The **Ordinary Meeting** of
Bayside Council
will be held in the Rockdale Town Hall, Council Chambers,
Level 1, 448 Princes Highway, Rockdale
on Wednesday, 09 June 2021 at 7:00 pm.

UNDER SEPARATE COVER ATTACHMENTS PART TWO

8 REPORTS

8.3 Draft Planning Proposal - Various Investigation Areas (Proposed Amendment 1 to Draft Bayside Local Environmental Plan 2021)

4 Appendix C to Planning Proposal Report - Rockdale Town Centre Urban Design Report 2

5 Appendix D to Planning Proposal Report - Walz Street Urban Design Report 76

6 Appendix E to Planning Proposal Report - Traffic Report 136

7 Appendix F to Planning Proposal Report - Flood Report 194

URBAN DESIGN AND BUILT FORM STUDY
ROCKDALE TOWN CENTRE

VERSION 1.0 MAY 2021

Bayside Council
Serving Our Community

ACKNOWLEDGEMENT OF COUNTRY

Bayside Council wish to acknowledge Aboriginal people as the traditional custodians of this land.

Through thoughtful and collaborative planning we seek to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

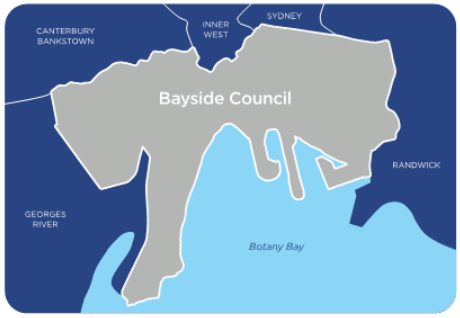

Table of Revisions				
Date	Revision	Status	By	Checked
6 May 2021	Version 1.0	For Bayside Local Planning Panel Meeting 20 May 2021	CH	MA

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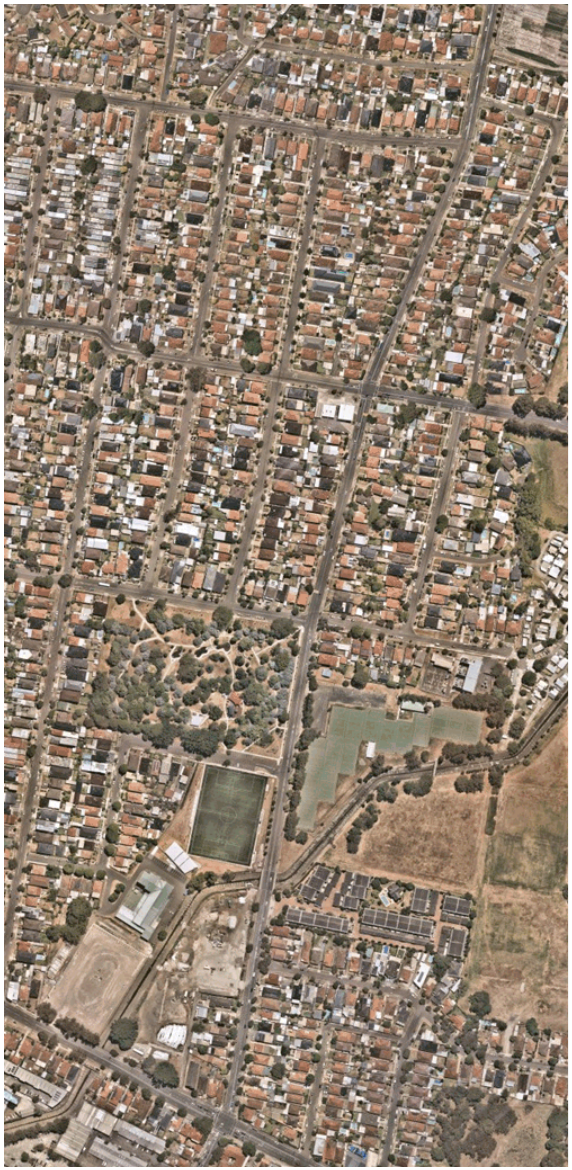

1.1 EXECUTIVE SUMMARY

In 2020, the Department of Planning, Industry and Environment announced the Public Spaces Legacy Program under which Bayside Council is eligible for a grant of up to $5.5M to deliver new or upgraded public and open spaces. One of the requirements associated with this grant is the commitment to deliver on housing and jobs growth, by exhibiting an updated Local Environmental Plan (LEP) to incorporate housing or employment supply for at least 6-10 years by 30 June 2021.

The NSW Department of Planning, Industry and Environment have informed Bayside Council that notification of the draft Bayside Local Environmental Plan 2021 (BLEP 2021) is likely to occur by 30 June 2021. The timeline for completion of the draft Planning Proposal would see it form Amendment 1 to the BLEP 2021.

Four areas have been identified as "0-5 year investigation areas". These areas include:

- Walz Street Precinct
- Bay Street Precinct
- Rockdale Town Centre Precinct
- Arncliffe West Precinct

This Urban Design and Built Form Study is for the East side of the Rockdale Town Centre precinct.

The study reflects on the unique character of place and strategic opportunities for the precinct to identify a potential built form that will improve the amenity of the area for existing and future residents as well strengthen the town centre identity.

1.1.1 METHODOLOGY

This study airms to:

- Update planning and design controls considering the existing Rockdale Town Centre Masterplan 2012 and the character of redevelopment that has occurred since its adoption.
- Unlock development on sites to be redeveloped by providing more certainty to developers
- Make the centre a more attractive place for investment and residents by improving the quality of built form and public domain outcomes through development.

The report will :

- consider the existing planning framework
- review the existing and emerging strategic context to establish parameters and directions for positive change.
- undertake analysis of opportunities and constraints for the precinct, adopting a place-based approach so that the design can respond to a deeper understanding of the area.
- envisage the desired built form
- describe design principles to guide the future built form and character of the the precinct
- provide recommendations to inform the revisions of the draft Bayside Local Environmental Plan 2021 and Development Control Plan.

1.1.1 RECOMMENDATIONS

To realise the desired future character for the Rockdale Town Centre study area there are a number of implementation recommendations.

These include:

- changes to the Local Environmental Plan as per the table in Figure 1.1.
- preparation of a Development Control Plan to reflect the design principles and other objectives identified in this report,
- review and update of the Rockdale Town Centre Masterplan and associated Public Domain Plans and Technical Specifications as required.
- preparation of a Contribution Plan

DRAFT BAYSIDE LEP 2021	Existing	Proposed
Zoning	B2 Lcoal Centre B4 Mixed Use	No change.
Height of Buildings	22m and 28m with 12m height bonus for sites >1500sqm in area	34m and 40m (note bonus height clause has been removed)
Floor Space Ratio	Does not apply	No change proposed
Design Excellence	Applies to some parts of precinct	To apply to whole study area
Land Reservation Acquisition	Applies	No change

FIGURE 1.1 PROPOSED CHANGES TO PLANNING CONTROLS

1.2 STUDY AREA

Rockdale Town Centre is a centre of the highest order in the hierarchy of centres within our Bayside Local Government Area (LGA). Therefore, careful planning for the development of this local centre is critical to achieving positive outcomes for its residents and the broader Bayside Communities.

The Rockdale Town Centre precinct is located on the Eastern side of the Rockdale Railway line with good connections to the Rockdale Railway Station and bus services. The precinct extends along Princes Highway from Rockdale Plaza Drive at the south for a length of almost 1 km to Bestic Street on both sides comprising some 22.7 hectares.

The Study Area which is the focus of the recommendations on this report comprises the land to the east of the station within the Town Centre precinct which is yet to be redeveloped or is subject to a planned development.

FIGURE 1.2 STUDY AREA

1.3 LOCAL CONTEXT

1.3.1 AN EXCITING FUTURE FOR ROCKDALE TOWN CENTRE

Rockdale is well established and serviced by major public transport infrastructure giving the Rockdale Town Centre great potential to flourish as a hub fostering environmental and economic resilience in the 30 minute city.

In this context, change and growth in the precinct is expected to occur primarily as part of major redevelopments. In an established town centre existing buildings, fragmented land ownership patterns create challenges for redevelopment as well as for the provision of additional green spaces and new connections. It is the redevelopment of large or amalgamated sites that will enable meaningful improvements in open space provision and the public domain.

Since the adoption of the Masterplan in 2011/2012 redevelopment has occurred on the fringes of the Town Centre where land ownership patterns have been less constrained.

Reconsidering the Rockdale Town Centre masterplan within 10 years is necessary to take into account changed conditions so that land owners, developers and tenants are prepared to invest in the vision.

The proposed changes are designed to help unlock the potential that remains in Rockdale and to ensure that future development also brings with it public benefit now and for future generations.

The revised masterplan will seek to enhance the vitality and amenity of Rockdale through redevelopment by:

- Improving our City's heart and civic precinct;
- making it more attractive for visitors;
- improving its vitality, lifestyle, entertainment and nightlife activities;
- Improving and linking laneways with the retail hub;
- residential rejuvenation;
- improving development density and design.

It is important for the future of the Town Centre that the existing masterplan is considered in light of development that has occurred as well as the emerging strategic context, and that planning controls are updated accordingly.

This will ensure that the plans for the precinct are not limited to what looks good on paper, but results in planning controls that reduce complexity and development assessment times, and minimise uncertainty.

The revised masterplan is key to ensuring that the Town Centre remains viable, encouraging redevelopment that improves the public domain and retains the development potential of remaining sites, so that land owners, tenants, developers, Government and the community are prepared to invest in a joint vision for a better place.

1.4 BACKGROUND

In 2020, the Department of Planning, Industry and Environment (DPIE) announced the Public Spaces Legacy Program under which Bayside Council is eligible for a grant of up to $5.5M to deliver new or upgraded public and open spaces. One of the requirements associated with this grant is the commitment to deliver on housing and jobs growth, by exhibiting an updated local environmental plan to incorporate housing or employment supply for at least 6-10 years by 30 June 2021.

The NSW Department of Planning, Industry and Environment have informed Bayside Council that notification of the draft Bayside Local Environmental Plan 2021 (BLEP 2021) is likely to occur by 30 June 2021.

The timeline for completion of the draft Planning Proposal would see it form Amendment 1 to the BLEP 2021.

The $5.5 million will fund projects in two of the Green Grids of Council and fund important projects that expand recreation opportunities for the Bayside community. $3 million will be allocated to implement the first stage of the Barton Park Masterplan, Banksia which includes the active transport component along the Muddy Creek Foreshore and $2.5 million towards the construction of a regional playspace at Sir Joseph Banks Park, Botany.

Barton Park in association with other projects will reconnect Rockdale to its waterfront and further along Muddy Creek and the Green Grid within a network of green spaces and recreational facilities to continuously improve quality of living, economic opportunities and the environment for our residents and future generations.

1.5 PLANNING FRAMEWORK

The precinct is under the draft Bayside Local Environmental Plan (BLEP) 2021.

The objectives of the zone:

- To maximise public transport patronage and encourage walking and cycling.
- To accommodate population growth through high density mixed use development that complements the role of retail, commercial, civic and cultural premises in the Rockdale Town Centre.
- To create a lively Rockdale Town Centre with an amenable and pedestrian focused public domain activated by building uses that engage with the street.

DESIGN CONSIDERATIONS

Increase building heights in strategic locations to encourage development and a more legible height structure in the Town Centre

Introduce clearer built form and amalgamation controls for more certainty about potential yields

All new development in the Town Centre to achieve design excellence

Identify opportunities to acquire land for open space and movement

ZONING

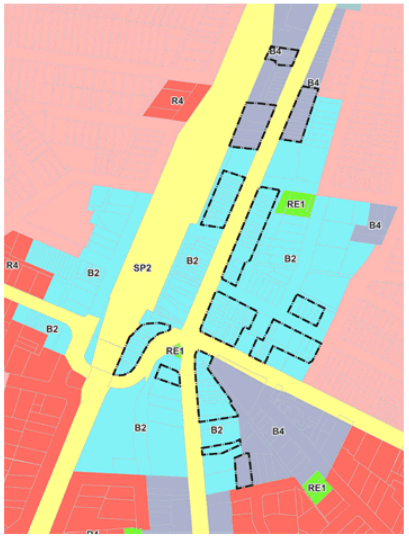

FIGURE 1.3 ZONING

HEIGHT OF BUILDINGS

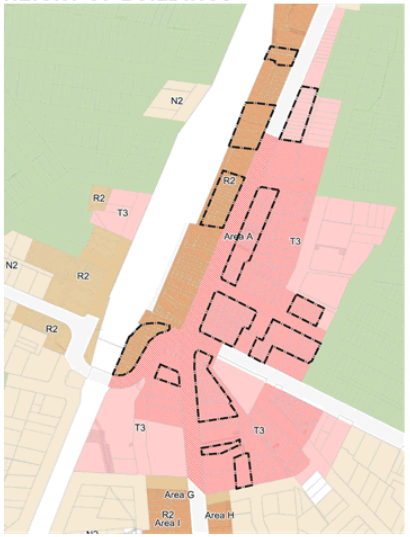

FIGURE 1.4 HEIGHT OF BUILDINGS

The precinct allows a maximum height of 22m 28m or approximately 6-7 storeys.

Some locations have a bonus height clause for sites greater than 1,500m2 with additional additional height subject to Design Review Panel)

FLOOR SPACE RATIO

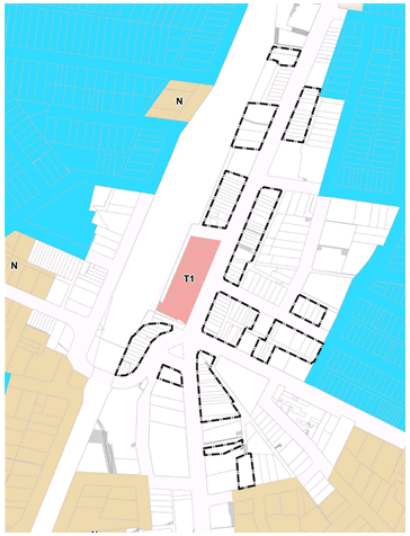

FIGURE 1.5 FLOOR SPACE RATIO

The precinct does not have Floor Space Ratio restrictions assigned in the Draft Bayside Local Environmental Plan (2021) BLEP 2021. (Note: A current Planning Proposal for the Interchange site proposes to remove the FSR).

LAND RESERVATION ACQUISITION

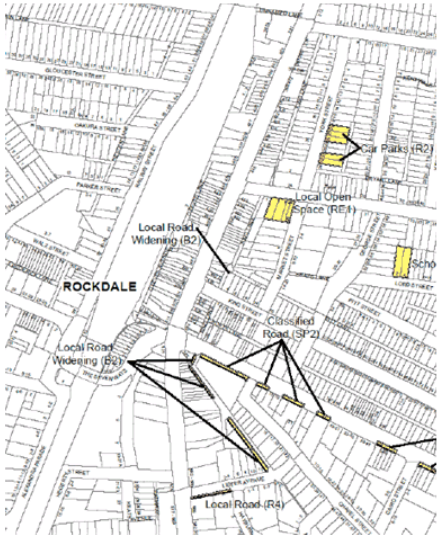

FIGURE 1.6 LAND RESERVATION ACQUISITION

There are a number of Land Reservation Acquisition identified in the Draft Bayside Local Environmental Plan 2021 (BLEP 2021)

1.5.1 LOT SIZES AND ACTIVE STREET FRONTAGES

There is no minimum lot sizes or active street frontages specified in the LEP for redevelopment within the Town Centre.

DESIGN EXCELLENCE

FIGURE 1.7 DESIGN EXCELLENCE

Only a few sites are identified as Design Excellence sites and are already subject to proposals or approval.

1.6 STRATEGIC CONTEXT

1.6.1 BROADER STRATEGIC CONTEXT

GREATER SYDNEY REGION PLAN, 2018

The Greater Sydney Region Plan - A Metropolis of Three Cities is the NSW Government's plan for metropolitan Sydney and sets out the future direction for Sydney's growth. The Plan provides a 40-year vision and plan to guide land use and infrastructure planning. It envisions Greater Sydney as a metropolis of three cities with Bayside forming the part of the Eastern Harbour City.

The plan contains objectives and strategies to make Greater Sydney more liveable, productive and sustainable. The alignment of infrastructure, population and employment growth throughout Greater Sydney is intended to facilitate access to jobs and services within 30 minutes by public transport. This requires higher land-use densities and redevelopment of areas around major nodes in the public transport network, including the Bayside LGA.

Rockdale and the Princes Highway corridor are flagged for urban renewal whilst Randwick and Kogarah are highlighted as key Health and Education Precincts. Several road and rail visions are shown that will substantially increase transport connectivity to Rockdale including the M6 Motorway and rail connections to Randwick and Bankstown

FUTURE TRANSPORT STRATEGY 2056, 2018

The Future Transport Strategy, 2056 outlines transport infrastructure priorities and aims to achieve the 30-minute city.

The strategy notes key projects in the Bayside LGA including the M6 and extension – Kogarah to Loftus, Port Botany freight line duplication, Foreshore Road upgrade and the Eastern Suburbs to inner west rapid bus links. Initiatives for investigation (20+ years) include addressing long-term capacity constraints to Port Botany and South East and the Extension of South East Mass Transit to Miranda.

SOUTH EAST SYDNEY TRANSPORT STRATEGY 2020

The South East Sydney Transport Strategy (SESTS) is guided by the Future Transport Strategy and focuses specifically on the localised area of south eastern Sydney. A number of projects have been earmarked such as a new rapid bus line from Maroubra to Rockdale, investigation of a future Metro line from Kogarah to Randwick and delivery of principle bicycle network. Brighton Le Sands has been identified as the potential location of a metro station. Possible location of the metro station may be near the study area.

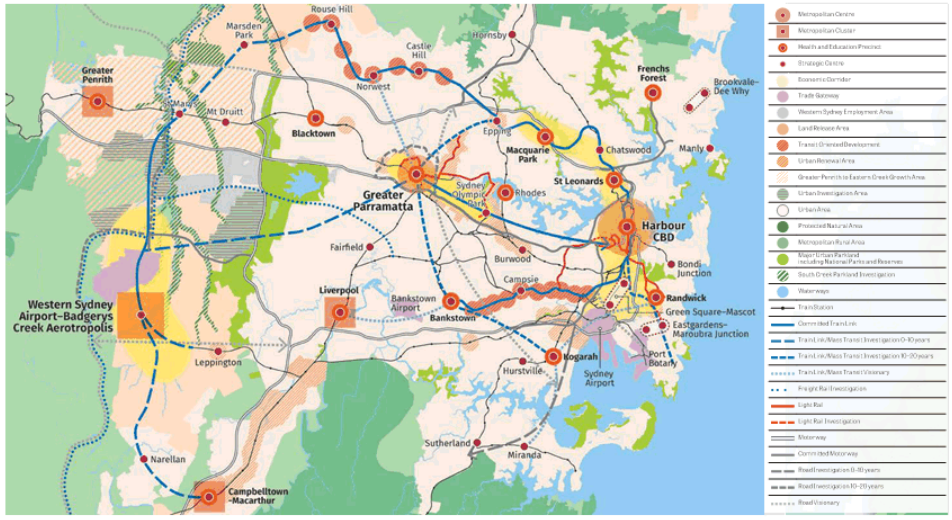

FIGURE 1.8 GREATER SYDNEY REGION PLAN

EASTERN CITY DISTRICT PLAN, 2018

This plan seeks to implement the Region Plan through planning priorities and actions. Councils are required to align all subsequent planning with the District Plan. It encourages greater housing supply and diversity with urban renewal opportunities around centres and areas with proximity to the regional transport network.

To facilitate housing supply, the plan sets a 5-year target for the Bayside LGA (10,150 dwellings) and requires the development of a 6-10 year housing target as well as capacity to contribute to the District's 20-year strategic housing target of 157,500 dwellings.

The plan requires a place-based approach to be undertaken to maintain and enhance the liveability of the Eastern City District by:

- Providing services and social infrastructure to meet people's changing needs
- Fostering healthy, creative, culturally rich and socially connected communities
- Providing housing supply, choice and affordability, with access to jobs, services and public transport
- Creating and renewing great places and local centres, and respecting the District's heritage.

The plan identifies a series of principles to be followed for place-based planning for centres:

- Provide public realm and open space focus;
- Increase residential development in, or within walkable distance of, the centre, deliver transit-oriented development and co-locate facilities and social infrastructure.
- Provide, increase or improve local infrastructure and open space; improve walking, cycling and public transport connections, including through the Greater Sydney Green Grid.
- Protect/expand retail and/or commercial floor space; protect/expand employment opportunities; support the night time economy;
- Provide community facilities and services, arts and cultural facilities; integrate and support creative enterprise and expression.
- Conserve and interpret heritage values; accommodate local festivals, celebrations, temporary and interim uses.
- Provide parking that is adaptable to future uses and takes account of access to public transport, walking and cycling connections.

DESIGN CONSIDERATIONS

More housing needed to meet Sydney's projected growth

M6 and future mass transit potentially reducing traffic along Princes Highway and Bay St

Delivery of infrastructure to align with development.

BETTER PLACED, 2017 - ONWARDS

The NSW Government identifies Design as the strategic approach needed to ensure that as our cities and towns grow bigger they get even better. Better Placed is a suite of guidelines to inform place-based/ design-driven planning prepared and continuously upgraded by the NSW Government Architect that has become the basis of the Government's 'new approach to precinct planning'.

This is in response to the concerns of communities and those involved in the development of our built environments about the impact of poor design, and defines how we can make the most of the opportunities that will arise as we develop new spaces and places.

Good design makes better places

New development has the potential to transform quality of life for people, stimulate the economy and enhance the environment. The design of the built environment shapes the places where we live, work and meet. The quality of design affects how spaces and places function, how they integrate, what they contribute to the broader environment, and the users, inhabitants and audiences they support or attract.

Better Placed is a policy for our collective aspirations, needs and expectations in designing NSW. It is about enhancing all aspects of our urban environments, to create better places, spaces and buildings, and thereby better cities, towns and suburbs. To achieve this, good design needs to be at the centre of all development processes from the project definition to concept design and through to construction and maintenance.

FIGURE 1.9 SOURCE: GANSW

GREEN GRID – CENTRAL DISTRICT, 2017

The Greater Sydney Green Grid details a long term vision to connect communities to the landscape. The Green Grid will see a network of high quality green areas, from regional parks to local parks and playgrounds that connect centres, public transport and public spaces to green infrastructure and landscape features. The vision includes enhanced waterway corridors, transport routes, suburban streets, footpaths and cycleways.

In Bayside LGA the key areas of the Green Grid are Rockdale Wetlands, Bardwell Valley Trail and Botany Bay Foreshore. It also identifies opportunities to deliver Boulevarde Streets as Green Links from Urban Centres to Botany Bay. Other suggested actions include improving interpretation signage, pedestrian and cyclist experience, connectivity to the foreshore and provide enhancements to the length of Cook Park from Brighton Le Sands to Sans Souci.

FIGURE 1.10 GREEN GRID

DESIGN CONSIDERATIONS

Green Grid Corridors provide connections and high quality open space.

Reconnect Rockdale to the waterfront and facilitate connectivity to major links.

Provide wayfinding, urban legibility and visual corridors to reconnect Rockdale with its lost landscape identity.

THE VARIOUS AND UNIQUE LANDSCAPES OF SYDNEY ARE RECOGNISED AS AN ASSET THAT CAN REINFORCE CHARACTER, IDENTITY AND ENVIRONMENTAL RESILIENCE. DELIVERED ALONGSIDE INFRASTRUCTURE AND URBAN RENEWAL AN ENHANCED NETWORK OF OPEN SPACE AND GREEN INFRASTRUCTURE CAN SERVE TO SHAPE AND SUPPORT NEW AND EXISTING COMMUNITIES.

THE HARBOUR, THE COASTLINE AND THE COOKS RIVER PROVIDE A COHERENT SPATIAL STRATEGY THAT DEFINES THE LANDSCAPE QUALITY OF THE SUBREGION.

SD.1.12 ROCKDALE WETLANDS – GEORGES RIVER TO COOKS RIVER

This group of projects have a very high conservation value extending from the Cooks to the Georges River along Muddy Creek, through Eve Street Wetlands, Spring Street Wetlands, Landing Lights Wetland, Patmore Swamp, Scarborough Park Ponds and through to Sans Souci. Opportunities include wetland restoration, establishment of bird hides education, interpretation and an improved pedestrian and cyclist environment.The Rockdale Wetlands Green Corridor is adjacent to the eastern part of the study precinct.

CD.1.13 BARDWELL VALLEY TRAIL AND WOLLI CREEK

This project cluster contains projects from Hurstville to Turella connecting pockets of natural bushland and remnant Turpentine Forest and Eucalypt Woodland which create a swathe of green in the middle of the densely populated area of the district. Projects include conservation management, green skills and interpretation, connectivity and biodiversity.

CD.1.14 BOTANY BAY FORESHORE AND COOKS PARK TRAIL

The Botany Bay Foreshore project is important in its context of linking the Great Coastal Walk to Botany Bay and the coastal projects of the South District. This cluster of projects provides an opportunity to improve connectivity to the foreshore and provide enhancements to the length of Cook Park from Brighton Le Sands to Sans Souci. This area is within 1 km of the study area.

KOGARAH COLLABORATION AREA PLACE STRATEGY, 2020

Encourage a flourishing culture and night time economy. Investigate and identify locations for student and affordable housing, short term accommodation and serviced apartments close to transport.

Create high quality public spaces and facilities that focus on wellness. Support the vision for a wellness precinct by investigating ways to maintain and improve air quality.

Protect and enhance the natural environment, increase the quantity, access to and quality of open space and enhance the urban tree canopy. Increase % of urban tree canopy in:

- town centres and main streets and areas with low urban tree canopy cover;
- areas with high pedestrian activity and high vulnerability and high urban heat island effect;
- Government owned land; and
- Green Grid routes.

Revitalise the Muddy Creek corridor and other local creeks to:

- improve walking and cycling between Rockdale and Kogarah town centres;
- improve the interface with the creek line;
- create new open space and seamless connections between key places;
- create an east-west Green Grid connection linking major open spaces.

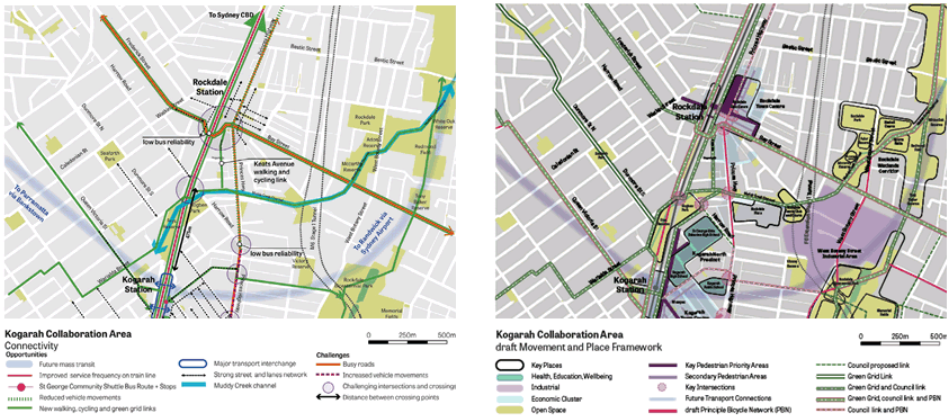

FIGURE 1.11 KOGARAH COLLABORATION AREA PLACE STRATEGY

Prioritise sustainable transport, development and water and energy use and reduce waste.

Design the local road network to support local commutes to work and plan to support local trips and patterns. Address future transport options including electric vehicles, autonomous vehicles, point to point, carshare and micromobility.

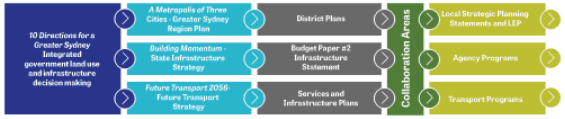

FIGURE 1.12 HEIRARCHY OF PLANS

DESIGN CONSIDERATIONS

Lobby to improve bus service

Keats Ave Link connect small parcels of open space in local context

Provide missing connections

Retail in mixed use development designed to reduce land use conflicts so as promote night time economy and protect resident amenity.

Promote safety by design and promote passive supervision

1.6.2 LOCAL STRATEGIC CONTEXT

BAYSIDE LOCAL STRATEGIC PLANNING STATEMENT, 2020

Sets out the land use vision for Bayside to 2036 and details the implementation of the key actions from the Eastern City District Plan and Region Plan through the same themes of Infrastructure and Collaboration, Liveability, Productivity and Sustainability. The LSPS determines how Bayside will manage land for the next 20 years with practical measures for aligning population and infrastructure growth.

The LSPS notes that Bayside will need an additional 28,000 dwellings by 2036, these will need to be in a variety of housing types with a particular focus on medium density dwellings to meet the population increase in families with children.

The Green Grids through Bayside are important social infrastructure and open space priorities with a particular focus on improving accessibility and functionality to best suit the growing community.

Sydney Airport and Port Botany are key trade gateways that are important to the economy of Sydney and the nation. Growth in the movement of people and freight is predicted over the coming 20 years.

Rockdale is highlighted as a Proposed Strategic Centre with significant expected job growth. An important aspect of this centre is the relationship with the Kogarah Health and Education Precinct and collaboration area.

BAYSIDE 2030 - COMMUNITY STRATEGIC PLAN 2018-2030, 2018

Details the vision and outcomes for 2030 in Bayside, setting the strategic direction for Council's delivery program and operation plans. The framework for the plan is based on guiding principles for social justice, resilient cities and good governance. It is developed around four themes for Bayside in 2030:

The plan identifies key future projects in the area including the M6 (formerly named F6 extension), train and mass transit links, light rail investigation between strategic centres and urban renewal at Bayside West, Bardwell Valley and Turrella.

A vibrant place:
Built forms focus on efficient use of energy, are sympathetic to the natural landscape and make our area a great place to live. Neighbours, visitors and businesses are connected in dynamic urban environments.

Our people will be connected in a smart City:
Knowledge sharing and collaboration ensures that we have the expertise and relationships to lead with integrity, adapt to change, connect vulnerable people to community and effectively respond in times of adversity and stress.

Green, leafy and sustainable:
The biodiversity of the area is protected and enhanced through collaborative partnerships. Vital habitats are supported to rehabilitate, thrive, adapt and recover from risks and climate events. The landscape will be preserved and regenerated to benefit a healthy environment now and in future.

A prosperous community:
Business innovation, technology, flourishing urban spaces and efficient transport will attract diverse business, skilled employees and generate home based business. Growth in services to the local community will generate employment support, a thriving community and livelihoods.

DESIGN CONSIDERATIONS

Provide more and diverse housing .

Built form to be sympathetic to the landscape, create dynamic urban environments, and make the area a great place to live.

Reduce social, economic and environmental vulnerability.

Ensure built form allows for job growth, efficient transport and innovation, and help attract investment

F6 and future mass transit potentially reducing traffic along Princes Highway and Bay St

BAYSIDE CENTRES & LOCAL HOUSING STRATEGY, 2021

The Bayside Local Housing Strategy adopted by Council sets the strategic framework and vision for housing in Bayside. It draws on policy and demographic trends alongside analysis of local opportunities and constraints to formulate an action plan for residential growth. The Strategy plans for housing until 2036 and includes a series of priorities needed to make housing more affordable, diverse and matched to the changing needs of the local community.

The Strategy highlights that Bayside currently has a large proportion of 2-bedroom dwellings with an expected shortfall in dwellings appropriate for key categories of growth; lone person households and families. The Strategy also highlights the importance of planning for affordable housing, encouraging infrastructure delivery and good design and the preservation of local character through planning controls.

To respond to the challenges of housing in Bayside, the strategy notes several investigation areas including Rockdale Town Centre and Bay Street.

Proximity to Sydney Airport limits building heights in the LGA.

Moderate change may be appropriate in pockets surrounding the Rockdale centre to the west where lots are larger and in close proximity to open space.

DESIGN CONSIDERATIONS

Enable the provision of more housing

Undertake place-based approach to understand character and set out how that will be protected and enhanced through redevelopment.

Promote diverse and affordable housing

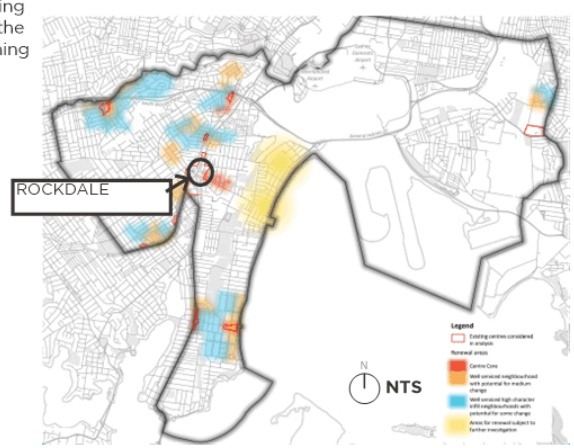

FIGURE 1.13 HOUSING STRATEGY

DRAFT SOCIAL INFRASTRUCTURE STRATEGY

The Social Infrastructure Strategy will guide Council in providing appropriate social infrastructure that can meet the expected need of the future community.

The strategy highlights an under provision of community facilities across the Bayside LGA, Existing facilities in growth areas are being placed under significant pressure due to population growth with new facilities required by 2036 to meet this need. Furthermore, Sydney Airport is a barrier to open space connectivity and as such, regional scale facilities need to be provided on both sides of the LGA.

The Green Grid is highlighted as important areas of open space noting the green space and recreation corridor link from Bay St through Rockdale Wetlands to President Avenue. Council has commenced work on spatial frameworks for the corridors.

DESIGN CONSIDERATIONS

Provide facilities, green spaces and linkages through redevelopments.

Housing, public domain and facilities for people of all ages.

Built form to allow floor space for employment growth, integrated with residential uses.

Surrounding built form to respond to the great potential of civic area.

DRAFT CENTRES AND EMPLOYMENT LANDS STRATEGY

The draft Centres and Employment Lands Strategy notes that employment in Bayside is set to grow significantly by 2036 driving demand for employment floorspace.

Sydney Airport and Port Botany are important employment hubs in the Bayside area, making up a large proportion of jobs in the LGA. However, future growth in employment is expected to be predominantly based on knowledge intensive and population serving jobs as opposed to industrial, health and education jobs.

The draft strategy highlights the opportunity for new manufacturing services to make use of the proximity to transport infrastructure and the renewal of the Princes Highway corridor to bring character to the area.

DESIGN CONSIDERATIONS

Provide facilities, green spaces and linkages through redevelopments.

Housing, public domain and facilities for people of all ages.

Built form to allow floor space for employment growth, integrated with residential uses.

DRAFT TRANSPORT STRATEGY AND DRAFT BIKE PLAN

The draft transport strategy focuses on increasing efficiency across the network and creating more safe and accessible transport options for the community and industry.

The draft Bike Plan builds on the Transport Strategy with a greater focus on active transport by making use of Green Grid links for high quality links.

DRAFT ENVIRONMENTAL REVIEW OF PLANNING CONTROLS

The draft Environmental Review of Planning Control document identifies key environmental themes, challenges and opportunities and priority actions for the future.

Key areas of focus are the Cooks River, Rockdale Wetlands and Mill Stream and Botany Wetlands Open Space Corridors and the Wolli Creek Regional Park and Bardwell Valley Parklands. These areas have high ecological value and provide essential recreation opportunities for the community.

DESIGN CONSIDERATIONS

Opportunity to augment cycling network, pedestrian connectivity and street activation through redevelopment.

Improve links to transport nodes

Improved facilities and amenity around transport nodes and along movement routes.

DRAFT FLOODING AND STORMWATER STUDY

The draft Flooding and Stormwater Study identifies challenges and opportunities to flooding and stormwater management in the Bayside Council LGA, focusing on planning controls in the Local Environmental Plan (LEP) and Development Control Plan (DCP).

The discussion paper identifies the need for land use planning policies that include consideration of climate change and the promotion of Water Sensitive Urban Design.

DESIGN CONSIDERATIONS

Redevelopment sites as key opportunity to implement and connect WSUD initiatives

Built form to facilitate efficient management of waste, and encourage sustainable habits

Retain water in the landscape & improve water quality downstream

Development to remove obstructions to overland flow

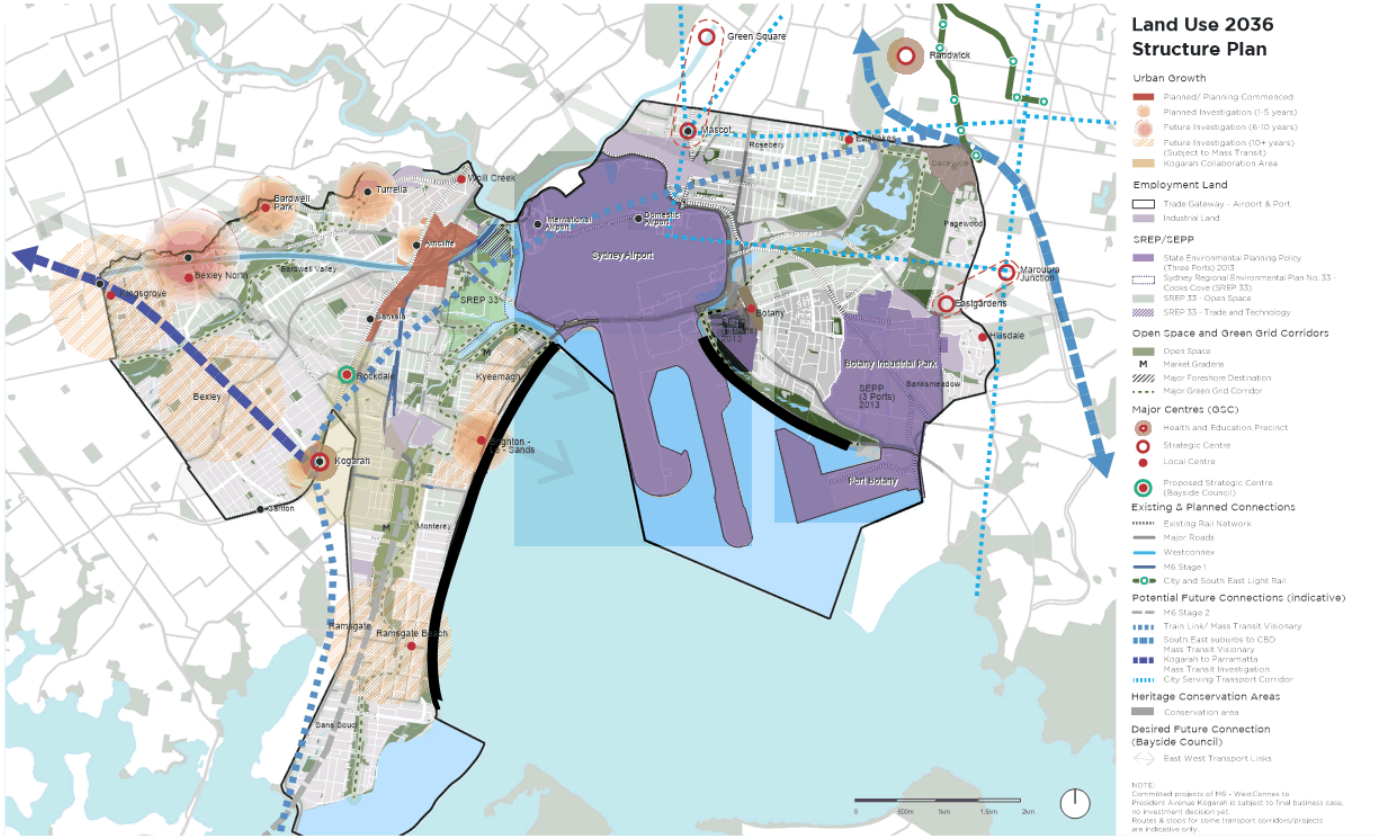

FIGURE 1.14 CONSOLIDATED ANALYSIS OF THE IMPLICATIONS OF THE EMERGING STRATEGIC CONTEXT FOR THE FUTURE OF ROCKDALE TOWN CENTRE AND THE BROADER BAYSIDE LGA

1.6.3 KEY STATE INFRASTRUCTURE PROJECTS UNDERWAY

M6 STAGE 1

The first stage of the M6 project has commenced. This section of road will be underground with an entry/exit portal at President Avenue. As part of this project a number of sites are being utilised as compounds with open space facilities demolished at Bicentennial Park and to be reinstated as part of the compensatory works.

McCarthy Reserve and the area east of the Sydney Water channel will receive significant upgrades as part of the M6 works and will include a skate park, playground, synthetic field and active transport paths that connect the open space. These works have commenced.

FIGURE 1.16 PROPOSED UPGRADES TO OPEN SPACE

FIGURE 1.15 OVERALL MAP OF M6

MUDDY CREEK NATURALISATION - SYDNEY WATER

Sydney Water own and are responsible for the Muddy Creek storm water channel draining to the Cooks River estuary. Sydney Water has commenced the design process for a naturalisation program for the section upstream of Bestic Street into the upper Muddy Creek catchment. This does not include the section immediately adjacent to Bay Street as the channel has not yet reached the end of its serviceable life however the treatment will be consistent once Sydney Water determines the need for the project to be extended upstream and beyond Bay Street.

The Sydney Water project includes the active transport link from Ador Reserve to Bestic Street through White Oak Reserve connecting to active transport north through Barton Park and through Kyeemagh.

DESIGN CONSIDERATIONS

Additional high quality recreation and green spaces will support a growing population in the Study Area

Need to improve connections from the Study Area to those facilities

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DESIGN CONSIDERATIONS

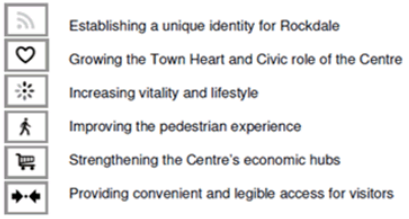
Additional high quality recreation and green spaces will support a growing population in the Study Area

Need to improve connections from the Study Area to those facilities

ROCKDALE TOWN CENTRE MASTERPLAN, 2012

Adopted by Council in 2012, the masterplan sets out the strategic vision and directions for the future of the Town Centre to achieve the community's desire and aspirations. It is the culmination of a thorough urban design, public domain and economic analysis, in extensive collaboration with the community to develop a vision for the future of the Rockdale Town Centre.

The masterplan provides six design strategies for the Centre's growth and development, and details how the Rockdale Town Centre will look and function, as well as what role it will play economically and culturally for the local community. It covers all aspects of the Centre's physical environment as well as its cultural, civic and economic role.



The Masterplan component outlines the community's vision, the design strategies that Council approved based on the community's vision, as well as setting out a number of the plans guided by these strategies. Key elements of the Masterplan:

- Precinct Plan
- Structure Plan (including 5 key initiatives for the revitalisation of the Centre):
- Town heart and civic precinct
- Pedestrian spine and retail hubs
- Interchange precinct redevelopment
- Green Gateways
- Residential revitalisation
- Parking Plan

The Masterplan Implementation Program component sets out the various recommendations and actions that emerge from the Masterplan and outlines what is needed to implement those actions.

Actions arise from the Structure Plan and Parking Plan components of the Masterplan. Each of these actions have potential requirements or changes to be made by Council under the town planning framework (eg changes to LEP/DCP or further technical details in the Public Domain Plan), or outside the planning framework (eg capital works program, contributions plan, further studies, changes to integrated planning documents and so forth).

Other recommendations and actions are dependent on other agencies, organisations, businesses or by further details/studies. All of these actions have been tabulated and categorised.

The draft Rockdale Town Centre Public Domain Plan is also attached as a separate document to this report. This draft plan is an important component of the overall Masterplan process. It specifically focuses on, and describes in more detail, the issues and recommendations surrounding the Centre's public domain. As an accompanying plan it is an important document for the future because it will eventually be accompanied by a Technical Manual, which specifies, in detail, the numerous design details and preferred materials specifications needed to improve the Public Domain. These technical details will be important for site specific public domain improvements and, as such, will be developed in close collaboration with design, project management and construction staff across Council.

2.0 Opportunities and Constraints Analysis

2.1 PRECINCT DEMOGRAPHICS - SNAPSHOT

For the purpose of this study a study area of the Rockdale-Banksia Statistical Areas 2 (SA2) is considered an appropriate area to assess the Rockdale Town Centre. The Rockdale-Banksia SA2 is generally considered the catchment for the Rockdale Town Centre retail area.

The Rockdale-Banksia area has a population of 19,961 with a median age of 33, slightly lower than the median for the Bayside LGA (35). The most common housing types are flats and apartments with the average household size 2.8 people, comparatively the most common housing type for Greater Sydney is separate houses with the same average household size. This indicates that it is likely larger families and groups living in smaller dwellings compared with the LGA and Greater Sydney.

The study area is very culturally diverse with 65.8% of the community born overseas and 72.1% speaking a language other than English at home. This is substantially higher than that of the rest of the Bayside LGA (47.5% and 56.6%) and Greater Sydney (42.9% and 35.8%), this diversity is important to consider during the design process. Interpretation and use of public spaces can vary across different cultures and should be reflected in design.

Professionals are the most common occupation in the study area (19.6%) as well as in Bayside LGA (22.5%) and Greater Sydney (26.3%). The next most common in the study area is Labourers (14.9%), substantially more common than in the LGA (9.4%) and Greater Sydney (7.5%). This can be reflected in the hours that workers are traveling, dining and shopping with labourers traditionally working earlier in the day or shift work in more industrial roles. Consideration of early morning and later evening movements may be important to consider in the design process.

The unemployment rate is somewhat higher (7.3%) in the study area compared with Bayside LGA (5.9%) and Greater Sydney (6.0%). This may be reflected in the retail demand and the recreation patterns of the community.

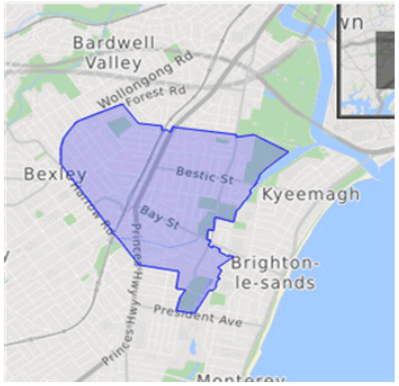


FIGURE 2.1 ROCKDALE –BANKSIA SA2 STATISTICAL AREA

DESIGN CONSIDERATIONS

Already high proportion of apartments, amenity and diversity of apartment sizes important - new developments will need common open space

Small proportion of population working in services hence encourage retail

Increased numbers of children living in town centre

	Rockdale-Banksia*	Bayside LGA**	Greater Sydney*
Population	19,961	178,396	4,823,991
Median age	33	35	36
Average household size	2.8	2.7	2.8
Dwelling structure	Flat or apartment 56.2%	Flat or apartment 45%	Separate house 56.9%
Born overseas	65.8%	47.5%	42.9%
Households with a language other than English is spoken	72.1%	56.6%	35.8%
Unemployment rate	7.3%	5.9%	6.0%

Source: *ABS, **Profile id. 2020

2.2 HISTORIC CONTEXT

The traditional owners of the area are the Aboriginal Peoples of the Eora Nation including the Gamaygal, Gwegal, Bidjigal and Gadigal Clans and collectively they are known as the "water people".

Prior to European settlement, the Bayside Local Government Area was comprised of coastal, wetland, waterway and bushland environments that sustained the Eora Nation with plentiful resources to support a rich culture.

The early development of Rockdale occurred in the low lying areas surrounded by rocky outcrops when the district was once heavily forested with very large trees. In the late 1890s the area was a mixture of noxious trades and market gardening.

The railway changed Rockdale when it opened in 1884 to become an important residential suburb on the Illawarra line. The first retail shop in Rockdale was built in 1862, developing a strong presence along Princes Highway in the emerging Town Centre.

The growing importance of Princes Highway as a major vehicular route, as well as the extension of the Sydney airport in the 1940s and then again later the opening of the east-west runway in the 1990s brought with it significant noise and amenity impact to these residential and retail areas.

FIGURE 2.2 PRINCES HIGHWAY ROCKDALE TAKEN FROM BAY STREET LOOKING NORTH, CIRCA 1912

FIGURE 2.4 THE INTERSECTION OF PRINCES HIGHWAY AND THE SEVEN WAYS IS A PLACE THAT ATTRACTS COMMUNITY FOCUS DESPITE ITS BUSY LOCATION

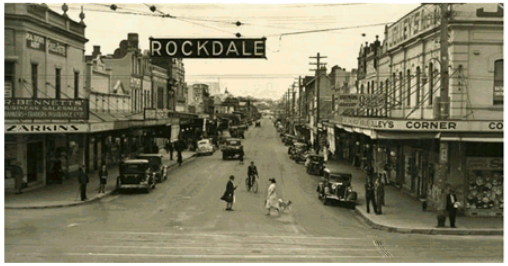


FIGURE 2.3 PRINCES HIGHWAY ROCKDALE AT THE BAY STREET INTERSECTION, 1937

DESIGN CONSIDERATIONS

Reconsider visual and physical connections to our unique landscape, including water

Retain and enhance retail and also improve amenity of residential development near noise sources, importance of railway station.

Junction of Seven Ways - consider as special place for built form and potential expansion of public domain/ open space.

2.3 HERITAGE AND COMMUNITY

Rockdale Town Centre has public buildings that give the Town Centre a strong civic and community focus and add to the vibrancy and character of the Centre. These include the Rockdale Town Hall, adjacent Rockdale Library, Council Administration Building. and Rockdale Public School (I219).

The Rockdale Town Hall (I220) and the The Guild Theatre (I221) are both listed in Schedule G of the Bayside LEP as items of local heritage significance. are performing arts and theatre spaces which are otherwise limited. Developing additional cultural spaces and clustering creative activities is needed and the existing landmark theatre spaces could become the backbones for that future vision.

Identifying opportunities to embed arts and culture into local government assets, NSW Government properties and in public spaces to expand cultural infrastructure in the area that responds to changing demographics.

The State heritage listed Rockdale Railway Station (I222) and associated railway infrastructure are also heavily utilised by the community and visitors, yet visually disconnected from the Town Centre identity.

The Uniting Church (I206) is the oldest church in the St George district. The buildings in this site and associated trees mark the entrance to Bay St, offer a space of respite from the busy roads and are an important green landmark contrasting with the adjoining Princes Highway.

FIGURE 2.5 HERITAGE AND COMMUNITY DIAGRAM

In addition to listed heritage items there are a number of highly visible open spaces, building and precincts identified on the map that contribute the character of Rockdale in a positive way.

The King Street Plaza and the Rockdale Library are some of the few places in the Town Centre where people stay and gather. Those places have emerged as a reference of a contemporary community identity for the current residents.

A tradition of culturally diverse eating places and an emerging modern cafes under new buildings are also strongly associated with community life in the Town Centre.

The Princes Highway remains the core of community life in the Town Centre and several other locations. contributes in a positive way to the identity of an evolving urban fabric that defines Princes Highway as its own unique place. The Princes Corner and iconic pubs located at the St George Tavern and The Grand Hotel have a strong presence as a result of strong architecture.

2.4 ECONOMIC ACTIVITY

The Rockdale Town Centre precinct is a vibrant retail hub, with predominately cafes, restaurants and fresh food supplies. It has a local shop village atmosphere.

In spite of convenient parking and good transport access, many people only pass by or commute via the Town Centre rather than visit it. This may be due to the lack of major attractions (retail anchors or large employment generators) and excessive long stay parking (public parking spaces with no time limits) within the retail core.

"...a great place to shop, work, visit and live"

- Establish a unique identity for Rockdale to make it more attractive for residents and visitors
- Increase and improve the Centre's entertainment and nightlife activities and facilities
- Maintain the culturally diverse fresh food retailing as a key part of the Centre's character
- Second storey commercial to reduce complaints in outdoor dining areas – night time economy.
- Ensure continuous retail street is maintained by maintaining and improving access and servicing potential via laneways. The laneway should be the primary location for building servicing and vehicular access and the built form should facilitate that. However, the potential to provide some activation should also be maximised.

FIGURE 2.6 RECENTLY COMPLETED BUILDING AT 433-439 PRINCES HIGHWAY

2.5 LAND OWNERSHIP

A significant proportion of the Town Centre core area comprises of small lot subdivisions which lends itself to a fragmented ownership pattern. Without site consolidations, future development of these sites will be difficult to achieve. A significant amount of land for commercial and residential uses in Rockdale Town Centre is currently strata-titled, which presents constraints to developments.

Significant public ownership of land in Rockdale has traditionally contributed to open space and employment generating uses that create the vitality and amenity of the Town Centre.

The significant Council landholdings east of the library are identified in the Rockdale Town Centre Masterplan as an opportunity site that will be transformed into an outstanding new civic centre including open space, modern buildings and services to the community. Future open space and transport connections will also be provided in the publicly owned lands associated with the Muddy Creek and M6 corridors.

Outside those areas, provision of additional and improved public domain and open spaces will be achieved through the redevelopment of private sites, with some limited potential land acquisition by Council.

A number of publicly owned schools within walking distance to the precinct also offer an opportunity to investigate shared recreation facilities between students and the local community.

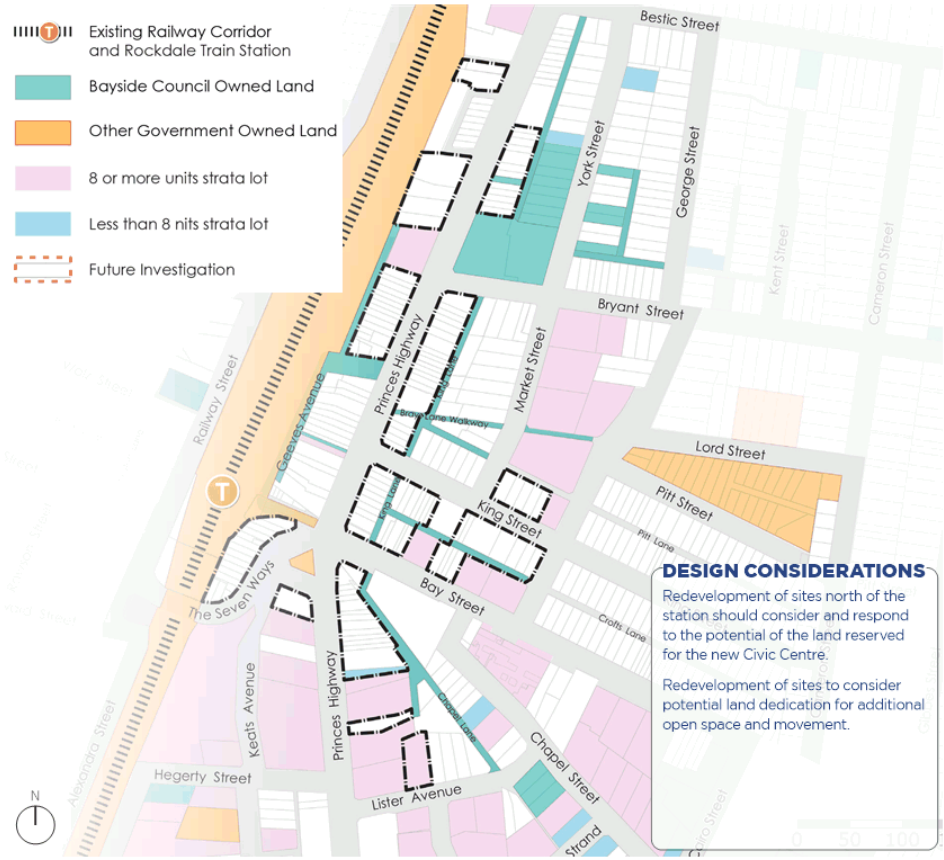


FIGURE 2.7 LAND OWNERSHIP

2.6 BUILT FORM CHARACTER

Rockdale Town Centre is a busy, vibrant and well-serviced centre. Its built form character is more remarkably defined by the relationship of the built environment with the Princes Highway and a few landmark buildings. Despite the heritage and historical importance of the railway to the Town Centre, the urban structure and built form do not directly address to the rail line or the station.

New apartment buildings recently developed along the Princes Highway have started to define an emerging modern urban character somewhat unique to Rockdale, with the built form responding to and embracing living along such major throughfare. New development along and near Princes Highway has also provided additional and/or modernised retail spaces on the ground floor that have attracted an emerging cafe culture and a greater variety of services to the community.

Most sites in the Town Centre offer opportunities for regional views and good views to the Botany Bay from higher levels. Amenity for residents, particularly along the busier roads is impacted by noise and air pollution, overhead wires and a overall lack of street trees or green outlook.

The back streets offer respite and have retained a fairly suburban character despite an emerging higher density built form that has contributed to an improved public domain and street activation away from busy roads.

Considering the intended character in the Masterplan and following a place-based approach, the analysis has considered four distinct character areas based on the existing character, built form being constructed and the function of the built environment in relation to the town centre.

FIGURE 2.8 BUILT FORM IN THE TOWN CENTRE AND IDENTIFIED CHARACTER AREAS WITHIN THE STUDY AREA

* Coming soon: Two DAs not mapped here - See Appendix 4 for a more up to date reference.

RECENT/PROPOSED DEVELOPMENT

1) 592 UP TO 610 PRINCES HIGHWAY
VARIOUS STAGES

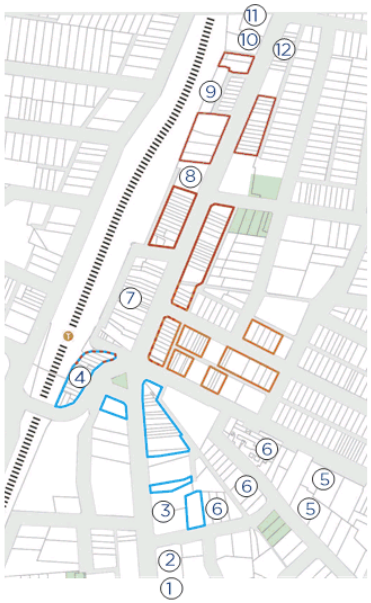
2) 588 PRINCES HIGHWAY
UNDER ASSESSMENT

3) 560 AND 586 PRINCES HIGHWAY
CONSTRUCTED

4) 13 THE SEVEN WAYS
APPROVED

5) 41 & 45 BAY STREET &
4 CHAPEL STREET
DEFERRED COMMENCEMENT

6) 15-21 BAY STREET,
1-11 CHAPEL STREET,
1-3 CHAPEL LANE &
6-12 LISTER AVENUE
CONSTRUCTION STARTED,
15-21 BAY STREET COMPLETED



7) 471-511 PRINCES HIGHWAY
UNDER ASSESSMENT
XXXX

8) 433-439 PRINCES HIGHWAY
CONSTRUCTION BEING COMPLETED
XXXX

9) 1-2 WAINES CRESCENT
APPROVED

10) 401 PRINCES HIGHWAY
APPROVED

11) 395-397 PRINCES HIGHWAY
CONSTRUCTION BEING COMPLETED

12) 376-384 PRINCES HIGHWAY
CONSTRUCTION BEING COMPLETED

AREA A

PRINCES HIGHWAY NORTH

Emerging development has brought an interesting built form and street address that is distinctive to this area, with additional tree planting as well as more diversity of size (including larger spaces) and improved quality of retail frontages.

The new library and the future adjoining Civic Centre precinct allow for a unique design response that includes further intensification of modern retail and residential options, establishing a high-quality, unique urban living character.

DESIGN CONSIDERATIONS

Retail spaces to increase diversity and complement opportunities in more established areas

Provide a greener outlook.

High-quality and distinctively modern residential and retail, with facilities on the door step defining a unique urban-living character

AREA B

PRINCES HIGHWAY STATION AREA

The Town Centre lacks visual and physical relationships with the railway despite its importance. The arrival experience by train is particularly poor with poor urban identity, and the built form and public domain are dated, uncomfortable and do not encourage people to stay, in contrast to the emerging environment along King Street.

Footpath and road restrictions also contribute to the remarkable lack of a green outlook. The amenity of apartment residents would be negatively impacted by road and railway noise. Geeves Rd lacks activation.

