

# Network Planning in Precincts Guide

The strategic design and planning of transport  
networks to support 15-minute neighbourhoods and  
30-minute cities

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*Transport for NSW acknowledges the Traditional Custodians of the land and pays respect to Elders past, present and future. We honour Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to place and their rich contribution to our society. To that end, all our work seeks to uphold the idea that if we care for Country, it will care for us.*

This *Network Planning in Precincts Guide* is for transport and land-use practitioners, including practitioners from Transport for NSW (TfNSW), the NSW Department of Planning and Environment (DPE), local government, and development professionals who are involved in strategic design and planning processes for precincts. It provides best practice principles, tools, examples and case studies of a transport network that facilitates the efficient movement of people and goods while supporting 15-minute neighbourhoods and 30-minute cities, as well as the desired place, safety, public health and wellbeing, environmental and economic outcomes.

This guide adopts the NSW Movement and Place Framework, [TfNSW Road User Space Allocation Policy](#) and [Safe System approach](#) [↗](#). It shifts the emphasis in network planning from a hierarchy of roads towards a complete network that is place-based and prioritises walking, cycling, public transport and the safety and comfort of our most vulnerable people.

The guide presents principles for planning and designing a multimodal transport network that integrates land use and transport at a precinct level (areas larger than 1 ha). It does not include guidance on:

- detailed street design
- transport infrastructure and services funding.

The guide should be used in conjunction with other guides such as the *Design of Roads and Streets Guideline*, which discusses design at a street level, and other mode-specific guides such as the [Walking Space Guide](#), [Cycleway Design Toolbox](#), the [Bus Priority Infrastructure Planning Toolbox](#), the [Last Mile Freight Toolkit](#) and the [Safe Systems Assessment Framework for Movement and Place guide](#).

The guide will evolve as TfNSW engages further with stakeholders and practitioners applying the principles outlined here.

# Issues and opportunities

	Issues	Opportunities
<b>Mode shift</b>	<ul style="list-style-type: none"> <li>• A car-centric transport network leads to congestion, unattractive places and high levels of carbon emissions. However, without good provisions for walking, cycling and public transport, people will choose to drive out of convenience.</li> <li>• Too many parking spaces in well-connected urban areas can lead to low walking, cycling and public transport use and unintended traffic congestion.</li> </ul>	<ul style="list-style-type: none"> <li>• A well-designed transport network at district, neighbourhood and street scales enables efficient movements of large numbers of people and goods.</li> <li>• High uptake of walking, cycling and public transport delivers significant health, environmental and economic benefits, creates resilient communities, and enables our communities to be more equitable, inclusive and liveable for everyone. It also reduces congestion.</li> <li>• Fewer car parking spaces means more space for footpaths, playgrounds, safe crossings, street trees, outdoor dining and bike lanes.</li> </ul>
<b>Land-use integration</b>	<ul style="list-style-type: none"> <li>• Low-density development with dispersed land uses is difficult to serve by modes other than cars. Destinations can be too far apart for walking and cycling, and public transport routes will need to make a lot of detours to serve them.</li> <li>• Residential development is sometimes staged with limited consideration for walking, cycling and public transport, requiring residents to drive from the outset.</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate levels of density can provide and sustain better local public services, including public transport.</li> <li>• A precinct with integrated land use and transport makes it more convenient to walk, cycle and take public transport between destinations. This results in less congestion, lower average vehicle kilometres and lower emissions.</li> <li>• The initial transport options available to residents, workers and visitors will shape their travel behaviour in the long term. Sustainable transport infrastructure and services need to be in place before new residents move in or workers travel to a precinct, to ensure sustainable travel behaviour is established from the outset.</li> </ul>

	Issues	Opportunities
<b>Permeable network</b>	<ul style="list-style-type: none"> <li>Subdivisions in greenfield areas, as well as newer brownfield areas, may have been built as separate discrete neighbourhoods with limited connections, dead ends and large block sizes, rather than forming an interconnected district for the longer term, leading to over-reliance on arterial road corridors to support the areas' transport needs and limited public transport connectivity.</li> </ul>	<ul style="list-style-type: none"> <li>A transport network with a grid or modified grid structure allows for the maximum number of connections, enabling people to have shorter, more direct journeys. The wider choice of routes leads to a more resilient and efficient transport network, dispersed demand and increased catchment for various centres and facilities.</li> <li>Better walking catchments support more public transport usage as people can easily access their stops, enabling public transport to provide a greater reach into the community. The precinct network is also more legible to residents, workers and visitors.</li> <li>Permeable streets need less road space, leaving more space for other public amenities, commercial and residential developments and future growth. It provides flexibility to change the role or function of streets as the land use evolves.</li> </ul>

