SCT Consulting

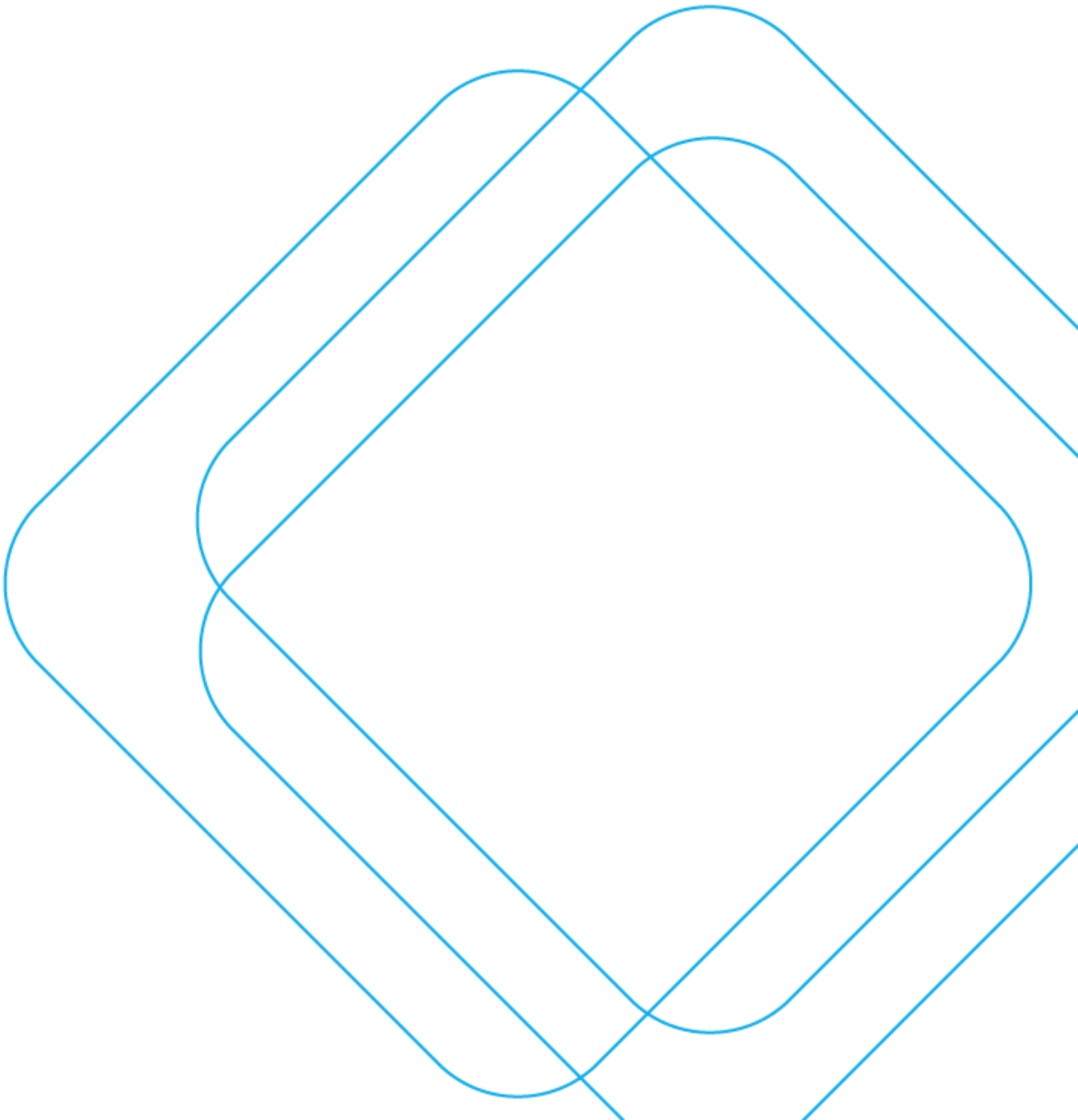
TRANSPORT STRATEGY AND IMPACT ASSESSMENT

Request for Planning Proposal: Kurnell Peninsula 251,260R, 278, and 280-282 Captain Cook Drive, Kurnell

4 DECEMBER 2023

Source: Bate Bay Sydney by Benny Marty

SCT Consulting acknowledges the traditional owners of the lands on which we work.
We pay our respects to Elders past, present and emerging.



Prepared for

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Quality Assurance

Project	Kurnell Peninsula Planning Proposal		
Project Number	SCT_00399		
Prepared by	SCT Consulting Pty Ltd (SCT Consulting)	**ABN**	53 612 624 058

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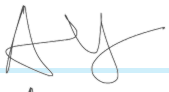
Reviewer:	Andy Yung	Director	
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1.0	21 November 2023	Draft for comment
2.0	1 December 2023	Final draft
3.0	4 December 2023	Final

Contents

Appendices

Appendix A Approved trip generation rates
Appendix B Captain Cook Drive Concept Design
Appendix C Extract of the previously completed modelling

Executive Summary

Purpose

This Transport Strategy and Impact Assessment report has been prepared by SCT Consulting to accompany a proponent-initiated Planning Proposal (Planning Proposal) in support of the proposed amendment to the State Environmental Planning Policy (Precincts—Central River City) 2021 (SEPP Precincts) and the Sutherland Shire Local Environmental Plan 2015 (SSLEP 2015).

The Planning Proposal aims to translate and amend current land use zones under the applicable controls to be consistent with the standard instrument local environmental plan zones and enable additional uses to accommodate a diverse range of land uses at 251, 260R, 278, and 280-282 Captain Cook Drive, Kurnell (the site). The Planning Proposal will establish a new mixed-use community encompassing residential, employment, tourism, education, cultural facilities, ecological regenerative zones and public open space areas.

This report has been prepared to document the proposed transport strategy for improving access to, from and within the site and assess the impacts on the surrounding transport network due to the proposed development. This includes consideration of all transport modes to document how the requirements of the Local Planning Directions Section 5.4 Integrating Land Use and Transport have been considered and met by the proposal from a transport perspective.

Overview

Overall the proposed master plan (supported by the outcomes of this Transport Strategy) addresses the relevant transport requirements of the *Local Planning Directions Section 5.4 as Integrating Land Use and Transport* and additional comments from the Department of Planning and Environment (DPE) on the Scoping Proposal.

The project site is envisaged as a mixed-use community consisting of a range of residential, retail, tourism, and recreational uses as well as a range of open space and community facilities (including a school). The master plan (and associated yield) results in a balance between the development and transport constraints, including:

– A mix of residential housing including townhouses, medium-density and high-density apartments to support the Council's ambition to ensure a reasonable supply of housing in the market.

– Provision of local centre, school, multiple district parks, as well as retail frontages and open space all seamlessly connected by a walking and cycling internal network to minimise the reliance on private vehicles

– An overall development size that can be accommodated by both the road and public transport network of the wider LGA.

The project also improves public access to Bate Bay and Boat Harbour, which includes over 2 kilometres of beach, through improved walking, cycling, public transport and private vehicle provisions.

To support the sustainable operation of the development from a transport perspective, several design considerations have been embedded into the master plan and other initiatives identified for implementation. Key components of the transport response by mode for the project are summarised in the subsequent sections. These design considerations and initiatives culminate to:

– Improve connectivity including equitable and accessible access to, from and within the development via walking, cycling and public transport

– Reduce the overall travel demand and reliance on private vehicles to reduce environmental impacts

– Create places for people and ensure people and goods can move safely through the site (prioritising in order, walking, cycling, public transport, freight and general traffic).

Walking and cycling

The site is designed to be largely self-contained with many key trip attractors within the proposed site. This suggests that many daily trips can be completed within the site, short trips that avoid the need to travel to neighbouring centres. Hence the walking and cycling network needs to provide a permeable, safe and convenient network.

Separated cycleways are proposed along the key north-south and east-west axes of the site, which transition into shared paths or shared zones for the first and last section of their journey.

Figure E-1-1 Proposed walking and cycling network

Source: GroupGSA base map with SCT Consulting annotations

The appropriate walking and cycling infrastructure has been provided based on the function of the link to ensure a high-quality user experience and meet the requirements of Council and Transport for NSW guidelines.

In addition to a connected network, several other infrastructure components have been identified for implementation to increase the attractiveness of walking and cycling and address barriers that may hinder their adoption, including:

– Street and walkway lighting

– Places to stop and rest

– Tree canopy cover

– End-of-trip facilities (including bike parking, lockers, and change rooms/showers)

– Bicycle maintenance stations

– E-bike charging stations.

A Green Travel Plan (GTP) has also been developed to encourage people to travel by public transport, walking, or cycling. This is often known as Travel Demand Management (TDM), where policies, objectives, measures and targets are applied to influence travel behaviour.

Potential initiatives to encourage higher uptake include:

– Shared bike stations/parking hubs

– Promotion of bicycle initiatives – such as cycle-to-work days, free bike check-up events, and bike riding lessons.

– Provision of free e-bike charging facilities at key trip attractors.

– Clear signage, maps, and wayfinding to support riding and walking trips, and increase the visual presence of these modes.

Public transport

The site is not located within the walking (or cycling catchment) of the rail network, and hence public transport accessibility is limited to a single service (Route 987) which operates relatively infrequently.

Consequently, a staged bus strategy has been to support the development, and also improve bus services for the Kurnell Peninsula in the long run.

Interim shuttle bus

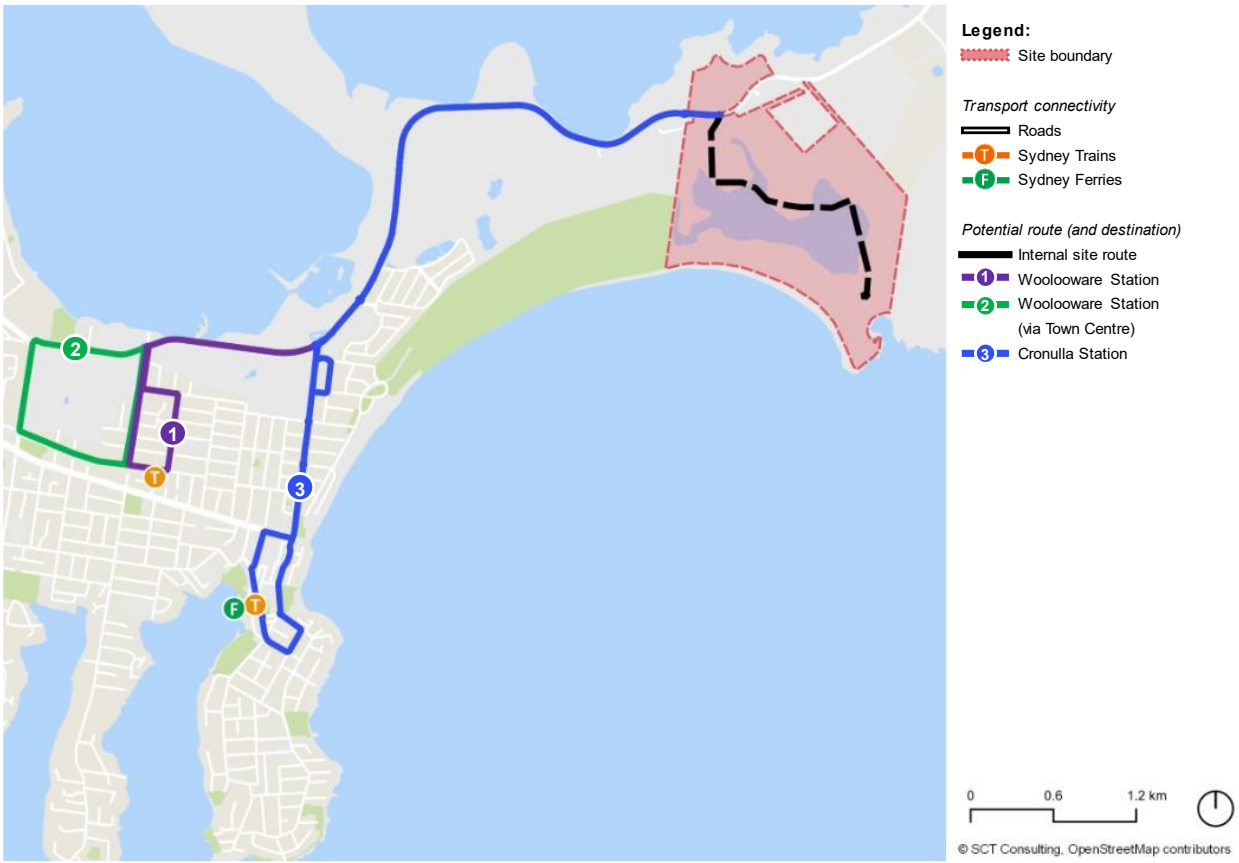
While the site is progressively delivered and occupied, it is proposed a shuttle service operate from the precinct to the train station to provide an accessible and convenient public transport connection. Both Woolooware Station and Cronulla Station were considered for the destination of the shuttle (Figure E-2). This study recommends Woolooware Station based on:

– There is less traffic congestion en route to Woolooware Station, which will improve travel times and the reliability of the service

– Customers interchanging to rail (which represent the majority of users) are connected to the same T4 Eastern Suburbs & Illawarra Line services

– Customers who have a destination in Cronulla Town Centre are still able to access a Route 987 service to Cronulla.

Figure E-1-2 Potential routes and destinations for shuttle service



Using a typical single-deck minibus, with a seated capacity of 22, the service capacity of 20 passengers has been adopted for the shuttle service. Based on the travel time for the direct route to Woolooware Station, the shuttle service could operate with a 32-minute headway (or approximately 2 trips per hour).

Based on the staged delivery of the project, two physical shuttle buses, operating at a 15-minute headway (or a frequency of approximately 4 buses per hour) could accommodate the demand for up to Stage 1B (inclusive), and three shuttle buses for Stage 2.

Beyond the opening of Stages 2 and 3A, the customer demand may exceed 150 trips per hour in the peak direction and equate to 3 full-size bus services per hour (or a service every 20 minutes). Subsequently, in consultation with Transport for NSW, there is an opportunity to transition from a shuttle service to an end-state bus service operated by a full-size bus.

End-state bus service

For the end-state bus service, the study considered two options:

– Option 1: Re-routing an existing route, to combine the existing patronage with those linked to the development. This will increase journey time for the existing service, but also deliver benefits to existing customers as their wait times are significantly reduced as the service frequency is increased to accommodate the increased patronage. This rerouted service would likely have a lower operating cost, compared to a new service.

– Option 2: Introduce a new service, which also serves other locations along the route to increase the potential patronage, and also provides a wider community benefit.

Overall, noting the delivery of (or changes to) a regular route service is subject to alignment with medium-term strategic planning and supporting analysis to be undertaken by Transport for NSW, this study recommends Option 1 (reroute existing bus route 987) as the preferred end-state solution once the proposed development has been realised.

This option balances the bus operational costs with connectivity to the development and benefits the wider community whilst not being contingent on population growth in surrounding town centres.

Bus infrastructure

It is proposed the main road through the precinct is sized to accommodate buses to service the precinct, including shuttle buses (minibuses), regular Sydney buses and coaches. A secondary network is also proposed which serves the beachfront (Town Centre South and Boat Harbour South) as well as the proposed school north of the town centre.

Figure E-1-3 Proposed bus network

Source: GroupGSA base map with SCT Consulting annotations

Along the primary and secondary bus corridors, bus stop pairs have been identified (**Figure E-4**) to serve the interim and end-state bus services.

Due to the staging of the development, not all bus stops are required from the outset of the development. However they will be space-proofed from the outset and infrastructure such as B-pole, seat and shelter (if appropriate)

infrastructure installed when required (**Figure E-5)**. In most locations, the bus stop has been identified within a parking lane and hence can be used as parking until required.

Figure E-1-4 Proposed bus stops within (and adjacent to) the site

Figure E-1-5 Timeline of bus operations and bus stop pair use

Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Precinct completion (expected)				1A					1B				2 3A		3B		4	5A			5B
Bus service strategy (recommended)																					
No shuttle (987 only)				■	■	■	■	▒													
Shuttle (town centre loop)								▒	■	■	■	■	■								
Shuttle (full loop)													■	■	■	▒	▒	▒			
End-state solution													▒	▒	▒	▒	▒	■	■	■	■
Bus stop pairs required																					
1 (Captain Cook Drive)				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2 (Town Centre North)							▒	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3 (Town Centre South)													■	■	■	■	■	■	■	■	■
4 (Bate Bay)																	■	■	■	■	■
5 (Precinct Main Road)														■	■	■	■	■	■	■	■
6 (Boat Harbour South)													■	■	■	▒	▒	▒			

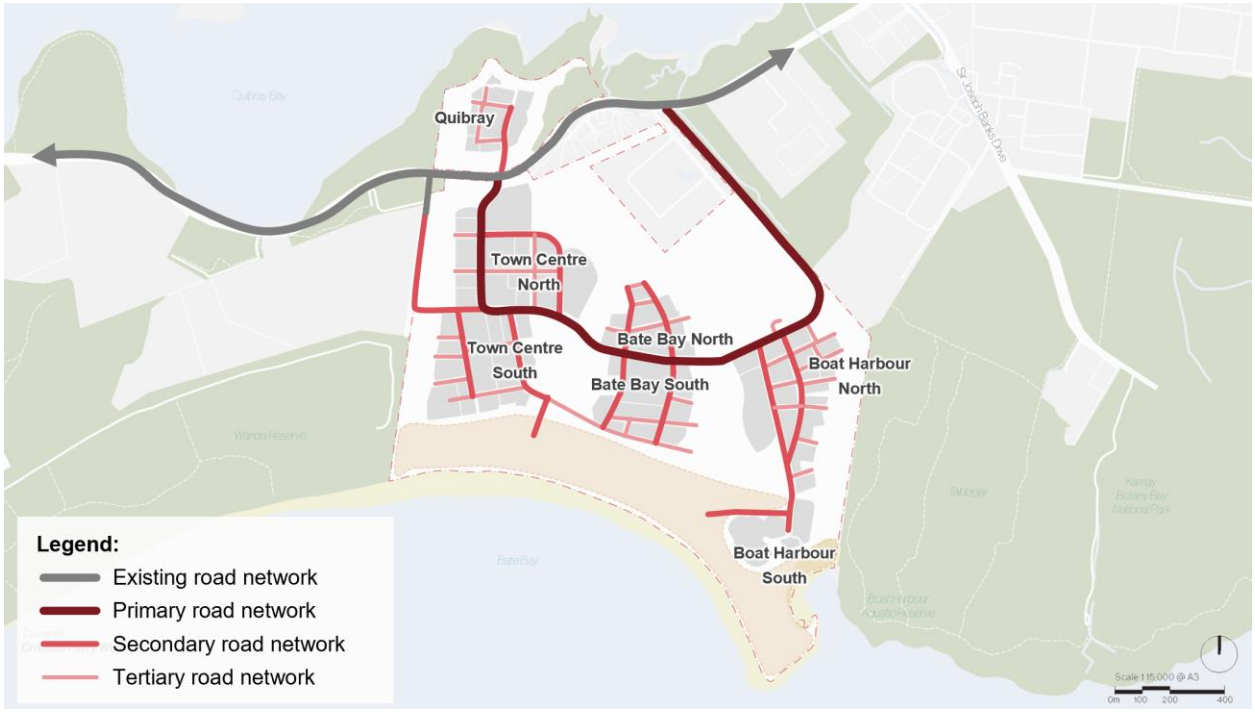
Legend ■ Expected operational period ▒ Potential transition period

Road network

Internal network

Vehicle connectivity for the precinct is provided by 3 tiers of road function as illustrated in **Figure E-6**. Access to the site is via Captain Cook Drive, with the main access via the Primary Road near the Town Centre North. Secondary accesses are provided through Lindum Road (primarily for servicing the town centre) and with the Primary Road at the eastern end of the site (primarily serving the Boat Harbour precinct).

Figure E-1-6 Proposed vehicle network



Source: GroupGSA base map with SCT Consulting annotations

To enable access to Captain Cook Drive, SIDRA intersection modelling was undertaken to develop 3 concept layouts for the intersections immediately adjacent to the project site:

– Captain Cook Drive | Lindum Road: The existing roundabout is to be upgraded to accommodate the 4-lane configuration of Captain Cook Drive. Proposed to be used as a secondary access point to service the town centre.

– Captain Cook Drive | Site Access (west): new signalised intersection serving as the main access to the site (north and south)

– Captain Cook Drive | Site Access (east): new priority intersection serving as the secondary access to the site (predominately serving Boat Harbour including the beach and the ecotourism).

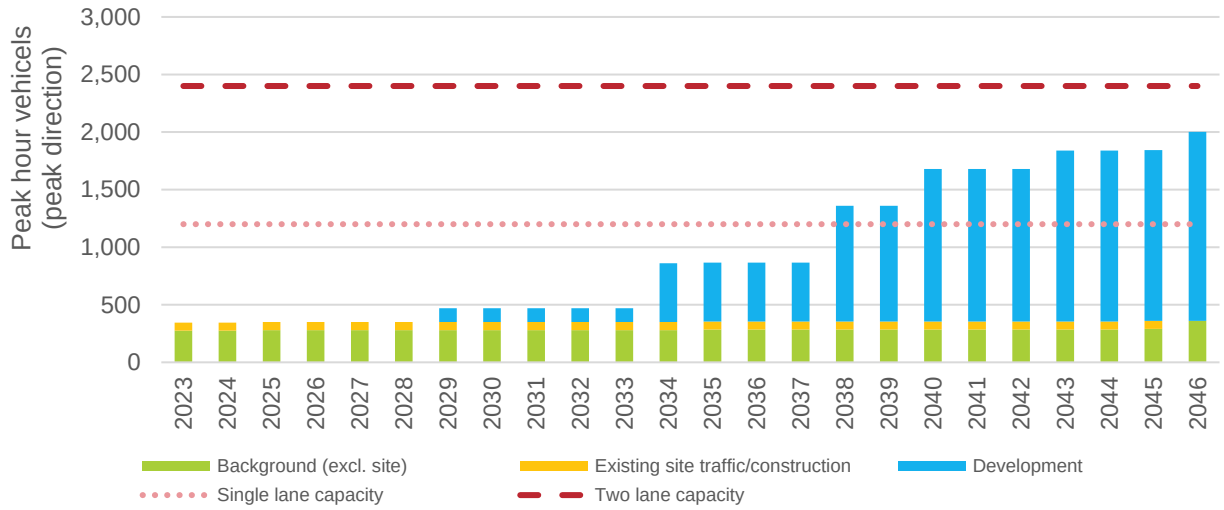
External network

Overall the proposed master plan results in a consistent vehicle generation to the previously modelled scenario, hence would result in a similar impact to the road network. The recommendations from the previous modelling are still relevant and applicable.

As recommended by the previous modelling, Captain Cook Drive needs to be upgraded to 4 lanes (2 in each direction) to accommodate the project. However, this upgrade is not required on the project's day of opening due to the staged delivery of the project.

Based on the proposed staging, the expected traffic volumes on Captain Cook Drive (east of Lindum Road) do not exceed the nominal free-flow lane capacity of 1,200 vehicles per hour until after the opening of Stages 2 and 3A (Town Centre and Boat Harbour South) in 2038 (**Figure E-7**).

Figure E-1-7 Captain Cook Drive midblock traffic volume forecast – PM peak hour



Evacuation considerations

The site is located within Kurnell Peninsula which is subject to both potential bushfire and flooding risks which may require evacuation of the site.

While the site is subject to potential bushfire risk, this risk has been sought to be managed through the urban design and landscape master plans. The design response includes on-site refuges to enable site occupants to safely shelter in place. As a last resort, a full evacuation scenario for the site has also been considered in this report.

Five on-site refuges have been identified within the master plan. These refuges have been positioned such that there is a refuge within a 10-minute walk of all the buildings and other public open spaces (**Figure 7-8**).

Figure 1-8 On-site refuges and walking catchments

Source: On-site refuge locations provided by Ecological Australia (2023)

The population, including residents, visitors and employees will be directed to walk to their nearest refuge, which will be sized appropriately to accommodate the expected population (plus some contingency). It is envisaged that the road network and parking near the refuges be used to transport the vulnerable population such as aged care residents and any mobility-impaired persons. This minimises the build-up of traffic within the internal road network and ensures emergency services have unrestricted access through the precinct.

If evacuation is required, evacuation would be via Captain Cook Drive. For this assessment, it is assumed the population will evacuate via cars with an occupancy rate of 3.5 persons per vehicle for the evacuation.

The worst-case scenario for the evacuation is evacuation towards the west (i.e. towards Cronulla) where the road capacity of Captain Cook Drive is shared with the concurrent evacuation of the existing population of Kurnell Peninsula.

To enable the development, Captain Cook Drive (CCD) is to be upgraded to 2 lanes in each direction towards Cronulla which significantly increases the capacity of the road network for evacuation. However, this upgrade is only required from a day-to-day traffic operation perspective in 2038, coinciding with the opening of Stages 2 and 3A (Town Centre and Boat Harbour South).

Hence, two evacuation scenarios have been considered:

– Existing Captain Cook Drive capacity with partial delivery of the site.

– Upgraded Captain Cook Drive with complete delivery of the site.

For a westbound evacuation, the minimum clearance time is approximately:

– 1.4 hours of equivalent lane capacity is required for the partially delivered (and operational) site if approximately 50% of Captain Cook Drive capacity is available for a westbound evacuation towards Cronulla.

– 2.2 hours of equivalent lane capacity is required for the completely delivered (and operational) site with the upgraded Captain Cook Drive.

The above clearance time is a simplification based on the capacity of Captain Cook Drive and is not reflective of the actual evacuation time which would include notification times and the time required to egress each land use and enter vehicles. It is envisaged that additional detail would be considered in the site-specific evacuation strategies as part of their respective development application process.

1.0 Introduction

1.1 Site overview

This Transport Strategy and Impact Assessment report has been prepared to accompany a proponent-initiated Planning Proposal at 251, 260R, 278, and 280-282 Captain Cook Drive, Kurnell within the Sutherland Shire Local Government Area (LGA).

The project site is envisaged as a mixed-use community consisting of a range of residential, retail, tourism, and recreational uses as well as a range of open space and community facilities (including a school). The key features of the existing site are summarised in **Table 1-1** and **Figure 1-1**.

Table 1-1 Site description

Feature	Lot 2 North	Lot 2 South	Lot 8	Lot 9
Street Address	251 Captain Cook Drive	280-282 Captain Cook Drive	278 Captain Cook Drive	260R Captain Cook Drive Kurnell
Legal Description	Lot 2 in DP1030269	Lot 2 in DP559922	Lot 8 in DP586986	Lot 9 in DP586986
Site Area	16ha	160ha	34.5ha	82m^2
	Total Area: Approximately 210.5 hectares			
Local Government Area	Sutherland Shire			

Figure 1-1 Site aerial and map

Source: GroupGSA

Photographs of the existing site are included in **Figure 1-2**.

Figure 1-2 Site photographs

View: Looking north across Lot 2 South, towards Quibray Bay with Boat Harbour in the foreground

View: Bate Bay looking south west, illustrating the revegetated dune in Lot 2 South

View: Looking towards Bate Bay over Lot 2 South and Lot 8 (left)

View: Looking north to Quibray Bay over Lot 2 North and Captain Cook Drive in the foreground

1.2 Planning Background

The site of the proposed development is governed by the *State Environmental Planning Policy (Precincts—Central River City) 2021* (SEPP Precincts) and the *Sutherland Shire Local Environmental Plan 2015* (SSLEP 2015). The SEPP supersedes the previous site-specific SEPP Kurnell Peninsula 1989.

The proponent is seeking an amendment to the SEPP, to translate and amend current land use zones under the applicable controls to be consistent with the standard instrument local environmental plan zones and enable additional uses to accommodate a diverse range of land uses. The Planning Proposal will establish a new mixed-use community encompassing residential, employment, tourism, education, cultural facilities, ecological regenerative zones and public open space areas on the project site.

A Project Control Group (PCG), which included the Department of Planning and Transport for NSW, was established to inform and evaluate the proponent-led SEPP amendment process. From a transport perspective, a two-stage methodology was recommended by Transport for NSW in 2017, based on which technical studies have been prepared to support Phase 1 and facilitate the SEPP amendment.

Upon review of the Phase 1 transport technical studies, Transport for NSW provided further guidance (December 2020), requesting the Phase 1 technical studies should address in full the requirements of the Ministerial Direction 9.1 - Section 3.4 – Integrating Land Use and Transport (Department of Planning, April 2016).

The Ministerial Direction 9.1 has since been superseded by the Local Planning Directions (Department of Planning, September 2023), with Section 5.4 as Integrating Land Use and Transport. The requirements, as included below, are consistent with the previous directive.

Local Planning Direction 5.1 – Integrating Land Use and Transport

Objectives

The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives:

a. improving access to housing, jobs and services by walking, cycling and public transport, and

b. increasing the choice of available transport and reducing dependence on cars, and

c. reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and

d. supporting the efficient and viable operation of public transport services, and

e. providing for the efficient movement of freight.

Application

This direction applies to all relevant planning authorities when preparing a planning proposal that will create, alter or remove a zone or a provision relating to urban land, including land zoned for residential, employment, village or tourist purposes.

Direction

A planning proposal must locate zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of:

a. Improving Transport Choice – Guidelines for planning and development (DUAP 2001), and

b. The Right Place for Business and Services – Planning Policy (DUAP 2001).

Source: Local Planning Directions (Department of Planning, March 2023) Section 5.1

The Transport Strategy (this document) addresses the requirements of Local Planning Direction and additional comments from the Department of Planning and Environment (DPE) on the Scoping Proposal.

1.3 Purpose of this report

SCT Consulting has been engaged by Besmaw Pty Ltd (the proponent), to develop a transport strategy for improving access to, from and within the site and assess the impacts on the surrounding transport network due to the proposed development. This includes consideration of all transport modes to document how the requirements of the *Local Planning Directions Section 5.4 Integrating Land Use and Transport* and additional comments from the Department of Planning and Environment (DPE) on the Scoping Proposal have been considered and met by the proposal from a transport perspective.

In developing this report SCT Consulting has used the mode-specific outcomes of technical studies previously prepared for the project, and relevant content has been appended to this document.

Table 1-2 Study requirements

Ref.	Requirement	Relevant section(s) of this report
Local Planning Direction		
Obj (a)	improving access to housing, jobs and services by walking, cycling and public transport	**Section 4.4** **Section 4.5**
Obj (b)	increasing the choice of available transport and reducing dependence on cars	**Section 5.1** **Section 5.2**
Obj (c)	reducing travel demand including the number of trips generated by development and the distances travelled, especially by car	**Section 4.6** **Section 4.8** **Section 5.1**
Obj (d)	supporting the efficient and viable operation of public transport services	**Section 5.2**
Obj (e)	providing for the efficient movement of freight.	**Section 4.5.1**
Dir (a)	Consistent with the aims, objectives and principles of Improving Transport Choice – Guidelines for planning and development	**Section 5.1** **Section 5.2** **Section 5.3**
Dir (b)	Consistent with the aims, objectives and principles of The Right Place for Business and Services – Planning Policy	**Section 2.1** **Section 2.2** **Section 4.4** **Section 4.5**
Additional comments from DPE on the Scoping Proposal		
Providing clear guidance for future development applications, including…car parking.		**Section 4.7**
Address whether the duplication of Captain Cook Drive or any future expansion can adequately support a large-scale evacuation		**Section 6.4**

1.4 Report structure

This report has been structured as follows:

– **Section 2** considers the relevant transport planning context.

– **Section 3** describes the existing transport conditions for all modes of transport.

– **Section 4** presents the proposed development and its access strategy, as well as the parking requirements and the likely trip generation as a result of the proposed development.

– **Section 5** discusses initiatives to be implemented to support the transport strategy and mitigate the potential impacts of the proposed development.

– **Section 6** discusses the likely cumulative impacts for all transport modes and parking as a result of the proposed development.

– **Section 7** summarises the report's content and presents the conclusions.

2.0 Strategic context

A review of regional and local strategic documents was undertaken to identify relevant implications for the project, in addition to the requirements set by the Local Planning Directions Section 5.4 as Integrating Land Use and Transport (Department of Planning, September 2023).

This section provides a summary of the key transport policy and planning context relevant to traffic and transport infrastructure and services.

2.1 Regional and district context

The key regional and district policy or strategy documents that influence this Transport Strategy are identified in Table 2-1 with a summary of how this project satisfies or supports the intentions and outcomes of the identified documents. Further information on the respective documents is included in the subsequent sections.

Table 2-1 Regional and district context summary

Policy or strategy document	Project alignment or response
Greater Sydney Region Plan: A Metropolis of three cities (GSC, 2018)	Supports the growth of key strategic centres within the South District of the Harbour CBD, including Miranda and Sutherland as well as key Collaboration Areas including the ANSTO innovation precinct, and health and education precincts by increasing housing supply in proximity to these growth areas and delivering associated social infrastructure to support the residential growth.
South District Plan (GSC, 2018)	
Future Transport Strategy (TfNSW, 2022)	The project's Transport Strategy (this document) identifies initiatives and opportunities to improve public transport and active travel connectivity to the key mass transit hubs to: – Improve connectivity including equitable and accessible transport options – Implement strategies to reduce the reliance on private vehicles to reduce environmental impacts – Enable economic activity including improving connectivity and access for visitors to Boat Harbour and the surrounds.
State Infrastructure Strategy 2022-2042 (INSW, 2022)	
Greater Sydney Services and Infrastructure Plan (TfNSW, 2020)	
M6 Extension Kogarah to Loftus	The project site does not preclude this future project and will benefit from their delivery in future. The project improves road capacity through the upgrade of Captain Cook Drive which connects Kurnell Peninsula to the future M6 Extension via President Avenue or Taren Point Road.
Extension of South East Mass Transit / Train Link to Miranda	The project site does not preclude this future project and will benefit from their delivery in future. The project will implement a bus strategy to improve connectivity to nearby rail stations to create seamless interchange and encourage public transport trips, which may eventually use the South East Mass Transit corridor into Sydney CBD and beyond.
Sutherland to Cronulla Active Transport Link	The project includes the upgrade of facilities on Captain Cook Drive (identified as a future corridor extension of the Strategy Cycleway network) which will tie into the regional cycling network to support SCATL. Internal to the project site, the cycling network will continue from Captain Cook Drive into each of the precincts and also provide connectivity to the public recreational spaces including Boat Harbour.
Strategic Cycleway Corridors (2023)	
NSW Movement and Place Framework	The internal road network has been developed to align with the principles of both documents to create places for people and also ensure people and goods can move safely through the site (prioritising in order, walking, cycling, public transport, freight and general traffic).
TfNSW Road User Space Allocation Policy (TfNSW, 2021)	

Policy or strategy document	Project alignment or response
Walking Space Guidelines (TfNSW, 2020)	The recommendations on infrastructure provisions including type and sizing based on expected function or customer demand have been adopted within the development of the street network.
Cycleway Design Toolbox (TfNSW, 2020)	
Improving Transport Choice (DUAP, 2001)	To support the rezoning, the proposed master plan configuration and yield have been informed by the Transport Strategy to accommodate a mixed-use community safely and sustainably. The supporting internal network prioritises (in order) walking, cycling, public transport and road network to provide a connected network.
The Right Place for Business and Services (DUAP, 2001)	

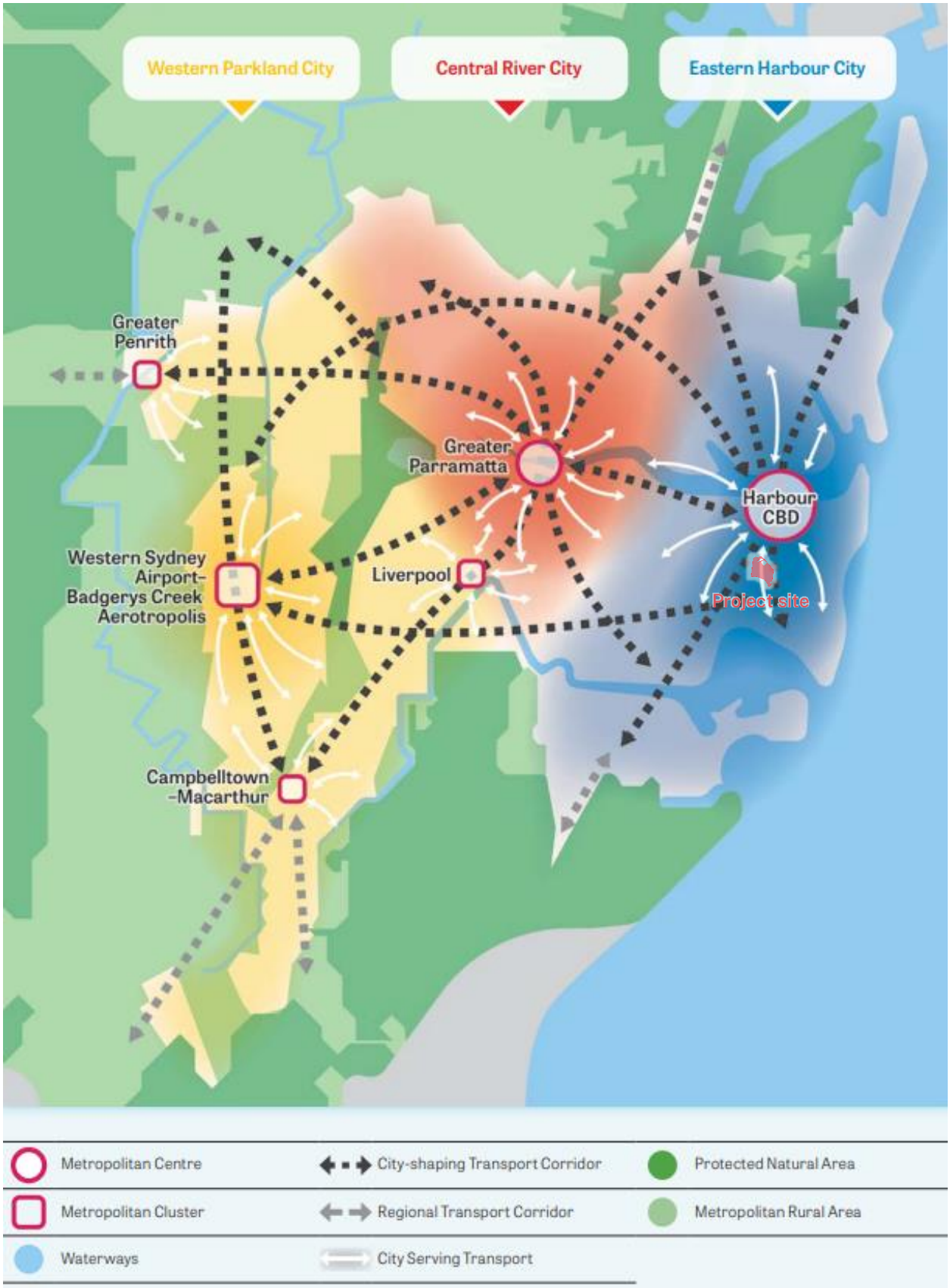
2.1.1 Greater Sydney Region Plan: A Metropolis of Three Cities

This plan has a vision of three cities where most residents live 30 minutes away from jobs, education, and health services. The three cities are Western Parkland City, Central River City, and Eastern Harbour City as shown in **Figure 2-1**.

Working alongside the Future Transport Strategy and State Infrastructure Strategy 2018-2038, the plan intends to co-ordinate an approach across whole-of-government for appropriate infrastructure to support the growth of three cities. This includes a common platform for data sharing across the government and the concept of Collaboration Areas that focus on different government organisations working to create places as centres of economic productivity.

The Kurnell Peninsular is located at the south eastern end of the Eastern Harbour City, within proximity to Strategic Centres at Sutherland and Miranda (within the Sutherland Shire) and with improved transport connections to other Strategic Centres and employment centres at Kogarah and Hurstville.

Figure 2-1 The Three Cities

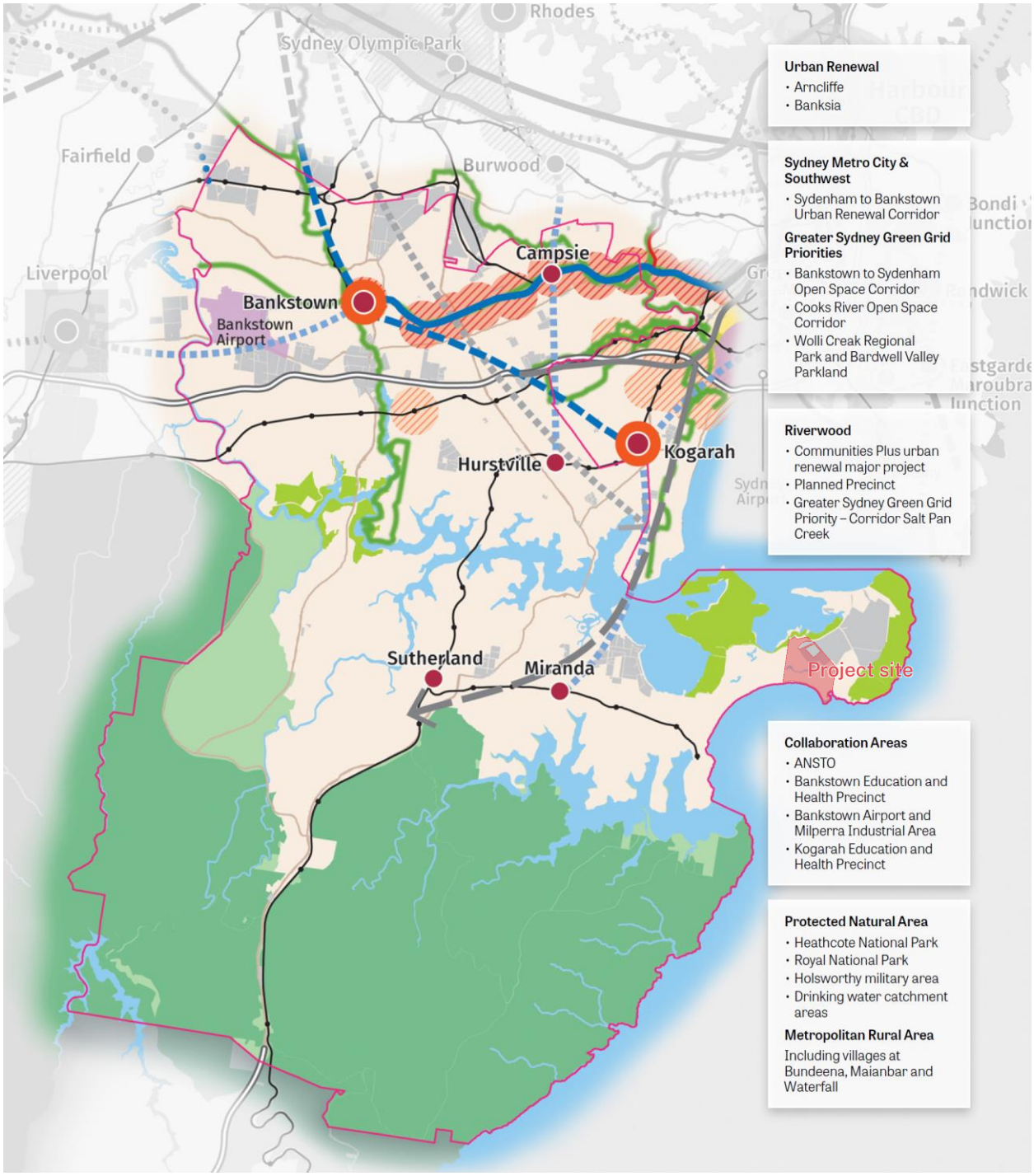


Source: Greater Sydney Commission. A Metropolis of Three Cities, 2018 (with annotation)

2.1.2 South District Plan

The South District Plan as shown in **Figure 2-2** is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney. It is a guide for implementing the Greater Sydney Region Plan, A Metropolis of Three Cities, at a district level and is a bridge between regional and local planning.

Figure 2-2 Future services in the South District



Source: Greater Sydney Commission (2018) South District Plan (with annotation)

The vision for Greater Sydney as a Metropolis of three cities – the Western Parkland City, the Central River City and the Eastern Harbour City – means residents in the South District will have quicker and easier access to a wider range of jobs, housing types and activities. The vision will improve the District's lifestyle and environmental assets.

In the South District, this will be achieved by:

– Supporting the growth of the ANSTO innovation precinct, health and education precincts, Bankstown Airport-Milperra industrial area and the District's strategic centres.

– Retaining industrial and urban services land and freight routes.

– Optimising the District's locational advantage of being close to Sydney Airport, Port Botany, and Port Kembla (in the Illawarra).

– Building on the District's connections to Parramatta, and in the longer term to Liverpool and Western Sydney Airport.

– Sustaining vibrant public places, walking and cycling, and cultural, artistic and tourism assets.

– Matching growth and infrastructure, including social infrastructure.

– Protecting and enhancing natural assets including waterways and beaches, bushland and scenic and cultural landscapes.

– Transitioning to a low-carbon, high-efficiency District through precinct-scale initiatives.

– Providing innovation in providing recreational and open spaces and increased urban tree canopy.

With economic growth, a core goal for centre planning, and job targets, expressed as a range, have been identified for each strategic centre. These targets seek to inform planning authorities and infrastructure agencies of anticipated growth.

2.1.3 Future Transport Strategy

The updated Future Transport Strategy, published in 2022, sets TfNSW's vision for safe, healthy, sustainable, accessible and integrated passenger and freight journeys in NSW. The Future Transport Strategy sets the strategic directions for Transport to achieve world-leading mobility for customers, communities, businesses and our people. It is part of a suite of government strategies, policies and plans that integrate and guide land use and transport planning across NSW.

The development of this Transport Strategy responds to the three outcomes set out in the Future Transport Strategy – connecting our customers' whole lives, successful places for communities and enabling economic activity – and aligns with the strategic directions and responses contained in the strategy.

The three transport outcomes and the leading 14 strategic directions (as shown in **Figure 2-3**) are directly relevant to the development of this Transport Strategy and have been used as guiding principles for the development of a successful, vibrant and thriving community.