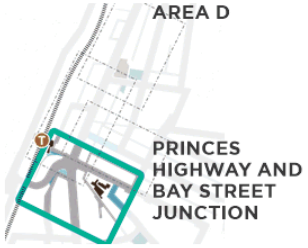
DESIGN CONSIDERATIONS

Built form orientation and design to reconnect the Town Centre phisically and visually to the station and King Street and consider amenity of residents.

Improve urban legibility and identity acknowledging the role of the station and the arrival experience.

The character is defined by a unique mix of existing, traditional retail, emerging modernised facades. Pedestrian friendly public domain and a built form with ample, active retail frontages have defined a new focus for the community activity and become one of the few places where people gather in the town centre.

Poor relationship with Area B, potential to extend the positive vibe of King St towards station and establish distinctive Town Centre Core character along both sides of Princes Highway marking a special location and improving urban readability.



Improve building design quality and presentation to Princes Highway towards the south and improve perception on the approach to the town centre from the south. Enable further variety and better quality of active uses fronting the street. Lack of green on the public domain at key junction creates negative perception of town centre.

Has a unique urban structure that marks the gateway to the town centre. This junction has also a historical civic importance to the community as the site of an Anzac Memorial, although the location is not fit for this purpose.

Restricted vehicular access and irregular shape of lots limit built form outcomes yet offers opportunity to deliver unique/ landmark buildings to further define this important gateway.

Currently buildings at the junction rear face and address the station interface and as a consequence the public domain on arrival from station is poor.

2.7 LANDSCAPE CHARACTER

2.7.1 TOPOGRAPHY, VIEWS AND VISTAS

"Place-based" planning is a new approach to planning for centres and key precincts being adopted in NSW that aims to support and build thriving communities. It involves taking a collaborative, spatial and long-term approach to develop contextual responses that better meet the needs of local people and their environment in a defined geographic location.

The Rockdale Town Centre is relatively flat along the Princes Highway spine and explains its historical role as an important travel route and the development along and around it.

Despite the heritage and historical importance of the railway to the Town Centre, better connectivity, particularly visual connectivity and relationship to the station is remarkably lacking.

Several contributory character features identified offer an opportunity to establish a rhythm of interesting views and vistas that establish a local identity, create interest while travelling through the town centre and entice visitors to stop by.

Those features are varied and reflect the history and natural character of the precinct as well as its more contemporary and unique urban structure and built form. Key vistas or views to those features are currently limited or blocked and redevelopment brings important opportunities to re-establish or enhance those.

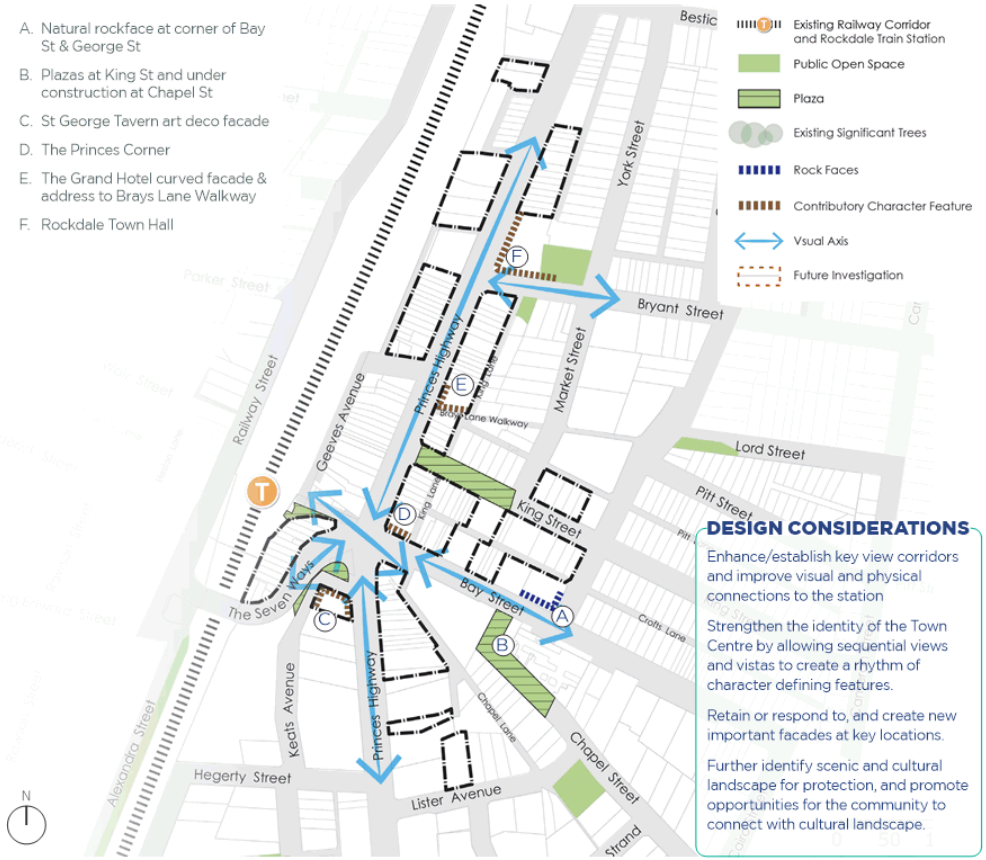


FIGURE 2.9 LANDSCAPE CHARACTER

2.7.2 NATURAL ENVIRONMENT AND CANOPY COVER

The suburb of Rockdale has less than 15 per cent urban tree canopy cover which is very low when considered against the NSW Government target of 40 per cent cover in Greater Sydney by 2036.

In Rockdale Town Centre, provision of green spaces, trees and an overall green outlook is particularly lacking due to a lack of footpath and space under awnings. Existing green spaces are small. Overhead wires and pruning contribute to the loss of urban tree canopy and limit opportunities for new planting.

Significant improvement is needed to improve well being of residents as enhanced green spaces and planting reduce pollution and improve amenity along our busy roads making them more attractive

Importantly, to reduce urban heat, increasing the urban tree canopy is essential, yet challenging. New developments have usually resulted in canopy loss. Requirements for landscaping on new development are inadequate and large floorplate buildings in centres leave little space for planting. The loss of private green spaces may also occur due to medium density and granny flats development decreasing tree canopy.

Other opportunities to plant trees should also be investigated, including reallocating road space, car parking and planting trees on private and government-owned land and along active transport routes.

DESIGN CONSIDERATIONS

Development to minimise impact on existing canopy cover and local vegetation character undergrounding of services to improve provision of street trees .

Seek a finer grained built form and innovative approaches to improve vegetation on constrained frontages to achieve an overall greener outlook.

Consider minimum landscaping and large tree requirements in new developments, and appropriate species for sense of place and a changing climate.

Use landscaping and trees along busy roads to improve air quality. Investigate internal and external design controls for new developments to reduce impacts of noise and poor air quality

Consider the impact on soil and water table conditions in identifying potential development and underground use of sites.

2.7.3 OPEN SPACE

The provision of open space in Rockdale Town Centres is low, and residential areas are often further than 400-metres to open space. Existing open spaces are small, limiting flexibility and function. Many have low levels of embellishment and do not meet community needs. New development adds additional pressure on existing spaces, compounding reliance on spaces outside the town centre.

The Rockdale Wetlands Corridor is the primary source of multiple sporting and recreational facilities including baseball, a PCYC, cricket nets, sporting fields, tennis courts and multi-use courts.

In established town centres, existing buildings, land fragmentation and ownership patterns mean that opportunities to provide land for additional open space and new connections are very limited, and can only be achieved through the redevelopment of large/amalgamated sites. Therefore, it is important to carefully consider opportunities to increase open space and connectivity as we plan for redevelopment within the study area.

Although there are currently limited public open space areas within the Town Centre, some existing open spaces have more potential. The well maintained Council forecourt garden, the outdoor dining/cafe atmosphere in King Street Place and the existing laneway network can be enhanced to make the Town Centre more accessible and attractive.

Several public domain improvements identified in the Town Centre Masterplan such as the new Chapel Street plaza as part of the development process have been completed.

Substantial improvements in open space quantity and quality, connectivity and biodiversity are expected to be completed in the future to support the increased number of residents in Rockdale Town Centre.

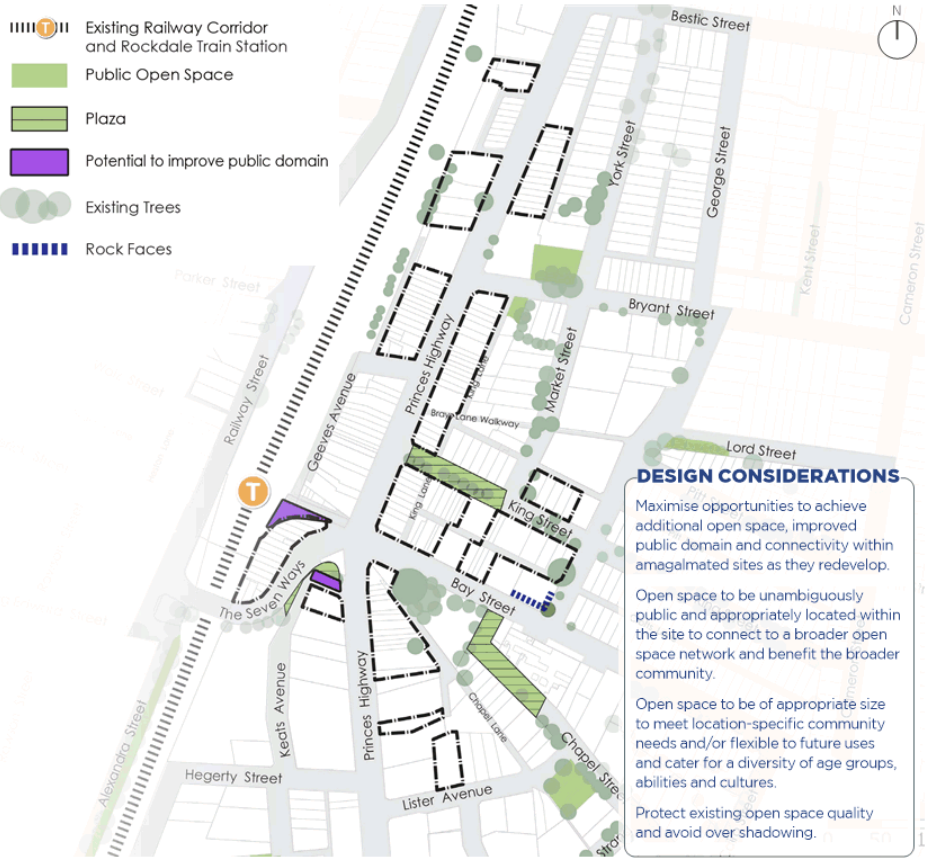


FIGURE 2.10 KEY OPEN SPACES AND SIGNIFICANT VEGETATION IN THE TOWN CENTRE

2.8 MOVEMENT

2.8.1 ACTIVE TRANSPORT

The Princes Highway is a major thoroughfare and barrier that limits east/west permeability. for pedestrians and cyclists.

There are strong desire lines to and from the railway station and connecting to Walz Street to the west and Bay Street to Brighton Le Sands to the east.

There are numerous laneways and positive links between areas. Laneways are generally quieter and potentially more pleasant human environments.

Currently cycling infrastructure is limited with commuter cyclists forced to ride in traffic which is not encouraged.

A narrow road separates The Seven Ways Memorial Garden from the St George Tavern. This roadway is necessary to allow large service vehicles to circulate from Princes Highway to Keats Avenue. There is an opportunity to consolidate the public land with a land swap in Keats Avenue that is sufficient to allow trucks to make a U-turn in Keats Avenue. This is of benefit to traffic on Princes Highway and also allows better public domain for the public as well as future occupiers of the St George Tavern site.

Improvements to the public domain will allow safer movement of trucks and pedestrians on the southern end of Geeves Avenue.

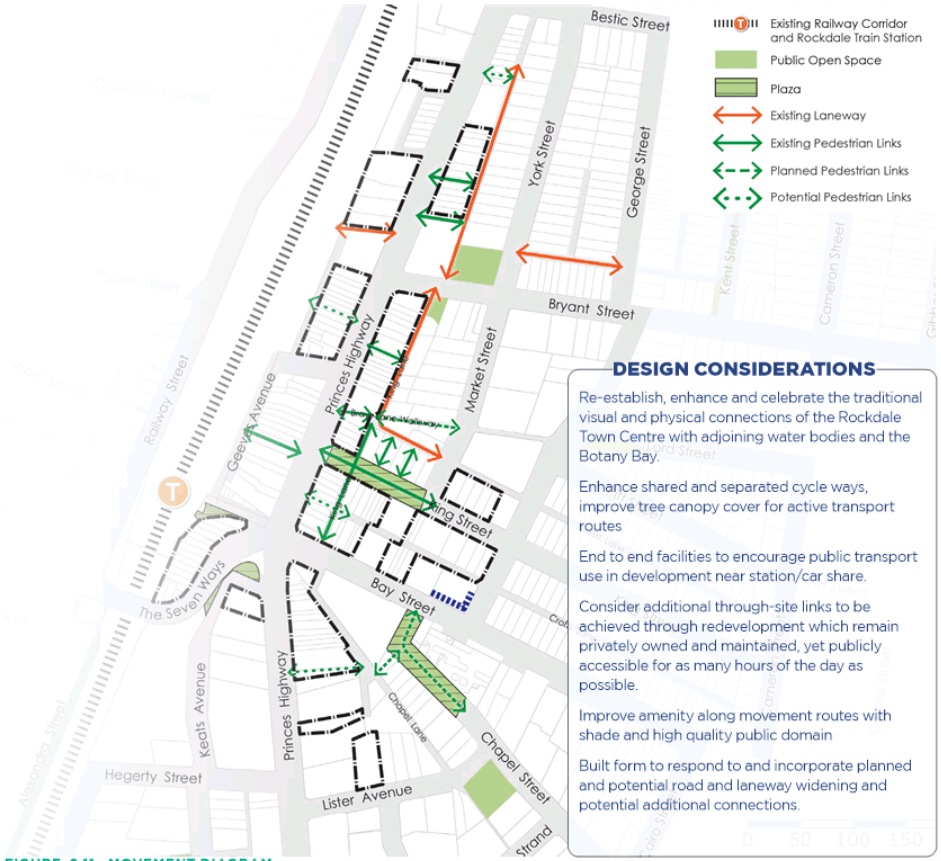


FIGURE 2.11 MOVEMENT DIAGRAM

2.8.2 TRAFFIC

Key recommendations for traffic facilities for this area include:

- Review of laneway access and movement strategy for the precinct to ensure laneway widths suits operations and servicing needs as well as increased pedestrian activity within the laneways.
- Promote development adjacent to the pedestrian arcade between the Princes Highway and Geeves Lane (opposite Rockdale Mall) to ensure that appropriate measures are in place to activate pedestrian movements through this area.
- Consider installation of a local area roundabout at the York Street / Bestic Street intersection.
- Enhance town centre bus stops to further promote the use of bus services with additional seating and shelters where necessary.
- Enhance footpath/verge treatments to be consistent with a public domain masterplan for the Town Centre.
- Consider installation of a signalised intersection at the Waines Crescent and Princes Highway intersection to connect Geeves Lane through to Waines Crescent to limit direct access from the Princes Highway. This will require land acquisition for a rear connection between 439 Princes Highway and Waines Crescent. There is an opportunity to engage with railway lands (owned by TfNSW) to achieve this connection.
- A pedestrian facility across Princes Highway at Waines Crescent may present an opportunity for a better laneway alignment on the eastern side of the highway further north of the existing pedestrian laneway owned by Council.
- Prepare a traffic model for the Rockdale Town Centre to ensure impacts have been suitably mitigated.

FIGURE 2.12 TRAFFIC FACILITIES

2.9 WATER

The study area straddles two sub-catchments within the Muddy Creek catchment, with Bay Street forming the catchment divide. Runoff from areas south of Bay Street drains towards the main Muddy Creek open channel near Rockdale Plaza Drive outside the study area.

Runoff from areas north of Bay Street drains in a northerly direction, discharging into the open channel commencing at Short Street, Banksia, also outside of the study area. The primary overland flow paths are along King Lane and York Street. Overland flow throughout the Rockdale Town Centre precinct is low and does not present a major constraint to redevelopment.

Healthy waterways are important for biodiversity, urban cooling, community recreation and local economy. Waterways in Bayside however have a legacy of significant environmental impacts from heavy industrial developments, channelling of existing creek lines, urban runoff and spills as well as invasive weeds and gross and suspended pollutants .

As identified in the Community Strategic Plan, improving local water quality is a key objective of the local community and Council with considerable efforts to work towards this goal.

Priorities for Council include reducing the flow and improving the quality of urban stormwater, managing the legacy of pollutants from the heavy industry that traditionally used local waterways as a waste system, reducing sewage overflows and managing the level of urban development further hardening the catchment. Bayside has more than 60% hard surfaces across the LGA and is facing increased growth pressures in the short term.

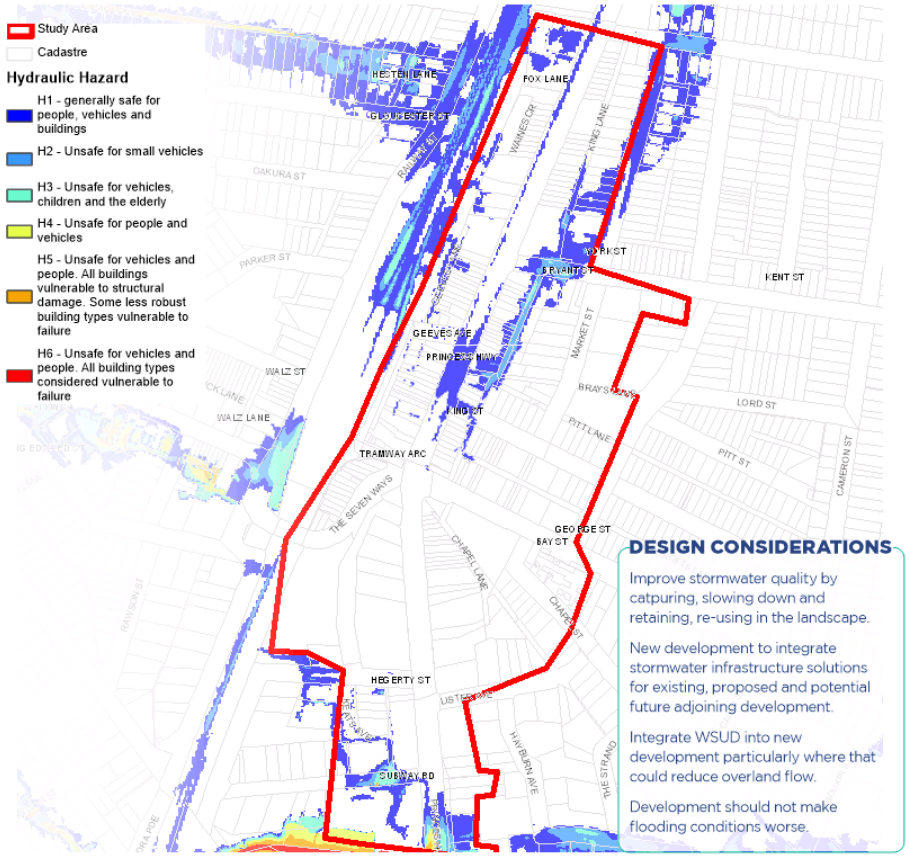


FIGURE 2.13 FLOOD HAZARD MAPPING

2.10 PROXIMITY TO AIRPORT

The Rockdale Town Centre sits with 2km of Sydney Airport. The northern part of the Town Centre lies directly beneath the flight path. This has a significant impact on new developments due to noise affectation and building height limitations.

IMPACT ON HEIGHT OF BUILDINGS

The Town Centre is subject to separate building height restrictions and approval processes to ensure that new buildings and the construction process does not interfere with the normal operations of Sydney Airport.

The Obstacle Limitation Surface (OLS) defines the height of development where development applications will be referred to the relevant authority for approval.

The topography in Rockdale means that, depending on the ground level, acceptable building heights range significantly. The building heights will need to be calculated for each site to ensure that the building height complies with the ADG, OLS and PANS-OPS the Procedure for Air Navigation Services – Aircraft Operations on a site specific basis.

NOISE

An ANEF (Australian Noise Exposure Forecast) is a plot of estimated noise exposure based on a forecast of aircraft movements and fleet mix.

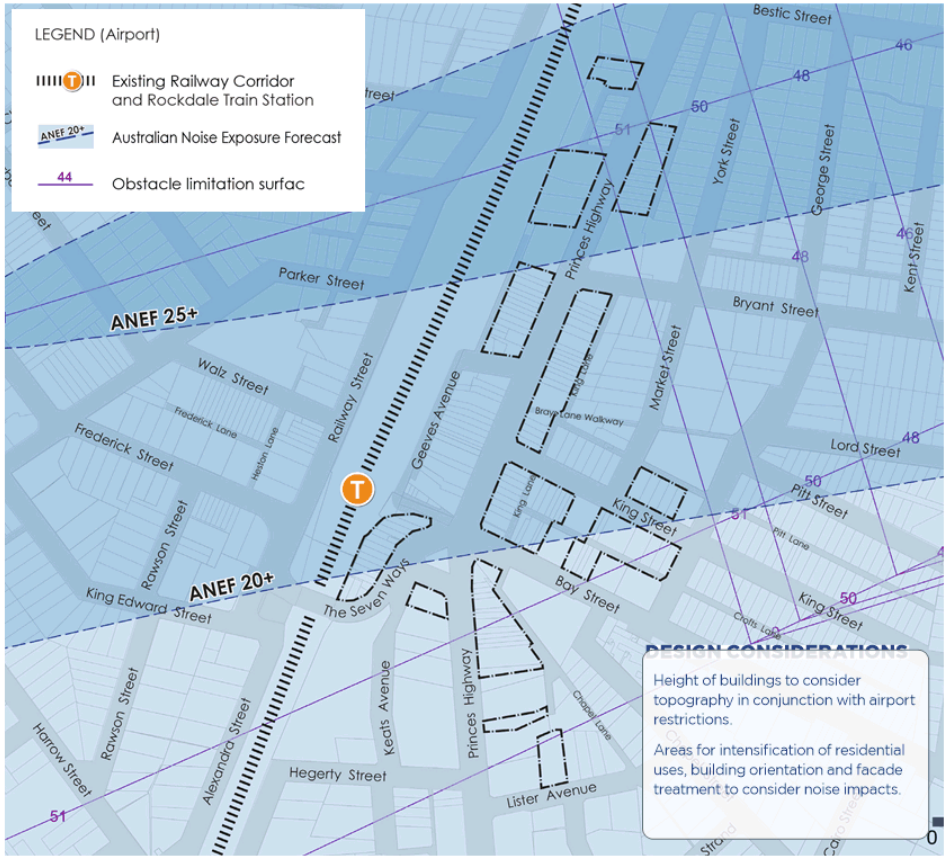


FIGURE 2.14 OLS AND ANEF CONSTRAINTS

2.11 OPPORTUNITIES AND CONSTRAINTS

CONSTRAINTS

- The Princes Highway is the most dominant feature of the Rockdale Town Centre.
- Lack of urban greenery, noise from traffic and planes impact public amenity.
- Local street circulation and servicing of buildings and businesses impacts pedestrian amenity.
- Future built form is constrained by airport height restrictions, existing strata, tight building separation.

OPPORTUNITIES

- Promote a more cohesive town centre, where all buildings and sites work together to improve amenity, identity and attractiveness of the town centre.
- Protect and/or enhance key landmarks, views and vistas.
- Create an attractive sense of arrival into the town centre from public transport and different access points.
- Improve design quality, create opportunities for iconic buildings and places in landmark locations to enhance the unique features and rhythm of urban experience that defines the town centre identity.
- Improve the public domain at ground and on the street front to activate the retail area and public spaces and attract investment.
- Protect mature trees and implement innovative ways to encourage a greener outlook through green facades and elements on the ground plane.
- Increase pedestrian permeability.
- Create stronger visual and physical connections between different precincts (existing and future), re-establish a positive relationship between the town centre, the railway station, surrounding green spaces and water.

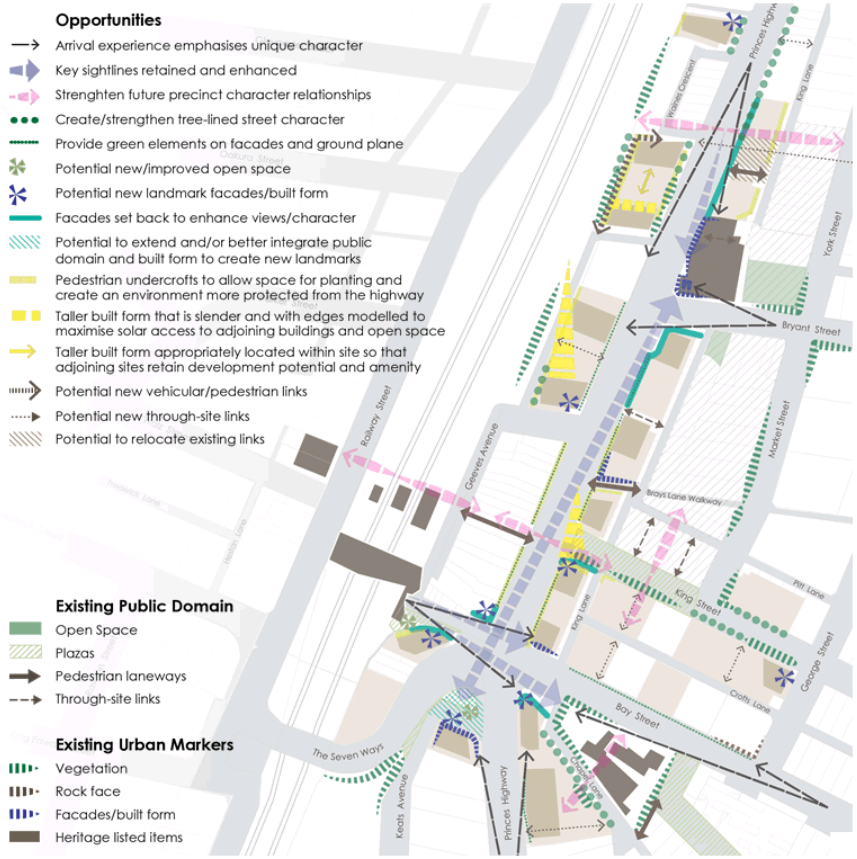


FIGURE 2.15 OPPORTUNITIES & CONSTRAINTS

3.0 Desired Future Character and Design Recommendations

3.1 DESIGN VISION

3.1.1 VISION

The study area sits within the Rockdale Centre Masterplan 2012 area.

The broader vision for the study area remains the community vision as set in 2012. That is, the Rockdale Town Centre will be:

"a great place to shop, work, visit and live"

3.1.2 DESIRED FUTURE CHARACTER

The Masterplan and the vision were informed by community aspirations for the Town Centre:

- Establish a unique identity for the Town Centre to make it more attractive for residents and visitors.
- Increase and improve the Centre's entertainment and nightlife activities and facilities.
- Maintain the culturally diverse fresh food retailing as a key part of the Centre's character.
- Encourage redevelopment of the Centre edges to make these areas more attractive.
- Improve and provide more open space for a range of users including families and children.
- Improve the laneways to better connect parts of the Centre and make them special in their own right.
- Maintain and enhance the Centre's important civic role, which needs to relate better to the rest of the adjoining areas.

This section provides a finer-grained and place-based response to those aspirations from the community and recommends design principles to guide future development to achieve the desired outcomes in each of the Character Areas identified in the context of this study.

The design principles reflect the place-based analysis presented in Chapters 1 and 2 and:

- interrogate and build on the 2012 Masterplan's 'five broad initiatives' (figure below) and other recommendations;
- respond to recent and approved development;
- respond to the new strategic context, challenges and opportunities for each Character Area that have emerged in the past 10 years.

The future character of the built form and public domain that will result from the application of the design principles is also presented and discussed in this chapter.

1. Establish a unique **identity** for Rockdale
2. Grow the town **heart** and civic role
3. Increase the **vitality** and lifestyle
4. Improve the **pedestrian** experience
5. Strengthen the Centre's **economic** hubs
6. Provide convenient and legible **access** for visitors

FIGURE 3.2 ROCKDALE TOWN CENTRE MASTERPLAN

3.1.3 DESIGN PRINCIPLES

CHARACTER AND PLACE

- Build on the distinctively modern civic, residential and retail design character emerging in this area
- Improve design quality and respond to the civic centre's future amenity and retail opportunities to create an area with a unique 'modern urban-living' character with multiple facilities on the door step
- Future public domain and built form to be delivered in coordination to protect and frame views and vistas to the Rockdale Town Hall and Rockdale Library.
- Establish visual and physical connections between the Town Centre and the site context such as the topography, Botany Bay, open spaces and established local character
- Protect and enhance view corridors and key sightlines and framing of historical and contemporary urban markers
- Create a sense of arrival using green gateways to signal entry into the Town Centre
- Use rhythm , architectural and public domain features to excite visitors to encourage them to stop and stay.
- Create a strong sense of place using landmarks, strong visual cues and focal points
- Protect character features such as high quality buildings especially brick, decorative and sandstone construction, facades, trees, and natural features such as rock outcrops
- Encourage a vibrant culture during the day and promote the night time economy

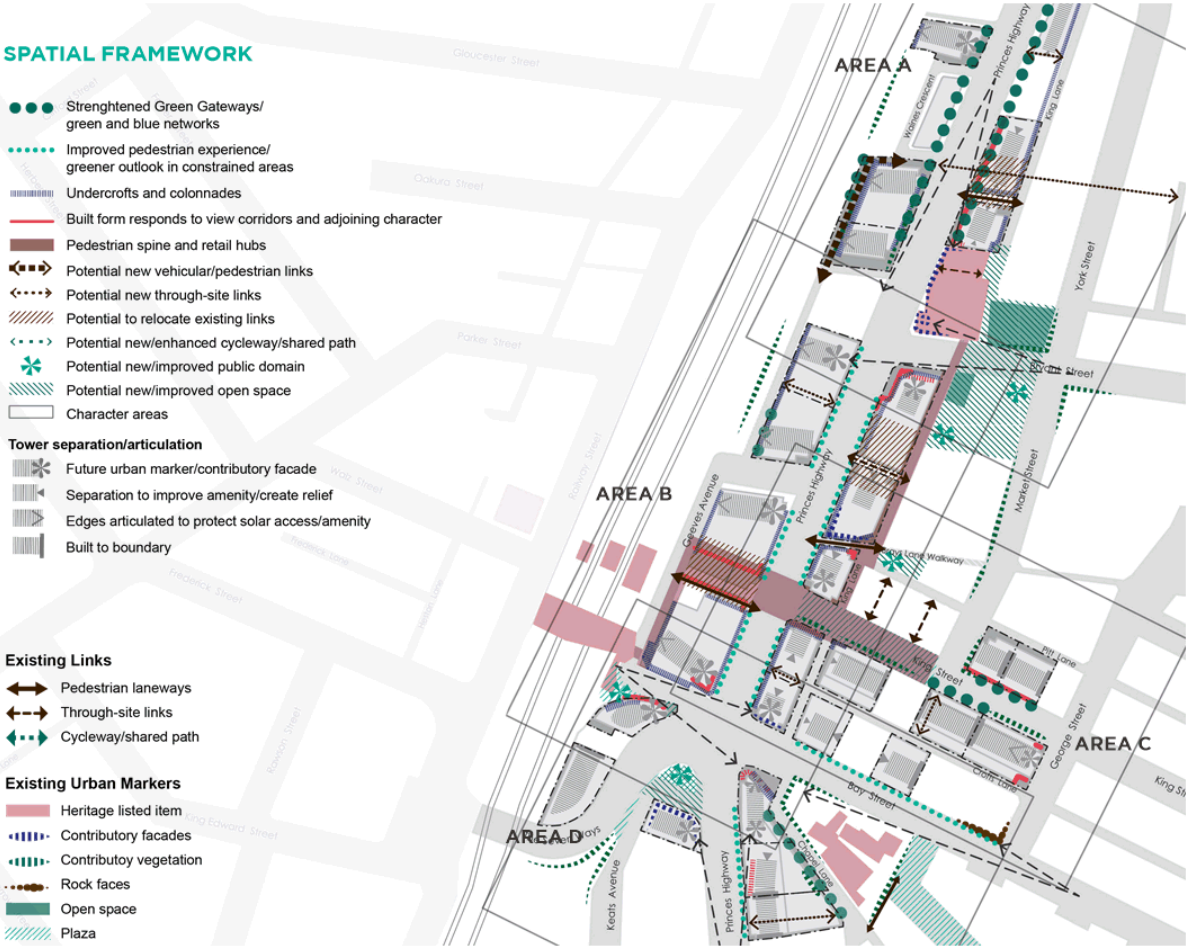
BUILT FORM

- Enhance town centre identity and legibility using built form height, massing, form, hierarchy and rhythm
- Protect neighbouring properties, residential areas, open space and town centre amenity. Design built form massing and orientation to minimise loss of solar access
- Lot amalgamation and building massing distribution to optmise design quality outcomes including preserving redevelopment potential of adjacent sites
- Create diversity in podium-tower relationships that respond positively to the public domain and desired character for each area
- Facades and buildings to be articulated to limit negative impacts on public domain and to create visual interest
- Provide highly articulated facades and tower edges modelled to maximise solar access and privacy to buildings in close proximity.
- Increase areas of public domain, improve view corridors and create new urban markers by articulating podium facades at key street corners to expose tower corners.

PUBLIC DOMAIN

- Improve pedestrian permeability and encourage a pedestrian friendly environment with activated places with well coordinated laneways, through-site links, crossings, passive surveillance, lighting and wayfinding
- Improve safety, comfort and connectivity for pedestrians and cyclists with surrounding recreational areas, Rockdale Wetlands Corridor, public transport, and Botany Bay
- Deliver gains for the Green and Blue Grids through a finer-grained integration between landscape and built form to achieve wins for sustainability, habitat and public amenity using WSUD and stormwater to green the landscape
- Maintain and improve access for servicing of retail area by vehicles and limit negative impacts on activated area
- Extend the Green Gateways to strengthen the arrival experience by protecting established trees, increased tree canopy and promote a greener outlook in the core area in public and private spaces
- In constrained areas, particularly in the heart of the centre along the Highway encourage a high standard of public domain, using increased soft landscape/tree planting, and colonnades and undercrofts to create expanded public spaces

3.1.4 OVERARCHING SPATIAL FRAMEWORK



3.2 PLACE-BASED RECOMMENDATIONS

3.2.1 AREA A - PRINCES HIGHWAY NORTH PRECINCT

FUTURE CHARACTER AND PLACE

Future Character and Place

- Arrival experience
- Key sightlines
- Character area gateways and relationships
- Built form
- Facades set back to enhance views/character
- Potential new landmark facades/built form
- Potential to better integrate public domain and built form to create new landmark places

Existing Urban Markers

- Vegetation
- Rock face
- Facades/built form
- Heritage listed item
- Plaza

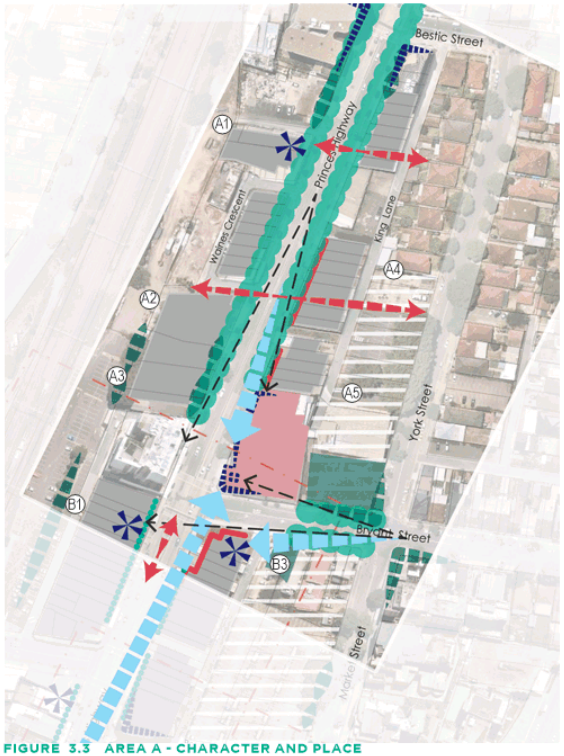


FIGURE 3.3 AREA A - CHARACTER AND PLACE

FUTURE BUILT FORM - BUILDING CONFIGURATION AND MASSING

Future Built Form – Configuration and Massing

Podium massing – character hierarchy
- Larger-scale: Town Centre core
- Medium-scale: Green Gateways/special places
- Small-scale: seamless street-level interface

Podium street wall – height and transitions
- 6 storeys
- 4 storeys
- 3 storeys
- 1-2 storeys

Tower configuration
- Siting and Orientation of longer facade
- Future urban marker/contributory facade

Tower heigth – character hierarchy
- 11-12 storeys: tallest, station area and key gateways
- 10-11 storeys: tall, site constraints/transition from station
- 8-9 storeys: medium, longer facade faces special places
- 6-7 storeys: tower-podium transition

Existing Urban Markers
- Heritage listed item
- Contributory facade retained as possible
- Open Space
- Plaza

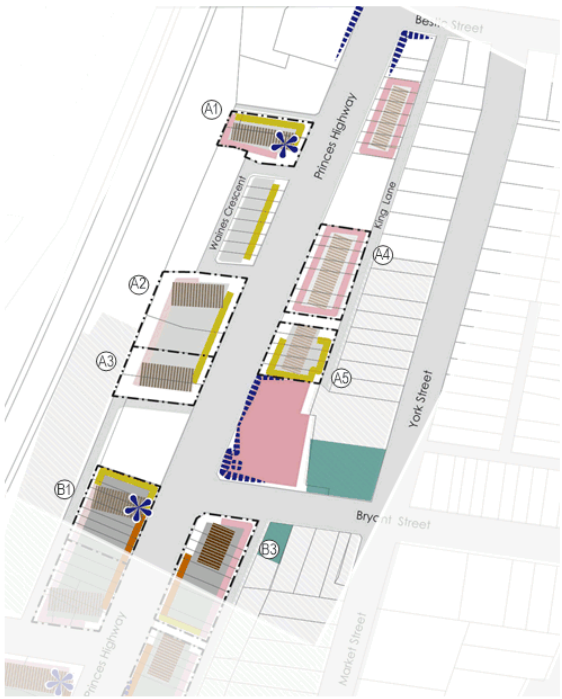


FIGURE 3.4 AREA A - BUILDING CONFIGURATION & MASSING

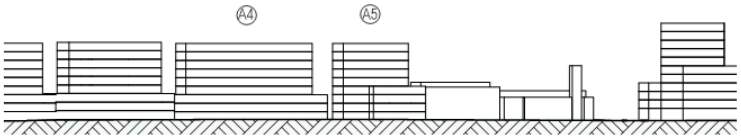


FIGURE 3.5 AREA A - ELEVATION

FUTURE BUILT FORM

BUIILDING ARTICULATION AND SETBACKS

Future Built Form – Setbacks and Articulation

Recommended lot amalgamation

Street wall setback

- 1 metre
- 3 metres public domain setback
- 3 metres landscape setback

Tower setback (from street wall)

- 2 metres
- 3 metres
- 6+ metres

Response to view corridors/adjoining future character

- Both street wall and tower to be set back
- Tower to be set back

Tower separation/articulation

- Future urban marker/contributory facade
- Separation to improve amenity/create relief
- Edges articulated to protect solar access/amenity
- Built to boundary

Existing Urban Markers

- Heritage listed item
- Contributory facade retained as possible
- Open Space
- Plaza

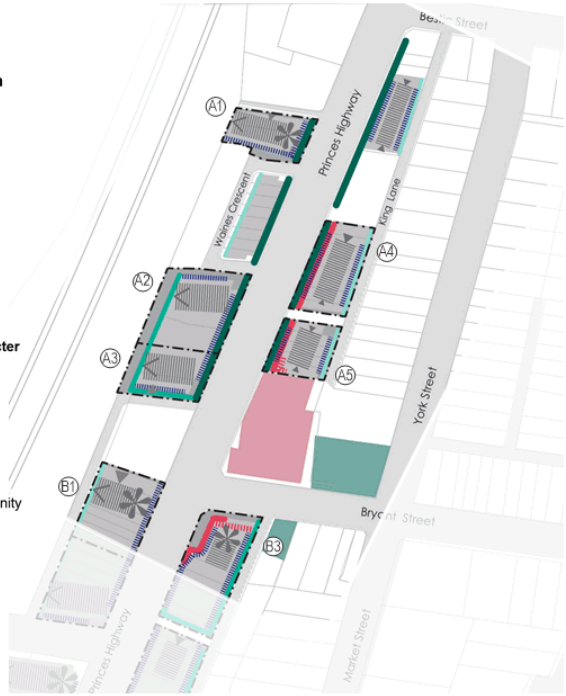


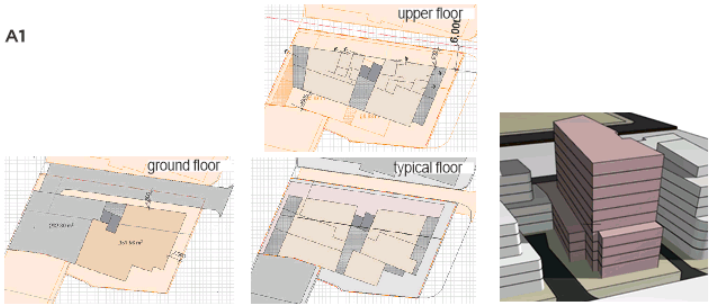
FIGURE 3.6 AREA A - CHARACTER AND PLACE

BUILT FORM TESTING - EXAMPLE SCHEME

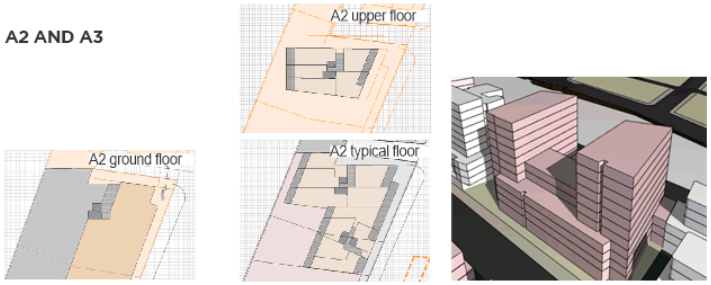
A1. 407-411 Princes Highway
A2. 427–429 Princes Highway
A3. 431-431A Princes Highway
A4. 414-428 Princes Highway
A5. 432-442 Princes Highway
B1. 445–457 Princes Highway
B3. 452–468 Princes Highway
y
432-– 442 Princes Highway

FIGURE 3.7 AREA A - BUILT FORM TESTING - EXAMPLE

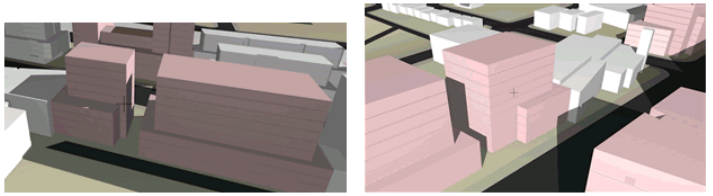
A1



A2 AND A3



A4, A5 AND RELATIONSHIP WITH LIBRARY



FUTURE PUBLIC DOMAIN

Future Public Domain

- Strenghtened Green Gateways/ green and blue networks
- Improved pedestrian experience/ greener outlook in constrained areas
- Undercrofts and colonnades
- Pedestrian spine and retail hubs
- Primary active street frontages
- Secondary active street frontages
- Laneway activation + servicing enabled
- Second storey supports retail/commercial
- Potential new vehicular/pedestrian links
- Potential new through-site links
- Potential to relocate existing links
- Potential new/enhanced cycleway/shared path
- Potential new/improved public domain
- Potential new/improved open space
- Recommended lot amalgamation

Existing Links

- Pedestrian laneways
- Through-site links
- Cycleway/shared path

Existing Urban Markers

- Heritage listed item
- Contributory vegetation to be retained/enhanced
- Rock faces to be retained
- Open space
- Plaza

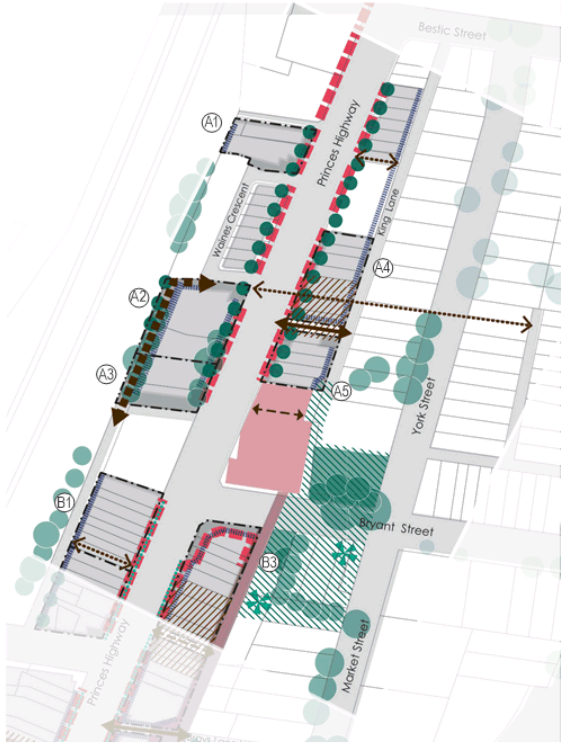


FIGURE 3.8 AREA A - PUBLIC DOMAIN

3.2.2 AREA B - PRINCES HIGHWAY STATION PRECINCT

FUTURE CHARACTER AND PLACE

Future Character and Place

- Arrival experience
- Key sightlines
- Character area gateways and relationships
- Built form
- Facades set back to enhance views/character
- Potential new landmark facades/built form
- Potential to better integrate public domain and built form to create new landmark places

Existing Urban Markers

- Vegetation
- Rock face
- Facades/built form
- Heritage listed item
- Plaza

FIGURE 3.9 AREA B - CHARACTER & PLACE

FUTURE BUILT FORM BUILDING CONFIGURATION AND MASSING

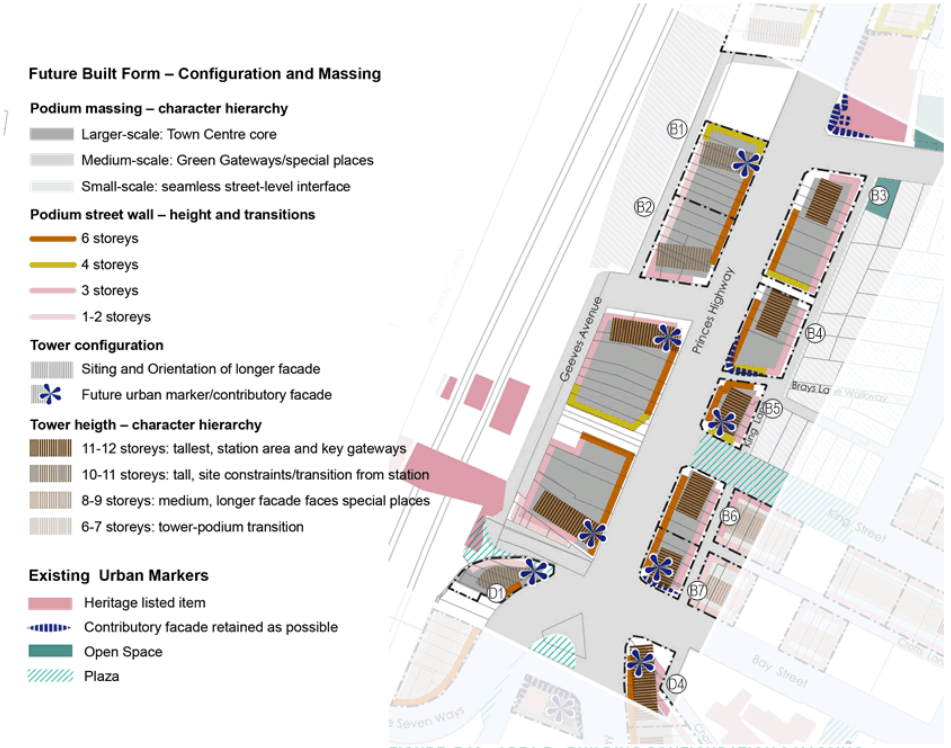


FIGURE 3.10 AREA B - BUILDING CONFIGURATION & MASSING

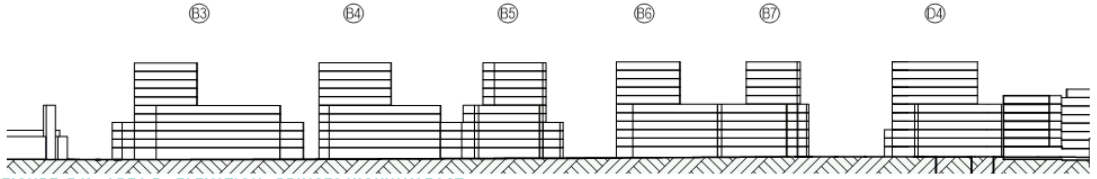


FIGURE 3.11 AREA B - ELEVATION - PRINCES HIGHWAY EAST

FUTURE BUILT FORM

BUILDING ARTICULATION AND SETBACKS

Future Built Form – Setbacks and Articulation

Recommended lot amalgamation

Street wall setback

- 1 metre
- 3 metres public domain setback
- 3 metres landscape setback

Tower setback (from street wall)

- 2 metres
- 3 metres
- 6+ metres

Response to view corridors/adjoining future character

- Both street wall and tower to be set back
- Tower to be set back

Tower separation/articulation

- Future urban marker/contributory facade
- Separation to improve amenity/create relief
- Edges articulated to protect solar access/amenity
- Built to boundary

FIGURE 3.12 AREA B - BUILDING ARTICULATION AND SETBACKS

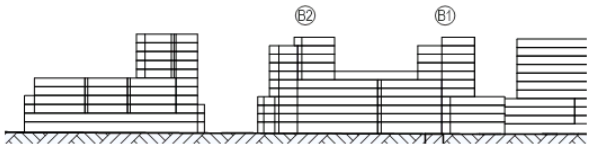


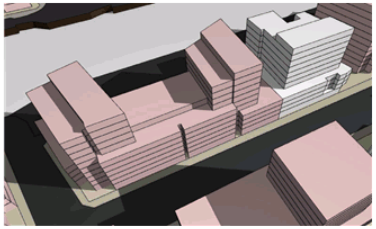
FIGURE 3.13 AREA B - ELEVATION - PRINCES HIGHWAY WEST

BUILT FORM TESTING – EXAMPLE SCHEME

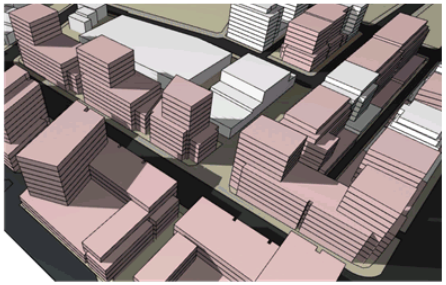
B1. 445–457 Princes Highway
B2. 459–469 Princes Highway
B3. 452–468 Princes Highway
B4. 470–484 Princes Highway
B5. 488– 496 Princes Highway
B6. 498– 508 Princes Highway
B7. 510–514 Princes Highway
D1. 1-9 The Seven Ways
D4. 520-538 Princes Highway

FIGURE 3.14 AREA B - BUILT FORM TESTING - EXAMPLE

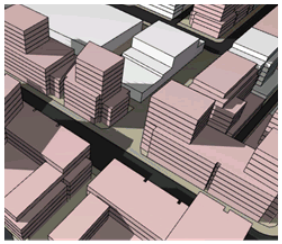
B1 AND B2



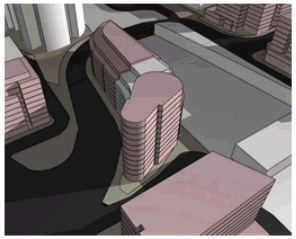
B3, B4, B5, B6, B7



RELATIONSHIP WITH KING STREET AREA



RELATIONSHIP WITH D1 AND STATION AREA



FUTURE PUBLIC DOMAIN

Future Public Domain

- Strenghtened Green Gateways/ green and blue networks
- Improved pedestrian experience/ greener outlook in constrained areas
- Undercrofts and colonnades
- Pedestrian spine and retail hubs
- Primary active street frontages
- Secondary active street frontages
- Laneway activation + servicing enabled
- Second storey supports retail/commercial
- Potential new vehicular/pedestrian links
- Potential new through-site links
- Potential to relocate existing links
- Potential new/enhanced cycleway/shared path
- Potential new/improved public domain
- Potential new/improved open space
- Recommended lot amalgamation

Existing Links

- Pedestrian laneways
- Through-site links
- Cycleway/shared path

Existing Urban Markers

- Heritage listed item
- Contributory vegetation to be retained/enhanced
- Rock faces to be retained
- Open space
- Plaza

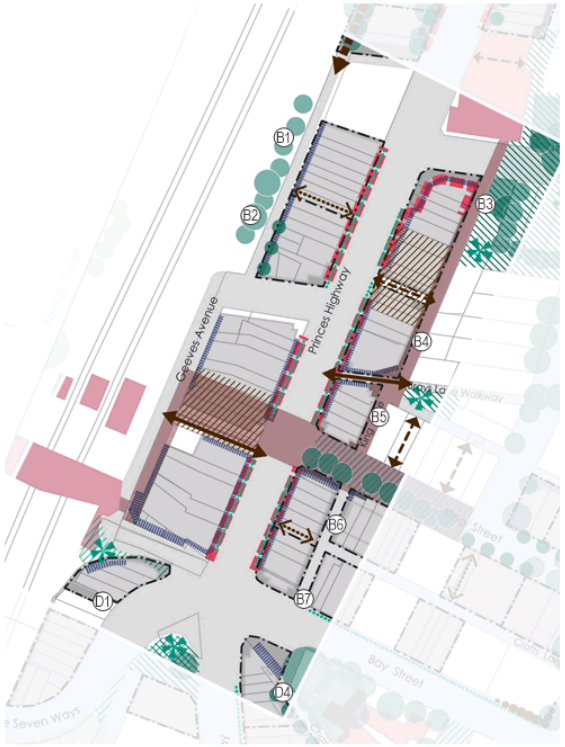


FIGURE 3.15 AREA B - PUBLIC DOMAIN

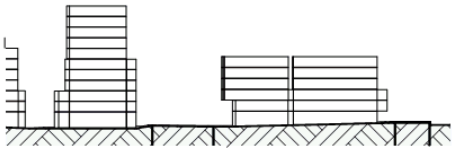


FIGURE 3.16 AREA C - SECTION - PRINCES HIGHWAY UNDERCROFTS AND FEATURE CORNER TOWER

3.2.3 AREA C - KING STREET PRECINCT

FUTURE CHARACTER AND PLACE

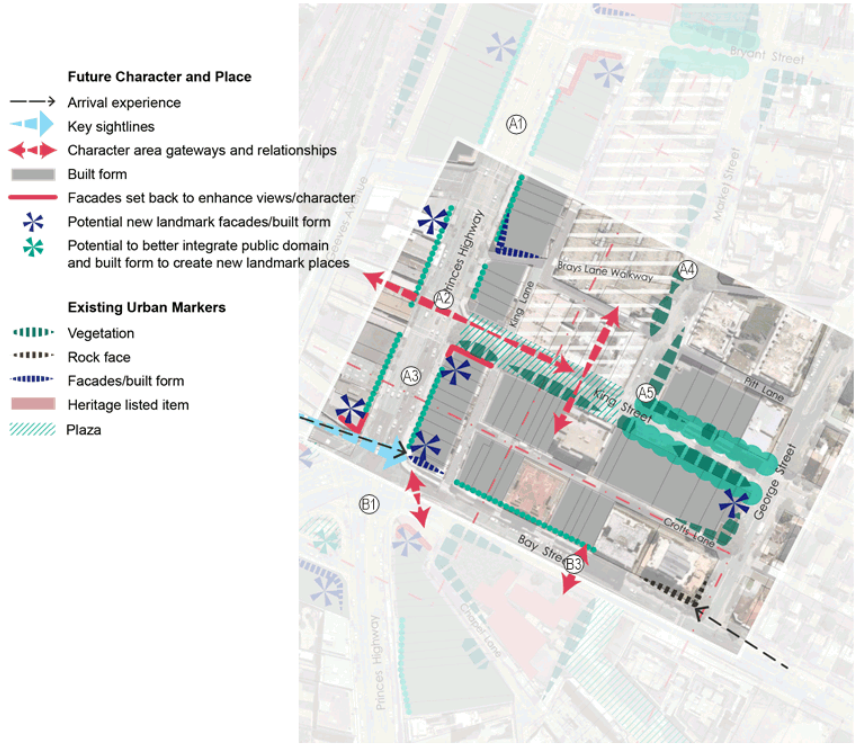


FIGURE 3.17 AREA C - CHARACTER AND PLACE

FUTURE BUILT FORM BUILDING CONFIGURATION AND MASSING

Future Built Form – Configuration and Massing

Podium massing – character hierarchy
- Larger-scale: Town Centre core
- Medium-scale: Green Gateways/special places
- Small-scale: seamless street-level interface

Podium street wall – height and transitions
- 6 storeys
- 4 storeys
- 3 storeys
- 1-2 storeys

Tower configuration
- Siting and Orientation of longer facade
- Future urban marker/contributory facade

Tower heigth – character hierarchy
- 11-12 storeys: tallest, station area and key gateways
- 10-11 storeys: tall, site constraints/transition from station
- 8-9 storeys: medium, longer facade faces special places
- 6-7 storeys: tower-podium transition

Existing Urban Markers
- Heritage listed item
- Contributory facade retained as possible
- Open Space
- Plaza

FIGURE 3.18 AREA C - BUILDING CONFIGURATION AND MASSING

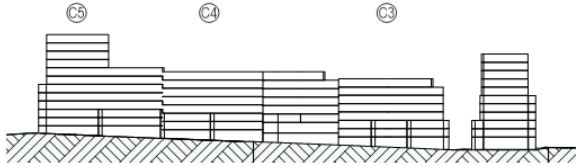


FIGURE 3.19 AREA C - ELEVATION - KING STREET SOUTH

FUTURE BUILT FORM

BUILDING ARTICULATION AND SETBACKS

Future Built Form – Setbacks and Articulation

Recommended lot amalgamation

Street wall setback

- 1 metre
- 3 metres public domain setback
- 3 metres landscape setback

Tower setback (from street wall)

- 2 metres
- 3 metres
- 6+ metres

Response to view corridors/adjoining future character

- Both street wall and tower to be set back
- Tower to be set back

Tower separation/articulation

- Future urban marker/contributory facade
- Separation to improve amenity/create relief
- Edges articulated to protect solar access/amenity
- Built to boundary

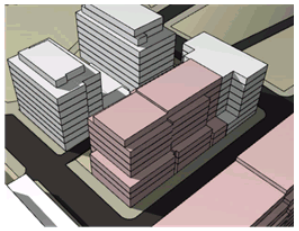
Existing Urban Markers

- Heritage listed item
- Contributory facade retained as possible
- Open Space
- Plaza