	Issues	Opportunities
<b>Infrastructure, services and technology</b>	<ul style="list-style-type: none"> <li>• Multiple modes often need to be accommodated on one corridor while also minimising the overall road footprint. Without clear guidance, the resulting road space allocation has been historically car-centric and created large road footprints, which make walking and cycling less safe and less convenient.</li> <li>• Walking, cycling and public transport are often considered last with the assumption they can be incorporated into the road network once it's completed. This results in poor walking and cycling experience with indirect connections and limited infrastructure.</li> <li>• Transport demand and supply can vary over time in predictable patterns and unpredictable disruptions, requiring flexible, adaptable solutions.</li> <li>• Lack of coordinated plans for freight movements and servicing at the precinct level result in inadequate freight and servicing provision despite a projected increase in freight activities.</li> <li>• Heavy focus on infrastructure-based solutions with limited consideration of short, medium and long-term service plans and technological advancements results in investments that are not fit for purpose and may require future retrofitting.</li> </ul>	<ul style="list-style-type: none"> <li>• The best vibrant streets have multiple users whose needs are well-balanced.</li> <li>• Prioritising walking, cycling and public transport creates multimodal transport networks that become the backbone of accessible precincts. This leads to successful places, a stronger economy and better safety, public health and wellbeing.</li> <li>• A permeable network that prioritises efficient modes and is supported by technology can help balance the trade-off between different movement and place functions, as well as between modes, to create a connected precinct.</li> <li>• Technological advancement has shifted travel demand, with many people working flexibly from home. An efficient precinct network allows people to access their local centres and destinations easily while working from home.</li> </ul>

	Issues	Opportunities
<b>Processes</b>	<ul style="list-style-type: none"> <li>The current framework for precinct planning and network development, particularly in residential and regional areas, often focuses on road network infrastructure and vehicle counts, which results in car-dependent developments.</li> </ul>	<ul style="list-style-type: none"> <li>A more integrated precinct planning process, presenting an opportunity to better coordinate land use and transport planning.</li> <li>Incorporating the NSW Movement and Place Framework makes network planning more supportive of place, balancing movement and place needs. This includes refining our catalogue of standard road environments, such as 'local, collector, and arterial', to include road environments with a focus on place outcomes, such as 'main streets' and 'civic spaces'.</li> <li>The recent TfNSW <i>Road User Space Allocation Policy</i> provides a clear framework for safely and equitably allocating road space across users.</li> </ul>

# 01

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Relationship with  
precinct planning  
and design  
process

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In 2019, DPE announced a new approach to strategic planning for precincts. It empowers local councils to lead planning processes for their local areas because they know their people and communities best, while DPE will continue to focus on strategic issues and a coordinated approach from State agencies. The new approach comprises four strategic pathways:

- State-led strategic planning
- collaborative planning between the State and councils
- State-led rezoning
- council-led rezoning.

For all four pathways, engagement with all relevant stakeholders is recommended, following the [Movement and Place core process](#).

# State-led strategic planning and collaborative planning between the State and councils

These two pathways involve early investigations and strategic planning work, either led by or coordinated by DPE. Figure 1 summarises the general process; however, this may change depending on the council and the precinct scale. This guide steps you through the stages summarised in Figure 1.

The transport deliverable for this process is a place-based transport strategy that accompanies the exhibition of the place strategy. Although a place-based transport strategy may focus at the network level, you also need to consider the desired street environments, street types and possible design solutions to achieve the vision for the place.