The refresh also expands the focus to include using transport to create 15-minute neighbourhoods. Through the combination of improved facilities including wider walking facilities, bicycle lanes, increased permeability of the road space and reallocation of road space to sustainable modes (including public transport), communities can be more connected. This shift to sustainable modes will also improve transport productivity and facilitate future growth.

Figure 2-3 Transport outcomes and strategic directions

Connecting our customers' whole lives

C1 Connectivity is improved across NSW
- C1.1 Enhance 30-minute metropolitan cities
- C1.2 Connect our regional cities, centres, towns and villages
- C1.3 Facilitate digital connectivity and smart city technologies
- C1.4 Improve digital connectivity along our transport corridors

C2 Multimodal mobility supports end-to-end journeys
- C2.1 Support car-free, active, sustainable transport options
- C2.2 Provide customer-centric design for public transport interchanges
- C2.3 Integrate emerging mobility choices
- C2.4 Facilitate efficient freight connectivity and access
- C2.5 Improve our technology-enabled customer services

C3 Equitable, accessible and secure transport for all
- C3.1 Provide transport choices for people no matter where they live
- C3.2 Develop an inclusive transport system enabling access to services and places for all
- C3.3 Make customers feel secure travelling day and night

C4 Our transport networks are safe
- C4.1 Deliver strategies to achieve ambitious safety targets
- C4.2 Promote safe behaviours
- C4.3 Expand technology and innovation to improve safety
- C4.4 Integrate a Safe Systems approach
- C4.5 Improve the safety of people walking and cycling
- C4.6 Deliver safer speed settings and infrastructure safety treatments on regional roads
- C4.7 Improve resilience to human threats and disruption
- C4.8 Create safer waterway access and infrastructure

Successful places for communities

P1 Supporting growth through smarter planning
- P1.1 Transform rail between metropolitan cities
- P1.2 Support growth around public transport
- P1.3 Ensure public transport is available on day one
- P1.4 Improve parking provision and management

P2 Transport infrastructure makes a tangible improvement to places
- P2.1 Support thriving and healthy 15-minute neighbourhoods
- P2.2 Manage street space as public space
- P2.3 Incorporate green, blue and OCHRE infrastructure
- P2.4 Build well-designed transport infrastructure that makes places more liveable and successful
- P2.5 Improve the amenity of places along State Roads

P3 Transition to net zero greenhouse gas emissions
- P3.1 Achieve net zero emissions from our operations and fleet by 2035
- P3.2 Help the transport sector achieve net zero emissions by 2050

P4 Transport minimises environmental impacts
- P4.1 Ensure a net increase in urban trees and no net loss in biodiversity
- P4.2 Improve air quality and reduce noise
- P4.3 Use space and assets more sustainably
- P4.4 Use more sustainable materials
- P4.5 Design out waste and keep materials in use

P5 Transport is resilient and adaptable to shocks and stresses
- P5.1 Provide customer journey resilience
- P5.2 Plan and monitor for shocks and stresses
- P5.3 Build and upgrade for shocks and stresses
- P5.4 Consider climate change impacts in all our decisions

Enabling economic activity

E1 Freight networks and supply chains are efficient and reliable
- E1.1 Improve freight efficiency, access and reliability on roads
- E1.2 Increase rail freight capacity and reliability
- E1.3 Optimise the capacity and performance of ports and airports
- E1.4 Manage and protect employment lands, key freight and logistics lands and corridors
- E1.5 Improve the efficiency of freight in centres and neighbourhoods
- E1.6 Enhance the freight network interoperability and data capabilities

E2 Existing infrastructure is optimised
- E2.1 Promote travel behaviour change to manage networks
- E2.2 Stabilise Greater Sydney's traffic
- E2.3 Improve the use and efficiency of our roads through road space allocation
- E2.4 Optimise the use of our motorways and strategic road network
- E2.5 Continue to develop, invest in, and deploy operational technologies to improve the transport system
- E2.6 Improve network use and efficiency through fairer pricing
- E2.7 Optimise maintenance

E3 Transport supports the visitor economy
- E3.1 Improve access and experiences
- E3.2 Deliver networks, services and technologies that support visitor access across the whole State

E4 The transport system is financially sustainable
- E4.1 Optimise revenue streams for the long-term viability of the transport system
- E4.2 Reduce cost pressures by enhancing spending efficiency

E5 Leverage our procurement power for better outcomes
- E5.1 Promote sustainable and ethical procurement
- E5.2 Make procurement easier and more efficient
- E5.3 Adopt flexible procurement practices to promote innovative services and solutions
- E5.4 Introduce new delivery approaches

Source: Future Transport Strategy, 2022

2.1.4 State Infrastructure Strategy 2022-2042

The State Infrastructure Strategy (SIS) is a 20-year Strategy, which sets out Infrastructure NSW's (INSW) independent advice on the current state of NSW's infrastructure and its future needs and priorities. It looks beyond current projects and identifies policies and strategies needed to provide infrastructure that meets the needs of the growing population and a growing economy.

The recommendations in the SIS for the transport sector are based on the context of the Future Transport Strategy and the Greater Sydney Region Plan. INSW supports the land use directions set out in the Greater Sydney Region Plan and seeks to assess the relative priority of the major investments within the Future Transport Strategy.

The role infrastructure investment will play in the future development of Greater Sydney can be characterised by managing the future growth of the Eastern Harbour City in a way that maintains its global attractiveness and competitiveness and addresses the challenges that affect similarly successful cities. These include traffic congestion, constrained urban freight movements, the freight needs of international gateways, housing affordability, cultural vibrancy and broader liveability concerns.

For the Eastern Harbour City, the SIS aims to improve access to international gateways, mass transit connections to the CBD (especially from the west and southeast), active transport, cultural infrastructure and provide more educational learning spaces.

2.1.5 Greater Sydney Services and Infrastructure Plan

The plan builds on Future Transport Strategy 2056 and identifies initiatives that can service future networks and reach desired transport outcomes. These outcomes are customer-centric with a focus on enhancing walking and cycling, 30-minute access to the nearest centre by public transport, convenient transport interchanges, and legible, safe, accessible and reliable public transport.

The derived initiatives have been grouped into:

– Committed initiatives (10 years or less) – with committed funding or commencing planning, or are part of key projects.

– Initiatives for investigation (20 years or less) – opportunity to understand whether these will be required initiatives in the short to medium term. Short-term strategies within the 10-year horizon will be prioritised for more detailed investigation.

– Visionary initiatives (20+ years) – long-term potential initiatives.

The initiatives that are relevant to the development of this Transport Strategy include:

– F6 Extension – Kogarah to Loftus (Greater Sydney Initiatives for Investigation (0 – 10 years))

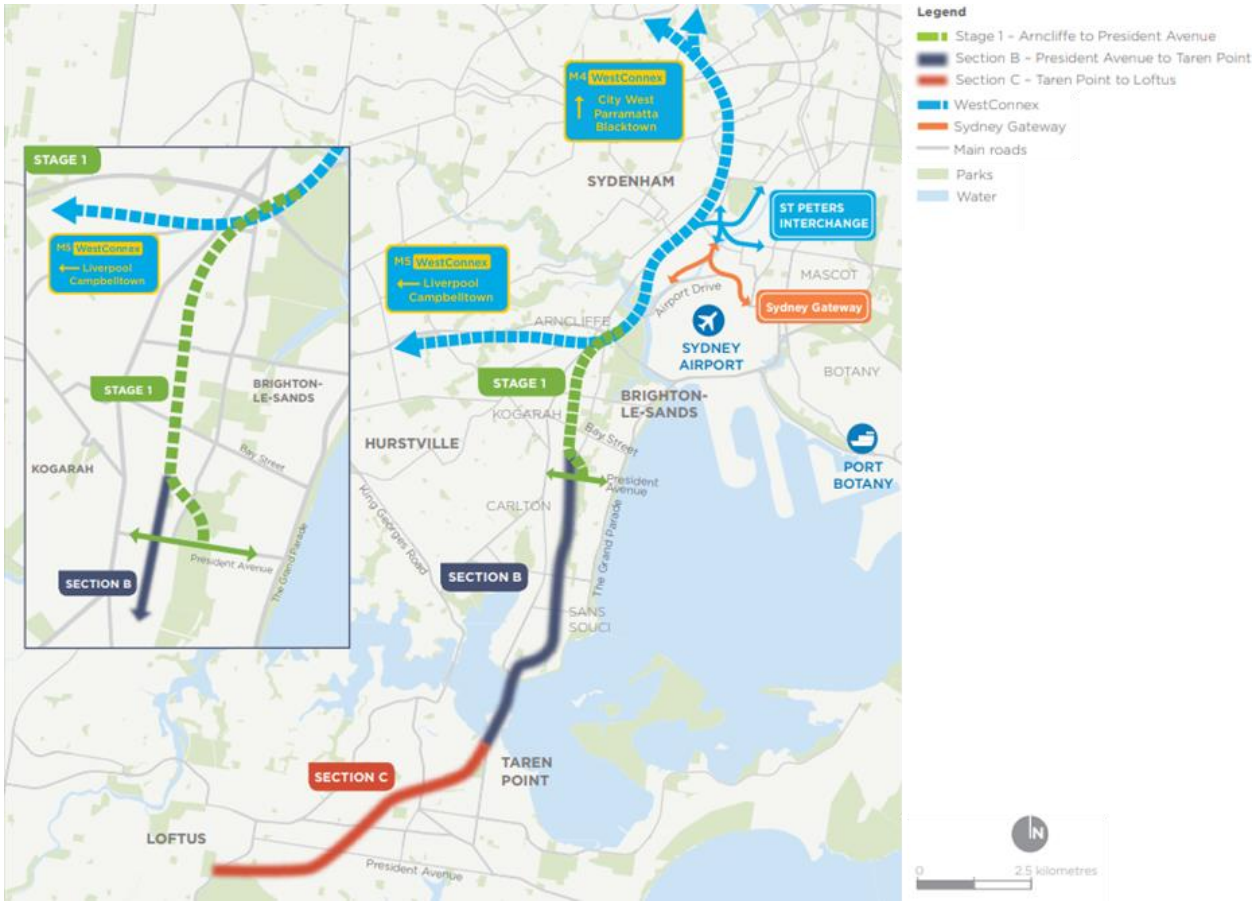
– Sutherland to Cronulla Active Transport Link (Greater Sydney Initiatives for Investigation (0 – 10 years))

– Extension of South East Mass Transit / Train Link to Miranda (Greater Sydney Initiatives for Investigation (20+ years).

2.1.6 M6 Extension Kogarah to Loftus

The M6 Stage 1 (formerly F6 Extension Stage 1), between the M8 Motorway at Arncliffe and President Avenue at Kogarah, is the first section of the proposed M6 project. The Minister for Planning and Public Spaces approved Stage 1 in December 2019. Stage 2 of the M6 would link Kogarah to the south via a motorway connection (as shown in **Figure 2-4**).

Figure 2-4 Proposed M6 extension between Kogarah and Loftus



Source: The M6 Extension Stage 1 New M5 Motorway at Arncliffe to President Avenue at Kogarah project overview (NSW Government, June 2018)

It is anticipated that Section B of the project will potentially run from Kogarah to Taren Point via Carlton and Sans Souci, while Section C will potentially run from Taren Point to the A1 Princes Highway in Loftus.

There is currently no timeline, funding commitment or planning approval for Section B or Section C. However, the road corridor reserved since 1951 for future sections of the M6 will remain in place.

2.1.7 Extension of South East Mass Transit / Train Link to Miranda

Transport for NSW's long-term mass transit network vision provides for a connected network within each of Greater Sydney's three cities.

For the Harbour CBD, the proposed South East Mass Transit Link will connect the Harbour CBD to Malabar via Randwick ending at Eastgardens-Maroubra Junction. An extension of the South East mass transit link would then extend from the Harbour CBD to Sydney Airport, Kogarah and Miranda via the Sandringham Peninsula.

The extension of the South East Mass Transit Link will support reliable 30-minute access by public transport for customers in southern Sydney by addressing capacity constraints on the existing train line and connecting new parts of the area by mass transit/train.

2.1.8 Sutherland to Cronulla Active Transport Link

The Sutherland to Cronulla Active Transport Link (SCATL) is a pedestrian and bicycle path between Sutherland and Cronulla to help make walking and bike riding a more convenient, safer and enjoyable transport option (see **Figure 2-5**).

Figure 2-5 Sutherland to Cronulla Active Transport Link

Source: Transport for NSW

When linked to the existing Alfords Point to Sutherland shared path, it will provide a regional continuous off-road path in excess of 22 kilometres and allow connections to Bankstown and on to Parramatta. The key benefits of the project include:

– Connection to key destinations such as transport interchanges, schools, residential areas and business precincts.

– Significant environmental and health benefits, encouraging people to walk or cycle in the area for fun or exercise.

– Providing a practical alternative to the car for short trips will reduce local traffic congestion.

Due to the complexities of building infrastructure in and around the rail corridor, the SCATL will be delivered in stages. Stage 1: Sutherland to Kirrawee is opened in April 2020 and is connecting key destinations such as transport interchanges, schools, residential areas and business precincts outside the rail corridor.

Stages 2 and 3 between Kirrawee to Cronulla will make greater use of the rail corridor while connecting key destinations like transport interchanges, Sutherland Hospital, beaches, parks and recreation areas, and shopping precincts.

2.1.9 Strategic Cycleway Corridors - Greater Sydney and Western Parkland City Overview

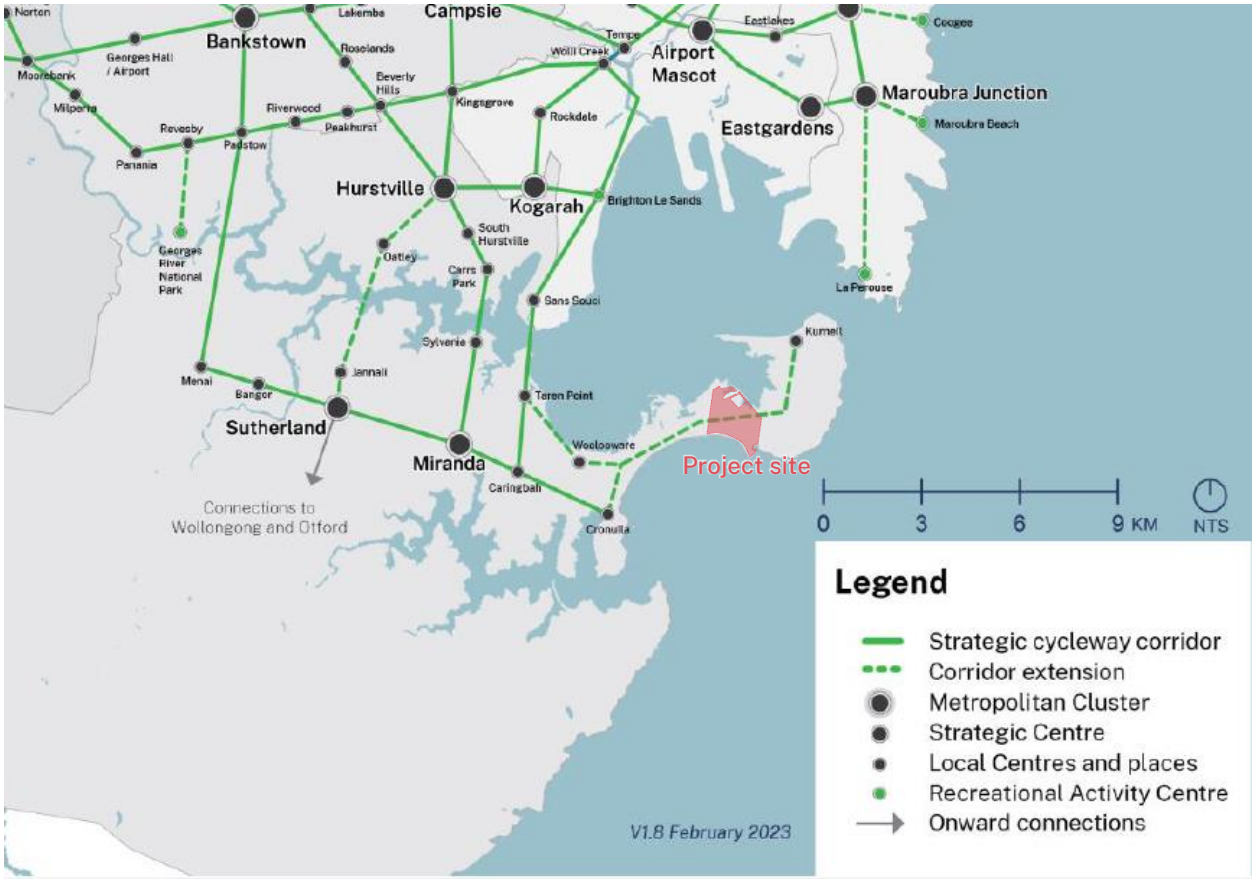
Cascading through Transport for NSW's strategies, it is evident walking and cycling is a key focus for planning and implementation within Greater Sydney. From a cycling perspective, research undertaken by Transport showed "*that appropriate [cycling] infrastructure has the potential to attract 70 per cent of the community*".

The Strategic Cycleway Corridors has identified a strategic network throughout Greater Sydney connecting centres and precincts. The identified corridors consist of existing established connections as well as connections which should be prioritised to fill in the gaps.

Within the Eastern Harbour City, 30 strategic cycleway corridors (or approximately 250 kilometres of cycleways) have been identified. The corridors will connect key centres and major points of interest. Exact routes will be subject to detailed design and collaboration with councils and the community. Extensions to corridors will also be considered to connect riders to recreational activity hubs including major parklands and beaches. This excludes local cycleways which connect local centres and places, typically delivered by the respective Council.

An extract of the Greater Sydney Strategic Cycleway Corridor Map is shown in **Figure 2-6**. It shows a corridor extension from Woolooware and Cronulla to Kurnell is being considered.

Figure 2-6 Extract of Greater Sydney Strategic Cycleway Map



Source: Transport for NSW, March 2023 (with annotation)

2.1.10 NSW Movement and Place Framework

TfNSW has adopted the Movement and Place Framework for planning and managing its road network. The Place-based planning approach embedded in the Movement and Place Framework involves taking a collaborative, spatial, long-term approach to develop contextual responses that better meet the needs of local people and their environment in a defined geographic location.

The Framework aims to support and build thriving communities and is ideally characterised by partnering and shared design, shared stewardship, and shared accountability for outcomes and impacts. This Plan has used a Place-based approach with land use, urban form and population demographics playing a key role.

The Movement and Place Framework provides a common structure for place-based transport and urban planning across NSW. The objectives of the Framework are to achieve roads and streets that:

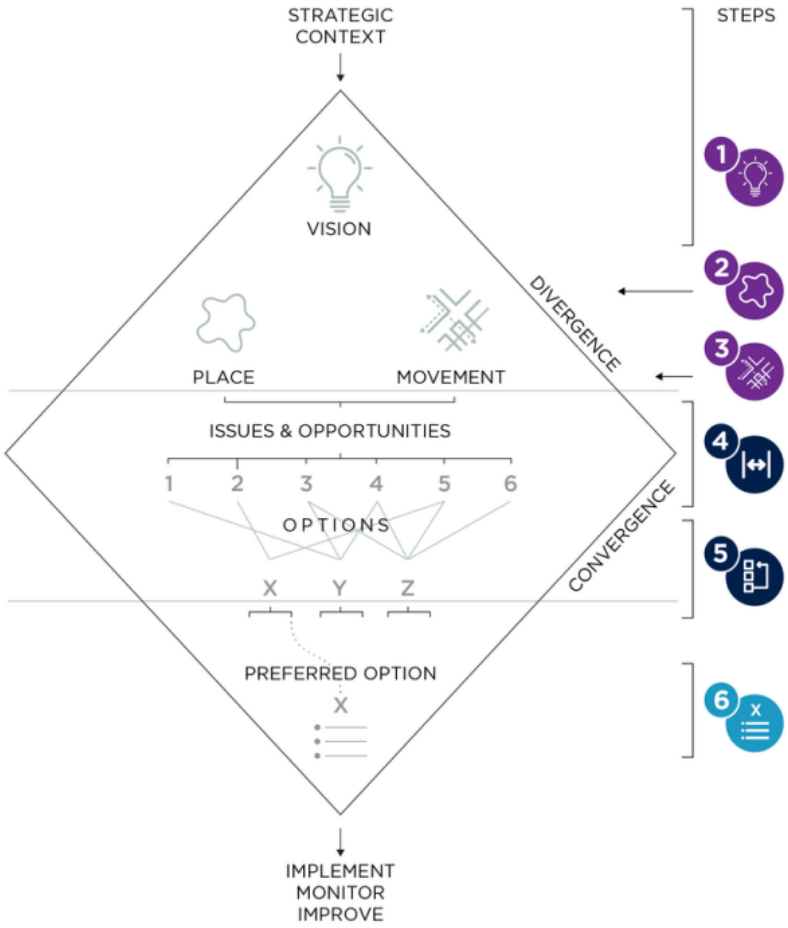
– Contribute to the network of public space within a location, where people can live healthy, productive lives, meet each other, interact, and go about their daily activities.

– Are enhanced by transport and have the appropriate space allocation to move people and goods safely and efficiently and connect places. Supporting the Place recognises that trade-offs may be required to achieve the best fit for the objectives.

The Movement and Place Framework sets out a collaborative approach for practitioners, stakeholders, and the community to work together, shown in **Figure 2-7**, as well as criteria for measuring and evaluating the alignment of movement and place.

At each of the steps of the process, a workshop was held to enable stakeholder input and discussion and to seek consensus.

Figure 2-7: Movement and Place process



Source: Evaluator's Guide to Movement and Place, 2021

This Practitioner's Guide to Movement and Place provides practitioners with a collaborative, iterative process that can guide consultation, analysis, decision-making, and evaluation throughout the life cycle of a plan or project. It details the importance of considering the whole street, which includes people walking and cycling, as well as people spending time in places.

2.1.11 Road User Space Allocation Policy

The Road User Space Allocation Policy applies to the entirety of the public road reserve from boundary to boundary on proposed and existing classified roads in built-up areas in regional and metropolitan NSW except for motorways.

By implementing this Policy, Transport ensures that the allocation of road user space is a deliberate exercise that considers the place, function and movement requirements of roads to achieve the strategic intent and outcomes as set out in state-wide, metropolitan and regional strategies and plans.

An action that assists in achieving these objectives is to optimise how space is allocated throughout the day, week or year, including the dynamic control of space, access, level of priority, speed and kerbside use through signage, signals, and other technology.

It also notes that when allocating road user space based on the network vision and road functions, we should consider all road users in order of:

1. walking (including equitable access for people of all abilities)
2. cycling (including larger legal micromobility devices)
3. public transport; freight and deliveries
4. point to point transport
5. general traffic and on-street parking for private motorised vehicles.

2.1.12 Walking Space Guidelines

This guide provides a set of standards to be applied to walking spaces on streets that vary depending on the intensity of use. The guide can be used to design walking spaces or to assess existing footpaths.

2.1.13 Cycleway Design Toolbox

The toolbox provides design guidelines on how to design for cycling and micro-mobility in New South Wales. The design guidelines are based on six principles: safe, connected, direct, attractive, comfortable and adaptable.

2.1.14 Improving Transport Choice - Guidelines for planning and development

Developed by the NSW Department of Urban Affairs and Planning (DUAP, now the Department of Planning) in conjunction with the NSW road and transport agencies, the guideline aims to help improve the location and planning of development to reduce car use and manage travel demand.

The guideline sets 10 principles to encourage highly accessible development through walking, cycling and public transport and demonstrates how they can be applied to different locations.

The principles recommend to:

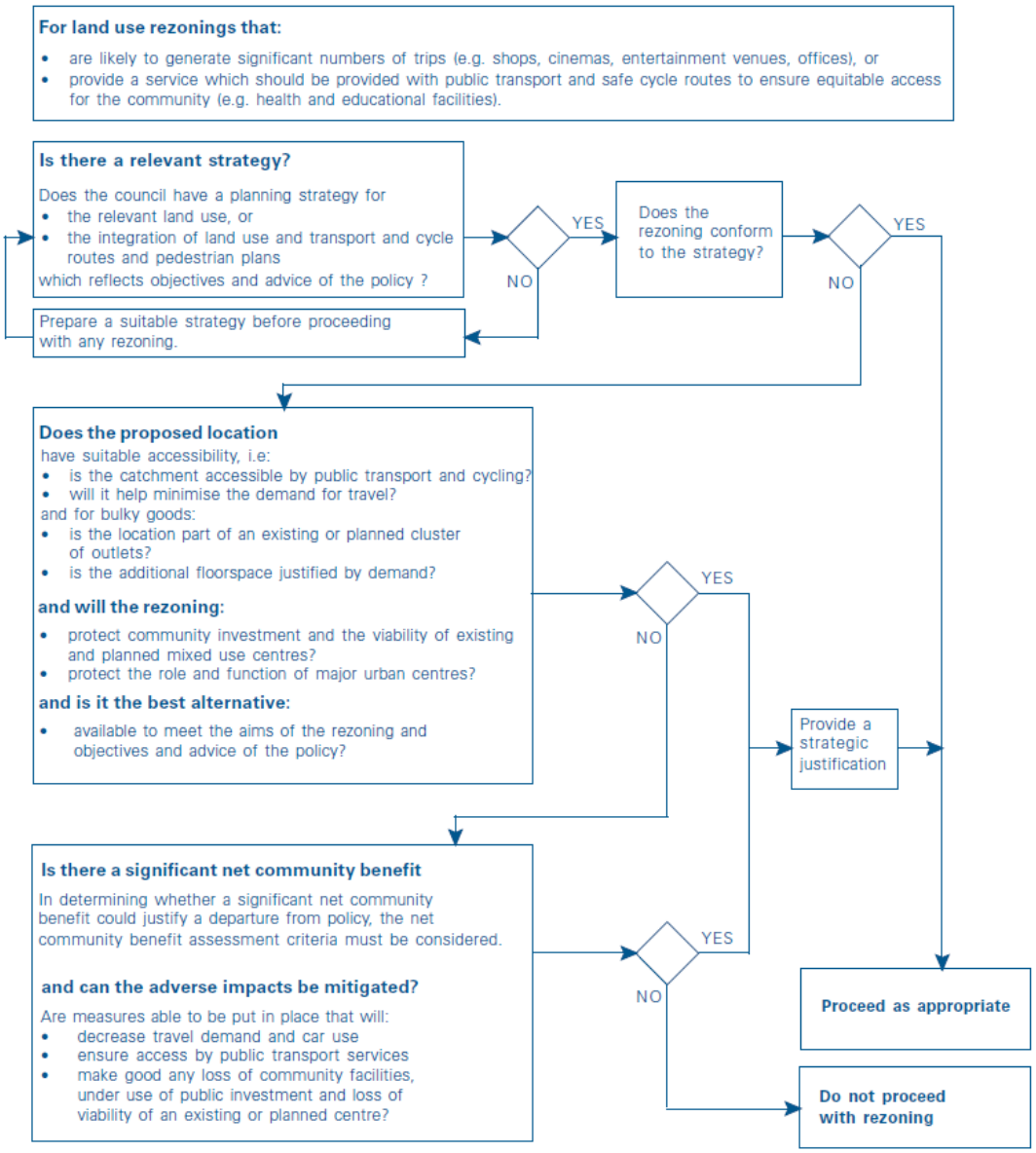
6. Concentrate development in centres within walking distance of major public transport nodes
7. Encourage a mix of housing, employment, services, public facilities and other compatible land uses, in accessible centres.
8. Concentrate development along major public transport corridors within urban areas.
9. Plan and implement public transport infrastructure and services in conjunction with land use
10. Provide a connected street network with direct and multiple access to (and for) public transport
11. Give priority access for pedestrians, including people with disabilities
12. Maximise cyclist accessibility to centres and employment
13. Manage parking supply to discourage use
14. Improve road management through prioritising transport modes and managing traffic flow
15. Implement good urban design.

2.1.15 The Right Place for Business and Services – Planning Policy

Developed by the NSW Department of Urban Affairs and Planning (DUAP, now the Department of Planning) in conjunction with the NSW Transport (now Transport for NSW), aims to help the decision-making process for the appropriate locations for developments to maximise transport choice and manage travel demand.

From a rezoning perspective, the guideline includes a decision tree to assess the appropriateness of rezoning, as shown in **Figure 2-8**.

Figure 2-8 Decision tree - proposals to rezone land



Source: The Right Place for Business and Services – Planning Policy (NSW Department of Urban Affairs and Planning, 2001)

2.2 Local context

The key local policy or strategic documents that influence this Transport Strategy are identified in Table 2-2 with a summary of how this project satisfies or supports the intentions and outcomes of the identified documents. Further information on the respective documents is included in the subsequent sections.

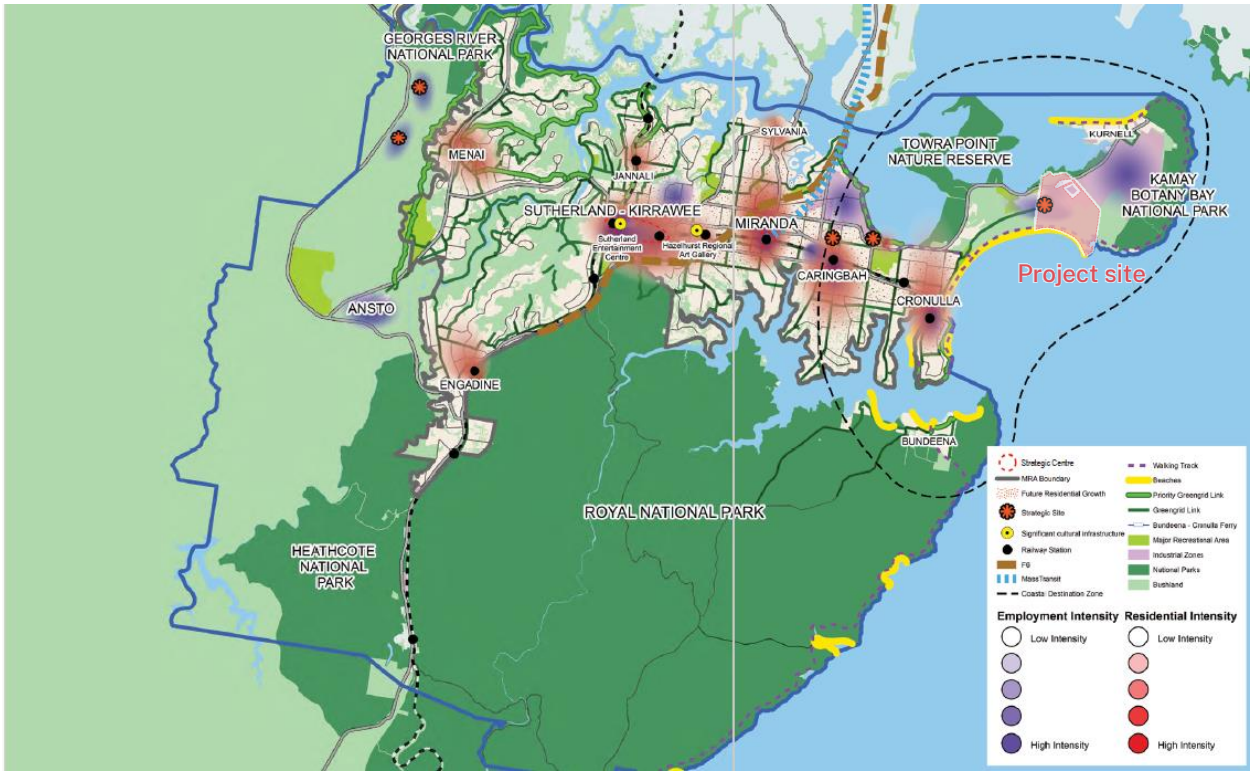
Table 2-2 Local context summary

Policy or strategy document	Project alignment or response
Sutherland Shire Council Local Strategic Planning Statement (LSPS)	The site has been identified as a strategic site by the LSPS, and the proposed master plan delivers on the key priority of increasing the provision of housing, employment, a town centre and recreational facilities within the LGA. The project also aligns with the other objectives of the LSPS, including: – Improves public access to Bate Bay and Boat Harbour, which includes over 2 kilometres of beach, which have been identified as Coastal Destinations. – Improves the visitor experience through the delivery of short-stay visitor accommodation near the desirable coastal destinations of Bate Bay and Boat Harbour – Improved public transport and active transport (including a bicycle network) to encourage behaviour change to limit the increase in traffic congestion and take pressure off parking demand in the region.
Sutherland Shire Council Housing Strategy 2031	The site is proposed to be developed with a mix of residential housing including townhouses, medium-density and high-density apartments to support the Council's ambition to ensure a reasonable supply of housing in the market. The mixture of housing helps ensure the supply can be accessed by younger new homeowners and older people looking to downsize. The housing is supported by a local town centre which is connected by an active transport network as well as improved public transport connectivity to key strategic centres and transport nodes nearby.
Sutherland Shire Council Integrated Transport Strategy **Sutherland Shire Council Public Transport Strategy** **Sutherland Shire Council Active Transport Strategy – 2022 update**	The proposed development is supported by: – An internal network that prioritises (in order) walking, cycling, public transport and road network to provide an equitable and accessible network. – The upgrade of cycling facilities on Captain Cook Drive will tie into the regional cycling network and support the Sutherland to Cronulla Active Transport Link. – Improved public transport connectivity through an interim shuttle bus strategy and recommendations for an end-state bus strategy.
Sutherland Shire Council Parking Strategy **Sutherland Shire Council Development Control Plan (DCP) 2015**	The proposed master plan includes parking provisions and road provisions which align with the DCP, whilst balancing the provisions with the intent of the above Council strategies to reduce the reliance on private vehicles through improvements to active and public transport.

2.2.1 Sutherland Shire Council Local Strategic Planning Statement (LSPS)

The Sutherland Local Strategic Planning Statement has been created to set Sutherland Shire Council's strategic planning vision for the next 20 years. A summary of the Sutherland Shire Structure Plan is shown in **Figure 2-9**.

Figure 2-9 Sutherland Shire Plan Structure Plan

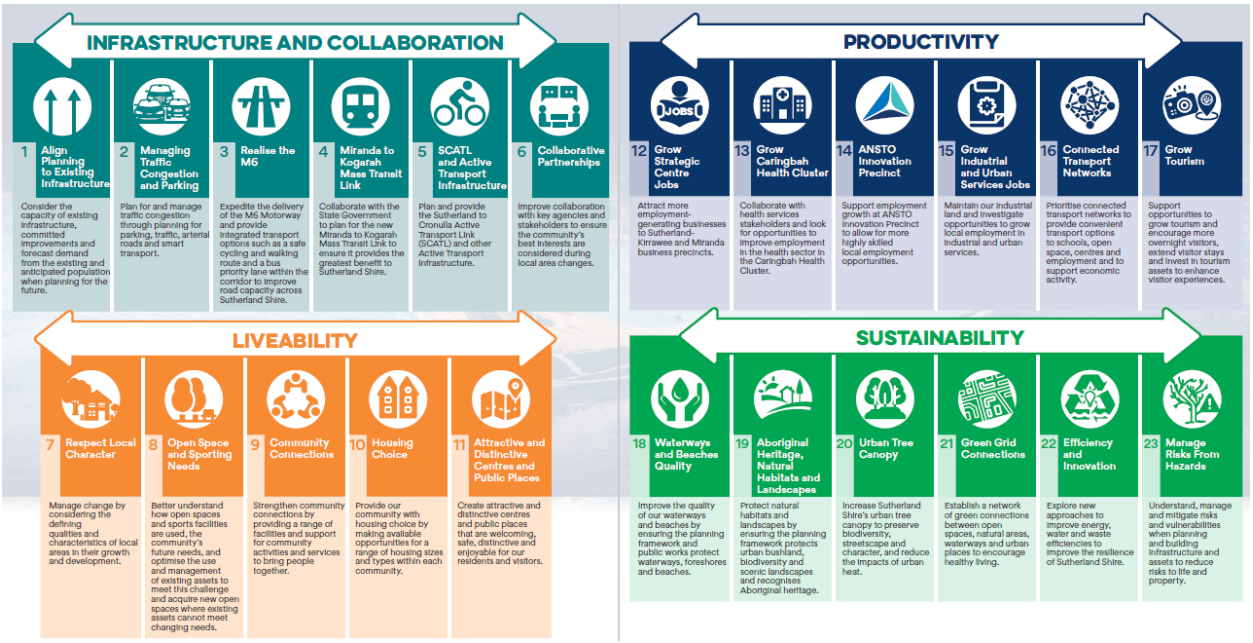


Source: Sutherland Shire Local Strategic Planning Statement (with annotation)

The site has been identified as a Strategic Site and Kurnell Peninsula is also identified as the Coastal Destination. The beaches of Bate Bay, the foreshore parks and coastal walks, the Royal and Kamay Botany Bay National Parks and the waterways of Port Hacking and Woolooware Bay draw people from across Sutherland Shire and Greater Sydney.

It identifies priorities to deliver specific land use outcomes for infrastructure, housing, town centres, employment, transport, recreation and the environment. It sets short, medium and long-term actions to achieve these outcomes and an implementation and monitoring framework. The planning priorities identified under the 4 key themes of Infrastructure and Collaboration, Productivity, Liveability and Sustainability, are shown in **Figure 2-10**.

Figure 2-10 Sutherland LSPS Planning Priorities



Source: Sutherland Shire Local Strategic Planning Statement

The Council acknowledged that only improvements to public transport and behaviour change will limit the increase in traffic congestion and take pressure off parking demand. The Council is committed to improvements to the transport system that will support residents' use of more sustainable modes of transport like cycling, walking and public transport. Land use planning decisions will also support reduced dependence on private vehicles. The council will strongly support transport demand management initiatives including working from home, improved walking and cycling, improved access to car sharing, carpooling and on-demand transport to help achieve net-zero emissions.

The largest number of jobs in the Sutherland Shire are located in Miranda and Sutherland Strategic Centres, followed by Caringbah Health Precinct and Cronulla Centre. The Council has identified the following plans for these major centres.

Miranda

– Support and strengthen Miranda Centres' night-time economy.

– Review and update existing place-based plans for Miranda to support the role and function of the centres.

– Collaborate to ensure that future transport infrastructure supports the growth of jobs in Miranda.

– Commission expert advice to identify opportunities to increase employment and economic activity in Miranda centre.

Sutherland – Kirrawee

– Support the growth of Sutherland / Kirrawee as an integrated 'centre'.

– Support and strengthen Sutherland / Kirrawee Centre's night-time economy.

– Review and update existing place-based plans for Sutherland/Kirrawee to support the role and function of the centres.

– Collaborate to ensure that future transport infrastructure supports the growth of jobs in Sutherland/ Kirrawee.

– Commission expert advice to identify opportunities to increase employment and economic activity in Sutherland/Kirrawee.

Caringbah Health Cluster

– Collaborate for increased specialisations in health services and opportunities for further education and training.

– Undertake place-based planning for the precinct and adjoining land in collaboration with South-Eastern Sydney Local Health District and Transport for NSW.

– Facilitate transport connections to the hospitals and Caringbah, including potential pilot bus programs.

– Explore options to strengthen the connectivity between the Kareena and Sutherland hospitals, the Caringbah Health Cluster and Miranda and Caringbah Centres.

The Sutherland Shire Council LSPS also identifies the following key actions that relate to connected transport corridors.

Realise the M6

– The Council plans to work together with TfNSW to explore opportunities for the M6 corridor to be a multi-modal link that is largely underground to protect public open space and resident amenity, with specific consideration of noise and air quality impacts.

– The Council would advocate for an integrated active transport system within the M6 corridor that could provide a safe cycling and walking route and a bus priority lane. This can assist in relieving the T4 Illawarra Line which is operating above capacity. A bus priority lane could also create space for a future mass transport link should demand be proven. Combining active transport and public transport within the M6 can help realise the full potential of the corridor.

Miranda to Kogarah Mass Transit Link

– The Council plans to collaborate with the State Government to plan for the new Miranda to Kogarah Mass Transit Link to ensure it provides the greatest benefit to Sutherland Shire. Once the alignment has been determined, the Council will protect the corridor and undertake place-based planning for centres that benefit from infrastructure investment.

SCATL and Active Transport Infrastructure

– The Council continues to advocate for funding for:

- Sutherland to Cronulla Active Transport Link (SCATL)
- a north/south (Como to Engadine) Active Transport Link
- a western north/south Active Transport Link (Sutherland to ANSTO and Sutherland to Alfords Point Bridge)

2.2.1.1 Grow Tourism in Sutherland

Sutherland Shire's tourism brand builds on the Sydney brand and adds its unique blend of Aboriginal European history, national parks, pristine waterways, beaches, cultural, sports and business attractions. Its attractions are concentrated in the Coastal Destination Area (see **Figure 2-11**) which combines beaches and waterways with foreshore areas, bushland and the lifestyle precinct of Cronulla.

Sutherland Shire's priority planning actions to grow tourism include:

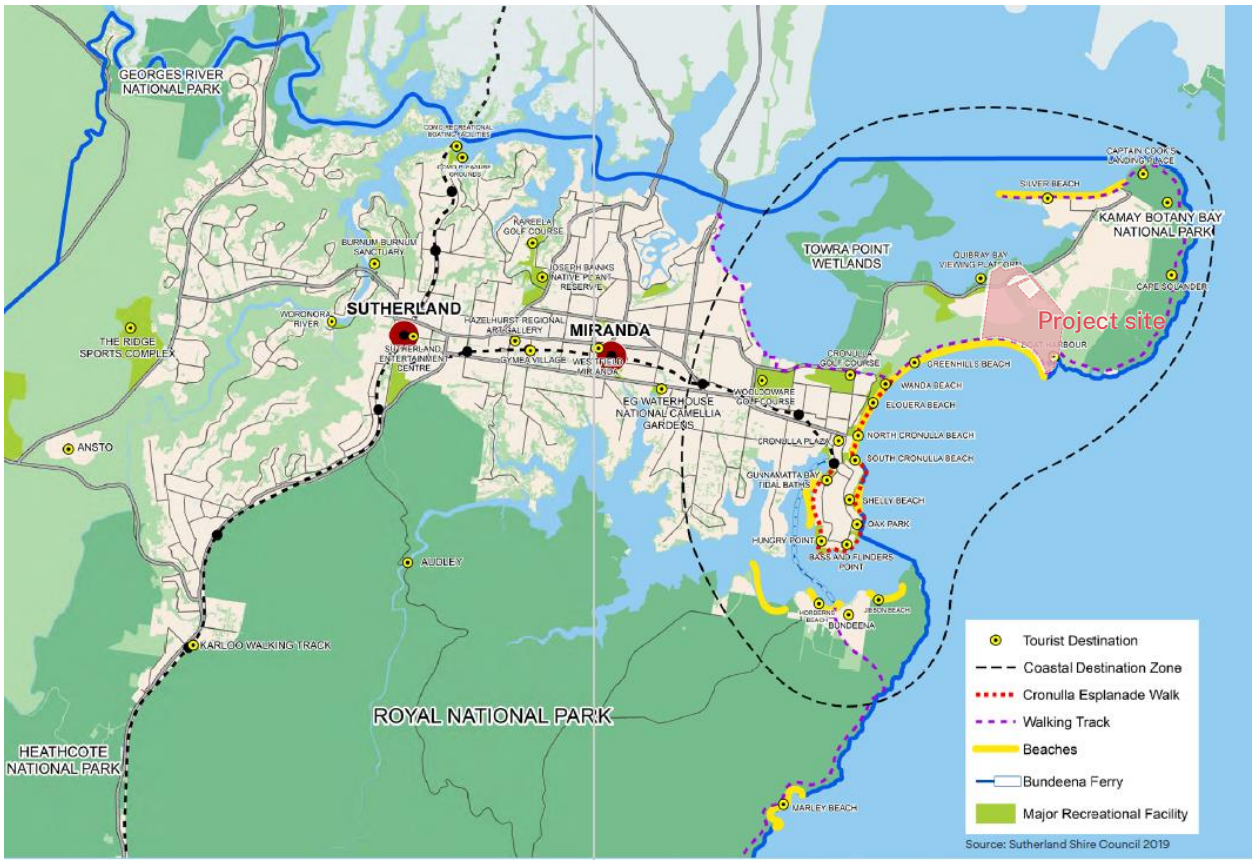
– Investigate opportunities to enhance and grow visitor experiences across Sutherland Shire, including short-stay visitor accommodation.

– Explore opportunities to improve navigation and accessibility to key visitor places/experiences.

– Partner with Transport for NSW to achieve 'Movement and Place' solutions for traffic in tourist areas.

– Support initiatives to provide tourism infrastructure and tourist and visitor accommodation by providing incentives through the planning framework.

Figure 2-11 Tourist attractions in Sutherland Council



Source: Sutherland Shire Local Strategic Planning Statement (with annotation)

2.2.2 Sutherland Shire Council Housing Strategy

The Sutherland Shire Housing Strategy is intended to create the framework that will deliver housing to meet the needs of today's community and the needs of future generations. The Council's goal is to ensure that there is a sufficient supply of housing over time so that residents will have comfortable and lively neighbourhoods with good access to jobs, shops, public transport, health facilities, community centres, and open space.

The South District Plan provides a broad framework for the long-term development of the South District, guiding government investment in infrastructure and linking local and state planning issues. Implementing the South District Plan is a statutory responsibility of Sutherland Shire Council. The South District Plan sets a 5-year housing target for (2016 – 2021) for each local government area, as well as a 20-year target for the District. For Sutherland Shire, the 5-year target is 5,200 residential dwelling completions. The 20-year strategic target for the South District is 83,500 dwellings. The 20-year target has not been distributed across the individual LGAs in these strategic plans.

Council's Housing Strategy 2031 seeks to ensure a reasonable supply of new housing comes onto the market over the period from 2012 to 2031 without dramatic change to Sutherland Shire's existing character. The approach to providing housing in convenient locations will also meet the needs of both older people looking to downsize and younger people who have left home or are trying to establish themselves in the Shire.