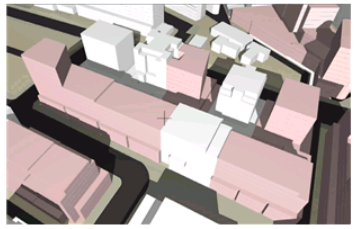
FIGURE 3.20 AREA C - BUILDING ARTICULATION AND SETBACKS

BUILT FORM TESTING – EXAMPLE SCHEME

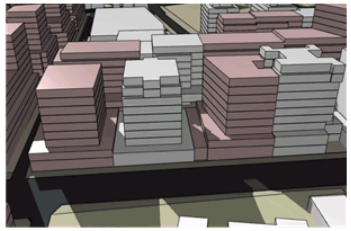
C1 AND C2



C3, C4 AND C5

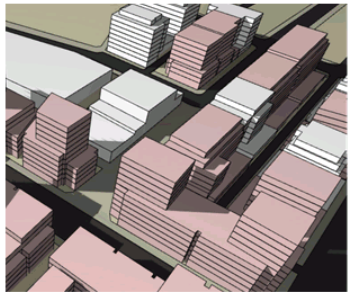


C6 AND C7



C1. 16-18 King Street
C2. 20-24 King Street
C3. 1-9 King Street
C4. 17-25 King Street
C5. 29-35 King Street
C6. 26-32 Bay Street
C7. 46-50 Bay Street

RELATIONSHIP WITH STATION AREA



FUTURE PUBLIC DOMAIN

Future Public Domain

- Strenghtened Green Gateways/ green and blue networks
- Improved pedestrian experience/ greener outlook in constrained areas
- Undercrofts and colonnades
- Pedestrian spine and retail hubs
- Primary active street frontages
- Secondary active street frontages
- Laneway activation + servicing enabled
- Second storey supports retail/commercial
- Potential new vehicular/pedestrian links
- Potential new through-site links
- Potential to relocate existing links
- Potential new/enhanced cycleway/shared path
- Potential new/improved public domain
- Potential new/improved open space
- Recommended lot amalgamation

Existing Links

- Pedestrian laneways
- Through-site links
- Cycleway/shared path

Existing Urban Markers

- Heritage listed item
- Contributory vegetation to be retained/enhanced
- Rock faces to be retained
- Open space
- Plaza

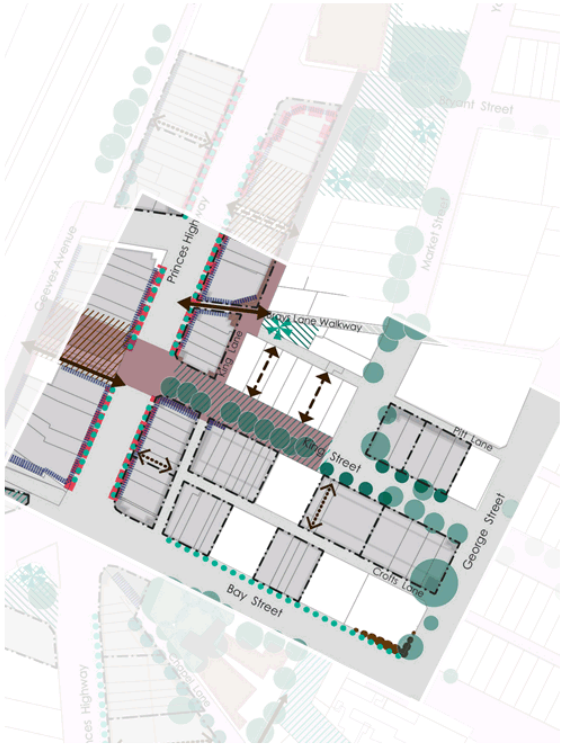


FIGURE 3.21 AREA C - PUBLIC DOMAIN

3.2.4 AREA D - PRINCES HIGHWAY AND BAY STREET JUNCTION

FUTURE CHARACTER AND PLACE

Future Character and Place

- Arrival experience
- Key sightlines
- Character area gateways and relatio
- Built form
- Facades set back to enhance views/
- Potential new landmark facades/built
- Potential to better integrate public do and built form to create new landmar

Existing Urban Markers

- Vegetation
- Rock face
- Facades/built form
- Heritage listed item
- Plaza

FIGURE 3.22 AREA D - CHARACTER AND PLACE

AREA D - BUILDING CONFIGURATION AND MASSING

Future Built Form – Configuration and Massing

Podium massing – character hierarchy
- Larger-scale: Town Centre core
- Medium-scale: Green Gateways/special places
- Small-scale: seamless street-level interface

Podium street wall – height and transitions
- 6 storeys
- 4 storeys
- 3 storeys
- 1-2 storeys

Tower configuration
- Siting and Orientation of longer facade
- Future urban marker/contributory facade

Tower heigth – character hierarchy
- 11-12 storeys: tallest, station area and key gateways
- 10-11 storeys: tall, site constraints/transition from station
- 8-9 storeys: medium, longer facade faces special places
- 6-7 storeys: tower-podium transition

Existing Urban Markers
- Heritage listed item
- Contributory facade retained as possible
- Open Space
- Plaza

FIGURE 3.23 AREA D - BUILDING CONFIGURATION AND MASSING

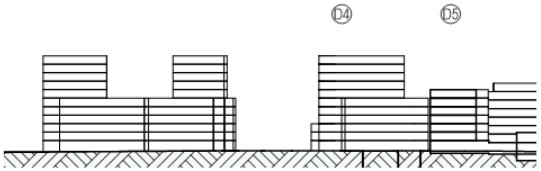


FIGURE 3.24 AREA D - ELEVATION - PRINCES HIGHWAY EAST

FUTURE BUILT FORM - BUILDING ARTICULATION AND SETBACKS

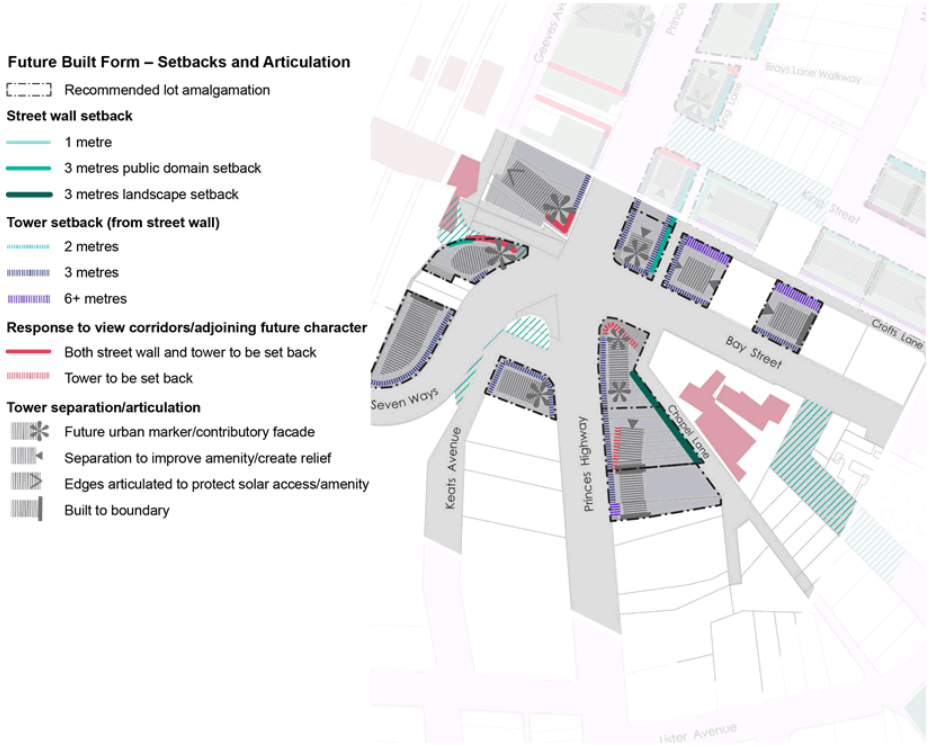


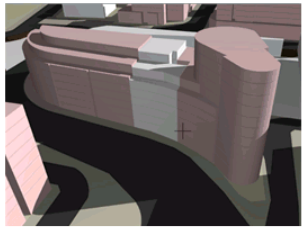
FIGURE 3.25 AREA D - BUILDING ARTICULATION AND SETBACKS

BUILT FORM TESTING – EXAMPLE SCHEME

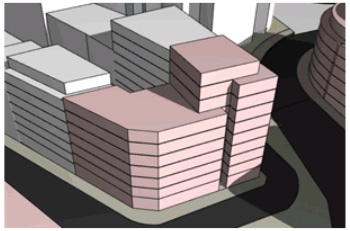
D1. 1-9 The Seven Ways
D2. 17-37 The Seven Ways
D3. 527-531 Princes Highway
D4. 520-538 Princes Highway
D5. 540-550 Princes Highway
D6. 552-556 Princes Highway

FIGURE 3.26 AREA D - BUILT FORM TESTING - EXAMPLE

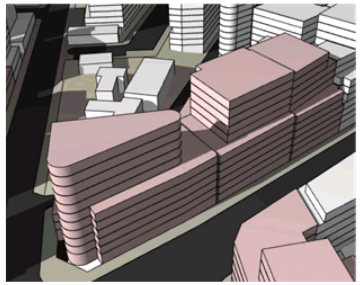
D1 AND D2



D3



D4, D5 AND D6



FUTURE PUBLIC DOMAIN

Future Public Domain

- Strenghtened Green Gateways/ green and blue networks
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- Potential to relocate existing links
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- Potential new/improved public domain
- Potential new/improved open space
- Recommended lot amalgamation

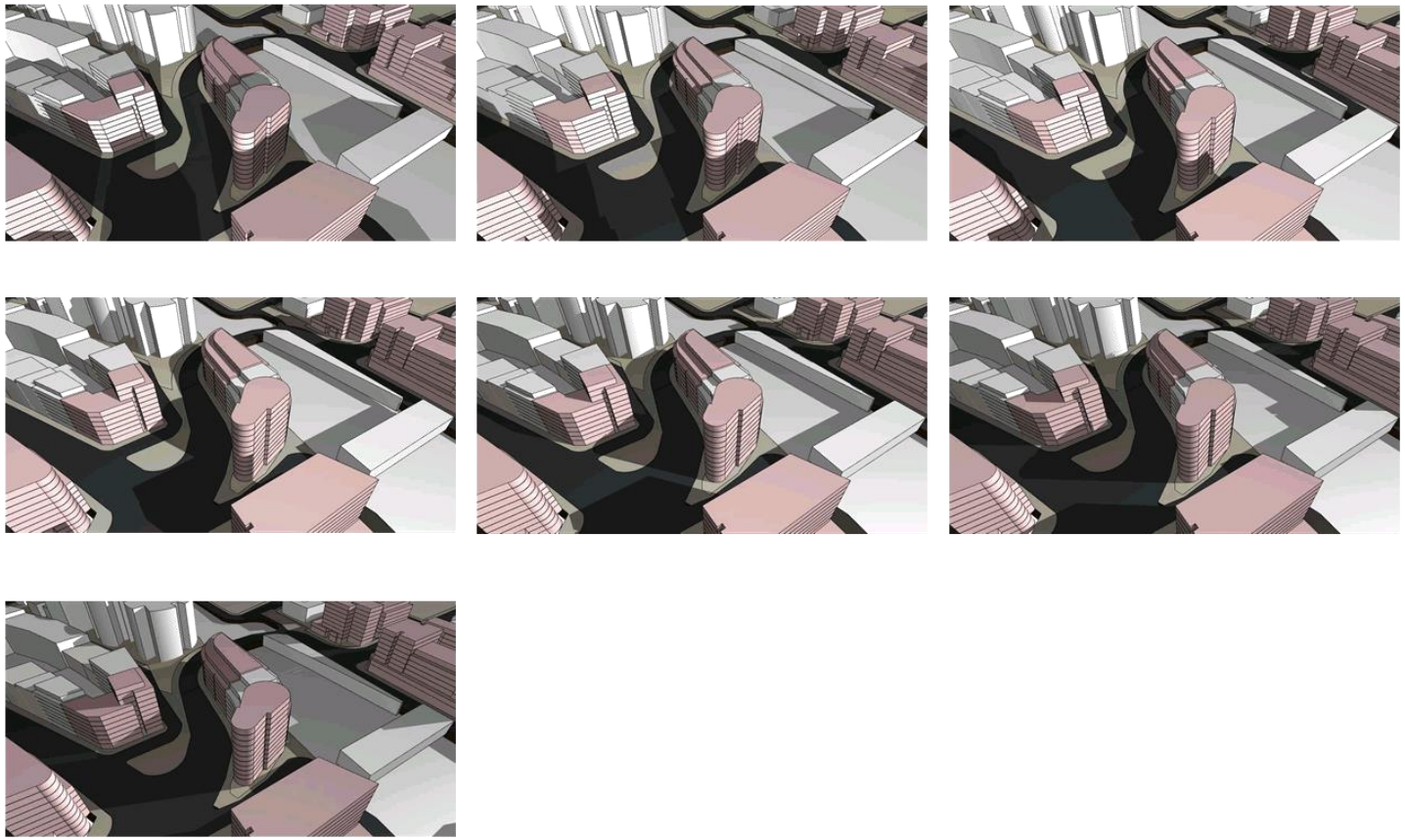
Existing Links

- Pedestrian laneways
- Through-site links
- Cycleway/shared path

Existing Urban Markers

- Heritage listed item
- Contributory vegetation to be retained/enhanced
- Rock faces to be retained
- Open space
- Plaza

FIGURE 3.27 AREA D - PUBLIC DOMAIN



3.0 Recommendations for Implementation

3.1 PROPOSED CHANGES TO PLANNING CONTROLS

3.1.1 CHANGES TO BLEP 2021

Refer to the table at Figure 4.2 for a summary of recommended planning controls to be included in Amendment 1 of Bayside Local Environmental Plan (BLEP 2021).

ZONING

No change proposed.

HEIGHT OF BUILDINGS

Figure 4.4 illustrates the changes to the Height of Building Map from 22m and 28m with height bonus for bigger sites to 28m, 34m and 40m. Bonus height clause has been removed.

FLOOR SPACE RATIO

No change proposed.

DESIGN EXCELLENCE

The Design Excellence should apply to the whole study area (Figure 4.3).

LAND RESERVATION ACQUISITION

No change proposed.

DRAFT BAYSIDE LEP 2021	Existing	Proposed
Zoning	B2 Lcoal Centre B4 Mixed Use	No change.
Height of Buildings	22m and 28m with 12m height bonus for sites >1500sqm in area	28m,34m and 40m (note bonus height clause has been removed)
Floor Space Ratio	Does not apply	No change proposed
Design Excellence	Applies to some parts of precinct	To apply to whole study area
Land Reservation Acquisition	Applies	No change

FIGURE 4.2 RECOMMENDED PLANNING CONTROLS SUMMARY

HEIGHT OF BUILDINGS (HOB)

FIGURE 4.4 HEIGHT OF BUILDING (HOB)

DESIGN EXCELLENCE

FIGURE 4.3 DESIGN EXCELLENCE

3.2 FURTHER RECOMMENDATIONS

DEVELOPMENT CONTROL PLAN (DCP)

- Update the Rockdale Town Centre site-specific DCP in the Bayside Development Control Plan to reflect recent development and the design principles for each character area, including the corresponding controls to achieve place-based built form outcomes.

DEVELOPMENT CONTRIBUTIONS

- Review the existing Development Contributions Plan and items applicable to the Study Area as part of the preparation of the new harmonised Bayside Contributions Plan 2021.

MASTERPLAN REVIEW

- Review and update of the Rockdale Town Centre Masterplan 2012 and associated Public Domain Plan as required to reflect the precincts already developed, works delivered or that can no longer be delivered.


Bayside Council
Serving Our Community
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Rockdale Customer Service Centre, 444-446 Princes Highway
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www.bayside.nsw.gov.au

URBAN DESIGN AND BUILT FORM STUDY
WALZ STREET PRECINCT

VERSION 1.0 MAY 2021

Bayside Council
Serving Our Community

ACKNOWLEDGEMENT OF COUNTRY

Bayside Council wish to acknowledge Aboriginal people as the traditional custodians of this land.

Through thoughtful and collaborative planning we seek to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

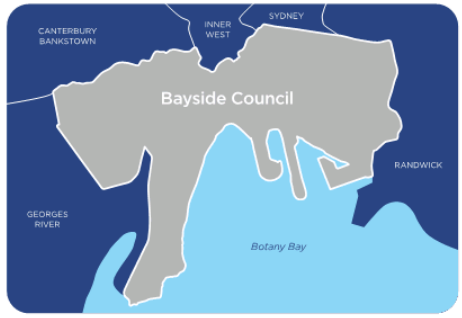

Table of Revisions				
Date	Revision	Status	By	Checked
6 May 2021	Version 1.0	For Bayside Local Planning Panel Meeting 20 May 2021	IC	MA

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1.0 Introduction

1.1 EXECUTIVE SUMMARY

In 2020, the Department of Planning, Industry and Environment announced the Public Spaces Legacy Program under which Bayside Council is eligible for a grant of up to $5.5M to deliver new or upgraded public and open spaces. One of the requirements associated with this grant is the commitment to deliver on housing and jobs growth, by exhibiting an updated Local Environmental Plan (LEP) to incorporate housing or employment supply for at least 6-10 years by 30 June 2021.

The NSW Department of Planning, Industry and Environment have informed Bayside Council that notification of the draft Bayside Local Environmental Plan 2021 (BLEP 2021) is likely to occur by 30 June 2021. The timeline for completion of the draft Planning Proposal would see it form Amendment 1 to the BLEP 2021.

Four areas have been identified as "0-5 year investigation areas". These areas include:

- Walz Street Precinct
- Bay Street Precinct
- Rockdale Town Centre Precinct
- Arncliffe West Precinct

This Urban Design and Built Form Study has been undertaken to establish appropriate built form and height controls for the remaining undeveloped block in the Walz Street Precinct on the western side of the railway Line, within Rockdale Town Centre.

This study reflects on the unique character of place and strategic opportunities for the precinct to identify a potential built form that will improve the amenity of the area for existing and future residents as well strengthen the town centre identity.

1.1.1 METHODOLOGY

This study aims to:

- Upgrade planning and design controls considering the existing masterplan and the character of redevelopment that has occurred since.
- Help unlock development (further opportunity) on sites yet to be redeveloped by providing more certainty to developer.
- Make the Centre a more attractive place for investment and residents by improving the quality of built form and public domain outcomes through development.

The report will consider:

- The existing planning framework
- The strategic context and impact on the site.
- Contextual analysis to identify opportunities, constraints and challenges.
- Envisage the desired built form
- Describe design principles to guide the future built form and character of the precinct.
- Provide recommendations to inform the revisions of the draft Bayside Local Environmental Plan 2021 and Development Control Plan.

1.1.2 RECOMMENDATIONS

To realise the desired future character for the Walz Street Precinct study area there are a number of implementation recommendations.

These include:

- Changes to the Local Environmental Plan as per the table in Figure 1.1.
- Preparation of a Development Control Plan to reflect the design principles and other objectives identified in this report,
- Review and update of the Rockdale Town Centre Masterplan and associated Public Domain Plans and Technical Specifications as required.
- Preparation of detail documentation for Walz Street including lighting design to ensure frontage works are delivered in an Integrated manner for the buildings and public domain given the challenging topography.
- Preparation of a Contribution Plan

Draft Bayside LEP 2021	Existing	Proposed
Zoning 3 and 5 Watkin St, Rockdale	R2 Residential	RE 1 Public Recreation
Zoning (The Study Area)	B2 Local Centre	No Change
Height	22m	25m to 30m
Floor Space Ratio	Nil	Nil
Land Reservation Acquisition	Nil	3 and 5 Watkin St, Rockdale
Design Excellence	Nil	Included

FIGURE 1.1 PROPOSED CHANGES TO PLANNING CONTROLS

1.2 STUDY AREA

The study area is bound by Walz Street to the north including properties with access to Frederick Lane, Railway Street to the east, extending to include properties that face Frederick Street to the corner of Rawson Street. The site comprises of 33 lots which are currently zoned B2 Local Centre under the draft Bayside Local Environmental Plan 2021 and is just over 1 hectare in size.

Rockdale is approximately 13 km south of the Sydney CBD and is well serviced by Rockdale Train Station. The area is dominated by shopfronts with decorative facades and low awnings with a human scale some of which may date back to late 1800s and are associated with the opening of the railway station and the early development of Rockdale.

The close proximity to the railway station places heavy demands on parking or standing of vehicles for drop off and pick up as well as to access the transport hub that services the collector bus services.

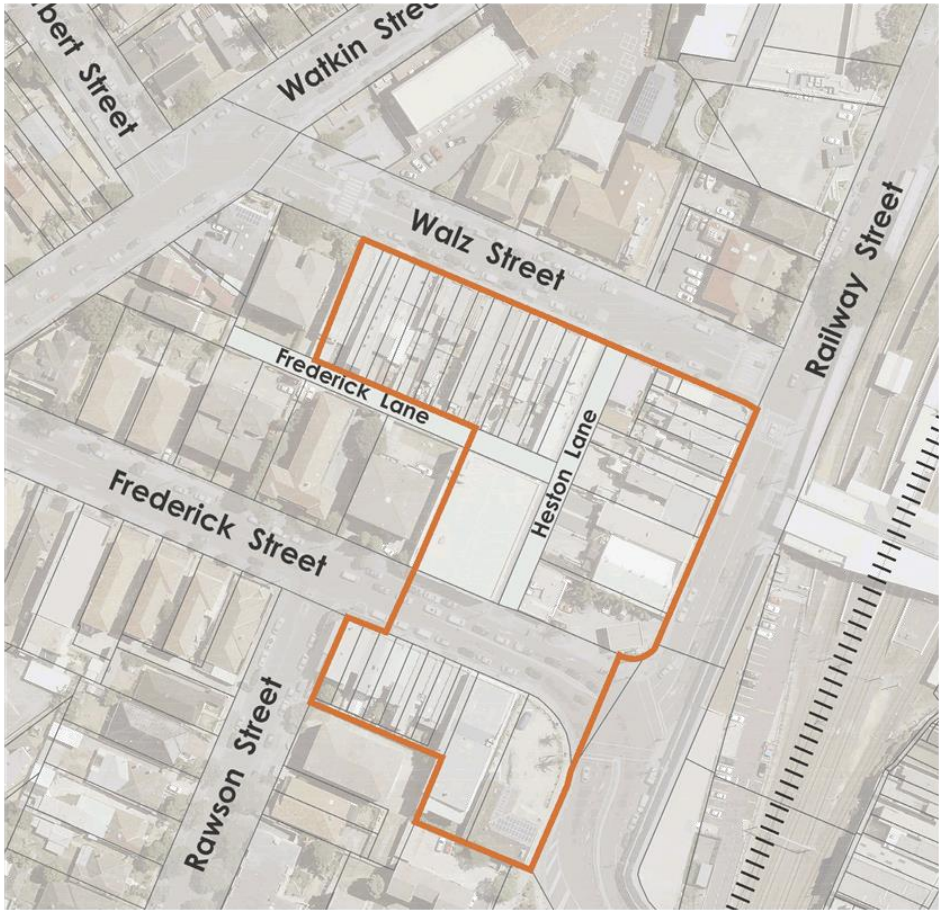


FIGURE 1.2 STUDY AREA

1.3 THE LOCAL CONTEXT

1.3.1 AN EXCITING FUTURE FOR ROCKDALE TOWN CENTRE

Rockdale is well established and serviced by major public transport infrastructure giving the Rockdale Town Centre great potential to flourish as a hub fostering environmental and economic resilience in the 30 minute city.

In this context, change and growth in the precinct is expected to occur primarily as part of major redevelopments. In an established town centre existing buildings, fragmented land ownership patterns create challenges for redevelopment as well as for the provision of additional green spaces and new connections. It is the redevelopment of large or amalgamated sites that will enable meaningful improvements in open space provision and the public domain.

Since the adoption of the Masterplan in 2011/2012 redevelopment has occurred on the fringes of the town centre where land ownership patterns have been less constrained.

Reconsidering the Rockdale Town Centre masterplan within 10 years is necessary to take into account changed conditions so that land owners, developers and tenants are prepared to invest in the vision.

The proposed changes are designed to help unlock the potential that remains in Rockdale and to ensure that future development also brings with it public benefit now and for future generations.

The revised masterplan will seek to enhance the vitality and amenity of Rockdale through redevelopment by:

- Improving our City's heart and civic precinct;
- making it more attractive for visitors;
- Increasing its vitality, lifestyle, entertainment and nightlife activities;
- Improving and linking our laneways with our retail hub;
- residential rejuvenation;
- improving development density and design.

It is important for the future of the Town Centre that the existing masterplan is considered in light of development that has occurred as well as the emerging strategic context, and that planning controls are updated accordingly.

This will ensure that the plans for the precinct are not limited to what looks good on paper, but results in planning controls that reduce complexity and development assessment times, and minimise uncertainty.

The revised masterplan is key to ensuring that the town centre remains viable, encouraging redevelopment that improves the public domain and retains the development potential of remaining sites, so that land owners, tenants, developers, Government and the community are prepared to invest in a joint vision for a better place.

1.4 BACKGROUND

In 2020, the Department of Planning, Industry and Environment (DPIE) announced the Public Spaces Legacy Program under which Bayside Council is eligible for a grant of up to $5.5M to deliver new or upgraded public and open spaces. One of the requirements associated with this grant is the commitment to deliver on housing and jobs growth, by exhibiting an updated local environmental plan to incorporate housing or employment supply for at least 6-10 years by 30 June 2021.

The NSW Department of Planning, Industry and Environment have informed Bayside Council that notification of the draft Bayside Local Environmental Plan 2021 (BLEP 2021) is likely to occur by 30 June 2021.

The timeline for completion of the draft Planning Proposal would see it form Amendment 1 to the BLEP 2021.

The $5.5 million will fund projects in two of the Green Grids corridors and fund important projects that expand recreation opportunities for the Bayside community. $3 million will be allocated to implement the first stage of the Barton Park Masterplan, Banksia which includes the active transport component along the Muddy Creek Foreshore and $2.5 million towards the construction of a regional playspace at Sir Joseph Banks Park, Botany.

Barton Park in association with other projects will reconnect Rockdale to its waterfront and further along Muddy Creek and the Green Grid creating a network of green spaces and recreational facilities to continuously improve quality of living, economic opportunities and the environment for our residents and future generations.

1.5 PLANNING FRAMEWORK

The precinct is under the draft Bayside Local Environmental Plan (LEP) 2021.

The objectives of the zone:

- To maximise public transport patronage and encourage walking and cycling.
- To accommodate population growth through high density mixed use development that complement the role of retail, commercial, civic and cultural premises in the Rockdale town centre.
- To create a lively Rockdale town centre with an amenable and pedestrian focused public domain activated by building uses that engage with the street.

1.5.2 ZONING

The precinct is currently zoned B2 local centre.

FIGURE 1.3 EXISTING ZONING MAP

1.5.1 HEIGHT OF BUILDINGS

The precinct allows a maximum height of 22m.

This existing maximum building heights allow approximately 6-7storey.

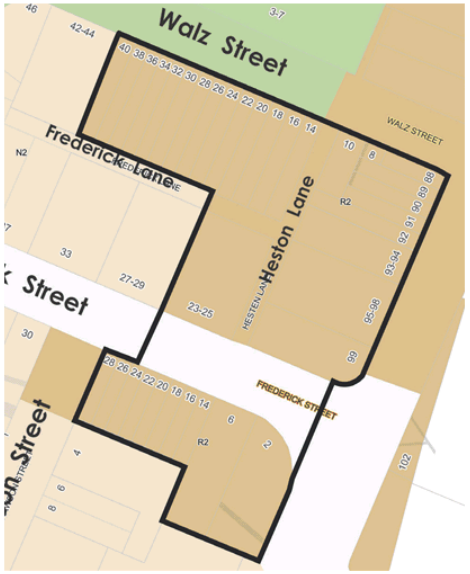


FIGURE 1.4 HEIGHT OF BUILDINGS

1.5.3 FLOOR SPACE RATIO

Floor Space Ratios do not apply to this precinct

FIGURE 1.5 FLOOR SPACE RATIO

1.5.4 DESIGN EXCELLENCE

Currently the Design Excellence Clause does not apply to this site.

FIGURE 1.6 DESIGN EXCELLENCE

1.5.5 LAND RESERVATION ACQUISITION

Currently there are no Land Reservations within the study area.

FIGURE 1.7 LAND RESERVATION AQUISTION

1.6 STRATEGIC CONTEXT

1.6.1 BROADER STRATEGIC CONTEXT

GREATER SYDNEY REGION PLAN, 2018

The Greater Sydney Region Plan - A Metropolis of Three Cities is the NSW Government's plan for metropolitan Sydney and sets out the future direction for Sydney's growth. The Plan provides a 40-year vision and plan to guide land use and infrastructure planning. It envisions Greater Sydney as a metropolis of three cities: with Bayside forming part of the Eastern Harbour city,

The plan contains objectives and strategies to make Greater Sydney more liveable, productive and sustainable. The alignment of infrastructure, population and employment growth throughout Greater Sydney is intended to facilitate access to jobs and services within 30 minutes by public transport. This requires higher land-use densities and redevelopment of areas around major nodes in the public transport network, including Bayside LGA.

Rockdale and the Princes Highway corridor are flagged for urban renewal whilst Randwick and Kogarah are highlighted as key Health and Education Precincts. Several road and rail visions are shown that will substantially increase transport connectivity to Rockdale including the M6 Motorway and rail connections to Randwick and Bankstown.

FUTURE TRANSPORT STRATEGY 2056, 2018

The Future Transport Strategy, 2056 outlines transport infrastructure priorities and aims to achieve the 30-minute city.

The strategy notes key projects in the Bayside LGA including the M6 and extension – Kogarah to Loftus, Port Botany freight line duplication, Foreshore Road upgrade and the Eastern Suburbs to inner west rapid bus links. Initiatives for investigation (20+ years) include addressing long-term capacity constraints to Port Botany and South East and the Extension of South East Mass Transit to Miranda.

SOUTH EAST SYDNEY TRANSPORT STRATEGY 2020

The South East Sydney Transport Strategy (SESTS) is guided by the Future Transport Strategy and focuses specifically on the localised area of south eastern Sydney. A number of projects have been identified such as a new rapid bus line from Maroubra to Rockdale, investigation of a future Metro line from Kogarah to Randwick and delivery of principle bicycle network. Brighton Le Sands has been identified as the potential location of a metro station. Possible location of the metro station may be near the study area.

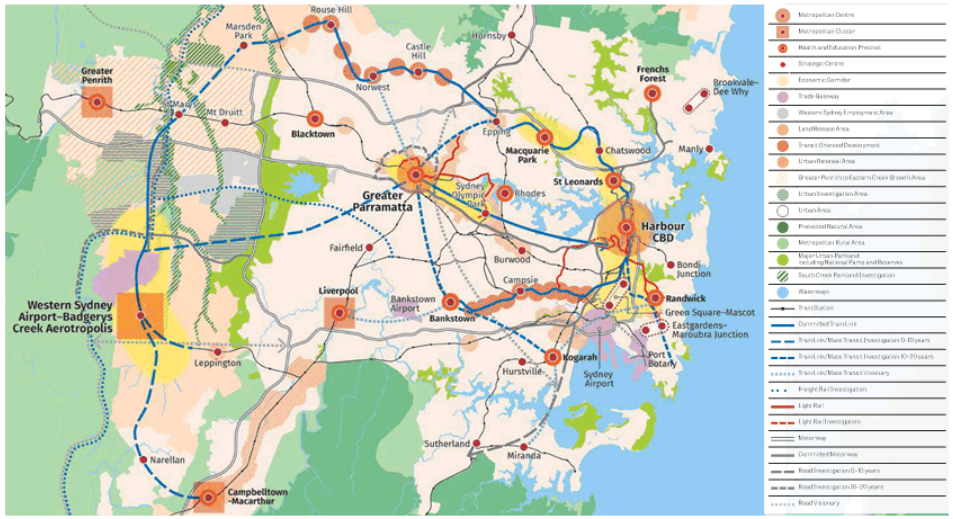


FIGURE 1.8 GREATER SYDNEY REGION PLAN

EASTERN CITY DISTRICT PLAN, 2018

This plan seeks to implement the Region Plan through planning priorities and actions. Councils are required to align all subsequent planning with the District Plan. It encourages greater housing supply and diversity with urban renewal opportunities around centres and areas with proximity to the regional transport network.

To facilitate housing supply, the plan sets a 5-year target for the Bayside LGA (10,150 dwellings) and requires the development of a 6-10 year housing target as well as capacity to contribute to the District's 20-year strategic housing target of 157,500 dwellings.

The plan requires a place-based approach to be undertaken to maintain and enhance the liveability of the Eastern City District by:

- Providing services and social infrastructure to meet people's changing needs
- Fostering healthy, creative, culturally rich and socially connected communities
- Providing housing supply, choice and affordability, with access to jobs, services and public transport
- Creating and renewing great places and local centres, and respecting the District's heritage.

The plan identifies a series of principles to be followed for place-based planning for centres:

- Provide public realm and open space focus;
- Increase residential development in, or within walkable distance of, the centre, deliver transit-oriented development and co-locate facilities and social infrastructure.
- Provide, increase or improve local infrastructure and open space; improve walking, cycling and public transport connections, including through the Greater Sydney Green Grid.
- Protect/expand retail and/or commercial floor space; protect/expand employment opportunities; support the night-time economy;
- Provide community facilities and services, arts and cultural facilities; integrate and support creative enterprise and expression.
- Conserve and interpret heritage values; accommodate local festivals, celebrations, temporary and interim uses.
- Provide parking that is adaptable to future uses and takes account of access to public transport, walking and cycling connections.

DESIGN CONSIDERATIONS

More housing needed to meet Sydney's projected growth

M6 and future mass transit potentially reducing traffic along Princes Highway and Bay St

Delivery of infrastructure to align with development.

BETTER PLACED, 2017

The NSW Government identifies Design as a strategic approach needed to ensure that as our cities and towns grow bigger they get even better. Better Placed is a suite of guidelines to inform place-based/design-driven planning prepared and continuously upgraded by the NSW Government Architect that has become the basis of the Government's 'new approach to precint planning'.

It responds to the concerns of communities and those involved in the development of our built environments about the impact of poor design, and defines how we can make the most of the opportunities that will arise as we develop new spaces and places.

Good design makes better places

New development has the potential to transform quality of life for people, stimulate the economy and enhance the environment. The design of the built environment shapes the places where we live, work and meet. The quality of design affects how spaces and places function, how they integrate, what they contribute to the broader environment, and the users, inhabitants and audiences they support or attract.

Better Placed is a policy for our collective aspirations, needs and expectations in designing NSW. It is about enhancing all aspects of our urban environments, to create better places, spaces and buildings, and thereby better cities, towns and suburbs. To achieve this, good design needs to be at the centre of all development processes from the project definition to concept design and through to construction and maintenance.

FIGURE 1.9 SOURCE: GANSW

GREEN GRID – CENTRAL DISTRICT, 2017

The Greater Sydney Green Grid details a long term vision to connect communities to the landscape. The Green Grid will see a network of high quality green areas, from regional parks to local parks and playgrounds that connect centres, public transport and public spaces to green infrastructure and landscape features. The vision includes enhanced waterway corridors, transport routes, suburban streets, footpaths and cycleways.

In Bayside LGA the key areas of the Green Grid are Rockdale Wetlands, Bardwell Valley Trail and Botany Bay Foreshore. It also identifies opportunities to deliver Boulevarde Streets as Green Links from Urban Centres to Botany Bay. Other suggested actions include improving interpretation signage, pedestrian and cyclist experience, connectivity to the foreshore and provide enhancements to the length of Cook Park from Brighton le Sands to Sans Souci.

FIGURE 1.10 GREEN GRID

DESIGN CONSIDERATIONS

Green Grid Corridors provide connections and high quality open space.

Reconnect Rockdale to the waterfront and facilitate connectivity to major links.

Provide wayfinding, urban legibility and visual corridors to reconnect Rockdale with its lost landscape identity.

THE VARIOUS AND UNIQUE LANDSCAPES OF SYDNEY ARE RECOGNISED AS AN ASSET THAT CAN REINFORCE CHARACTER, IDENTITY AND ENVIRONMENTAL RESILIENCE. DELIVERED ALONGSIDE INFRASTRUCTURE AND URBAN RENEWAL AN ENHANCED NETWORK OF OPEN SPACE AND GREEN INFRASTRUCTURE CAN SERVE TO SHAPE AND SUPPORT NEW AND EXISTING COMMUNITIES.

THE HARBOUR, THE COASTLINE AND THE COOKS RIVER PROVIDE A COHERENT SPATIAL STRATEGY THAT DEFINES THE LANDSCAPE QUALITY OF THE SUBREGION.

SD.1.12 ROCKDALE WETLANDS – GEORGES RIVER TO COOKS RIVER

This group of projects have a very high conservation value extending from the Cooks to the Georges River along Muddy Creek, through Eve Street Wetlands, Spring Street Wetlands, Landing Lights Wetland, Patmore Swamp, Scarborough Park Ponds and through to Sans Souci. Opportunities include wetland restoration, establishment of bird hides education, interpretation and an improved pedestrian and cyclist environment.The Rockdale Wetlands Green Corridor is adjacent to the eastern part of the study precinct.

CD.1.13 BARDWELL VALLEY TRAIL AND WOLLI CREEK

This project cluster contains projects from Hurstville to Turella connecting pockets of natural bushland and remnant Turpentine Forest and Eucalypt Woodland which create a swathe of green in the middle of the densely populated area of the district. Projects include conservation management, green skills and interpretation, connectivity and biodiversity.

CD.1.14 BOTANY BAY FORESHORE AND COOKS PARK TRAIL

The Botany Bay Foreshore project is important in its context of linking the Great Coastal Walk to Botany Bay and the coastal projects of the South District. This cluster of projects provides an opportunity to improve connectivity to the foreshore and provide enhancements to the length of Cook Park from Brighton le Sands to Sans Souci. This area is within 1 km of the study area.

KOGARAH COLLABORATION AREA PLACE STRATEGY, 2020

Encourage a flourishing culture and night-time economy. Investigate and identify locations for student and affordable housing, short-term accommodation and serviced apartments close to transport.

Create high quality public spaces and facilities that focus on wellness. Support the vision for a wellness precinct by investigating ways to maintain and improve air quality

Protect and enhance the natural environment, increase the quantity, access to and quality of open space and enhance the urban tree canopy. Increase % of urban tree canopy in:

- town centres and main streets and areas with low urban tree canopy cover;
- areas with high pedestrian activity and high vulnerability and high urban heat island effect;
- Government owned land; and
- Green Grid routes.

Revitalise the Muddy Creek corridor and other local creeks to:

- improve walking and cycling between Rockdale and Kogarah town centres;
- improve the interface with the creek line;
- create new open space and seamless connections between key places;
- create an east-west Green Grid connection linking major open spaces.
- There is an opportunity to make a direct connection from the study area.

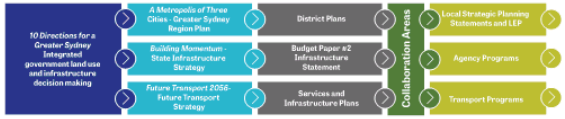


FIGURE 1.11 HEIRARCHY OF PLANS

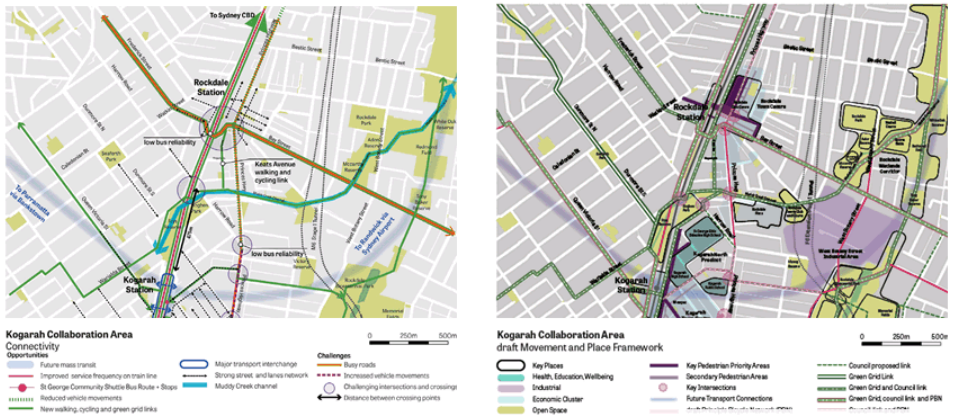


FIGURE 1.12 KOGARAH COLLABORATION AREA PLACE STRATEGY

Prioritise sustainable transport, development and water and energy use and reduce waste.

Design the local road network to support local commutes to work and plan to support local trips and patterns. Address future transport options including electric vehicles, autonomous vehicles, point to point, carshare and micromobility.

DESIGN CONSIDERATIONS

Lobby to improve bus service

Keats Ave Link connect small parcels of open space in local context

Provide missing connections

Retail in mixed use development to have enough separation to avoid conflict and enable night-time economy

1.6.2 LOCAL STRATEGIC CONTEXT

BAYSIDE LOCAL STRATEGIC PLANNING STATEMENT, 2020

Sets out the land use vision for Bayside to 2036 and details the implementation of the key actions from the Eastern City District Plan and Region Plan through the same themes of Infrastructure and Collaboration, Liveability, Productivity and Sustainability. The LSPS determines how Bayside will manage land for the next 20 years with practical measures for aligning population and infrastructure growth.

The LSPS notes that Bayside will need an additional 28,000 dwellings by 2036, these will need to be in a variety of housing types with a particular focus on medium density dwellings to meet the population increase in families with children.

The Green Grids through Bayside are important social infrastructure and open space priorities with a particular focus on improving accessibility and functionality to best suit the growing community.

Sydney Airport and Port Botany are key trade gateways that are important to the economy of Sydney and the nation. Growth in the movement of people and freight is predicted over the coming 20 years.

Rockdale is highlighted as a Proposed Strategic Centre with significant expected job growth. An important aspect of this centre is the relationship with the Kogarah Health and Education Precinct and collaboration area.

BAYSIDE 2030 - COMMUNITY STRATEGIC PLAN 2018-2030, 2018

Details the vision and outcomes for 2030 in Bayside, setting the strategic direction for Council's delivery program and operation plans. The framework for the plan is based on guiding principles for social justice, resilient cities and good governance. It is developed around four themes for Bayside in 2030:

The plan identifies key future projects in the area including the M6 (formerly named F6 extension), train and mass transit links, light rail investigation between strategic centres and urban renewal at Bayside West, Bardwell Valley and Turrella.

A vibrant place:
Built forms focus on efficient use of energy, are sympathetic to the natural landscape and make our area a great place to live. Neighbours, visitors and businesses are connected in dynamic urban environments.

Our people will be connected in a smart City:
Knowledge sharing and collaboration ensures that we have the expertise and relationships to lead with integrity, adapt to change, connect vulnerable people to community and effectively respond in times of adversity and stress.

Green, leafy and sustainable:
The biodiversity of the area is protected and enhanced through collaborative partnerships. Vital habitats are supported to rehabilitate, thrive, adapt and recover from risks and climate events. The landscape will be preserved and regenerated to benefit a healthy environment now and in future.

A prosperous community:
Business innovation, technology, flourishing urban spaces and efficient transport will attract diverse business, skilled employees and generate home based business. Growth in services to the local community will generate employment support, a thriving community and livelihoods.

DESIGN CONSIDERATIONS

Provide more and diverse housing .

Built form to be sympathetic to the landscape, create dynamic urban environments, and make the area a great place to live.

Reduce social, economic and environmental vulnerability.

Ensure built form allows for job growth, efficient transport and innovation, and help attract investment

F6 and future mass transit potentially reducing traffic along Princes Highway and Bay St

BAYSIDE CENTRES & LOCAL HOUSING STRATEGY, 2021

The Bayside Local Housing Strategy was adopted by Council and sets the strategic framework and vision for housing in Bayside. It draws on policy and demographic trends alongside analysis of local opportunities and constraints to formulate an action plan for residential growth. The Strategy plans for housing until 2036 and includes a series of priorities needed to make housing more affordable, diverse and matched to the changing needs of the local community.

The Strategy highlights that Bayside currently has a large proportion of 2-bedroom dwellings with an expected shortfall in dwellings appropriate for key categories of growth; lone person households and families. The Strategy also highlights the importance of planning for affordable housing, encouraging infrastructure delivery and good design and the preservation of local character through planning controls.

To respond to the challenges of housing in Bayside, the strategy notes several investigation areas including Rockdale Town Centre and Bay Street.

Proximity to Sydney Airport limits building heights in the LGA.

Moderate change may be appropriate in pockets surrounding the Rockdale centre to the west where lots are larger and in close proximity to open space.

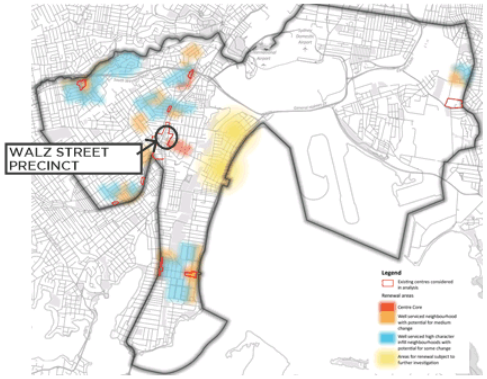


FIGURE 1.13 LOCAL HOUSING STRATEGY

DESIGN CONSIDERATIONS

Enable the provision of more housing

Undertake place-based approach to understand character and set out how that will be protected and enhanced through redevelopment.

Promote diverse and affordable housing

DRAFT CENTRES AND EMPLOYMENT LANDS STRATEGY

The draft Centres and Employment Lands Strategy notes that employment in Bayside is set to grow significantly by 2036 driving demand for employment floorspace.

Sydney Airport and Port Botany are important employment hubs in the Bayside area, making up a large proportion of jobs in the LGA. However, future growth in employment is expected to be predominantly based on knowledge intensive and population serving jobs as opposed to industrial, health and education jobs.

The draft strategy highlights the opportunity for new manufacturing services to make use of the proximity to transport infrastructure and the renewal of the Princes Highway corridor to bring character to the area.

DESIGN CONSIDERATIONS

Provide facilities, green spaces and linkages through redevelopments.

Housing, public domain and facilities for people of all ages.

Built form to allow floor space for employment growth, integrated with residential uses.

DRAFT TRANSPORT STRATEGY AND DRAFT BIKE PLAN

The draft transport strategy focuses on increasing efficiency across the network and creating more safe and accessible transport options for the community and industry.

The draft Bike Plan builds on the Transport Strategy with a greater focus on active transport by making use of Green Grid links for high quality links.

DRAFT ENVIRONMENTAL REVIEW OF PLANNING CONTROLS

The draft Environmental Review of Planning Control document identifies key environmental themes, challenges and opportunities and priority actions for the future.

Key areas of focus are the Cooks River, Rockdale Wetlands and Mill Stream and Botany Wetlands Open Space Corridors and the Wolli Creek Regional Park and Bardwell Valley Parklands. These areas have high ecological value and provide essential recreation opportunities for the community.

DESIGN CONSIDERATIONS

Opportunity to augment cycling network, pedestrian connectivity and street activation through redevelopment.

Improve links to transport nodes

Improved facilities and amenity around transport nodes and along movement routes.

DRAFT FLOODING AND STORMWATER STUDY

The draft Flooding and Stormwater Study identifies challenges and opportunities to flooding and stormwater management in the Bayside Council LGA, focusing on planning controls in the LEP and DCP.

The discussion paper identifies the need for land use planning policies that include consideration of climate change and the promotion of Water Sensitive Urban Design.

DESIGN CONSIDERATIONS

Redevelopment sites as key opportunity to implement and connect WSUD initiatives

Built form to facilitate efficient management of waste, and encourage sustainable habits

Retain water in the landscape & improve water quality downstream

Development to remove obstructions to overland flow

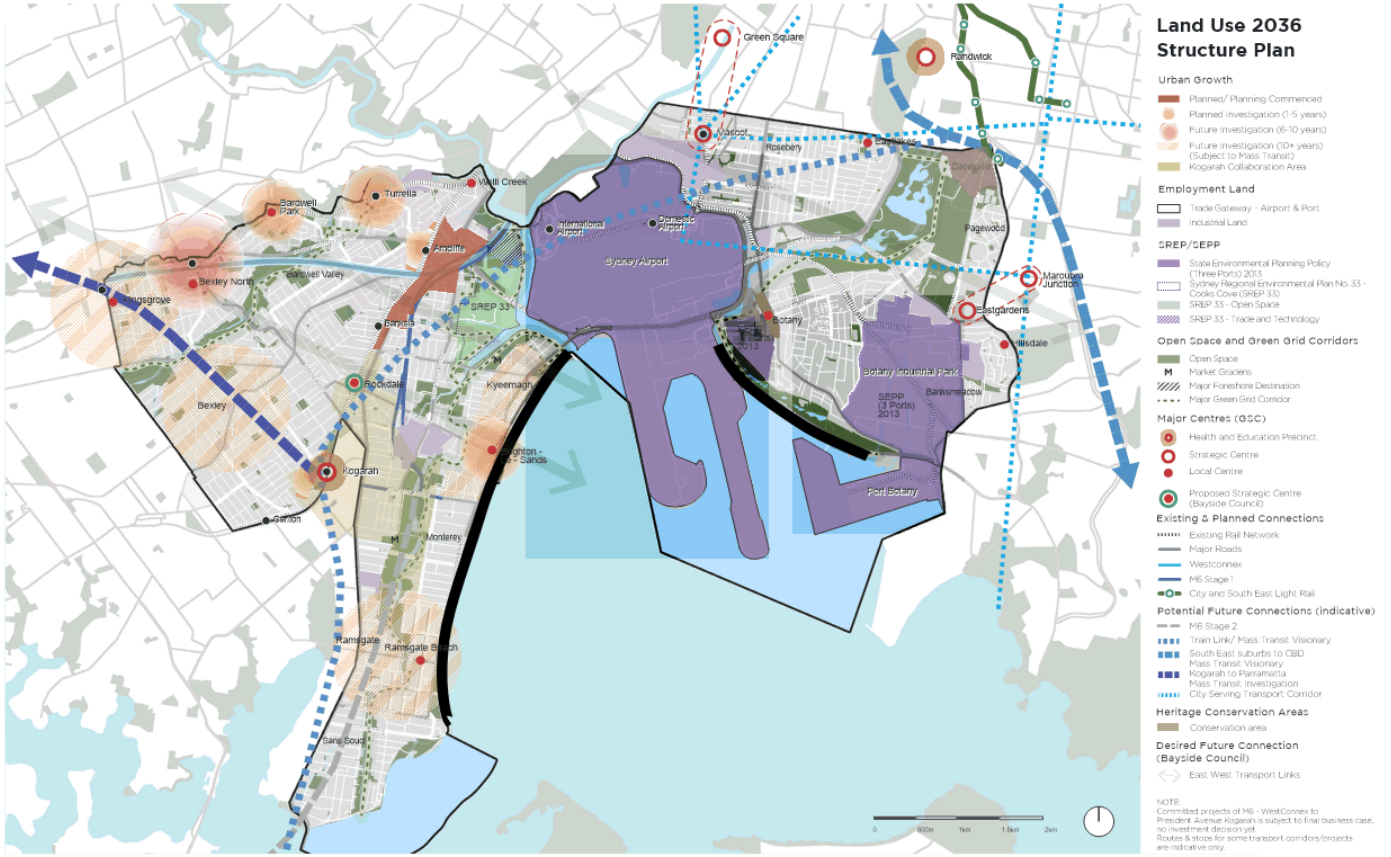


FIGURE 1.14 CONSOLIDATED ANALYSIS OF THE IMPLICATIONS OF THE EMERGING STRATEGIC CONTEXT FOR THE FUTURE OF ROCKDALE TOWN CENTRE AND THE BROADER BAYSIDE LGA

1.6.3 KEY STATE INFRASTRUCTURE PROJECTS UNDERWAY

M6 STAGE 1

The first stage of the M6 project has commenced. This section of road will be underground with an entry/exit portal at President Avenue. As part of this project a number of sites are being utilised as compounds with open space facilities demolished at Bicentennial Park and to be reinstated as part of the compensatory works.

McCarthy Reserve and the area east of the Sydney Water channel will receive significant upgrades as part of the M6 works and will include a skate park, playground, synthetic field and active transport paths that connect the open space. These works have commenced.

FIGURE 1.16 PROPOSED UPGRADES TO OPEN SPACE

FIGURE 1.15 OVERALL MAP OF M6

MUDDY CREEK NATURALISATION - SYDNEY WATER

Sydney Water own and are responsible for the Muddy Creek storm water channel draining to the Cooks River estuary. Sydney Water has commenced the design process for a naturalisation program for the section upstream of Bestic Street into the upper Muddy Creek catchment. This does not include the section immediately adjacent to Bay Street as the channel has not yet reached the end of its serviceable life however the treatment will be consistent once Sydney Water determines the need for the project to be extended upstream and beyond Bay Street.

The Sydney Water project includes the active transport link from Ador Reserve to Bestic Street through White Oak Reserve connecting to active transport north through Barton Park and through Kyeemagh.

DESIGN CONSIDERATIONS

Additional high quality recreation and green spaces will support a growing population in the Study Area

Need to improve connections from the Study Area to those facilities

1.6.4 KEY LOCAL INFRASTRUCTURE PROJECTS

ROCKDALE TOWN CENTRE MASTERPLAN

The Rockdale Town Centre Masterplan will be used to guide the Centre's growth and development. The associated Rockdale Town Centre Masterplan Implementation Plan (2013) includes a detailed program of future works to implement the masterplan through town planning tools and actions.

The Implementation Plan informs Councils' Developer Contributions Scheme, allocating how funds collected from new development in the Town Centre and across the City can be used to contribute to the delivery of new infrastructure.

Where Public Domain projects are identified as being fundable from developer contributions, recommendations are made with regard to the potential nexus to be investigated in the review of Councils Developer Contribution's Scheme.

Rockdale Town Centre will grow as the Civic and cultural heart of the City, with new and improved infrastructure and services to benefit Rockdale's diverse community.

The current Contributions Plan also identifies that Rockdale Town Centre services the wider community. This means that contributions may be collected from development across the City to fund new infrastructure envisaged in the Masterplan.

METROPOLITAN GREEN GRID PROGRAM

The Metropolitan Green Grid program has provided grant funding to Council to deliver spatial frameworks for three green corridors. This work will identify opportunities for substantial improvements in open space quantity, quality, connectivity and biodiversity.

BARTON PARK MASTERPLAN

The Barton Park Masterplan was endorsed by Council in June 2020 with a approved funding strategy for Zone 1 (Active and Passive Park) and Zone 2 (foreshore Environment Zone including the active transport component).

$3m of the grant associated with Public Spaces Legacy will be directed to this stage of works.

DESIGN CONSIDERATIONS

Future built form to respond to and integrate with planned upgrades and promote accessibility

Increase visual and physical connectivity between the Study Area and its waterways, green spaces and recreation facilities

Redevelopment to be seen as opportunity for delivering additional open space and upgrades

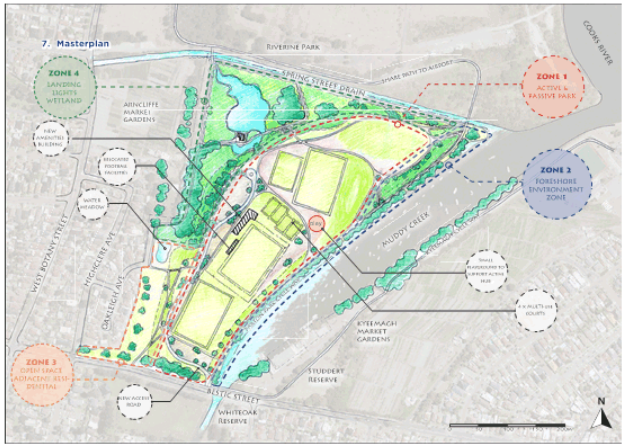


FIGURE 1.17 BARTON PARK MASTERPLAN

2.0 Opportunities and Constraints Analysis

The analysis is key in understanding the opportunities and constraints for the study area and will provide the rationale to the proposed future built form.

2.1 DEMOGRAPHICS

For the purpose of this study the Rockdale-Banksia Statistical Areas 2 (SA2) is considered an appropriate area to assess the Rockdale Town Centre. The Rockdale-Banksia SA2 is generally considered the catchment for the Rockdale Town Centre Masterplan area.

The Rockdale-Banksia area has a population of 19,961 with a median age of 33, slightly lower than the median for the Bayside LGA (35). The most common housing types are flats and apartments with an average household size of 2.8 people, comparatively the most common housing type for Greater Sydney is separate houses with the same average household size. This indicates that it is likely larger families and groups are living in smaller dwellings compared with the LGA and Greater Sydney.

The study area is very culturally diverse with 65.8% of the community born overseas and 72.1% speaking a language other than English at home. This is substantially higher than that of the rest of the Bayside LGA (47.5% and 56.6%) and Greater Sydney (42.9% and 35.8%), this diversity is important to consider during the design process. Interpretation and use of public spaces can vary across different cultures and should be reflected in design.

Professionals are the most common occupation in the study area (19.6%) as well as in Bayside LGA (22.5%) and Greater Sydney (26.3%). The next most common occupation in the study area are labourers (14.9%), substantially more common than in the LGA (9.4%) and Greater Sydney (7.5%). This is noticeable in the hours that workers are traveling, dining and shopping with labourers traditionally working earlier in the day or shift work in industrial roles. Consideration of early morning and later evening movements may be important to consider in the design process.

The unemployment rate is somewhat higher (7.3%) in the study area compared with Bayside LGA (5.9%) and Greater Sydney (6.0%). This may be reflected in the retail demand and the recreation patterns of the community.

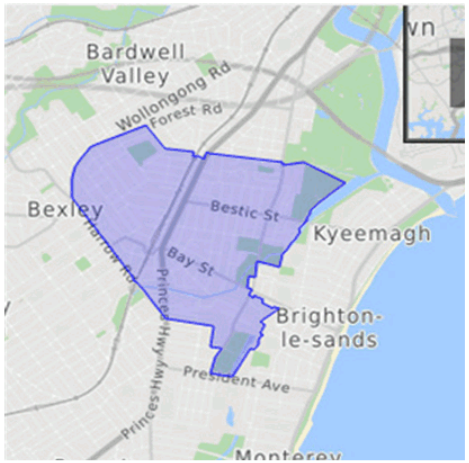


FIGURE 2.2 ROCKDALE –BANKSIA SA2 STATISTICAL AREA

	Rockdale-Banksia*	Bayside LGA**	Greater Sydney*
Population	19,961	178,396	4,823,991
Median age	33	35	36
Average household size	2.8	2.7	2.8
Dwelling structure	Flat or apartment 56.2%	Flat or apartment 45%	Separate house 56.9%
Born overseas	65.8%	47.5%	42.9%
Households with a language other than English is spoken	72.1%	56.6%	35.8%
Unemployment rate	7.3%	5.9%	6.0%

Source: *ABS, **Profile id. 2020

FIGURE 2.3 DEMOGRAPHIC STATISTICS

2.2 CULTURAL AND SOCIAL VALUES

2.1.1 HISTORIC CONTEXT

The traditional owners of the area are the Aboriginal Peoples of the Eora Nation including the Gamaygal, Gwegal, Bidjigal and Gadigal Clans and collectively they are known as the "water people".

Prior to European settlement, the Bayside Local Government Area was comprised of coastal, wetland, waterway and bushland environments that sustained the Eora Nation with plentiful resources to support a rich culture.

The early development of Rockdale occurred in the low lying areas surrounded by rocky outcrops when the district was once heavily forested with trees of tremendous size. In the late 1890s the area was a mixture of noxious trades and market gardening.

The railway changed Rockdale when it opened in 1884 to become an important residential suburb on the Illawarra line. The first retail shop in Rockdale was built in 1862, developing a strong presence along Princes Highway in the emerging Town Centre.

The growing importance of Princes Highway as a major vehicular route, as well as the extension of the Sydney airport in the 1940s and then again later the opening of the east-west runway in the 1990s brought with it significant noise and amenity impacts to these residential and retail areas.