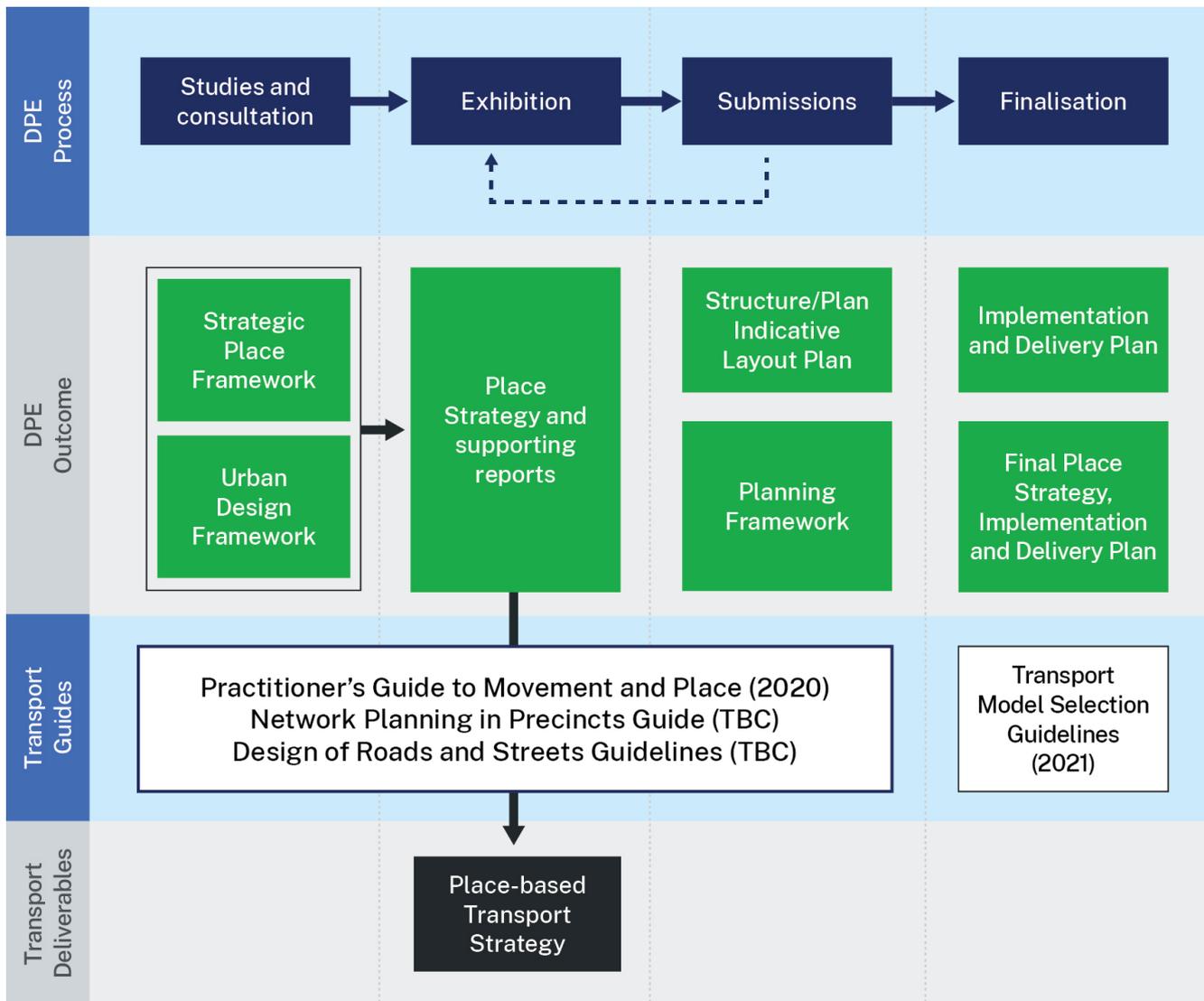


Figure 1 The guide's role in supporting State-led strategic planning and collaborative planning between the State and councils

## Studies and consultation

- See [Principle 1](#) when preparing a strategic place framework to incorporate the desired transport outcomes and the vision for the precinct.
- Once the vision has been identified, see [Principle 2](#) to develop a high-level urban structure that prioritises walking, cycling and public transport in the urban design framework.

## Exhibition

- See [Principle 3](#) to develop a place-based transport strategy that demonstrates the integration between land use and transport. Following the Movement and Place Framework, existing and future main streets should be identified at this stage.

## Submissions

- See Principles [4](#), [5](#), and [6](#) to identify the grid-like transport network that supports walking, cycling and public transport while also accommodating freight and servicing movements following [Principle 7](#).
- See [Principle 8](#) as you develop the network plan to ensure the corridor functions align with the desired street environments.

Before making a submission, engage with TfNSW to ensure alignment with this guide and to identify and resolve any issues. A simple [checklist of assessment guidance](#) is provided to help you demonstrate alignment with the guide's principles.

# State-led and council-led rezoning process

Once the planning frameworks have been identified, DPE or local councils (or both) will lead the rezoning process. Figure 2 summarises the general process; however, this may change depending on the council and the precinct scale.