The key actions that create additional housing capacity and will deliver housing to meet the needs of the population in 2031 include:

1. Increased opportunities to develop residential flats in selected centres by some increases to permissible heights and floor space ratios.
2. Increased opportunities to develop residential flats and townhouses in new residential flats and townhouse zones close to selected centres.
3. Encourage concentration of residential flat development in existing residential flat zones by a general increase in the permitted floor space ratio from FSR 1:1 up to 1.2:1, an increase in height from 3 storeys to 16m (4-5 storeys) and the removal of the minimum lot size requirement.
4. Encourage villa development in accessible locations with a floor space ratio bonus.
5. Remove restrictions on building villas on internal lots.
6. Remove restrictions on building single-storey dual occupancies on internal lots.
7. Require an increased proportion of adaptable dwellings in multi-unit developments.
8. Encourage the development of ground-floor flats with features that appeal to older people.

2.2.3 Sutherland Shire Council Integrated Transport Strategy

The Integrated Transport Strategy outlines the key outcomes that will contribute to the convenient and efficient movement of people and goods throughout Sutherland Shire.

The Strategy outlines four key outcomes centred on planning for a safe and sustainable transport system that will allow the community to conveniently access services, employment, business and recreational pursuits via a choice of transport options. This will be achieved by measures aimed at reducing car dependency and improving the public domain via greater investment in and support of more sustainable modes of transport like walking, cycling and public transport. Improved advocacy, consultation and a more collaborative approach with State Government transport agencies will drive and inform ongoing planning.

1. A safe, connected, accessible active transport network – to increase the current active transport (walking and cycling) mode share of all daily trips taken across Sutherland Shire by 25% by 2030.
2. An improved public transport customer experience – to increase the current public transport mode share of all daily trips taken across Sutherland Shire by 35% by 2030.
3. Sufficient capacity for projected growth in daily trip volumes for all modes of transport within the road network – to provide a safe and efficient road network that can be shared by all users within Sutherland Shire.
4. Convenient and available parking that considers the needs of all users – to effectively manage parking supply and demand to achieve a maximum of 85% (on-street) and 90% (off-street) peak occupancy for time-limited parking by 2030.

2.2.4 Sutherland Shire Council Public Transport Strategy

The Public Transport Strategy outlines how our community vision for public transport will be progressed over the coming decade. It intends to achieve a transport mode shift to lessen our dependence on and impact from, high levels of private motor vehicle use in the Sutherland Shire. To achieve this, using public transport must be made safer, affordable, convenient, accessible and enable us to remain mobile and connected to the things we want to do.

The Council will continue to collaborate and partner with Transport for NSW as well as advocate strongly for service improvements to enhance the customer experience and meet our community's expectations. Complementing and building on these service improvements, a key role and focus of the Council will be to augment the public transport network and facilitate greater mode share. This will be achieved by improving the links to, as well as links used by public transport. Through these actions which include improvements to footpaths, lighting, shelters, wayfinding and the local road network, we aim to achieve a safer, integrated, accessible and intuitive travel experience for everyone.

The Council's vision is "*A public transport system that is an attractive alternative to private transport by being safe, accessible, reliable and equitable and enables the community to conveniently stay mobile and connected.*"

The 4 key areas of focus of this Public Transport Strategy include:

1. **Safe transport experience**: We want all users of public transport in the Shire to experience an attractive, safe, comfortable, convenient and reliable door-to-door journey.
2. **Ready for the future**: We will support and advocate for improvements so that public transport is more attractive and accessible, broadens our transport choices for the future, and is integral to the strategic planning of the Shire.
3. **Accessing transport options**: We will be committed to broadening public transport options that are affordable, universally accessible, and equitably distributed to meet the current and future needs of the Shire.
4. **Partnerships**: We will effectively work with NSW Government agencies, businesses and community organisations to facilitate the delivery of high-quality public transport options that support the lifestyle expectations of the Sutherland Shire community.

Some of the relevant initiatives that influenced the planning of this project include:

– Influence, facilitate and implement public transport measures within the 800-metre radius around transport hubs to meet the expected increase in housing densities.

– Integrate safe access to public transport in road safety programs in schools.

– Promotion of public transport options to older residents.

– Investigate opportunities for upgrading bus shelters with smart technology.

– Investigate measures that enable rideshare, shuttle bus and community transport to improve accessibility to core locations within transport hubs and other town centres.

2.2.5 Sutherland Shire Council Active Transport Strategy – 2022 update

The Sutherland Shire Active Transport Strategy and Implementation Plan has been prepared to ensure that active transport continues to contribute to an active, safe, healthy, liveable, connected and resilient Shire. Active transport is transport using physical activity. Walking and cycling are the most common, but it can also include using a scooter or skateboard, wheelchair, pushing a pram /stroller and roller skating.

Although motor vehicles will continue to play a key role in our mobility, moving forward to address the challenges we face will require attractive and effective alternative transport options.

The Active Transport Strategy and Implementation Plan aims to make active transport the preferred transport option for the community, especially for short trips. It features separated and shared pedestrian/cycling paths, wayfinding systems, improved lighting, seating and end-of-trip facilities. Programs will be established to encourage and instil confidence in our community to participate and engage more often in active transport. Improved safety, access and connectivity to the places we want to go are key outcomes of the Strategy that will help our community achieve better health, environmental and economic outcomes over the next 20 years.

The Sutherland to Cronulla Active Transport Link is a vital part of a framework of regional off-road routes that will establish the backbone of the Shire's proposed local shared path network. Supporting this will be increased provision of bicycle parking facilities in our town centres and activity areas, a dedicated wayfinding system to help navigate the network and improved lighting to offer safer and year-round access. For the local network of shared paths and

footpaths, an initial emphasis will be given to constructing them within 2km catchments around our town centres. These catchment areas have the greatest population densities, schools and other services. Because they are located on the ridge areas of the shire, they generally tend to be flatter or undulating and are easier to use by people of various abilities.

Some of the relevant Council's Strategy Objectives include:

– Prioritise the establishment of the Shire's regional north-south and east-west routes to form the backbone of the Active Transport Network from which the finer-grained local routes will connect.

– Prioritise walking and cycling infrastructure near our town centres, public transport hubs and schools.

– Improve safety, connectivity and amenity of cycling and walking routes through measures that include increased density of designated road crossing points, lighting of network routes, tree canopy cover and path conditions.

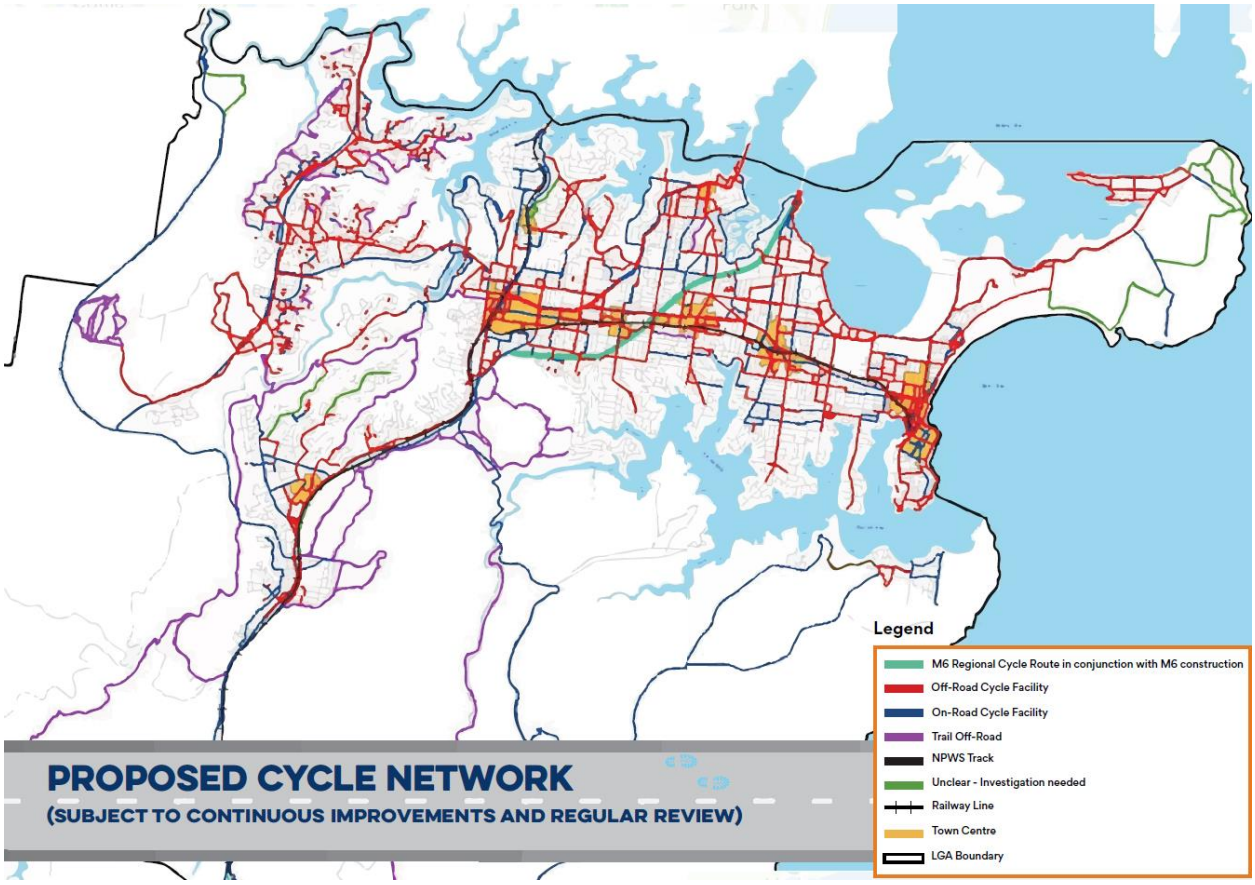
– Provide end-of-trip facilities such as bicycle parking spaces and water refilling stations in town centres and transport hubs.

The Council's future Active Transport Network is shown in **Figure 2-12**, which includes an extensive network of over 550km of bicycle and shared paths that will link people to where they want to go.

The proposed network suggests that the on-road cycleway along Captain Cook Drive should be upgraded to an off-road cycle facility that connects with the regional network as well as a series of local cycle facilities in the Kurnell Peninsula.

Council also recommends a minimum of 1.2m footpaths for R2 Low Density and R3 Medium Density Residential Zones as well as all other land use zonings other than B1, B2 and B3 (centres) zones. A minimum of 1.8m footpaths are recommended for R4 High-Density Residential Zones, except for areas of low pedestrian activity within R4 zones, a footpath pavement width between 1.2 and 1.8 metres is appropriate.

Figure 2-12 Council's proposed cycle network



Source: Sutherland Shire Council, 2022

2.2.6 Sutherland Shire Council Parking Strategy

The Parking Strategy and Implementation Plan outlines how our vision for parking supply and management will be progressed over the coming decade. It intends to achieve a balance of parking that considers the needs of all users and to acknowledge the important role that parking management has in attaining an integrated and sustainable transport system.

The traditional response to increasing demand for parking has been to increase supply. If suitably located, increased supply can yield benefits in terms of convenience and economic activity. However, these benefits are often short-lived as history shows that additional supply further induces demand and reliance on car-based transport. This results in increased traffic congestion, which can reduce the liveability of our centres.

With roads already congested and the cost of providing additional parking spaces high, cities worldwide are reconsidering the value and sustainability of a demand satisfaction approach. In cities, the shift is toward a demand management approach with more efficient use of existing parking supply and promotion of alternative transport options. This is of particular importance in our town centres where on and off-street parking needs to be balanced with increased demand for better amenity, safety, public place presentation and liveability.

Accordingly, the vision of the strategy is to provide: "*safe and equitable parking that supports the local economy and balances car dependency with improved placemaking and alternative transport choice.*" It will do this through four key areas of focus and our commitment to working collaboratively and in consultation with the community and key stakeholders.

The action of most relevance to this Transport Strategy is to integrate Housing and Transport strategies (including parking) to support higher-density living with reduced car dependency in the vicinity of centres and transport hubs.

2.2.7 Sutherland Shire Council Development Control Plan 2015

The Sutherland Shire Council Development Control Plan (DCP) 2015 contains detailed development controls which aim to facilitate quality development, protect neighbourhood amenity and maintain environmental quality. In particular, the DCP sets requirements for site amalgamation, setbacks, building envelopes, landscape treatments, privacy and parking.

Chapter 36 - Vehicular Access Traffic Parking and Bicycles supplements the vehicular access, traffic, parking and bicycle controls provided for specific types of developments. It provides detailed controls that apply across most forms of development and establishes what the Council will consider acceptable design solutions regarding these issues. It also sets controls for the subdivision of land.

Car parking should be provided to ensure all land uses and/or combination of activities provide sufficient parking on-site to satisfy the demand for parking by different vehicle types generated by the development and to minimise reliance on street parking.

Car parking shall be provided according to the DCP requirements for these specific land uses included in part of this proposed development, as highlighted in **Table 2-3**.

Table 2-3 DCP car parking requirements for key land uses

Land use	Car parking rate
Residential – dwelling houses	Minimum: 2 spaces per dwelling Maximum: 3 spaces per dwelling
Residential – dual occupancies	Minimum 1 space per dwelling Maximum 3 spaces per dwelling
Residential – residential flat building/shop top housing	*Zones R4 & R3* Minimum: 1 space per 1 bed, 1.5 spaces per 2 bed, 2 spaces per 3 bed, 1 visitor space per 4 units Maximum: up to 3 spaces per dwelling *Zone B1, B2, B3 & B4* Minimum 1 space per unit – No visitor parking Maximum: up to 3 spaces per dwelling
Seniors housing	Car parking rates consistent with State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

Land use	Car parking rate
Hotel or motel accommodation	Minimum of 1 space per 4 rooms; plus, 1 space per 2 employees
Serviced apartments	Minimum of 1 space per 2 units; plus, 1 space per 2 employees
Office and business premises	*Zones B1, B2, B3 & B4*: Minimum of 1 space per 30m^2 GFA *Zones B5 & B6*: Minimum of 1 space per 45m^2 GFA
Retail premises	*Zones B1, B2, B3 & B4*: Minimum of 1 space per 30m^2 GFA *Zones B5 & B6*: Minimum of 1 space per 45m^2 GFA
Medical centres	*Zones B1, B2, B3 & B4*: Minimum of 1 space per 30m^2 GFA
Childcare centres	1 space per 4 children in attendance
Caravan park / Ecotourist facility	1 space per caravan site or ecotourist unit 1 visitor space per 20 caravan site or ecotourist unit 1 space for the site manager

Any new public roads created as part of subdivision shall comply with the following road widths as shown in **Figure 2-13**.

Figure 2-13 New road width requirements

1. New roads shall comply with the following widths:

Public Roads	Minimum Reserve Width (m)	Minimum Carriageway width (m)	Footpath Reserve Width (m)	Max no. dwellings served
Minor Cul-de-sac (<6 sites)	12.5	5.5	3.5	20
Minor local street	14.5	7.5	3.5	75
Local Street	16.0	9.0	3.5	150
Collector and distributor	18.0	11.0	3.5	>150
Perimeter	20m	9.0	Variable	N/A

2. Identified or planned bus routes and roads acting as perimeter roads in bush fire interface areas are to have a minimum 9 metre carriageway.

The DCP also provides guidance on the provision of facilities for cycling to reduce car dependency and to support public transport use, development will give priority to walking, cycling and public transport access as well as to promote and encourage the use of bicycles as a sustainable, safe and convenient means of transport for trip purposes that include shopping, education (to school), work, health and recreation.

As a minimum, developments must provide 1 bicycle parking space per 10 car parking spaces for the first 200 car spaces, then 1 space per 20 parking spaces thereafter. In addition, 1 unisex shower is required per 10 employees.

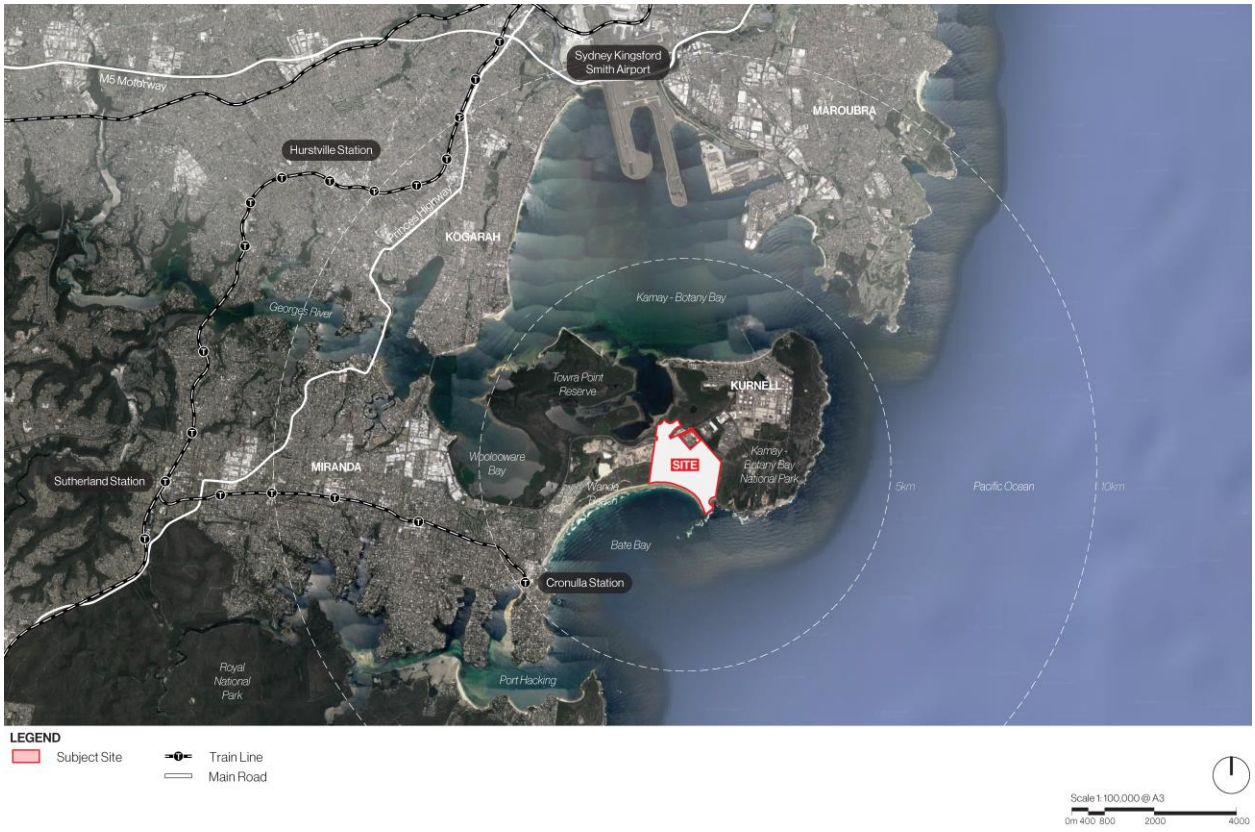
3.0 Existing conditions

3.1 Site context

3.1.1 Location

The site consists of 251, 260R, 278, and 280-282 Captain Cook Drive, Kurnell. It is located within the Sutherland Shire Local Government Area (LGA) and is approximately 10 kilometres south of Sydney Kingsford Smith Airport, and 5 kilometres north-east of Cronulla (**Figure 3-1**).

Figure 3-1 Site location



Source: GroupGSA

3.1.2 Land use

The current site houses the Kurnell Boarding Stables in the northern lot (Lot 2 North), and a boat harbour, and sand extraction and rehabilitation facilities in the southern lot (Lot 2 South). The southern lot is also adjacent to a section of public beach. Public access to this portion of the beach is only via the western section of Cronulla. There is no direct public access from Captain Cook Drive onto the beachfront adjacent to the site.

A review of the vehicle volumes to the site from 2017 to 2018 (The Transport Planning Partnership (TTPP), 2020) have highlighted that heavy vehicles such as trucks for landfill and transporting sand make up a significant proportion of trips to the site (about 86 per cent). This is reflective of the industrial uses close to the site.

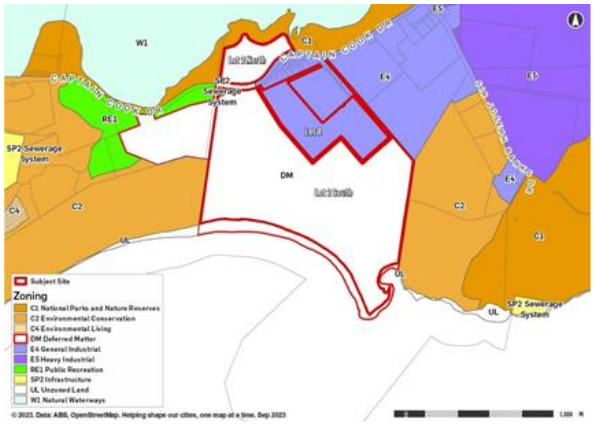
Lot 2 North and Lot 2 South are identified as deferred matters under the SSLEP 2015, which is the primary environmental planning instrument that applies to the Sutherland LGA.

These allotments are zoned and subject to the provisions of Chapter 5 Kurnell Peninsula of SEPP Precincts, as illustrated in Figure 25. The land use zoning under SEPP Precincts reflects the terms of a Deed of Agreement (between Besmaw and other parties including the Council and the then DPE) that was executed at the time the site was zoned under *Sydney Regional Environmental Plan 1989.*

Lot 8 and Lot 9 are not deferred matters and are subject to the provisions of the SSLEP2015, as illustrated in **Figure 3-2** (right).

Figure 3-2 Existing land use zoning (left: Precincts SEPP and right: SSLEP 2015)

Source: Urbis



Source: Urbis

The composition of the existing zoning is outlined in **Table 3-1**:

Table 3-1 Existing land use zones

Planning Instrument	Lot	Land use zone
Precinct SEPP	Lot 2 North	6(c) Private Recreation
	Lot 2 South	Part 7(b) Special Development Part 6(b) Public Recreation Part 9(a) Regional Open Space Part 4(a) General Industrial Part unzoned land, along the Bate Bay beach front
SSLEP 2015	Lot 8	E4 General Industrial
	Lot 9	E4 General Industrial

3.1.3 Adjacent land uses

The land use zoning for the existing site and its surroundings are shown in **Figure 3-3**. To the west of the site, land uses are predominantly environmental conservation and public recreation. In addition to conservation and public recreation uses, industrial land uses are a major land use type to the east of the study area. Captain Cook Drive is the main collector road servicing Kurnell in the east, which is largely industrial land and nature reserve with a small residential pocket at the northern extent.

The key trip attractors in the area are the parks and nature reserves, including the Kamay Botany Bay National Park and the beaches along the foreshore areas.

Figure 3-3 Surrounding land uses and sites

Source: GroupGSA

3.2 Travel behaviour

3.2.1 Method of Travel to Work

Table 3-2 and **Table 3-3** compare the Method of Travel to Work (MTW) mode share for the residents and employees in the Cronulla – Kurnell – Bundeena Statistical Area 2 (SA2) zone and the Sutherland Shire LGA. **Table 3-2** summarises 2016 data and **Table 3-3** summarises 2021 data respectively.

Table 3-2 2016 Method of Travel to Work mode share for residents and employees for the two regions

Travel Mode Share	Resident			Employee		
	Cronulla – Kurnell	Sutherland Shire	Difference	Cronulla – Kurnell	Sutherland Shire	Difference
Train	15%	16%	-1%	6%	6%	0%
Bus	0%	1%	0%	1%	1%	0%
Car	64%	65%	-1%	65%	71%	-6%
Truck	1%	1%	0%	1%	1%	0%
Other	1%	1%	0%	1%	1%	0%
Bicycle	1%	0%	0%	1%	0%	0%
Walked only	4%	2%	2%	7%	3%	4%
Worked at home / didn't go to work	13%	14%	-1%	18%	17%	1%
Total	100%	100%	-	100%	100%	-

Source: Australian Bureau of Statistics; 2016

Table 3-3 2021 Method of Travel to Work mode share for residents and employees for the two regions

Travel Mode Share	Resident			Employee		
	Cronulla – Kurnell	Sutherland Shire	Difference	Cronulla – Kurnell	Sutherland Shire	Difference
Train	3%	3%	0%	4%	3%	1%
Bus	0%	0%	0%	0%	0%	0%
Car	42%	42%	0%	42%	48%	-7%
Truck	1%	1%	0%	1%	1%	0%
Other	1%	1%	0%	1%	1%	0%
Bicycle	1%	0%	0%	1%	0%	0%
Walked only	3%	2%	1%	5%	2%	2%
Worked at home / didn't go to work	50%	52%	-1%	47%	44%	3%
Total	100%	100%	-	100%	100%	-

Source: Australian Bureau of Statistics; 2021

In both 2016 and 2021, the travel mode shares in the Cronulla – Kurnell – Bundeena are generally aligned with the Sutherland Shire LGA mode shares. The only notable differences in both 2016 and 2021 are:

– Those employed in Cronulla – Kurnell – Bundeena tend to drive to work less than the Sutherland Shire average by 6 per cent and 7 per cent per cent in 2016 and 2021 respectively.

– Walking to work was more prevalent in Cronulla – Kurnell – Bundeena than in the Sutherland Shire (by 4 per cent and 2 per cent in 2016 and 2021 respectively.

However, due to the impacts of COVID-19 in 2021, there is a major shift in mode shares as compared to 2016. As more people were working from home in 2021 (about 50 per cent compared to less than 15 per cent in 2016), there are significant drops in the percentages of people taking public transport, driving, and walking to commute to work. Cycling to work has traditionally had a very low mode share in both Cronulla – Kurnell – Bundeena and Sutherland Shire, and this remained unchanged in both years.

3.2.2 Household travel survey

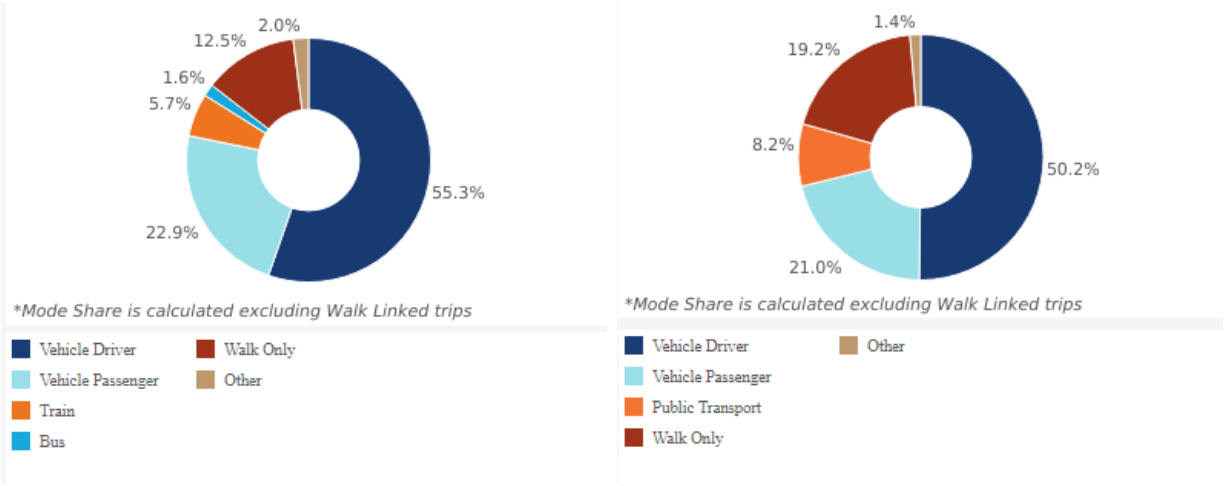
The household travel survey has indicated a slight population growth of 3 per cent in the Sutherland Shire LGA between the 2016/2017 to 2022/2023 survey years. Although there is also an increase in the number of households (seven per cent over the six years), the number of vehicles owned remains unchanged. **Figure 3-4** shows the summarised travel mode share percentages within the Sutherland Shire LGA in 2016/2017 and 2022/2023. Comparison between the data highlights the following trends:

– There is a decline in car-related travel in 2022/2023 by 7 per cent

– Bus travel has reduced significantly to less than 1 per cent of travel mode share in 2022/2023

– There is a larger proportion of train (2.5 per cent increase in 2022/2023) and walking-only trips (6.7 per cent increase)

Figure 3-4 Travel mode share percentages in 2016/2017 (left) and 2022/2023 (right)



Source: TfNSW; 2023

3.2.3 Education related travel

The project site, discussed in detail in **Section 4.0**, is envisaged as a mixed-use community that includes a school. Transport for NSW (formerly Roads and Maritime Services) commissioned a review of various primary and secondary schools (Trip Generation Surveys - Schools Analysis Report, GTA Consultants 2014) to understand the travel behaviour of students and staff.

The survey included the nearby Kurnell Public School, which has been used as a benchmark for the proposed school within the site, including trip generation and method of travel.

Table 3-4 Kurnel Public School – key information

Type	Public primary (K-6) school				
Size	215 students and 15 staff				
Trip Generation (all modes)	AM peak: 1.61 trips per student (inclusive of vehicle trips)				
	PM peak: 1.90 trips per student (inclusive of vehicle trips)				
Trip Generation (vehicles only)	AM peak: 0.60 trips per student (inclusive of vehicle trips)				
	PM peak: 0.32 trips per student (inclusive of vehicle trips)				
Mode share (%) for main mode	**Walk**	**Cycle/Scooter**	**Bus**	**Train**	**Private vehicle**
	55%	10%	0%	0%	35%

Source: Trip Generation Surveys - Schools Analysis Report, GTA Consultants 2014

3.2.4 Vehicle ownership

Table 3-5 compares household vehicle ownership in Kurnell to the Sutherland Shire LGA in 2016 and 2021. About 740 households and 820 households in Kurnell completed the household travel survey in 2016 and 2021 respectively. The general trend in Kurnell households is that a larger proportion of households own multiple vehicles compared to households in Sutherland Shire. In 2021, 12 per cent more households in Kurnell have three or more vehicles than in Sutherland Shire. This has increased from eight per cent in 2016. Kurnell has conventionally had a lower proportion of households who own up to one vehicle as compared to Sutherland Shire (about 10 per cent lower).

Table 3-5 Household vehicle ownership in Kurnell and Sutherland Shire between 2016 and 2021

Number of cars	2016			2021		
	Kurnell	Sutherland Shire	Difference	Kurnell	Sutherland Shire	Difference
No motor vehicles	3%	6%	-3%	2%	6%	-4%
1 motor vehicle	20%	31%	-10%	23%	33%	-11%
2 motor vehicles	42%	39%	3%	40%	39%	1%
3 or more motor vehicles	28%	20%	8%	32%	20%	12%
Not stated	8%	6%	2%	4%	3%	1%
Total number of households	100%	100%	-	100%	100%	-

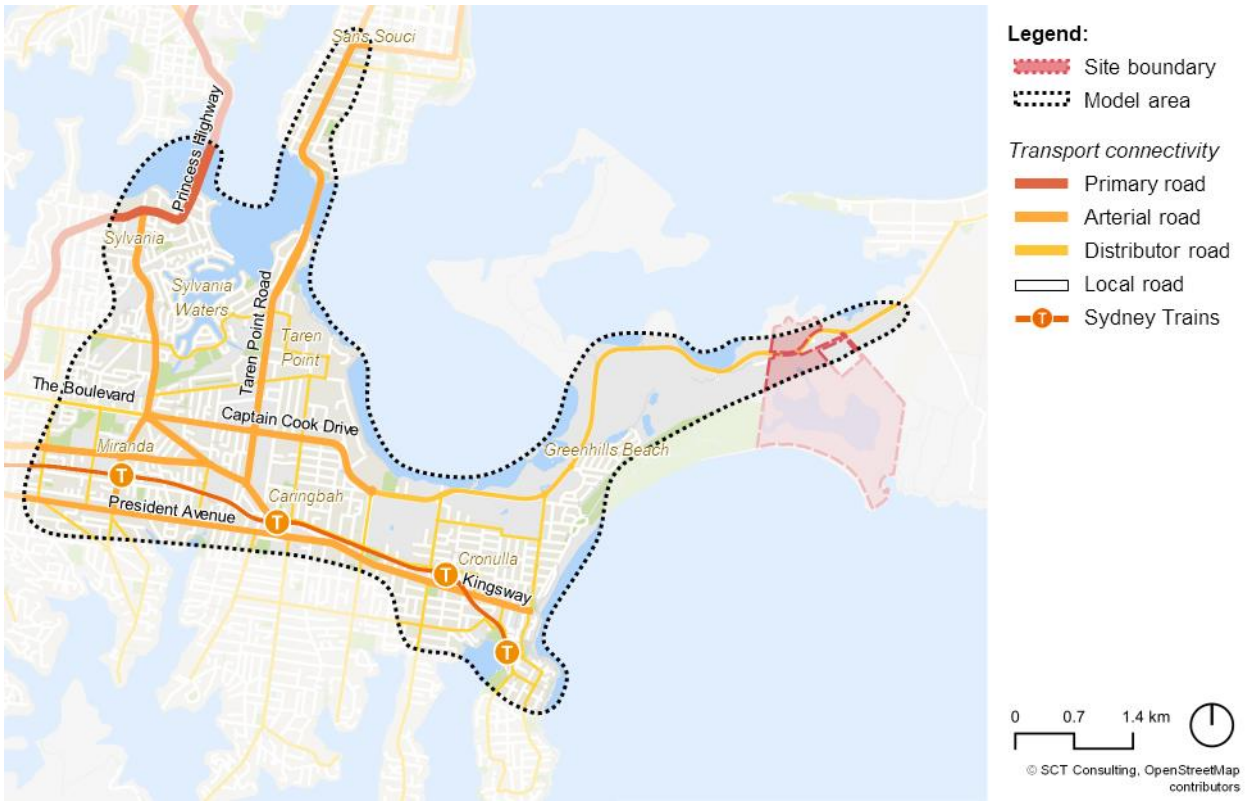
3.3 Road network

3.3.1 Overview

A previous transport assessment was undertaken for the earlier phase of the development. The assessment included a mesoscopic modelling (VISUM) assessment to understand the future traffic impacts on the surrounding road network. 2018 AM and PM peak hour models were developed to test future year 'do minimum' and 'with development' scenario road network performances and the potential impact of appropriate mitigations.

Figure 3-5 shows the area that modelling was undertaken for compared to the study area for this transport strategy. Accordingly, this section will only summarise findings relating to traffic conditions on Captain Cook Drive and Lindum Road.

Figure 3-5 Previous modelling boundary in relation to the study area



Source: TTPA (2020) boundary overlaid to SCT Consulting map

3.3.2 Existing conditions

3.3.2.1 Road Hierarchy

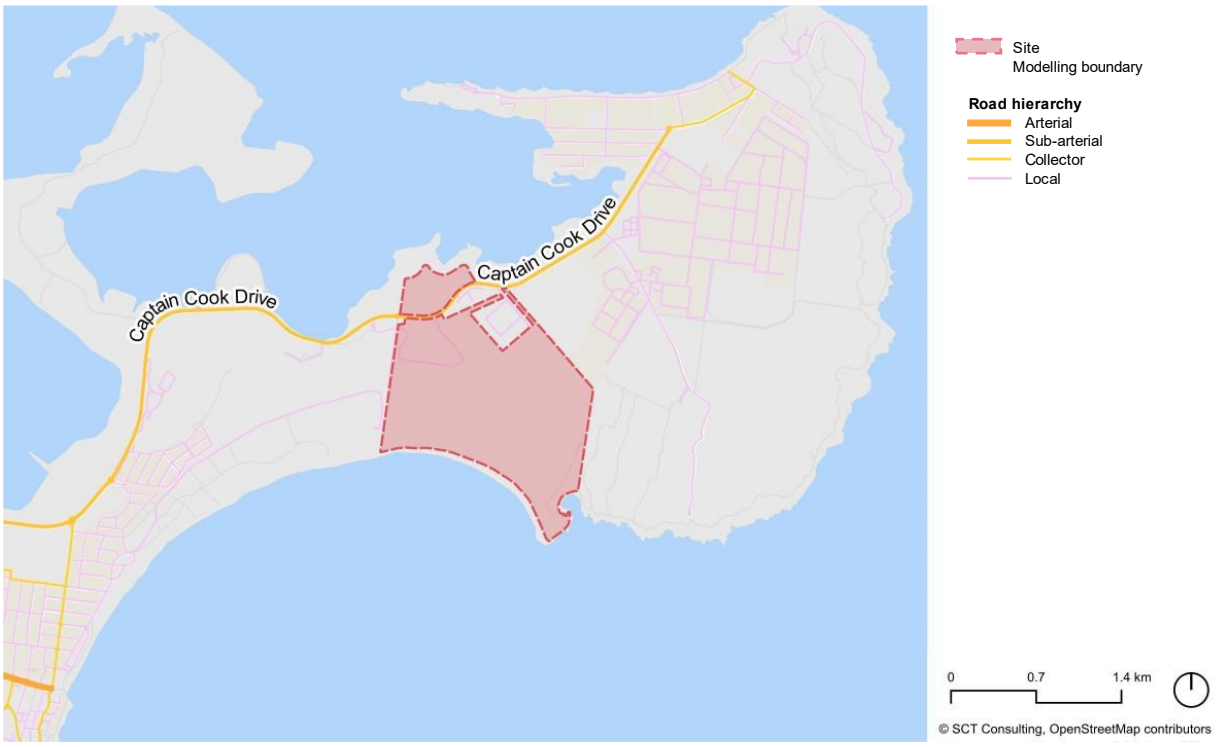
Figure 3-6 shows the hierarchy of roads in proximity to the study area. The main access points for the site are along Captain Cook Drive, with an additional entrance to the western side of the site on Lindum Road.

Key characteristics of the two roads are:

– **Captain Cook Drive** – The section of Captain Cook Drive fronting the site is a sub-arterial road. It runs in an east-west direction between the eastern end of Kurnell and The Boulevarde in Miranda. Captain Cook Drive adjacent to the site is a single-carriageway with one lane in each direction. It has a road speed of 80km/hr which transitions to 60km/hr just east of the site. No on-street parking is allowed on either side of the road, but there are on-road cycle lanes on both sides of the road.

– **Lindum Road** – It is a local road that runs in the north-south direction past the western edge of the site. At the northern end of Lindum Road, it links to Captain Cook Drive to form a roundabout. It has a single lane in each direction and has a speed limit of 50km/hr. The road currently provides access only to the Greenhills Skate Park, Marang Parklands, and truck access to Boat Harbour.

Figure 3-6 Road hierarchy



3.3.2.2 Congestion

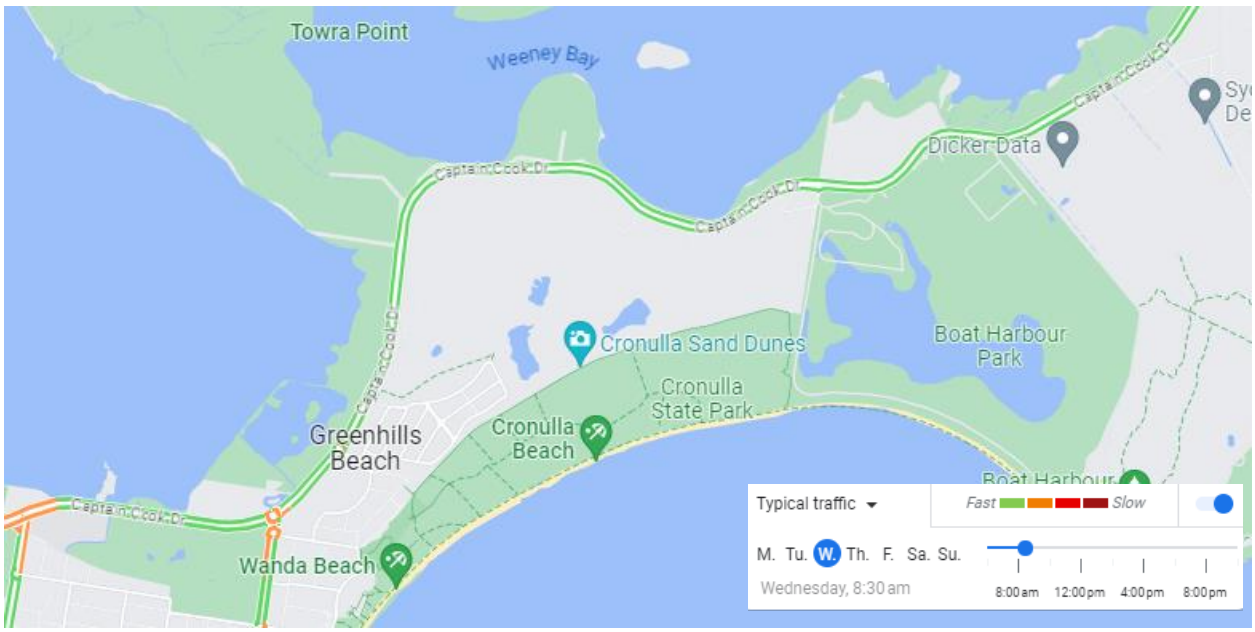
Figure 3-7 and **Figure 3-8** show the typical AM and PM peak hour traffic queues and speeds. In addition, the previous traffic modelling has identified congested intersections as shown in **Figure 3-9**. Key findings from the figures show:

– There are no congestion issues on the section of Captain Cook Drive adjacent to the site.

– Some slowing of traffic is observed at the Captain Cook Drive / Elouera Road intersection in both peak periods.

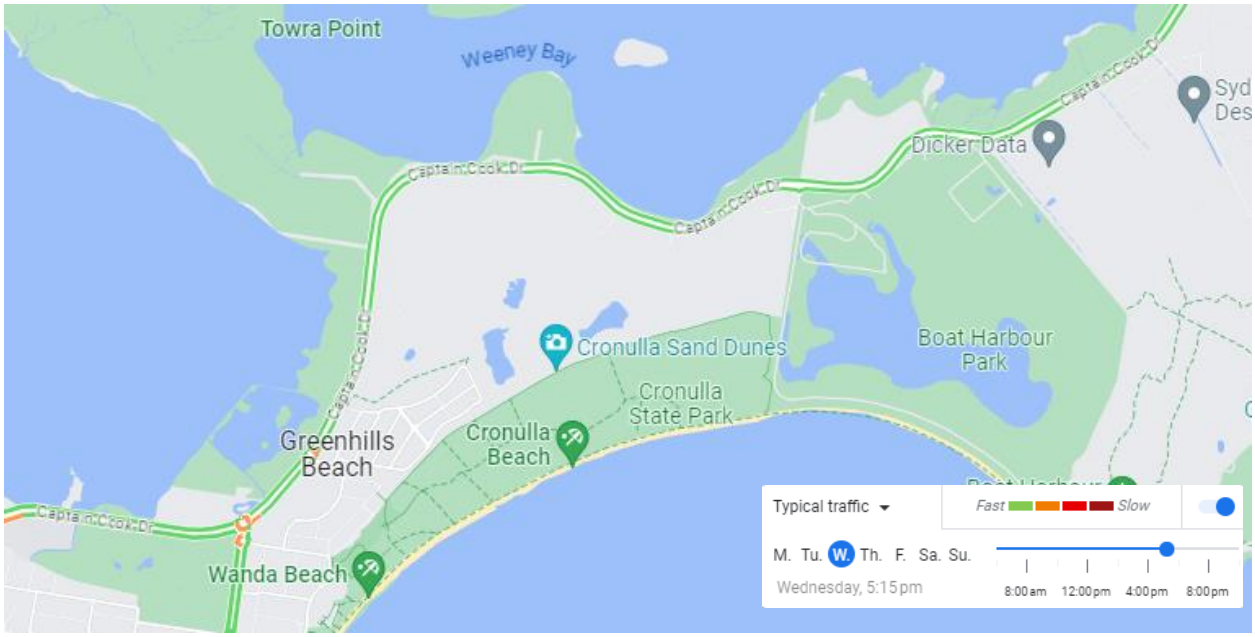
– There were heavy right turns from Captain Cook Drive to Taren Point Road in the AM peak hour.

Figure 3-7 Typical AM peak hour traffic speeds



Source: Google Maps; 2023

Figure 3-8 Typical PM peak hour traffic speeds



Source: Google Maps; 2023

Figure 3-9 Congested locations

Source: Bitzios; 2019

3.3.2.3 Traffic volumes

The previous study (TTPP, 2020) commissioned traffic surveys of the study area (discussed in **Section 4.3.1**) to inform the development of the base and future traffic models.

Current (2023) traffic volumes have been compared to 2018 volumes using Transport for NSW permanent counters in the region in **Table 3-6**.

Table 3-6 Comparison of traffic volumes (2018 vs 2023)

ID	Location	Dir	2018			2023			Change		
			Daily	AM	PM	Daily	AM	PM	Daily	AM	PM
9834	Kingsway near Sylvania Road	EB	11,596	997	770	11,274	914	752	-3%	-8%	-2%
		WB	11,883	513	1,140	11,309	494	1,084	-5%	-4%	-5%
7162	Kingsway near Gannons Road	EB	Traffic data not available								
		WB	16,910	1,107	1,070	16,356	1,119	1,061	-3%	1%	-1%

Source: Transport for NSW Traffic Volume Viewer

As evident from the comparison in **Table 3-6** traffic volumes on the key road corridor have fallen compared to 2018 (the year of previous data collection and modelling). Hence, the modelled results would reflect a "worse" scenario compared to the existing scenario. Therefore the results of the previous modelling would still be valid (discussed in **Section 6.3**), albeit slightly conservative.

As a conservative assumption, the 2018 traffic data has been used as a proxy for the 2023 traffic data to inform the development of concept intersections for the three locations immediately adjacent to the site on Captain Cook Drive which will likely be used by project vehicles. The locations (and associated modelling) are discussed in **Table 3-6**.

3.3.3 Network upgrades (proposed and committed)

The future year base model was based on a series of road network upgrades within the modelling boundary that have been committed by Sutherland Shire Council and TfNSW. These committed upgrades and their current completion statuses are summarised in **Table 3-7** with their locations shown in **Figure 3-10**.