FIGURE 2.4 PRINCES HIGHWAY TAKEN FROM BAY STREET LOOKING NORTH, CIRCA 1912

FIGURE 2.6 PRINCES HIGHWAY & THE SEVEN WAYS

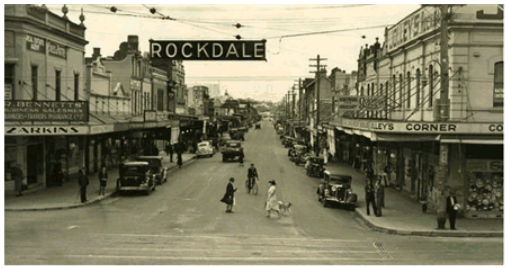


FIGURE 2.5 PRINCES HIGHWAY AT BAY STREET, 1937

2.2.1 HERITAGE

The heritage listed Guild Theatre (1221) and St Joseph's Primary School (1223) occupy the north side of Walz Street. The State Heritage Listed Rockdale Station Group (I222) is adjacent to the eastern edge of the precinct.

In addition to listed heritage items, there are a number of highly visible buildings that contribute to the character of the area in a positive way and complement the existing heritage fabric being closely related in materials and scale with some dating back to the early 1900s'.

FIGURE 2.8 ROCKDALE STATION PLATFORM

FIGURE 2.7 GUILD THEATRE

FIGURE 2.9 HERITAGE ITEMS

2.2.2 COMMUNITY FACILITIES

There are a number of culturally significant community facilities within easy walking distance of the Walz Street Precinct. These include:

There are two private schools within a 5 minute walk in Alexandra Parade and Parker Street with many children of primary and high school age accessing the precinct before and after school.

Several places of worship are within 5 minutes walk of the precinct.

Theatres - The Guild Theatre and Rockdale Town Hall have hosted community theatre groups and hosted a large range of community events. The Rockdale Town Hall and Civic precinct welcomes new Australian Citizens every year on Australia Day in a large event that is well patronised.

The recently build Rockdale Library is conveniently located within 10 minutes walk on the eastern side of the Rockdale Railway Station.

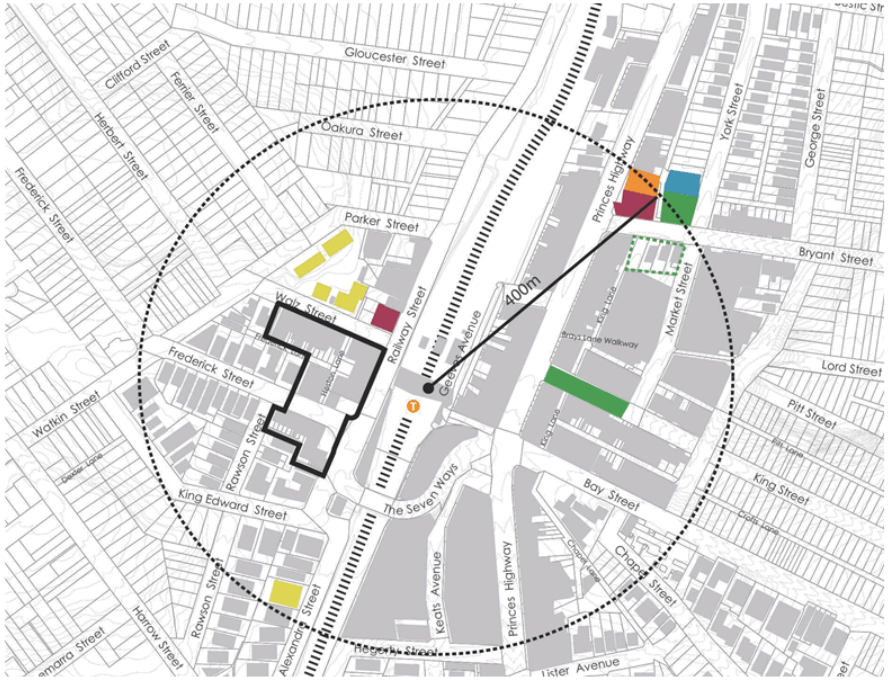


FIGURE 2.10 COMMUNITY FACILITIES

- Schools
- Theatre / Town Hall
- Council Administration Building
- Rockdale Library
- Open Space / Park / Plaza
- Proposed Open Space

2.3 LAND OWNERSHIP

2.3.1 GOVERNMENT LAND

The State Government owns a substantial area of land associated with the Rockdale Railway Station. This includes access via a driveway from Alexandra Parade on the south side of The Seven Ways under the overhead bridge to service the commuter carpark behind 102 Railway Street. This area provides approximately 30 parking spaces adjacent to the railway. Whilst this parking is available to the general public it is poorly sign posted and appears to be under utilised.

2.3.2 BAYSIDE COUNCIL

Bayside Council owns the Guild Theatre on the northern side of Walz Street. This heritage listed theatre is operated by a community group and this group produces high quality stage shows.

Council has created a physical road closure in Parker Street. This is known as the Parker Street Garden. This road closure prevents traffic from entering Parker Street from Ferrier Street on the west and thus prevents high speed traffic from moving through school zones. There is an opportunity to further enhance open space with the acquisition of adjacent properties to consolidate with this small parcel of green space in the precinct which has limited areas of public space.

Council also owns a tree lined area of land south of The Seven Ways known locally as the Alexandra Parade Garden that provides angle parking for commuter use. It does not function as open space but provides visual relief for residents by buffering the visual impact of the railway corridor.

2.3.3 STRATA PROPERTY

Figure 2.11 shows strata properties in the precinct.

FIGURE 2.11 STRATA PROPERTIES

2.4 ECONOMIC ACTIVITY

2.4.1 ACTIVE STREETS

This precinct is zoned as B2 Local Centre, which requires ground floor activation uses such as commercial or retail uses. .

This precinct provides a variety of commercial and retail services for local residents and workers. There are a large amount of restaurants, cafes and food outlets. These businesses especially are thriving on the weekends and evenings.

FIGURE 2.12 RETAIL PRECINCT IN RAILWAY STREET OPPOSITE ROCKDALE RAILWAY STATION

2.5 EXISTING BUILT FORM CHARACTER

The precinct has a strong active frontage along Walz Street and Railway Street and the southern side of Frederick Street and generates much of the centre's day and night time activities.

The precinct is a vibrant retail hub, with predominately cafes, restaurants and fresh food supplies. It has a local shop village atmosphere.

The subdivision pattern combines a majority of small shop lots with a few larger sized lots. The two storey shop fronts establish a modest scale to the precinct.

The building façades along Railway Street are of a quality notably superior to the remaining facades within Rockdale centre, contributing to a street character worthy of retention. Consideration should be given to integrating the existing two storey facades into new development within the Walz Street precinct.

The precinct is also surrounded by high density residential predominantly consisting of 3-4 storey walk up residential flat buildings located to the west and south.

75-81 Railway Street has recently been rezoned to B2 Local Centre, with 28m Height of Buildings and no FSR.

FIGURE 2.13 BUILT FORM DIAGRAM

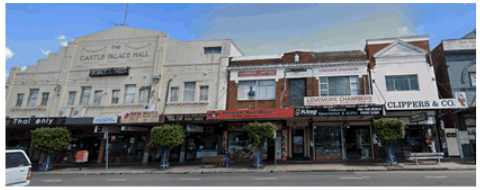


FIGURE 2.14 EXISTING RETAIL FACADE - STATION STREET

2.6 LANDSCAPE CHARACTER

2.6.1 TOPOGRAPHY

Walz street rises significantly by approximately 7m from east to west but there is also an exaggerated cross fall from north to south with an accentuated kerb treatment as the road is higher than the shop fronts. This results in an uncomfortable walking environment in the pedestrian zone at the interface with the road and does not encourage outdoor dining.

The western side of Railway Street is flat with most of the road frontage servicing bus stops.

The gradient in Frederick Street also inclines to the west however the gradient is less steep than Walz Street and does not suffer from the cross grade issue resulting in a footpath with a more consistent gradient.

FIGURE 2.15 TOPOGRAPHY AND EXISTING VEGETATION

2.6.2 NATURAL ENVIRONMENT AND CANOPY COVER

The suburb of Rockdale has less than 15 percent urban tree canopy cover which is very low when considered against the NSW Government target of 40 percent cover in Greater Sydney by 2036.

In Rockdale Town Centre, provision of green spaces, trees and an overall green outlook is particularly lacking due to a lack of footpath and space under awnings. Existing green spaces are small, overhead wires and pruning contribute to the loss of urban tree canopy and limit opportunities for new planting.

Significant improvement is needed to improve the well being of residents as enhanced green spaces and planting reduce pollution and improve amenity along our busy roads making them more attractive.

Importantly to reduce urban heat. increasing the urban tree canopy is essential, yet challenging.

New developments have usually resulted in canopy loss.

2.6.3 SOILS

The Hawkesbury Sandstone geology is evident in the Rockdale area with various outcrops and remnant cliff faces still evident in the area. The associated soil profiles are yellow podzolic which produce shallow sandy or sandy loam soils suitable for endemic species and require enrichment for exotic species.

These soils are fragile and prone to erosion.

2.6.4 OPEN SPACE

Open space is limited in this precinct.

Green space is limited to:

- road closure known as the Parker Street Garden
- the Alexandra Parade Garden is a green strip adjacent the railway corridor does not offer public recreation but visual relief from the infrastructure and shade for parked vehicles

Other open space is located further than 400m walking distance. This includes:

- District heritage listed park - "Seaforth Park" located south of the precinct approximately 600 metres away.
- Rockdale Wetlands Corridor approximately 1km east of the precinct providing access to regional level facilities including new facilities provided as part of the M6 corridor upgrades
- The Lady Robinsons Beach is located 2 km on the shores of Botany Bay. This regional facility and nearby Brighton Le Sand shopping precinct provide a high standard of public realm easily accessible by public transport, walking or cycling.

The Parker Street Garden could potentially be expanded upon with the acquisition of two properties adjacent at Nos 3 and 5 Watkin Street, These two properties combined with the road closure would amount to an small pocket park approximately 1800 square metres and is within easy walking distance of less than 200m.

2.6.5 LANDSCAPE CHARACTER

The intersection of Walz Street and Railway Street has strong historic character with intact heritage buildings on both corners. The coner pharmacy building with decorative façade and addresses the other side of the road and the Guild Theatre in the context of the State Listed late 1800s Rockdale Railway Station. The strong view uphill terminates with distant tree canopy. Looking from Watkins Street downhill toward the railway line to the blocks of building on the eastern side of Rockdale.

Parking does not interrupt the views from the station to the intact sandstone kerbing and early 1900s facades and shop fronts remaining highly visible..

The public domain is in decline with the existing pavement treatments looking somewhat outdated being a mix of square cream and red urban stone pavers as well as some plain concrete.

Future development will be a catalyst for a revitalised public domain that will deliver a coherent unified palette of pavement to complement the eastern side of the Town Centre and create visual connections across the railway line without continuing the older style paving styles.

There is limited passive surveillance and poor amenity along a number of public access ways such as Heston Lane and Frederick Lane.

The condition of road facilities such as signage and linemarking is in degraded condition and contributes to the overall sense of decline in the precinct. The major intersection of Frederick Street, Railway Street and The Seven Ways presents an extensively hard paved landscape with the corner dominated by the service station and corner building where there is an absence of visual relief due to the lack of trees.

FIGURE 2.16 KOGARAH COLLABORATION AREA PLACE STRATEGY

FIGURE 2.17 WALZ & RAILWAY ST - LOOKING WEST

FIGURE 2.18 RAILWAY & FREDERICK ST & THE SEVEN WAYS - LOOKING NORTH

FIGURE 2.19 RAILWAY STREET - LOOKING NORTH

2.7 MOVEMENT

The precinct is adjacent to good public transport via the Rockdale Railway Station and the bus interchange.

Walz and Frederick Street are important links for pedestrians to connect to Rockdale Railway Station and Rockdale Town Centre East.

Figure 2.20 shows the bus stops that service the western side of the Rockdale Train Station. The bus services provide connections to Hurstville, Burwood, Roselands and Sydney.

A taxi rank is located on the northern side of Walz Street outside The Guild Theatre.

An on road cycleway runs along Railway Street.

Investigations into changing Walz Street into one way have been considered however to date the impact on the regional network has resulted in Walz Street remaining a two-way street.

There are a number of traffic and parking issues due to limited parking, compounded by a high number of bus movements which service the bus stops on Railway Street.

The steep topography of Walz Street, particularly at the street and footpath interface, also impact the pedestrian experience.

The intersection of Watkin, Walz and Herbert Streets is very wide and encourages speeding. This intersection could be improved with redesign to narrow and slow down traffic.

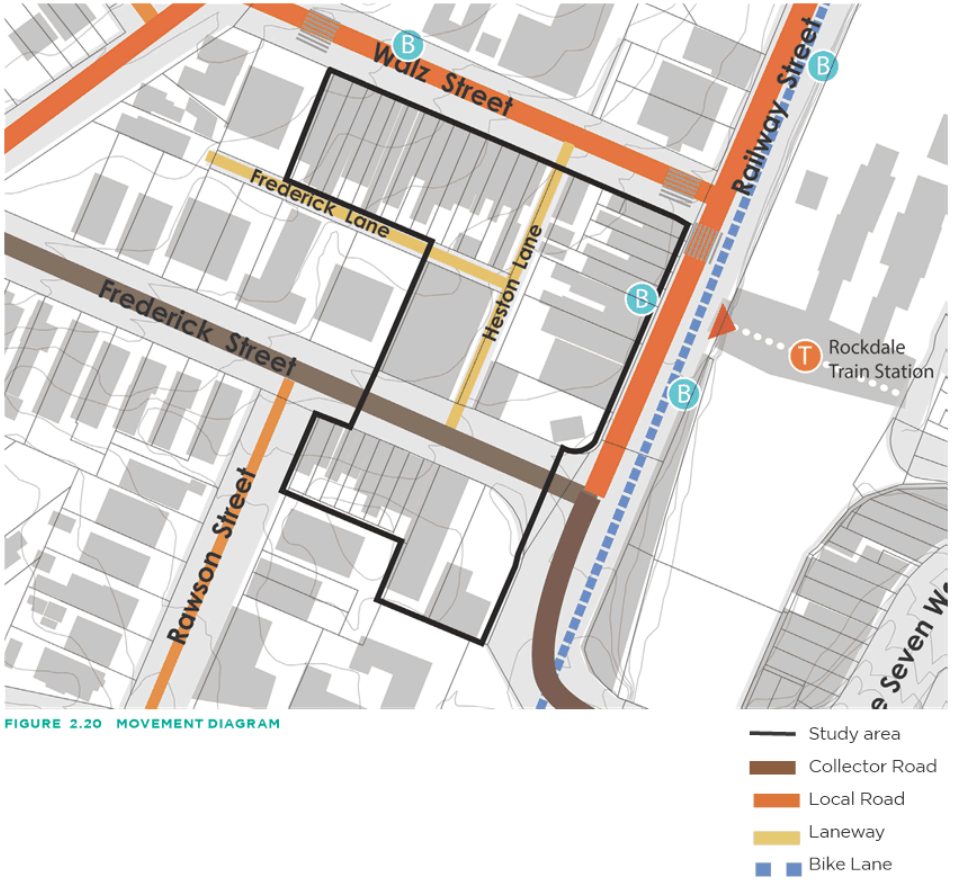


FIGURE 2.20 MOVEMENT DIAGRAM

2.8 URBAN RESILIENCE

2.8.1 URBAN HEAT

Our climate is changing. In the future, Bayside will have an increasing number of hot days (above 35°C), more frequent extreme weather events and rising sea levels.

Bayside will be particularly impacted by rising temperatures, as urban areas tend to concentrate and maintain heat, reducing the cooling effects of vegetation and air flow.

Climate change and land use pressures mean there is a growing need for development in Bayside to be appropriately located and designed. By planning development that considers the impacts of climate change, Council promotes community wellbeing and resilience.

Encourage heat reduction approaches such as roof gardens and insulation, building orientation, efficient/natural cooling systems, heat reflective materials and colours, shading and energy efficiency

Heat impacts can be addressed by ensuring urban trees are appropriate for the location.

2.7.1 FLOODING

The study site is subject to flood behaviour that is usually referred to as "overland flow." In urban environments with significant impervious surfaces and a pit/pipe drainage network for stormwater, overland flow occurs when the amount of runoff from the catchment exceeds the capacity of the subsurface drainage network.

Overland flow flood affectation is usually characterised as "flash flooding." It is of relatively short duration and often relatively shallow and fast flowing. It can occur with little to no warning prior to the occurrence of an intense flood-producing storm.

Overland flooding may result in shallow flooding in the sag point on Railway Street outside 95-98 Railway St and 99 Railway Street.

The rear of the lots on the southern side of Frederick Street within this precinct are subject to significant inundation in the 1% AEP event (Nos. 2/6/14/16/18/20/22/24/26/28 Frederick Street). This is due to the local catchment draining towards this location which extends up to Forest Road.

Stormwater runoff from the local catchment is drained via a 1.4 m by 1.2 m box culvert which runs from a sag point in Rawson Street behind the Frederick Street lots, and under the existing buildings on No. 6 and No. 2 Frederick St.

In events exceeding the capacity of the subsurface drainage network, overland flow will occur through the back of the lots south of Frederick Street. Under current conditions, this overland flow can pond to significant depths (over 2 m) in the rear of the Frederick St lots, since the land at the rear of the lots is much lower than Railway Street, creating a trapped low point in the topography.

The lots within this precinct subject to minimum floor level controls would include:

- Lots facing Railway Street, due to ponding of overland flow in the Railway Street sag point,
- Lots on the southern side of Frederick Street, due to the overland flow path and trapped low point at the rear of these lots

For the lots south of Frederick Street, the minimum floor level requirements would limit the use of the rear of the sites, and would likely require special construction techniques (such as a suspended slab) to enable building at the required floor levels without obstructing the rear flow path.

At the front of the Frederick Street sites, the minimum floor level requirements would not be significantly above the street level.

Figure 2.21 shows the mapped flooding hazards.

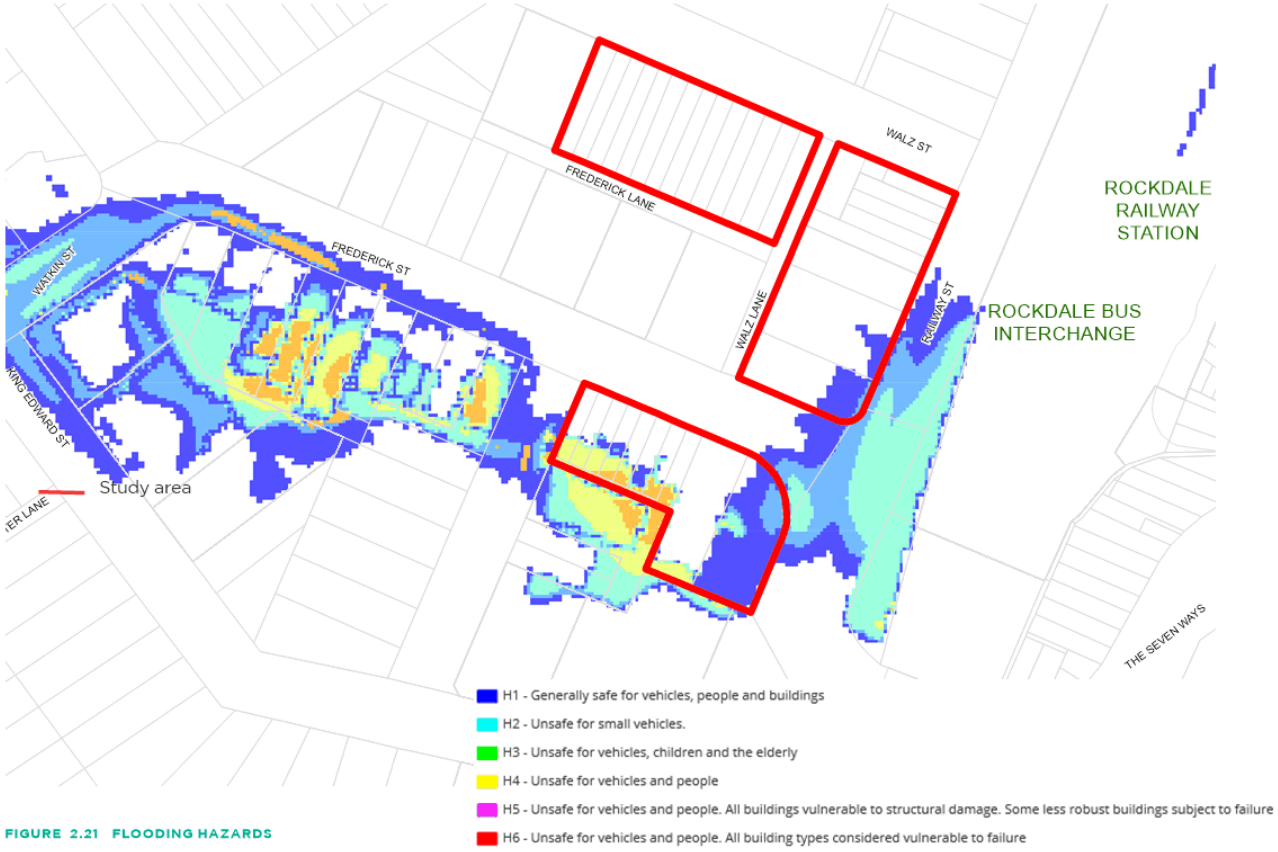


FIGURE 2.21 FLOODING HAZARDS

2.9 PROXIMITY TO AIRPORT

The study area is impacted by its proximity to the airport. Firstly, the height of buildings is constrained by the Obstacle Limitations Surface (OLS) of 51m AHD. This means a maximum building height of 51m AHD (above sea level) can be achieved.

Due to the natural topography of the precinct, the lowest point of the site is at the corner of Railway Street and Frederick Street(RL 20) and slowly increases its level up to RL 20.

The site located on the corner of Railway Street and Walz Street can potentially accommodate a maximum height of 8 storeys on its north western edge, but may be increased to 9 storeys in the south eastern portion of the site, pending appropriate detail design resolution.

FIGURE 2.22 OBSTACLE LIMITATION SURFACE (OLS)

Study area

2.10 CONSOLIDATED OPPORTUNITIES AND CONSTRAINTS

CONSTRAINTS

The key constraints in the study area are:

- Fragmented ownership which requires substantial amalgamation for future redevelopment.
- Flooding issues on the southern side of Frederick Street.
- Interface with the existing R4 zone. There are existing 3 storey walk up apartments adjacent to the study area. Appropriate built form transition and solar access to the existing apartments is required. Note that under the Apartment Design Guide new development cannot reduce solar access by more than 20%.
- Due to proximity to Sydney Airport, an OLS height of 51m AHD applies to the site.
- Maintaining uninterrupted active frontages along Walz, Railway and Frederick Streets requires careful design of vehicular entries to new development.

FIGURE 2.23 SITE CONSTRAINTS

Study area
OLS control up to 51m
Design considerations to existing residential housing
Heritage buildings
Busy intersection
Flood affected area

OPPORTUNITIES

Enhancement and upgrade of existing streets with ample width and canopy streets.

- Laneways provide alternative vehicular access to new developments
- Potential new east west active transport connections.
- Provide northern aspect for most of the new dwellings.
- Well serviced by major public transport infrastructure.
- Improved corner treatment at the intersection of The Seven Ways with Frederick Street and Railway Street.
- Maintain the heritage quality at the intersection of Walz Street and Railway Street.
- Retain the character of major facades on Railway Street with podium style development to maintain building integrity.

FIGURE 2.24 KEY OPPORTUNITIES

3.0 DESIRED FUTURE CHARACTER AND DESIGN RECOMMENDATIONS

3.1 DESIGN VISION AND OBJECTIVES/STRATEGIES

3.1.1 VISION

As discussed in Chapter 2 of this document, Walz Street Precinct is within Rockdale Centre Masterplan 2021.

The vision of the Walz Street Precinct remains consistent with the community's vision articulated expressed in 2012. That is, the Rockdale Town Centre will be:

"a great place to shop, work, visit and live"

3.1.2 PLANNING OBJECTIVES

The planning objectives identified in the Rockdale Town Centre Masterplan 2012 will continue apply as follows:

- Establish a unique identity for Rockdale
- Grow the town heart and civic role
- Increase the vitality and lifestyle
- Improve the pedestrian experience
- Strengthen the Centre's economic hubs
- Provide convenient and legible access for visitors

3.1.3 DESIRABLE FUTURE CHARACTER:

The desirable character of the precinct is articulated in the Rockdale Town Centre Masterplan 2012 will be further enhanced. Currently this is expressed as:

"The Walz Street Precinct is a vibrant retail hub with a predominance of ethnic food outlets and fresh food supplies. It has a village feel despite its fringe location at the western edge of the Centre. Whilst the precinct trades well, there are a number of traffic and parking issues. The steep topography of Walz Street, particularly at the street and footpath interface, can also constrain the pedestrian experience."

Future Desired Character

The vitality and character of the precinct will be enhanced by improving the public domain. This is detailed in 'Pedestrian spine and retail hubs' of the Structure Plan.

Additional Future Desirable Character are identified in this study.

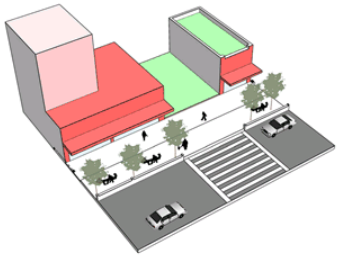
- The building façades along Railway Street are of a quality notably superior to the remaining facades within Rockdale centre, contributing to a street character worthy of retention.
- Thus, a two-storey street wall height along Walz Street and Railway Street has been proposed, to maintain the character of the existing precinct and maintain a cohesive street character as the emerging precinct develops.
- Potential has been identified to increase the height of building forms from 6 storeys to 8 storeys along the edge of Railway street, setting back from the two- storey street wall height. This will form a series of clearly defined towers sited along the edge of the rail corridor, helping to define Rockdale Town Centre with a built form strategy consistent with proposed building forms on the eastern side of the rail corridor.

FIGURE 3.25 TWO STOREY PODIUM WITH TOWER AT THE BACK

FIGURE 3.26 PUBLIC DOMAIN IMPROVEMENTS TO PROMOTE OUTDOOR DINING EXPERIENCE

3.2 DESIGN RECOMMENDATIONS

3.2.1 DESIGN PRINCIPLES

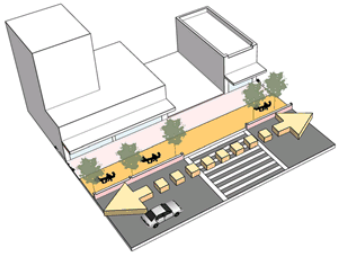


Principle 1

Enhancing the existing built form character without compromising future development opportunities and neighbour's amenities.

Design Responses:

- Consolidate 2 storey street wall scale of railway Parade and Walz Street by providing generous set back to upper level built forms.
- Retain the historical facade along Railway Street and integrate into the new development where possible.
- Establish taller tower forms along Railway Street, adjacent to the railway.
- Ensure the amenity of existing residential buildings adjoining the centre are maintained, by providing transitional landscaping and modelling new built form.

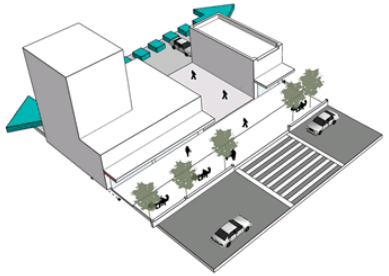


Principle 2

Improve the public domain by promoting the concept of "streets as public spaces" and proving additional open space area to the precinct.

Design Responses:

- Revitalise Walz and Frederick Streets into pedestrian friendly street with amenity, comfort and outdoor dining facilities.
- Better east-west connections to the Railway station, Guild Theatre and other amenities.
- Introduce more street tree planting.
- Acquire Nos 3 and 5 Watkin Street (2 lots) for new open space to consolidate with an existing road closure.



Principle 3

Provide a clear, legible access for all users.

Design Responses:

- Ensure continuous retail street is maintained by maintaining and improving access and servicing potential via laneways.
- Ensure quality of public domain particularly pavement.
- Use topography to create interest and improve safety for all users.

3.2.2 SPATIAL FRAMEWORK

The spatial framework plan (Figure 3.4) sets out how the broad structure of the centre may look in the next 5-10 years. Specifically land use, built form, public domain, character and connections.

The framework is informed by the analysis in Section 1 and 2 and design principles in Section 3.2.1. The framework will reinforce the desirable character of the precinct with respect to the Rockdale Town Centre Masterplan 2012 (Refer to Figure 3.5).

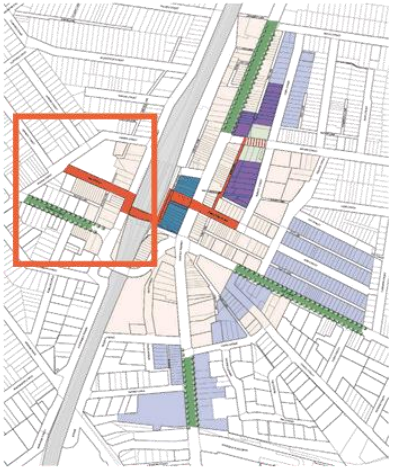


FIGURE 3.28 STRUCTURE PLAN (ROCKDALE TOWN CENTRE MASTERPLAN 2012)

FIGURE 3.27 THE SPATIAL FRAMEWORK

3.3 RECOMMENDATIONS

3.3.1 HEIGHT HIERARCHY STRATEGY

APPLYING PRINCIPLE 1

Figure 3.6 illustrates the proposed height strategy of the precinct. The objective is to explore opportunities for increased height in appropriate locations across the precinct whilst maintaining an acceptable level of amenity for neighbouring developments. Street scale and character is also a consideration that has driven this proposal.

Taller buildings restricted to a few locations in the study area up to 8 storeys in height. Possible locations include:

- corner of Railway and Frederick Streets. The site located on the corner of Railway Street and Walz Street
- corner Frederick Street and The Seven Ways. An elevated terrace is to be provided at the ground level. The terrace will need to consider impacts of potential flooding and provide opportunities for café seating on the north east facing terrace.

The building form fronting Frederick Street is expressed as a 6 storey street wall with a recessive seventh storey. This allows more generous setbacks to be provided to the southern boundary of Frederick street sites to protect the amenity of the existing neighbours. The 6 storey street wall will be viewed in isolation from the Walz and Railway Street buildings, helping to justify the change in building typology in this specific location.

FIGURE 3.29 INDICATIVE HEIGHT STRATEGY

- 2 storey street wall
- Possible 4 storey maximum
- Possible 6 storey maximum
- Possible 7 storey (25m maximum)
- Possible 8 storey (28m maximum)
- Possible 8/9 storey (30m maximum)
- Deep soil landscaping (min 3m wide)

3.3.2 AMALGAMATION

APPLYING PRINCIPLE 1

The proposed amalgamation pattern can provide an appropriate development size for future development to achieve the desirable high density mixed use development character. It allows the proposed building massing to appropriate street orientation, solar access, communal open space and combined vehicular and pedestrian access.

Figure 3.7 illustrates the proposed indicative amalgamation pattern.

FIGURE 3.30 INDICATIVE AMALGAMATION PLAN

Proposed indicative amalgamation pattern

3.3.3 USES AND GROUND FLOOR ENTRIES

APPLYING PRINCIPLE 1, 2 AND 3

Figure 3.8 illustrates the proposed ground floor uses and proposed pedestrian/ vehicular entries of the precinct.

Ground floor uses are either shops and commercial uses.

Vehicular entries are proposed to the laneways and side street to avoid interruption of pedestrian movement on main streets and avoid conflicts between pedestrians and cars.

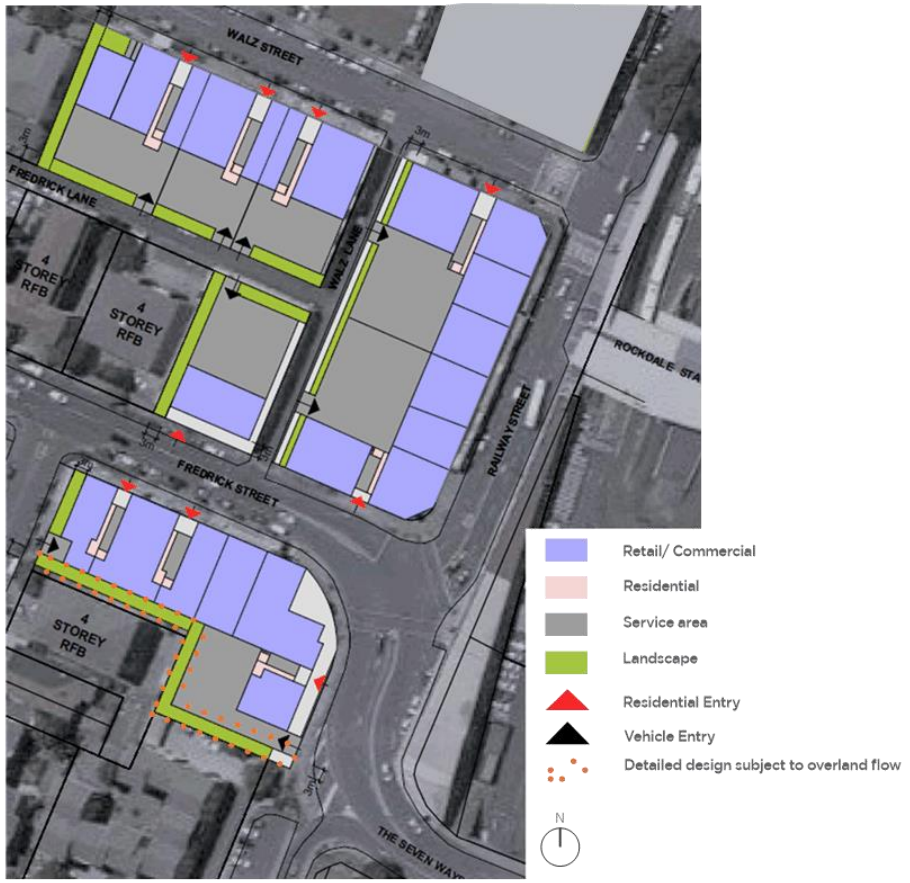


FIGURE 3.31 INDICATIVE GROUND FLOOR USES AND PROPOSED VEHICLES ENTRIES

3.3.4 SETBACKS AND DEEP SOIL LANDSCAPE

APPLYING PRINCIPLE 1 AND 2

Ground floor front setback

The retail area along Walz, Railway and Frederick Streets will have zero metres (0m) setback.

A 3m street set back is required from 23-25 Frederick Street to the adjoining residential zone to the west.

A street set back should also be provided to the western edge of 38-40 Walz Street to accommodate the transition with the residential flat building on the neighbouring site.

Rear/side setback (ground floor)

Deep soil landscape setbacks (approximately 3m) are proposed to:

- laneway interfaces
- Interfaces with neighbours of a different zone
- Rawson Street interface

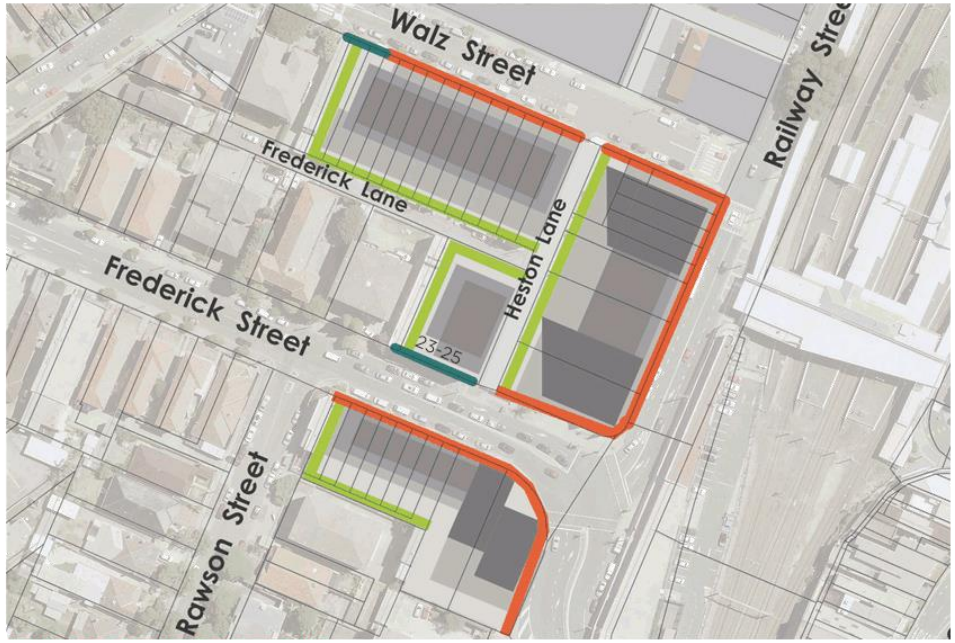


FIGURE 3.32 GROUND FLOOR SETBACKS

Urban front setback - 0m

Building in landscape setting front setback- 3m

Rear or Side Setback Landscape setback (rear or side) - deep soil planing zone - 3m

3.3.5 BUILDING SETBACK (ABOVE GROUND) AND BUILDING DESIGN

APPLYING PRINCIPLE 1

BUILDING FRONTING RAILWAY STREET, WALZ STREET AND FREDERICK STREET

4m setbacks above 2 storey podium are proposed to Railway and Walz Streets to maintain the 2 storey character.

Setback to adjoining neighbours

The existing residential buildings to the south of the precinct are vulnerable to amenity impacts (e.g. over shadowing, perceived bulk, loss of privacy) created by increased height and density.

The proposed orientation of the apartment layout has been considered in accordance with Part 2F - Building Separation in the Apartment Design Guide. For buildings up to 8 storeys, interfaces between habitable rooms and non-habitable rooms are to have a minimum separation of 12m plus an additional 3m when adjoining a zone of lower density.

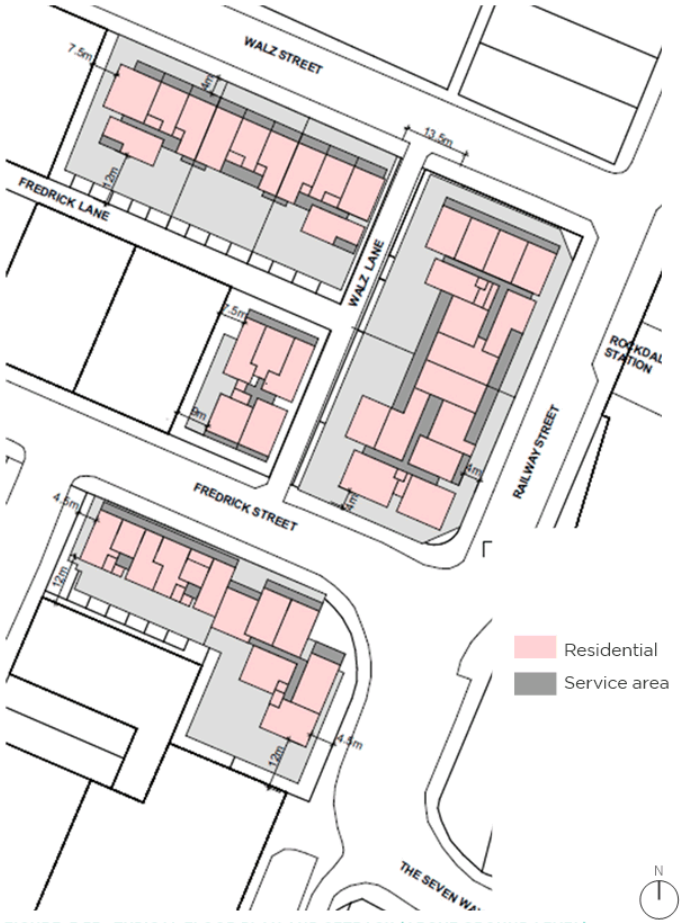


FIGURE 3.33 TYPICAL FLOOR PLAN AND SETBACK (ABOVE GROUND LEVEL)

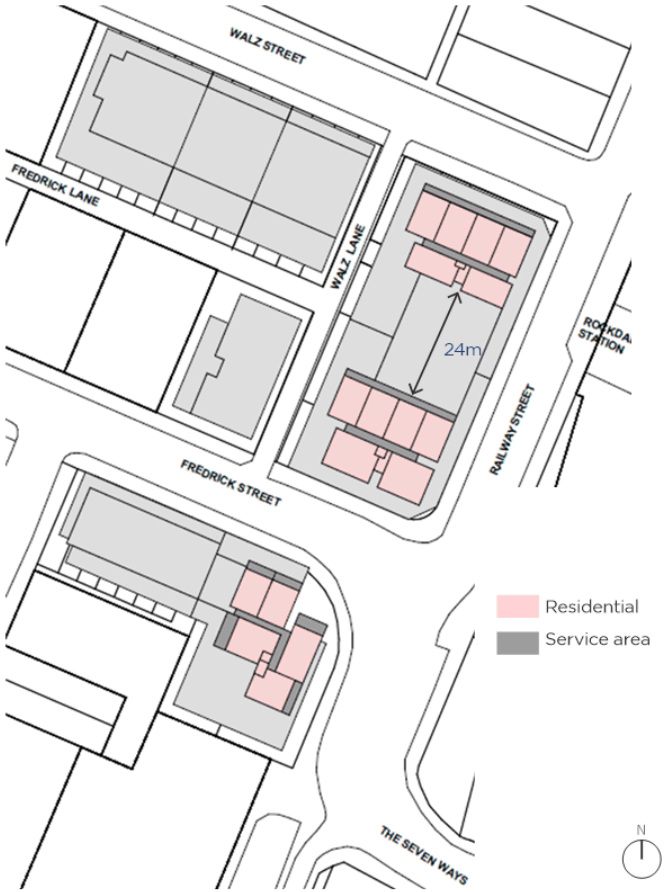


FIGURE 3.34 TYPICAL FLOOR PLAN (8TH FLOOR)

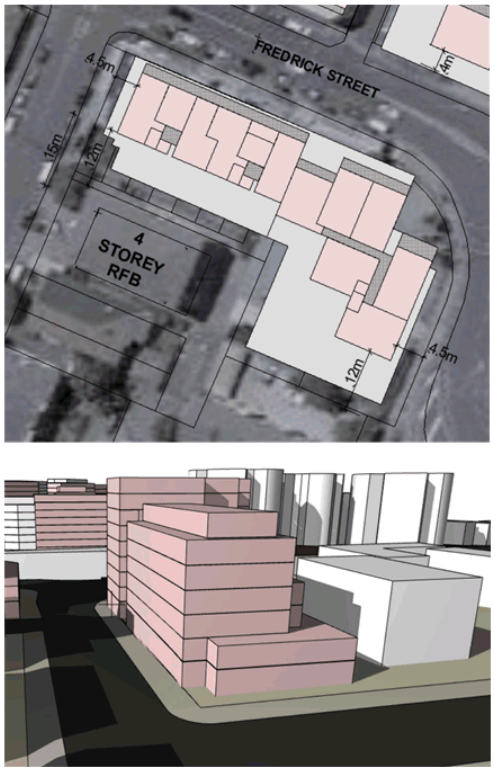


FIGURE 3.35 SOUTHERN PRECINCT - 12M REAR SETBACK TO PRESERVE NEIGHBOUR AMENITY TO THE SOUTH.

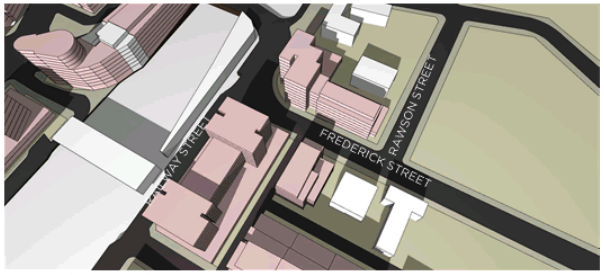
3.3.6 SOLAR IMPACT

APPLYING PRINCIPLE 1

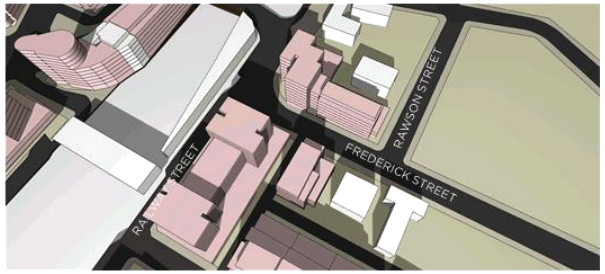
A solar analysis has been conducted to ensure the neighbouring properties receive solar access in accordance with the requirements of the Apartment Design Guide.

The shadow diagrams on the right show the increase in building heights along Railway and Frederick Streets preserve the solar access to neighbouring properties.

9am (21 June)

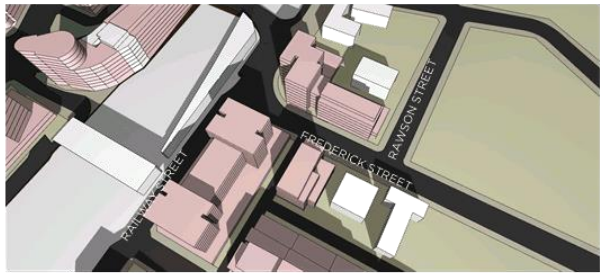


11am (21 June)



12pm (21 June)

2pm (21 June)



1pm (21 June)

3pm (21 June)

3.4 PUBLIC DOMAIN

APPLYING PRINCIPLE 2 AND 3

The design of the public realm contributes to the amenity of the precinct and its enjoyment. The streets should enhance the character and vitality of the place, including creating a connected series of public transport nodes and community places such as the Guild Theatre.

Design strategies include:

- Walz Street will be reinforced as the main street for activity and pedestrian use. The public areas on Walz Street should allow for a range of activities and outdoor uses such as cafes.
- Redesign the Watkin Street and Walz Street , Watkin Street and Herbert Street intersections to improve safety and amenity for pedestrians and cyclists.
- Railway Street will continue to carry traffic and public transport as primary traffic roads.
- Plan for shade trees and landscaping along main streets, and enhanced pedestrian connections and public places
- Ensure active frontages in new developments or redevelopment along main streets and pedestrian routes.
- Acquire 3 and 5 Watkin Street (2 lots) for new open space measuring to 1,080sqm., adjoining the road closure totalling of 1,800 sqm.
- Update the existing Rockdale Town Centre Public Domain Plan to include the proposed changes to the main streets and the design principles for the new open space.
- Building entires and lobbies to contribute in a positive way to the public domain.

FIGURE 3.36 PUBLIC DOMAIN AND OPEN SPACE

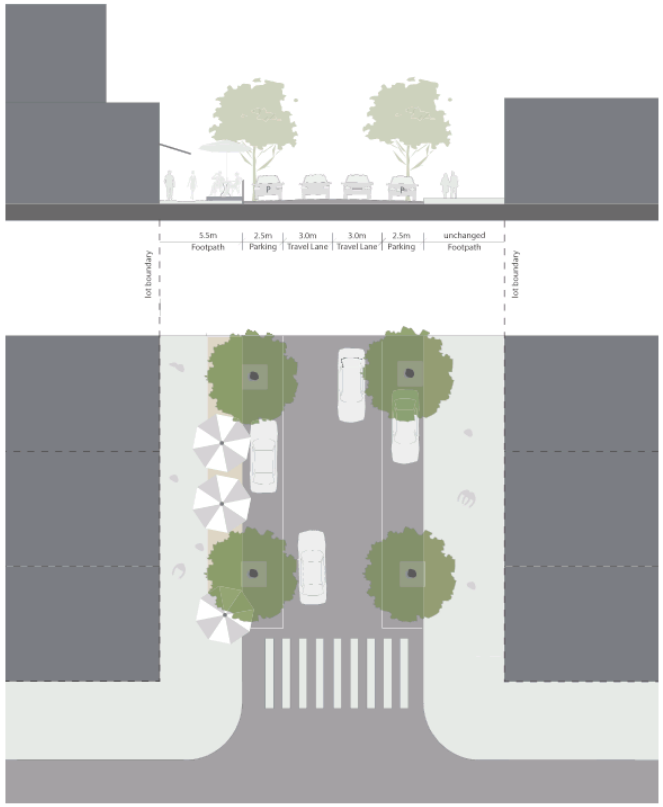


FIGURE 3.37 PROPOSED INDICATIVE FUTURE STREETSCAPE - WALZ STREET

*DIMENSIONS ARE INDICATIVE ONLY - SUBJECT TO FURTHER DESIGN DETAILS

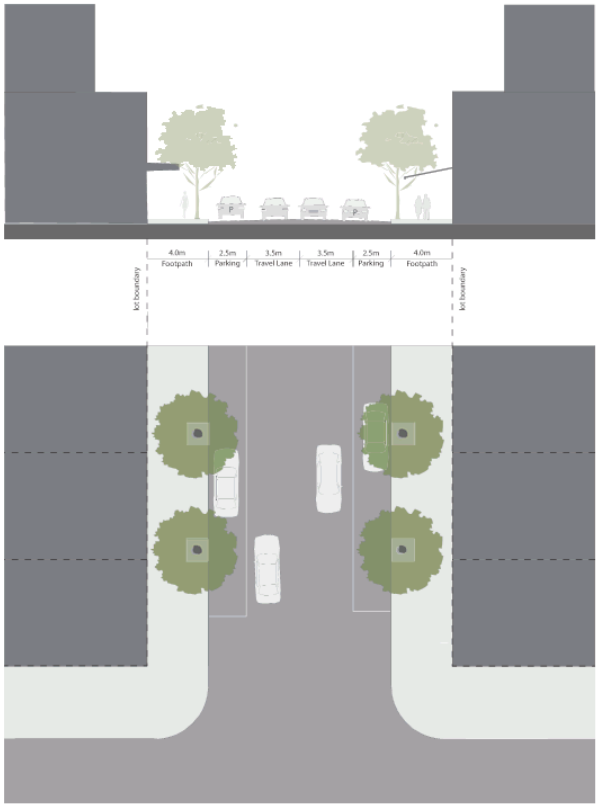


FIGURE 3.38 PROPOSED INDICATIVE FUTURE STREETSCAPE -FREDERICK STREET

*DIMENSIONS ARE INDICATIVE ONLY - SUBJECT TO FURTHER DESIGN DETAILS

4.0 RECOMMENDATIONS FOR REVIEW OF PLANNING CONTROLS

4.1 PROPOSED CHANGES TO PLANNING CONTROLS

Figures on the right reflect the proposed changes to the draft Bayside LEP 2021 in accordance with the recommendations of the study.

Figure 4.1 illustrates the changes to the Height of Building from 22m to 25m-30m.

Change is not proposed to the Zoning and Floor Space Ratio. (Figure 4.4 & Figure 4.2)

The Walz Street Precinct is proposed to be included in Clause 6.12 Design Excellence.

2 residential parcels at 3 and 5 Watkin Street are proposed to be acquired for open space. They are to be rezoned to RE1 Public Recreation to provide additional open space for the future increase in population.

Planning controls will also be included in the Bayside Development Control Plan.

FIGURE 4.1 PROPOSED CHANGES TO HEIGHT OF BUILDING

FIGURE 4.2 NO CHANGE TO FLOOR SPACE RATIO

Draft Bayside LEP 2021	Existing	Proposed
Zoning 3 and 5 Watkin St, Rockdale	R2 Residential	RE 1 Public Recreation
Zoning (The Study Area)	B2 Local Centre	No Change
Height	22m	25m to 30m
Floor Space Ratio	Nil	Nil
Land Reservation Acquisition	Nil	3 and 5 Watkin St, Rockdale
Design Excellence	Nil	Included

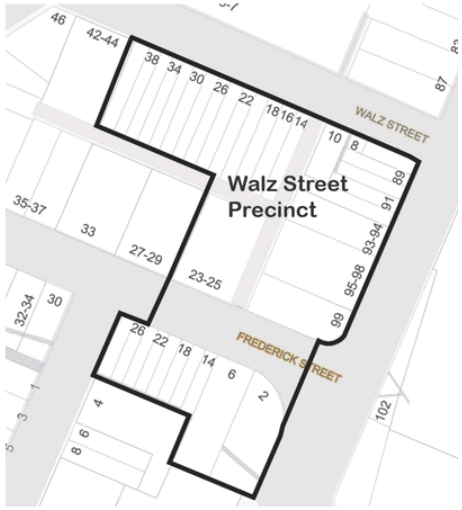


FIGURE 4.3 PROPOSED DESIGN EXCELLENCE CLAUSE 6.12 TO APPLY

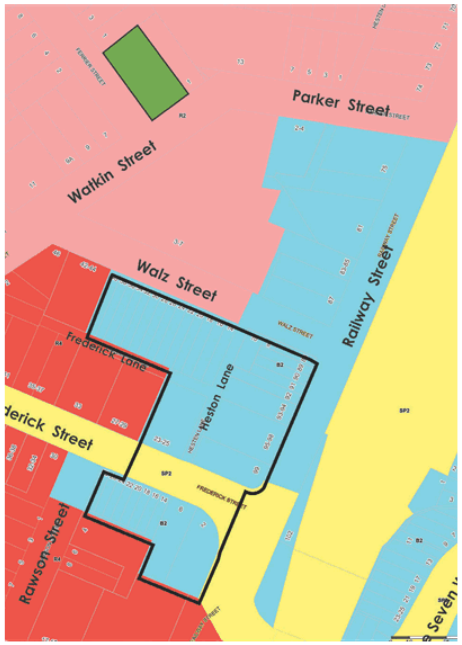


FIGURE 4.4 PROPOSED CHANGES TO ZONING

Proposed RE1 Public Recreation (3 and 5 Watkin Street, Rockdale)

FIGURE 4.5 PROPOSED CHANGES TO LAND RESERVATION ACQUISITION.

Proposed Land Acquisition (3 and 5 Watkin Street, Rockdale)


Bayside Council
Serving Our Community
Eastgardens Customer Service Centre, 152 Bunnerong Road
Rockdale Customer Service Centre, 444-446 Princes Highway
Phone 1300 581 299 | 9562 1666
Email council@bayside.nsw.gov.au
www.bayside.nsw.gov.au

Bayside LEP Amendment Planning Proposal

Traffic and Transport Assessment Report

Rockdale Town Centre
Walz Street
Bay Street
Arncliffe West

Bayside Council

4 May 2021

Gold Coast
Suite 26, 58 Riverwalk Avenue
Robina QLD 4226
P: (07) 5562 5377

Brisbane
Level 2, 428 Upper Edward Street
Spring Hill QLD 4000
P: (07) 3831 4442

Sydney
Studio 203, 3 Gladstone Street
Newtown NSW 2042
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Document Issue History

Report File Name	Prepared	Reviewed	Issued	Date	Issued to
P5081.001R Bayside LEP Amendment Planning Proposal Traffic Report	S.Seeney / L.Johnston	A.Bitzios	A.Bitzios	01/04/2021	Josh Ford Bayside Council josh.ford@bayside.nsw.gov.au
P5081.002R Bayside LEP Amendment Planning Proposal Traffic Report	S.Seeney / L.Johnston	A.Bitzios	A.Bitzios	09/04/2021	Josh Ford Bayside Council josh.ford@bayside.nsw.gov.au
P5081.003R Bayside LEP Amendment Planning Proposal Traffic Report	S.Seeney / L.Johnston	A.Bitzios	A.Bitzios	04/05/2021	Josh Ford Bayside Council josh.ford@bayside.nsw.gov.au
P5081.004R Bayside LEP Amendment Planning Proposal Traffic Report	S.Seeney / L.Johnston	A.Bitzios	A.Bitzios	04/05/2021	Josh Ford Bayside Council josh.ford@bayside.nsw.gov.au

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1. INTRODUCTION

1.1 Background

On 5 August 2020, the New South Wales (NSW) Department of Planning, Industry and Environment (DPIE) wrote to Bayside Council (Council), informing them of funding grants available under the NSW Public Spaces Legacy Program (PSLP). In their correspondence, DPIE stated this was "*a $250 million program that will deliver a lasting legacy of new and improved public spaces across NSW, while accelerating the assessment of local development applications and rezonings*".

The program focuses on the post-COVID pandemic economic and social recovery for NSW and has a primary goal of delivering quality public space, which could help contribute to the recovery. To be eligible for funding, Council is required to prepare a draft Planning Proposal which brings forward the 6–10-year housing supply of 7,720 dwellings within the Local Government Are (LGA).

This medium-term housing supply target is included in both the Bayside Local Strategic Planning Statement (LSPS) and the Bayside Local Housing Strategy (LHS).

The Planning Proposal predominantly seeks to amend height and floorspace planning controls in the Rockdale Local Environmental Plan 2011 (RLEP 2011).

1.2 Purpose

Bitzios Consulting have been commissioned by Bayside Council to prepare a Traffic and Transport Assessment to support a Council led Planning Proposal of four separate areas within their Local Government Area.

1.3 Proposed Amendment Areas

The current LEP approved in 2015 has seen a relatively low uptake of previously approved forecast residential yields. This planning proposal predominantly focuses on providing consistency and clarity within the planning policy and has sought opportunities to further incentivise development within each of the precincts. The proposed planning policy amendments seeks to further encourage re-development to enable this yield to be unlocked. The proposed amendment areas included in this planning proposal are shown in Figure 1.1 and Figure 1.4 below.

The resultant changes proposed within this Planning Proposal results in the following increases in residential yield upper limits:

- Rockdale Town Centre: 0 dwellings (Unlocking capacity via amended planning controls)
- Walz Street: 65 dwellings (Estimated)
- Bay Street: 1,000 dwellings (Estimated)
- Arncliffe West: 440 dwellings (Estimated)
- **Total Yield Capacity Increase: 1,505 dwellings (Estimated)**

Source: SIX Maps

Figure 1.1: Precinct 1 – Rockdale Town Centre

Source: SIX Maps

Figure 1.2: Precinct 2 – Walz Street

Source: SIX Maps

Figure 1.3: Precinct 3 – Bay Street

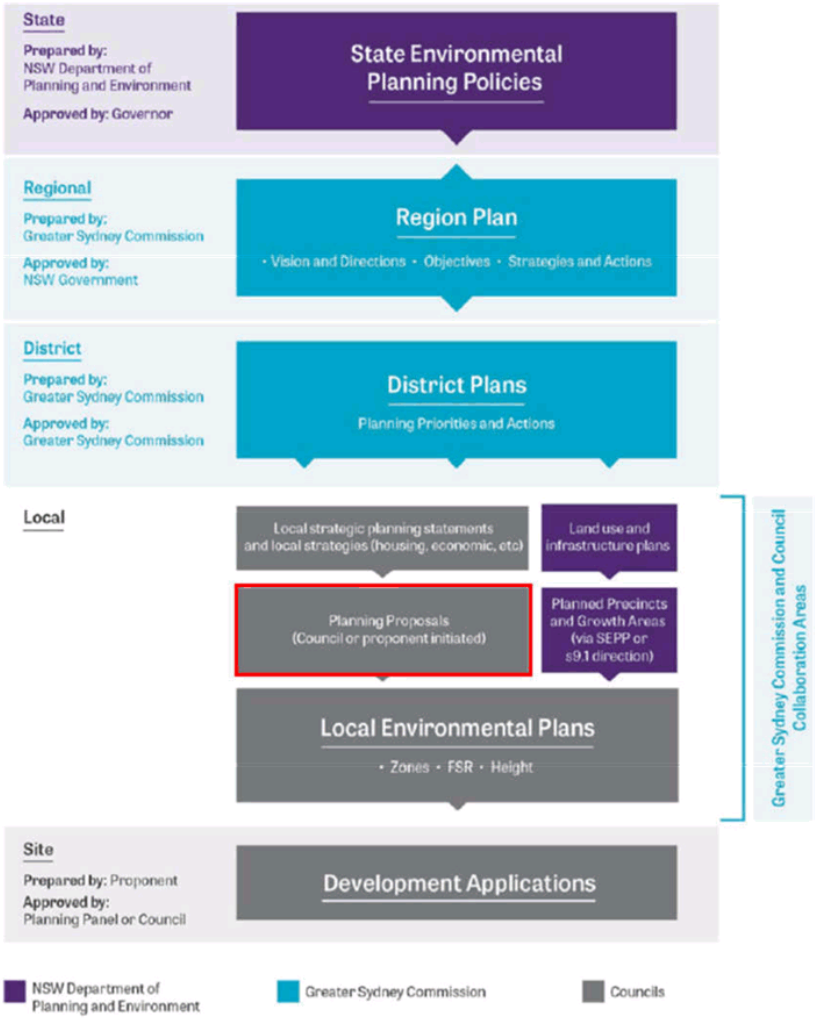
Source: SIX Maps

Figure 1.4: Precinct 4 – Arncliffe West

2. STRATEGIC CONTEXT

2.1 Overview

The following documents guide planning and development in NSW and have been reviewed in relation to the four proposed amendment areas. The state strategies and plans provide high-level planning objectives for NSW as a whole and more specific districts within the state. These objectives provide functions for the local government strategies to implement within the smaller context areas of Rockdale, Bayside, Arncliffe and Banksia. Figure 2.1 describes the planning hierarchy in NSW and where this application resides within the hierarchy, whilst the subsequent sub-sections provide an overview of each relevant strategy.