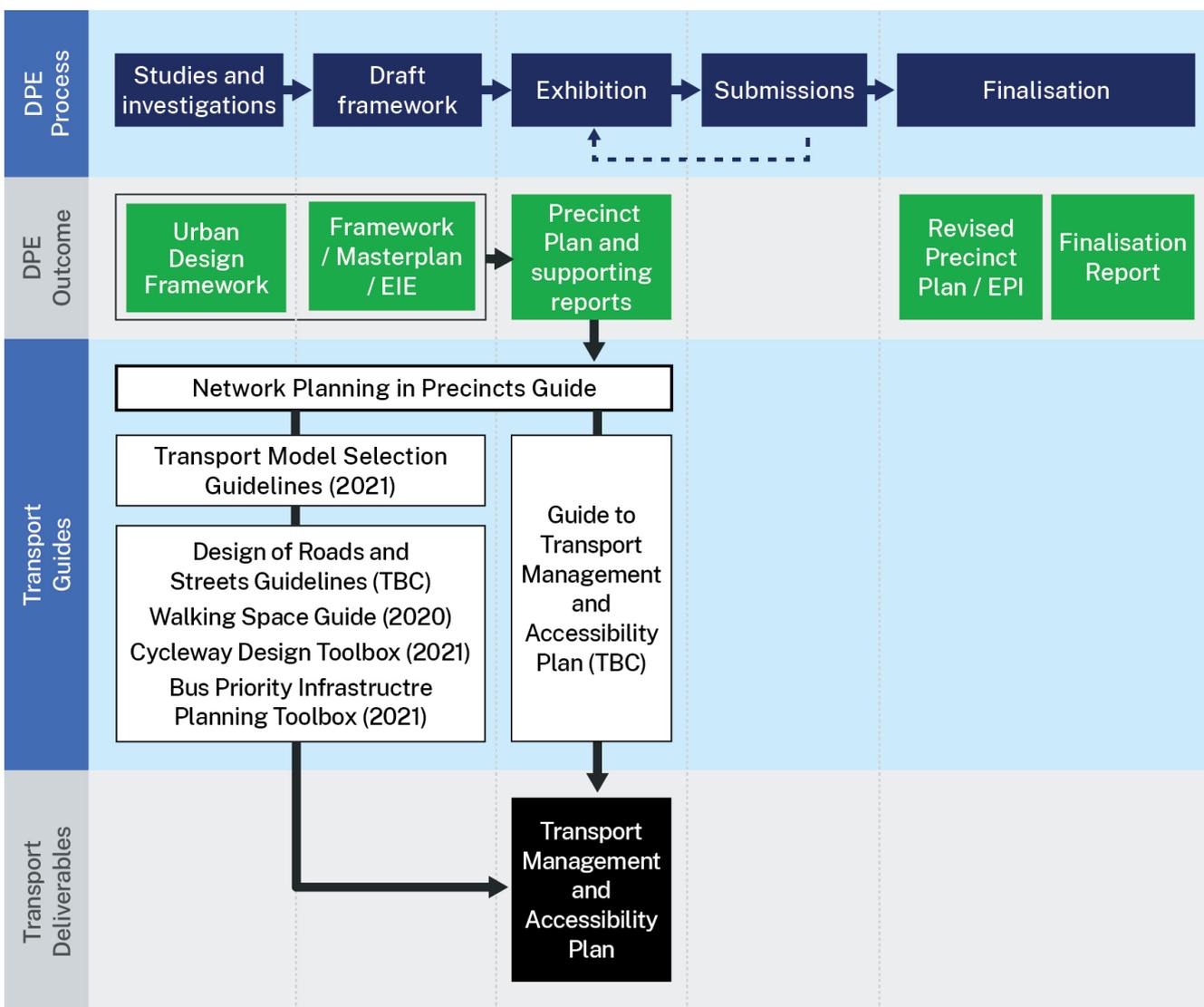


Figure 2 The Guide's role in supporting State-led and council-led rezoning

The transport deliverable for this process is a transport management and accessibility plan, based on working through the following stages:

## Studies and investigations

- Further develop the urban design framework by following the principles outlined in this guide as well as other transport mode-specific documents, including the [Walking Space Guide](#), [Cycleway Design Toolbox](#), [Bus Priority Infrastructure Planning Toolbox](#), the [Last Mile Freight Toolkit](#) and the [Safe System Assessment Framework for Movement and Place Guide](#). Refer to the Design of Roads and Streets Guidelines for further detail on how different modes can operate in the same corridor to create the desired street environments. If modelling is necessary, the [Transport Model Selection Guidance](#) can help you select the right modelling tool for the task.

## Draft framework

- Provide more details on the precinct's complete multimodal networks in the framework, master plan, or explanation of intended effect, reflecting all the principles outlined in this guide.

## Exhibition

- Prepare a transport management and accessibility plan to outline how the transport network will support the proposed precinct plan, including any additional population and employment, while also delivering the desired place outcomes. The transport management and accessibility plan should apply the principles in this guide and may draw on the examples presented in the guide's case studies.

Before making a submission, engage with TfNSW to ensure alignment with this guide and to identify and resolve any issues. A [simple checklist of assessment guidance](#) is provided to help you demonstrate alignment with the guide's principles.

# Using the guide for other deliverables

This guide can also help councils and State agencies prepare other precinct-related documents such as local strategic planning statements, local environmental plans, local housing strategies, transport sustainability plans and green travel plans, among others.

# 02

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## Network planning and design approach

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The following section outlines the frameworks that underpin the transport network planning approach in this guide: the [NSW Movement and Place Framework](#), [TfNSW Road User Space Allocation Policy](#) and [Safe System approach](#) [↗](#). It identifies how a precinct's network relates to other phases of planning and design and the trade-offs to consider at this phase.

# NSW Movement and Place Framework: street environments

Movement and Place is a multidisciplinary and cross-government ‘place-based’ approach to the planning, design, delivery, and operation of transport networks. The framework delivers on NSW policy and strategy directions to create successful streets and roads by balancing the movement of people and goods with the amenity and quality of places. It recognises the value of the network of public spaces formed by streets and roads and the spaces they adjoin and impact.

This guide adopts the [NSW Movement and Place Framework](#) and aligns with the [Practitioner’s Guide to Movement and Place](#). The Practitioner’s Guide introduces six steps in implementing a Movement and Place approach.