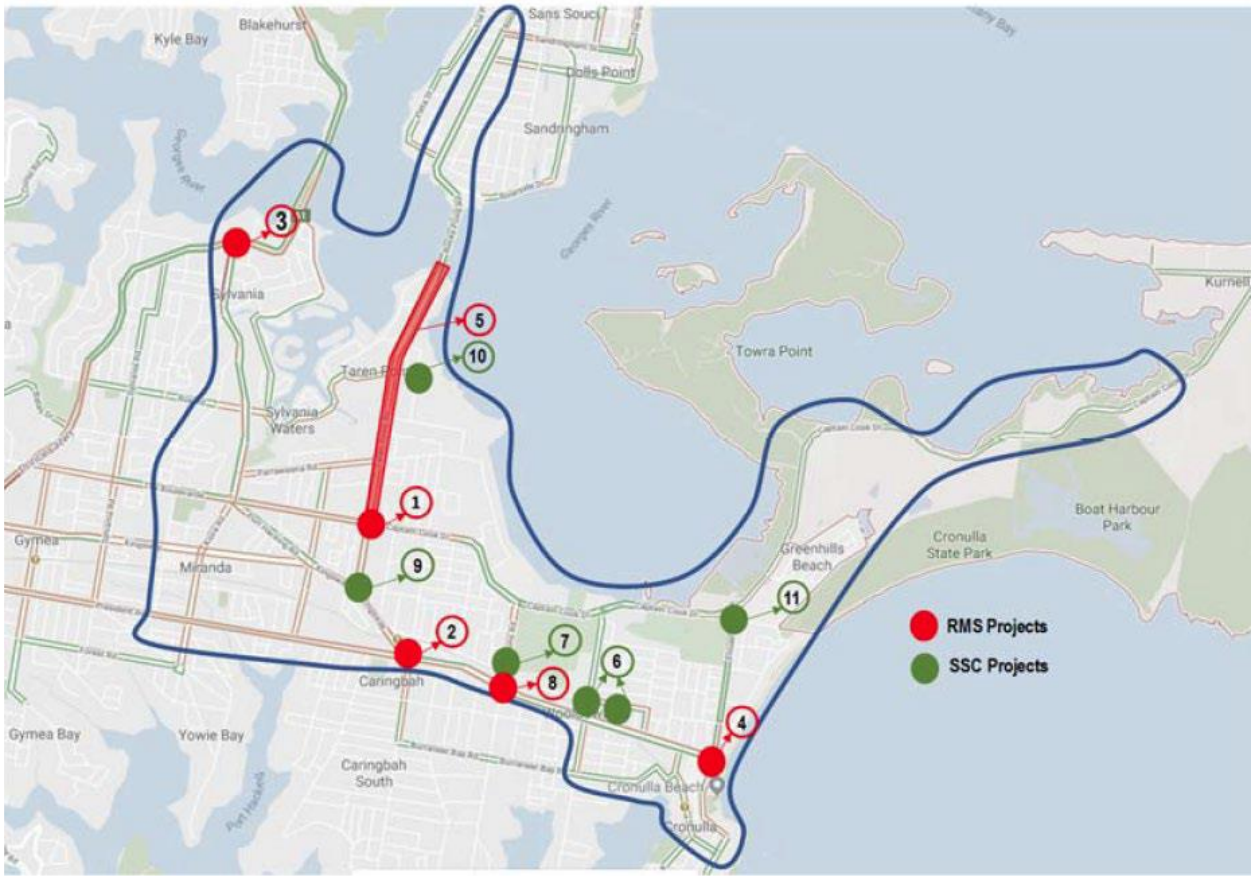
Table 3-7 Committed road network upgrades

ID	Project / Location	Project Details	Authority	Status
1	Captain Cook Drive, Taren Point Road and The Boulevarde, Caringbah intersection improvement	Additional southbound right turn lane into The Boulevarde	TfNSW	Completed
2	Kingsway and President Avenue, Caringbah intersection improvements	Additional right turn lane from Kingsway into President Avenue	TfNSW	Completed
3	Princes Highway and Port Hacking Road, Sylvania intersection improvements	Increase the length of three westbound through lanes from 42m to 123m	TfNSW	Completed
4	Kingsway and Elouera Road intersection improvement	Additional southbound right turn lane into Kingsway from Elouera Road	TfNSW	Completed
5	New and extended clearways on Taren Point Road	Extended clearways on Taren Point Road from Captain Cook Bridge to The Boulevarde/Captain Cook Drive	TfNSW	To be confirmed
6	Denman Avenue Traffic Calming	Roundabouts at Denman Avenue / Woolware Road and Denman Avenue / Wills Road	Council	Completed

ID	Project / Location	Project Details	Authority	Status
7	Gannons Road | Denman Avenue	– Proposed southbound two departure lanes on Gannons Rd from Denman Ave to Kingsway. And increase the existing Right Turn Bay length. – New right turn bay on Gannons Rd northbound (South Approach). Convert the right turn bay on Gannons Road (North Approach) into the through and right lane	Council	Complete
8	Kingsway | Gannons Road	Two through and two dedicated short right turn lanes on Kingsway (East Approach).	TfNSW	Complete
9	Kingsway | Taren Point Road	An additional lane on Taren Point Rd (South Approach)	Council	Complete
10	Toorak Avenue | Alexander Avenue	New Roundabout	Council	Complete
11	Elouera Road | Bate Bay Road	New Roundabout	Council	Complete

Source: Adapted from The Transport Planning Partnership (TTPP); 2023

Figure 3-10 Committed road network upgrades for the future year base network



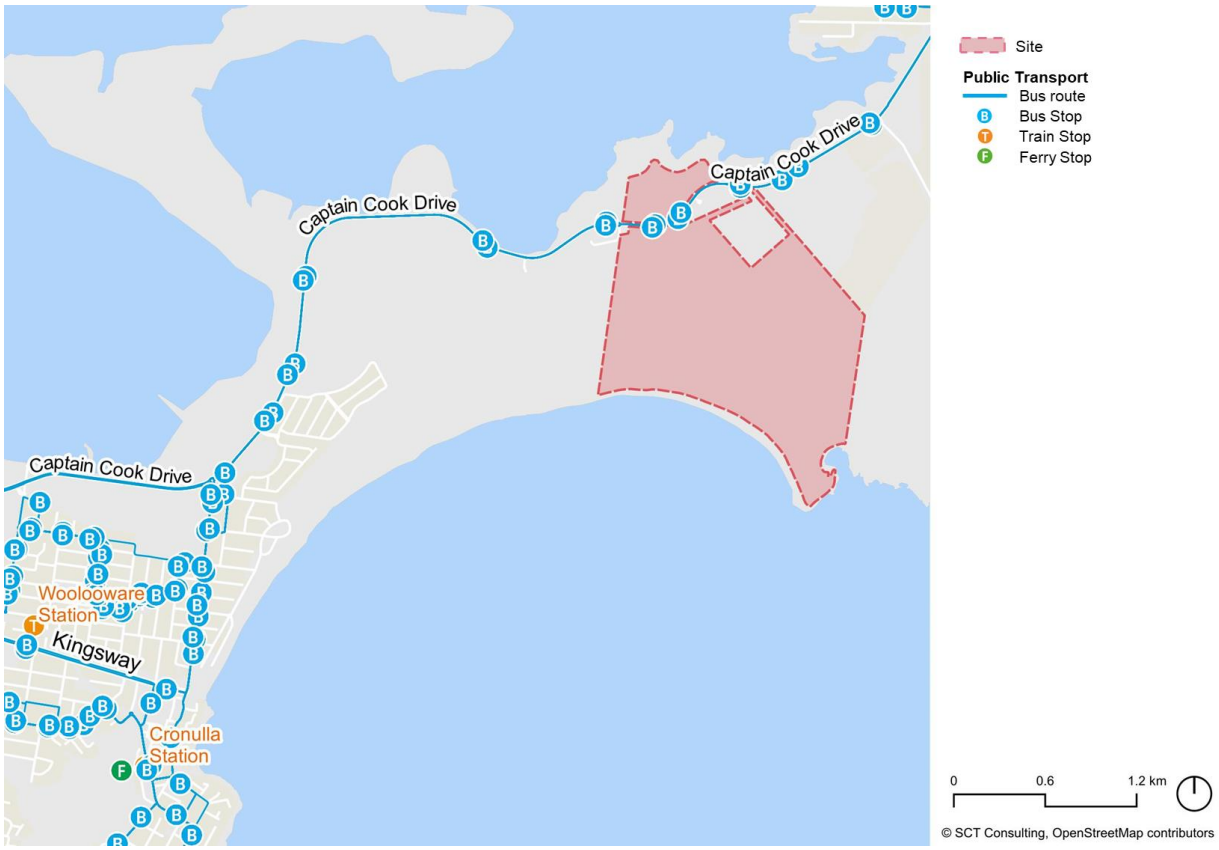
Source: Bitzios; 2019

3.4 Public transport

The existing public transport network is shown in **Figure 3-11**. The three set of bus stops on the section of Captain Cook Drive directly adjacent to the site is only serviced by Route 987. Route 987 is a loop service between Kurnell and Cronulla, with relatively low service frequencies of two buses per hour during the AM and PM peak hours and only one bus per hour during off-peak hours.

The closest train stations are at Cronulla and Woolooware with route 987 providing a direct service from the site access on Captain Cook Drive to Cronulla Station. Cronulla and Woolooware Stations are serviced by the T4 Eastern Suburbs and Illawarra Line, which connects Waterfall or Cronulla to Bondi Junction. Peak hour T4 services are six trains per hour while off-peak hour trains are four trains per hour.

Figure 3-11 Public transport routes



Source: GTFS; 2022

3.5 Walking

There are currently limited walking facilities near the site. Facilities are limited to:

– Footpath on Captain Cook Drive between the bus stops and Lindum Road. This footpath extends down Lindum Road to serve the Marang Parklands Field and Greenhills Skate Park.

– There are no footpaths on Captain Cook Drive beyond the above section. Captain Cook Drive is signposted as 80km/hr, resulting in an unsafe walking environment for pedestrians beyond the paved footpath.

– A walking trail (unpaved with no artificial light) extends from Lindum Road west through Cronulla State Park.

– No internal walking networks on site due to the nature of the existing uses on site.

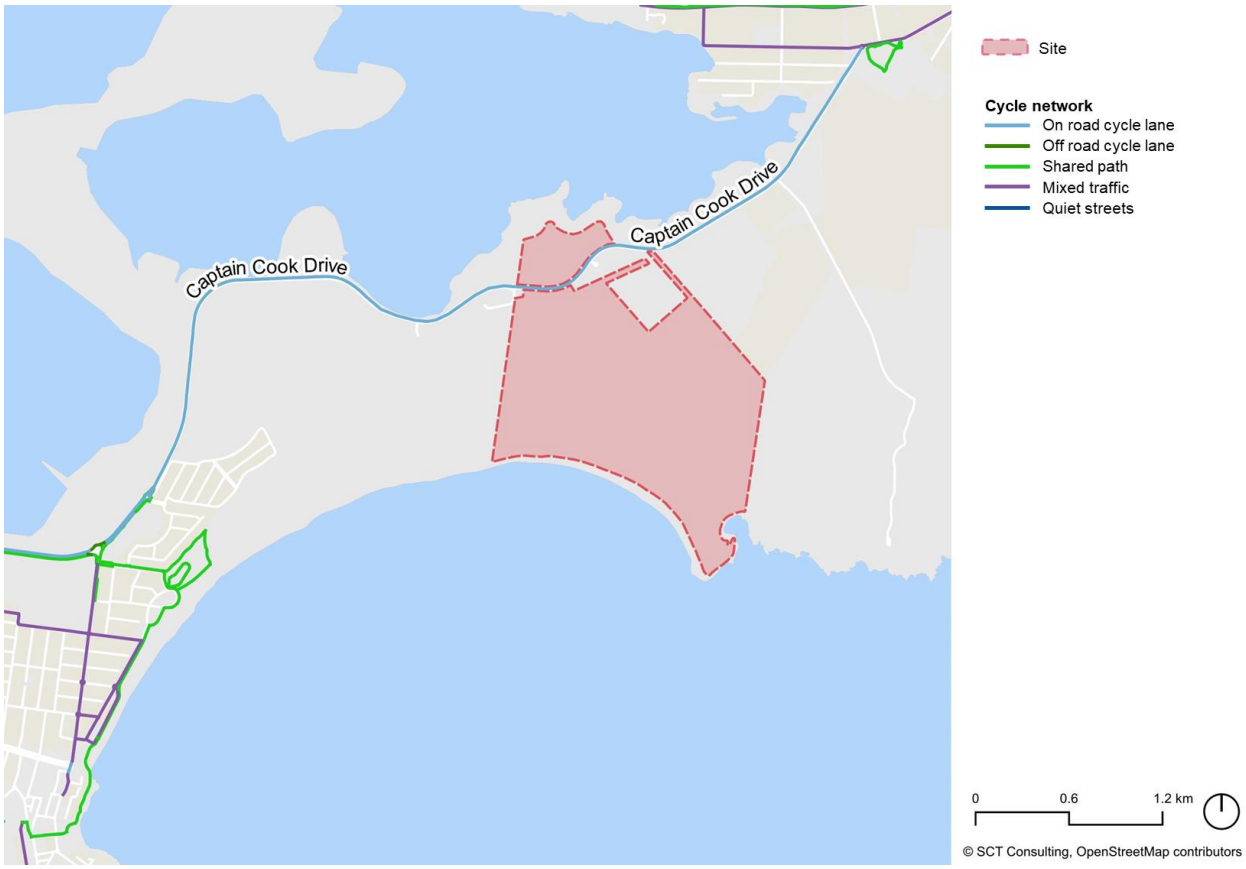
– Hence, the existing walking catchment is limited near the site.

Hence the existing walking catchment is limited.

3.6 Cycling

Figure 3-12 shows the existing cycling network surrounding the site. The section of Captain Cook Drive east of the Captain Cook Drive / Elouera Road intersection has on-road cycle lanes on both sides of the road. Captain Cook Drive has an 80km/hr road speed from the Captain Cook Drive / Elouera Road intersection to the site. The high-speed environment could be uncomfortable for cyclists.

Figure 3-12 Existing cycling network

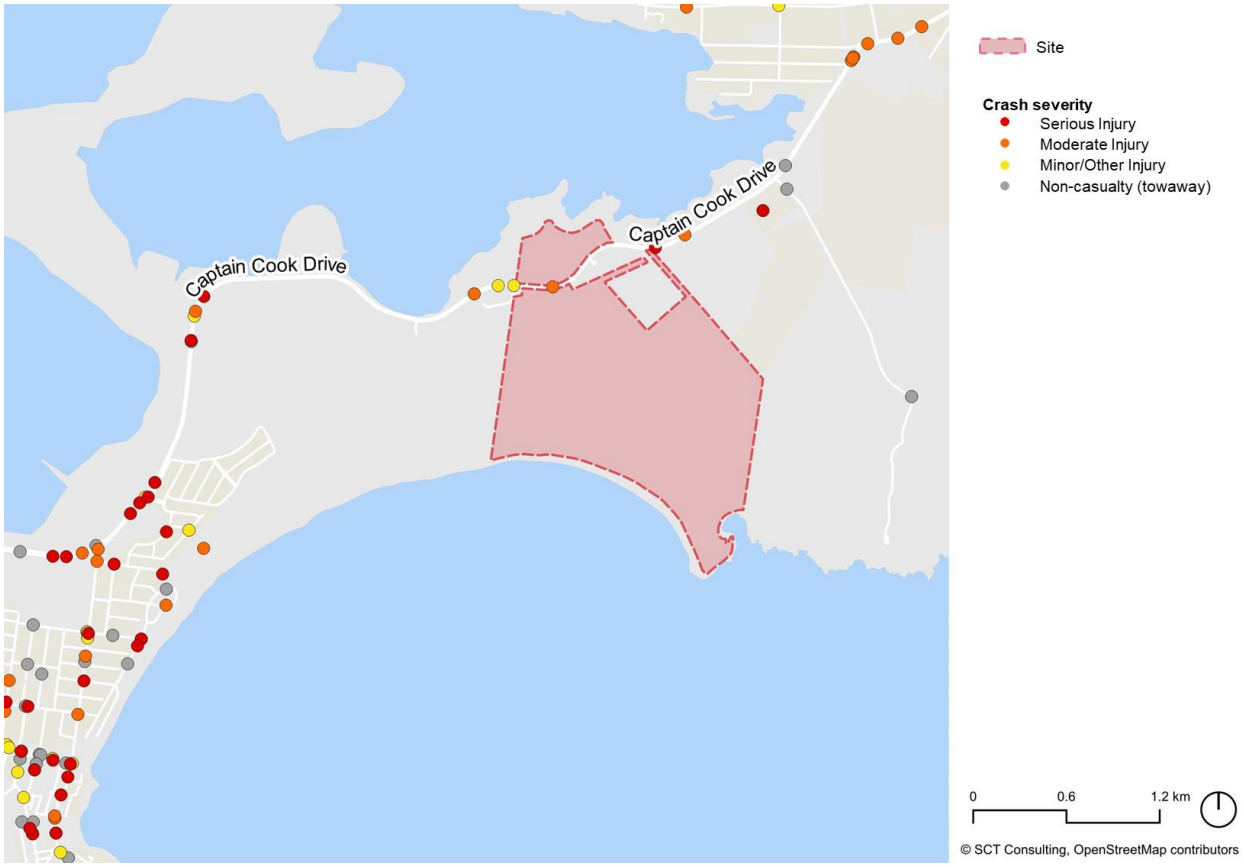


Source: TfNSW; 2023

3.7 Crash data

Figure 3-13 summarises the location of crashes from 2018 to 2022 around the study area. Along Captain Cook Drive, there are six crashes close to the site, with two clusters at the western and eastern fringes of the site. A majority of these crashes are ‘moderate injury’ crashes (three), two are ‘minor injury’ crashes and there was a ‘serious injury’ crash. One of the ‘minor injury’ crashes involved a cyclist.

Figure 3-13 Crash severity around the study area



Source: TfNSW; 2023

4.0 The proposal

4.1 Overview

The project site is envisaged as a mixed-use community consisting of a range of residential, retail, tourism, and recreational uses as well as a range of open space and community facilities (including a school).

The proposed master plan consists of four precincts (**Figure 4-1**), each with a mix of opportunities for living, employment and recreational activity. Precincts will be connected through walking, cycling and public transport infrastructure creating an active, accessible, and sustainable community.

Figure 4-1 Master Plan Overview

Source: GroupGSA

Nestled between Cronulla State Park and Botany Bay National Park, the development provides an opportunity to improve public access to Bate Bay and Boat Harbour, which includes over 2 kilometres of beach, whilst also providing a range of facilities for visitors of the recreational open space.

4.2 Development staging

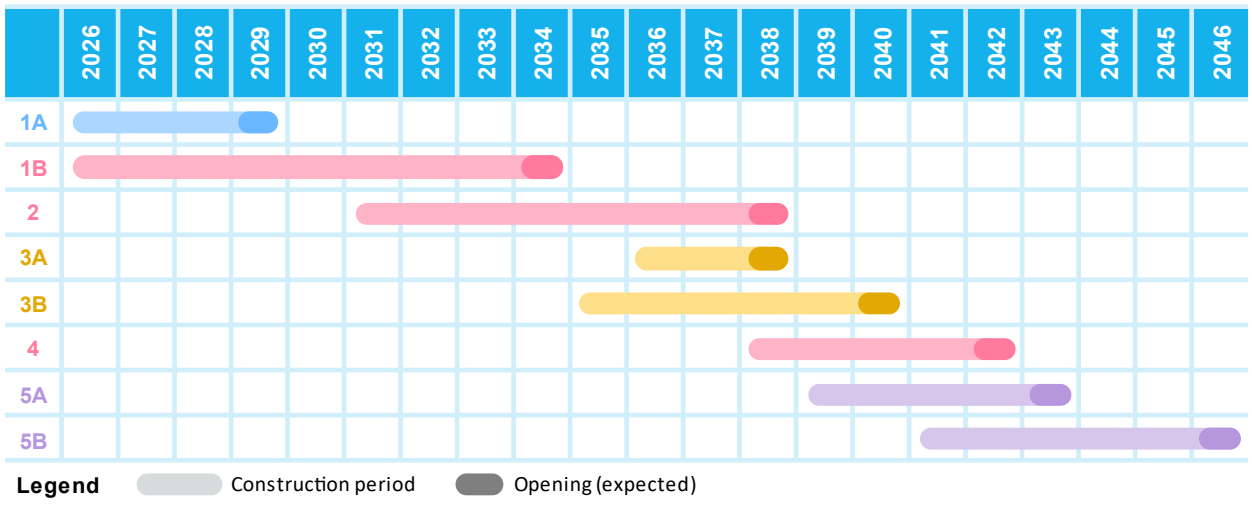
The development will be delivered in stages between 2029 and 2046 as summarised in **Figure 4-2** and **Figure 4-3**. Construction is expected to commence in 2026, with a year of opening in 2029 with only Stage 1A completed and potentially Stage 1B partially completed. The development is expected to be fully completed and operational in 2046.

For the traffic modelling, it is assumed the project will be 100% complete and operational by 2039, 10 years after the year of opening to inform road infrastructure recommendations consistent with best practice for assessing traffic-generating developments.

Figure 4-2 Master Plan staging overview

Source: GroupGSA with SCT annotations

Figure 4-3 Master Plan staging overview – delivery program



Based on the delivery program dated 4 December 2023 (Urbis).

4.3 Comparison to the previous master plan

4.3.1 Context

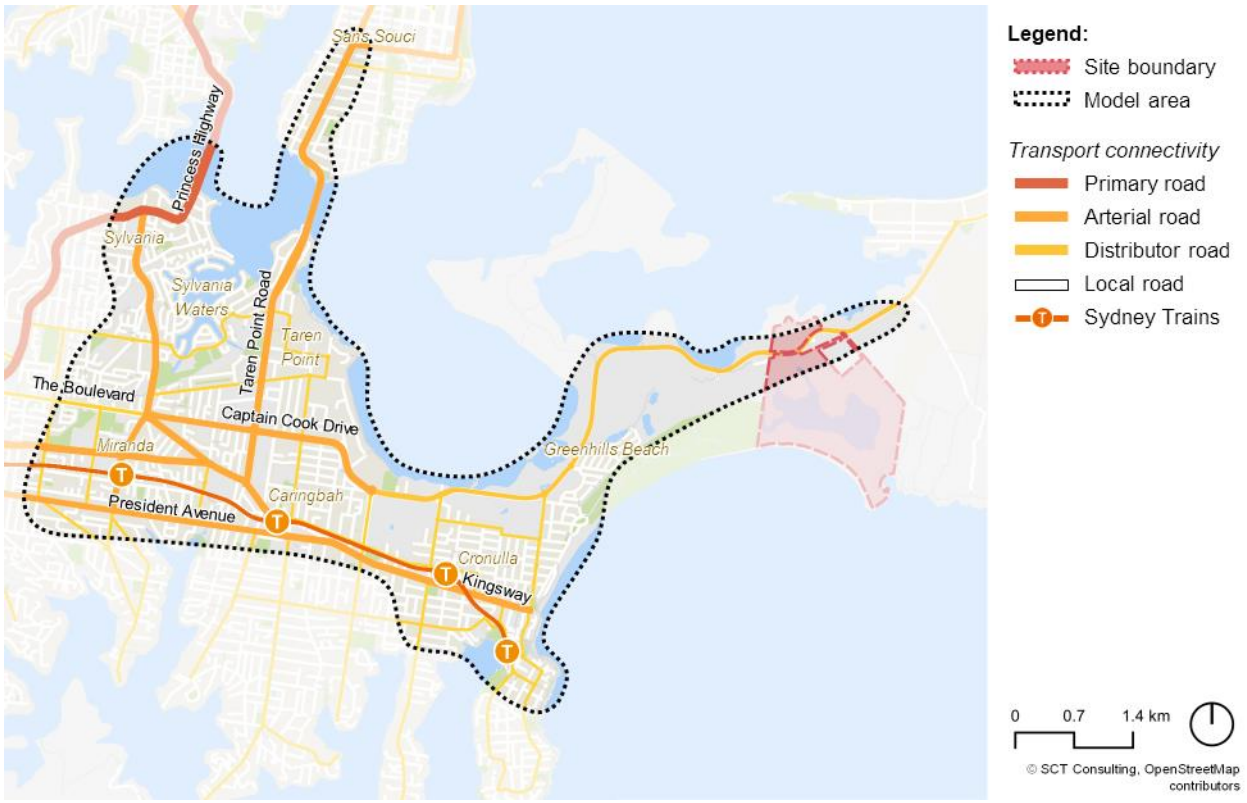
In support of the earlier phases of the SEPP amendment process, a master plan and associated technical studies, including a transport study, were prepared.

The transport study, *Kurnell Peninsula Phase 1 Transport Assessment* (TTPP, March 2020), was based on a site master plan and land use yield as documented in *Masterplan Design Statement* (PTW Architects, August 2020).

Since these earlier studies, the project has evolved and responded to feedback from ongoing consultation with key stakeholders including Sutherland Shire Council (SSC), Transport for NSW, Government Architect NSW (GANSW as part of the Department of Planning, Housing and Infrastructure), which has resulted in the current master plan.

The previous transport study included the development of an extensive mesoscopic traffic model (PTV VISUM - Intersection Capacity Analysis) of the surrounding area (**Figure 4-4**) as agreed with Sutherland Shire Council and Transport for NSW. This model was used to assess numerous future scenarios (with and without development) to inform and identify capacity improvements for the road network. Improvements included those required for the growth wider region (independent of this project), and hence delivered by others and also improvements that would be required as a direct result of this project.

Figure 4-4 Traffic model boundary



Source: TTPA (2020) boundary overlaid to SCT Consulting map

This study leverages the results and recommendations from the previous traffic modelling, where appropriate, by comparing and contrasting the similarities and differences between the two master plans (and their associated land use mix and yield) and the consequent impact on the road network. The impact on the road network is discussed in **Section 6.3**.

4.3.2 Land use and yield comparison

The proposed master plan has evolved from the previous iteration, with the key changes being:

– Introduction of educational land use, to facilitate a school to serve the new residential population (as well as provide additional options for the nearby suburbs of Greenhills Beach and Kurnell).
– Re-configuration of residential land uses to increase the diversity of dwellings provided to help support housing supply targets for the region, including increased high-density residential apartments and the inclusion of medium-density townhouses.
– Conversion of previous commercial land uses to increased retail areas to serve the new population (including tourism) and the existing population which is currently required to head to Cronulla or Woolooware Bay.

Table 4-1 summarises the changes in land use between the previously assessed scheme and the proposed scheme. During the development of the previous scheme, numerous land use options were considered with the end outcome a mixed-use community of approximately 550,000 m^2 yield. The modelling undertaken however reflects an earlier iteration with a higher yield of 600,000 m^2. This higher yield reflects the "worst-case" from a traffic perspective and hence was adopted as the reference case.

Table 4-1 Comparison of land use and yields

Land use type/category		Previous Master Plan	High Yield Master Plan (modelled)	Proposed Master Plan	Change (compared to modelled)
Dwellings (in number of dwellings)					
Seniors Living		*716*	660	750	▲ 90
Residential	High density	*2,002*	2,043	2,743	▲ 700
	Medium density	*1,404*	1,071	840	▼ 231
	Low density	*48*	149	-	▼ 149
Tourism		*1,719*	1,005	587	▼ 418
	Subtotal	*5,889*	4,928	4,922	▼ 8
Non-residential gross floor area (in m^2)					
Commercial		*6,184*	4,542	-	▼ 4,542
Education		-	-	15,771	▲ 15,771
Retail		*6,239*	6,471	9,806	▲ 3,335
Community		*2,304*	2,400	1,325	▼ 1,075
	Subtotal	*14,727*	13,413	26,902	▲ 13,489
Total (including residential GFA)		***551,576 m^2***	**600,000 m^2**	**592,385 m^2**	▼ 7,714 m^2

Source: Previous Master Plan: Masterplan Design Statement (PTW Architects, August 2020
High Yield (modelled): Kurnell Peninsula Phase 1 Transport Assessment (TTPP, March 2020). Residential development was only expressed as gross-floor area, and no dwelling numbers were provided for this scenario. Hence, dwelling numbers were inferred using the ratios from the previous master plan and extrapolated to the higher yield.

Overall, the proposed master plan reflects a comparable number of dwellings to the reference case (modelled high yield scenario) and an increase in non-residential GFA due to the addition of the school (education).

The school size and type have not been defined at this stage of the project and are subject to further studies by Schools Infrastructure NSW (SINSW). However, for this assessment, it has been adopted as a 500-student primary school. The sizing has been informed by the population analysis (Economic Impact Assessment - HillPDA, 2023). Primary schools generally have a higher vehicle trip generation (per student) compared to secondary schools, hence having a greater impact on the road network. This reflects a conservative assumption.

This change in land use mix and yield results in a comparable vehicle trip generation, hence the revised master plan's impact to the road network is comparable to the previously modelled scheme. Therefore the recommendations and outcomes of the previous traffic modelling are still applicable.

The site's vehicle trip generation is discussed in **Section 4.8**, and the relevant recommendations and outcomes for the road network are discussed in **Section 6.3**.

4.4 Transport objectives

The transport objectives developed for the site are:

1. Encourage and facilitate the increased uptake of sustainable modes (public transport, walk and cycle) through improved integration, accessibility and permeability of infrastructure and services.
2. Reduce vehicle trip generation by:
    a. Improvements to public transport services, including infrastructure within the site and services connecting the site to key destinations in the surrounding region.
    b. Provision of safe, comfortable and convenient walking and cycling infrastructure to provide an attractive alternative for short trips, in particular trips within the site.
    c. Implementing parking policies consistent with best practise whilst balancing the requirements and constraints of the site locality.
3. Balance the on-street environment to provide:
    a. Permeable, prioritised and safe environment for customers who walk or cycle.
    b. Sufficient on-street parking to support mobility-impaired customers, short-turn-around parking and on-demand services.
    c. Activation of the street-level environment throughout the day.
    d. Provide safe and efficient access for servicing the various land uses.
    e. Provision of dedicated spaces for freight and point-to-point.

4.5 Proposed movement network and street types

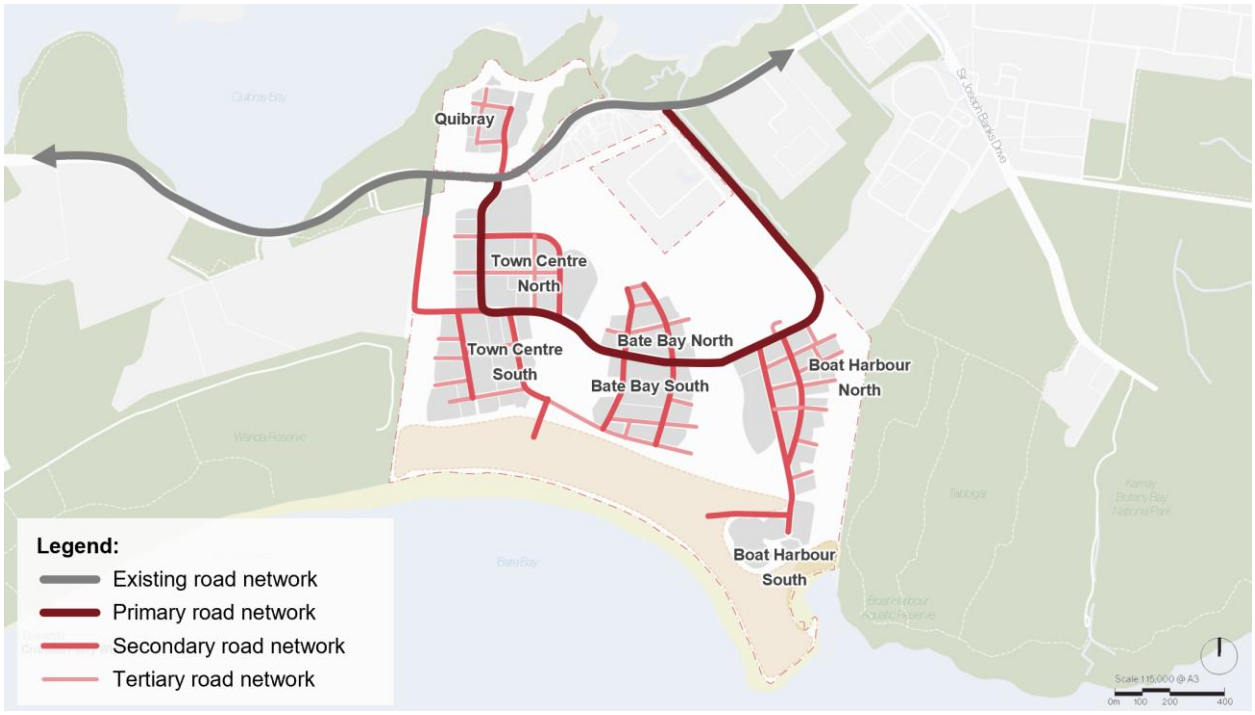
4.5.1 Vehicle and servicing access

Vehicle connectivity for the precinct is provided by 3 tiers of road function as illustrated in **Figure 4-5** with typical descriptions as per **Table 4-2**. Access to the site is via Captain Cook Drive, with the main access via the Primary Road near the Town Centre North. Secondary accesses are provided through Lindum Road (primarily for servicing the town centre) and with the Primary Road at the eastern end of the site (primarily serving the Boat Harbour precinct).

Table 4-2 Road function – vehicle access

Road function	Description
Primary	– Key corridor for serving the new precinct. – Lane widths are sized to support heavy vehicles including buses and freight. – Can accommodate specialised fire appliances for emergencies in each direction. – Based on the proposed land uses, 2 traffic lanes in each direction are required between Captain Cook Drive (CCD) and Town Centre North. Only 1 traffic lane in each direction is required west of Town Centre North through to the eastern connection with CCD. – Kerbside parking and bus stops are provided where appropriate.
Secondary	– Connect each of the precincts to the Primary road corridor. – Lane widths sized to support heavy vehicles including freight. – Can accommodate specialised fire appliances for emergencies in each direction. – Provision includes 1 traffic lane in each direction plus kerbside parking on both sides.
Tertiary	– Service local neighbourhoods. – Typically low-speed environments. – Lane widths are sized to local deliveries and waste collection. – Can accommodate specialised fire appliances for emergencies. Parked specialist vehicles (with extended supports) may encroach onto the opposing traffic lane. – Provision includes 1 traffic lane in each direction plus kerbside parking on both sides.

Figure 4-5 Proposed vehicle network



Source: GroupGSA base map with SCT Consulting annotations

4.5.2 Walking and cycling access

The site is designed to be largely self-contained, with its own local centre, school, multiple district parks, as well as retail frontages and open space dispersed throughout the residential areas. Hence the walking and cycling network needs to provide a permeable, safe and convenient network.

Separated cycleways are proposed along the key north-south and east-west axes of the site, which transition into shared paths or shared zones for the first and last section of their journey. It is recommended that shared paths be provided through the green spaces to facilitate and encourage recreational walking and cycling.

External to the site, the neighbouring centres are a long walk away, and therefore cycling would be the expected active transport mode for travel outside of the site. External trip attractors include train stations along the T4 Line, and commercial and employment centres, hence the main connection is via cycle paths on Captain Cook Drive (which are upgraded as part of the road widening – refer to **Appendix B**).

The proposed pedestrian and cyclist access routes and the connections to the existing network are shown in **Figure 4-6**. Walking and cycling desire lines and infrastructure recommendations are discussed in more detail in **Section 5.1**.

Figure 4-6 Proposed walking and cycling network

Source: GroupGSA base map with SCT Consulting annotations

4.5.3 Public transport access

Due to the location of the site, public transport access is limited to bus services which connect to neighbouring town centres and the Sydney Trains T4 Illawarra Line at Cronulla Station. Existing services operate along Captain Cook Drive as illustrated in **Figure 4-7**.

It is proposed the main road through the precinct is sized to accommodate buses to service the precinct, including shuttle buses (minibuses), regular Sydney buses and coaches. A secondary network is also proposed which serves the beachfront (Town Centre South and Boat Harbour South) as well as the proposed school north of the town centre. This secondary network has been sized to accommodate coaches and buses to allow school and holiday charter services. The role of buses (and associated infrastructure) is discussed in more detail in **Section 5.2**.

Figure 4-7 Proposed bus network

Source: GroupGSA base map with SCT Consulting annotations

4.5.4 Street typology

The proposed mixed-use development is serviced by a contiguous road network and links connecting the Town Centre and surrounding residential areas to the tourism destinations and coastal front, as shown in **Figure 4-8**. The road network addresses mode-specific requirements and ambitions as discussed in the preceding sections.

Figure 4-8 Proposed Street Hierarchy

Source: GroupGSA

The street typologies identify the extent of road reserve available for pedestrian priority initiatives, determine its dominant function, and how best to provide high-quality public domain, whilst remaining relevant to its context and function.

- **Main Street** serves as a vital loop road, functioning as a primary connector for all forms of movement. It ensures the safe and efficient flow of all modes of travel, creating a seamless network for everyone.
- **Collector Street** is essential for accommodating larger traffic movements, providing access to the school for bus drop-offs, connecting to vital services in the town centre, and serving as the gateway to the Arrival Precinct parking area.
- **High Street** functions as the vibrant heart of the urban community. It has been carefully designed to promote vibrancy, activity, and amenity through a finely woven network of safe and accessible streets. This street offers a walkable experience with a variety of destinations such as restaurants, shops, services, and transit stops.
- **Residential Boulevard** is an attractive street for people activities as well as supporting the multi-modal movement of local residents.
- **Residential Streets** prioritise pedestrians and create a neighbourhood environment with low vehicular speed and minimal traffic volume. This design places people at the centre, ensuring a safe and peaceful living experience.
- **Perimeter Roads** provide firefighter access, acting as fire control lines within Asset Protection Zones.
- **Laneways** are dedicated to pedestrians and cyclists, enhancing walkability by connecting various places and amenities within precincts.

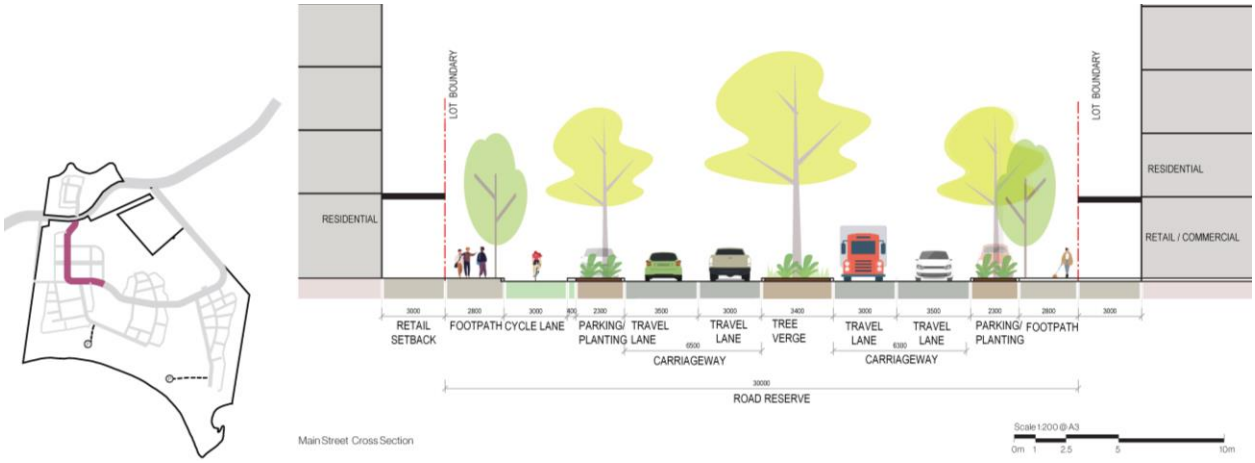
4.5.4.1 Main street

The main street is a main connector for cars, buses, cyclists and pedestrians, connecting neighbourhood centres, running along commercial corridors also prioritising the street for pedestrians and transit. It is a lively street for efficient public and active transport movement and complementary place activities.

Wide nature strips for canopy trees and bioretention swale create a green gateway, buffering the commercial or residential street edge from the vehicular carriageway. The separated bi-directional cycleway will ensure safe and efficient movement and encourage sustainable travel behaviour.

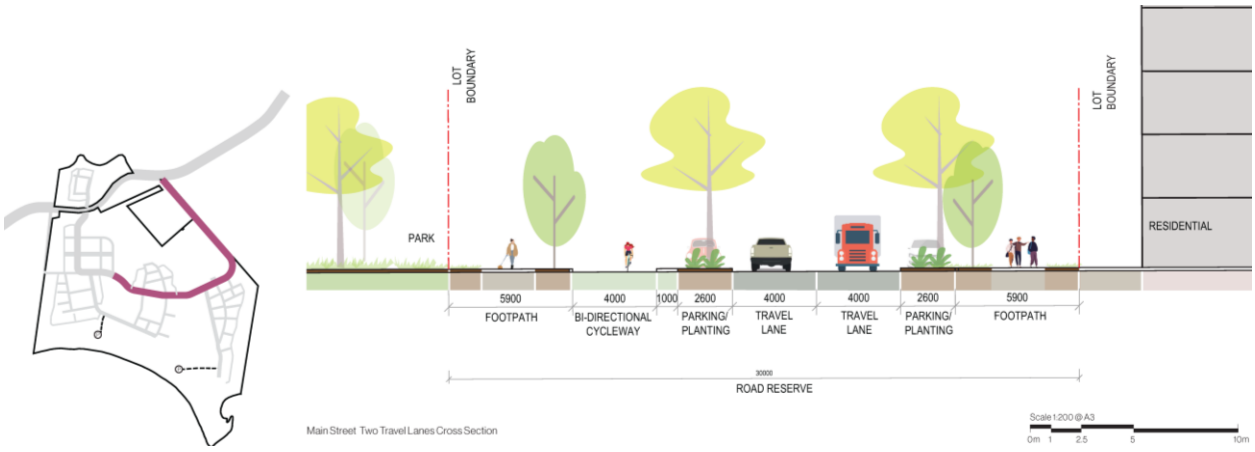
The main street forms a loop road with both ends connecting with Captain Cook Drive. As most development-related traffic is heading towards the west along Captain Cook Drive towards Cronulla and Woolooware, the western section of the main street would collect most of the traffic and hence require a wider cross-section (as shown in **Figure 4-9**) to accommodate 4 traffic lanes versus the eastern section of the main street (from the southern boundary of the Town Centre District Park to the eastern site boundary) that only requires 2 traffic lane (with single traffic lane in each direction, as shown in **Figure 4-10**).

Figure 4-9 Cross section: Main Street (4 lanes)



Source: GroupGSA

Figure 4-10 Cross section: Main Street (2 lanes)



Source: GroupGSA

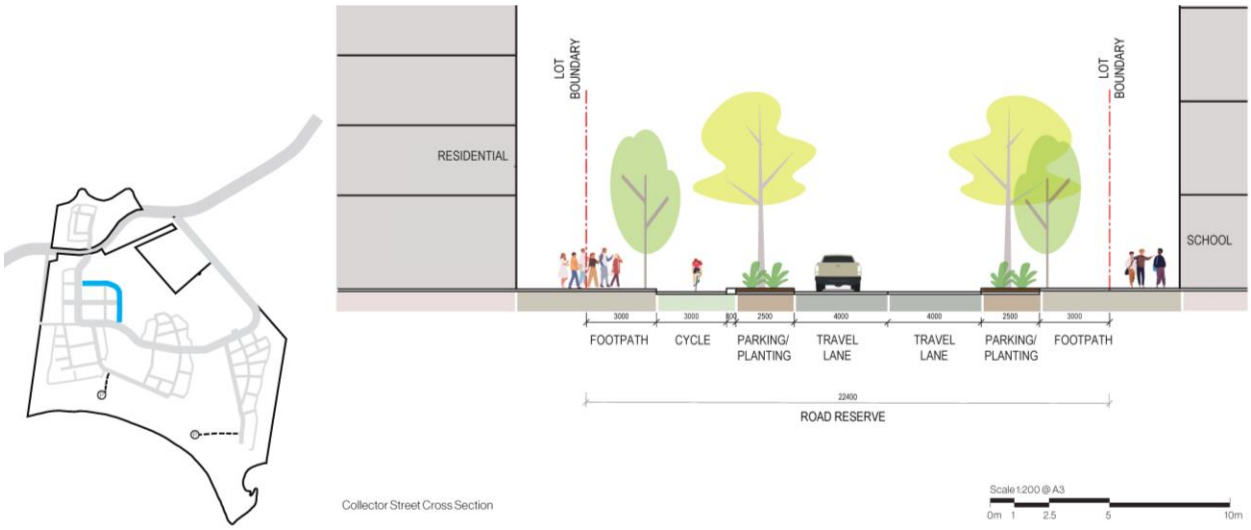
Table 4-3 Provisions compared with minimum and recommended requirements – Main Street

Element	Provision	Requirement	Source	Rationale	Outcome
Travel lane (kerbside)	Min. 3.5m	Min. 3.2m	TfNSW Bus Infrastructure Guidelines	A minimum 3.5m kerbside lane is provided along the main street to allow buses to use the lane that satisfies TfNSW's minimum requirements.	Sufficient
Travel lane (centre)	3.0m	3.0-3.4m	Austroads Guide to Road Design Part 3	The provision satisfies the minimum requirements for low-speed roads within the precinct. Lane widths are kept to a minimum to also minimise pedestrian crossing times, especially near the town centre.	Sufficient
Parking lane	Min. 2.3m	2.0-2.3m	AS2890.5	The provision satisfies the minimum requirements for low-speed roads within the precinct.	Sufficient
Median	3.4m	N/A	N/A	Spaced to provide nature strips for canopy trees and bioretention swale create a green gateway. It could be used to accommodate right-turn bays at intersections without the need for localised widening.	Sufficient
Cycle facility	Min. 3.0m	Min. 3.0m	TfNSW Cycleway Design Toolbox	A single bi-directional cycleway on the southern side is supported. Transport Cycle Design Toolbox recommends a 3.0m cycleway to enable overtaking, future growth and accommodate riders of all ages and abilities. The facility widens to 4.0m on the eastern section of the main street.	Sufficient
Footpath reserve	Min. 5.8m	3.5m	Sutherland Shire Council DCP	Ample footpath spatial allowance is provided to encourage walking trips and activities within the precinct. The wide footpath offers a more walkable streetscape and facilitates additional space for landscape and canopy trees.	Sufficient

4.5.4.2 Collector street

The collector street is a perimeter street along the edge of the town centre, providing access to the school and access for services vehicles to retail shops. This typology facilitates a dedicated cycleway and public transport network as well as provides a safe walking environment for people, as shown in **Figure 4-11**.

