER PEBBLES
RW	RENDERED FINISH/SELECTED PAINT FINISH
TC	TIMBER CLADDING
VB	EXTERNAL VENETIAN BLINDS

Issue	Date	Description
A	13/06/2025	Final draft DA Issue

Scale Bar 1 : 100 @ A1

0 1 2 3 4 5m

CLIENT:
HSN PROPERTY

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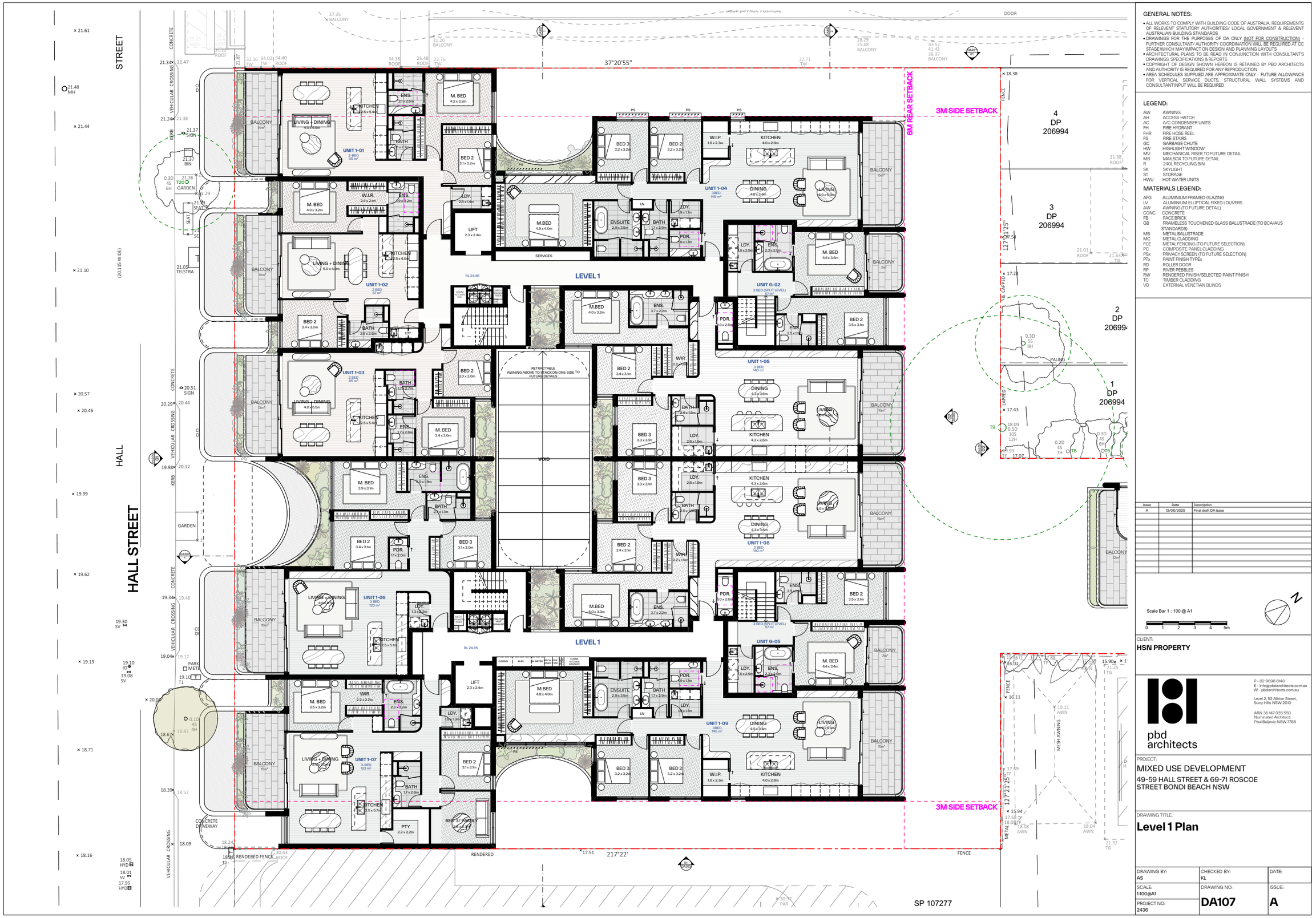
ABN 36 147 035 550
Nominated Architect: Paul Buljevic NSW 7768

PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Level 1 Plan - Roscoe St

DRAWING BY:	CHECKED BY:	DATE:
AS	KL	
SCALE: 1:100@A1	DRAWING NO: **DA106**	ISSUE: **A**
PROJECT NO: 2436		



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LEGEND:

AW	AWNING
AH	ACCESS HATCH
AC	A/C CONDENSER UNITS
FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HW	HIGHLIGHT WINDOW
MV	MECHANICAL RISER TO FUTURE DETAIL
MB	MAILBOX TO FUTURE DETAIL
R	240L RECYCLING BIN
SK	SKYLIGHT
ST	STORAGE
HWU	HOT WATER UNITS

MATERIALS LEGEND:

AFG	ALUMINIUM FRAMED GLAZING
LV	ALUMINIUM ELLIPTICAL FIXED LOUVERS
AW	AWNING (TO FUTURE DETAIL)
CONC	CONCRETE
FB	FACE BRICK
GB	FRAMELESS TOUCHENED GLASS BALUSTRADE (TO BCA/AUS STANDARDS)
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MC	METAL CLADDING
FCE	METAL FENCING (TO FUTURE SELECTION)
PC	COMPOSITE PANEL CLADDING
PSx	PRIVACY SCREEN (TO FUTURE SELECTION)
PTx	PAINT FINISH TYPEx
RD	ROLLER DOOR
RP	RIVER PEBBLES
RW	RENDERED FINISH/SELECTED PAINT FINISH
TC	TIMBER CLADDING
VB	EXTERNAL VENETIAN BLINDS

Issue	Date	Description
A	13/06/2025	Final draft DA issue

Scale Bar 1 : 100 @ A1

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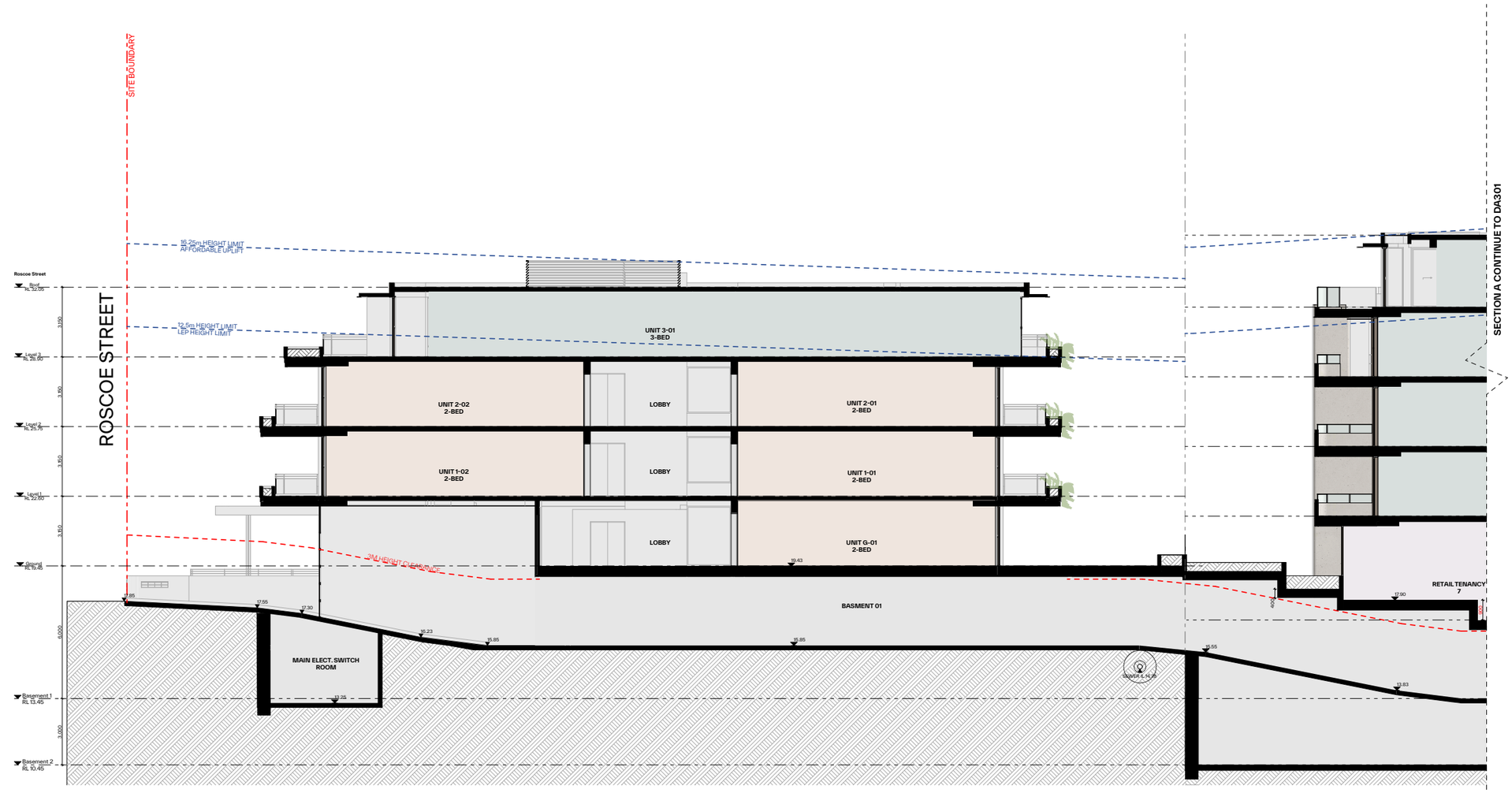
ABN 36 147 035 550
Nominated Architect: Paul Buljevic NSW 7768

PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Level 1 Plan

DRAWING BY: AS	CHECKED BY: KL	DATE:
SCALE: 1:100@A1	DRAWING NO: **DA107**	ISSUE: **A**
PROJECT NO: 2436		



1 Section A (Roscoe Street) 1:100

GENERAL NOTES:

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LEGEND:

AW	AWNING
AH	ACCESS HATCH
AC	A/C CONDENSER UNITS
FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HW	HIGHLIGHT WINDOW
MV	MECHANICAL RISER TO FUTURE DETAIL
MB	MAILBOX TO FUTURE DETAIL
R	240L RECYCLING BIN
SK	SKYLIGHT
ST	STORAGE
HWU	HOT WATER UNITS

MATERIALS LEGEND:

AFG	ALUMINIUM FRAMED GLAZING
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VB	EXTERNAL VENETIAN BLINDS

Issue	Date	Description
A	13/06/2025	Final draft DA Issue

Scale Bar 1 : 100 @ A1

0 1 2 3 4 5m

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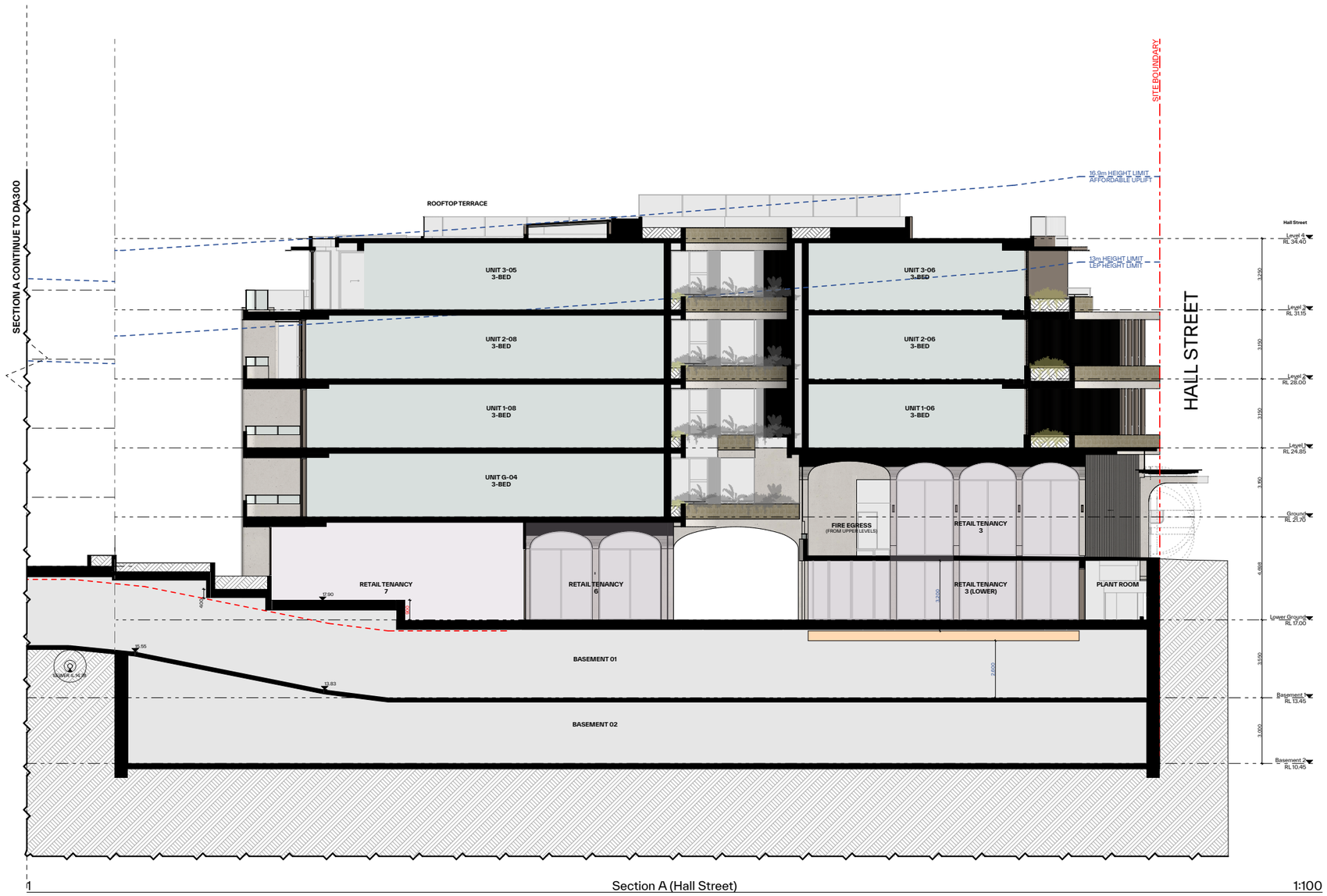
ABN 36 147 035 550
Nominated Architect:
Paul Buljevic NSW 7768

PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Section A Sheet 1

DRAWING BY: AS	CHECKED BY: KL	DATE:
SCALE: 1:100@A1	DRAWING NO: **DA300**	ISSUE: **A**
PROJECT NO: 2436		



1 Section A (Hall Street) 1:100

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LEGEND:

AW	AWNING
AH	ACCESS HATCH
AC	A/C CONDENSER UNITS
FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HW	HIGHLIGHT WINDOW
MV	MECHANICAL RISER TO FUTURE DETAIL
MB	MAILBOX TO FUTURE DETAIL
R	240L RECYCLING BIN
SK	SKYLIGHT
ST	STORAGE
HWU	HOT WATER UNITS

MATERIALS LEGEND:

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RP	RIVER PEBBLES
RW	RENDERED FINISH/SELECTED PAINT FINISH
TC	TIMBER CLADDING
VB	EXTERNAL VENETIAN BLINDS

Issue	Date	Description
A	13/06/2025	Final draft DA issue

Scale Bar 1 : 100 @ A1

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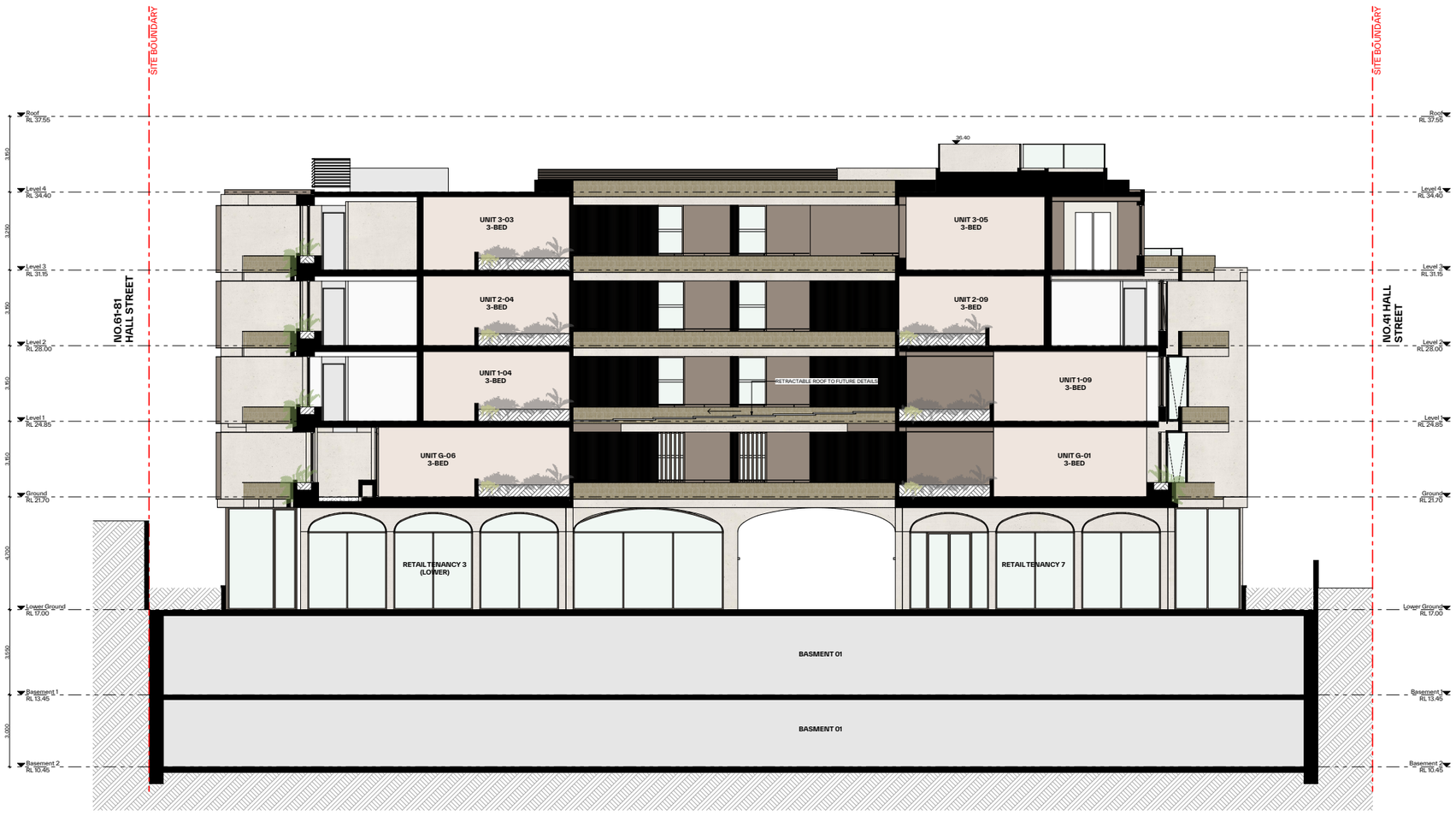
Nominated Architect:
Paul Buljevic NSW 7768

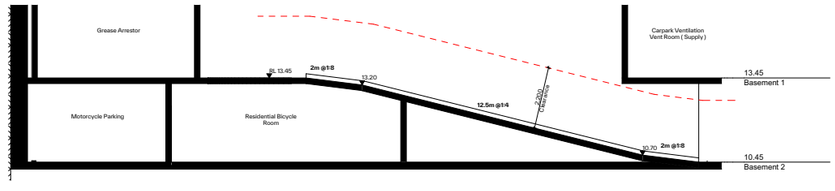
PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Section A Sheet 2

DRAWING BY: AS	CHECKED BY: KL	DATE:
SCALE: 1:100@A1	DRAWING NO: **DA301**	ISSUE: **A**
PROJECT NO: 2436		



1 Section B 1:100



2 Driveway Section C 1:100

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FH	FIRE HYDRANT
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Issue	Date	Description
A	13/06/2025	Final draft DA Issue

Scale Bar 1 : 100 @ A1

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ABN 36 147 035 550
Nominated Architect: Paul Buljevic NSW 7768

PROJECT:
MIXED USE DEVELOPMENT
49-59 HALL STREET & 69-71 ROSCOE STREET BONDI BEACH NSW

DRAWING TITLE:
Section B

DRAWING BY: AS	CHECKED BY: KL	DATE:
SCALE: 1:100@A1	DRAWING NO: **DA302**	ISSUE: **A**
PROJECT NO: 2436		

CJP | CONSULTING ENGINEERS

Appendix B

Traffic & Pedestrian Survey Data

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Roscoe St and O'Brien St, Bondi Beach

GPS -33.889153, 151.272781

Date:	Tue 20/05/25
Weather:	Overcast
Suburban:	Bondi Beach
Customer:	N/A

North:	N/A
East:	Roscoe St
South:	O'Brien St
West:	Roscoe St

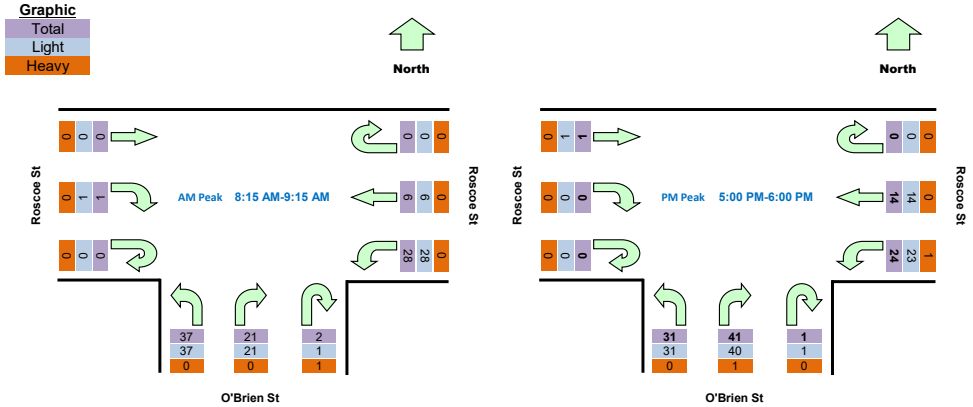
Survey Period	AM:	6:30 AM-9:30 AM
	PM:	3:30 PM-6:30 PM
Traffic Peak	AM:	8:15 AM-9:15 AM
	PM:	5:00 PM-6:00 PM

All Vehicles

Time		East Approach Roscoe St			South Approach O'Brien St			West Approach Roscoe St			Hourly Total	
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	Hour	Peak
6:30	6:45	0	0	1	0	5	5	0	0	1	51	
6:45	7:00	0	0	2	2	7	2	0	0	1	65	
7:00	7:15	0	0	0	1	1	8	0	0	0	72	
7:15	7:30	0	2	2	0	6	5	0	0	0	77	
7:30	7:45	0	2	11	1	5	7	0	0	0	86	
7:45	8:00	0	2	6	0	3	10	0	0	0	81	
8:00	8:15	0	0	3	0	6	5	0	1	0	85	
8:15	8:30	0	1	6	0	6	10	0	1	0	95	Peak
8:30	8:45	0	1	5	0	6	9	0	0	0	86	
8:45	9:00	0	2	8	1	6	8	0	0	0		
9:00	9:15	0	2	9	1	3	10	0	0	0		
9:15	9:30	0	3	2	0	3	7	0	0	0		
15:30	15:45	0	4	4	0	3	8	0	0	0	59	
15:45	16:00	0	2	3	0	5	11	0	1	0	59	
16:00	16:15	0	1	1	0	2	6	0	0	0	53	
16:15	16:30	0	0	2	0	2	4	0	0	0	69	
16:30	16:45	0	1	3	0	6	9	0	0	0	87	
16:45	17:00	0	1	2	0	7	6	0	0	0	100	
17:00	17:15	0	4	7	0	8	6	0	0	1	112	Peak
17:15	17:30	0	3	6	0	9	8	0	0	0	107	
17:30	17:45	0	3	7	1	12	9	0	0	0	98	
17:45	18:00	0	4	4	0	12	8	0	0	0		
18:00	18:15	0	2	6	0	7	6	0	0	0		
18:15	18:30	0	3	2	0	4	8	0	0	0		

Peak Time		East Approach Roscoe St			South Approach O'Brien St			West Approach Roscoe St			Peak
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	total
8:15	9:15	0	6	28	2	21	37	0	1	0	95
17:00	18:00	0	14	24	1	41	31	0	0	1	112

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.



Light Vehicles

Time		East Approach Roscoe St			South Approach O'Brien St			West Approach Roscoe St		
Period Start	Period End	U	WB	L	U	R	L	U	R	EB
6:30	6:45	0	0	0	0	5	4	0	0	0
6:45	7:00	0	0	2	1	7	1	0	0	1
7:00	7:15	0	0	0	1	1	7	0	0	0
7:15	7:30	0	2	2	0	5	5	0	0	0
7:30	7:45	0	2	11	0	5	7	0	0	0
7:45	8:00	0	2	6	0	3	9	0	0	0
8:00	8:15	0	0	3	0	6	4	0	1	0
8:15	8:30	0	1	6	0	6	10	0	1	0
8:30	8:45	0	1	5	0	6	9	0	0	0
8:45	9:00	0	2	8	0	6	8	0	0	0
9:00	9:15	0	2	9	1	3	10	0	0	0
9:15	9:30	0	2	2	0	1	7	0	0	0
15:30	15:45	0	4	4	0	3	8	0	0	0
15:45	16:00	0	2	3	0	5	11	0	1	0
16:00	16:15	0	1	1	0	2	6	0	0	0
16:15	16:30	0	0	2	0	2	4	0	0	0
16:30	16:45	0	1	3	0	6	9	0	0	0
16:45	17:00	0	1	2	0	7	6	0	0	0
17:00	17:15	0	4	6	0	7	6	0	0	1
17:15	17:30	0	3	6	0	9	8	0	0	0
17:30	17:45	0	3	7	1	12	9	0	0	0
17:45	18:00	0	4	4	0	12	8	0	0	0
18:00	18:15	0	2	6	0	7	6	0	0	0
18:15	18:30	0	3	2	0	4	8	0	0	0

Peak Time		East Approach Roscoe St			South Approach O'Brien St			West Approach Roscoe St			Peak
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	total
8:15	9:15	0	6	28	1	21	37	0	1	0	94
17:00	18:00	0	14	23	1	40	31	0	0	1	110

Heavy Vehicles

Time		East Approach Roscoe St			South Approach O'Brien St			West Approach Roscoe St		
Period Start	Period End	U	WB	L	U	R	L	U	R	EB
6:30	6:45	0	0	1	0	0	1	0	0	1
6:45	7:00	0	0	0	1	0	1	0	0	0
7:00	7:15	0	0	0	0	0	1	0	0	0
7:15	7:30	0	0	0	0	1	0	0	0	0
7:30	7:45	0	0	0	1	0	0	0	0	0
7:45	8:00	0	0	0	0	0	1	0	0	0
8:00	8:15	0	0	0	0	0	1	0	0	0
8:15	8:30	0	0	0	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	0	0	0	0
8:45	9:00	0	0	0	1	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	1	0	0	2	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	1	0	1	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0
18:00	18:15	0	0	0	0	0	0	0	0	0
18:15	18:30	0	0	0	0	0	0	0	0	0

Peak Time		East Approach Roscoe St			South Approach O'Brien St			West Approach Roscoe St			Peak
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	total
8:15	9:15	0	0	0	1	0	0	0	0	0	1
17:00	18:00	0	0	1	0	1	0	0	0	0	2

Cyclists

Time		East Approach Roscoe St			South Approach O'Brien St			West Approach Roscoe St		
Period Start	Period End	U	WB	L	U	R	L	U	R	EB
6:30	6:45	0	0	0	0	0	0	0	0	0
6:45	7:00	0	0	0	0	0	0	0	0	0
7:00	7:15	0	0	0	0	0	1	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	2
7:30	7:45	0	0	2	0	0	0	0	0	0
7:45	8:00	0	1	1	0	0	0	0	0	1
8:00	8:15	0	1	0	0	0	0	0	0	1
8:15	8:30	0	0	1	0	1	1	0	0	0
8:30	8:45	0	1	1	0	0	0	0	0	2
8:45	9:00	0	1	0	0	0	0	0	0	0
9:00	9:15	0	1	0	0	0	0	0	1	0
9:15	9:30	0	0	1	0	0	0	0	0	0
15:30	15:45	0	0	1	0	1	2	0	0	1
15:45	16:00	0	1	1	0	2	1	0	0	0
16:00	16:15	0	1	2	0	2	0	0	0	0
16:15	16:30	1	0	5	0	1	0	0	2	1
16:30	16:45	0	0	1	0	1	1	0	0	1
16:45	17:00	0	4	3	0	2	0	0	0	2
17:00	17:15	0	0	3	0	1	1	0	0	0
17:15	17:30	0	0	1	0	3	0	0	0	0
17:30	17:45	0	1	5	0	5	1	0	0	0
17:45	18:00	0	1	6	2	6	0	0	0	3
18:00	18:15	0	2	1	0	5	0	0	1	4
18:15	18:30	0	1	5	0	6	1	0	0	1

Pedestrians

Time		A					B					C					D					E					F					Hourly Total
Period Start	Period End	to B	to C	to D	to E	to F	to A	to C	to D	to E	to F	to A	to B	to D	to E	to F	to A	to B	to C	to E	to F	to A	to B	to C	to D	to F	to A	to B	to C	to D	to E	
6:30	6:45	0	0	7	0	0	0	4	0	0	0	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	64
6:45	7:00	0	1	5	0	0	0	4	0	0	0	3	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81
7:00	7:15	0	0	0	0	0	0	0	0	1	0	0	2	0	0	1	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	93
7:15	7:30	0	2	9	1	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	125
7:30	7:45	0	2	13	0	1	0	3	1	1	0	0	3	0	0	0	8	0	0	1	0	0	0	0	0	1	1	0	0	0	0	133
7:45	8:00	0	0	4	0	0	0	3	0	0	0	3	3	0	0	0	13	0	0	2	0	0	0	0	1	0	0	1	0	0	0	130
8:00	8:15	0	0	9	1	1	0	5	0	0	2	2	5	0	0	0	13	0	0	0	0	0	0	1	1	0	1	0	0	0	0	125
8:15	8:30	0	0	10	1	0	0	2	2	0	0	1	1	0	0	0	5	0	0	1	0	1	1	0	1	0	0	0	0	1	0	102
8:30	8:45	0	0	7	0	1	0	3	0	2	0	0	7	0	1	0	7	0	0	0	1	0	0	0	0	0	2	0	1	0	0	91
8:45	9:00	0	0	10	1	0	0	4	0	0	0	0	2	0	0	1	4	0	0	1	2	0	0	0	0	0	0	0	0	0	0	
9:00	9:15	0	1	7	0	0	0	1	0	0	0	1	1	0	0	0	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
9:15	9:30	0	0	7	0	0	0	2	0	0	0	0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15:30	15:45	0	1	7	0	0	0	2	0	0	0	2	3	0	0	0	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	117
15:45	16:00	0	2	13	1	0	0	3	1	0	1	0	8	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105
16:00	16:15	0	1	6	0	1	0	3	1	0	1	0	9	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	105
16:15	16:30	0	2	6	1	0	0	5	0	0	0	0	11	0	0	1	6	0	0	0	0	1	0	0	1	0	1	0	0	0	0	108
16:30	16:45	0	0	2	0	0	0	2	0	1	0	0	2	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	102
16:45	17:00	0	3	7	0	0	0	8	0	0	1	0	4	0	0	0	7	0	0	1	0	0	0	0	1	0	0	0	1	0	0	128
17:00	17:15	0	0	8	1	0	0	3	0	0	0	0	3	0	0	0	12	0	0	0	0	1	0	1	0	0	1	0	0	0	0	112
17:15	17:30	0	3	8	0	0	0	4	0	1	0	2	4	0	2	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	112
17:30	17:45	0	0	10	0	1	0	5	1	0	0	0	4	0	0	0	12	0	0	0	0	0	0	0	1	0	2	0	0	0	0	108
17:45	18:00	0	0	5	0	0	0	5	0	0	0	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18:00	18:15	0	0	11	1	0	0	5	0	0	0	1	3	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18:15	18:30	0	0	6	0	0	0	2	0	0	0	2	3	0	0	0	11	0	0	0	0	0	1	0	0	0	0	0	0	0	0	

Peak Time		A					B					C					D					E					F					Peak total
Period Start	Period End	to B	to C	to D	to E	to F	to A	to C	to D	to E	to F	to A	to B	to D	to E	to F	to A	to B	to C	to E	to F	to A	to B	to C	to D	to F	to A	to B	to C	to D	to E	
8:15	9:15	0	1	34	2	1	0	10	2	2	0	2	11	0	1	1	22	0	0	2	3	1	1	0	1	0	2	1	1	1	0	102
17:00	18:00	0	3	31	1	1	0	17	1	1	0	2	15	0	2	0	31	0	0	0	1	1	0	1	1	0	3	0	0	0	0	112



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Appendix C

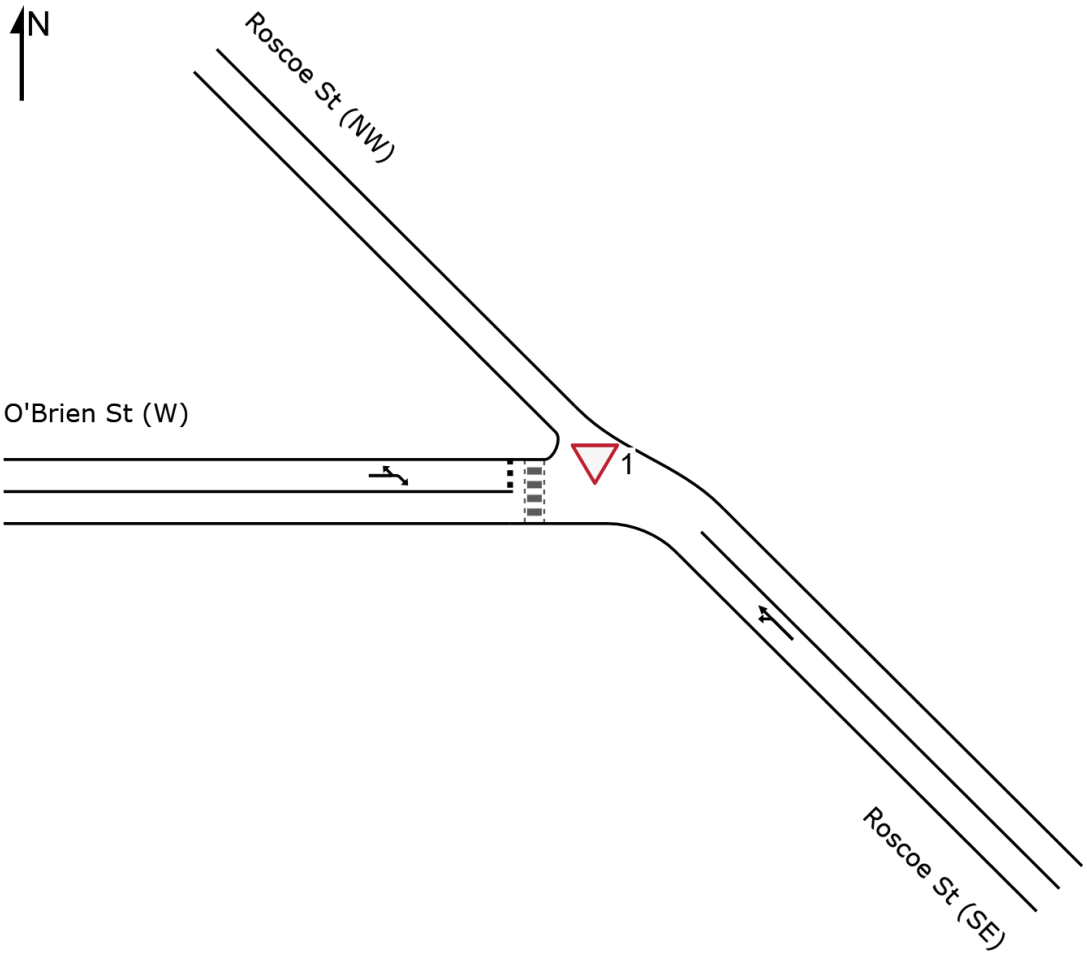
SIDRA Movements Summaries

SITE LAYOUT

Site: [1] Roscoe St & O'Brien St Existing AM (Folder1)

Roscoe St & O'Brien St, Bondi
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: [1] Roscoe St & O'Brien St Existing AM (Folder1)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

Roscoe St & O'Brien St, Bondi
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
SouthEast: Roscoe St (SE)															
21a	L1	All MCs	28	0.0	28	0.0	0.018	3.4	LOS A	0.0	0.0	0.00	0.40	0.00	34.8
22	T1	All MCs	6	0.0	6	0.0	0.018	0.0	LOS A	0.0	0.0	0.00	0.40	0.00	36.3
Approach			34	0.0	34	0.0	0.018	2.8	NA	0.0	0.0	0.00	0.40	0.00	35.1
West: O'Brien St (W)															
10b	L3	All MCs	37	0.0	37	0.0	0.038	4.1	LOS A	0.1	1.0	0.04	0.47	0.04	34.1
12a	R1	All MCs	21	0.0	21	0.0	0.038	3.0	LOS A	0.1	1.0	0.04	0.47	0.04	34.1
Approach			58	0.0	58	0.0	0.038	3.7	LOS A	0.1	1.0	0.04	0.47	0.04	34.1
All Vehicles			92	0.0	92	0.0	0.038	3.4	NA	0.1	1.0	0.02	0.44	0.02	34.4

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [1 (2)] Roscoe St & O'Brien St Existing PM (Folder1)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

Roscoe St & O'Brien St, Bondi
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
SouthEast: Roscoe St (SE)															
21a	L1	All MCs	24	0.0	24	0.0	0.020	3.4	LOS A	0.0	0.0	0.00	0.31	0.00	35.5
22	T1	All MCs	14	0.0	14	0.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	37.1
Approach			38	0.0	38	0.0	0.020	2.2	NA	0.0	0.0	0.00	0.31	0.00	36.1
West: O'Brien St (W)															
10b	L3	All MCs	31	0.0	31	0.0	0.048	4.1	LOS A	0.2	1.2	0.06	0.45	0.06	34.2
12a	R1	All MCs	41	0.0	41	0.0	0.048	3.1	LOS A	0.2	1.2	0.06	0.45	0.06	34.2
Approach			72	0.0	72	0.0	0.048	3.5	LOS A	0.2	1.2	0.06	0.45	0.06	34.2
All Vehicles			110	0.0	110	0.0	0.048	3.0	NA	0.2	1.2	0.04	0.40	0.04	34.8

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [1] Roscoe St & O'Brien St Proposed AM (Folder1)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

Roscoe St & O'Brien St, Bondi
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
SouthEast: Roscoe St (SE)															
21a	L1	All MCs	43	0.0	43	0.0	0.029	3.4	LOS A	0.0	0.0	0.00	0.37	0.00	35.0
22	T1	All MCs	13	0.0	13	0.0	0.029	0.0	LOS A	0.0	0.0	0.00	0.37	0.00	36.6
Approach			56	0.0	56	0.0	0.029	2.6	NA	0.0	0.0	0.00	0.37	0.00	35.4
West: O'Brien St (W)															
10b	L3	All MCs	37	0.0	37	0.0	0.046	4.1	LOS A	0.2	1.2	0.06	0.46	0.06	34.1
12a	R1	All MCs	32	0.0	32	0.0	0.046	3.1	LOS A	0.2	1.2	0.06	0.46	0.06	34.1
Approach			69	0.0	69	0.0	0.046	3.6	LOS A	0.2	1.2	0.06	0.46	0.06	34.1
All Vehicles			125	0.0	125	0.0	0.046	3.2	NA	0.2	1.2	0.04	0.42	0.04	34.6

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: [1 (2)] Roscoe St & O'Brien St Proposed PM (Folder1)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

Roscoe St & O'Brien St, Bondi
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
SouthEast: Roscoe St (SE)															
21a	L1	All MCs	31	0.0	31	0.0	0.016	3.4	LOS A	0.0	0.0	0.00	0.48	0.00	34.2
22	T1	All MCs	17	0.0	17	0.0	0.009	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach			48	0.0	48	0.0	0.016	2.2	NA	0.0	0.0	0.00	0.31	0.00	36.0
West: O'Brien St (W)															
10b	L3	All MCs	31	0.0	31	0.0	0.063	4.1	LOS A	0.2	1.6	0.08	0.44	0.08	34.5
12a	R1	All MCs	62	0.0	62	0.0	0.063	2.8	LOS A	0.2	1.6	0.08	0.44	0.08	34.5
Approach			93	0.0	93	0.0	0.063	3.3	LOS A	0.2	1.6	0.08	0.44	0.08	34.5
All Vehicles			141	0.0	141	0.0	0.063	2.9	NA	0.2	1.6	0.05	0.39	0.05	35.0

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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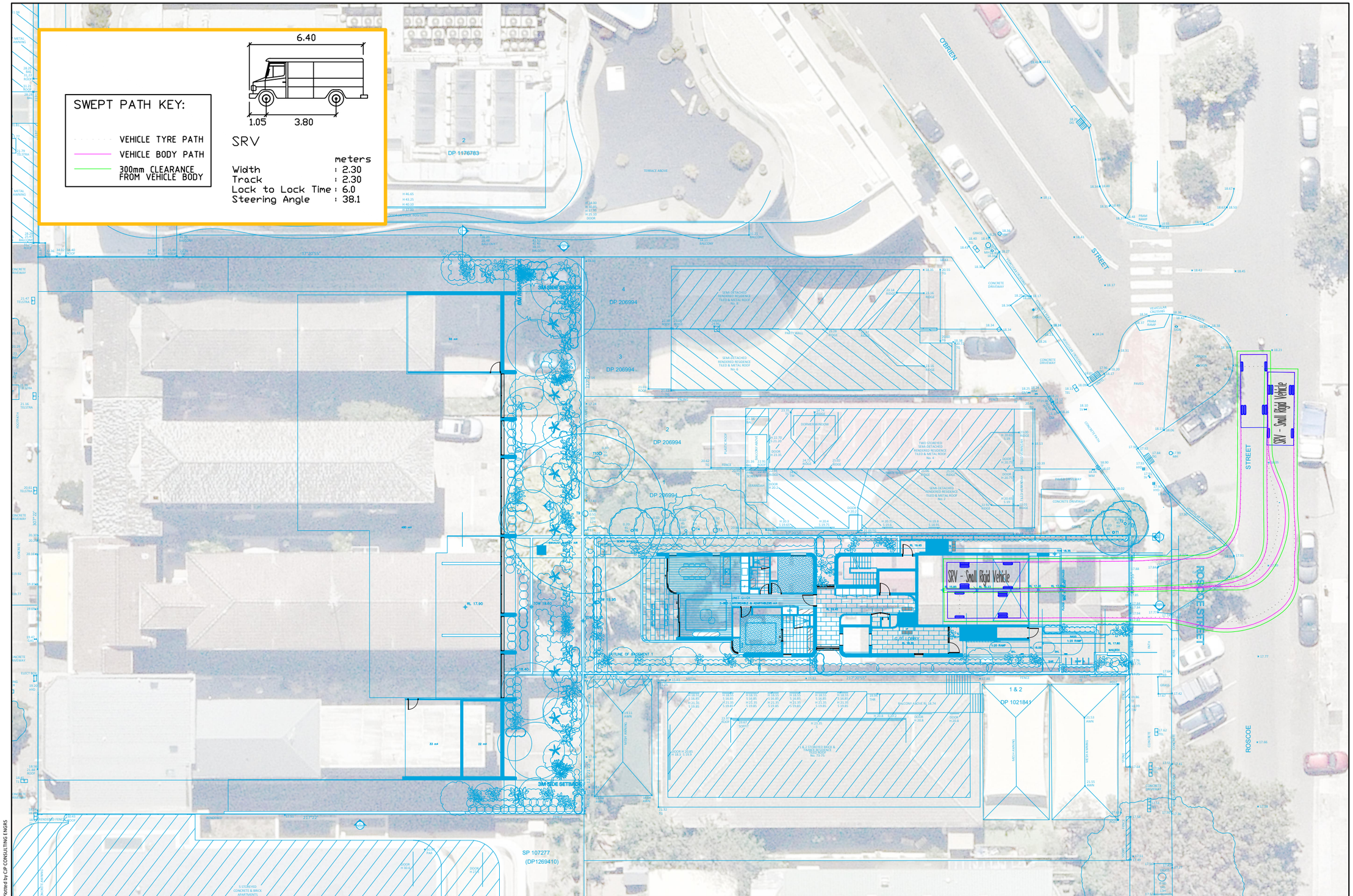
Appendix D

Swept Turn Paths



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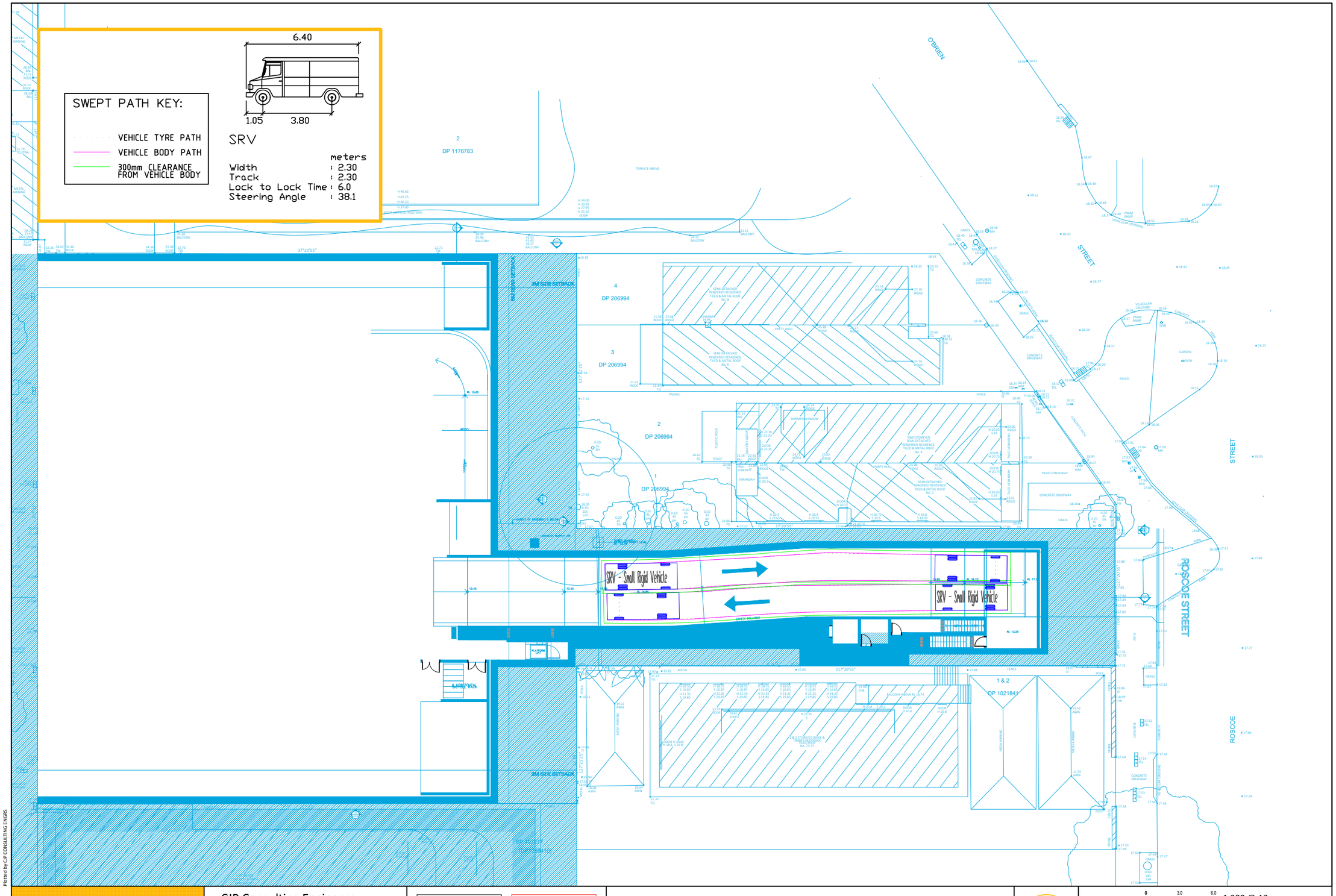
—



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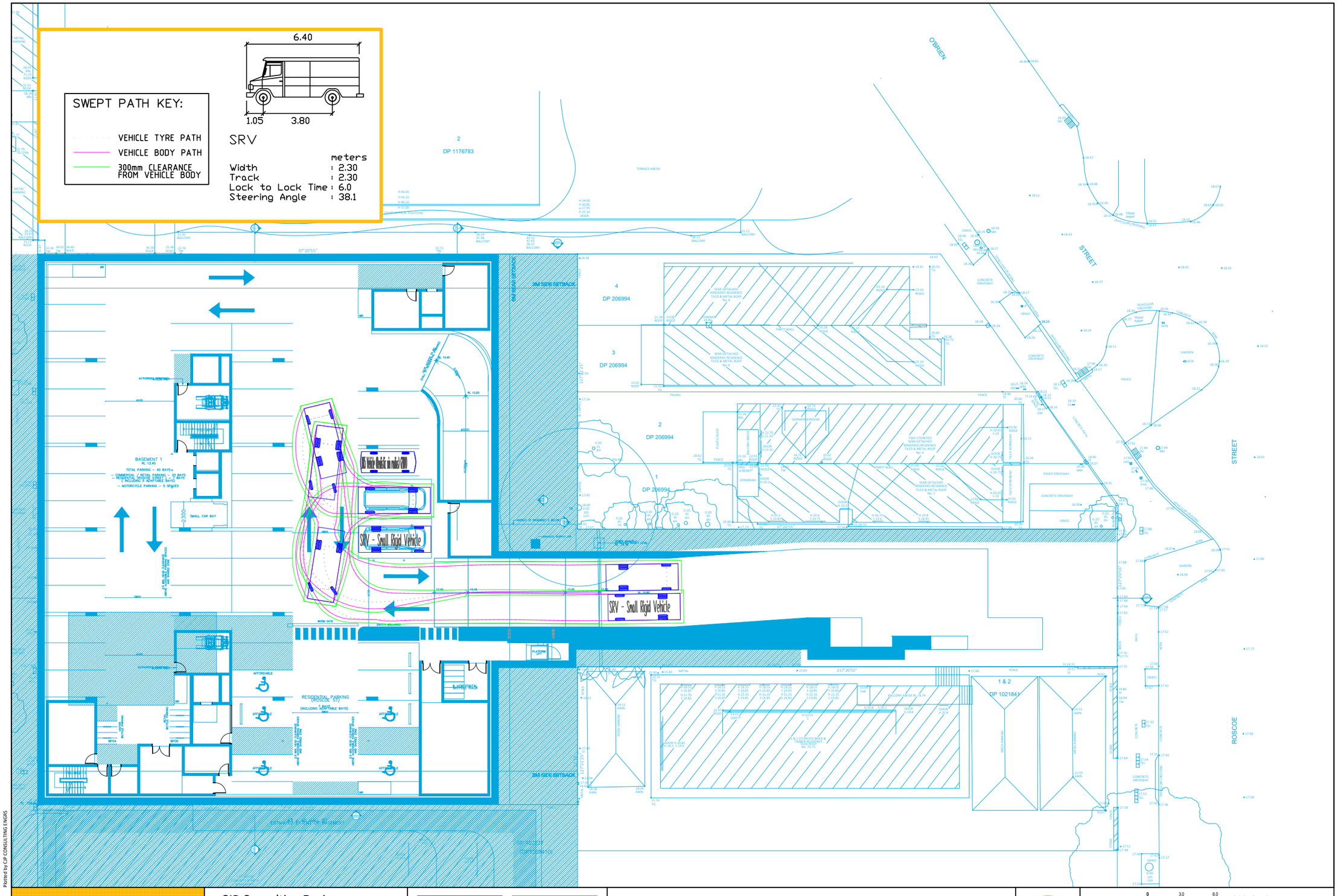
THE EXACT LOCATIONS SHALL BE PROVEN ON SITE.
ALL EXISTING SERVICES SHOWN ARE NOT GUARANTEED.

49-59 HALL STREET & 69-71 ROSCOE STREET, BONDI BEACH
SWEPT TURN PATH ASSESSMENT - GROUND - BASEMENT 1 RAMP
SRV ENTRY AND EXIT PATHS

SCALE 0 3.0 6.0 1:300 @ A3

DRAWING NO. 25025-D01-V2 | SHEET NO. 02 OF 07
ISSUE DATE 19 June 2025 | DRAWN BY D. ALOC | REVIEWED BY C. PALMER



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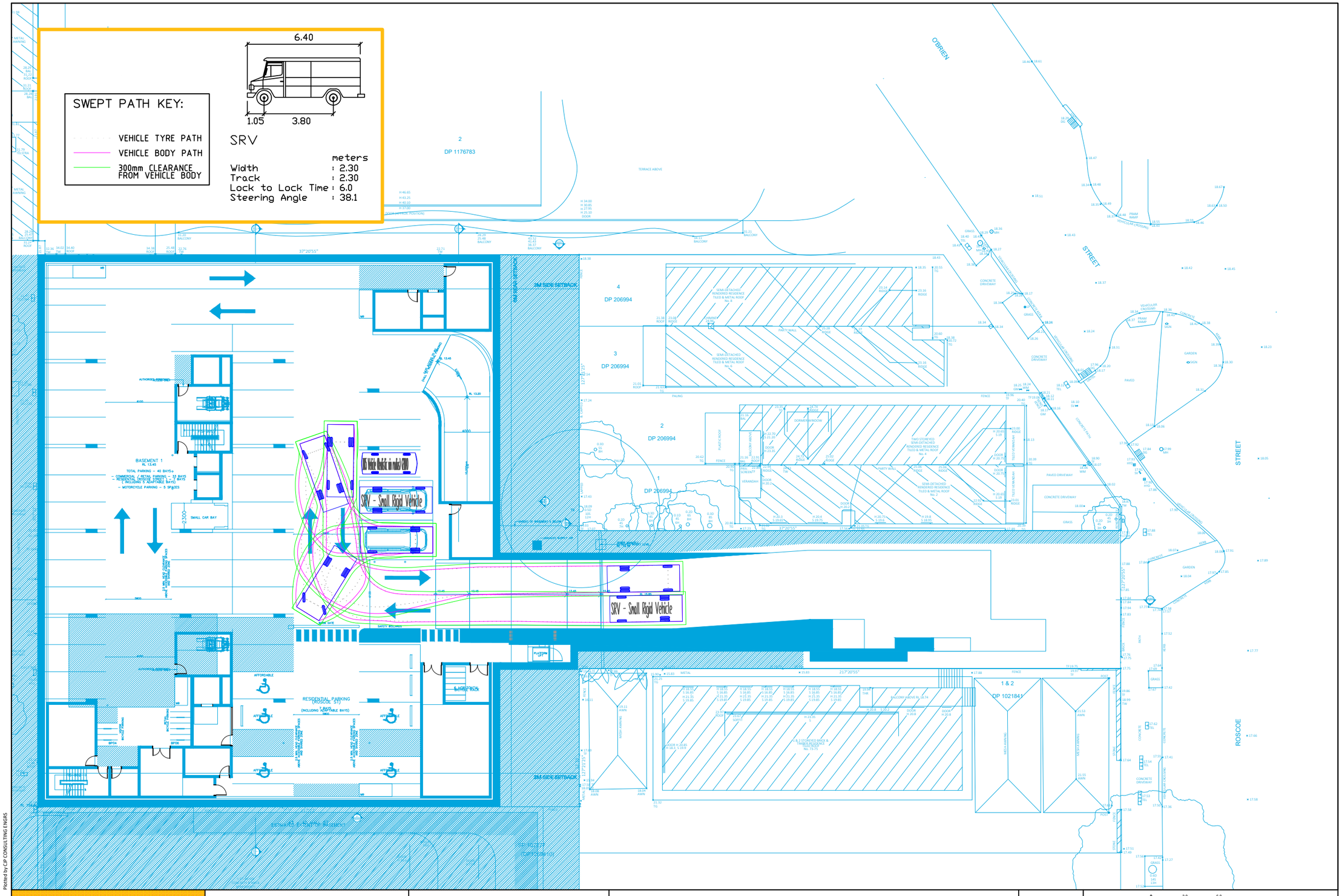
PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

WARNING
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY.
THE EXACT LOCATIONS SHALL BE PROVEN ON SITE.
ALL EXISTING SERVICES SHOWN ARE NOT GUARANTEED.

49-59 HALL STREET & 69-71 ROSCOE STREET, BONDI BEACH
SWEPT TURN PATH ASSESSMENT - BASEMENT 1 (LOADING BAY 1)
SRV ENTRY AND EXIT PATHS

SCALE 0 3.0 6.0 1:300 @ A3

DRAWING NO. 25025-D01-V2 | SHEET NO. 03 OF 07
ISSUE DATE 19 June 2025 | DRAWN BY D. ALOC | REVIEWED BY C. PALMER



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49-59 HALL STREET & 69-71 ROSCOE STREET, BONDI BEACH
SWEPT TURN PATH ASSESSMENT - BASEMENT 1 (LOADING BAY 2)
SRV ENTRY AND EXIT PATHS

SCALE 0 3.0 6.0 1:300 @ A3

DRAWING NO. 25025-D01-V2 | SHEET NO. 04 OF 07
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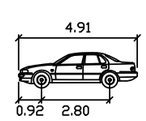
SWEPT PATH KEY:

- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY



B85

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Track	: 1.77
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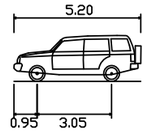
Steering Angle	: 34.1



B99

	meters
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Track	: 1.84
Lock to Lock Time	6.0
Steering Angle	: 33.9

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49-59 HALL STREET & 69-71 ROSCOE STREET, BONDI BEACH
SWEPT TURN PATH ASSESSMENT - GROUND
B99 ENTRY PATH AND B85 EXIT PATH

SCALE 0 3.0 6.0 1:300 @ A3

DRAWING NO. 25025-D01-V2 | SHEET NO. 05 OF 07

ISSUE DATE 19 June 2025 | DRAWN BY D. ALOC | REVIEWED BY C. PALMER

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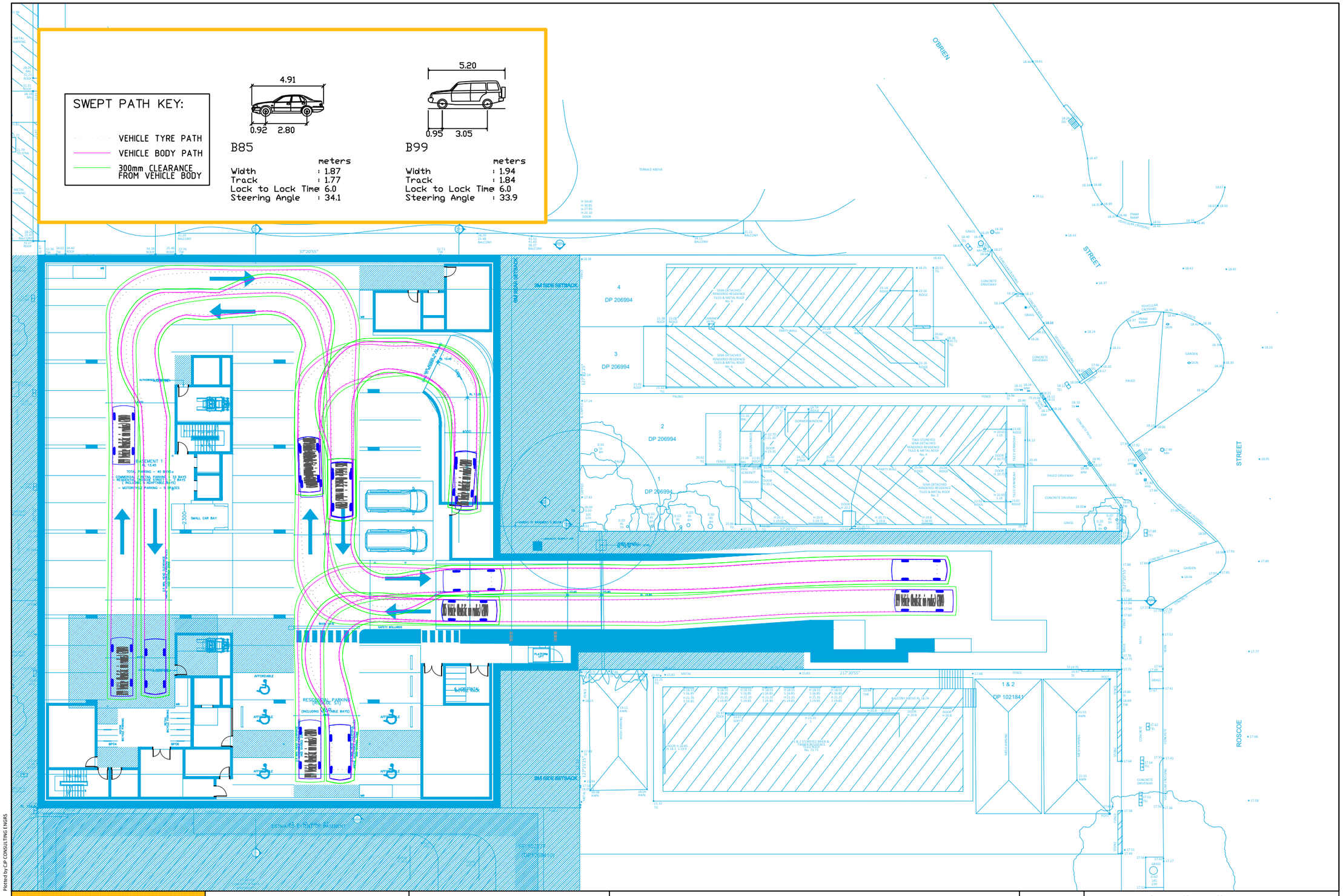

CJP CONSULTING ENGINEERS	CJP Consulting Engineers PO Box 1184 Hunters Hill NSW 2110 M: 0415 256 233 E: info@cjpconsultingengineers.com.au	PRELIMINARY PLAN FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION	WARNING THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY THE EXACT LOCATIONS SHALL BE PROVEN ON SITE ALL EXISTING SERVICES SHOWN ARE NOT GUARANTEED	49-59 HALL STREET & 69-71 ROSCOE STREET, BONDI BEACH SWEPT TURN PATH ASSESSMENT - BASEMENT 1 B85 AND B99 CIRCULATION PATHS

SCALE 0 3.0 6.0 1:300 @ A3

DRAWING NO. 25025-D01-V2	SHEET NO. 06 OF 07
ISSUE DATE 19 June 2025	DRAWN BY D. ALOC REVIEWED BY C. PALMER

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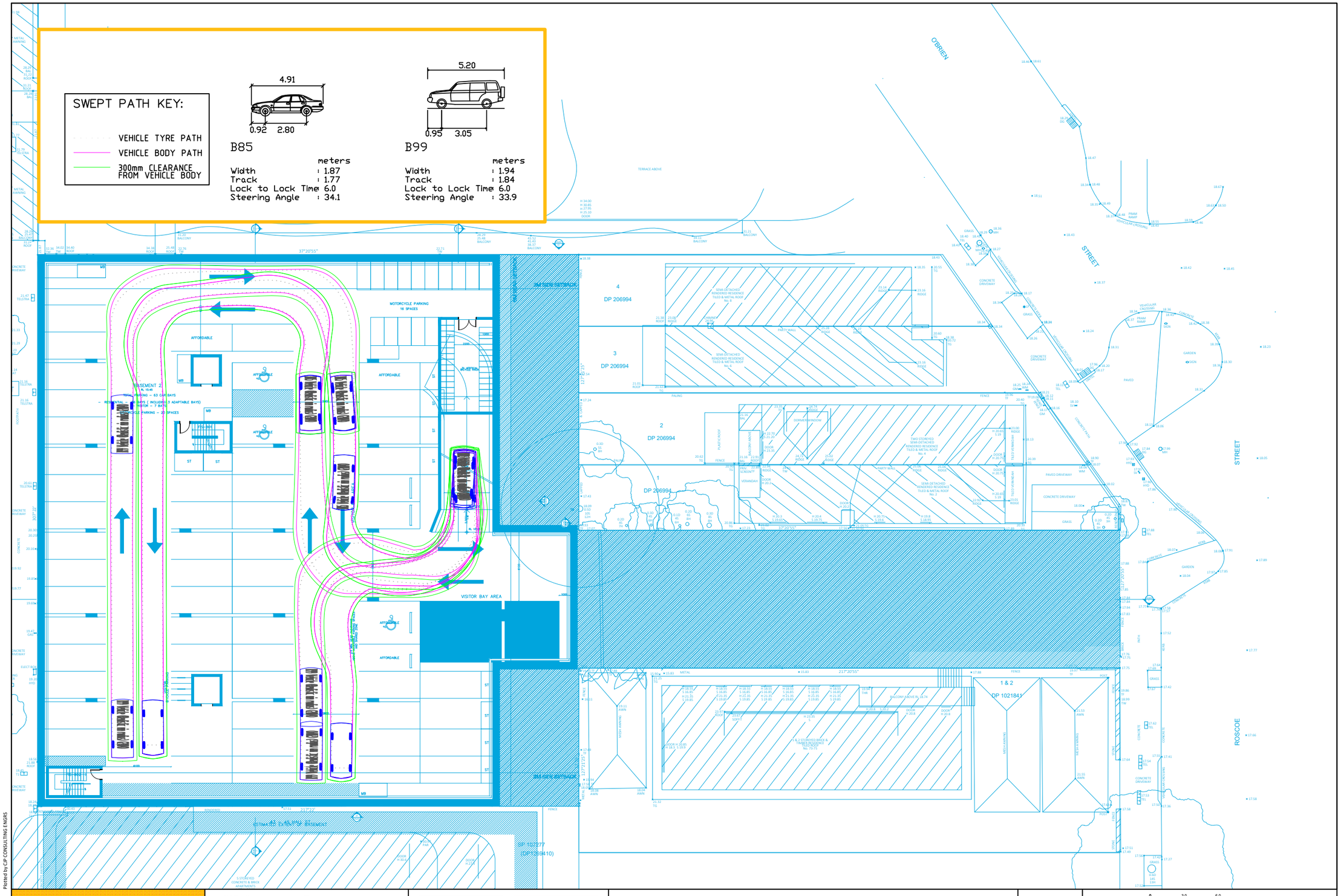

Plotted by CJP CONSULTING ENGRS

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SWEPT TURN PATH ASSESSMENT - BASEMENT 2
B85 AND B99 CIRCULATION PATHS

SCALE 0 3.0 6.0 1:300 @ A3

DRAWING NO. 25025-D01-V2 SHEET NO. 07 OF 07

ISSUE DATE 19 June 2025 DRAWN BY D. ALOC

REVIEWED BY C. PALMER

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Erin Baskin
Assistant Development Manager
HSN Property Group
P.O . Box 2038
Rose Bay North NSW 2030

30 May 2025

Dear Erin,

Subject: Hall Street and Roscoe Street, Bondi – Economic impact assessment

HillPDA was commissioned by Hall Street by HSN Pty Ltd, Hall Street Property A Pty Ltd, and Hall Street Property B Pty Ltd to undertake an economic impact assessment of a mixed-use development (the Proposal) across two sites located at 49-59 Hall Street and 69 & 71 Roscoe Street (Subject Site).

The Proposal will enable access to the basement car park on the Hall Street Site through the Roscoe Street site, which is currently not permissible and is subject to a planning proposal. There will be some economic benefits from this arrangement.

It is understood that the Proposal would provide 37 residential apartments, of which 11 are affordable dwellings, and seven retail premises over two separate buildings. Shop-top housing would be provided at 49-59 Hall Street, comprising 31 residential apartments and seven retail premises. This site is zoned E1 – Local Centre, forming part of Bondi Village. The second development (69 & 71 Roscoe Street) is a six-unit residential flat building.

The purpose of this assessment is to:

1. Understand the strategic context of Bondi Village Centre
2. Understand the supply and demand for retail space within Bondi Village.
3. Understand the need for increased residential supply within the Waverley local government area, with a focus on increased apartment-style dwellings, and implications for Bondi Village
4. Estimate the economic activity of the proposal during its construction and operational phases.
5. Understand the economic benefits of the Proposal.

1. Key outcomes

The following provides a concise summary of our key findings from this assessment:

Bondi Village

Bondi Beach Village Centre provides a range of commercial and retail premises catering to locals and tourists. The presence of anchor tenants, such as Metro Woolworths, Harris Farm, and IGA Supermarket, coupled with 75% of shops occupied by retail uses, indicates a strong local economy and reinforces its role as a central top-up shopping and dining destination for the Bondi Beach and North Bondi communities. The Proposal would increase retail space in the centre to serve its residents and visitors.

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Retail demand

As of 2024, Bondi Village Centre provides around an estimated 33,500sqm GFA of retail space. By 2041, demand for retail space will increase to between 36,190sqm and 39,825sqm, representing a net increase of 2,690sqm to 6,325sqm.

The Proposal would provide around 1,225sqm of retail space. With around 300sqm currently estimated to be provided onsite, the Proposal would increase the amount of retail space in the centre by 925sqm. As such, the proposal would meet some of the centres' retail needs over the coming decades (14 to 34 per cent) without creating an oversupply or adversely affecting retail viability within or surrounding the centre.

Demand for increased residential supply

By 2029, it is estimated that Waverley will only meet 47 per cent to 79 per cent of its housing projections/targets, resulting in a shortfall of between 510 and 1,280 dwellings. The Proposal would increase dwelling supply, contributing to Waverley meeting its projections and targets.

From reviewing median dwelling prices within Waverley, it can be concluded that:

1. Strata dwellings provide a comparatively more affordable option for residents living in Waverley
2. Increased dwelling supply is required to place downward pressure on dwelling sale prices, increasing affordability.

The Proposal, consisting of 37 apartments, would bolster the supply of comparatively more affordable housing options in the LGA. This additional housing supply will also help lower prices, which are significantly higher in Waverley compared to those in Greater Sydney.

In addition, the 11 affordable dwellings offer a wide range of economic and social benefits. These include enabling lower-income occupations and households, such as key workers, to live and work in Waverly.

Economic impact

The proposed $85 million construction and ongoing operation of the Proposal would provide economic benefits to the local and state economy, summarised as:

- 702 job years during construction (173 job years onsite and a further 529 job years across the State economy),
- 64 FTE ongoing jobs during operation (37 FTE jobs onsite and 27 FTE additional jobs across the State economy),
- Contribute $7 million in Gross Value Add to the Gross State Product ($2 million to Waverley's Gross Value Add and a further $5 million in Gross Value Add across the State economy),
- Residents on site would generate an annual household retail spend of around $1.8 million,
- Providing a catalyst for further investment in the locality,
- Providing jobs closer to home and contributing to Wavely and New South Wales employment targets, and
- Provide a higher level of street activation, increasing security, trade for retailers and investment within the local area.

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2. Bondi Village Centre

Bondi Beach Village Centre provides a range of commercial and retail premises catering to locals and tourists. The presence of anchor tenants like a Metro Woolworths, Harris Farm and IGA Supermarket, coupled with 75% of shops occupied by retail uses, indicates a strong local economy and enforces its role as a central top-up shopping and dining destination for Bondi Beach and North Bondi communities.

Waverley Council's 'Our Liveable Places' strategy outlines a future for Hall Street as an iconic destination that is lively, green, and sustainable, catering to both locals and international visitors. The aim is to foster a community feel that is creative and diverse, enhancing the street's appeal as a central hub in Bondi Beach. Part of this vision is for shop-top housing that ensures an adequate supply of commercial services while creating an active, vibrant and viable centre through its resident population.

The proposal aligns with the Village's strategic context and draft centres strategy.

Figure 1: Artist's impression of future potential on Hall Street facing Campbell Parade



Source: Draft Waverley Village Centres Strategy

3. Retail supply and demand

The current supply of retail space within Bondi Village Centre has been estimated through:

- Analysis of ABS 2021 journey to work data at the ANZSIC 1-, 2- and 4-digit level and TfNSW employment projections to understand jobs within retail and food and beverage sub-industries.
- Convert jobs to floorspace provision by applying workspace ratios sourced from the City of Sydney 2022 Floorspace Survey, NSW Common Planning Assumptions 2023 and various consultancy reports.
- Apply a vacancy rate of 5% (Draft Waverley Village Centres Strategy).

Using this method, it is estimated that Bondi Village Centre provides around 33,500sqm GFA of retail space, resulting in a provision rate of 1.48sqm per capita for the community of Bondi Beach and North Bondi suburbs (referred to as Bondi Village primary catchment).

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It is estimated that the population of Bondi Village's primary catchment generates demand for around 48,000sqm of supermarket and specialty store space[1]. Around 30 per cent of demand is typically provided within a catchment's local centre network. Applying this proportion to Bondi Village primary catchment's main local centre (Bondi Village), it is estimated that around 13,900 sqm or 42 per cent of Bondi Village space is generated by residents, resulting in a per capita provision rate of 0.62 sqm. The remaining 19,580sqm or 58 per cent of retail space is likely generated by tourists and visitors to the centre.

The population of Bondi Village primary catchment is projected to reach 23,915 to 25,650 persons[2], representing an increase of between 1,285 and 3,020 persons. These new residents would increase the demand for retail space within Bondi Village by between 790sqm and 1,856sqm.

Accounting for demand from visitors and tourists, overall demand for new space increases to between 2,700sqm and 6,325sqm.

Table 1: Bondi Village Centre supply and demand 2024-2041 (sqm)

Category	Scenario	Demand segment		Total
		Resident	Tourist/visitor	
Supply 2024		13,919	19,581	33,500
Demand	Medium growth	14,708	21,480	36,188
	High growth	15,775	24,049	39,824
Net change	medium growth	789	1,899	2,688
	High growth	1,856	4,467	6,324

The Proposal would provide around 1,225sqm of retail space. With around 300sqm currently estimated to be provided onsite, the Proposal would increase the amount of retail space in the centre 925sqm. As such, the proposal would meet some of the centres' retail needs over the coming decades (14 to 34 per cent) without creating an oversupply or adversely affecting retail viability within or surrounding the centre.

4. Demand for increased residential supply

The following assesses the need for increased dwelling supply within Waverly LGA to meet its dwelling projections/targets and increase affordability. The section also assesses development trends within the LGA, focusing on the preference towards the development of multi-unit developments and their location.

Attainment of dwelling needs /targets

There are two dwelling projections for the Waverley local government area:

1. NSW Department of Planning, Housing and Infrastructure (NSW DPHI) 2024 population and dwelling projections. This dataset projects population and dwelling needs over 20 years, from 2021 to 2041.

   It is estimated that Wavely LGA would require an additional 5,399 dwellings over the period, representing an annual increase of 270 dwellings.

2. NSW DPHI's recent five-year dwelling targets. These five-year targets respond to the NSW Government's commitment under the National Housing Accord to deliver 377,000 well-located new homes across the state by 2029.

   The target for Waverley LGA is an additional 2,400 new dwellings by 2029. This equates to an annual target of around 480 new dwellings.

[1] Deep end services, Retail demand and supply report commissioned by the Greater Sydney Commission. The report estimated that Wavely LGA had a supermarket and specialty retail provision rate of 2.05sqm per person in 2015.

[2] Source: NSW Department of Planning, Housing and Infrastructure 2024 population projections at SA2 Level – medium and high growth scenarios

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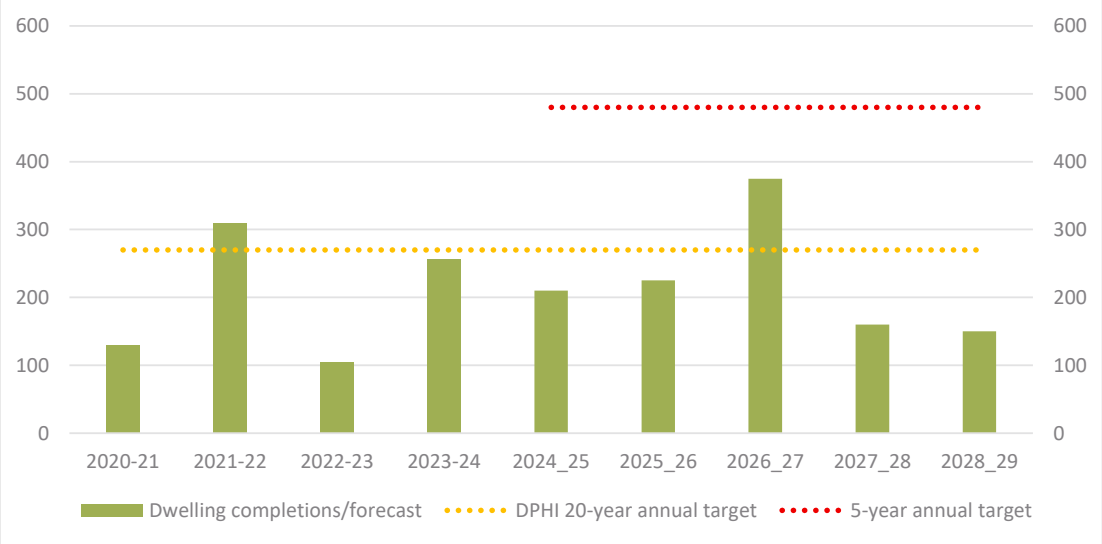
HillPDA analysed the NSW DPHI net dwelling completions and forecast data. This indicates that over the nine financial years between 2020-21 and 2028-29, around 800 additional new dwellings were completed. In addition to these completed dwellings, around 1,120 are forecasted, equating to a total supply of around 1,920 dwellings.

This implies that by 2029, Waverley will only meet 47 per cent to 79 per cent of its housing projections/targets, resulting in a shortfall of between 510 and 1,280 dwellings.

The Proposal would increase the number of dwellings in Waverley LGA, contributing to addressing its projected shortfall.

Figure 2: Waverley LGA dwelling supply versus needs 2021-2029



Source: NSW Department of Planning, Housing and Infrastructure, Urban Development Program - accessed 26th of May 2025

Dwelling end sale prices

The former *A Plan for Growing Sydney* acknowledged that Sydney's housing prices are high compared to other Australian capital cities. The plan highlights that governments can "*help to put downward pressure on prices (by) accelerating the supply and the variety of housing across Sydney, such as apartments and townhouses, will make it easier for people to find homes to suit their lifestyle and budget".*

Delivering houses in greenfield and urban renewal locations will help people to live closer to family and friends, to workplaces and schools, and to the services they use on a daily or weekly basis".

In the 2024 September quarter, the median total dwelling sale price across Waverley was $1.25 million. This was around $267,000 higher than the median sale price recorded across Greater Sydney ($980 million).

Compared to Greater Sydney, the median price for non-strata dwellings was $2.22 million or 175% higher across Waverley, and the median for strata dwellings was $275,000 or 35% higher.

While within Waverley, the median sale price for strata dwellings reached around $1.07 million in the 2023 September quarter. This was $2.42 million or 69% lower than the median non-strata dwelling price ($3.49 million), implying that strata dwellings, such as those proposed in the Proposal, provide a comparably more affordable option.

From this analysis, it can be concluded that:

1. Strata dwellings provide a comparatively more affordable option for residents living in Waverley
2. Increased dwelling supply is required to place downward pressure on dwelling sale prices, increasing affordability.

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The Proposal, consisting of 37 apartments, would bolster the supply of comparatively more affordable housing options in the LGA. This added housing supply will also help lower prices, which are significantly higher in Waverley than Greater Sydney.

Preference towards apartment-style dwellings

Analysis of dwelling completions data between 1998-99 and 2023-24 shows 5,360 net dwellings were completed across Waverley. Of these, the majority (5,150 or 96%) were for multi-storey developments.