Movement and Place core process	Network Planning in Precincts Guide principles
<p><a href="#">Step 1</a>: Establish the project scope, vision, objectives and evaluation criteria</p> <p><a href="#">Step 2</a>: Understand place</p> <p><a href="#">Step 3</a>: Understand movement</p>	<p><a href="#">Principle 1</a>: Identify the desired outcomes for the precinct</p> <p><a href="#">Principle 2</a>: Develop an urban structure that supports successful places and encourages walking, cycling, and public transport journeys</p> <p><a href="#">Principle 3</a>: Co-locate key land uses along priority walking, cycling and public transport corridors</p>
<p><a href="#">Step 4</a>: Overlay and discuss conflicts, issues and opportunities</p> <p><a href="#">Step 5</a>: Develop options</p> <p><a href="#">Step 6</a>: Choose the preferred option.</p>	<p><a href="#">Principle 4</a>: Create a permeable network with a grid-like structure, short block length and high intersection density</p> <p><a href="#">Principle 5</a>: Enable connected, direct and comfortable walking and cycling movements on all corridors</p> <p><a href="#">Principle 6</a>: Plan public transport infrastructure, services and technology concurrently</p> <p><a href="#">Principle 7</a>: Accommodate the movement of goods, freight and urban services based on the desired place outcomes</p> <p><a href="#">Principle 8</a>: Design self-explaining street environments following the NSW Movement and Place Framework</p>

Table 2 Alignment between the Movement and Place approach and the principles in this guide

The [NSW Movement and Place Framework](#) [↗](#) defines four types of street environment that consider both the movement function and place intensity of a corridor (Figure 3).