Figure 4-11 Cross section: Collector Street



Source: GroupGSA

Table 4-4 Provisions compared with minimum and recommended requirements – Collector Street

Element	Provision	Requirement	Source	Rationale	Outcome
Travel lane	4.0m	3.5m	Austroads Guide to Road Design Part 3	The provision satisfies the minimum requirements for low-speed roads within the precinct. Travel lanes are slightly wider to accommodate the heavy vehicle movements in and out of the town centre.	Sufficient
Parking lane	2.5m	2.0-2.3m	AS2890.5	The provision satisfies the minimum requirements for low-speed roads within the precinct, with a small buffer from general traffic.	Sufficient
Cycle facility	3.0m with 400mm additional separation	Min. 3.0m	TfNSW Cycleway Design Toolbox	A single bi-directional cycleway on the northern side is supported to provide a connection with the open space and off-street shared park network. Transport Cycle Design Toolbox recommends a 3.0m cycleway to enable overtaking, future growth and accommodate riders of all ages and abilities.	Sufficient
Footpath reserve	6.0m	3.5m	Sutherland Shire Council DCP	Ample footpath spatial allowance is provided to encourage walking trips and activities within the precinct. The wide footpath offers a more walkable streetscape and facilitates additional space for landscape and canopy trees.	Sufficient

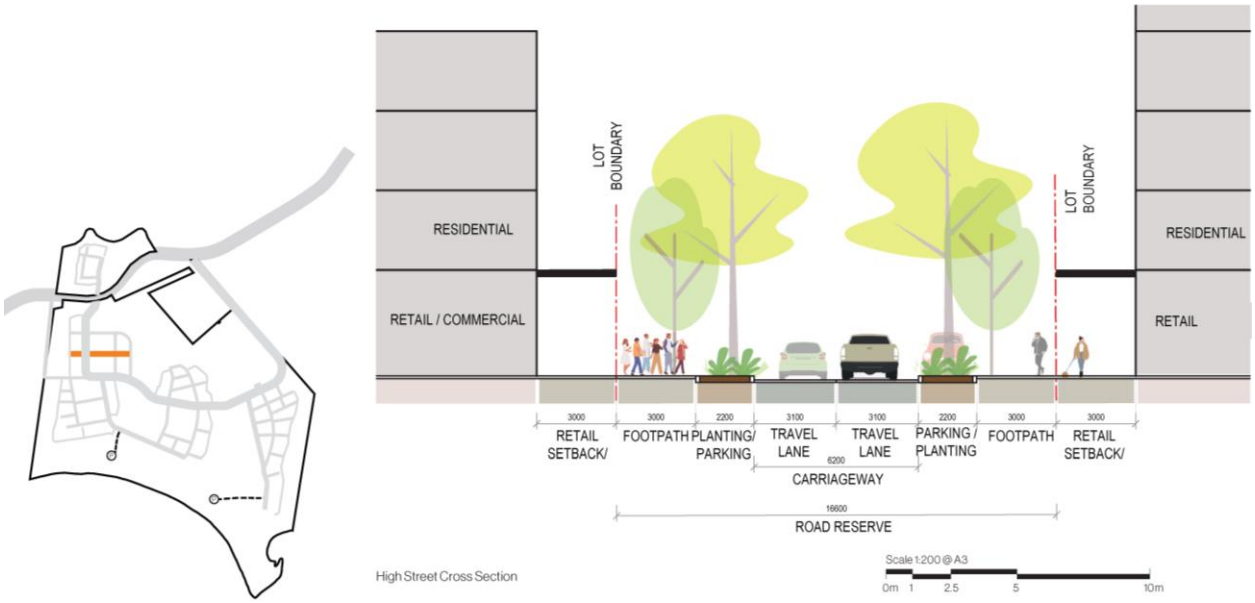
4.5.4.3 High street

The high street passes through the heart of urban communities and lies at the heart of everyday life, offering walkable destinations such as restaurants, shops, services, and transit stops, as shown in **Figure 4-12**.

This typology encourages pedestrian movement and creates an environment of vibrancy and vitality. Active frontages are locations where retail shopfronts address the street, building entries are positioned and pedestrians circulate, accessing shops and services.

This street through the town centre acts as a quietway with sign-posted on-road cycling. It is not recommended to mix cyclists in high pedestrian areas on the footpaths in the town centre.

Figure 4-12 Cross section: High Street



Source: GroupGSA

Table 4-5 Provisions compared with minimum and recommended requirements – Collector Street

Element	Provision	Requirement	Source	Rationale	Outcome
Travel lane	3.1m	3.0-3.4m	Austroads Guide to Road Design Part 3	The provision satisfies the minimum requirements for low-speed roads within the precinct. Lane widths are kept to a minimum to also minimise pedestrian crossing times in the town centre. This street does not expect to cater for larger vehicles (servicing from Collector Street) and public transport.	Sufficient
Parking lane	2.2m	2.0-2.3m	AS2890.5	The provision satisfies the minimum requirements for low-speed roads within the precinct, with a small buffer from general traffic.	Sufficient
Cycle facility	3.1m (shared with traffic)	Min. 2.9m	TfNSW Cycleway Design Toolbox	This street acts as a quietway with sign-posted on-road cycling. It is not recommended to mix cyclists in high pedestrian areas on the footpaths in the town centre.	Sufficient
Footpath reserve	6.0m	3.5m	Sutherland Shire Council DCP	Ample footpath spatial allowance is provided to encourage walking trips and activities within the town centre. The wide footpath offers a more walkable streetscape and facilitates additional space for retail, landscape and canopy trees.	Sufficient

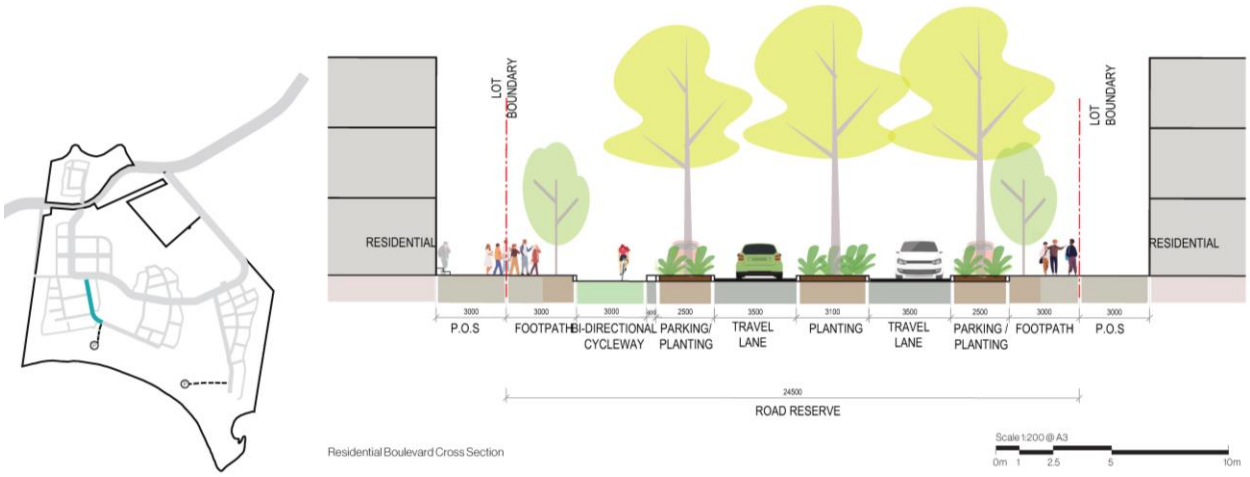
4.5.4.4 Residential boulevard

The residential boulevard is an attractive street for people activities as well as supporting the multi-modal movement of local residents. This typology accommodates wide nature strips/central median for canopy trees and bioretention swale that creates green linkages. They typically connect the local residential streets with the main (collector) street.

Separated bi-directional cycleway facilitates safe and efficient active transport movement, as shown in **Figure 4-13**.

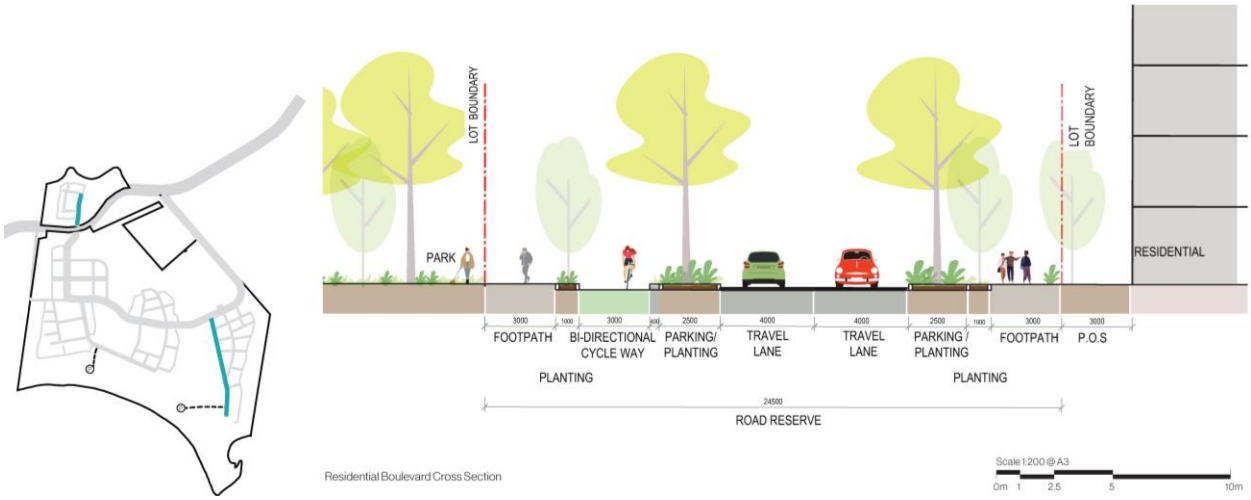
In some locations, the perimeter road function is also provided by the residential streets. An alternative residential boulevard type (as shown in **Figure 4-14**) has been designed to accommodate the 8m wide clear carriageway for access for firefighting vehicles and egress.

Figure 4-13 Cross section: Residential Boulevard



Source: GroupGSA

Figure 4-14 Cross section: Residential Boulevard (as Perimeter Road)



Source: GroupGSA

Table 4-6 Provisions compared with minimum and recommended requirements – Residential Boulevard

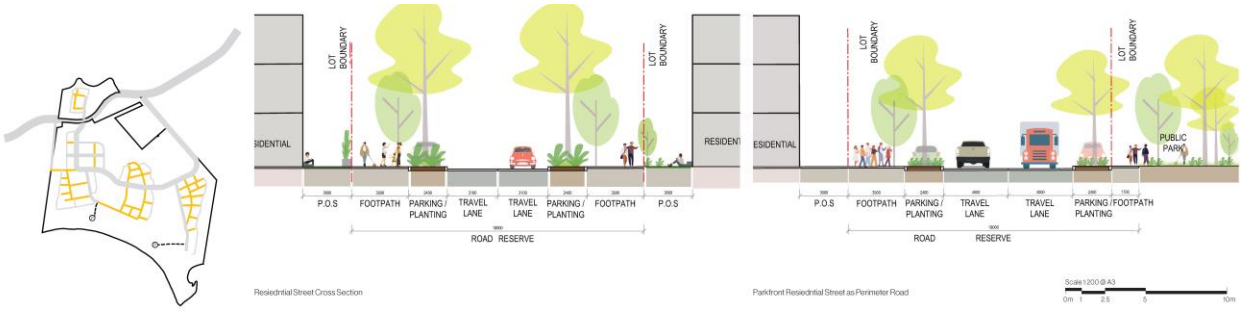
Element	Provision	Requirement	Source	Rationale	Outcome
Travel lane	3.5m / 4.0m for perimeter roads	3.5m / Min. 6.0m for emergency vehicle access	Austroads Guide to Road Design Part 3	The provision of 3.5m travel lanes to accommodate heavy vehicles (i.e. deliveries to the hotel) and coaches. Travel lanes are widened to a combined 8.0m for access for firefighting vehicles and egress.	Sufficient
Parking lane	2.5-2.6m	2.0-2.3m	AS2890.5	The provision satisfies the minimum requirements for low-speed roads within the precinct, with a small buffer from general traffic.	Sufficient
Median	3.1m	N/A	N/A	Spaced to provide wide nature strips/central median for canopy trees and bioretention swale that creates green linkages. It could be used to accommodate right-turn bays at intersections without the need for localised widening.	Sufficient
Cycle facility	3.0m with 400mm additional separation	Min. 3.0m	TfNSW Cycleway Design Toolbox	A single bi-directional cycleway is supported. Transport Cycle Design Toolbox recommends a 3.0m cycleway to enable overtaking, future growth and accommodate riders of all ages and abilities.	Sufficient
Footpath reserve	6.0m	3.5m	Sutherland Shire Council DCP	Ample footpath spatial allowance is provided to encourage walking trips. The wide footpath offers a more walkable streetscape and facilitates additional space for landscape and canopy trees.	Sufficient

4.5.4.5 Residential street

The residential street is a pedestrian-focused neighbourhood street with a low speed and volume of vehicular movement, as shown in **Figure 4-15**.

Wide shared footpath provides safe and comfortable pedestrian linkages and public domain for community uses. Mature street tree canopy and activated street pocket parks provide ecological linkages and microclimate, contributing to the streetscape.

Figure 4-15 Cross section: Residential Street



Source: GroupGSA

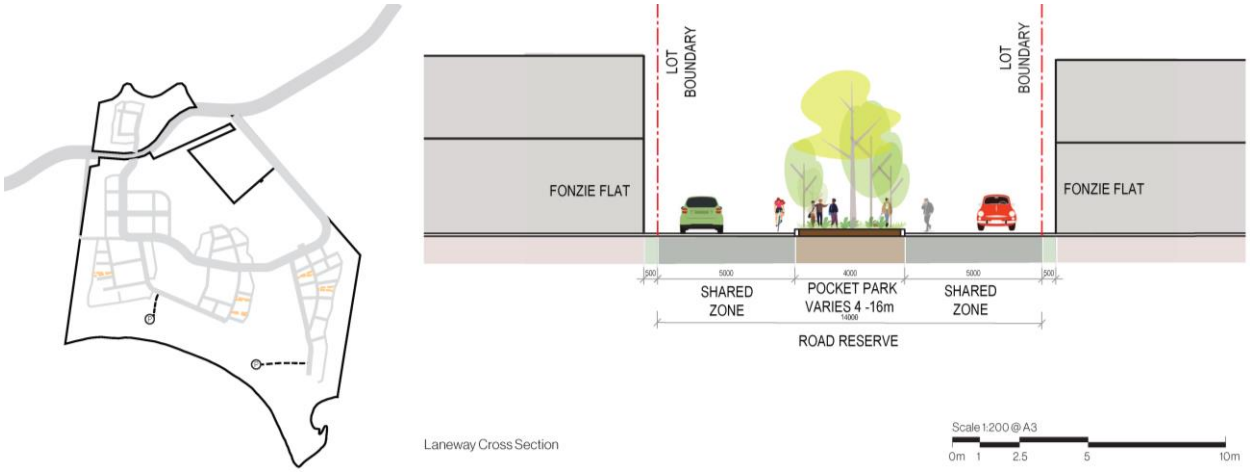
Table 4-7 Provisions compared with minimum and recommended requirements – Residential Street

Element	Provision	Requirement	Source	Rationale	Outcome
Travel lane	3.1m / 4.0m for perimeter roads	3.0-3.4m / Min. 6.0m for emergency vehicle access	Austroads Guide to Road Design Part 3	The provision satisfies the minimum requirements for low-speed roads within residential neighbourhoods. Travel lanes are widened to a combined 8.0m for access for firefighting vehicles and egress.	Sufficient
Parking lane	2.4m	2.0-2.3m	AS2890.5	The provision satisfies the minimum requirements for low-speed roads within the precinct, with a small buffer from general traffic.	Sufficient
Cycle facility	3.5m shared paths	Min. 2.5m	TfNSW Cycleway Design Toolbox	3.5m shared paths on both sides are provided on all local residential streets (1m wider than the minimum requirements), which would encourage walking and cycling trips for residents.	Sufficient
Footpath reserve	6.5m	3.5m	Sutherland Shire Council DCP	Ample footpath spatial allowance is provided to encourage walking trips. The wide footpath offers a more walkable streetscape and facilitates additional space for landscape and canopy trees.	Sufficient

4.5.4.6 Laneway

Laneways provide a safer walking environment and a fine-grain street network that creates a pedestrian-friendly environment near low and medium-density housing areas whilst facilitating service vehicles. This typology could become a shared public space that enables a range of activities to occur in the space, as shown in **Figure 4-16**.

Figure 4-16 Cross section: Laneway



Source: GroupGSA

Table 4-8 Provisions compared with minimum and recommended requirements – Laneway

Element	Provision	Requirement	Source	Rationale	Outcome
Travel lane	5.0m (shared zones)	N/A	N/A	The provision of shared space encourages a safer walking environment and a fine-grain street network that creates a pedestrian-friendly environment near the low and medium-density housing areas. These street sections are relatively short that minimise high-speed traffic movements.	Sufficient

4.6 Mode share targets

The region has relatively poor bus connectivity and is not within walking distance of rail infrastructure (the closest station is at Cronulla or Woolooware along the Sydney Trains T4 Eastern Suburbs and Illawarra Line). This results in comparatively low existing public and active transport mode share for the immediate region.

To inform the transport assessment a base case mode-share (**Table 4-9**) has been adopted, which reflects a private vehicle mode share consistent with the previously approved vehicle trip generation rates (TTPP, 2020) and existing active and public transport mode share (as discussed in **Section 3.2**). The base case provides a reasonable reflection of the minimum requirements for active and public transport and the worst-case scenario for road traffic.

Table 4-9 Base case mode share

Land use	Car	Train	Bus	Cycle	Walk
Residential					
Seniors Housing	80%	8%	1%	1%	10%
Aged care	80%	8%	1%	1%	10%
High Density residential	80%*	7%	1%	5%	10%
Medium Density residential	80%*	7%	1%	5%	10%
Townhouses	80%*	7%	1%	5%	10%
Eco Tourist Villas/ Hotel	55%	10%	5%	10%	20%
Non-residential					
Retail	80%	8%	1%	1%	10%
Community Facilities	80%	8%	1%	1%	10%
Education	36%	-	-	10%	54%

Note (*): It is assumed approximately 50% of the rail mode-share uses a private vehicle to access the station (park-and-rides or kiss-and-ride). Hence these trips are counted in both train and car mode-share, hence the total is greater than 100%.

The project recommends (and leverages) several initiatives to improve public and active transport mode share, as discussed in **Section 5.0**. With these opportunities to better serve the development, an aspirational case (**Table 4-10**) demand has also been considered for informing the active and public transport requirements.

Table 4-10 Aspirational case mode share

Land use	Car	Train	Bus	Cycle	Walk
Residential					
Seniors Housing	80%	8%	1%	1%	10%
Aged care	80%	8%	1%	1%	10%
High Density residential	67%	16%	2%	5%	10%
Medium Density residential	75%*	16%	2%	5%	10%

Land use	Car	Train	Bus	Cycle	Walk
Residential					
Townhouses	75%*	16%	2%	5%	10%
Eco Tourist Villas/ Hotel	55%	10%	5%	10%	20%
Non-residential					
Retail	52%	8%	5%	5%	30%
Community Facilities	62%	8%	5%	5%	20%
Education	25%	-	5%	10%	60%

Note (*): It is assumed approximately 50% of the rail mode-share uses a private vehicle to access the station (park-and-rides or kiss-and-ride). Hence these trips are counted in both train and car mode-share, hence the total is greater than 100%.

The mode-share targets above (**Table 4-9** and **Table 4-10**) reflect the percentage of total trips, including both trips external to the site and those internal to the site.

For walking and cycling trips, the viability of trips varies quite significantly between internal and external trips due to the potential length of the trip. With the right provision of infrastructure, the internal trips, with short distances, can have a significantly higher active transport mode share than the wider LGA. The proposed targets for the site are:

– Internal trips: The majority (over 50%) of internal trips are to be completed by walking and cycling.

– External trips: 4% of external trips to be completed by active transport by 2030, exceeding the council's strategic targets for the LGA, as set by the Integrated Transport Strategy (2020).

Section 5.1 discusses how the above targets can be achieved with the appropriate infrastructure and strategy.

4.7 Parking requirements and provision

The Sutherland Shire Council Development Control Plan (DCP) 2015 contains detailed development controls which aim to facilitate quality development, protect neighbourhood amenity and maintain environmental quality. Chapter 36 - Vehicular Access Traffic Parking and Bicycles supplements the vehicular access, traffic, parking and bicycle controls provided for specific types of developments. It provides detailed controls that apply across most forms of development and establishes what the Council will consider acceptable design solutions regarding these issues.

Car parking requirements as per Sutherland Shire DCP as well as State Environmental Planning Policy (Housing), for specific land uses included in part of this proposed development, are summarised in **Table 4-11**.

The proposed car parking provision for each of the land uses is generally consistent with the DCP or the State Environmental Planning Policy (Housing). However, there are opportunities to further discuss and reduce parking rates or shared parking provisions to further discourage private vehicle use, subject to the agreement to the implementation of the Green Travel Plan including all the active and public transport initiatives.

Table 4-11 DCP car parking requirements for key land uses

Land use	Reference and category	Car parking requirements	Proposed car parking rate
Medium and high-density residential including townhouses	Sutherland Shire DCP - Residential – residential flat building/shop top housing	*Zones R4 & R3* Minimum: 1 space per 1 bed, 1.5 spaces per 2 bed, 2 spaces per 3 bed, 1 visitor space per 4 units Maximum: up to 3 spaces per dwelling	Minimum: 1 space per 1 bed, 1.5 spaces per 2 bed, 2 spaces per 3 bed, 1 visitor space per 4 units Maximum: up to 3 spaces per dwelling
Seniors housing – independent living units (ILUs)	SEPP (Housing) 2021[1] – independent living units	At least 1 parking space for every 15 beds in the facility; and at least 1 parking space for every 2 employees who are on duty at the same time; and at least 1 parking space for ambulance parking.	At least 1 parking space for every 15 beds in the facility; and at least 1 parking space for every 2 employees who are on duty at the same time; and at least 1 parking space for ambulance parking.
Seniors housing – residential aged care facilities (RACF)	SEPP (Housing) 2021[2] – residential care facilities	For a development application made by, or made by a person jointly with, a social housing provider - at least 1 parking space for every 5 dwellings Otherwise, at least 0.5 parking spaces for each bedroom	For a development application made by, or made by a person jointly with, a social housing provider - at least 1 parking space for every 5 dwellings. Otherwise, at least 0.5 parking spaces for each bedroom
Tourism (eco-cabins)	Sutherland Shire DCP – caravan park/ecotourist facility	1 space per caravan site or ecotourist unit 1 visitor space per 20 caravan site or ecotourist unit 1 space for the site manager	1 space per caravan site or ecotourist unit 1 visitor space per 20 caravan site or ecotourist unit 1 space for the site manager
Tourism (hotel rooms)	Sutherland Shire DCP – hotel or motel accommodation	Minimum of 1 space per 4 rooms; plus, 1 space per 2 employees	Minimum of 1 space per 4 rooms; plus, 1 space per 2 employees
Retail premises	Sutherland Shire DCP – retail premises	*Zones B1, B2, B3 & B4*: Minimum of 1 space per 30m^2 GFA *Zones B5 & B6*: Minimum of 1 space per 45m^2 GFA	Minimum of 1 space per 45m^2 GFA
Cultural and community facilities	Sutherland Shire DCP – office and business premises	*Zones B1, B2, B3 & B4*: Minimum of 1 space per 30m^2 GFA *Zones B5 & B6*: Minimum of 1 space per 45m^2 GFA	Minimum of 1 space per 45m^2 GFA
Education	Sutherland Shire DCP – schools	Traffic study	1 space per staff; and pick up drop off area to be determined in future development application

[1] Sutherland Shire DCP refers to SEPP (Housing for Seniors or People with a Disability) 2004. However, this policy is repealed by SEPP (Housing 2021)
[2] Sutherland Shire DCP refers to SEPP (Housing for Seniors or People with a Disability) 2004. However, this policy is repealed by SEPP (Housing 2021)

4.8 Trip generation

4.8.1 Peak hour

Based on the proposed land use types and their respective yields, the AM and PM peak hour trips generated by the site have been estimated to inform the transport assessment.

Vehicle-based trips have been estimated based on the rates agreed with Transport for NSW (previously RMS) as per the previous study (extract included in **Appendix A**) and summarised in **Table 4-12**.

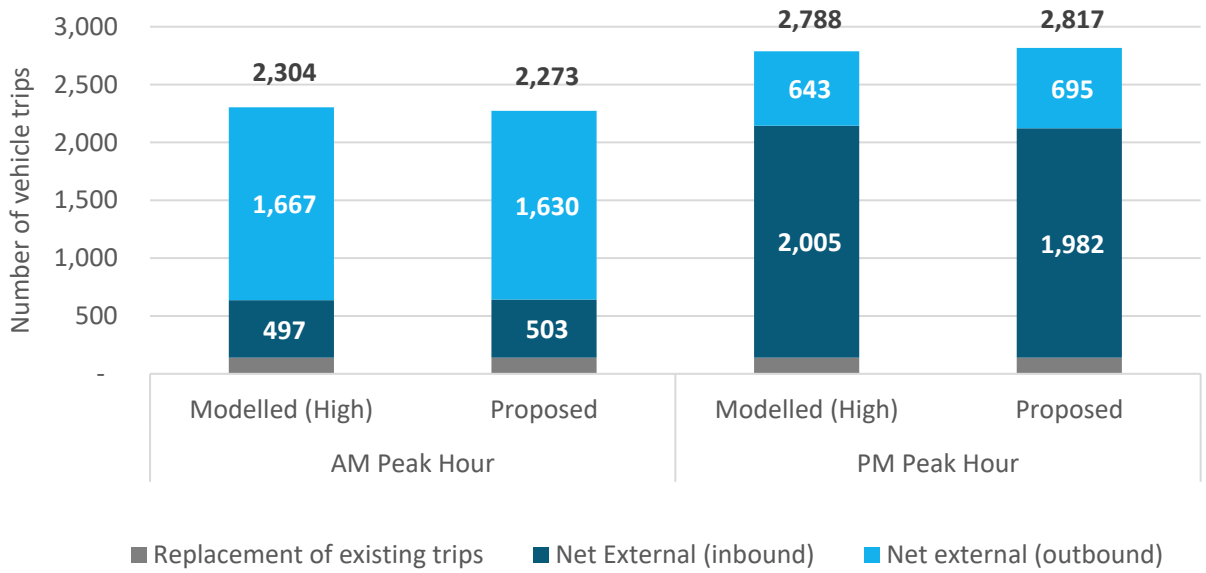
The site currently generates 1,400 vehicle movements per day (including 700 ingress and 700 egress movements), which equates to approximately 140 vehicle movements per hour based on a 10-hour working day (TTPP, 2020). These existing trips have been subtracted from the proposed site's vehicle trip generation to determine the net increase in vehicle trips on the surrounding road network (**Table 4-12**).

Table 4-12 Precinct vehicle trip generation – base case

Land use	Yield	Trip rate		Directional split (AM)		AM peak hour		PM peak hour	
		AM	PM	In	Out	In	Out	In	Out
Residential (based on the number of dwellings)									
Seniors Housing	628	0.16	0.31	50%	50%	50	50	97	97
Aged care	122	0.12	0.24	50%	50%	7	7	15	15
High density residential	2,743	0.35	0.43	20%	80%	192	768	944	236
Medium density residential	582	0.85	0.85	20%	80%	99	396	396	99
Townhouses	258	0.85	0.85	20%	80%	44	175	175	44
Eco Tourist Villas/ Hotel	587	0.35	0.43	20%	80%	41	164	202	50
Non-residential (based on size)									
Retail	9,806 m^2	0.03	0.06	50%	50%	147	147	294	294
Community Facilities	1,325 m^2	0.02	0.02	50%	50%	13	13	13	13
Education	500 students	0.60	0.32	50%	50%	150	150	80	80
Subtotal						744	1,872	2,216	929
Internal trip reduction						-171	-171	-164	-164
Existing site generation						-70	-70	-70	-70
Net external trips						**503**	**1,630**	**1,982**	**695**

Compared to the previously modelled "high' scenario (refer to **Section 4.3**), the proposed master plan results in a consistent net vehicle trip generation (and hence net impact to the road network) as illustrated in **Figure 4-17**. Paired with the reduction in background traffic (**Section 3.3.2.3**) the results and recommendations of the previous traffic modelling are still applicable and relevant.

Figure 4-17 Comparison of net external vehicle trips – proposed versus previously modelled 'high' scenario



Source: previous modelled 'high' scenario from previous Transport Assessment (TTPP, 2020)

Based on the adopted mode share (**Section 4.6**), the public transport and cycle trip generation for the base case are summarised in **Table 4-9**. The ability to encourage and accommodate the aspirational mode share is considered in **Section 5.0**, in addition to the base case. For the train component of mode share, due to the location of the site, these customers will likely either drive, catch the bus or cycle to the station, and the respective implications on each mode have been considered.

Table 4-13 Precinct non-vehicle trip generation – base case

Land use	Yield	Non-car mode share	Train		Bus		Cycle		Walk	
			AM	PM	AM	PM	AM	PM	AM	PM
Residential (based on the number of dwellings)										
Seniors Housing	628	20%	8	16	1	2	1	2	13	24
Aged care	122	20%	1	2	0	0	0	0	2	4
High density residential	2,743	20%	67	83	10	12	60	74	120	147
Medium density residential	582	20%	35	35	5	5	31	31	62	62
Townhouses	258	20%	15	15	2	2	14	14	27	27
Eco Tourist Villas/ Hotel	587	45%	21	25	10	13	37	46	75	92
Non-residential (based on size)										
Retail	9,806 m^2	20%	24	47	3	6	4	7	37	74
Community Facilities	1,325 m^2	20%	2	2	0	0	0	0	3	3
Education	500 students	64%	0	0	0	0	83	44	450	240
Total trips			**173**	**225**	**31**	**40**	**147**	**175**	**338**	**433**

5.0 Supporting initiatives

5.1 Active transport strategy and initiatives

Sutherland Shire Council has set targets to increase active transport by 25% by the year 2030 (Integrated Transport Strategy). This is further supported by the Council's Active Transport Strategy (2022) which lists objectives including prioritising walking and cycling infrastructure in proximity (2km to 5km) of town centres, transport hubs and schools, improving network connectivity, and providing end-of-trip facilities at key destinations.

The proposed site and its surroundings have a mostly flat terrain, giving it great potential for active transport to be a popular mode of travel. This active transport strategy considers how the proposed site can align with and contribute to increasing active transport mode share in Sutherland Shire.

The objectives of this strategy are to:

– Minimise car trips for journeys within the proposed site (short trips) by encouraging walking and cycling.

– Improve safety, connectivity and amenity of cycling and walking routes from the proposed site to surrounding centres, employment areas and recreational destinations.

– Apply the Principles of Movement and Place which has been adopted by Sutherland Shire Council.

5.1.1 Trip attractors within the site

The site is designed to be largely self-contained, with its own local centre, school, multiple district parks, as well as retail frontages and open space dispersed throughout the residential area. **Figure 5-1** illustrates key trip attractors within the proposed site. This suggests that many daily trips can be completed within the site, short trips that avoid the need to travel to neighbouring centres.

Figure 5-1 Destinations within the proposed site

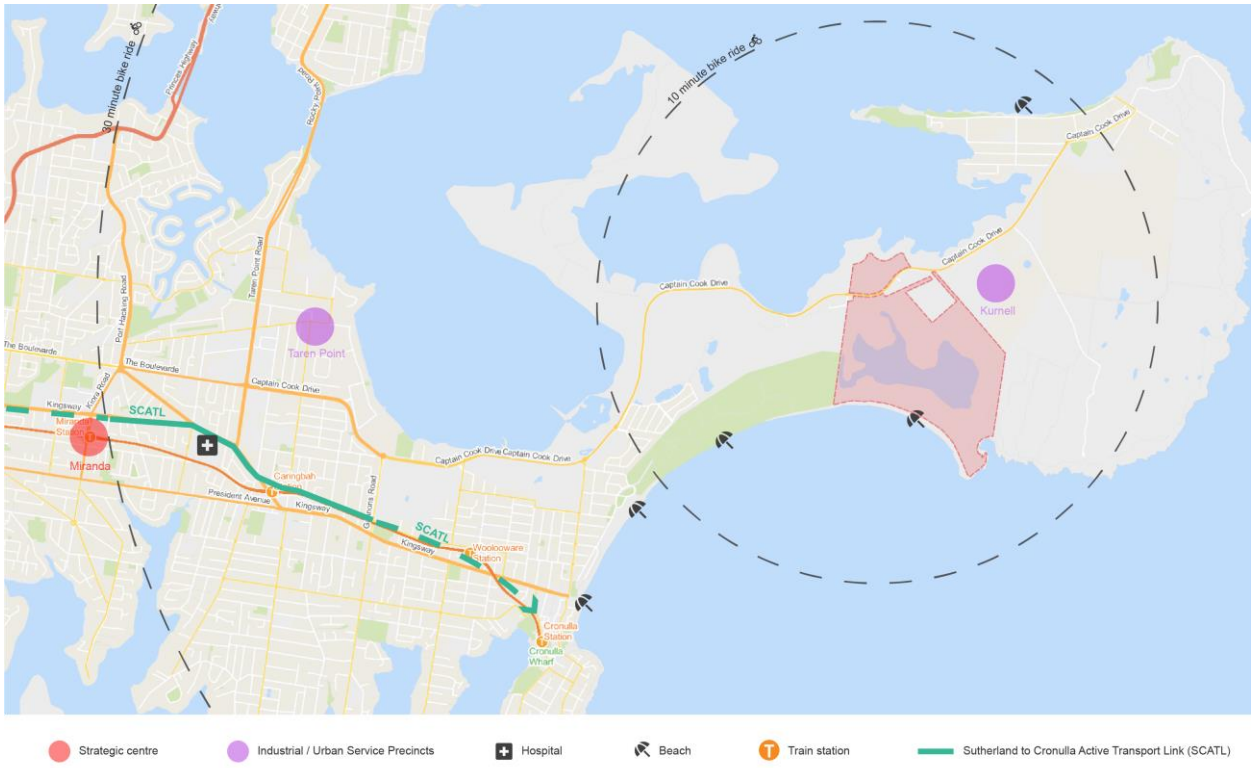
The proposed site itself is less than 3km from end to end, which is well within Sutherland Shire Council's definition of a short trip. In terms of journey time, more than half the site is within a 10-minute walk to the local centre and school, while the whole site can be reached within a ten-minute bicycle ride. With flat terrain and short distances, the site should target high active transport usage for all internal trips.

To enable and encourage short trips to be completed on foot or bike, high-quality footpaths and cycling infrastructure should link residential dwellings within the site to all trip attractors, enabling residents of all walking and cycling abilities to access these facilities without a car. As well as links within the site, connections to any adjacent active transport facilities and recreational destinations should be provided for, such as links to Linden Road and Cronulla State Park to the west, and Boat Harbour to the south.

5.1.2 Destinations and trip attractors around the site

Neighbouring centres are a long walk away, and therefore cycling would be the expected active transport mode for travel outside of the site. External trip attractors include train stations along the T4 Line, commercial and employment centres such as Miranda Strategic Centre, Taren Point and Kurnell industrial/urban services precincts, and the SCATL running east-west across Sutherland Shire. These are illustrated in **Figure 5-2**.

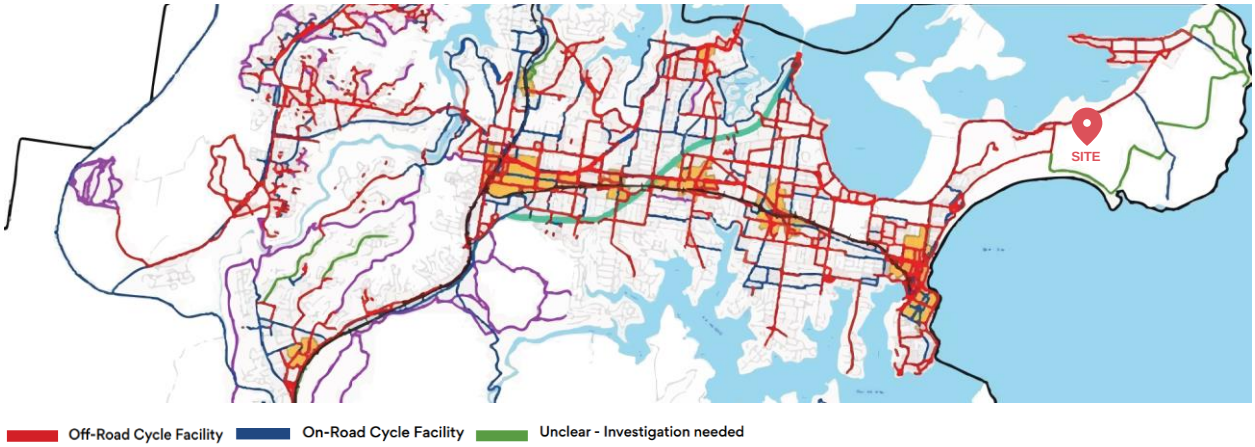
Figure 5-2 Destinations within 30m cycling of the proposed site



Providing safe and separated cycling links to neighbouring trip attractors will facilitate the uptake of cycling trips. This is aligned with Sutherland Shire Council's Active Transport Strategy (**Figure 5-3**) which proposes two off-road cycle facilities linking into the site on Captain Cook Drive and through Cronulla State Park's green grid link. These proposed links connect to the southwest where the majority of the trip attractors are, and when delivered, will allow cyclists of all skill levels to ride into these neighbouring centres.

This development should support Sutherland Shire Council's strategy by providing a high-quality interface between the internal active transport network to the external strategic routes. It can also help by contributing infrastructure and links that complete the proposed strategic network.

Figure 5-3 Sutherland Shire Proposed cycle network



Source: Sutherland Shire Active Transport Strategy, 2022

5.1.3 Targets

The viability of active transport varies significantly between trips made internally to the site and trips made externally to the site. With the right provision of infrastructure, internal trips with short distances can have a significantly higher active transport mode share than the wider LGA. The proposed targets for the site are:

– Internal trips: The majority (over 50%) of internal trips are to be completed by walking and cycling.

– External trips: 4% of external trips to be completed by active transport by 2030, exceeding the council's strategic targets for the LGA, as set by the Integrated Transport Strategy (2020).

5.1.4 Walking infrastructure

An attractive footpath network with good amenity and pedestrian priority is key to encouraging people to walk. Characteristics such as clear width, gradient, tree cover, lighting, shielding from noise and traffic, and permeability are all important factors to consider when designing a good walking network. As a site that seeks to maximise active transport participation, footpaths will be needed on both sides of all roadways.

This section considers what walking infrastructure should be provided to facilitate high walking mode share.

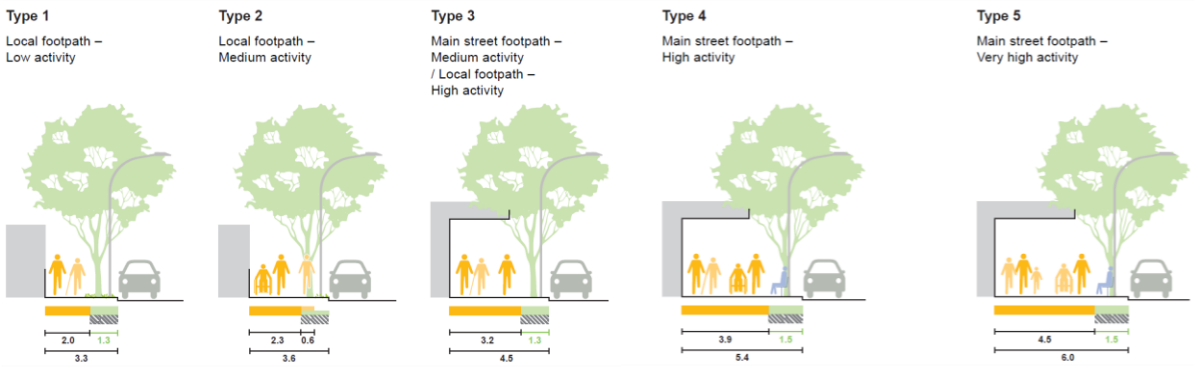
5.1.4.1 Footpath widths

Proposed street cross sections should follow the TfNSW Walking Space guide which recommends footpath widths based on land use characterisation and proximity to public transport. Relevant footpath types are detailed in **Table 5-1**.

Table 5-1 TfNSW footpath type and use case for the proposed site

Footpath Type	Clear width	Land use characterisation	Proximity to public transport	Proximity to places of interest
1 – Local footpath	2.0m	Residential areas with detached housing, or low-intensity employment areas	-	-
2 – Local footpath	2.3m	Residential areas that include row or town houses or up to 3-storey residential flat buildings/mixed-use residential buildings	Adjacent to regional cycle lanes 0-200m from a bus stop	Within two blocks of a local place of interest
3 – Main Street	3.2m	Streets with shops, food and drink premises, entertainment uses or services, residential areas that include residential flat buildings/mixed-use residential buildings greater than 3 storeys	Footpath adjacent to retail 0-200m from a bus stop	Within one block of a local place of interest Within two blocks of a regional place of interest

Figure 5-4 Footpath type illustrations



Source: TfNSW Walking Space Guide, 2020

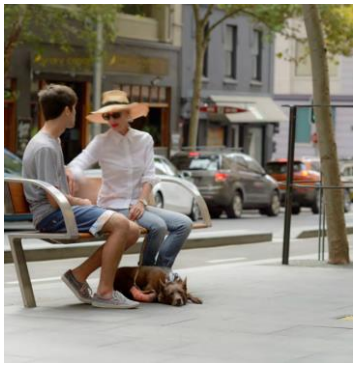
Footpaths Type 2 and 3 are recommended for the proposed site as the site consists of attached and residential flat dwellings and commercial/mixed-use areas. This means clear widths should be at a minimum of 2.3m throughout the site, with increasing pedestrian priority and clear width on streets with shops, food and drink premises, entertainment uses or services.

5.1.4.2 Amenity and priority

Wide footpaths alone are not enough to encourage people to walk. Walking trips need to be pleasant, safe, and direct, which results from a variety of factors. **Table 5-2** lists treatments that should be considered throughout the site to improve the attractiveness of walking trips. These treatments are a compilation of guidance from the NSW Government's Movement and Place framework, Council strategies, best practice in Sydney, and Healthy Streets Indicators.

Table 5-2 Footpath treatments for improved amenity and priority

Treatment	Rationale and characteristics	
Continuous footpath	This is a continuation of the footpath, parallel with the main street, at grade, without colour or texture change, across side street intersections. Vehicles must give way to pedestrians already on the continuous footpath, giving pedestrians increased priority as well as a better walking experience. Avoiding any changes in grade makes the walking journey more accessible for users where ramps may be challenging, such as seniors, parents with prams or those using wheelchairs. This can be used throughout the site from the local centre through to local streets.	 Source: NSW Government
Wombat crossings	Wombat crossings are raised zebra crossings so that there is no change of grade for the pedestrian. This is like the continuous footpath treatment. Raised crossings increase visibility for approaching drivers and slow down traffic movements, improving safety for pedestrians. Both zebra crossings and raised crossings should be used generously through the site along key pedestrian desire lines.	

Treatment	Rationale and characteristics	
Shared zones	Road space in a shared zone is shared by vehicles and pedestrians. These zones have a speed limit of 10km/h and drivers must give way to pedestrians at all times. Share zones prioritise pedestrian movement, reduce the dominance of vehicles along the street, encourage a modal shift towards walking and cycling and create a more socially inclusive street environment. This should be considered in lanes and streets in retail and shopping areas (such as the main street through the local centre), as well as residential areas where there is a low demand for vehicular movements.	 Source: NSW Government
Lighting	Street Lighting supports way-finding, improves amenity, encourages night time activity, discourages criminal activity, and improves both the perceived and real safety of all pedestrians. Adequate lighting should be provided in public domain areas throughout the site, as well as along footpaths, cycleways and crossings. This is also reflected in resident sentiment, where 65% of Sutherland Shire residents surveyed in the 2022 Public Domain Lighting Consultation supported further ambient lighting in town centres.	 Source: Sutherland Shire Council, 2023
Places to stop and rest	Regular opportunities to stop and rest are essential for some users to be able to walk or cycle longer distances. Provision of seating at regular intervals along key walking and cycling corridors will create inclusive environments for everyone and make streets welcoming places to dwell. Seating should be provided five to ten minutes apart (400m-800m for walking) and should be attractive and comfortable to use.	 Source: City of Sydney Council, 2021
Tree canopy cover	Trees provide comfort to pedestrians through shade and shelter from the sun and rain. It also improves air quality, moderates 'Urban Heat Island' effects, manages stormwater run-off, blocks noise and contributes to street character. The benefits of trees in our environment are widely recognised, including in Sutherland Shire where improving the quality and quantity of the Urban Canopy is a key principle. Trees should be planted regularly along footpaths and cycleways throughout the site, as well as through public domain areas. Ideally, the tree will form a buffer between moving traffic and pedestrians.	