Table 2: Net dwelling completed across Waverley by broad typology (FY 1998-99 and 2023-2024)

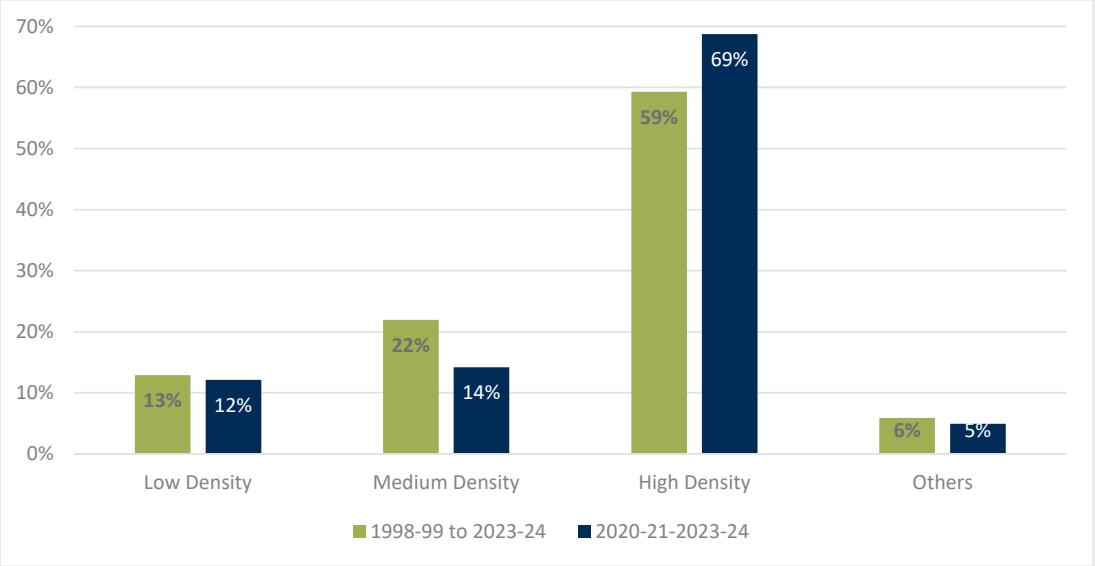
Detached	Multi Unit	Total
214	5,147	5,361
4%	96%	100%

Source: NSW Department of Planning, Housing and Infrastructure, Urban Development Program - accessed 26th of May 2025

Analysis of dwelling approvals by broad density type shows a preference towards higher density development. This is reflected in 59% of approved dwellings between 1998-99 and 2023-24 being higher-density developments.

This proportion increased to 69% for dwellings approved between 2020-21 and 2023-24, indicating a growing preference for higher-density developments.

Figure 3: Proportion of dwelling approvals by density type (FY 1998-99 to 2023-24)



Source: NSW Department of Planning, Housing and Infrastructure, Urban Development Program - accessed 26th of May 2025

Figure 4 visually shows the location of multi-unit development by size across Wavely LGA between 2020-21 and 2023-24. The figure also shows the location of multi-unit development currently under construction, with development approval or an application.

It is concluded that recent development has been largely concentrated within the existing centre network, with a particular focus on Bondi Junction. This trend, towards in-centre development, is set to continue with a growing preference for mid-sized development within Bondi Village.

Overall, the Proposal is in accordance with the development trends occurring in Waverley.

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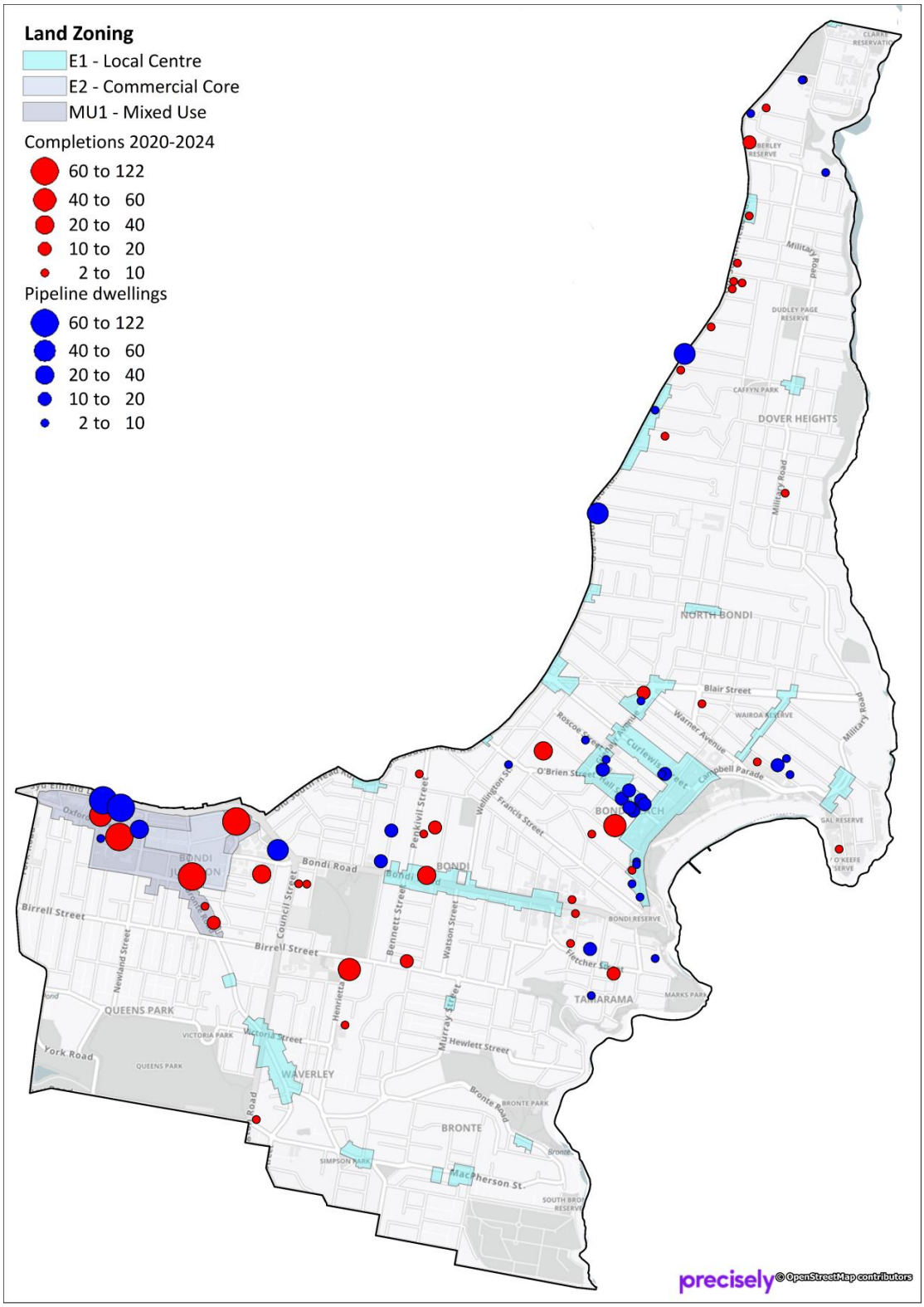
Figure 4: Multi-unit development and pipeline supply by location



Source: HillPDA, NSW DPHI Urban Development Programme and CordellsConnect

5. Economic impacts

The following section estimates the economic activity the proposal would generate on-site and supported across NSW.

Direct economic impacts are those generated by the uses onsite. These metrics have been estimated using various sources, including IBIS World 2023 world reports, ABS Input-Output tables and workspace ratios sourced from the NSW Common Planning Assumptions.

Indirect impacts are those supported across NSW by the land uses onsite. These metrics have been estimated using Australian National Accounts Input Output tables 2021-2022.

Economic activity is assessed by examining three different economic impact metrics (or performance indicators) described in the table below.

Table 3: Economic impact metrics assessed

Metric	Description
Output	Output is a gross measure of the total sales generated by the types of land uses present on the Site or in the Project
Employment	Employment generated and supported by the types of land uses present on the Site or in the Project. Employment is expressed as Full-Time Equivalent (FTE).
Wages	The wages and salaries paid to employees on the Site or in the Project
Gross Value Added	Gross value added (GVA) of an industry refers to the value of outputs less the costs of inputs. It measures the contribution that the industry makes to the country's wealth or gross domestic product (GDP).

Design and construction phase - economic impact

Based on a provided construction cost of $85 million, coupled with ABS Input Output tables and IBIS world reports, the following assesses the economic activity that the Proposal would generate and support during its design and construction phase:

- **Employment:** 173 job years are generated on the site. These job years would support a further 529 job years across NSW. In total, the State's impact as a whole is estimated at approximately 702 job years.
- **Output:** The State's impact as a whole is estimated at $269 million in direct and indirect output.
- **Wages:** A total of $14 million in wages directly generated by construction activities onsite. Construction activities would support a further $42 million across NSW. In total, the State's impact as a whole is estimated at $56 million.
- **GVA:** Construction activities onsite are estimated to directly contribute $24 million in GVA to the region's GRP. Construction activities on site would support a further $84 million across NSW. In total, the State's impact as a whole is estimated at $109 million.

Operational phase - economic impact

The proposal would provide around 1,224 sqm GFA of retail space. It is estimated that this could generate 37 full-time equivalent (FTE) jobs. This is based on:

- Sixty per cent is occupied by food and drink uses and 40 per cent by other retail uses
- A workspace ratio of 1 job per 20sqm for food and drink uses and 1 job per 30sqm for general retail, and
- A FTE to total job (full and part time employment) ratio of 0.68 for food and drink uses and 0.75 for general retail.

Based on 37 FTE jobs generated on site, coupled with ABS Input Output tables and IBIS world reports, the following assesses the economic activity that the Proposal would generate and support during its operational phase:

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- **Employment:** 37 Full-time equivalent (FTE) jobs are generated on the site. These direct jobs would support a further 27 FTE jobs across NSW. In total, the State's impact as a whole is estimated at approximately 64 FTE jobs.
- **Output:** A total of $5 million in output directly generated by the proposed uses onsite. The land uses on site would support a further $9 million across NSW. In total, the State's impact as a whole is estimated at $14 million.
- **Wages:** A total of $2 million in wages directly generated by the proposed uses onsite. The land uses on site would support a further $2 million across NSW. In total, the State's impact as a whole is estimated at $4 million.
- **GVA:** The proposed uses onsite are estimated to directly contribute $2 million in GVA to the region's GRP. The land uses on site would support a further $5 million across NSW. In total, the State's impact as a whole is estimated at $7 million.
- **Resident retail expenditure and floorspace:** an estimated resident population of around 70 persons onsite. This population could generate a total annual household retail spend of $1.8 million (as of 2028) and around 155sqm in retail floorspace demand.

6. Other economic benefits

Investment stimulus: Where a significant property investment decision has been made, it is generally viewed as a strong positive commitment for the local area. Such an investment can, in turn, stimulate and attract further investment. Development of the proposal would support a wide range of economic multipliers which would, in turn, support investment in associated industries. It would also raise the profile of Waverley LGA and Bondi Village centre to potential investors.

The Proposal would create additional business opportunities associated with the employment floorspace provided on-site in this locality. It would increase the profile of this area and, in so doing, increase the financial feasibility of commercial developments, potentially acting as a catalyst for sites within the locality.

Employment targets: Transport for NSW forecasts Waverley will need to provide just over 2,565 jobs between 2024 and 2041. The Proposal, with its employment-generating and supporting potential, would contribute to attaining these targets.

Jobs closer to home: There are many benefits associated with providing jobs closer to home, most notably a reduced need to travel and the flow-on benefits associated with reduced pressure on infrastructure.

Reducing the number and length of journeys made, particularly those made in private vehicles, has environmental benefits. There are also lifestyle benefits associated with increased free time, reduced travel-related stress, and a lower likelihood of road-related accidents.

The Proposal can potentially generate a total of 37 FTE jobs onsite. This increases employment opportunities for local residents to live and work in Waverley. Providing jobs closer to home meets the GSC 30-minute city direction, where residents live within 30 minutes of their jobs, education and health facilities, services and great places.

Population and dwelling targets: NSW DPHI project that the Shire will be home to an additional 7,490 people between 2021 and 2041, requiring around 5,400 new dwellings. The Proposal provides increased opportunity for Waverley to attain its project growth and dwelling needs.

Street activation: A mixed-use development comprising retail and residential uses would generate pedestrian activity in local streets and the centre. Increased street activation would increase security, trade for retailers and investment within the local area.

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7. Benefits of the Proposal

We understand that the Proposal will enable access to the basement car park on the Hall Street Site through the Roscoe Street site, which currently is not permissible. There will be some economic benefits from this arrangement.

Firstly, the Proposal removes the need for driveways on Hall Street. If access to the basement car parking is from Hall Street, this would reduce the area of ground floor retail space as proposed. It would appear (based on the current design) that the loss would be at least 70sqm. This would break the continuity of active retail uses along Hall Street and create a pedestrian-vehicular conflict zone.

Secondly, the Proposal shows 837sqm of retail space in the lower ground level. If the ramping is two lanes wide through this level, it would result in a loss of approximately 150sqm of retail space (subject to design). Total loss of retail space will be 220sqm minimum.

The loss of these spaces would result in an opportunity cost of 9.2 full-time equivalent jobs in retail operations on site.

Ramping down to the basement level may result in the loss of some car spaces on Basement Level 1, although the actual number would be subject to design. If car spaces are lost, then this may reduce the feasibility of development, given that there is sale value in those spaces without any savings in construction costs.

Finally, the ramp down from Hall Street would need to be at least 21 metres in length, which exceeds the length of the retail spaces fronting Hall Street. Hence, there is likely to be some loss of residential space on the ground floor, further resulting in a loss of end-sale value and development feasibility.

Yours sincerely,

Signed by



.....

Nicholas Hill

Acting Managing Principal

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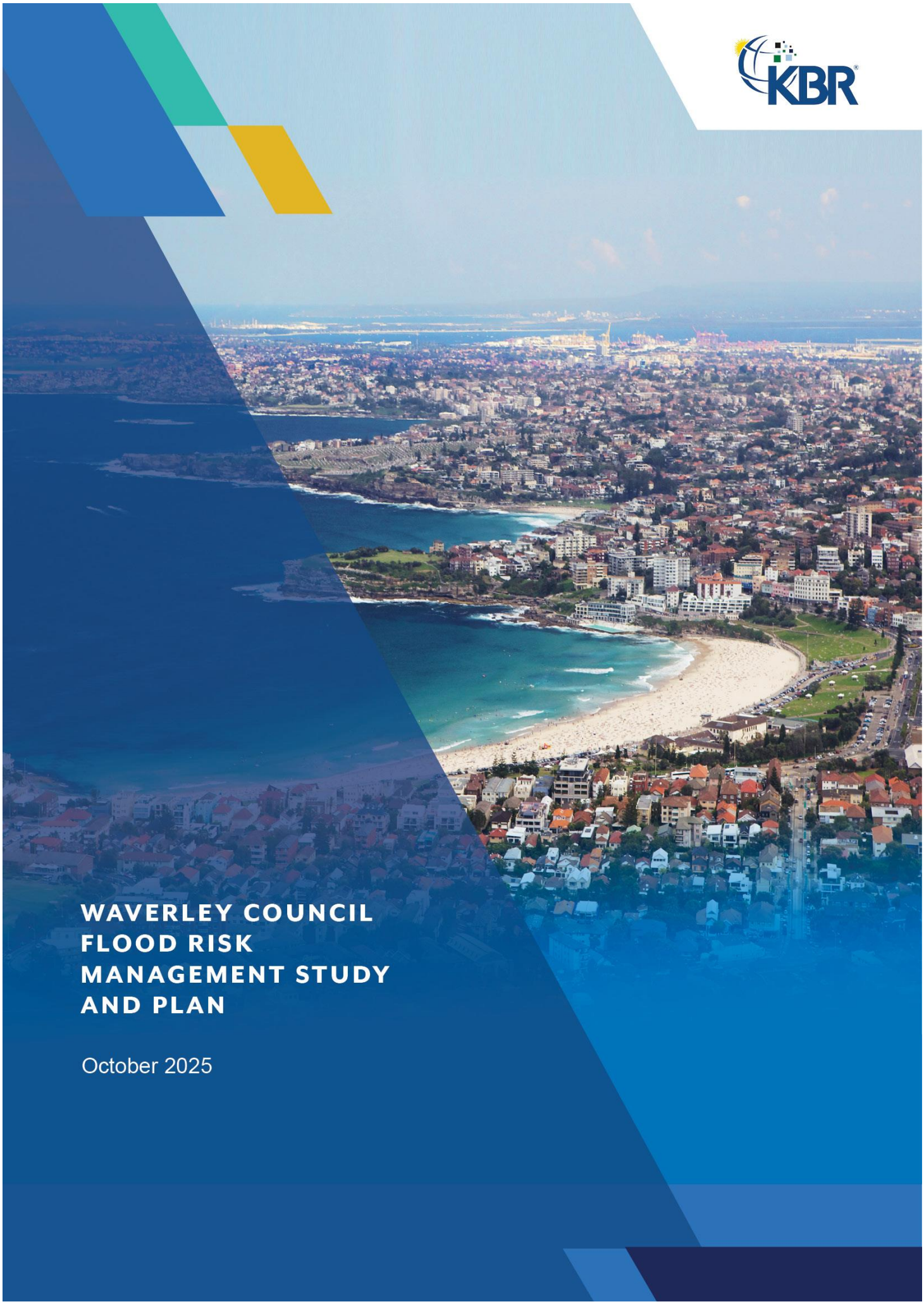
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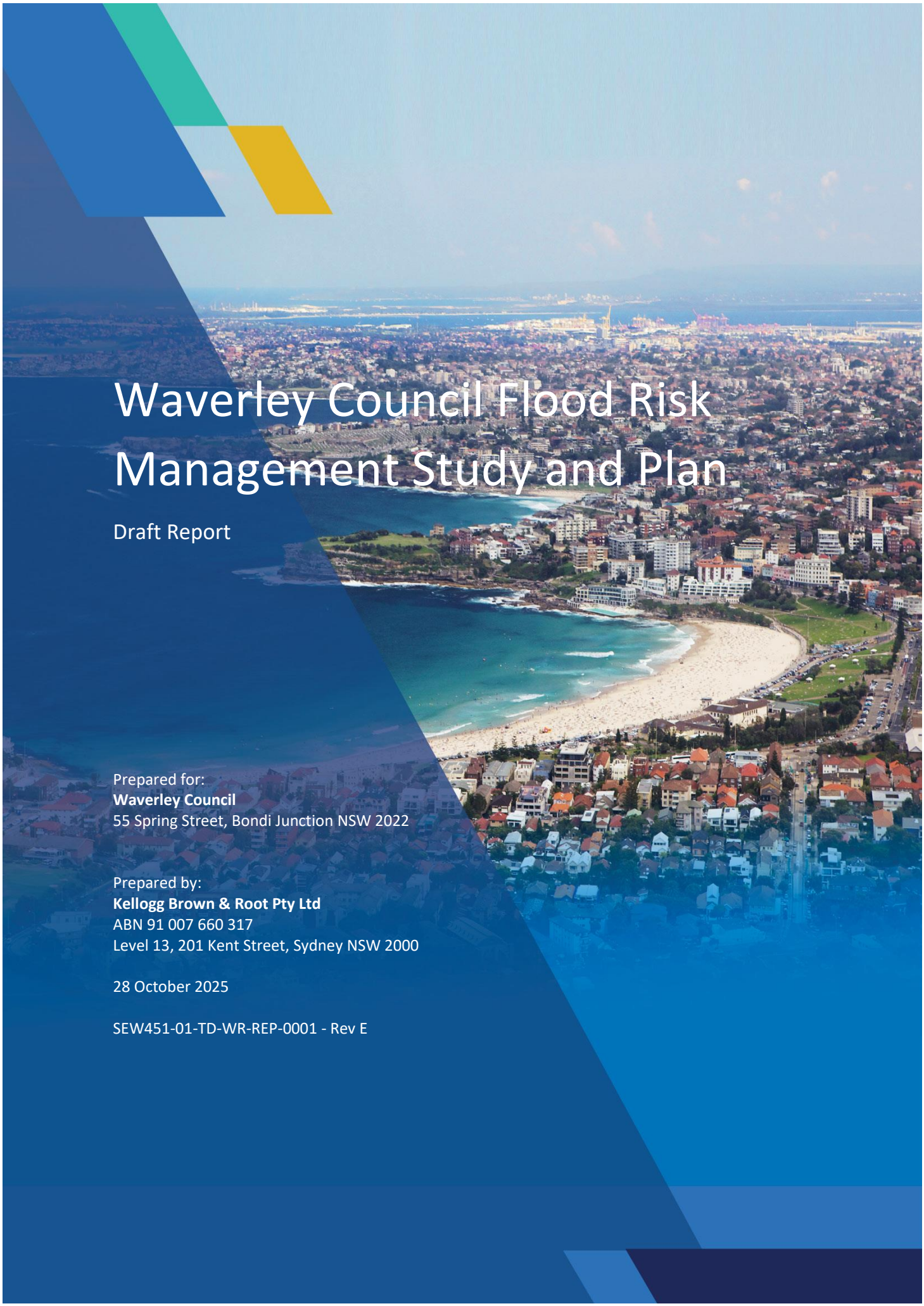

Waverley Council Flood Risk Management Study and Plan

Draft Report

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28 October 2025

SEW451-01-TD-WR-REP-0001 - Rev E

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Acknowledgments

KBR acknowledges the Traditional Custodians throughout Australia and their continuing connection to land, water, culture and community, and pays respect to their Elders past and present.

Limitations Statement

The sole purpose of this report and the associated services performed by Kellogg Brown & Root Pty Ltd (KBR) is to present a flood risk management study and plan in accordance with the scope of services set out in the contract between KBR and Waverley Council ('the Client'). That scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

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Revision History

Revision	Date	Comment	Signatures			
			Originated by	Checked by	Technical Approval	Project Approval
A	27/06/2024	Issued for Comment	I Kim			R Robson
B	25/10/2024	Issued for Comment	I Kim			R Robson
C	09/10/2025	Issued for Comment	I Kim			R Robson
D	24/10/2025	Issued for Comment	I Kim			R Robson
E	28/10/2025	Issued for Comment	I Kim			R Robson
			Digitally signed by Isaac Kim Date: 2025.10.28 17:13:13 +11'00'			Rebecca Robson 2025.10.28 17:19:27 +10'30'

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Glossary

AAD	Annual Average Damages
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALS	Airborne Laser Scanning
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
BCR	Benefit Cost Ratio
BOM	Bureau of Meteorology
CAD	Computer Aided Design
CBA	Cost Benefit Analysis
CP	Development Contributions Plan
DA	Development Application
DAP	Disaster Adaptation Plan
DCCEEW	Department of Climate Change, Energy, the Environment, and Water
DCP	Development Control Plan
DEM	Digital Elevation Model
DPE	Department of Planning and Environment
DPIE	Department of Planning Industry and Environment
EAF	Elevation Adjustment Factor
ELVIS	Elevation and Depth Foundation Spatial Data
EP&A	Environmental Planning and Assessment
FAQ	Frequently Asked Question
FERC	Flood Emergency Response Categorisation
FPA	Flood Planning Area
FPCC	Flood Planning Constraint Categorisation
FPL	Flood Planning Level
FRMS	Flood Risk Management Study
FRMS&P	Flood Risk Management Study and Plan
FRMP	Flood Risk Management Plan
FRP	Flood Risk Precinct
GIS	Geographic Information System
GSDM	Generalised Short Duration Method



HPC	Heavily Parallelised Compute
IFD	Intensity, Frequency, and Duration
IPCC	Intergovernmental Panel on Climate Change
KBR	Kellogg Brown and Root
LEP	Local Environmental Plan
LGA	Local Government Area
LiDAR	Light Detection and Ranging
MAF	Moisture Adjustment Factor
MCA	Multi Criteria Assessment
NSW	New South Wales
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
RCP	Reconciled Concentration Pathway
SFC	Special Flood Considerations
SIP	Shelter in Place
SLR	Sea Level Rise
SSP	Shared Socioeconomic Pathway
TUFLOW	Two-Dimensional Unsteady Flow
WAE	Work as Executed



Executive Summary

Waverley Council (Council) has engaged Kellogg Brown & Root (KBR) to undertake the Waverley Council Flood Risk Management Study and Plan. The Flood Risk Management Study is the next stage of the Floodplain Management Process and builds upon the previously completed Waverley LGA Flood Study by BMT in 2021. The primary objectives of the study are to improve the understanding of flood behaviour and better inform the management of flood risk within the Waverley Local Government Area. The study is supported by the New South Wales Government and has been undertaken in accordance with the Flood Prone Land Policy.

STUDY BACKGROUND

The Waverley Local Government Area is located in the inner-eastern suburbs of Sydney and consists of a highly urbanised catchment with the eastern border of the study area outlining the shoreline adjacent to the Tasman Sea. While no significant creek systems are present within the catchment, watercourses such as the Tamarama Gully and Bronte Gully are found within the study area. As such, the relevant flooding mechanism for this study is predominantly overland flow (i.e. when the capacity of the underground drainage system is exceeded, as well as when waters are not directed into the underground drainage system).

MODEL UPDATES

As a part of this study, KBR has completed a series of hydrologic and hydraulic model updates inclusive of the latest topographic and Council stormwater information. The model updates have allowed for increased confidence in the modelling of overland flow paths, a limitation that was flagged upon conclusion of the Flood Study. All hydrologic modelling was completed in accordance with the Australian Rainfall and Runoff Version 4.2 guidelines, inclusive of the latest climate guidance released in August 2024.

A desktop floor level assessment was completed for over 8,000 residential and commercial buildings, allowing for the quantification of the economic impact of flooding over a wide range of theoretical design flood magnitudes. The annual average damages for residential and commercial properties were estimated to be $36.4 M. The flood damages assessment provides a point of comparison in quantifying the economic benefit that each flood mitigation measure provides.

FLOOD RISK MANAGEMENT MEASURES

KBR in partnership with GLN Planning have utilised the updated modelling results and input from the community to develop a series of flood risk management measures covering the following categories:

- Community flood awareness measures,
- Land-use planning measures,
- Flood mitigation measures, and
- Property modification measures.

The developed measures have been subject to a detailed multi-criteria assessment, and a weighted score has been assigned, ranking each measure over its performance on a diverse range of metrics.

COMMUNITY CONSULTATION AND ENGAGEMENT

A multi-stage, detailed community consultation and engagement program was employed throughout the duration of the study. A combination of hard copy mailouts, dedicated web portals, online webinars, and group and one-to-one in person sessions were facilitated by KBR and Council staff. Information was both



presented and sought from the community. Over the various consultation and engagement methods implemented, strong community feedback was received.

NEXT STEPS

The Draft Waverley Council Flood Risk Management Study report (this report) is currently on public exhibition. The feedback provided by the community will be considered for the Final Waverley Council Flood Risk Management Study and Plan.



1 Introduction

Kellogg Brown & Root Pty Ltd (KBR) in partnership with GLN Planning was commissioned by Waverley Council (herein referred to as Council) to undertake a Flood Risk Management Study and Plan (FRMS&P) for the Waverley Local Government Area (LGA).

This study has been completed as a part of the New South Wales (NSW) Government Floodplain Management Program, in accordance with the NSW Government's Flood Risk Management Manual (Department of Planning & Environment, 2023a) (herein referred to as the Manual). The study has been funded by Council, with both financial and technical support from the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW).

1.1 STUDY OBJECTIVES

The primary objectives of the FRMS&P are to improve the understanding of flood behaviour and impacts, and better inform management of flood risk in the study area in consideration of available information, and relevant standards and guidelines.

The objectives of the Flood Risk Management Study (FRMS) are:

- Review and update the existing models from the Waverley LGA Flood Study (BMT, 2021) (herein referred to as the Flood Study) in accordance with the latest Australian Rainfall & Runoff (ARR) guidelines and incorporate any changes to the catchment since the completion of the Flood Study;
- Undertake a thorough review of the historical and baseline design flood behaviour and provide a detailed description of the flood issues across the study area;
- Review Council's environmental plans, emergency plans, and other long-term plans and policies that is associated with flood risk;
- Identification of potential emergency management issues (e.g. road inundation, isolated communities etc.) and assess the flood risk to strategic locations for emergency management;
- Engage the community to provide them with the opportunity to provide flood information, input on preferred mitigation options, and general views on flood risk management; and
- Identify, assess, and compare various flood risk management measures in terms of effectiveness and suitability to present and future community, with emphasis on the consideration of the effects of climate change.

The objectives of the Flood Risk Management Plan (FRMP) are:

- Provide detailed management measures and strategies;
- Assign who is responsible and associated timeframes and priority for executing specific measures/strategies; and
- Provide preliminary cost estimates for specific management measures.

1.2 STUDY LOCATION

The Waverley LGA is located in the inner-eastern suburbs of Sydney, approximately seven (7) kilometres from the Sydney Central Business District. The study area consists of a highly urbanised catchment with the eastern border of the study area outlining the shoreline adjacent to the Tasman Sea. The total study area is approximately 10 km^2 which consists of the Waverley LGA in its entirety and a small section of the Randwick LGA (not included within the scope of works for this



study). While no significant creek systems are present within the catchment, watercourses such as the Tamarama Gully and Bronte Gully are found within the study area.

An overland flow path is a flow path that forms when the capacity of the underground drainage system or soil capacity is exceeded and follows the natural ground topography towards a watercourse or water body (in this instance the ocean).

Due to the proximity of the study area to the ocean, tidal interactions have been considered and applied within the hydraulic model.

The study area is composed of the following 14 separate catchments that were defined as part of the Flood Study:

- Bondi,
- Bondi Junction,
- Bronte,
- Centennial Park,
- Clovelly Beach,
- Diamond Bay,
- Dover Heights,
- Lachlan Swamps,
- North Bondi,
- Penkivil,
- Queens Park,
- Rose Bay,
- Rose Bay North, and
- Tamarama.

The Clovelly Beach catchment lies within the City of Randwick and Waverley Council LGAs. This catchment either flows overland into the Sydney Harbour or directly into the South Tasman Sea. Figure 1-1 shows the study locality and the catchments that comprises the Waverley Council catchment area.

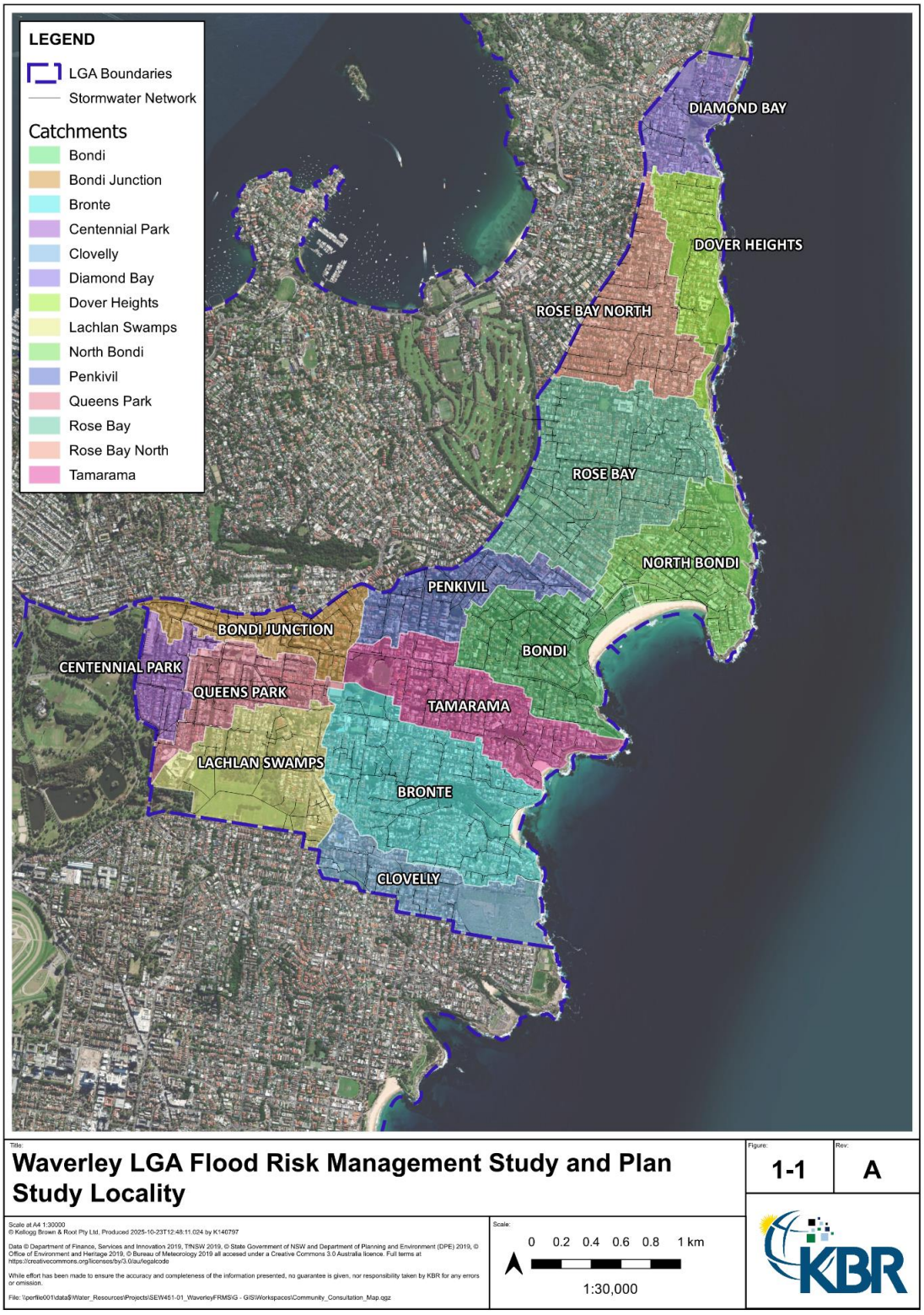


Figure 1-1 Study Locality



1.3 POPULATION CHARACTERISTICS

The Australian Bureau of Statistics (ABS) estimated resident population of the LGA was 71,414 as of 2023. While this data is primarily relevant to emergency management, understanding the socio-economic nature of the community can assist with ensuring that appropriate risk management measures are adopted. Information on categories including dwelling and tenure type, primary languages spoken, age of population, and the movement of people into and out of the area have been extracted from the 2021 Census data. These characteristics have been summarised in Table 1-1.

Table 1-1 Key Population Characteristics (ABS, 2021)

Waverley LGA Key Population Characteristics (Area Code LGA18050)
Population: 68,605 (2021) **No. Private Dwellings:** 32,775 **No. of Lone Person Dwellings:** 8,216 **Property Tenure:** • 23.8% owned with a mortgage • 24.2% owned outright • 49.0% rented **Language:** 73.1% only speak English at home **Internet:** 87.8% of households with at least one person with internet access **No. Persons Requiring Assistance:** 1,961 (2.8% of the population) *Relates to people with a profound or severe disability that are defined as those people needing help or assistance in one or more of the three core activity areas of self-care, mobility, and communication* **No. Persons > 75:** 4,231 (6.2% of the population) *Elderly people are less mobile and may not be able to respond as quickly to flood related emergencies alone* **No. Single Parent Families:** 8,216 (29.9% of the population) *Single parent families could be indicative of a low adult-to-child ratio leading to difficulty responding to flood related emergencies*

Information extracted from the Australian Bureau of Statistics: Waverley 2021 Census

1.4 ECONOMIC BASE

The top six (6) industries in the LGA are identified from the 2021 Census as follows:

- Professional, Scientific, and Technical Services (19.6%),
- Financial and Insurance Services (10.7%),
- Health Care and Social Assistance (10.3%),
- Education and Training (7.3%),
- Construction (6.7%), and
- Retail Trade (6.5%).

The majority of employment generating land uses in the LGA is located within the commercial areas. The most common occupations in the LGA included professionals (41.8% compared to 25.8% in NSW), managers (22%), and clerical and administrative workers (9.6%).

On average, during a 12-month period (based on the ePlanning Dashboard data for FY11 to FY20), Council receives approximately 480 Development Applications (DAs), 260 Modification Applications (MODs), and 220 complying development certificates. The majority of all these applications requiring assessment were for alterations and additions to residential premises while the next most common category was for commercial, retail, or office developments. The remainder of applications requiring assessment were for new single dwellings, subdivisions, mixed uses, and multi-unit housing. Based on the ABS data for the last 10 years, building approvals are issued for between 114 to 423 new dwellings per annum.

Consequently, the more common categories of application have been prioritised in the review of the Flood Risk Management planning controls as a part of this study.

1.5 THE FLOODPLAIN MANAGEMENT PROCESS

As detailed in the Manual, the primary objective of the NSW Governments Flood Prone Land Policy is to reduce the impact of flooding and flood liability to landowners and occupiers of the floodplain and reduce the damages and losses resulting from floods. As with local land use planning processes, the responsibility for the management of flood liable land rests with local government/councils with support from DCCEEW.

The Manual defines the NSW Floodplain Management Process which includes five sequential steps as detailed in Figure 1-2. This study contributes the 'Flood Risk Management Study' and 'Flood Risk Management Plan' steps of the process and builds upon the earlier step of the 'Flood Study' which involved defining the existing flood risk.

While the Floodplain Management Process has been undertaken in various forms within the catchment, the purpose of this study is to revise the understanding of flooding in line with the changing nature of the catchment and to prepare the floodplain risk management plan and associated options for the catchment in its entirety.

At the outset of this study, an advisory committee comprised of local elected representatives, community members, and representatives from DCCEEW, SES, and Sydney Water was established to oversee the study and provide their feedback at key points.



Figure 1-2 Steps of the Floodplain Management Process (Appropriated from Figure 2 of the Flood Risk Management Manual)



2 Community Consultation

Community consultation is an integral component of the Floodplain Management Process and provides several benefits, contributing to the success of each stage of the process. For a FRMS&P, community consultation and engagement aim to raise awareness about the program and provide the community with the opportunity to provide suggestions on preferred options to be considered within the study.

In addition, community consultation provides a wealth of information as to the observed flood extents and/or flood depths in certain locations during historic flood events. This information can be utilised to inform the confirmation of flooding hotspots and in turn the identification and selection of flood mitigation options.

2.1 FLOODPLAIN DEVELOPMENT MANUAL AND FLOOD RISK MANAGEMENT MANUAL GUIDANCE ON COMMUNITY CONSULTATION

The Manual asserts that community consultation is pivotal to the effective management of flood risk within the catchment. Community consultation serves several purposes, including but not limited to:

- To inform the community of the process for floodplain risk management within their location area;
- To inform the community of the progress of defining and mitigating flood risk within the catchment;
- To enable the community to provide key information into the undertaking of flood studies and floodplain risk management studies and plans; and
- To provide the community ownership over the floodplain risk management strategies and mitigation options.

A consultation process is currently underway as a part of this Study. The following elements have been completed to date:

- Consultation throughout the study with governmental bodies including Council and DCCEEW,
- Consultation throughout the study with Council's Floodplain Risk Management Committee,
- Community consultation via a commencement of study letter, community questionnaire, webpage, and media release,
- Targeted letter mailout in priority areas to inform residents and request feedback on the preliminary flood mitigation measures developed,
- Targeted community engagement via two (2) online webinars facilitated by KBR and Council staff, and
- Targeted community consultation with bookable one-to-one sessions with Council staff.

2.2 INITIAL COMMUNITY CONSULTATION

It is understood that a detailed community engagement process was undertaken as part of the Flood Study. As part of the Flood Study, 35,169 letters were mailed out to all residential properties and businesses within the Waverley LGA. A total of 144 responses were received, reflective of a 0.4% response rate. Due to the low response rate received during the Flood Study alternative



methods of engagement were considered for this study in an attempt to increase community engagement.

An LGA-wide initial community consultation was undertaken from the 11th of June 2024 to the 15th of July 2024. Residents, landowners, and business were requested to supply information, images, and videos relating to flooding they had experienced at their home or in other areas of the Waverley LGA. In addition, residents and property owners were asked to comment on their own ideas on reducing flood risk as well as ranking a series of suggested mitigation measures. While the collection of data was undertaken primarily through Council's "Have Your Say (HYS)" webpage, the engagement and communication methods detailed in Table 2-1 were undertaken to bolster community engagement opportunities.

Table 2-1 Summary of Community Engagement and Communications

Type	Name	Response Count	Overview
Engagement	Have Your Say Online Survey	567	567 unique visitors were logged with a total of 82 completed surveys received. 64 downloads of the flood risk manual and 52 downloads of the FAQs were noted.
Engagement	Have Your Say Face-to-Face Pop Ups	10	Council and KBR project team members jointly held the following four pop up sessions across the LGA for community members to physically attend, provide responses, and/or ask questions: • 4th July 2025 - Kimberley Community Hall (Vaucluse) • 5th July 2025 - Bamford Reserve (North Bondi) • 5th July 2025 - Margaret Whitlam Recreation Centre (Bondi Junction) • 6th July 2025 - Waverley Library (Bondi Junction) A total of 10 residents attended across the four (4) sessions.
Engagement	Emails from the Community	51	51 direct emails from the community were received via Council's dedicated email address.
Communication	Resident Letter	140	Market Push were engaged to deliver non-addressed letters to ground-level mailboxes across the LGA. Approximately 36,000 letters were delivered with 140 scans of the QR code included on the letters noted.
Communication	Wenworth Courier: Mayor's Message	48,477	In the 19th of June Edition of the Wentworth Courier, Mayor Paula Masselos encouraged community members to visit the Have Your Say webpage and provide their input.
Communication	Waverley Weekly E-Newsletter	32	In the 12th of June Edition of the Waverley Weekly E-Newsletter, a link to the Have Your Say webpage and survey was included as the lead story.
Communication	Social Media Posts	1,536	Council's Facebook and Instagram pages were used to promote the community consultation with reminders publicised on both platforms. A total of 835 and 701 views were noted on Facebook and Instagram accordingly.
Communication	Waverley Council Website	33	A thumbnail and link were included on Council's flood planning webpage. This link remains live so that community members can be informed on the progress of the study.

Type	Name	Response Count	Overview
Communication	Have Your Say E-Newsletter	250	In the June edition of the monthly newsletter, a link to the Have Your Say webpage and survey was included as the lead story.
Communication	Have Your Say Automatic Email	32	Automatic emails were sent on the system launch of each Have Your Say page. A total of 667 emails were sent with 32 openings noted.

Via the Have Your Say webpage, 82 completed surveys were received with an additional 51 responses received via direct email. A further 10 responses were received in person, totalling 143 responses. Of the approximate 36,000 letters mailed out, this represents a 0.4% response rate, similar to that observed within the Flood Study.

The spatial distribution of the responses has been summarised in Figure 2-1 and mapped in Figure 2-2. The responses received were well distributed across the study area.

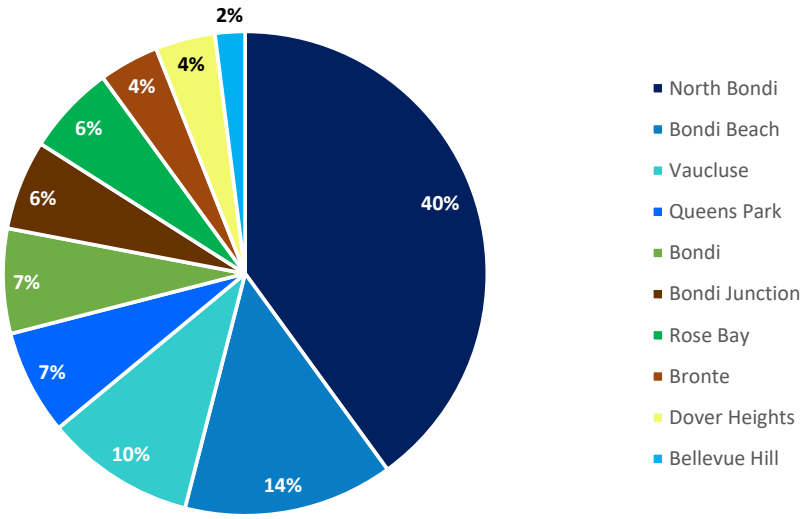


Figure 2-1 Summary of Response Distribution Per Suburb

Across the various submissions received, the following broad themes were identified:

1. Reponses detailing time, location, and degree of flooding experienced.
2. Objection to Council's existing flood modelling (Waverley LGA Flood Study) and their home and street being identified as a 'hot spot' in the 2021 flood planning outcomes.
3. Resident's belief that the flood modelling has contributed to increases in their insurance premiums as well as influencing the overall dollar value of their property.
4. Concern regarding Council's lack of action on flooding in the region and impacts to home, business, or the local area.

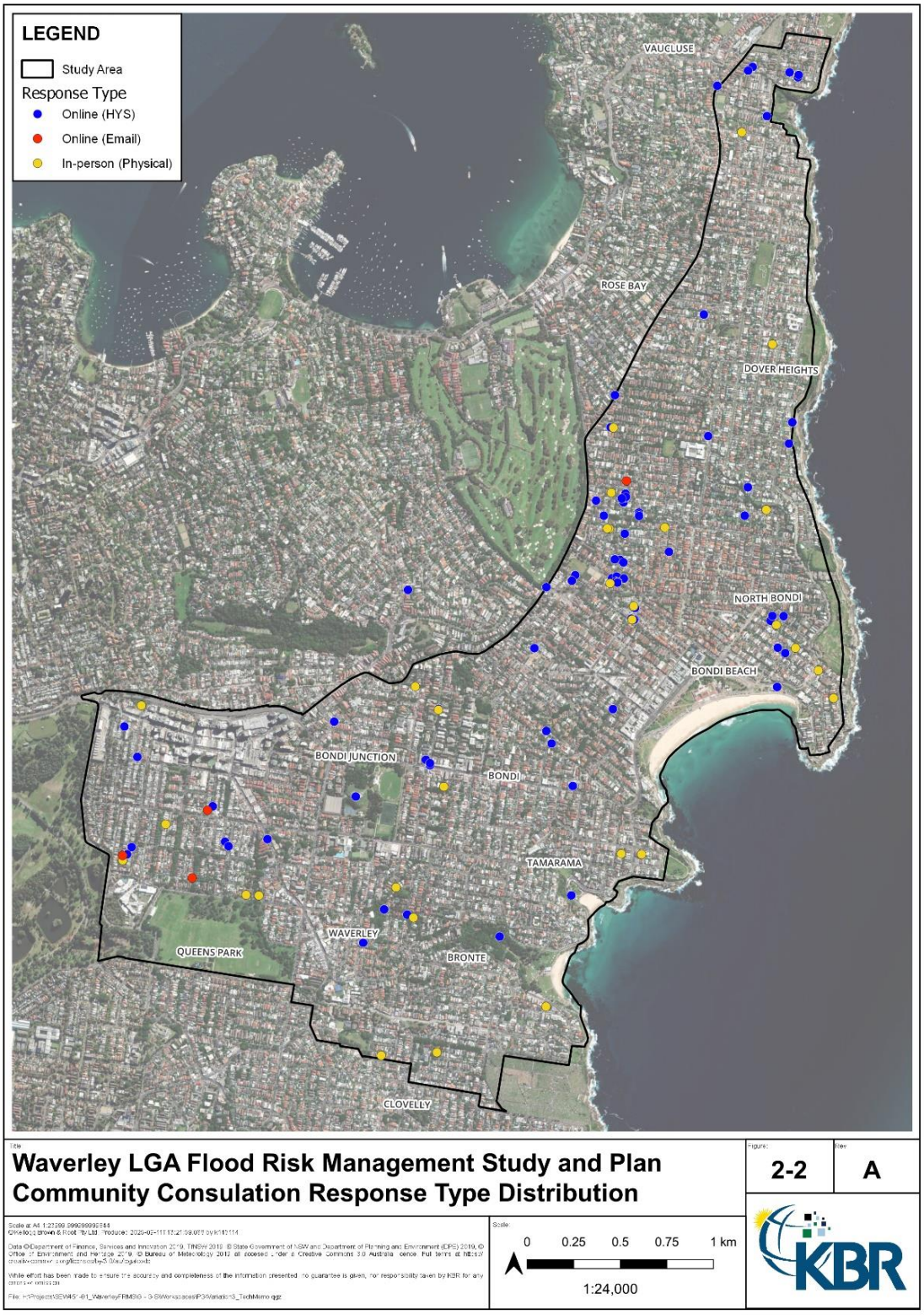


Figure 2-2 Spatial Distribution of Community Consultation Responses

Among the responses received during the community consultation, several reports associated with flood events that have occurred since the completion of the Flood Study were noted (refer to Figure 2-3). It is likely that 2024 was the dominant year of flooding reported as the initial community consultation was completed between June and July 2024, during which heavy rain was experienced across the LGA.

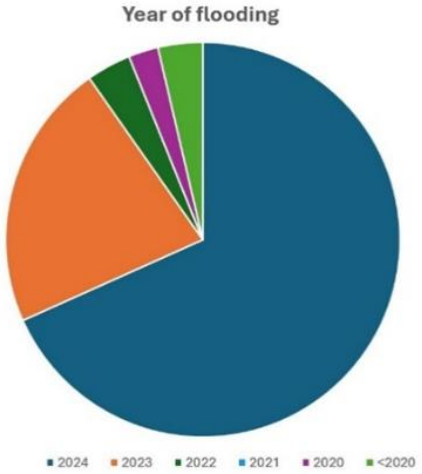


Figure 2-3 Summary of Reported Year of Flooding Experienced



Figure 2-4 Example Photographic Evidence submitted by residents (clockwise from top-left: Justus St, Bonus St, flood marks on Lynch Ave, and Glenayr Ave)

As part of the community consultation questionnaire, respondents were asked to rank suggested mitigation options from least to most important. Improvements to dedicated flow paths (e.g. road reprofiling, kerb and guttering, or flow path diversions) was ranked as the most preferential

option, closely followed by the improvement of stormwater infrastructure. A summary of the findings is presented in Figure 2-5.

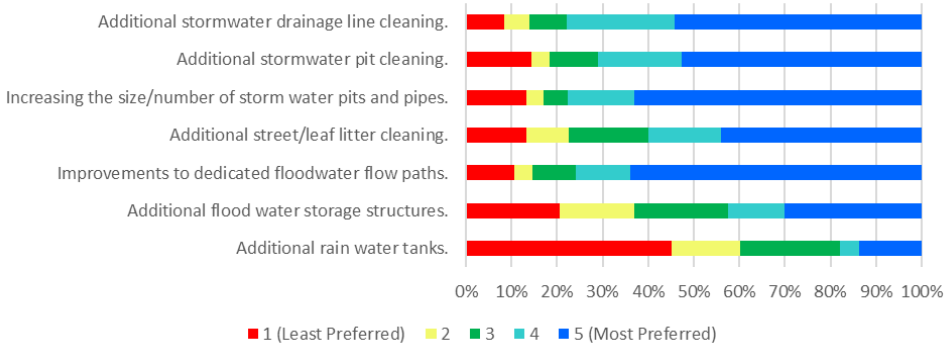


Figure 2-5 Summary of Suggested Mitigation Options Ranking

The initial community consultation material has been compiled and included in Appendix A.

2.3 TARGETED COMMUNITY CONSULTATION

As part of the development of the Flood Mitigation Measures detailed in Section 10.3 of this report, a targeted community consultation exercise was undertaken from the 15th of July 2025 to the 10th of August 2025. The intent of the engagement was to provide the community and stakeholders with an update to the progress of the study as well as to seek their feedback on a preliminary list of flood mitigation measures that were developed in collaboration between Council and KBR (refer to Section 10.3.1).

6,252 residents and property owners received a formally addressed notification letter via Australia post, with an invitation to attend an online webinar targeted at priority hotspot areas. Two (2) online webinars were presented by KBR and Council staff on the following dates:

- 29th July 2025 7:00 pm, and
- 30th July 2025 12:15 pm.

Following the online webinars, residents and property owners were invited to book one-to-one sessions with Council staff at the Waverley Council Customer Service Centre (55 Spring Street, Bondi Junction) between the 5th to 6th of August 2025 for any further questions or enquiries.

A multi-communication channel approach was employed to reach and encourage community participation. The outcomes of the engagement and communications are presented in Table 2-2.

Table 2-2 Summary of Community Engagement and Communications

Type	Name	Response Count	Overview
Engagement	Have Your Say Website	353	The engagement method was primarily aimed at directing people to the website to read updates on the study and register to attend either the webinar or one-to-one meetings with Council Staff.
Engagement	Emails from the Community	24	Emails from the community were received at flodriskmanagement@waverley.nsw.gov.au
Engagement	Face-to-Face	10	One-to-one sessions were held in person with at the Waverley Council Customer Service Centre.

Type	Name	Response Count	Overview
Engagement	Resident Letters	6252	Physical letters were delivered to residents and homeowners in priority areas via Australia Post. The letter contained a QR code of which there were 533 scans.
Engagement	Webinars	57	33 participants attended the webinar on the 29th of July. 24 participants attended the webinar on the 30th of July.
Engagement	Webinar Video Upload	214	A recording of the webinar was uploaded onto Council's Have Your Say website.
Communication	Wentworth Courier: Mayor's Message	48,477	Information was published on the 23rd of July 2025 edition of the Wentworth Courier.
Communication	Waverley Weekly E-Newsletter	66	Two stories were published in the Waverley Weekly on the 15th and 22nd of July. 44 and 22 unique clicks were recorded accordingly.
Communication	Emails	173	Emails were sent to the following groups: • Those who contributed to the initial community consultation and provided their emails to Council for follow up (35). • Follow-up email after the webinars (73). • Final email to webinar attendees (63).

It is evident that targeted communications, using personally addressed mail to residents and property owners, was a successful engagement approach. The mailed letter to QR code scan ratio of 8.5% was concluded to be a strong response received.

The webinars were well attended with 84 registrations and 57 attendees recorded across both online presentations. Questions were asked and answered throughout the duration of the webinar, with follow-up questions and documents circulated to attendees for questions that could not be answered within the allocated time.

Ten residents booked in one-to-one sessions for up to 30 minute individual time slots. The one-to-one sessions allowed for quality information sharing and feedback. Each meeting was documented with Council staff actively pursuing the topics brought up in these sessions.

Feedback from the community included acknowledge of Council's efforts made to engage as well as on the quality and detail included within the webinar presentations. Residents were appreciative of the steps Council had taken in the 12 months to August 2025 to help address the impacts of flooding in the LGA.

A wide range of responses received from the community were compiled with individual responses provided by KBR and Council staff. A summary of the types of responses received has been presented below:

- Responses were received questioning the derivation and re-establishment of the hotspots. A detailed overview of how the hotspots were established has been included in Section 6.4.
- Responses were received regarding the criteria and the weighting that have been applied to consolidate and filter out the preliminary flood mitigation measures. The process of why specific criteria was prioritised over others has been detailed in Section 10.3.1.
- Responses were received as to why specific flood mitigation measures were not investigated further. Each option has been subject to a high-level assessment criteria consisting of a number



of constraints and metrics. A key driver of the preliminary flood mitigation measure assessment is the reduction of flood affectation. Further details are described in Section 10.3.1.

- Recommendations for the construction of new inlet pits were made. KBR has undertaken extensive iterative modelling of stormwater infrastructure upgrades across the hotspot locations. A key finding of this exercise was the limited improvement provided by the construction of new inlet pits without the upgrade of the underlying pipe capacity. Further details on a review of the existing stormwater volume capacity can be found in Section 6.3.
- Responses were received concerning additional outflows into existing ponds and waterbodies. Should the flood mitigation measures presented as a part of this study proceed to detailed design prior to construction, an environmental impact assessment and a water sensitive urban design assessment will be undertaken (if necessary) to ensure compliance with all relevant regulations and standards.
- Questions were raised regarding the consideration of more frequent events (e.g. 20% AEP) during the preliminary assessment stage. KBR simulated all preliminary flood mitigation measures for the 20% AEP and 1% AEP design events only, providing insight for frequent to rare events. Both the 20% AEP and 1% AEP event modelled results were considered in the application of the high-level assessment criteria.
- Questions were raised regarding how basement car parks were considered. Underground car parks were not explicitly included within the hydraulic model as the location, extent, and available storage capacity are not widely available in a ready-to-use format. Their exclusion from the hydraulic model was agreed upon with Council and DCCEEW at the outset of the study, noting that this results in a more conservative result. The outputs of the model can be used by Council to identify which locations will be at risk.
- Questions were raised as to the availability of the modelling and mapping outputs to the community. The draft FRMS&P report and all associated mapping will be available to the public for viewing during the upcoming Public Exhibition period.
- Questions related to budget, funding, and their use were raised. These questions were answered by Council and have not been included in this report to protect community confidentiality.
- Enquiries were made as to how the future climate has been taken into consideration as a part of this study. The latest climate projects have been considered, including the NARCLIM 2.0 data and the Australian Rainfall and Runoff Version 4.2 guidance. Further details are described in Section 5.1.1.

The feedback received from the community was considered in the selection of the five (5) flood mitigation measures to be carried forward for detailed assessment as described in Section 10.3

2.4 PUBLIC EXHIBITION

Upon completion of the Draft Waverley LGA Flood Risk Management Study Report, the report will be placed on Public Exhibition. During this time, the report will be publicly available, allowing the community to provide feedback input on the study and associated outcomes. All feedback received from the community will be reviewed and considered, and where appropriate, the study will be amended to address any valid issues identified.



3 Compilation and Review of Available Data

As a part of the FRMS&P process, a comprehensive review was undertaken on all data received from Council and obtained from publicly available sources. The review has been separated into the following categories:

- Previous Studies and Investigations;
- GIS Data;
- CAD Data and Design Drawings;
- Council Policies and Plans; and
- Historical Flood Data.

3.1 PREVIOUS STUDIES AND INVESTIGATIONS

3.1.1 Waverley Council Stormwater Drainage System Mapping & Modelling (Bankstown Civic Design, 2007)

An LGA wide drainage network modelling and mapping study was completed by Bankstown Civic Design (Bankstown Council) in 2007 for the former Waverley Municipal Council. The modelling was undertaken using the DRAINS hydrologic and hydraulic modelling software package applying the ILSAX method of catchment runoff calculation. Initial losses of 2 mm and 20 mm were adopted for the impervious and pervious surfaces respectively. A database of approximately 3,000 individual sub-catchments was delineated for each inlet pit, with a Type 1 soil profile and antecedent moisture condition of 1 adopted within the DRAINS parameterisation.

As a part of the study, a comprehensive field investigation and survey of approximately 4,400 stormwater pits and pipes were surveyed by Bankstown Civic Design. Waverley Council's stormwater network database was subsequently updated following the outcomes of the investigation and has been progressively updated and continuously managed to date.

3.1.2 3.1.2 Waverley LGA Flood Study (BMT, 2021)

The Waverley LGA Flood Study was completed by BMT in 2021 for Waverley Council with the intent of defining the historical, existing, and future conditions flood behaviour across the Waverley LGA. The study area extends across 10 km2 and encompasses local overland flood conditions as well as oceanic interactions with an extensive stormwater system. As a part of the study, BMT developed a calibrated and validated XP-RAFTS hydrologic model and a TUFLOW hydraulic model for a range of design events (1EY, 50%, 20%, 10%, 5%, 2%, 1%, and 0.2% AEP events) as well as the Probable Maximum Flood (PMF) event.

The overland flow regime in urban environments is considered complex and is characterised by inundation of urbanised areas with interconnecting and varying flow paths at varying depths. Road networks often convey a considerable proportion of flood waters due to the hydraulic efficiency of the road surface compared to residential properties. The flood behaviour observed included:

- Shallow overland flow paths in the upper catchment;
- Major overland flow paths are formed in the lower catchment that traverse through road corridors and surrounding properties depending on catchment topography; and
- In some locations, overland flow drains to localised topographic depressions resulting in large peak depths.



The outcomes of the study form the basis of this Floodplain Risk Management Study and Plan and are inclusive of the:

- Identification of properties experiencing flooding in each design event;
- Derivation of a preliminary Flood Planning Area, resulting in 3,150 properties being identified;
- Flood Control Lot mapping identifying properties where flood related development controls would apply; and
- Emergency response considerations such as mapping, identifying roads that may not be trafficable during the peak of a flood event and individual properties that are considered unsafe for on-site refuge.

Additionally, a key outcome of the study was the identification of 12 hotspot locations within the study area where there was a concentration of flood affected properties. The locations flagged are detailed below:

- William Street - Gilgandra Road, Rose Bay,
- Glenayr Avenue - Plowman Street, North Bondi,
- Elliott Street - Bonus Street, North Bondi,
- Brassie Street - Niblick Street, North Bondi,
- Beach Road - Warners Avenue, North Bondi,
- Wallis Parade - Ramsgate Avenue, North Bondi,
- Roscoe Street - Beach Road, Bondi Beach,
- Chambers Avenue - Jacques Avenue, Bondie Beach,
- Francis Street - Simpson Street, Bondi Beach,
- Tasman Street - Tamarama Street, Bondi,
- Palmerston Avenue - Murray Street, Bronte, and
- Alt Street - York Road, Queens Park.

The study recommends that future investigations and floodplain risk management activities should be targeted at improving flood risk at the abovementioned hotspot locations and includes detailed commentary on the existing flood behaviour and preliminary mitigation optioneering.

BMT acknowledged limitations in the adopted approach that directly influence the level of confidence in specific sections of the catchment, predominantly those in the steeper upper catchment. BMT considered the modelling limitations and assumptions in their approach to lot tagging and have been clear in stating them within the Flood Study report.

3.1.3 Draft DCP Provisions (WMS, 2021)

Subsequent to the Waverley LGA Flood Study, WMS prepared a Flood Risk Precinct (FRP) map to be used for the purposes of applying amended DCP controls. The FRP map adapted information contained in the Flood Study to categorise lots as either part of a Low, Medium, or High FRP, which cumulatively represent all proposed Flood Control Lots for the Waverley LGA (refer to Section 6.6 for the definitions and mapping criteria). It is noted that the FRP approach has no direct correlation to BMT's three-tier classification approach (types A, B, and C) presented within the Flood Study. The FRP approach would flag a greater number of lots than the three-tier classification approach as no manual review and removal of tagged lots has been undertaken. While the lot tagging criterion presented is simple to replicate, it did not take into consideration the level of uncertainty in the underlying modelling that has been flagged by BMT in the Flood Study.



3.1.4 Waverley DCP Flood Chapter - Response to Public Exhibition Submissions (WMS, October 2022)

Following the Public Exhibition of the Draft Waverley Development Control Plan (DCP) Flood Chapter, WMS was engaged to assist in the addressing of the submissions received. A total of 99 submissions were received during the one-month Public Exhibition period and the following two months (23 June 2022 - 23 September 2022). The responses received were broken up into the following categories:

- Flood Risk Precinct Classification;
- Implications to property value;
- Consultation process;
- Implications to insurance premiums;
- Implications to development; and
- Applicability of FRP to apartments.

In discussion with Council, WMS identified short- and long-term responses which included the preparation of a Frequently Asked Questions (FAQ) document and the following recommendations to be considered within the Waverley FRMS&P:

- Flood modelling updates to include recent drainage upgrades;
- Review flood planning DCP chapters in metropolitan NSW LGAs and explore alternative ways of defining and managing flood risk and developments in the Waverley LGA, and/or reviewing how the Flood Risk Precincts have been defined; and
- Review draft DCP controls in collaboration with Waverley Council planners.

3.1.5 Review of Waverley LGA Flood Study and Waverley DCP Amendment (GLN Planning, April 2023)

GLN Planning and KBR were engaged by Waverley Council to undertake a peer review of the modelling methodologies employed and lot-tagging approaches adopted within the Waverley LGA Flood Study. Additionally, the review considered subsequent work undertaken by WMS in 2021 and 2022 (detailed above). It is noted that no allowance was made for a detailed review of hydrologic or hydraulic models developed for the purposes of the Flood Study.

The following recommendations were extracted from the Review of Waverley LGA Flood Study and Waverley DCP Amendment:

- No reinforcement of kerb and gutter profiles may result in artificial breakout of flows from the road profile resulting in overland flow paths through urban properties. BMT has acknowledged this limitation by identifying areas where this may be occurring and classifying as Type C lots. The Review suggests the investigation of localised or global representation of kerb and gutter profiles to represent the appropriate conveyance of flows through road corridors in the FRMS.
- Further investigation of flow obstructions (e.g. brick or concrete walls) and the representation of buildings may be warranted as part of the FRMS to further validate key flow paths.
- Further consideration of the applied Manning's 'n' values for residential lots within the TUFLOW hydraulic model as the values applied are at the lower end of the expected values for these surface types.
- The approach to defining the FPA should be considered further as part of the FRMS.
- The FRP map is currently presented using the lot-based approach. It is recommended that the FRP map be modified to adopt a line-based approach to convey the flood extent and level of risk to the community.



- The adopted approach to lot tagging should be clearly articulated and repeatable but should also consider the level of uncertainty/confidence in the underlying modelling. Any deviation from the selected criterion to add or remove tagged properties based on engineering judgement or visual inspection should be documented for future reference.

Both the authors of the Flood Study and the review acknowledge the limitations with the flood study modelling in certain areas. The review acknowledges the lack of consideration of these areas in the lot tagging approach adopted during the Draft DCP Provisions. It is concluded that the approach adopted during the Draft DCP Provisions is conservative and the approach to the FPA should be considered further during the future flood risk management study (this study).

3.2 GIS DATA

The GIS data provided by Council and sourced from publicly available government sources is detailed in Table 3-1. A detailed data review has been undertaken on the provided hydrologic and hydraulic models. It is understood that Council requires the modelled stormwater network to be updated with the latest provided dataset as a part of this Study. Provided GIS datasets will be relied upon for any updates to the models undertaken within this study (e.g. infilling missing buildings and enforcement of kerbs and gutters).

Table 3-1 Summary of GIS Data

Dataset	Provider	Contents	Format
2020 Sydney 1 m Resolution Digital Elevation Model	NSW Government - Spatial Services	Elevation data sourced from ELVIS with a 0.3 m vertical accuracy and a 0.8 m horizontal accuracy.	.tif
2020 High Resolution Aerial Imagery	Waverley Council	High resolution aerial imagery provided by Council. It was noted during review that the aerial imagery does not align perfectly with the 2020 LiDAR dataset.	.ecw
Cadastre	Waverley Council	Council cadastre layer.	.shp
Catchment and Sub-catchment Boundaries	Waverley Council	Council sub-catchment delineation layers.	.shp
Land Zoning	Waverley Council	Council land use distribution layer.	.shp
Pit Database	Waverley Council	Council pit database inclusive of type and depth details. Differentiation has been made on whether the pit is a sag pit or on grade. While no details have been included as to when the database update has occurred. Based on known works undertaken within the catchment, the database appears to have been updated post 2019.	.shp
Pipe Database	Waverley Council	Council pipe database inclusive of type, diameter, length, slope, and capacity details. While no details have been included as to when the database update has occurred. Based on known works undertaken within the catchment, the database appears to have been updated post 2019.	.shp
Geoscape Buildings	Waverley Council	Waverley LGA buildings layer generated in June 2020 and provided to Council by DCCEEW.	.shp
Kerb and Gutter	Waverley Council	Council kerb and gutter delineation only with no elevation details. Delineation appears mostly in	.tab



Dataset	Provider	Contents	Format
		line with the topographic dataset underlying the TUFLOW model.	
Waverley LGA Flood Study XP-RAFTS Hydrologic Model and Outputs	Waverley Council	Hydrologic model files and outputs developed for the purpose of the Waverley LGA Flood Study.	.mid, .out, .ts1
Waverley LGA Flood Study TUFLOW Hydraulic Model and Outputs	Waverley Council	Hydraulic model files and outputs developed for the purposes of the Waverley LGA Flood Study.	.mid, .asc
Utility Layout Information	Before You Dig Australia	Existing utility plans and safety information	.pdf

3.3 CAD DATA AND DESIGN DRAWINGS

Work as Executed (WAE) details received from Council have been reviewed and have been included within the TUFLOW model where necessary (e.g. where the underlying model topography indicates clear differences compared to the WAE details). Stormwater pit and pipe details can be extracted from the provided .dwg files however, any topographic representation will require the provision of a design surface or tin for inclusion in the TUFLOW model. All data that has been received from Council has been tabulated in Table 3-2.

Table 3-2 Summary of WAE CAD Data

Dataset	Provider	Contents	Format
Spring and Denison Street - Stage 2 Stormwater	Waverley Council	Spring Street and Denison Street WAE with pit invert levels, surface levels, pipe diameters, and alignments - 28th August 2020.	.dwg
Spring Street Stage 3 Stormwater	Waverley Council	Sprint Street WAE with pit invert levels, surface levels, pipe diameters, and alignments - 20th January 2021.	.dwg
York Road Kerb and Gutter and Road Resurfacing	Waverley Council NJB Surveying	York Road WAE with existing levels, surveyed levels, and alignments - 12th March 2021.	.dwg
Oxford Street Stage 6 Stormwater	Waverley Council	Oxford Street near Denison Street WAE with pit invert levels, surface levels, pipe diameters, and alignments - 21st May 2021.	.dwg
Bronte Road Stage 4 Kerb and Gutter	Waverley Council	Bronte Road near Oxford Street WAE kerb and gutter alignments, surveyed levels, and design levels - 14th December 2021.	.dwg
Bronte Road and Oxford Street Pedestrian Kerb Ramp	Waverley Council	Bronte Road and Oxford Street pedestrian kerb ramp delineation with no design or surveyed levels - 4th May 2022.	.dwg
Tamarama Marine Drive Private Lighting	Waverley Council NJB Surveying	Tamarama Marine Drive existing survey with surveyed levels - 23rd February 2023.	.dwg
Calga Place	Waverley Council	Calga Place and Bronte Road intersection WAE with surveyed levels, design levels, and alignments - date unknown.	.dwg
Calga Place	Waverley Council	Calga Place WAE with design levels and alignments - date unknown.	.dwg



Dataset	Provider	Contents	Format
Macpherson Street Intersection Pedestrian Crossing	Waverley Council	Lugar Street and Macpherson Street intersection WAE with pedestrian crossing alignment and design levels - date unknown.	.dwg

3.4 POLICIES AND PLANS

Relevant State and Council policies and plans are summarized in Table 3-3. Council plans and policies were reviewed and relied upon during the development of the land-use planning measures (refer to Section 10.2). Further details on the existing planning framework within the Waverley LGA is presented in Section 8.

Table 3-3 Summary of State and Council Policies and Plans

Dataset	Provider	Contents	Format
Waverley Local Environment Plan 2012 (LEP)	Waverley Council	2012 principal environmental planning instrument used by Council to regulate land use and influence planning and development decisions within the LGA.	.pdf
Waverley Development Control Plan 2022 (DCP)	Waverley Council	2022 DCP supports the controls detailed in the LEP with more specific planning and design guidelines.	.pdf
Waverley Council and Woollahra Council Flood Emergency Sub Plan	Waverley Council	2021 plan to set out the multi-agency arrangements for the emergency management of flooding in the Waverley Council and Woollahra Council LGAs.	.pdf
Waverley Council Water Management Technical Manual (WMTM)	Waverley Council	2021 manual that serves to provide standalone technical guidelines for matters relating to water management.	.pdf
Waverley Local Strategic Planning Statement 2020-2036	Waverley Council	2020 planning statement provides a 20-year vision for planning in the LGA and the direction to achieve it. It is reviewed every seven (7) years.	.pdf
Waverley Local Housing Strategy 2020-2036	Waverley Council	2020 housing statement provides statistics on population, housing, and demographic within the LGA. The strategy recommended a modest increase in housing choice of 3,400 dwellings to 2036 reflective of a growth rate of 0.4%.	.pdf
Planning Circular PS 24-001 Update on Addressing Flood Risk in Planning Decisions	Department of Planning Housing and Infrastructure	2024 circular released to supplement PS 21-006. This circular emphasised that consistent with the findings of the 2022 NSW Flood Inquiry, the Department recommends applying a risk-based approach when addressing flooding in planning decisions.	.pdf
Planning Systems Circular PS 21-0006 Considering Flooding in Land Use Planning: Guidance and Statutory Requirements	(Former) Department of Planning & Environment	2021 circular that provides recommendations and requirements for the consideration of flooding in land use planning.	.pdf



3.5 HISTORICAL FLOOD DATA

While model calibration and validation has been undertaken as a part of the Flood Study, additional historical flood information can be useful in further validating and refining the models as well as verification of or identification of existing and additional hotspots. Historical flood information was requested as a part of the initial community consultation within this study. Data that has been received has been summarized in Table 3-4.

Table 3-4 Summary of Historical Flood Data

Dataset	Provider	Contents	Format
June 2013 - January 2020 stormwater request database	Waverley Council	Stormwater request database consisting of location, description of issue, and remediation undertaken.	.xls
January 2020 - February 2024 stormwater request database	Waverley Council	Stormwater request database consisting of location, description of issue, and remediation undertaken.	.xls
Emails of Flooding Issues	Waverley Council	Collection of emails from residents to Council detailing flooding and stormwater related issues.	.msg
Photos and Videos of Flooding Incidents	Waverley Council	Photos and videos of various locations within the LGA.	.png, .mov



4 Review of Existing Models

While the Review of Waverley LGA Flood Study and Waverley DCP Amendment (GLN Planning, 2023) has undertaken a high-level peer review to assess the appropriateness of the modelling methodologies adopted within the Waverley LGA Flood Study (BMT, 2021), it is noted that a detailed model review was not completed prior to the current study. As such, a detailed hydrologic and hydraulic model review was completed prior to the implementation of any model updates.

4.1 HYDROLOGIC MODEL REVIEW

XP-RAFTS was adopted as the hydrologic modelling package and is considered suitable for the purposes of the Flood Study. It should be noted however, that as of the end of 2021, XP-RAFTS is no longer a supported program by the software vendor and should a new hydrologic model require to be developed in future studies, alternative programs should be considered.

A database of over 3,000 individual sub-catchments (one for each pit) was previously developed as part of the Drainage System Modelling completed in 2007. BMT consolidated the 3,000 sub-catchments into 508 sub-catchments for the Flood Study. Even with the consolidation, there is still an unusually large number of sub-catchments for a catchment of this size. Noting that inflows into the TUFLOW model are applied predominantly via the 2D Source Area (SA) Pit approach, the high number of sub-catchments would prevent the over allocation of inflows to pits compared to a coarser delineation. While the number and delineation of sub-catchments could be further refined, the adopted approach is considered reasonable and further refinement is not necessary.

Impervious ratios across the catchment appear appropriate and representative of a highly urbanized catchment. An aerial reduction factor of 1.0 has been applied and is in accordance with the ARR 2019 guidelines, as all catchment areas are less than 1 km2. A Critical duration assessment was completed for each temporal pattern bin, resulting in the durations of 20, 45, and 90 minutes selected to be critical for the design events with the 15, 30, and 90 minute durations selected for the PMF. The shorter critical durations identified are to be expected for an urbanized catchment of this size. The ARR 2019 temporal patterns were adopted in accordance with the 2016 IFDs for design event modelling.

As per the ARR 2019 Version 4.1 guidelines, calibrated losses have been adopted in favour of the ARR datahub losses. While higher than the datahub losses, the calibrated losses are more comparable with those in neighbouring catchments (Coogee Bay Flood Study (BMT WBM, 2013), Rose Bay Catchment Flood Study (WMAwater, 2010), Double Bay Catchment Flood Study (Bewsher, 2008), and Centennial Park Flood Study (WMAwater, 2008)). The following calibrated losses have been adopted:

- Pervious initial and continuing loss of 20 mm and 2 mm/hr respectively; and
- Impervious initial and continuing loss of 2 mm and 0 mm/hr respectively.

While the calibrated losses are higher than those indicated in the ARR Datahub, the latest ARR guidelines stipulate a hierarchy in regard to the selection of losses to be applied, noting that calibrated losses are at the highest priority. As such, the losses adopted within the Flood Study are in accordance with the latest guidelines at the time of model development.

4.2 HYDRAULIC MODEL REVIEW

A linked 1D/2D TUFLOW HPC hydraulic model (version 2018-10-AF) was developed for the purposes of the Flood Study, simulating the complex interaction between creeks and floodplains, converging and diverging of flows through structures and the interaction between surface and sub-



surface flow. The model uses the 2013 Digital Elevation Model (DEM) with 1 m horizontal grid resolution derived from the NSW Land and Property Information LiDAR as its base topographic input and employs an appropriate 2 m horizontal grid cell size resolution. While the topographic dataset utilized was the latest available dataset at the time of development of the models, it is noted that more recent 2020 LiDAR is now publicly available.

The hydraulic roughness distribution was defined using a combination of aerial photography and cadastral information and appears appropriately represented. Buildings have been defined within the model via increased Manning's 'n' within the building footprint, allowing flood waters to travel through buildings. It is noted however that a significant number of buildings were not included within the PMF extent with the Flood Study stating that "only buildings located within a predicted flow path, which are likely to reduce the conveyance of floodwater, have been included in the model". Additionally, an updated buildings layer covering the entire study area has been made available by DCCEEW in June 2020. As such, this dataset would not have been available for the Flood Study.

While local enforcements have been included occasionally within the model (e.g. major concrete or brick walls), no kerb or gutter enforcements were identified. It is acknowledged that the enforcement of kerbs and gutters has been recommended by BMT as an outcome of the Flood Study and review of the topographic model suggests that this could assist in an improved representation of the breakout of overland flows, particularly in steeper regions.

An extensive stormwater network (total of 5,200 pipes) has been included as 1D elements embedded within the 2D domain. Pit and pipe inlet types, dimensions, invert levels, and pit inlet rating curves have been provided by Council. Where pit and pipe invert levels were not available, they were estimated from the DEM with a minimum assumed cover of 600 mm. Blockage factors of 50% and 20% for sag and on-grade pits as well as hydraulic structure blockages have been appropriately applied in accordance with the ARR Blockage Assessment.

Inflows into the TUFLOW model have been included predominantly in the form of a 2D Source-Area (SA) Pit methodology or directly to the 2D domain at the lowest point within the sub-catchment. This is a commonly adopted approach for such an urbanised catchment with a detailed stormwater network. The downstream model boundaries have been determined based on the long-term records from Fort Denison in Sydney Harbour in accordance with the Flood Risk Management Guide (OEH, 2015). Extracted levels have been applied as a constant water level boundary condition over time with appropriate overland flow coincidence considered.

The calibration of both hydrologic and hydraulic models was completed on the December 2015 event with validation undertaken on the August 2015 and February 2017 events. Available calibration data was limited to anecdotal flood information such as observations, photographs, and peak flood level estimates based on observed flood marks, originating from the previous community consultation process. No gauges to inform the calibration process were available within the study area.

In lieu of the limited data available and the uncertainty associated with anecdotal flood information, a reasonable calibration was achieved. Additionally, further validation was undertaken against a Rainfall-on-Grid (RoG) model with reasonable correlation attained.

While the review concludes that the calibrated and validated hydraulic model was largely fit for purpose at the time of development of model, the following minor issues have been identified:

- 39 pits were identified to be above the ground surface;
- Topographic anomalies causing localised artificially trapped low points; and
- Mass balance and volume errors arising due to the poor representation of the Bronte Gully.



5 Model Updates

While the modelling associated with the Flood Study was concluded to be largely fit for purpose, several hydrologic and hydraulic model updates have since been completed to address:

- Superseded datasets;
- Issues identified during the initial model review;
- Recommendations made within the Flood Study; and
- New technical guidance released since the completion of the Flood Study.

5.1 HYDROLOGIC MODEL UPDATES

5.1.1 Australian Rainfall and Runoff Version 4.2 Climate Change Update

In August 2024, ARR was updated from Version 4.1 to 4.2. The primary focus of the update was to revise the consideration of climate change in ARR to be in line with the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report (AR6) and its associated studies. As a part of this update, the climate change scenarios were considered under Shared Socio-economic Pathways (SSP) as opposed to the previously adopted Reconciled Concentration Pathways (RCP) of the IPCC 5th Assessment Report, formerly adopted in ARR Version 4.1.

The implications of the updated guidelines not only encapsulate a new approach to the modelling of future climate scenarios, but also recommend the upscaling of design event rainfall, including the Probable Maximum Precipitation (PMP). The updated guidelines also recommend the upscaling of the associated hydrologic losses to be reflective of the climate change that has occurred since the development of the rainfall data.

For example, the Bureau of Meteorology 2016 Intensity-Frequency-Duration (IFD) curves were developed using data from historical gauged records up to 2012 with a midpoint between 1961-1990. Climate change has occurred over the period of the input dataset and continues to occur beyond the input data to the IFDs. The revised Version 4.2 guidelines attempt to factor in the climate change from the IFDs that has occurred from the IFD input data to a nominated point in time (i.e. present day).

ARR Version 4.1 climate change guidance presented a single rainfall uplift factor for each AEP applied uniformly to all durations. The new Version 4.2 update introduces dynamic scaling factors that are biased towards shorter storm durations. Unlike the rainfall upscaling, the scaling factor on both initial and continuing losses are independent of duration and only vary across SSP scenario and the projection year. Therefore, the updated guidance implies not only the increase in rainfall across the study area, but also the potential for changes in critical durations.

To coincide with the increase in rainfall and storm losses, NASA has provided future projected sea levels across the world for various SSP scenarios and future year projections in an associated study for the IPCC 6th Assessment Report.

While the Waverley Council FRMS&P commenced prior to the release of the new guidance, it was jointly agreed upon with Council and DCCEEW to adopt the recommendations of the new guidance for the purposes of design event and future climate modelling. Council and DCCEEW have agreed to adopt the SSP2-4.5 pathway for the 2030 (present day) horizon, and 2100 for the future climate horizon.



5.1.2 Design Rainfall

The Flood Study utilised the BoM 2016 IFD dataset for the simulation of present-day conditions at the time of undertaking of the study. For the current study, the 2030-year horizon was jointly established between Council and DCCEEW to represent the new present-day conditions. The year 2030 was selected to coincide with the approximate time of construction for the mitigation options investigated as a part of this Study.

Upscaling factors to be applied on the BoM 2016 IFDs were extracted from the ARR Version 4.2 Datahub and presented in Table 5-1.

Table 5-1 ARR 4.2 Rainfall Upscaling Factors

Year (Horizon)	< 1 Hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours
2030 (SSP2-4.5)	1.18	1.17	1.16	1.14	1.13	1.12	1.12

5.1.3 Design Rainfall Losses

The Flood Study adopted calibrated pervious initial and continuing losses of 20 mm and 2 mm/hour accordingly. Similar to the design rainfall depth factors (refer to Table 5-1), the relevant upscaling factors for the initial and continuing losses were extracted from the ARR Version 4.2 Datahub and presented in Table 5-2.