Source: Eastern City District Plan

Figure 2.1: NSW Planning Hierarchy

2.2 State Strategies and Plans

2.2.1 NSW Future Transport Strategy 2056

Future Transport Strategy 2056 was prepared by the NSW Government and aims to provide an *"overarching strategy, supported by a suite of plans to achieve a 40-year vision for our transport system"*. The Bayside Local Government Area is located within the Eastern Harbour City which is a part of the three cities concept the strategy identifies. This concept aims to create areas that include employment, education and services which can be accessed via public or active transport within 30 minutes to reduce congestion and travel time.

2.2.2 NSW South East Sydney Transport Strategy

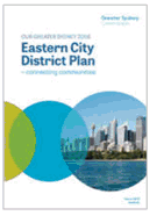
The South East Sydney Transport Strategy is guided by the Future Transport Strategy and focuses specifically on the localised area of south eastern Sydney. The strategy provides a transport and land use plan for the medium – long term (2026-2056) and includes the use of a compact city and rapid transit corridors. Aiming to achieve the 30-minute city objective several projects have been earmarked such as a new rapid bus line from Maroubra to Rockdale and residential growth in Banksia-Arncliffe.

2.2.3 NSW Road Safety Plan 2021

The Road Safety Plan 2021 features targeted and proven initiatives that will help us to progress towards our road safety goals, addressing key trends, behaviours and the types of crashes occurring on NSW roads. The Plan also aligns the Towards Zero vision with Future Transport 2056, which aims to have an NSW transport network with zero trauma by 2056. Some key relevant aspects include:

- increasing safety for vulnerable road users by providing pedestrian crossings, refuges, and traffic calming devices, as well as expanding 40km/h zones in high pedestrian and local areas.
- urban streets move people and goods around densely populated areas, so roads need to be designed for the separation of vulnerable road users and with speeds that are safe.

2.2.4 NSW Eastern City District Plan



The Eastern City District Plan aims to manage growth over a 20-year period at a district level and aims to connect regional and local planning. It informs local strategic planning and local environmental plans however also assist Council to plan for growth and support place-based outcomes. The plan identifies Rockdale as a local centre that is pedestrian friendly and has a mix of land uses and outlines the Arncliffe Communities Plus project that aims to deliver a mix of social, affordable, and private dwellings.

2.2.5 NSW Department of Planning, Industry and Environment Apartment Design Guide

The Apartment Design Guide is used to improve the planning and design of residential apartments in NSW. The guide identifies different types of apartment designs and the local characteristic's that need to be considered. The *State Environmental Planning Policy No 65 – Design Quality of Residential Apartment Development (SEPP 65)* is to be used in conjunction with this guide and establishes nine design quality principles. The Apartment Design Guide outlines how these principles can be implemented through design and planning practice.

2.2.6 NSW Environment Planning and Assessment Act Section 9.1 Direction 3.4

The Minister for Planning issued a list of Directions to relevant planning authorities under section 9.1(2) of the Environmental Planning and Assessment Act 1979 - previously section 117(2). These directions apply to planning proposals lodged with the Department of Planning, Industry and Environment on or after the date the direction was issued (1 July 2009). Direction 3.4 specifically talks to Integrated Land Use and Transport and requires applicants to increase the choice of transport options and reduce the dependence on car use. Supporting public transport and freight are also key objectives.

2.2.7 Bayside West Precincts 2036 Plan

The Bayside West Precinct Plan sets out land use and infrastructure delivery for the area over the next 20 years. It aims to provide more housing choices to meet the needs of the community including detached dwellings, townhouses, and apartments. A Special Infrastructure Contribution (SIC) will provide additional funding for road and active transport improvements that will support the anticipated growth of the area. Arncliffe has been earmarked for future rezoning and the development controls within the Rockdale LEP 2011 are applicable to developments within these precincts.

2.3 Local Strategies and Plans

2.3.1 Bayside Local Strategic Planning Statement 2020

The Bayside Local Strategic Planning Statement 2020 (LSPS) sets out the 20-year visitor for land use in the Local Government Area (LGA). The vision and priorities for land use outlined in the LSPS is implemented through the Local Environmental Plans (LEP) and informs other planning tools including the Development Control Plans (DCP) and Local Infrastructure Contribution Plans. Within the Statement, Arncliffe West was prioritised for planning policy amendments to occur within the next 1 – 5 years.

2.3.2 Bayside Local Housing Strategy 2019

The Bayside Local Housing Strategy guides how residential development in Bayside will be planned and managed to 2036. The Strategy aims to provide residential development meets the needs of both the current and future residents ensuring adequate supply of housing. The spatial approach for the area is to have majority of the growth in activity centres near fixed rail transport and minimise low scale developments that are less accessible. The strategy identifies Bayside will need approximately 1,300 additional dwellings per year between 2016 and 2036 to house the forecast population growth.

2.3.3 Rockdale Local Environmental Plan 2011

The Rockdale Local Environmental Plan (LEP) aims to encourage residential and employment densities around transport nodes to provide sustainable transport options. The LEP also sets out the land use zone codes, principal development standards and other provisions relating to how development impacts the environment.

2.3.4 Arncliffe and Banksia Local Infrastructure Contributions Plan 2020

The Local Infrastructure Contributions Plan for Arncliffe and Banksia authorise Bayside Council to collect monetary contributions and/or land from developers to provide for local infrastructure needed to support the relevant development and imposed via a condition of development consent. The plan provides a framework for the efficient and equitable determination, collection, and management of contributions towards local infrastructure.

By ensuring adequate public facilities are provided and that developers are making reasonable contributions so that the existing community is not unreasonably burdened by the provision of local infrastructure.

2.3.5 Bayside's Priority Green Corridors

The 'Green Grid' is a network of green spaces which connects town centres, public transport hubs and residential areas. The network is made up of parks, sporting fields, bushland, waterways, areas of cultural significance and walking and cycling paths. There are three Priority Green Grid Corridors running through Bayside:

- Bardwell Valley Parklands and Wolli Creek
- Rockdale Wetlands Corridor
- Mill Stream and Botany Wetlands Corridor.

3. PROPOSED AMENDMENTS

3.1 Rockdale Town Centre

The planning proposal seeks to provide consistency across planning controls within this overall precinct within the Rockdale Town Centre. The Rockdale Town Centre precinct is shown in Figure 1.1. There is no net increase in the dwelling yield capacity because of the planning policy changes, however it is likely that the changes proposed will 'unlock' existing approved yield capacity forecasts under the current LEP. The expected locations for sites potential for redevelopment are shown in pink/red in Figure 3.1.

Figure 3.1: Rockdale East – Forecast Yield Increase Locations

As seen within , most of the yield increases are located within proximity to the major Rockdale Bus-Rail Modal interchange. Figure 3.2 below shows that most of the development footprint is within a 400m walking distance to the high-quality transport facility, with a very high proportion within 200m. Development within these areas should be encouraged, which is consistent with the proposed LEP amendments for this precinct.

Source: SIX Maps

Figure 3.2: Rockdale Town Centre – Distance to Rockdale Bus-Rail Interchange

3.2 Walz Street

The planning proposal seeks to amend the allowable height limits within this planning precinct.. The number of high-density dwellings is forecast to increase by 65 units because of this amendment. The expected locations for sites potential for redevelopment are also shown in Figure 3.3 below.

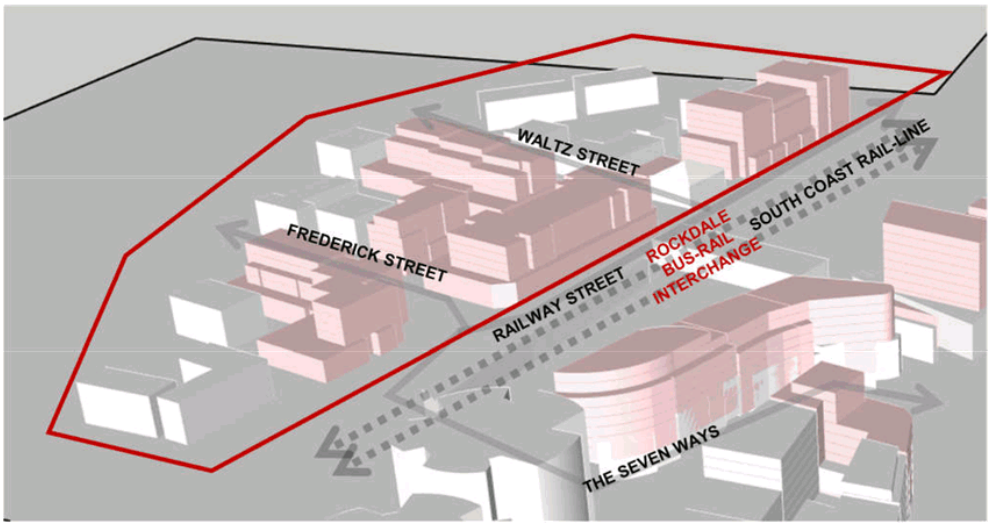


Figure 3.3: Walz Street – Forecast Yield Increase Locations

As seen within Figure 3.3, most of the yield increases are located within very close proximity to the major Rockdale Bus-Rail Modal interchange.

Figure 3.4 below shows that all the development is centrally located and is within 200m of the major transport node. Like Rockdale Town Centre, these planning policy amendments are encouraged as it provides increased residential populations with access to high quality public transport services reducing the overall proportion of people likely to use 'car' as a preferred mode of travel.

Source: SIX Maps

Figure 3.4: Rockdale West – Distance to Rockdale Bus-Rail Interchange

3.3 Bay Street

The planning proposal seeks to amend the land use zoning, height and floorspace planning controls for the precinct shown in Figure 1.3. The number of medium and high-density dwellings is forecast to increase by 1,000 units because of this amendment. The expected locations for sites potential for redevelopment are shown in Figure 3.5.

Figure 3.5: Bay Street – Forecast Yield Increase Locations

Figure 3.6 below shows that most of the future yield increase is within 200m of a bus stop on a connecting route to Rockdale Rail Station and to the future potential Brighton Le Sands Metro Station. They are also within walking distances to each of these major centres, being approximately 900m-950m in each direction from West Botany Street.

The M6 project is delivering significant pedestrian and cycle infrastructure in a north-south direction near the West Botany Street corridor. Whilst having good access to public transport, it will also have 'front door' access to regional pedestrian and cycle networks.

Source: SIX Maps

Figure 3.6: Bay Street – Proximity to Transport

Source: TfNSW M6 Stage 1 Web Portal

Figure 3.7: M6 Upgrade Location – Cycle Facilities

Figure 3.8 shows the type of development proposed along the Bay Street corridor. Driveways along this corridor are directed towards the lowest order road where practicable. In some instances, driveways will be required to front Bay Street.

Informal traffic surveys of these developments suggest that they generate 6–7 trips in the peak period combined across both developments. The combined developments comprise 29 units, resulting in a trip generation in the order 0.2 trips per unit in the peaks. This rate demonstrates the higher utilisation of public transport for this dwelling type in this area.

Source: Google Streetview

Figure 3.8: Typical Bay Street Developments

A summary of the survey findings is shown in Table 3.1 below.

Table 3.1: Traffic Survey Summary

PERIOD	99-101 Bay Street		95-97 Bay Street		On-street Parking	
AM	IN	OUT	IN	OUT	IN	OUT
0700-0800	1	0	1	4+1 motorbike	0	2
0800-0900	1	2	1	2	0	1
PM						
1600-1700	1	0	0	2	4	1
1700-1800	0	0	2	1	4	0

The dwelling mixes are also as follows:

- 93-97 Bay Street - 19 residential units comprised of 17 two-bedroom and 2 three-bedroom units and basement parking – DA-2014/190
- 99-101 Bay Street - 10 residential units comprised of 8 two-bedroom and 2 one-bedroom and basement parking - DA-2012/10.

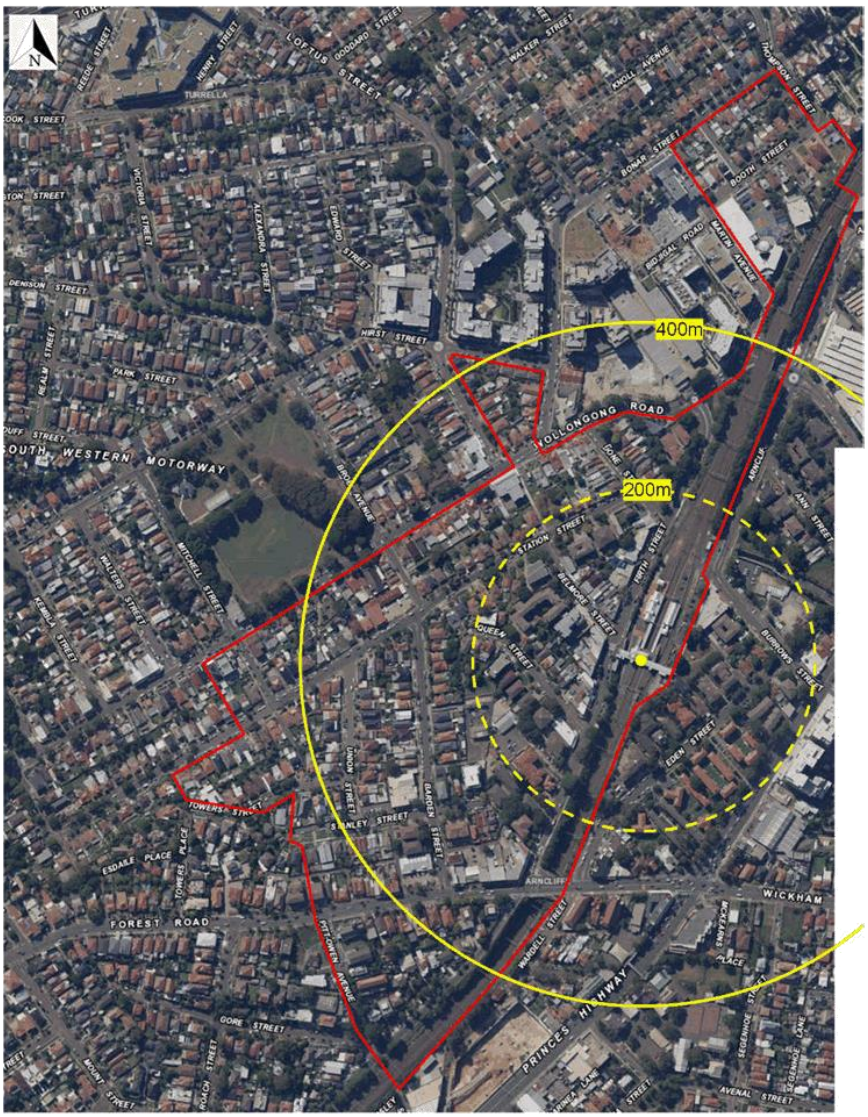
3.4 Arncliffe West

The planning proposal seeks to amend the land use zoning. height and floorspace planning controls for the precinct shown in Figure 1.4. The number of high-density dwellings is forecast to increase by 440 units as a result of this amendment. The proposed change in Floor Space Ratio limits for the precinct is shown in Figure 3.9.

Figure 3.9: Arncliffe West – Proposed Floor-Space-Ratio Changes

As shown in Figure 3.9 the majority of the forecast yield increase is located at the 'front door' of the Arncliffe Rail Station.

Figure 3.10 below shows that most of the precinct is centrally located and is within 400m of the major transport node should other be amalgamated for further development opportunities.



Source: SIX Maps

Figure 3.10: Arncliffe West – Distance to Arncliffe Rail Station

4. IMPACT ASSESSMENT APPROACH

4.1 Overview

The assessment of traffic and transport impacts associated with the planning proposal amendment has considered both the strategic alignment with government policies, plans and directions, as well as the traditional traffic and transport impacts typically assessed following TfNSW guidelines and Council planning controls.

4.2 Strategic Assessment

To undertake a strategic traffic and transport assessment of the four proposed areas several performance criterion has been determined and is shown in Table 4.1. The performance criterion has been developed based directly from NSW Future Transport Strategy 2056.

Table 4.1: Strategic Performance Criteria (Future Transport Strategy 2056)

Performance Area	Performance Objective	Outcomes
Successful Places	Transport initiatives that improve liveability of places	▪ Monitor the application of Movement and Place principles to new or redesigned centres ▪ Increase the number of people able to access centres by walking, cycling, and using public transport ▪ Develop transport enabled health and liveability outcomes
A Strong Economy	Provide efficient public transport and road connections for passengers and freight	▪ Work towards a Metropolitan 30-minute City ▪ Improve Regional centre connectivity ▪ Improve freight movement efficiency
Safety and Performance	Deliver a safe and reliable network with zero trauma	▪ Reduction in fatalities and serious injuries ▪ Improve journey time reliability ▪ Provide competitive public transport travel times on major corridors
Accessible Services	Provide whole of journey accessibility for customers regardless of age or ability	▪ Public and active transport accessibility to education, jobs, health, and community services ▪ Physical accessibility of infrastructure, vehicles, and services.
Sustainability	Improve financial sustainability of transport in NSW and its contribution to net zero emissions.	▪ Ensure effectiveness of public transport and road expenditure ▪ Encourage mode shift to active, public transport and electric vehicle use to reduce Carbon emissions.

4.3 Traffic and Transport Impact Assessment

Following the strategic assessment of the proposed uplift within each precinct, an assessment of the traditional traffic and transport matters have been undertaken. This assessment has considered the following items:

- **Existing Conditions Assessment** – identification of existing issues and opportunities taking into consideration the strategic transport objectives and outcomes listed in Table 4.1.
- **Growth Impact Assessment** – a strategic assessment of traffic, public transport, pedestrian, and cycle impacts associated with the increase in proposed yield within each precinct. Local traffic access and site servicing implications have also been considered. It has been assumed that parking demand and supply matters will be addressed within the relevant parking code to ensure that the key objectives under the Section 9.1 Direction to reduce the dependence of car use has been given due consideration.
- **Recommendations** – considering precinct issues and opportunities, along with the magnitude of expected transport travel demand increases, a series of recommendations have been provided to assist with managing future growth. These recommendations may require further investigations and studies to better articulate infrastructure and policy requirements with a higher degree of certainty, which may occur prior to, or as part of, the submission of development applications, pending the nature of the recommendation.

5. STRATEGIC ASSESSMENT

5.1 Rockdale Town Centre

The strategic performance assessment of the proposed changes to the Rockdale LEP for the Rockdale Town Centre precinct is discussed in Table 5.1.

Table 5.1: Strategic Performance Assessment – Rockdale East

Performance Area	Performance Objective	Response	Acceptable Outcome
Successful Places	Transport initiatives that improve liveability of places	▪ Increased density of population within the Rockdale Town Centre will increase activity within public areas, further encouraging people to walk and utilise public transport	▪ Yes
A Strong Economy	Provide efficient public transport and road connections for passengers and freight	▪ Increasing public transport utilisation will reduce car dependence and pressures on continued road-based infrastructure upgrades.	▪ Yes
Safety and Performance	Deliver a safe and reliable network with zero trauma	▪ Existing safe crossing facilities exist across the Rockdale Town Centre precinct which enables safe pedestrian access to the Rockdale Train Station ▪ The treatment of laneways during redevelopment will need consideration of design principles that promote the safe movement of pedestrians and cyclists in a shared arrangement with service vehicles as well as local residential vehicles accessing basement car parks. Enhancements to laneways are likely to be required.	▪ Yes, with treatment
Accessible Services	Provide whole of journey accessibility for customers regardless of age or ability	▪ Rockdale Town Centre precinct is relatively flat and walkable for all ages. With good access to Rockdale Train Station, access is provided to broader metropolitan services.	▪ Yes
Sustainability	Improve financial sustainability of transport in NSW and its contribution to net zero emissions.	▪ Placing population growth within Centres, such as Rockdale, promotes a reduction in car use, increasing the utilisation of existing high quality public transport facilities and services, reducing the overall financial burden to the state.	▪ Yes

5.2 Walz Street

The strategic performance assessment of the proposed changes to the Rockdale LEP for the Walz Street precinct is discussed in Table 5.2.

Table 5.2: Strategic Performance Assessment – Walz Street

Performance Area	Performance Objective	Response	Acceptable Outcome
Successful Places	Transport initiatives that improve liveability of places	▪ Increased density of population within the Walz Street precinct will increase activity within public areas, further encouraging people to walk and utilise public transport	▪ Yes
A Strong Economy	Provide efficient public transport and road connections for passengers and freight	▪ Increasing public transport utilisation will reduce car dependence and pressures on continued road-based infrastructure upgrades.	▪ Yes
Safety and Performance	Deliver a safe and reliable network with zero trauma	▪ Existing safe crossing facilities exist across the Walz Street precinct which enables safe pedestrian access to the Rockdale Train Station	▪ Yes
Accessible Services	Provide whole of journey accessibility for customers regardless of age or ability	▪ Walz Street precinct towards the station is relatively flat and walkable for all ages. With good access to Rockdale Train Station, access is provided to broader metropolitan services.	▪ Yes
Sustainability	Improve financial sustainability of transport in NSW and its contribution to net zero emissions.	▪ Placing population growth within Centres, such as Rockdale, promotes a reduction in car use, increasing the utilisation of existing high quality public transport facilities and services, reducing the overall financial burden to the state.	▪ Yes

5.3 Bay Street

The strategic performance assessment of the proposed changes to the Rockdale LEP for the Bay Street precinct is discussed in Table 5.3.

Table 5.3: Strategic Performance Assessment – Bay Street

Performance Area	Performance Objective	Response	Acceptable Outcome
Successful Places	Transport initiatives that improve liveability of places	▪ The development proposal aims to rationalise multiple driveways. Setbacks on development frontages are proposed to enable higher quality off-road facilities for cyclists whilst also enhancing the pedestrian experience.	▪ Yes
A Strong Economy	Provide efficient public transport and road connections for passengers and freight	▪ The reduction in the overall number of driveways fronting Bay Street will reduce with redevelopment, providing improvements for freight and bus travel times. ▪ The extent of redevelopment is not significant, and is not expected to generate significant traffic impacts ▪ Driveways servicing the developments are proposed from the lowest order road where possible ▪ Frequent bus stop exists along the corridor resulting in residents being within 200-300m of any stop. ▪ The very popular '478' and '479' bus services traverse this route providing efficient connections to Rockdale and Brighton-Le-Sands and onwards to Miranda.	▪ Yes
Safety and Performance	Deliver a safe and reliable network with zero trauma	▪ Crossing Bay Street to access Bus Stops is problematic. ▪ There are no formal crossing points between West Botany Street and George Street (approximately 800m). ▪ Additional safe crossing points will be required to support development on this corridor. ▪ Laneways should also be considered where practicable to reduce driveway accesses directly from Bay Street, improving pedestrians and cycle safety, whilst also removing the potential for rear-end and T-bone crashes associated with driveway manoeuvres.	▪ Yes, with treatments and actions

Performance Area	Performance Objective	Response	Acceptable Outcome
Accessible Services	Provide whole of journey accessibility for customers regardless of age or ability	▪ The development location has excellent access to high quality bus services. ▪ Bay Street is relatively flat and is easy to walk ▪ Bay Street has very good access to other key social and recreational land uses and appropriate infrastructure to support the redevelopment has potential to increase walking and cycling ▪ The eastern end of the redevelopment area is within 800m of the major Rockdale Bus-Rail interchange.	▪ Yes, with treatments
Sustainability	Improve financial sustainability of transport in NSW and its contribution to net zero emissions.	▪ The level of development intensity proposed along Bay Street is not significant. ▪ The inclusion of appropriate pedestrian crossing facilities to key bus stops, along with enhanced off-road facilities, will encourage walking and cycling, reducing the reliance on car use.	▪ Yes, with treatments

5.4 Arncliffe West

The strategic performance assessment of the proposed changes to the Rockdale LEP for the Arncliffe West precinct is discussed in Table 5.4.

Table 5.4: Strategic Performance Assessment – Arncliffe West

Performance Area	Performance Objective	Response	Acceptable Outcome
Successful Places	Transport initiatives that improve liveability of places	▪ The development precinct is within walking proximity to a local train station ▪ Increased walking within and around the village centre will further encourage public transport use. ▪ Detailed planning has already been undertaken to provide the infrastructure support framework for this development ▪ The main development intensity is forecast in very close proximity to the train station.	▪ Yes
A Strong Economy	Provide efficient public transport and road connections for passengers and freight	▪ The development precinct is near a local train station, and has excellent access to the broader rail network, being one station away from Wolli Creek Rail-Rail interchange.	▪ Yes
Safety and Performance	Deliver a safe and reliable network with zero trauma	▪ Infrastructure assessments and contributions plans for the precinct has already been undertaken to provide the necessary supportive network for redevelopment.	▪ Yes

Performance Area	Performance Objective	Response	Acceptable Outcome
Accessible Services	Provide whole of journey accessibility for customers regardless of age or ability	▪ The terrain in Arncliffe is generally not conducive for walking for the elderly. ▪ However, the identified locations for yield increases are located on relatively flat sections with good access to public transport, located within village centres with good access to local facility needs.	▪ Yes, subject to redevelopment of flat areas.
Sustainability	Improve financial sustainability of transport in NSW and its contribution to net zero emissions.	▪ Most of the forecast yield is to be placed opposite the Arncliffe Rail Station. ▪ Encouraging development near Rail Stations will reduce the reliance of car use and promote active travel. ▪ Infrastructure treatments for the precinct have already been considered as part of past assessments.	▪ Yes

6. TRAFFIC AND TRANSPORT IMPACT ASSESSMENT

6.1 Rockdale Town Centre

6.1.1 Overview

The Rockdale Town Centre study area consists of a mix of land uses including retail, commercial and residential uses. Both Princes Highway and Bay Street currently operate as B-Double routes and there is a major rail-bus modal interchange at Rockdale Train Station. Majority of the increased density is proposed to occur along Princes Highway aiming to provide mixed use developments located in proximity to high-frequency public transport.

Laneways within the precinct are currently being used by both pedestrians and service vehicles. Increased densification within the centre will also increase pedestrian activity within the laneway. Any redevelopment of the precinct will need further consideration and review of lane-way widths, operations and servicing needs as sites are redevelopment.

6.1.2 Existing Conditions

6.1.2.1 Traffic Conditions

Details of the key roads within the study area is provided in Table 6.1.

Table 6.1: Key Roads

Road Name	No. of Lanes	Speed Limit	Jurisdiction	Hierarchy
Princes Highway	4	60km/h	TfNSW	Arterial Road
Bay Street	2	60km/h	TfNSW	Sub-Arterial Road
Bestic Street	2	60km/h	Council	Collector Road
The Seven Ways	2	60km/h	TfNSW	Sub-Arterial Road
Bryant Street	2	50km/h	Council	Collector Road

Table 6.2 details the key intersections within the study area.

Table 6.2: Key Intersections

No	Major Road	Minor Road	Jurisdiction	Control
1	Princes Highway	Bay Street / The Seven Ways	TfNSW	Signals
2	Princes Highway	Bryant Street	TfNSW	Signals
3	Princes Highway	Bestic Street	TfNSW	Signals
4	Princes Highway	Rockdale Plaza Drive	TfNSW	Signals
5	Princes Highway	Lister Avenue	TfNSW	Signals
6	Princes Highway	Geeves Avenue	TfNSW	Signals

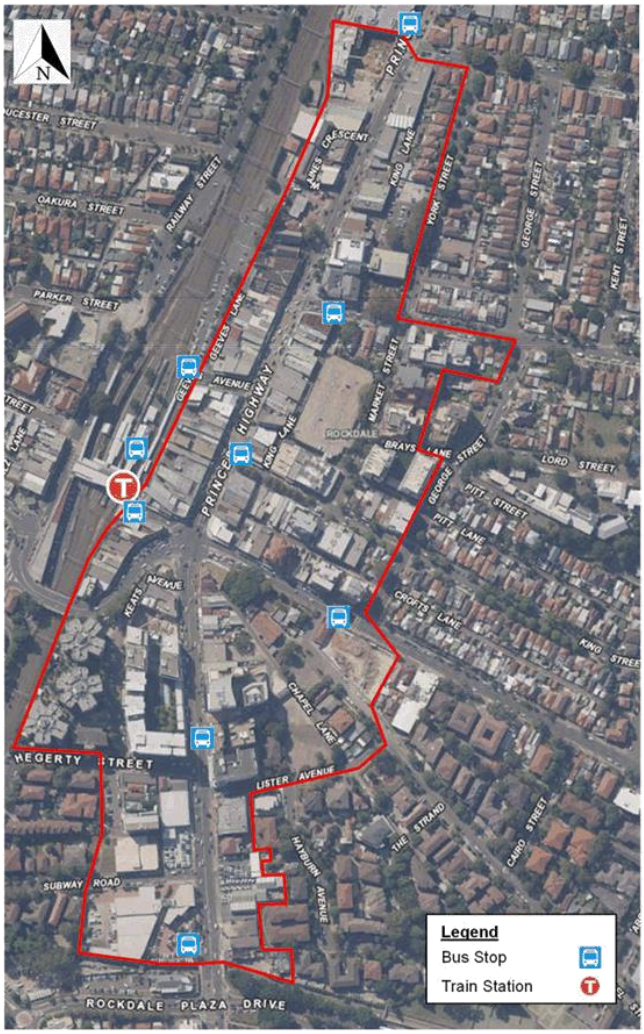
The key intersections are shown below in Figure 6.1.

Source: SIX Maps

Figure 6.1: Rockdale Town Centre – Key Intersection Locations

6.1.2.2 Public Transport

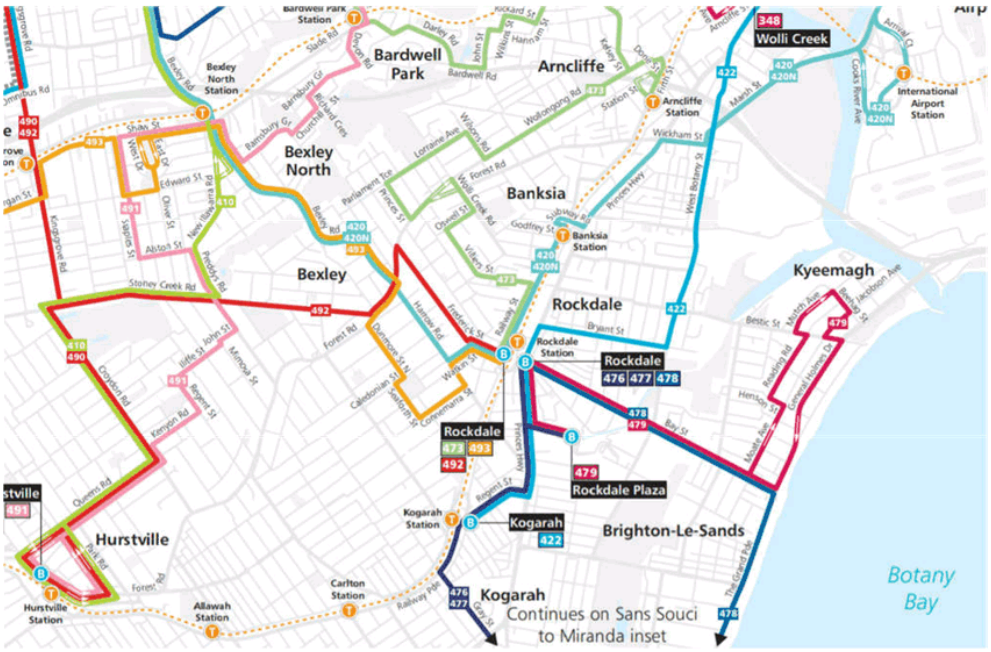
The Rockdale Train Station provides high-frequency public transport serviced by T4 line which connects the Eastern Suburbs to the Illawarra Line and the South Coast Line which connects Sydney to Kiama. The station allows for a bus and rail interchange as bus bays are provided on both sides of the station and are serviced by a number of bus routes. Other bus stops are provided within the Rockdale Town Centre study area and are located on Bay Street and Princes Highway. The public transport stops located in Rockdale Town Centre are shown in Figure 6.2.



Source: SIX Maps

Figure 6.2: Rockdale Town Centre – Public Transport

Figure 6.3 shows the large number of high-frequency, well-located bus service networks that are supported by the above bus stops.



Source: TfNSW

Figure 6.3: Rockdale Bus Network

6.1.2.3 Pedestrian and Cycle

The pedestrian and cycle facilities in Rockdale Town Centre consist of pathways and crossings connecting Princes Highway and Bay Street to the surrounding local streets and public transport stops. There are pedestrian thoroughfares located along King Street and King Lane that connects to Princes Highway. There are limited on-road or separated cycle lanes. The active transport infrastructure is shown in Figure 6.4.

Source: SIX Maps

Figure 6.4: Rockdale Town Centre – Active Transport Infrastructure

6.1.2.4 Local Accessibility / Servicing

The development areas predominantly rely upon laneways to service major developments in the area. King Lane is used to the north-east of the Princes Highway and Geeves Lane predominantly to the north-west. Chapel Lane is used to service the south-east precinct, whilst the south-west precinct has no laneways and is serviced within the building footprints or from the street frontage.

King Lane is severed by the Bayside Council administration and library buildings. This results in the laneway turning through and adjacent to the Council public car park. Any redevelopment of this section will need consideration of how the laneway will connect to the broader network and how the intersections will perform with key east-west streets, such as Bestic Street and Bryant Street. Turn restrictions at these intersections may be warranted for safety reasons. Any restriction introduction would need to be undertaken with care, to ensure swept paths of the largest expected vehicle can still be made.

Longitudinally the laneways will need to be of sufficient width to safely cater for centre-bound pedestrian movements, however not designed so wide that higher speed vehicle movements are encouraged.

Geeves Lane is abutting the rail corridor and to the north continues as Waines Crescent. Geeves Lane historically has been restrictive on redevelopment opportunities due to the difficulty in being able to turn a service vehicle around within the designated laneway and without entering onto railway land. Longer term strategies should be detailed, to continue the laneway to the north towards Waines Crescent exiting onto Princes Highway through an additional signalised intersection. Figure 6.5 shows the location of a suggested laneway extension and new signalised intersection. The additional signalised intersection would assist with the safe crossing of pedestrians across the Princes Highway, particularly once the sites along this frontage have been developed.

Creating a rear-service lane network will reduce the reliance of direct access from the Princes Highway as the sites are continued to be re-developed.

Chapel Lane is currently used to service the south-east precinct. Major redevelopment of this area is already underway with servicing and local access arrangements already approved.

Source: SIX Maps

Figure 6.5: Rockdale Town Centre – Geeves Lanes extension

6.1.3 Impact Assessment

6.1.3.1 Traffic Impacts

The existing road network is considered adequate in accommodating the additional trips given majority of the key roads consist of four-lane signalised intersections, and with the M6 expected to remove a significant portion of through trips off the Princes Highway.

Trips generated by induced development have already been considered and accounted for under the current approved LEP and are expected to be distributed onto the external road network. A large proportion of those trips expected to travel north towards Sydney via Princes Highway which exists as a four-lane arterial road.

The future committed inclusion of the M6 upgrade is expected to significantly reduce traffic along the Princes Highway and West Botany Street further enabling the impacts to be catered for by the existing road network. Notwithstanding this, with a large portion of the development yield expected towards the north eastern end of the precinct, consideration should be given to the inclusion of a local area roundabout at the Bestic Street / York Street intersection (similar to the arrangement at Bryant Street / York Street) to mainly assist with the safe operation of vehicles egressing and entering into York Street. Traffic modelling should be conducted to support such a facility and to ensure that queues do not extend back towards the Princes Highway.

As previously mentioned, consideration should also be given to extending Geeves Avenue to Waines Crescent and providing an additional signalised intersection at Waines Crescent and the Princes Highway.

With the extent of development proposed within this precinct and to provide assurances on the impacts and intersection treatments recommended, it is suggested that a traffic model be created for the Rockdale Town Centre. The model would need to consider revised traffic volumes along the Princes Highway because of the M6 upgrade.

More specifically the M6 will:

As stated on the M6 web-page, *"The M6 Stage 1 will:*

- *Enable motorists to bypass up to 23 sets of traffic lights on the Princes Highway between St Peters and Kogarah*
- *Be built underground to minimise disruption to the community and property impacts*
- *Ease congestion, meaning less time in traffic and faster trips to the CBD and across Greater Sydney.*
- *Reduce traffic on General Holmes Drive by 10,000 vehicles per day*
- *Improve travel times and provide more direct access from southern Sydney to the wider Sydney motorway network*
- *Improve pedestrian and cyclist safety through the new shared cycle and pedestrian pathways*
- *Assist in the reduction of traffic congestion, particularly along Princes Highway through Arncliffe, Banksia and Rockdale, and The Grand Parade, Brighton-Le-Sands, and provide shorter travel times for road users*
- *Improve the amenity of the foreshore precinct at Brighton-Le-Sands at The Grand Parade through a reduction in traffic and returning local streets to local communities*
- *Reduce the number of trucks on surface roads by over 2,000 per day*
- *Allow motorists to bypass Sydney Airport traffic*
- *Contribute to a more accessible, more liveable and productive Greater Sydney."*

Traffic modelling from the M6 EIS shows that the performance of the surrounding intersections is generally to operate within acceptable limits, taking into consideration background population growth forecasts into the future.

Table 8-31 President Avenue intersection and surrounds: VISUM modelled key intersection performance – 2026 and 2036 'Do minimum' scenarios

Key intersections	2014/15 'base case'		2026 'Do minimum'		2036 'Do minimum'	
	Ave delay (sec)	LoS	Ave delay (sec)	LoS	Ave delay (sec)	LoS
AM peak hour						
Princes Highway / West Botany Street	15	B	17	B	18	B
Wickham Street / West Botany Street	46	D	52	D	54	D
Princes Highway / Wickham Street / Forest Road	48	D	67	E	68	E
General Holmes Drive / Bestic Street	58	E	66	E	65	E
Princes Highway / Bay Street	33	C	44	D	66	E
Princes Highway / Rocky Point Road	32	C	33	C	30	C
West Botany Street / Bay Street	47	D	70	E	73	F
West Botany Street / Bestic Street	40	C	48	D	61	E
PM peak hour						
Princes Highway / West Botany Street	11	A	11	A	11	A
Wickham Street / West Botany Street	27	B	33	C	40	C
Princes Highway / Wickham Street / Forest Road	68	E	78	F	85	F
General Holmes Drive / Bestic Street	28	B	39	C	42	C
Princes Highway / Bay Street	44	D	55	D	68	E
Princes Highway / Rocky Point Road	18	B	19	B	21	B
West Botany Street / Bay Street	61	E	64	E	67	E
West Botany Street / Bestic Street	37	C	55	D	69	E

Source: F6 Extension Stage 1 EIS Volume 1 & 2 Chapter 8 Traffic and Transport

Figure 6.6: Future Road Network Performance – M6 EIS Traffic and Transport Assessment

6.1.3.2 Public Transport Impacts

The area is currently well-serviced by high-frequency public transport consisting of numerous bus stops and the Rockdale Train Station. There is a public transport stop within approximately 200m walking distance to the entire study area which is considered adequate to cater for the additional public transport trips associated with the proposed increase in residential density. No additional bus transport stops are proposed at this stage given the existing infrastructure.

Additional public transport services may be required in the future to accommodate the additional trips generated by the proposed development, however at this stage no further studies are recommended.

The existing bus stop infrastructure within the study area was also assessed and key bus stops located on urban routes are recommended to have a shelter, seat, and J pole. Majority of bus stops within the study area have adequate infrastructure.

Key bus stop infrastructure recommendations include:

- Bus shelter & seat at the Princes Highway / Rockdale Plaza intersection
- Bus shelter on Bay Street
- Bus shelter on Bryant Street.

6.1.3.3 Pedestrian and Cycle Impacts

The area is currently well-serviced by pedestrian pathways and crossings as discussed in Section 6.1.2.3. There are currently sufficient signalised crossings on Princes Highway to discourage any informal crossing behaviour and is considered adequate to cater for the additional pedestrian trips associated with the proposed development. There are limited on road cycle lanes within the study area and given the high traffic volumes that Princes Highway experiences on-road cycling should be discouraged with increased promotion of cycle routes along the foreshore and the Rockdale Wetland areas.

There is an opportunity to provide on-road and off-road cycle lanes along Bay Street to better connect the eastern end of Bay Street to the west including the Rockdale train station and retail uses. This is discussion further as part of the Bay Street development precinct.

The pedestrian walk-through between the Princes Highway and Geeves Lanes directly opposite Rockdale Mall is not conducive for pedestrian activity. It is recommended that appropriate setbacks are in place to ensure the arcade is widened as part of any redevelopment of adjacent sites. This is a critical issue for the precinct, and appropriate development incentives should be included to provide assurances on this outcome.

The footpath condition in general requires enhancement within the Rockdale Town Centre area to further attract pedestrian movements. Low level lighting and civic improvements to the town centre footpath / verge areas should be a requirement of any future development along with contributions secured for known sections already developed and opportunities missed.

6.1.3.4 Access & Servicing Impacts

As previously mentioned, most of the Rockdale Town Centre precinct is serviced by laneways rather than arterial or collector road street frontages.

Further consideration will be required where laneways intersect with higher order roads to ascertain whether their location is too closely spaced with other major intersections.

Further detailed assessment is required within this precinct to support car park access and site servicing arrangements. This task should be completed in conjunction with urban planners to ensure connected laneways are considered and how the vehicle movements can interact with pedestrians in a positive manner.

6.1.4 Recommendations

The key recommendations for the Rockdale Town Centre precinct are as follows:

- Review of lane-way access and movement strategy for the precinct
- Incentivise development adjacent to the pedestrian arcade between the Princes Highway and Geeves Lane (opposite Rockdale Mall) to ensure that appropriate measures are in place to activate pedestrian movements through this area. Council may consider property resumptions and civic improvements as part of a contributions plan to support this recommendation.
- Consider installation of a local area roundabout at the York Street / Bestic Street intersection
- Consider installation of a signalised intersection at the Waines Crescent / Princes Highway intersection as part of a broader plan to connect Geeves Lane through to Waines Crescent to limit direct access from the Princes Highway.
- Enhance several town centre bus stop facilities to further promote the use of local bus services.
- Prepare a traffic model of the Rockdale Town Centre to ensure access arrangements have been suitably provided.
- Enhance footpath/verge treatments consistent with a public domain masterplan for the town centre.

6.2 Walz Street

6.2.1 Overview

The Walz Street study area consists of a mix of land uses including retail, commercial and residential uses. There is a 3m lane width restriction on Frederick Street between Princes Highway and Watkin Street. There is also a major rail-bus modal interchange at the Rockdale station. Most of the increased density is proposed to occur along the western side of Railway Street aiming to provide mixed use developments located in proximity to high-frequency public transport. The western side of the Rockdale Train Station is vastly different to Rockdale Town Centre on the eastern side of the train station. The western side is portrayed more so as a village centre. With close proximity to such as major transport node, the land-use intensity could quite justifiably be significantly increased at this location.

All developments proposed within this precinct are well located, being less than 200m-400m from the major transport nodal facility.

6.2.2 Existing Conditions

6.2.2.1 Traffic Conditions

Details of the key roads within the study area is provided in Table 6.3.

Table 6.3: Key Roads

Road Name	No. of Lanes	Speed Limit	Jurisdiction	Hierarchy
Railway Street	2	40km/h	Council	Local Road
Frederick Street	2	50km/h	TfNSW	Sub-Arterial
The Seven Ways	2	60km/h	TfNSW	Sub-Arterial
Walz Street	2	50km/h	Council	Local Road

Table 6.4 details the key intersections within the study area.

Table 6.4: Key Intersections

No	Major Road	Minor Road	Jurisdiction	Control
1	Frederick Street / The Seven Ways	Railway Street	TfNSW	Signals
2	Railway Street	Waltz Street	Council	Priority-controlled
3	Frederick Street	Rawson Street	Council	Priority-controlled

The key intersections are shown below in Figure 6.7.

Source: SIX Maps

Figure 6.7: Walz Street – Key Intersection Locations

6.2.2.2 Public Transport

The Rockdale Train Station provides high-frequency public transport serviced by T4 which connects the eastern suburbs to the Illawarra Line and the South Coast Line which connects Sydney to Kiama. The station allows for a bus and rail interchange as bus bays are provided on both sides of the station and are serviced by several bus routes. Other bus stops are provided within the Walz Street study area and are located on Walz Street and the western side of Railway Street. The public transport stops located in the Walz Street precinct are shown in Figure 6.8.

Source: SIX Maps

Figure 6.8: Rockdale West – Public Transport

Figure 6.8 shows the significant number of buses that service the western side of the Rockdale Train Station. The bus services provide connections to Hurstville, Burwood, Roselands and Sydney Airport/s.

6.2.2.3 Pedestrian and Cycle

The pedestrian and cycle facilities in the Walz Street precinct consist of pathways and crossings connecting Railway Street to the surrounding local streets. There are limited on-road or separated cycle lanes. The active transport infrastructure is shown in Figure 6.9.

Source: SIX Maps

Figure 6.9: Walz Street – Active Transport Infrastructure

6.2.2.4 Local Accessibility / Servicing

The precinct is locally serviced and access via Rawson Street to the south and Railway Street and Walz Street to the north. Walz Lane and Frederick Lane provide most of the servicing requirements to the rear of the development footprint.

6.2.3 Impact Assessment

6.2.3.1 Traffic Impacts

The Roads and Maritime Services (RMS) Guide to Traffic Generating Developments – updated traffic surveys | August 2013 recommends the following trip generation rates:

- AM Peak – 0.19 trips per unit
- PM Peak – 0.15 trips per unit
- Daily – 1.52 trips per unit.

Table 6.5 summaries the trip generation of the proposed development.

Table 6.5: Development Trip Generation

Land Use	Quantity	Traffic Generation Rates			Trips (vph)		
		AM	PM	Daily	AM	PM	Daily
Multiple Dwelling (High Density Residential)	65 units	0.19 trips per unit	0.15 trips per unit	1.52 trips per unit	13	10	99

As shown above the additional residential units are expected to generate 13 trips in the AM and 10 in the PM peak hour.

As discussed in Section 6.2.2 the existing road network is considered adequate in accommodating for the additional trips given majority of key roads consist of two-lane cross sections. The trips generated by the development will be distributed onto the external road network and it is expected a large proportion of those trips will travel south-east towards Sydney via Princes Highway which is already designed as a four-lane arterial road.

6.2.3.2 Public Transport Impacts

The area is currently well-serviced by high-frequency public transport consisting of numerous bus stops and the Rockdale Train Station. There is a public transport stop within approximately 200m walking distance to the entire study area which is considered adequate to cater for the additional public transport trips associated with the proposed increase in residential density. No additional bus transport stops are proposed at this stage given the existing infrastructure.

Additional public transport services may be required in the future to accommodate the additional trips generated by the proposed development, however at this stage no further studies are recommended.

The existing bus stop infrastructure within the study area was also assessed and key bus stops within urban areas are recommended to have shelter, seats, and J pole. All four bus stops within the study area have adequate infrastructure to accommodate for the proposed development.

6.2.3.3 Pedestrian and Cycle Impacts

The area is currently well-serviced by pedestrian pathways and crossings as discussed in Section 6.2.2.3. There are currently sufficient pedestrian crossings on Railway Street, Fredrick Street and Walz Street to discourage any informal crossing behaviour and is considered adequate to cater for the additional pedestrian trips associated with the proposed development.

Consideration should be given to designating road space along Walz Street for cyclists, to assist with cycle movements in the area as well as formalising on-road cycle treatments along Railway Street.

6.2.3.4 Site Servicing and Local Traffic Impacts

It is expected that any redevelopment would utilise the rear laneways for access and servicing. The intersection of King Edward Street and Watkin Street is restricted to left in-left out only movements. This will place greater emphasis on most development movements using the Rawson Street / Frederick Street intersection from the southern precinct development. Whilst there is expected to be additional traffic movements at this intersection, it is envisaged that motorists currently use gaps created by the traffic signals at either end of Frederick Street to enable vehicles to enter/exit the main road network.

From a road geometry perspective, the intersection of Walz Street and Watkin Street, as well as Watkin Street and Herbert Street is less than ideal. It is recommended that the two intersections are re-designed to provide turn movement clarity whilst also to provide improved environments for pedestrians and cyclists.

6.2.4 Recommendations

The key recommendations for the Walz Street precinct as a result of assessment of impacts associated with a proposed increase of 65 units is as follows:

- There is an opportunity to re-design the Watkin Street / Walz Street and Watkin Street / Herbert Street intersections to improve safety and amenity for pedestrians and cyclists
- There is an opportunity to incorporate cycle treatments along Walz Street and Railway Street.

6.3 Bay Street

6.3.1 Overview

The Bay Street study area consists predominately of residential uses. Bay Street and West Botany Street operate as B-Double routes. Bay Street also contains highly utilised bus services from Miranda to Rockdale and Rockdale to Kyeemagh.

Bay Street is relatively flat and provides an important connection between Rockdale Town Centre to the foreshore at Brighton Le Sands. Rockdale Town Centre provides for all the business, community facility and transport access needs, whereas Brighton Le Sands offer the social and recreation needs through the foreshore facilities and restaurant precincts. Activation of the land uses along Bay Street will greatly assist with bringing these two key centres closer together.

6.3.2 Existing Conditions

6.3.2.1 Traffic Conditions

Details of the key roads within the study area is provided in Table 6.6.

Table 6.6: Key Roads

Road Name	No. of Lanes	Speed Limit	Jurisdiction	Hierarchy
Bay Street	4	60km/h	TfNSW	Collector Road
West Botany Street	4	60km/h	Regional	Collector Road
Cameron Street	2	50km/h	Council	Local Road
Farr Street	2	50km/h	Council	Local Road
Gibbes Street	2	50km/h	Council	Local Road
Hinkler Street	2	50km/h	Council	Local Road

Table 6.7 details the key intersections within the study area.

Table 6.7: Key Intersections

No	Major Road	Minor Road	Jurisdiction	Control
1	Bay Street	West Botany Street	TfNSW	Signals
2	Bay Street	Farr Street / Garnet Street	TfNSW	Priority controlled
3	Bay Street	Cameron Street	TfNSW	Priority controlled
4	Bay Street	Hinkler Street	TfNSW	Priority controlled

The key intersections are shown below in Figure 6.10.

Source: SIX Maps

Figure 6.10: Bay Street – Key Intersection Locations

6.3.2.2 Public Transport

Figure 6.11 shows the location of the current bus stops along Bay Street. The bus stops are generally in a poor condition, with a couple of the bus stops including bus shelters. Each of the bus stops require enhanced facilities to promote public transport use.

Source: SIX Maps

Figure 6.11: Bay Street – Public Transport

6.3.2.3 Pedestrian and Cycle

Longitudinally along Bay Street, the pedestrian facilities are generally in good condition. Cyclists are expected to share the road with cars, truck and buses. The parking lane is often occupied allowing for suitable room for cyclists to safely ride. There is currently no safe pedestrian crossing facility of Bay Street for pedestrians wishing to access bus stops. The distance between signalised intersections along Bay Street is approximately 800m.

6.3.2.4 Local Accessibility / Servicing

The land use pattern along Bay Street allows for multiple driveways which is not conducive to the safe operations of the road corridor. Multiple vehicle crossovers also have a negative impact on pedestrian and cycle safety.

All site servicing currently occurs along the Bay Street frontage.

A short section of Bay Street towards the western end of the precinct is serviced via a rear laneway (Crofts Lane). This laneway was observed to be too narrow with vehicles having to often reverse back in the lane to George Street.

6.3.3 Impact Assessment

6.3.3.1 Traffic Impacts

As mentioned in Section 3.3 of this report, the Bay Street redevelopment opportunities are limited to medium rise development. A survey was undertaken at two existing developed sites along Bay Street which generated in the order of 0.2 trips per unit in the peak period. This would equate to being in the order of 1.8 trips per day.

Table 6.8 summaries the trip generation of the proposed development using these rates.

Table 6.8: Development Trip Generation

Land Use	Quantity	Traffic Generation Rates			Trips (vph)		
		AM	PM	Daily	AM	PM	Daily
Multiple Dwelling (*Medium Density Residential*)	1,000 units	0.2 trips per unit	0.2 trips per unit	1.8 trips per unit	200	200	1,800

Each development site is expected to generate in the order of 6-7 trips in the peak period. When considering the in/out split and trip directionality, each nominated driveway is not expected to have any significant impact on Bay Street operations.

Notwithstanding this, it is good practice to provide driveway access from the lowest order road. Where practicable to do so, the development should be required to include its driveway access from the lowest order road. By removing driveways from the Bay Street frontage this will reduce the number of conflicts with pedestrians and cyclists whilst also reduce the number of conflicts with through vehicles.

Where it is possible to do so, the development footprints should also target the inclusion of a rear laneway to service the site.

6.3.3.2 Public Transport Impacts

Bus stops are currently located at:

- Cairo Street
- Farr Street
- West Botany Street
- Aero Street.

To enable a safe pedestrian crossing facility to each of these bus stops it is recommended that the Cairo Street intersection, Farr Street intersection and Aero Street intersection are signalised.

Where able to be integrated into the development footprint, bus bays should be allowed for at each of these locations with enhancements to the facilities to include modern bus shelters.

6.3.3.3 Pedestrian and Cycle Impacts

The inclusion of traffic signals at Cairo Street, Farr Street and Aero Street provides opportunities for improved pedestrian and cycle connectivity between Bay Street and adjoining cycle links and parks.

Longitudinally along Bay Street space provisions should be made for premium cycle facilities such as a separated off-road cycle facility, or wider shared path.

The proposed and existing signalised pedestrian cross walks along and across Bay Street are shown in Figure 6.12.

Figure 6.12: Bay Street – Proposed and Existing Pedestrian Cross Walks

With the inclusion of a future cycle connection through to an upgraded McCarthy Reserve a mid-block signalised intersection for cycle promotion should be strongly considered. Figure 6.13 shows the Bay Street cycle connections with reference to the proposed signalised intersection.

Source: M6 Website

Figure 6.13: Bay Street – Cycle Connections

6.3.3.4 Site Servicing and Local Traffic Impacts

The inclusion of a signalised intersection at Cairo Street provides local access benefits for the Rockdale East southern precinct as well as the existing development areas on the southern side of Bay Street. A local area roundabout is already in place at the Cairo Street / Chapel Street intersection which reinforces the location of these signals.

The inclusion of a signalised intersection at Farr Street has much broader network benefits and is attached to the local shop/s at this intersection. Garnet Street however is likely to be required to be restricted to left in only due to its proximity to the Farr Street intersection. A turning head for north bound traffic would need to be included within Garnet Street and required as part of the re-development of the adjoining lot.

The inclusion of a signalised intersection at Aero Street also has much broader benefits as it provides improved local accessibility for the community that resides to the north of Bay Street. Currently there is no right turn permitted from Francis Street onto Bay Street.

Crofts Lane is currently used to service the properties fronting Bay Street between George Street and Cameron Street. Croft Lane is currently too narrow to permit larger sized service vehicles. It is suggested to acquire 117 Cameron Street to enable Croft Lane to continue through to Cameron Street and converted to a one-way street. Through redevelopment of the area, it would be ideal to increase the width of Croft Lane.

All the above treatments to revitalise Bay Street to achieve position outcomes will be costly. The level of redevelopment may not be sufficient to cover the cost of infrastructure. It is suggested that any potential future Council-led investigations consider the area bounded by George Street, Pitt Street through to Farr Street. This would also then leverage off the new proposed Farr Street signalised intersection. Likewise, to the east, it is recommended that any potential future Council-led investigations consider the area bounded by West Botany Street, Bruce Street, Aero Street and Bay Street.

If the NSW Department of Planning, Industry and Environment issues a Gateway Determination for the Planning Proposal, a Bay Street traffic model will need to be developed to test the impacts and benefits of introducing multiple signalised intersections along Bay Street.

6.3.4 Recommendations

The key recommendations for the Bay Street precinct are included in Figure 6.14.

In addition to the below other key recommendations include:

- Driveways are to be accessed from the lowest order road where practicable
- Rear service lanes should be included within development applications where practicable
- If the NSW Department of Planning, Industry and Environment issues a Gateway Determination for the Planning Proposal, traffic modelling of the Bay Street treatments will need to be undertaken to support the Planning Proposal.

Source: SIX Maps

Figure 6.14: Bay Street – Recommendations

6.4 Arncliffe West

6.4.1 Overview

The Arncliffe West precinct has been previously assessment as part of the Arncliffe and Banksia technical studies that have informed the Arncliffe East and Banksia Planning Proposal.

The study concluded that the Allen Street / Princes Highway intersection would need to be opened to a signalised intersection to offset impacts likely to be experienced at the Brodie Spark Drive / Princes Highway intersection because of increased growth within the Arncliffe West precinct. It should be noted that the planning proposal is forecasting an increase in yield by approximately 440 dwellings with the majority of the densification occurring at the doorstep of the Arncliffe Rail Station.

The Arncliffe and Banksia Study highlighted that the focus of the assessment was on arterial road upgrades. However, several local road upgrades were recommended for consideration / assessment, which included:

- Wolli Creek Road / Wollongong Road
- Fripp Street / Wollongong Road
- Dowling Street / Wollongong Road.

6.4.2 Recommendations

The recommendations from the previous Arncliffe studies relative to the immediate Arncliffe West area were as follows. It should be noted that these recommended improvements have already been captured in the contributions plan for the Arncliffe area.

Intersection studies:

- Wolli Creek Road / Wollongong Road
- Fripp Street / Wollongong Road
- Dowling Street / Wollongong Road.

Pedestrian/Cycle Improvements:

New on-road cycle paths along:

- Wollongong Road
- Allen Street.

Improvements to Pedestrian Crossings:

- Wollongong Road / Firth Street roundabout – conversion to signalised intersection.

It is recommended that the original AIMSUN models referenced in the technical studies are accessed and reviewed to ensure that the appropriate densities have been included within the models and that no other local treatments are necessary.

The technical studies did not appear to delve into the localised impacts and issues surrounding site servicing. It is recommended that applicants are guided towards ensuring rear laneways are integrated into development masterplans, or as a minimum all servicing is contained within the site.

7. SUMMARY OF RECOMMENDATIONS

Bitzios Consulting have been commissioned by Bayside Council to strategically assess the impacts associated with a proposal to increase the floor-space ratio and height provisions within several key areas, including the proposed rezoning of some sites.

The proposed density increases are consistent with State and Local Government policies and strategies and aim to further support the use of active and public transport in lieu of private motor vehicle use.

The increase in development yields provides opportunities to capture additional transport infrastructure contributions to support strategies to promote active and public transport use, including rectifying existing deficiencies in the network where appropriate and practical to do so.

A summary of the key recommendations associated with each of the precincts are as follows:

Rockdale Town Centre

- Review of lane-way access and movement strategy for the precinct
- Incentivise development adjacent to the pedestrian arcade between the Princes Highway and Geeves Lane (opposite Rockdale Mall) to ensure that appropriate measures are in place to activate pedestrian movements through this area. Council may consider property resumptions and civic improvements as part of a contributions plan to support this recommendation
- Consider installation of a local area roundabout at the York Street / Bestic Street intersection
- Consider installation of a signalised intersection at the Waines Crescent / Princes Highway intersection as part of a broader plan to connect Geeves Lane through to Waines Crescent to limit direct access from the Princes Highway
- Enhance several town centre bus stop facilities to further promote the use of local bus service
- Prepare a traffic model of the Rockdale Town Centre to ensure impacts have been suitably mitigated
- Enhance footpath/verge treatments consistent with a public domain masterplan for the town centre.