Treatment	Rationale and characteristics	
Permeability	Roadways and blocks are often designed with cars in mind. However, large blocks are a deterrent for pedestrians who cannot travel at the same speeds as those who are driving. Pedestrian/cycling links through sites and allows pedestrians to take a more direct path when walking. This reduces the length of the trip while also giving pedestrians unique routes to choose from that are free from traffic.	 Source: NSW Government

5.1.5 Cycling infrastructure

The internationally recognised design principles of cycling-friendly infrastructure are that it is: safe, connected, direct, attractive, and comfortable. As a greenfield site, the proposed development has the potential to deliver cycling routes that meet all these design principles, on a relatively flat topography, in an attractive environment.

This section considers what cycling route infrastructure and end-of-trip facilities should be provided to encourage the uptake of cycling, both for commuting and for leisure. It is informed by guidance from TfNSW's Cycleway Design Toolbox, Sutherland Shire's Active Transport Strategy, as well as best practice locally and internationally.

5.1.5.1 Cycling routes

Recommendations for the proposed site considering the internationally recognised design principles are detailed in **Table 5-3**, along with the implications for the proposed site.

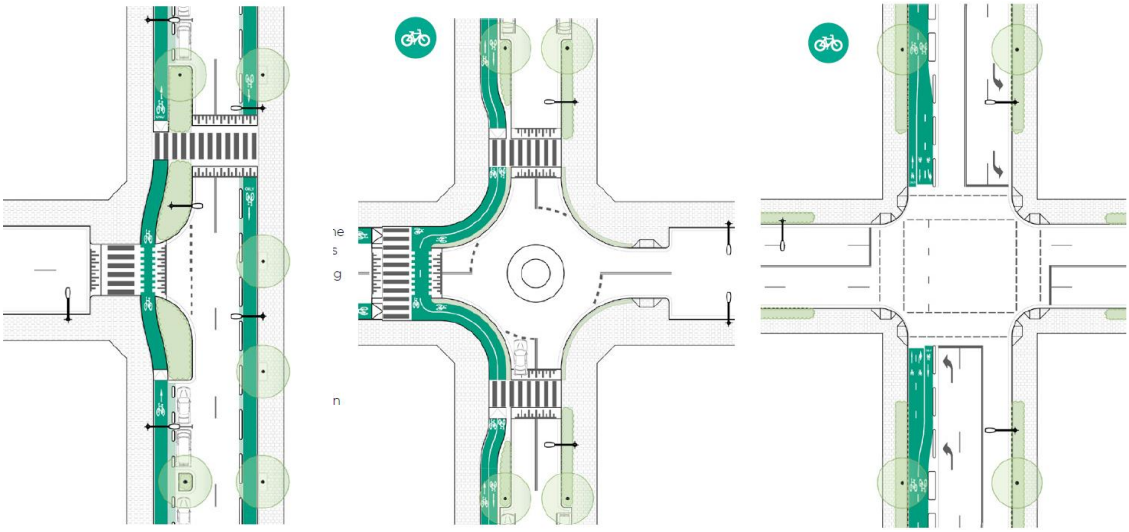
Table 5-3 Cycling infrastructure design principles and implications

Principle	Description	Implication for site
Safe	Cycling infrastructure must not only be safe but should also be perceived to be safe so that people of all ages and abilities feel comfortable using the facilities. Separation from vehicle traffic and provision of dedicated and protected space for cycling will minimise conflicts and should be provided whenever possible. Separation from pedestrians should also be considered to reduce conflict for both pedestrians and cyclists, especially when cyclists are travelling at higher speeds.	– All roads within the site are to be provided with cycling facilities that are separated from vehicle traffic. This includes shared paths or dedicated cycling facilities. – Where cycle paths are adjacent to parked cars, buffers should also protect cyclists from a car door opening.
Connected	Cycling infrastructure should be designed and planned to enable people to reach their day-to-day destinations easily, along routes that are connected, simple to navigate, and of a consistent quality that is appropriate for the expected use of that route. A poorly connected cycling network will reduce coherence and act as a disincentive for cycling or even place riders into dangerous situations.	– All key trip attractors within and adjacent to the site are to be connected to all residential dwellings by cycling routes. – Connections to the external bicycle network should be intuitive and easy to access for cyclists. – Crossing opportunities should allow cyclists to cross without dismounting and be placed along key desire lines.

Principle	Description	Implication for site
Direct	Measured in both time (effort) and distance, direct routes should provide bicycle riders with the shortest and fastest way of travelling from place to place, and make cycling an attractive alternative to driving or even public transport, particularly for local journeys. Permitting bicycle riders to make movements prohibited by motor traffic, allowing contraflow cycling, and creating links where cars cannot go will enhance the directness of their given routes.	– All roadways within the site to also be a cycling route. – Provide through-site links for cyclists that increase permeability beyond that of the road network. Consider links through residential and retail blocks, as well as through parks and open space. – Ramps and openings in buffer zones should allow cyclists to enter and exit the cycling network with minimal need to dismount.
Attractive	The surroundings encountered when cycling range from attractive to intimidating and can encourage or discourage cycling along a particular route – it may even determine whether users choose cycling as a means of transport.	– Provide adequate tree canopy cover and lighting along all cycling links. – Align cycling links through or along open green spaces, such as the district parks to increase enjoyment of cycling trips.
Comfortable	Comfortable conditions for cycling require routes that are clearly demarcated from vehicles and pedestrians with high-quality, well-maintained and smooth surfaces. Routes should provide adequate width for the volume of users, enable minimal stopping and starting, avoid steep gradients, and limit interaction with vehicles.	– All cycling paths are to be separated from vehicle traffic. – Along movement-oriented links, cyclists should also be separated from pedestrians to minimise conflict. – Cycle paths are to be indicated by coloured pavement or paint.

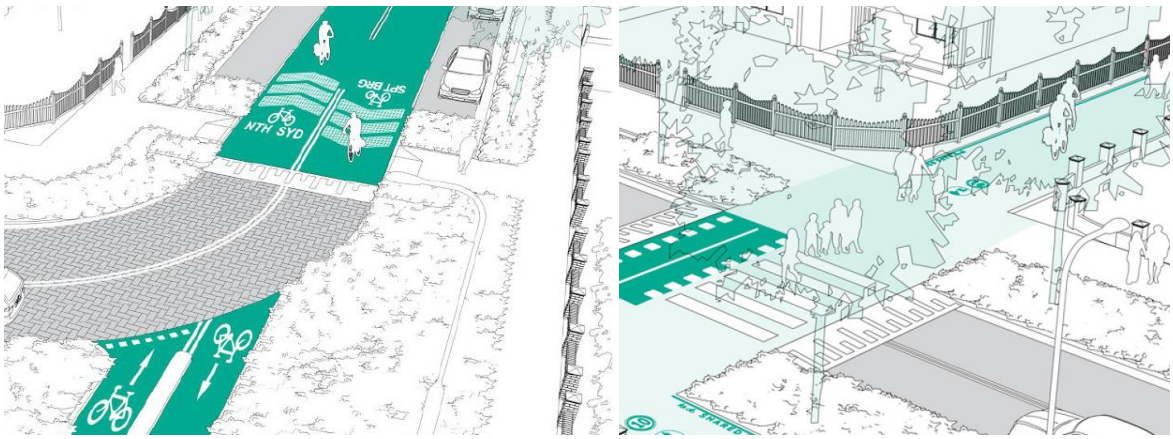
Applying these principles to typologies provided in the Cycleway Design Toolbox, the site should implement separated and dedicated cycling paths along movement-oriented streets, such as the main streets and collector streets, and shared paths, shared zones, or quietways, in place-oriented areas, such as the local centre or residential local streets. Illustrations of these typologies are provided in **Figure 5-5** and **Figure 5-6**.

Figure 5-5 Two-way dedicated bicycle path along a zebra crossing, roundabout, and signalised intersection



Source: Cycleway Design Toolbox, TfNSW, 2020

Figure 5-6 Quiet way and shared path examples



Source: Cycleway Design Toolbox, TfNSW, 2020

5.1.5.2 Bicycle parking provision

A safe and secure place to store bicycles at origin and destination is nearly as important as having cycling routes themselves. Somebody who has no place to safely park their bike at their destination may choose not to risk losing their bicycle and therefore not cycle. This is analogous to how a lack of parking availability may incentivise people to use other forms of transport or forgo the trip altogether.

The Sutherland Shire DCP currently links bicycle parking provision at a proportional rate to car parking. It requires all development to provide 1 bicycle parking space per 10 car parking spaces for the first 200 car spaces, and half the rate thereafter, as well as 1 unisex shower per 10 employees. The requirement is exempt for Dwelling Houses, Dual Occupancies, and Multi-Dwelling Housing, as these would have ground-level entrances and space to store their own bicycles.

However, this practice entrenches car dominance, which in this case, would be 10 cars to one bicycle. With a flat topology and separated cycling links connecting the whole site, travel behaviour, particularly for internal trips, will not look the same as the rest of Sutherland Shire. Bicycle parking provision should be decoupled from car parking rates and increased. The site should also consider reduced car parking rates to encourage the use of alternate modes.

Table 5-4 recommends rates of bicycle parking for the proposed site.

Table 5-4 Recommended bicycle parking rates

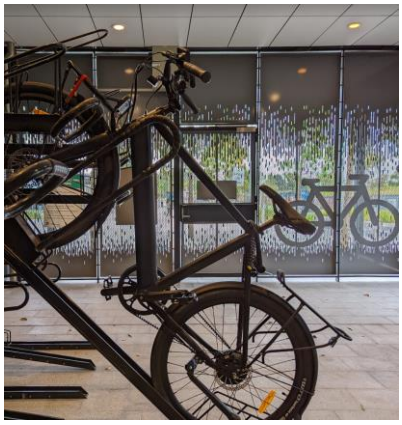
Land use	Rationale	Recommendation
Retail / Commercial	Shops, dining, and commercial spaces will largely serve the local community, and adequate parking should be provided in convenient locations to encourage residents to cycle from their homes. The DCP has an effective bicycle parking rate of 1 space per 300m^2 GFA as the car parking rate is 1 space per 30m^2 GFA. This equates to approximately 25 bicycle parking spaces across all retail locations throughout the site. It is recommended that this rate be increased. Using a bicycle parking rate from an LGA with similar characteristics would be a helpful starting point for the proposed site. Waverly fits this description, with medium to high-density residential dwellings, mixed-use zoning and low rail coverage. Bicycle parking spaces should have a mix of secure room storage for employees, as well as easy-to-access, close-to-destination, public-domain bicycle racks for visitors.	– 1 bicycle parking space per 200m^2 GFA, which is a similar rate to Waverley Council DCP. – Realistically, the proposed site should be able to achieve an even higher proportion of cycling mode share than Waverly due to the provision of separated cycleways on every street.

Land use	Rationale	Recommendation
School	The school will primarily serve the local catchment. Students have a higher propensity to use active transport, as the majority of them will not be able to drive. School students are physically capable of walking or riding across the whole of the proposed site (potentially with supervision for those of primary school age). This is backed by the School Student Transport Scheme (SSTS) eligibility, where for primary school students (years 3 to 6), only those who live more than 2.3km walk away are provided with free public transport. This distance increases to 2.9km for secondary school students (years 7-12). The whole proposed site can reach the school within a 2.3km trip, and the majority are expected to walk or cycle. Provision of bicycle parking facilities will be needed to facilitate this.	– 1 bicycle parking space per 5 students. – Adequate provision of end-of-trip facilities such as showers and lockers for staff who ride. – Consider the provision for other micromobility devices such as scooters or skateboards.
Residential	Bicycle parking availability at home is critical for encouraging cycling. Residents who do not have direct access to the ground floor from their homes will need secure bicycle parking facilities in well-lit areas with good passive surveillance. Insufficient or low-quality bicycle storage space could force residents to bring the bicycle into their units, making it more inconvenient and less attractive to own a bicycle. Bicycle parking supply should be decoupled from car parking and support the target to have the majority of internal trips completed by active transport.	– 1 space per dwelling for residents (secure and sheltered, suitable for long-term parking) – 1 space per 10 dwellings for visitors (secure, convenient, close to residential access)
Community / Open space / Parks	The proposed site will have ample supply of open green space, as well as beach fronts which will be used for leisure purposes. Short-stay bicycle parking should also be provided in these locations near their interface with the cycling network. Bicycle parking should be provided regardless of car parking provision. However, a minimum ratio has been suggested as guidance.	– Minimum of 1 bicycle parking space for every 2 car parking spaces.

5.1.5.3 End-of-trip facilities

The provision of high-quality end-of-trip facilities increases the attractiveness of cycling mode share and addresses barriers to cycling that may be hindering its adoption. Suggested solutions are detailed in **Table 5-5**.

Table 5-5 Bicycle parking and end-of-trip facilities

Item	Description and recommendations	
Bicycle parking types	The bicycle parking infrastructure should reflect the purpose of trips expected. The Australian Standards AS2890.3 suggest facility types based on typical applications. For short-term parking, such as for retail, gyms, dining etc, bicycle racks in the public domain, areas with good passive surveillance, as close as practicable to the user's destination is recommended. For destination parking such as for workers, students, as well as in dwellings, a secure room or structure, protected from the weather is recommended. Bicycle parking areas should be well-lit, easy to access, and located on the ground plane whenever possible.	

Item	Description and recommendations	
Lockers	Lockers allow cyclists to put away helmets and a change of clothes so that these do not need to be carried around all day. Cars often act as a “locker” of sorts for their owners, and lockers near bicycle parking will fulfil this need for those who choose to ride. Lockers make cycling more convenient, and therefore more attractive for people.	 Source: City of Sydney Council, 2021
Change rooms and showers	One of the key issues with active transport is that the traveller is exposed to the weather. This could mean sweating from the heat or being damp from the rain at the end of a trip. For many people, cleanliness, comfort, and presentation is an important consideration. Change rooms and showers allow commuters to wash and change into a clean set of clothes for their day ahead. Showers and change rooms should be provided for those who ride, especially those who ride to work.	 Source: Australia Square, bokor architecture&interiors
Bicycle maintenance stations	Bicycle maintenance stations provide typical bicycle repair tools for public access. This is often coupled with a bicycle pump where users can top up their tire pressure. Maintenance stations dispersed through the cycling network or around trip attractors will give cyclists peace of mind that a pump or tools for repairs are always nearby. This reduces barriers to cycling by addressing fears of needing to walk a broken or flat bike home.	 Source: ACT Government
E-bike charging stations	Electric bicycles (E-bike) offer riders the ability to travel longer distances and negotiate hilly terrain with ease. It also allows people of different skill levels and physical abilities to participate in cycling, growing the pool of people who could consider riding. E-bike ownership is expected to increase, and similar to how EV charging is becoming a rapid part of car parking infrastructure, e-bike charging infrastructure should also be considered in the local centre and key trip attractors.	 Source: AttiaDesign, 2021

5.1.6 Summary of recommendations

This strategy makes several recommendations to maximise active transport participation throughout the proposed site. These are summarised in **Figure 5-7**, and detailed in the list below.

Figure 5-7 Recommended initiatives to maximise active transport participation

1. Footpaths and cycleways (or where appropriate, shared infrastructure that safely accommodates all users) are to be provided on all roadways within the proposed site.
2. Connect and improve cycling links to the Cronulla, Miranda and Taren Point commercial and employment centres.
3. Provide high-quality walking and cycling links into adjacent trip attractors such as the beach.
4. Provide wombat crossings along pedestrian desire lines, such as those labelled number 4 in **Figure 5-7**.
5. Implement continuous footpath treatments along key walking routes, such as those labelled number 5 in **Figure 5-7**.
6. Consider using shared zone / quietway treatments in the local centre to prioritise pedestrian and cyclist movements.
7. Increase permeability in the walking and cycling network by providing through-site links and breaking up large blocks, such as those labelled number 7 in **Figure 5-7**.
8. Include shared paths through green space/parks to allow for leisure trips and increase permeability, such as indicatively shown as number 8 in **Figure 5-7**.
9. Provide adequate bicycle parking space and high-quality end-of-trip facilities at the local centre and major trip attractors, including the school, district and regional parks, and tourist accommodation.
10. Provide ample lighting, tree cover and places to stop and rest throughout the active transport network.
11. Implement recommended changes for increased bicycle parking provision throughout the proposed site.

These recommendations should also consider (and respond to) existing elements of the site including topography and cultural considerations.

5.2 Bus strategy

5.2.1 Strategic need

As identified in **Section 3.4**, public transport accessibility is quite poor throughout the Kurnell Peninsula with connectivity limited to a single service (Route 987) which operates along Captain Cook Drive between 6am and 7pm at a frequency of 1-2 buses per hour.

Accessibility to the Route 987 for the project site would be even lower (and hence less attractive) as almost all of the development would be outside of the typical walking catchment (400m) of the bus stops on Captain Cook Drive.

To help improve the accessibility and attractiveness of buses as a sustainable alternative to car travel, the project is proposing a staged bus strategy to support the development. The proposed bus strategy would be consistent with the objectives of the Local Planning Directions Section 5.4 Integrating Land Use and Transport (September 2023), contributing to the objectives highlighted below.

Local Planning Direction 5.1 – Integrating Land Use and Transport

The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives:

a. **improving access to housing, jobs and services** by walking, cycling and **public transport,** and

b. **increasing the choice of available transport and reducing dependence on cars**, and

c. reducing travel demand including the number of trips generated by development and **the distances travelled, especially by car,** and

d. **supporting the efficient and viable operation of public transport services,** and

e. providing for the efficient movement of freight.

Source: Local Planning Directions (Department of Planning, March 2023) Section 5.1

During the development of the project, including the bus strategy, Transport for NSW provided key feedback on the intent, typology and details of the bus strategy including the below two key extracts.

Comments on SEPP amendment submission (11 December 2020)

"… if the proposal were to proceed, significant initial and ongoing commitment to enhancing local public transport initiatives, including for example running shuttle buses to the nearby town centre type services and mass public transport at Cronulla. This may require enhancement of public transport facilities in Cronulla."

"However, a diversion to the route 987 will increase the length of each trip by approx. 3km and up to 10 minutes additional running time. This will impact existing customers from Kurnell and needs to be carefully considered."

Kurnell Peninsula Stakeholder Meeting (2 December 2022)

"[Proponent] is proposing a private bus shuttle service funded by the proponent as an interim solution until capacity reaches that of a usual bus service… TfNSW requires details about the projected route, capacity and demand…"

The bus strategy has been prepared to demonstrate how the proponent satisfies the Local Planning Direction and associated feedback from Transport for NSW, including:

– Highlight the potential customer demand for the bus service to help inform the servicing strategy.

– Document the nominated interim shuttle service, including bus route, stops and proposed capacity.

– Highlight potential options for the end-state bus route, including consideration of impacts and opportunities to benefit the wider community.

5.2.2 Customer demand

Adopting the existing public transport mode share provides a reasonable reflection of the minimum or **base case** demand for a potential bus related to the development. However, as this strategy recommends updates to the public transport network to better serve the development, an **aspirational case** demand has also been considered for the end-state bus strategy.

To determine the number of customers, first-principles analysis has been undertaken for both the base and aspirational scenario by:

1. Determining the total customer trips (or trip generation) due to the land use mix and yields in the proposed master plan (as discussed in **Section 4.1**)
2. Proportioning these trips to a potential bus service by considering existing mode-share for the region and the subsequent potential mode-share for the site.

To determine the customer demand for the potential bus service, the following sources and assumptions were adopted:

– Base case
  - Existing mode-share based on:
    - Method of Travel to Work and Household Travel Survey data for residential, employment, and retail land uses (as per **Sections 3.2.1** and **3.2.2**).
    - Kurnell Public School benchmarking (as per **Section 3.2.3**).
  - Since rail services can't be accessed directly from the site (i.e. by walking), it is assumed that the rail mode-share is accessed by either personal transport (vehicle, cycle or other micro-mobility options) or bus. The split between personal transport and bus varies by land use:
    - For high and medium-density residential trips, it is assumed trips are 50 per cent personal transport (car and cycle) trips and 50 per cent bus-linked trips. Since these are origin trips, i.e. residents, these users may have access to a vehicle and hence may park-and-ride at the train station to continue their commute via train.
    - For trips for seniors housing, aged care, hotel, retail, and community uses, these trips are typically destination trips (or the latter leg of their journey) and hence are not likely to have access to a private vehicle. Hence all trips have been assumed as bus-linked trips. Some customers may commute on the train with their cycle or other micro-mobility mode (i.e. a scooter), however, these customers represent a small proportion of trips and hence have been assumed as bus-linked as a conservative assumption.

– Aspirational case
  - Developed based on Sutherland Shire LGA's mode share proportions (as per **Sections 3.2.1** and **3.2.2**). The LGA is generally better served (and hence more accessible) to bus and rail options, and hence has higher public transport mode-share compared to the Kurnell Peninsula (albeit still considerably lower than other areas of Greater Sydney). It is assumed with frequent, convenient, and accessible bus service to the precinct, a comparable mode-share could be achieved.
  - As an aspirational goal, all rail mode share for high-density residential uses is assumed as bus-linked trips (rather than car-linked park-and-ride).

Table 5-6 summarises potential bus customer demand for the base and aspirational case.

The PM peak represents the most-onerous scenario for bus demand (i.e. highest customer trips), with approximately 265 passengers (with approximately 190 in the peak direction) for the base case. The customer demand increases to up to 605 passengers (with approximately 435 in the peak direction) during the PM peak hour with the aspirational mode-share.

Table 5-6 Summary of potential bus customer demand (rounded to the nearest 5 trips)

Scenario	Total bus potential (mode share %)*	Total trips (PM peak hour) **	Peak direction trips (PM peak hour) **
Base	6%	265	185
Aspirational	13%	605	435

Note: (*) The total bus potential is a consideration of bus mode shares and the likelihood of bus-train trips across all land uses.
Note: (**) The PM peak hour had a higher number of trips generated and was assessed as the most onerous scenario.

Source: 2016 mode-share analysis from Kurnell Peninsula Phase 1 Transport Assessment (TTPP, March 2020)

A further breakdown of potential bus customer demand by development precinct in the peak direction of the PM peak hour is summarised in **Table 5-7**.

Table 5-7 Potential bus customer demand per precinct (rounded to the nearest 5 trips)

Precinct	Base (PM peak direction)	Aspirational (PM peak direction)
Quibray Bay	10	25
Town Centre South	40	85
Town Centre North	55	160
Boat Harbour	50	85
Bate Bay South	15	40
Bate Bay North	15	40
Total	**185**	**435**

5.2.3 Development staging

As discussed in **Section 4.2**, the development will be delivered in stages between 2029 and 2046 as summarised in **Table 5-8**. In the year of opening in 2029, only Stage 1A will be completed, with Stage 1B partially completed. The development is expected to be fully completed and operational by 2046.

Table 5-8 Staging details

Stage	Precinct	Estimated year of completion
1A	Quibray Bay	2029
1B	Town Centre South	2034
2	Town Centre North East	2038
3A	Boat Harbour South	2038
3B	Boat Harbour North	2040
4	Town Centre North West	2042
5A	Bate Bay South	2043
5B	Bate Bay North	2046

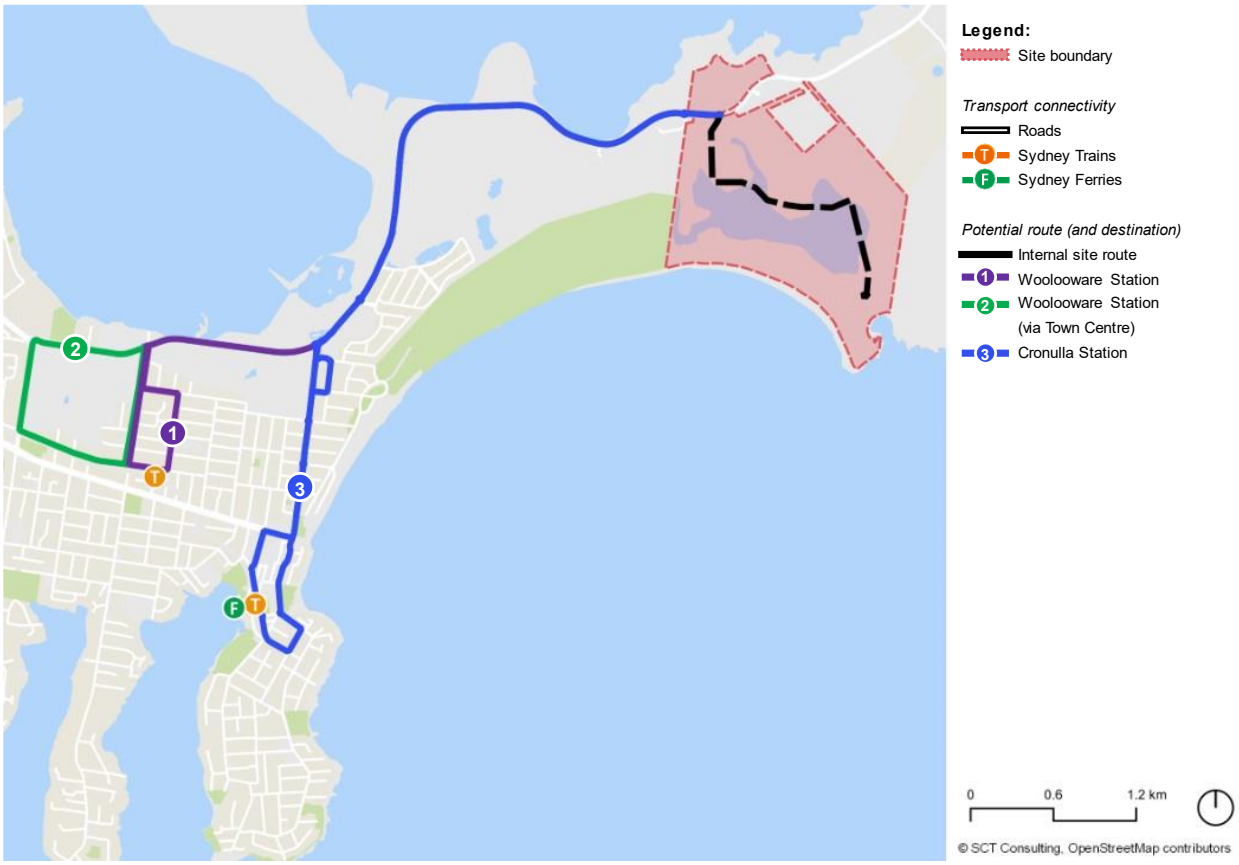
Accordingly, **Section 5.2.4** and **Section 5.2.5** will describe how bus services can be catered for different stages of the development from the year of opening (interim shuttle bus) to through to the full completion of the development (end-state bus service) respectively.

5.2.4 Interim shuttle service

While the site is progressively delivered and occupied, a shuttle service will operate between the proposed site and a nearby train station to provide an accessible and convenient public transport connection.

Both Woolooware Station and Cronulla Station were considered for the destination of the shuttle, with an additional route diverting to Woolooware Town Centre as a second destination for site customers also considered as illustrated in **Figure 5-8**.

Figure 5-8 Potential routes and destinations for shuttle service



Within the proposed site, the shuttle bus service would operate on the identified primary bus corridor through the Town Centre and Bate Bay precincts, and along the secondary bus access through to Boat Harbour South.

To service the precincts (and the associated land uses) six bus stop pairs have been nominated (**Figure 5-9**) to balance customer accessibility (based on a maximum 5-minute or 400m walk) and bus travel times.

These stops will be provided progressively as the various stages of the development are completed and occupied.

For Quibray Bay (Stage 1A), which is located north of Captain Cook Drive, the precinct is in the immediate walking vicinity of the existing bus stops on Captain Cook Drive (Stop ID 223153 and 223154) for Route 987 to Cronulla Station. Due to the precinct's proximity to the existing service and the relatively low patronage associated with this component of the development a dedicated shuttle is not warranted, and customers can use the existing service without exceeding the service capacity.

Due to the provision of the new access road to the development and the associated signalised intersection (as discussed in **Section 6.3.1.2**, the existing bus stops would need to be relocated. It is recommended the bus stop pair be relocated west as indicated in **Figure 5-9**.

As summarised in **Figure 5-10**, once Stage 1B (Town Centre South) is open (even partially), it is recommended that shuttle buses are operated into the precinct. The shuttle bus is only required to loop through the Town Centre (Stage 1 in **Figure 5-11**).

Once Boat Harbour South is open (Stage 3A), the shuttle bus should extend through to Boat Harbour Beach (Stage 2 in **Figure 5-11**) however it will not be required to stop at locations 4 and 5 until as indicated in **Figure 5-10**. Bus stop pair should be space-proofed from the outset, however, the infrastructure such as B-pole, seat and shelter (if

appropriate) should not be installed until required. In most locations, the bus stop has been identified within a parking lane and hence can be used as parking until required.

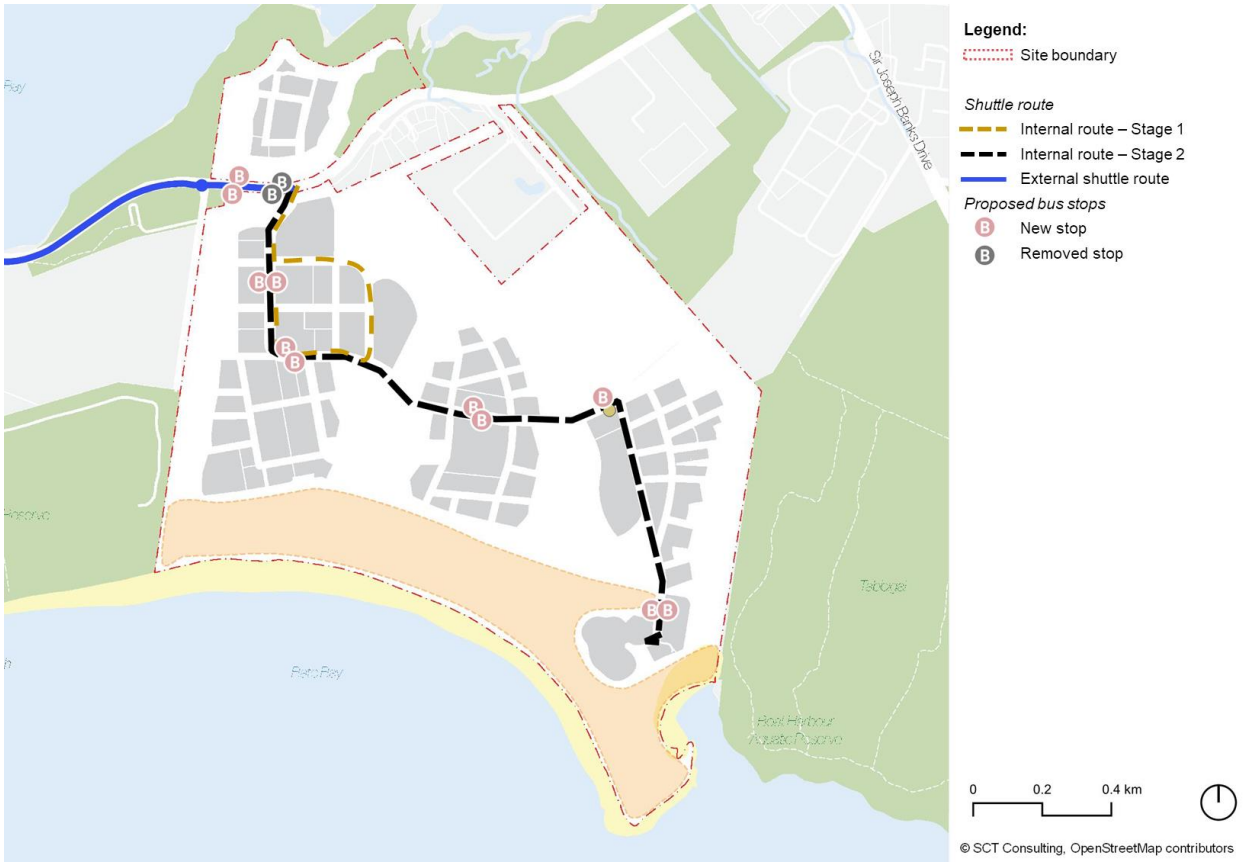
Figure 5-9 Proposed bus stops within (and adjacent to) the site

Figure 5-10 Timeline of bus operations and bus stop pair use

Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Precinct completion (expected)				1A					1B				2 3A		3B		4	5A			5B
Bus service strategy (recommended)																					
No shuttle (987 only)				■	■	■	■	■													
Shuttle (town centre loop)								■	■	■	■	■	■								
Shuttle (full loop)													■	■	■	■	■	■			
End-state solution													■	■	■	■	■	■	■	■	■
Bus stop pairs required																					
1 (Captain Cook Drive)				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2 (Town Centre North)							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3 (Town Centre South)													■	■	■	■	■	■	■	■	■
4 (Bate Bay)																	■	■	■	■	■
5 (Precinct Main Road)														■	■	■	■	■	■	■	■
6 (Boat Harbour South)													■	■	■	■	■	■			

Legend ■ Expected operational period ■ Potential transition period

Figure 5-11 Proposed shuttle route and stops



A summary of the travel time for each considered route is provided in **Table 5-9**. The shuttle route to Woolooware Station is 18km long (loop distance) and equates to a 32-minute total loop journey time. Despite a similar travel distance between Woolooware and Cronulla, the Cronulla route has a three-minute longer travel time due to the traffic congestion in and around Cronulla.

The shuttle travel time has been based on:

– Google travel time information for weekday AM and PM peak periods for travel times on existing roads

– A 25 km/h travel speed for new roads within the site (typical speed for buses on local streets)

– Additional allowances including a 30-second travel time penalty for the right-turn from Captain Cook Drive to the site, and a 4-minute allowance for recovery time and stoppages.

Table 5-9 Travel time for shuttle bus routes

Route options	Route number	Travel distance (loop)	Travel time (loop)
Woolooware Station	1	18km	32min
Woolooware Town Centre	2	19km	32min
Cronulla Station	3	19km	35min

This study recommends Woolooware Station based on:

– There is less traffic congestion en-route to Woolooware Station, which will improve travel times and the reliability of the service.

– Customers interchanging to rail (which represent most users) are connected to the same T4 Eastern Suburbs & Illawarra Line services.

– Customers who have a destination in Cronulla Town Centre are still able to access a Route 987 service to Cronulla.

No bus stop infrastructure is currently provided on Denman Avenue near Woolooware Station. Therefore, a bus zone (and associated signage) will need to be provided on one side of Denman Avenue in coordination with Sutherland Shire Council. This bus zone will require the removal of up to 3 kerbside parking spaces.

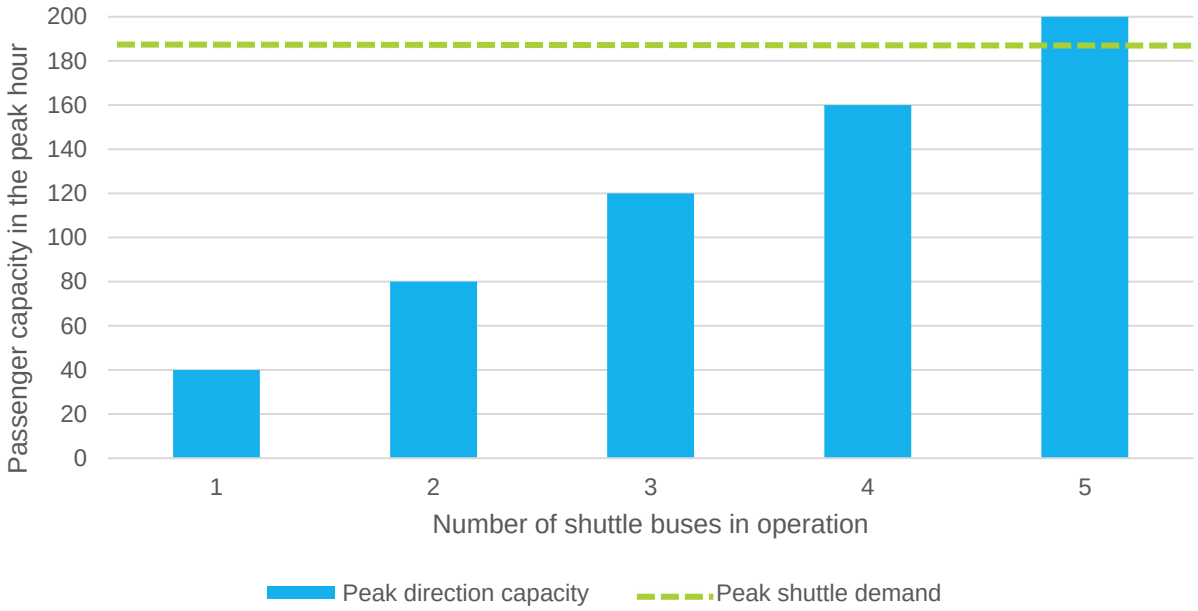
Using a typical single-deck minibus, with a seated capacity of 22, the service capacity of 20 passengers has been adopted for the shuttle service. Based on the travel time for the direct route to Woolooware Station, the shuttle service could operate with a 32-minute headway (or approximately 2 trips per hour). With this headway, the capacity of one physical minibus could accommodate up to 40 passengers per hour, which would be 22 per cent of the total base case peak hour demand (**Figure 5-12**).

In the year of opening (2029), Quibray Bay (Stage 1A) and part of Town Centre South (Stage 1B) will be completed. No shuttle bus is required as Quibray Bay trips can use the existing 987 bus service on Captain Cook Drive (within 400m walking distance).

Only when Town Centre South (Stage 1B) is fully operational in 2034, will a shuttle bus be needed. The forecast demand (~50 passengers in the PM peak direction in the Base Case summarised in **Table 5-7**), can be accommodated by two physical shuttle buses, operating at a 15-minute headway (or a frequency of approximately 4 buses per hour). The shuttle bus would have a better service frequency (15-minute headway) than the existing route 987 (currently 30-minute headway).

Given the shuttle bus (and driver) would be exclusively used for this route (especially during peak periods), the bus will operate continuously (i.e. operate five times an hour and not be parked idle). During off-peak periods, the frequency would be reduced to allow for driver breaks.

Figure 5-12 Comparison of shuttle capacity to base case development demand



If required, the total base case peak direction demand (~185 customers per hour) could be accommodated by 5 shuttle buses, which would alternate at six-minute headways (10 return trips per hour). Service provision increases can also be uplifted (if deemed required by the proponent) as the development is being delivered.

As illustrated in **Figure 5-10**, beyond the opening of Stage 2 and 3A, the customer demand may exceed 150 trips per hour in the peak direction, which would require more than 3 shuttle buses operating at a 10-minute headway (6 shuttles per hour) and equate to 3 full-size bus services per hour (or a service every 20 minutes). Subsequently, in consultation with Transport for NSW, there is an opportunity to transition from a shuttle service to an end-state bus service operated by a full-size bus. This transition period would occur earlier, if bus mode-share exceeds the base case and approaches the aspirational case, which could align with the opening of Town Centre North (Stage 2).

5.2.5 End state bus service

Discussions and documentation from the previous phase of the project envisaged that an interim shuttle bus would be operated by the Proponent until the development (and or surrounding area) could justify (via expected patronage) a regular route bus service.

The end-state customer demand is forecasted as:

– Base case, approximately 265 passengers (with approximately 185 in the peak direction) for the peak hour.

– Aspirational case, approximately 605 passengers (with approximately 435 in the peak direction) for the peak hour.

Adopting a 50-passenger bus capacity (seated with some standing passengers), the development-related demand could justify four buses per hour in the base case, and up to nine buses per hour for the aspirational case.

From an operational (and cost) perspective, development-related patronage for both the base and aspirational case is likely to justify a regular route service to specifically service the site. However, this is dependent on the provision of a frequent, reliable service connecting to multiple key destinations to achieve substantial mode share, especially outside of the peak periods.

The site also provides access to the Kurnell Beach and Boat Harbour which is a popular attraction, especially during the summer holidays and weekends. In addition to accessing on-site facilities, the site has the potential to host amenities for the surrounding community, including:

– Retail, including food and beverage and a local supermarket.

– Personal services, such as hairdressers and beauty.

– Small-scale medical facilities, such as a medical practice and pharmacy.

– Childcare.

These destinations (including the beach) would generate local trips, though the majority are not likely peak-hour trips. A small proportion of retail and child-care trips have been included in the peak-hour estimates. The remainder, in particular recreational beach trips, would result in increased off-peak and weekend usage which would help justify services throughout the day and on weekends.

Consequently, this transition from a shuttle service to a regular route service could be supported by either:

– Option 1: Re-routing an existing route, to combine the existing patronage with those linked to the development. This will increase journey time for the existing service, but also deliver benefits to existing customers as their wait times are significantly reduced as the service frequency is increased to accommodate the increased patronage. This re-routed service would likely have a lower operating cost, compared to a new service.

– Option 2: Introduce a new service, which also serves other locations along the route to increase the potential patronage, and also provides a wider community benefit.

These two options have been considered at a high level in the subsequent sections.

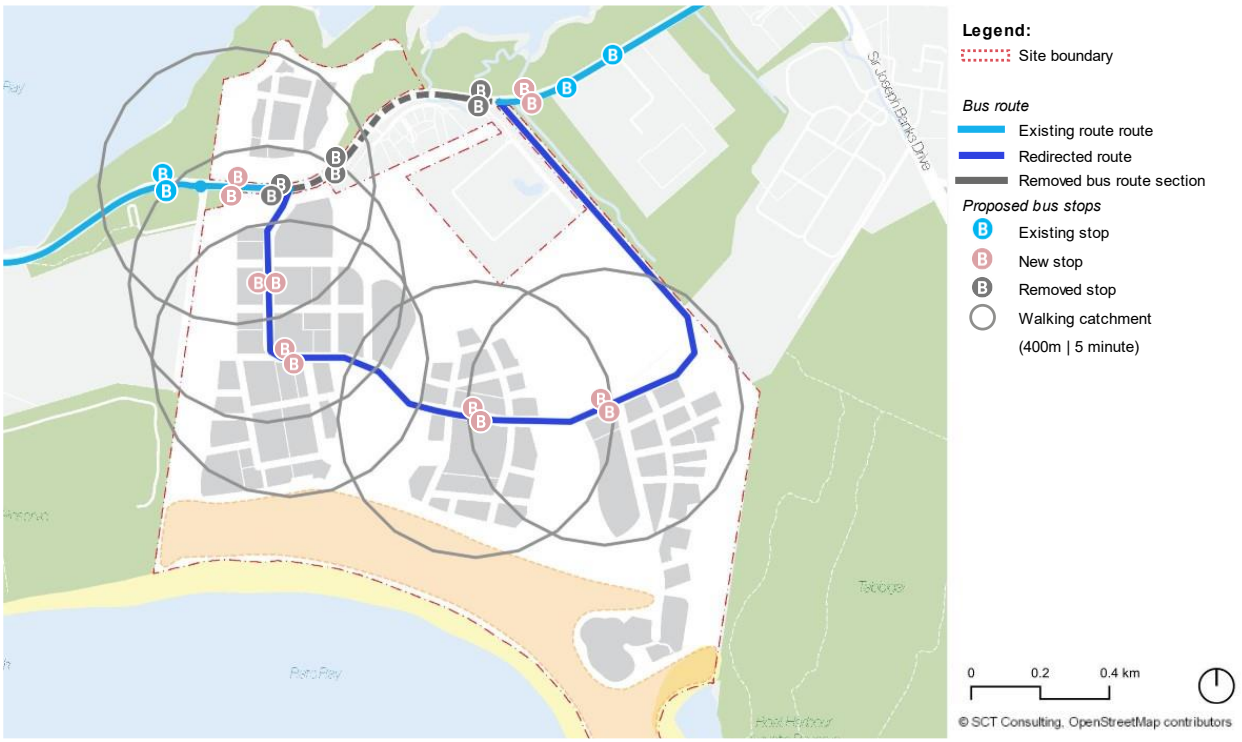
5.2.5.1 Option 1 – Reroute existing bus route 987

Bus route 987 currently operates along Captain Cook Drive, adjacent to the northern end of the site. This service has a 35-minute travel time and operates as 2 services in each peak hour (1 bus every 30 min).

This comparatively low frequency equates to an “average” wait time of 15 minutes for a passenger. It is acknowledged that with such an infrequent service, customers would time their arrival, hence their wait time would be lower at the stop, but they’ve still experienced that increased time (and hence reduced productivity) elsewhere in their day.

As noted by Transport for NSW, the re-routing of route 987 via the site (as illustrated in **Figure 5-13**) would increase the customer (and bus journey time), as well as increased walk time for some customers on Captain Cook Drive as their bus stops are removed or relocated. The new bus stops are built in line with the progressive occupation of the site in stages and the interim shuttle strategy. As the public bus route will be limited to the main street, bus stop pair 6 (**Figure 5-11**) will not be used in the end-state bus strategy. However, the impact is limited mostly to hotel use, which comprises of largely short-term stays and is more accommodating to reduced public transport convenience. The closest bus stop (stop pair 5) is only less than 800m away (10 minutes). It would not be feasible to extend the service down to the hotel for a marginal increase in convenience for hotel guests while increasing travel time for remaining passengers on board.