Table 5-2 ARR 4.2 Rainfall Loss Adjustment Factors

Year (Horizon)	Initial Loss Adjustment Factor	Continuing Loss Adjustment Factor
2030 (SSP2-4.5)	1.02	1.05

5.1.4 Sea Level Rise

Oceanic tailwater conditions for the Flood Study were determined in accordance with the Floodplain Risk Management Guide (Office of Environment & Heritage, 2015). The tailwater conditions have been maintained with the inclusion of the ARR Version 4.2 sea level rise factor.

The relevant sea level rise values were extracted for Sydney, Fort Denison using the NASA Sea Level Projection Tool. The extracted values are presented in Table 5-3.

Table 5-3 Projected Sea Level Rise at Fort Denison, Sydney

Year (Horizon)	Projected Sea Level Rise (m)
2030 (SSP2-4.5)	0.09

5.1.5 Probable Maximum Precipitation

Similar to the upscaling of design rainfall adopted in accordance with the ARR Version 4.2 guidelines, the new guidance also recommends the upscaling of the Probable Maximum Precipitation. The upscaling of the PMP was adopted in accordance with the factors presented in .

While the Probable Maximum Flood (PMF) event was reported to have been modelled as a part of the Waverley LGA Flood Study (BMT, 2021), the calculations and inputs used in deriving the PMP were not included in the report or provided at the onset of this Study. As such, attempts were made to replicate the PMF hydrographs produced as a part of the Flood Study. While near identical outputs were able to be generated, minor discrepancies could not be eliminated and could be associated with the version of the hydrologic software used as well as differences in adopted input parameters.



The following parameters were utilised in accordance with the Bureau of Meteorology Generalised Short Duration Methodology (GSDM) to regenerate the PMP:

- Elevation Adjustment Factor (EAF) = 1.0;
- Moisture Adjustment Factor (MAF) = 0.7;
- Catchment Type = Rough (1.0);
- Catchment Area = 1 km2;
- Initial Loss = 0 mm; and
- Continuing Loss = 0 mm/hr.

5.2 HYDRAULIC MODEL UPDATES

5.2.1 Model Topography

The Flood Study utilised the following topographic datasets within the TUFLOW hydraulic model, both of which were provided by Council to the consultant:

- 2013 Light Detection and Ranging (LiDAR) captured by the Government's Land and Property Information; and
- 2008 Airborne Laser Scanning (ALS) captured by AAM HATCH.

As mentioned in Section 3.2, more recent LiDAR covering the entirety of the study area has been made available since the development of the Flood Study TUFLOW model. KBR has extracted the 2020 1 m horizontal grid resolution Digital Elevation Model (DEM) from the Elvis - Elevation and Depth - Foundation Spatial Data portal (ICSM, 2024). The dataset consists of a stated 0.3 m vertical accuracy and a 0.8 m horizontal accuracy.

A detailed review of the 2020 DEM has been completed in comparison to the older topographic datasets used within the Flood Study. The Flood Study and new LiDAR datasets both include the deficiencies associated with heavily processed LiDAR within an urban environment. This includes substantial tinning through dense urban lots, across buildings, and the filtering of vegetation. While both datasets are reported to contain the same vertical and horizontal accuracies, it is likely that there are differences in post-processing and data filtering methodologies applied.

The difference in elevation between the 2020 DEM and the combined 2008/2013 datasets is presented in Figure 5-1. The majority of the differences fall between a range of ± 0.05 m across the model domain. Larger differences are noted particularly in areas where new development has occurred since the time of capture of the older datasets. It is noted that the 2020 DEM is generally higher than the older combined dataset north of Bondi and lower to the south.

The 2020 DEM is considered more reflective of the current day representation of the study area and is a single homogeneous dataset. The post-processing of the newer dataset has also allowed for the improved resolution of several key hydraulic elements such as the Bronte Gully.

In agreement with Council, KBR updated the hydraulic model with the new dataset. In conjunction, KBR has also updated all existing topographic enforcements (2d_zsh) to be aligned with the new dataset.

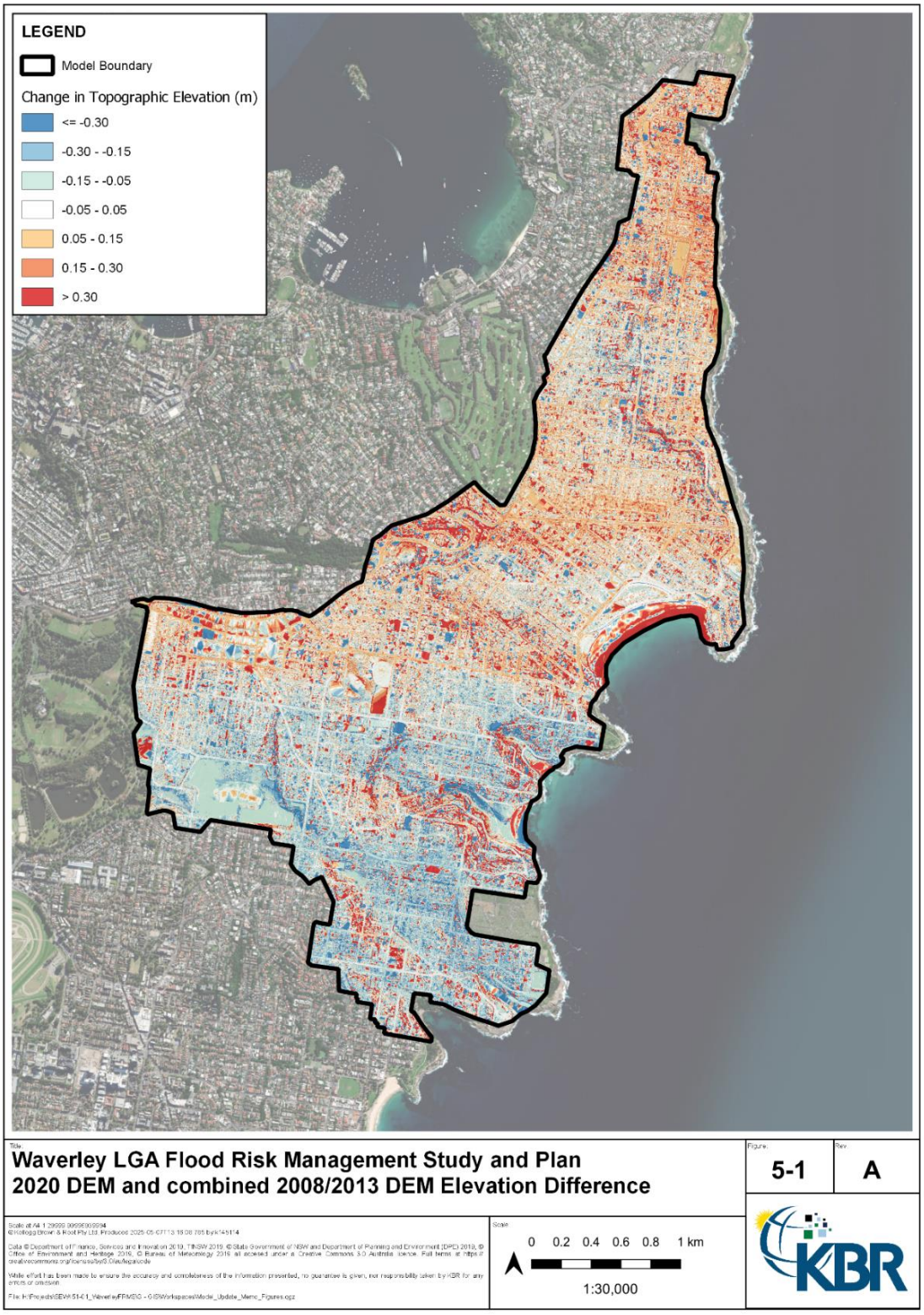


Figure 5-1 Elevation Difference Between 2020 DEM and Combined 2008/2013 DEM



5.2.2 Enforcement of Kerbs and Gutters

The Flood Study states the following:

"Another problem that is faced by the modelling in the steep catchments is where overland flow escapes the confines of the roadway and flows through properties to the new road below. Inspection of the available data and site verification suggests that overland flows would be expected to remain contained within the road corridor. … The available LiDAR data and model resolution does not provide enough detail to fully capture the road geometry. With an elevation point every metre at best, key controls such as the kerb and gutter profiles and crests of driveway entrances are not accurately represented."

As informed by the outcomes and review of the Flood Study, manual enforcement of the kerb and/or gutter profiles has been completed at key locations to increase confidence in overland flow breakout, especially in steeper regions. It is acknowledged that the accurate representation of the kerb, gutter, and road profiles is less consequential within trapped low points or areas of flatter topography as flood waters rise and spill out beyond the capacity of the roadway.

A desktop review was first undertaken to identify areas requiring kerb and/or gutter enforcements. A kerb alignment shapefile was provided by Council on the 4th of March 2024. This dataset was refined to align with the 2020 DEM and the location of the pit and pipe network within the model. Kerbs were then enforced in the hydraulic model by raising the ground surface with kerb heights estimated from Google Streetview or verified on site via ground truthing exercises. Gutters were enforced by lowering the ground surface using the 'GULLY' functionality within the TUFLOW model, allowing flow to traverse cell by cell down the gutter profile.

The enforcement of kerbs and gutters is a fine level of detail within the modelling that required assumptions on a case-by-case basis. No localised survey was undertaken to inform this task. As agreed with Council, the kerb and gutter enforcements were progressively added to the model on an engineering judgement basis to prioritise locations that were determined to have a notable impact on the existing flood behaviour. It is acknowledged that the kerbs and/or gutters have not been applied at every instance across the entire study area.

Example cross sections of the road profile depicting the kerb and gutter enforcements in comparison to the 2020 DEM has been presented in Figure 5-2 and Figure 5-3, illustrating the improved representation of kerb and gutters. A summary of the enforcements applied is presented in Table 5-4.

Table 5-4 Summary of Applied Enforcements

Type of Enforcement	Number of Enforcements Applied	Approximate Total Length (km)
Kerb	80	1
Gutter	410	56

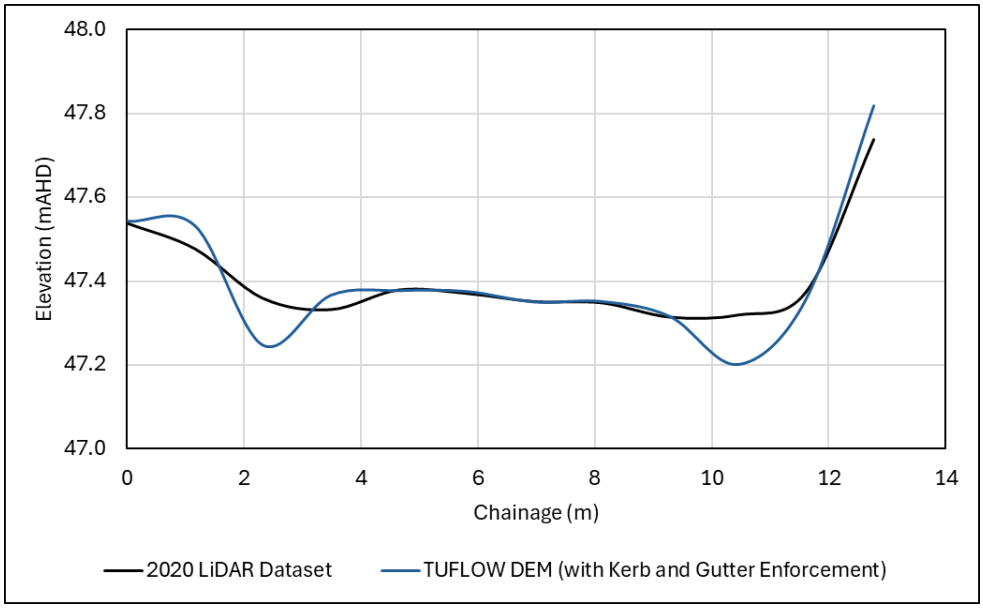


Figure 5-2 Kerb and Gutter Enforcement Topographic Profile

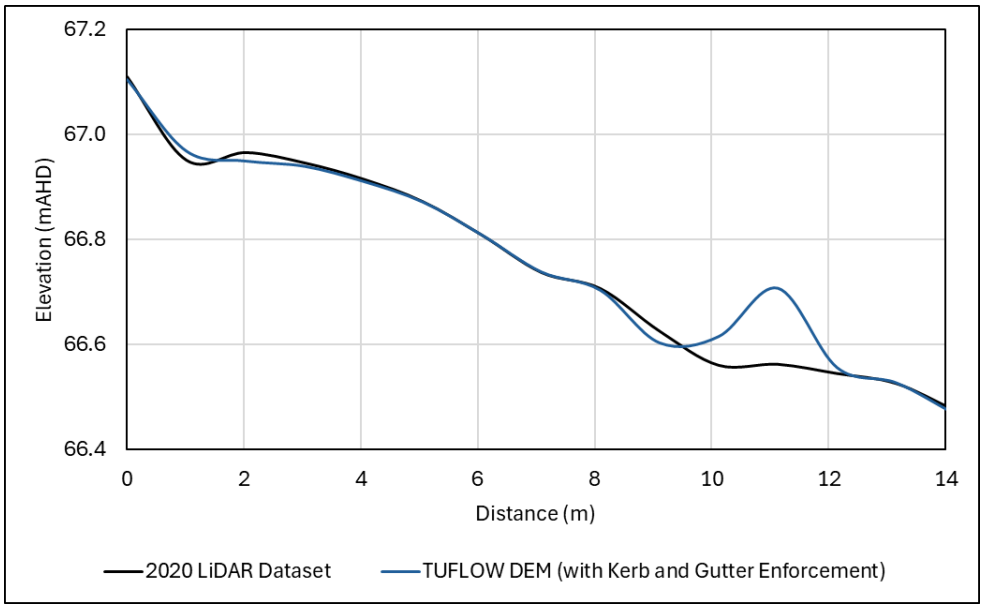


Figure 5-3 Kerb Enforcement Topographic Profile

5.2.3 Enforcement of Key Hydraulic Controls

The Flood Study states that each modelled flow path was verified using a combination of aerial photography, Google Streetview, interrogation of LiDAR elevation datasets, and ground truthing on site. This exercise formed the basis of the topographic enforcements of key hydraulic controls throughout the study area. As discussed in Section 5.2.1, each existing enforcement applied within the Flood Study TUFLOW model was reviewed and updated to provide alignment with the updated model topography.

In addition to the kerb and gutter enforcements, missing hydraulic controls along major flow paths were manually digitised and included within the updated model. The same procedure as adopted within the Flood Study was replicated for this exercise. It should be noted that only permanent



impermeable structures (e.g. concrete or brick retaining walls) were included as 'THIN' lines within the TUFLOW model. Temporary structures susceptible of failure during storm events were not considered (e.g. wooden or colourbond fences).

Similar to the enforcement of kerb and gutters, the manual enforcement of key hydraulic controls were progressively added to the model on an engineering judgement basis to prioritise locations that were determined to have a notable impact on the existing flood behaviour. It is acknowledged that the key hydraulic controls have not been applied at every instance across the entire study area.

A total of 503 new key hydraulic controls were applied within the TUFLOW model.

5.2.4 Building Representation

Building structures have the potential to divert and/or slow down flow and event act as potential flood storage during a storm event. Two key updates were made to the representation of buildings within the TUFLOW hydraulic model:

- Update of buildings to the latest dataset provided by Council; and
- Update of building representation from a high Manning's 'n' approach to a combined raised building floor pad and depth-varying Manning's 'n' approach.

The Flood Study states that not all buildings have been included across the study area, with only those that are likely to reduce the conveyance of flood water included within the model. This is likely to be a result of a sufficient buildings database not being readily available for inclusion at the time of development of the Flood Study TUFLOW model. As such, it is expected that building polygons would likely have been manually digitised based upon aerial imagery. At the outset of this study, a complete database of buildings (Geoscape, 2020) within the study area was provided by Council on behalf of DCCEEW on the 31st of January 2024.

Within the provided Flood Study TUFLOW model, buildings were represented by significantly increasing the Manning's 'n' value within the building footprint (n = 1.0). This representation allows flow through the building at slow velocities and accounts for the flood storage within the building itself. Another commonly adopted approach is the removal of the building footprint from the model domain, blocking flow through the structure and forcing flow to traverse around the nulled building footprint.

It was concluded that modelling the blockage of flow provided by the raised floor level slab would be a key component of accurately representing overland flow behaviour across the study area, while still allowing for flood waters to flow through the building footprint once the building slab level is overtopped. This is supported by the community consultations responses received within both the Flood Study and the Floodplain Risk Management Study and Plan, in which flow paths were reported through buildings.

Therefore, KBR has implemented the following building representation approach:

1. Updated all building footprints to the new Geoscape dataset provided by Council with manual inclusion of missing buildings from the new Geoscape dataset using a combination of aerial imagery and Google StreetView.
2. Contracted all building footprints by 1 m (half of the model cell size) on all sides. The contraction of the building footprint facilitates flow between buildings as the Geoscape dataset was identified to conservatively include the roof overhangs.
3. Raised the contracted building footprint above the surrounding ground surface. A 0.3 m raising was employed across the majority of the study area and was verified using a combination of Google StreetView and ground truthing site visit exercises. Where necessary, the level of raising was adjusted.



4. Applied a depth-varying Manning's 'n' approach (n = 0.02 up to 0.03 m depth, n = 0.30 beyond 0.10 m depth, and interpolation in between) on the contracted building footprint in accordance with the recommendations from the TUFLOW software vendor (BMT, 2025).

5.2.5 Bronte Gully

As detailed in Section 4.2, mass balance discrepancies and model stability issues were identified to be occurring throughout the model due to deficiencies in the representation of the Bronte Gully. In the instance of the Flood Study TUFLOW model, a total volume error of -13.310 m3 and a cumulative mass balance error of -1.07% was identified for the 1% AEP event.

As detailed in Section 5.2.1, the 2020 DEM provided an improved representation of the Bronte Gully and the surrounding area. The one-dimensional gully was therefore converted into a complete two-dimensional representation. The final cumulative mass balance error was brought to 0.00% as a result of the conversion.

5.2.6 Stormwater Network

At the outset of the study, Council provided KBR with an updated stormwater network database within the Waverley LGA. The provided database was compared with the existing stormwater network in the Flood Study TUFLOW model. All stormwater pipes with ≥ 225 mm in diameter were added into the model. A total of 181 pits and 182 pipes were added and/or updated as part of the stormwater network update. Pipes identified as privately owned, soil drains, and rain gardens were not included due to insufficient information or not being able to be represented in TUFLOW.

A number of stormwater pits and pipes owned by Woollahra Municipal Council and Transport for NSW (formerly Roads and Maritime Services NSW) were also added to appropriately represent overland flows out of the study area. As pipe property attributes were missing from these datasets, dimensions were estimated from Google StreetView and aerial photography where available. Where information was unavailable, attributes and dimensions were assumed from adjacent stormwater elements as agreed upon with Council.

KBR subsequently completed a thorough review of the updated stormwater network using the TUFLOW 1D Integrity Tool to ensure no snapping, pipe direction misalignment, and continuity issues arose as a result of the updates. In addition, several pipes that were modelled above ground as a part of the Flood Study (refer to Section 4.2) were updated to be sufficiently below the ground surface. Care was taken to ensure that alignment between the stormwater pits and the gutter enforcements (refer to Section 5.2.2) was achieved.

5.3 CRITICAL DURATION ASSESSMENT

As the rainfall upscaling factors are dynamic and vary across storm duration (refer to Section 5.1.1), the critical duration analysis was re-simulated to identify any changes in critical duration.

As per the methodology detailed within the Flood Study report, all storm durations from 20 minutes to 18 hours were simulated through the XP-RAFTS. A subset of durations between 20 minutes and 2 hours was simulated through the TUFLOW models, noting that a bias towards shorter durations is introduced with the new climate factors. A critical mean assessment was subsequently completed resulting in the 20-minute and 45-minute durations selected to be critical for catchments affected by overland flooding. The 90-minute duration storm was selected to be critical for flood storage areas.

An example enveloped durations map has been presented for the 1% AEP event. While durations other than the 20, 45, and 90 minute storms are indicated as critical for various parts of the LGA, the difference in peak flood level was negligible. The newly completed critical duration assessment affirmed the analyses previously undertaken during the Flood Study. It was concluded that no change in critical duration or representative temporal pattern has occurred despite the upscaling of rainfall, losses, and sea levels.

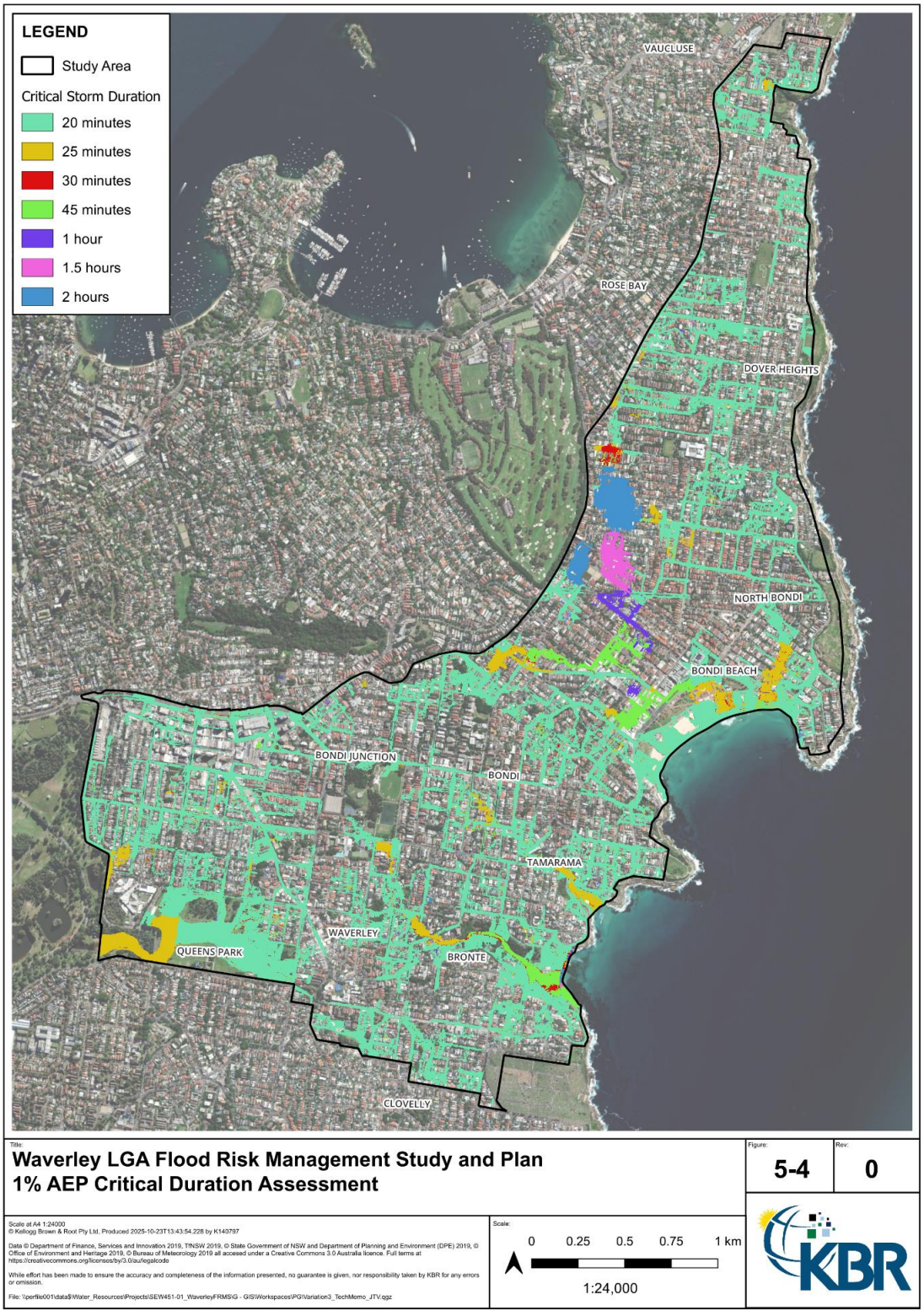


Figure 5-4 Example Mean Duration Envelope (1 % AEP Event)



5.4 OUTCOMES OF UPDATED MODELLING

All updated model results were post-processed using the following methodology detailed within the Flood Study report:

- Areas where depth does not exceed 0.15 m were removed from the design flood extent;
- Areas where the velocity-depth product exceeds 0.10 m2/s were reinstated; and
- Flood islands and puddles with an area of less than 200 m2 were removed.

All model output comparisons have been undertaken on the post-processed results only.

The following three scenarios have been established in order to ascertain the outcomes of the updated modelling:

(1) Scenario 1 - Flood Study hydrology and TUFLOW model results;

(2) Scenario 2 - Updated TUFLOW model using the Flood Study hydrology; and

(3) Scenario 3 - Updated TUFLOW model using updated hydrology (ARR Version 4.2).

5.4.1 Hydraulic Model Updates Only (Scenario 2 - Scenario 1)

To provide a like-for-like comparison against the Flood Study results, the hydraulic model was simulated using the same hydrology utilised within the Flood Study (e.g. no upscaling of rainfall, losses, and sea levels to 2030). This comparison allows for an understanding of the impacts of the hydraulic model updates in isolation to the updated hydrology.

Peak flood level difference mapping between the updated hydraulic model against the Flood Study TUFLOW model has been presented in Figure 5-5 for the 1% AEP event.

The change in building representation has led to a localised redistribution of flows through allotments. The redistribution of flows has led to localised changes in peak flood levels in and around building footprints without significantly altering the overall flood behaviour within the study area. This is driven by the nature of the raised building footprint approach, preventing shallow flow through buildings and diverting water between buildings.

The application of the kerb and gutter enforcements in conjunction with the enforcement of additional key hydraulic controls has resulted in both localised and large-scale changes in flood behaviour. The manual enforcement of kerb and gutters within the hydraulic model has significantly increased confidence in the modelling of overland flows, more readily containing flow to the roadway.

Overall, Scenario 2 indicates a notable decrease in overland flow breakout through properties, particularly in areas with steeper topography. The combination of hydraulic updates allows for a total of 70 overland flow paths to be removed that were previously indicated to spill out overland within the Flood Study TUFLOW model.

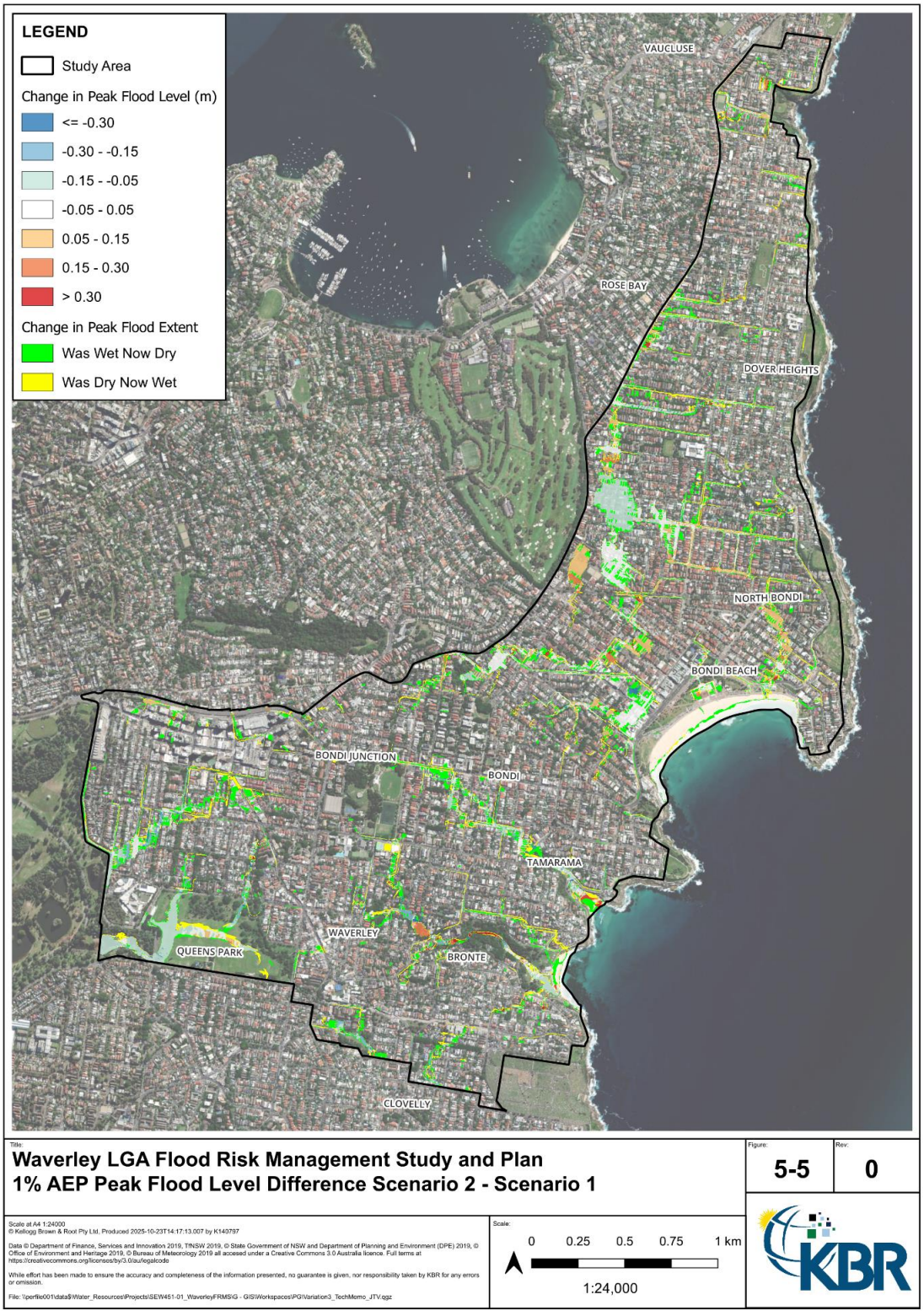


Figure 5-5 Peak Flood Level Difference between Scenario 2 - Scenario 1



5.4.2 Hydrologic and Hydraulic Model Updates (Scenario 3 - Scenario 2)

Scenario 3 is established as the new present-day scenario and includes upscaled rainfall, losses, and sea levels to the 2030 year horizon (SSP2-4.5). Peak flood level difference mapping against Scenario 2 has been presented in Figure 5-6 for the 1% AEP event.

The overall increase in the applied rainfall depth has resulted in a broadscale increase in peak flood levels across the study area when compared against Scenario 2. The impact is most noticeable within flood storage locations and in the lower reaches of the study area due to the increase in volume as runoff propagates down the study area.

The minor increase in sea levels at the downstream model boundary (ocean) has not resulted in further backwatering/encroachment into residential areas. This indicates that the study area is elevated sufficiently higher than the downstream boundaries and largely unimpacted by the effects of sea level rise.

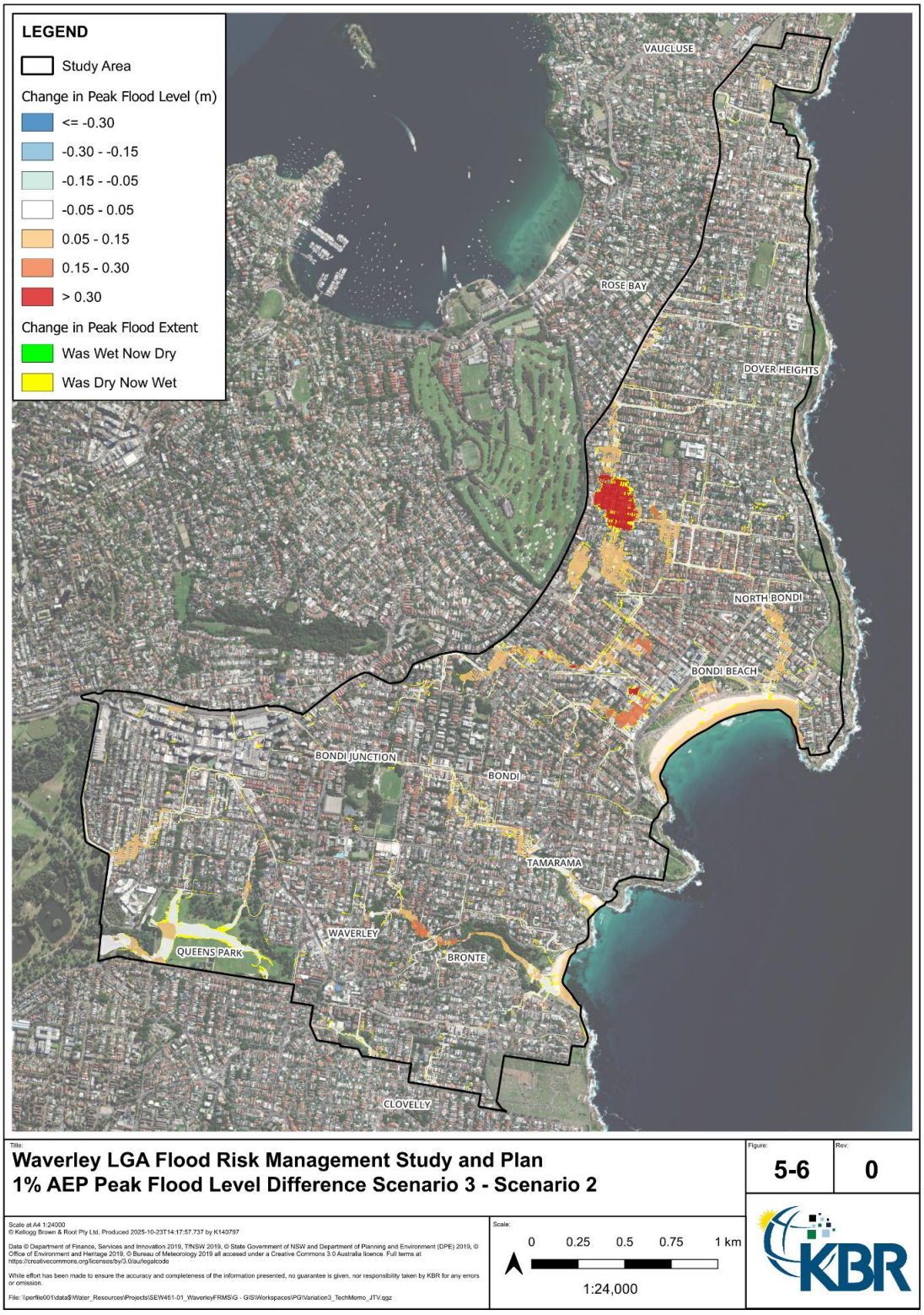


Figure 5-6 Peak Flood Level Difference between Scenario 3 - Scenario 2



5.5 UPDATED HISTORICAL EVENT CALIBRATION AND VALIDATION

As a significant number of updates have been made to the hydraulic model, the historical storm events from the Flood Study were simulated through the updated model to ensure the model remains suitably calibrated. As per the Flood Study, validation of the updated results was undertaken by re-simulating the December 2015, August 2016, and February 2017 events. The Flood Study calibration was undertaken using the December 2015 event, with validation completed using the August 2016 and February 2017 events.

The same basis of calibration as the Flood Study was adopted with the community consultation outcomes relied upon for comparison of the simulated flood levels to observed flood conditions. The community consultation outcomes have been provided in the following two distinct response types:

- Locations where general flooding has been reported without specific detailed flood depths; and
- Locations where flood depths have been reported.

Within the Flood Study, no consideration was given to locations where no flooding was reported. As such, these locations were not considered within this current exercise.

Where the previous community consultation results reported flood depths, equivalent flood levels were estimated by adding the reported depths to the topographic levels extracted from the 2020 DEM (noting that the base topographic dataset has changed between the existing and updated hydraulic models). For locations where general flooding has been reported, efforts have been made to confirm flooding within the vicinity of the reported location. The number of reported locations used to assess the three (3) events is shown in Table 5-5. The community consultation response locations have been spatially mapped in Figure 5-7, Figure 5-8, and Figure 5-9.

Table 5-5 Number of Reported Locations Used for Model Calibration and Validation

Response Type	December 2015	August 2015	February 2017
Locations with general flooding reported	15	15	6
Locations with flood depths reported	6	4	1

In all 36 instances where general flooding has been reported, the updated model results have simulated flooding across the three historical events. Similarly, strong alignment has been maintained between the community reported depths and the simulated peak flood levels from the updated model. Nine locations are within a ± 0.01 m difference, with two locations showing differences up to 0.2 m in depth. Considering the level of uncertainty associated with anecdotal information, the high level of agreement between the observed and modelled flood levels concludes the model remains suitably aligned with the community consultation responses.

A summary of the comparison between observed and modelled flood levels for all three historical events are detailed in Table 5-6 to Table 5-8.

Table 5-6 Comparison Between Observed and Modelled Peak Flood Levels for the December 2016 Event

ID	Location	Observed Depth (m)	Converted Level (m AHD)	KBR Modelled Peak Flood Level (m AHD)	Difference (m)
1	Burnie Street, Clovelly 0.50-0.75 m in front yard	0.50 - 0.75	33.00 - 33.25	33.00	-
2	Palmerstone Avenue, Bronte 1 m ground and yard	1.00	42.00	41.80	-0.20
3	Curlewis Street, Bondi Beach	1.00	15.70	15.70	-



ID	Location	Observed Depth (m)	Converted Level (m AHD)	KBR Modelled Peak Flood Level (m AHD)	Difference (m)
	1 m in car basement				
4	Wallis Parade, North Bondi 0.3 m estimate	0.30	16.75	16.76	+0.01
5	Wallis Parade, North Bondi Flood level estimate based on Flood Study Figure 5-8	0.60	16.75	16.76	+0.01
6	Macdonald Street, Vaucluse 0.1 m in front yard	0.10	61.40	61.40	-

Table 5-7 Comparison Between Observed and Modelled Peak Flood Levels for the August 2016 Event

ID	Location	Observed Depth (m)	Converted Level (m AHD)	KBR Modelled Peak Flood Level (m AHD)	Difference (m)
1	Palmerstone Avenue, Bronte 0.5-0.6 m ground floor	0.50 - 0.60	41.50 - 41.60	41.60	-
2	Simpson Street, Bondi 0.5-0.6 m measurement during site visit (refer to Flood Study Figure 5-14)	0.50 - 0.60	36.30 - 36.40	36.50	+0.10
3	Old South Head Road Francis Street 0.3-0.4 m	0.30 - 0.40	50.70 - 50.80	50.80	-
4	Wallis Parade, North Bondi 0.04 m from entering ground floor apartment	0.26 m assuming 0.30 m building pad	16.66	16.65	-0.01

Table 5-8 Comparison Between Observed and Modelled Peak Flood Levels for the February 2017 Event

ID	Location	Observed Depth (m)	Converted Level (m AHD)	KBR Modelled Peak Flood Level (m AHD)	Difference (m)
1	Warners Avenue, North Bondi -0.6 m measurement during site visit (refer to Flood Study Figure 5-23)	0.60	10.60	10.60	-

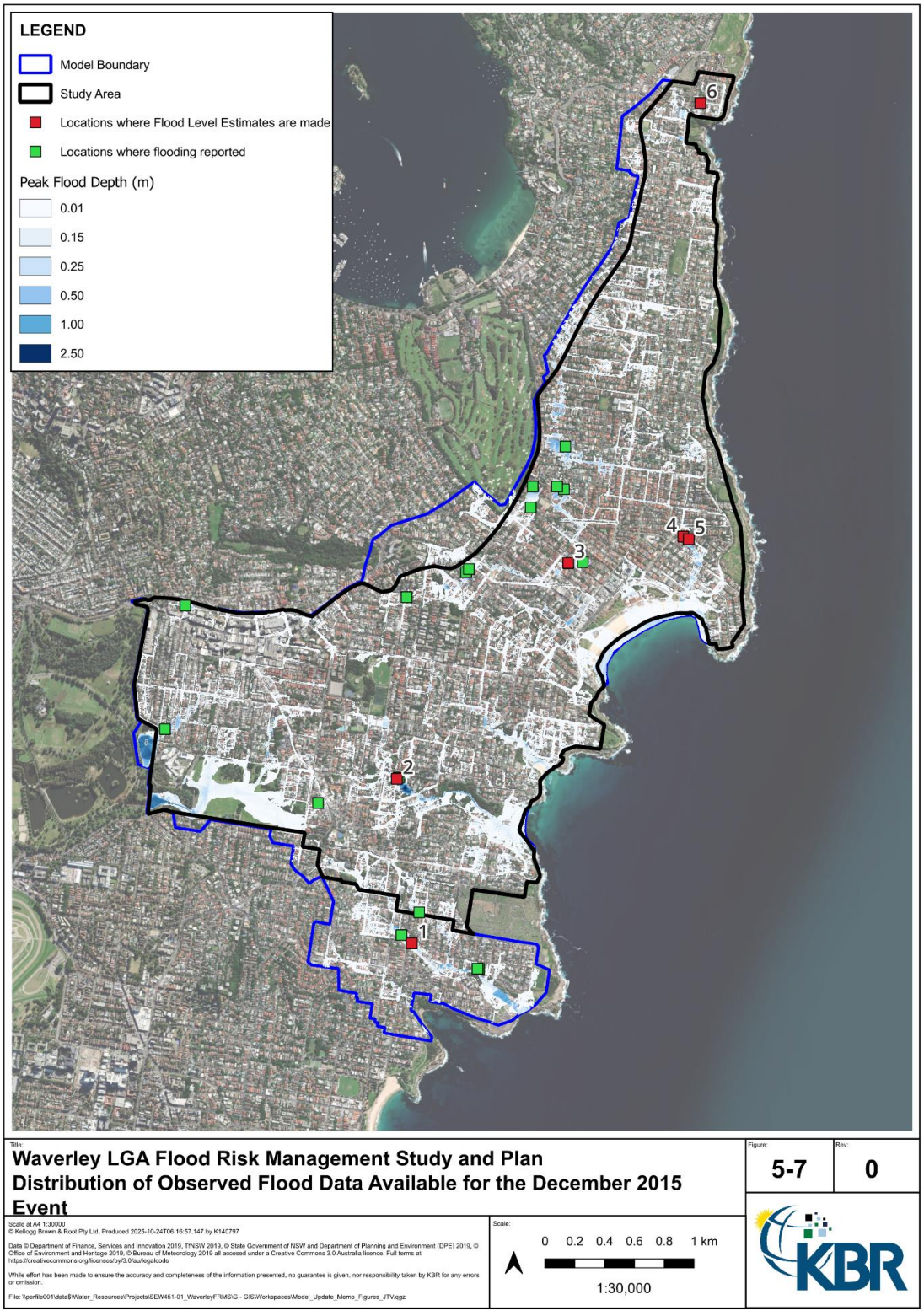


Figure 5-7 Distribution of Observed Flood Data for the December 2015 Event

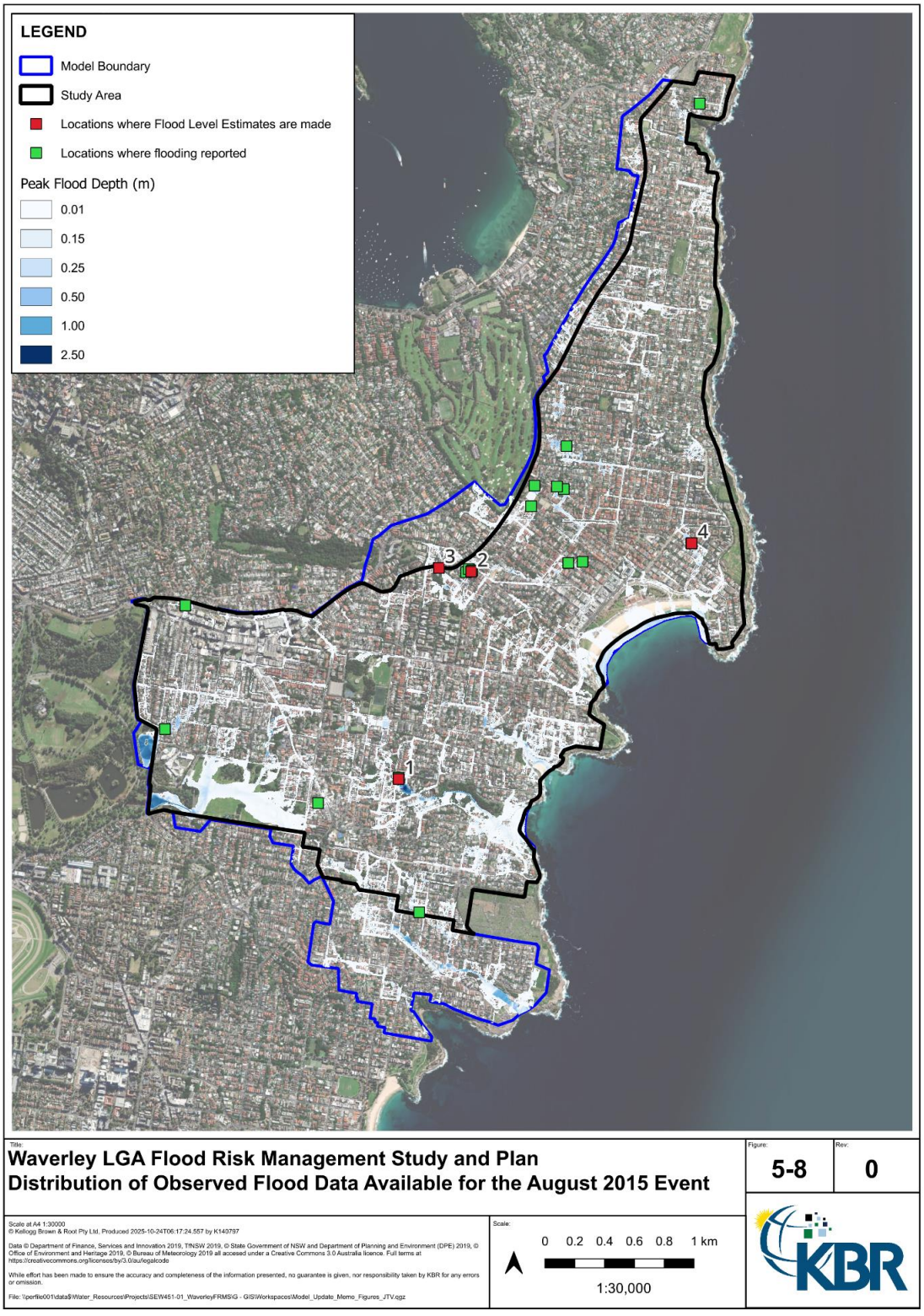


Figure 5-8 Distribution of Observed Flood Data for the August 2015 Event

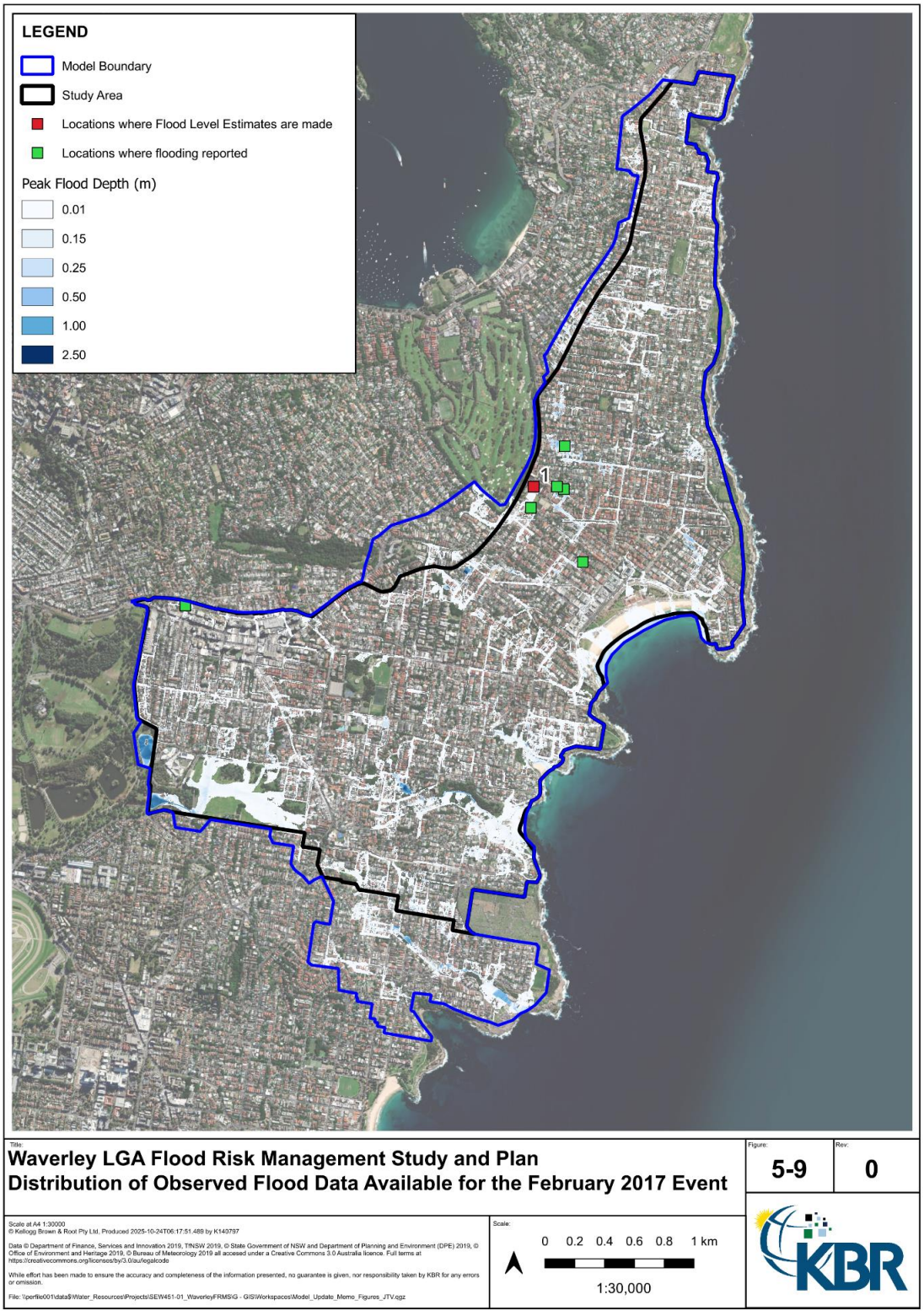


Figure 5-9 Distribution of Observed Flood Data for the February 2017 Event



6 Updated Design Flood Behaviour

6.1 RESULT POST-PROCESSING

The post-processing of the design event modelling results, adopted within the Flood Study was reviewed prior to the flood mapping component of the study. The depth cutoff, velocity depth product reinstatement, and flood island removal values were reviewed to identify any combinations that would produce a more appropriate result noting the updated modelling. The introduction of a velocity reinstatement parameter was also explored. However, extensive testing concluded that the process and parameterisation adopted within the Flood Study produced an appropriate representation of the flood behaviour within the study area. The adopted parameters are presented in Section 5.4.

6.2 FLOOD MAPPING

One of the benefits and outcomes of 2D modelling is the ability to visualise the spatial distribution of model outputs, such as peak flood level, depth, and velocity as a high-definition flood map. The visualisation of the various model outputs is a critical component in developing an understanding of and appreciation of the flood behaviour and associated flood risks across the study area.

In conjunction with the updated hydrologic and hydraulic models, the flood mapping outputs have been updated (refer to Section 5), post-processed (refer to Section 6.1), and presented in Appendix B. The mapped outputs have been detailed in Table 6-1.

Table 6-1 Summary of Flood Mapping Outputs

Output	Event
Peak flood depth	63.2%, 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP events as well as the PMF event
Peak flood velocity	
Flood hazard categorisation	
Flood function categorisation	5%, and 1% AEP events as well as the PMF event

6.2.1 Flood Hazard Classification

Flood hazard is typically derived from a combination of peak flood depth and velocity. The visualisation of flood hazard provides for a better understanding of the potential flood risk within the study area. Handbook 7 - Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (2013) provides a revised hazard classification, which adds clarity to the hazard categories and what they mean in practice. The revised classifications were formally adopted by the DCCEEW in the Flood Risk Management Manual (Department of Planning & Environment, 2023a). The classification is divided into six (6) categories with each category indicating the restrictions on people, buildings, and vehicles as depicted in Figure 6-1.

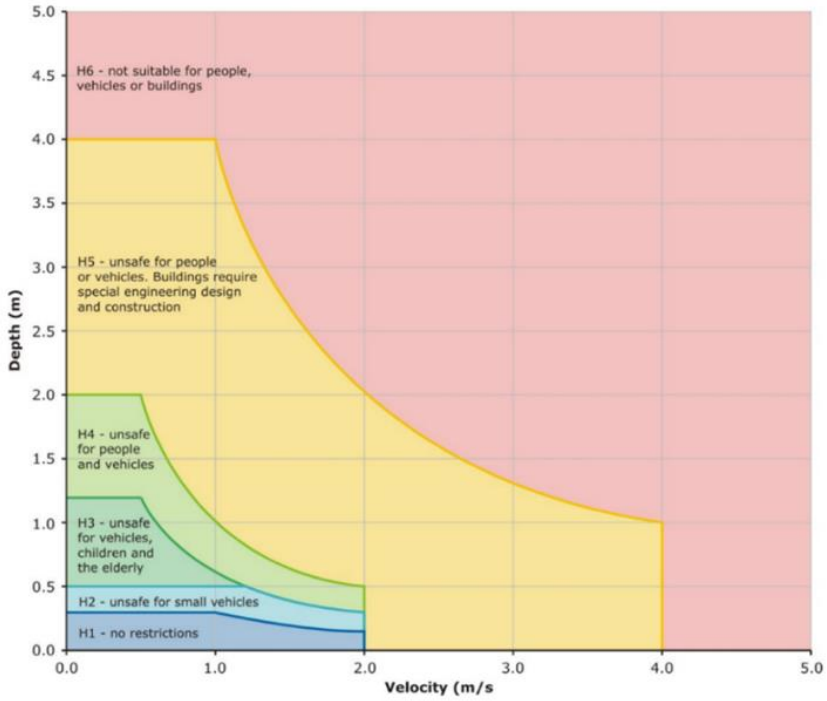


Figure 6-1 Combined Flood Hazard Curves (AIDR, 2017)

6.2.2 Flood Function Categorisation

The definition of flood behaviour and the associated impacts are likely to vary from one floodplain to another, depending on the catchment characteristics and associated nature of flooding within the study area. As such, the provided guidance in Flood Risk Management Guideline FB02: Flood Function (NSW Government, 2023) and the previously adopted framework Floodplain Development Manual (NSW Government, 2005) allows for the interpretation and adaptation of defining the Flood Function categories on a case-by-case basis.

The hydraulic Flood Function categories as defined within the Flood Risk Management Guideline are as follows:

- Floodways - Areas that convey a significant portion of the rainfall-runoff flow. These are areas that, even if partially blocked, would cause a significant increase in flood levels or a significant redistribution of flood flows, which may adversely affect other areas.
- Flood Storage - Areas that are important in the temporary storage of floodwaters during the passage of the flood. If the area is substantially removed by levees or fill, it would result in elevated water levels and/or elevated discharges. Flood Storage areas, if completely blocked, would cause peak flood levels to increase by more than 0.1 m and/or would cause the peak discharge to increase by more than 10%.
- Flood Fringe - Remaining areas of flood prone land after Floodways and Flood Storage areas have been defined. Blockage or filling of this area would not have any significant effect on flood behaviour or flood levels.

While the hydrologic and hydraulic model updates have resulted in the localised refinement of overland flow, the overall flood behaviour remains largely unchanged between the Flood Study. As such, as agreed upon with Council and DCCEEW, the parameters used for defining the Flood Function categories have been maintained from the Flood Study (refer to Table 6-2). A review of



the parameterisation has been completed, determining that the parameters adopted are found to be still appropriate.

Table 6-2 Flood Function Definition Parameters

Category	Adopted Parameter Thresholds
Floodway	Velocity * Depth > 0.2
Flood Storage	Velocity * Depth < 0.2 and Depth > 0.5 meters
Flood Fringe	Velocity * Depth < 0.2 and Depth < 0.5 meters

6.3 STORMWATER VOLUME CAPACITY ASSESSMENT

The 1D TUFLOW ESTRY engine produces results which presents how much a pipe or culvert is filled with floodwater throughout the hydraulic model simulation. Figure 6-2 illustrates at which event the pipe/culvert's available volumetric capacity is exceeded. Figure 6-3 presents the percentage results full for the 20% AEP event.

These results presented can act as an indicator to the pipe/culvert's volumetric capacity under differing design events. While the volume of a pipe may be full under the simulated conditions, more flow may be conveyed dependant on other hydraulic factors such as upstream and downstream water levels, or pit inlet capacities. The percentage full results can indicate locations where further investigations into drainage upgrades may be beneficial.

As is typical for urban stormwater networks, the results indicate that for the 20% AEP event, the drainage network is typically operating at or around pipe volume full across most of the urbanised study area. All trunk lines are indicated to be reaching volume full capacity in the 63.2% AEP event. Therefore, without the upgrade of the trunk drainage lines, the benefits associated with the upgrade of the existing network or construction of new pits would be diminished.

The stormwater volume capacity assessment has been considered in the development of the flood mitigation measures as described in Section 10.3.

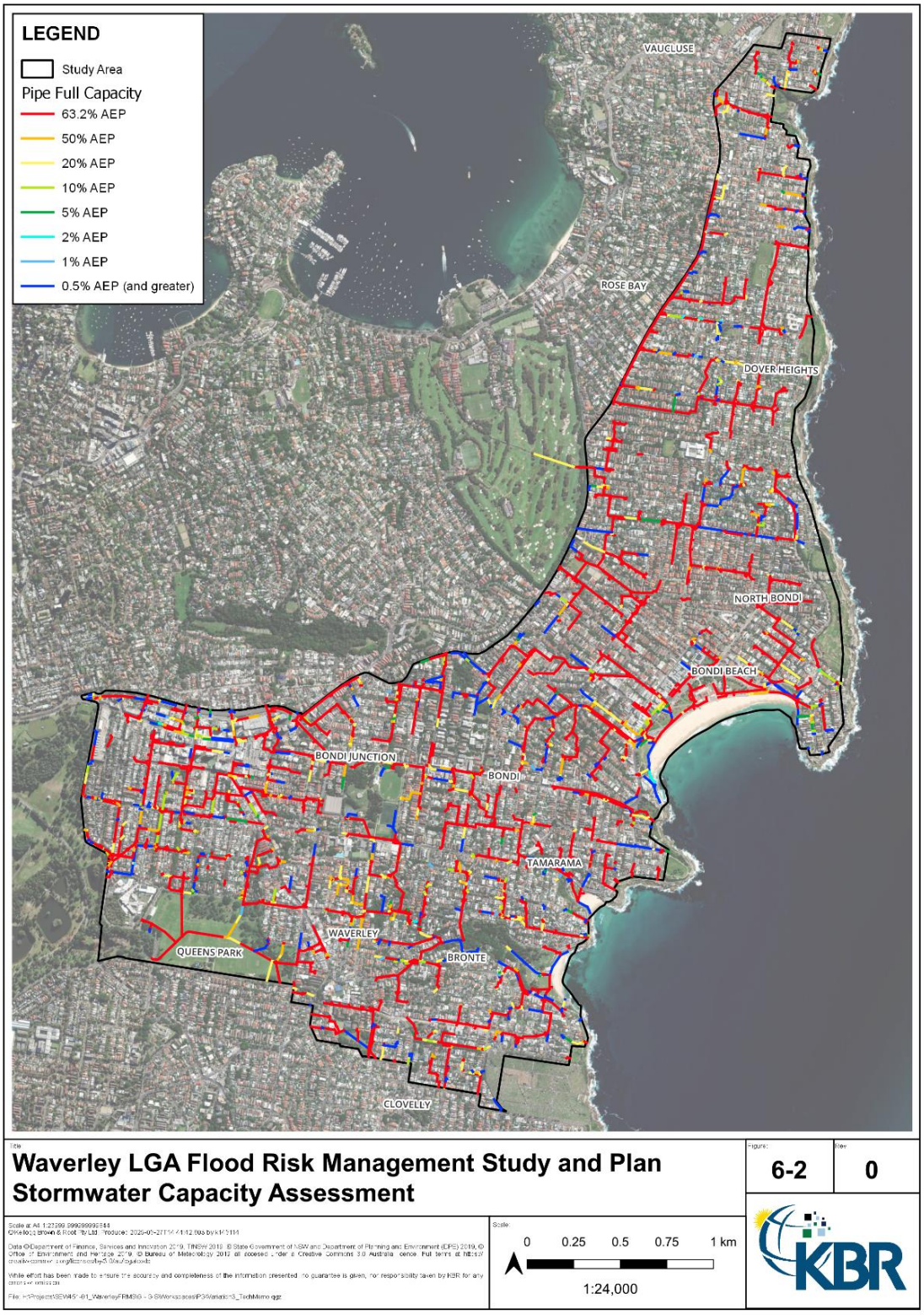


Figure 6-2 Stormwater Volume Capacity Assessment

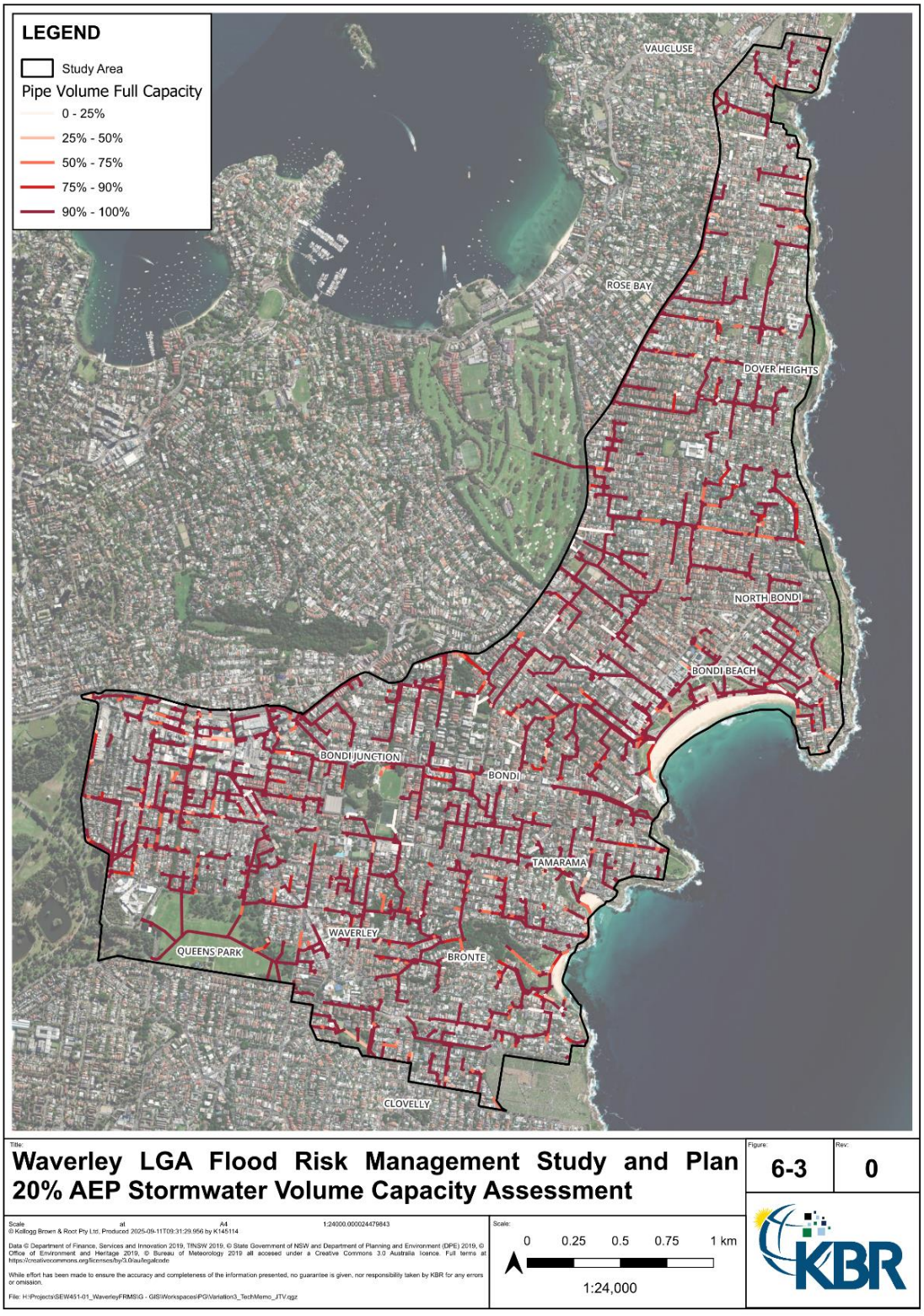


Figure 6-3 20% AEP Event Stormwater Volume Capacity



6.4 HOTSPOT VERIFICATION

The outcomes of the updated flood mapping and initial community consultation have been reviewed to confirm the relevance of the 12 hotspots identified within the Flood Study. The hotspot identification process identifies locations with high concentrations of flood-affected properties and highlights areas should be targeted for floodplain mitigation optioneering.

No significant variation in the overall catchment flood behaviour or the representation of major overland flow paths has occurred between the existing and updated modelling. Therefore, whilst there have been localised changes within the hotspots themselves, the 12 original hotspot locations have been maintained from the Flood Study with no new hotspots identified. A detailed description of each hotspot is included in Section 7.9 of the Waverley LGA Flood Study (BMT, 2021).

The identified hotspots include:

1. William Street - Gilgandra Road, Rose Bay;
2. Glenayr Avenue - Plowman Street, North Bondi;
3. Elliott Street - Bonus Street, North Bondi;
4. Brassie Street - Niblick Street, North Bondi;
5. Beach Road - Warners Avenue, North Bondi;
6. Wallis Parade - Ramsgate Avenue, North Bondi;
7. Roscoe Street - Beach Road, Bondi Beach;
8. Chambers Avenue - Jaques Avenue, Bondi Beach;
9. Francis Street - Simpson Street, Bondi Beach;
10. Tasman Street - Tamarama Street, Bondi;
11. Palmerston Avenue - Murray Street, Bronte; and
12. Alt Street - York Road, Queens Park.

6.5 ROAD INUNDATION ANALYSIS

Separate to the hot spot analysis and its focus on overland flow risk to properties, a detailed analysis of the impact of flood waters to roads and vehicles has been undertaken across the range of design events simulated. Each road within the study area has been segmented at each intersection, resulting in a total of 1400 road segments for 388 unique roads. Across each road segment, the maximum and average post-processed flood hazard and depth outputs were sampled and interpreted into three categories as summarised in Table 6-3.

Table 6-3 Road Inundation Analysis Summary

Event	Roads Hazardous to Vehicles: Hazard Categorisation > H2 (number [%})	Roads Cut: Flood Depth > 150 mm (number [%])	Roads Susceptible to Aquaplaning: Flood Depth > 5 mm (number [%])
63.2% AEP	40 [2.9%]	68 [4.9%]	106 [7.6%]
50% AEP	58 [4.1%]	84 [6.0%]	140 [10.0%]
20% AEP	149 [10.6%]	138 [9.9%]	290 [20.7%]
10% AEP	260 [18.6%]	172 [12.3%]	462 [33.0%]
5% AEP	312 [22.3%]	183 [13.1%]	513 [36.6%]



Event	Roads Hazardous to Vehicles: Hazard Categorisation > H2 (number [%})	Roads Cut: Flood Depth > 150 mm (number [%])	Roads Susceptible to Aquaplaning: Flood Depth > 5 mm (number [%])
2% AEP	350 [25.0%]	206 [14.7%]	555 [39.6%]
1% AEP	410 [29.3%]	219 [15.6%]	604 [43.1%]
0.5% AEP	445 [31.8%]	238 [17.0%]	643 [45.9%]
0.2% AEP	499 [35.6%]	259 [18.5%]	701 [50.1%]
PMF	985 [70.4%]	549 [39.2%]	1,132 [80.9%]

6.5.1 Road Hazard Analysis

In accordance with the Flood Risk Management Manual (Department of Planning & Environment, 2023a), a H2 hazard category is identified as being unsafe for small vehicles. As such, all road segments with a hazard category above H2 have been denoted with the attributed AEP and presented in Figure 6-4.

6.5.2 Road Cutoff Analysis

Roads with average flood depths greater than 150 mm have been identified as being cutoff. While no prescriptive depth criteria are stated within the Flood Risk Management Manual, research has indicated that 150 mm depth of water is sufficient to float small vehicles (G P Smith, B D Modra, T A Tucker, and R J Cox, 2017). This depth also corresponds with the common kerb height and has been selected as the criteria for which a roadway has been completely inundated and therefore cut off (refer to Figure 6-5).

6.5.3 Road Aquaplaning Analysis

The maximum aquaplaning depth threshold has been extracted from relevant Austroads guidelines (Austroads, 2024). Roadways that experience flood depths above 5 mm at any instance of the road segment have been identified to be subject to aquaplaning (refer to Figure 6-6).

6.6 FLOOD RISK PRECINCT CLASSIFICATION

The Flood Risk Precinct Classification (FRPC) disaggregates the floodplain into low, medium, and high flood risk categories. As part of the Draft DCP Provisions prepared by Water Modelling Solution for Waverley Council (WMS, 2021), Flood Risk Precinct Classifications were derived for the Waverley LGA.

As the hydrologic and hydraulic model updates (refer to Section 5) has resulted in notable changes in modelled outputs, the FRPC was updated as a part of this study. As requested by Council, the same approach that was previously adopted has been applied. The definition of the FRPC is presented in Table 6-4 with the re-defined FRPC presented in Figure 6-7. Hazard classification criteria are detailed in Section 6.2.1)

Table 6-4 Flood Risk Precinct Classification Definitions

Category	Criteria
High Flood Risk	Areas with a hazard classification of H4 to H6 in the 1% AEP event.
Medium Flood Risk	Areas with a hazard classification of H1 to H3 in the 1% AEP event.
Low Flood Risk	The area between the 1% AEP extent and the PMF extent.

The flood risk precinct classification outputs have been considered in the development of the land-use planning measures as described in Section 10.2.

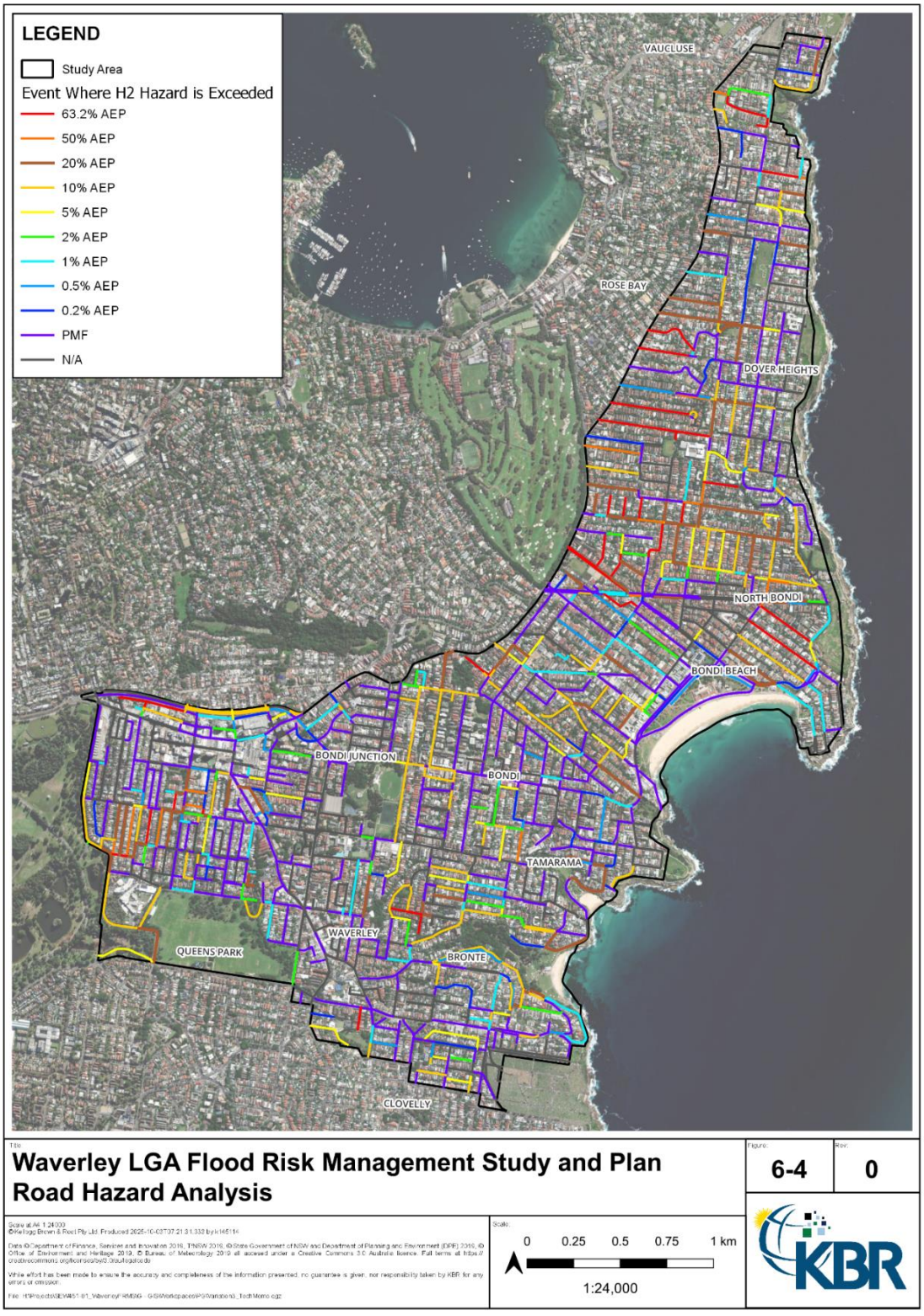


Figure 6-4 Road Hazard Analysis

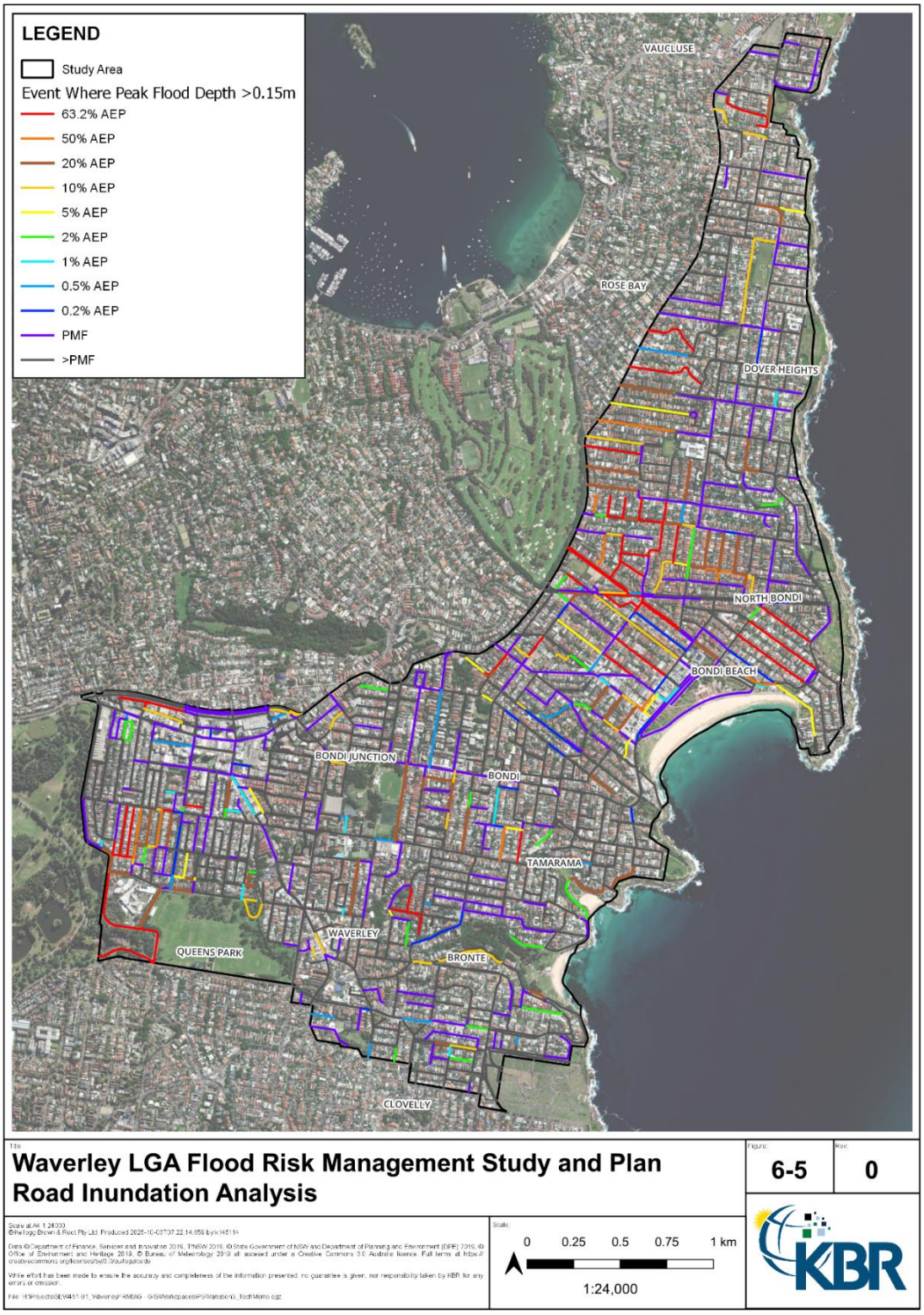


Figure 6-5 Road Inundation Analysis

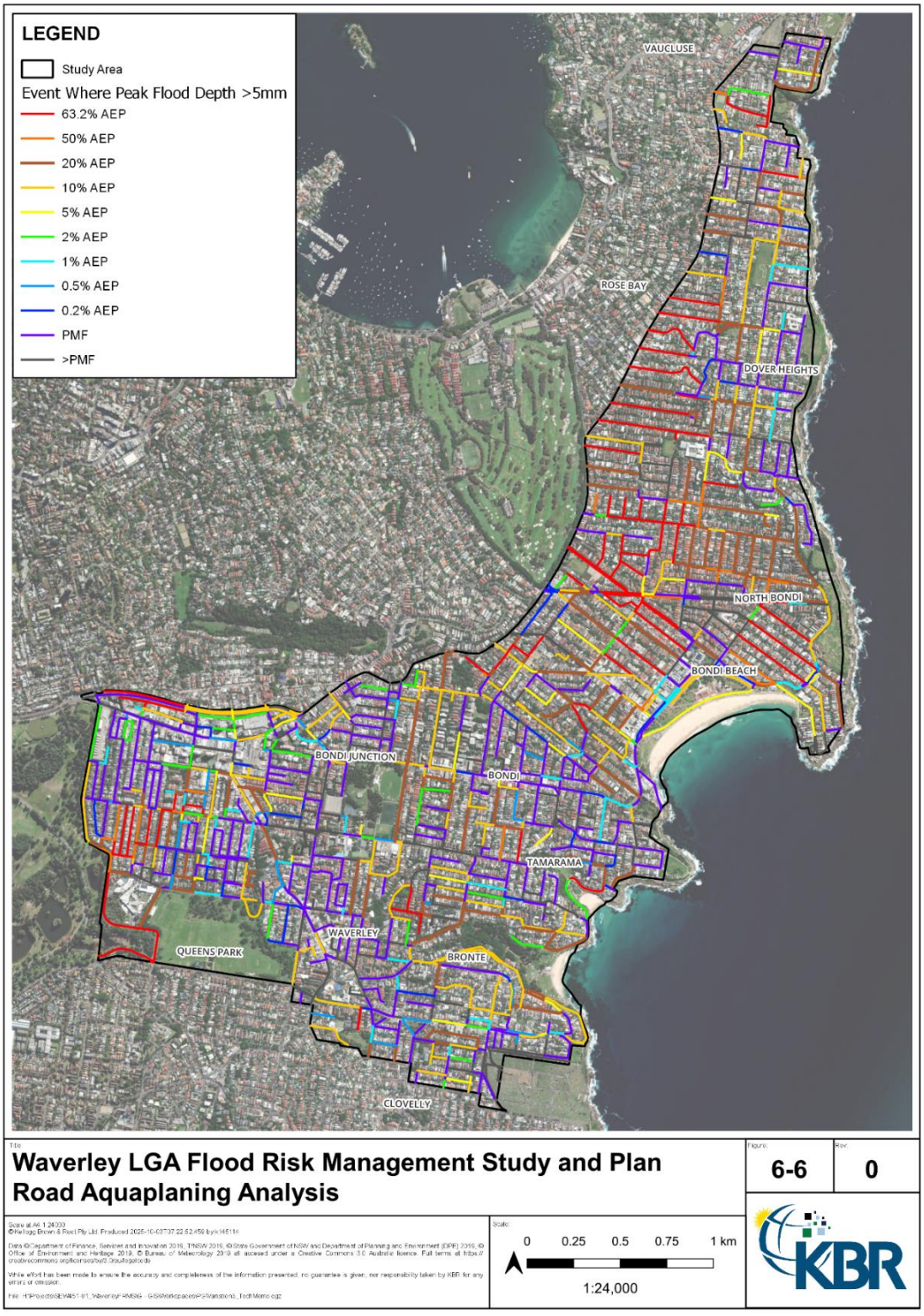


Figure 6-6 Road Aquaplaning Analysis

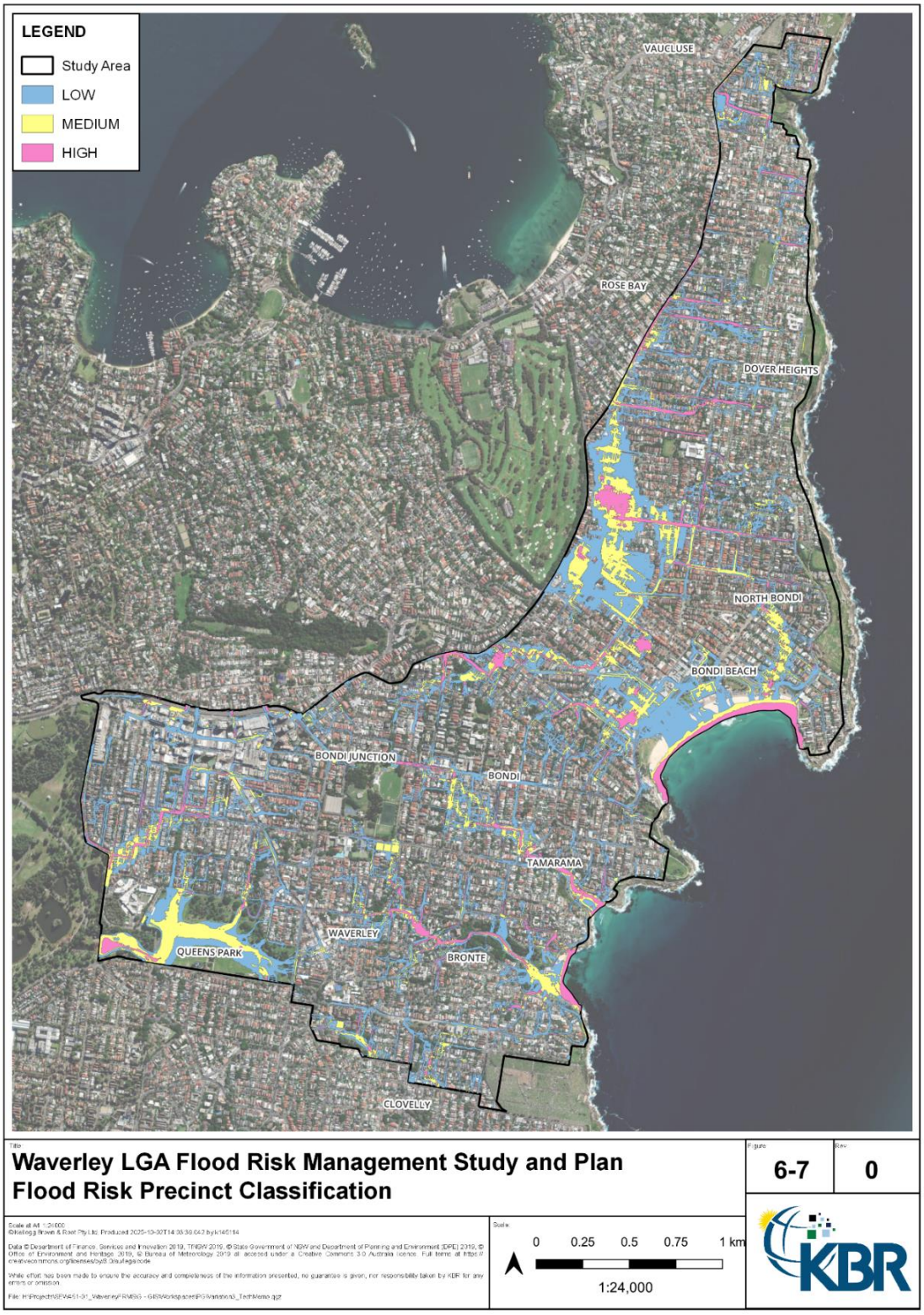


Figure 6-7 Flood Risk Precinct Classification

6.7 FLOOD EMERGENCY RESPONSE CLASSIFICATION OF COMMUNITIES

KBR has completed the flood emergency response classification of communities in accordance with the Australian Disaster Resilience Handbook - Flood Emergency Response Classification of the Floodplain (AIDR, 2017). The Flood Emergency Response Classification (FERC) system offers a structured method to classify and manage flood risks across Australia. This framework aims to enhance flood risk understanding and management by categorising areas based on their flooding characteristics, thereby aiding emergency services, planners, and communities in developing targeted strategies to mitigate and respond to flood events effectively.