## Movement and place

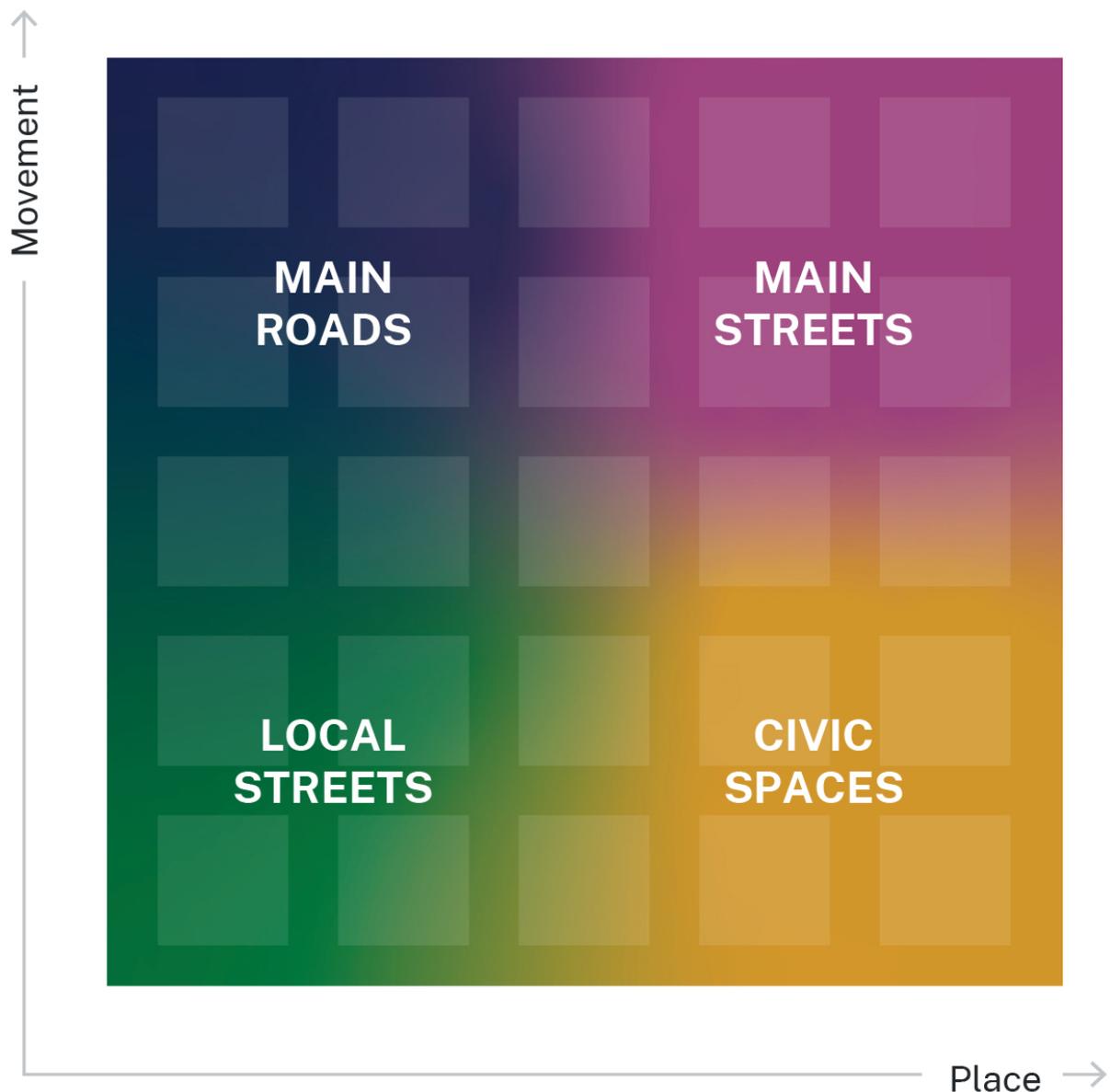


Figure 3 Movement and Place street environments

- **Civic spaces** accommodate low movement function but high place intensity. These are streets at the heart of communities, with a significant meaning, activity function or built environment. They encourage people to interact with the surrounding streetscape through active frontages and space for dwelling – usually found in centres, community hubs and other significant destinations. Civic spaces prioritise walking and cycling, although some public transport and general traffic may be allowed in the

space. The road treatments are designed to limit through-movements and reduce travel speed.

- **Local streets** accommodate low movement function and low place intensity. These are the majority of streets within the transport network, often with important local place qualities. They facilitate movements within a precinct, feeding into centres, public transport interchange locations as well as main streets and main roads. Local streets are usually focused on amenities to support walking and cycling activities, with some local public transport, last-mile freight and general traffic access.
- **Main streets** accommodate high movement function and high place intensity. In centres, they are usually important civic streets fronted with active uses such as retail and commercial buildings that also connect destinations and neighbourhoods. Main streets are often the most complex road environments, accommodating both movement and place, yet these are often the most iconic and valuable street environments. Due to the many competing movement and place needs, main streets should prioritise the most space-efficient modes such as walking, cycling and public transport, while high speed and volumes of freight and general traffic movements are generally discouraged. Road treatments should focus on facilitating movement that contributes to the high place intensity in main streets.
- **Main roads** accommodate high movement function but low place intensity. They facilitate through-movements and prioritise modes that enable longer journeys, such as freight, public transport and general traffic. Amenity and attractive design are considered. However, due to the higher speed environment, clearances and appropriate treatments are used to provide a safe environment for all road users.

# Road User Space Allocation Policy and Procedure: modal considerations and trade-offs

TfNSW is responsible for allocating physical and temporal road user space safely and equitably. The TfNSW Road User Space Allocation (RUSA) Policy aims to reduce private motor vehicle trips within built-up areas to support efficient movement and enhance the amenity of places. Anyone in TfNSW involved in the planning, design, scheme approval, building, management or operation of roads in NSW needs to adhere to this policy. These principles should be adhered to ahead of any guidance that seeks to protect or maintain the level of service for private vehicles.

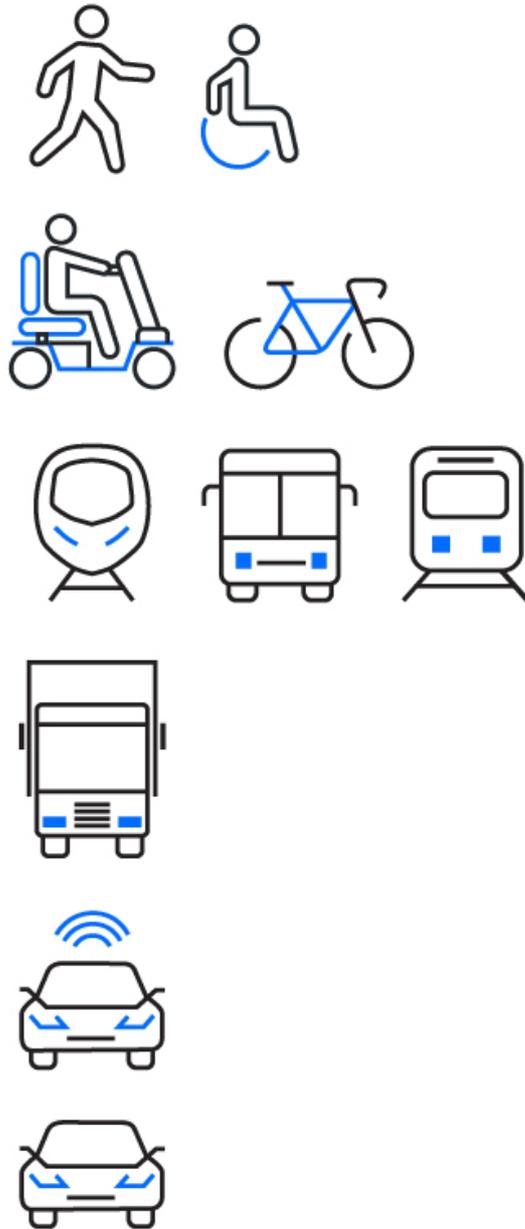
The policy ensures that road user space allocation:

- considers place and movement functions
- achieves the strategic intent and outcomes as set out in strategies and plans
- achieves the movement and place vision of a corridor or network
- considers the limited amount of space available
- considers the safety of the most vulnerable users
- can be adjusted to respond to specific circumstances, including temporal reallocation.