Figure 5-13 Option 1 – rerouting of existing bus route via the site (with revised stop locations)



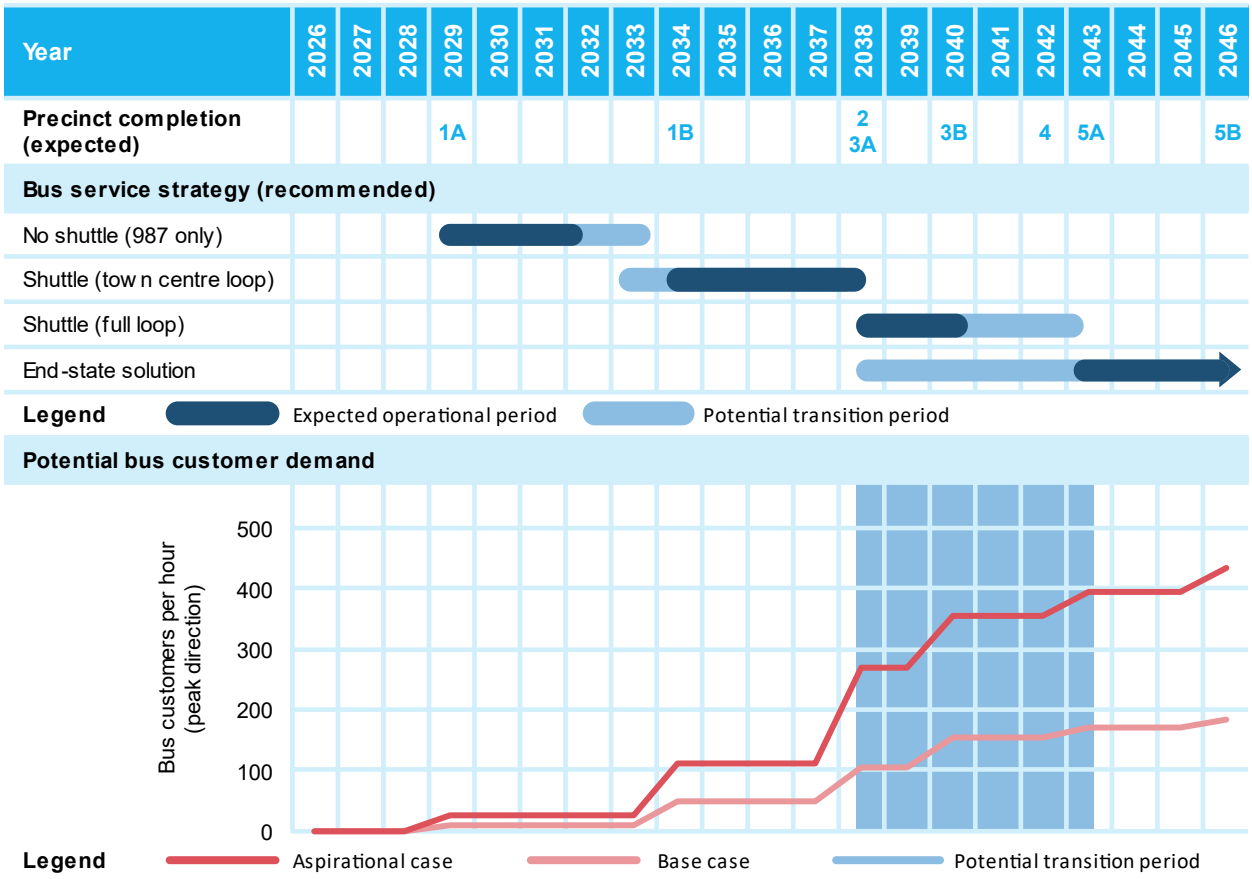
However, as summarised in **Table 5-10**, the increase in frequency (and hence reduction in average wait time) due to the patronage generated by the development will likely offset the increase in existing customer journey time. Hence, for both the base and aspirational cases, there is a net benefit to existing bus customers in addition to providing a high-frequency bus service to serve the development and improve access to the public beach.

Table 5-10 Summary of potential bus customer demand

Component of journey	Base Case	Aspirational Case
Existing service provision		
Service headway (minutes)	*30*	
Resultant average passenger wait time (minutes)	15	
Travel time (one direction)	*35*	
Proposed changes		
Increase in peak hour services (buses per hour)	*+4*	*+9*
Service headway (minutes)	*10*	*5*
The resultant change in average passenger wait time (minutes)	**-10**	**-12.5**
Increased travel time (per direction)		
Additional distance through the site at 25 km/h (minutes)	**+6.5**	
Additional penalty for right turn manoeuvres (per direction, minutes)	**+0.5**	
Removal of bus stops on Captain Cook Drive (no. of stops x 30 seconds)	**-1.5**	
New or relocated bus stops (no. of stops x 30 seconds)	**+2.0**	
The net difference in existing customer total journey (minutes)	***-2.5***	***-5.0***

Additional analysis of travel time impacts shows that there is no change in customer total journey time if there are two or fewer additional buses per hour. At least three additional services (150 passengers) are required to make a dedicated end-state service beneficial to customers in terms of overall travel time savings. Due to the variance in the base and aspirational case mode share targets, an end-state service could be triggered between 2038 and 2043 depending on the achieved mode share. **Figure 5-14** compares the potential bus customer demand for each precinct and the estimated stage to highlight when the transition to the regular route service may occur.

Figure 5-14 Potential bus customer demand to inform transition to regular bus service



5.2.5.2 Option 2 – New service

The alternative to rerouting an existing service would be the provision of a new regular route service that also serves other locations along the route to increase the potential patronage, and also provide a wider community benefit.

As illustrated in **Figure 5-15**, several routes into Cronulla Station and Woolooware Station have been considered, with each serving different intermediate destinations (including key land uses such as residential, town centres and schools).

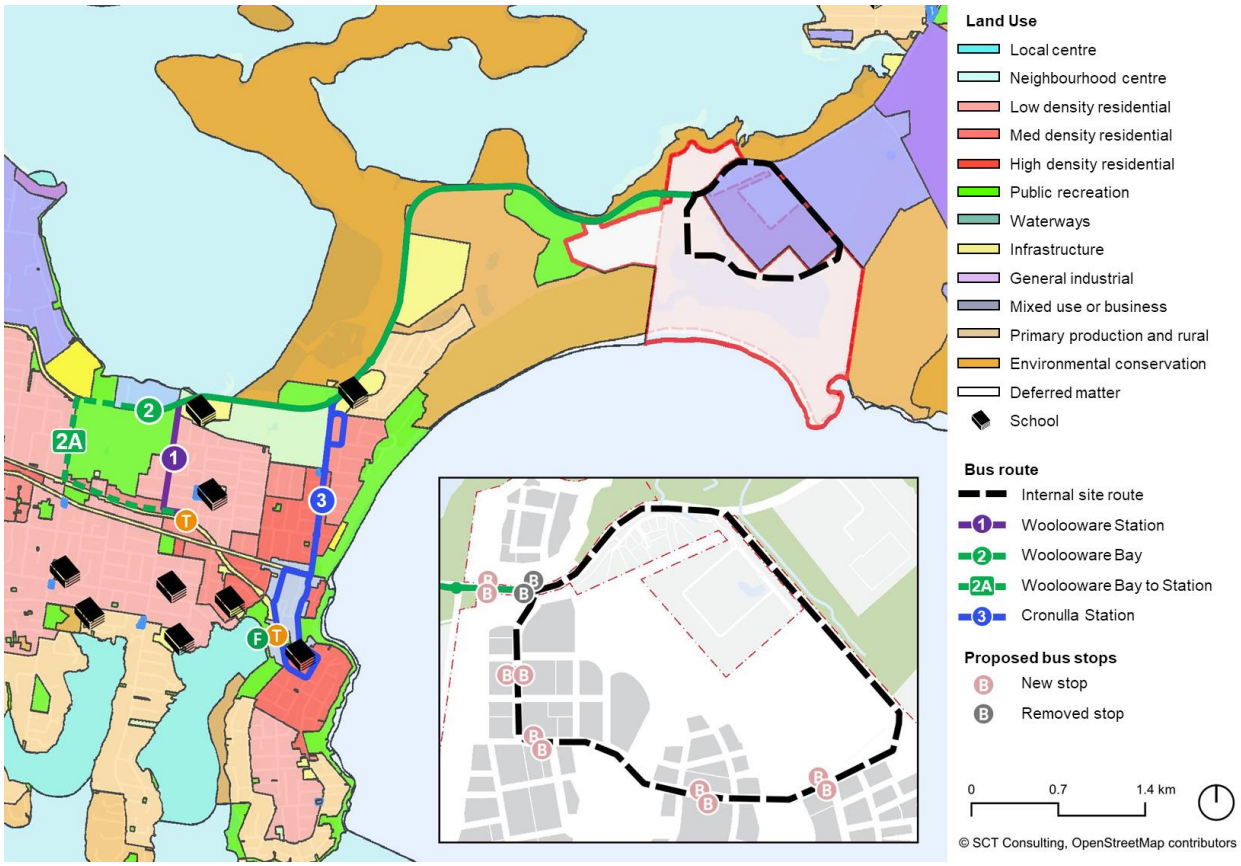
Based on the respective travel times for each route (**Table 5-11**), along with the number of existing routes already operating into Cronulla Station, a route into Woolooware Station is recommended if a new service is provided. Additionally, given the marginal increase in travel time, this route should operate to the station via the town centre to also serve other customer catchments (Route 2a).

Table 5-11 Comparison of travel times for route options

Route and destination		Travel time (minutes one-way)		Additional points of interest
		AM Peak	PM Peak	
1	Woolooware Station	8	8	2 schools
2	Woolooware Bay Town Centre	6	6	1 school
2a	Woolooware Station via Town Centre	10	10	2 schools
3	Cronulla Station	11	9	2 schools

As noted previously for the interim shuttle service, no bus zones exist at Woolooware Station on Denman Avenue. If a bus zone is provided for the interim shuttle service, this zone should be positioned such that it can be lengthened for a regular bus. Bus zones (and stops) would need to be implemented along the service in coordination with the Council and Transport for NSW to serve this new route.

Figure 5-15 Option 2 – route options for new regular route service (inset: internal routing)



5.2.5.3 Recommendation

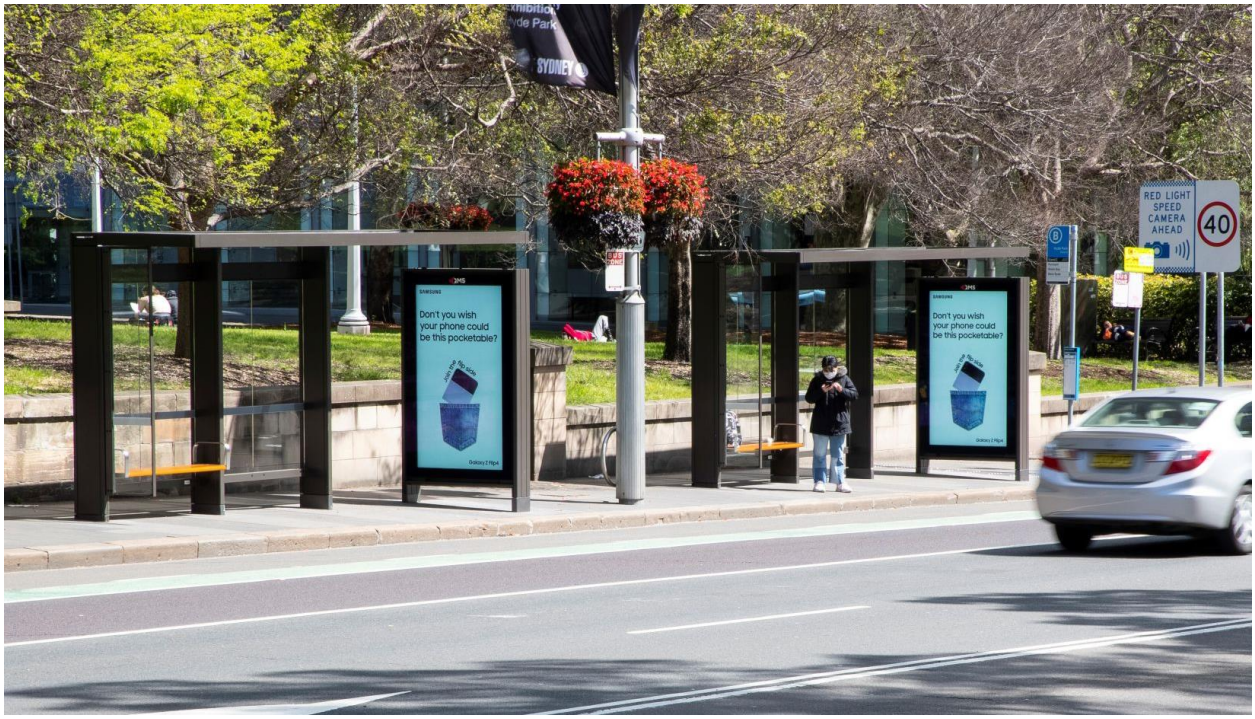
Overall, noting the delivery of (or changes to) a regular route service is subject to alignment with medium-term strategic planning and supporting analysis to be undertaken by Transport for NSW, this study recommends Option 1 (reroute existing bus route 987) as the preferred end-state solution once the proposed development has been realised. This option balances the bus operational costs with connectivity to the development and benefits the wider community whilst not being contingent on population growth in surrounding town centres.

5.2.6 Bus shelter infrastructure

The amenity of a bus stop, including its shelter, is an important factor influencing a public transport user's experience and needs to be considered in a bus stop design. The type of shelter will vary depending on the building structure, building façade, and the availability of awnings. The appropriate amount of space needs to be safe guarded in the design to ensure shelters are provided for bus stops.

Most of the new bus stops on site will likely require a typical bus shelter while a sign-posted bus stop could be sufficient in the town centre (bus stop pairs 2 and 3). Awnings from buildings are more likely to be provided in core retail precincts, which could double as a shelter for bus stops in the town centre. **Figure 5-16** shows an example of a typical stop with a bus shelter while **Figure 5-17** shows an example of a sign-posted stop with building cover.

Figure 5-16 Typical bus shelter



Source: City of Sydney; 2023

Figure 5-17 Sign posted bus stop on King Street in Newtown (Stop ID 204217, King Street at Hordern Street)

Source Google Maps; 2023

5.2.7 Summary

Based on the analysis undertaken, there will be no shuttle service in the year of opening as only Quibray Bay will be fully operational, and customers can use the existing 987 service on Captain Cook Drive. Only when Town Centre South is fully operational in 2034, will an interim shuttle bus be needed. Two 22-seater shuttle buses will be sufficient to service the peak hour direction of travel in 2034. If required, the total base case peak direction demand could be accommodated by 5 shuttle buses, which would alternate at six-minute headways.

In the later stages of the staged project, the study recommends rerouting the existing bus route 987 via the site. This option is recommended as it balances bus operational costs, connectivity and community benefit (including access to on-site facilities and beach). The trigger point where route 987 can be rerouted instead of using the shuttle bus is between Stage 2 to 3B (depending on travel mode shares then), where at least three additional public bus services are required to service the peak direction demand.

It is recommended further consultation with Transport for NSW, including their bus planners, be undertaken to discuss this recommendation.

5.3 Green travel plan

A Green Travel Plan (GTP) is a set of initiatives that seek to encourage people to travel by public transport, walking, or cycling. This is often known as Travel Demand Management (TDM), where policies, objectives, measures and targets are applied to influence travel behaviour.

There is an increasing awareness that reliance on cars is unsustainable. Unrestricted car growth impacts our environment, congestion, health, and well-being, and building to make driving faster and more convenient will only reinforce the pattern of car dependency. Instead, investment in transport infrastructure should be guided by a careful balance of accessibility and sustainability in how people get around Sutherland Shire. This is aligned with many of the Sutherland Shire Strategies, such as the Active Transport Strategy and the Integrated Transport Strategy.

GTP's largely focus on two areas; the adequate provision of infrastructure and services, and programs/initiatives that encourage people to use them. Just as parking and roadways enable car use, investment and thoughtful design in active transport infrastructure and public transport services are needed to enable sustainable travel behaviour. Infrastructure and public transport services have largely been considered in **Section 5.1** and **Section 5.2** and will not be repeated in detail here. As a summary, the site should:

– Provide a highly permeable and safe walking and cycling network, with connections to regional routes and major transport hubs.

– Have high quality, safe and accessible end-of-trip facilities.

– Provide frequent public transport services to establish a non-car travel behaviour.

A range of additional initiatives that could encourage the uptake of public and active transport are listed in **Table 5-12**. Many of these initiatives cannot be enforced at this stage of the planning process, and it is recommended that subsequent development applications be given the requirement to develop green travel plans that realise the benefits of the proposed site.

Table 5-12 Sustainable travel initiatives

Mode	Initiative
Public Transport	– Ensure bus stops are attractive places to wait. Comfortable, sheltered and well-lit at night. – Provision of public transport information, such as real-time information at stations or apps on upcoming services and travel time. – Make the interim shuttle bus service free or low-cost to establish and encourage non-car travel behaviour from the beginning of development. – Clear signage and wayfinding to support bus stops
Active Transport	– Shared bike stations/parking hubs: Not all users may choose to own a bicycle, particularly those who are tourists or just visiting the site. To maximise riding participation, the site could also consider a rental bicycle system that has "stations" or "hubs" around key trip attractors. A "tap-on / tap-off" system could be used at each station that allows for easy payment, such as through Opal or credit cards. This also helps those who may be undecided on bike ownership to try their hand at riding before committing to purchasing their own bike. – Promotion of bicycle initiatives – such as cycle-to-work days, free bike check-up events, and bike riding lessons. – Provision of free e-bike charging facilities at key trip attractors. – Clear signage, maps, and wayfinding to support riding and walking trips, and increase the visual presence of these modes.
Car use	– Reduced parking rates with flexibility in parking arrangements such as shared parking between non-conflicting uses. – Parking spaces dedicated to car-share schemes and community car-share vehicles, both on-street and incorporated in easily accessed public car parks. – Implementation of time restrictions or paid parking for on-street and off-street parking facilities throughout the site.
Land use	– The site is proposed to be a mixed-use site, which should maximise trip containment. The retail mix should be managed to increase the services and products available

Mode	Initiative
	within the site, and therefore reduce the need to make longer trips to neighbouring centres. Pharmacies, medical centres, cafes, restaurants, supermarkets, and entertainment venues are examples of key retail opportunities that could be established within the site.
Monitoring	– While it is important to develop a Travel Plan that is aimed at managing travel demand and reducing reliance on car travel, it is more important to monitor and evaluate the effectiveness of individual measures and the need to adjust the measures. Different initiatives may have different levels of effectiveness for this specific site. Monitoring mode share and people's sentiment will be key to understanding how to encourage sustainable travel behaviour in the proposed site and subsequent developments.

6.0 Transport impact assessment

6.1 Walking and cycling

Based on the trip generation (**Table 4-13**), approximately 435 walking and 175 cycling peak-hour trips are generated by the development in the base case, potentially increasing to 600 walking and 215 cycling trips in the aspirational case.

The majority of these trips will be internal to the site, such as to and from the town centre, school and recreational facilities (including the public beach) and as such will be accommodated by the cycling and footpath provisions within the development. For external trips, it is unlikely that customers are walking the length of Captain Cook Drive. Some localised trips (such as for exercise and recreation) may occur, and these can be accommodated by the improvements to footpath provisions on Captain Cook Drive.

Cycling trips may extend to nearby town centres external to the site, including Cronulla, Kurnell and Woolooware, as well as joining the Sutherland to Cronulla Active Travel Link. These trips can be accommodated on Captain Cook Drive within the new cycle provisions which are being provided by the road upgrade package.

6.2 Public transport

The impact on existing public transport is limited to the early stages of the development, including Stages 1A, during which time a precinct shuttle bus may not be operated. During this period, customers will likely use the existing Route 987 bus service on Captain Cook Drive. As discussed in **Section 5.2.2**, this may culminate in up to 15 trips per hour which can be accommodated within the existing capacity of the service.

As the development is progressively delivered and operational, the increased bus trips will be accommodated by the dedicated shuttle service until which time the end-state bus solution is implemented (**Section 5.2.5**).

6.3 Road network

As discussed in **Section 4.3**, the previous transport study included the development of a mesoscopic traffic model (PTV VISUM - Intersection Capacity Analysis) of the surrounding area as agreed with Sutherland Shire Council and Transport for NSW. The proposed master plan results in a consistent vehicle generation to the previous scenario (**Section 4.8**), hence would result in a similar impact on the road network. The recommendations from the previous modelling are still relevant and applicable, including upgrades to the immediate road network (Captain Cook Drive) and wider impacts on the Sutherland Shire LGA.

It is assumed the construction traffic volume (and impact) would be less than the site's existing traffic generation and hence can be readily accommodated within the existing road network.

6.3.1 Captain Cook Drive impacts

The previous modelling identified several upgrades along Captain Cook Drive, as summarised in **Table 6-1**. To supplement this previous analysis, additional analysis has been undertaken to reflect the more granular detail of the proposed master plan developed in this stage.

Table 6-1 Upgrades to support development – Captain Cook Drive

Location	Treatment required	Status
Captain Cook Drive - Eastern boundary to Elouera Road	Upgrade to 4 lanes	Included in the proposed CCD design. Refer to **Section 6.3.1.1**.
Captain Cook Drive - Lindum Drive	Upgrade to accommodate 4 lanes.	Refer to the proposed configuration in **Figure 6-3**
Captain Cook Drive - Trinity Street	Signalise with select turning lanes for south and east approaches	Included in the proposed CCD design
Captain Cook Drive - Elouera Road	Signalise with select turning lanes for west, south and east approaches	Included in the proposed CCD design

Source: Adapted from TTPP 2020

6.3.1.1 Captain Cook Drive widening

As recommended by the previous modelling, Captain Cook Drive needs to be upgraded to 4 lanes (2 in each direction) to accommodate the project (**Table 6-1)**. A concept design for the Captain Cook Drive (and associated intersections) is included in **Appendix B**.

However, this upgrade is not required on the project's day of opening due to the staged delivery of the project (as discussed in **Section 4.2**).

Based on the proposed staging, the expected traffic volumes on Captain Cook Drive (east of Lindum Road) do not exceed the nominal free-flow lane capacity of 1,200 vehicles per hour until after the opening of Stages 2 and 3A (Town Centre and Boat Harbour South) in 2038 for either the AM (**Figure 6-1**) or PM (**Figure 6-2**) peak hour.

Figure 6-1 Captain Cook Drive midblock traffic volume forecast – AM peak hour

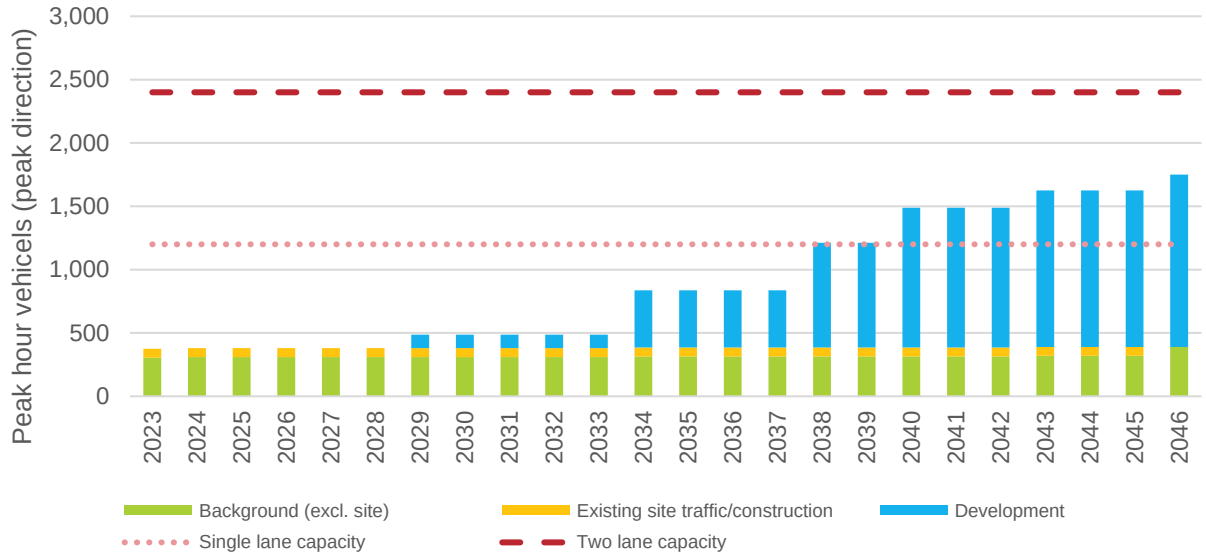
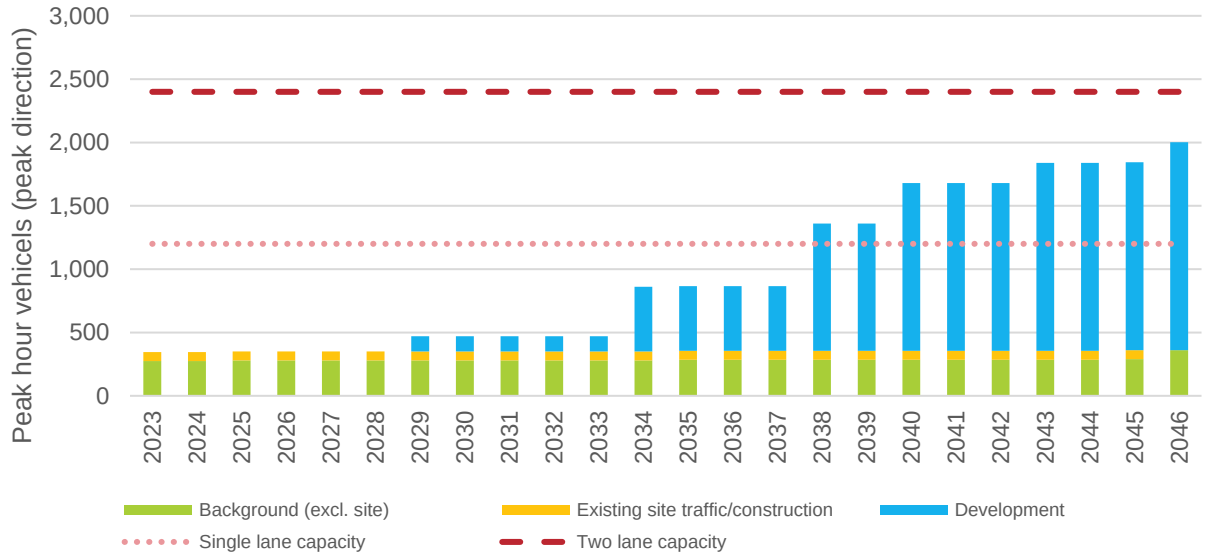


Figure 6-2 Captain Cook Drive midblock traffic volume forecast – PM peak hour



This analysis is based on the weekday peak and trips generated directly by the site and does not include additional trips generated by the public beach. However, the recreational trips will generally be higher on the weekend and off-peak, which would not correspond with the site's weekday commuter peak.

6.3.1.2 Captain Cook Drive intersections

Based on the proposed vehicle trip generation (**Table 4-12**), SIDRA intersection modelling was undertaken to develop 3 concept layouts for the intersections immediately adjacent to the project site:

- Captain Cook Drive | Lindum Road: The existing roundabout is to be upgraded to accommodate the 4-lane configuration of Captain Cook Drive. This will be used as a secondary access point to service the town centre.
- Captain Cook Drive | Site Access (west): new signalised intersection serving as the main access to the site (north and south).
- Captain Cook Drive | Site Access (east): new priority intersection serving as the secondary access to the site (predominately serving Boat Harbour including the beach and the ecotourism).

The proposed intersection concept layouts are illustrated in **Figure 6-3** with the respective performance summarised in **Table 6-3**. Intersection performance was assessed using the SIDRA Network 9.0 software package, and is measured in terms of the following:

- Degree of Saturation (DoS): The ratio of arrival (demand) flow rate to capacity during a given flow period. Acceptable intersection performance requires DoS < 1.0.
- Level of Service (LoS): An index of the operational performance of traffic for a given intersection during a given flow period (refer to **Table 6-2)**. Acceptable intersection performance normally requires a minimum of LoS D.
- Queue length: A measure of the indicative length of the queue, based on the typical space occupied by vehicles.
- Delay in seconds: the measure of the delay required to be reported per Traffic Modelling Guidelines – being the worst movement for all priority-controlled junctions (including roundabouts) and the average for all signalised intersections.

Table 6-2 Level of Service index

Level of Service	Average delay per vehicle (sec)	Performance explanation
A	Less than 14.5	Good operation
B	14.5 to 28.4	Good with acceptable delays and spare capacity
C	28.5 to 42.4	Satisfactory
D	42.5 to 56.4	Operating near capacity
E	56.5 to 70.4	At capacity, at signals, incidents will cause excessive delays. Roundabouts require other control methods.
F	70.5 or greater	

Source: Guide to Traffic Generating Developments; RMS, 2002

Figure 6-3 Proposed intersections immediately adjacent to the project site – Concept layouts

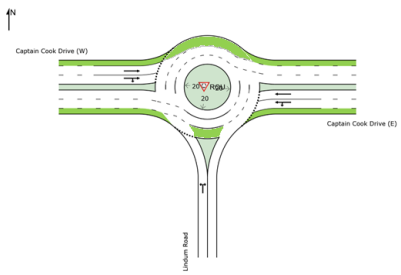
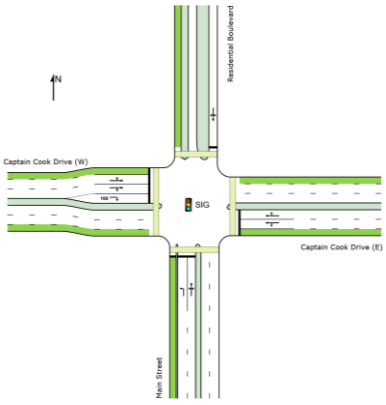
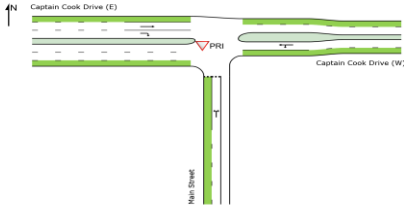
Roundabout: Captain Cook Drive | Lindum Road	**Signalised intersection:** Captain Cook Drive | Site Access (west)	**Priority intersection:** Captain Cook Drive | Site Access (east)
		

Table 6-3 Proposed intersections immediately adjacent to the project site – intersection performance

Intersection	Weekday AM Peak Hour				Weekday PM Peak Hour			
	Volume (veh/h)	DoS	Delay (seconds)	LoS	Volume (veh/h)	DoS	Delay (seconds)	LoS
Captain Cook Drive | Lindum Road	2,854	0.596	15.5	B	3,341	0.677	11.3	A
Captain Cook Drive | Main Street (West)	2,921	0.807	39.6	C	3,476	0.978	55.7	D
Captain Cook Drive | Main Street (East)	1,668	0.426	16.7	B	1,905	0.491	25.4	B

6.3.2 Wider LGA impacts

In addition to the committed and completed works as per **Table 3-7**, further upgrades to the surrounding road network were identified by the previous modelling to support the development and ongoing growth in the region.

These upgrades, summarised in **Table 6-4** (or refer to **Appendix C**), are envisaged to be designed and implemented as the development is progressively delivered in conjunction with Transport for NSW and Sutherland Shire Council.

Table 6-4 Upgrades to support development

Location	Treatment required	Status
Captain Cook Drive - Woolooware Street	Signalise with selected turning lanes for approaches	Not commenced
Captain Cook Drive- Foreshore Boulevarde	Upgrade to include selected turning lanes for approaches	Not commenced
Captain Cook Drive - Gannons Road	Signalise with selected turning lanes for approaches	Not commenced
Captain Cook Drive - Endeavour Road	Signalise with selected turning lanes for approaches	Not commenced
Captain Cook Drive- The Boulevarde -Taren Point Road	Upgrade to include selected turning lanes for approaches	Not commenced
Port Hacking Road - The Boulevarde-Kiora Road	Capacity upgrade requiring additional land	Not commenced
Taren Point Road -Holt Road - Toorak Avenue	Upgrade to include selected turning lanes for approaches	Not commenced
Kingsway -Taren Point Road - Kareena Road	Capacity upgrade requiring additional land	Not commenced
Kingsway -Taren Point Road	Upgrade to include selected turning lanes for approaches	Not commenced
Kingsway -Gannons Road	Upgrade to include selected turning lanes for approaches	Not commenced

Source: Adapted from TTPP 2020

6.4 Evacuation considerations

The site is located within Kurnell Peninsula which is subject to both potential bushfire and flooding risks which may require evacuation of the site.

Based on advice from the flood consultant (Egis Group), localised flooding of the surrounding area and sections of Captain Cook Drive may occur. However these floods would be time-limited in duration, and hence the recommendation is for the site population to remain onsite during the flood peak, following which it would be safe to egress the site via Captain Cook Drive.

While the site is subject to potential bushfire risk, this risk has been sought to be managed through the urban design and landscape master plans where landscape treatment within the site and particularly at the site boundaries has been designed to act as an asset protection zone. Attention has been paid to species selection and landscape treatment to minimise on-site risk. In addition to these mitigations, on-site refuges have been identified by the bushfire consultant (Eco Logical Australia) to enable site occupants to safely shelter in place.

As a last resort, a full evacuation scenario for the site has also been considered in this report.

6.4.1 Scenario: Shelter in place

Five on-site refuges have been identified within the master plan as identified in **Figure 6-4**. These refuges have been positioned throughout the precinct such that there is a refuge within a comfortable (and quick) walk of all the development buildings and other public open spaces. As illustrated in **Figure 6-4**, almost every building within the southern portion of the development (Lot 2 South) is within a 5-minute walk of an on-site refuge, with the entire development within a 10-minute walk.

The population, including residents, visitors and employees will be directed to walk to their nearest refuge, which will be sized appropriately to accommodate the expected population (plus some contingency). It is envisaged that the road network and parking near the refuges be used to transport the vulnerable population such as aged care residents and any mobility-impaired persons. This minimises the build-up of traffic within the internal road network and ensures emergency services have unrestricted access through the precinct.

Figure 6-4 On-site refuges and walking catchments

Source: On-site refuge locations provided by Eco Logical Australia (2023)

The on-site refuges also largely align with the delivery staging for the development (as discussed in **Section 4.2**) and hence will be available to the respective population as each stage is opened.

The exception is the Quibray Bay Precinct (Lot 2 North), which is delivered as Stage 1A. No on-site refuge has currently been identified within this precinct. Hence, the population would be required to evacuate (if required to leave the development) as discussed in **Section 6.4.2.2**.

6.4.2 Scenario: Site evacuation

As discussed in **Section 4.2**, the project is to be delivered in stages between 2029 and 2046. Consequently, the potential population requiring evacuation would progressively increase until the development is fully completed and operational in 2046.

Full evacuation scenarios for the site have been considered in this section for both:

– Complete development (refer to **Section 6.4.2.1**).

– Evacuation of the partially delivered development (**Section 6.4.2.2**)

For both scenarios, the assessment considers two evacuation scenarios:

– Day evacuation: assumes all workers are present, and residential areas are partially present (as some residents may be at their place of work, education or other locations).

– Night evacuation: assumes the complete residential population is present and some workers are present.

The assumptions regarding the percentage of the population present for each of the scenarios are discussed in the respective sections.

The assessment also considers two evacuation destinations:

– Evacuation towards the west (i.e. Cronulla) – this assumes the existing population of Kurnell Peninsula is also evacuating west (hence road capacity is shared)

– Evacuation towards the east (i.e. Kurnell Peninsula) – in this instance, it is assumed the Kurnell Peninsula population would remain on-site (not evacuating west) and it is very unlikely the Cronulla population is evacuating to an enclosed peninsula. Therefore it is assumed the road capacity (eastbound) is available for the evacuation to the project site.

6.4.2.1 Complete development

Based on the economic analysis undertaken by HillPDA in support of the planning proposal, the total end-state population of the site has been estimated in **Table 6-5**, including the assumed population percentage for the day and night time evacuation scenarios.

Table 6-5 Estimated end-state site population

Type	Dwellings or size	Occ.	Density	Population	Estimated on site	
					Day	Night
Residents						
Apartments	3,325	98%	1.9 per dwelling	6,080	50%	100%
Townhouses	258	98%	2.8 per dwelling	708	50%	100%
Senior ILUs	628	98%	1.3 per dwelling	800	100%	100%
Senior RACF	122	98%	1.0 per dwelling	120	100%	100%
Tourism	587	85%	1.5 per room	748	75%	100%
Staff						
Speciality food	8419 m^2	-	25 m^2 per staff	337	100%	0%
Non-retail services	835 m^2	-	40 m^2 per staff	21	100%	0%
Non-food	2552 m^2	-	33 m^2 per staff	77	100%	0%
Cultural	1324 m^2	-	80 m^2 per staff	17	100%	0%
Tourism	587 rooms	-	1.0 staff per room	587	100%	100%
School	500 students	-	7.9 students per staff	563	100%	0%
Senior RACF	122 rooms	-	1.6 staff per room	195	100%	75%

Type	Dwellings or size	Occ.	Density	Population	Estimated on site	
					Day	Night
Residents						
Senior ILUs	628 rooms	-	0.4 staff per room	251	100%	75%
Total population				10,504	6,922	9,378

Source: Adapted from Kurnell Planning Proposal Economic impact assessment (HillPDA, 2023)

Although Captain Cook Drive is to be upgraded to 2 lanes in each direction west (and inclusive) of the site, not all this road capacity would be available to the site population. The Kurnell Peninsula population (east of the site) is currently served by Captain Cook Drive (as 1 lane in each direction). Hence if this allowance is retained in the future, such that the existing population is no worse off compared to the existing scenario, the following capacity is available to the project population:

– Evacuation towards the west (i.e. Cronulla) – 1 lane retained for existing population; therefore 1 lane is available to the site population.

– Evacuation towards the east (i.e. Kurnell Peninsula) – In this instance, the Kurnell Peninsula population would remain on-site (not evacuating west) and it is very unlikely the Cronulla population is evacuating to an enclosed peninsula. Therefore it is assumed the single eastbound lane (east of the site) is available for the evacuation to the project site.

The above assumes no tidal flow arrangements are implemented for westbound evacuation, which is a conservative assumption, as capacity could be increased by emergency services during evacuation by directing vehicles to use one of the opposing lanes of traffic.

The minimum clearance time from the site is summarised in **Table 6-6**, based on:

– An assumed vehicle occupancy of 3.5 people per vehicle.

– A lane capacity of 1,200 vehicles per hour on Captain Cook Drive.

– A single lane for the project's population in each scenario (as discussed above).

Table 6-6 Minimum clearance time for evacuation scenarios

Population component	Total Population	Day evacuation			Night evacuation		
		Pop . onsite	Eqv. cars	Minimum clearance time (hours)	Pop . onsite	Eqv. cars	Minimum clearance time (hours)
Residents	8,456	4,875	1,446	-	8,456	2,416	-
Employees	2,048	2,048	585	-	922	263	-
Total	10,504	6,922	2,031	**1.6**	9,378	2,679	**2.2**

Therefore, for the more constrained (and likely) evacuation scenario (towards the west) approximately 2.2 hours of lane capacity is required to egress the population. This clearance time is a simplification based on the capacity of Captain Cook Drive and is not reflective of the actual evacuation time which would include notification times and the time required to egress each land use and enter vehicles.

This additional time would be significant for the school and aged care facilities where significant support would be required since the population is not as mobile, requires constant supervision and will not have vehicles accessible to them. Hence their evacuation would likely need to be facilitated by larger vehicles, such as buses. This would then reduce the number of vehicles egressing though are larger, and hence the above simplified capacity calculation would still be applicable as a conservative estimate of the capacity of Captain Cook Drive.

For school and aged care sites, an evacuation strategy should be developed as part of their respective development application process. This should highlight how the site would be evacuated including where and how quickly vehicles (such as buses) can be brought to the site to enable evacuation of the site, and how this translates into a total evacuation time.

6.4.2.2 Partial delivery of development

Based on the economic analysis undertaken by HillPDA in support of the planning proposal and a population estimation methodology consistent with the complete development (Section 6.4.2.1), the population of the site by stage has been estimated in **Table 6-7**.

To enable the development, Captain Cook Drive (CCD) is to be upgraded to 2 lanes in each direction towards Cronulla which significantly increases the capacity of the road network for evacuation. However, as discussed in Section 6.3.1.1, this upgrade is only required from a day-to-day traffic operation perspective in 2038, coinciding with the opening of Stages 2 and 3A (Town Centre and Boat Harbour South). Consequently, the staged evacuation focuses on the pre-CCD upgrade (hence constrained by existing capacity).

Table 6-7 Estimated site population (staged)

Type	Dwellings or size	Occ.	Density	Population	Estimated on site	
					Day	Night
Stage 1A						
Residents						
Apartments	303	98%	1.9 per dwelling	554	50%	100%
Staff						
Speciality food	469 m^2	-	25 m^2 per staff	19	100%	0%
Cultural	262 m^2	-	80 m^2 per staff	3	100%	0%
			Sub-total	*576*	*299*	*554*
Stage 1B						
Residents						
Apartments	762	98%	1.9 per dwelling	1,393	50%	100%
Townhouses	62	98%	2.8 per dwelling	170	50%	100%
Senior ILUs	172	98%	1.3 per dwelling	219	100%	100%
Senior RACF	122	98%	1.0 per dwelling	120	100%	100%
Tourism	115	85%	1.5 per room	147	75%	100%
Staff						
Cultural	610 m^2	-	80 m^2 per staff	8	100%	0%
Tourism	115 rooms	-	1.0 staff per room	115	100%	100%
Senior RACF	122 rooms	-	1.6 staff per room	195	100%	75%
Senior ILUs	172 rooms	-	0.4 staff per room	69	100%	75%
			Sub-total	*2,436*	*1,618*	*2,362*
Total population				**3,012**	**1,917**	**2,916**

Source: Adapted from Kurnell Planning Proposal Economic impact assessment (HillPDA, 2023)

Captain Cook Drive in its existing arrangement operates as 1 lane in each direction, therefore the evacuation capacity would be shared with the existing population of Kurnell Peninsula for an evacuation towards the west (i.e. Cronulla).

It is unknown what percentage of Captain Cook Drive's capacity is required by the existing population during evacuation, hence sensitivity testing has been undertaken to estimate the minimum clearance time from the site based on a range of available Captain Cook Drive capacity (from 25% through to 75% availability).

Similar to the end-state, for evacuation towards the east (i.e. Kurnell Peninsula) it is assumed the single eastbound lane (east of the site) is available for the evacuation to the project site.

In addition to the site population due to the completed development, there would also likely be an on-site population associated with the construction of the subsequent stages. However, this population would be consistent with the existing site use and hence be within the current evacuation considerations.

The minimum clearance time from the site is summarised in **Table 6-6**, based on:

– An assumed vehicle occupancy of 3.5 people per vehicle.

– A lane capacity of 1,200 vehicles per hour on Captain Cook Drive.

Table 6-8 Minimum clearance time for evacuation scenarios

Stage	Period	Equivalent vehicles	Minimum clearance time (hours) based on the available capacity (%) of Captain Cook Drive			
			25%	50%	75%	100%
Stage 1A	Day	85	0.3	0.1	0.1	0.1
	Night	158	0.5	0.3	0.2	0.1
Stage 1A + 1B	Day	547	1.8	0.9	0.6	0.5
	Night	833	2.8	1.4	0.9	0.7

During the initial phase of the project (Stage 1A only) the development minimum clearance time is less than half an hour even if only 25% of Captain Cook Drive capacity is available to the project.

With the opening of Stage 1B, the minimum clearance time remains below 1.5 hours if approximately 50% of Captain Cook Drive capacity is available for a westbound evacuation towards Cronulla. For an eastbound evacuation to Kurnell Peninsula, the minimum clearance time is less than 1 hour (based on the 100% availability scenario).

With the opening of Stages 2 and 3A, it is envisaged Captain Cook Drive has also been upgraded, hence the minimum clearance time would be less than that identified for the complete development (refer to **Section 6.4.2.1**).

7.0 Summary

7.1 Overview

Overall the proposed master plan (supported by the outcomes of this Transport Strategy) addresses the relevant transport requirements of the *Local Planning Directions Section 5.4 as Integrating Land Use and Transport* and additional comments from the Department of Planning and Environment (DPE) on the Scoping Proposal.

The project site is envisaged as a mixed-use community consisting of a range of residential, retail, tourism, and recreational uses as well as a range of open space and community facilities (including a school). The master plan (and associated yield) results in a balance between the development and transport constraints, including:

– A mix of residential housing including townhouses, medium-density and high-density apartments to support the Council's ambition to ensure a reasonable supply of housing in the market.

– Provision of local centre, school, multiple district parks, as well as retail frontages and open space all seamlessly connected by a walking and cycling internal network to minimise the reliance on private vehicles

– An overall development size that can be accommodated by both the road and public transport network of the wider LGA.

The project also improves public access to Bate Bay and Boat Harbour, which includes over 2 kilometres of beach, through improved walking, cycling, public transport and private vehicle provisions.

To support the sustainable operation of the development from a transport perspective, several design considerations have been embedded into the master plan and other initiatives identified for implementation. Key components of the transport response by mode for the project are summarised in the subsequent sections. These design considerations and initiatives culminate to:

– Improve connectivity including equitable and accessible access to, from and within the development via walking, cycling and public transport

– Reduce the overall travel demand and reliance on private vehicles to reduce environmental impacts

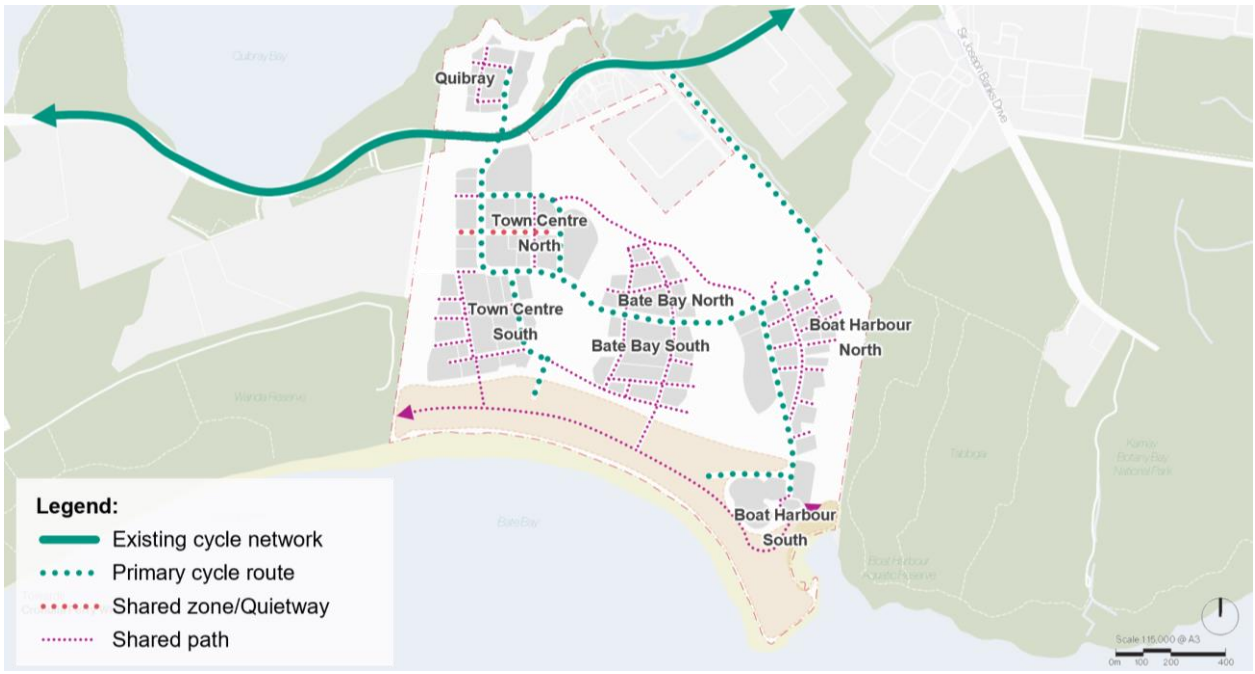
– Create places for people and ensure people and goods can move safely through the site (prioritising in order, walking, cycling, public transport, freight and general traffic).