The FERC system uses three levels of classification (primary, secondary, and tertiary), each providing increasing detail about the flood risk and response requirements. Figure 6-8 presents the AIDR flow chart detailing the FERC definition process.

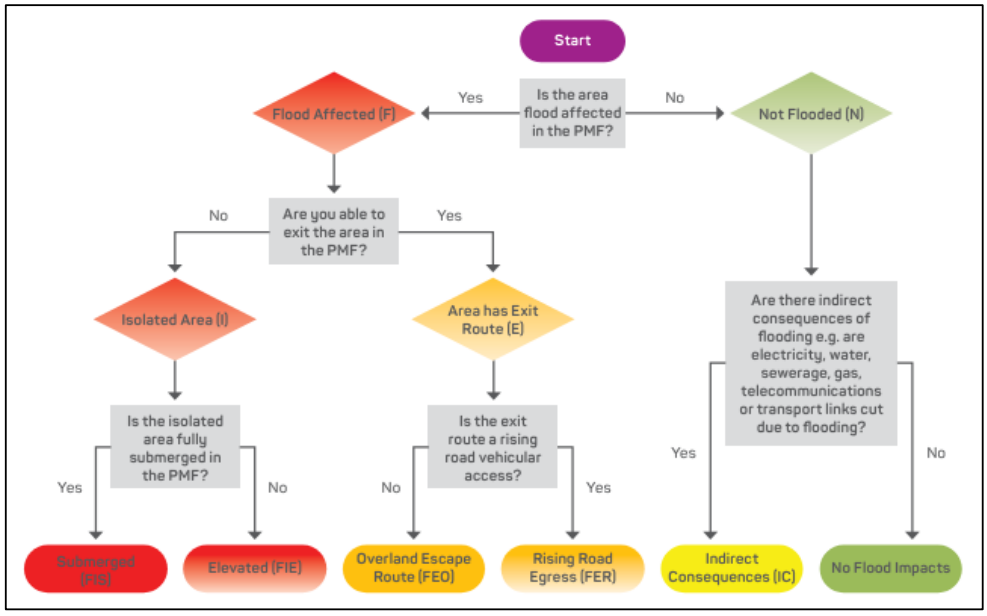


Figure 6-8 FERC System Process Flowchart

Each classification process has been summarised as follows:

- Flooded (F): The area is flooded in the PMF event.
  - Isolated (I): Areas isolated from community evacuation facilities by floodwater and/or impassable terrain. Likely to lose electricity, gas, water, sewerage, and telecommunications.
    - Submerged (S): Where all the land in the isolated area is fully submerged.
    - Elevated (E): Where there is substantial elevated land in the isolated area above the flood.
  - Exit Route (E): Areas not isolated in the PMF event with an exit route to community evacuation facilities.
    - Overland Escape (O): Evacuation relies on escape routes that rise out of the floodplain.
    - Rising Road (R): Evacuation follows roads that rise out of the floodplain.
- Not Flooded (N): The area is not flooded in the PMF event.



- Indirect Consequence (IC): Areas not flooded but may lose services like electricity, gas, water, sewerage, telecommunications, and transport due to flooding elsewhere.
- Flood Free: Areas not affected by flooding or its indirect consequences.

The flood emergency response classification of communities for the 14 catchments that comprise the study area was undertaken for the PMF event as well as the 0.5% and 1% AEP. Where the processes were undertaken on the 0.5% AEP and 1% AEP events, the same procedure as above was adopted but the nominated AEPs were used in lieu of the PMF event. The classification exercise was completed on a suburb-wide bases and has been presented in Figure 6-9, Figure 6-10, and Figure 6-11 for the PMF, 0.5% AEP, and 1% AEP events respectively.

For the 1% AEP and 0.5% AEP events, the majority of the LGA is classified as FER in accordance with the AIDR guidelines with the exception of Rose Bay and Dover Heights. While there are no major highways or motorways within the LGA, the majority of the roads within the suburbs are trafficable for small vehicles up to the 0.5% AEP event, allowing for evacuation via rising road egress. The suburb of Dover Heights has overland flow completely contained within the roadway and is therefore classified as IC. On the other hand, Rose Bay contains the most severe trapped low point within the Waverley LGA, with large, ponded depths extending over a significant number of residential properties and roadways. As such, Rose Bay has been classified as FEO with evacuation possible via overland escape routes and not as readily through vehicular roadways.

Comparatively, the PMF event indicates notable increases in depth and extent of flooding across the LGA, resulting in exacerbation of the FERC extents. Due to the increase in the volume of rainfall afforded by the PMF event, the suburbs of Bondi and Rose Bay have been classified as FIS, with significant portions of the suburbs isolated and submerged. Dover Heights has been classified as FER as the roadway capacity is exceeded, and flows begin to breakout overland. Apart from the suburb of Lachlan Swamps, the remaining suburbs have been classified as FEO as the trafficability of the roadways decrease with increasing depth and hazard rating.

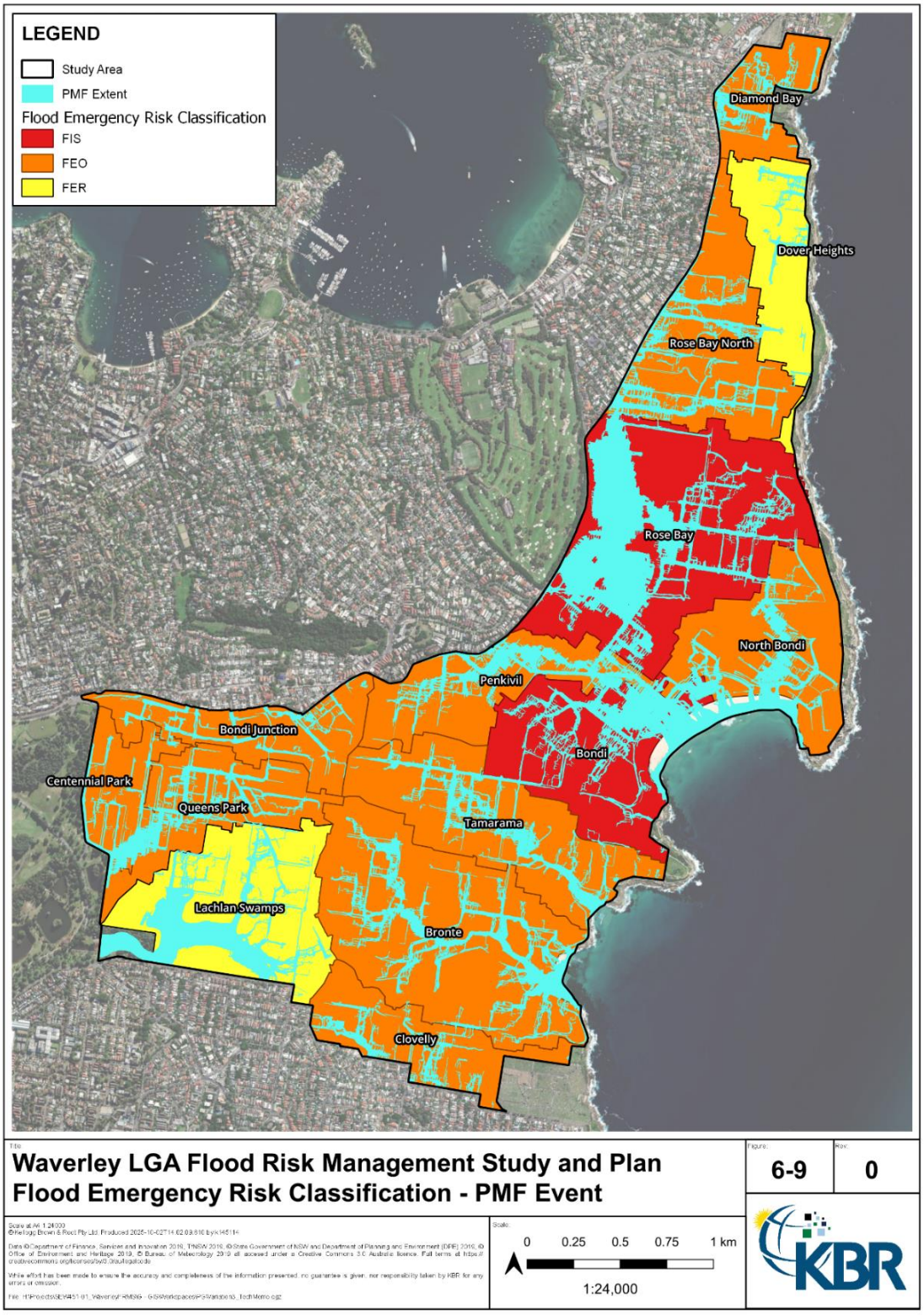


Figure 6-9 Flood Emergency Risk Classification - PMF Event

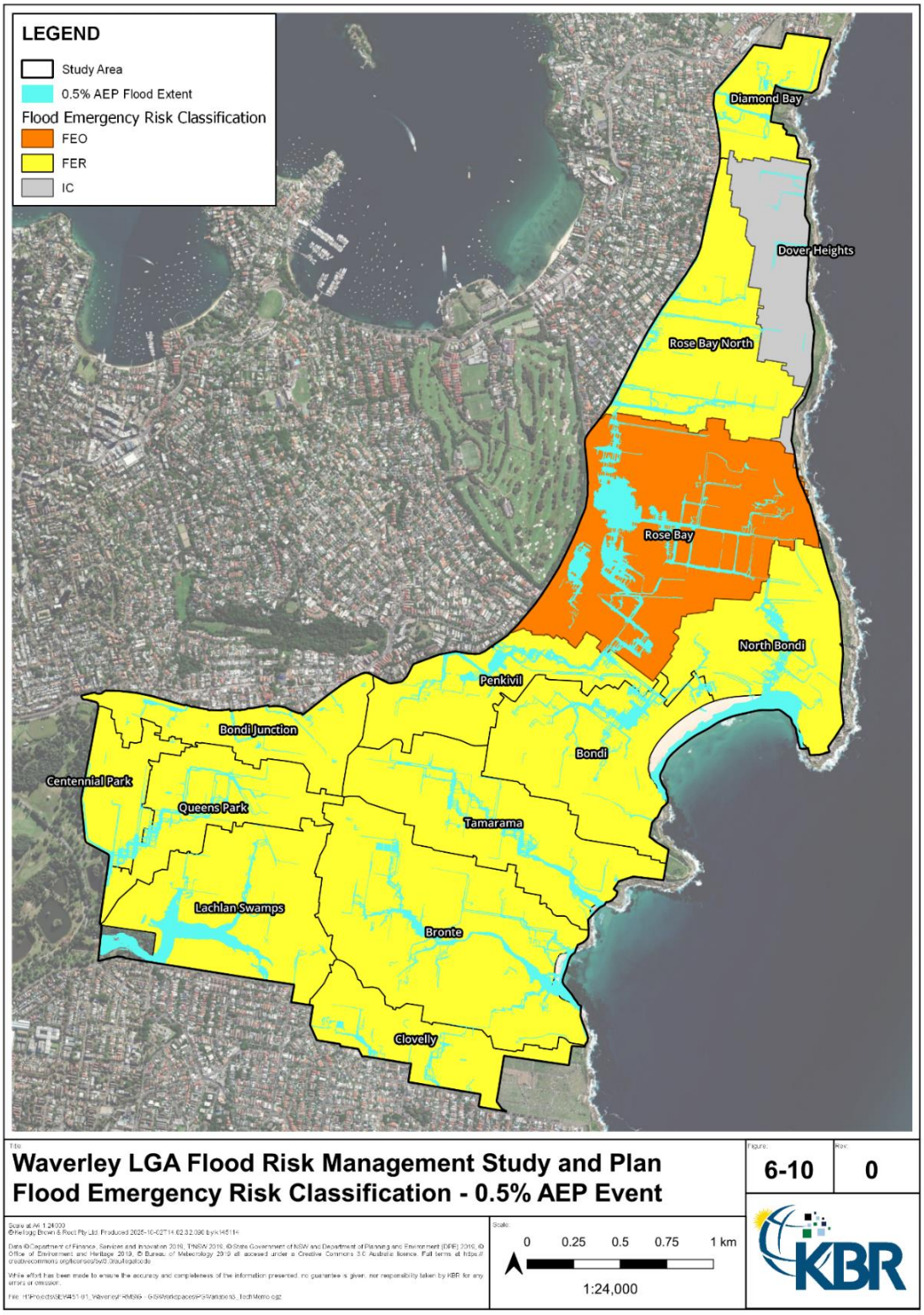


Figure 6-10 Flood Emergency Risk Classification - 0.5% AEP Event

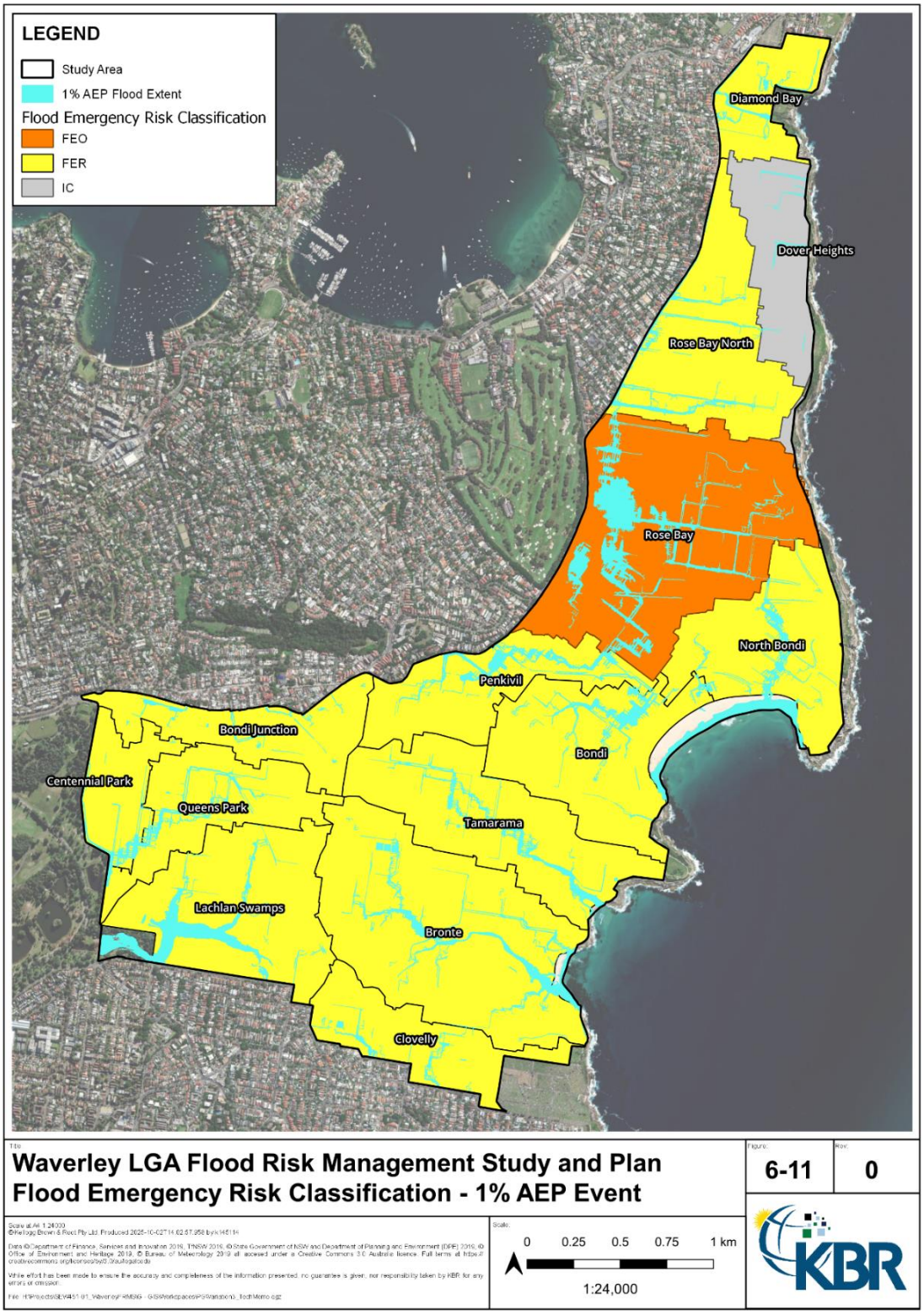


Figure 6-11 Flood Emergency Risk Classification - 1% AEP Event



6.8 FLOOD PLANNING CONSTRAINT CATEGORISATION

To inform strategic land use planning activities, KBR has prepared Flood Planning Constraint Categorisation (FPCC) mapping in accordance with Guideline 7-5 of the Australian Disaster Resilience Handbook Collection (AIDR, 2017). The four-tier categorisation approach utilises the various mapping outputs developed as a part of this study and classifies the floodplain into areas of similar degree of flood risk constraint. For this study, the 1% AEP event was established as the Defined Flood Event (DFE) in reference to the handbook. The FPCC outputs have been used to inform land-use planning measures described in Section 10.2.1.

It is noted that the handbook recommends the consideration of isolation potential for the derivation of the FPCC 2 category. However, as described in Section 6.7, the isolation potential is minimal for the study area, with the majority of the floodplain classified as FEO or FER for design storm magnitudes up to the 1% AEP event. As such, the Flood Emergency Response Classification was not applicable to be considered in this instance.

The constraints categorisation methodology was refined to suit the complexities of the Waverley LGA and are presented in Table 6-5 and Figure 6-12.

Table 6-5 Flood Planning Constraint Categorisation Mapping Criteria

Category	Constraint	Implication
FPCC 1	Floodway in the 1% AEP event	Areas that convey a significant portion of flow. Any developments within these areas are likely to cause the exacerbation of flood risk and the displacement of flood waters to adjacent areas.
	Flood storage areas in the 1% AEP event	Areas that are important in the temporary storage of flood waters during a flood event. Any developments within these areas are likely to cause the exacerbation of flood risk and the displacement of flood waters to adjacent areas.
	H6 flood hazard in the 1% AEP event	Unsafe for all people and all vehicles. All building types considered vulnerable to failure.
FPCC 2	Floodway in the 0.2% AEP event	Areas that convey a significant portion of flow. Any developments within these areas are likely to cause the exacerbation of flood risk and the displacement of flood waters to adjacent areas.
	H6 flood hazard in the 0.2% AEP event	Unsafe for all people and all vehicles. All building types considered vulnerable to failure.
	H5 flood hazard in the 1% AEP event	Unsafe for all people and all vehicles. Buildings require special engineering design and construction.
	Emergency Response - Isolated and Submerged (FIS)	Not applicable.
	Emergency Response - Isolated but Elevated (FIE)	Not applicable.
FPCC 3	Within the Medium and High Flood Risk Precinct extents	As the flood planning controls are intrinsically linked to the Flood Risk Precinct Classification (refer to Section 6.6), the FPCC 3 category was linked to the Medium and High Flood Risk Precinct extents, where land use planning controls are imposed as part of the proposed DCP updates.
FPCC 4	Within the PMF event extent	The development of critical facilities and assets should consider the need for emergency response facilities for vulnerable users.

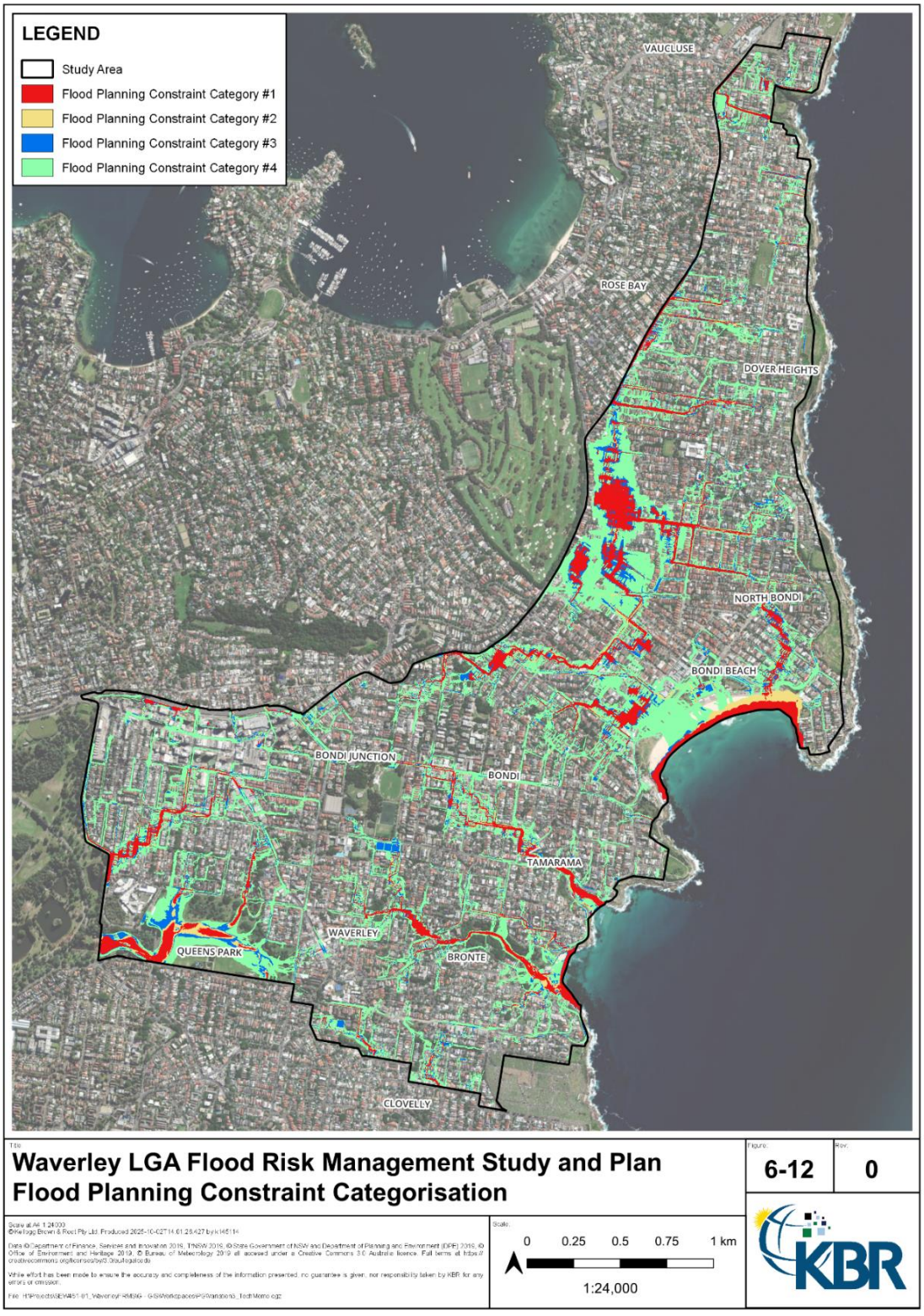


Figure 6-12 Flood Planning Constraint Categorisation Mapping

7 Future Flood Risk

7.1 FUTURE CLIMATE MODELLING SENSITIVITY ASSESSMENT

Following discussions with Council and DCCEEW, the following future climate sensitivities were simulated, inclusive of upscaled rainfall, losses, and sea levels:

- SSP2-4.5 for the 2100 year horizon, and
- SSP3-7.0 for the 2100 year horizon.

The modelling of a future climate scenario provides insight into the sensitivity of the floodplain and consequences to the community in relation to a changing climate.

Climate change is increasingly demonstrated to be a key planning requirement due to the potential long-term impacts posed to the community. In accordance with the latest ARR Version 4.2 climate change updates (refer to Section 5.1.1), the relevant climate change factors have been extracted from the ARR Datahub and presented in Table 7-1 and Table 7-2. The sea level rise values were extracted for Sydney, Fort Denison using the NASA Sea Level Rise Projection Tool.

Table 7-1 Rainfall Factors for the 2100 Year Horizon

Year (Horizon)	<1 Hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours
2100 (SSP2-4.5)	1.41	1.37	1.35	1.32	1.29	1.27	1.25
2100 (SSP3-7.0)	1.66	1.59	1.55	1.50	1.45	1.42	1.39

Table 7-2 Loss and Sea Level Rise Factors for the 2100 Year Horizon

Year (Horizon)	Initial Loss Adjustment Factor	Continuing Loss Adjustment Factor	Sea Level Rise (m)
2100 (SSP2-4.5)	1.05	1.10	0.53
2100 (SSP3-7.0)	1.07	1.14	0.68

Peak flood level difference mapping between the future climate scenarios and the present day conditions (2030) has been undertaken on the 1% AEP event and presented in Figure 7-1 and Figure 7-2 for the SSP2-4.5 and SSP3-7.0 scenarios respectively.

For the 2100 SSP2-4.5 scenario, widespread increases in peak flood level magnitudes are simulated in comparison to the present-day conditions. However, minimal change in flood extent is noted. In particular, the increase in rainfall has led to notable increases in peak flood level within the major trapped low point south of Rose Bay. Representing sea level rise has not resulted in further backwater/encroachment into residential areas. This can be attributed to the large differences in elevation towards the catchment outlets (e.g. cliff face outlets).

Similar to the 2100 SSP2-4.5 scenario, widespread increases in peak flood level magnitudes are simulated when compared against present day conditions for the 2100 SSP3-7.0 scenario. However, there is a notable increase in flood extents including the development of new overland flow paths due to the significant increases in rainfall depths. Similar to the 2100 SSP2-4.5 scenario, the application of sea level rise has not resulted in further backwater/encroachment into residential areas. This indicates that the majority of the Waverley LGA is elevated sufficiently higher than the downstream boundary (i.e. the ocean) and largely unimpacted by the effects of sea level rise up to the 2100 year horizon.

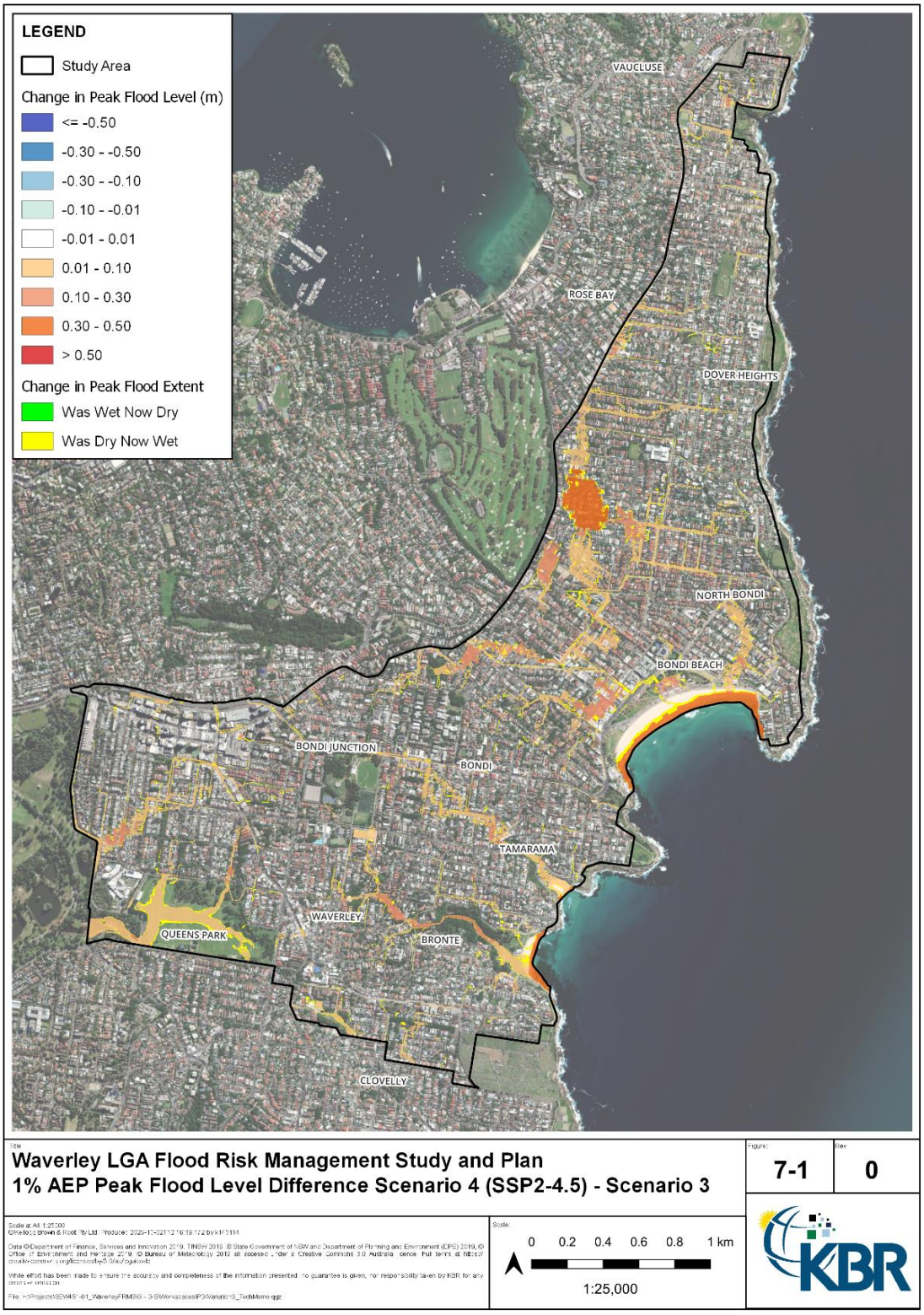


Figure 7-1 1% AEP Peak Flood Level Difference 2100 SSP2-45 - Present Day Conditions (2030)

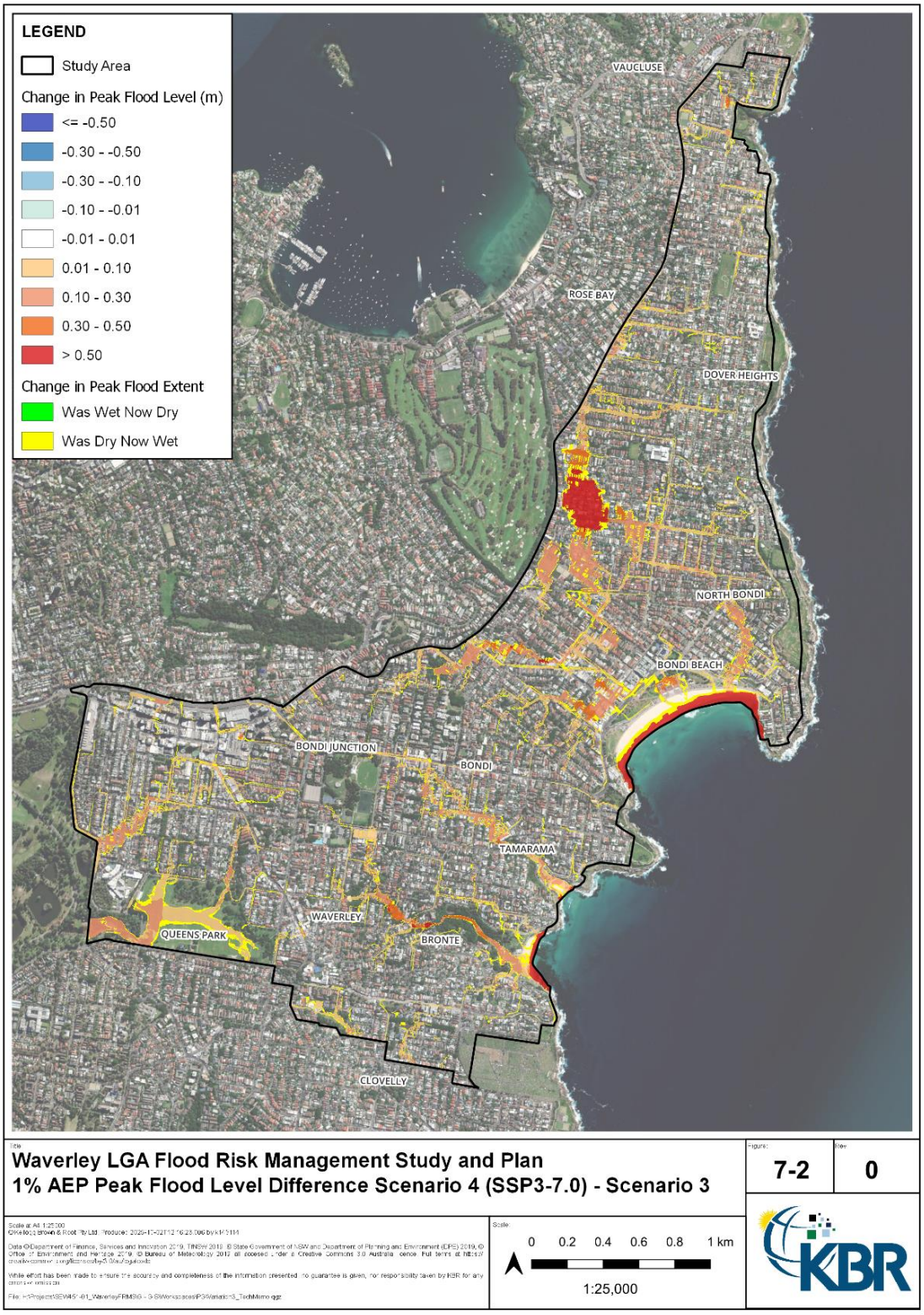


Figure 7-2 1% AEP Peak Flood Level Difference 2100 SSP3-7.0 - Present Day Conditions (2030)



7.2 ASSESSMENT OF THE CUMULATIVE IMPACTS OF INFILL DEVELOPMENT IN THE FLOODPLAIN

Due to the largely developed nature of the Waverley LGA, limited benefit to Council would be achieved by considering the addition of full permissible development across the LGA. Alternatively, it has been identified that landowners are more commonly adding extensions to existing dwellings or redeveloping by increasing the building footprint area in comparison to historical buildings. As such, it was agreed upon with Council that investigating increases in building footprint size would provide far more valuable information for the purposes of assessing the cumulative impact of works in the floodplain.

For the purposes of this assessment, it was agreed upon with Council that an average increase in building footprint size of approximately 20% would be applied. This approximately equates to an increase in existing building footprint area by 0.5 m in length when averaged across all existing buildings. As such, KBR has applied the following methodology:

- Increase in the enforced topographic building slab area by 0.5 m in length for all existing buildings, and
- Extension of the surface roughness (Manning's 'n') delineation for buildings by the same length such that the topographic enforcement and surface roughness representation aligns.

The cumulative impact assessment was simulated for the 20%, 5%, and 1% AEP events as well as the PMF event in Figure 7-3 to Figure 7-6 respectively, providing a wide cross-section of flood magnitudes from frequent to rare events.

The increase in building slab area results in a constriction of overland flow paths between buildings. In some instances, due to the densely urbanised nature of the study area, this results in the complete blockage of the overland flow path until flood waters accumulate high enough to spill over the floor of the building. The effect of this is the localised redistribution of flow paths, cutting off existing flow paths in some locations, while forming new ones in other locations.

Up to the 1% AEP event, the changes in peak flood level and extent are fairly consistent and localised, both providing for increases and decreases in flood behaviour. However, more dramatic increases in peak flood levels and extent are noted in the PMF event as overland flow paths become more pronounced and interconnected in comparison to the other design events modelled. As overland flow paths merge into larger flooded areas, the increase in building slab footprint essentially acts as additional flow obstructions where the compounding effect results in more noticeable increases in peak flood levels along the major overland flow paths and ponded areas.

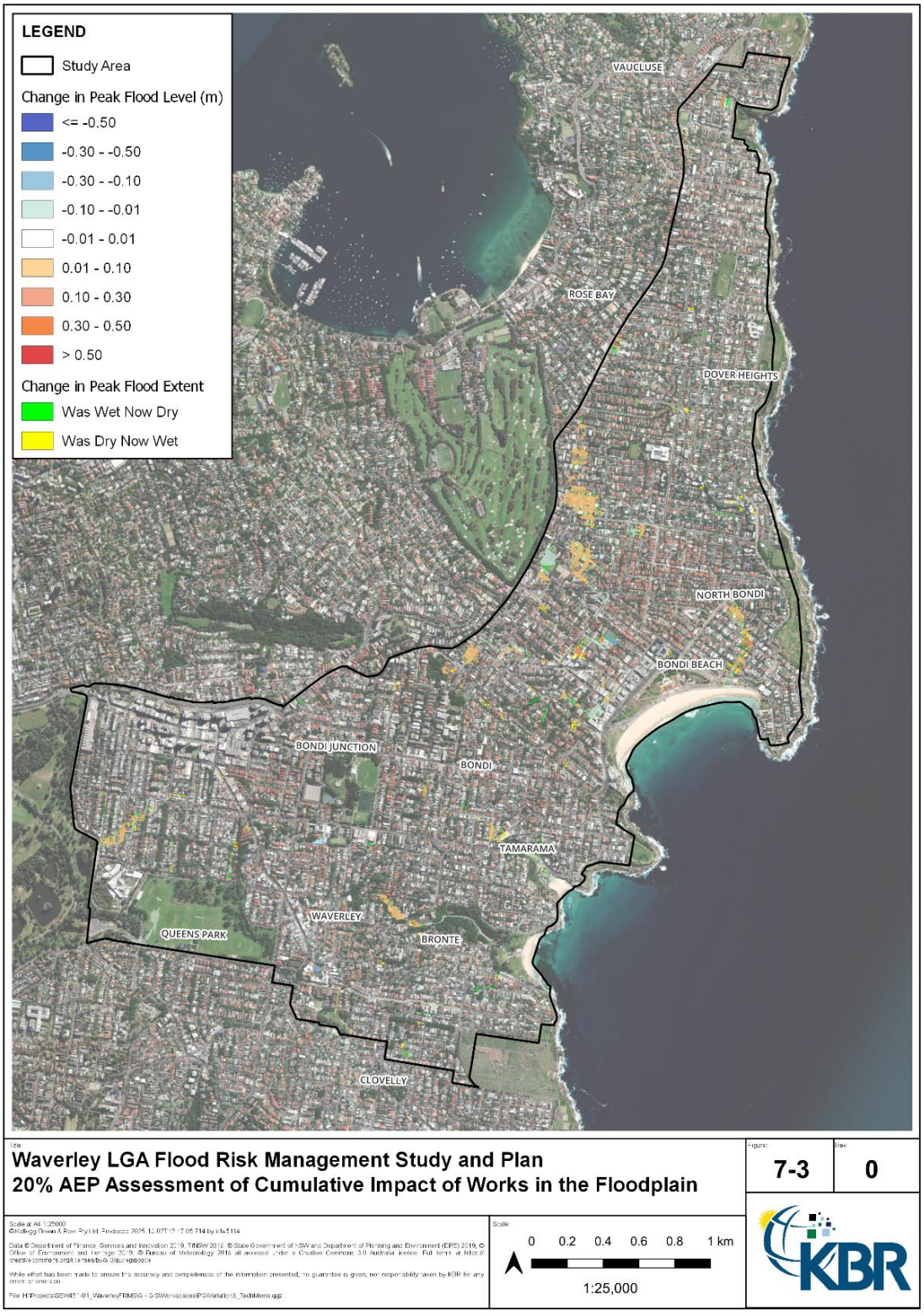


Figure 7-3 20% AEP Assessment of Cumulative Impact of Infill Development in the Floodplain

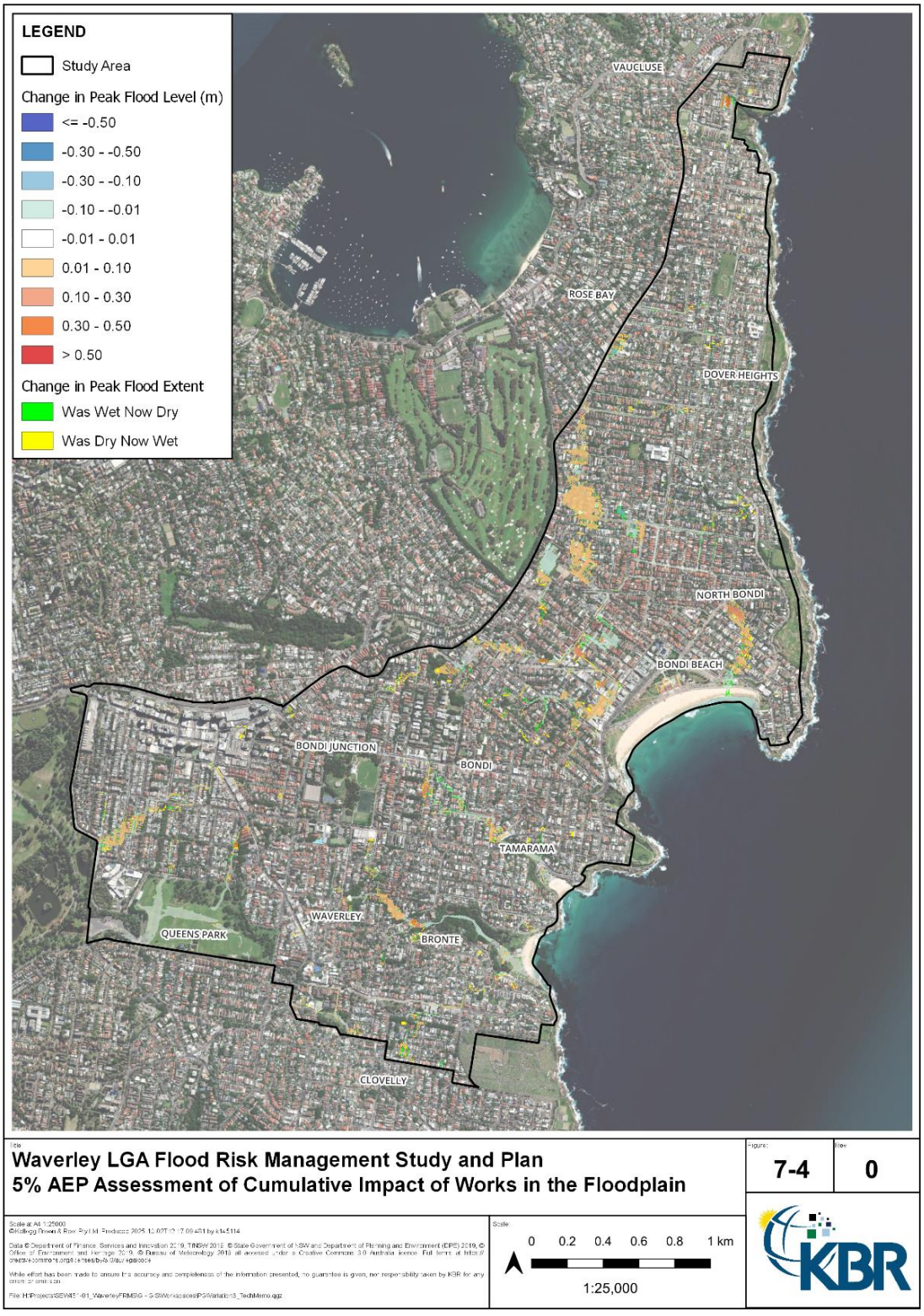


Figure 7-4 5% AEP Assessment of Cumulative Impact of Infill Development in the Floodplain

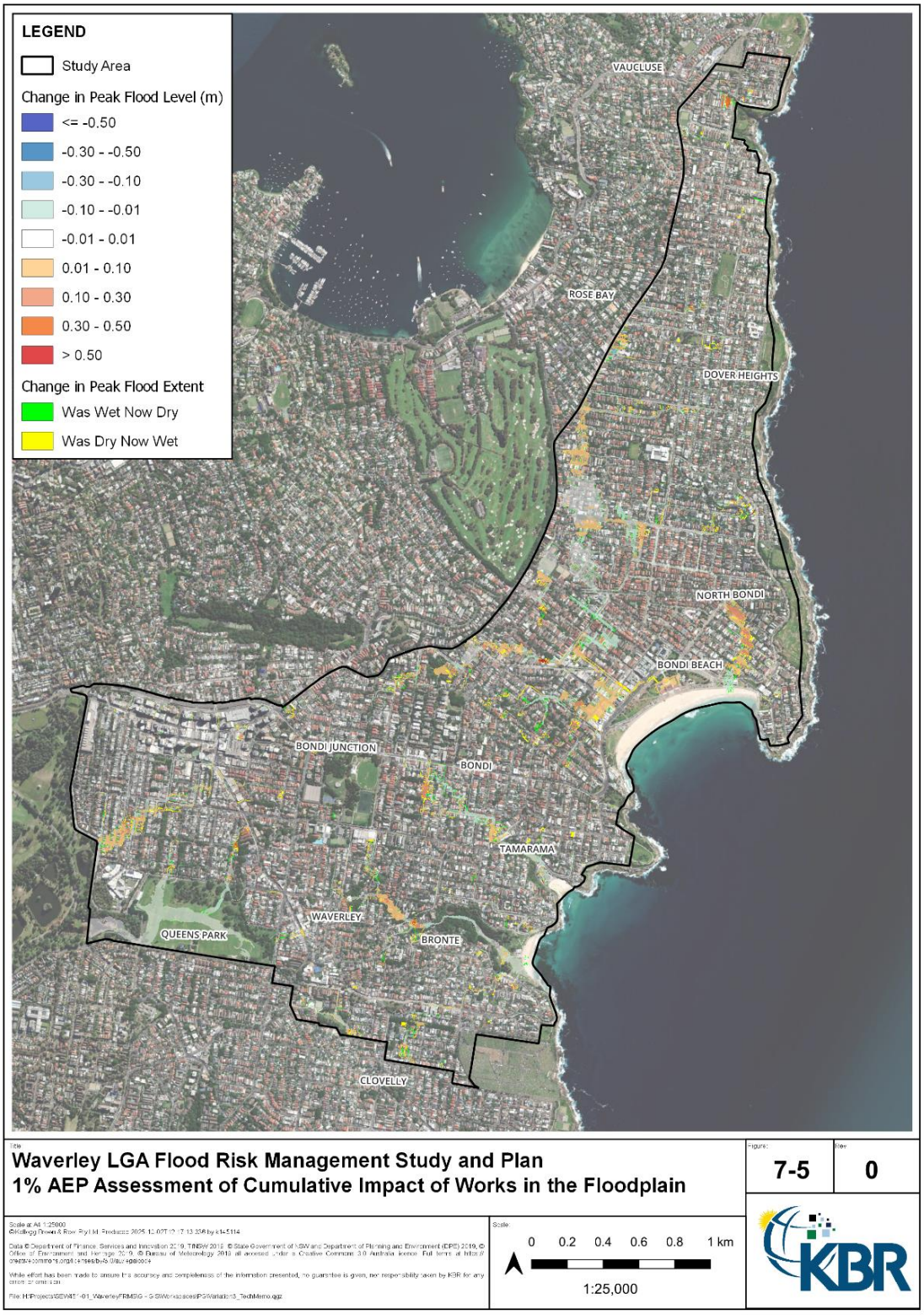


Figure 7-5 1% AEP Assessment of Cumulative Impact of Infill Development in the Floodplain

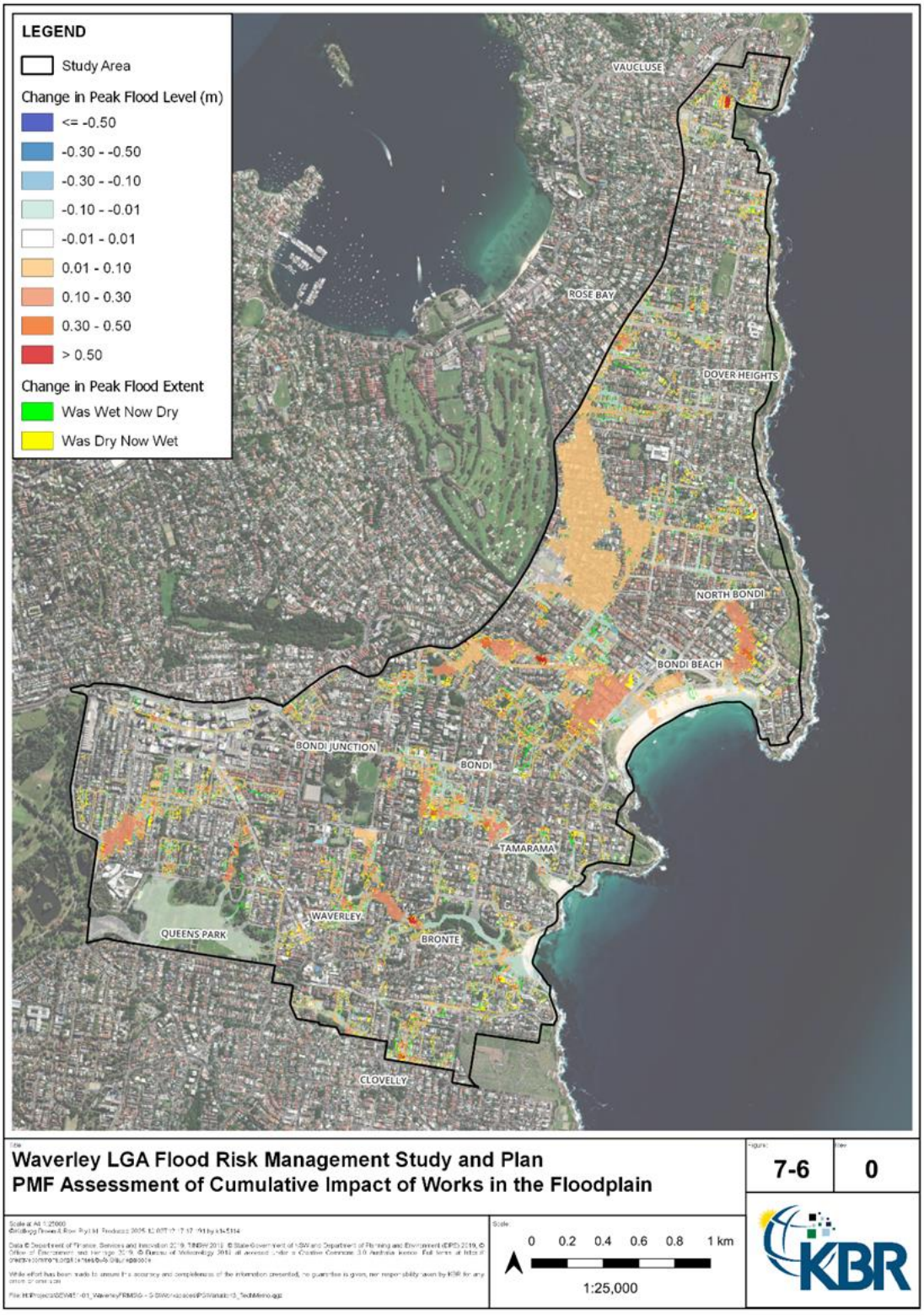


Figure 7-6 PMF Assessment of Cumulative Impact of Infill Development in the Floodplain



8 Existing Planning Framework

This section outlines the existing planning framework relevant to the implementation of flood risk management planning strategies and has been extracted from the Waverley Flood Risk Management Study & Plan Planning Considerations report (GLN Planning, 2025). The planning framework consists of an array of legislation, government directives, policies and guidelines, statuary and non-statutory plans, and Council policies and practices. The information provided in subsequent sections provides a basis for understanding the land-use planning recommendations discussed in Section 10.2.

The formulation and implementation of a Flood Risk Management Study and Plan is the cornerstone of the NSW Government's Flood Prone Land Policy. As with other local planning processes, the preparation of such study and plan are a Council responsibility. The planning recommendations ultimately incorporated and adopted by Council will subsequently require implementation through separate planning processes, principally governed by the Environmental Planning and Assessment Act 1979 (EP&A Act).

The imposition of planning controls can be an effective means of managing flood risks associated with future development (including redevelopment). Such controls might vary from prohibiting certain land uses in areas of high flood risk, to specifying development controls.

In principle, the degree of restriction that is imposed on development due to flooding should relate to the level of risk that the community is prepared to accept after balancing economic, environmental, and social considerations (i.e. the application of the 'merit based approach' required by the Manual). In practice, the planning controls that may ultimately be imposed are influenced by a complex array of considerations including state-imposed planning policy and directions, existing local planning strategies and policies, and ultimately the acceptability of conditions that could be imposed through the development application process.

8.1 THE FLOOD RISK MANAGEMENT STUDY AND PLAN RELATIONSHIP WITH THE EP&A LEGLISATION

In 1984, the NSW State Flood Policy was introduced, disbanding the mandatory application of a singular 100 year flood standard. The new policy alternatively required local Councils to prepare individual Flood Risk Management Plans based on a 'merit based approach'. The first Floodplain Development Manual was published in 1986 to assist Councils in undertaking this task.

The current policy and manual were published and gazetted in 2023 and is accompanied with ten (10) technical guides. While the policy and manual have evolved over time, the following key principals have been maintained:

a. Local Government is responsible for Flood Risk Management in NSW with financial and technical support being provided by the State Government. The actions, decisions, and information provided by Council and exercised in this duty are indemnified through the provisions of Section 733 of the Local Government Act, 1993. Indemnity is provided where Council acts in good faith, which is deemed to be in accordance with the principles of the Manual unless proven otherwise.

b. A 'merit based approach' that provides a basis for decision making in the floodplain is to be adopted. This is in recognition that flood prone land is a valuable resource which should not be unnecessarily sterilised by the rigid application of prescriptive criteria, and to avoid the approval of inappropriate proposals. The merit approach is defined in the Manual as follows:



"Weighs social, economic, ecological, and cultural impacts of land-use options for difference flood prone areas together with flood damage, hazard and behaviour implications, and environmental protection and wellbeing of the state's rivers and floodplains." (NSW Government, 2023)

The level of flood risk acceptable to the community is to be determined through a process typically overseen by an advisory committee comprised of local elected representatives, community members, and Local and State Governmental officials (refer to Section 1.5). This process is illustrated in Figure 8-1. The ultimate intent is to prepare Flood Risk Management studies and plans for individual floodplains that are adopted by Councils. These studies and plans should investigate and adopt an integrated mix of management measures that address existing, future, and continuing flood risk.

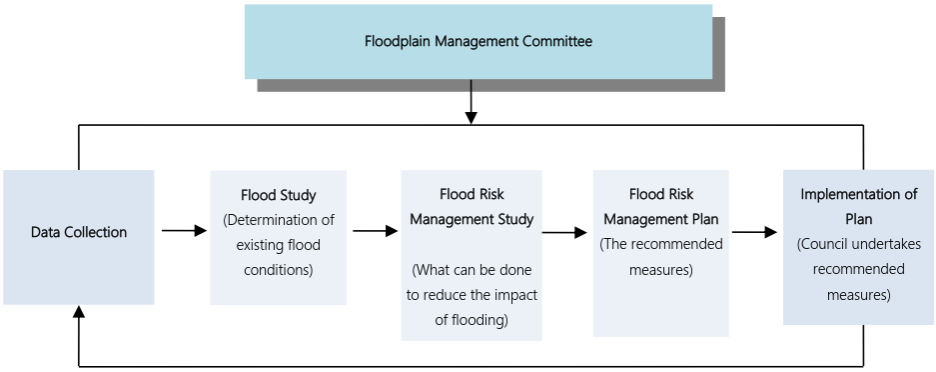


Figure 8-1 NSW Flood Risk Management Process (Adapted from the Manual)

The Manual and planning controls under the EP&A Act should not be considered as providing alternate approaches. The Flood Prone Lands Policy and Manual are separate to the principal planning legislation in NSW (contained within the EP&A Act and associated Regulations). Ultimately, the planning recommendations made within a Flood Risk Management Study and Plan may be reflected in planning instruments and policies brought into force in accordance with the EP&A Act.

While the EP&A Act and Regulation indirectly refers to flooding as an issue requiring consideration in some circumstances (e.g. in the determination of what is designated development for the purposes of the Act and therefore requiring the preparation of an Environmental Impact Statement), this legislation does not refer to the Flood Prone Lands Policy or the Manual. The plans prepared under the EP&A Act provide the relevant considerations for the assessment of proposals involving development or an activity that could affect the environment (e.g. DA, complying and exempt development, or an activity such as major road infrastructure under Part 5 of the EP&A Act).

The Flood Risk Management Study and Plan can provide appropriate input to the EP&A Act planning processes in three (3) ways:

- Providing direction at a local and state strategic planning level in addressing flood risk management (e.g. where a change in land use or intensification of development could be appropriate on flood risk management grounds),
- Recommendation of development controls to be incorporated in appropriate planning instruments (e.g. LEPs and DCPs) to mitigate the risk to development, where permitted in the floodplain, and
- Ensuring that the planning controls and associated documents (e.g. Section 10.7 Planning Certificate) contribute to ensuring the community is appropriately informed about any flood risk.



To understand how these outcomes may be best achieved, it is important to consider the existing EP&A Act framework and guidelines that relate to flood risk management.

8.2 FLOOD PLANNING GUIDELINES

The Flood Prone Land Package was introduced in a Planning Systems Circular ((PS21-006) issued to Councils in final form on the 14th of July 2021 by the (then) Department of Planning Industry and Environment (DPIE)). This package replaced the previous guideline for development control on floodplains announced by the (then) NSW Planning Minister on the 31st of January 2007.

The 2021 Circular provided advice to Councils on the recent changes including:

- An amendment to Clause 7A of Schedule 4 to the Environmental Planning and Assessment Regulation, 2000,
- A revised local planning direction regarding flooding, issued under Section 9.1 of the EP&A Act,
- Two LEP clauses which introduce flood related development controls (one mandatory and one optional),
- Removal of all flood planning overlay maps from LEPs,
- Introduction of a new guideline, ”Considering Flooding in Land Use planning Guideline” dated the 14th of July 2021, and
- Revoking of the 2007 guideline.

The new 2021 Guideline standardised the flood risk management LEP provisions and encouraged Councils to undertake changes to its DCP and flood planning maps. Notable direction provided by the guidelines include:

- Councils should define their Flood Planning Area (FPA) and Flood Planning Levels (FPLs) in their DCPs and outline if there are multiple FPAs/FPLs and where they apply.
- It is suggested that Councils could attach their adopted flood policies, flood studies, and flood risk management studies and plans to their DCPs to ensure they are considered in the assessment of a DA.
- Guidance on seeking the application of the optional “Special Flood Considerations” (SFC) LEP clause and possible complementary DCP changes.
- The public availability of flood planning maps (in ways other than within an LEP), which could entail being published in DCPs, other relevant environmental planning instruments, or on a council website.

On the 1st of March 2024, the current Department of Planning, Housing, and Infrastructure (DPHI) issued Planning Circular PS24-001 to supplement PS 21-006. This Circular emphasised that consistent with the findings of the 2022 NSW Flood Inquiry, the Department’s recommendation of applying a risk-based approach when addressing flooding in planning decisions. The 2024 Circular also reiterated the various sources of information and guidance available to Councils in undertaking such tasks (being documents considered as part of the preparation of this study).

The 2024 Circular refers to the function of the recently introduced NSW Reconstruction Authority and the document entitled “Planning for a More Resilient NSW - A Strategic Guide to Planning for Natural Hazards” published by the Department in November 2021. This latter guide promotes the adoption of an ‘all-hazards’ approach to land-use planning. Similarly, a key relevant role of the NSW Reconstruction Authority in the context of this study would be to work with Council in the preparation of a Disaster Adaptation Plan (DAP) to integrate flood risk management recommendations with an all-hazards DAP, as part of a separate process.



8.3 SECTION 9.1 DIRECTIONS

Ministerial directions pursuant to Section 9.1(2) of the EP&A Act specify matters which local councils must take into consideration in the preparation of LEPs. Direction 4.1 deals specifically with flood prone land and was amended as part of the 2021 Flood Prone Land Package. The Direction applies to all councils that contain flood prone land when an LEP proposes to *"create, remove, or alter a zone or provision that affects flood prone land"*.

Direction 4.1 requires that a Planning Proposal should introduce provisions that give effect to, and are consistent with the:

- Considering Flooding in Land Use Planning - Guideline (Department of Planning & Environment, 2021),
- NSW Flood Prone Land Policy (included within the Flood Risk Management Manual),
- The Flood Risk Management Manual (Department of Planning & Environment, 2023a), and
- An adopted Flood Risk Management Plan (e.g. this study and plan).

While the Direction continues to refer to the 2005 Floodplain Management Manual, it can be assumed that the new 2023 Manual would supersede this, noting that the principles contained within both versions are similar. The key requirements of the Direction seek to ensure draft LEPs:

- Are consistent with the principles of the Manual (including the 2021 Guideline),
- Do not rezone flood prone land zoned special use areas, recreation, rural, or environmental conservation to a residential, business, industrial, or special use area zone, and
- Do not permit development in floodways that would result in significant flood impacts on others, permit a significant increase in development on the floodplain, require substantial government spending on flood mitigation, or allow development without consent except for agricultural, or flood mitigation works.

The Direction specifies that a variation may be permitted where it is minor or accords with a Flood Study or Flood Risk Management Study and Plan when one does not exist, or a flood impact risk assessment that is consistent with the principles of the Manual and Council requirements.

8.4 EP&A REGULATION 2021

Schedule 2, Clause 9 of the EP&A Regulation specifies information that is require dot be included in Section 10.7 Planning Certificates for land within a FPA and subject to flood related development controls (in accordance with Section 290 of the EP&A Regulation).

Councils are required to distinguish between land where different categories of flood related development controls apply. In particular:

- Clause 9(1) requires inclusion of a notation on planning certificates if the land or part of the land to which the certificate relates to is within the FPA and is subject to flood related development controls.
- Clause 9(2) require inclusion of a notation if the land or part of the land to which the certificate relates to is between the FPA and the Probable Maximum Flood extent and is subject to flood related development controls.

The 2021 Guideline notes that if information is lacking, then an 'unknown' response should be provided until the information is made available and Council's relevant flood related development controls are updated. However, it is important to understand that unmapped locations may also be subject to flood related development controls and these areas should be noted in the planning certificate.



In accordance with Section 10.7(5) of the EP&A Act, Councils should include any additional information on flooding and flood risk in this more expansive planning certificate.

The recommended approach adopted by Council in the 2023-2024 review of the Waverley LGA Flood Study (BMT, 2021) was to apply a simplified approach where the FPA extends to the PMF extent. This avoids complications with mapping an FPA based on adding freeboard to a flood that is of a smaller magnitude than the PMF event (i.e. 1% AEP event), particularly for areas of the floodplain where the depth of flooding is shallow. This would provide an additional layer of flood mapping that could complicate and confuse the communication of flood risk information to the general public.

8.5 CLIMATE CHANGE CONSIDERATIONS

The Flood Risk Management Manual (Department of Planning & Environment, 2023a) highlights the need for climate change to be considered in a Flood Risk Management Study and Plan to understand how flood risk might change over time.

While now dated, the (then) NSW Department of Environment and Climate Change issued a Flood Risk Management Guideline titled “Practical Consideration of Climate Change’ in 2007 that provide pertinent high-level guidance. The Guideline addressed the consequences of potential changes in sea levels and rainfall intensities associated with future climate predictions. Due to some level of uncertainty with the timing and magnitude of climate change effects, this Guideline recommended the undertaking of sensitivity analyses to understand the potential implications of climate change when modelling flood behaviour and frequency, and to test the robustness of management strategies.

Since the release of the 2023 Flood Risk Management Manual, previous climate guidance has been superseded by the release of new guidance. A detailed methodology of how the latest guidance has been included as a part of this study is included in Section 5.1.1. The modelling outputs for statutory planning purposes, including the definition of flood risk precincts have considered the latest climate guidance.

8.6 REGIONAL PLANNING STRATEGIES

The Greater Sydney Commission (GSC) published the ‘Eastern City District Plan’ in 2018 in association with the regional plan, ‘A Metropolis of Three Cities’. The relevant priorities set out for the LGA are in the sustainability chapter relating to a resilient city. These include:

- Planning Priority E20 - Adapting to the impacts of urban and natural hazards and climate change. The objectives under this planning priority are:
  - Objective 36 - People and places adapt to climate change and future shocks and stresses, and
  - Objective 37 - Exposure to natural and urban hazards is reduced.

The District Plan understandably provides only high-level commentary in regard to all natural hazards, which can be interpreted to relate to flood risk management as follows:

- Climate change will exacerbate flood hazards,
- Effective planning can reduce the exposure to flood hazards and build resilience,
- Planning for population growth and change needs to consider exposure at a local level as well as cumulative impacts at district and regional levels, and
- Centralised and coordinated collection of data on flood hazards, particularly exposure of infrastructure, will help build resilience through land use and infrastructure planning.



The District Plan notes that the State Government has adopted the 2023 Flood Risk Management Manual, which provides councils with policy directions and tools for managing exposure to flooding.

8.7 LOCAL PLANNING STRATEGIES

As required by Section 3.9 of the EP&A Act, Waverley Council has prepared a Local Strategic Planning Statement (LSPS) that was published in March 2020. The LSPS undergoes review every seven (7) years, providing a vision for planning in the LGA and the direction to achieve that. It provides a direct line of sight to the Eastern City District Plan and other regional and local strategies including the Waverley Local Strategic Planning Statement 2020-2036 (Waverley Council, 2020), showing how targets such as house and employment opportunities will be met within a local context.

Council also produced a Housing Strategy titled Waverley Local Housing Strategy 2020-2036 (Waverley Council, 2020). The Housing Strategy (page 6) notes that the Waverley LGA has the second highest population density (80 people per hectare) in NSW with 66% of residents living in flats, unity, or apartments and a high proportion of renters, which is linked to these predominant household types. The strategy notes a younger demographic within the LGA with more group homes and less couples with children. Based on this context and other considerations, the strategy recommended a modest increase in housing choice of 3,400 dwellings to 2036 which reflects a growth rate of 0.4%.

There are no substantial proposed changes to development potential available under current planning instruments discussed below. The LSPS notes (page 16) that Waverley Council's current planning controls provide for infill development that will substantially accommodate future housing needs. However, Waverley Council also has a job target for Bondi Junction, which will require changes to the planning controls to allow a higher density of worker population.

Planning Priority 16 of the LSPS is to:

> *"Plan for and manage our assets and urban environment and support our community to adapt and be resilient to a changing climate."*

The LSPS recognises the worsening effects of natural hazards, including flooding, and that effective planning should reduce exposure to natural and urban hazards, building resilience in the built environment and community in response to these constraints. The preparation of the Flood Study and responding to the risks identified by that study was seen as an important contribution to achieving that goal (LSPS, pages 74-76) and was listed as an immediate priority in the Action Plan.

8.8 STATE ENVIRONMENTAL PLANNING POLICIES

A State Environmental Planning Policy (SEPP) is a planning document prepared in accordance with the EP&A Act by the (then) DPIE and approved by the Minister, who deals with matters of significance for State Environmental Planning.

No SEPP has been prepared dealing specifically with the issue of flooding, but some regulate development in response to potential flood risks. Those SEPPs of potential relevance to this study are discussed in the following sections.

8.8.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

Chapter 2 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 aims to facilitate the effective delivery of infrastructure across the State by identifying development permissible without consent.

Clause 2.12 and 2.13 governs public authorities' consultation with Councils and the SES for development with impacts on flood liable land.



Clause 2.56 specifies that development for the purposes of flood mitigation work may be carried out by a public authority without consent.

Clauses 2.137 and 2.137A specify that development for the purpose of stormwater management systems may be carried out by a public authority without consent subject to meeting certain criteria and is otherwise permissible with consent in accordance with Clause 2.138.

8.8.2 State Environmental Planning Policy (Housing) 2021

Part 5 (Housing for Seniors or People with a Disability) of the State Environmental Planning Policy (Housing) 2021 generally applies to land with an urban type zoning, permitting housing for seniors or people with a disability where they may otherwise not be permitted under Council's planning controls. Further, the recently adopted Part 6 permits higher density forms residential development than may otherwise be permitted in residential zones.

The Housing SEPP would apply to parts of the study area would effectively override Council's planning controls to permit residential development for seniors and persons with a disability or higher density forms residential development to a scale permitted by the SEPP.

8.8.3 State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

The specification of exempt and complying development is primarily governed by the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008. The Codes SEPP effectively provides approval pathways as alternatives to a full Development Application (DA) for certain low impact development. Exempt development requires no approval provided it complies with certain criteria. Complying development must meet certain criteria but also requires an approval in the form of a Complying Development Certificate (CDC), which must be issued by Council or a private certifier subject to specified conditions.

The Codes SEPP is divided into a number of "Codes" that deal with exempt development and different types of complying development. Those Codes of specific relevance to the LGA are the:

- Exempt Development Code (Part 2),
- General Housing Code (Part 3),
- Low Rise Housing Diversity Code (Part 3B),
- Pattern Book Development Code (Part 3BA),
- Housing Alterations Code (Part 4),
- Industrial and Business Alterations Code (Part 5), and
- Industrial and Business Buildings Code (Part 5A).

The relevant clauses of the Codes SEPP apply to 'Flood Control Lots' defined as:

> *"**flood control lot** means a lot to which flood related development controls apply in respect of development for the purposes of industrial buildings, commercial premises, dwelling houses, dual occupancies, multi dwelling housing, or residential flat buildings (other than development for the purposes of group homes or seniors housing)."*
>
> ***Note.** This information is a prescribed matter for the purpose of a certificate under Section 149(2) [now 10.7] of the Act.*

A flood control lot is a lot where flood related development controls apply for the purposes of a specified development. Flood related development controls are not defined but would include any development controls related to flooding that apply to land that are a matter for consideration under Section 4.15 of the EP&A Act. These development controls may apply through a Local Environmental Plan (LEP) or Development Control Plan (DCP). Consequently, based on the



approach adopted by Waverley Council or the mapping of a Flood Planning Area (FPA), all lots that are partially or fully within the FPA are considered as a flood control lot.

Specific exempt development is not permitted on a flood control lot (e.g. earthworks, retaining walls, and structural supports are not exempt as per Clause 2.29 of the SEPP).

The Pattern Book Development Code, external alterations under the Housing Alterations Code, ancillary development, and earthworks under the Industrial and Business Alterations Code do not apply to development on a flood control lot (clauses 3BA.6(b), 4.4A9(b), and 5.17(b)/5.19(b) respectively).

The General Housing, Low Rise Housing, and Industrial and Business Building Codes also provide several exclusions as to what can be complying development on a flood control lot. Most complying development is permitted on flood control lots where a Council or professional engineer can certify that the part of the lot proposed for development is not within a:

- Floodway area - refer to Section 6.2.2 for definitions,
- Flood storage area - refer to Section 6.2.2 for definitions,
- Flow path - a flow path (referred to as an overland flow path in this study – refer to Section 1.2 for definition) identified in Council's Flood Study or Flood Risk Management Study carried out in accordance with the Flood Risk Management Manual (Codes SEPP),
- High hazard area - identified in Council's Flood Study or Flood Risk Management Study carried out in accordance with the Flood Risk Management Manual (Codes SEPP), and
- High risk area - identified in Council's Flood Study or Flood Risk Management Study carried out in accordance with the Flood Risk Management Manual (Codes SEPP) (see for example Clause 3.5).

The Codes SEPP specifies various controls in relation to floor levels, flood compatible materials, structural stability, flood affectation, safe evacuation, car parking, and driveways (see for example Clause 3.5(2)). These controls must be imposed on a CDC where the development is located on a flood control lot. The minimum floor level must be adopted by Council as part of a DCP in order for it to be imposed on a CDC (see for example Clause 3.5(2)(a)). Despite this, it is expected that a Certifier would seek to impose a minimum floor level that Council would normally apply, and consequently it is desirable that such information be broadly and clearly publicised.

Important considerations for this study regarding the establishment of rules for development that could be approved as a complying development is the defining of any of the five (5) floodplain "high risk/hazard" areas (where complying development is excluded) and the setting of minimum floor levels. Overland flow paths, high hazard areas, and high-risk areas that are required to be identified in a Council prepared Flood Study or Flood Risk Management Study will allow the defining of the relevant exclusion criteria under the Codes SEPP.

The objective of how the Flood Risk Management Study and Plan deals with complying development should be to ensure that such development does not lead to increased flood risk to the property and persons as a consequence of the application of the CDC process, in comparison to outcomes otherwise likely to be achieved through the full DA process. At the same time, the outcome of the Flood Risk Management Plan should not be to create unnecessary administrative burdens on the public and Council by requiring a DA where this would be of no likely benefit to reducing flood risk.

Council could proactively provide advice to the public as to where the Code SEPP applies. The flood mapping outputs produced as a part of this study would help achieve this (refer to Section 6.2). For the purposes of this study, it has been concluded that all areas within the LGA mapped as within a Medium or High Flood Risk Precinct (FRP) could be considered to be an overland flow path. Floodway, flood storage, and high hazard areas would be automatically captured within the extent



of these two precincts. High risk areas are separately mapped as part of the High FRP. Further details on the derivation of the Flood Risk Precinct Classification are presented in Section 6.6.

Accordingly, as an outcome of this study, Council could confirm that the mapped Medium and High FRPs represent overland flow paths, floodway, flood storage, and high hazard areas. Additionally, Council could confirm that the High FRP represents the high-risk areas for the purposes of the Codes SEPP. This information can be proactively communicated to the general community to ensure that opportunities to utilise a complying development approval pathway are correctly pursued.

8.9 LOCAL ENVIRONMENTAL PLAN 2012

The Waverley LGA is governed by the Waverley Local Environmental Plan (Waverley Council, 2012). The standard instrument mandatory flood risk management Clause 5.21 Flood Planning applies. Subclause 5.21(5) provides the following definitions:

> ***Flood Planning Area*** *has the same meaning as it has in the Flood Risk Management Manual.*
>
> ***Flood Risk Management Manual*** *means the Flood Risk Management Manual,* ISBN 978-1-923076-17-4, published by the NSW Government in June 2023.

The Manual (page 21) provides the following definitions:

> ***Flood Planning Area*** *- The area of land below the Flood Planning Level.*
>
> ***Flood Planning Level*** *- The combination of the flood level from the Defined Flood Event and freeboard selected for flood risk management purposes.*
>
> ***Defined Flood Event*** *- The flood event selected as a general standard for the management of flooding to development.*

Subclause 5.21(5) also states that reference should be made to the Considering Flooding in Land Use Planning - Guideline (Department of Planning & Environment, 2021), for the meaning of words or expressions used in Clause 5.21 unless otherwise defined. The 2021 Guideline (page 5) clarifies the above Flood Risk Management definitions as follows:

> *"Councils should define their FPAs and FPLs in their development control plans (DCPs) and outline if there are multiple FPAs/FPLs and where they apply. For example, a Council may have different FPAs for different catchments based on the flood risk identified through the flood risk management process. A Council may also have different FPLs based on the land use type (e.g residential, industrial, or commercial developments). These should be documented in their DCP. Council may have a range of development controls to suite the flood constraints and different types of development.*

The Review of Waverley LGA Flood Study and Waverley DCP Amendment (GLN Planning, 2023) report discusses alternate mapping approaches for the FPA and for the purposes of applying controls in the DCP. The preferred option, which has been adopted and implemented by Council, was to adopt the aggregate of the Low, Medium, and High Flood Risk Precincts as the FPA. As discussed in Section 10.2, this provides for a consistent and simpler application of flood risk management planning controls contained in the LEP and DCP. The continuation of this approach is supported.

Changes to the standard instrument LEP in 2021 included the insertion of the "Special Flood Considerations" (SFC) Clause 5.22. This is a standard optional clause that a Council could have opted into for inclusion in their LEP at the time of adoption. Alternatively, it can be adopted as part of their LEP at a later time. It is noted that Waverley Council did not opt into the optional Clause 5.22 when introduced into the standard instrument. Council advised that this was discussed with the (then) Department of Planning and Environment and was advised that this would not be appropriate until Council had completed its Flood Risk Management Study.



The intent of Clause 5.22 is to ensure consideration of emergency management matters, where necessary, for areas above the FPA but still flood prone. The clause applies specifically to "sensitive and hazardous development", which relates to a defined list of land uses but also applies to any other development that a consent authority considers may be subject to a "particular risk to life" and "require the evacuation of people or other safety considerations" (subclause 5.22(2)(b)).

In this case, the provisions of Clause 5.22 can be considered superfluous for the following reasons:

- The FPA for the purposes of the LEP is the aggregate of all three FRPs (i.e. Low, Medium, and High) and therefore is inclusive of all flood prone land.
- Emergency management issues are not as extreme as in some other LGAs where riverine flooding (as opposed to overland flow) prevails, resulting in significant constraints on evacuation.
- The existing DCP (together with the recommended updates made as a part of this study) provides appropriate controls to address emergency management considerations.
- The adoption of Clause 5.22 does not necessarily provide a targeted application of flood risk management planning controls for sensitive and hazardous development. The clause not only applies to sensitive and hazardous development between the flood planning area and the PMF, but Glause 5.22(2) outlines that the control applies to any development that Council considers will cause particular risk to life and require evacuation.