It is a powerful policy in re-imagining the functions of existing corridors in a brownfield precinct.

## Order of road user space considerations

consider first



consider last

Figure 4 Order of considerations for allocating space for road users

The allocation of space for road users according to this guide follows the same order of considerations set out in the TfNSW RUSA Policy - see Figure 4.

When allocating road user space, avoid:

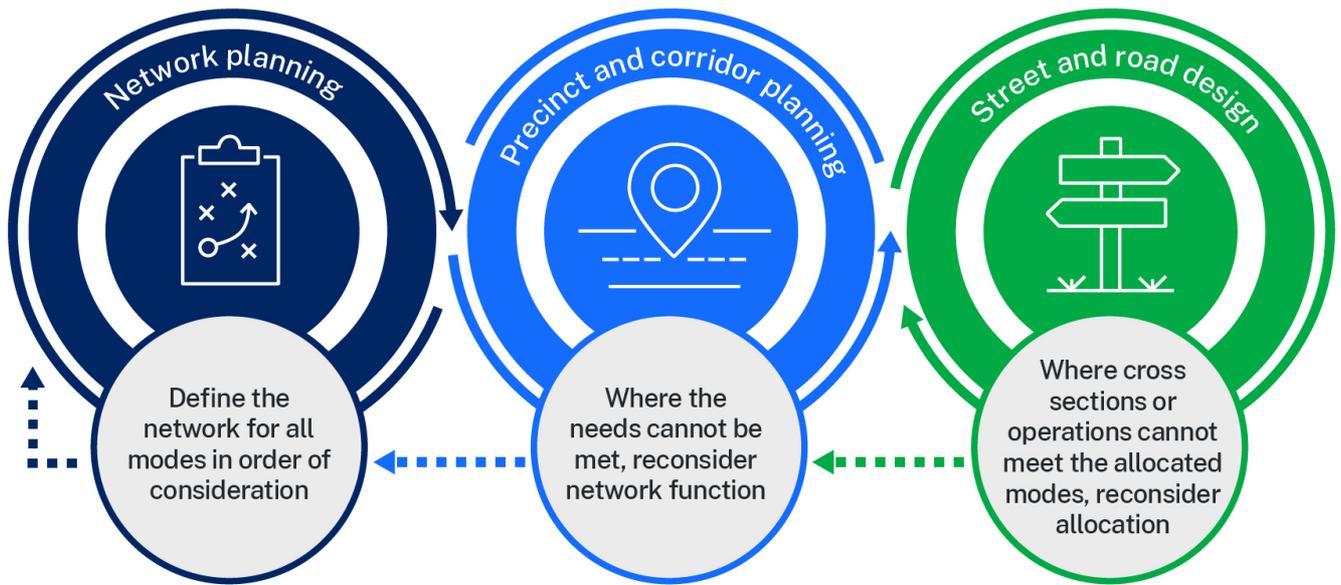
- adverse impacts on road safety for all road users
- barriers to access a place or service due to people's physical ability or age, which may result in non-compliance with the Commonwealth Disability Discrimination Act 1992 (DDA)
- loss of allocation for walking or cycling
- loss of trees or amenity
- an overall increase in lanes for private motor vehicles
- delays to public transport due to general traffic.

While some precincts may be car-dependent today, the policy aims to maximise the potential for walking, cycling and public transport to facilitate mode shift in the long term to more efficient travel modes.

This TfNSW RUSA Policy is supported by the TfNSW RUSA Procedure, which involves three main phases of planning and design:

- network planning
- precinct and corridor planning
- street and road design.

For consistency throughout projects, later planning phases need to be informed by decisions and outputs of previous phases, so considerations and decisions are made on a progressively finer scale. For each phase, the procedure describes what needs to be achieved, the tasks to be undertaken, as well as the governance and decision making required to support progress to the next phase. The relationship between the three phases is summarised in Figure 5.



*Figure 5 Relationship between various planning and design phases within TfNSW*

This guide focuses on the precinct and corridor planning phases for both greenfield and brownfield developments. The primary outputs of this phase are establishing needs for each mode, identifying street environments, and determining modal priorities.

# Safe System approach: protecting vulnerable road users

The safety of our community while travelling on NSW roads is a top priority for TfNSW. We use the [Safe System approach](#) to achieve the goal of zero deaths and serious injuries on NSW roads. This approach has four elements:

- safe people
- safe roads
- safe speeds
- safe vehicles.

It recognises that people will always make mistakes and may have road crashes, but the system should be forgiving, so those crashes will not result in death or serious injury.

Adopting the [Safe System approach](#) in network planning can reduce the exposure to crash risk, the likelihood of a crash occurring, and the severity of a crash should one occur. As the Safe System approach focuses on better safety outcomes for vulnerable road users, a network that is designed with this approach will also benefit from better provisions for people walking and cycling. This supports other desirable outcomes, such as reduced carbon emissions in line with the TfNSW [Transport Environment and Sustainability Policy](#).