Walz Street

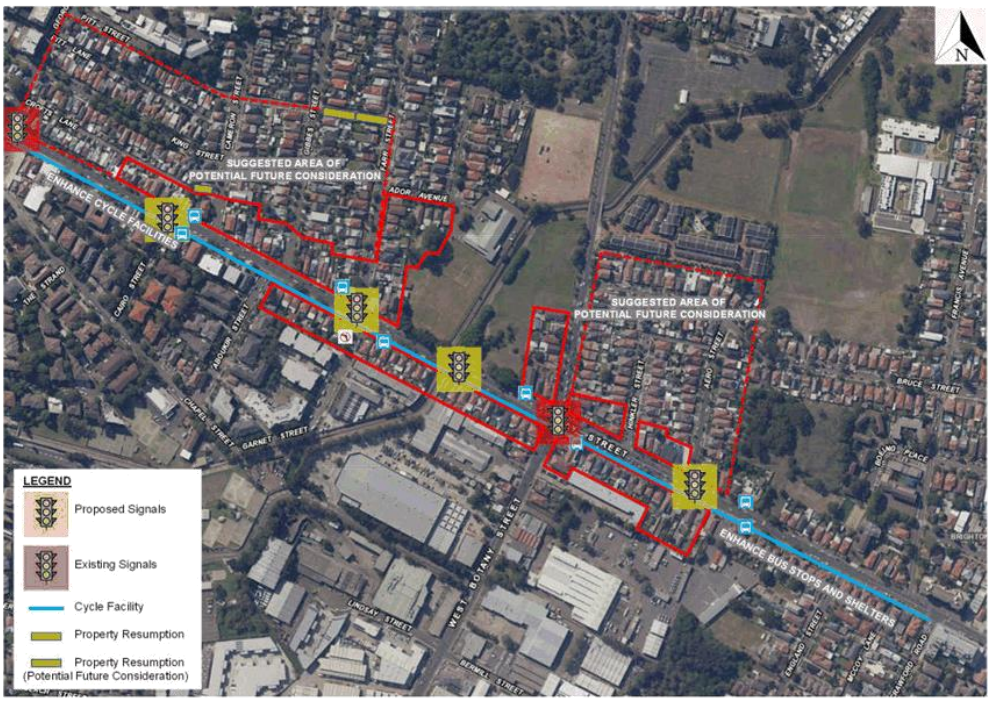
- Consider re-designing the Watkin Street / Walz Street and Watkin Street / Herbert Street intersections to improve safety and amenity for pedestrians and cyclists
- Consider incorporating cycle treatments along Walz Street and Railway Street.

Bay Street

The key recommendations for the Bay Street precinct are included in Figure 7.1.

In addition to the below other key recommendations include:

- Driveways are to be accessed from the lowest order road where practicable
- Rear service lanes should be included within development applications where practicable
- Traffic modelling of the Bay Street treatments are required to support the planning proposal.



Source: SIX Maps

Figure 7.1: Bay Street – Recommendations

Arncliffe West

The recommendations from the previous Arncliffe studies relative to the immediate Arncliffe West area were as follows. It should be noted that these recommended improvements have already been captured in the contributions plan for the Arncliffe area.

Intersection studies:

- Wolli Creek Road / Wollongong Road
- Fripp Street / Wollongong Road
- Dowling Street / Wollongong Road.

Pedestrian/Cycle Improvements:

New on-road cycle paths along:

- Wollongong Road
- Allen Street.

Improvements to Pedestrian Crossings:

- Wollongong Road / Firth Street roundabout – conversion to signalised intersection.

It is recommended that the original AIMSUN models referenced in the technical studies are accessed and reviewed to ensure that the appropriate densities have been included within the models and that no other local treatments are necessary.

The technical studies did not appear to delve into the localised impacts and issues surrounding site servicing. It is recommended that applicants are guided towards ensuring rear laneways are integrated into development masterplans, or as a minimum all servicing is contained within the site.

It is noted that further detailed assessment will be accompanied with each individual development application.

BAYSIDE COUNCIL

PUBLIC SPACES LEGACY PROGRAM – FLOOD CONSTRAINTS REVIEW

FINAL REPORT

APRIL 2021

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PUBLIC SPACES LEGACY PROGRAM – FLOOD CONSTRAINTS REVIEW

FINAL REPORT

APRIL 2021

Project **Public Spaces Legacy Program – Flood Constraints Review**	Project Number **121023**
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PUBLIC SPACES LEGACY PROGRAM – FLOOD CONSTRAINTS REVIEW

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EXECUTIVE SUMMARY

Bayside Council is preparing a Planning Proposal to qualify for eligibility for grant funding under the NSW Public Spaces Legacy Program. The Planning Proposal being prepared by Council focusses on four precincts already identified in the medium term housing supply target. Some portions of these precincts are flood prone, and it is therefore necessary to determine whether the Planning Proposal meets the relevant legislative requirements relating to flooding.

Council engaged WMAwater to review the available flood information for the relevant land, and assess the changes under the Planning Proposal against relevant strategic planning and environmental legislation.

Some sites are constrained by flood affectation. The details of the specific flood behaviour and constraints within each precinct are discussed in Sections 3.6 to 3.9. The flood constraints identified for specific development lots in this assessment do not prohibit development of those sites, either under the existing LEP/DCP or under the amended LEP/DCP resulting from the Planning Proposal. Either way, future development applications will be required to demonstrate compliance with the flood-related development controls.

The flood constraints may lower the achievable number of dwellings within the subject land, specifically at the following most heavily constrained sites:

- The block bounded by Kelsey Street, Hirst, Street, Bonar Street and Wollongong Road in the Arncliffe West precinct, and
- Lots on the south side of Frederick Street in the Walz Street precinct.

These locations have significant overland flow paths through the sites in the 1% AEP event which may limit the building footprint that can be achieved, particularly at ground level. This should be factored into the consideration of whether the Planning Proposal will meet the medium term housing supply targets. Outside of these areas, there are other sites where future development applications will need to address flood-related development controls, but the controls are unlikely to significantly compromise the development potential.

Although this review identified significant localised flood constraints for some lots, it is likely the Planning Proposal will improve the feasibility of redevelopment in those lots where it would currently be impractical to meet the flood-related development controls. This is because consolidation of lots and permissibility of larger, taller buildings provides more flexibility in the development design to accommodate flow paths through part of the consolidated site, while fully developing the remainder with minimum floor levels that meet requirements. This is less likely to be feasible with lower density development involving fragmented lots and separate buildings. The consolidation of lots and increased density will likely improve the viability of the most heavily flood-constrained sites identified above.

WMAwater considers that the Planning Proposal is consistent with the Ministerial Directions for flood prone land (see Section 2.2 and Section 4 for detailed discussion). The Planning Proposal is consistent with other relevant legislation and Council's strategic planning framework for flood

planning, in that the flood-related development controls enforced through that framework are not significantly altered by the Planning Proposal.

This review does not include detailed flood modelling of potential development or building layouts, and does not constitute a flood impact assessment for specific development sites. Future development proposals for flood prone sites will need to be accompanied by site specific flood assessments demonstrating compliance with Council's flood-related development controls.

1. INTRODUCTION

1.1. Overview

The NSW Department of Planning Industry and Environment (DPIE) has advised Bayside Council (Council) that funding grants are available under the NSW Public Spaces Legacy Program. The program focuses on the post-COVID economic and social recovery for NSW, and has a primary goal of delivering quality public space. DPIE has indicated to be eligible for the grant funding, Council is required to prepare a Planning Proposal to bring forward the medium term housing supply targets under the Bayside Local Strategic Planning Statement (LSPS, Reference 1) and the Bayside Local Housing Strategy (LHS, Reference 2).

The Planning Proposal being prepared by Council focusses on four precincts already identified in the medium term housing supply target as part of the above documents. Some portions of these precincts are flood prone, and it is therefore necessary to determine whether the Planning Proposal meets the relevant legislative requirements relating to flooding.

Council engaged WMAwater to review the available flood information for the relevant land, and assess the changes under the Planning Proposal against relevant strategic planning and environmental legislation. WMAwater has reviewed and summarised the flood constraints with a view to providing sufficient information for the Planning Proposal to proceed to Gateway Determination at the Bayside Local Planning Panel.

This review does not include detailed flood modelling of potential development or building layouts, and does not constitute a flood impact assessment for specific development sites. Future development proposals for flood prone sites will need to be accompanied by site specific flood assessments demonstrating compliance with Council's flood-related development controls.

1.2. Study Areas

This assessment covers four separate study areas within the Bayside Local Government Area:

- The "Walz Street Precinct," encompassing existing mixed-use development on Walz Street, Frederick Street and Railway Street, Rockdale (Figure B1);
- The "Bay Street Precinct," encompassing existing residential dwellings on Bay Street, Farr Street and Ador Avenue, Rockdale (Figure C1);
- The "Arncliffe West Precinct," encompassing mixed use development (primarily residential) as shown on Figure D1; and
- The "Rockdale Town Centre Precinct," encompassing mixed use development (primarily commercial) as shown on Figure E1.

2. BACKGROUND

2.1. Planning Proposal Description

The Planning Proposal seeks to amend height and floor space planning controls in the Rockdale Local Environmental Plan 2011 (RLEP 2011). No change to land use tables is proposed. A brief summary of the specific changes is provided in the relevant section reviewing the flood constraints for each precinct (Sections 3.6 to 3.9).

Council provided WMAwater with images demonstrating the indicative built form assumed for the Planning Proposal. This information is overlaid on the map of hydraulic categories for each precinct.

2.2. Relevant Legislation

The Planning Proposal is required to comply with Directions issued by the Minister for Planning under section 9.1(2) of the Environmental Planning and Assessment Act 1979 (previously section 117(2)). The applicable directions for flood prone land are found in Direction 4.3 (Reference 3), which was issued 1 July 2009, and repeated below.

4.3 Flood Prone Land

Objectives

(1) The objectives of this direction are:

(a) to 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*, and

(b) to ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land.

Where this direction applies

(2) This direction applies to all relevant planning authorities that are responsible for flood prone land within their LGA.

When this direction applies

(3) This direction applies when a relevant planning authority prepares a planning proposal that creates, removes or alters a zone or a provision that affects flood prone land.

What a relevant planning authority must do if this direction applies

(4) A planning proposal must include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the *Floodplain Development Manual 2005* (including the *Guideline on Development Controls on Low Flood Risk Areas*).

(5) A planning proposal must not rezone land within the flood planning areas from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to a Residential, Business, Industrial, Special Use or Special Purpose Zone.

(6) A planning proposal must not contain provisions that apply to the flood planning areas which:

- (a) permit development in floodway areas,
- (b) permit development that will result in significant flood impacts to other properties,
- (c) permit a significant increase in the development of that land,
- (d) are likely to result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services, or
- (e) permit development to be carried out without development consent except for the purposes of agriculture (not including dams, drainage canals, levees, buildings or structures in floodways or high hazard areas), roads or exempt development.

(7) A planning proposal must not impose flood related development controls above the residential flood planning level for residential development on land, unless a relevant planning authority provides adequate justification for those controls to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).

(8) For the purposes of a planning proposal, a relevant planning authority must not determine a flood planning level that is inconsistent with the Floodplain Development Manual 2005 (including the *Guideline on Development Controls on Low Flood Risk Areas*) unless a relevant planning authority provides adequate justification for the proposed departure from that Manual to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).

Consistency

(9) A planning proposal may be inconsistent with this direction only if the relevant planning authority can satisfy the Director-General (or an officer of the Department nominated by the Director-General) that:

- (a) the planning proposal is in accordance with a floodplain risk management plan prepared in accordance with the principles and guidelines of the Floodplain Development Manual 2005, or
- (b) the provisions of the planning proposal that are inconsistent are of minor significance.

Note: "flood planning area", "flood planning level", "flood prone land" and "floodway area" have the same meaning as in the *Floodplain Development Manual 2005*.

The directions require the development to be consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 (Reference 4), as per clause 4. The primary objective of NSW Flood Risk Management, as expressed within the NSW Flood Prone Lands Policy (Reference 4, page 1) is as follows:

> "*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, utilising ecologically positive methods wherever possible*."

The NSW Flood Prone Land Policy, as produced within Section 1.1 of the Floodplain Development Manual (2005), is consistent with that first introduced in 1984, which places the primary responsibility for implementation on local councils. The implementation of flood risk management in the relevant areas of Bayside Council is through the Rockdale Development Control Plan 2011 (DCP, Reference 5) and Rockdale Local Environmental Plan 2011 (LEP, Reference 6). The flood planning controls contained in the DCP are designed to ensure that

there is no adverse flood impact on adjacent properties and that a development is compatible with the flood hazard of the land. Hence, enforcing compliance with the DCP is the primary mechanisms by which Council ensures that development will be consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005. The DCP requires compliance with Council's Flood Risk Management Policy (Reference 7). The DCP identifies the following objectives, which are supplemented by prescriptive controls:

> **Flood Risk Management**
>
> 3. Development must comply with Council's – Flood Management Policy which provides guidelines of controlling developments in different flood risk areas. It should be read in conjunction with the NSW Government's 'Floodplain Development Manual 2005'.
> 4. The filling of land up to the 1:100 Average Recurrence Interval (ARI) flood level (or flood storage area if determined) is not permitted, unless specifically directed by Council in very special and limited locations. Filling of land above the 1:100 ARI up to the Probable Maximum Flood (PMF) (or in flood fringe) is discouraged; however it will be considered providing it does not adversely impact upon flood behaviour.
> 5. Development should not adversely increase the potential flood affectation on other development or properties, either individually or in combination with the cumulative impact of similar developments likely to occur within the same catchment.
> 6. The impact of flooding and flood liability is to be managed, ensure the development does not divert the flood waters, not interfere with flood water storage or the natural functions of waterways. It must not adversely impact upon flood behaviour.
> 7. A flood refuge may be required to provide an area for occupants to escape to for developments where occupants require a higher standard of care. Flood refuges may also be required where there is a large difference between the PMF and the 1 in 100 year flood level that may place occupants at severe risk if they remain within the building during large flood events.

2.3. Previous Flood Studies, Floodplain Risk Management Studies and Plans

The following Floodplain Risk Management Studies and Plans (FRMSPs) have previously been prepared for the catchments relevant to the study areas in this Planning Proposal:

- *Wolli Creek, Bardwell Creek, Bonnie Doon Channel and Eve Street/Cahill Park Catchments Floodplain Management Study and Plan*, Webb, McKeown & Associates [now WMAwater], 1998 (Reference 8)
- *Spring Street Drain, Muddy Creek and Scarborough Ponds Floodplain Management Study and Plan*, Willing & Partners [now Cardno], 2000 (Reference 9)

For each of these catchments, an updated Flood Study with 2D flood modelling has subsequently been completed, but the FRMSPs have not yet been updated. The mapping and discussion of flood behaviour in this assessment is derived from the updated catchment design flood modelling, as per the following studies:

- *Bonnie Doon, Eve St / Cahill Park Pipe and Overland 2D flood Study*, WMAwater February 2017 (Reference 10); and
- *Spring Street Drain, Muddy Creek and Scarborough Ponds Catchments 2D Flood Study Review*, BMT WBM February 2017 (Reference 11).

2.4. Site Inspections

WMAwater personnel carried out site inspections of the study areas on 3rd and 11th March 2021. The purpose of the site inspections was to confirm the validity of the modelled flood behaviour by reviewing current site conditions, and to gain an appreciation of the relevant flooding constraints.

3. FLOOD CONSTRAINTS REVIEW

3.1. Overview of Flood Behaviour and Risks

Generally, the areas affected by the Planning Proposal are subject to flood behaviour that is usually referred to as "overland flow." In urban environments with significant impervious surfaces and a pit/pipe drainage network for stormwater, overland flow occurs when the amount of runoff from the catchment exceeds the capacity of the subsurface drainage network. In most of the older developed areas of Sydney (such as around Rockdale), the drainage network capacity is often only sufficient for rainfall events up to around 20% or 10% AEP (1 in 5 or 1 in 10 chance per year, respectively). In more intense events, such as the 1% AEP event generally used as the risk standard for new development in NSW, overland flow will occur along whatever remains of the pre-development creek-line or valley. Depending on the development layout, this overland flow may occur along remnant creek lines through parks/reserves, down roadways, or through private development.

Overland flow flood affectation is usually characterised as "flash flooding." It is of relatively short duration and often relatively shallow and fast flowing. It can occur with little to no warning prior to the occurrence of an intense flood-producing storm.

Often, in older areas where the layout of the road network, private development lots and stormwater system has been set decades ago, the capital costs of broad-scale upgrades to the drainage infrastructure is prohibitive. Typical floodplain management practice in these areas is to rely on development controls to maintain existing overland flow paths by ensuring they are not obstructed or diverted by new development. The risks to new development are managed by ensuring that floor levels of new buildings are sufficiently above the relevant flood risk standard. In many flash flood areas of Sydney where existing development does not meet these standards, the most effective long term measure to reduce the flood risk is through redevelopment. This is frequently facilitated by consolidation of development lots for higher intensity uses, since the larger development scale provides more flexibility for retaining the existing overland flow paths, while meeting the required standards for the new buildings.

The Bay St precinct is an exception in that the main Muddy Creek channel flows through this area, and flooding from overtopping of the channel banks would be characterised as "mainstream" flooding rather than overland flow. However flooding would still occur relatively quickly, without significant warning.

The main objectives for flood-related controls on new development, as reflected in the relevant planning legislation discussed in Section 2.2, are:

- Ensuring that new development does not exacerbate flooding problems elsewhere,
- Mitigating the risk of damage to new development by raising building floor levels and basement entry points to minimum heights above the flood levels, and
- Mitigating the risk to life for occupants/users of new development, by ensuring the development is compatible the flood hazard of the land, and considering evacuation requirements and structural soundness of the building for the full range of flood risk,

including extremely rare events with more severe flooding than the primary 1% AEP standard.

Flood planning concepts relevant to achieving these objectives are discussed in the following sections (3.2 to 3.5). A review of the relevant flood information specific to each precinct is provided in Sections 3.6 to 3.9.

3.2. Hydraulic Categories

The mapping of hydraulic categories as part of catchment-wide flood studies provides a broad scale estimate of the areas that could potentially exacerbate existing flood risk if redeveloped. This categorisation is defined by the Floodplain Development Manual as:

- **Floodway –** Those 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 cause a significant redistribution of flood flows, or a significant increase in flood levels.
- **Flood Storage** – Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas.
- **Flood Fringe –** The remaining area of flood prone land after floodway and flood storage areas have been defined.

Definition of hydraulic categories is subjective, particularly in an urban catchment where the depths of inundation are relatively shallow and the peak flows small. However blocking even a minor overland flow path can re direct flow onto adjoining properties and so adversely affect the adjoining property, and therefore be considered floodway. This is frequently the case where the historical creek line and the stormwater drainage network runs through private property. Floodways are not necessarily always defined as high hazard areas. Hazard reflects the potential harm to life and property due to flooding, whilst floodways reflect areas where if filled or modified will produce a significant adverse hydraulic impact on others.

While hydraulic categories can provide an indication of where obstruction of filling of flow paths may be problematic, it does not mean that the area cannot be developed. For minor flow paths (even if classified as floodway), it may be possible to divert or modify the flow path within the development extent such that adverse impacts off-site are avoided. This can be demonstrated by doing a "flood impact assessment" whereby the catchment flood models are altered to represent the new development, and the resulting flood behaviour is compared with existing flood behaviour to demonstrate it is not worsened. Council generally endeavours to ensure that any new development takes this into account by requiring a flood study to be undertaken to assess the potential hydraulic impacts of the development.

Any filling on the floodplain or blocking of a flow path will affect flood levels to some degree, however it is impractical for Council to monitor every development on the floodplain as many will have only a very minor impact. This constraints review focusses on those areas where a flood

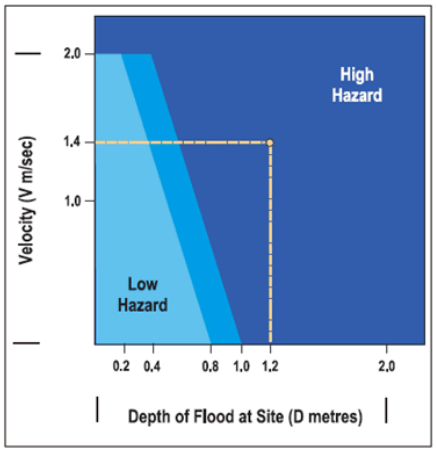
impact assessment is likely to be required for any redevelopment, both under the current LEP and for the changes under the Planning Proposal.

3.3. Flood Hazard Classification

Hydraulic hazard is a measure of potential risk to life and property damage from flood. Hydraulic hazard is typically determined by considering the depth and velocity of floodwaters.

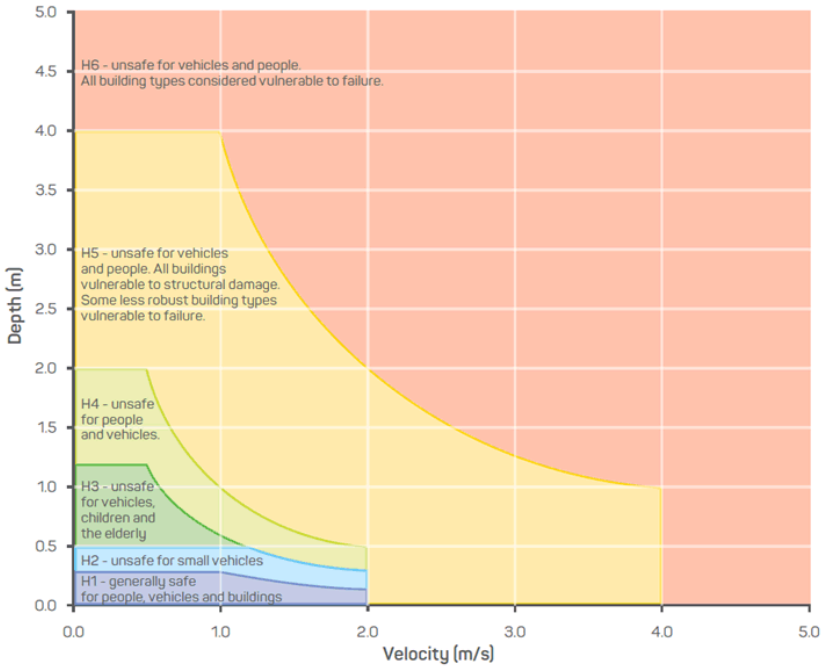
Appendix L of the NSW Floodplain Development Manual (FDM, Reference 4) gives one method for hydraulic hazard, which is shown in Diagram 1.

Diagram 1: Provisional "L2" Hydraulic Hazard Categories (FDM)



In recent years (since the publication of the Floodplain Development Manual in 2005), there have been a number of developments in the classification of hazards. Research has been undertaken to assess the hazard to people, vehicles and buildings based on flood depth, velocity and velocity depth product. The findings of this research are incorporated into revised categories for hazard classification presented in the Australian Disaster Resilience Handbook Collection (*Handbook 7 – Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia*). The supporting guideline 7-3 (Reference 12) contains information relating to the categorisation of flood hazard. A summary of this categorisation is provided in Diagram 2.

Diagram 2: General flood hazard vulnerability curves (ADR)



This classification provides a more detailed distinction and practical application of hazard categories, identifying the following 6 classes of hazard:

- H1 – No constraints, generally safe for vehicles, people and buildings;
- H2 – Unsafe for small vehicles;
- H3 – Unsafe for all vehicles, children and the elderly;
- H4 – Unsafe for all people and all vehicles;
- H5 – Unsafe for all people and all vehicles. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure. Buildings require special engineering design and construction; and
- H6 – Unsafe for all people and all vehicles. All building types considered vulnerable to failure.

Areas classified as, H3 or greater under the ADR classification roughly correspond to areas of high hazard under the FDM classification method. The maps and associated discussion of flood hazard in this review use the ADR classification.

3.4. Emergency Management and Risk to Life

Flooding in these catchments will generally occur quite rapidly in response to very heavy rain (referred to as “flash flooding”). The Bureau of Meteorology (BoM) does not issue quantitative flood warnings for flash-flood catchments, defined as rain-to-flood times of less than six hours. The BoM does not issue quantitative warnings for these study areas. The BoM does issue

severe weather warnings whenever severe weather is occurring in an area or expected to develop or move into an area. This includes very heavy rain that may lead to flash flooding. The warnings describe the area under threat and the expected hazards. Warnings are issued with varying lead-times, depending on the weather situation, and can be from 1 hour to 24 hours or more. The Bureau also issues detailed severe thunderstorm warnings that include thunderstorms producing heavy rainfall which may cause flash flooding.

The SES is the legislated Combat Agency for floods and is responsible for the control of flood operations. This includes the coordination of other agencies and organisations for flood management tasks. The SES Local Controller is responsible for dealing with floods as detailed in the State Flood Plan.

Given the flash flood nature of the catchment and the lack of warning time for flooding, the SES is unlikely to mobilise volunteers to any specific locations in the area in anticipation of flooding, except possibly at major roads with significant flood affectation such as Bexley Road. The SES will generally only respond to specific calls for assistance or observed flooding in flash flood areas.

Generally, the most effective way to mitigate flood risk to human life in this environment is to ensure that buildings are built to withstand flood forces to enable people to remain indoors during the intense storm events, and to discourage people from attempting to drive through floodwaters. This is best achieved by effective design of each building to ensure it remains flood free without requiring active measures such as the deployment of barriers or flood gates, so that people can remain inside until flooding has subsided. Since flash flooding is usually of relatively short duration, the risks arising from isolation during flooding are relatively low.

3.5. Extreme Flood Events and the Probable Maximum Flood

Generally, planning controls in NSW are focussed on a 1% AEP or "1 in 100" standard for development, with a freeboard allowance above the 1% AEP level for setting floor levels. However both the NSW Floodplain Development Manual (Reference 4) and Council's Flood Risk Management Policy (Reference 7) emphasise that the residual or "continuing" risk of more extreme events must be considered as part of development planning. Reference 7 states:

> *Above the Flood Planning Level a continuing flood risk extends to the limit of the floodplain that would be covered by the Probable Maximum Flood. In this area development controls are not prescribed for most types of development, but there may be a need for planning considerations, such as evacuation planning, in some circumstances. Specific controls may also be required if a major development could seriously affect the behaviour of the PMF, and for critical facilities which must continue to operate during and after an extreme flood event.*

For this reason, mapping of the hazard for the PMF has been included in this assessment and is considered in the discussion of each precinct. The PMF requires measured consideration, because it represents risk that is a combination of extremely low probability (in the order of a 1 in 10 million chance per year for this study area), combined with extreme consequences (because the PMF often involves widespread high hazard flooding in places that are flood free

up to the 1% AEP development standard). It is necessary to remember that even relatively extreme events such as a 1 in 1000 (0.1% AEP) design event will generally be significantly closer to the 1% AEP than the PMF in terms of flood extents and hazard. The purpose of considering the PMF flood behaviour is to identify and manage the full range of residual risk above the 1% AEP development standard, for land uses where there is a lower tolerance for risk than for typical development. It is not feasible or appropriate to try and eliminate all flood risk by prohibiting development on the basis of the PMF hazard. As the NSW Flood Prone Land Policy (within Reference 4) states:

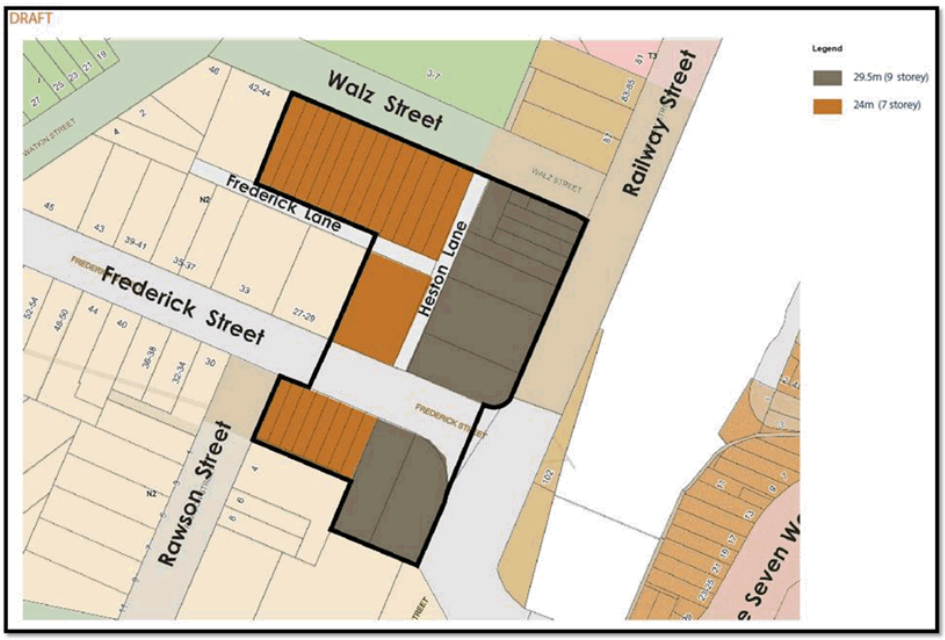
> *The primary objective of the New South Wales Flood Prone Land Policy, as outlined below, recognises the following two important facts:*
>
> - *flood prone land is a valuable resource that should not be sterilised by unnecessarily precluding its development; and*
> - *if all development applications and proposals for rezoning of flood prone land are assessed according to rigid and prescriptive criteria, some appropriate proposals may be unreasonably disallowed or restricted, and equally, quite inappropriate proposals may be approved.*

3.6. Walz Street Rockdale Precinct

3.6.1. Planning Proposal Changes

The height limitation for buildings in the Walz St Precinct is presently 22 m. The Planning Proposal would increase this limit to 24 m (7 storey) / 29 m (9 storey) for different parts of the precinct as indicated on Diagram 3. No rezoning is proposed in this area and there is no defined FSR within the precinct.

Diagram 3: Walz St Precinct - Proposed Changes to Building Height Restrictions



3.6.2. Site Characteristics and Flood Behaviour

Mapping of relevant design flood information is provided in Appendix B as follows:

- Peak flood depths and levels – Figure B2 (5% AEP) and Figure B3 (1% AEP)
- Hydraulic categories – Figure B4 (1% AEP)
- Hydraulic Hazard – Figure B5 (1% AEP) and Figure B6 (PMF)

The lots north of Frederick Street within this precinct are not significantly affected by flooding up to the 1% AEP event. Overland flow can cause flooding within the sag point on Railway Street west of the railway corridor (Photo 1), which may result in shallow flooding at the front of 95-98 and 99 Railway Street. The remainder of properties on Walz Street and Railway Street within the precinct are outside the 1% AEP flood extent.

Photo 1: Sag point in Railway Street, upstream of railway corridor

The rear of the lots on the southern side of Frederick Street within this precinct are subject to significant inundation in the 1% AEP event (Nos. 2/6/14/16/18/20/22/24/26/28 Frederick Street, see Photo 2, Photo 3 and Photo 4).

Photo 2: Low lying flood storage area/flow path behind 2 Frederick Street.

Photo 3: Low lying flood storage area/flow path behind 28 Frederick Street.

Photo 4: Low lying flood storage area/flow path behind lots south of Frederick Street.

There is a local catchment draining towards this location which extends north-west up to Forest Road. Stormwater runoff from the local catchment is drained via a 1.4 m by 1.2 m box culvert

which runs from a sag point in Rawson Street behind the Frederick Street lots, and under the existing buildings on No. 6 and No. 2 Frederick St (Photo 5).

Photo 5: Existing building at 2 Frederick Street Rockdale, on top of stormwater pipe alignment

The pipe alignment is shown in Figure B1. In events exceeding the capacity of the subsurface drainage network, overland flow will occur through the back of the lots south of Frederick Street. Under current conditions, this overland flow can pond to significant depths (over 2 m) in the rear of the Frederick St lots, since the land at the rear of the lots is much lower than Railway Street, creating a trapped low point in the topography. Council's stormwater asset database indicates that this trapped low point is drained by a single 0.3 m pipe connecting to the box culvert trunk system, which limits the drainage from this area. The fronts of these lots facing Frederick Street are not affected by flooding up to the 1% AEP event.

3.6.3. Floor Level Requirements

The lots within this precinct subject to minimum floor level controls would include:

- Lots facing Railway Street, due to ponding of overland flow in the Railway Street sag point, and
- Lots on the southern side of Frederick Street, due to the overland flow path and trapped low point at the rear of these lots (Photo 2 and Photo 3).

These requirements would likely not be onerous for the lots facing Railway Street, as they would be only slightly above the footpath level. For the lots south of Frederick Street, the minimum floor level requirements would limit the use of the rear of the sites, and would likely require special construction techniques (such as a suspended slab) to enable new development to be

built at the required floor levels without obstructing the rear flow path. At the front of the Frederick Street sites, the minimum floor level requirements would not be significantly above the street level.

3.6.4. Impact Considerations

Risks of exacerbating flooding issues from redevelopment of lots north of Frederick Street within this precinct would be low. The existing buildings on these sites already occupy the majority of the lots, and the available flood information indicates relatively minor "flood fringe" exposure, or no inundation at all in the 1% AEP event.

However for lots south of Frederick Street, the presence of the overland flow path and trapped low point would present a significant constraint to re-development of these lots. Parts of these lots are classified as "floodway" or "flood storage." This would limit the potential building footprint within these lots, particularly for the ground floor and any lower ground/basement floors. Basement or lower ground car parking is unlikely to be feasible in these lots, or only feasible with a very reduced footprint relative to the total lot area. It is likely that elevated construction would be required at the rear of the lots, such that the existing flow path is retained and not obstructed. Furthermore, construction of new buildings over the top of Council's stormwater pipes would be contrary to the general requirements of Council's stormwater technical guidelines (Reference 13), except under special circumstances.

3.6.5. Hazard Considerations

In the 1% AEP design event the hazard classification of development lots in the Walz Street precinct is generally low (H1/H2, see Figure B5), except for the rear of the Frederick Street lots, which are affected by high hazard due to the significant depth. The low point in Railway Street is affected by H3 hazard which would limit vehicle access through this area.

Flood hazard is significantly higher for the PMF event (Figure B6), with the rear of the Frederick Street lots affected by H5 hazard, and H4 hazard on Railway Street. This means that during extreme events more intense than the 1% AEP, occupants of buildings on Railway Street may become isolated and will not be able to evacuate the area on foot or by vehicle. Isolation would be of relatively short duration and the risks of occupants requiring emergency evacuation or supplies during the flood would typically be low. However some buildings will need to be structurally designed to consider extreme flood conditions up to the PMF, and provide flood-free refuge on higher floors.

The high hazard classification at the rear of the Frederick Street lots will limit the feasibility of using this space for a lower ground floor or car parking, and suspended construction would be required for upper-storey development above this area. This may in turn affect the feasibility of achieving the maximum allowable floor space ratio under the Planning Proposal.

3.7. Bay Street Rockdale Precinct

3.7.1. Planning Proposal Changes

The Planning Proposal is designed to facilitate the addition of 1,000 new dwellings in the Bay Street precinct. The intensification would be realised by altering the existing R2 zoning (low density residential) to a mixture of R3 (medium density residential), R4 (high density residential) and B4 (mixed use) zones. The height limits would be increased from 8.5 m currently to up to between 14 m to 27 m, and FSR would be increased from 0.5 to a range from 0.7 to 2.0. These height limits and floor space ratios would be dependent on lot amalgamation patterns similar to the indicative built form in the Planning Proposal being achieved (as per indicative building footprints on Figure C4).

3.7.2. Site Characteristics and Flood Behaviour

Mapping of relevant design flood information is provided in Appendix C as follows:

- Peak flood depths and levels – Figure C2 (5% AEP) and Figure C3 (1% AEP)
- Hydraulic categories – Figure C4 (1% AEP)
- Hydraulic Hazard – Figure C5 (1% AEP) and Figure C6 (PMF)

The primary Muddy Creek concrete-lined channel runs through the centre of the Bay Street Precinct from south-west to north-east, between 141 and 143 Bay Street (Photo 6 and Photo 7).

Photo 6: Muddy Creek concrete-lined channel, and adjoining property at 141 Bay Street

Photo 7: Muddy Creek concrete-lined channel, and adjoining property at 143 Bay Street

There is a low point in Bay Street at the crossing of this channel (Photo 8). The channel widens at this point relative to the size upstream, and flood flows up to the 1% AEP are generally contained within the channel banks. Several of the lots along Bay Street between Garnet Street and West Botany Street are affected by flooding in the 1% AEP event, generally with relatively shallow depths up to approximately 0.2 m. The source of this flooding is partially due to overland down Bay Street from the west, when runoff from the local sub-catchments exceeds the stormwater network capacity.

Photo 8: Low point in Bay Street at Muddy Creek crossing

3.7.3. Floor Level Requirements

Each of the flood-affected blocks will require minimum floor level controls on future development. This includes most of the lots on Bay Street, and some of the lots on Farr St and Ador Avenue.

These controls may be up to a metre above existing ground levels for the lower lying blocks closer to the Muddy Creek channel. The exact and height above ground will be dependent on the specific site location. It is unlikely these requirements will present a major constraint to development under the assumed amalgamation and building patterns.

3.7.4. Impact Considerations

There are no significant areas within the lot boundaries classified as “floodway” or “flood storage,” although Bay Street itself is a floodway for local overland flow.

Further technical analysis will be required at the DA stage for individual developments, including modelling of flood impacts to demonstrate compliance. However, it appears that the indicative building footprints provide for some open space which could conceivably be used to provide similar volumes of temporary flood fringe as currently exists within the lots.

3.7.5. Hazard Considerations

In the 1% AEP design event the hazard classification throughout the Bay St precinct is generally low (H1/H2, see Figure C5), and does not present any significant constraint to redevelopment.

Flood hazard is significantly higher for the PMF event (Figure C6), with the majority of the lots development lots affected by H3/H4 hazard, and sections of H5 hazard on Garnet Street and Bay Street. This means that during extreme events more intense than the 1% AEP, occupants of buildings in the area will become isolated and will not be able to evacuate the area on foot or by vehicle. Isolation would be of relatively short duration and the risks of occupants requiring emergency evacuation or supplies during the flood would typically be low. However some buildings will need to be structurally designed to consider extreme flood conditions up to the PMF, and provide flood-free refuge on higher floors.

3.8. Arncliffe West Precinct

3.8.1. Planning Proposal Changes

The Planning Proposal involves rezoning of land for more intensive development and increased building heights and floor space ratios. The intensification would be realised by altering some of the existing R2 zoning (low density residential) within the precinct to R4 (high density residential). The height limits would be increased for R4 and B4 zoning areas, and B1 land fronting Arncliffe Park. These height limits and floor space ratios would be dependent on lot amalgamation patterns similar to the indicative built form in the Planning Proposal being achieved (as per building footprints supplied by Council shown on Figure E4).

3.8.2. Site Characteristics and Flood Behaviour

Mapping of relevant design flood information is provided in Appendix D as follows:

- Peak flood depths and levels – Figure D2 (5% AEP) and Figure D3 (1% AEP)
- Hydraulic categories – Figure D4 (1% AEP)
- Hydraulic Hazard – Figure D5 (1% AEP) and Figure D6 (PMF)

Unlike the other areas considered in this report, the Arncliffe West Precinct does not have existing mapping of hydraulic categories. Reference 10 defined floodways within this catchment as:

- *All roads, drainage easements or parks inundated by floodwaters, and*
- *All flood liable private property where runoff enters across one boundary and exits partially or fully across another.*

The principal areas affected by flooding that are included in the Planning Proposal are:

- The triangular-shaped block bounded by Kelsey St, Hirst St, Bonar St and Wollongong Road ("Kelsey St block"),
- The block bounded by Booth St, Martin Ave and the railway corridor ("Martin Ave block"), and
- The block bounded by Station St, Broe Ave, Wollongong Rd and Mitchell St ("Station St block").

Of these areas, the Kelsey St block is the area with the most significant direct flooding exposure in the 1% AEP event. The pre-development creek-line from this catchment runs approximately halfway between Wollongong Road and Hirst St, from south-west to north-east. The stormwater trunk drainage pipe for the catchment runs through the centre of the block (a 1.8 m diameter pipe at this location). When this pipe system capacity is exceeded, overland flow occurs through this area (at the location in Photo 9 for example). Parts of this block are affected by high hazard flooding in the 1% AEP event due to the depth and velocity of this overland flow path.

Photo 9: Overland flow path through existing residential development on Kelsey Street

The Martin Avenue block is located near the confluence of several stormwater drainage lines. This confluence occurs at the sag point at the intersection of Martin Ave and Wollongong Rd. The low point in the topography at this location is created by the railway line embankment, which is several metres higher than the road levels (Photo 10).

Photo 10: Sag point in Wollongong Road at Martin Avenue intersection, with railway on right

In the 1% AEP event, overland flow accumulates in this sag point to significant depths (over 1.5 m), as the only drainage from this area is a single 1.8 m by 0.9 m box culvert under the railway line, which has significantly less capacity than the upstream pipes which drain to this location. The land of the Martin Ave block subject to the Planning Proposal is generally higher

than the 1% AEP flood level at the sag point, so direct inundation of this land is minor. However the depths of flooding in the roads adjacent to the block is such that flood-related development controls will be required on this land for any future development proposals (such as minimum floor level controls and limitations on basement access from Martin Ave or Wollongong Road).

At the Station St block, there is a sag point in Station St on the upstream side, approximately halfway between Mitchell St and Broe Ave (Photo 11). The stormwater drainage line from Union St runs through the lots on this block, and flow exceeding the capacity of the line in the 1% AEP event will run overland through the lots in this block, generally at relatively shallow depths (less than 0.3 m).

Photo 11: Sag point in Station Street, upstream of flow path through existing development

3.8.3. Floor Level Requirements

Each of these flood-affected blocks will require minimum floor level controls on future development. These controls may be around a metre above existing ground levels at the centre of the Kelsey St block, but closer to the street levels at Wollongong Road. The exact levels will depend on how the overland flow path through the block is managed by any development proposal.

The minimum floor level requirement for the Martin Avenue block will be more than 2 m above the street level at the sag point, but would not apply along Booth St, which is higher and flood free. The minimum floor level requirements will limit the feasibility of having basement entry points located along the lower part of Martin Avenue.

Floor level requirements for the Station St block will depend on how the overland flow path through the block is managed by any development proposal.

3.8.4. Impact Considerations

Detailed flood modelling of proposed future development within the Kelsey St block, and parts of the Station St block, will be required under the LEP/DCP to demonstrate that flooding is not exacerbated upstream or downstream.

The requirement to prevent adverse flood impacts on other areas will be a significant constraint for redevelopment of the Kelsey St block. The overland flow path through this block is sufficient to be classified as floodway, and the entry point of the stormwater pipes and overland flow path from Kelsey Street is at an awkward location in the centre of the block. It is unlikely that the overland flow path can be eliminated by increasing pipe drainage capacity or diverting pipes around the block, unless the trunk drainage line for the entire catchment is upgraded to similar capacity. If the pipe capacity is increased locally, providing sufficient localised inlet capacity to capture all overland flow would not be feasible. Therefore, it is likely that any future development of this block will need to provide open space for an overland flow path through the centre of the block, as exists currently. Any buildings would need to be sufficiently clear of the stormwater line to allow access for maintenance and future upgrades under Council's stormwater management policies. This requirement will limit the potential for a single building within the lot, and may limit the feasibility of obtaining the proposed FSR within the allowable building height.

However, it is more likely that consolidated high-density re-development of these lots would be able to resolve these flood issues, compared to redevelopment under the current R2 zoning. It would likely not be possible to build new R2 dwellings on the existing lots that satisfy the development controls for minimum floor levels, impacts and consistency with hazard. Rezoning of this area and consolidation of the lots would be the most effective long term strategy for reducing flood risks in this area, despite the constraints identified above, as a higher density development proposal is more likely to be able to provide a design solution that complies with the LEP/DCP requirements.

3.8.5. Hazard Considerations

In the 1% AEP design event the hazard classification of development lots in the Arncliffe West Street precinct is generally low (H1/H2, see Figure D5), except for the lots on Kelsey/Hirst/Bonar Streets, which are affected by high hazard due to the relatively high velocity of the overland flow path through this area. The low point in Martin Avenue / Wollongong Road is affected by H4 hazard which would limit vehicle and pedestrian access through this area during flooding.

Flood hazard is significantly higher for the PMF event (Figure D6), with the Kelsey Street block affected by high hazard within the lots and on the surrounding streets. This means that during extreme events more intense than the 1% AEP, occupants of buildings in this area will become isolated and will not be able to evacuate the area on foot or by vehicle. Isolation would be of relatively short duration and the risks of occupants requiring emergency evacuation or supplies during the flood would typically be low. However some buildings will need to be structurally designed to consider extreme flood conditions up to the PMF, and provide flood-free refuge on higher floors.

The high hazard classification through the Kelsey Street block will limit the feasibility of building basements in this area, due to the difficulty of preventing ingress of high hazard water in to the basements for a full range of flood events. This may in turn affect the feasibility of achieving the assumed built form and maximum allowable floor space ratio assumed under the Planning Proposal for this block.

3.9. Rockdale Town Centre Precinct

3.9.1. Planning Proposal Changes

The planning Proposal in the Rockdale Town Centre precinct is for an intensification of allowable development through increased building heights and removal of maximum floor space ratio limits. No rezoning of land use is proposed in this precinct.

The Planning Proposal also includes a site-specific DCP for four investigation areas (A/B/C/D), with indicative building heights and amalgamation patterns.

The amended height limits would be dependent on lot amalgamation patterns similar to the indicative built form in the Planning Proposal being achieved (as per indicative building footprints on Figure E4).

3.9.2. Site Characteristics and Flood Behaviour

Mapping of relevant design flood information is provided in Appendix E as follows:

- Peak flood depths and levels – Figure E2 (5% AEP) and Figure E3 (1% AEP)
- Hydraulic categories – Figure E4 (1% AEP)
- Hydraulic Hazard – Figure E5 (1% AEP) and Figure E6 (PMF)

This precinct straddles two sub-catchments within the Muddy Creek catchment, with Bay Street forming the catchment divide. Runoff from areas south of Bay Street is drained towards the main Muddy Creek open channel near Rockdale Plaza Drive. The only significant flood exposure in the 1% AEP event for this part of the precinct is in the lots immediately adjacent to the open channel on the Princes Highway.

Runoff from areas north of Bay Street drains in a northerly direction, eventually discharging into the open channel commencing at Short Street, Banksia, approximately 500 m downstream of Bestic Street. Upstream of Bestic Street, within the precinct included in the Planning Proposal, the primary overland flow paths are along King Lane and York Street, with notable flood-affected sag points in Bryant Street and Bestic Street. Some of the lots fronting these road reserves are affected by shallow overland flow inundation in the 1% AEP event (see Figure E3).

3.9.3. Floor Level Requirements

Lots fronting the overland flow paths in the northern part of the precinct, and in the vicinity of the open channel at the southern end of the precinct, will be subject to minimum floor level controls

for the ground floor and any basement entry points. These minimum levels will depend on the nature of the proposed building use and the adjacent depths of flooding in the road reserves, and will need to be assessed on a case by case basis for future development proposals. The implementation of these controls will not be altered by the changes in the Planning Proposal.

3.9.4. Impact Considerations

Some of the lots within the study area are affected by shallow inundation in the 1% AEP event, typically classified as flood fringe (see Figure E4). Development applications for these lots will need to demonstrate whether excluding this shallow inundation from the lot will significantly increase flood risks in the road reserve or for existing development. There is a possibility that the indicative built form footprints shown on Figure E4 would need to be reduced for some of the affected sites (i.e. with larger ground floor setbacks) to retain the temporary flood storage on these sites. This would need to be assessed on a case by case basis for each development proposal, as would also be required under the current LEP and DCP.

3.9.5. Hazard Considerations

In the 1% AEP design event the hazard classification of overland flow throughout the Rockdale Town Centre precinct is generally low (H1/H2, see Figure E5), and does not present a major constraint to redevelopment.

Flood hazard is significantly higher for the PMF event (Figure E6), with several major roads affected by high hazard, including the Princes Highway, Subway Road, Bryant Street and York Street. This means that during extreme events more intense than the 1% AEP, occupants of buildings in the area, particularly near the open channel on the Princes Highway and Subway Road, will become isolated and will not be able to evacuate the area on foot or by vehicle. Isolation would be of relatively short duration and the risks of occupants requiring emergency evacuation or supplies during the flood would typically be low. However some buildings will need to be structurally designed to consider extreme flood conditions up to the PMF, and provide flood-free refuge on higher floors.

4. CONSISTENCY WITH MINISTERIAL DIRECTIONS

The Planning Proposal does not include any land currently zoned Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zone, and therefore it satisfies part 4.3(5) of the Directions.

With regard to the items in part 4.3(6), WMAwater observes the following:

a) Some of the land within the Planning Proposal extent is affected by floodway. However the Planning Proposal will not automatically permit development of the floodway areas. Development controls for assessment of floodway modification or development are contained within Council's strategic planning framework under the Flood Risk Management Policy, LEP and DCP. These controls already apply to the land under consideration, and the nature of the controls and the development constraints presented by the controls would not be altered by the Planning Proposal. The approval of the Planning Proposal does not provide a guarantee or an implication that these requirements can be waived at subsequent development approval stages.

b) It will be necessary for future development applications to demonstrate the proposed works will not result in significant flood impacts to other developments, through modelling as part of a flood impact assessment where appropriate. As with part 4.3-6(a) above, satisfaction of this requirement depends on the details of the proposed development as is enforced through Council's strategic planning framework at the Development Application stage. These controls already apply to the land under consideration, and the nature of the controls and the development constraints presented by the controls would not be altered by the Planning Proposal. The approval of the Planning Proposal does not provide a guarantee or an implication that these requirements can be waived at subsequent development approval stages.

c) It is unclear in this context what "significant increase in the development of the land" means. From the perspective of flood risk, the land is generally fully urbanised, and primarily covered by hardstand and buildings. The Planning Proposal will not significantly increase the development with regards to how much runoff will occur from the area. The proposed development will increase the development of the land in terms of intensity of floor space and the population density in the area – that is the entire purpose of the Planning Proposal. With regards to flood risk, this increase in population density is largely offset by the following considerations:

    i. The increase in floor space will be primarily related to additional building storeys that are not at risk of damage from flooding.

    ii. In some areas the increase in population density will be associated with higher density land use zoning (e.g. R2 to R4), which will involve consolidation of single-storey dwellings into multi-unit and multi-storey developments. It is more likely that consolidated high-density re-development of these lots would be able to resolve these flood issues, compared to redevelopment under lower density zoning such as R2. Rezoning of the flood affected lots and consolidation of the lots would generally be the most effective long term strategy for reducing flood risks in the areas under consideration, as a higher density development proposal

with a larger lot size is more likely to be able to provide a design solution that complies with the LEP/DCP requirements.

iii. New buildings would need to comply with minimum floor level controls and protection of basement areas, which in many cases are not satisfied by the existing buildings. Redevelopment of the land will therefore reduce the likely flood damages for the ground floor and basement levels, as well as reducing the risk to life to people within the buildings, despite the concurrent increase in total population.

Re-development of urbanised areas is an inevitable result of increases to population in the Sydney metropolitan area. The NSW Flood Prone Land Policy recognises that:

"Flood prone land is a valuable resource that should not be sterilised by unnecessarily precluding its development"

The Floodplain Development Manual indicates that development within the floodplain should be undertaken on a merit-based approach, ensuring that the development is compatible with the flood hazard of the land. Based on the review of available flood information as part of this assessment, the Planning Proposal improves the likelihood that redevelopment of the subject land can meet the required development controls and be compatible with the flood hazard, relative to existing zoning and height/FSR controls.

d) The development is unlikely to result in substantially increased requirement for government spending on flood mitigation measures, infrastructure or services. The primary flood risk mitigation measure to reduce existing flood risks in this region would be to redevelop land to be consistent with the planning controls, including increasing the building floor levels up to the relevant standard, which is achieved through re-development of the land in accordance with the Planning Proposal.

e) WMAwater understands that the developments indicated in the Planning Proposal will require development consent, and the proposal does not include agriculture, road or exempt development components.

With regard to Direction 4.3(7), the Planning Proposal does not impose flood-related development controls above the residential flood planning level (although such controls already exist under the current LEP/DCP, and would remain in force with approval of the Planning Proposal).

With regard to Direction 4.3(8), the relevant flood planning levels are already specified by Council's LEP/DCP and will not be altered by the Planning Proposal. This is consistent with the Floodplain Development Manual.

The Planning Proposal is therefore consistent with the Section 9.1 Ministerial Directions.

5. SUMMARY AND CONCLUSIONS

Some sites are constrained by flood affectation. The details of the specific flood behaviour and constraints within each precinct are discussed in Sections 3.6 to 3.9. The flood constraints identified for specific development lots in this assessment do not prohibit development of those sites, either under the existing LEP/DCP or under the amended LEP/DCP resulting from the Planning Proposal. Either way, future development applications will be required to demonstrate compliance with the flood-related development controls.

The nature of these constraints and the solutions to satisfy the development controls are not significantly altered by the Planning Proposal. However, as with the current LEP zoning, height allowances and maximum FSR, the flood constraints may preclude full development of some sites to the maximum allowable density. This is because compliance with various flood controls (such as not obstructing a flow path, or not building a basement in a hazardous area, or building the ground floor at a minimum level) may reduce the achievable building footprint or number of building storeys within a given site.

The flood constraints may lower the achievable number of dwellings within the subject land, specifically at the following most heavily constrained sites:

- The block bounded by Kelsey Street, Hirst, Street, Bonar Street and Wollongong Road in the Arncliffe West precinct, and
- Lots on the south side of Frederick Street in the Walz Street precinct.

These locations have significant overland flow paths through the sites in the 1% AEP event which may limit the building footprint that can be achieved, particularly at ground level. This should be factored into the consideration of whether the Planning Proposal will meet the medium term housing supply targets in the LSPS (Reference 1) and LHS (Reference 2). However these constraints only apply to specific sites within the areas of the Planning Proposal, and could possibly by addressed by revising the indicative building amalgamation patterns based on the outcomes of the Gateway determination. Outside of these localised areas, there are other sites where future development applications will need to address flood-related development controls, but the controls are unlikely to significantly compromise the development potential.

Although this review identified significant localised flood constraints for some lots, it is likely the Planning Proposal will improve the feasibility of redevelopment in those lots where it would currently be impractical to meet the flood-related development controls. This is because consolidation of lots and permissibility of larger, taller buildings provides more flexibility in the development design to accommodate flow paths through part of the consolidated site, while fully developing the remainder with minimum floor levels that meet requirements. This is less likely to be feasible with lower density development involving fragmented lots and separate buildings. The consolidation of lots and increased density will likely improve the viability of the most heavily flood-constrained sites identified above.

WMAwater considers that the Planning Proposal is consistent with the Ministerial Directions for flood prone land (see Section 2.2 and Section 4 for detailed discussion). The Planning Proposal

is consistent with other relevant legislation and Council's strategic planning framework for flood planning, in that the flood-related development controls enforced through that framework are not significantly altered by the Planning Proposal. Council has indicated that consultation will be undertaken with relevant public agencies (such as the State Emergency Service, the Department of Energy, Environment and Science, and the Department of Industry, planning and Environment) following Gateway determination at the Local Planning Panel. Council expects that comments from these public agencies regarding specific constraints or development controls can be addressed as part of the site-specific DCPs to be prepared for each of the study areas.

6. REFERENCES

Bayside Council
1. **Local Strategic Planning Statement**
March 2020.

Bayside Council
2. **Local Housing Strategy**
April 2020

NSW Government
3. **Section 9.1 Directions**
Consolidated list of Directions issued by the Minister for Planning to relevant planning authorities under section 9.1(2) of the *Environmental Planning and Assessment Act 1979*.
<https://www.planning.nsw.gov.au/-/media/Files/DPE/Directions/ministerial-direction-s9-1-consolidated-list-environment-planning-and-assessment-2019-06-21.pdf?la=en>

NSW Government
4. **Floodplain Development Manual**
NSW Government, April 2005

Bayside Council
5. **Rockdale Development Control Plan 2011**
Effective December 2011

Bayside Council
6. **Rockdale Local Environmental Plan 2011**
Effective December 2011

Bayside Council
7. **Flood Risk Management Policy**
Adopted by Rockdale Council, February 2016

Webb McKeown & Associates
8. **Wolli Creek, Bardwell Creek, Bonnie Doon Channel and Eve Street/Cahill Park Catchments Floodplain Management Study and Plan**
Prepared for Rockdale Council, 1998.

Willing & Partners
9. **Spring Street Drain, Muddy Creek and Scarborough Ponds Floodplain Management Study and Plan**
Prepared for Rockdale Council, 2000.

WMAwater

10. **Bonnie Doon, Eve St / Cahill Park Pipe and Overland 2D flood Study**
Prepared for Rockdale Council, February 2017

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11. **Spring Street Drain, Muddy Creek and Scarborough Ponds Catchments 2D Flood Study**
Prepared for Rockdale Council, February 2017

Australian Institute for Disaster Resilience

12. **Guideline 7-3 Flood Hazard**
Supporting document for Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia
Australian Government, 2017

Bayside Council

13. **Rockdale Technical Specification – Stormwater Management**
Effective December 2011

Figures

Appendix A

APPENDIX A. Glossary

LIST OF ACRONYMS

AEP	Annual Exceedance Probability
ARR	Australian Rainfall and Runoff
BOM	Bureau of Meteorology
DCP	Development Control Plan
DPIE	Department of Planning Industry and Environment
FDM	Floodplain Development Manual
LEP	Local Environment Plan
LHS	Local Housing Strategy
LSPS	Local Strategic Planning Statement
mAHD	meters above Australian Height Datum
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PP	Planning Proposal

ADOPTED TERMINOLOGY

Australian Rainfall and Runoff (ARR, 2019) recommends terminology that is not misleading to the public and stakeholders. Therefore the use of terms such as "recurrence interval" and "return period" are no longer recommended as they imply that a given event magnitude is only exceeded at regular intervals such as every 100 years. However, rare events may occur in clusters. For example there are several instances of an event with a 1% chance of occurring within a short period, for example the 1949 and 1950 events at Kempsey. Historically the term Average Recurrence Interval (ARI) has been used.

ARR 2019 recommends the use of Annual Exceedance Probability (AEP). Annual Exceedance Probability (AEP) is the probability of an event being equalled or exceeded within a year. AEP may be expressed as either a percentage (%) or 1 in X. Floodplain management typically uses the percentage form of terminology. Therefore a 1% AEP event or 1 in 100 AEP has a 1% chance of being equalled or exceeded in any year.

The Probable Maximum Flood is the largest flood that could possibly occur on a catchment. It is related to the Probable Maximum Precipitation (PMP). The PMP has an approximate probability in the order of 1 in 10 million chance per year for the areas considered in this study.