Accordingly, a recommendation of this study is that subject to the adoption of all other planning recommendations, including the extent of the FPA for the purposes of Clause 5.21 of the LEP, that Council does not adopt Clause 5.22.

The land use zonings applying to the LGA under the LEP have been formulated over an extensive period and are based on a range of planning considerations. An overlay of the current FPA over existing zonings is provided as Figure 8-2.

It is considered good practice to review the delineation of land use zonings as part of a Flood Risk Management Study to ensure that they do not support development outcomes that would likely be considered incompatible with the flood risk. Given the already established and developed nature of the LGA, modest expected future growth (as outlined in Section 8.7), and the nature of flood risks, any material changes to land use zone boundaries would not be warranted. Despite this, a detailed consideration of potential development opportunities and responses for flood risk hot spots (refer to Section 6.4) is provided in Section 10.2.

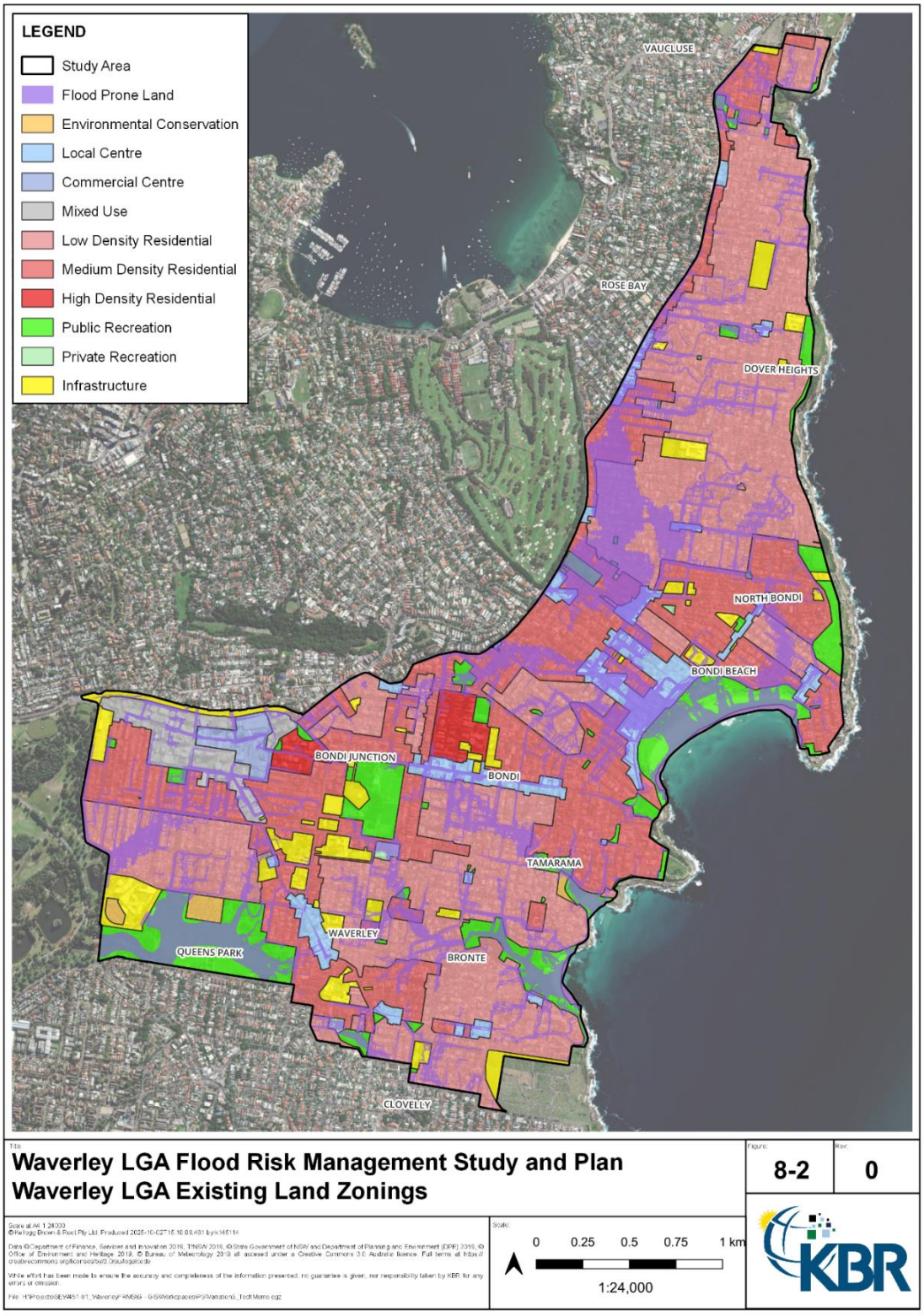


Figure 8-2 Waverley LGA Existing Zonings



8.10 DEVELOPMENT CONTROL PLAN 2022

The Waverley Development Control Plan (Waverley Council, 2022) was originally adopted by Council in December 2022 and amended in March 2024 to implement the recommendations emanating from the Waverley LGA Flood Study (BMT, 2021) and Review of Waverley LGA Flood Study and Waverley DCP Amendment (GLN Planning, 2023).

Part B, Section B5.2 of the DCP specifically applies flood risk management planning controls. As outlined in the 2023 Review, the DCP Controls adopt the "Planning Matrix" approach, consistent with a risk-based approach which needs to consider the full range of potential flood magnitudes, and the variable sensitivity of different land uses to flooding. The Matrix approach operates in conjunction with the mapping of the Low, Medium, and High FRPs.

The DCP provides variable controls for the following elements of a development, depending on the vulnerability of the proposed land use and the extent of the flood risk of the land upon which it is located:

- Flood level,
- Building components,
- Structural soundness,
- Flood effects on others,
- Car parking and driveway access,
- Emergency management,
- Management and design, and
- Fencing.

The current DCP flood risk management controls were introduced just over 12 months ago, allowing for sufficient time for Council to identify any issues with their application that warrant review, as intended as part of this study.

Community consultation undertaken during this study did not identify any material issues with the DCP flood risk management controls. This is consistent with the outcome of discussions with Council officers, including an in-person workshop attended by KBR, GLN Planning, and Council staff on the 3rd of June 2025. The workshop reinforced ongoing support for the current flood risk management planning controls framework, identifying only a range of minor changes for consideration.

A comprehensive review of the DCP has been undertaken as a part of this study with the process outlined and discussed in Section 10.2.2.

8.11 DEVELOPER CONTRIBUTIONS

A Development Contributions Plan (CP) could provide a potential funding mechanism to contribute towards the costs associated with mitigating flood risk where required to facilitate new development.

Council has adopted a Section 7.12 CP, known as the Waverley Council Development Contributions Plan (Waverley Council, 2006). In accordance with the EP&A Act, a Section 7.12 CP does not need to establish a nexus between project development and facilities to be funded by the plan. Rather, the CP must outline what these facilities are intended to be. A contribution payable under a Section 7.12 CP is based on a fixed percentage of the cost of the development in accordance with the EP&A Act and Regulation. That is, any flood mitigation works included in the CP would compete with Council's ability to fund other types of works.



The current CP provides for some stormwater quality related works, but none related specifically to flood mitigation works. Potential for flood mitigation measures (structural options) are reviewed and presented in Section 10.3. While structural options could be considered for inclusion in the CP as a potential source of partial funding, any funding directed to such options would need to be diverted from existing facilities within the CP. Accordingly, inclusion of works in this CP would need to be a separate, whole of Council decision.

8.12 SECTION 10.7 PLANNING CERTIFICATES

A Section 10.7 (formerly Section 149) Planning Certificate is a certificate used under the provision of the EP&A Act that outlines the zoning and planning controls applied to a property. The certificate is available to any person on request but must be attached to a contract prepared for the sale of the property. The flood related matters to be contained within the Section 10.7(2) Certificate are prescribed by Clause 9 of Schedule 2 of the EP&A Regulation and generally relate to whether planning controls (and not necessarily flood related risks) apply to a property. The regulation requires the certificate to specify whether the land, or any part of the land, is located within the FPA or between the FPA and the PMF. In this instance, based on the adopted approach for defining the FPA as discussed above, there would be no distinction required (as is the existing approach undertaken by Council).

A Section 10.7(5) Certificate, being a more complex but more expensive certificate, requires Council to advise of "other relevant matters affecting the land of which it may be aware". These more complete certificates are not mandatory for inclusion with property sale contracts (with Section 10.7(2) Certificates being the minimum required). Where a Section 10.7(5) Certificate is requested, Council can notify of a broader range of flood risk information of which they are aware.

It is recognised that Section 10.7 Certificates should not be solely relied upon as community education tools, as they have only limited circulation. The majority of flood affected properties would not be reached in a given year. However, information on a Section 10.7 Certificate can reflect readily available information that may also be provided to people making general enquiries. This is an important source of information for the community that influence what is the understood (or perceived) flood risk for a property that a person owns and/or occupies or operates a business from.

Council also provides "Flood Certificates" at a fee in response to a formal "Application for Flood Level Information". The information can be sought by any individual (i.e. it is not restricted to the landowner) and is tailored to provide detailed flood data that enables the controls in the DCP to be addressed.

8.13 FENCING

Fences can impact overland flow flooding by redirecting flows during a storm event into properties as well as impact access and evacuation paths.

The Codes SEPP provides several paths for landowners to construct new fences as exempt or complying development. Clauses 2.33 and 2.34 detail the requirements for fences in certain residential zones. Clauses 2.37 and 2.38 detail the requirements for fences in business and industrial zones.

Part B, Section 5.2.8 of the DCP contains controls on fencing on flood prone land. The controls would apply to a DA and requires that fencing is constructed in a manner that does not obstruct the flow of floodwaters to as to have an adverse impact on flooding experienced on surrounding land.

Despite this, it is recognised that the monitoring of constructed fences over time is difficult and resource demanding and fencing constructed in a manner that does not have regard to flow paths can have a significant effect on flooding.



8.13.1 Fences on Residential Land

Clause 2.33(c) under the Codes SEPP excludes fences from being built as exempt development on a flood control lot. Therefore, if a lot is located on a flood control lot (i.e. within any FRP), a fence cannot be pursued as exempt development on residential zoned land.

It is envisaged that the general public is unaware that fences on flood control lots require a full DA.

8.13.2 Fences on Business and Industrial Land

As with fences on residential lots, Clause 2.37 of the Codes SEPP excludes fences on a flood control lot zoned for business or industrial purposes. However, Clauses 5.23 and 5.23 of the Commercial and Industrial Alterations Code allow a fence to be approved as complying development only if the following is satisfied:

- It is on a side or rear boundary,
- Not be any higher than 3 m above the existing ground level, and
- Cannot be of a solid construction (e.g. it could be a permeable wire mesh fence).

Subclause 5.24(2) of the Codes SEPP also requires any fence along a site boundary that adjoins a residential zone or a lane to have a design that is 75% open for that part of the fence that is more than 1.8 m above ground level.

The approval requirements for fencing, particularly on flood prone land, is complex but also important to managing flood impacts in a highly urbanised environment such as the Warley LGA. While planning controls are effectively in place to address this concern, improved understand of these controls through community education is discussed further in Section 10.2.2.



9 Economic Impacts of Flooding

A flood damage assessment is a means by which the impacts of flooding can be quantified, and an estimate of the cost to the community can be made. While the exact economic impact of flooding is difficult to quantify, flood damages are typically categorised into tangible or intangible damages. Tangible damagers refer to those where a monetary value can readily be attributed, such as the damaged caused by a flood to a property. Australian Rainfall and Runoff disaggregates tangible flood damages further into "direct costs" (i.e. damages to structures and their content) and "indirect costs" (i.e. clean-up and disposal of materials, loss of earnings, sales and production, or temporary relocation expense) (Geosciences Australia, 2024). On the other hand, intangible damages are much more difficult to quantify and assign a monetary value (i.e. loss of life).

9.1 FLOOD LEVEL DATABASE

Due to the significant number of properties and densely urbanised nature of the study area, it was agreed upon with Council that a floor level survey would not be feasible within the time and budget constraints of the project. Rather, KBR developed a desktop informed floor level database for properties within the PMF flood extent.

As described in Section 5.2.4, building floor levels were enforced within the hydraulic model through assumed slab depths informed by desktop and site investigations. As such, for the purposes of the floor level database, assumed building floor levels were able to be directly extracted from the topographic model. The following information was gathered using a combination of aerial imagery, Google Street View, Council provided GIS layers, and publicly available GIS layers (refer to Table 3-1):

- Lot and Section number,
- Street address,
- Building properties (construction type, material, and roof type),
- Number of stories/floors, and
- Number of dwellings.

The outcomes of the data capture are presented in Table 9-1.

Table 9-1 Floor Level Database Capture

Property Type	Number
Residential	7,614
Commercial/Industrial	632
Public	70
Total	**8,316**

Note: The numbers presented in this table are reflective of the number of buildings (i.e. an apartment building would be considered as one (1) building

9.2 FLOOD DAMAGES ASSESSMENT

The DT01 Flood Damage CBA Tool and associated Flood Risk Management Measures Flood Risk Management Guideline MM)1 (DPE, 2023b) is the current flood damage estimation tool developed for NSW. The tool has been utilised for the assessment of the economic impacts of flooding for this study, and includes calculations to obtain the following:



- Residential building direct flood damages including structural damages, external damages, and damage to contents.
- Non-residential building flood damages including commercial/industrial, and public facilities.
- General public infrastructure.
- Indirect costs including road damage, loss of trading, clean-up costs, and social willingness to pay values for varying degrees of property flood immunity.
- Intangible damages including loss of life and mental health impacts.
- Adjustment factors including inflation in line with historic Consumer Price Index figures and emergency uplift costs for residential buildings.

It should be noted that the flood damage values do not necessarily quantify the flood risk exposure or damage cost of a flood event. The estimated values should be considered as a comparative assessment to provide qualitative ranking of different floodplain management options for a given study area.

9.3 METHODOLOGY

The following methodology was applied to undertake the flood damages assessment:

1. Simulate the entire suite of present day (2030 SSP2-4.5) design events through the updated, calibrated, and validated hydrologic and hydraulic models (50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP events as well as the PMF event).
2. Establish a floor level database (refer to Section 9.1) for properties within the PMF extent. Key parameters include property type, building type, ground floor level, building floor level, number of stories, and number of dwellings.
3. Disaggregate the floor level database by property type (residential, commercial/industrial, and public buildings).
4. Extract the peak flood level and hazard category for each design event at each building.
5. Input the disaggregated floor level database and extracted peak flood levels into the DT01 Flood Damage CBA Tool (refer to Section 0).

9.4 TOTAL FLOOD DAMAGES AND ANNUAL AVERAGE DAMAGES

Annual Average Damage (AAD) is a method of quantifying the cost to a particular area and catchment condition. The AAD is derived from the total damage and is reflective of the average damage per year over the recurrence interval applied to obtain the total damage values. Alterations in catchment or development conditions (e.g. the construction of a structural mitigation option) will naturally result in changes to the AAD value derived. As such, the AAD can be utilised to quantify the reduction in costs over a long period of time.

The outcomes of the flood damages assessment have been extracted from the DT01 Flood Damage CBA Tool and presented in Table 9-2 and Figure 9-1. The total damage value for each event is inclusive of both tangible and intangible costs. The AAD for the baseline present-day conditions have also been included in Table 9-2.

Table 9-2 Total Flood Damages Assessment Outcomes

Event	Number of Properties Affected	Number of Properties Flooded Above Floor	Total Damage	
20% AEP	285	113	$	52,666,184
10% AEP	536	236	$	106,818,385

Event	Number of Properties Affected	Number of Properties Flooded Above Floor	Total Damage
5% AEP	678	329	$ 129,176,441
2% AEP	818	422	$ 157,808,804
1% AEP	957	506	$ 193,846,285
0.5% AEP	1,080	577	$ 230,861,766
0.2% AEP	1,271	705	$ 295,167,129
PMF	3,540	2,508	$ 1,504,240,726
Average Annual Damages (AAD)			$ 36,389,468

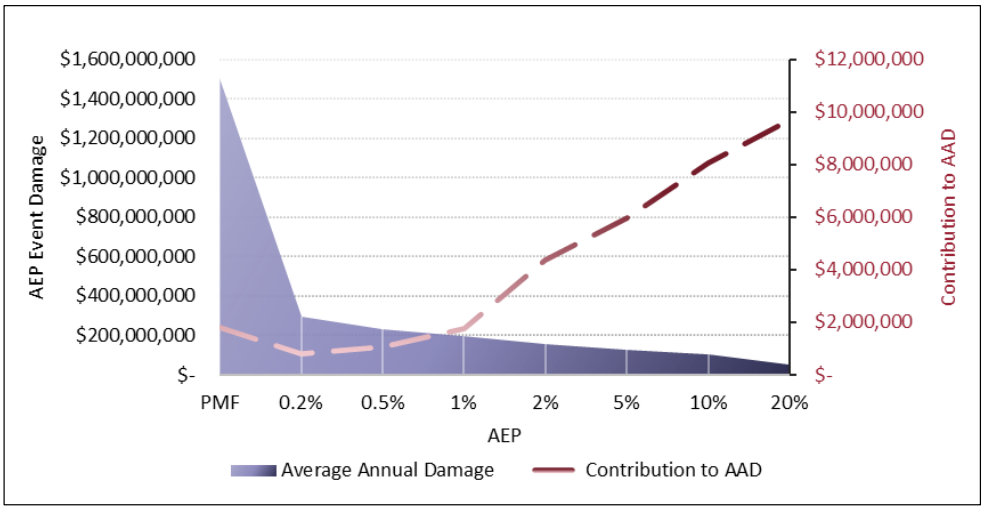


Figure 9-1 Combined Flood Damages Assessment Outcomes

The tangible damages are inclusive of costs associated with internal, structural, and external damages to residential, commercial/industrial, and public buildings. Intangible costs have also been calculated, inclusive of the risk to life and impacts to mental health. The total damages have been disaggregated to understand the dominant drivers of flood damage within the study area. The breakdown of the total flood damages by cost type are presented in Table 9-3 and Figure 9-2. Similarly, the breakdown of the total flood damages by property type are presented in Table 9-4.

As the study area is dominated by overland flow as the key flooding mechanism, a steady increase in the number of properties affected is noted up to the 0.2% AEP event. No notable jump in total flood damage is modelled between design events. However, as the capacity of the road corridor is significantly exceeded in the PMF event, a sharp rise in the number of properties flooded above floor is noted. Correspondingly, a significant jump in flood damage is modelled beyond the 0.2% AEP event.

As clearly depicted in Figure 9-2, the intangible costs associated with risk to life are the largest drivers of the total flood damage. The calculation for these costs is informed by the flood hazard classification (refer to Section 6.2.1) at the property and estimated values of $5.3 million and $52,962 for fatalities and injuries accordingly (Australian Government, 2022). An exponential increase in intangible damages is noted for the PMF event as the sharp increase in the number and magnitude of above floor flooding propels high hazard classification values.

Table 9-3 Total Flood Damages Assessment Breakdown by Cost Type

Event	External Damages	Internal and Structural Damages	Intangibles	Total Damage
20% AEP	$ 2,048,829	$ 20,525,191	$ 30,092,164	$ 52,666,184
10% AEP	$ 3,585,503	$ 44,140,103	$ 59,092,779	$ 106,818,385
5% AEP	$ 6,146,486	$ 59,991,737	$ 63,038,218	$ 129,176,441
2% AEP	$ 7,828,071	$ 76,259,468	$ 73,721,265	$ 157,808,804
1% AEP	$ 9,374,357	$ 90,974,992	$ 93,496,935	$ 193,846,285
0.5% AEP	$ 10,592,057	$ 104,287,343	$ 115,982,366	$ 230,861,766
0.2% AEP	$ 12,834,171	$ 128,134,200	$ 154,198,758	$ 295,167,129
PMF	$ 44,088,471	$ 554,102,501	$ 906,049,753	$ 1,504,240,726

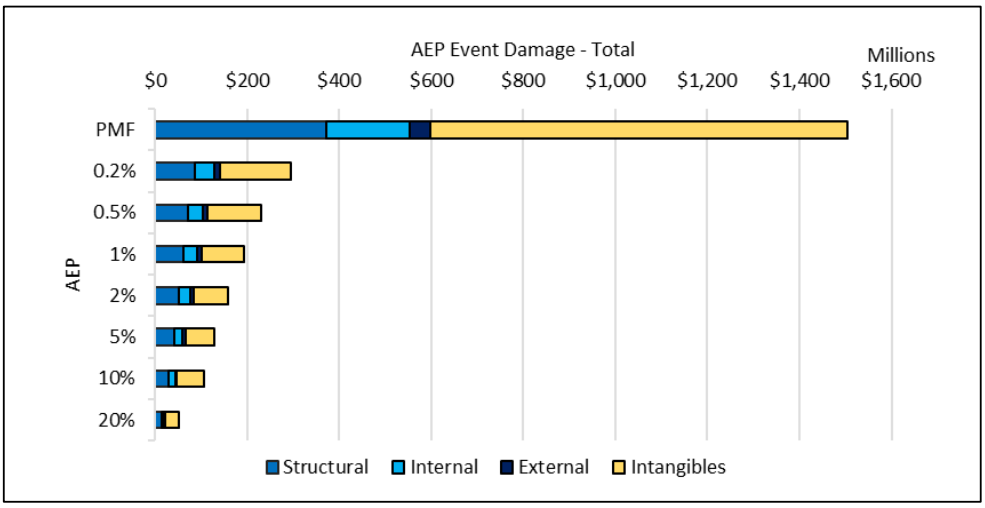


Figure 9-2 Total Damages Breakdown by Cost Type

Table 9-4 Combined Flood Damages Assessment Breakdown by Property Type

Event	Residential	Commercial / Industrial	Public	Total Damage
20% AEP	$ 52,452,445	$ 213,738	$ -	$ 52,666,184
10% AEP	$ 105,483,275	$ 1,204,130	$ 130,979	$ 106,818,385
5% AEP	$ 127,239,963	$ 1,762,521	$ 173,957	$ 129,176,441
2% AEP	$ 154,453,458	$ 3,136,364	$ 218,981	$ 157,808,804
1% AEP	$ 189,621,876	$ 3,919,472	$ 304,937	$ 193,846,285
0.5% AEP	$ 225,823,561	$ 4,368,982	$ 669,223	$ 230,861,766
0.2% AEP	$ 288,491,721	$ 5,668,503	$ 1,006,905	$ 295,167,129
PMF	$ 1,457,939,869	$ 39,430,573	$ 6,870,284	$ 1,504,240,726



10 Flood Risk Management Measures

The Manual provides a risk-based process and measures that aim to support the understanding and effective management of existing, future, continuing, and residual flood risk. In particular, the Manual separates flood risk management into the following four distinct categories:

- Community flood awareness measures;
- Land-use planning measures;
- Flood mitigation measures; and
- Property modification measures.

The combination of measures from each category aim to allow the diverse management of flood risk. KBR in collaboration with GLN Planning and Waverley Council have investigated a comprehensive range of flood risk management measures as part of this study.

10.1 COMMUNITY FLOOD AWARENESS MEASURES

The measures presented within this section aim to increase community flood awareness and therefore resilience. As the study area is vulnerable to flash flooding, it is imperative to bolster the community's understanding and response to rapidly occurring and dissipating floods. Targeted improvements to emergency management have also been considered within this section.

10.1.1 CM01: Community Education and Awareness

CM01: Improved Community Flood Awareness and Education

KBR recommends Council's implementation of an on-going flood education and awareness program to improve the community's understanding and awareness of flood risk. The key objectives of the awareness program are to ensure that the community:

- Understand the difference between mainstream and overland flow regimes
- Have a general understanding of flood mapping outputs and flood hazard
- Are aware of key overland flow paths and trapped low points within the Waverley LGA
- Know how to interpret and react to severe weather and flood warnings issued by the BoM and the SES
- Understand personal safety and property protection measures during a flash flood event
- Understand available evacuation routes and emergency response measures

Community flood awareness is an education process that aims to increase flood resilience on a whole of LGA basis. A deeper understanding of the nature of flooding that is to be expected within the study area will equip the community with appropriate response measures prior to, during, and after a storm event.

Due to common changes in tenancies across the LGA, it is imperative that community education and awareness programs are considered not just as once off events, but periodically as an on-going process. While long term residents may be better equipped, the lack of general community awareness may be exacerbated by new residents with minimal appreciation or understanding of flood risk.



However, on-going flood education campaigns can incur significant cost over time. The effectiveness of repeated engagement processes may also decrease over time as residents are continuously exposed to the same content, especially during extended periods of little rainfall. As such, a mix of active participation and indirect community education and awareness methods are recommended.

Update of Council's Website

While historic studies and flood planning information related to development applications are currently posted on Waverley Council's website, KBR recommends the creation of a dedicated flood risk information section that is easily visible and navigable. It is recommended for all historic and future flood and flood risk studies and their outcomes to be published online so residents can access the latest information.

Clear definitions regarding the different flood mechanisms and their applicability to the LGA would be highly beneficial for improving community knowledge. The differentiation between definitions adopted by Floodplain Management Australia, and those used in other industry bodies should be clearly articulated (e.g. Insurance Council of Australia).

KBR also recommends the inclusion of simple guides to understanding and interpreting severe weather and flood warnings issued by the BoM and SES. Easy to access and consolidated links to other flood related documents and guidelines such as the SES Flash Flood Guide, the NSW Flood Risk Management Manual, and Sydney Water's stormwater management education material will also be beneficial.

Expansion of GIS Mapping Portal

KBR recommends the expansion of Council's public existing GIS mapping portal (refer to Figure 10-1) to include the flood mapping outputs of currently endorsed and future studies within the Waverley LGA. The public access of this database will allow residents and community members to easily view, interact, and digest the outputs of highly complicated and technical studies. At Council's discretion, additional information such as Council's stormwater asset delineation could be easily integrated into the portal.

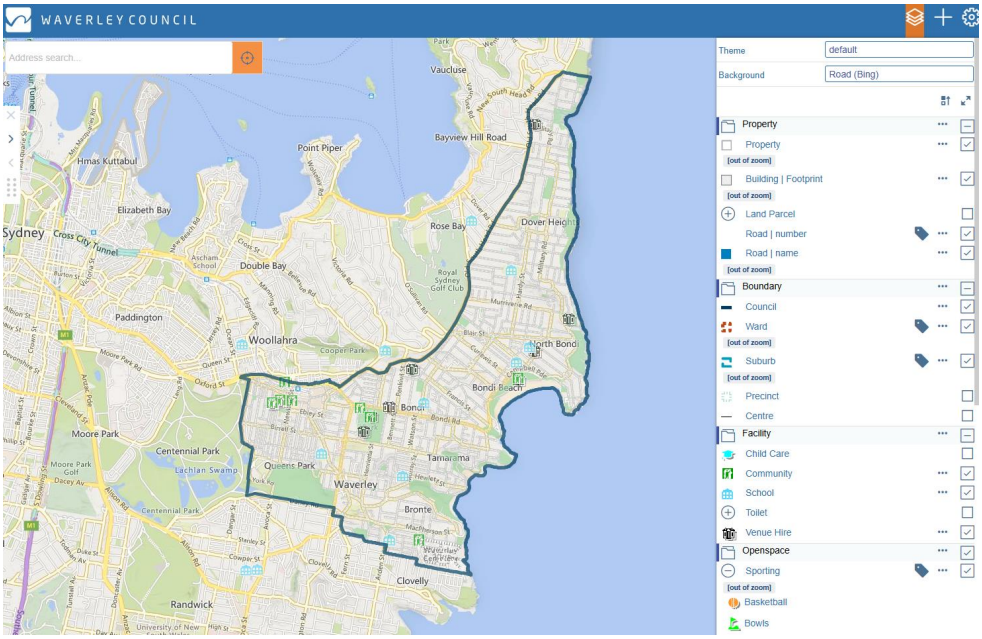


Figure 10-1 Snapshot of Council's Existing GIS Mapping Portal



Dedicated Flood Education, Awareness, and Resilience Programs

While dedicated LGA wide flood education, awareness, and resilience campaigns may be difficult and expensive to implement and maintain over time, targeted consultation with residents in high flood risk areas may be a cost-effective alternative (refer to Section 6.4 for flooding hotspots within the Waverley LGA).

Flood education and awareness should be a key role for combat agencies such as the SES. Collaboration between SES, Sydney Water, and Council will determine the effectiveness of the dedicated flood education campaigns. It is recommended for Council to provide technical input on existing flood behaviour and risk. Additionally, Council could use the targeted consultation campaigns to provide an overview of flood mitigation measures that are currently being undertaken or considered. KBR also recommends for emergency services such as the SES to provide information on appropriate community response and actions to improve resilience.

10.1.2 CM02: Improved Road User and Driver Safety

CM02: Road Vulnerability Awareness and Enhanced Road Signage

KBR recommends Council's undertaking of a detailed road vulnerability assessment informed by the updated flood information presented within this study. The assessment should take into consideration the trafficability, flood immunity, and hazard classification of the road. Additionally, the assessment should consider existing evacuation routes in the instance of a flood.

The outcomes of the assessment can be used to determine appropriate locations for the installation of road flood signage across the LGA. The type of signage should be tailored to each location and installation must be undertaken in accordance with the relevant Australian Standards. Community awareness and the demand on staff to undertake such works should also be considered.

In addition, it is recommended for Council to engage in conversations with state government agencies, such as Transport for NSW, to provide driver education programs not only regarding risk to individual safety, but also on the consequences of driving through floodwaters.

Due to the highly urbanised and steep nature of the LGA, flash flooding across roads is identified to be a key risk. The short critical durations identified in combination with the rapid response time of the study area significantly impairs the viability of road closure assessments as a reliable flood mitigation measure. That is, flood waters can quickly rise to hazardous depths and velocities and recede before a formal road closure can be established.

As a part of this study, KBR has completed a detailed road inundation analysis, providing mapping and commentary on the susceptibility of roads to high flood hazards and depths (refer to Section 6.5 for further information). Several key roads have been identified to be cut off even for frequent design magnitudes. Installing flood signage at strategic locations on these roads may assist in the prevention of road users from crossing hazardous flood waters during or after a storm event. As such, key roads that have been identified as potential locations for flood signage have been presented in Table 10-1. These signs could doubly warn community members of the risk of damage to parked cars in these locations.

Several examples of road flood signage have been extracted from Transport for NSW and presented in Figure 10-2 to Figure 10-4. However, should this measure be considered by Council for implementation, more tailored signs to the community could be developed.

Table 10-1 Potential Road Flood Signage Locations

Location	20% AEP Hazard Classification	1% AEP Hazard Classification	20% AEP Peak Flood Depth (m)	1% AEP Peak Flood Depth (m)
Isabelle Avenue	H6	H6	0.75	0.96
Murriverie Road	H5	H5	0.52	1.46
Warners Avenue	H3	H4	1.23	1.67
Simpson Street	H4	H5	1.18	1.79
Dickson Street	H5	H5	2.39	2.92



Figure 10-2 G9-21-3 Signage (Transport for NSW, 2023)



Figure 10-3 G9-21-2 Signage (Transport for NSW, 2023)



Figure 10-4 G9-22-1 Signage (Transport for NSW, 2023)

A common misconception amongst the general public is the depth of water that is required to cause a vehicle to float. As identified in Section 6.5.2, only 150 mm is required to float a small car, causing the loss of control. It should also be noted that smaller depths with fast moving flood waters could produce a high hazard rating as could deep water with slower moving velocities. Efforts should be made to educate road users of the risks to their own safety as well the consequences of driving through flood waters.

Driver education regarding the interpretation of the new road flood signage should also be implemented in conjunction. Should signage be placed where flooding is short lived, users may be dismissive of the reliability of the signage. On the other hand, if road closure signs are left out well beyond the time when flood waters have receded, complacency and dismissiveness of the signage may increase over time. Therefore, the provision of clear guidance on how to identify and interpret the various flood signage across the LGA is strongly recommended.

10.1.3 CM03: Co-ordination with Emergency Services

CM03: Flood Emergency Response Co-ordination

The State Emergency Service has formal responsibility for the emergency management operations in response to flooding. Other organisations including the Bureau of Meteorology, police, fire brigade, ambulance, and community groups often provide assistance.

The effective and ongoing co-ordination with emergency services allows for a collaborative approach of ensuring the safety of the community. Considering that the SES is principally a volunteer organisation, strengthening the relationship between Council, SES, and other emergency service groups can bolster community involvement and ownership of flood emergency response.

As described in Section 10.1.2, the Waverley LGA comprises fast reacting catchments prone to flash flooding. While not as extreme as other LGA's impacted by riverine flooding (in comparison to the overland flooding nature of the Waverley LGA), the quick and collaborative response of Council and emergency services during a flood is a critical component of the management of flood risk to the community during extreme events. The community flood awareness measure CM03 focuses on the ongoing management and improvement of the co-ordination between the emergency response agencies prior to a flood event such that appropriate response is enabled during and after such an event.

Clearly defining the roles and responsibilities of Council and each emergency response agency allows for efficient operation during a flood event. As described in other community flood



awareness measures proposed, Council holds the responsibility of ensuring the preparedness of the community as well as for responding to issues relating to public spaces and infrastructure (e.g. road closures and stormwater maintenance). Emergency response agencies such as the SES are responsible for the control of flood operations (e.g. evacuation). Ensuring the community is aware of the differences in the roles and responsibilities of Council and the various emergency response agencies will empower the community to efficiently communicate with the relevant operator during a flood event.

Where possible, KBR also recommend the inclusion of representative from key emergency response agencies for various flood management and risk related studies conducted by Council or the state government. Not only will this improve communication between stakeholders, but it will also allow agencies an opportunity to provide their input during the undertaking of such study. For example, the SES may have valuable information on emergency escape routes that are frequently impacted, or NSW Health (e.g. hospitals or community health centres) may provide insight on preferred emergency escape routes during wet weather events.

While KBR recommends the implementation of regular meetings (e.g. quarterly) between Council and the various emergency response agencies, logistic difficulties may prevent the regular occurrence of such meetings with all attendees. As such, smaller meetings targeting specific agendas could be set up as an alternative. The important factor is to ensure that ongoing and periodic meetings are held to ensure that limitations associated with the changeover of staff can be minimised. Additionally, KBR recommends joint training exercises specifically related to combatting overland flow and flash flooding be arranged across all relevant parties.

10.2 LAND-USE PLANNING MEASURES

The primary objective of the NSW Government's Flood Prone Land Policy is 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". At the same time, the policy recognises the benefits flowing from the use, occupation and development of flood prone land.

The only way to completely remove flood risks from a development is for it to be located outside the extent of the Probable Maximum Flood. That would be a very risk-averse approach to floodplain management which is not supported by the Manual, and not feasible for such an urbanised study area like the Waverley LGA. One of the principal tenants of the Flood Prone Lands Policy is that "flood prone land is a valuable resource and that development applications and proposals for rezoning of flood prone land should be the subject of careful assessment which incorporates the consideration of local circumstances".

When considering future development, both the Policy and the Flood Risk Management Manual promote the use of a "merit based approach" which balances social, economic, environmental, and flood risk parameters to determine whether particular development or use of the floodplain is appropriate and sustainable. In this way, the policy avoids the unnecessary sterilisation of flood prone land. Equally, it ensures that flood prone land is not the subject of uncontrolled development that exposes individuals and the community to intolerable flood risks.

Consequently, best practice flood risk management in land-use planning involves applying a risk management approach. This requires an understanding of risk management principles and their application to flood risk management as discussed within this section.

The recommendations made within this section have been extracted from the Waverley Flood Risk Management Study & Plan Planning Considerations report (GLN Planning, 2025).



10.2.1 LM01: Flood Maps for Strategic Planning Purposes

LM01: Flood Maps for Strategic Planning Purposes

GLN Planning recommends the preparation of mapped outputs using the information contained within this study for the purposes of strategic planning.

The flood information to be considered might include flood hazard classification, hydraulic categorisation, evacuation constraints, and variations associated with projected climate change. This should be considered for a range of floods so that the full spectrum of flood risk can be understood.

The information contained within this study and associated flood mapping provide an invaluable source of knowledge that can be used to better understand flood risk management considerations. The strategic planning process requires the consideration of a wide range of factors to produce or review plans that guide land use management and development in an area. Flood risk management is one of these factors.

The type of flood risk information that can be extracted from a Flood Study and Flood Risk Management Study (this study) and mapped for strategic planning purposes differs from flood planning maps prepared to be read in conjunction with an LEP or DCP. The difference relates to their function.

The extent of flood information and mapping that can be used for strategic planning purposes can be more complex compared to that needed for statutory planning purposes. The flood information might typically include flood hazard classification outputs (i.e. depth and velocity), hydraulic categorisation outputs (i.e. floodway, flood storage, or flood fringe), evacuation constraints, and variations associated with projected climate change. This should be considered for a range of flood magnitudes so that the full spectrum of flood risk can be understood.

A system to distil this type of information into maps that can be used for strategic planning purposes is the Flood Planning Constraint Categorisation approach outlined by Guideline 7-5 of the Australian Disaster Resilience Handbook Collection (AIDR, 2017). This guideline provides a basis for a simplified grouping of flood risk information across a range of flood frequencies into four (4) categories. This information includes a single map outlining FPCCs and information on the implications of flooding in the different categories. This information can be used to inform the preparation of strategic plans (e.g. Council's Local Strategic Planning Statement) and LEP zone boundaries.

As outlined by the guideline, four (4) FPCCs have been formulated for the following purpose:

> *Four FPCCs have been developed to separate areas of the floodplain from the most constrained (and therefore least suitable for intensification of land use or development - FPCC1), to the least constrained (and therefore more suitable for intensification of land use or development - FPCC4).*

The FPCC classification and mapping outputs have been prepared as part of this study, detailed in Section 6.8 and Figure 6-12 respectively. The planning implications associated with each category are presented in Table 10-2.

Table 10-2 Flood Planning Constraint Categorisation Planning Implication

FPCC	Constraint	Planning Implication
1	• Floodway in the 1% AEP event • Flood storage areas in the 1% AEP event • H6 flood hazard in the 1% AEP event	Most uses could be considered unsuitable.



FPCC	Constraint	Planning Implication
2	• Floodway in the 0.2% AEP event • H6 flood hazard in the 0.2% AEP event • H5 flood hazard in the 1% AEP event	Many uses unsuitable but controls can sometimes assist to make uses acceptable.
3	Within the Medium and High Flood Risk Precinct extents	Most uses suitable with standard development controls.
4	Within the PMF event extent	Most uses suitable subject to emergency management considerations but can remain unsuitable for vulnerable uses.

While FPCCs are ideally suited for use in greenfield and riverine (as opposed to overland flow) situations, they can be helpfully considered in established urban areas, subject to being judiciously applied. The consideration of the ideal flood risk land-use planning outcome by FPCCs needs to be balanced with outcomes that recognise the established nature of existing development, planning objectives that seek to maximum development opportunities in a central metropolitan location, and the potential to manage legacy flood risk issues. Accordingly, FPCCs and other flood information outputs produced as a part of this study have been considered in the review of existing land use zones of identified hotspots together with a practical appreciation of the nature of existing development (refer to Section 10.2.2).

10.2.2 LM02: Changes to the Flood Risk Management Statutory Planning Framework

LM02: Changes to the Flood Risk Management Statutory Planning Framework

GLN Planning supports the risk based approach for the statutory planning framework presented as a “Planning Matrix Approach” with some refinement.

The recommendations have been disaggregated into the following categories:

- Flood planning maps,
- Planning review of hotspots,
- Development Control Plan provisions,
- Fencing, and
- Climate change.

As outlined in the Review of Waverley LGA Flood Study and Waverley DCP Amendment (GLN Planning, 2023), the flood risk management statutory planning framework was historically based on determining a singular FPL to determine the extent of an FPA, which in turn governs the appearance of statutory flood planning maps. However, this does not optimally allow for the application of a risk based approach which needs to consider the full range of potential flood magnitudes and the variable sensitivity of different land uses to flooding.

The ”Planning Matrix” approach (Bewsher & Grech, 1997) was formulated to address the inadequacies of past approaches. This approach does not rely on a singular FPL but requires the mapping of typically three (3) “precincts” with different levels of flood hazards. This is consistent with the recommendation of the Queensland Commission of Inquiry, following devastating flooding in 2010-2011. The recommendation included flood planning maps be prepared showing “… ‘zones of risk’ (at least three) derived from information about the likelihood and behaviour of flooding.” (Queensland Government, 2012). Cumulatively, these three (3) precincts can constitute a FPA map.

The Planning Matrix approach operates in conjunction with the mapping of Flood Risk Precincts (typically Low, Medium, and High FRPs). Rather than identify a single FPA within which all



development is equally subject to the same planning considerations, the FRPs are used in conjunction with the planning matrix to determine which controls apply, to which land uses, within each FRP.

The Planning Matrix and FRP mapping approach was adopted by the original Flood Study and for the Draft DCP Provisions (WMS, 2021) prepared for Council. This approach is now commonly applied by a substantial number of local government Councils in NSW and is supported by Guide FB01 (Understanding and Managing Flood Risk Guide) accompanying the Manual.

The Draft DCP provisions, as reviewed by GLN Planning, underwent an extensive Council consideration and community consultation process before being adopted by Council in March 2023. These DCP provisions have been in force since May 2024. A review of the Part B Section 5.2 flood risk management provisions of the DCP, inclusive of a workshop conducted with Council officers in June 2025, has not identified any fundamental issues with the application of the Planning Matrix approach or the format and general contents of the DCP provisions. However, various detailed aspects of the DCP provisions warranting amendment were identified as part of this review process and are outlined and discussed in the subsequent sections.

Flood Planning Maps

The 2023 Review considered options for flood planning maps prepared for statutory planning purposes. The following three (3) approaches were considered, being approaches commonly used by other Councils in NSW in recent years:

1. A Single Line Based Map - this approach shows a line-based map on a single FPL (typically the 1% AEP event plus freeboard) to trigger the consideration of flood planning controls for areas only within that line.
2. Flood Control Lot map - this approach maps the whole of lots that are identified as substantially affected by a single FPL (typically the 1% AEP event plus freeboard) to trigger the consideration of flood planning controls for the whole of lots identified in this way.
3. Flood Risk Precinct Map - this approach typically maps the whole of the floodplain (i.e. up to the PMF event extent) into three categories (normally referred to as Low, Medium, and High FRPs) based on various flood considerations to apply different planning controls to different land uses in different parts of the floodplain.

The 2023 Review concluded that the Flood Risk Precinct mapping approach was preferable for the context of the Waverley LGA. For the reasons outlined in the review, the FRP mapping approach provides a best practice risk-based approach that is designed to work with the Planning Matrix approach. The FRP mapping approach divides the whole of the floodplain into precincts that do not miscommunicate known flood risk to the community and provides a platform from which nuanced planning controls can be established with minimal complexity.

While a detailed review and update of the FRP mapping previously adopted in March 2024 was undertaken as a part of this study (refer to Section 6.6), apart from the localised changes to the mapping extents themselves, there is no basis to conclude that any fundamental change to the FRP mapping approach in itself is warranted.

There is no specific requirement to prepare a Flood Control Lot Map (i.e. that depicts flood control lots as defined by the Codes SEPP). In practice, this is normally done for the purpose of having a GIS based source to automatically trigger which properties should be noted as a flood control lot on a Section 10.7 Planning Certificate. In some cases, flood maps cannot perform this function because it is a practice of some NSW Councils to exclude the “tagging” of Flood Control Lots if a small proportion of the lot is affected by flooding (i.e. less than 5-10% being a criterion commonly used). This is thought to be a reasonable approach because a model will always have limited levels of accuracy and a small area of flood affectation could have immaterial implications for development.



However, in highly urbanised catchments primarily subject to overland flow flooding (such as the Waverley LGA), any inaccuracies in the modelling outputs could be negative or positive. In this case, it is likely to be minimal given the extent of additional detail incorporated into the hydraulic model as a part of this study (refer to Section 5.2). Additionally, because of the densely developed nature of the catchment, even a small part of a property being flood affected could be a relevant development consideration. Further, exclusion of some properties that are partially flood affected from a flood control lot classification, would likely be confusing to the general public who could interrogate the FRP maps made available by Council or obtain a Flood Certificate.

Accordingly, the identification of Flood Control Lots for the purposes of tagging properties for notification on Section 10.7 Planning Certificates should be based on a lot either wholly or partially located within the FPA, adopted for the purposes of the DCP and LEP.

It should be noted that flood mapping extents can vary over time with changes to the urban form. While this is mostly controlled through the planning provisions that are aimed at ensuring that new development does not result in material flood impacts on adjoining properties, essential capital works programs could be undertaken that have some effects, particularly works intended to reduce flooding. Accordingly, Council should review the hydrologic and hydraulic modelling on a period basis or after any major capital works projects and update the FRP maps accordingly.

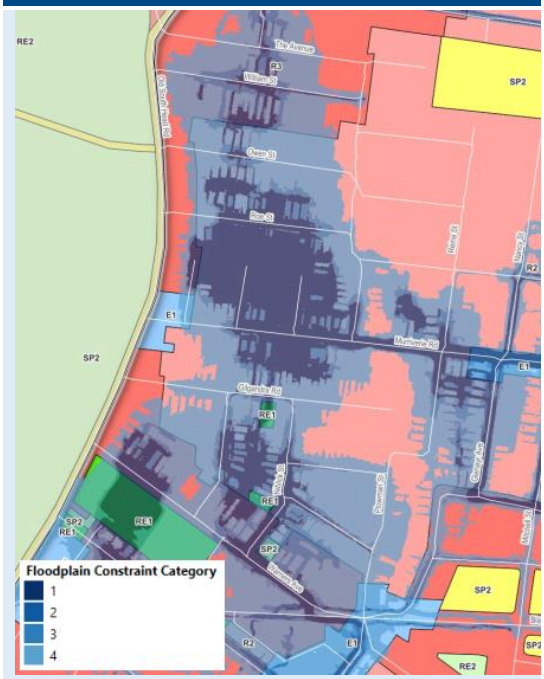
Planning Review of Hotspots

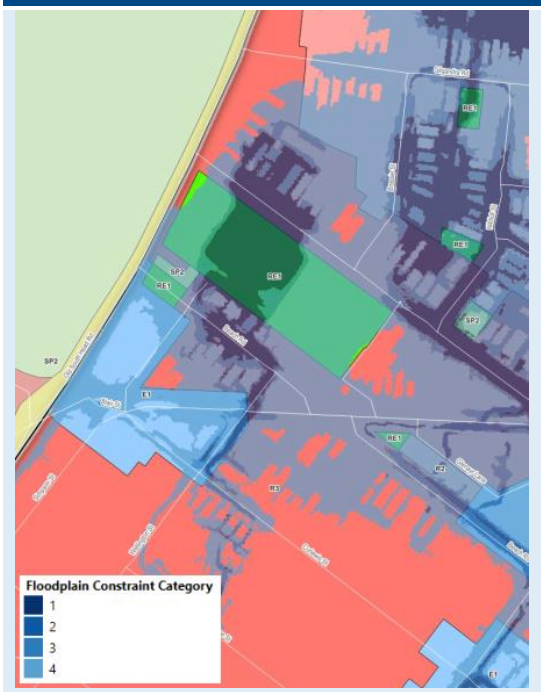
GLN Planning has reviewed the updated hydrologic and hydraulic modelling outcomes for the 12 nominated hotspots (refer to Section 6.4) and have considered whether site specific flood planning controls, including changes to land use zonings, are appropriate. This has included a site inspection of the hotspots in July 2025, together with review of aerial imagery and general planning information available on the NSW Planning Portal and information received from Council.

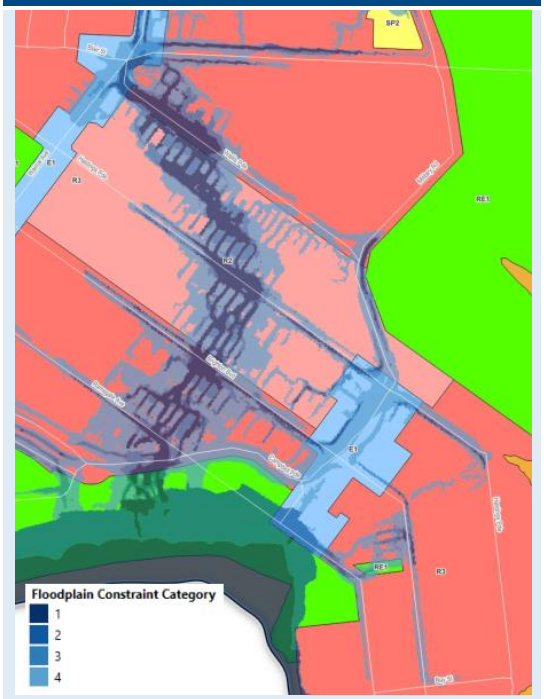
Table 10-3 outlines the key characteristics of each of the hotspots and the recommended planning actions. Mapping indicating the FPCC outputs overland onto the LEP land use zoning for each of the hotspots are also included within the table.

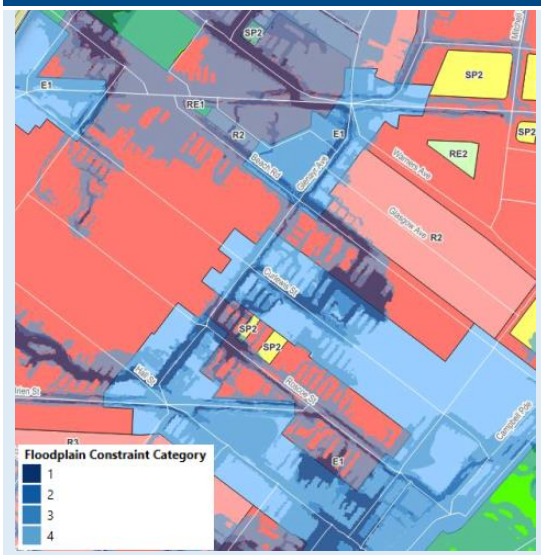
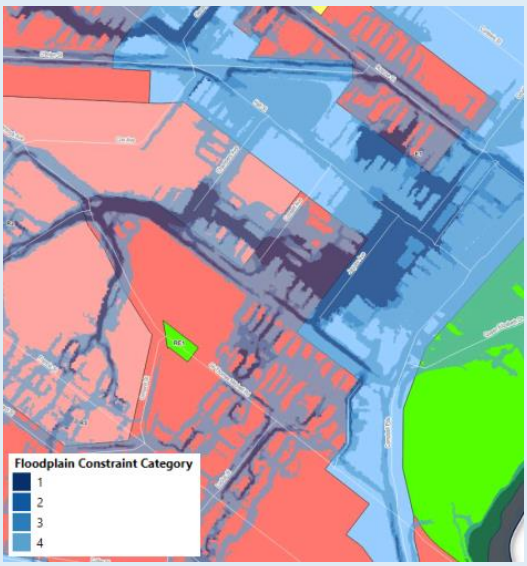
Table 10-3 Review of Hotspots

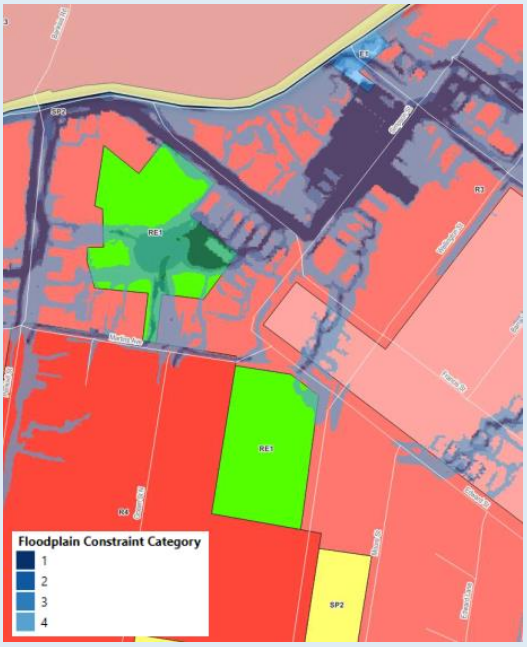
Description and Characteristics of Hotspot	Comments and Recommendations
Hotspots 1 to 4 - Gilgandra Road and Murriverie Road  View looking east along Murriverie Road (GLN Planning, 2025)	This area is mostly zoned R2 Low Density Residential with a smaller proportion zoned R3 Medium Density Residential in the north along William Street and in the south along Warners Avenue. The R2 zoned area is primarily developed with one to two story detached housing. A substantial proportion of this housing has been renovated or recently rebuilt. The R3 zoned area is mostly developed with two to four storey older, but often renovated, residential flat buildings. As depicted by the FPCC overlay, the worst flood affected parts of this cluster of hotspots (FPCC 1) is between Roe Street and Murriverie Road, extending into narrower areas to the north, south, and east. The area is generally flat and flooding reflects those parts which are naturally trapped depressions. Given that only relatively small areas are subject to FPCC 1 and given the established nature of the area, there would be no utility in changing the land use zonings that apply to

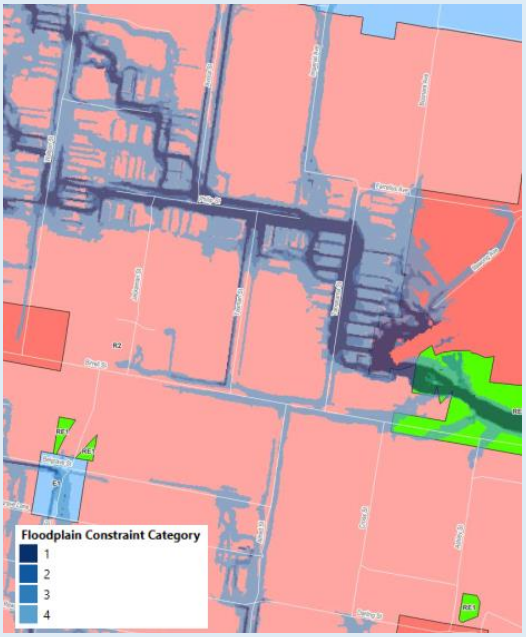
Description and Characteristics of Hotspot	Comments and Recommendations
	reflect flooding constraints. This would be unlikely to facilitate a change to existing development to reflect flooding constraints. The existing DCP planning controls, with the recommended updates from this study, are capable of managing future flood risk. As there are significant existing issues associated with flow paths through properties, this may require further review in the future.
Hotspot 5 - Beach Road, Warners Avenue, and Barracluff Park Area  View looking east along Warners Avenue adjacent to Barracluff Park (GLN Planning, 2025)	This area is to the south of Hotspots 1 to 4 and is mostly zoned R3 Medium Density Residential. Barracluff Park is zoned RE1 Public Recreation. The R3 zoned area is mostly developed with two to three storey older style residential flat buildings, some of which have been recently renovated. Barracluff Park includes a playing field, hard courts, and other recreational facilities. The worst flood affected parts of this hotspot (FPCC 1) is centred in Barracluff Park and Warners Avenue. The properties immediately to the north and south have varying levels of flood affectation, being mostly FPCC 1 near Barracluff Park and Warners Avenue and FPCC 3 and 4 beyond. The main flood affected area is parkland for which the RE1 zoning is appropriate from a flood risk management perspective. Given that only small areas of residential zoned land are subject to FPCC 1 and given the established nature of the area, there would be no utility in changing the land use zonings that apply to reflect flooding constraints. As above, this would be unlikely to facilitate a change to existing development to reflect flooding constraints. The existing DCP planning controls, with the recommended updates from this study, are capable of managing future flood risk.

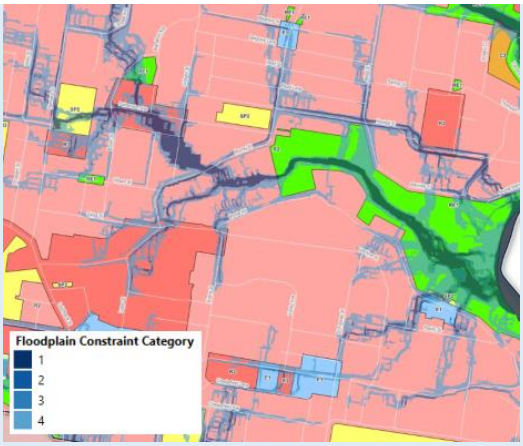
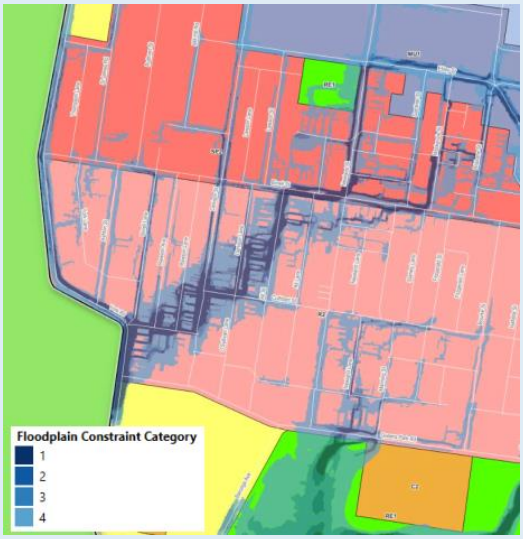
Description and Characteristics of Hotspot	Comments and Recommendations
	
Hotspot 6 - Hastings Parade, Brighton Boulevard, and Ramsgate Avenue Area  Looking northwest along Brighton Boulevard near the low point (GLN Planning, 2025)	The northern part of this area is zoned R2 Low Density Residential while the southern part is zoned R3 Medium Density Residential. This hotspot reflects the line of a historical flow path that extends from near the intersection of Wairoa Avenue and Blair Street to North Bondi Beach. The flow path comprises a network of channels extending partially down public roads then through setbacks between residential buildings. The central channels are FPCC 1 while the areas beyond these are mostly FPCC 3 and 4. As above, given the relatively small areas of residential zoned lands are subject to FPCC 1 and given the established nature of the area, there would be no utility in changing the land use zonings that apply to reflect flooding constraints. Existing planning controls, with the recommended updates from this study, are likely to be capable of managing future flood risk. However, as there are significant existing issues associated with flow paths through properties, this may require further review in the future. Of particular important in this location is the need to ensure that uncontrolled fence construction does not alter existing flow paths so as to cause unexpected impacts.

Description and Characteristics of Hotspot	Comments and Recommendations
	
Hotspot 7 - Roscoe Street, Glenayr Avenue, Curlewis Street, and Beach Road Area  View looking south along Glenayr Avenue towards its intersection with Blair Street (GLN Planning, 2025)	This area is mostly zoned R3 Medium Density Residential and E1 Local Centre. The E1 zoning permits shop top housing with development consent (with ground floor commercial development) to heights of 12.5 m to 15.0 m. This area is developed with predominantly two storey houses, two to three storey older style residential flat buildings, and relatively newer four storey residential flat buildings. While these are mostly dense forms of housing, they are within detached buildings. This hotspot reflects a disparate network of historical flow paths at the lower end of a flow path that traverses across the LGA from the ridge line along Old South Head Road. The flow paths extend between residential buildings which are mostly detached and then mainly along streets. The central channels are FPCC 1 while the areas beyond these are mostly FPCC 3 and 4. For the same reasons as above, there would be no utility in changing the land use zonings that apply to reflect flooding constraints. However, there is a need to ensure that uncontrolled fence construction does not alter existing flow paths so as to cause unexpected impacts.

Description and Characteristics of Hotspot	Comments and Recommendations
	
Hotspot 8 - Chambers Avenue to Bondi Beach Area  Source: Landchecker 13.03.2025 	This area is mostly zoned R3 Medium Density Residential and E1 Local Centre with the same development opportunities as in Hotspot 7. The western end of this hotspot is zoned R2 Low Density Residential and there are pockets of low scale heritage houses and larger heritage commercial buildings in this area. Closer to the beach, existing development comprises a mix of two storey commercial development (sometimes with dwellings in the upper level) to newer six storey mixed use ground floor commercial developments with shop top housing above. In this area, buildings are attached in building forms expected for commercial centres. This area comprises an overland flow path that flows from several flow paths that converge near the intersection of Lamrock and Forest Knoll Avenues (flowing in an eastward direction to South Bondi Beach). This conveys flows between residential buildings, where detached, and then mainly along streets within the lower areas near the beach where buildings are attached. For the same reasons as above, there would be no utility in changing the land use zonings that apply to reflect flooding constraints. As there are significant existing issues associated with flow paths through properties, this may require further review in the future. However, there is a need to ensure that uncontrolled fence construction does not alter flow paths so as to cause unexpected impacts.

Description and Characteristics of Hotspot	Comments and Recommendations
Hotspot 9 - Francis Street and Thomas Hogan Reserve Area  View looking southeast along Francis Street towards Simpson Street near the Thomas Hogan Reserve (GLN Planning, 2025) 	This area is mostly zoned R3 Medium Density Residential, other than the Thomas Hogan Reserve which is zoned RE1 Public Recreation. This area is predominantly developed with dwelling houses, semi-detached dwellings, and two to four storey older, but often renovated, residential flat buildings. The area consists of undulating terrain necessitating split level roads in some locations. As depicted by the FPCC overlay, the worst flood affected parts of this hotspot (FPCC 1) are properties along Simpson Street and within the Thomas Hogan Reserve. Road corridors such as Penkivil Street, Francis Street, and O'Brien Street are also major flow paths with a FPCC 1 affectation. As above, given that relatively small, disparate areas of residential zoned land are subject to FPCC 1 and given the established nature of the area, there would be no utility in changing the land use zonings that apply to reflect flooding constraints. The existing DCP planning controls, with the recommended updates from this study, are capable of managing future flood risk. As there are significant existing issues associated with flow paths through properties, this may require further review in the future.
Hotspot 10 - Phillip Street to Tamarama Street Area 	This area is mostly zoned R2 Low Density Residential, other than Tamarama Park and Beach which is zoned RE1 Public Recreation. The topography of the area ranges from generally flat to steeper terrain within and surrounding the Tamarama Gully. The area is predominantly developed with detached housing and semi-detached dwellings. Flooding is associated with minor overland flow paths that converge to form a major flow path (flowing in a south easterly direction towards the Tamarama Gully). This conveys flows between residential buildings, where detached, and along streets.

Description and Characteristics of Hotspot	Comments and Recommendations
View looking east along Phillip Street towards Tamarama Street (GLN Planning, 2025) 	For the same reasons above, there would be no utility in changing the land use zonings that apply to reflect flooding constraints. As there are significant existing issues associated with flow paths through properties, this may require further review in the future. However, there is a need to ensure that uncontrolled fence construction does not alter existing flow paths so as to cause unexpected impacts.
Hotspot 11 - Palmerstone Avenue to the Bronte Gully Area  View looking west down Palmerstone Avenue near the intersection with Dickson Street (GLN Planning, 2025)	This hotspot is mostly zoned R2 Low Density Residential with a smaller proportion zoned R3 Medium Density Residential around Palmerstone Avenue and Dickson Street. The lower reaches of the hotspot comprises Bronte Park and Beach which is zoned RE1 Public Recreation. The area is predominantly developed with dwelling houses, semi-detached dwellings, and two to four storey older, but often renovated, residential flat buildings. The area consists of undulating terrain, necessitating split level roads in some locations. Flooding is associated with a major overland flow path that originates near Henrietta Street, fed by several minor flow paths before discharging into the Bronte Gully. As depicted by the FPCC overlay, the worst affected parts of this hotspot (FPCC 1) are properties along Palmerstone Avenue and Dickson Street. The flow path continues along the rear boundaries of the long allotments fronting Murray Street and Bronte Road before discharging into Bronte Gully. As above, given that relatively small disparate areas of residential zoned land are subject to FPCC 1, the established nature of the area, and the containment of some overland flow paths along roads and the rear of private open space areas of larger properties, there would be no utility in changing the land use zonings that apply to reflect flooding

Description and Characteristics of Hotspot	Comments and Recommendations
	constraints. The existing DCP planning controls, with the recommended updates from this study, are capable of managing future flood risk. However, there is a need to ensure that uncontrolled fence construction does not alter existing flow paths so as to cause unexpected impacts.
Hotspot 12 - Alt Street, Denison Street, and York Road Area  Source: Landchecker 13.03.2025 	This area is mostly zoned R2 Low Density Residential, other than the smaller part north of Birrell Street zoned R3 Medium Density Residential. The topography of the area ranges from generally flat to gently sloping. The area is predominantly developed with detached housing and semi-detached dwellings, with a minor proportion of residential flat buildings. Flooding is associated with original overland flow paths that have been historically developed with housing. Flows consequently weave between residential buildings and along streets. For the same reasons as above, there would be no utility in changing the land use zonings that apply to reflect flooding constraints. However, there is a need to ensure that uncontrolled fence construction does not alter flow paths so as to cause unexpected impacts. As there are significant existing issues associated with flow paths through properties, this may require further review in the future.



In summary, while some properties within the hotspot locations are significantly affected by flooding, a change to the land use zoning of these properties would not be warranted. Having regard to the established urban environmental context as discussed in Table 10-3, the impracticality of pursuing a less vulnerable land use for these properties and the ability to manage the flood risk within the application of the DCP controls provides no reasonable justification to consider alternate zonings.

Despite the above conclusion, Council should conscientiously ensure that consideration of any future proposals to change the land use zonings or development standards that affect the land use potential of properties in the LGA apply flood risk management principles and assessment criteria as discussed above to ensure that potential flood risk is not increased, and where possible, reduced.

Development Control Plan Provisions

As described in Section 8.10, the existing Part B Section 5.2 flood risk management DCP provisions have been reviewed as a part of this study. This review has involved extensive discussions with Council officers involved in development assessments, consideration of relevant decisions of the NSW Land and Environment Court, the introduction of any guideline since the adoption of the DCP, and the project team's experience within other Council areas and with Government projects.

Detailed notes and potential actions were compiled as part of discussions held with Council Officers, including an in-person workshop. These notes have specifically informed the recommended updates to the existing flood risk management DCP provisions.

In summary, the review has found that the format, structure, and the majority of the provisions of the existing DCP are fit for purpose. Relatively minor issues were identified that primary relate to the interpretation of the provisions or requirements for superfluous assessments or documentation.

While not an explicit requirement of this project brief, Appendix C has been included, providing a draft revised Section 5.2 of the DCP that reflects the recommended changes. The pertinent recommended changes to the DCP are summarised:

- Update in terminology, definitions, and controls based on current guidelines (including the SIP Guideline) and practices;
- Direction to obtain a Council Flood Certificate before commencing the preparation of a development application;
- Inclusion of additional notes to aid in the interpretation of the provisions;
- Removal of the requirement for structural certification for alterations and additions to dwelling houses, dual occupancies, or semi-detached dwellings other than where that would provide for shelter in place;
- Rationalisation of the requirements for locating the pumping and electricals for swimming pools;
- Inclusion of a standalone requirement to ensure that mitigation measures being considered to manage flood risks avoid consequential impacts to the amenity of an area and the quality of the public domain;
- Collapse of the land use categories of "critical uses and facilities and sensitive uses and facilities" into a single category titled "sensitive and hazardous development" as the controls were the same and this aligns with the terminology in the Considering Flooding in Land Use Planning - Guideline (Department of Planning & Environment, 2021);



- Identification of definitions that are superfluous for the flood risk management DCP provisions (potentially required for other DCP provisions) and updated other definitions;
- Review of Annexure B5-3 to provide further guidance for the preparation and assessment of a Flood Impact Risk Assessment (FIRA) with reference to the Flood Impact and Risk Assessment - Flood Risk Management Guideline LU01 (Department of Planning & Environment, 2023c);
- Update of Annexure B5-1 Land Use Risk Categories;
- Incorporation of criteria for the design and assessment of flood refuge areas; and
- General review and update of the terminology and presentation of the document.

Amendments to the flood risk management DCP provisions may require further consideration and refinement by Council before commencing the formal DCP amendment process in accordance with the requirements of the EP&A Act.

Fencing

While not identified as part of the project brief, proactive measures that could be explored to minimise the flood impact of fencing has been included as part of this study. As discussed in Section 8.13, fencing can have significant impacts on the flow of flood waters in areas dominated by overland flow flooding (such as the Waverley LGA) and can be inadvertently constructed without the required approval and appropriate consideration of flood impacts.

Possible actions from Council could include the production of technical guidance to inform the community of where there is an obligation to obtain approval for fencing, the effects of fencing on flooding, and flood smart design options. This guidance could either include technical requirements which specify the performance outcomes or provide a shortlist of designs to choose from.

An example of a technical guidance note could include:

- A percentage range for the open area of the fence (e.g. 50-75%) between the existing ground level and the flood planning level.
- Specifications for openings could be provided (e.g. for all openings to be at least 75 mm wide to allow the flow of water).

While this is a simpler option, Council may prefer a shortlist of specific fence designs to better understand their construction and maintenance cost. Possible design solutions include:

- Fences with an integrated louvre design along the bottom of the fence between ground level and the FPL that would open under the pressure from overland flows.
- Fixed mesh elements along the bottom to allow water to pass through the fence but still allow a solid upper portion to be provided for privacy. The mesh component would need to be sized to ensure that pets cannot pass through the gaps while also avoiding material or debris to be caught.
- Timber paling fencing with alternating vertical slats that provide gaps to allow floodwater to pass through.

A third option is to outline possible modifications to existing fences instead of replacing a fence along an entire boundary. These options could be promoted as part of a voluntary fence program for flood control lots. While no similar program is identified to exist within the Waverley LGA, it is recommended for the parameters of such a program to consider:

- Using the outputs from this study to generally determine parts of the floodplain where modified fences would be beneficial.



- A promotional campaign that highlights the approval requirements for fencing on flood control lots.

Council could adjust approval pathways to encourage the use of a Flood Smart Fencing Program. At present, no fences on flood control lots are technically considered exempt development under the Codes SEPP. Additionally, no relevant exempt development provisions exist in the LEP. However, in accordance with Clause 1.9(9) of the Codes SEPP, if the LEP provided for exempt development, then the LEP would prevail.

Accordingly, Council could amend Schedule 2 of the LEP to include fencing within all residential, business, and industrial zones on a flood control lot that is approved as part of Council's Flood Smart Fencing Program as exempt development. The amendment to Schedule 2 would also need to specify all criteria to be satisfied by such fences (i.e. height, material, and design for front, side, and rear boundaries) including flood related specifications. Where any of these criteria are not satisfied, a full DA would need to be submitted. The program would need to be first established such that it can be defined within the LEP. This would provide a mechanism to both encourage the construction of flood smart fencing and reduce the administrative burden of needing to process a DA for all fencing on flood control lots.

Climate Change

The consideration of climate change effects requires the determination of what would be reasonable standards to apply today to ensure that a development has an acceptable level of flood immunity in the future based on projected future climate flood effects. The aim should be to take a precautionary approach to contain flood risks at those levels otherwise considered acceptable today, where this can be practically achieved. The time period for consideration of the future climate is typically years 2050 and 2100.

The NSW Sea Level Rise Policy Statement (NSW Government, 2009) recommends that strategic and statutory planning documents could respond by restricting the intensification of development in areas subject to predicted climate change flood risk or applying planning controls to manage the additional risk. The mechanisms that might be applied include:

- Adopting climate change design flood levels when assessing the suitability of land at the strategic planning stage and assessing potential development outcomes associated with planning proposals.
- Increasing the design flood levels in current planning controls that apply to development to take into account predicted climate change effects. This would typically be practice in greenfield developments but often impractical for developments within established areas.
- Imposing time-limited consents to provide the potential to remove, replace, or adapt development in the future.

The first mechanism is generally only relevant at a high-level strategic planning stage when delineating the footprint of future urban land in a greenfield situation. This is mostly irrelevant to the Waverley LGA.

In regard to both the first and second mechanisms, a sensitivity analysis is appropriate and has been undertaken as a part of this study (refer to Section 7.1). This analysis is relevant for strategic planning purposes, particularly to assess the acceptability of flood risk associated with a Planning Proposal that would provide for significant new development.

Variable FPLs for different land uses and scale of development can be used where this would allow for a more practical planning outcome. This would involve taking into consideration the vulnerability of different development, the expected design life of development, and the practicality of developing at higher levels. More vulnerable land uses and/or those with an expected longer life span could be assigned climate change flood levels. Other uses could be



subject to time limited consents. This information could be integrated into the Planning Matrix approach.

In a practical sense, the adopting of the higher FPL could be appropriate for new areas or major developments where additional filling, or higher floor levels can be more readily achieved with relatively lower additional cost and minimal impacts on surrounding development. Conversely, it could be difficult to implement higher FPLs for minor development within already established areas where could be amenity, streetscape, or drainage impacts.

In regard to the third mechanism, the Court has been reluctant to accept time related consents (e.g. Newton and anor v Great Lakes Council [2013] NSWLEC 1248). However, if it is to be considered for inclusion in a future version of the DCP, it should be accompanied by clear objectives and criteria for how it would be applied, what happens at the expiration of the consent period, and opportunities to extend the consent period if circumstances change. The expiration date should also be event triggered (e.g. the reaching of a certain mean sea level) as opposed to a calendar date trigger.

For development assessment purposes in the Waverley LGA context, consideration of the effects of climate change could be simply reflected in the FPLs (primarily for floor levels) imposed through the DCP. As discussed in Section 5.1.1, the updated hydrologic and hydraulic modelling has adopted design rainfall information reflective of the climate change up to the 2030 year horizon (in accordance with the latest Australian Rainfall and Runoff guidelines). The consideration of the longer term effects of climate change, such as the imposition of minimum floor levels to take into consideration projected climate change effects up to the year 2100 might not always be practical. Further, while this provided added protection for the habitable floor levels of buildings, it does not address other issues such as the inundation of the remainder of the property lot, or of roads and other public spaces. Such matter would need to be resolved as part of an adaptation strategy which is beyond the scope of this study.

Accordingly, Council should adopt updated FRP mapping and FPLs for the purposes of applying the flood risk management DCP controls, based on the updated modelling outputs developed as a part of this study (inclusive of climate change up to the 2030 year horizon). The longer term effects of climate change on flood risk should be the subject of separate considerations that inform an adaptation strategy for the LGA to manage existing development. However, the longer term effects of climate change on flood risk should be taken into consideration when undertaking strategic planning and in the assessment of planning proposals.

10.2.3 LM03: Application of Flood Planning Controls

LM03: Applications of Flood Planning Controls

As requested by Council, GLN Planning has provided advice in regard to suitable conditions that could be imposed on development applications to ensure appropriate flood risk management outcomes are achieved. The recommendations detailed within this section could be used as the basis to formulate conditions of consent in Council's standard format.

Council has requested advice in regard to suitable conditions that could be imposed on development applications to ensure appropriate flood risk management outcomes are achieved. Based on the experience of the project team and having reviewed the processes and issues relevant to the Waverley LGA, the following principles have been identified:

- In order to minimise the need for the formal modification of development consent conditions for minor changes that maintain an equivalent flood risk management outcome, consider including the opportunity for certifiers to be satisfied at the construction certificate stage where Council has confirmed in writing that alternate design solutions are acceptable.



- Development plans and conditions should be based on a specific Reduced Level (RL) and not a flood Annual Exceedance Probability. This is necessary to ensure that the visual and amenity consequences of a proposed design, as understood at the development application stage, does not detrimentally change at the construction stage. There would remain the need to assess a development application based on FPLs derived from AEP flood frequencies, but this would need to be translated to specific RLs within a condition of consent unless already shown as such as on the development plans to be approved.
- In many circumstances, the flood risk management related planning controls as specified in the DCP can be used to formulate conditions of consent to ensure that outcomes committed to by the applicant, or otherwise required, are achieved. For example, where shelter in place is proposed and/or required, a condition of consent can reiterate the requirements of the DCP for the building to be constructed and certified as capable of remaining structurally sound in a PMF event.

The above principles can be used as the basis to formulate conditions of consent in Council's standard format.

10.2.4 LM04: Notifications and Communications

LM03: Notifications and Communications

To ensure consistent messaging across the Waverley Council planning documents, recommendations have been made to update the information presented within the Section 10.7 Certificate and Council Flood Certificate.

While planning documents are not the principal means to advise people of flood risks for the purposes of creating flood awareness and community preparedness, they nonetheless form a component of information sources. To ensure that Council exercises an appropriate duty of care of responsibly informing the public of flood risks, and to avoid undermining flood awareness education campaigns, it is important to ensure a consistent message is provided by:

- This study (Waverley Council Flood Risk Management Study and Plan),
- General planning studies and strategies,
- Council's on-line mapping system,
- Definitions, mapping, and controls within planning policies (i.e. LEP and DCP), and
- Section 10.7 (formerly Section 149) Planning Certificates.

Having regard to previous commentary within this report (refer to Section 8.12), the following principles should ideally be applied in the drafting of the Section 10.7(2) Certificates:

- Where FRP mapping has been undertaken, the applicable FRP should be noted with an explanation to its meaning and application under the DCP provisions,
- For the purposes of Schedule 2 of the EP&A Regulations, all land mapped within an FRP would be within the FPA (which is inclusive of land up to the PMF event extent), and
- All properties tagged on the flood control map prepared for internal Council use would also be noted as flood control lots for the purposes of the Codes SEPP.

The information regarding flood risk provided with a Section 10.7 Certificate would not in itself lead to any alteration to the permissibility of development, but is more directed towards providing factual information (important due to the liability issues as well as flood risk management outcomes) to increase awareness of the potential flood risks known to Council and to provide complete and consistent messaging about flood risk. While the detailed contents of a Section 10.7 Certificate are constrained by that specified by the EP&A Regulations, the application of the



Planning Matrix approach and recommended flood planning maps provides a singular comprehensive source of flood risk information. This information provides a balance between statutory compliance and comprehensive disclosure.

Council's Flood Certificates provide pro-forma based data that facilitates the application of the flood risk management DCP controls. Having regard to the Considering Flooding in Land Use Planning - Guideline (Department of Planning & Environment, 2021), the information provided within a Flood Certificate could ideally be included with a Section 10.7(5) Certificate to discharge Council's responsibility to provide any additional information regarding flooding not covered by a Section 10.7(2) Certificate.

Many people only purchase a Section 10.7(2) Certificate and not the Section 10.7(5) Certificate, which can include more information. Advice should be provided on the Section 10.7(2) Certificate that more detailed flood information is available and consideration should be given to purchasing a Section 10.7(5) Certificate or Council Flood Certificate.

Appropriate wording for the notification should be determined based on legal advice.

10.2.5 Summary and Recommendations

In preparation of the land-use planning measure presented as a part of this study, the strategic planning context of the study area, relevant policies and planning controls, and principles associated with flood risk management relevant to planning was subject to detailed review.

In summary, the following recommendations were made:

- A detailed review of the existing flood risk management planning controls, in particular the DCP controls,
- Guidance on how to consider flood risk management matters when undertaking strategic planning, including determining the suitability of land uses in different areas of the floodplain,
- Increasing usage of Council's Flood Certificates to improve the consideration of flood risk management in the development assessment process and supplement the communication of flood risk provided by Section 10.7 Planning Certificates,
- Principles for the consideration of climate change flood effects, and
- Recommendations for flood smart fencing initiatives.

An assessment was also undertaken in regard to the suitability of current land-use zoning and planning controls associated with the hotspot locations. No recommendations for changes were considered appropriate. The mapping methodology for the flood risk precincts used for the application of the DCP controls was also reviewed with no further refinements determined to be necessary.

It should be noted that many of these recommendations are interdependent, with the rationalisation of flood planning mapping being pivotal to ensuring all recommendations are successfully implemented. Importantly, both planning and flood risk management are dynamic processes and will require on-going monitoring and review as new information and issues emerge.

10.3 FLOOD MITIGATION MEASURES

The measures presented within this section involve structural modifications to the floodplain to modify the existing flood behaviour. The intent of these options is to reduce flood risk and address flood affectation of flood prone areas and properties. Typically, the following measures are investigated as part of a Floodplain Risk Management Study:

- Stormwater augmentation;
- Detention basins;



- Levees and embankments;
- Diversion channels; and
- Roadway augmentation.

For heavily developed and densely urbanised catchments/floodplains like the Waverley LGA, the feasibility of flood mitigation measures can often be severely constrained. As development continues to increase, the efficiency and capacities of the existing stormwater infrastructure become unable to service the increased imperviousness and reduction of available flood storage capacities across the surface. Available undeveloped land for the construction of larger structural modifications (e.g. basins and embankments) decrease as the density of development increases. Additionally, existing sub-surface utilities can often pose a significant technical and financial risk impeding the feasibility of any structural option that requires excavation. A deep understanding of the benefits and costs is pivotal in identifying options that provide a net benefit to the community.

KBR has relied on collaboration between internal water resources, civil, cost-estimation, utilities, drainage, and environmental capabilities to develop flood mitigation measures that have been scrutinised through differing design and construction perspectives. The intent of this rigorous process was to ensure that the flood mitigation measure is not just a theoretical option that works within a hydraulic model, but consideration has been given to potential multifaceted and multidisciplinary constraints. Where possible, KBR has attempted to mitigate identified risks as part of the iterative optioneering process detailed throughout this report.

10.3.1 Identification and Preliminary Flood Mitigation Measures Assessment

Prior to the identification of potential flood mitigation measures, KBR undertook a thorough review of the existing and updated hydrologic and hydraulic model outputs in conjunction with the re-established hotspot locations. No pre-existing flood mitigation measures were identified for inclusion in the preliminary assessment. KBR's detailed understanding of the study area and the experience of the project team in developing floodplain management solutions for other similar urbanized study areas across NSW was therefore heavily relied upon.