7.2 Walking and cycling

The site is designed to be largely self-contained with many key trip attractors within the proposed site. This suggests that many daily trips can be completed within the site, short trips that avoid the need to travel to neighbouring centres. Hence the walking and cycling network needs to provide a permeable, safe and convenient network.

Separated cycleways are proposed along the key north-south and east-west axes of the site, which transition into shared paths or shared zones for the first and last section of their journey.

Figure 7-1 Proposed walking and cycling network



Source: GroupGSA base map with SCT Consulting annotations

The appropriate walking and cycling infrastructure has been provided based on the function of the link to ensure a high-quality user experience and meet the requirements of Council and Transport for NSW guidelines.

In addition to a connected network, several other infrastructure components have been identified for implementation to increase the attractiveness of walking and cycling and address barriers that may hinder their adoption, including:

– Street and walkway lighting
– Places to stop and rest
– Tree canopy cover
– End-of-trip facilities (including bike parking, lockers, and change rooms/showers)
– Bicycle maintenance stations
– E-bike charging stations.

A Green Travel Plan (GTP) has also been developed to encourage people to travel by public transport, walking, or cycling. This is often known as Travel Demand Management (TDM), where policies, objectives, measures and targets are applied to influence travel behaviour.

Potential initiatives to encourage higher uptake include:

– Shared bike stations/parking hubs
– Promotion of bicycle initiatives – such as cycle-to-work days, free bike check-up events, and bike riding lessons.
– Provision of free e-bike charging facilities at key trip attractors.
– Clear signage, maps, and wayfinding to support riding and walking trips, and increase the visual presence of these modes.

7.3 Public transport

The site is not located within the walking (or cycling catchment) of the rail network, and hence public transport accessibility is limited to a single service (Route 987) which operates relatively infrequently.

Consequently, a staged bus strategy has been to support the development, and also improve bus services for the Kurnell Peninsula in the long run.

7.3.1 Interim shuttle bus

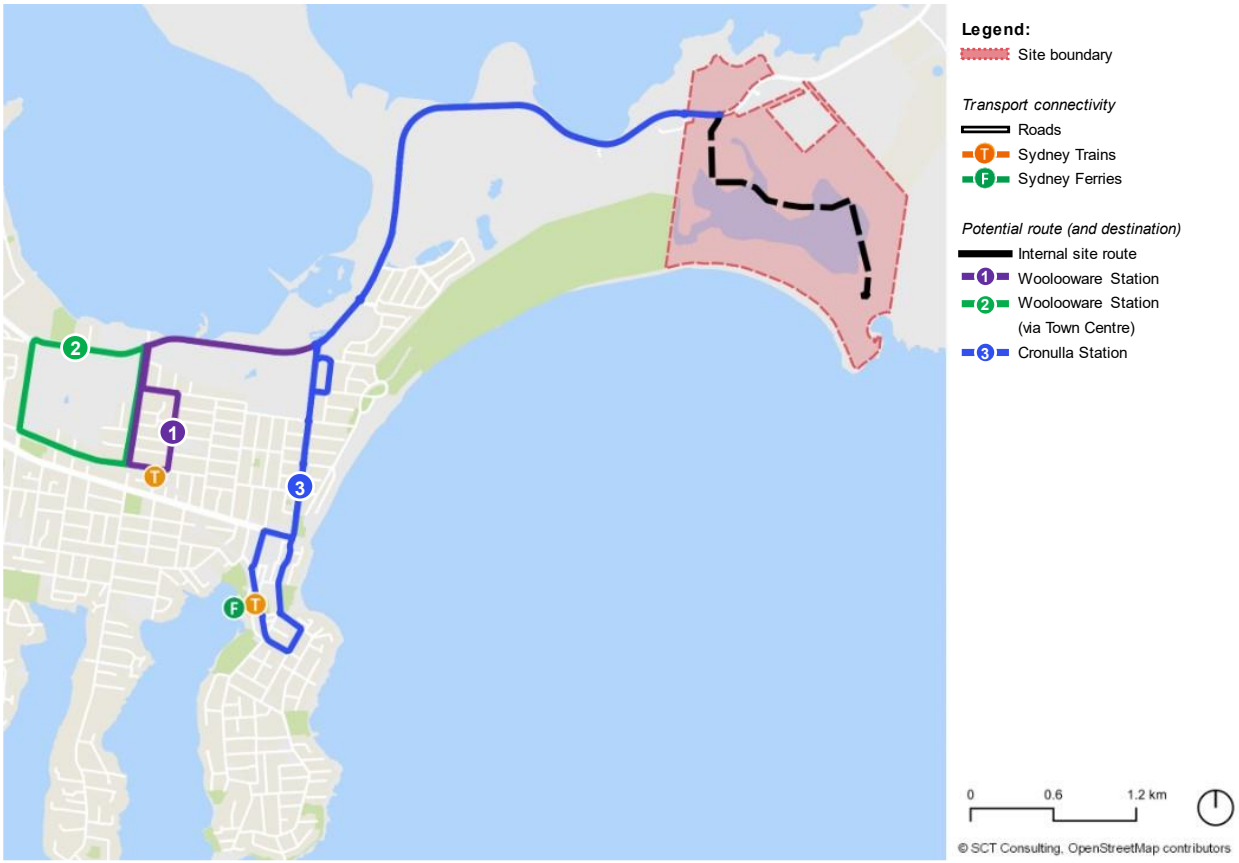
While the site is progressively delivered and occupied, it is proposed a shuttle service operate from the precinct to the train station to provide an accessible and convenient public transport connection. Both Woolooware Station and Cronulla Station were considered for the destination of the shuttle (Figure 7-2). This study recommends Woolooware Station based on:

– There is less traffic congestion en route to Woolooware Station, which will improve travel times and the reliability of the service

– Customers interchanging to rail (which represent the majority of users) are connected to the same T4 Eastern Suburbs & Illawarra Line services

– Customers who have a destination in Cronulla Town Centre are still able to access a Route 987 service to Cronulla.

Figure 7-2 Potential routes and destinations for shuttle service



Using a typical single-deck minibus, with a seated capacity of 22, the service capacity of 20 passengers has been adopted for the shuttle service. Based on the travel time for the direct route to Woolooware Station, the shuttle service could operate with a 32-minute headway (or approximately 2 trips per hour).

Based on the staged delivery of the project, two physical shuttle buses, operating at a 15-minute headway (or a frequency of approximately 4 buses per hour) could accommodate the demand for up to Stage 1B (inclusive), and three shuttle buses for Stage 2.

Beyond the opening of Stages 2 and 3A, the customer demand may exceed 150 trips per hour in the peak direction and equate to 3 full-size bus services per hour (or a service every 20 minutes). Subsequently, in consultation with Transport for NSW, there is an opportunity to transition from a shuttle service to an end-state bus service operated by a full-size bus.

7.3.2 End-state bus service

For the end-state bus service, the study considered two options:

– Option 1: Re-routing an existing route, to combine the existing patronage with those linked to the development. This will increase journey time for the existing service, but also deliver benefits to existing customers as their wait times are significantly reduced as the service frequency is increased to accommodate the increased patronage. This rerouted service would likely have a lower operating cost, compared to a new service.

– Option 2: Introduce a new service, which also serves other locations along the route to increase the potential patronage, and also provides a wider community benefit.

Overall, noting the delivery of (or changes to) a regular route service is subject to alignment with medium-term strategic planning and supporting analysis to be undertaken by Transport for NSW, this study recommends Option 1 (reroute existing bus route 987) as the preferred end-state solution once the proposed development has been realised.

This option balances the bus operational costs with connectivity to the development and benefits the wider community whilst not being contingent on population growth in surrounding town centres.

7.3.3 Bus infrastructure

It is proposed the main road through the precinct is sized to accommodate buses to service the precinct, including shuttle buses (minibuses), regular Sydney buses and coaches. A secondary network is also proposed which serves the beachfront (Town Centre South and Boat Harbour South) as well as the proposed school north of the town centre.

Figure 7-3 Proposed bus network

Source: GroupGSA base map with SCT Consulting annotations

Along the primary and secondary bus corridors, bus stop pairs have been identified (**Figure 7-4**) to serve the interim and end-state bus services.

Due to the staging of the development, not all bus stops are required from the outset of the development. However they will be space-proofed from the outset and infrastructure such as B-pole, seat and shelter (if appropriate)

infrastructure installed when required (**Figure 7-5**). In most locations, the bus stop has been identified within a parking lane and hence can be used as parking until required.

Figure 7-4 Proposed bus stops within (and adjacent to) the site

Figure 7-5 Timeline of bus operations and bus stop pair use

Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Precinct completion (expected)				1A					1B				2 3A		3B		4	5A			5B
Bus service strategy (recommended)																					
No shuttle (987 only)				■	■	■	■	■													
Shuttle (town centre loop)								■	■	■	■	■	■								
Shuttle (full loop)													■	■	■	■	■	■			
End-state solution													■	■	■	■	■	■	■	■	■
Bus stop pairs required																					
1 (Captain Cook Drive)				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2 (Town Centre North)							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3 (Town Centre South)													■	■	■	■	■	■	■	■	■
4 (Bate Bay)																	■	■	■	■	■
5 (Precinct Main Road)														■	■	■	■	■	■	■	■
6 (Boat Harbour South)													■	■	■	■	■	■			

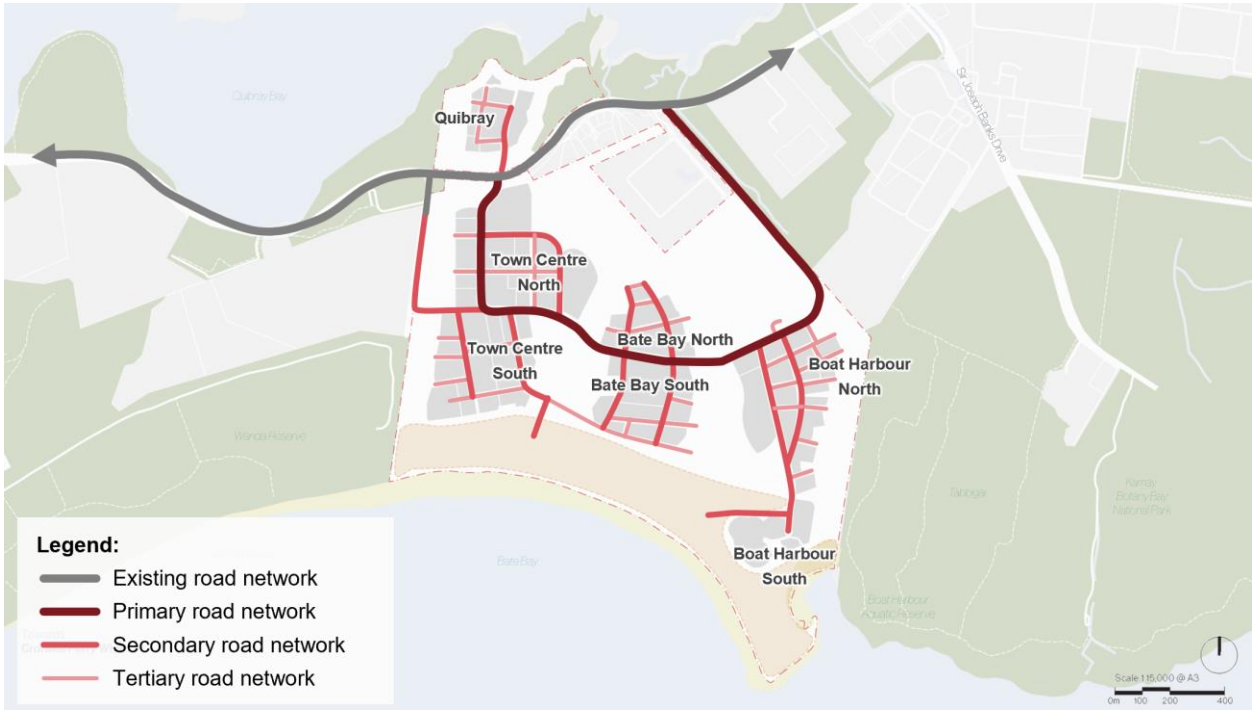
Legend ■ Expected operational period ■ Potential transition period

7.4 Road network

7.4.1 Internal network

Vehicle connectivity for the precinct is provided by 3 tiers of road function as illustrated in **Figure 7-6**. Access to the site is via Captain Cook Drive, with the main access via the Primary Road near the Town Centre North. Secondary accesses are provided through Lindum Road (primarily for servicing the town centre) and with the Primary Road at the eastern end of the site (primarily serving the Boat Harbour precinct).

Figure 7-6 Proposed vehicle network



Source: GroupGSA base map with SCT Consulting annotations

To enable access to Captain Cook Drive, SIDRA intersection modelling was undertaken to develop 3 concept layouts for the intersections immediately adjacent to the project site:

– Captain Cook Drive | Lindum Road: The existing roundabout is to be upgraded to accommodate the 4-lane configuration of Captain Cook Drive. Proposed to be used as a secondary access point to service the town centre.

– Captain Cook Drive | Site Access (west): new signalised intersection serving as the main access to the site (north and south)

– Captain Cook Drive | Site Access (east): new priority intersection serving as the secondary access to the site (predominately serving Boat Harbour including the beach and the ecotourism).

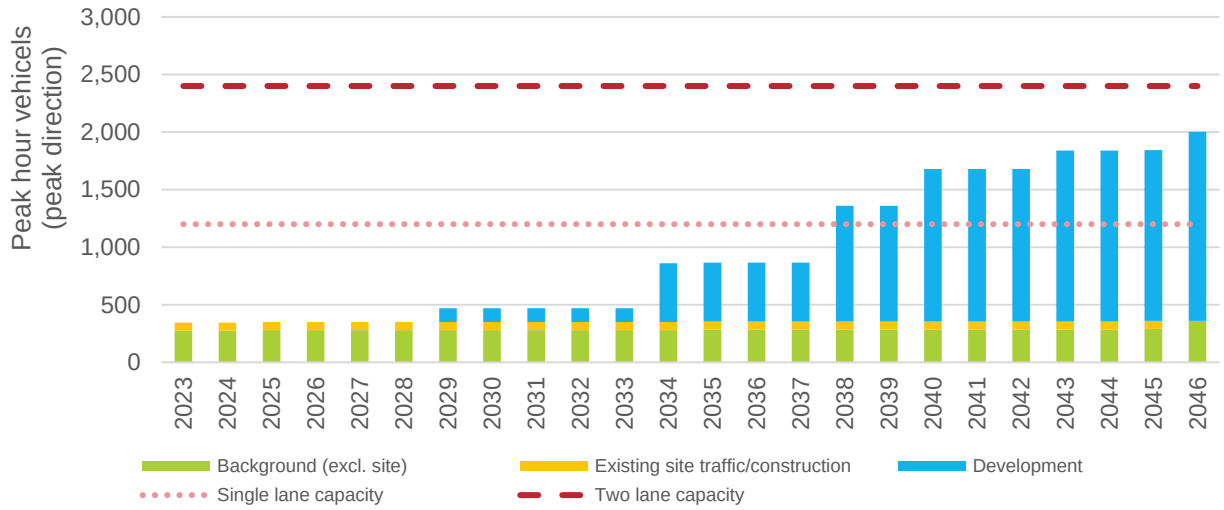
7.4.2 External network

Overall the proposed master plan results in a consistent vehicle generation to the previously modelled scenario, hence would result in a similar impact to the road network. The recommendations from the previous modelling are still relevant and applicable.

As recommended by the previous modelling, Captain Cook Drive needs to be upgraded to 4 lanes (2 in each direction) to accommodate the project. However, this upgrade is not required on the project's day of opening due to the staged delivery of the project.

Based on the proposed staging, the expected traffic volumes on Captain Cook Drive (east of Lindum Road) do not exceed the nominal free-flow lane capacity of 1,200 vehicles per hour until after the opening of Stages 2 and 3A (Town Centre and Boat Harbour South) in 2038 (**Figure 7-7**).

Figure 7-7 Captain Cook Drive midblock traffic volume forecast – PM peak hour



7.5 Evacuation considerations

The site is located within Kurnell Peninsula which is subject to both potential bushfire and flooding risks which may require evacuation of the site.

While the site is subject to potential bushfire risk, this risk has been sought to be managed through the urban design and landscape master plans. The design response includes on-site refuges to enable site occupants to safely shelter in place. As a last resort, a full evacuation scenario for the site has also been considered in this report.

Five on-site refuges have been identified within the master plan. These refuges have been positioned such that there is a refuge within a 10-minute walk of all the buildings and other public open spaces (**Figure 7-8**).

Figure 7-8 On-site refuges and walking catchments

Source: On-site refuge locations provided by Eco Logical Australia (2023)

The population, including residents, visitors and employees will be directed to walk to their nearest refuge, which will be sized appropriately to accommodate the expected population (plus some contingency). It is envisaged that the road network and parking near the refuges be used to transport the vulnerable population such as aged care residents and any mobility-impaired persons. This minimises the build-up of traffic within the internal road network and ensures emergency services have unrestricted access through the precinct.

If evacuation is required, evacuation would be via Captain Cook Drive. For this assessment, it is assumed the population will evacuate via cars with an occupancy rate of 3.5 persons per vehicle for the evacuation.

The worst-case scenario for the evacuation is evacuation towards the west (i.e. towards Cronulla) where the road capacity of Captain Cook Drive is shared with the concurrent evacuation of the existing population of Kurnell Peninsula.

To enable the development, Captain Cook Drive (CCD) is to be upgraded to 2 lanes in each direction towards Cronulla which significantly increases the capacity of the road network for evacuation. However, this upgrade is only required from a day-to-day traffic operation perspective in 2038, coinciding with the opening of Stages 2 and 3A (Town Centre and Boat Harbour South).

Hence, two evacuation scenarios have been considered:

– Existing Captain Cook Drive capacity with partial delivery of the site.

– Upgraded Captain Cook Drive with complete delivery of the site.

For a westbound evacuation, the minimum clearance time is approximately:

– 1.4 hours of equivalent lane capacity is required for the partially delivered (and operational) site if approximately 50% of Captain Cook Drive capacity is available for a westbound evacuation towards Cronulla.

– 2.2 hours of equivalent lane capacity is required for the completely delivered (and operational) site with the upgraded Captain Cook Drive.

The above clearance time is a simplification based on the capacity of Captain Cook Drive and is not reflective of the actual evacuation time which would include notification times and the time required to egress each land use and enter vehicles. It is envisaged that additional detail would be considered in the site-specific evacuation strategies as part of their respective development application process.

APPENDIX A

APPROVED TRIP GENERATION RATES

From: Wayne Johnson
To: HALL James C
Cc: Ken Hollyoak; Jessica Szeto; development.sydney@rms.nsw.gov.au; Rachel.NICHOLSON@rms.nsw.gov.au
Subject: RE: Kurnell Peninsula - Year 2026 and Year 2036 STM With and Without Development Traffic
Date: Tuesday, 27 March 2018 8:31:00 PM
Attachments:

Evening James,

Following our meeting last week, TTPP have revised the trip rates and provided further justification for:

- Traffic generation rates for seniors housing and aged care housing development – i.e. separate rates for each use
- Retail AM traffic generation assumptions – i.e. 50% of PM trips (rather than the 25% proportion previously proposed)

The project team would like RMS to review the development trip generation rates and run both yields (upper and lower) in their STM for Year's 2026 and 2036 with and without development traffic. As discussed, it would be greatly appreciated if RMS could run both yield options with and without development traffic and provide results within **2-3 weeks**, noting that the project is already well behind schedule.

Table 1: Kurnell Masterplan – Development Yield

Land Use	Lower Yield	Upper Yield
Seniors Housing	293 dwellings	440 dwellings
Aged care	147 dwellings	220 dwellings
High Density Residential	1362 dwellings	2043 dwellings
Mid Density Residential	714 dwellings	1071 dwellings
Prestige Housing	100 dwellings	149 dwellings
High Density Hospitality	174 dwellings	262 dwellings
Eco Tourist Villas	55 dwellings	82 dwellings
Serviced Apartment	441 dwellings	661 dwellings
Commercial	3028 sqm	4542 sqm
Retail	4314 sqm	6471 sqm
Community Facilities	1600 sqm	2400 sqm

Traffic Generation Assumptions

The traffic generation estimates for the Kurnell masterplan have been sourced from the Roads and Maritime's *Guide to Traffic Generating Developments* (2002) and in their technical direction TDT2013/04a containing revised rates. In addition to this, the proposed high density residential traffic generation rates for the masterplan have been sourced from the recent 2017 traffic generation surveys conducted at Cronulla (Site 6) as part of Roads and Maritime's *High Density Residential (Car Based) Analysis Report* for high density residential developments not well served by public transport services.

The proposed traffic generation rates for the Kurnell masterplan traffic assessment are as follows:

Residential

- **Low density dwellings**
  Roads and Maritime's updated technical direction suggests the following traffic generation rates:
  - AM peak hour vehicle trips = 0.95 trips per dwelling
  - PM peak hour vehicle trips = 0.99 trips per dwelling.

- **Medium density dwellings**

Consideration has been given to private car dependency for drivers that reside in medium density dwellings. Although the Roads and Maritime Guide (2002) recommends a rate of 0.4-0.65 trips/dwelling in the peak hour, the following adjustment has been applied to the Roads and Maritime rates given the subject site is not located near a railway station:

  - AM peak hour vehicle trips = 0.85 trips per dwelling
  - PM peak hour vehicle trips = 0.85 trips per dwelling.

- **High density dwellings (Cronulla 2017 Surveys – Site 6)**

The traffic generation rates based on recent 2017 surveys at the Cronulla site (Site 6) conducted as part of Roads and Maritime's *High Density Residential (Car Based) Analysis Report* are as follows:

  - AM peak hour vehicle trips = 0.35 trips per dwelling
  - PM peak hour vehicle trips = 0.43 trips per dwelling.

- **Seniors Housing**
  Roads and Maritime's updated technical direction provides traffic generation rates for seniors living development – which comprises a mix of self-contained, hostel (low care) and aged care (high care) accommodation types. The proposed seniors housing development is expected to be largely self-contained seniors housing (e.g. independent living units) and as such, the traffic generation rates have been derived from the Roads and Maritime surveyed sites, which are solely self-contained accommodation sites (i.e. Sites 6-9). The surveyed sites suggest the following network peak hour traffic generation rates:
  - AM peak hour vehicle trips = 0.16 trips per dwelling*
  - PM peak hour vehicle trips = 0.31 trips per dwelling (0.03-0.31 trips per dwelling, upper rate used).
    **N.B. AM site peak does not generally coincide with the network peak hour. As such, for the purpose of this traffic generation analysis, it has been assumed that 50% of PM trips would occur in the AM.*

- **Aged Care Housing**
  Similar to the above, the traffic generation rates for aged care seniors living accommodate types have been derived from the Roads and Maritime surveyed sites (i.e. Sites 3 and 4). It should be noted that these sites include a mix of accommodate types, i.e. self-contained, hostel and aged care accommodation types. For aged care housing (i.e. high care facilities), it is noted that lower traffic generation would be expected compared to self-contained/hostel (low care) accommodation types as aged care facilities would generally attract less mobile senior residents, who require high level personal assistance and care and thus, are unlikely to own a car/travel by car. Although, as a conservative measure, the traffic generation rates from the Roads and Maritime surveyed sites (Sites 3 and 4) have been used to estimate the likely traffic generation arising from aged care housing (noting that this may in fact be lower in reality as the surveyed sites include lower care senior accommodation types), which are as follows:
  - AM peak hour vehicle trips = 0.12 trips per dwelling*
  - PM peak hour vehicle trips = 0.24 trips per dwelling (0.05-0.24 trips per dwelling, upper rate used).
    **N.B. AM site peak does not generally coincide with the network peak hour. As such, for the purpose of this traffic generation analysis, it has been assumed that 50% of PM trips would occur in the AM.*

Commercial/Office
The Roads and Maritime's updated technical direction suggests a trip rate of 1.2-1.6 trips per 100 sqm for commercial developments. However, as the subject site is not located near a railway station, the 'old' Roads and Maritime trip rates for commercial land use is considered more appropriate and is as follows:

- AM and PM peak hour vehicle trips = 2 trips per 100 sqm.

Serviced Apartments/Tourist Villas
Roads and Maritime do not have any trip rates for serviced apartment developments. For the purpose of estimating the traffic generation from the serviced apartments, the trip rates for high density residential dwellings has been adopted:

- AM peak hour vehicle trips = 0.35 trips per dwelling
- PM peak hour vehicle trips = 0.43 trips per dwelling.

Mixed Retail Use / Neighbourhood Centre
The proposed mixed retail use is expected to be ancillary, such as a neighbourhood centre to serve local residents/employees within the Kurnell Peninsula. As such, the following traffic generation is proposed:

- AM peak hour vehicle trips = 3 trips per 100 sqm*
- PM peak hour vehicle trips = 6 trips per 100 sqm
  **N.B. AM site peak does not generally coincide with the network peak hour, plus some retail shops would not likely be open during the network peak hour (i.e. before 9am). As such, it has been assumed that 50% of PM trips would occur in the AM to account for staff/retail AM trips.*

Community Facilities
The proposed community facilities will most likely be an ancillary use to the Kurnell masterplan. Additionally, the site peak hour traffic generation patterns for such uses are unlikely to coincide with the network peak hour. As such, for the purpose of estimating the traffic generation patterns, the following trip rate has been assumed for the community facility use based on the commercial trip rates:

- AM and PM peak hour vehicle trips = 2 trips per 100 sqm.

Directional Splits Assumptions
The following directional splits (i.e. inbound/outbound vehicle movement proportions) for each land use has been assumed as follows:

- **Residential:** 20% inbound and 80% outbound (AM Peak); 80% inbound and 20% outbound (PM Peak)
- **Commercial/office:** 80% inbound and 20% outbound (AM Peak); 20% inbound and 80% outbound (PM Peak)
- **Serviced Apartments/Tourist Villas:** 15% inbound and 85% outbound (AM Peak); 85% inbound and 15% outbound (PM Peak)
- **Mixed Retail:** 50% inbound and 50% outbound (AM and PM Peak)
- **Community Facilities:** 50% inbound and 50% outbound (AM and PM Peak)

Internal Trip Containment Assumptions
It is assumed that 10% of the potential external traffic movements generated from the subject site would be internalised as a result of the mix of land uses.

Initially, an internal trip reduction of 25% was proposed, however, this has since been conservatively reduced to 10% as a result of feedback from Roads and Maritime in the meeting.

Trip Generation Estimates
Estimates of the AM and PM peak hour traffic generation for the proposed upper and lower masterplan options are provided in the Table 2 and Table 3, respectively.

Table 2: Kurnell Masterplan Traffic Generation Potential (Upper Yield)

Land Use	Size	Trip Generation Rate		AM Peak		PM Peak	
		AM Peak	PM Peak	Inbound	Outbound	Inbound	Outbound
Seniors Housing	440 dwellings	0.16 trips per dwelling	0.31 trips per dwelling	14 trips	55 trips	110 trips	28 trips
Aged care	220 dwellings	0.12 trips per dwelling	0.24 trips per dwelling	6 trips	22 trips	43 trips	11 trips
High Density Residential*	2043 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	144 trips	573 trips	703 trips	176 trips
Mid Density Residential	1071 dwellings	0.85 trips per dwelling	0.85 trips per dwelling	183 trips	729 trips	729 trips	183 trips
Prestige Housing	149 dwellings	0.95 trips per dwelling	0.99 trips per dwelling	29 trips	114 trips	119 trips	30 trips
High Density Hospitality*	262 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	19 trips	74 trips	91 trips	23 trips
Eco Tourist Villas*	82 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	5 trips	25 trips	30 trips	6 trips
Serviced Apartment*	661 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	35 trips	197 trips	242 trips	43 trips
Commercial	4542 sqm	2 trips per 100sqm	2 trips per 100sqm	73 trips	19 trips	19 trips	73 trips
Retail / Neighbourhood Centre	6471 sqm	3 trips per 100sqm	6 trips per 100sqm	98 trips	98 trips	195 trips	195 trips
Community Facilities**	2400 sqm	2 trips per 100sqm	2 trips per 100sqm	24 trips	24 trips	24 trips	24 trips
Sub-Total				630 trips	1,930 trips	2,305 trips	792 trips
					AM Peak	**-**	***PM Peak***
Total Two-Way Traffic Movements					*2,560 trips*	-	*3,097 trips*
Internal Trip Reduction (-10%)					*-256 trips*	-	*-310 trips*
Existing Site Traffic Generation*					*-140 trips*	-	*-140 trips*
Net Proposed Development Traffic Generation Estimate					**2,164 trips**	**-**	**2,647 trips**

* The previous traffic assessment conducted for the site found that the existing site currently generates up to 1,400 vpd. For the purpose of the above assessment, it has assumed that the peak hour traffic generation of the site equates to 140 vph (=1,400/10 hours).

Table 3: Kurnell Masterplan Traffic Generation Potential (Lower Yield)

Land Use	Size	Trip Generation Rate		AM Peak		PM Peak	
		AM Peak	PM Peak	Inbound	Outbound	Inbound	Outbound
Seniors Housing	293 dwellings	0.16 trips per dwelling	0.31 trips per dwelling	10 trips	37 trips	73 trips	19 trips
Aged care	147 dwellings	0.12 trips per dwelling	0.24 trips per dwelling	4 trips	15 trips	29 trips	8 trips
High Density Residential*	1362 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	96 trips	382 trips	469 trips	118 trips
Mid Density Residential	714 dwellings	0.85 trips per dwelling	0.85 trips per dwelling	122 trips	486 trips	486 trips	122 trips
Prestige Housing	100 dwellings	0.95 trips per dwelling	0.99 trips per dwelling	19 trips	76 trips	80 trips	20 trips
High Density Hospitality*	174 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	13 trips	49 trips	60 trips	15 trips
Eco Tourist Villas*	55 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	3 trips	17 trips	21 trips	4 trips
Serviced Apartment*	441 dwellings	0.35 trips per dwelling	0.43 trips per dwelling	24 trips	132 trips	162 trips	29 trips
Commercial	3028 sqm	2 trips per 100sqm	2 trips per 100sqm	49 trips	13 trips	13 trips	49 trips
Retail / Neighbourhood Centre	4314 sqm	3 trips per 100sqm	6 trips per 100sqm	65 trips	65 trips	130 trips	130 trips
Community Facilities**	1600 sqm	2 trips per 100sqm	2 trips per 100sqm	16 trips	16 trips	16 trips	16 trips
Sub-Total				421 trips	1,288 trips	1,539 trips	530 trips
					AM Peak	**-**	***PM Peak***
Total Two-Way Traffic Movements					*1,709 trips*	-	*2,069 trips*
Internal Trip Reduction (-10%)					*-171 trips*	-	*-207 trips*
Existing Site Traffic Generation*					*-140 trips*	-	*-140 trips*
Net Proposed Development Traffic Generation Estimate					**1,398 trips**	-	**1,722 trips**

* The previous traffic assessment conducted for the site found that the existing site currently generates up to 1,400 vpd. For the purpose of the above assessment, it has assumed that the peak hour traffic generation of the site equates to 140 vph (=1,400/10 hours).

The proposed masterplan is estimated to generate:

- **Upper Yield:** **2,164 two-way trips in the AM peak hour** and **2,647 two-way trips in the PM peak hour**
- **Lower Yield:** **1,398 two-way trips in the AM peak hour and 1,722 two-way trips in the PM peak hour.**

Please let me know if you have any queries in relation to the above traffic generation assumptions or if you require further information.

Thanks in advance.

Regards,

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APPENDIX B

CAPTAIN COOK DRIVE CONCEPT DESIGN

APPENDIX C

EXTRACT OF THE PREVIOUSLY COMPLETED MODELLING

Kurnell Peninsula
Phase 1 Transport Assessment

Prepared for:

Besmaw

2 March 2020

The Transport Planning Partnership

7.9 Proposed Development Assessment

A high-level conservative assessment has been undertaken to assess the impacts associated with the Master Plan development.

Traffic modelling was undertaken on a yield of 600,000 sqm which represents a worst-case modelling assessment given the yield of the Master Plan has since reduced to 550,000 sqm.

A Master Plan yield of 600,000 sqm was forecast to generate a net additional 2,164vph in the AM Peak and 2,647vph in the PM Peak on the road network.

A Master Plan yield of 550,000 sqm is forecast to generate a net additional 1,939vph in the AM Peak and 2,570vph in the PM Peak on the road network.

In regard of the above, the reduction in development yield is forecast to result in a reduction of 225 vph in the AM Peak and 77 vph in the PM Peak.

Traffic modelling was conservatively undertaken for a yield of 600,000 sqm rather than 550,000 sqm. As such, it should be acknowledged that a reduction in development yield would result in an improvement in network performance and a reduction in the amount of infrastructure upgrade works.

A summary of the required network upgrades identified to support the proposed development is provided in Table 23, and graphically shown in Figure 7.6.
Furthermore, it is noted that further optimisation of the Year 2026 Development scenario models is intended to be undertaken in the future, which will most likely further improve the traffic modelling outcomes. This would be further examined as part of the Phase 2 Detailed Transport Assessment stage.

Table 23: Year 2026 Development Scenario – Required Network Upgrades

ID	Intersection	Issues	Recommended Upgrades in 2026 Base	Additional Treatments Required with Development (in addition to Base upgrades)	Intersection sizing and footprint requirements subject to detail design
1	Captain Cook Drive-Eastern boundary subject site to Elouera Road	Over-capacity (v/c >1.3 AM Peak westbound and PM peak eastbound)	nil	**Upgrade to 4 lanes**	nil
2	Captain Cook Drive-Lindum Drive	roundabout restricts the flow of traffic from the development	nil	**Signalise with additional upgrades Captain Cook Drive (West)** - Add 50m right turn lane **Captain Cook Drive (East)** - Add 50m left and through lane **Lindum Road (South)** - Add 10m right turn pocket - Add 50m left turn lane	nil
3	Captain Cook Drive-Trinity Street	roundabout will be over-capacity (eastern approach AM, western approach PM)	nil	**Signalise with additional upgrades Captain Cook Drive (South)** - Add 50m right turn lane **Trinity Street (East)** - Add 25m left turn lane	nil
4	Captain Cook Drive-Elouera Road	roundabout will be over-capacity (eastern approach AM, western approach PM)	nil	**Signalise with additional upgrades Captain Cook Drive (West)** - Add 50m right turn lane - Add 100m exit lane **Captain Cook Drive (East)** - Add 50m left turn lane **Elouera Road (South)** - Add 50m right turn lane	nil

ID	Intersection	Issues	Recommended Upgrades in 2026 Base	Additional Treatments Required with Development (in addition to Base upgrades)	Intersection sizing and footprint requirements subject to detail design
5	Captain Cook Drive-Woolooware Street	roundabout will be over-capacity (eastern approach AM, western approach PM)	nil	**Signalise with additional upgrades Captain Cook Drive (West)** - Add 100m through and left turn lane - Add 150m right turn lane - Add 100m exit lane **Woolooware Road (South)** - Add 20m left turn pocket lane **Captain Cook Drive (East)** - Add 50m short right turn lane - Add 100m exit lane	nil
6	Captain Cook Drive-Foreshore Boulevarde	overcapacity		**Additional Upgrades Required Captain Cook Drive (West)** - Add 150m left & through lane - add 100m exit lane **Captain Cook Drive (East)** - Add 50m long through lane, - add 100m exit lane	
7	Captain Cook Drive-Gannons Road	roundabout will be over-capacity (eastern & southern approach AM, western approach PM)	nil	**Signalise with additional upgrades Captain Cook Drive (West)** - Add 150m through and left lane - Add two (2) 75m right turn lanes - Add 100m exit lane **Gannons Road (South)** - Add 20m right turn lane - Add 50m exit lane **Captain Cook Drive (East)** - Add 50m right turn lane - Add 250m left and through lane - Add 100m exit lane	

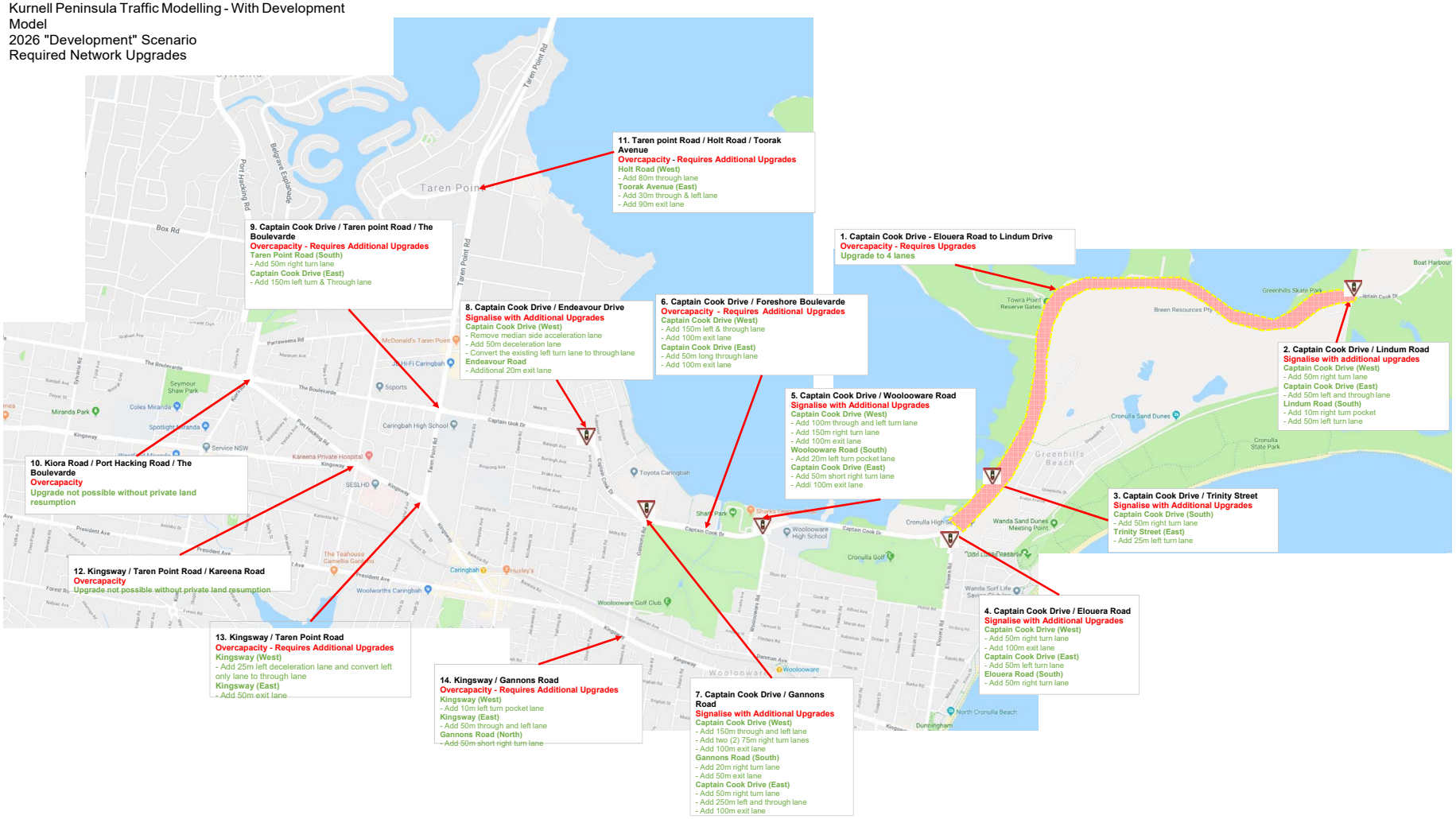
ID	Intersection	Issues	Recommended Upgrades in 2026 Base	Additional Treatments Required with Development (in addition to Base upgrades)	Intersection sizing and footprint requirements subject to detail design
8	Captain Cook Drive-Endeavour Road	the priority-controlled seagull intersection will be over-capacity (eastern approach right turn lane in AM and Endeavour Road approach in both AM/PM)	nil	**Signalise with additional upgrades Captain Cook Drive (West)** - Remove median side acceleration lane - Add 50m deceleration lane - Convert the existing left turn lane to through lane **Endeavour Road** - Add 20m exit lane	
9	Captain Cook Drive-The Boulevarde-Taren Point Road	overcapacity (eastern approach right turns AM/PM), additional 5s delay	**The Boulevarde (West)** - Add 50m short through lane **Captain Cook Drive (East)** - Add 100m lane on the departure side	**Additional Upgrades Required Taren Point Road (South)** - Add 50m right turn lane **Captain Cook Drive (East)** - Add 150m left turn & Through lane	possibly some land from Caringbah High School
10	Port Hacking Road-The Boulevarde-Kiora Road	overcapacity (eastern and western approach AM/PM)	**The Boulevarde (West)** - Add 50m short lane - Add 50m short lane on the departure side **Port Hacking Road (North)** - Add 50m exit lane **The Boulevarde (East)** - Add 50m short right turn lane	**Upgrade not possible without private land resumption**	

ID	Intersection	Issues	Recommended Upgrades in 2026 Base	Additional Treatments Required with Development (in addition to Base upgrades)	Intersection sizing and footprint requirements subject to detail design
11	Taren Point Road-Holt Road-Toorak Avenue	overcapacity (southern approach Holt Road in AM, northern approach in PM); additional 6s delay	**Taren Point Road (North)** - Add 50m short right turn lane **Holt Road (west)** - Add 50m lane on the departure **Toorak Avenue (East)** - Additional right turn lane westbound on Toorak Avenue and convert the kerbside lane from "left only" to a shared "through and left".	**Additional Upgrades Required Holt Road (West)** - Add 80m through lane **Toorak Avenue (East)** - Add 30m through & left lane - Add 90m exit lane	parking bays on Toorak Ave requires relocation
12	Kingsway-Taren Point Road-Kareena Road	Overcapacity (eastern approach AM)	**Kingsway (East)** - Additional 50m through lane **Kingsway (West)** - Additional 90m through lane	**Upgrade not possible without private land resumption**	
13	Kingsway-Taren Point Road	Overcapacity (eastern approach in AM, western approach in PM)	nil	**Additional Upgrades Required Kingsway (West)** - Add 25m left deceleration lane and convert left only lane to through lane **Kingsway (East)** - Add 50m exit lane	

ID	Intersection	Issues	Recommended Upgrades in 2026 Base	Additional Treatments Required with Development (in addition to Base upgrades)	Intersection sizing and footprint requirements subject to detail design
14	Kingsway-Gannons Road	overcapacity (eastern approach in AM, northern and western approach in PM),additional 4s delay	nil	**Upgrades Required Kingsway (West)** - Add 10m left turn pocket lane **Kingsway (East)** - Add 50m through and left lane **Gannons Road (North)** - Add 30m short right turn lane	possibly some land from the Hockey Fields

Figure 7.6: Year 2026 Development Scenario – Required Network Upgrades

Kurnell Peninsula Traffic Modelling - With Development
Model
2026 "Development" Scenario
Required Network Upgrades



Source: Bitzios

With the above network improvement works, a comparison of the intersection performance during the worst case peak time period is shown Table 24. The worst case at some intersections might be one of the AM peak hours whereas the worst case at other locations might be a PM peak hour.

Table 24: Key Intersection Performance – Worst AM/PM Peak Period

Intersection	LoS (Worst Time Period)		
	2026 Base	2026 Base Improved	2026 Development With Upgrades
Captain Cook Drive-Lindum Drive	A	A	C
Captain Cook Drive-Trinity Street	A	A	B
Captain Cook Drive- Elouera Road	A	A	C
Captain Cook Drive-Woolooware Street	B	B	C
Captain Cook Drive-Foreshore Boulevarde	C	C	C
Captain Cook Drive-Gannons Road	C	C	C
Captain Cook Drive-Endeavour Road	A	A	B
Captain Cook Drive-The Boulevarde-Taren Point Road	E	D	D
Port Hacking Road-The Boulevarde-Kiora Road	F	F	F
Taren Point Road-Holt Road-Toorak Avenue	E	D	D
Kingsway-Taren Point Road-Kareena Road	E	D	E
Kingsway-Taren Point Road	D	D	D
Kingsway-Gannons Road	D	D	D

Table 24 indicates that the proposed development could be accommodated on the road network, subject to the provision of the network upgrade works outlined in Table 18 (Year 2026 Base Upgrades) and Table 23 (Year 2026 Development Upgrades). It is however noted that the Port Hacking Road-The Boulevarde-Kiora Road intersection will continue to operate unsatisfactorily at LoS F during weekday commuter peak periods in the future scenario with the proposed development traffic.

Additionally, the Kingsway-Taren Point Road-Kareena Road intersection will shift from LoS D to E in the weekday AM peak period as a result of the proposed development. Any additional intersection upgrades at this intersection would most likely require private land resumption.

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