GLOSSARY

Taken from the Floodplain Development Manual (April 2005 edition)

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. For example, if a peak flood discharge of 500 m^3/s has an AEP of 5%, it means that there is a 5% chance (that is one-in-20 chance)

	of a 500 m³/s or larger event occurring in any one year (see ARI).
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average Annual Damage (AAD)	Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.
Average Recurrence Interval (ARI)	The long term average number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods with a discharge as great as, or greater than, the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
caravan and moveable home parks	Caravans and moveable dwellings are being increasingly used for long-term and permanent accommodation purposes. Standards relating to their siting, design, construction and management can be found in the Regulations under the LG Act.
Catchment	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
consent authority	The Council, government agency or person having the function to determine a development application for land use under the EP&A Act. The consent authority is most often the Council, however legislation or an EPI may specify a Minister or public authority (other than a Council), or the Director General of DIPNR, as having the function to determine an application.
development	Is defined in Part 4 of the Environmental Planning and Assessment Act (EP&A Act). **infill development:** refers to the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development. **new development:** refers to development of a completely different nature to that associated with the former land use. For example, the urban subdivision of an area previously used for rural purposes. New developments involve rezoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power. **redevelopment:** refers to rebuilding in an area. For example, as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either rezoning or major extensions to urban services.
disaster plan (DISPLAN)	A step by step sequence of previously agreed roles, responsibilities, functions, actions and management arrangements for the conduct of a single or series of connected emergency operations, with the object of ensuring the coordinated response by all agencies having responsibilities and functions in emergencies.
Discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m³/s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).
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 move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.
emergency management	A range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding.
flash flooding	Flooding which is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. Often defined as flooding which peaks within six hours of the causative rain.
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
flood awareness	Flood awareness is an appreciation of the likely effects of flooding and a knowledge of the relevant flood warning, response and evacuation procedures.
flood education	Flood education seeks to provide information to raise awareness of the flood problem so as to enable individuals to understand how to manage themselves an their property in response to flood warnings and in a flood event. It invokes a state of flood readiness.
flood fringe areas	The remaining area of flood prone land after floodway and flood storage areas have been defined.
flood liable land	Is synonymous with flood prone land (i.e. land susceptible to flooding by the probable maximum flood (PMF) event). Note that the term flood liable land covers the whole of the floodplain, not just that part below the flood planning level (see flood planning area).
flood mitigation standard	The average recurrence interval of the flood, selected as part of the floodplain risk management process that forms the basis for physical works to modify the impacts of flooding.
Floodplain	Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land.
floodplain risk management options	The measures that might be feasible for the management of a particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed evaluation of floodplain risk management options.
floodplain risk management plan	A management plan developed in accordance with the principles and guidelines in this manual. Usually includes both written and diagrammetic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.
flood plan (local)	A sub-plan of a disaster plan that deals specifically with flooding. They can exist at State, Division and local levels. Local flood plans are prepared under the leadership of the State Emergency Service.
flood planning area	The area of land below the flood planning level and thus subject to flood related development controls. The concept of flood planning area generally supersedes the Aflood liable land@ concept in the 1986 Manual.

Flood Planning Levels (FPLs)	FPL=s are the combinations of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the Astandard flood event@ in the 1986 manual.
flood proofing	A combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding, to reduce or eliminate flood damages.
flood prone land	Is land susceptible to flooding by the Probable Maximum Flood (PMF) event. Flood prone land is synonymous with flood liable land.
flood readiness	Flood readiness is an ability to react within the effective warning time.
flood risk	Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and continuing risks. They are described below. **existing flood risk:** the risk a community is exposed to as a result of its location on the floodplain. **future flood risk:** the risk a community may be exposed to as a result of new development on the floodplain. **continuing flood risk:** the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.
flood storage areas	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas.
floodway areas	Those 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 cause a significant redistribution of flood flows, or a significant increase in flood levels.
Freeboard	Freeboard provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. Freeboard is included in the flood planning level.
habitable room	**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.
Hazard	A source of potential harm or a situation with a potential to cause loss. In relation to this manual the hazard is flooding which has the potential to cause damage to

	the community. Definitions of high and low hazard categories are provided in the Manual.
Hydraulics	Term given to the study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and velocity.
Hydrograph	A graph which shows how the discharge or stage/flood level at any particular location varies with time during a flood.
Hydrology	Term given to the study of the rainfall and runoff process; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods.
local overland flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
local drainage	Are smaller scale problems in urban areas. They are outside the definition of major drainage in this glossary.
mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.

major drainage	Councils have discretion in determining whether urban drainage problems are associated with major or local drainage. For the purpose of this manual major drainage involves:
	$ the floodplains of original watercourses (which may now be piped, channelised or diverted), or sloping areas where overland flows develop along alternative paths once system capacity is exceeded; and/or
	$ water depths generally in excess of 0.3 m (in the major system design storm as defined in the current version of Australian Rainfall and Runoff). These conditions may result in danger to personal safety and property damage to both premises and vehicles; and/or
	$ major overland flow paths through developed areas outside of defined drainage reserves; and/or
	$ the potential to affect a number of buildings along the major flow path.

mathematical/computer models	The mathematical representation of the physical processes involved in runoff generation and stream flow. These models are often run on computers due to the complexity of the mathematical relationships between runoff, stream flow and the distribution of flows across the floodplain.
merit approach	The merit approach weighs social, economic, ecological and cultural impacts of land use options for different flood prone areas together with flood damage, hazard and behaviour implications, and environmental protection and well being of the State=s rivers and floodplains. The merit approach operates at two levels. At the strategic level it allows for the consideration of social, economic, ecological, cultural and flooding issues to determine strategies for the management of future flood risk which are formulated into Council plans, policy and EPIs. At a site specific level, it involves consideration of the best way of conditioning development allowable under the floodplain risk management plan, local floodplain risk management policy and EPIs.
minor, moderate and major flooding	Both the State Emergency Service and the Bureau of Meteorology use the following definitions in flood warnings to give a general indication of the types of

	problems expected with a flood: **minor flooding:** causes inconvenience such as closing of minor roads and the submergence of low level bridges. The lower limit of this class of flooding on the reference gauge is the initial flood level at which landholders and townspeople begin to be flooded. **moderate flooding:** low-lying areas are inundated requiring removal of stock and/or evacuation of some houses. Main traffic routes may be covered. **major flooding:** appreciable urban areas are flooded and/or extensive rural areas are flooded. Properties, villages and towns can be isolated.
modification measures	Measures that modify either the flood, the property or the response to flooding. Examples are indicated in Table 2.1 with further discussion in the Manual.
peak discharge	The maximum discharge occurring during a flood event.
Probable Maximum Flood (PMF)	The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation, and where applicable, snow melt, coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event should be addressed in a floodplain risk management study.
Probable Maximum Precipitation (PMP)	The PMP is 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 PMF estimation.
Probability	A statistical measure of the expected chance of flooding (see AEP).
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Runoff	The amount of rainfall which actually ends up as streamflow, also known as rainfall excess.
Stage	Equivalent to water level. Both are measured with reference to a specified datum.
stage hydrograph	A graph that shows how the water level at a particular location changes with time during a flood. It must be referenced to a particular datum.
survey plan	A plan prepared by a registered surveyor.
water surface profile	A graph showing the flood stage at any given location along a watercourse at a particular time.

APPENDIX B. Walz Street Precinct Flood Mapping

Appendix B

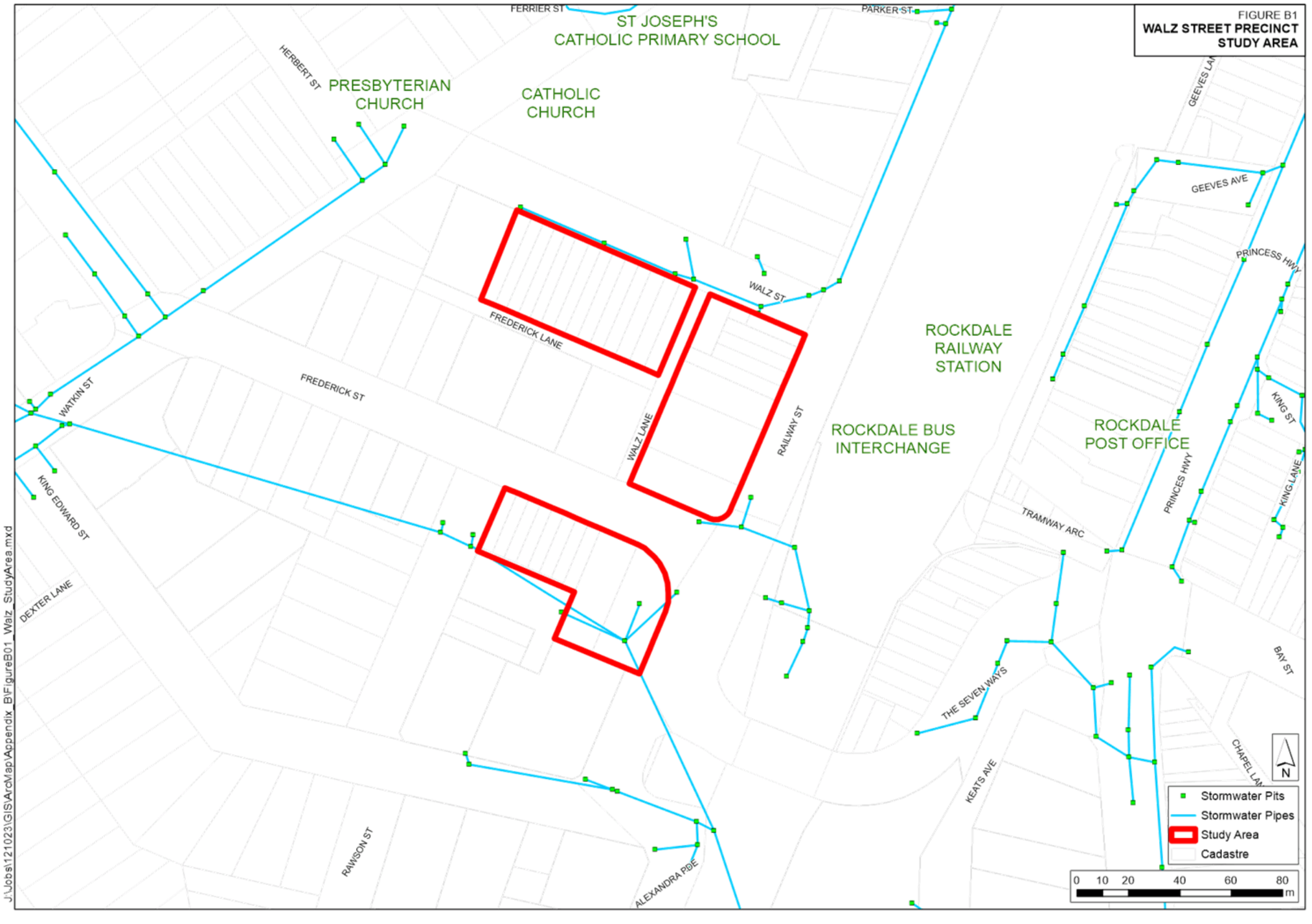
FIGURE B1
WALZ STREET PRECINCT
STUDY AREA
ST JOSEPH'S
CATHOLIC PRIMARY SCHOOL
PRESBYTERIAN
CHURCH
CATHOLIC
CHURCH
ROCKDALE
RAILWAY
STATION
ROCKDALE BUS
INTERCHANGE
ROCKDALE
POST OFFICE
FERRIER ST
PARKER ST
HERBERT ST
GEEVES LANE
GEEVES AVE
PRINCESS HWY
WALZ ST
FREDERICK LANE
FREDERICK ST
WALZ LANE
RAILWAY ST
WATKIN ST
KING EDWARD ST
DEXTER LANE
KING ST
KING LANE
TRAMWAY ARC
THE SEVEN WAYS
BAY ST
KEATS AVE
CHAPEL LANE
RAWSON ST
ALEXANDRA PDE
J:\Jobs\121023\GIS\ArcMap\Appendix_B\FigureB01_Walz_StudyArea.mxd
N
Stormwater Pits
Stormwater Pipes
Study Area
Cadastre
0 10 20 40 60 80
m


FIGURE B2
WALZ STREET PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
5% AEP EVENT
FERRIER ST
ST JOSEPH'S
CATHOLIC PRIMARY SCHOOL
PARKER ST
HERBERT ST
PRESBYTERIAN
CHURCH
CATHOLIC
CHURCH
GEEVES
GEEVES AVE
PRINCESS HWY
WALZ ST
FREDERICK LANE
ROCKDALE
RAILWAY
STATION
FREDERICK ST
WATKIN ST
KING ST
WALZ LANE
RAILWAY ST
ROCKDALE BUS
INTERCHANGE
ROCKDALE
POST OFFICE
KING EDWARD ST
PRINCES HWY
KING LANE
TRAMWAY ARC
DEXTER LANE
THE SEVEN WAYS
KEATS AVE
RAWSON ST
ALEXANDRA PDE
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N
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
0 10 20 40 60 80
m

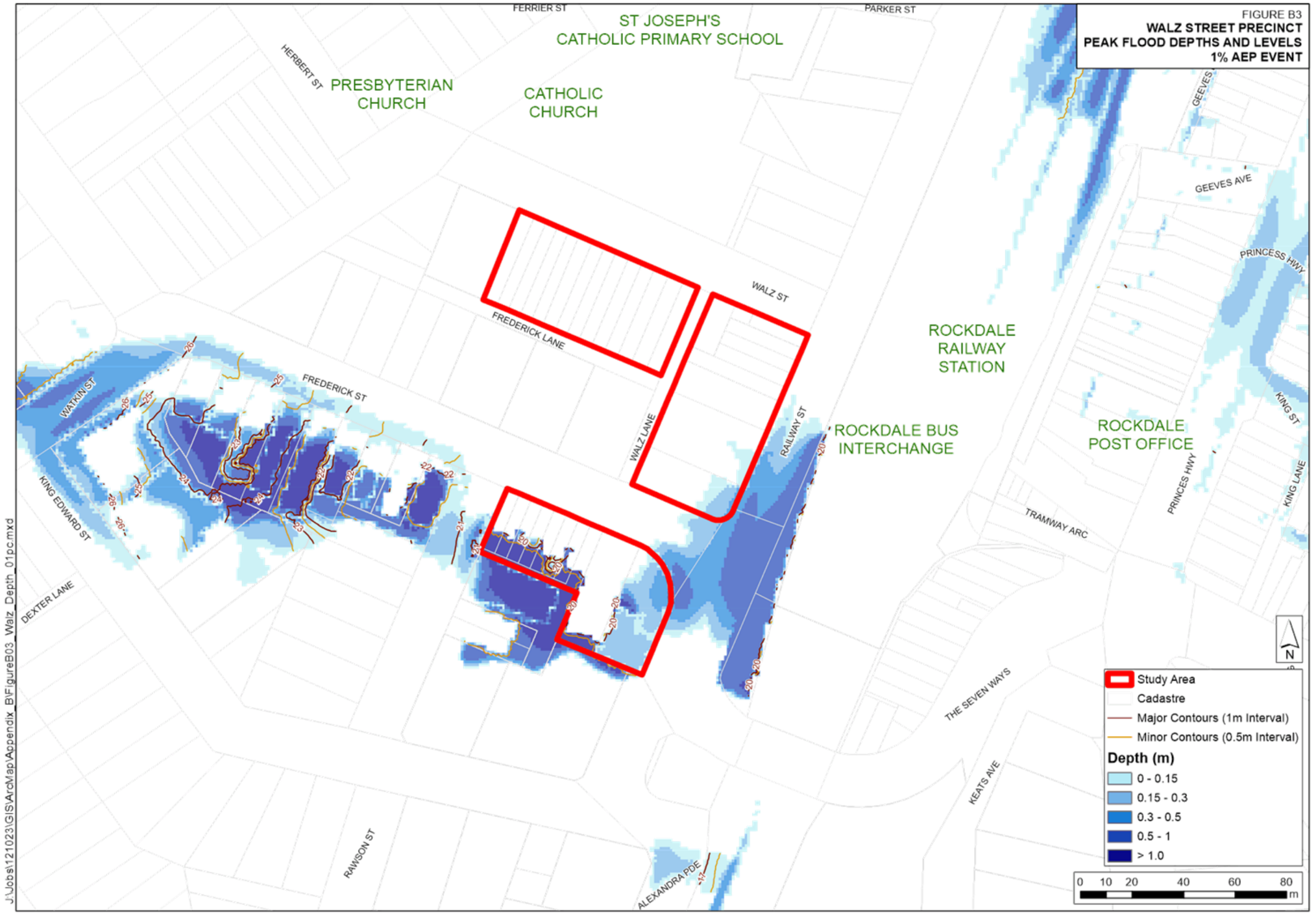
FIGURE B3
WALZ STREET PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
1% AEP EVENT
FERRIER ST
PARKER ST
ST JOSEPH'S
CATHOLIC PRIMARY SCHOOL
HERBERT ST
PRESBYTERIAN
CHURCH
CATHOLIC
CHURCH
GEEVES AVE
PRINCESS HWY
WALZ ST
FREDERICK LANE
ROCKDALE
RAILWAY
STATION
FREDERICK ST
WATKIN ST
WALZ LANE
RAILWAY ST
ROCKDALE BUS
INTERCHANGE
ROCKDALE
POST OFFICE
KING ST
KING LANE
KING EDWARD ST
TRAMWAY ARC
DEXTER LANE
THE SEVEN WAYS
KEATS AVE
RAWSON ST
ALEXANDRA PDE
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N
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
0 10 20 40 60 80
m


FIGURE B4
WALZ STREET PRECINCT
HYDRAULIC CATEGORISTION
1% AEP EVENT
ST JOSEPH'S
CATHOLIC
PRIMARY SCHOOL
PRESBYTERIAN
CHURCH
CATHOLIC
CHURCH
Walz Street
Railway Street
Frederick Lane
Heston Lane
Frederick Street
ROCKDALE
RAILWAY
STATION
ROCKDALE BUS
INTERCHANGE
ROCKDALE
POST OFFICE
Rawson Street
Study Area
Proposed Building Footprints
Cadastre
Hydraulic
Categorisation
Flood Fringe
Flood Storage
Floodway
0 10 20 40 60 80
m
J:\Jobs\121023\GIS\ArcMap\Appendix_B\FigureB04_Walz_HydCat_01pc.mxd

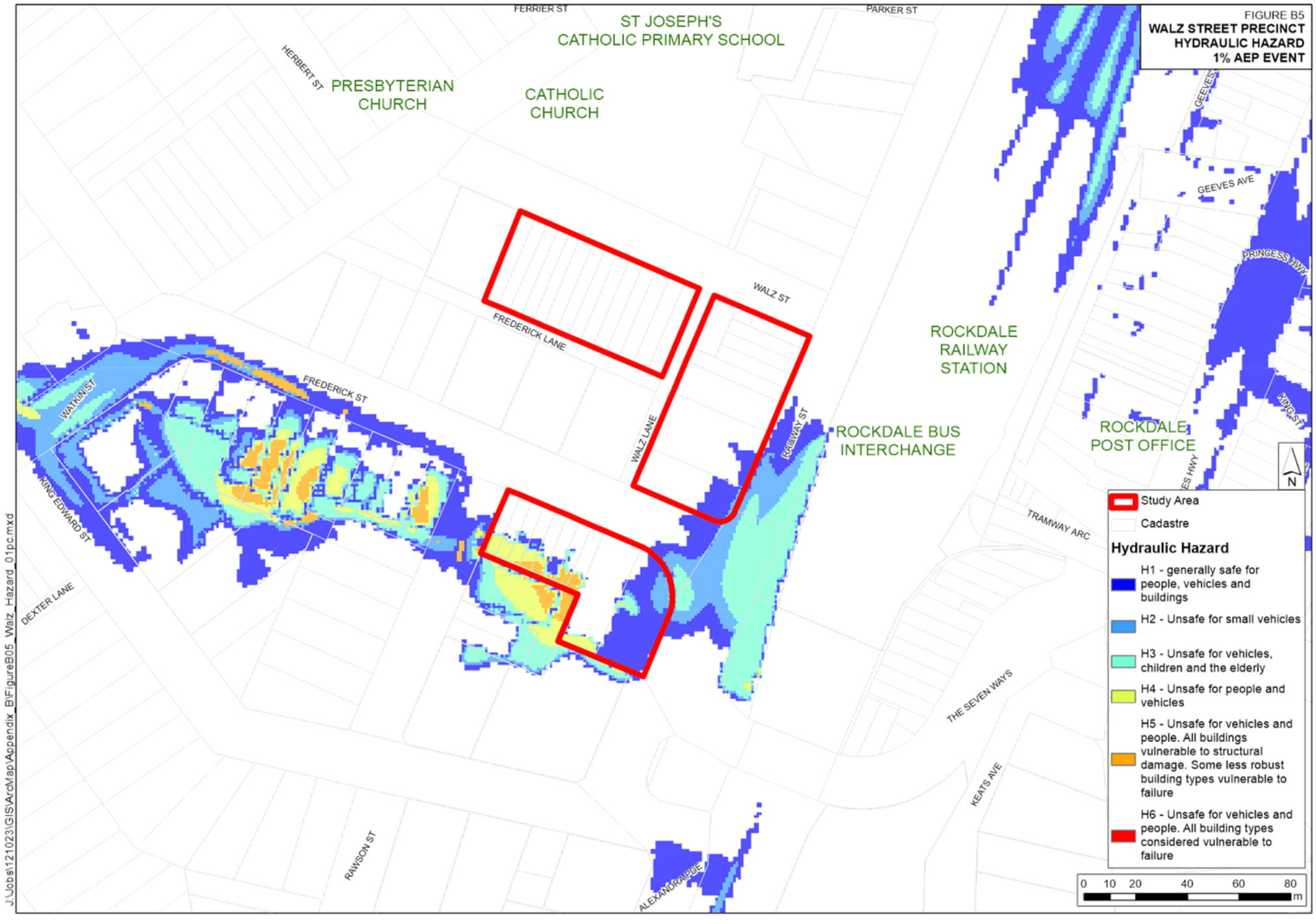
FIGURE B5
WALZ STREET PRECINCT
HYDRAULIC HAZARD
1% AEP EVENT
FERRIER ST
ST JOSEPH'S
CATHOLIC PRIMARY SCHOOL
PARKER ST
HERBERT ST
PRESBYTERIAN
CHURCH
CATHOLIC
CHURCH
GEEVES
GEEVES AVE
PRINCESS HWY
WALZ ST
FREDERICK LANE
ROCKDALE
RAILWAY
STATION
FREDERICK ST
WATKIN ST
WALZ LANE
RAILWAY ST
ROCKDALE BUS
INTERCHANGE
ROCKDALE
POST OFFICE
KING ST
KING EDWARD ST
TRAMWAY ARC
DEXTER LANE
THE SEVEN WAYS
KEATS AVE
RAWSON ST
ALEXANDRA PDE
J:\Jobs\121023\GIS\ArcMap\Appendix_B\FigureB05_Walz_Hazard_01pc.mxd
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 10 20 40 60 80
m

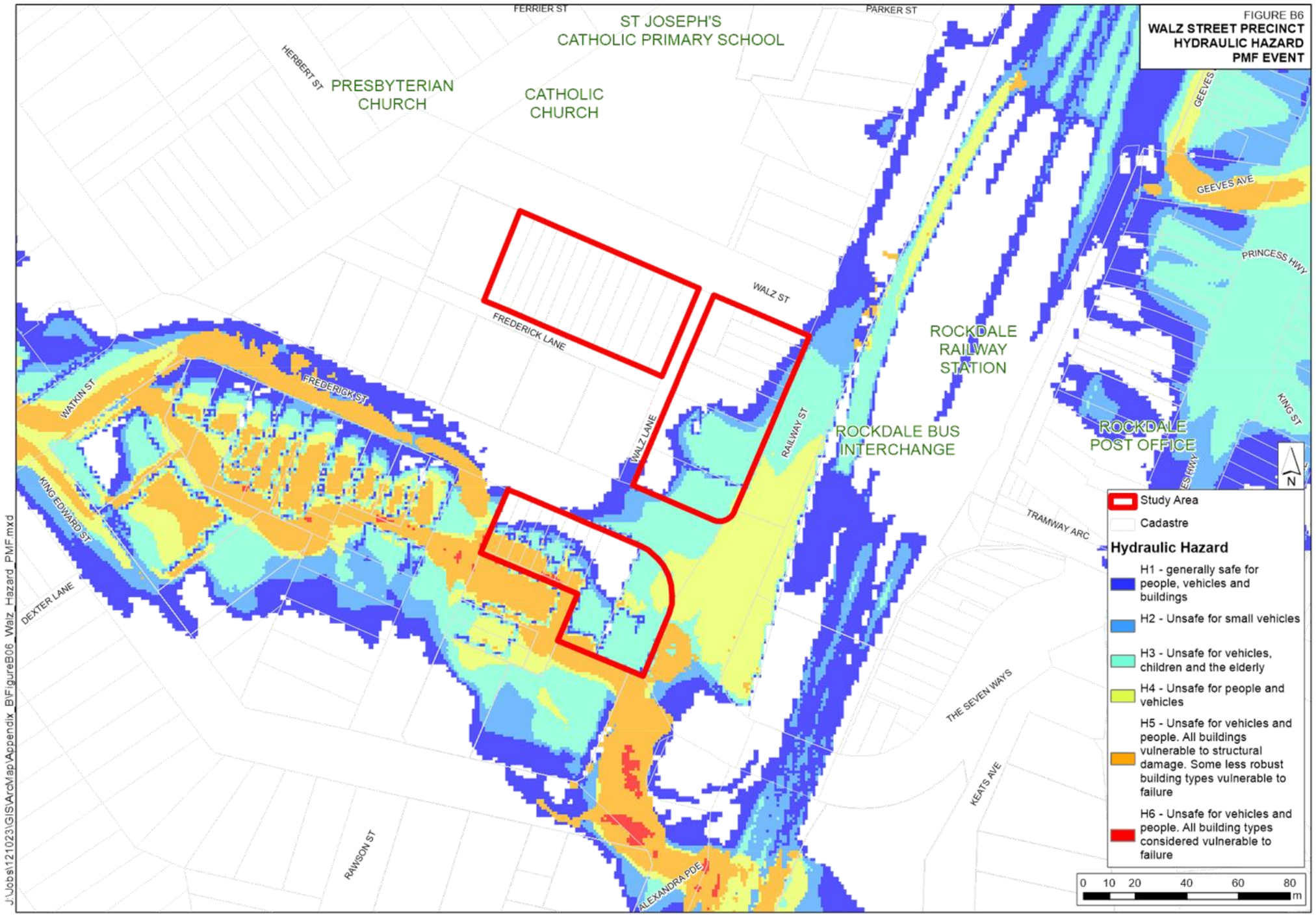
FIGURE B6
WALZ STREET PRECINCT
HYDRAULIC HAZARD
PMF EVENT
FERRIER ST
PARKER ST
ST JOSEPH'S
CATHOLIC PRIMARY SCHOOL
HERBERT ST
PRESBYTERIAN
CHURCH
CATHOLIC
CHURCH
GEEVES
GEEVES AVE
PRINCESS HWY
WALZ ST
FREDERICK LANE
ROCKDALE
RAILWAY
STATION
WATKIN ST
FREDERICK ST
WALZ LANE
RAILWAY ST
ROCKDALE BUS
INTERCHANGE
ROCKDALE
POST OFFICE
KING ST
KING EDWARD ST
TRAMWAY ARC
DEXTER LANE
THE SEVEN WAYS
KEATS AVE
RAWSON ST
ALEXANDRA PDE
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 10 20 40 60 80
m
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APPENDIX C. Bay Street Precinct Flood Mapping

Appendix C

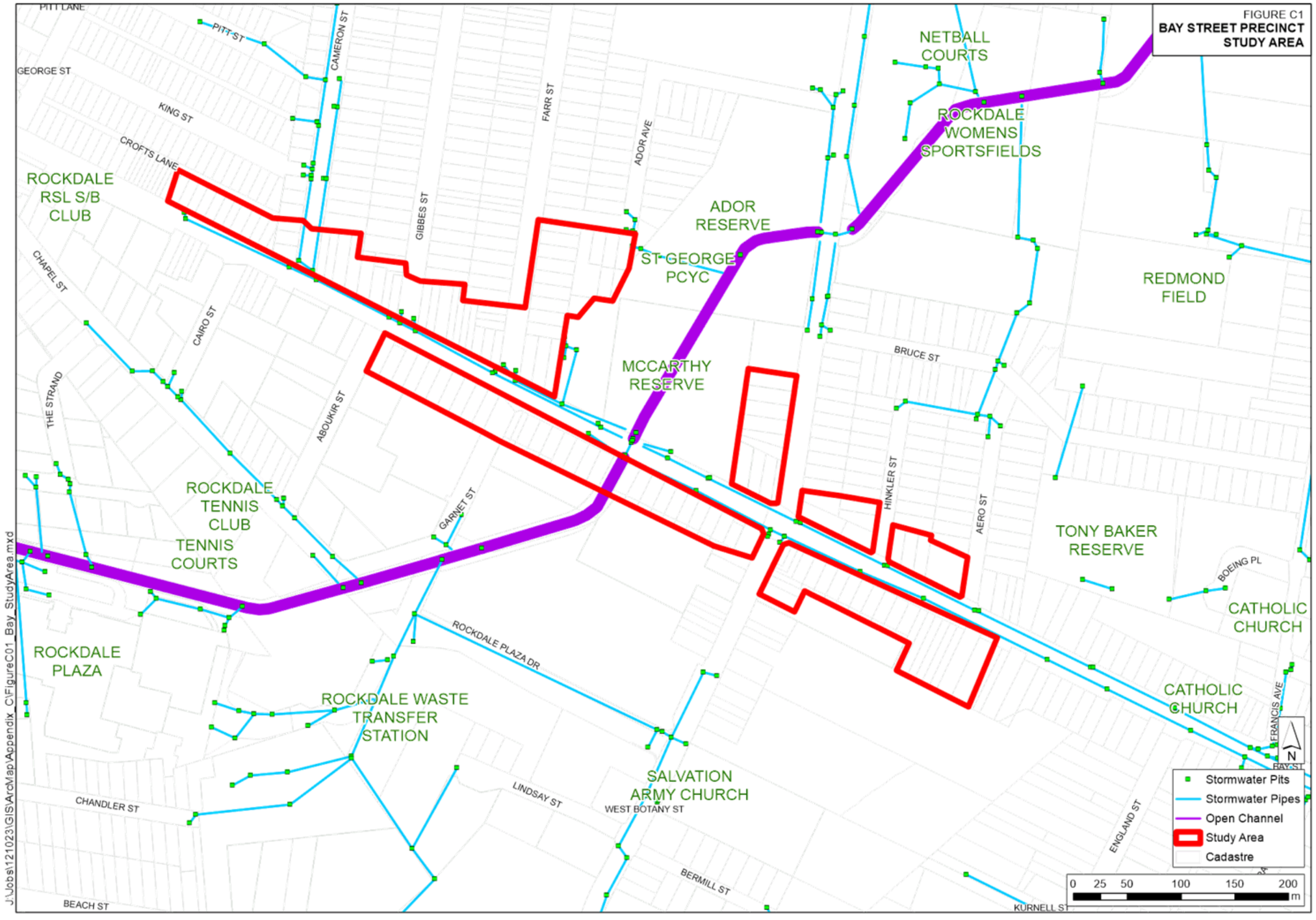
FIGURE C1
BAY STREET PRECINCT
STUDY AREA
PITT LANE
PITT ST
GEORGE ST
KING ST
CROFTS LANE
CAMERON ST
GIBBES ST
FARR ST
ADOR AVE
ROCKDALE
RSL S/B
CLUB
CHAPEL ST
CAIRO ST
THE STRAND
ABOUKIR ST
ADOR
RESERVE
ST GEORGE
PCYC
MCCARTHY
RESERVE
NETBALL
COURTS
ROCKDALE
WOMENS
SPORTSFIELDS
REDMOND
FIELD
BRUCE ST
ROCKDALE
TENNIS
CLUB
TENNIS
COURTS
GARNET ST
HINKLER ST
AERO ST
TONY BAKER
RESERVE
BOEING PL
CATHOLIC
CHURCH
ROCKDALE
PLAZA
ROCKDALE PLAZA DR
ROCKDALE WASTE
TRANSFER
STATION
CATHOLIC
CHURCH
FRANCIS AVE
BAY ST
CHANDLER ST
LINDSAY ST
SALVATION
ARMY CHURCH
WEST BOTANY ST
ENGLAND ST
BERMILL ST
BEACH ST
KURNELL ST
N
Stormwater Pits
Stormwater Pipes
Open Channel
Study Area
Cadastre
0 25 50 100 150 200
m
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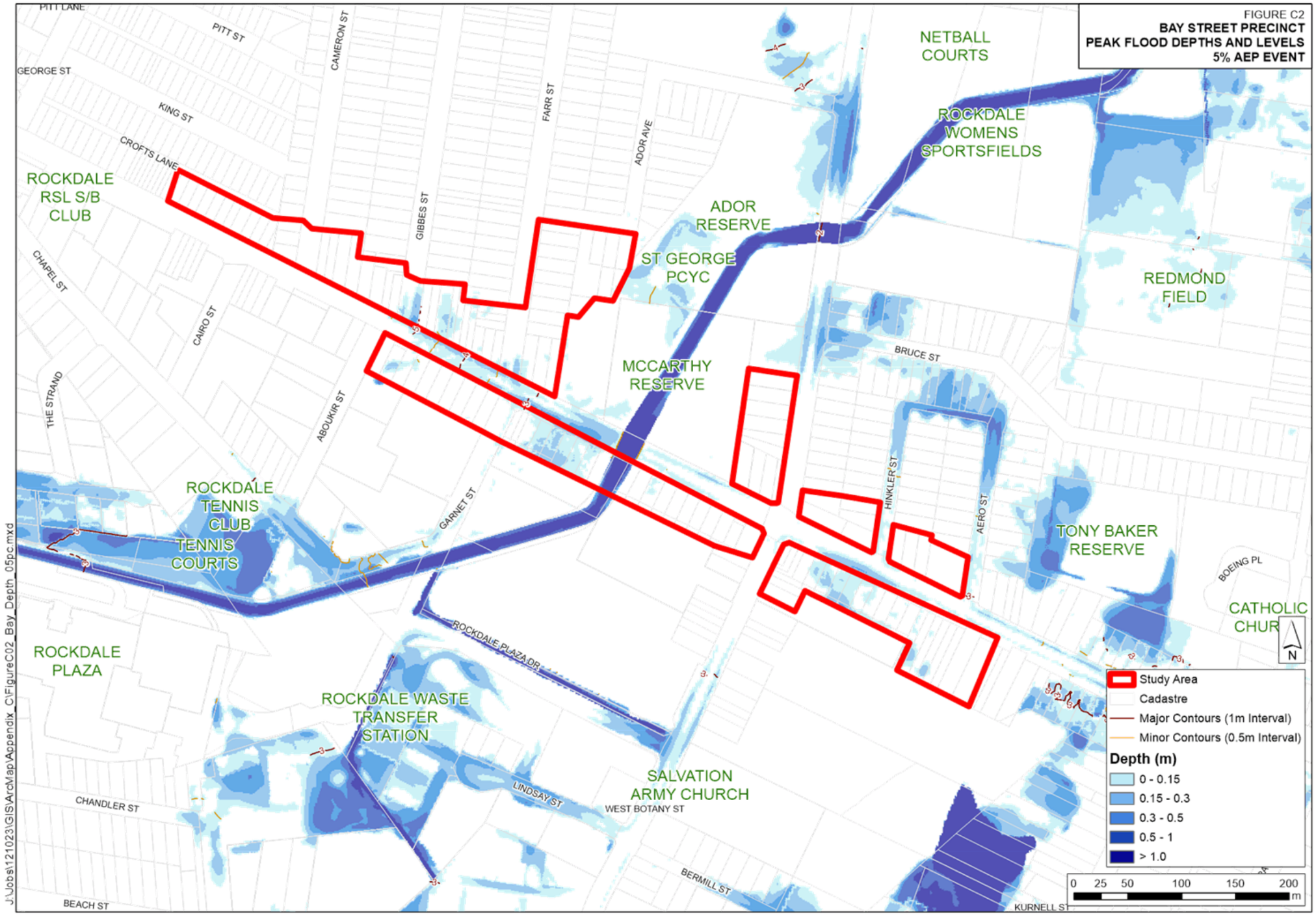
FIGURE C2
BAY STREET PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
5% AEP EVENT
PITT LANE
PITT ST
GEORGE ST
KING ST
CROFTS LANE
CAMERON ST
GIBBES ST
FARR ST
ADOR AVE
CHAPEL ST
CAIRO ST
THE STRAND
ABOUKIR ST
GARNET ST
ROCKDALE PLAZA DR
LINDSAY ST
WEST BOTANY ST
BERMILL ST
BEACH ST
CHANDLER ST
BRUCE ST
HINKLER ST
AERO ST
BOEING PL
KURNELL ST
ROCKDALE RSL S/B CLUB
NETBALL COURTS
ROCKDALE WOMENS SPORTSFIELDS
ADOR RESERVE
ST GEORGE PCYC
REDMOND FIELD
MCCARTHY RESERVE
ROCKDALE TENNIS CLUB TENNIS COURTS
TONY BAKER RESERVE
CATHOLIC CHUR
ROCKDALE PLAZA
ROCKDALE WASTE TRANSFER STATION
SALVATION ARMY CHURCH
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N
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
0 25 50 100 150 200
m

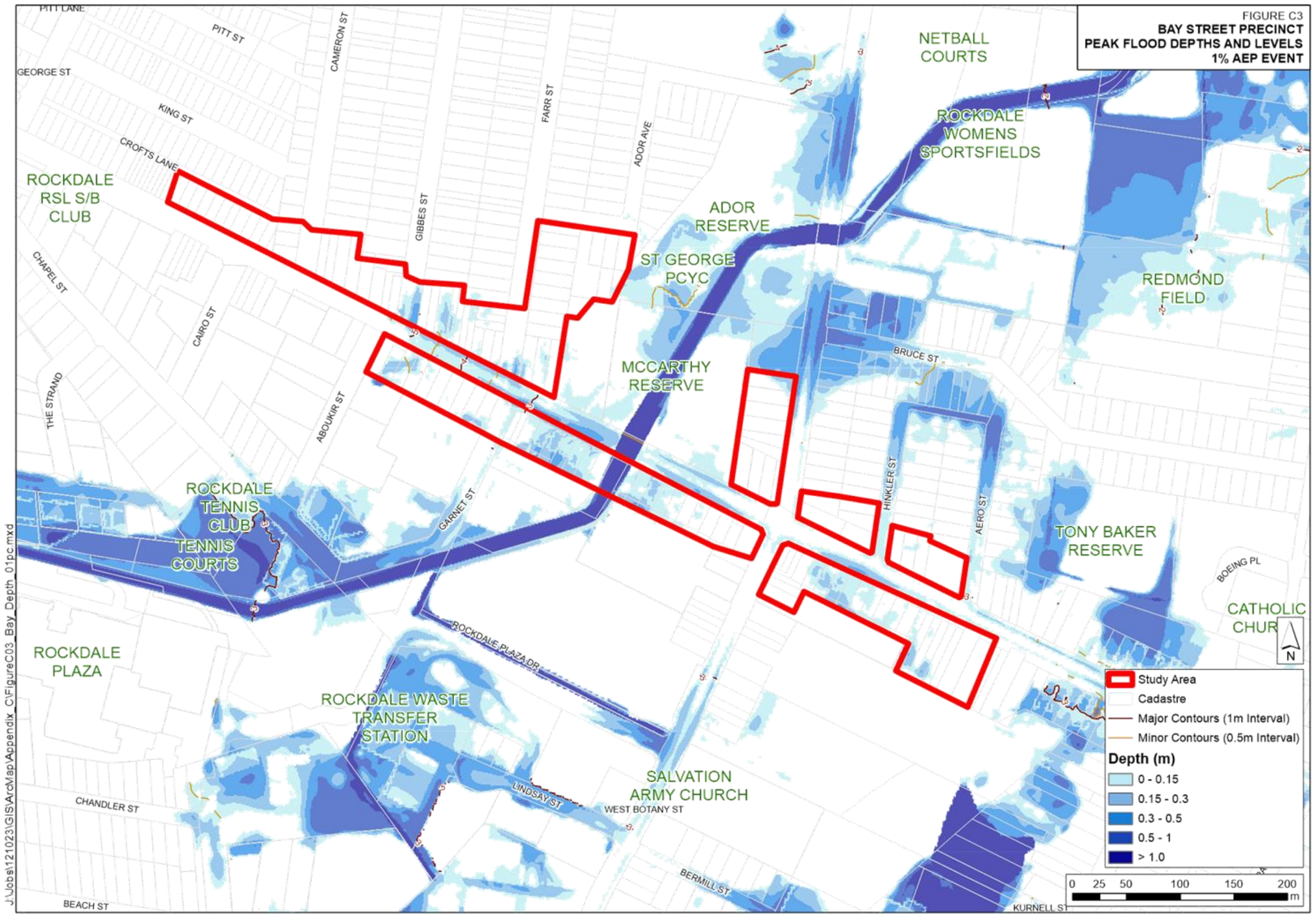
FIGURE C3
BAY STREET PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
1% AEP EVENT
PITT LANE
PITT ST
GEORGE ST
KING ST
CROFTS LANE
CAMERON ST
FARR ST
ADOR AVE
GIBBES ST
CHAPEL ST
CAIRO ST
THE STRAND
ABOUKIR ST
GARNET ST
HINKLER ST
AERO ST
BRUCE ST
BOEING PL
ROCKDALE PLAZA DR
LINDSAY ST
WEST BOTANY ST
CHANDLER ST
BERMILL ST
BEACH ST
KURNELL ST
ROCKDALE RSL S/B CLUB
NETBALL COURTS
ROCKDALE WOMENS SPORTSFIELDS
ADOR RESERVE
ST GEORGE PCYC
REDMOND FIELD
MCCARTHY RESERVE
ROCKDALE TENNIS CLUB TENNIS COURTS
TONY BAKER RESERVE
CATHOLIC CHUR
ROCKDALE PLAZA
ROCKDALE WASTE TRANSFER STATION
SALVATION ARMY CHURCH
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N
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
0 25 50 100 150 200
m

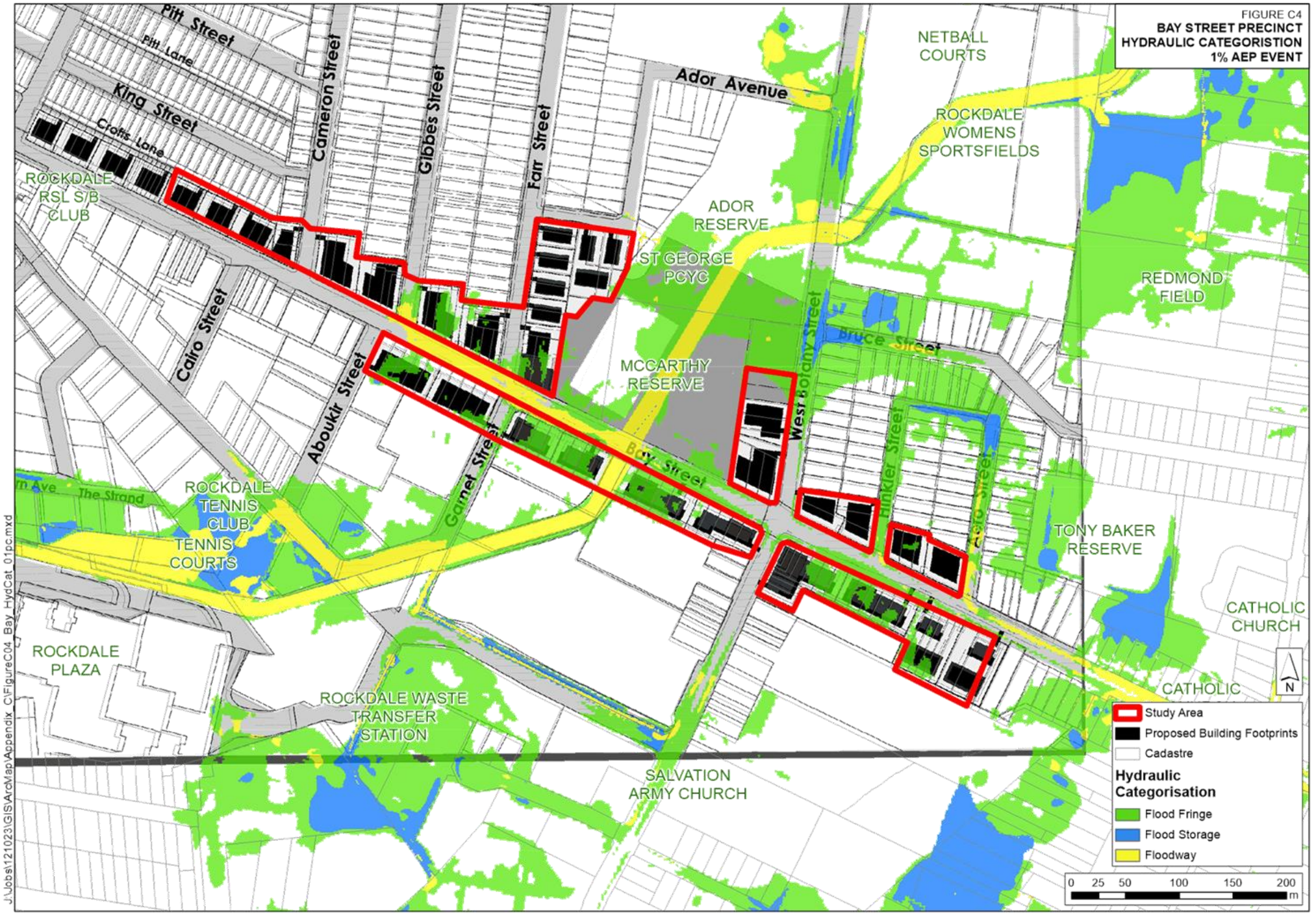
FIGURE C4
BAY STREET PRECINCT
HYDRAULIC CATEGORISTION
1% AEP EVENT
Pitt Street
Pitt Lane
King Street
Crofts Lane
Cameron Street
Gibbes Street
Farr Street
Ador Avenue
NETBALL COURTS
ROCKDALE WOMENS SPORTSFIELDS
ROCKDALE RSL S/B CLUB
ADOR RESERVE
ST GEORGE PCYC
REDMOND FIELD
Cairo Street
Aboukir Street
MCCARTHY RESERVE
West Botany Street
Bruce Street
Bay Street
Garnet Street
Bunker Street
The Strand
ROCKDALE TENNIS CLUB
TENNIS COURTS
TONY BAKER RESERVE
CATHOLIC CHURCH
ROCKDALE PLAZA
ROCKDALE WASTE TRANSFER STATION
SALVATION ARMY CHURCH
CATHOLIC
N
Study Area
Proposed Building Footprints
Cadastre
Hydraulic Categorisation
Flood Fringe
Flood Storage
Floodway
0 25 50 100 150 200
m
J:\Jobs\121023\GIS\ArcMap\Appendix C\FigureC04_Bay_HydCat_01pc.mxd

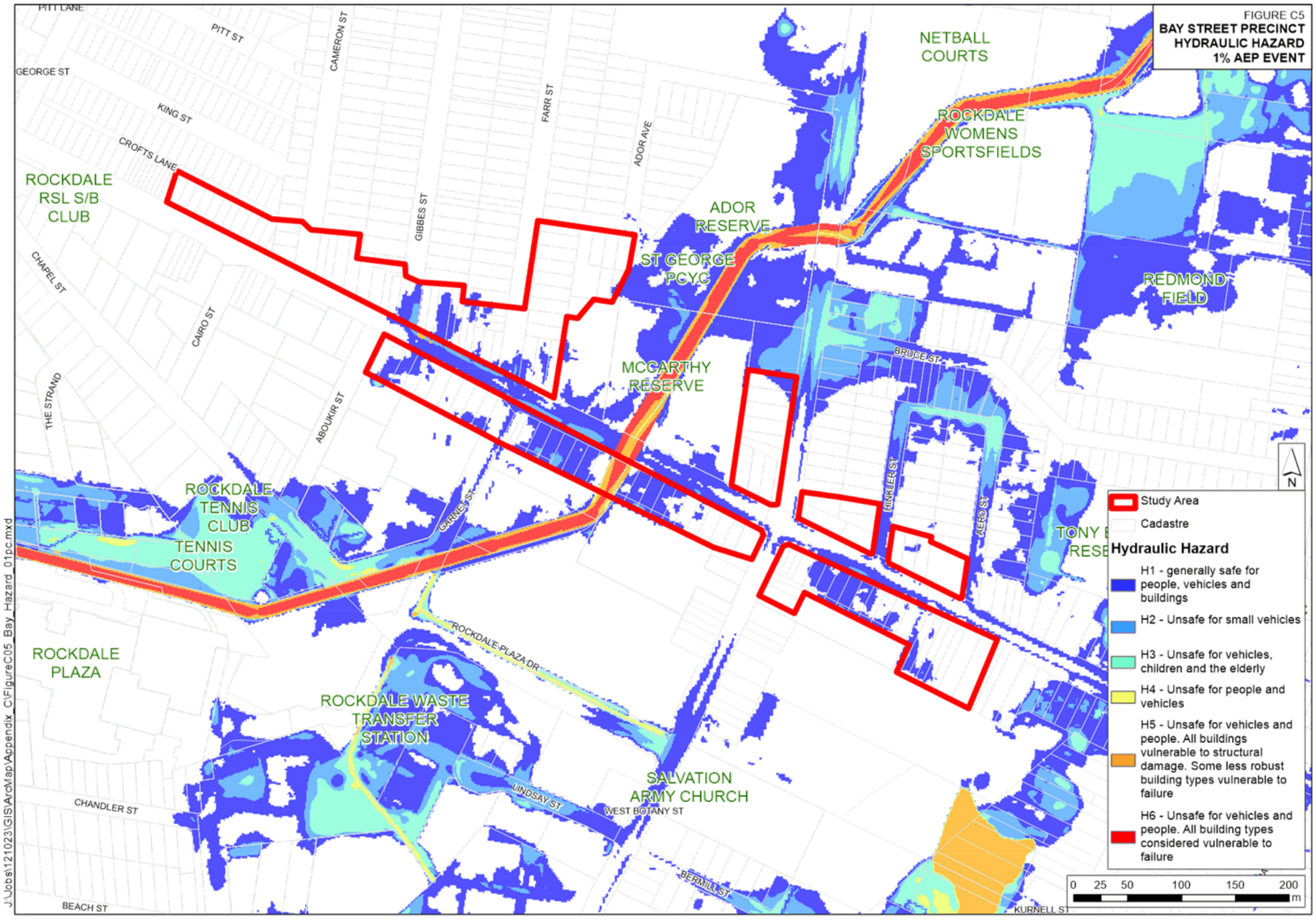
FIGURE C5
BAY STREET PRECINCT
HYDRAULIC HAZARD
1% AEP EVENT
PITT LANE
PITT ST
GEORGE ST
KING ST
CROFTS LANE
CAMERON ST
FARR ST
ADOR AVE
GIBBES ST
CHAPEL ST
CAIRO ST
THE STRAND
ABOUKIR ST
GARNET ST
ROCKDALE PLAZA DR
LINDSAY ST
WEST BOTANY ST
BERMILL ST
BEACH ST
BRUCE ST
HINKLER ST
AERO ST
KURNELL ST
ROCKDALE RSL S/B CLUB
NETBALL COURTS
ROCKDALE WOMENS SPORTSFIELDS
ADOR RESERVE
ST GEORGE PCYC
REDMOND FIELD
MCCARTHY RESERVE
ROCKDALE TENNIS CLUB TENNIS COURTS
ROCKDALE PLAZA
ROCKDALE WASTE TRANSFER STATION
SALVATION ARMY CHURCH
TONY
RESE
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 25 50 100 150 200
m
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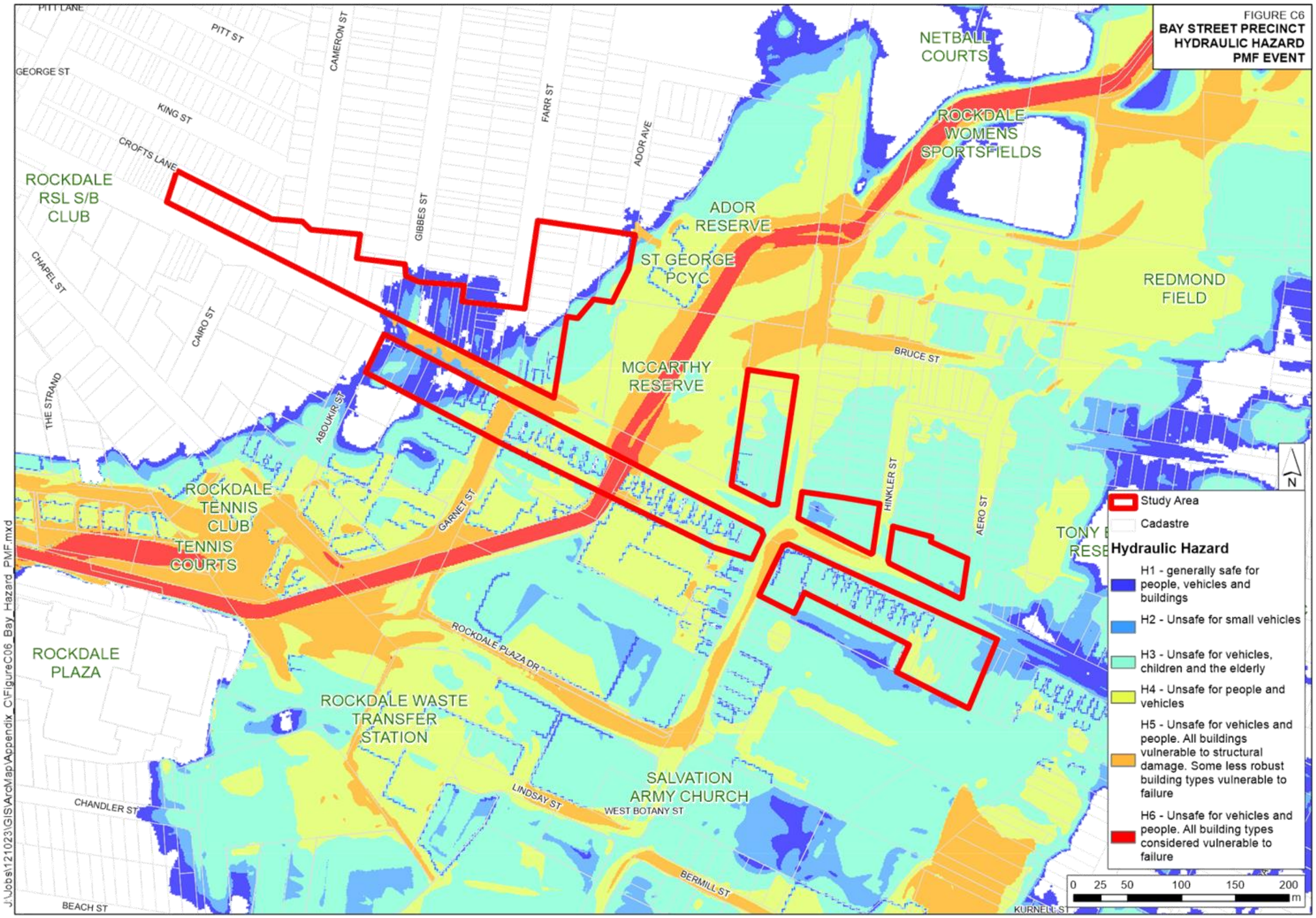
FIGURE C6
BAY STREET PRECINCT
HYDRAULIC HAZARD
PMF EVENT
PITT LANE
PITT ST
GEORGE ST
KING ST
CROFTS LANE
CAMERON ST
GIBBES ST
FARR ST
ADOR AVE
CHAPEL ST
CAIRO ST
THE STRAND
ABOUKIR ST
GARNET ST
ROCKDALE PLAZA DR
LINDSAY ST
WEST BOTANY ST
BRUCE ST
HINKLER ST
AERO ST
BERMILL ST
CHANDLER ST
BEACH ST
KURNELL ST
ROCKDALE RSL S/B CLUB
ROCKDALE TENNIS CLUB
TENNIS COURTS
ROCKDALE PLAZA
ROCKDALE WASTE TRANSFER STATION
ADOR RESERVE
ST GEORGE PCYC
MCCARTHY RESERVE
NETBALL COURTS
ROCKDALE WOMENS SPORTSFIELDS
REDMOND FIELD
SALVATION ARMY CHURCH
TONY
RESE
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 25 50 100 150 200
m
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APPENDIX D. Arncliffe West Precinct Flood Mapping

Appendix D

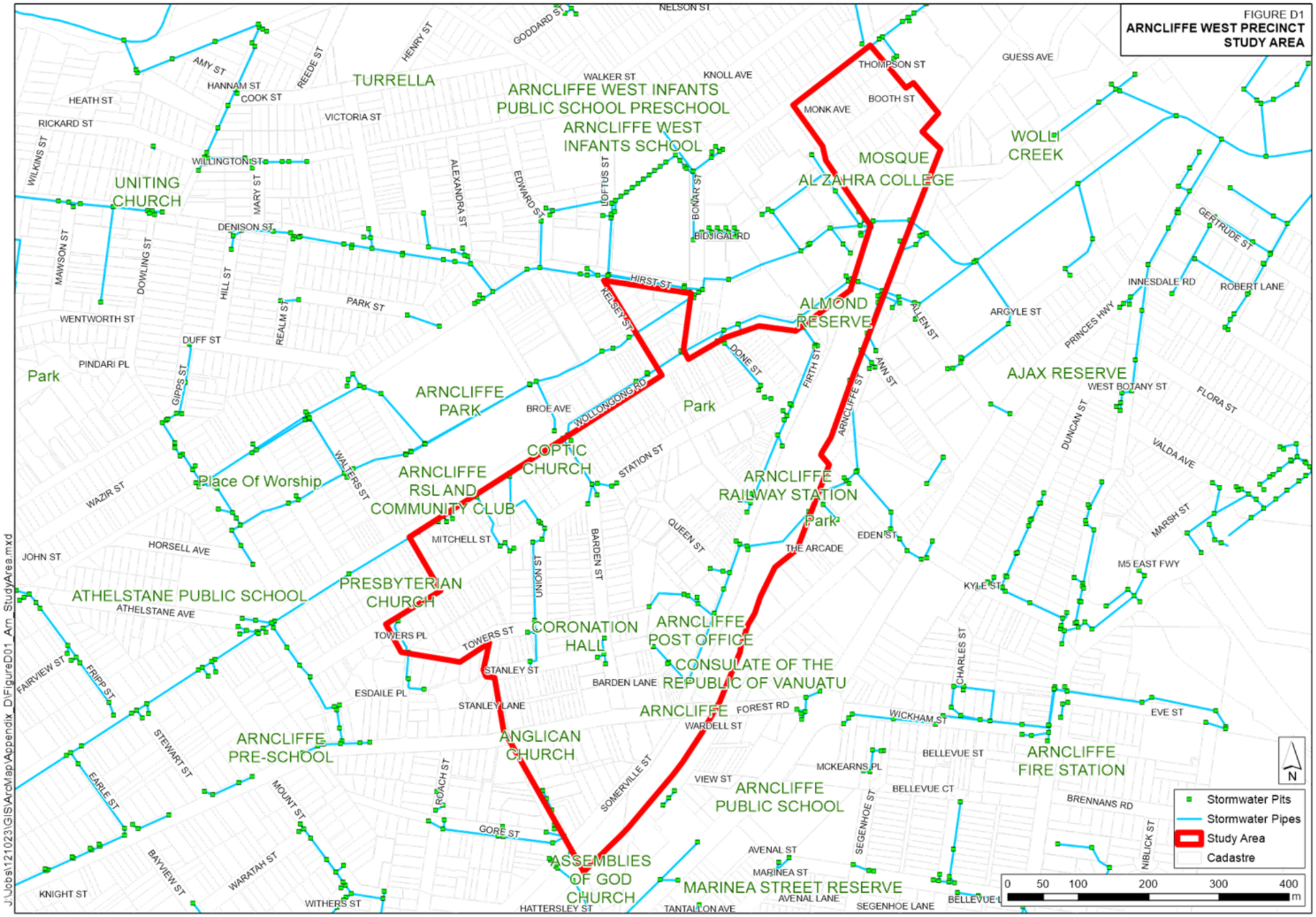
FIGURE D1
ARNCLIFFE WEST PRECINCT
STUDY AREA
TURRELLA
ARNCLIFFE WEST INFANTS
PUBLIC SCHOOL PRESCHOOL
ARNCLIFFE WEST
INFANTS SCHOOL
MOSQUE
AL ZAHRA COLLEGE
WOLLI
CREEK
UNITING
CHURCH
ALMOND
RESERVE
AJAX RESERVE
ARNCLIFFE
PARK
COPTIC
CHURCH
ARNCLIFFE
RSL AND
COMMUNITY CLUB
ARNCLIFFE
RAILWAY STATION
Park
Place Of Worship
PRESBYTERIAN
CHURCH
ATHELSTANE PUBLIC SCHOOL
CORONATION
HALL
ARNCLIFFE
POST OFFICE
CONSULATE OF THE
REPUBLIC OF VANUATU
ARNCLIFFE
PRE-SCHOOL
ANGLICAN
CHURCH
ARNCLIFFE
PUBLIC SCHOOL
ARNCLIFFE
FIRE STATION
ASSEMBLIES
OF GOD
CHURCH
MARINEA STREET RESERVE
NELSON ST
GODDARD ST
HENRY ST
AMY ST
REEDE ST
HANNAM ST
COOK ST
HEATH ST
RICKARD ST
VICTORIA ST
WILLINGTON ST
WILKINS ST
MARY ST
ALEXANDRA ST
EDWARD ST
LOFTUS ST
BONAR ST
WALKER ST
KNOLL AVE
THOMPSON ST
BOOTH ST
MONK AVE
GUESS AVE
BIDJIGAL RD
DENISON ST
MAWSON ST
DOWLING ST
HILL ST
PARK ST
HIRST ST
KELSEY ST
WENTWORTH ST
DUFF ST
REALM ST
PINDARI PL
GIPPS ST
DONE ST
FIRTH ST
ANN ST
ALLEN ST
ARGYLE ST
PRINCES HWY
INNESDALE RD
GERTRUDE ST
ROBERT LANE
WEST BOTANY ST
FLORA ST
DUNCAN ST
VALDA AVE
MARSH ST
M5 EAST FWY
KYLE ST
BROE AVE
WOLLONGONG RD
ARNCLIFFE ST
STATION ST
QUEEN ST
EDEN ST
THE ARCADE
BARDEN ST
UNION ST
MITCHELL ST
WALTERS ST
WAZIR ST
HORSELL AVE
JOHN ST
ATHELSTANE AVE
TOWERS PL
TOWERS ST
STANLEY ST
STANLEY LANE
ESDAILE PL
BARDEN LANE
FOREST RD
WARDELL ST
CHARLES ST
WICKHAM ST
EVE ST
BELLEVUE ST
MCKEARNS PL
VIEW ST
BELLEVUE CT
BRENNANS RD
NIBLICK ST
SEGENHOE ST
AVENAL ST
MARINEA ST
AVENAL LANE
SEGENHOE LANE
BELLEVUE1
FAIRVIEW ST
FRIPP ST
STEWART ST
EARLE ST
BAYVIEW ST
KNIGHT ST
WARATAH ST
MOUNT ST
WITHERS ST
ROACH ST
GORE ST
SOMERVILLE ST
HATTERSLEY ST
TANTALON AVE
Park
Park
Park
J:\Jobs\121023\GIS\ArcMap\Appendix_D\FigureD01_Arn_StudyArea.mxd
N
Stormwater Pits
Stormwater Pipes
Study Area
Cadastre
0 50 100 200 300 400
m