The identification and preliminary flood mitigation measures assessment process is presented in Figure 10-5. Following a review of the stormwater system capacity, over 20 mitigation options were identified, consolidated into a shortlist of 10 options through iterative hydraulic modelling. Five (5) preferred flood mitigation measures were then selected through a multi-variate scoring process in consultation with Council and DCCEEW. Noting the community's request for stormwater upgrades and understanding the known flooding locations across the LGA, KBR's intent was to focus on the 12 identified hotspot locations with a particular focus on presenting at least one stormwater-related option within the initial optioneering stage.

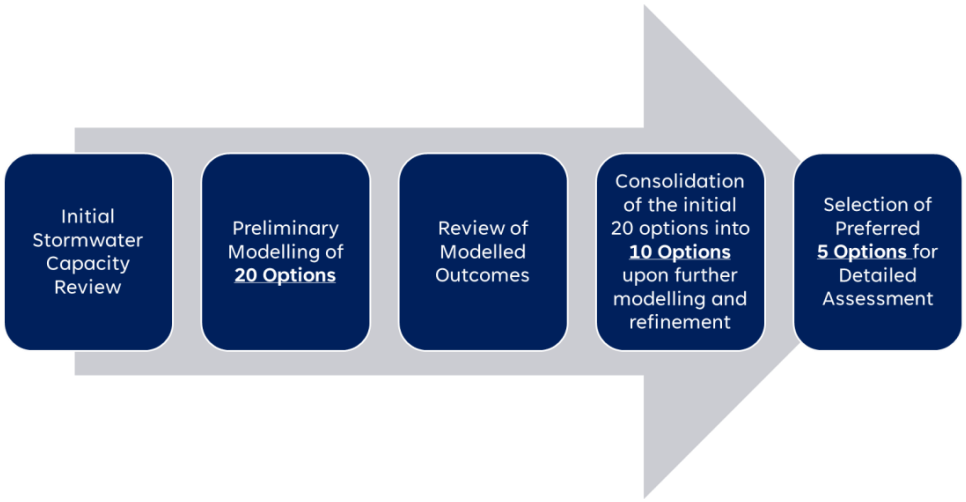


Figure 10-5 Preliminary Flood Mitigation Measure Development Process

Review of Existing Stormwater Network Volume Capacity

As detailed in Section 6.3, the stormwater network volume capacity assessment can be used to identify locations with the potential for localised stormwater upgrades (e.g. new pits).

As is typical for urban stormwater networks, the results indicate that for the 20% AEP event, the drainage network operates at or approximately pipe volume full across most of the urbanised study area. The modelling indicates that all trunk lines reach volumetric capacity in the 63.2% AEP event. Therefore, without the upgrade of the trunk drainage lines themselves, the benefits associated with the upgrade of the existing network or construction of new pits only, would be diminished.

To validate the conclusions of the existing stormwater volume capacity assessment, KBR simulated the following two LGA wide theoretical stormwater upgrades:

- Doubling of all pit inlet capacities (refer to Figure 10-6), and
- Doubling of all pit inlet capacities in conjunction with the tripling of all pipe/culvert sizes (refer to Figure 10-7).

The difference in peak flood levels in comparison to the existing case scenario for the 1% AEP events are presented in Figure 10-6 and Figure 10-7 for the above two scenarios respectively.

As described above, in the review of the existing stormwater network volume capacity, the trunk drainage network is reaching volumetric capacity in the 63.2% AEP event. With no available capacity in the trunk drainage network, the doubling of all pit inlet capacities results in negligible change in flood behaviour across the study area. This indicates that there is negligible benefit in upgrading the pit inlet capacities without consideration of underlying pipe upgrades.

However, when the pipe network is increased in conjunction, significant reductions in peak flood levels are modelled even for the 1% AEP event. Ranging from overland flow paths to major trapped low points, the theoretical upgrades confirmed the sensitivity of almost all hotspots to trunk drainage capacity constraints.

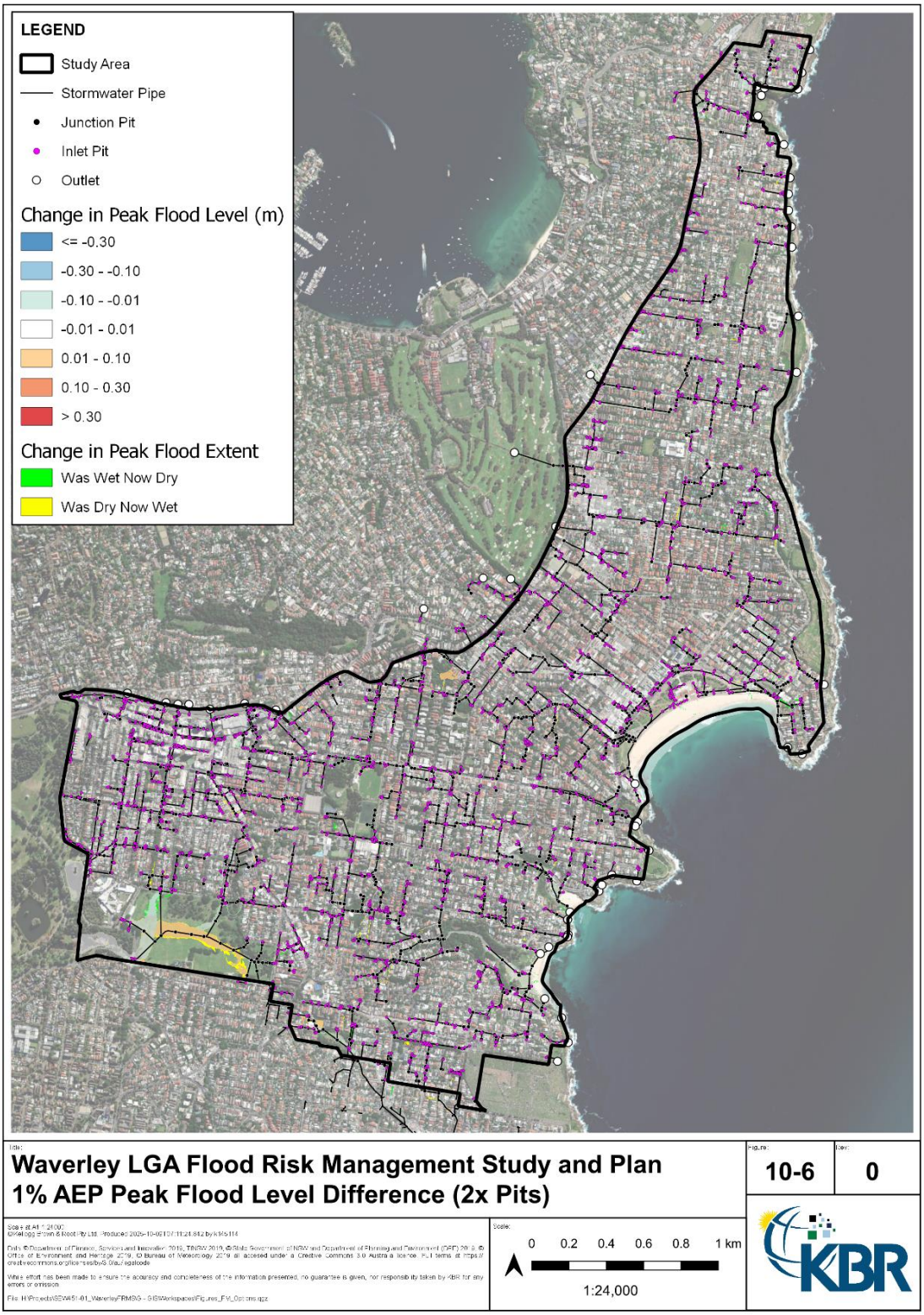


Figure 10-6 1% AEP (SSP2-4.5 2030) Peak Flood Level Difference – Doubling of All Pit Inlet Capacities

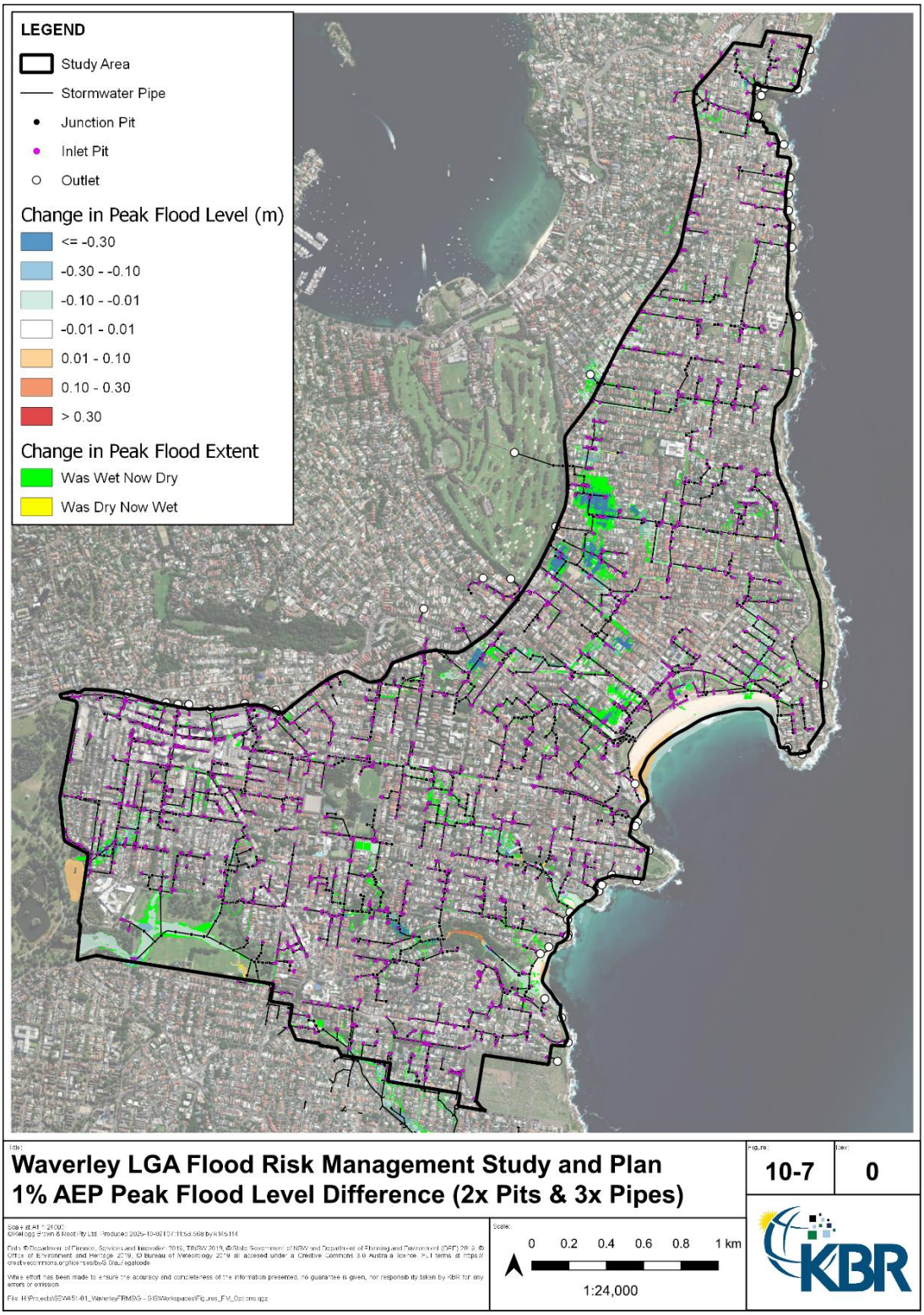


Figure 10-7 1% AEP (SSP2-4.5 2030) Peak Flood Level Difference – Doubling of All Pit Inlet Capacities and Tripling of All Pipe Sizes

Preliminary Flood Mitigation Measure Development

Following the establishment of the flooding hotspots and review of the existing stormwater network volume capacity, KBR has undertaken extensive iterative modelling to develop preliminary flood mitigation measures for the Waverley LGA.

While the initial optioneering process if often highly iterative, KBR's learned understanding of the existing stormwater network and interaction with the wider floodplain has allowed for the targeted development of several preliminary flood mitigation measures, increasing efficiency and significantly reducing the number of iterations of modelling involved. While over 20 options were modelled, for the purposes of reporting, the following 20 high-level measures were presented to Council on the 19th of June 2025 for comment:

(1) Additional stormwater outlet parallel to Gilgandra Road, North Bondi,

(2) Additional stormwater outlet parallel to Murriverie Road, North Bondi,

(3) Barracluff Park, North Bondi detention basin,

(4) Barracluff Park, North Bondi raised embankment,

(5) Barracluff Park and Warners Avenue, North Bondi stormwater upgrade,

(6) Formalisation of overland flow path between Hastings Parade and Ramsgate Avenue, North Bondi,

(7) Trunk drainage upgrade between Hastings Parade and Ramsgate Avenue, North Bondi,

(8) Road reprofiling of Glenayr Avenue, Bondi Beach,

(9) Raised kerb and crossings along Glenayr Avenue, Bondi Beach,

(10) Chambers Avenue to Bondi Beach, Bondi Beach trunk drainage upgrade

(11) Lamrock Avenue, Bondi Beach road reprofiling

(12) Thomas Hogan Reserve and Francis Street, Bondi Beach diversion channel

(13) Thomas Hogan Reserve, Bondi Beach detention basin and retaining wall

(14) Phillip Street to Tamarama Street, Bondi trunk drainage upgrade

(15) Palmerstone Avenue, Bronte trunk drainage upgrade

(16) Bronte Gully, Bronte channel widening

(17) Denison Street, Bondi Junction stormwater diversion

(18) York Road, Queens Park stormwater outlet diversion

(19) York Road, Queens Park stormwater outlet flap gates

(20) Raised kerb between Rawson Avenue, Queens Park, and Alt Street, Bondi Junction

The approximate location of each high-level measure is illustrated in Figure 10-8.

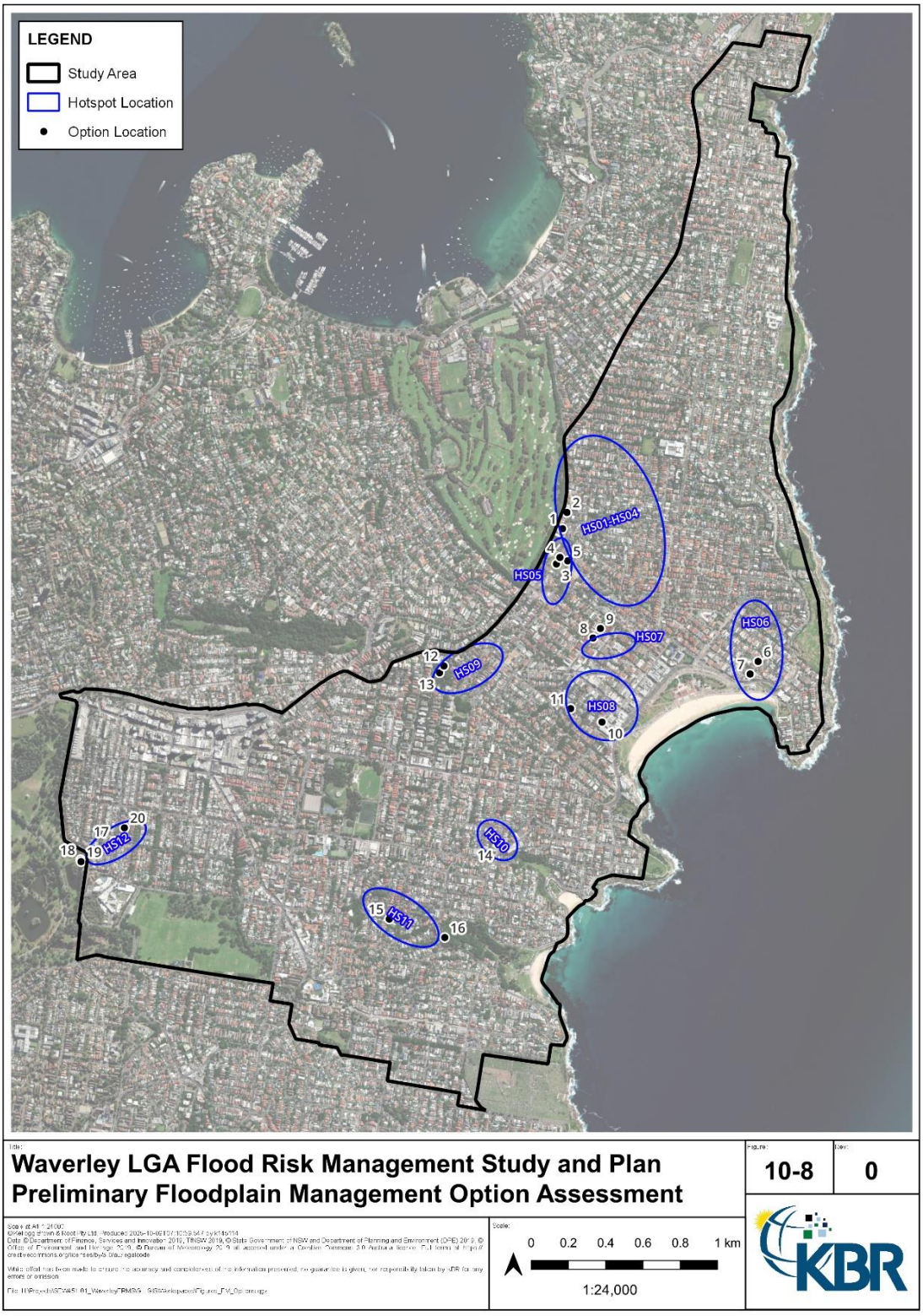


Figure 10-8 High-Level Option Locations



In consultation with Council, the initial 20 options were consolidated into 10 options for further consideration, removing less viable options from a property flood risk mitigation perspective (refer to Figure 10-9). Additional refinement and further modelling of these 10 options was undertaken for the 20% and 1% AEP events to provide insight into their mitigation performance for frequent and rare design events.

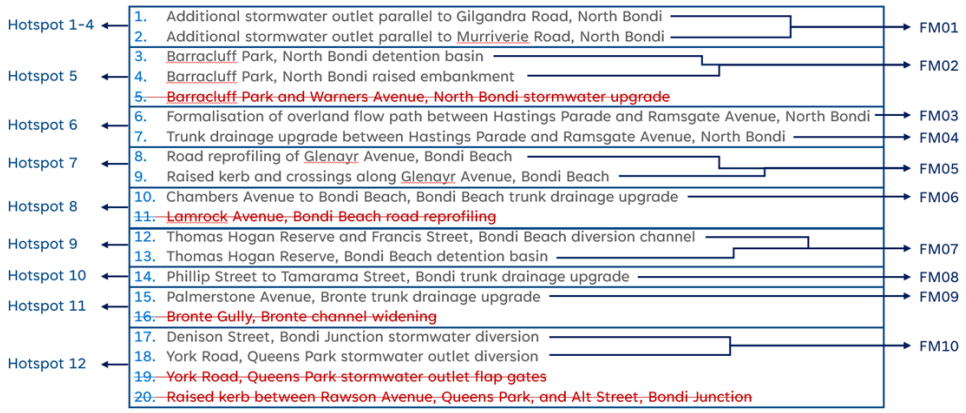


Figure 10-9 Preliminary Floodplain Mitigation Measure Refinement Process

Each of the 10 options presented was subject to a high-level assessment criteria developed in conjunction with Council. The high-level assessment criterion is presented in Table 10-4, where the criteria are ranked Low (1), Medium (2), or High (3) according to the metrics within corresponding cells. A higher number corresponds with a more preferable outcome.

The rapid assessment criterion allowed for a simple assessment of the relative merit of the identified flood mitigation measure. The aim of this exercise was to provide a high-level assessment of the various flood mitigation measures applicable to the study area, clearly articulating to Council and the community, the benefits and trade-offs of a particular option. This assessment has allowed for the selected of preferred measures to take forward to the detailed evaluation stage.

A factor of two (2) was applied to the Property Affectation and Flood Hazard metrics to obtain a singular weighted score for each of the 10 options. These metrics were assigned a larger weighting as this is the main criteria and driver for this study, resulting in the greatest reduction of damage costs and/or risk to life. The outcomes of this process are presented in Table 10-5.

Table 10-4 High-Level Assessment Criteria

Criteria	Low (1)	Medium (2)	High (3)
Property Affectation	Option has reduced above floor flooding for up to **1 property**.	Option has reduced above floor flooding for **1 - 3 properties**.	Option has reduced above floor flooding for more than **3 properties.**
Flood Hazard*	Option has produced up to **3,000 m²** improvement in flood hazard.	Option has produced between **3,000 – 5,000 m²** improvement in flood hazard.	Option has produced more than **5,000 m²** improvement in flood hazard.
Practicality and Constraints	Major physical and technical constraints and uncertainties are identified which may result in the unfeasibility of the option.	Physical and technical constraints and uncertainties are identified which may result in increased costs and timeframe.	Minimal physical and technical constraints and uncertainties are identified. Minimal impact on the cost and constructability of the option are anticipated.
Environmental Impacts	Option involves broad scale impacts to flora and fauna.	Likely to be minimal impact to flora and fauna.	Construction of the option is likely to result in benefits to flora and fauna.
Community Support	Likely to attract strong opposition from the community and stakeholders directly affected by the construction of and finished option.	No opposition is anticipated by the community and stakeholders.	The option is likely to attract support from the community and stakeholders.
Extent of Works	Option involves a combination of structural mitigation works or significant excavation.	Option involves a moderate degree of excavation.	Option is limited to minor, localised structural mitigation works involving limited excavation.
Ongoing Maintenance	Frequent ongoing maintenance is required to ensure the effectiveness of the option.	Occasional maintenance would assist in the effective operation of the option.	Option does not require ongoing maintenance for effective operation.

*improvement in flood hazard area is calculated as the difference in flood hazard category multiplied by the extent of change.



Table 10-5 Preliminary Flood Mitigation Measure Criteria Outcomes

Criteria	FM01	FM02	FM03	FM04	FM05	FM06	FM07	FM08	FM09	FM10
Property Affectation*	3	3	1	1	2	3	3	2	2	3
Flood Hazard*	3	3	1	2	2	3	3	2	2	2
Practicality/Constraints	2	1	1	1	2	1	2	1	1	3
Environmental Impacts	2	2	2	2	2	1	1	2	1	2
Community Support	1	1	2	3	2	1	2	2	1	2
Extent of Works	2	1	1	2	2	1	1	2	2	3
Ongoing Maintenance	3	2	3	2	3	2	3	2	1	3
Weighted Score	2.44	2.11	1.44	1.78	2.11	2.00	2.33	1.89	1.56	2.56
Recommendation	✓	✓	✗	✗	✓	✗	✓	✗	✗	✓

*double weighting applied

The following five (5) preferred measures that scored the lowest (indicating they were the most viable options) were presented to the Floodplain Management Committee on the 9th of July 2025 ahead of the targeted community consultation (refer to Section 2.3) that took place between the 10th of July to the 8th of August 2025:

- FM01 – Gilgandra Road and Murriverie Road Combined Stormwater Augmentation,
- FM02 – Barracluff Park Combined Civil Works,
- FM05 – Glenayr Avenue Combined Civil Works,
- FM07 – Thomas Hogan Reserve and Francis Street Combined Civil Works
- FM10 – York Road Combined Stormwater Augmentation

Measures FM03 and FM04 did not proceed further due to the minimal changes in property affectation and flood hazard categorisation. In addition, significant practicality constraints were identified, such as the feasibility and acceptability of the voluntary purchase of multiple properties, clashes with sub-surface utilities, and impacts to existing buildings.

Measure FM06 was the only option that did not proceed despite scoring positively in the property affectation and flood hazard categories. This is due to the feasibility associated with upgrading existing stormwater infrastructure that passes underneath densely developed commercial precincts. Limited space underneath these precincts was identified, further exacerbated by multiple clashes with sub-surface utilities.

Measure FM08 and FM09 did not proceed for similar reasons. Both measures are proposed in areas that are topographic trapped low points with the existing stormwater assets severely undersized while passing underneath and between several residential buildings. Multiple clashes with existing sub-surface utilities were also identified. Both measures provided minor changes to property affectation and flood hazard categorisation.

10.3.2 Sub-Surface Utility Assessment

A sub-surface utility search has been conducted in each of the five (5) hotspots carried forward for detailed assessment. The Before You Dig Australia (BYDA) database was relied upon for this assessment, providing indicative locations for the following utilities:

- Electrical (Ausgrid),



- Telecommunications (GigaComm, TPG Telecom, Telstra, and National Broadband Network),
- Gas (Jemena),
- Water (Waverley Council, Woollahra Municipal Council, Sydney Water, and Transport for NSW), and
- Sewer (Sydney Water).

KBR has refined each flood mitigation measure as part of the iterative optioneering process to minimise interference with the existing sub-surface utilities identified. Where a potential proximity risk to a utility has been identified, detailed commentary has been provided in the subsequent reporting of each flood mitigation measure.

10.3.3 Cost Estimation

KBR's cost estimation team have completed an Association for the Advancement of Cost Engineering (AACE) Class 4 capital cost estimate for each of the five (5) flood mitigation measures presented within subsequent sections of this report. The cost estimation has considered the information presented within the BYDA database and has been:

- Prepared using the KBR Cost Estimating Tool and inhouse rates data,
- Prepared to a non-binding, nominal accuracy of -30/+50%,
- Prepared with a base date for estimate of August 2025,
- Expressed in Australian dollars, and
- Developed excluding Goods and Services Tax (GST).

The unit rates developed to enable the preparation of the capital cost estimates have been based on the information drawn from:

- KBR historical rates database including rates from recent projects, and
- Budget pricing received from material and equipment vendors.

10.3.4 FM01: Gilgandra and Murriverie Road Combined Stormwater Augmentation (North Bondi)

FM01: Gilgandra and Murriverie Road Combined Stormwater Augmentation	
	KBR recommend the construction of additional stormwater outlets to alleviate the accumulation of flood waters within the William Street to Gilgandra Road major trapped low point.
Cost	$18,252,682 (AACE Class 4 estimate)
BCR	1.71
Scope of Works	• 600 m long 1.50 m diameter HDPE pipes. • 330 m long 1.75 m diameter HDPE pipes. • Four (4) junction pits.
Constraints	• Extension of works into the privately owned Royal Sydney Golf Club. • Extension of works outside of the Waverley LGA into the Woollahra LGA. • Potential for downstream impacts within the Royal Sydney Golf Club. • Unknown costs associated with works within the Royal Sydney Golf Club. • Potentially constrained by the capacity of the downstream formalised open channel Sydney Water asset.



FM01: Gilgandra and Murriverie Road Combined Stormwater Augmentation	
	• Multiple stakeholder liaison required.
Priority	2

The catchment area between William Street and Gilgandra Road in North Bondi encompasses the largest trapped low point within the Waverley LGA. The underlying stormwater network extends to cover the William Street-Owen Street, Glenayr Avenue-Plowman Street, Elliott Street-Bonus Street, and Brassie Street-Niblick Street hotspots (hotspots 1 to 4), culminating into a single outlet point discharging into the Sydney Water owned open channel within the Sydney Royal Golf Club). The stormwater network services a catchment area of approximately 1.3 km2 which approaches full volume capacity in the 63.2% AEP event. Due to the quick response time of the catchment, the rapidly compounding volume of runoff across the interconnected hotspots results in the significant ponding of floodwaters across frequent and rare events.

Scope of Works

To alleviate the burden on the already at capacity stormwater network, KBR has developed a mitigation strategy that includes the implementation of supplementary diversion pipes originating from Gilgandra Road and Murriverie Road. The new pipes are proposed to be discharged into the existing open channel within the Sydney Royal Golf Club and have been designed to minimise disruption to existing trees and sub-surface utility services. The proposed flood mitigation measure includes the following scope of work:

- 250 m long 1.50 m diameter HDPE pipes from Murriverie Road,
- 350 m long 1.50 m diameter HDPE pipes from Gilgandra Road,
- 330 m long 1.75 m diameter HDPE pipes connecting the above new pipes to the open channel, and
- Four (4) junction pits to facilitate the pipe connections.

Modelled Outcomes

The proposed flood mitigation measure was simulated for the full suite of design events. For the purposes of reporting, the difference in peak flood levels for the 20% AEP and 1% AEP events is presented in Figure 10-10 and Figure 10-11 respectively.

Due to the additional outlet capacity, widespread decreases in peak flood levels are modelled across the interconnected hotspots consistently for the range of design events. Peak flood level reductions up to 0.25 m and 0.45 m are simulated for the 20% AEP and 1% AEP events respectively. Most notably, the significant reduction in peak flood levels between William Street and Gilgandra Road has resulted in the mitigation of above floor flooding for 36 properties in the 1% AEP event.

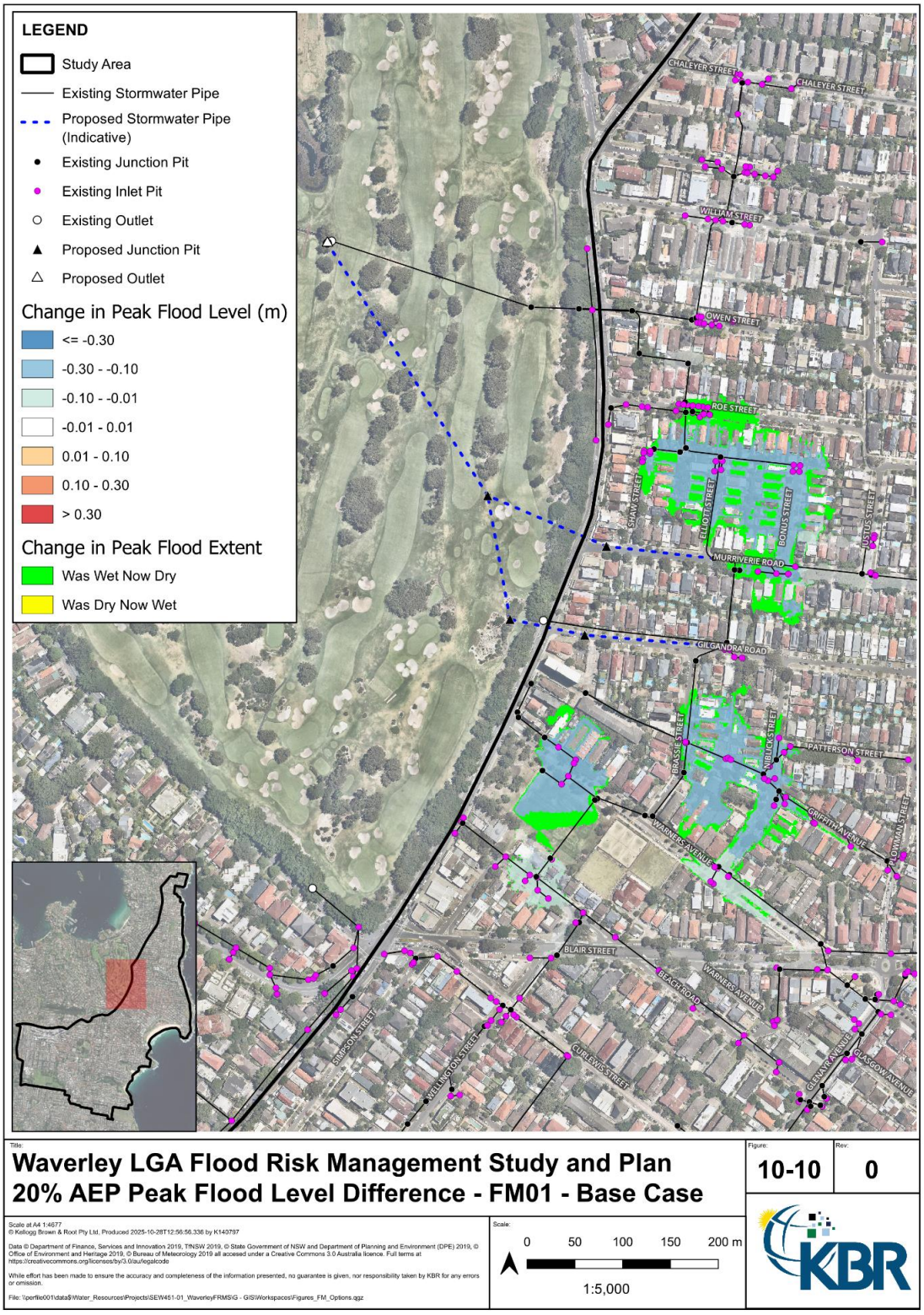


Figure 10-10 FM01 20% AEP (SSP2-4.5 2030) Peak Flood Level Difference

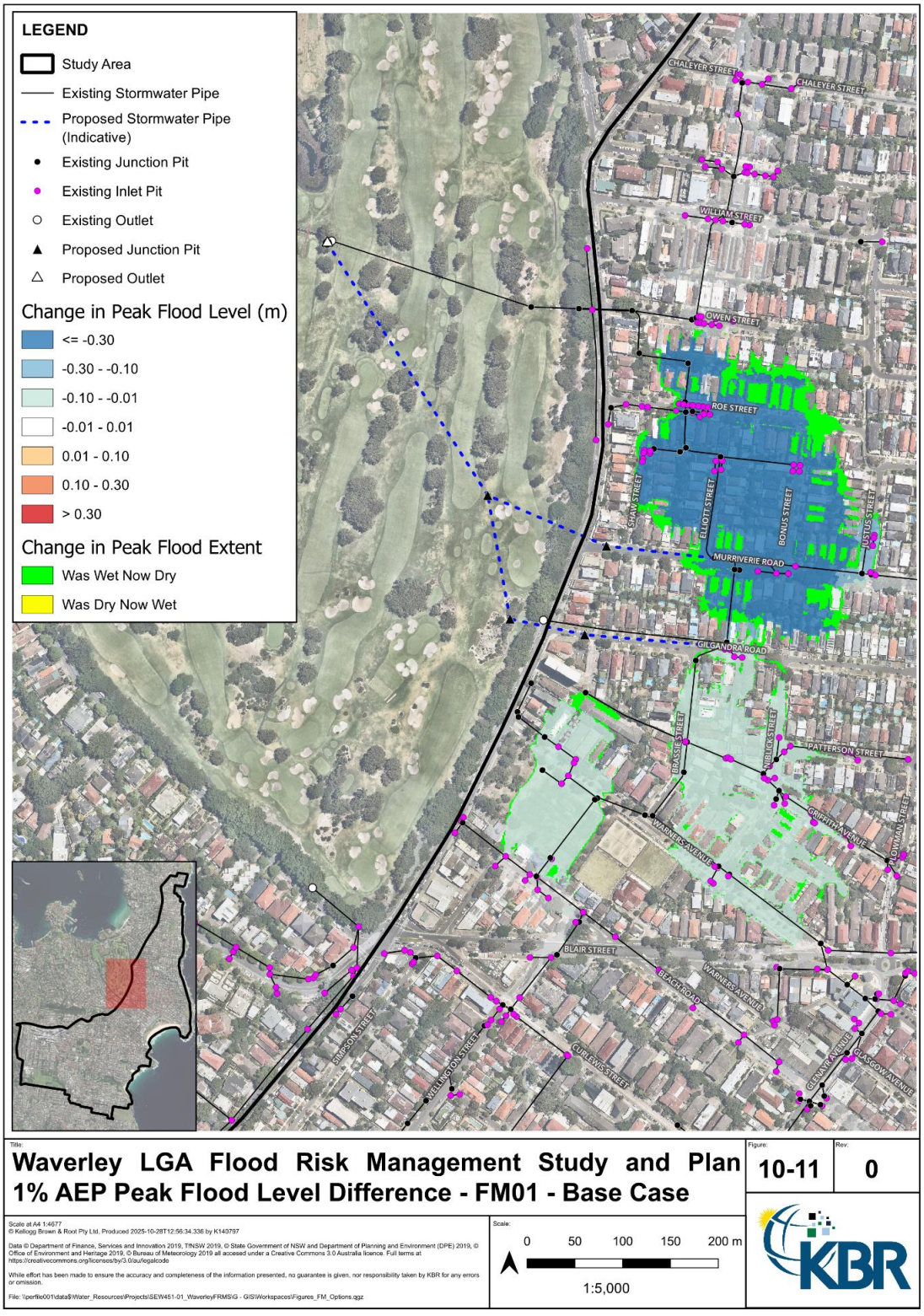


Figure 10-11 FM01 1% AEP (SSP2-4.5 2030) Peak Flood Level Difference



The number of properties affected and inundated above floor as well as the comparison to existing conditions is presented in Table 10-6. Similarly, the flood damages assessment outcomes and comparison against the existing conditions are presented in Table 10-7.

Table 10-6 FM01 Number of Properties Impacted

Event	Number of Properties Affected			Number of Properties Flooded Above Floor		
	Existing	FM01	Difference	Existing	FM01	Difference
20% AEP	284	260	-24	113	88	-25
10% AEP	534	520	-14	235	211	-24
5% AEP	673	648	-25	324	300	-24
2% AEP	814	790	-24	416	381	-35
1% AEP	955	937	-18	497	461	-36
0.5% AEP	1,074	1,046	-28	569	553	-16
0.2% AEP	1,268	1,250	-18	697	664	-33
PMF	3,532	3,526	-6	2,490	2,480	-10

Table 10-7 FM01 Flood Damages Assessment Outcomes

	Event	Existing	FM01	Difference
Total Damage	20% AEP	$ 52,707,288	$ 48,765,726	-$ 3,841,562
	10% AEP	$ 106,824,519	$ 102,473,515	-$ 4,351,004
	5% AEP	$ 129,129,608	$ 124,316,106	-$ 4,813,502
	2% AEP	$ 157,549,364	$ 150,034,762	-$ 7,514,602
	1% AEP	$ 193,921,226	$ 185,863,834	-$ 8,057,392
	0.5% AEP	$ 231,145,403	$ 223,442,173	-$ 7,703,230
	0.2% AEP	$ 295,368,671	$ 283,956,149	-$ 11,412,522
	PMF	$ 1,504,281,463	$ 1,498,517,415	-$ 5,764,048
AAD		**$ 36,429,685**	**$ 34,371,581**	**-$ 2,058,104**

Cost Estimation

A detailed breakdown of the capital cost estimate is provided in Table 10-8.

Table 10-8 FM01 Capital Cost Estimate Breakdown

Scope Item	$ AUD (ex GST)
Direct Cost	$ 6,761,055
Design Growth Allowance	$ 676,105
Net Cost	**$ 7,437,160**
Indirect Costs	
Preliminaries	$ 1,189,946
Overhead and Margin	$ 862,711
Construction Contingency	$ 2,372,454
Owners Contingency	$ 2,965,568



Scope Item	$ AUD (ex GST)
Consultant Fees - Design	$ 444,835
Consultant Fees - Survey & Investigations	$ 305,453
Subtotal	**$ 15,578,127**
Q Leave	$ 54,523
Location Factor	$ 781,633
Escalation	$ 1,838,400
Total	**$ 18,252,682**

It should be noted that the cost estimation does not include any works to the golf course or upgrade of the Sydney Water asset. Closure of the golf course and associated loss of amenity have not been quantified as a part of this estimation.

Cost-Benefit Analysis

For the purposes of a Cost-Benefit Analysis (CBA), a design life of 120 years was assumed for pits and pipes. Standard design and yearly maintenance values were provided by Waverley Council. A discount rate of 7% was applied in line with guidance from the Australian Government Treasure (Australian Government, 2025).

The Benefit-Cost Ratio (BCR) for FM01 was calculated to be 1.71, representing a financially feasible option. A BCR above a value of 1 represents an option where the value provided by the benefits outweigh the costs.

Additional Comments

Several submissions were received from residents within the affected area with requests for the upgrade of the underlying stormwater asset noted. Several in-person meetings were held between affected residents, Council, and KBR staff throughout the study. As such, strong community support is anticipated for the pursuance of this floodplain management option. However, it is acknowledged that the extent of works extends beyond the Waverley LGA into the Woollahra LGA and private land owned by the Royal Sydney Golf Club. The discharge of additional flood waters into the Sydney Water owned open channel within the golf course could result in impacts on the golf course. As such, continued liaison with multiple stakeholders will be required and the final design to be implemented may require refinement and alteration to ensure downstream impacts to the Golf Club are minimised.

Should this flood mitigation measure proceed for further investigation beyond this study, KBR recommend a detailed study that involves the extension of the hydraulic model domain to include the entirety of the golf course down to the bay. The modelling of the potential impacts within the golf course have not been simulated due to the hydraulic model not extending far beyond the Waverley LGA. The augmentation of the Sydney Water open channel is recommended for consideration.

10.3.5 FM02: Barracluff Park Combined Civil Works (North Bondi)

FM02: Barracluff Park Combined Civil Works	
	KBR recommend the increase in flood storage capacity of Barracluff Park to minimise the spillover of overland flows into the Warners Avenue low point and adjacent properties.
Cost	$6,980,929 (AACE Class 4 estimate)



FM02: Barracluff Park Combined Civil Works	
BCR	0.68
Scope of Works	• 8,500 m^3 excavation. • 85 m long raised concrete retaining wall.
Constraints	• Potential interference with existing stormwater pipe. • Potential reduction in amenity of the park. • Risk of community acceptance.
Priority	4

A localised trapped low point exists on Warners Avenue towards Old South Head Road. The low point is constrained to the southwest by Barracluff Park, which predominantly sits higher than the adjacent road. The topography is steeply grading from either side of Warners Avenue with the dominant overland flow path direction traversing from southwest to northeast.

As the limited roadway capacity of Warners Avenue is exceeded, flood waters spill out into adjacent properties. Visible flood marks were noted across the front walls of the affected properties, providing alignment between the community reported frequency of inundation with the flood extents simulated for frequent design events.

The Beach Road-Warners Avenue hotspot is part of an interconnected series of trapped low points that are serviced by a shared underlying stormwater system. As the stormwater infrastructure is indicated to reach full volume capacity in the 63.2% AEP event, little benefit will be provided by the construction of new stormwater inlet pits without the extensive upgrade of the underlying pipes. This has been confirmed through iterative modelling, where the underlying pipe capacities have been incrementally increased without any material benefit unless extended significantly downstream.

Scope of Works

Noting the limited benefits provided by the upgrade of the existing stormwater infrastructure until such an extent where the works become unfeasible, KBR has investigated a series of structural options aiming to increase the flood storage capacity of Barracluff Park. The intent of this flood mitigation measure is to minimise the accumulation of flood waters within Warners Avenue by holding more water upstream. The proposed flood mitigation measure includes the following scope of work:

- Excavation of approximately 8,500 m3 of Barracluff Park with excavation depths between 1.0 m to 1.5 m, and
- Construction of an approximate 85 m long raised concrete retaining wall between Barracluff Park and Warners Avenue.

Modelled Outcomes

The proposed flood mitigation measure was simulated for the full suite of design events. For the purposes of reporting, the difference in peak flood levels for the 20% AEP and 1% AEP events is presented in Figure 10-12 and Figure 10-13 respectively.

The increased flood storage capacity completely mitigates the overland flow path from the southeast of Warners Avenue up to the 1% AEP event with minimal spillover modelled in rarer events. This leads to significant reductions in peak flood levels up to 0.40 m and 0.44 m within the Warners Avenue roadway and therefore the spillover of flood waters into the adjacent residential properties for the 20% AEP and 1% AEP events respectively. However, due to the limited available



capacity of the stormwater network and the low-lying nature of the building ingress points within this location, the modelling indicates that complete elimination of above floor flooding is unable to be achieved.

As it is understood that this location is prone to frequent inundation, the intent of this mitigation strategy was to provide improvements to flood affectation and the trafficability of the road, particularly for minor events. In the 20% AEP event, the peak flood hazard of H4 (unsafe for people and vehicles) has been reduced to predominantly H2 (unsafe for small vehicles) with small pockets of H3 (unsafe for vehicles, children, and the elderly).

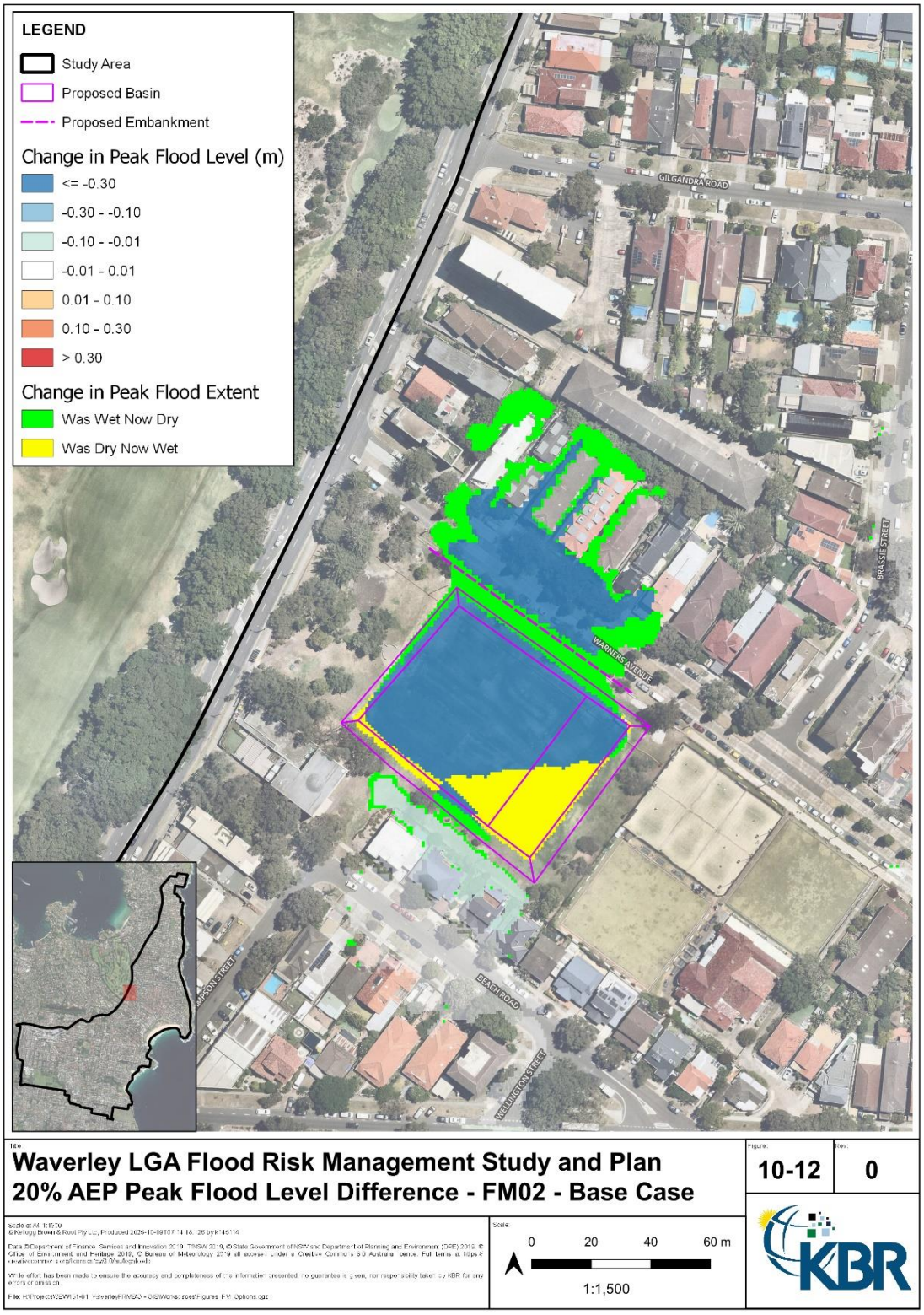


Figure 10-12 FM02 20% AEP (SSP2-4.5 2030) Peak Flood Level Difference

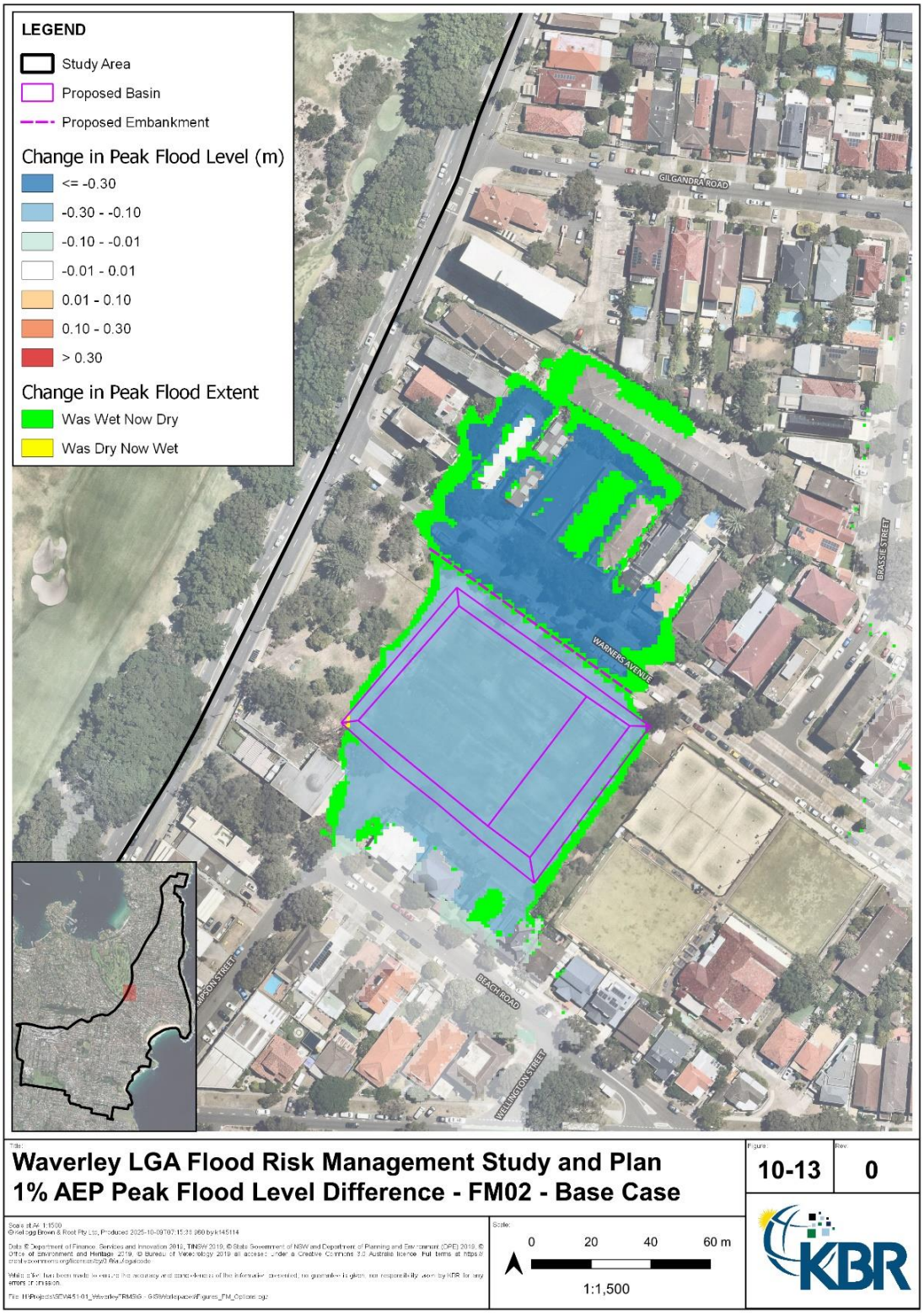


Figure 10-13 FM02 1% AEP (SSP2-4.5 2030) Peak Flood Level Difference



The number of properties affected and inundated above floor as well as the comparison to existing conditions is presented in Table 10-9. Similarly, the flood damages assessment outcomes and comparison against the existing conditions are presented in Table 10-10.

Table 10-9 FM02 Number of Properties Impacted

Event	Number of Properties Affected			Number of Properties Flooded Above Floor		
	Existing	FM02	Difference	Existing	FM02	Difference
20% AEP	284	283	-1	113	112	-1
10% AEP	534	533	-1	235	234	-1
5% AEP	673	671	-3	324	321	-3
2% AEP	814	813	-1	416	415	-1
1% AEP	955	951	-3	497	494	-3
0.5% AEP	1,074	1,072	-2	569	567	-2
0.2% AEP	1,268	1,264	-6	697	691	-6
PMF	3,532	3,530	-2	2,490	2,488	-2

Table 10-10 FM02 Flood Damages Assessment Outcomes

	Event	Existing	FM02	Difference
Total Damage	20% AEP	$ 52,707,288	$ 52,055,664	-$ 651,624
	10% AEP	$ 106,824,519	$ 106,084,126	-$ 740,393
	5% AEP	$ 129,129,608	$ 127,902,143	-$ 1,227,465
	2% AEP	$ 157,549,364	$ 156,273,605	-$ 1,275,759
	1% AEP	$ 193,921,226	$ 190,390,431	-$ 3,530,796
	0.5% AEP	$ 231,145,403	$ 227,668,380	-$ 3,499,023
	0.2% AEP	$ 295,368,671	$ 293,257,665	-$ 2,111,006
	PMF	$ 1,504,281,463	$ 1,502,668,185	-$ 1,613,278
AAD		**$ 36,429,685**	**$ 36,116,961**	**-$ 312,724**

Cost Estimation

A detailed breakdown of the capital cost estimate is provided in Table 10-11.

Table 10-11 FM02 Capital Cost Estimate Breakdown

Scope Item	$ AUD (ex GST)
Direct Cost	$ 2,585,836
Design Growth Allowance	$ 258,584
Net Cost	**$ 2,844,420**
Indirect Costs	
Preliminaries	$ 455,107
Overhead and Margin	$ 329,953
Construction Contingency	$ 907,370
Owners Contingency	$ 1,134,212



Scope Item	$ AUD (ex GST)
Consultant Fees - Design	$ 170,132
Consultant Fees - Survey & Investigations	$ 116,824
Subtotal	**$ 5,958,018**
Q Leave	$ 20,853
Location Factor	$ 298,944
Escalation	$ 703,115
Total	**$ 6,980,929**

Cost-Benefit Analysis

For the purposes of a CBA, a design life of 115 years was assumed for basins and retaining walls. Standard design and yearly maintenance values were provided by Waverley Council. A discount rate of 7% was applied in line with guidance from the Australian Government Treasure (Australian Government, 2025).

The BCR for FM02 was calculated to be 0.68, representing a financially constrained option.

Additional Comments

An existing stormwater pipe runs through the southeastern portion of the park within the extent of the proposed works. The depth of the pipe is unknown and has been assumed for inclusion within the hydraulic model. While the proposed excavation depth has been minimised above this pipe, there is a risk that this utility could require relocation or impose alteration of the proposed flood mitigation measure. In this instance, the costs associated with the protection of the underground utility have been included within the cost estimation. The cost of relocation of the asset has not been allowed for.

The increase in flood storage capacity of Barracluff Park may result in a reduction in amenity, particularly following a storm event. Consideration of high infiltration mechanisms or localised drainage facilities should be considered to increase the usability of the park. Consequently, community support for this option may be low, compounded by the impact to the streetscape aesthetic associated with a raised retaining wall or embankment.

Alternatively, while the proposed flood mitigation measure consists of a permanent excavation to provide above-surface storage capacity, a similar outcome could be achieved with the implementation of sub-surface storage (i.e. onsite detention tank).

10.3.6 FM05: Glenayr Avenue Combined Civil Works (Bondi Beach)

FM05: Glenayr Avenue Combined Civil Works	
	KBR does not recommend the reprofiling of Glenayr Avenue due to the sensitivity of the flow conveyance of the roadway on areas downstream of the proposed works.
Cost	$5,585,575 (AACE Class 4 estimate)
BCR	0.15
Scope of Works	• 250 m of road reprofiling. • 100 m of kerb raising. • Two (2) raised vehicular crossings.



FM05: Glenayr Avenue Combined Civil Works	
Constraints	• Clashes with electrical, telecommunications, gas, and sewer sub-surface utilities. • Disruption to commercial precincts during construction. • Potential impacts to the accessibility of commercial and residential precincts. • Risk of community acceptance.
Priority	Not recommended

The Glenayr Avenue-Plowman Street hotspot includes an overland flow path that traverses through a mix of commercial and residential properties on the southeastern side of Glenayr Avenue. As described in Section , the Glenayr Avenue-Plowman Street hotspot is part of an interconnected series of hotspots drained by the same shared stormwater network. When the capacity of the stormwater network is exceeded, Glenayr Avenue itself plays a key role in facilitating overland flows from the southeastern portion of the LGA to the north. In developing this flood mitigation measure, careful consideration of altering the flow conveyance of Glenayr Avenue was given so as to minimise flood affectation further downstream.

Scope of Works

The mitigation strategy involves the reprofiling of Glenayr Avenue in combination with a series of civil works to allow rainfall-runoff to drain away from the properties southeast of the roadway. The proposed flood mitigation measure includes the following scope of work:

- Reprofiling of approximately 250 m of Glenayr Avenue with a maximum vertical cut of 0.25 m,
- Raising of approximately 100 m of kerb by 0.1 m between Curlewis Street and Beach Road on the southeastern portion of Glenayr Avenue, and
- Two (2) raised vehicular crossings on Curlewis Street and Beach Road.

Modelled Outcomes

The proposed flood mitigation measure was simulated for the full suite of design events. For the purposes of reporting, the difference in peak flood levels for the 20% AEP and 1% AEP events is presented in Figure 10-14 and Figure 10-15 respectively.

While an iterative process was undertaken to minimise the increases in peak flood levels downstream, a clear trade-off is observed where the upstream benefits are reduced accordingly. When the aggressiveness of the reprofiling and the level of cutting is increased, larger reductions in peak flood levels are modelled upstream, while consequently larger increases are simulated downstream. The extent of this effect is minimal in more frequent storms such as the 20% AEP event and far more pronounced in rarer events.

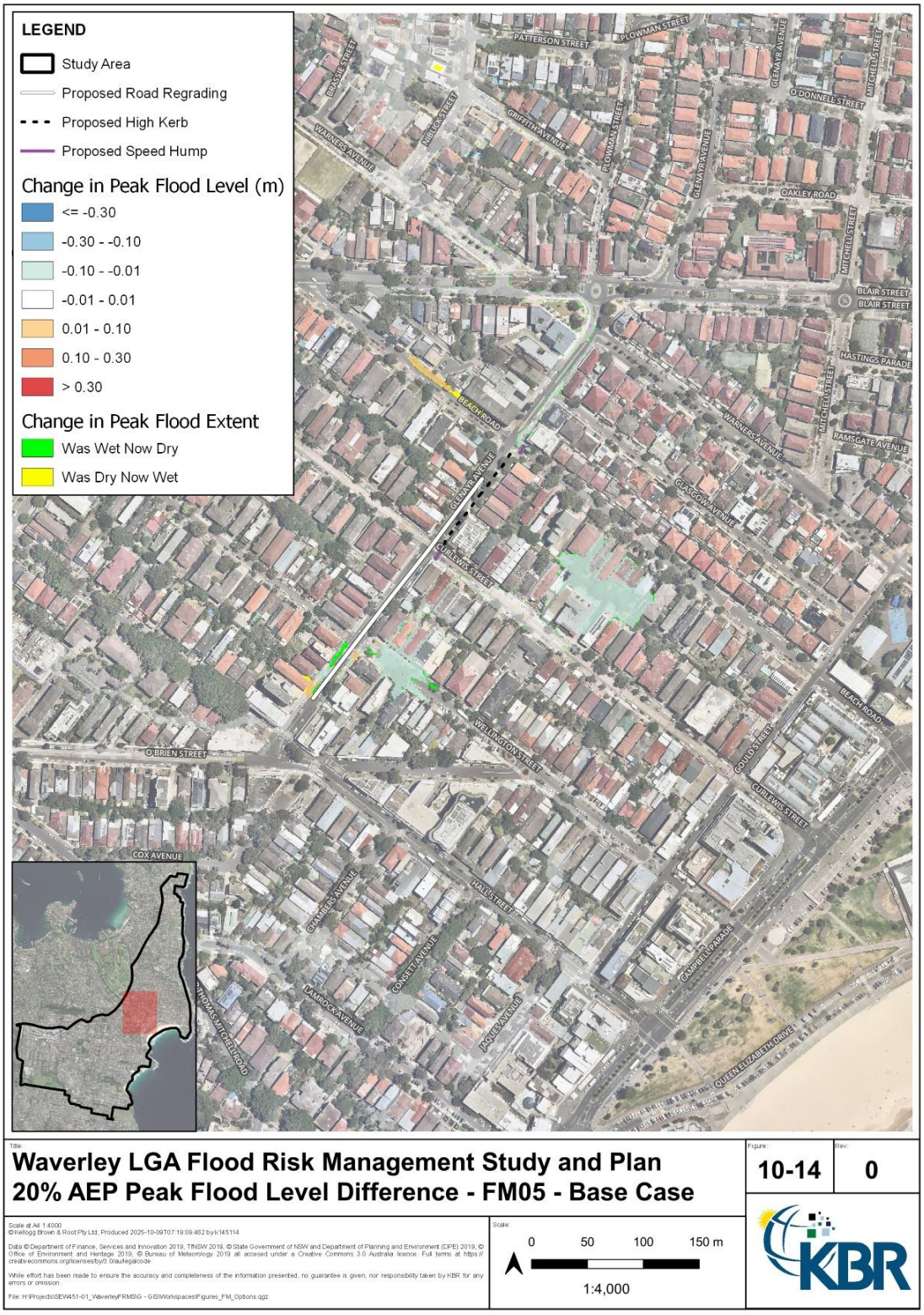


Figure 10-14 FM05 20% AEP (SSP2-4.5 2030) Peak Flood Level Difference

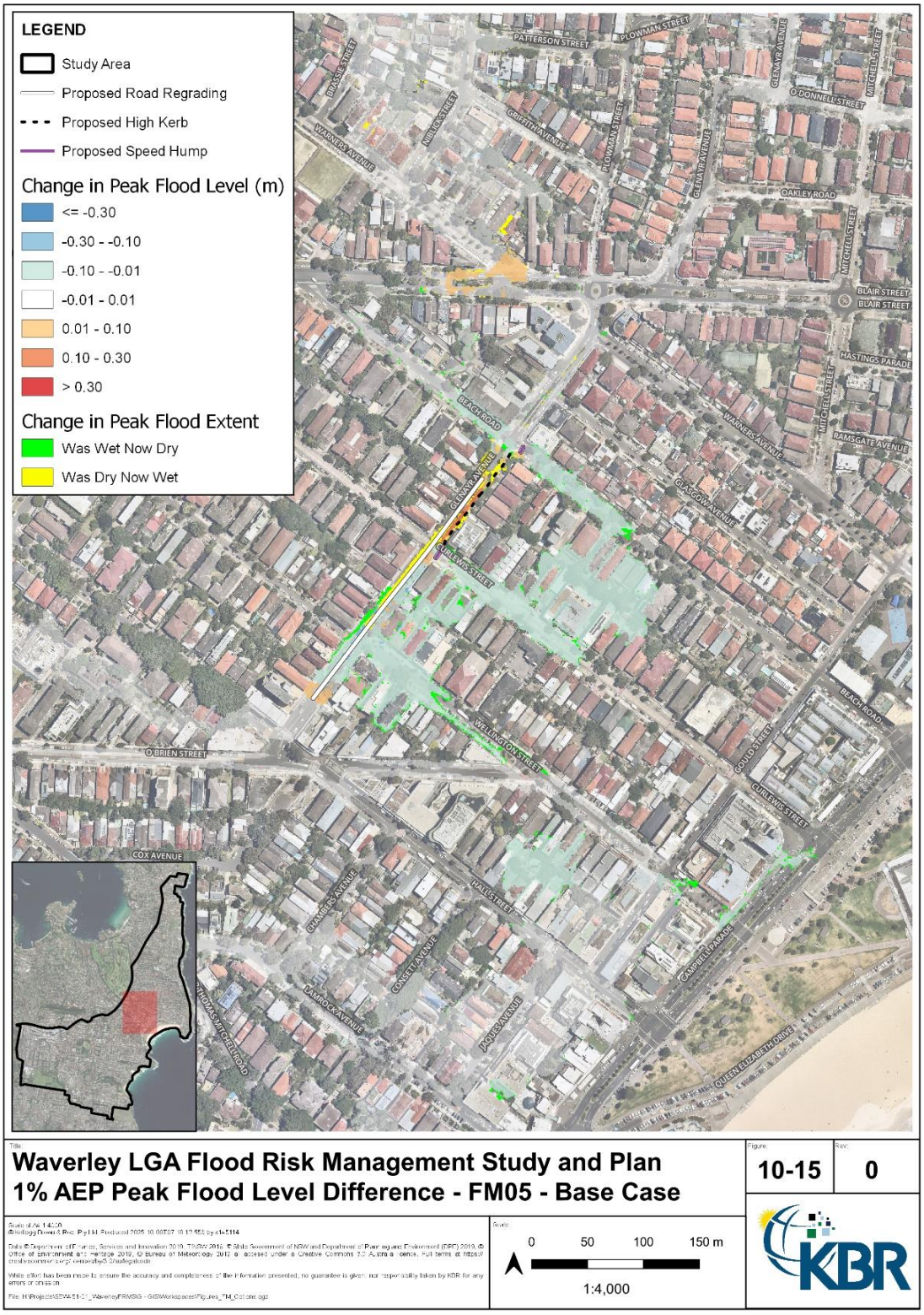


Figure 10-15 FM05 1% AEP (SSP2-4.5 2030) Peak Flood Level Difference



The number of properties affected and inundated above floor as well as the comparison to existing conditions is presented in Table 10-12. Similarly, the flood damages assessment outcomes and comparison against the existing conditions are presented in Table 10-13.

Table 10-12 FM05 Number of Properties Impacted

Event	Number of Properties Affected			Number of Properties Flooded Above Floor		
	Existing	FM05	Difference	Existing	FM05	Difference
20% AEP	284	283	-1	113	113	-
10% AEP	534	535	+1	235	236	+1
5% AEP	673	669	-4	324	323	-1
2% AEP	814	815	+1	416	416	-
1% AEP	955	954	-1	497	498	+1
0.5% AEP	1,074	1,072	-2	569	567	-2
0.2% AEP	1,268	1,269	+1	697	694	-3
PMF	3,532	3,530	-2	2,490	2,489	-1

Table 10-13 FM05 Flood Damages Assessment Outcomes

	Event	Existing	FM05	Difference
Total Damage	20% AEP	$ 52,707,288	$ 52,560,744	-$ 146,544
	10% AEP	$ 106,824,519	$ 106,811,680	-$ 12,839
	5% AEP	$ 129,129,608	$ 129,107,785	-$ 21,823
	2% AEP	$ 157,549,364	$ 157,559,948	+$ 10,584
	1% AEP	$ 193,921,226	$ 193,686,798	-$ 234,428
	0.5% AEP	$ 231,145,403	$ 224,667,518	-$ 6,477,885
	0.2% AEP	$ 295,368,671	$ 294,803,860	-$ 564,811
	PMF	$ 1,504,281,463	$ 1,503,196,874	-$ 1,084,589
AAD		**$ 36,429,685**	**$ 36,368,730**	**-$ 60,955**

Cost Estimation

A detailed breakdown of the capital cost estimate is provided in Table 10-14.

Table 10-14 FM05 Capital Cost Estimate Breakdown

Scope Item	$ AUD (ex GST)
Direct Cost	$ 2,068,977
Design Growth Allowance	$ 206,898
Net Cost	**$ 2,275,875**
Indirect Costs	
Preliminaries	$ 364,140
Overhead and Margin	$ 264,001
Construction Contingency	$ 726,004
Owners Contingency	$ 907,505



Scope Item	$ AUD (ex GST)
Consultant Fees - Design	$ 136,126
Consultant Fees - Survey & Investigations	$ 93,473
Subtotal	**$ 4,767,124**
Q Leave	$ 16,685
Location Factor	$ 239,190
Escalation	$ 562,576
Total	**$ 5,585,575**

Cost-Benefit Analysis

For the purposes of a CBA, a design life of 40 years was assumed for a concrete road and kerb. Standard design and yearly maintenance values were provided by Waverley Council. A discount rate of 7% was applied in line with guidance from the Australian Government Treasure (Australian Government, 2025).

The BCR for FM05 was calculated to be 0.15, representing a financially unfeasible option.

Additional Comments

As Glenayr Avenue is highly commercialised on either side of the road, interference with sub-surface utilities poses a key risk in the feasibility of this flood mitigation measure. While an allowance has been included for the isolation and protection of existing services within the area of proposed works, no allowance for the relocation of utilities has been included. A review of the BYDA database indicates potential clashes with electrical, telecommunications, gas, and sewer utilities.

In addition, the construction of the option will result in significant disruption to the commercial precincts adjacent to the roadway, leading to a temporary loss in revenue despite the future increase in flood resilience. The reprofiling of the road itself could result in impacts to the accessibility of certain buildings where the roadway profile has been altered. These factors could contribute to weak support from the community.

10.3.7 FM07: Thomas Hogan Reserve and Francis Street Combined Civil Works (Bondi)

FM07: Thomas Hogan Reserve and Francis Street Combined Civil Works

KBR recommend the increase in flood storage and inflow capacities of Thomas Hogan Reserve to provide widespread benefits to the lower LGA.

Cost $3,980,427 (AACE Class 4 estimate)

BCR 3.62

Scope of Works
- 5,000 m^3 excavation.
- 75 m long raised concrete retaining wall.
- 80 m long concrete lined open channel.
- Removal/relocation of the Waverley Council Community Centre building.

Constraints
- Potential reduction in amenity of the reserve.

Priority 1



The Francis Street-Simpson Street hotspot is a significant topographic low point that is constrained by O'Brien Street to the northeast and Francis Street to the southwest. The residential properties on the northwestern side of Simpson Street are situated significantly lower than O'Brien Street and Francis Street, with the trapped low point resulting in the pooling of floodwaters that are unable to drain effectively during intense rainfall events. This hotspot is part of a larger overland flow path with flows arriving from Old South Head Road, Simpson Street, and overland between properties.

KBR and Council staff have met with residents local to this hotspot throughout the study and acknowledge their request for additional stormwater improvements to help drain the trapped low points more rapidly during and after storm events. However, due to the relative proximity of the hotspot to the upstream end of the catchment in conjunction with the limited available capacity of the existing stormwater network, limited improvement will be realised with the construction of new pits without upgrading the underlying pipe capacity. While upgrading the trunk drainage capacity could alleviate flooding at this location, the pipe capacity upgrade would need to extend notably downstream towards Bondi Beach to provide material changes in flood affectation. This would incur significant cost with the feasibility of such an option subject to clashes with sub-surface utilities.

Scope of Works

As an alternative, KBR has explored the more efficient diversion of overland flows into Thomas Hogan Reserve alongside the increase in flood storage capacity in an attempt to reduce the volume of runoff reaching the Francis Street-Simpson Street low point. The proposed flood mitigation measure includes the following scope of work:

- Excavation of approximately 5,000 m3 of Thomas Hogan Reserve with maximum excavation depths of 1.0 m,
- Construction of an approximate 75 m long raised concrete retaining wall between Francis Street and the reserve,
- Construction of an approximate 80 m long concrete lined open channel from Francis Street to the reserve, and
- Removal or relocation of the Waverley Council Community Centre building.

Modelled Outcomes

The proposed flood mitigation measure was simulated for the full suite of design events. For the purposes of reporting, the difference in peak flood levels for the 20% AEP and 1% AEP events is presented in Figure 10-16 and Figure 10-17 respectively.

While overland flows from Penkivil Street and Martins Avenue already accumulate into the Thomas Hogan Reserve, the existing case modelling indicates that runoff from Old South Head Road and Francis Street largely bypass the reserve. The overland flows largely culminate in the Francis Street-Simpson Street trapped low point to hazardous depths. The inclusion of an open channel as part of this mitigation strategy connecting Francis Street to the Thomas Hogan Reserve allows for a significant volume of runoff to be diverted into the reserve.

The removal of runoff from the existing overland flow path results in an immediate reduction in peak flood levels within the Francis Street-Simpson Street hotspot by up to 0.24 m and 0.15 m in the 20% AEP and 1% AEP events respectively. Not only is there a widespread reduction in flood levels and hazards, the removal of several overland flow paths between properties is modelled, with the effect being more pronounced with increasing storm intensity.

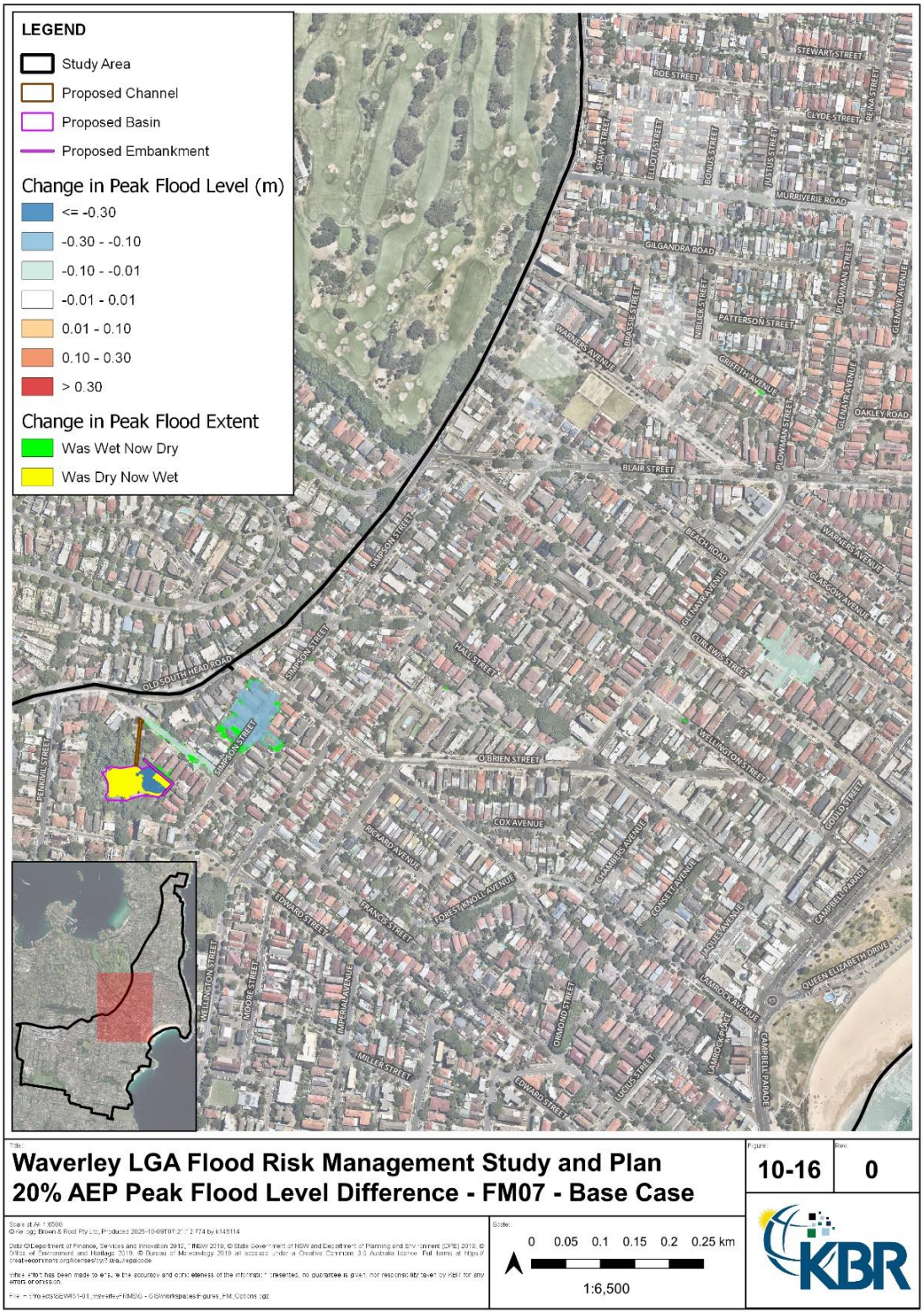


Figure 10-16 FM07 20% AEP (SSP2-4.5 2030) Peak Flood Level Difference

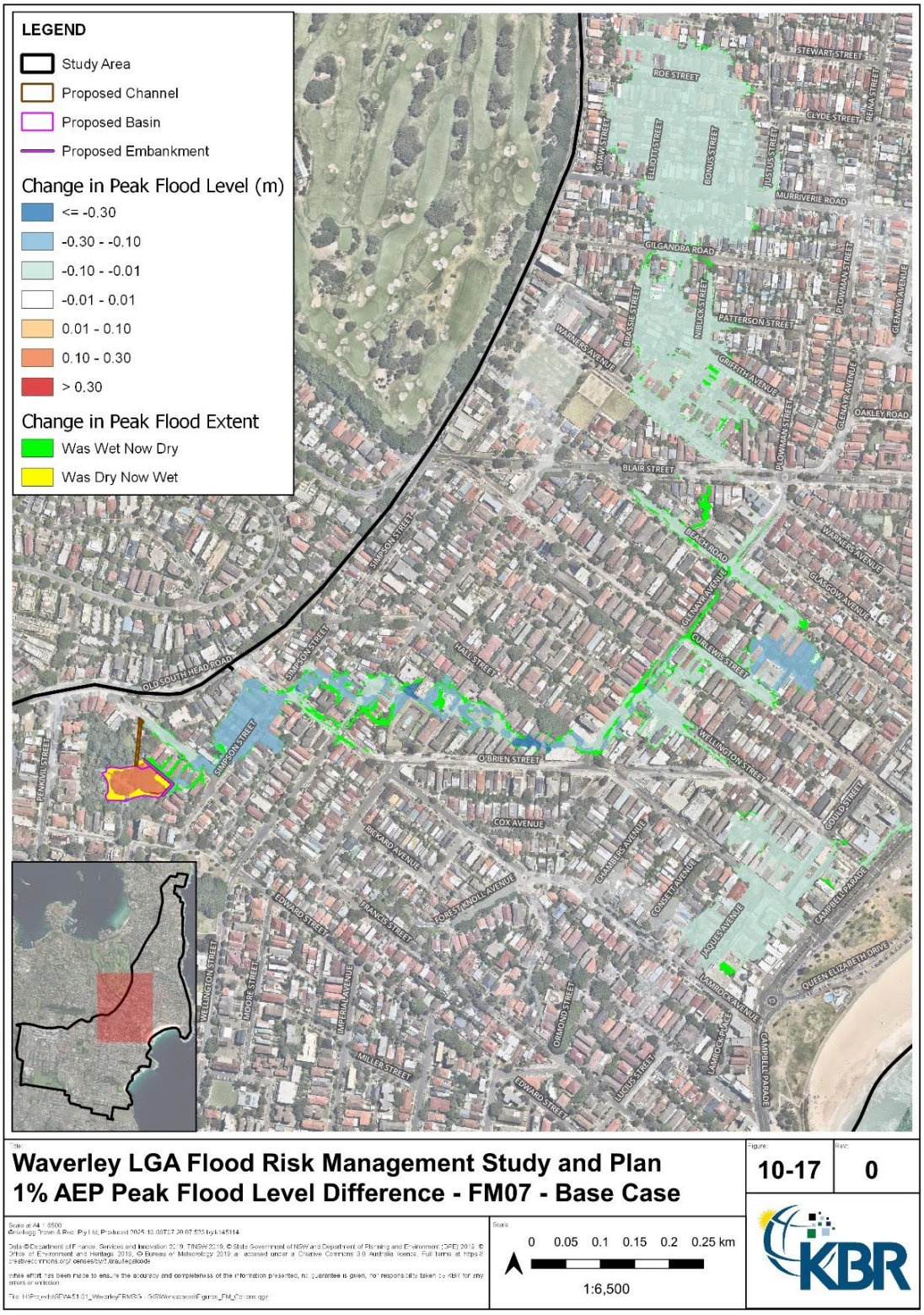


Figure 10-17 FM07 1% AEP (SSP2-4.5 2030) Peak Flood Level Difference



The number of properties affected and inundated above floor as well as the comparison to existing conditions is presented in Table 10-15. Similarly, the flood damages assessment outcomes and comparison against the existing conditions are presented in Table 10-16.

Table 10-15 FM07 Number of Properties Impacted

Event	Number of Properties Affected			Number of Properties Flooded Above Floor		
	Existing	FM07	Difference	Existing	FM07	Difference
20% AEP	284	280	-4	113	112	-1
10% AEP	534	528	-6	235	230	-5
5% AEP	673	661	-12	324	318	-6
2% AEP	814	800	-14	416	406	-10
1% AEP	955	933	-22	497	486	-11
0.5% AEP	1,074	1,051	-23	569	556	-13
0.2% AEP	1,268	1,241	-27	697	676	-21
PMF	3,532	3,530	-2	2,490	2,484	-6

Table 10-16 FM07 Flood Damages Assessment Outcomes

	Event	Existing	FM07	Difference
Total Damage	20% AEP	$ 52,707,288	$ 51,969,048	-$ 738,240
	10% AEP	$ 106,824,519	$ 104,319,510	-$ 2,505,009
	5% AEP	$ 129,129,608	$ 125,819,363	-$ 3,310,245
	2% AEP	$ 157,549,364	$ 147,459,451	-$ 10,089,913
	1% AEP	$ 193,921,226	$ 182,051,966	-$ 11,869,260
	0.5% AEP	$ 231,145,403	$ 206,832,294	-$ 24,313,109
	0.2% AEP	$ 295,368,671	$ 282,396,826	-$ 12,971,845
	PMF	$ 1,504,281,463	$ 1,499,799,826	-$ 4,481,637
AAD		**$ 36,429,685**	**$ 35,483,744**	**-$ 945,941**

Cost Estimation

A detailed breakdown of the capital cost estimate is provided in Table 10-17.