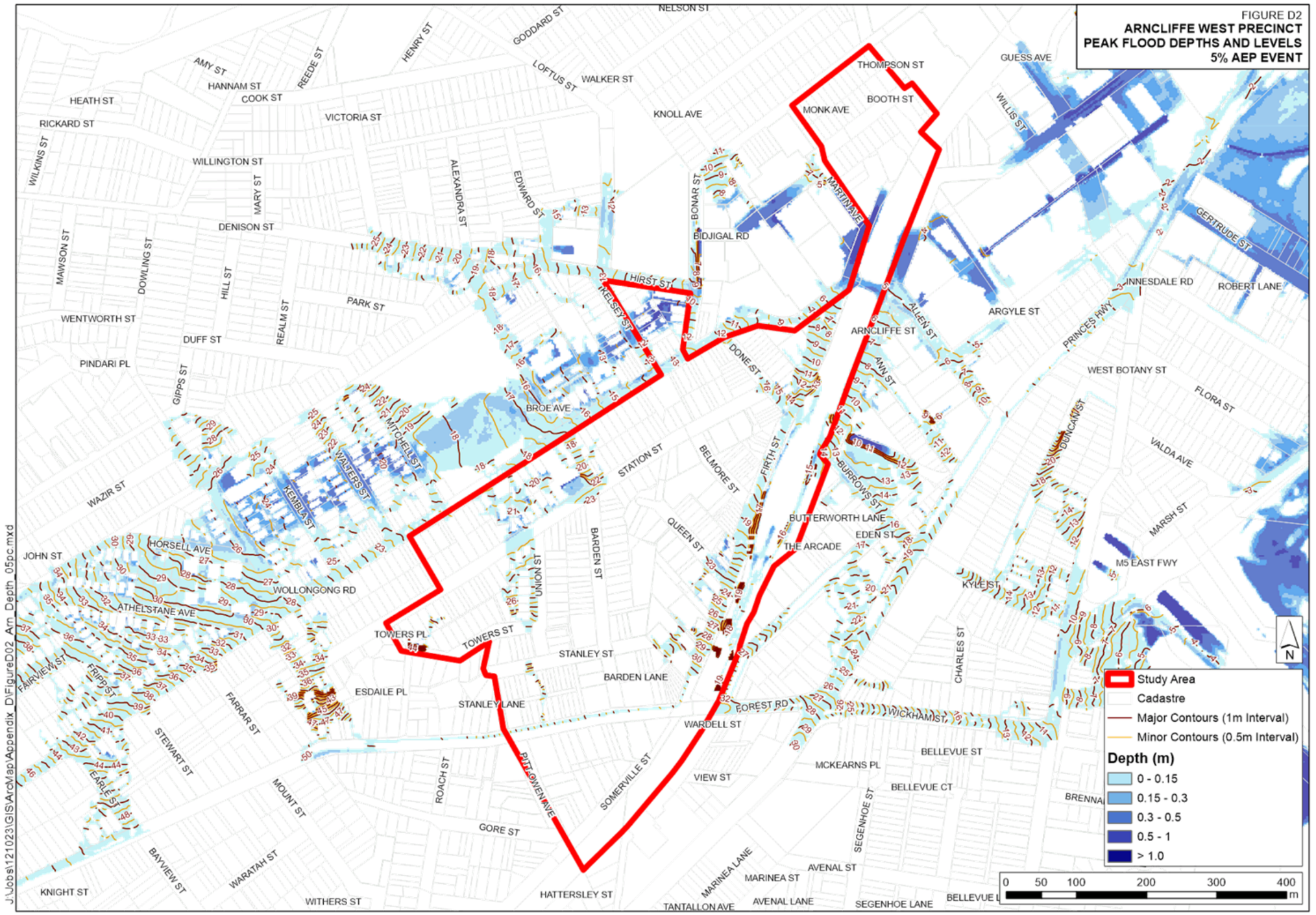
FIGURE D2
ARNCLIFFE WEST PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
5% AEP EVENT
NELSON ST
GODDARD ST
HENRY ST
REEDE ST
AMY ST
HANNAM ST
COOK ST
LOFTUS ST
WALKER ST
HEATH ST
RICKARD ST
VICTORIA ST
KNOLL AVE
THOMPSON ST
BOOTH ST
MONK AVE
GUESS AVE
WILLIS ST
WILKINS ST
WILLINGTON ST
MARY ST
ALEXANDRA ST
EDWARD ST
BONAR ST
MARTIN AVE
DENISON ST
BIDJIGAL RD
GERTRUDE ST
MAWSON ST
DOWLING ST
HILL ST
HIRST ST
KELSEY ST
INNESDALE RD
ROBERT LANE
PARK ST
WENTWORTH ST
REALM ST
ALLEN ST
ARGYLE ST
DUFF ST
ARNCLIFFE ST
PRINCES HWY
PINDARI PL
GIPPS ST
DONE ST
ANN ST
WEST BOTANY ST
BROE AVE
MITCHELL ST
FLORA ST
WALTERS ST
KEMBLA ST
STATION ST
BELMORE ST
FIRTH ST
DUNCAN ST
VALDA AVE
WAZIR ST
BURROWS ST
BUTTERWORTH LANE
MARSH ST
JOHN ST
HORSELL AVE
QUEEN ST
EDEN ST
THE ARCADE
M5 EAST FWY
BARDEN ST
UNION ST
KYLE ST
WOLLONGONG RD
ATHELSTANE AVE
TOWERS PL
TOWERS ST
STANLEY ST
CHARLES ST
FAIRVIEW ST
FRIPP ST
BARDEN LANE
ESDAILE PL
FORREST RD
WICKHAM ST
FARRAR ST
STANLEY LANE
WARDELL ST
STEWART ST
BELLEVUE ST
PITTWATER AVE
ROACH ST
SOMERVILLE ST
MCKEARNS PL
VIEW ST
BELLEVUE CT
EARLE ST
MOUNT ST
SEGENHOE ST
GORE ST
BAYVIEW ST
WARATAH ST
MARINEA LANE
AVENAL ST
KNIGHT ST
WITHERS ST
HATTERSLEY ST
MARINEA ST
TANTALLON AVE
AVENAL LANE
SEGENHOE LANE
BELLEVUE L
N
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
0 50 100 200 300 400
m
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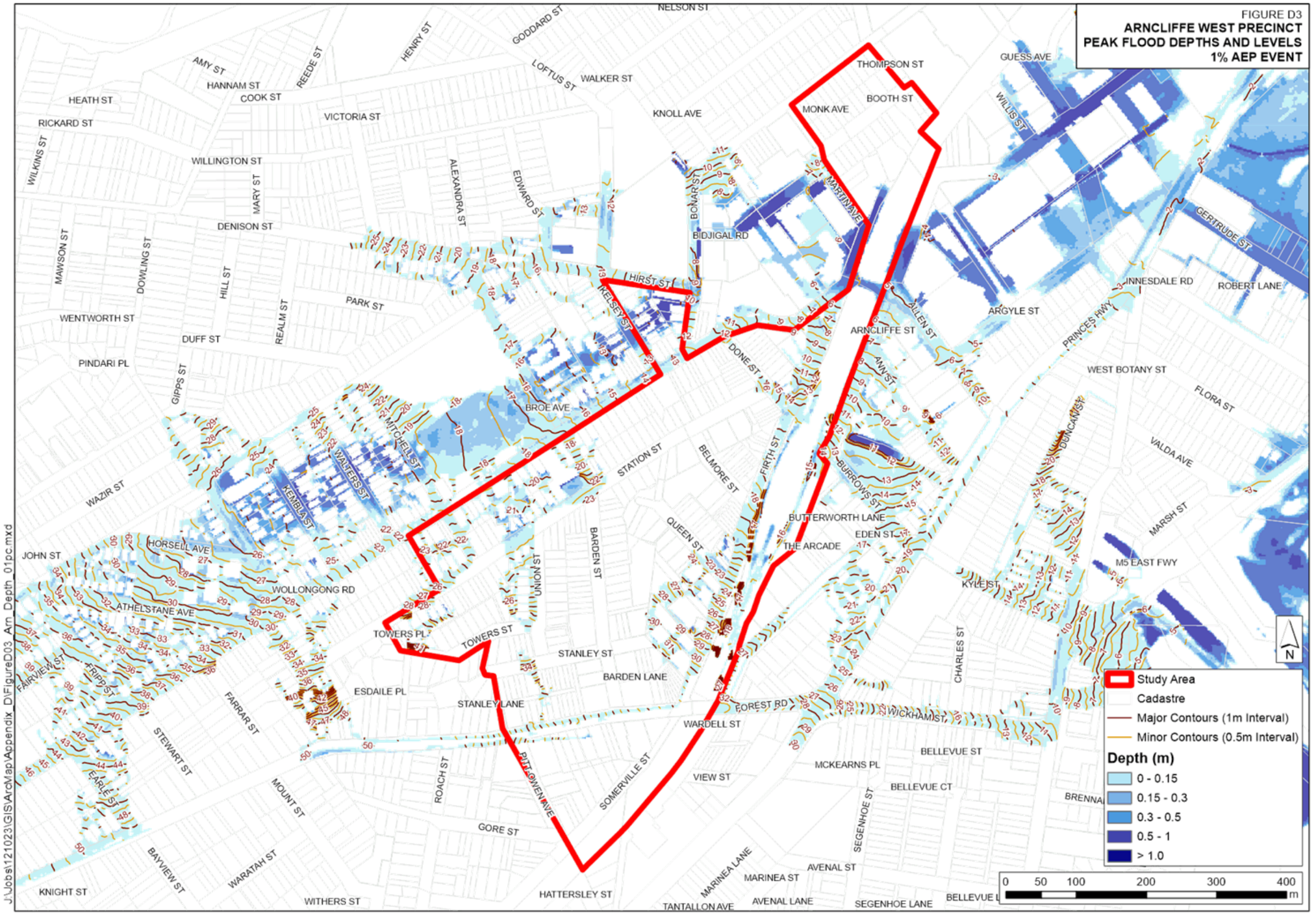
FIGURE D3
ARNCLIFFE WEST PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
1% AEP EVENT
NELSON ST
GODDARD ST
HENRY ST
REEDE ST
AMY ST
HANNAM ST
COOK ST
LOFTUS ST
WALKER ST
HEATH ST
RICKARD ST
VICTORIA ST
KNOLL AVE
THOMPSON ST
BOOTH ST
MONK AVE
GUESS AVE
WILLIS ST
WILKINS ST
WILLINGTON ST
MARY ST
ALEXANDRA ST
EDWARD ST
BONAR ST
MARTIN AVE
GERTRUDE ST
DENISON ST
BIDJIGAL RD
MAWSON ST
DOWLING ST
HILL ST
HIRST ST
KELSEY ST
INNESDALE RD
ROBERT LANE
PARK ST
ARGYLE ST
WENTWORTH ST
REALM ST
ALLEN ST
ARNCLIFFE ST
PRINCES HWY
DUFF ST
DONE ST
ANN ST
PINDARI PL
GIPPS ST
WEST BOTANY ST
BROE AVE
FLORA ST
MITCHELL ST
WATERS ST
KEMBLA ST
STATION ST
BELMORE ST
FIRTH ST
BURROWS ST
VALDA AVE
WAZIR ST
BUTTERWORTH LANE
EDEN ST
MARSH ST
JOHN ST
HORSELL AVE
THE ARCADE
QUEEN ST
UNION ST
BARDEN ST
M5 EAST FWY
KYLE ST
WOLLONGONG RD
ATHELSTANE AVE
TOWERS PL
TOWERS ST
STANLEY ST
CHARLES ST
FAIRVIEW ST
FRIPP ST
BARDEN LANE
ESDAILE PL
STANLEY LANE
FORREST RD
WICKHAM ST
FARRAR ST
WARDELL ST
STEWART ST
BELLEVUE ST
MCKEARNS PL
EARLE ST
PITT OWEN AVE
VIEW ST
ROACH ST
SOMERVILLE ST
BELLEVUE CT
MOUNT ST
GORE ST
SEGENHOE ST
BAYVIEW ST
WARATAH ST
MARINEA LANE
AVENAL ST
KNIGHT ST
WITHERS ST
HATTERSLEY ST
MARINEA ST
TANTALLON AVE
AVENAL LANE
SEGENHOE LANE
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
N
0 50 100 200 300 400
m
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FIGURE D4
ARNCLIFFE WEST PRECINCT
HYDRAULIC CATEGORIES
NO MAPPING OF HYDRAULIC CATEGORIES
REFER TO SECTION 3.8.2
NELSON ST
GODDARD ST
HENRY ST
REEDE ST
AMY ST
HANNAM ST
COOK ST
LOFTUS ST
WALKER ST
THOMPSON ST
GUESS AVE
HEATH ST
RICKARD ST
VICTORIA ST
KNOLL AVE
MONK AVE
BOOTH ST
WILLIS ST
WILKINS ST
WILLINGTON ST
MARY ST
ALEXANDRA ST
EDWARD ST
BONAR ST
MARTIN AVE
DENISON ST
BIDJIGAL RD
GERTRUDE ST
MAWSON ST
DOWLING ST
HILL ST
HIRST ST
KELSEY ST
INNESDALE RD
ROBERT LANE
PARK ST
ARGYLE ST
WENTWORTH ST
REALM ST
ALLEN ST
PRINCES HWY
DUFF ST
ARNCLIFFE ST
DONE ST
ANN ST
PINDARI PL
GIPPS ST
WEST BOTANY ST
FLORA ST
BROE AVE
MITCHELL ST
WALTERS ST
STATION ST
BELMORE ST
FIRTH ST
BURROWS ST
DUNCAN ST
VALDA AVE
WAZIR ST
KEMBLA ST
QUEEN ST
BUTTERWORTH LANE
EDEN ST
MARSH ST
JOHN ST
HORSELL AVE
UNION ST
BARDEN ST
THE ARCADE
M5 EAST FWY
WOLLONGONG RD
KYLE ST
ATHELSTANE AVE
TOWERS PL
TOWERS ST
CHARLES ST
STANLEY ST
FAIRVIEW ST
FRIPP ST
BARDEN LANE
ESDAILE PL
FARRAR ST
STANLEY LANE
FOREST RD
WICKHAM ST
EVE ST
WARDELL ST
STEWART ST
BELLEVUE ST
MCKEARNS PL
EARLE ST
ROACH ST
PITT OWEN AVE
SOMERVILLE ST
VIEW ST
BELLEVUE CT
BRENNANS RD
MOUNT ST
SEGENHOE ST
NIBLICK ST
GORE ST
BAYVIEW ST
WARATAH ST
MARINEA LANE
AVENAL ST
MARINEA ST
KNIGHT ST
WITHERS ST
HATTERSLEY ST
TANTALLON AVE
AVENAL LANE
SEGENHOE LANE
BELLEVUE L
N
Study Area
Cadastre
0 50 100 200 300 400 m
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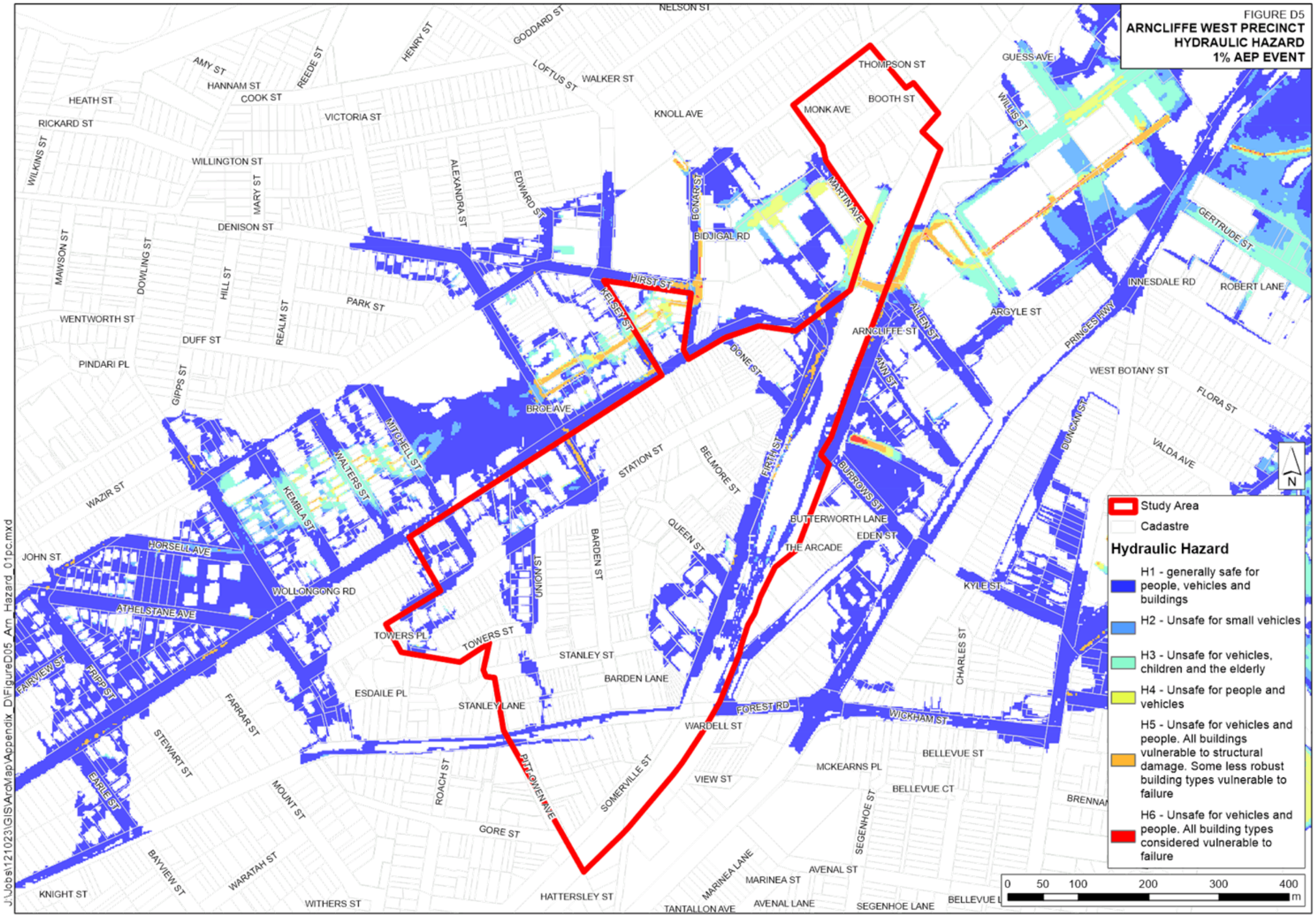
FIGURE D5
ARNCLIFFE WEST PRECINCT
HYDRAULIC HAZARD
1% AEP EVENT
NELSON ST
GODDARD ST
HENRY ST
REEDE ST
AMY ST
HANNAM ST
COOK ST
LOFTUS ST
WALKER ST
HEATH ST
RICKARD ST
VICTORIA ST
KNOLL AVE
THOMPSON ST
BOOTH ST
MONK AVE
GUESS AVE
WILLIS ST
WILKINS ST
WILLINGTON ST
MARY ST
ALEXANDRA ST
EDWARD ST
BONAR ST
MARTIN AVE
BIDJIGAL RD
GERTRUDE ST
DENISON ST
MAWSON ST
DOWLING ST
HILL ST
REALM ST
PARK ST
FIRST ST
KELSEY ST
INNESDALE RD
ROBERT LANE
ARGYLE ST
ALLEN ST
ARNCLIFFE ST
PRINCES HWY
WENTWORTH ST
DUFF ST
PINDARI PL
GIPPS ST
DONE ST
ANN ST
WEST BOTANY ST
FLORA ST
BROE AVE
MITCHELL ST
DUNCAN ST
VALDA AVE
STATION ST
BELMORE ST
FIRST ST
BURROWS ST
WAZIR ST
WALTERS ST
KEMBLA ST
BUTTERWORTH LANE
EDEN ST
THE ARCADE
QUEEN ST
JOHN ST
HORSELL AVE
WOLLONGONG RD
ATHELSTANE AVE
UNION ST
BARDEN ST
KYLE ST
CHARLES ST
TOWERS PL
TOWERS ST
STANLEY ST
BARDEN LANE
FAIRVIEW ST
FRIPP ST
ESDAILE PL
STANLEY LANE
FARRAR ST
FOREST RD
WICKHAM ST
WARDELL ST
STEWART ST
BELLEVUE ST
MCKEARNS PL
ROACH ST
PITT OWEN AVE
SOMERVILLE ST
VIEW ST
BELLEVUE CT
EARLE ST
MOUNT ST
SEGENHOE ST
GORE ST
BAYVIEW ST
WARATAH ST
MARINEA LANE
AVENAL ST
MARINEA ST
KNIGHT ST
WITHERS ST
HATTERSLEY ST
TANTALLON AVE
AVENAL LANE
SEGENHOE LANE
BELLEVUE L
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 50 100 200 300 400
m
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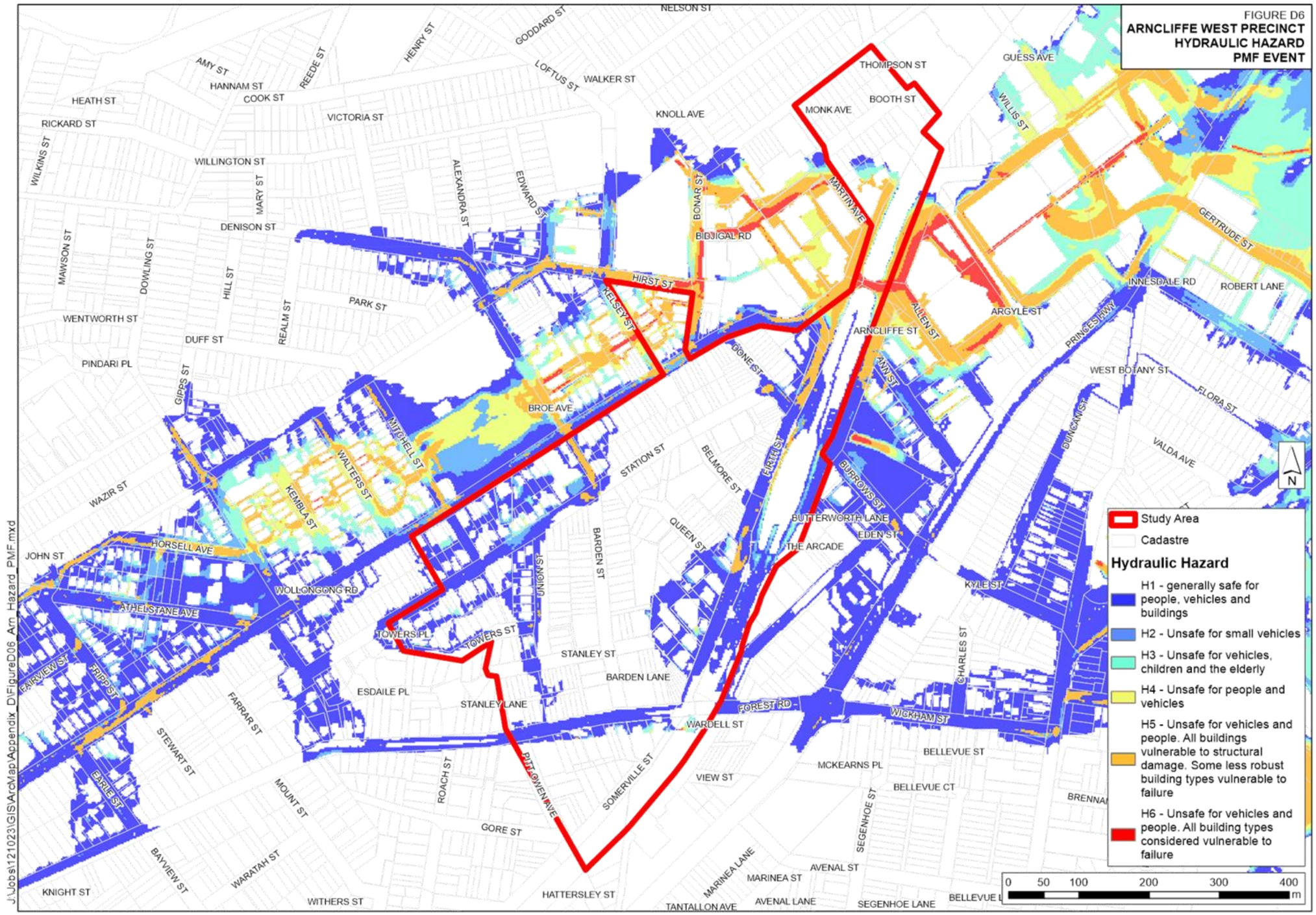
FIGURE D6
ARNCLIFFE WEST PRECINCT
HYDRAULIC HAZARD
PMF EVENT
NELSON ST
GODDARD ST
HENRY ST
REEDE ST
AMY ST
HANNAM ST
COOK ST
LOFTUS ST
WALKER ST
HEATH ST
RICKARD ST
VICTORIA ST
KNOLL AVE
THOMPSON ST
BOOTH ST
MONK AVE
GUESS AVE
WILLIS ST
WILKINS ST
WILLINGTON ST
MARY ST
ALEXANDRA ST
EDWARD ST
BONAR ST
MARTIN AVE
GERTRUDE ST
DENISON ST
BIDJIGAL RD
MAWSON ST
DOWLING ST
HILL ST
HIRST ST
KELSEY ST
INNESDALE RD
ROBERT LANE
PARK ST
REALM ST
WENTWORTH ST
DUFF ST
ARNCLIFFE ST
ALLEN ST
ARGYLE ST
PRINCES HWY
PINDARI PL
GIPPS ST
BOONE ST
ANN ST
WEST BOTANY ST
FLORA ST
BROE AVE
MITCHELL ST
WALTERS ST
STATION ST
BELMORE ST
FIRTH ST
BURROWS ST
DUNCAN ST
VALDA AVE
WAZIR ST
KEMBLA ST
BUTTERWORTH LANE
EDEN ST
THE ARCADE
JOHN ST
HORSELL AVE
WOLLONGONG RD
ATHELSTANE AVE
KYLE ST
QUEEN ST
BARDEN ST
ST SIMON'S UNION
TOWERS PL
TOWERS ST
STANLEY ST
CHARLES ST
FAIRVIEW ST
FRIPP ST
BARDEN LANE
ESDAILE PL
STANLEY LANE
FARRAR ST
FOREST RD
WICKHAM ST
WARDELL ST
STEWART ST
BELLEVUE ST
MCKEARNS PL
ROACH ST
PITT OWEN AVE
SOMERVILLE ST
VIEW ST
BELLEVUE CT
EARLE ST
MOUNT ST
GORE ST
SEGENHOE ST
MARINEA LANE
AVENAL ST
MARINEA ST
BAYVIEW ST
WARATAH ST
KNIGHT ST
WITHERS ST
HATTERSLEY ST
TANTALLON AVE
AVENAL LANE
SEGENHOE LANE
BELLEVUE L
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 50 100 200 300 400
m
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APPENDIX E. Rockdale Town Centre Precinct Flood Mapping

Appendix E

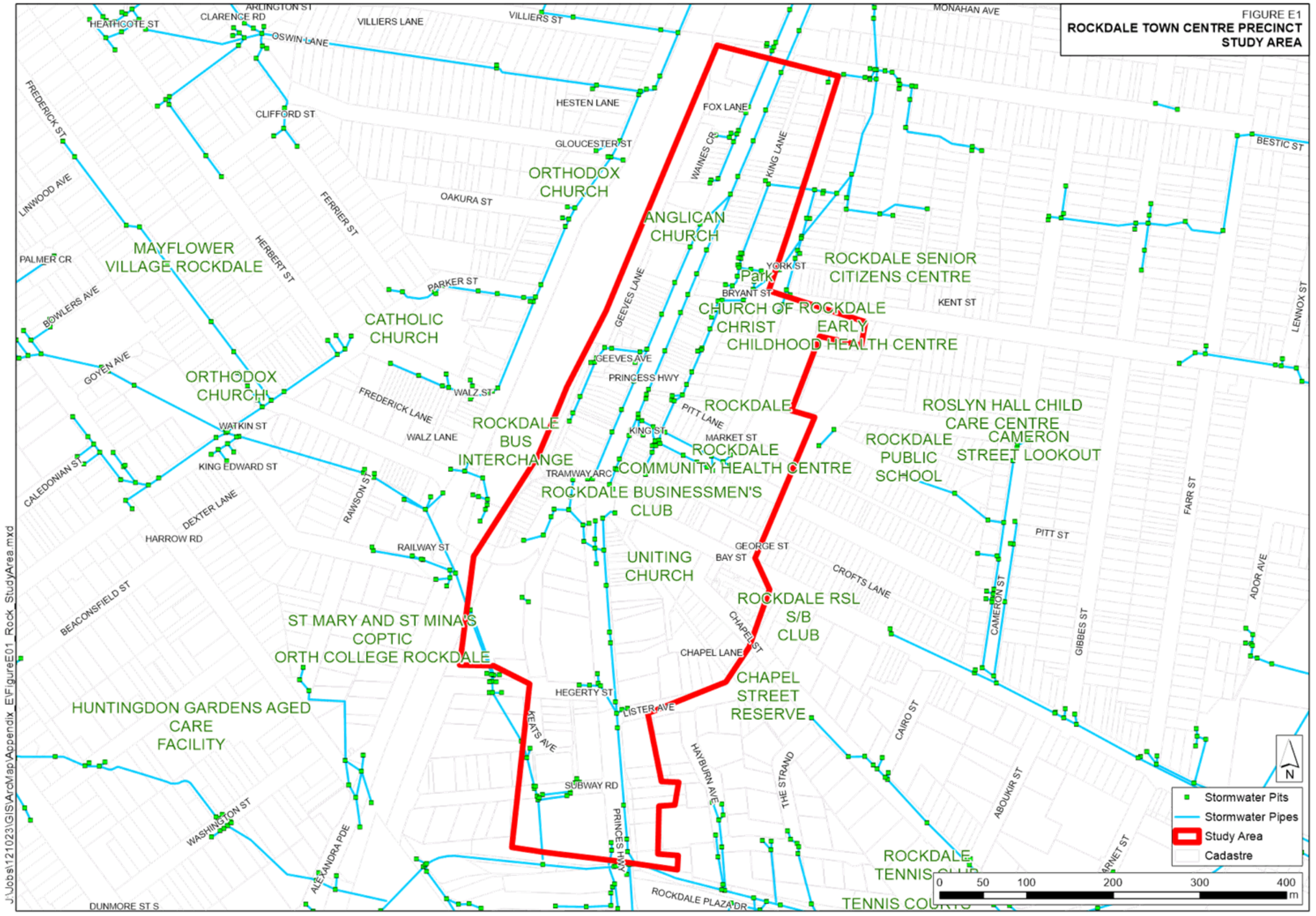
FIGURE E1
ROCKDALE TOWN CENTRE PRECINCT STUDY AREA
ARLINGTON ST
CLARENCE RD
HEATHCOTE ST
OSWIN LANE
VILLIERS LANE
VILLIERS ST
MONAHAN AVE
HESTEN LANE
FOX LANE
CLIFFORD ST
GLOUCESTER ST
FREDERICK ST
LINWOOD AVE
OAKURA ST
FERRIER ST
ORTHODOX CHURCH
WAINES CR
KING LANE
BESTIC ST
ANGLICAN CHURCH
MAYFLOWER VILLAGE ROCKDALE
HERBERT ST
PALMER CR
PARKER ST
YORK ST
ROCKDALE SENIOR CITIZENS CENTRE
Park
BRYANT ST
KENT ST
LENNOX ST
BOWLERS AVE
CATHOLIC CHURCH
GEEVES LANE
CHURCH OF CHRIST
ROCKDALE EARLY CHILDHOOD HEALTH CENTRE
GOYEN AVE
GEEVES AVE
PRINCESS HWY
ORTHODOX CHURCH
WALZ ST
FREDERICK LANE
ROCKDALE BUS INTERCHANGE
PITT LANE
ROCKDALE
ROSLYN HALL CHILD CARE CENTRE
WATKIN ST
WALZ LANE
KING ST
MARKET ST
ROCKDALE PUBLIC SCHOOL
CAMERON STREET LOOKOUT
CALEDONIAN ST
KING EDWARD ST
TRAMWAY ARC
ROCKDALE COMMUNITY HEALTH CENTRE
DEXTER LANE
RAWSON ST
ROCKDALE BUSINESSMEN'S CLUB
FARR ST
HARROW RD
RAILWAY ST
GEORGE ST
BAY ST
PITT ST
UNITING CHURCH
CROFTS LANE
BEACONSFIELD ST
ROCKDALE RSL S/B CLUB
CAMERON ST
GIBBES ST
ADOR AVE
ST MARY AND ST MINAS COPTIC ORTH COLLEGE ROCKDALE
CHAPEL ST
CHAPEL LANE
CHAPEL STREET RESERVE
HEGERTY ST
LISTER AVE
HUNTINGDON GARDENS AGED CARE FACILITY
KEATS AVE
CAIRO ST
HAYBURN AVE
THE STRAND
ABOUKIR ST
SUBWAY RD
WASHINGTON ST
PRINCES HWY
ALEXANDRA PDE
ROCKDALE TENNIS CLUB
ROCKDALE PLAZA DR
TENNIS COURTS
DUNMORE ST S
J:\Jobs\121023\GIS\ArcMap\Appendix E\FigureE01_Rock_StudyArea.mxd
N
Stormwater Pits
Stormwater Pipes
Study Area
Cadastre
0 50 100 200 300 400
m

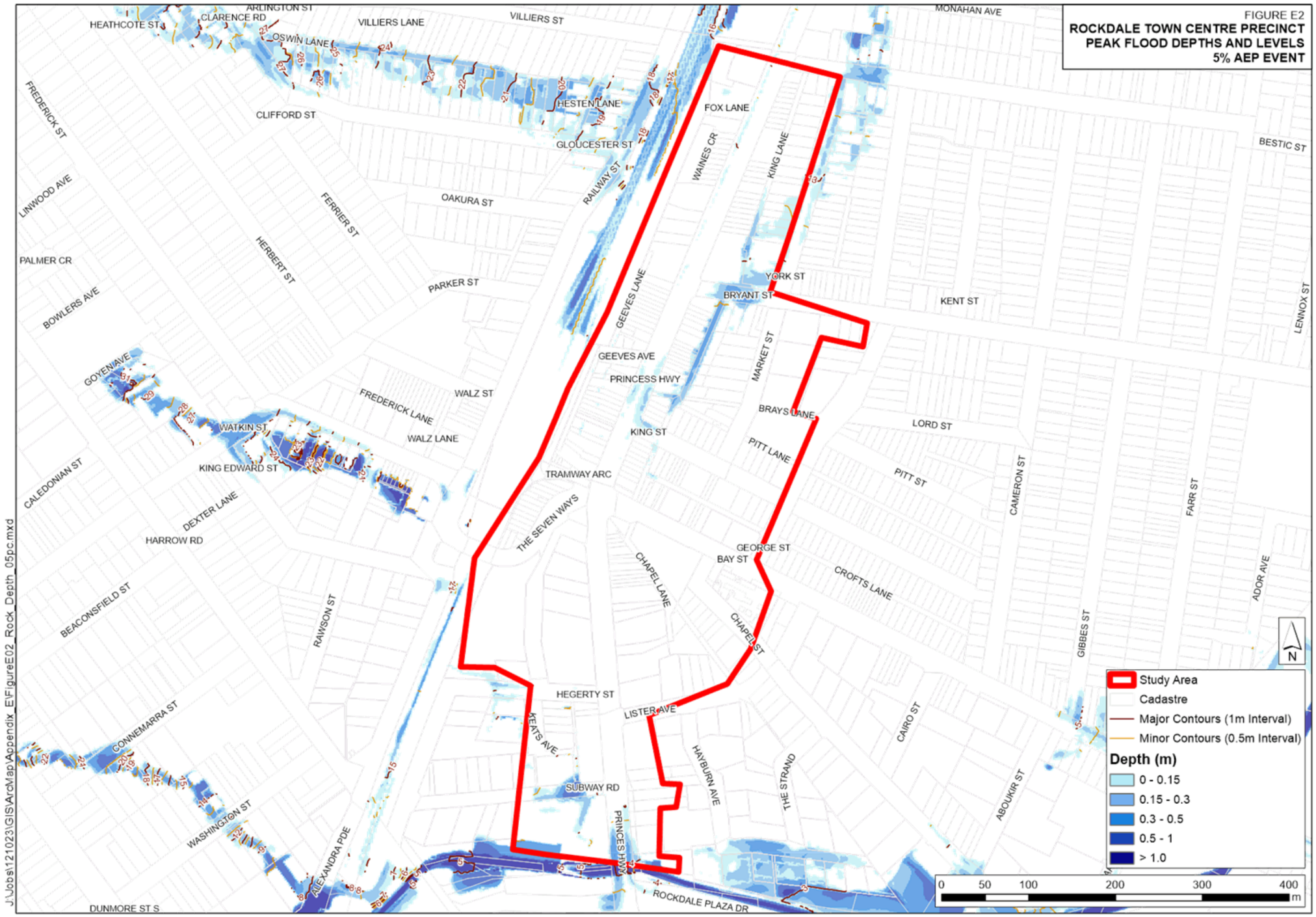
FIGURE E2
ROCKDALE TOWN CENTRE PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
5% AEP EVENT
ARLINGTON ST
CLARENCE RD
HEATHCOTE ST
VILLIERS LANE
VILLIERS ST
MONAHAN AVE
OSWIN LANE
FREDERICK ST
CLIFFORD ST
HESTEN LANE
FOX LANE
GLOUCESTER ST
WAINES CR
KING LANE
BESTIC ST
LINWOOD AVE
OAKURA ST
RAILWAY ST
FERRIER ST
HERBERT ST
PALMER CR
PARKER ST
YORK ST
BRYANT ST
KENT ST
LENNOX ST
BOWLERS AVE
GEEVES LANE
GEEVES AVE
MARKET ST
GOYEN AVE
PRINCESS HWY
FREDERICK LANE
WALZ ST
BRAYS LANE
LORD ST
WATKIN ST
WALZ LANE
KING ST
PITT LANE
CALEDONIAN ST
KING EDWARD ST
TRAMWAY ARC
PITT ST
CAMERON ST
FARR ST
DEXTER LANE
HARROW RD
THE SEVEN WAYS
GEORGE ST
BAY ST
CHAPEL LANE
CROFTS LANE
ADOR AVE
BEACONSFIELD ST
RAWSON ST
CHAPEL ST
GIBBES ST
HEGERTY ST
LISTER AVE
CONNEMARRA ST
KEATS AVE
CAIRO ST
SUBWAY RD
HAYBURN AVE
THE STRAND
ABOUKIR ST
WASHINGTON ST
ALEXANDRA PDE
PRINCES HWY
ROCKDALE PLAZA DR
DUNMORE ST S
J:\Jobs\121023\GIS\ArcMap\Appendix E\FigureE02_Rock_Depth_05pc.mxd
N
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
0 50 100 200 300 400
m

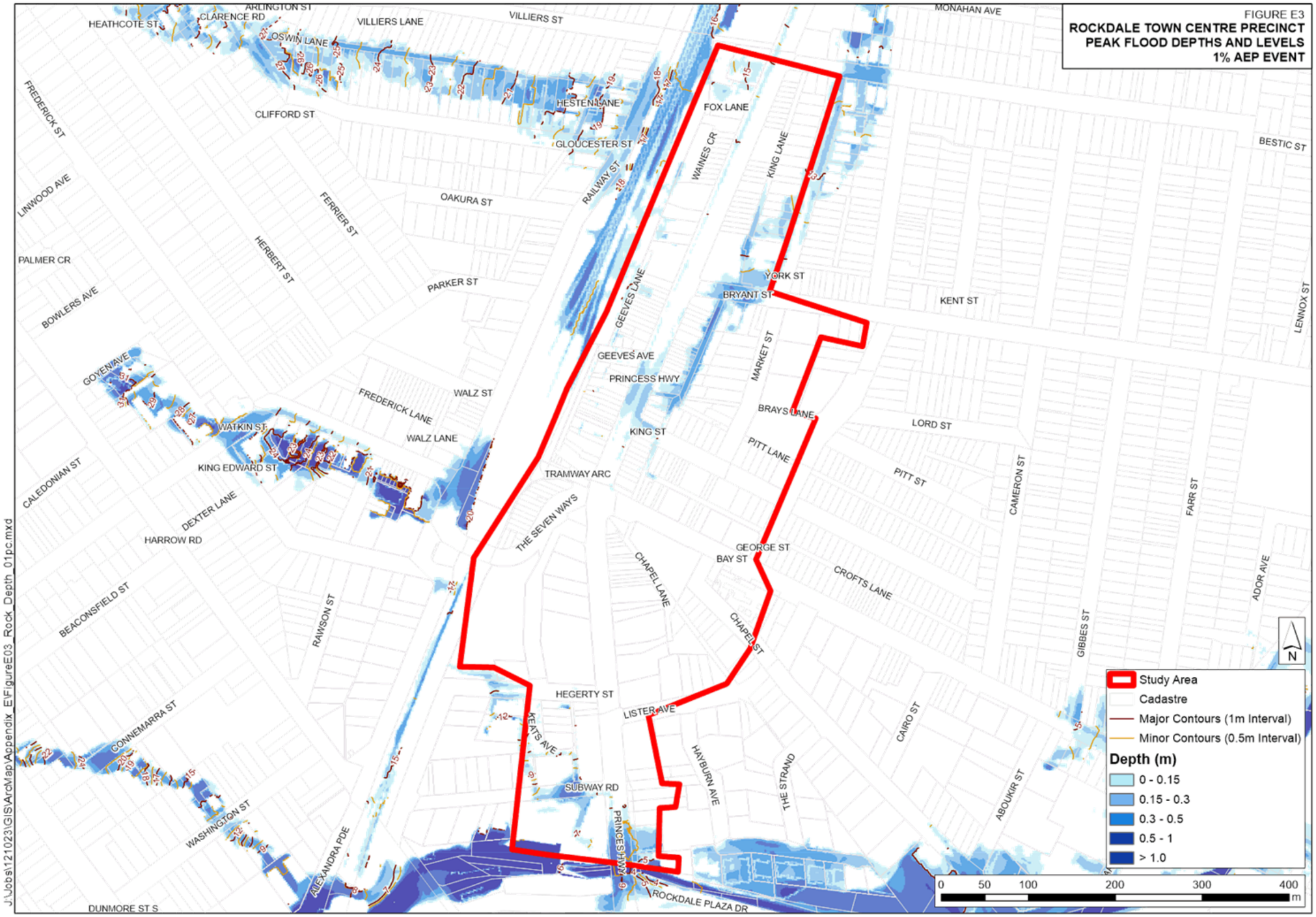
FIGURE E3
ROCKDALE TOWN CENTRE PRECINCT
PEAK FLOOD DEPTHS AND LEVELS
1% AEP EVENT
ARLINGTON ST
HEATHCOTE ST
CLARENCE RD
VILLIERS LANE
VILLIERS ST
MONAHAN AVE
OSWIN LANE
FREDERICK ST
CLIFFORD ST
HESTEN LANE
FOX LANE
GLOUCESTER ST
WAINES CR
KING LANE
BESTIC ST
LINWOOD AVE
RAILWAY ST
OAKURA ST
FERRIER ST
HERBERT ST
PALMER CR
PARKER ST
YORK ST
BRYANT ST
KENT ST
LENNOX ST
BOWLERS AVE
GEEVES LANE
GEEVES AVE
MARKET ST
PRINCESS HWY
GOYEN AVE
WALZ ST
FREDERICK LANE
BRAYS LANE
LORD ST
WATKIN ST
WALZ LANE
KING ST
PITT LANE
PITT ST
CAMERON ST
FARR ST
KING EDWARD ST
CALEDONIAN ST
DEXTER LANE
TRAMWAY ARC
THE SEVEN WAYS
HARROW RD
GEORGE ST
BAY ST
CROFTS LANE
ADOR AVE
BEACONSFIELD ST
RAWSON ST
CHAPEL LANE
CHAPEL ST
GIBBES ST
HEGERTY ST
LISTER AVE
CONNEMARRA ST
KEATS AVE
CAIRO ST
SUBWAY RD
HAYBURN AVE
THE STRAND
ABOUKIR ST
WASHINGTON ST
ALEXANDRA PDE
PRINCESS HWY
ROCKDALE PLAZA DR
DUNMORE ST S
J:\Jobs\121023\GIS\ArcMap\Appendix_E\FigureE03_Rock_Depth_01pc.mxd
N
Study Area
Cadastre
Major Contours (1m Interval)
Minor Contours (0.5m Interval)
Depth (m)
0 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1.0
0 50 100 200 300 400
m


FIGURE E4
ROCKDALE TOWN CENTRE PRECINCT
HYDRAULIC CATEGORISTION
1% AEP EVENT
Bestic Street
Gloucester Street
Clifford Street
Ferrier Street
Herbert Street
Frederick Street
Oakura Street
Parker Street
Princes Highway
George Street
Kent Street
Cameron Street
Gibbes Street
Bryant Street
Waltz Street
Railway Street
Market Street
Lord Street
King Street
Pitt Street
Watkin Street
Rawson Street
King Edward Street
The Seven Ways
Bay Street
Chapel Street
Keats Avenue
Alexandra Street
Harrow Street
Connemarra Street
Cairo Street
Farr Street
N
Study Area
Proposed Building Footprints
Cadastre
Hydraulic Categorisation
Flood Fringe
Flood Storage
Floodway
0 50 100 200 300 400
m
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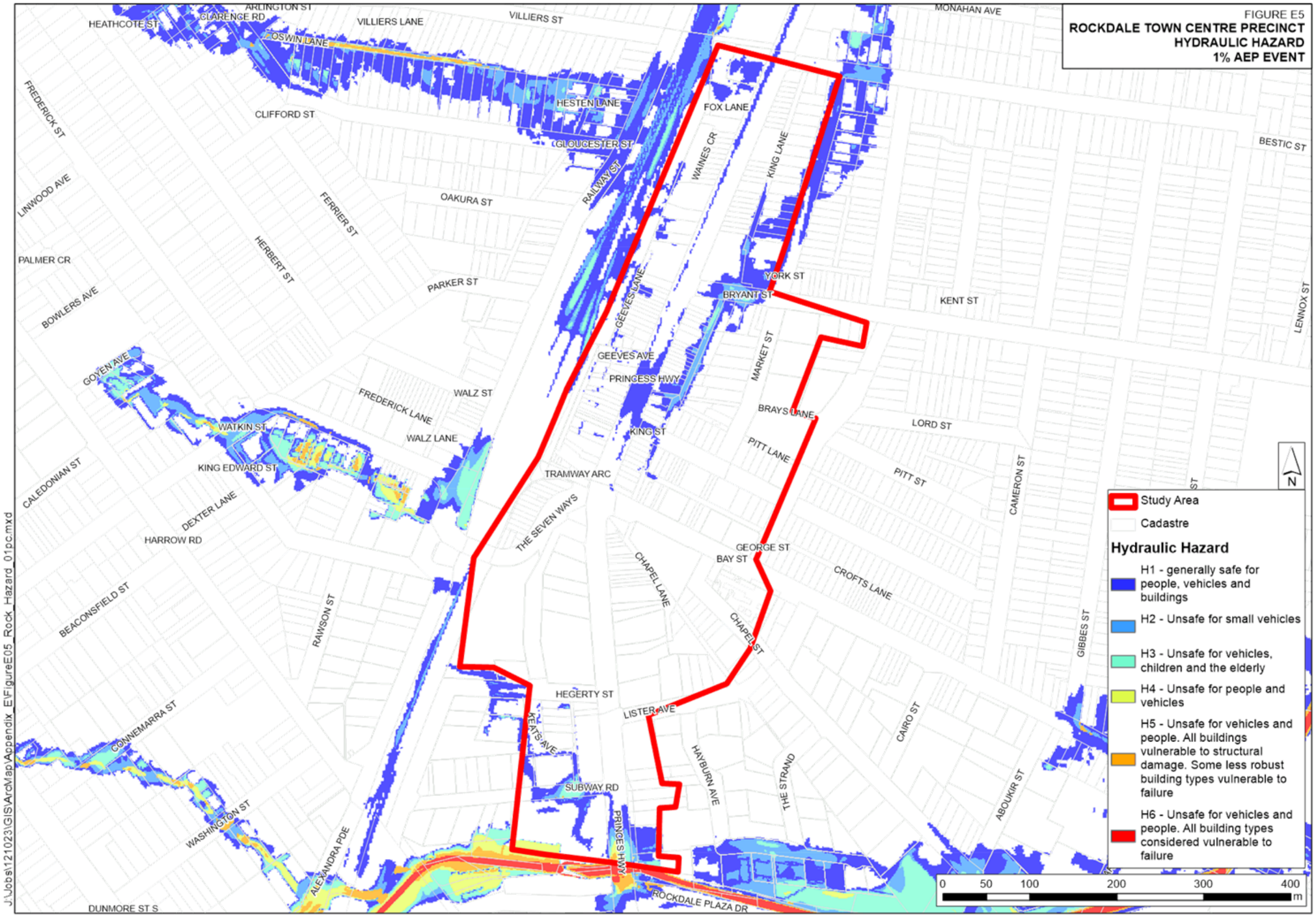
FIGURE E5
ROCKDALE TOWN CENTRE PRECINCT
HYDRAULIC HAZARD
1% AEP EVENT
ARLINGTON ST
CLARENCE RD
HEATHCOTE ST
OSWIN LANE
VILLIERS LANE
VILLIERS ST
MONAHAN AVE
FREDERICK ST
CLIFFORD ST
HESTEN LANE
FOX LANE
GLOUCESTER ST
WAINES CR
KING LANE
BESTIC ST
RAILWAY ST
LINWOOD AVE
OAKURA ST
FERRIER ST
HERBERT ST
PALMER CR
PARKER ST
YORK ST
BRYANT ST
KENT ST
LENNOX ST
BOWLERS AVE
GEEVES LANE
GEEVES AVE
MARKET ST
GOYEN AVE
PRINCESS HWY
WALZ ST
FREDERICK LANE
BRAYS LANE
LORD ST
WATKIN ST
WALZ LANE
KING ST
PITT LANE
CALEDONIAN ST
KING EDWARD ST
TRAMWAY ARC
PITT ST
CAMERON ST
DEXTER LANE
HARROW RD
THE SEVEN WAYS
GEORGE ST
BAY ST
CHAPEL LANE
CROFTS LANE
BEACONSFIELD ST
RAWSON ST
CHAPEL ST
GIBBES ST
HEGERTY ST
LISTER AVE
CONNEMARRA ST
KEATS AVE
CAIRO ST
SUBWAY RD
HAYBURN AVE
THE STRAND
ABOUKIR ST
WASHINGTON ST
ALEXANDRA PDE
PRINCES HWY
ROCKDALE PLAZA DR
DUNMORE ST S
J:\Jobs\121023\GIS\ArcMap\Appendix_E\FigureE05_Rock_Hazard_01pc.mxd
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 50 100 200 300 400
m

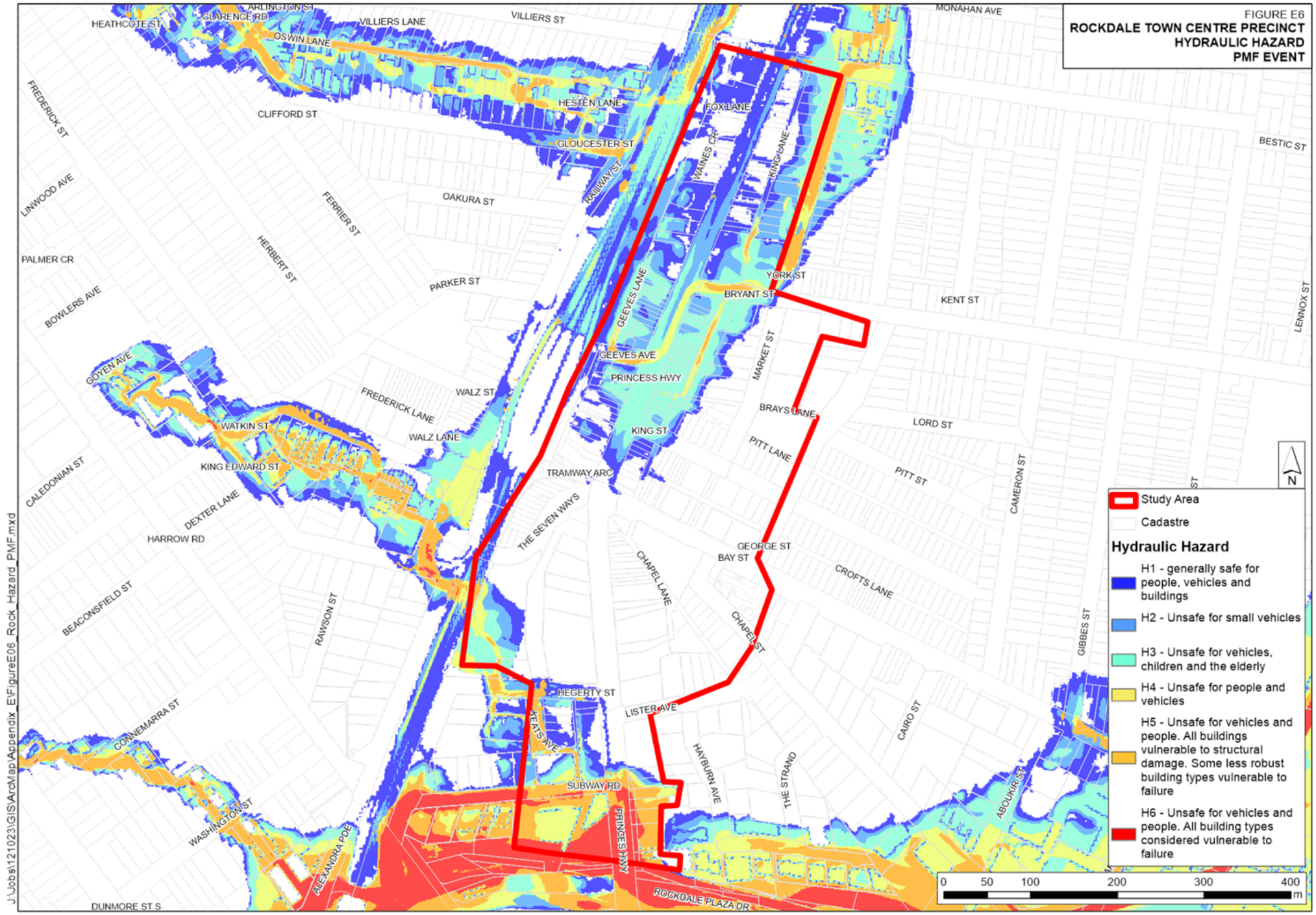
FIGURE E6
ROCKDALE TOWN CENTRE PRECINCT
HYDRAULIC HAZARD
PMF EVENT
ARLINGTON ST
CLARENCE RD
HEATHCOTE ST
VILLIERS LANE
VILLIERS ST
MONAHAN AVE
OSWIN LANE
FREDERICK ST
CLIFFORD ST
HESTEN LANE
FOX LANE
GLOUCESTER ST
WAINES CR
KING LANE
BESTIC ST
RAILWAY ST
LINWOOD AVE
OAKURA ST
FERRIER ST
HERBERT ST
PALMER CR
PARKER ST
YORK ST
BRYANT ST
KENT ST
LENNOX ST
GEEVES LANE
BOWLERS AVE
GEEVES AVE
MARKET ST
GOYEN AVE
PRINCESS HWY
FREDERICK LANE
WALZ ST
BRAYS LANE
LORD ST
WATKIN ST
WALZ LANE
KING ST
PITT LANE
CALEDONIAN ST
KING EDWARD ST
TRAMWAY ARC
PITT ST
CAMERON ST
DEXTER LANE
THE SEVEN WAYS
HARROW RD
GEORGE ST
BAY ST
CHAPEL LANE
CROFTS LANE
BEACONSFIELD ST
RAWSON ST
CHAPEL ST
GIBBES ST
HEGERTY ST
LISTER AVE
KEATS AVE
CONNEMARRA ST
CAIRO ST
SUBWAY RD
HAYBURN AVE
THE STRAND
ABOUKIR ST
WASHINGTON ST
PRINCES HWY
ALEXANDRA PDE
ROCKDALE PLAZA DR
DUNMORE ST S
J:\Jobs\121023\GIS\ArcMap\Appendix E\FigureE06_Rock_Hazard_PMF.mxd
N
Study Area
Cadastre
Hydraulic Hazard
H1 - generally safe for people, vehicles and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles, children and the elderly
H4 - Unsafe for people and vehicles
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure
0 50 100 200 300 400
m