Table 10-17 FM07 Capital Cost Estimate Breakdown

Scope Item	$ AUD (ex GST)
Direct Cost	$ 1,474,407
Design Growth Allowance	$ 147,441
Net Cost	**$ 1,621,848**
Indirect Costs	
Preliminaries	$ 256,496
Overhead and Margin	$ 188,134
Construction Contingency	$ 517,369
Owners Contingency	$ 646,712



Scope Item	$ AUD (ex GST)
Consultant Fees - Design	$ 97,707
Consultant Fees - Survey & Investigations	$ 66,611
Subtotal	**$ 3,397,177**
Q Leave	$ 11,890
Location Factor	$ 170,453
Escalation	$ 400,906
Total	**$ 3,980,427**

Cost-Benefit Analysis

For the purposes of a CBA, a design life of 115 years was assumed for basins and retaining walls. Standard design and yearly maintenance values were provided by Waverley Council. A discount rate of 7% was applied in line with guidance from the Australian Government Treasure (Australian Government, 2025).

The BCR for FM07 was calculated to be 3.62, representing a financially feasible option. The benefits quantified far outweigh the estimated costs of the flood mitigation measure.

Additional Comments

As the scope of works are mostly contained within the reserve, minimal disruption to the street and surrounding residential properties is anticipated. A review of the BYDA database also indicates no potential clashes with existing sub-surface utilities. While the improved flood storage capacity may increase the accumulated ponded depths of runoff during large events, the impact to the usability of the reserve could be minimised with the introduction of high infiltration mechanisms or drainage facilities.

Alternatively, while the proposed flood mitigation measure consists of a permanent excavation to provide above-surface storage capacity, a similar outcome could be achieved with the implementation of sub-surface storage (i.e. onsite detention tank).

Improvements to water quality and/or the consideration of potential environmental impacts should be considered during future detailed feasibility assessments. With no major change to the existing function of the reserve, community support is anticipated to be high due to the significant benefits this option provides for a large portion of the LGA.

10.3.8 FM10: York Road Combined Stormwater Augmentation (Queens Park)

FM10: York Road Combined Stormwater Augmentation	
	KBR recommend the diversion of the existing stormwater network at the Denison Street and Cuthbert Street intersection as well as the construction of a new outlet on York Road to alleviate the burden on the at capacity northern stormwater network.
Cost	$1,565,062 (AACE Class 4 estimate)
BCR	0.76
Scope of Works	• 75 m long 1.50 m width by 1.0 m height box culverts. • One (1) 4.2 m long lintel and grated inlet pit. • One (1) junction pit. • Unblocking of the partially blocked pipe.



FM10: York Road Combined Stormwater Augmentation	
Constraints	• Potential environmental impacts due to the increased discharge into the Model Yacht Pond.
Priority	3

The Alt Street-York Road hotspot encompasses an overland flow path that traverses a series of low points between closely adjoined residential properties before discharging into Model Yacht Pond within Centennial Park. Two separate stormwater networks drain the series of streets, diverging at the Denison Street and Cuthbert Street intersection. The modelling indicates that the northern line reaches capacity in the 63.2% AEP event, while the southern line has available capacity up to and beyond the 0.5% AEP event. The intent of this flood mitigation measure is to alleviate the burden on the northern line to reduce flood levels within the trapped low points of each street.

The stormwater pipe underneath the residential buildings between Lynch Avenue and York Road (in a northeast to southwest direction) has been found to be partially blocked with concrete. As additional debris could completely block this pipe during and after rainfall events, this pipe was conservatively modelled as completely blocked and unable to facilitate floodwaters in discussion with Council.

Scope of Works

As part of this mitigation strategy, KBR has allowed for the removal of blockage within the affected pipe to bolster the efficiency of the stormwater infrastructure. The proposed flood mitigation measure includes the following scope of work:

- 10 m long 1.5 m width by 1.0 m height box culvert connection at the Denison Street low point,
- 65 m long 1.5 m width by 1.0 m height box culvert outlet on York Road,
- One (1) 4.2 m long lintel and grated inlet pit at the Denison Street low point,
- One (1) junction pit to facilitate the additional stormwater connection, and
- Unblocking of the partially concrete blocked pipe between Lynch Avenue and York Road.

Modelled Outcomes

The proposed flood mitigation measure was simulated for the full suite of design events. For the purposes of reporting, the difference in peak flood levels for the 20% AEP and 1% AEP events is presented in Figure 10-18 and Figure 10-19 respectively.

Reductions in peak flood levels of up to 0.30 m are modelled for the 20% AEP event. The removal of overland flow volume from the surface has resulted in a notable decrease in peak flood extent, removing breakouts by containing flow more readily within the road corridor. Additionally, a decrease in flood hazard from H2/H3 within the road corridors to H1/H2 is simulated, significantly improving the trafficability of the roads during minor to moderate flood events. While decreases in peak flood behaviour are still modelled for the rarer design events, the effect is far more diminished due to the decreasing relevance of stormwater infrastructure where the capacity is far exceeded by the volume of rainfall.



Figure 10-18 FM10 20% AEP (SSP2-4.5 2030) Peak Flood Level Difference

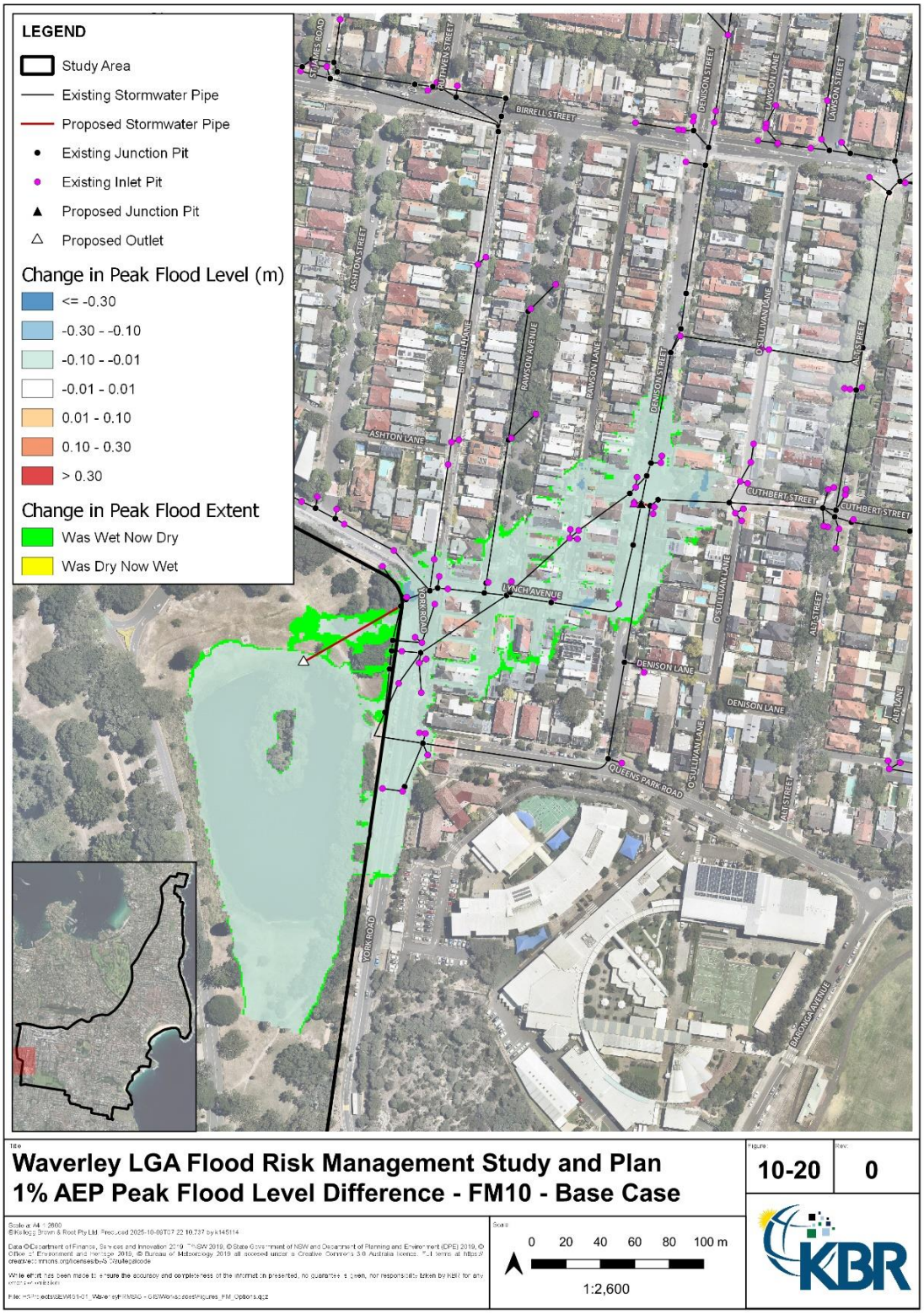


Figure 10-19 FM10 1% AEP (SSP2-4.5 2030) Peak Flood Level Difference



The number of properties affected and inundated above floor as well as the comparison to existing conditions is presented in Table 10-18. Similarly, the flood damages assessment outcomes and comparison against the existing conditions are presented in Table 10-19.

Table 10-18 FM10 Number of Properties Impacted

Event	Number of Properties Affected			Number of Properties Flooded Above Floor		
	Existing	FM10	Difference	Existing	FM10	Difference
20% AEP	284	279	-5	113	113	-
10% AEP	534	523	-11	235	232	-3
5% AEP	673	668	-5	324	321	-3
2% AEP	814	808	-6	416	409	-7
1% AEP	955	954	-1	497	493	-4
0.5% AEP	1,074	1,068	-6	569	567	-2
0.2% AEP	1,268	1,264	-4	697	693	-4
PMF	3,532	3,530	-2	2,490	2,489	-1

Table 10-19 FM10 Flood Damages Assessment Outcomes

	Event	Existing	FM10	Difference
Total Damage	20% AEP	$ 52,707,288	$ 52,664,161	-$ 43,127
	10% AEP	$ 106,824,519	$ 106,498,510	-$ 326,009
	5% AEP	$ 129,129,608	$ 128,717,100	-$ 412,508
	2% AEP	$ 157,549,364	$ 156,724,126	-$ 825,238
	1% AEP	$ 193,921,226	$ 193,223,063	-$ 698,163
	0.5% AEP	$ 231,145,403	$ 230,500,089	-$ 645,314
	0.2% AEP	$ 295,368,671	$ 294,921,527	-$ 447,144
	PMF	$ 1,504,281,463	$ 1,504,205,175	-$ 76,288
AAD		**$ 36,429,685**	**$ 36,650,898**	**-$ 78,787**

Cost Estimation

A detailed breakdown of the capital cost estimate is provided in Table 10-20.

Table 10-20 FM10 Capital Cost Estimate Breakdown

Scope Item	$ AUD (ex GST)
Direct Cost	$ 579,721
Design Growth Allowance	$ 57,972
Net Cost	**$ 637,693**
Indirect Costs	
Preliminaries	$ 102,031
Overhead and Margin	$ 73,972
Construction Contingency	$ 203,424
Owners Contingency	$ 254,280



Scope Item	$ AUD (ex GST)
Consultant Fees - Design	$ 38,142
Consultant Fees - Survey & Investigations	$ 26,191
Subtotal	**$ 1,335,734**
Q Leave	$ 4,675
Location Factor	$ 67,020
Escalation	$ 157,632
Total	**$ 1,565,062**

Cost-Benefit Analysis

For the purposes of a CBA, a design life of 120 years was assumed for pits and pipes. Standard design and yearly maintenance values were provided by Waverley Council. A discount rate of 7% was applied in line with guidance from the Australian Government Treasure (Australian Government, 2025).

The BCR for FM10 was calculated to be 0.76, representing a financially constrained option. While the BCR does not indicate financial favourability, the flood damages assessment is heavily biased towards impact to property. The damages tool does not involve the same level of scrutiny and calculation behind the reduction in flood affectation and trafficability of roads, and therefore emergency services. In addition, while property lots are modelled to be inundated in existing conditions, the modelling indicates the majority of buildings do not experience above floor flooding. As such, the dollar benefit that this mitigation strategy provides will naturally be limited in comparison to flood mitigation measures that significantly reduce the number of properties that are flooded above floor.

Additional Comments

As stormwater upgrades have commonly been requested by residents, community support for this flood mitigation measure is anticipated to be strong. In addition, the limited scope and minimal complexity of the works will allow the option to be quickly and efficiently constructed.

A sewer line is identified underneath the middle of Denison Street, however due to the typical depths at which sewer utilities are constructed, it poses low risk to the constructability of this option. No other major utility clash has been identified.

It is noted that while there are no major constraints identified, an environmental assessment, water sensitive urban design assessment, and liaison with the state government may be required due to the increased discharges into the Model Yacht Pond.

Whilst the current floor levels are modelled to be not inundated, the construction of this work is modelled to reduce flood affectation of properties, allowing for increased development options in the future.

10.3.9 Summary and Recommendations

Of the five (5) flood mitigation measures outlined above, Option 4 has been identified as the most financially beneficial flood mitigation measure, providing widespread benefits in flood affectation across a range of theoretical design flood events. The modelled benefits extend far beyond the immediate location of works, providing relief for several hotspots. Due to the limited number of constraints identified with the high BCR, Option 4 has scored the highest when subject to the MCA.

Option 1 has also been identified to be a financially beneficial flood mitigation measure, providing significant above floor flooding relief within the major trapped low point of the Waverley LGA.



Option 1 has also scored positively when subject to the MCA. However, the extent of works extends beyond the Waverley LGA, into the Woollahra LGA and private land owned by the Royal Sydney Golf Club. The limited extent of the hydraulic model and assumptions included within the cost estimation must be considered should this option proceed to detailed design.

Option 2 and Option 5 have both been identified as financially constrained options with similar BCR scores. Both flood mitigation measures provide benefits to flood affectation for residential properties and the trafficability of adjacent roadways. Option 2 scored poorly in the BCR due to the extent of works required while providing relief for a highly localised area. On the other hand, Option 5 provides widespread improvement for a minimal extent of works required.

Option 3 is the only flood mitigation measure that is not recommended due to the BCR returning a financially unfeasible outcome. While extensive iterative modelling of this location was undertaken, a favourable solution could not be achieved which produced no adverse impacts to downstream properties whilst gaining material benefits to properties upstream of Glenayr Avenue. In addition, the sub-surface utility clash assessment has identified several existing utilities crossing underneath Glenayr Avenue which poses key risks to the feasibility of this option. While not recommended, a key finding of the investigations within this location was the sensitivity of the downstream and upstream impacts to the conveyance capacity of the roadway.

10.4 PROPERTY MODIFICATION MEASURES

The measures presented within this section involve property modification projects for properties that are generally in flood prone areas with limited options in regard to minimising flood affectation.

10.4.1 PM01: Flood Proofing

PM01: Flood Proofing

KBR recommend the consideration of flood proofing for properties identified to be impacted by above floor flooding for the 1% AEP event. While the responsibility of flood proofing should ultimately fall on property owners, it is recommended that Council engage in consultation programs with impacted property owners to provide information about possible flood proofing options.

Flood proofing is the design and construction of buildings in such a way or with appropriate water-resistant materials such that flood damage is minimised up to a specified criterion. The Waverley DCP (Waverley Council, 2022) states for new development, all habitable floor levels are to be equal to or above the 1% AEP flood level with the addition of freeboard (500 mm for areas subject to oceanic flooding conditions and 300 mm for all other areas). The DCP further states that all non-habitable floor levels should be greater than or equal to the 1% AEP flood level. As such, KBR acknowledges that appropriate controls are in place to protect future development within the LGA.

However, as presented in Table 9-2, over 500 properties are modelled to be at risk of above floor flooding in the 1% AEP event. The ingress of flood waters into buildings can result in significant economic loss as well as mental and emotional stress. In instances where flood waters are unable to be diverted away from the property through other mitigation measures, the flood proofing of such properties could provide substantial economic and social relief. For these properties, KBR recommends the consideration of non-structural flood proofing measures that can be retrofit to existing properties to minimise flood damage. Retrofit flood proofing measures could involve, temporary or permanent flood gates or barriers, modifications to building joinery and fittings, floor coverings, relocation of low-lying electrical services, or the installation of internal drainage and pumps. Examples of flood barriers are provided in Figure 10-20 and Figure 10-21.



Figure 10-20 Manual Flood Barrier Example (Australian Industry, 2024)



Figure 10-21 Passive (Buoyant) Flood Barrier Example (Australian Industry, 2024)

The responsibility of flood proofing properties within the Waverley LGA should fall on property owners. It is noted that there is unlikely to be a one solution fits all scenario, with required measures expected to vary depending on the magnitude and type of flood risk at the property. As such, KBR recommends Council to engage in consultation programs with impacted property owners to provide information about possible flood proofing options. Consultation could be targeted at properties modelled to experience above floor flooding within the hot spot locations identified in Section 6.4. The availability of funding subsidies on a local government and state level should be explored by Council in an attempt to minimise financial burden on property owners.

10.4.2 PM02: Voluntary House Raising

PM02: Voluntary House Raising

KBR does not recommend the undertaking of a voluntary house raising scheme within the study area.

Voluntary house raising aims to reduce the flood damages to buildings by raising the habitable floor level above a specific level (e.g. the 1% AEP flood level plus freeboard). Unlike other mitigation measures that seeks to minimise flood affectation or risk to the property, voluntary house raising does not directly eliminate the risk. Rather, the benefit that it provides is largely limited to the reduction in economic damage. Additionally, the property would still be at risk of damage for flood events rarer than the targeted immunity of the raised floor level. Flood hazards and risk to safety would remain mostly unchanged around the vicinity of the building.

It should be noted that house raising, while theoretically possible for any house type, is most suitable for non-brick single story buildings already constructed on piers. Significantly higher costs are typically required for raising slab-on-ground buildings. Additional costs related to building feature constraints (e.g. heritage components, internal fire places, and unique structural elements) and relocation costs during construction must also be considered.



Within the Waverley LGA, the following concerns have been identified regarding the effectiveness of implementing a voluntary house raising scheme:

- Unsuitability of property floor level raising for densely urbanised catchments primarily impacted by flash flooding,
- Buildings subject to property floor level raising may already be approaching the end of their design life,
- Rebuilding may provide a more cost-effective and attractive option over renovation to landowners, and
- Flood proofing of the existing property may provide a more cost-effective alternative.



11 Multi-Criteria Assessment

A Multi-Criteria Assessment (MCA) involves a matrix of metrics that allow the quantification of the benefits and risks associated with each floodplain risk management measure. The multi-criteria matrix expands upon the high-level assessment criteria developed and used during the assessment of preliminary flood mitigation measures, offering a greater breadth and depth of assessment. While the MCA includes a wide facet of perspectives, it cannot completely encapsulate the full complexity of assessment and selection of suitable floodplain risk management measures. The MCA is intended to be a tool to be used in simplifying this matter, however the limitations should be carefully considered in interrogating the outcomes of this assessment.

In consultation with Council, a scoring system has been established across the range of assessment metrics to allow stakeholders to assess each floodplain risk management measure using a consistent basis. Scores are ranked from one (1) to five (5) with the higher number indicative of a favourable outcome. A weighting has been attached to each assessment metric, acknowledging the greater importance of specific criterion. The weighted score across the range of categories is summed to determine the overall score.

The responses received from the targeted community consultation and input received from Council have been considered in the derivation of the assessment metrics, criteria, and assigning of weighting percentages.

The multi-criteria matrix and associated scoring system is presented in Table 11-1.

The outcomes of the multi-criteria assessment are presented in Table 11-2.



Table 11-1 Multi-Criteria Matrix

#	Criteria	Definition	Scoring Guide (1–5)	Score	Unit / How Measured	Weight (%)	Weight Justification
1	Benefit Cost Analysis (BCA)	Ratio of present value of benefits to total costs.	1 = BCR < 0.5	1	Benefit-Cost Ratio (unitless)	30%	Core decision factor for investment prioritisation and value for money.
			2 = 0.5–1.0	2			
			3 = 1.0–1.5	3			
			4 = 1.5–2.0	4			
			5 = BCR > 2.0	5			
2	Implementation Complexity	Cost, timeline, and difficulty of implementation.	1 = >$10M & >2 years	1	$AUD and months	10%	Affects project staging, risk, and feasibility.
			2 = $5M–10M or 1.5–2 yrs	2			
			3 = $2M–5M or 1–1.5 yrs	3			
			4 = $1M–2M	4			
			5 = <$1M & <6 mo	5			
3	Above Floor Impact on Properties	Reduction in properties affected by internal flooding for the 1% AEP event.	1 = No change	1	Number of properties	15%	Key safety and community resilience measure.
			2 = 1-2 properties	2			
			3 = 2-5 properties	3			
			4 = 5-10 properties	4			
			5 = >10 properties protected	5			
4	Change in Flood Affectation	Change in peak flood level within a lot for the 1% AEP event.	1 = No change	1	Number of properties and average depth	10%	Measures direct floodplain improvement.
			2 = 1mm - 25mm	2			
			3 = 25mm - 50mm	3			
			4 = 50mm - 100mm	4			
			5 = >100mm	5			
5	Impact on Flood Hazard	Shift in flood hazard classification (e.g. high → medium).	1 = No change	1	Area x hazard category rating change	10%	Supports planning and emergency management.
			2 = 0m² - 10,000m²	2			
			3 = 10,000m² - 25,000m²	3			
			4 = 25,000m² - 50,000m²	4			
			5 = >50,000m²	5			
6	Social Disruption	Disruption to community access, noise, or services.	1 = Major relocations/closures	1	Qualitative impact footprint	5%	Temporary but affects community tolerance and scheduling.
			2 = High disruption	2			
			3 = Moderate	3			
			4 = Minor	4			
			5 = Minimal	5			
7	Emergency Access / Trafficability	Usability of roads during flood events.	1 = No improvement	1	km of road usable during floods	5%	Important for evacuation, emergency response, and supply access.
			2 = 0m - 50m	2			
			3 = 50m - 100m	3			
			4 = 100m - 200m	4			
			5 = >200m	5			
8	Community Acceptance & Support	Support or resistance from stakeholders and the public.	1 = Strong opposition	1	Survey results, engagement feedback	5%	Affects approvals, delivery risk, and long-term project success.
			2 = Some opposition	2			
			3 = Neutral	3			
			4 = Supportive	4			
			5 = Strong support	5			
9	Environmental Impacts	Effect on biodiversity, ecosystems, and waterways.	1 = High negative impact	1	Hectares of ecosystem affected or enhanced	5%	Required for compliance and environmental stewardship.
			2 = Moderate	2			
			3 = Neutral	3			
			4 = Low positive	4			
			5 = Major positive impact	5			
10	Heritage Impacts	Impact on Indigenous or cultural heritage values.	1 = Permanent damage	1	Proximity to heritage areas; significance category	5%	Mandatory under heritage legislation where applicable.
			2 = High risk	2			
			3 = Low risk	3			
			4 = No impact	4			
			5 = Enhances/preserves heritage or NA	5			



Table 11-2 Multi-Criteria Assessment Outcomes

Measure	Description	Criteria										
		Benefit-Cost Analysis	Implementation Complexity	Above Floor Impact on Properties	Change in Flood Affectation	Impact on Flood Hazard	Social Disruption	Emergency Access / Trafficability	Community Acceptance & Support	Environmental Impacts	Heritage Impacts	Weighted Total Score
FM07	Thomas Hogan Reserve and Francis Street Combined Civil Works	5	3	4	4	5	4	4	4	3	2	**4.15**
FM01	Gilgandra and Murriverie Road Combined Stormwater Augmentation	4	1	5	5	5	2	5	2	3	5	**3.90**
LM02	Changes to the Flood Risk Management Statutory Planning Framework	5	5	5	1	2	5	1	2	3	5	**3.85**
LM03	Application of Flood Planning Controls	5	5	5	1	2	5	1	2	3	5	**3.85**
LM04	Notifications and Communications	5	5	3	2	2	5	2	3	3	5	**3.75**
CM01	Community Education and Awareness	5	5	2	2	2	5	4	4	3	5	**3.75**
LM01	Flood Maps for Strategic Planning Purposes	5	5	3	1	2	5	2	3	3	5	**3.65**
CM03	Co-ordination with Emergency Services	4	5	2	2	2	5	5	4	3	5	**3.50**
PM01	Flood Proofing	5	2	5	1	1	2	1	3	3	2	**3.20**
FM10	York Road Combined Stormwater Augmentation	2	4	2	4	2	4	5	5	2	5	**2.95**
FM02	Barracluff Park Combined Civil Works	2	2	2	2	3	3	2	1	3	5	**2.30**
PM02	Voluntary House Raising	2	1	5	1	2	1	1	1	3	3	**2.20**
FM05	Glenayr Avenue Combined Civil Works	1	3	2	2	2	1	1	3	3	3	**1.85**



12 Flood Risk Management Plan

To be completed following public exhibition.



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ZERO 24/7 HARM
Our Zero Harm culture has been hugely successful throughout KBR and has led to year-over-year improvements in safety. We now emulate this success as it relates to sustainability. Just as with the Zero Harm practice, we outline commitments and responsibilities for every KBR employee to apply to their daily lives. Our sustainability vision is underpinned by KBR's Zero Harm and Courage to Care culture — doing zero harm to the planet and zero harm to all people.
As a company, we believe that zero workplace incidents is an achievable goal. We commit to a Zero Harm policy and approach to safety for our employees and those we work with, including customers, partners, subcontractors, suppliers and visitors. Our commitment to health, safety, security and environment (HSSE) has resulted in unprecedented safety performance throughout the organization and across our global footprint. KBR's journey to Zero Harm is driven by our employees' commitment to safety 24/7. To achieve that goal, we use our internationally recognized transactional HSSE management systems and transformational leadership. KBR's transactional HSSE management systems are ISO 14001 and OHSA 18001 certified.
KBR



Appendix A: Community Consultation Material

Flood Risk Management Study and Plan



Community Consultation Report

August 2024

WAVERLEY COUNCIL

Waverley Council acknowledges the Bidjigal, Birrabirragal and Gadigal people, who traditionally occupied the Sydney Coast, and we pay respect to all Aboriginal and Torres Strait Islander Elders both past and present.

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Appendix 20

This report was prepared by Leigh Pitkethly, Engagement Officer. Council project team members were Amanda Tipping (Senior Project Manager), Robbie Frawley (Infrastructure Programs Coordinator), Patrick Hay (Senior Strategic Planner). Consultants KBR were Joshua Eggleton and Isaac Kim.

Executive Summary

From June 11 to July 15, 2024 Waverley Council held a community consultation for part one of the Flood Risk Management Study and Plan.

Residents and property owners were asked to supply information, images and video relating to flooding they had experienced, either at their home or in other areas of Waverley. It was organised LGA-wide, focussing on the collection of data via Council's *Have Your Say (HYS)* website.

Eighty-two submissions were received via the website, as well as **51** emails to the project team. **Ten** people attended *Have Your Say* face-to-face pop-ups across the LGA.

Among the many individual submissions received, there were broad themes that presented during the consultation.

1. Neutral contributions detailing when and where a community member experienced a flooding incident
2. Objection to Council's existing flood modelling and their home or street being identified as a 'hot spot' in the identified flood planning that took place in 2021. (Outside the scope of the project.)
3. Residents' belief that flood modelling has caused their insurance premiums to increase. Some also believe it has affected the overall dollar value of their home
4. Concern about Council's lack of action on flooding in the region and impacts to home, business or local area.

Project Background

Building on the completion of the Waverley Local Government Area (LGA) Flood Study, which was adopted in 2021, Waverley Council commenced the next step in the NSW Governments Flood Risk Management Framework in early 2024 - a Flood Risk Management Study and Plan (FRMS&P) for the Waverley LGA.

The objective of this project is to refine the model across the LGA and explore and recommend flood mitigation options to reduce or alleviate detrimental impacts of flooding where possible.

This project has two parts:

1. The Flood Risk Management Study

To incorporate community knowledge of flooding and undertake ground testing onsite to further refine the Waverley LGA flood study, improving its accuracy and the confidence that the community has in the flood planning maps. To develop and assess flood risk mitigation measures to reduce or alleviate existing and future flood risks in our community.

2. The Flood Risk Management Plan

This part of the project focuses on recommending and prioritising flood risk mitigation measures, including documenting the decisions made to manage flood risks into the future. A list of recommended measures and their priority are detailed in the plan including how they would be implemented and who is responsible.

The study and plan are being prepared by independent flood consultant Kellogg Brown & Root Pty Ltd (KBR) and urban planning consultant GLN Planning Pty Ltd. With joint support and funding from NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) under their Floodplain Management Program.

This project is separate to previous recently completed projects including the Waverley LGA Flood Study 2021 and the amendment to the Waverley Development Control Plan 2022.

Community Engagement and Communications

In accordance with Waverley Council's adapted IAP2 model of engagement, three methods were used to gather community feedback:

1. Online survey on the *Have Your Say* (HYS) platform
2. Emails to floodriskmanagement@waverley.nsw.gov.au
3. Face to Face *Have Your Say* pop-ups

A multi- channel communication approach was used to reach and encourage residents to participate.

ENGAGEMENT	AUDIENCE	OPENS	OVERVIEW
Have Your Say **Online Survey**	567	NA	The engagement method was primarily aimed at directing people to the survey on *Have Your Say*. There were **82** completed surveys, **567** unique visitors to the HYS page**, 64** downloads of the flood risk manual and **52** downloads of the FAQs.
Emails From Community	NA	NA	**Fifty-one** emails from the community were received at floodriskmanagement@waverley.nsw.gov.au
Face-to-Face	10	NA	The project team held four *Have Your Say* pop-ups. 4th July, Kimberley Community Hall (Vaucluse), 5th July, Hugh Bamford Reserve (North Bondi) and Margaret Whitlam Recreation Centre (Bondi Junction), and 6th July Waverley Library, (Bondi Junction). There were **10** people who attended these across the session times.
COMMUNICATIONS	**AUDIENCE**	**OPENS**	**OVERVIEW**
Resident Letters	36K	NA	*Market Push* were engaged to deliver non-addressed letters to ground-level mailboxes across the LGA. This took place for approximately two weeks from 11 June to 25 June. Letters included a QR code, which had **140** scans. Page 12.
Wentworth Courier: Mayor's Message	48477 *(Source: Wikipedia)*	NA	In the 19 June edition of the Wentworth Courier, Mayor Paula Masselos encouraged people to visit the HYS page and share their feedback. Page 14 of this report.
Waverley Weekly E-Newsletter		32	It was the lead *Have Your Say* story in WW – 12 June edition - with a link to the HYS page and survey. Page 14.
Social Media Posts	Full data, page 15	Full data, page 15	Consultation promoted on Facebook and Instagram and a reminder was publicised on both spaces. Facebook had a reach of **835** and Instagram **701** on their 'grid' spaces. See page 14 and 15 for more information.
Waverley Council Website	298 Unique views	33 visits to HYS	A thumbnail and link was included on Council's flood planning page. This link remains so that the community can keep uptodate on progress. Page 16.
HYS Monthly E-Newsletter	9636	250	The project was the lead story in the June HYS newsletter that was issued on 14 June, 2024. Page 16.
HYS Automatic Email	667	32	Automatic email which is sent on the system launch of each HYS page. Page 16.

Engagement – *Have Your Say* Survey Questions

The *Have Your Say* consultation was open for 35 days (five weeks). The questions asked were as below:

1. **Address of flooding incident** Required
   Please provide exact address of the incident. If you do not know the address, please give as much details as possible. For example, nearest cross streets, visible identifying marker such as a large tree, house/fence colour or type.

2. **What was the day and time of the flooding incident?** Required

3. **What do you estimate was the depth of the flooding? Please use mm, cm or metres.** Required

4. **Please attach photos and/or videos of the incident.**
   Choose file...
   Max files: **10** Allowed file types: **pdf,doc,docx,txt,xls,xlsx,rtf,png,gif,jpg,jpeg**. Size limit: **20.00 MB**

5. **Please indicate how you were inconvenienced or impacted by flooding at this location?** Required
   a) Access to property
   b) Daily routine impacted
   c) Safety threatened
   d) Business unable to operate
   e) Could not stay in property for a period
   f) Property damage
   g) I was not inconvenienced or impacted by the flooding
   h) Other (please specify)

6. **As a local resident you may have your own ideas on reducing flood risk, please share your ideas below.** If you do not wish to share your ideas, please move to the next question.

7. **As a local resident who may have witnessed flooding/drainage problems please mark and rank the below suggestions.** Use the scale of 1 to 5. 1 being the Least Important and 5 being the Most Important.
   a) Rain-water tanks.
   b) Floodwater storage structures, such as retarding and detention basins. These temporarily hold water and reduce peak flows during a flood event
   c) Improvements to dedicated floodwater flow paths. For example, waterways, channels, drainage flow paths.
   d) Undertaking additional street/leaf litter cleaning.
   e) Increasing the size or number of storm water drainage pits and pipes.
   f) Undertaking additional stormwater pit cleaning.
   g) Undertaking additional stormwater drainage line cleaning.

   First Name Required
   Last Name Required

   Council will be undertaking site inspections, should you wish to demonstrate any of the above in person please provide your details.

   Your address
   Email address
   Phone number

Engagement – *Have Your Say* Survey Results

Q1: Address of flooding incident

North Bondi	32	39.02%	Bondi Junction	5	6.1%
Bondi Beach	11	13.41%	Rose Bay	5	6.1%
Vaucluse	8	9.76%	Bronte	3	3.66%
Queens Park	6	7.32%	Dover Heights	3	3.66%
Bondi	6	7.32%	Bellevue Hill	1	1.22%

Note: At least one submission misunderstood the instructions and pinned their own address instead of the one they then went on to detail as having flooded. As entering personal addresses at the end of the survey was optional, we cannot know if there are more of these entries.

Snapshot of comments from question one

"At the top of Chaleyer St near the intersection of Hardy St, there are two stormwater drains that always have water flowing out of them, even when it has not been raining for weeks. Google street view shows this has been happening for years."

"No major flood incident, however, the council tree on the footpath is growing roots through the stormwater drains causing pooling of water following rain. There are also electrical wires protruding from the ground on the footpath side of the tree which is concerning."

"There has never been any flooding at our home even though your flood study days we are at medium risk. Due to your classification we have to raise our foundations by 35cm when building to mitigate a risk that is not there."

"On the evening of 1 June 2024, the corner of XX and XX became inundated with water which the stormwater drains couldn't contain. As a result, my car was flooded and was written off by insurance at a significant financial and time cost to my family."

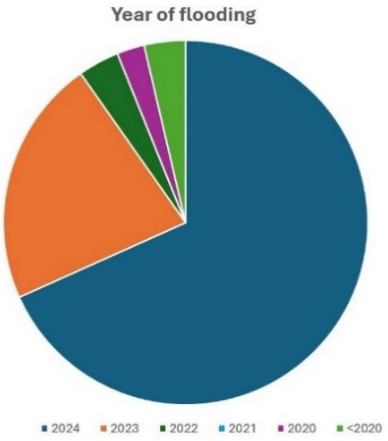
"On 17 March 2019, a 55kg dog was washed down the Bronte gulley culvert and into the ocean (400metres) and rescued by Bronte Patrol 9 volunteer lifesavers. It has always worried me that could have been a child."

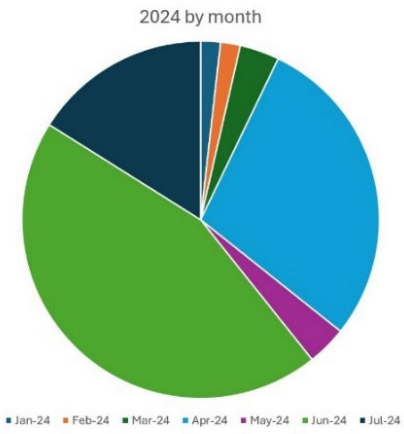
"Both sides of Penkyvil Street on the corner of Bondi Road always flood in heavy rain. During the heavy rain last week, it was impossible to cross Bondi Road or Penkyvil Road without being over ankle deep in water as the flooding was more than a metre deep from kerb."

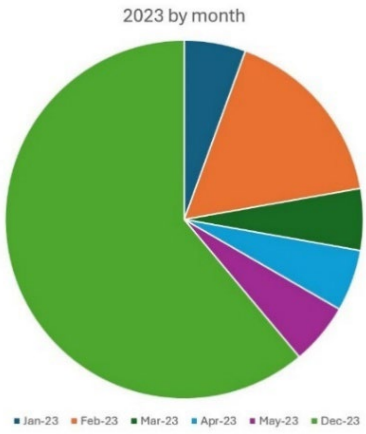
"Corner of XX and XX: No flooding experienced. Residents believe that the flood model is incorrect in this location. A site visit indicated it may be beneficial to reinforce the kerb-line and the fence-line at this location as overland flow not expected to travel through these properties."

Q2: What was the day and time of the flooding incident?

Note: The consultation was done in June / July 2024, during which there was heavy rain. This may be why the first and second graphs are heavily weighted towards entries of flooding at this time

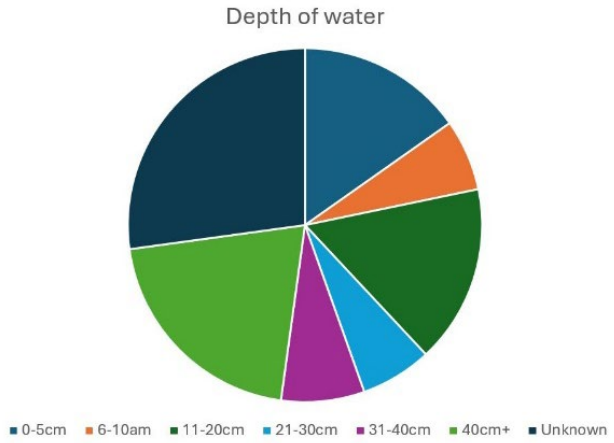




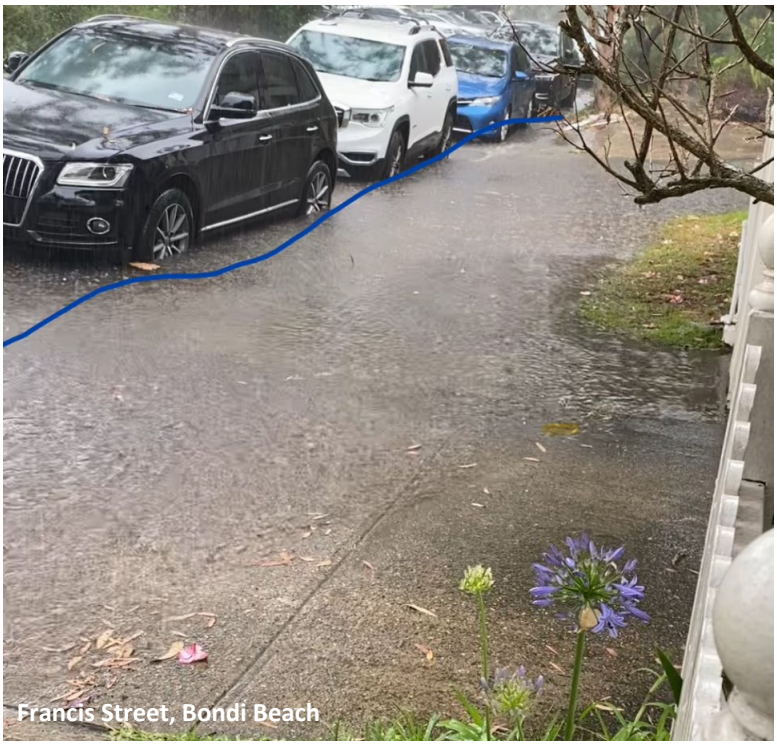


Q3: What do you estimate was the depth of the flooding?

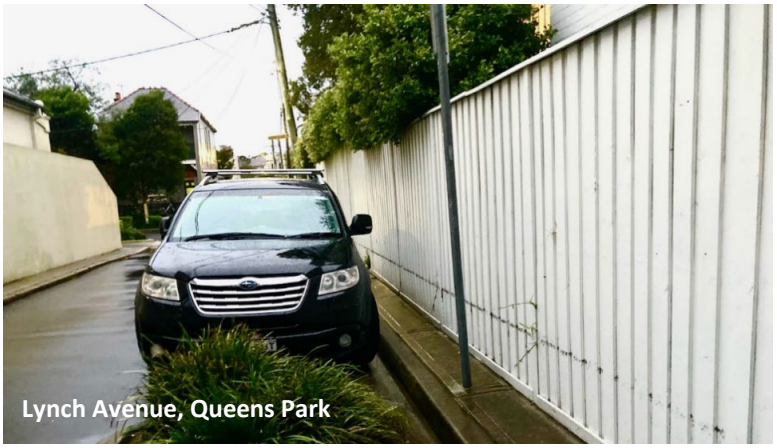
Note: Not all submissions included depth of flooding.



Q4: Please attach photos and/or videos of the incident. *(Snapshot only of images submitted.)*





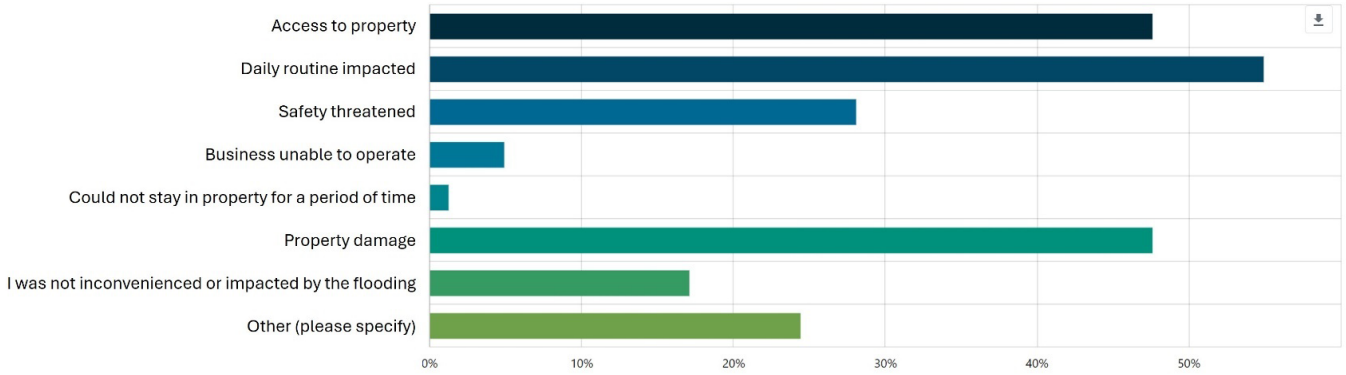








Q5: Please indicate how you were inconvenienced or impacted by flooding at this location?



Actual numbers – highest to lowest

Daily routine was impacted: 45
Access to their property impacted: 39
Property damage: 39
Safety threatened: 23
Not inconvenienced by the flooding: 17
Business unable to operate: 4
Could not stay in property: 1
Other: 20

Other comments

“Cover toilet each time it floods {so that} mud and leaves do not go into the toilet. I also have to move my car and bins regularly when it floods.”

“Prolonged pooling of water affects pedestrian safety, drenches and can destroy shoes, leaches and destabilises cement and buildings.”

“Fear, stress, anxiety.”

“Fear. Panic. I was out at the time and my son was home, terrified as the water was rising. Speaking to him on the phone as I was trying to rush home. I had a panic attack.”

“Concern for children.”

“Several inaccessible points along walkway, with days before the overflow into coastal bush regeneration areas and evaporation gradually occurred.”

Q6: As a local resident you may have your own ideas on reducing flood risk, please share your ideas below.

Sixty three of the 82 respondents answered this question.

“1/ Regular tree checks should be carried out to inspect and cut down any high trees which have overgrown and could be removed and replaced with another appropriate species- no flowering and small species in height. High winds and heavy rain causes leaves to form large mounds, branches and tree fluff to fly metres into Street pits and property roofs/ gutters - causing water to not run freely (flooding). 2/ Regular inspections of pits in Streets etc - especially pre and after heavy rain. 3/ Sending out flyers to residents with regular updates on street flood maintenance which has been carried out by council. 4/ Using machinery to remove leaf build up near footpaths as they do regularly.”

"I reported flooding into my garage in April of 2022. The council responded fairly quickly and then a few weeks later a drain was installed in the sidewalk by the council. Unfortunately, the drain has not carried out its function, as the fall from the sidewalk to the street is not enough and the drain fills immediately when it rains heavily, and water still enters our garage."

"Stormwater system is not sized appropriately or maintained regularly enough to respond to extreme rainfall events which are expected to increase in frequency with climate change."

"Community water tanks should be installed wherever possible to collect run off and conserve water for community gardens, and street trees and verge plantings. Too many trees on private property are being removed and not replaced (whatever owners promise Council under a DA) and this dramatically worsens flooding problems everywhere."

"We have flooded 3 times this year - usually only once a year. Clear stormwater drains - we have had other heavier rains with no flooding. Add a pumping station at the lowest point on the street to remove water faster."

Q7: As a local resident who may have witnessed flooding/drainage problems please mark and rank the below suggestions. Use the scale of 1 to 5. 1 being the Least Important and 5 being the Most Important.

	Least Important				Most Important		
	1	**2**	**3**	**4**	**5**	**Count**	**Score**
Rain water tanks.	45.21% 33	15.07% 11	21.92% 16	4.11% 3	13.70% 10	73	2.26
Floodwater storage structures, such as retarding and detention basins. These temporarily hold water and reduce peak flows during a flood event	20.55% 15	16.44% 12	20.55% 15	12.33% 9	30.14% 22	73	3.15
Improvements to dedicated floodwater flow paths. For example waterways, channels, drainage flow paths.	10.67% 8	4.00% 3	9.33% 7	12.00% 9	64.00% 48	75	4.15
Undertaking additional street/leaf litter cleaning.	13.33% 10	9.33% 7	17.33% 13	16.00% 12	44.00% 33	75	3.68
Increasing the size or number of storm water drainage pits and pipes.	13.16% 10	3.95% 3	5.26% 4	14.47% 11	63.16% 48	76	4.11
Undertaking additional stormwater pit cleaning.	14.47% 11	3.95% 3	10.53% 8	18.42% 14	52.63% 40	76	3.91
Undertaking additional stormwater drainage line cleaning.	8.33% 6	5.56% 4	8.33% 6	23.61% 17	54.17% 39	72	4.10

Flooding mitigation suggestions

In order of preference, as below:

1. Improvements to dedicated floodwater flow paths. For example, waterways, channels, drainage flow paths
2. Increasing the size or number of storm water drainage pits and pipes
3. Undertaking additional stormwater drainage line cleaning
4. Undertaking additional stormwater pit cleaning
5. Undertaking additional street/leaf litter cleaning
6. Floodwater storage structures, such as retarding and detention basins. These temporarily hold water and reduce peak flows during a flood event
7. Rain-water tanks.

Engagement - Face-to-Face



July 5 – Hugh Bamford Reserve, North Bondi



July 4 – Kimberley Community Hall, Vaucluse

The purpose of the face-to-face pop-ups was to provide a way for the community to complete the *Have Your Say* survey in hard copy; for those that did not have a digital means to do so.

It was also an opportunity for staff to be physically present across the LGA and speak with the community about their concerns and questions. There were two after-hours sessions and two morning sessions.

At these sessions eight paper-based feedback was recorded.

Engagement - Contributions by Email

Submissions were accepted by email to the address floodriskmanagement@waverley.nsw.gov.au

The themes fell into four categories:

1. General submissions as an alternative to using the *Have Your Say* social map tool
2. Objecting to Councils flood modelling and identifying their home or street as a 'hot spot' in the identified flood planning that took place in 2021. (Outside the scope of the project.)
3. Concern about Council's lack of action on flooding in the region and impacts to home, business or local area
4. Questions about the using the *Have Your Say* tool, or the project overall.

There were **51** recorded email submissions, and this includes people who send multiple emails, or emails on behalf of a street or group of interested community members. Some individuals sent emails with attachments that were too large to include via the survey itself.

Each person received a reply, specific to their submission, in acknowledgement of their email.

Conclusions and Recommendations

The Flood Risk Management Study and Plan Project Team centred the *Have Your Say* community consultation around the 'Social Map' tool.

This was an engaging way that residents could contribute to the consultation process, and it also provided the project team with a quick visual reference of the location submissions.

Primary feedback themes

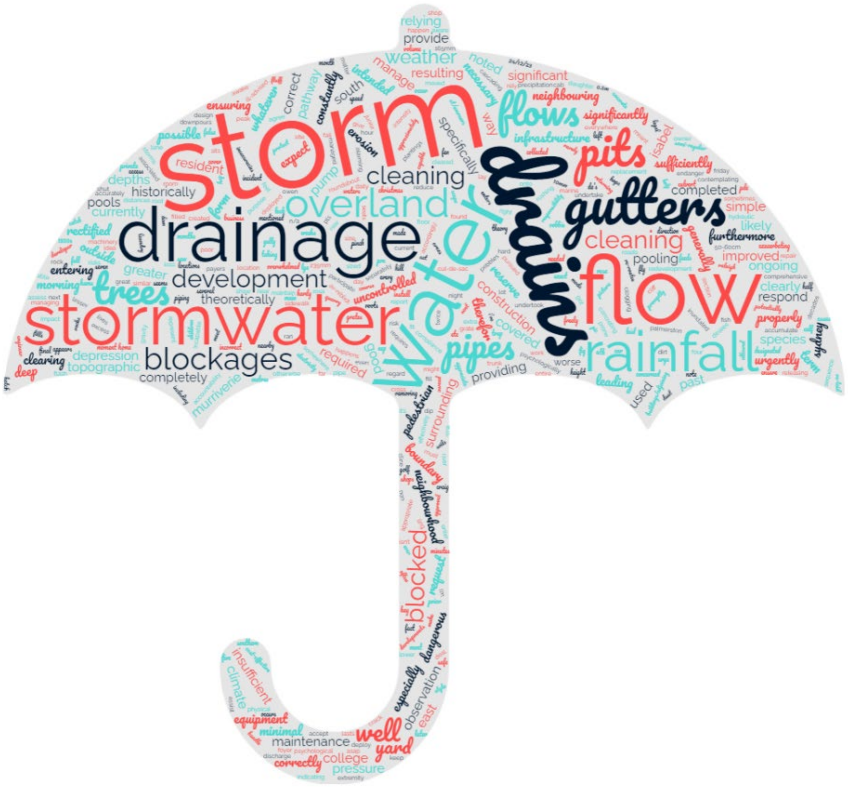
- Neutral observations from the community detailing when and where they experienced or were aware of a flooding incident/s.
- Objection to Council's existing flood modelling and an individual's home or street being identified as a 'hot spot' in the identified flood planning that took place in 2021. (Outside the scope of the project.)
- Residents' belief that flood-modelling has caused their insurance premiums to increase. Some also believe it has affected the overall dollar value of their home.
- Concern about Council's lack of action on flooding in the region and impacts to home, business or local area.

Community feedback

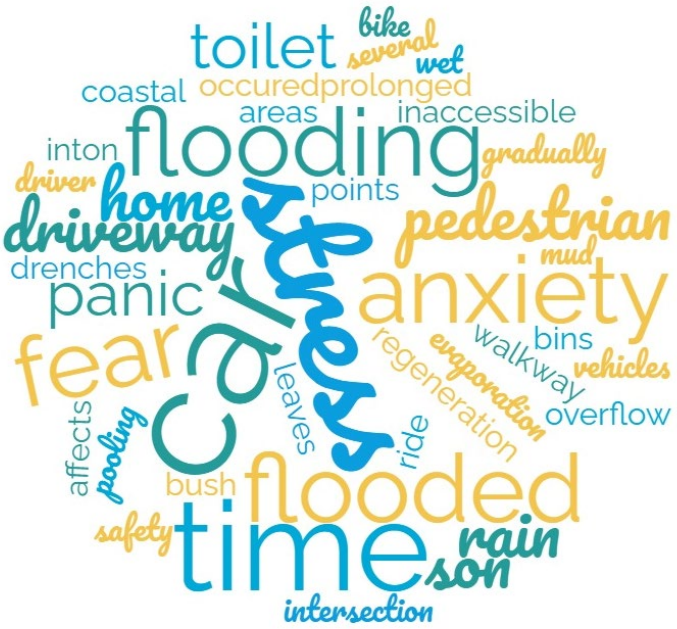
It is evident that this topic has the potential to be an emotionally charged community issue. However, people who submitted feedback strived to be clear in detailing their experiences of flooding, despite some of these occasions being in the recent past and having an impact on either a resident's property, emotional or physical wellbeing.

Submissions received ranged from 'fair to very good' in quality. Overall, they provide solid information for Council staff to reference in developing actions for the project's next stage. Some contributions were very detailed as were photos and videos provided as supporting documentation.

One of the consultation goals was to solicit ideas from residents for flood mitigation measures. Two questions were dedicated to this, and through set suggestions and open text comment fields, some common themes emerged. The word cloud below highlights some of the frequent sentiments received from respondents to the open-ended question six. The larger the size word, the more frequently it was used.



Question five asked respondents to detail how they were impacted by the flooding event they submitted, and further to those options included in the survey, another 20 written responses were attached. A few people used this option to detail the emotional and psychological impact as opposed to a physical or practical inconvenience. As with question six, more detail on this feedback can be found in the raw data file.



Consultation approach

As detailed on page three of this report, Council used the main channels of the *Have Your Say* website, face to face and email for community feedback on this project. This was supported by various communications to disseminate information about the open consultation and to drive 'traffic' to those feedback options. The primary communications channel used was a letterbox drop across the Waverley LGA to 36,000 mailboxes.

It is noted that word of mouth via residents also likely played a role in awareness of the survey, as did individual staff conversations with community members, precinct committees and councillors.

The last two pages of this report address the strengths and weaknesses of each communication and engagement approach. These can be considered for the next stage of the community consultation as needed.

Ongoing changes in how people access information (For example, traditional communication versus non-traditional communication) should be noted for future project work. It is apparent that reaching busy members of the community, as well as property owners who do not live in the dwellings themselves, is becoming more and more challenging. Though once people can be reached, the robustness of contributions are still very valuable.

In summary

The community and engagement team are satisfied with the results from the consultation. Using a diversity of community and engagement approaches ensured we reached a wide demographic of community members across the area. The feedback data will be given to other members of the project team to analyse and further develop Council's recommendations and prioritisation of its flood risk mitigation measures.

Resident Letter

Re: Flood Risk Management Study Community Consultation

Dear resident

Waverley Council invite you to '*Have Your Say*' during the community consultation for the Flood Risk Management Study and Plan project.

Background
In 2021 the Waverley Local Government Area (LGA) Flood Study, was adopted. Building on this, Waverley Council started the next step in the NSW Government's Flood Risk Management Framework in early 2024 - a Flood Risk Management Study and Plan (FRMS&P) for the Waverley LGA.

This project aims to refine the model across the LGA and explore and recommend flood mitigation options to reduce or alleviate detrimental impacts of flooding where possible.

This project has two parts:

- **The Flood Risk Management Study** - To incorporate community knowledge of flooding and undertake ground testing onsite to further refine the Waverley LGA flood study. This will improve its accuracy and the confidence that the community has in the flood planning maps. And, to develop and assess flood risk mitigation measures to reduce or alleviate existing and future flood risks in our community.
- **The Flood Risk Management Plan –** This part of the project focuses on recommending and prioritising flood risk mitigation measures, including documenting the decisions made to manage flood risks into the future. A list of recommended measures and their priority are detailed in the plan, including how they would be implemented and who is responsible.

The study and plan are being prepared by independent flood consultant Kellogg, Brown & Root Pty Ltd (KBR) and urban planning consultant GLN Planning Pty Ltd. Technical support and funding is provided from NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the NSW Floodplain Management Program.

Community Consultation
We are seeking feedback from community members on their experiences of flooding in our LGA and invite you to take part in this important community consultation. Your contribution will help us to better understand, plan and respond to flooding in our Council area.

Community Consultation for the **Flood Risk Management Study** will be open for five weeks starting **Tuesday, 11 June and closing 5pm Monday, 15 July.**

How you can *Have Your Say* (HYS)

1. **Feedback via our website.** Has your home, street, or wider neighbourhood experienced flooding? Tell us about it and submit photos and videos (if you have them). You can also find more current and historical information on flooding via the *Have Your Say* website.
2. **In-person *Have Your Say*.** Council will hold 'drop-in sessions' during the five-week consultation period. These will be informal *Have Your Say* pop-ups where you can provide feedback to staff about flooding in the Waverley LGA.

For details about the community pop-ups and to submit your feedback, please scan the QR code or visit https://haveyoursay.waverley.nsw.gov.au/waverley-council-flood-risk-management-study-and-plan

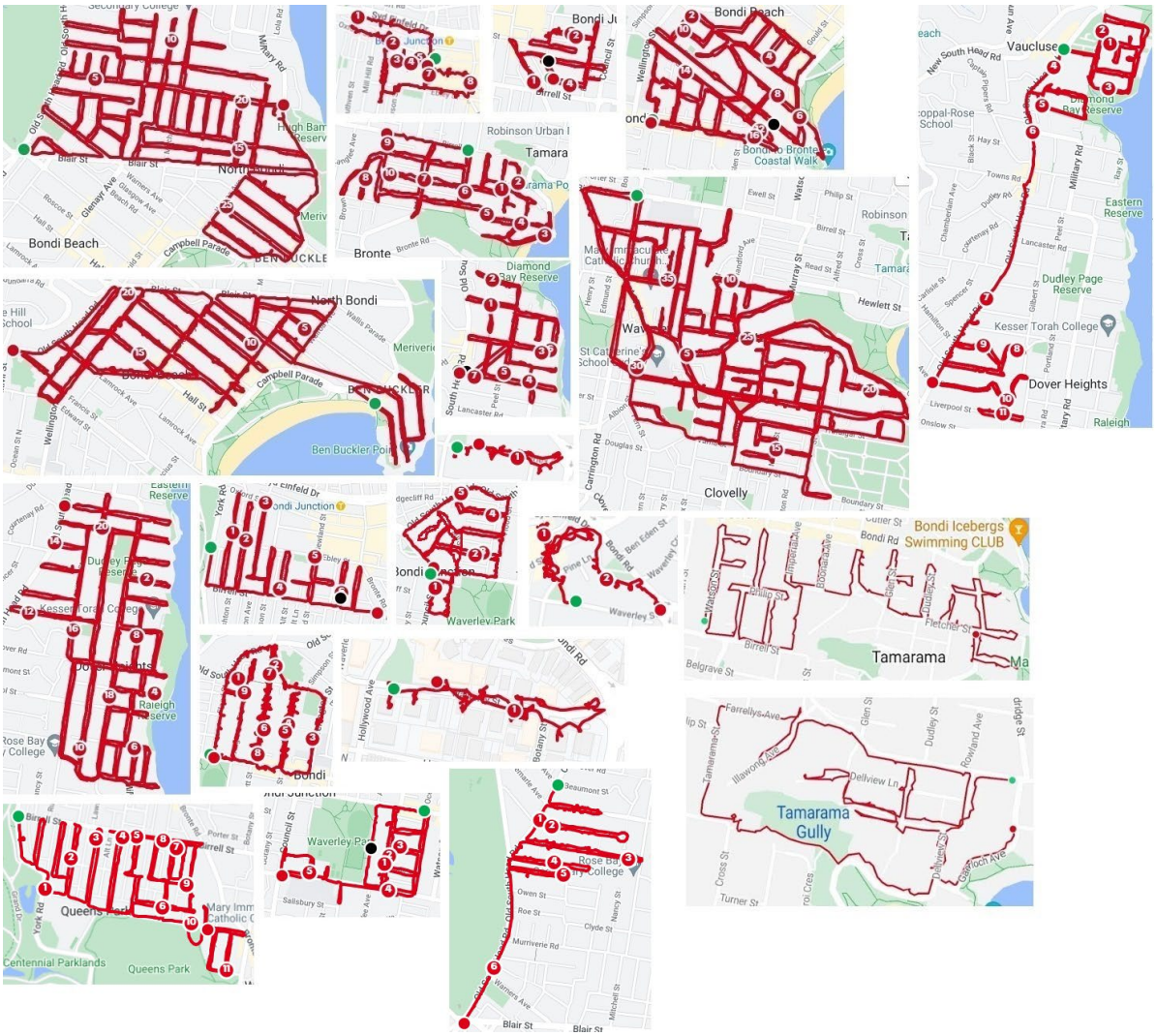
Alternatively, please contact me with any questions about the project at floodriskmanagement@waverley.nsw.gov.au or call 9083 8245.

Yours sincerely
Amanda Tipping
Senior Project Manager, Waverley Council

QR code

A QR Code was included in the resident letter only. There were **140** scans of the code, which generally peaked over weekends, periodically over the five weeks of the consultation. The highest day of visits was Sunday, 14 July: The day before the survey closed.

GPS tracking of letterbox drop



Council used a non-addressed letterbox drop service to distribute 36000 residential notices across the LGA.

These were delivered to ground level homes and businesses, unit blocks with accessible mailboxes and any multi-level residential buildings that had accessible inside mailboxes. (IE: In the foyer of a secure building for example.)

The image above shows the GPS tracking on the streets that were covered.

Communications

Wentworth Courier



Waverley Council Update

Mayor's Message

Waverley Youth Art Prize

Waverley Council was proud to announce the winners of the 2024 Waverley Youth Art Prize on 6 June, which this year saw young artists respond to the theme 'Mysteries of the Deep'. The Prize provides a platform to celebrate and recognise the talents of emerging artists aged 9 to 18 who live, study or spend time in Waverley. We received an impressive 265 entries which have enabled us to create a moving and colourful exhibition now showing at Waverley Library until 25 July. All entries are exhibited, allowing visitors to appreciate the artistic skills and perspectives of these talented young individuals. Be sure to visit the exhibition and vote for your favourite in the People's Choice prize.

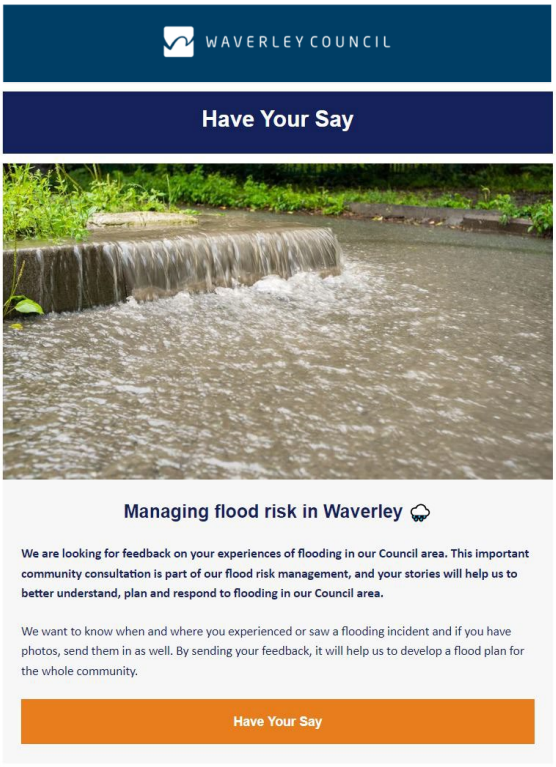
Oxford Street Mall late night trading

A reminder that our community Australian Standards. We'll retain the location's pocket park character and provide space and comfort for all types of parks users. Our survey closes Sunday 23 June at haveyoursay.waverley.nsw.gov.au/scotts-reserve-playground-upgrade.

Help us understand flooding in our area

Waverley Council is inviting the community to provide feedback about their experiences of flooding in our local government area to help inform our new Flood Risk Management Study and Flood Risk Management Plan (FRMS&P). The FRMS&P will help us refine flood modelling across our local government area and explore flood mitigation options for property owners and publicly managed community assets. Our consultation includes a short survey and respondents will also be able to submit information, and photos if you have them, of flooding you have experienced, whether it be in your home, street or other location in our Council area. The FRMS&P is the next step in the NSW Government's Flood Risk Management Framework and builds on the separate 2021 the Waverley Local Government Area (LGA) Flood Study. Consultation closes on Monday 15 July at haveyoursay.waverley.nsw.gov.au.

Waverley Weekly



WAVERLEY COUNCIL

Have Your Say

Managing flood risk in Waverley

We are looking for feedback on your experiences of flooding in our Council area. This important community consultation is part of our flood risk management, and your stories will help us to better understand, plan and respond to flooding in our Council area.

We want to know when and where you experienced or saw a flooding incident and if you have photos, send them in as well. By sending your feedback, it will help us to develop a flood plan for the whole community.

Have Your Say

Communications

Social media: Facebook



Waverley Council
22 June at 18:44

Have Your Say on managing flood risk in Waverley

As part of our flood risk management, we are looking for feedback on your experiences of flooding in our Council area. Help us understand flooding in our Council area by submitting your stories (bonus points for photos!) so that we can better plan and respond when the clouds open

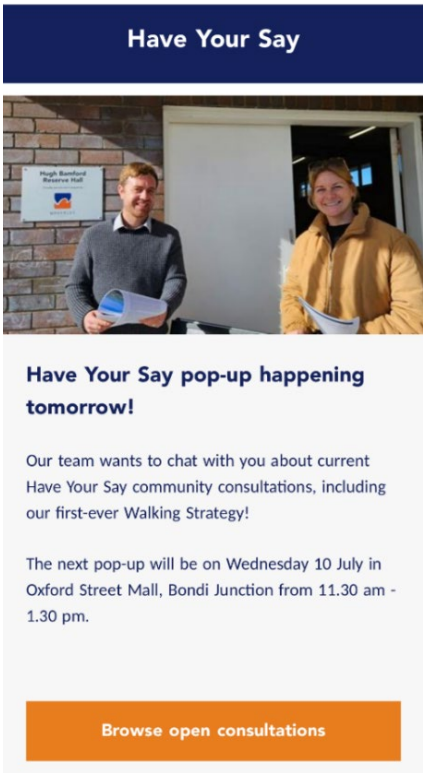
Head to the link below to #HaveYourSay

https://haveyoursay.waverley.nsw.gov.au/waverley-council-flood-risk-management-study-and-plan

3 1 share

Like Comment Share

Write a comment...



Have Your Say

Have Your Say pop-up happening tomorrow!

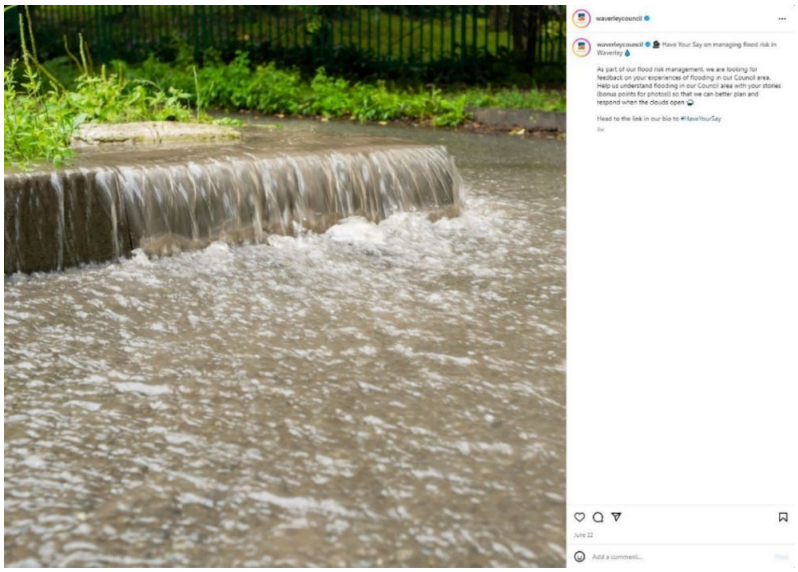
Our team wants to chat with you about current Have Your Say community consultations, including our first-ever Walking Strategy!

The next pop-up will be on Wednesday 10 July in Oxford Street Mall, Bondi Junction from 11.30 am - 1.30 pm.

Browse open consultations

Communications

Social media: Instagram





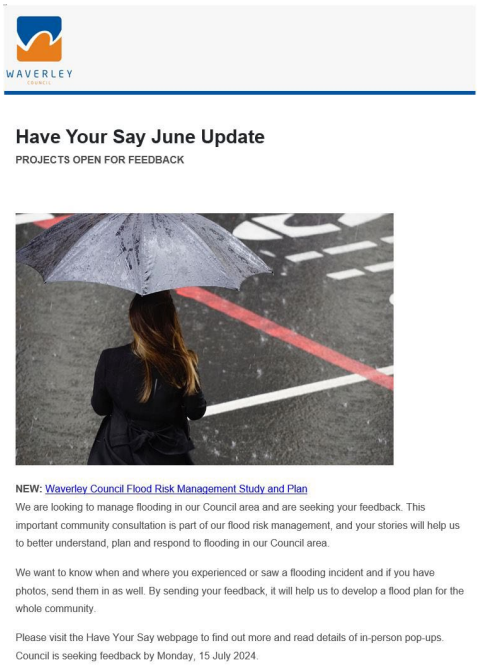
Social media: Data

CHANNEL	CLICKS	IMPRESSIONS	ENGAGEMENTS	REACH	LIKES
INSTAGRAM GRID	O	737	12	701	11
INSTAGRAM STORY	1	183	0	180	0
INSTAGRAM STORY #2	1	144	2	144	2
FACEBOOK GRID	3	863	12	825	4
WAVERLEY WEEKLY	32	NA	NA	NA	NA

Social media terminology

- **Impressions:** The total number of times your content is **displayed**, regardless of click.
- **Reach:** The unique number of individuals who've **seen** your content.
- **Engagement:** Tracks actions such as **likes, shares, clicks,** and **comments**.

Communications - *Have Your Say*



WAVERLEY

Have Your Say June Update

PROJECTS OPEN FOR FEEDBACK

NEW: Waverley Council Flood Risk Management Study and Plan

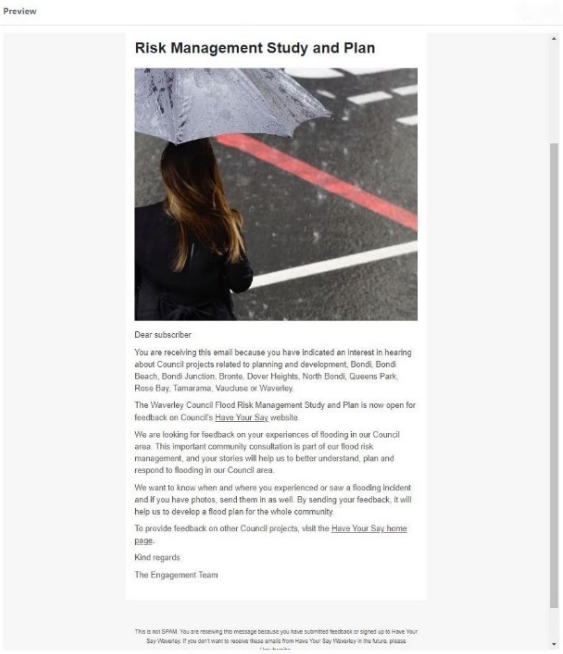
We are looking to manage flooding in our Council area and are seeking your feedback. This important community consultation is part of our flood risk management, and your stories will help us to better understand, plan and respond to flooding in our Council area.

We want to know when and where you experienced or saw a flooding incident and if you have photos, send them in as well. By sending your feedback, it will help us to develop a flood plan for the whole community.

Please visit the Have Your Say webpage to find out more and read details of in-person pop-ups. Council is seeking feedback by Monday, 15 July 2024.

Have Your Say – Monthly newsletter

Recipients:	9363
Opens:	4504
Clicks:	251



Preview

Risk Management Study and Plan

Dear subscriber

You are receiving this email because you have indicated an interest in hearing about Council projects related to planning and development, Bondi, Bondi Beach, Bondi Junction, Bronte, Dover Heights, North Bondi, Queens Park, Rose Bay, Tamarama, Vaucluse or Waverley.

The Waverley Council Flood Risk Management Study and Plan is now open for feedback on Council's Have Your Say website.

We are looking for feedback on your experiences of flooding in our Council area. This important community consultation is part of our flood risk management, and your stories will help us to better understand, plan and respond to flooding in our Council area.

We want to know when and where you experienced or saw a flooding incident and if you have photos, send them in as well. By sending your feedback, it will help us to develop a flood plan for the whole community.

To provide feedback on other Council projects, visit the Have Your Say home page.

Kind regards

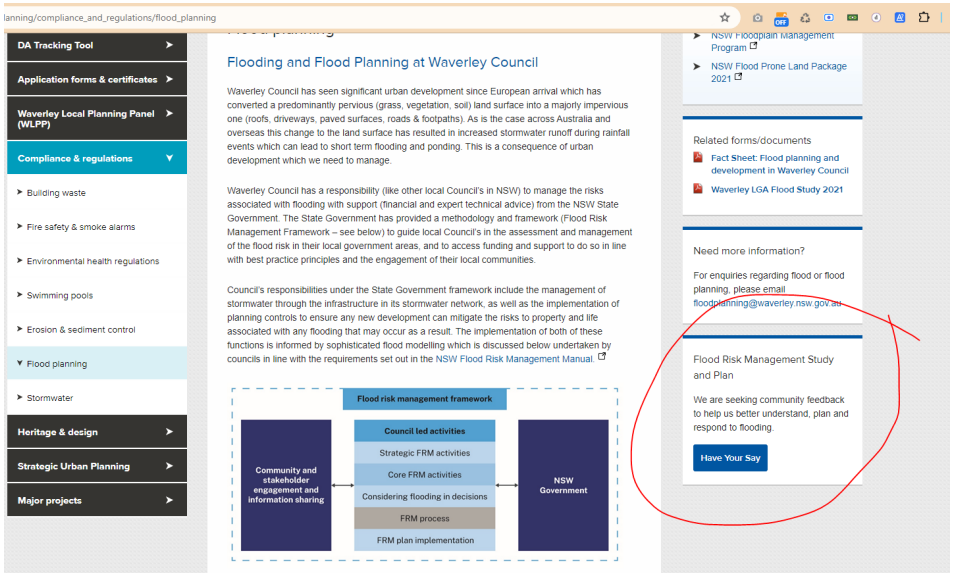
The Engagement Team

Have Your Say – Subscriber automated email

Recipients:	667
Opens:	387
Clicks:	32

Communications - Website

During the consultation period (June 11 to July 15) there were **298 unique views** on the flood planning page and **33 visits** to the FRMS+P *Have Your Say* page from Council's website.



lanning/compliance_and_regulations/flood_planning

DA Tracking Tool
Application forms & certificates
Waverley Local Planning Panel (WLPP)
Compliance & regulations
Building waste
Fire safety & smoke alarms
Environmental health regulations
Swimming pools
Erosion & sediment control
Flood planning
Stormwater
Heritage & design
Strategic Urban Planning
Major projects

Flooding and Flood Planning at Waverley Council

Waverley Council has seen significant urban development since European arrival which has converted a predominantly pervious (grass, vegetation, soil) land surface into a majorly impervious one (roofs, driveways, paved surfaces, roads & footpaths). As is the case across Australia and overseas this change to the land surface has resulted in increased stormwater runoff during rainfall events which can lead to short term flooding and ponding. This is a consequence of urban development which we need to manage.

Waverley Council has a responsibility (like other local Council's in NSW) to manage the risks associated with flooding with support (financial and expert technical advice) from the NSW State Government. The State Government has provided a methodology and framework (Flood Risk Management Framework – see below) to guide local Council's in the assessment and management of the flood risk in their local government areas, and to access funding and support to do so in line with best practice principles and the engagement of their local communities.

Council's responsibilities under the State Government framework include the management of stormwater through the infrastructure in its stormwater network, as well as the implementation of planning controls to ensure any new development can mitigate the risks to property and life associated with any flooding that may occur as a result. The implementation of both of these functions is informed by sophisticated flood modelling which is discussed below undertaken by councils in line with the requirements set out in the NSW Flood Risk Management Manual.

NSW Floodplain Management Program
NSW Flood Prone Land Package 2021

Related forms/documents
Fact Sheet: Flood planning and development in Waverley Council
Waverley LGA Flood Study 2021

Need more information?
For enquiries regarding flood or flood planning, please email floodplanning@waverley.nsw.gov.au

Flood Risk Management Study and Plan
We are seeking community feedback to help us better understand, plan and respond to flooding.
Have Your Say

Communication and Engagement Reflections

ENGAGEMENT METHODS

	Pros	**Cons**
	Ability to update and change quickly.	Some sections of the community will be excluded because of unfamiliarity with digital platforms.
	Results and submissions are presented in a variety of formats such as graphs and statistical percentages for quick analysis.	HYS has some weak points and while most of it is easy to understand some elements are not intuitive both for the site admins and the community members.
Online -survey	Real-time monitoring of consultation progress and can respond if needed.	
	Easily accessible by most people	
	Staff can access and review content.	
	Technical support is available from Social Pinpoint.	
	Project can stay online for reference for as long as needed and can accommodate ongoing project updates for the community's information.	
	Can be used 24/7.	
	Pros	**Cons**
	Universal method of communication and most people have email or access to it.	Small number of community members will be excluded who do not have email.
Email	Can be used 24/7.	Limited number and size of files can be sent via email.
	Responses can be delivered quickly.	Can be viewed by community as impersonal/distant.
		Do not always have everyone's email address or uptodate email address.
	Pros	**Cons**
	Council staff are visible and accessible.	Logistics with availability of venues and of staff can be difficult to coordinate.
Face to Face	Allows for two-way interactions and genuine communication.	Tensions and conversations can get heated when the consultation topic is controversial.
	Allows community members who do not have access to other ways of being involved to contribute.	Ability to speak one-to-one with large numbers of people is limited and can be time consuming.

COMMUNICATION METHODS

Non-addressed resident letters	**Pros**	**Cons**
	Cost effective.	Delivered to ground level homes and businesses only.
	Easy to arrange through current suppliers.	Targets occupiers only – including renters - as opposed to property owners.
		Potential to be viewed as advertising material and not read by residents.
		Increasingly people do not regularly look in their mailboxes and may miss the letter's timeliness.
Addressed resident letters	**Pros**	**Cons**
	Targeted letters are generally more effective.	Fewer people check their post boxes.
	Can be personalised and reach more people.	Residents may not be property owners and renters would not open letters addressed to the actual owner.
	More likely that residents will open addressed mail than non-addressed mail.	
Wentworth Courier Mayor's Message	**Pros**	**Cons**
	Regular weekly column that is well-read so likely to get in.	Relies on people reading the Courier so need to be done in collaboration with other channels.
Waverley Weekly	**Pros**	**Cons**
	Large distribution base.	Limited to subscribers only.
	Produced weekly so good chance to be profiled.	Restricted number of HYS stories per edition.
	Can submit content with late notice if needed.	
	Data shows that this platform has good open rates for HYS content.	
Social Media	**Pros**	**Cons**
	Potential to reach large audience immediately.	Audience may not be engaged with content.
	Content can be submitted and changed at short notice.	May only appear fleetingly as users move past content quickly.
	Available 24/7	May reach and elicit feedback from non-intended target audiences.
		Reliant on social media algorithms to reach target groups.
***Have Your Say* Monthly e-news and automated email**	**Pros**	**Cons**
	Targets people who have subscribed so they have a known interest in community consultations.	Limited to subscribers only.
	Can submit content with late notice if needed.	For the monthly news, projects need to fall within the timeframe of the newsletter production and distribution.
	Data shows that this platform can have good open rates for HYS content.	Emails need to be current, and subscribers update their own contact details.

Appendix added 18/11/2024

A further breakdown of the feedback was done in November to include the following numbers:

1. Have Your Say - Emails

Related to the specific project scope: 25 (47%) ,

Unrelated or outside the scope of the project, but related to flooding: 27 (50%)

Ad hoc: 2 (3%).

Total 54

2. Have Your Say - Survey

Related to the specific project scope: 98% (80)

Unrelated or outside the scope of the project, but related to flooding: 2% (2)

Total 82

3. Have Your Say – Face to Face

Related to the specific project scope: 50%

Unrelated or outside the scope of the project, but related to flooding: (5) 50%

Total 10

4. Overall

Related to the specific project scope: 75%

Unrelated or outside the scope of the project, but related to flooding: 23%

Ad hoc: 2%

FLOOD RISK STUDY MITIGATION AND PLAN



Community Consultation Report

September 2025

WAVERLEY COUNCIL

Waverley Council acknowledges the Bidjigal, Birrabirragal and Gadigal people, who traditionally occupied the Sydney Coast, and we pay respect to all Aboriginal and Torres Strait Islander Elders both past and present.

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This report was prepared by Leigh Pitkethly, Engagement Officer. Council project team members were Amanda Tipping (Senior Project Manager), Robbie Frawley (Infrastructure Programs Coordinator), Patrick Hay (Senior Strategic Planner). Consultants KBR were Joshua Eggleton and Isaac Kim.

Executive Summary

From 15 July – 10 August 2025, Waverley Council held targeted community consultation for stage two of the Flood Risk Management Study and Plan (FRMSP). Broad communications through Council channels promoted the flood consultation and engagement primarily focused on residents and property owners in priority or 'hot spot' areas.

The purpose of this engagement was to present flood mitigation options to the community - developed following the 2024 FRMSP Community Consultation - and seek feedback on these options.

Residents and property owners received a formally addressed notification letter (sent via Australia Post) inviting them to attend one of two webinars where the background of the project, and the mitigation options, were presented by Council and the consultant.

Following the webinars interested people had the opportunity to attend a one-to-one session with Council staff to provide specific feedback or ask questions about what was presented.

The community consultation received a good level of interest and participation. It is recommended that Council staff review and consider the community feedback and suggestions, incorporating any viable ideas into the final report due for public exhibition in November 2025. The Have Your Say website developed in 2024 continues to be a good platform for ongoing updates and information for the community.

- *Please note that FRMSP will be used throughout the report for brevity. Where used, it denotes the full project name Flood Risk Management Study and Plan.*

Project Background

Building on the completion of the Waverley Local Government Area (LGA) Flood Study, which was adopted in 2021, Waverley Council commenced the next step in the NSW Governments Flood Risk Management Framework in early 2024 - a Flood Risk Management Study and Plan (FRMS&P) for the Waverley LGA.

The objective of this project is to refine the model across the LGA and explore and recommend flood mitigation options to reduce or alleviate detrimental impacts of flooding where possible.

This project has two parts:

1. The Flood Risk Management

To incorporate community knowledge of flooding and undertake ground testing onsite to further refine the Waverley LGA flood study, improving its accuracy and the confidence that the community has in the flood planning maps. To develop and assess flood risk mitigation measures to reduce or alleviate existing and future flood risks in our community.

2. The Flood Risk Management Plan

This part of the project focusses on recommending and prioritising flood risk mitigation measures, including documenting the decisions made to manage flood risks into the future. A list of recommended measures and their priority are detailed in the plan including how they would be implemented and who is responsible.

This project is separate to previous recently completed projects including the Waverley LGA Flood Study 2021 and the amendment to the Waverley Development Control Plan 2022.

Community Engagement and Communications

In accordance with Waverley Council's adapted IAP2 model of engagement, various methods were used to gather community feedback:

1. *Have Your Say* (HYS) platform
2. Emails to floodriskmanagement@waverley.nsw.gov.au
3. Two online webinars with PowerPoint presentation
4. Face to face private sessions

A multi-communication channel approach was used to reach and encourage residents to participate.

ENGAGEMENT	AUDIENCE	CLICKS	OVERVIEW
***Have Your Say* Website**	353	NA	The engagement method was primarily aimed at directing people to Have You Say to read updates on the FRMSP and register to attend either the webinar or face to face meeting with Council staff. There were **353** unique views during the consultation period.
Emails From Community	NA	NA	**24** emails from the community were received at floodriskmanagement@waverley.nsw.gov.au
Face-to-Face	10	NA	There were **10** people who attended these one-on-one sessions.
Resident Letters	6252		Australia Post was used to distribute **6252** formally addressed letters to priority areas in Waverley. The letter contained a QR code of which there were **533** scans.
Webinars	57		Two held in July. On 29 July there were **33** participants and on 12:15pm, 30 July there were **24** participants.
Webinar Video	214		A recording of the webinar took place and was placed on HYS for people to review. There were **214** views.
COMMUNICATIONS	**AUDIENCE**	**OPENS**	**OVERVIEW**
Wentworth Courier: Mayor's Message	48477 *(Source: Wikipedia)*		**23 July 2025** edition of the Wentworth Courier, Mayor's Message.
Waverley Weekly E-Newsletter	30K		Two stories appeared in Waverley Weekly, 15 and 22 July editions . 15/7 - **44** unique clicks on the FRMSP story 22/7 - **22** unique clicks on the FRMSP story
Emails			1. Sent to people who contributed to the 2024 FRMSP consultation *and* provided their emails to Council for follow up – **35** 2. Follow - webinar email after webinar – **73** 3. Final email to webinar attendees – **65** (note that email double ups were removed as were staff that organised the consultation.)

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Engagement - Have Your Say Website

The Have Your Say website was used as the primary channel to engage residents and property owners in stage two of the FRMSP.

The purpose was to:

1. Have a public platform that provides the whole Waverley community with project progress and updated information about the FRMSP (and next steps). This has been in place since community consultation in 2024
2. Direct people to register for one of two webinars held in late July 2025. Following these, direct interested residents to register for a face-to-face meeting with Council officers
3. Make available the recording of the webinar
4. Capture subscribers who would like to follow the FRMSP page and receive updates as they are completed.

Have Your Say Data Snapshot

There was no surveying of the community for this targeted consultation. Some general data was gathered from HYS.

- **Visits -** 577
- **Unique visitors -** 353
- **Followers** - 9
- **Returning visitors** - 53.2%
- **First time** - 46.8%

Document downloads

- FRMS+P - consultation report - 87
- Flood-risk-management-manual- 37
- Waverley Council Flood Risk Management Study FAQ -29

Engagement - Letters

Formally addressed letters were sent to by Australia Post to **6,252** properties. This method of delivery was chosen to ensure that residents and well as owner / non-occupiers received notification. (See page 8)

Letters contained a QR code directing people to the Flood Risk Management Study and Plan HYS page. In the period between 15 July and 11 August 2025 there were **533** QR code scans. This represents **8.5%** of the total number of letters and indicates a good engagement result and show interest by the community in the project.

Engagement - Webinar

Two Zoom webinars were held to share updates on the FRMSP The sessions ran for approximately 45 minutes each. The purpose of holding online sessions was so that attendees could attend in the comfort and place of their own choosing. It also allowed staff to deliver detailed information, record the session and make available to the community who could refresh their memory of the content. Comments in the chat function were addressed during the sessions. One session was held after business hours and one during lunchtime to

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maximise the opportunity for attendance. There were **84** registrations, which differed slightly from actual attendees.

1. 7pm, 29 July: **33** participants
2. 12:15pm, 30 July: **24** participants

The webinars primarily focussed on presentations by Council staff and KBR – the consultants engaged by Waverley Council. The sessions focussed on the background to flooding and flood work in Waverley, FRMSP progress, preliminary options assessment, options proposed to progress to detailed design, additional mitigation options and next steps with consultation. Additionally, staff provided an update to attendees on stormwater work undertaken directly by Council in the last year.

Questions related to the presentation were answered throughout, towards the end of the presentation and in a follow up question an answer document that was emailed to attendees.

The webinar was recorded and posted on Have Your Say. It has had **214** views as of 5 September 2025.

Engagement – Face to Face

Two days of appointment times were available for residents to meet with Council staff at the Customer Service Centre, 55 Spring Street, Bondi Junction: 5 and 6 August 2025. Ten people used this occasion to share feedback, personal experiences of flooding and any concerns or issues.

Residents who met with staff, also shared their appreciation for the level of detail contained within the webinar presentation and the opportunity to meet face to face with Council to understand how options can address flooding in the LGA and around their property.

Key themes from the face-to-face meetings focussed on gratitude towards Council for the work that has gone into the project and developing the mitigation options, insurance premiums being impacted, the specific circumstances of each individual and suggestions for mitigation, and keeping gutters cleared. A representative from the Centennial Parkland also spoke with Council staff. They shared their management plan for our information and consideration.

Engagement - Email

Email from the community were delivered to floodriskmanagement@waverley.nsw.gov.au

There were **14** recorded emails which required follow-up. There were **10** emails that did not required follow-up.

Emails received were on a variety of topics. They included thanking Council for clearing drains and gutters, documenting specific property circumstances, or seeking information on specific property issues. As relevant, Council staff responded to these individual enquiries.

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Conclusions and Recommendations

This Flood Risk Management Study and Plan project engagement, was a targeted consultation. Council sought to engage residents, primarily in affected areas, on the recommendations and prioritisation of the developed flood mitigation options.

This was done by:

1. Notifying residents and property owners in hot spot areas of the consultation
2. Offering registration to attend two webinar presentations
3. Offering opportunities for a one-on-one meeting with Council staff
4. Ongoing information and updates made available via Council's Have Your Say engagement platform.

It should be noted that a survey was not conducted as part of this engagement, as a Local Government Area-wide consultation - with survey - had been carried out across June/July 2024.

It is evident that targeted communications, using personally addressed mail to residents and property owners, was a successful engagement approach. The mailed letter to QR code scan ratio of 8.5% is a good response. As an alternative to non-addressed letterbox drops, it is recommended that this notification method be considered for future consultations.

The webinars were well attended, with slightly less numbers participating than had registered. There were 84 registrations and 57 attendees across both online presentations. Questions were asked and answered throughout, and a follow-up question answer and document was circulated to attendees, addressing relevant questions that could not be answered at the time.

Ten residents took up the opportunity to speak with council staff, one to one, for 15 to 30-minute individual sessions. Most of these were conducted in-person in the Bondi Junction Customer Service Centre, though a small number chose to speak with staff via phone. These allowed for quality information sharing and feedback. Each individual resident meeting was documented, and Council staff are pursuing the topics brought up in these sessions.

The consultation was arranged and conducted in a short time frame and there were some good outcomes with positive feedback received and easy to understand information delivered to a wide range of receivers across different channels. The community noticed the efforts of Council to engage and made appreciative comments to staff. Residents also commented positively on the quality of the webinar presentation and the detailed content.

Residents in hot spot areas shared openly with staff their specific concerns and ongoing issues but were also grateful of the steps Council had taken in the 12 months to August 2025 to help arrest the impacts flooding in the LGA.

It is recommended that the Have Your Say website continue as the primary platform for driving engagement campaigns and updates on the FRMSP. It is also recommended that the information shared by the community be reviewed by Council staff and consultants and considered, as appropriate, to be included in the final report to be exhibited in November 2025.

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Resident Letter

Our ref: A24/0331

Re: Waverley Council Flood Risk Management Study and Plan Update

Dear Resident / Property Owner

In July last year we held a council-wide community consultation for the **Flood Risk Management Study and Plan.** During that engagement we sought feedback from residents on their experiences of flooding in our Local Government Area (LGA) and gathered ideas for how we can better manage and limit flooding events.

Our consultants have finished the updates required to the flood model to refine it based on the valuable submissions received, subsequent onsite inspections across the LGA, and updates in line with flood modelling industry best practice, as well as the required incorporation of updated climate change data.

They have investigated, modelled and undertaken preliminary assessment of possible flood mitigation options across the LGA and we would like the community's feedback on the results. We will be holding two public webinars **(Tuesday 29/7/25 at 7:00-7:45pm and Wednesday 30/7/25 at 12:15-1:00pm)** to share their results and recommendations, including the five mitigation options proposed to proceed to detailed design.

Following feedback regarding previous community consultation, we're sending letters via Australia Post to all property owners and residents within the areas of flooding concern, in addition to advertising this round of consultation through our Floodplain Management Committee, councillors, flood information subscriber list, as well as local print and digital media. Following the public webinars, there will be the opportunity for community feedback and comments on the recommendations.

To book your spot at one of the webinars scan the QR code on this letter. You can also visit https://haveyoursay.waverley.nsw.gov.au/waverley-council-flood-risk-management-study-and-plan to find out more information.

Alternatively, please contact me with any questions about the project at floodriskmanagement@waverley.nsw.gov.au or call 9083 8245.

Yours sincerely

Amanda Tipping
Senior Project Manager
Waverley Council



Appendix B: Design Event Flood Mapping



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
63.2% AEP Peak Flood Depth

Figure: A-01

Rev: 0

Scale at A4 1:11999.99998776002
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While effort has been made to ensure the accuracy and completeness of the information presented, no guarantee is given, nor responsibility taken by KBR for any errors or omission.

File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
63.2% AEP Peak Flood Depth

Figure: A-02

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
50% AEP Peak Flood Depth

Figure: A-03

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
50% AEP Peak Flood Depth

Figure: A-04

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
20% AEP Peak Flood Depth

Figure: A-05

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale: 0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
20% AEP Peak Flood Depth

Figure: A-06

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale: 0 100 200 300 400 500 m

1:12,000

KBR



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
10% AEP Peak Flood Depth

Figure: A-07

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
10% AEP Peak Flood Depth

Figure: A-08

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Peak Flood Depth

Figure: A-09

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Peak Flood Depth

Figure: A-10

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
2% AEP Peak Flood Depth

Figure: A-11

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
2% AEP Peak Flood Depth

Figure: A-12

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Peak Flood Depth

Figure: A-13

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Peak Flood Depth

Figure: A-14

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.5% AEP Peak Flood Depth

Figure: A-15

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.5% AEP Peak Flood Depth

Figure: A-16

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.2% AEP Peak Flood Depth

Figure: A-17

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.2% AEP Peak Flood Depth

Figure: A-18

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Peak Flood Depth

Figure: A-19

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR



LEGEND

- Study Area
- Peak Flood Depth (m)
  - 0.01
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 3.00

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Peak Flood Depth

Figure: A-20

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
63.2% AEP Peak Flood Velocity

Figure: B-01

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
63.2% AEP Peak Flood Velocity

Figure: B-02

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
50% AEP Peak Flood Velocity

Figure: B-03

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
50% AEP Peak Flood Velocity

Figure: B-04

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
20% AEP Peak Flood Velocity

Figure: B-05

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
20% AEP Peak Flood Velocity

Figure: B-06

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
10% AEP Peak Flood Velocity

Figure: B-07

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
10% AEP Peak Flood Velocity

Figure: B-08

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale: 0 100 200 300 400 500 m

1:12,000

KBR

LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Peak Flood Velocity

Figure: B-09

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Peak Flood Velocity

Figure: B-10

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale: 0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
2% AEP Peak Flood Velocity

Figure: B-11

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
2% AEP Peak Flood Velocity

Figure: B-12

Rev: 0

Scale at A4 1:11999.99998776002
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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Peak Flood Velocity

Figure: B-13

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Peak Flood Velocity

Figure: B-14

Rev: 0

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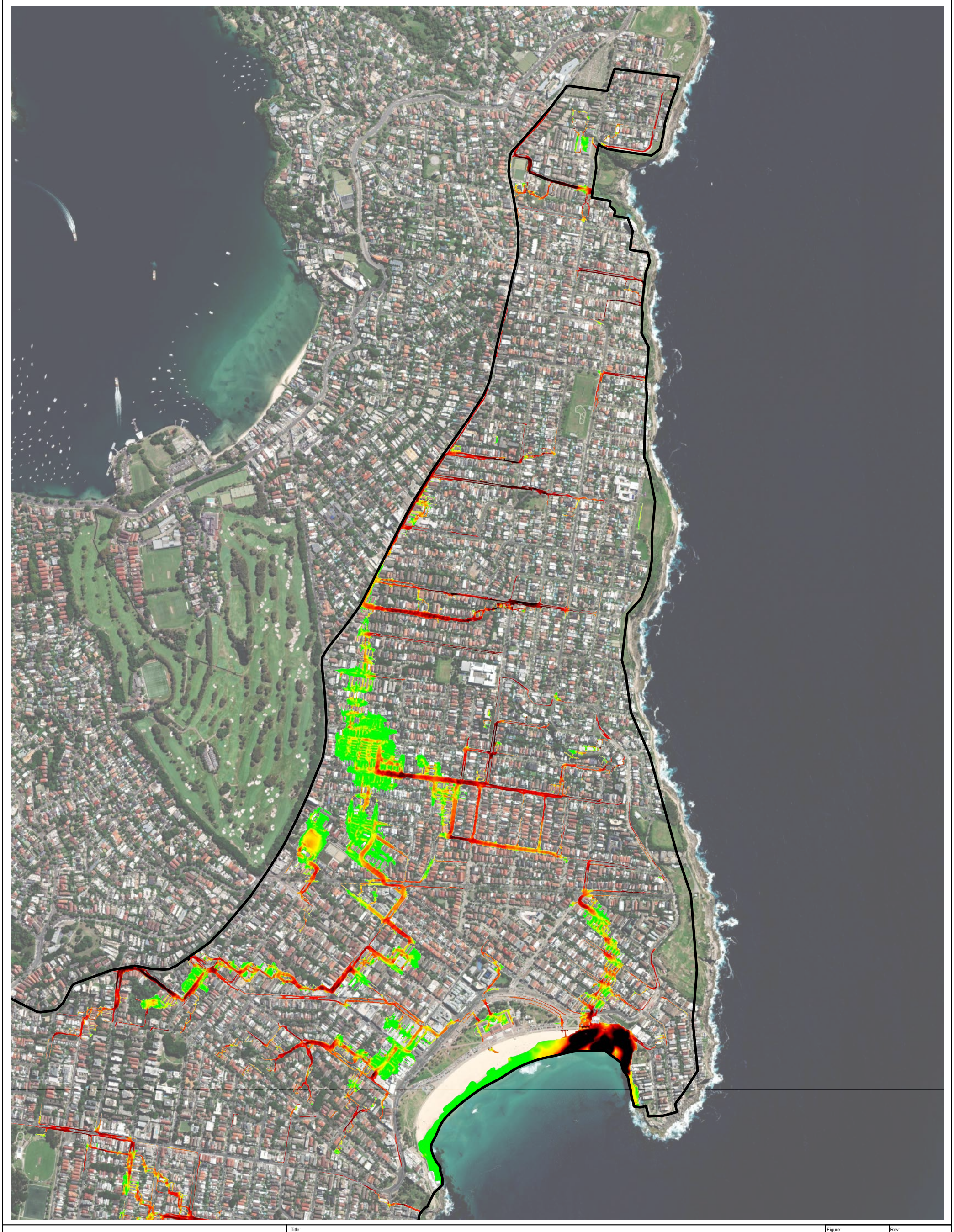
File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.5% AEP Peak Flood Velocity

Figure: B-15

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.5% AEP Peak Flood Velocity

Figure: B-16

Rev: 0

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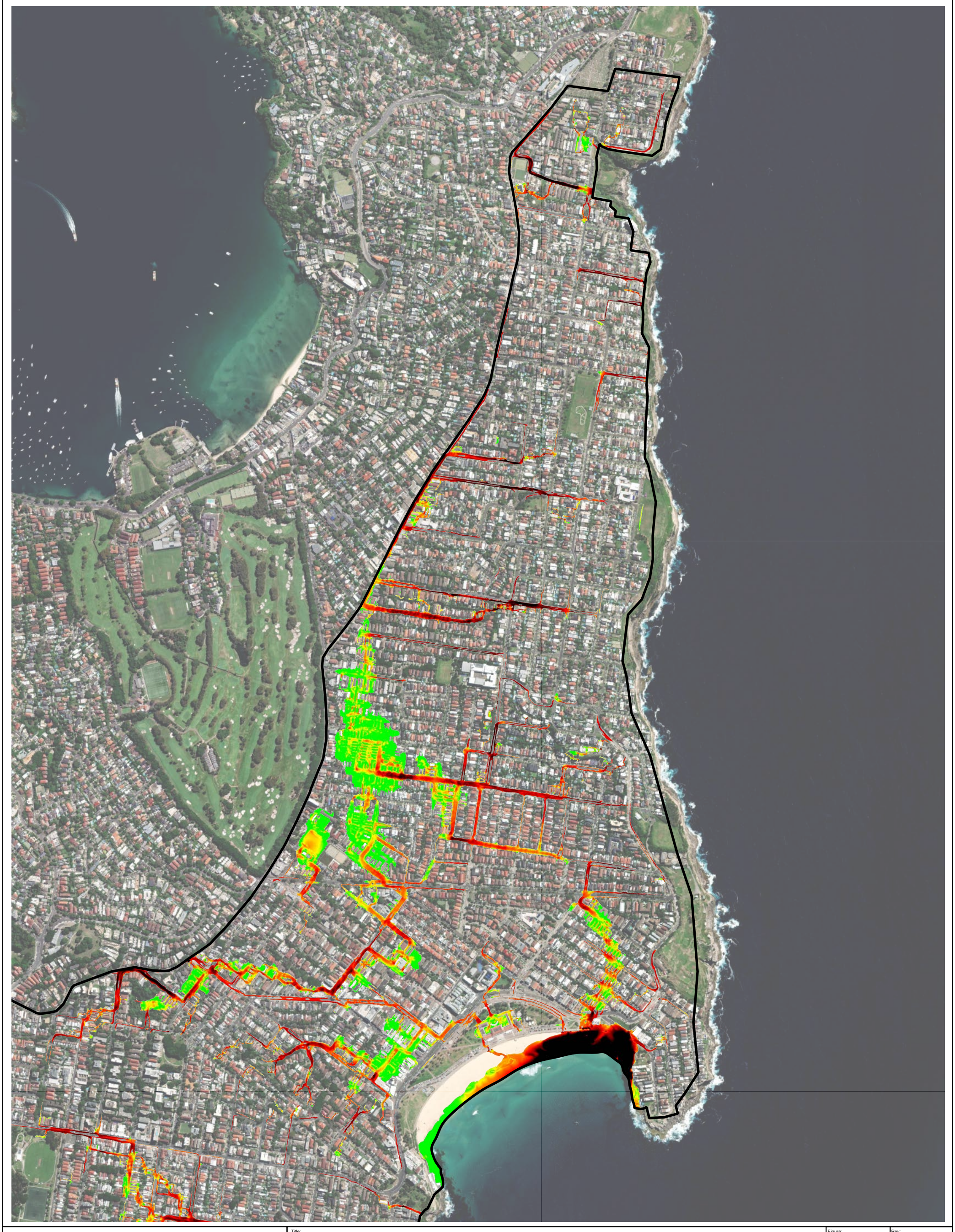
File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.2% AEP Peak Flood Velocity

Figure: B-17

Rev: 0

Scale at A4 1:11999.99998776002

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
0.2% AEP Peak Flood Velocity

Figure: B-18

Rev: 0

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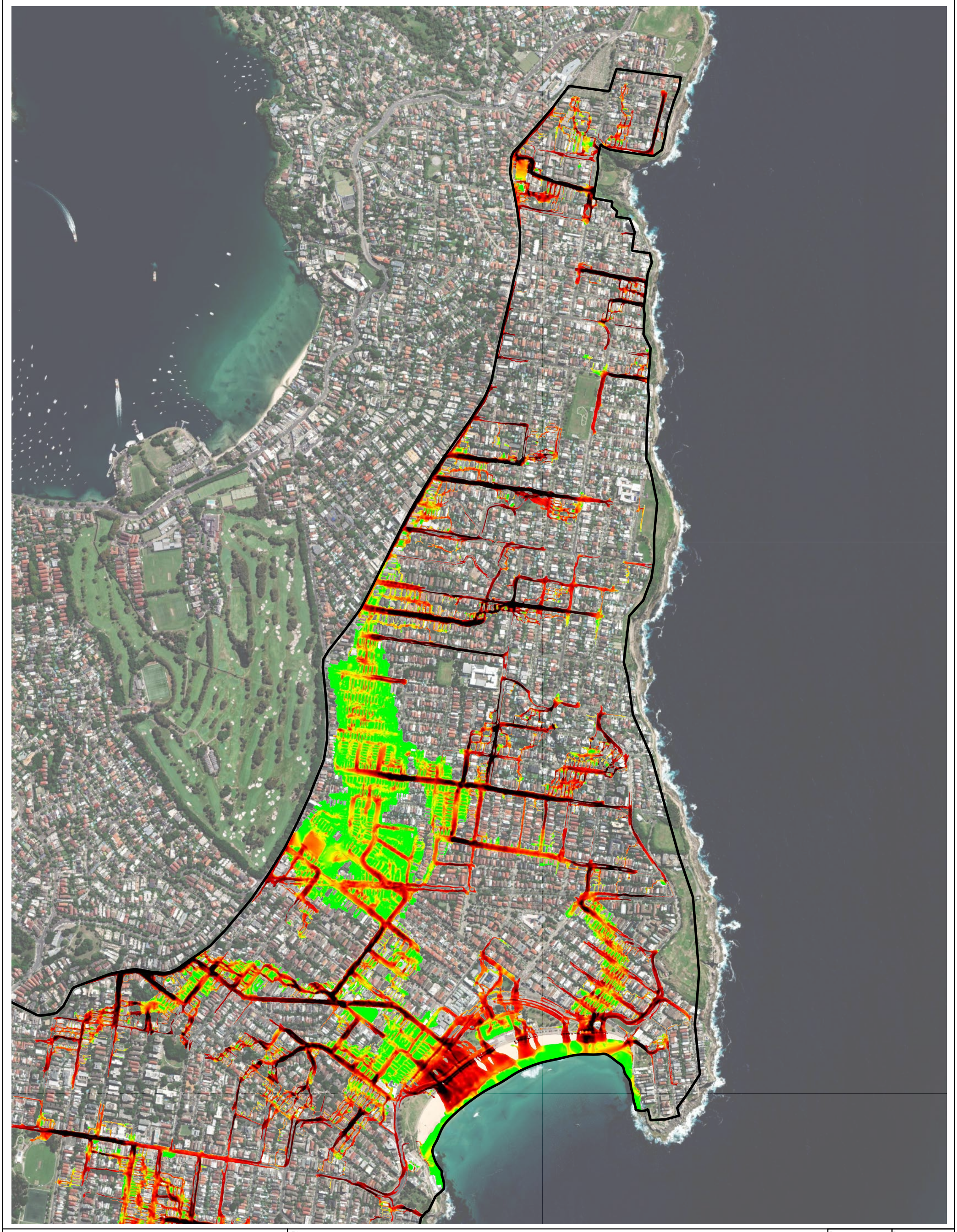
File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Peak Flood Velocity

Figure: B-19

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

KBR

LEGEND

- Study Area
- Peak Flood Velocity (m/s)
  - 0.25
  - 0.50
  - 1.00
  - 2.00
  - 4.00

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Peak Flood Velocity

Figure: B-20

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
63.2% AEP Peak Flood Hazard

Figure: C-01

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
63.2% AEP Peak Flood Hazard

Figure: C-02

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
50% AEP Peak Flood Hazard

Figure: C-03

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
50% AEP Peak Flood Hazard

Figure: C-04

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
20% AEP Peak Flood Hazard

Figure: C-05

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
20% AEP Peak Flood Hazard

Figure: C-06

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
10% AEP Peak Flood Hazard

Figure: C-07

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
10% AEP Peak Flood Hazard

Figure: C-08

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Peak Flood Hazard

Figure: C-09

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Peak Flood Hazard

Figure: C-10

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
2% AEP Peak Flood Hazard

Figure: C-11

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
2% AEP Peak Flood Hazard

Figure: C-12

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Peak Flood Hazard

Figure: C-13

Rev: 0

Scale at A4 1:11999.99998776002

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Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Peak Flood Hazard

Figure: C-14

Rev: 0

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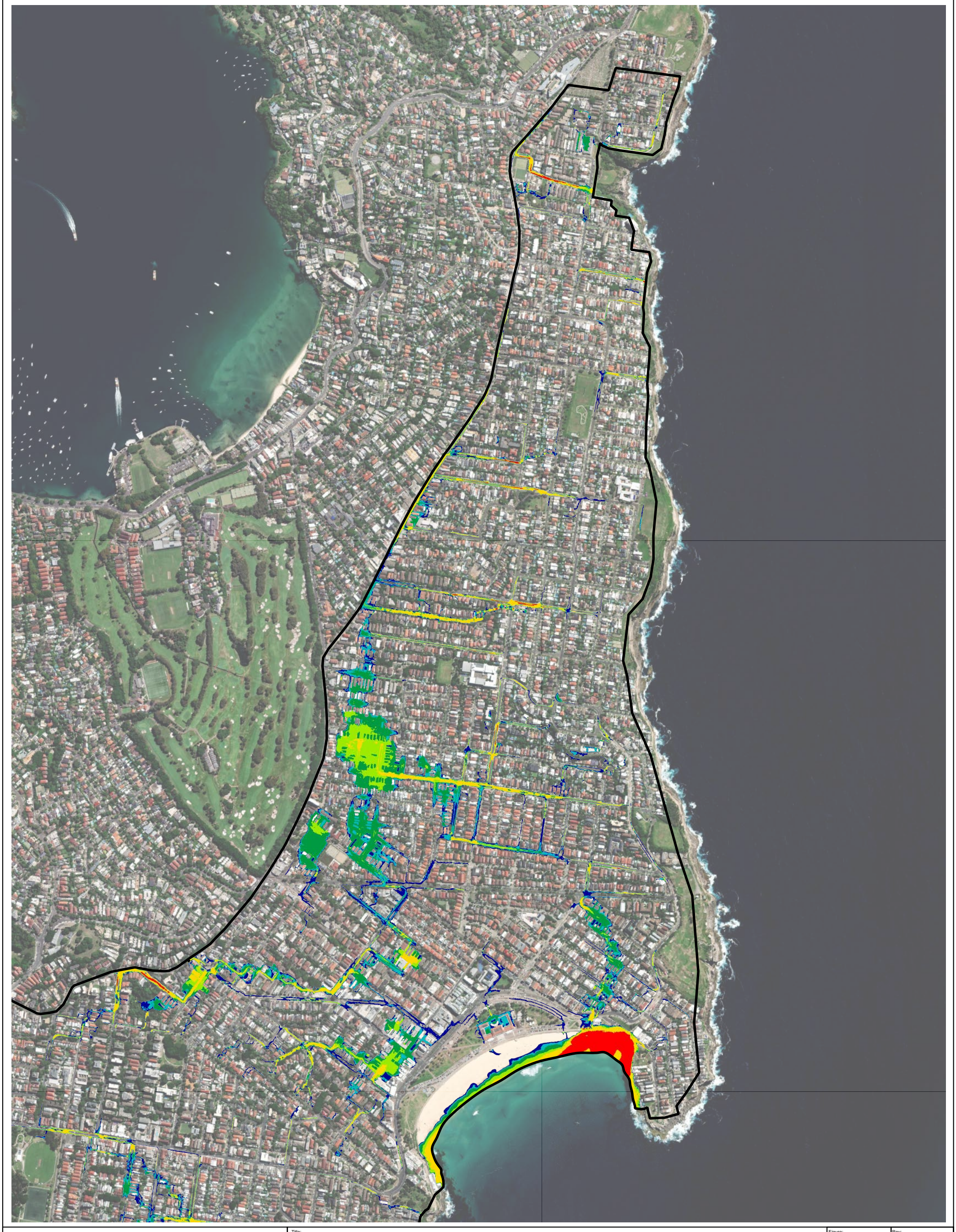
File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
0.5% AEP Peak Flood Hazard

Figure: C-15

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
0.5% AEP Peak Flood Hazard

Figure: C-16

Rev: 0

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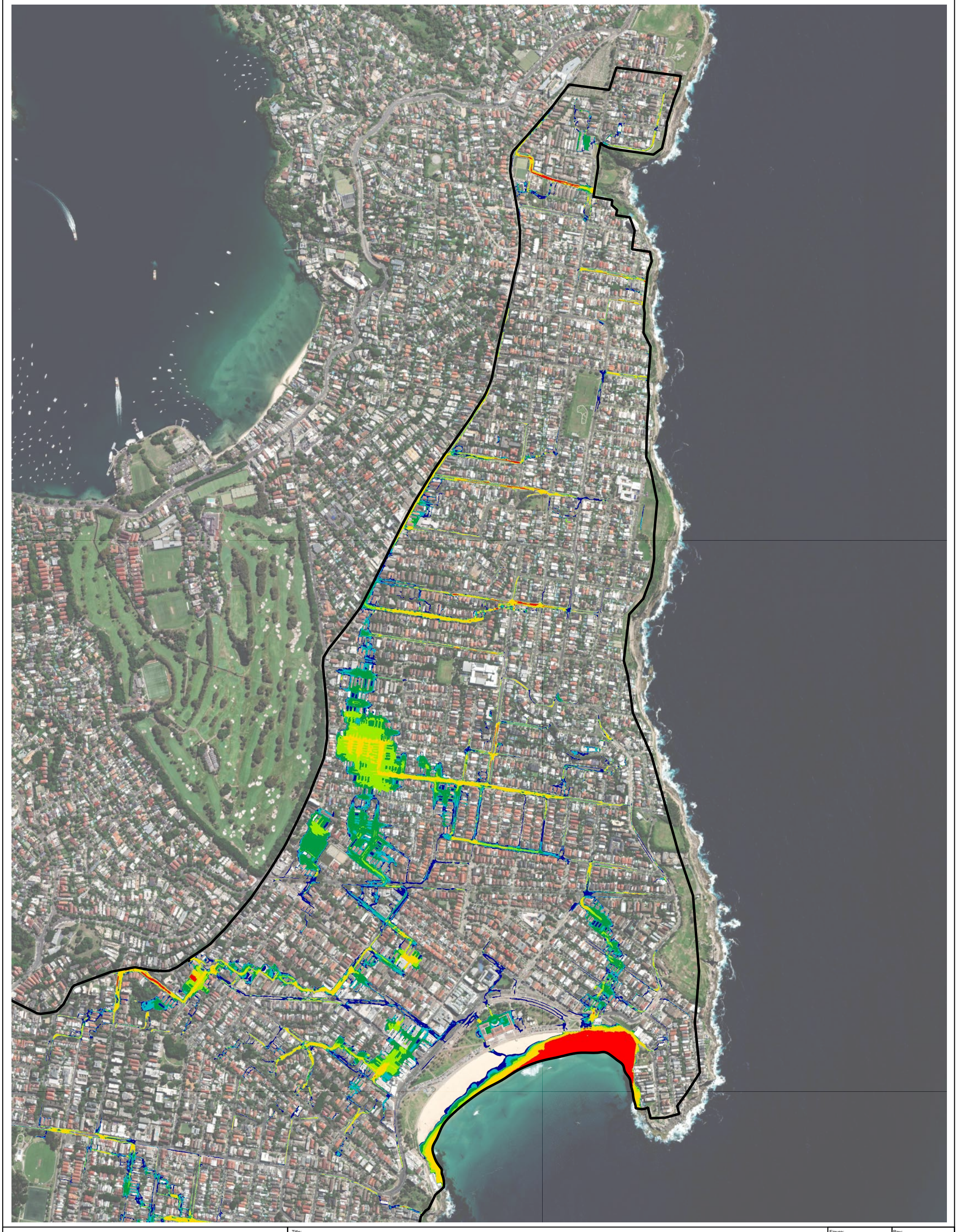
File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
0.2% AEP Peak Flood Hazard

Figure: C-17

Rev: 0

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Scale:

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LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
0.2% AEP Peak Flood Hazard

Figure: C-18

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

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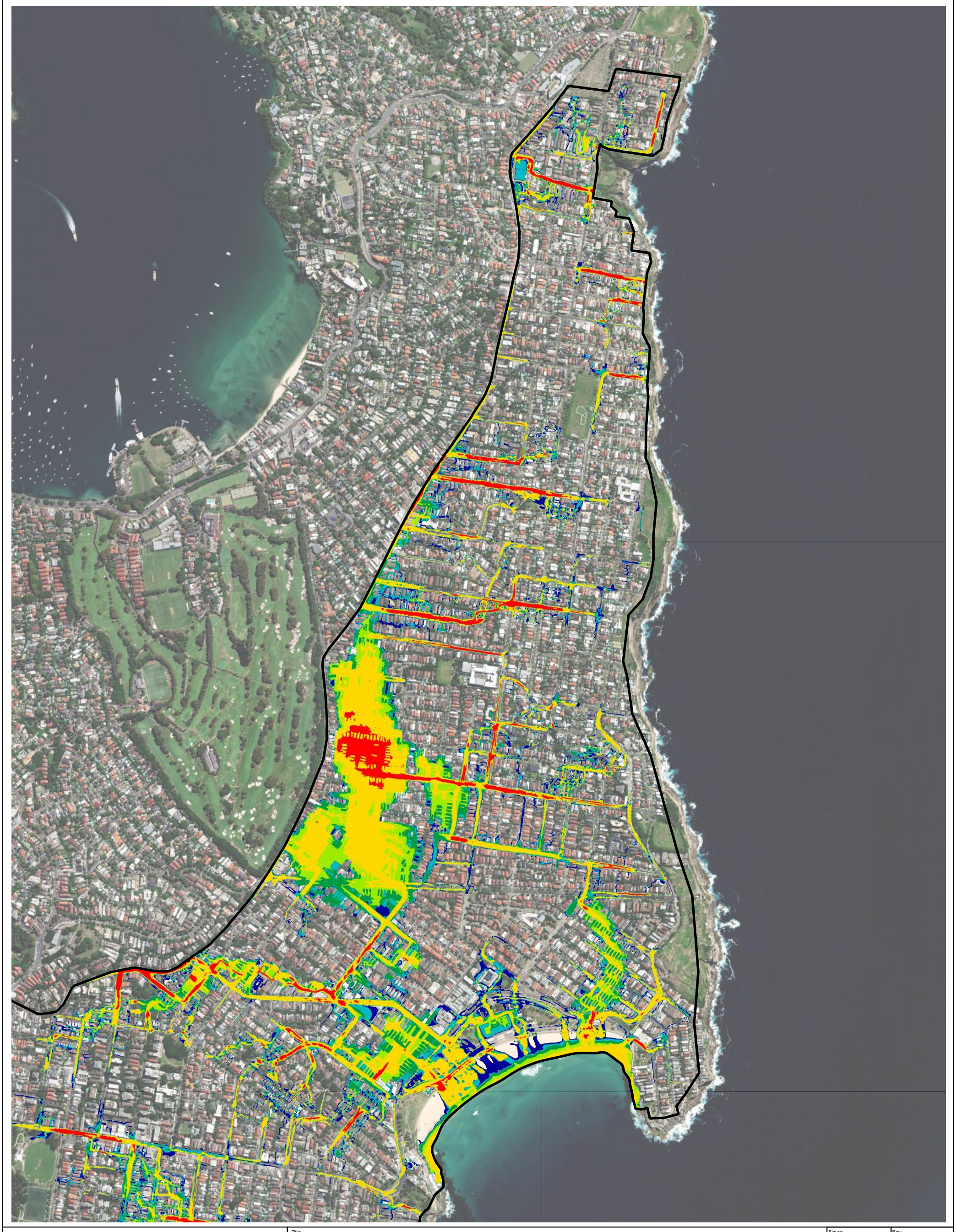

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Peak Flood Hazard

Figure: C-19

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Peak Flood Hazard
  - H1
  - H2
  - H3
  - H4
  - H5
  - H6

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Peak Flood Hazard

Figure: C-20

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Flood Function
  - Floodway
  - Flood Storage
  - Flood Fringe

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Flood Function

Figure: D-01

Rev: 0

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Scale:

0 100 200 300 400 500 m

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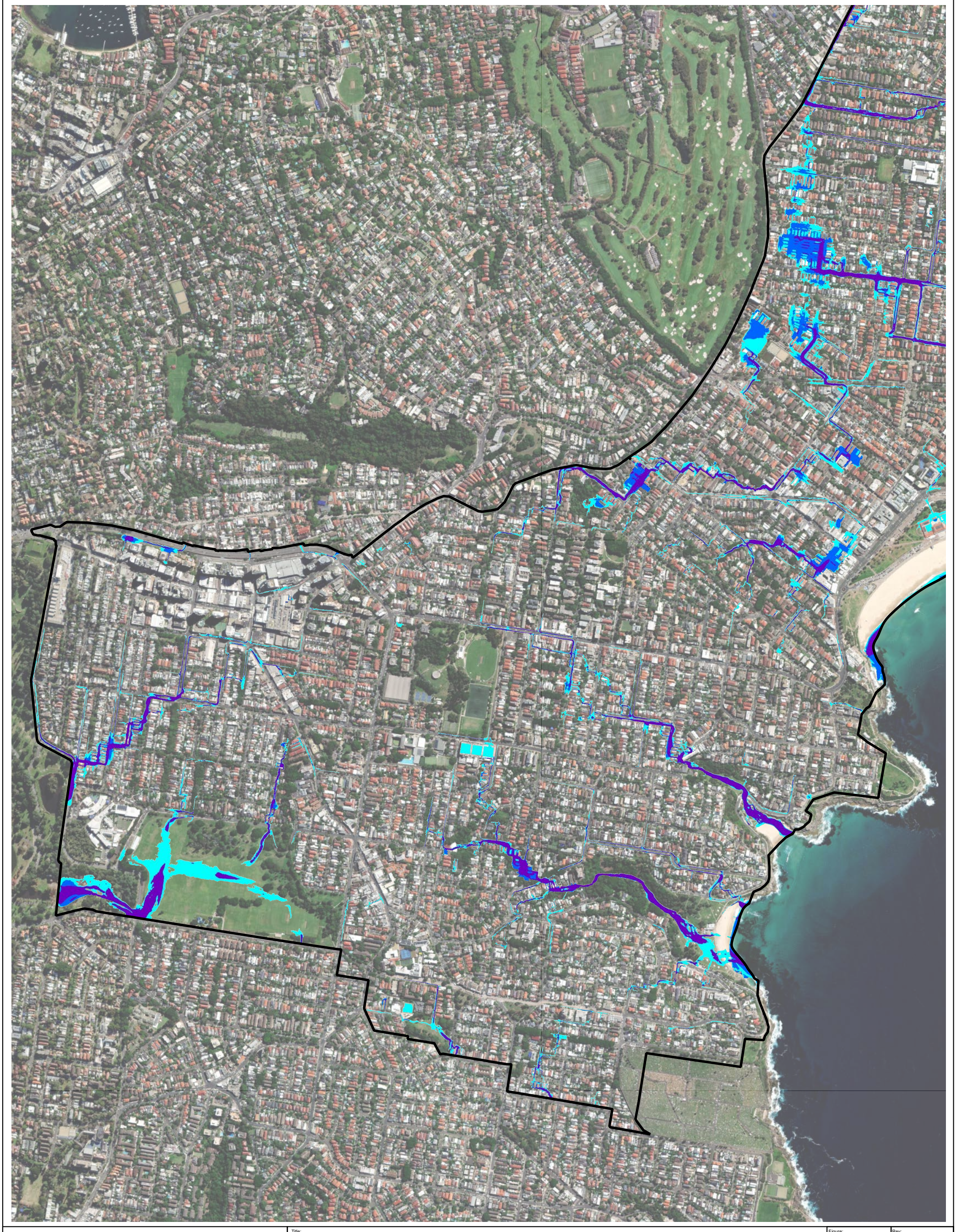

LEGEND

- Study Area
- Flood Function
- Floodway
- Flood Storage
- Flood Fringe

Title:

Waverley LGA Flood Risk Management Study and Plan
5% AEP Flood Function

Figure: D-02

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Flood Function
  - Floodway
  - Flood Storage
  - Flood Fringe

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Flood Function

Figure: D-03

Rev: 0

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Scale:

0 100 200 300 400 500 m

1:12,000



LEGEND

- Study Area
- Flood Function
  - Floodway
  - Flood Storage
  - Flood Fringe

Title:

Waverley LGA Flood Risk Management Study and Plan
1% AEP Flood Function

Figure: D-04

Rev: 0

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Scale:

0 100 200 300 400 500 m

1:12,000

KBR

LEGEND

- Study Area
- Flood Function
  - Floodway
  - Flood Storage
  - Flood Fringe

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Flood Function

Figure: D-05

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

0 100 200 300 400 500 m

1:12,000

LEGEND

- Study Area
- Flood Function
  - Floodway
  - Flood Storage
  - Flood Fringe

Title:

Waverley LGA Flood Risk Management Study and Plan
PMF Flood Function

Figure: D-06

Rev: 0

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File: H:\Projects\SEW451-01_WaverleyFRMS\G - GIS\Workspaces\Flood_Mapping.qgz

Scale:

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Appendix C: Draft Amended DCP Provisions

PART B GENERAL PROVISIONS

5.2 FLOOD PLANNING

The NSW State Government defines the 'Floodplain' as *'land susceptible to flooding by the PMF* (probable maximum flood) *event'*, and ~~.~~ ~~The document also defines~~ 'flood' as natural phenomena where water inundates land that is usually dry, ~~generally~~ resulting from either (or both) coastal inundation (excluding tsunamis) or catchment flooding~~due to weather systems that generate a high amount of rainfall~~. Flooding can be due to water flowing within, out of, or towards a waterway. Water that runs towards a watercourse is known as ~~an~~ local overland ~~flow~~ flooding and this type of flooding is the predominant type of flooding that occurs throughout the Waverley Local Government Area.

For the purposes of insurance most of the water associated with where inundation could occur, aside from Bronte Gully and Tamarama Gully, in the Waverley LGA should be considered as 'stormwater~~'~~.'

Sections 5.2.1-5.2.8 apply to land identified in the 'Flood Planning Area' layer on Council's mapping website and provided as a general reference in ~~annexure~~ Annexure B5-3~~4~~. These Flood Planning Areas cumulatively represent the Flood Planning Area referred to in clause 5.21 of Waverley LEP 2012.

Waverley Online Mapping Tool	
Discover Waverley Mapping Tool	
Map Configuration	Planning
Layer	Flood Planning Area

~~Section 5.2.9 provides controls for all other development.~~

There are three different levels of potential flood risk associated with the Flood Planning Area ~~–~~ high, medium and low, see below.

Table 1 Flood Risk Precinct Definitions

Flood Risk Precinct	Description	Technical Definition
High	Land within the 1% AEP flood extent with a high hydraulic hazard classification. There is a high potential for damage to property, risk to life or evacuation difficulty. ***Note**: In this precinct there would be a significant risk of flood damages without compliance with flood related building and planning controls.*	Land classified as with a "H4- H6" hazard in the 1% AEP event.
Medium	Land below the 1% AEP flood that is not subject to high hydraulic hazard and where they are no significant evacuation difficulties. ***Note**: ~~I~~in this precinct there would still be significant risk of flood damage, but these damages can be minimised by the application of appropriate development controls.*	Land classified as with a "H1- H3" hazard in the 1% AEP event.

Low	All other land within the floodplain (i.e.~~.~~ within the extent of the Probable Maximum Flood (PMF), that is not classified as within a High or Medium Flood Risk Precinct. ***Note**: The Low Flood Risk Precinct is where the risk of damage~~s~~ is low for most land uses. The Low Flood Risk Category is the area above the 1% AEP flood.*	Flood affected land between the PMF and 1% AEP extent.

Notes:

1. *Delineation of Flood Risk Precincts outlined in Table 1 is provided by Council's online mapping services "Discovery~~.~~ Waverley" based on flood modelling undertaken for Waverley.*

~~1.~~2. *Where sufficient information ~~is not~~remains un~~-~~available, but the potential for flood risk issues are evident based on available information, applicants may be required to undertake a ~~site specific~~site-specific flood assessment. These situations include where:*

a) Council has knowledge that the property has been previously affected by or impacted upon flooding or a~~n~~ local overland flow path;
b) ~~T~~the property is on the low side of the road and/or the boundary levels are below the level of Council's kerb;
c) ~~T~~the property is lower than surrounding properties;
d) ~~T~~the property is in a natural low point, gully or depression; or
e) ~~T~~the property is adjacent to or contains a flow path, open channel, watercourse or drainage line.

The assessment would determine the Flood Risk ~~Categories~~ Precincts in order to apply appropriate controls in addition to any further assessments required by this Development Control Plan.

~~2.~~3. *~~Technical definitions for Flood Risk Precincts as outlined in Table 1 are defined by the relevant flood events in the governing study, which is the most recently endorsed Council Flood Study or Flood Risk Management Study and Plan.~~ The mapping of Flood Risk Precincts is undertaken independently of mapping undertaken for Coastal Hazards. Reference should be made to Council's "Coastal Risk Management Policy" for the mapping and management of land affected by coastal hazards.*

~~3.~~4. *Applicants should obtain a Flood Certificate from Council before preparing a development application. A flood Certificate will confirm key flood related information required for the preparation of a development application for individual properties, where information is available.*

DRAFT

Objectives

(a) Minimise risk to life and damage to property by controlling development on flood prone land

(b) Ensure the impacts of the full range of potential floods up to and including the PMF are considered when assessing development having regard to the sensitivity of different land uses to flooding.

(c) Ensure that development does not have an unacceptable impact on flood behaviour, people's safety, surrounding properties and structures, and the natural environment.

(d) To provide detailed controls that if satisfied would address the considerations required by clause 5.21 of *Waverley Local Environmental Plan 2012*.

Controls

How to determine what planning controls apply

Refer to land use risk categories ~~in the table below~~ in Table 3 ~~Annexure B5-1~~, and the planning controls matrix in Table 2 ~~below~~ to determine which controls are applied.

Application of Controls

Compliance with the prescriptive controls must be demonstrated.

Where the prescriptive controls are not satisfied, applicants must demonstrate, based on site specific assessments, that the performance criteria are clearly satisfied to the satisfaction of Council.

Annexures

Planning Controls Matrix for Flood Planning

The Planning Controls Matrix identifies the prescriptive flood related development controls that apply to the Flood Planning Areas and land use category. Refer to ~~Annexure B5-1~~Table 3 for explanations of each land use category.

Table 2 Planning Controls Matrix

Flood Risk	Low Flood Risk							Medium Flood Risk							High Flood Risk						
LAND USE	~~Critical uses and facilities~~Sensitive &	Subdivision	Residential	Commercial or Industrial	Tourist Related Development	Recreation or Non-urban Uses	Concessional Development	Sensitive & Hazardous	Subdivision	Residential	Commercial or Industrial	Tourist Related Development	Recreation or Non-urban Uses	Concessional Development	Sensitive & Hazardous	Subdivision	Residential	Commercial or Industrial	Tourist Related Development	Recreation or Non-urban Uses	Concessional Development
Floor Level	3, 6		2, 6	2, 6	2, 6			3		2, 4, 6	2, 4, 6	2, 4, 6	1, 6	5, 6	3		2, 4, 6	2, 4, 6	2, 4	1, 6	5, 6
Building Components	2		1	1	1			2		1	1	1	1	1	2		1	1	1	1	1
Structural Soundness	2				2			2		1	1	2	1	1	2		1	1	2	1	1
Flood Affectation								1	1	1	1	1	1	1	1	1	1	1	1	1	1
Car Parking & Driveway Access	~~2~~1, ~~3~~, 4~~3~~		~~2~~1, ~~3~~2, 4	~~2~~1, ~~3~~2, 4	~~2~~1, ~~3~~, 4~~3~~	~~2~~1, ~~3~~2, 4	~~2~~1, ~~3~~2, 4	1, ~~3~~, 4		1, ~~2~~, ~~3~~, ~~4~~, ~~5~~4	1, ~~2~~, ~~3~~, ~~4~~, ~~5~~4	1, ~~2~~3, ~~3~~, 4~~5~~	1, ~~4~~3~~2~~, ~~5~~4	1, ~~4~~3~~2~~, ~~5~~4	1, 3, 4		1, ~~2~~, ~~3~~, ~~4~~, ~~5~~4	1, ~~2~~, ~~3~~, ~~4~~, ~~5~~4	1, 3, 4	1, ~~4~~3, ~~5~~4	~~4~~1, ~~5~~4
Emergency Management	2, 3	1	1	1	1	1	1	2, ~~3~~	4	1	1, 3	1, 3	1, 3	1	2, 3,4,5	4	1	1, 3, 5	1, 3,4,5	1, 3	1
Management & Design		1						~~2~~, 3	1	2, ~~4~~	2, 3	2, 3, 4	2, 3, 4	2, ~~,~~ 4	~~2~~, 3	1	2, ~~4~~	2, 3	2, ~~3~~,	2, ~~,~~ 3, ~~4~~	2, ~~4~~
Fencing	1	1	1	1	1	1	1	1	1,	1,	1,	1,	1,	1,	1	1,	1,	1,	1,	1,	1,

Key

No controls	
Subject to significant flood constraints (refer to General Note 1)	
DCP Control Reference no.	1

General Notes:

1. ***Significantly Constrained Land***: ~~*Where*~~ *This relates to flood affected land where potential development* ~~*types are*~~ *in the nominated land use category is likely to be incompatible with the hazards* ~~*existing within the nominated part of the floodplain*~~ *without substantial mitigation measures. Consequently, the development may be found unacceptable unless* ~~*the design of the development together with the*~~ *mitigation measures can address any potential unacceptable amenity or environmental impacts. Alternatively, this may require a reduction in the otherwise anticipated development intensity for the land.*

~~2. **Filling:** *Filling of a site, or site modification works in general, that is partially affected by flooding (if acceptable to Council) may change the flood risk precinct, and the associated development controls that apply to development on the site.*~~

~~3.~~2. ~~**Multiple FRPs:** *Development controls relate to the FRP identified for the site. Where a site has two or more FRPs the relevant sets of controls apply to each risk precinct but for practical purposes the stricter controls would normally apply across the whole development.*~~

Annexures

~~4.~~3. ***Fencing:*** *Refer to the relevant fencing section of the DCP for planning considerations involving only the erection of a fence for the type of development your application is considered. Any fencing that forms part of a proposed development is subject to the relevant flood effect and structural soundness considerations of the relevant category.*

~~5.~~4. ***Freeboard:*** *Where required the following freeboard heights apply:*

a. *Areas subject to oceanic flooding conditions~~:~~ as depicted by the flood risk precincts mapping on Discover Waverley Maps: 500mm*

b. *Other areas: 300mm.*

6. ***Mixed Use Development:*** *For mixed-used developments, the planning controls apply to each use to the extent relevant. For example, Floor level and Building Component controls will typically apply to only the ground floor, while the balance of the controls could apply to the overall development.*

7. ***Subdivision****: When assessing subdivision the planning controls for the intended end use will be taken into consideration to ensure that any potential development on a new lot would be capable of meeting the controls.*

Table 3 Land Use Categories

Land use is categorised into eight Land Use Risk Categories according to the sensitivity of each type of land use to flooding. The definitions of each land use are primarily based on *the Waverley Local Environmental Plan 2012* and are categorised as follows.

Category	Examples (not exhaustive, refer to Waverley LEP 2012 for full list).
Critical usesSensitive and Hazardous development and facilities **Sensitive Uses and Facilities**	Community facilities and public administration building which may provide an important contribution to the notification or evacuation of the community during flood events, correctional centres, early education and care facilities, educational establishments, emergency services facilities, group homes, hazardous industries, hazardous storage establishments, hospitals information and education facilities, respite day care centres, seniors housing, sewerage systems, water supply systems.Community facilities which may provide an important contribution to the notification or evacuation of the community during flood events (e.g. SES headquarters and Police Stations); hospitals, emergency services; public administration building, and residential care facility, and waste or resource management facility. Offensive storage establishments; seniors housing; centre-based child care centres; preschools; schools and other educational institutions; correctional centres; liquid fuel depots; public utility undertakings (including electricity generating works; sewerage treatment plant; sewerage systems; telecommunication facilities; utility installations and water treatment facilities) which are essential to evacuation during periods of flood or if affected would unreasonably affect the ability of the community to return to normal activities after flood events; and waste disposal facilities.
Subdivision	Subdivision of land which involves the creation of new allotments with potential for further development.
Residential	Boarding houses; camping or caravan park site; health consulting rooms; home businesses; home industries; home occupation; backpackers accommodation, bed and breakfast accommodation, hotel or motel accommodation; residential accommodation (excluding seniors housing and residential care facilities); serviced apartments; and other development within residential lots that is not concessional development including but not limited to construction of garages, fencing and/or retaining walls, and swimming pools, and the construction of an outbuilding with a floor area that exceeds 30 $m^{2,}$, fencing and/or retaining walls.

Annexures

Commercial or Industrial	Animal boarding or training establishments, commercial premises and buildings or land used for industry. Any business, office or retail premises or buildings or land used for industrial activities.
Tourist Related Development	Camp sites or caravan parks –short–term sites (1) only As defined by the Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2005, Camping ground, caravan park and eco-tourist facilities
Recreation or Non-urban Uses	Agriculture; aquaculture; animal boarding or training establishments; extractive industry; recreation facility (indoor), recreation facility (outdoor); recreation facility (major); recreation areas and minor ancillary structures (e.g. toilet blocks or kiosks); recreation facility (indoor), recreation facility (outdoor); recreation facility (major); and water recreation structure.
Concessional Development	Residential development that involves: a. An internal or external alteration to an existing dwelling house, dual occupancy or semi-detached dwelling, which does not change the floor area and/or footprint of the existing dwelling; b. An addition to existing premises of not more than 50 square metres to the existing ground floor level building footprint; c. A change of use which does not increase flood risk having regard to property damage and personal safety; d. Subdivision which does not propose the creation of new allotments with potential for further development; ~~b.~~e. The construction of an outbuilding with a floor area of no greater than 30m^2

Annexures

5~~6~~.2.1 Floor Level

Prescriptive Controls

1. All floor levels are to be equal to or greater than the 5% AEP flood level.
2. Habitable floor levels are to be equal to or greater than the 1% AEP flood level plus freeboard.
3. All floor levels are to be equal to or greater than the PMF level unless justified by a site-specific assessment.
4. All non-habitable floor levels shall be no lower than the 1% AEP flood level. Where this is impractical, non-habitable spaces should be flood-proofed to the 1% AEP level.
5. Floor levels shall be equal to or greater than the level of the 1% AEP flood level plus freeboard. Where this is not practical due to compatibility with the height of adjacent buildings, or compatibility with the floor level of existing buildings, or the need for access for persons with disabilities, a lower floor level may be considered. In these circumstances, the floor level shall be as high as practical and when undertaking alterations or additions no lower than the existing floor level.
6. All floor levels (habitable or otherwise) are to be a minimum of 150mm above the adjacent ground level.

***Note**: Should non-habitable subfloor areas be designed in a manner that enables occupation for habitable purposes or is readily adaptable for such purposes, Council may impose a restriction on title to avoid this occurring.*

Performance Criteria

1. The ~~cost of~~ damage~~s~~ that may be incurred over the expected life of a development should be no greater than that which could be expected ~~to be met~~ by meeting the applicable prescriptive floor level controls.

2. Despite the need to elevate floors, the development must remain acceptable with regard to its appearance and accessibility from the public domain and the amenity of the occupants.

***Note**: ~~Council will not accept performance based solutions that employ flood barriers for wholly new buildings.~~ Flood barriers are generally only acceptable in circumstances involving the adaptive reuse of existing buildings inclusive of heritage items and where alterations and additions are proposed to existing buildings and compliance with design floor levels is impractical or not required (in the case of concessional development).*

5~~f~~.2.2 Building Components

Prescriptive Controls

1. All new structures are to have flood compatible building components below or at the 1% AEP flood level plus freeboard. Refer to Annexure B5-~~3~~1 for a list of recommended flood compatible building components.
2. All new structures to have flood compatible building components below or at the PMF level.

Performance Criteria

1. All structures are to have flood compatible building materials below the prescribed flood planning floor level.

5.2.3 Structural Soundness

Prescriptive Controls

1. As part of a ~~Flood Impact Assessment~~ Flood Impact and Risk Assessment (~~FIA~~FIRA), an engineer's report (refer to Annexure B5-2~~3~~ for details) shall be provided ~~for development~~ to certify that any new structure can withstand the forces of floodwater, debris & buoyancy up to & including a 1% AEP flood level plus freeboard.

   ***Note**: certification to ~~be~~ confirm structural soundness up to and including PMF if required to satisfy evacuation criteria (see below).*

2. As part of ~~Flood Impact Assessment~~ Flood Impact and Risk Assessment (~~FIA~~FIRA), an engineer's report (refer to Annexure B5-~~3~~ 2 for details) shall be provided for developments to certify that any new structure can withstand the forces of floodwater, debris & buoyancy up to & including the PMF level.

Performance Criteria

1. All development would be structurally sound when impacted by a 1% AEP flood plus freeboard.

2. Where development relies on sheltering in place to be acceptable it would be structurally sound when impacted by a PMF.

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5.2.4 Flood Affectation

Prescriptive Controls

1. ~~As part of an~~Unless Council advises it is not required, ~~.~~ a ~~Flood Impact Assessment~~ Flood Impact and Risk Assessment (~~FIA~~FIRA)~~, an engineer's report~~ (refer to Annexure B5-2~~3~~ for details) shall be provided to certify that the development ~~(including indoor and outdoor features, such as above ground swimming pools and associated pump housing)~~ will not materially increase flood effects elsewhere, having regard to:
    - loss of flood storage;
    - changes in flood levels, flows and velocities caused by alterations to the flood conveyance.

Performance Criteria

1. Development ~~does not detrimentally increase the potential flood affectation on other development or properties either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain~~should not increase potential flooding of other properties resulting in a reduction in flood immunity to buildings and property, or a reduction in the ability of occupants of a property to safely evacuate during a flood.~~.~~

1. Development should not change the height or behaviour of flood waters elsewhere in the floodplain in a manner which is likely to materially and adversely impact other property. The assessment of these effects must include the potential for similar impacts that would arise as a consequence of other development in the floodplain that has the potential to occur in the future under current zoning and planning controls.

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5.2.5 Car Parking and Driveway Access

Prescriptive Controls

~~1. The minimum surface level of open car parking spaces or carports shall be no lower than the 5% AEP flood level plus freeboard.~~

1. Garages for three (3) or fewer vehicles shall have a minimum finished floor level at the 1% AEP flood level if practical~~no lower than the 5% AEP flood level plus freeboard~~.

2. Basement car parking shall be protected from inundation by a 1% AEP flood plus freeboard.

3. Basement car parking shall be protected from inundation by a ~~The crest of the driveway providing access between the road and basement car- parking shall be a minimum of~~ 1% AEP flood plus freeboard or the PMF, whichever is higher.

4. Restraints or vehicle barriers may be required to prevent floating vehicles leaving a site during a 1% AEP flood, where this is likely to pose a risk to others.

~~* (Note: A flood depth of more than 200mm will can cause serious water damage to a typical vehicle and a depth of 300mm is sufficient to cause a typical vehicle to float.)~~

~~*~~**Note**: For control ~~n~~No.~~5~~4. site by site considerations will be assessed based on context and risk.

Performance Criteria

1. Measures will be in place to warn people not to drive out of car parking areas where this would be dangerous and provide guidance and facilities to ~~be able~~enable pedestrians to safely exit the carpark.
2. All reasonable and practical measures are implemented to reduce the likelihood of motor vehicles being damaged by a flood.
3. All reasonable and practical measures will be in place to manage the potential vehicles floating and causing damage or becoming debris during a flood.

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5.2.6 Emergency Management

Prescriptive Controls

1. The evacuation requirementss of the development during flooding shall be considered in the Statement of Environmental Effects.
2. Reliable access for pedestrians or vehicles shall be provided from a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF level. Where safe and practical this should involve evacuation to an area outside of the PMF extent, otherwise provide for sheltering in place within a building that would be structurally sound in a PMF.
3. The development shall be consistent with the NSW State Flood Plan (a sub plan to the State Emergency Management Plan), any Waverley Specific Emergency Sub Plan or any relevant Council emergency management strategy. any relevant flood strategy, Floodplain
4. 3. Risk Management Plan adopted by Council or similar.
5. 4. The Applicant shall demonstrate that evacuation of potential development as a consequence of a subdivision proposal can be undertaken in accordance with the Flood Planning controls.
6. 5. The Applicant shall provide a flood emergency response plan that demonstrates how risk to life will be managed during a flood event. For example, a safe evacuation route needs to be clearly identified, or a shelter in-place strategy with reliable access shall be provided to an area of refuge above the PMF level.

Performance Criteria

1. The development should be designed and be able to be managed to ensure that during a flood emergency all occupants are capable of seeking safe refuge.

5.2.7 Management and Design

Prescriptive Controls

1. The Applicant is to demonstrate that potential development as a consequence of a subdivision proposal can be undertaken in accordance with the DCP.
2. The Applicant is to demonstrate that an area is available to store goods above the 1% AEP flood level plus freeboard.
3. No storage of materials below the 1% AEP plus freeboard which may cause pollution or be potentially hazardous during any flood.
4. In-ground swimming pools are to have surrounding coping/tiling that is no more than 100 mm above surrounding ground level. All pumping/electricals are to be above the 1% AEP flood level plus freeboardlocated outside of a floodway or flood storage areas and as high as practical.

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Performance Criteria

1. The development should be designed and managed to ensure that during a flood valuable goods are capable of being protected.

5.2.8 Fencing

1. Fencing is to be constructed in a manner that does not obstruct the flow of floodwaters so as to have an adverse impact on flooding.

~~5.3 All Other Areas~~

~~(a) For sites not in a the 'fFlood pPlanning aArea' habitable floor levels must comply with the drainage requirements of section 5.1 Stormwater Management and WSUD and as specified in the NCC.~~

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Annexures

~~**Annexure B5-1**~~
~~**Land Use Categories**~~

Annexure B5-12
Flood Compatible Material

Table 1 List of suitable flood compatible materials

Building Component	
Flooring and sub-floor	• Concrete slab-on-ground monolith
	• suspended reinforced concrete slab
Floor covering	• clay tiles
	• concrete, precast or in situ
	• concrete tiles
	• epoxy, formed-in-place
	• mastic flooring, formed-in-place
	• rubber sheets or tiles with chemicals-set-adhesive
	• silicone floors formed-in-place
	• vinyl sheets or tiles with chemical-set adhesive
	• ceramic tiles, fixed with mortar or chemical-set
	• asphalt tiles, fixed with water resistant adhesive
Wall structure	• Solid brickwork, block work, reinforced, concrete or
Roofing structure (for situations where the relevant flood level is	• reinforced concrete construction • galvanised metal construction
Doors	• solid panel with water proof adhesives
	• flush door with marine ply filed with cell foam
	• painted metal construction
	• aluminium or galvanised steel frame
Wall and ceiling linings	• 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
Insulation windows	• Foam (closed cell types)
	• Aluminium frame with stainless steel rollers or similar corrosion and ~~water-resistant~~water-

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Nails, bolts, hinges and fittings	• Brass, nylon or stainless steel~~;~~ • Removable pin hinges • Hot dipped galvanised steel wire nails or similar.

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Electrical and mechanical equipment *For dwellings constructed on land to which this DCP applies, the electrical and mechanical materials, equipment and installation must conform to the following requirements:*	
Main power supply	Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, must be located above the ~~relevant~~ design flood level. Means must be available to easily disconnect the dwelling from the main power supply.
Wiring	All wiring, power outlets, switches, must be to the maximum extent possible, located above the probable maximum flood level. All electrical wiring installed below this level must be suitable for continuous underwater immersion and must contain no fibrous components. Earth leakage circuit-breaker (core balance relays) or ~~a~~ a Residual Current Device must be installed. Only submersible type splices must be used below probable maximum flood level. All conduits located below the relevant ~~designated~~ design flood level must be so installed that they will be self-draining if subjected to flooding.
Equipment	All equipment installed below or partially below the ~~relevant~~ design flood level must be capable of disconnection by ~~a~~ a single plug and socket assembly.
Reconnection	Should any electrical device and/or part of the wiring be flooded it must be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.
Heating and air conditioning systems *Where viable, heating and air conditioning systems should be installed in areas and spaces of the house above the probable maximum flood level. ~~When~~ If this is not feasible, every precaution must be taken to minimise the damage caused by submersion according to the following guidelines:*	
Fuel	Heating systems using gas or oil as fuel must have a manually operated valve located in the fuel supply line to enable fuel cut-off.
Installation	Heating equipment and fuel storage tanks must 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. All storage tanks must be vented to an elevation of 600 millimetres above the ~~relevant~~ design flood level.
Ducting	All ductwork located below the design~~relevant~~ flood level must 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~~design flood level, a closure ~~assemble~~assembly operated from above the ~~relevant~~ design flood level must protect the ductwork.

***Note**: The above list is not considered to be exhaustive and other materials and methods can be proposed for Council's consideration as part of any application*

Annexures

Annexure B5-~~23~~
Flood Impact and Risk Assessment Requirements

General

A Flood Impact and Risk Assessment (**FIRA**) must be prepared by a professional engineer who specialises in hydraulic engineering. The FIRA must be prepared in accordance with the relevant sections of this Chapter. Applicants are referred to guidance provided by "Flood impact and risk assessment - Flood risk management guideline LU01" (2023 NSW Department of Planning and Environment) for detailed guidance for the preparation of a FIRA.

The assessment of impacts should be fit for purpose. Computer modelling may not be required in all circumstances, subject to Council's advice.

Flood frequencies to be considered

A minimum of t~~T~~he ~~20~~5% AEP, 1% AEP and PMF flood events must be modelled to assess the impact on existing flood conditions of a proposed development to property, infrastructure and the environment.

When is a FIRA required?

A ~~FIA~~FIRA may be required for any type of development where the development occurs in the floodplain (i.e. situated within the Flood Planning Area). A ~~FIA~~FIRA may also be required where the site in question is ~~tagged~~ identified as a Flood Control Lot as defined in ~~the~~ *State Environmental Planning Policy (Exempt and Complying Development Codes)* ~~State Environmental Planning Policy) for the purposes~~to aid in ~~of~~ the application of the State Environmental Planning Policy.

For the purposes of Council being satisfied that a FIRA is not required, Council will consider the context of the proposed development and site characteristics, inclusive of the following criteria:

- the development will be designed to not obstruct the flow of flood waters
- the development will not materially change existing pervious ground surfaces to impervious ground surfaces
- the development is not located in a floodway or storage area.

Computer Model

Unless it can be demonstrated that hydraulic modelling is not required, the ~~FIA~~FIRA must be prepared using Council's TUFLOW model. ~~(note: a fee is payable for the TUFLOW model).~~ Once engaged, the consultant must enter into a license agreement for the use of Council's flood model for the specific purpose of preparing the ~~FA~~FIRA for the proposed development only.

***Note**: a fee is payable for the use of the TUFLOW model.*

Flood Impact Assessment Criteria

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The following criteria should be applied as part of the consideration of determining whether a development will have a material impact on other developments or land:

- The flood impact of the development should not exceed a maximum increase of 10mm on land not associated with the development in a 1% AEP flood.
- The flood impact of the development should not exceed a maximum increase of 20mm on land not associated with the development in a 5% AEP flood.
- The development should not result in flood flow velocities increasing at the property boundary for any flood up to a 1% AEP flood:
  - by any amount where the existing condition flow velocity is greater than 1.5 m/s, or
  - by more than 20% where the existing flow velocity is less than 1.5 m/s.
- The development should not result in the change in hazard classification in a 1% AEP flood on adjoining private or public land.

Shelter in Place considerations

Where sheltering in place is required to the prescriptive controls of the DCP, the FIRA shall include an assessment of whether the proposal provides an acceptable flood refuge area. The assessment shall have regard to the "Shelter-in-Place Guideline for Flash Flooding" (Department of Planning, Housing & Infrastructure, 2024) and incorporate the following design features:

- floor level to be above the PMF
- within a building that is structurally sound in all floods up to and including a PMF
- access to the refuge is self-directing and accessible for all likely occupants without reliance on mains electricity
- weather protection.

For residential development involving more than a single dwelling house and for non-residential development where 5 or more occupants might be required to shelter in place, the additional design features are to be included:

- the refuge is sized for a minimum $2m^2$ of floor area per likely occupant
- appropriate means to regulate thermal comfort (eg heating, blankets, etc)
- personal hygiene facilities (access to toilet facilities)
- emergency survival pack that is checked and renewed annually (incorporating supplies such as a medical kit, food, water, fire extinguisher, radio, lighting, batteries and/or on-site power systems).

FIRA Report

The ~~FIA~~FIRA must address the following:

- Description of the Site (including existing stormwater drainage and local catchment characteristics) and details of the proposed development.
- Flood affectation to the Site and surrounding land during the 5% AEP, 1% AEP and PMF events under existing (i.e. pre-development) conditions.
- Flood affectation to the Site and surrounding land during the 5% AEP, 1% AEP and PMF events under post-development conditions.

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- Overview of the change in flood conditions associated with the proposed development.
- Overview of the Flood Risk Precinct(s) and associated development controls applicable to the Site for pre and post development conditions.
- ~~Flood affectation to the Site during the 5% AEP, 1% AEP and PMF events under post-development conditions.~~
- ~~Overview of the change in flood conditions associated with the proposed development.~~
- Discussion of adherence to applicable planning controls.
- Proposed mitigation measures to address any impacts or minimise risk to personal safety of occupants and the risk of property damage.
- A flood evacuation strategy (Flood Emergency Response Plan) (if required).
- On site response plan to minimise flood damage and provide adequate storage areas for hazardous materials and valuable goods above the flood level (if required).
- The architectural/engineering plans on which the assessment is based.
- Supporting calculations and mapping.
- The professional qualifications and experience of the author(s).

The FIRA shall be prepared and submitted for the proposed development as part of a development application. In the event the plans and associated reports are updated as part of the assessment process, the FIRA shall be updated to reflect the current version of the proposed development. ~~and , for example, not for an earlier version of a development proposal.~~ RLs that reflect AEP flood levels are required to demonstrate compliance with the DCP controls and shall be clearly shown on the development application plans.

The FIRA must include maps and analysis that clearly demonstrate the above considerations.

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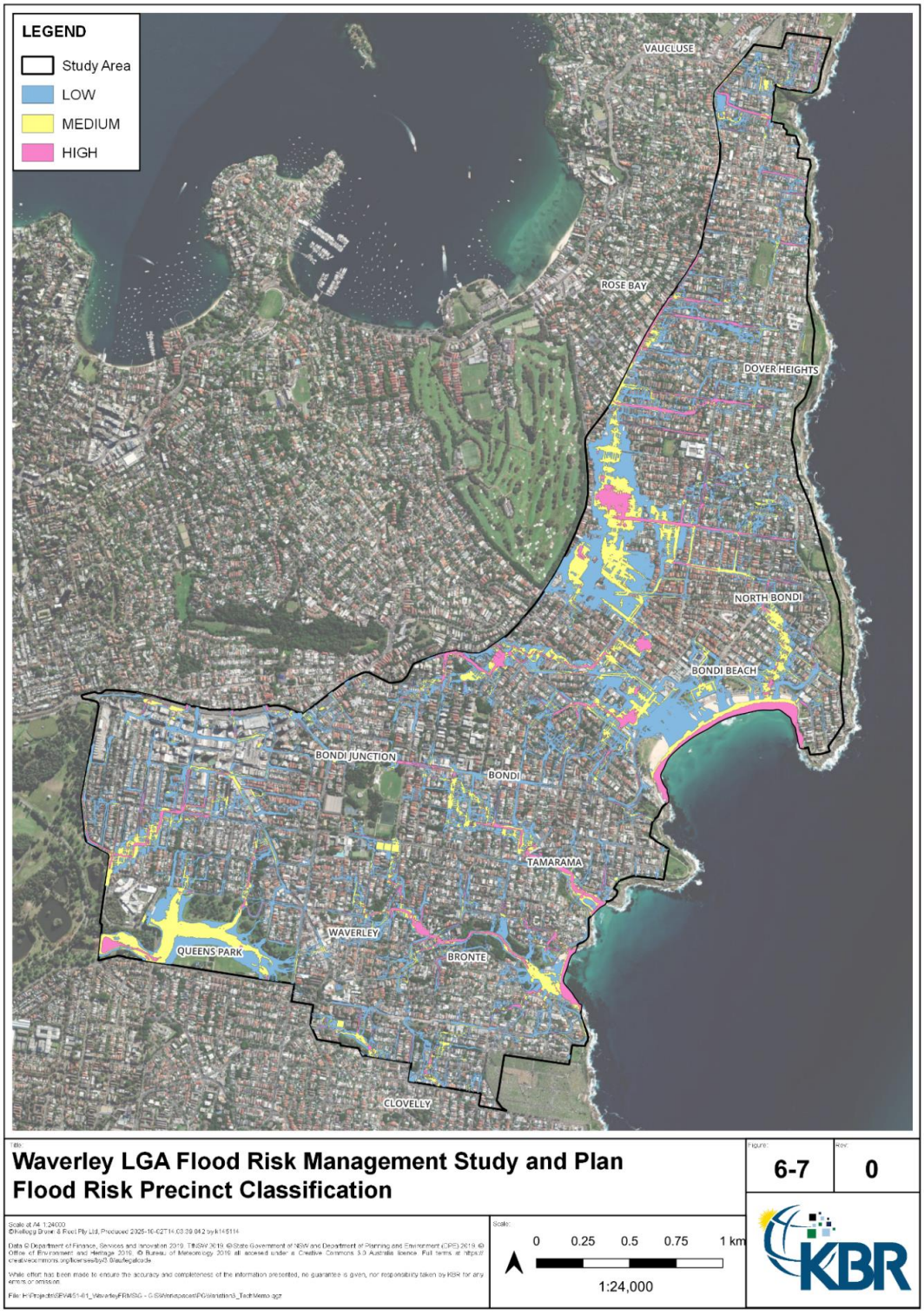
Annexures

Annexure B5-34
Flood Planning Area Reference Maps



***Note:** The Flood Planning Area map is provided as a reference and is subject to administrative updates in line with updates to flood modelling in the Waverley LGA.*

DEFINITIONS

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.

Australian Height Datum (AHD) - A common national plan of level corresponding approximately to mean sea level.

~~**ARR 1987** - Australian Rainfall and Runoff: 1987 published by the Institute of Engineers, Australia.~~

~~**ARR 2019** - Australian Rainfall and Runoff 2019, published by the Commonwealth of Australia (Geoscience Australia).~~

~~**Base Flows** - Flows that occur during dry weather conditions.~~

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.

Design flood level - The level specified as a prescriptive control.

~~**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 movement of people from a place of danger to a place of relative safety, and their eventual return ~~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~~.

Flood - A natural phenomenon that occurs when water covers land that is normally dry. It may result
from coastal inundation (excluding tsunamis) or catchment flooding, or a combination of both.

Flood compatible building components - A combination of measures incorporated in the design and/or construction and alteration of individual buildings or structures subject to flooding, and the use of flood compatible materials ~~for the reduction~~that are capable of reducing or eliminating~~on~~ of flood ~~damage~~.

Flood compatible materials - Those materials used in building which are resistant to damage when inundated.

Flood evacuation strategy - The proposed strategy for the evacuation of areas within 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, or by advice received from the State Emergency Services (SES).

Flood proofing - A combination of measures (such as flood barriers or flood doors) incorporated in the design, construction and alteration of individual buildings or structures subject to flooding, to reduce or eliminate flood damages. ~~Examples include use of tiled surfaces and installing power points above flood planning levels etc.~~

Flood refuge area - An onsite refuge above the PMF that provides reasonable shelter for the likely occupants of the development commensurate with the period of time that refuge is likely to be required in floods up to the PMF~~.~~.

> ***Note**: In general, it is not acceptable to rely on a refuge provided by or on other development sites. In all cases where an onsite refuge is provided, it is to be both intrinsically accessible to all people on the site, sheltered and an integrated part of the development (i.e. a second storey with internal stair access). The route to the refuge is to be fail safe, plainly evident and self-directing.*

~~**Flood Fringe Areas -** The remaining areas of flood prone land after floodway and flood storage areas have been identified.~~

Floodway Areas - Areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially ~~blocked would~~blocked, cause a significant redistribution of flow or a significant increase in flood levels.

Flood Storage Areas - Floodplain area that is important for the temporary storage of floodwaters during a flood.

Flood Study - A comprehensive technical investigation of flood behaviour undertaken in accordance with the principles in the Manual and consistent with associated guidelines ~~A study prepared for one or more floodplains in accordance with the requirements of the FDM (superseded) or FRMM~~.

Floodplain - (Synonymous with flood liable and flood prone land) is the area of land that is subject to inundation by the PMF.

~~**Floodplain Development Manual (FDM)** - Floodplain Development Manual (2005).~~

Flood Risk Management Manual (the Manual) – Flood Risk Management Manual prepared by the NSW Government and associated Flood Risk Management Toolkit (2023).

Floodplain Risk Management Plan (FRMP) - A management plan developed in accordance with the principles in the Manual and its supporting guidelines~~A plan prepared for one or more floodplains in accordance with the requirements of the FDM (superseded) or FRMM~~.

Floodplain Risk Management Study (FRMS) - A management study developed in accordance with the principles in the Manual and its supporting guidelines.~~A study prepared for one or more floodplains in accordance with the requirements of the FDM (superseded) or FRMM.~~

Freeboard - A factor of safety typically used in relation to the setting of minimum floor levels or levee

crest levels.

Habitable - 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.

***Note**: This definition is relevant only to the application of Section 5.2 Flood Planning of the DCP.*

Local overland flooding~~**Overland flow**~~ - Inundation by local run-off on its way to a waterway, rather than overbank flow from a waterway~~Runoff from rainfall that flows over the land before entering a watercourse, creek, river, lake or dam. Overland flow can flow down roads, driveways and through homes and buildings. It is typically shallow and fast flowing~~.

~~**Overland Flow Path** - The path that stormwater may take if the piped or channelled stormwater system becomes blocked or its capacity exceeded. Overland flow paths provide a fail safe system to ensure that stormwater is not likely to cause flood damage.~~

Probable Maximum Flood (PMF) - The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation (PMP), and where applicable, snow melt, coupled with the worst flood-producing catchment conditions~~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 means 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 water depths increase.

Risk - 'The effect of uncertainty on objectives' (ISO31000 2018) ~~The chance of something happening that will have an impact~~. ~~It~~ Risk is measured in terms of consequences and probability (likelihood).

~~**Stormwater** - Rainfall that is concentrated after it runs off all urban surfaces such as roofs, pavements, carparks, roads, gardens and vegetated open space and includes water in stormwater pipes and channels.~~

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