# 03

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## Network planning and design principles

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Adopting a vision-led approach to planning, the NSW Government aims to set the vision and desired outcomes for places and communities across multiple agencies even before a problem has been identified. This gives a clear picture of the outcomes we want for our people and helps us identify obstacles to realising these outcomes, rather than focusing on solving a specific problem. This guide articulates this vision-led approach in the context of transport network planning in precincts.

People and places should be at the heart of a precinct, and a precinct's integrated and multimodal transport network should enable people to access and spend more time in the places they value and enjoy.

Guided by the [NSW Movement and Place Framework](#), [TfNSW Road User Space Allocation Policy](#) and [Safe System approach](#) [↗](#), this section outlines eight key principles for planning a transport network that serves a precinct's people and places, as shown in Figure 6.

## Principles

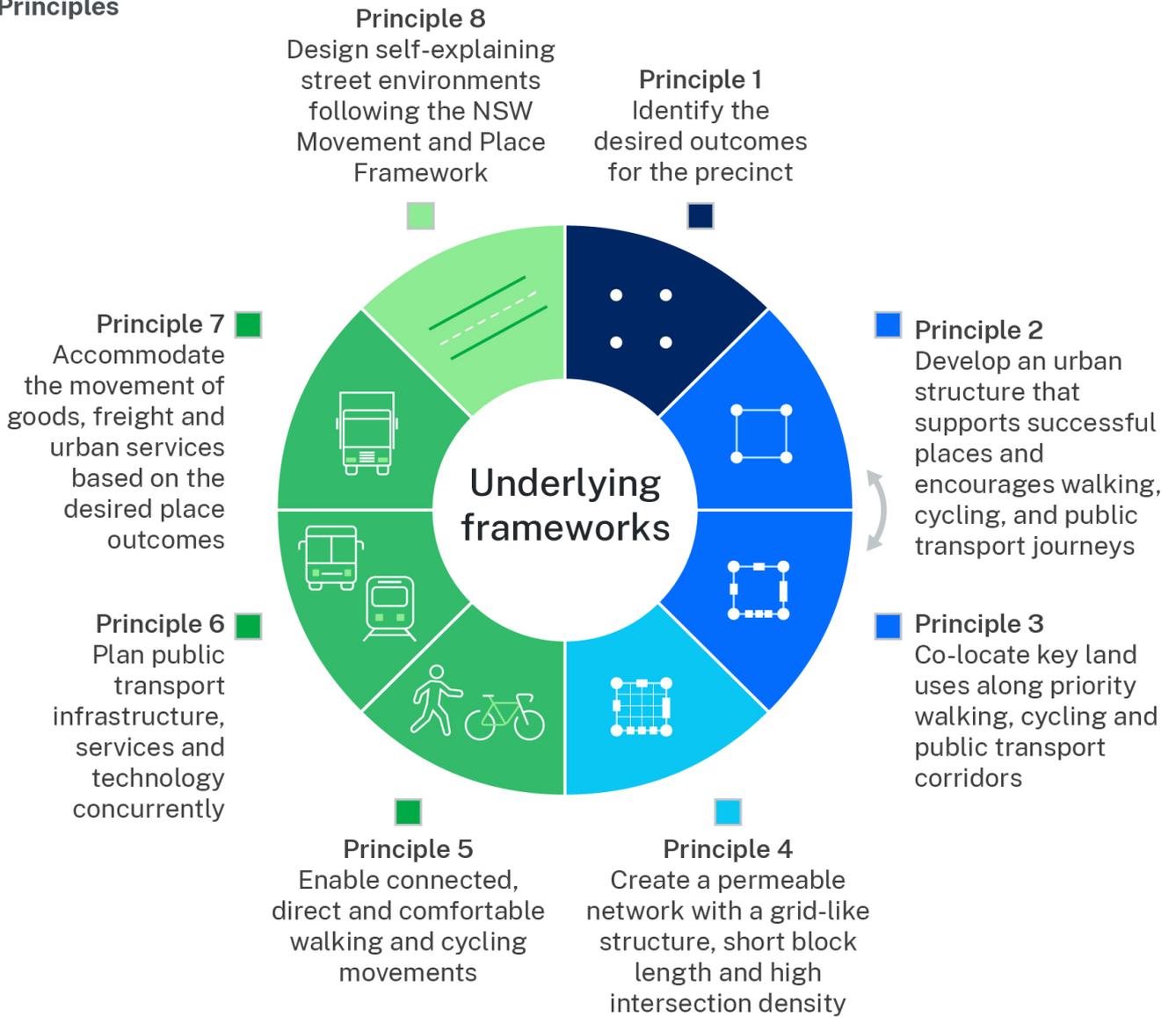


Figure 6 Principles for transport network planning in precincts

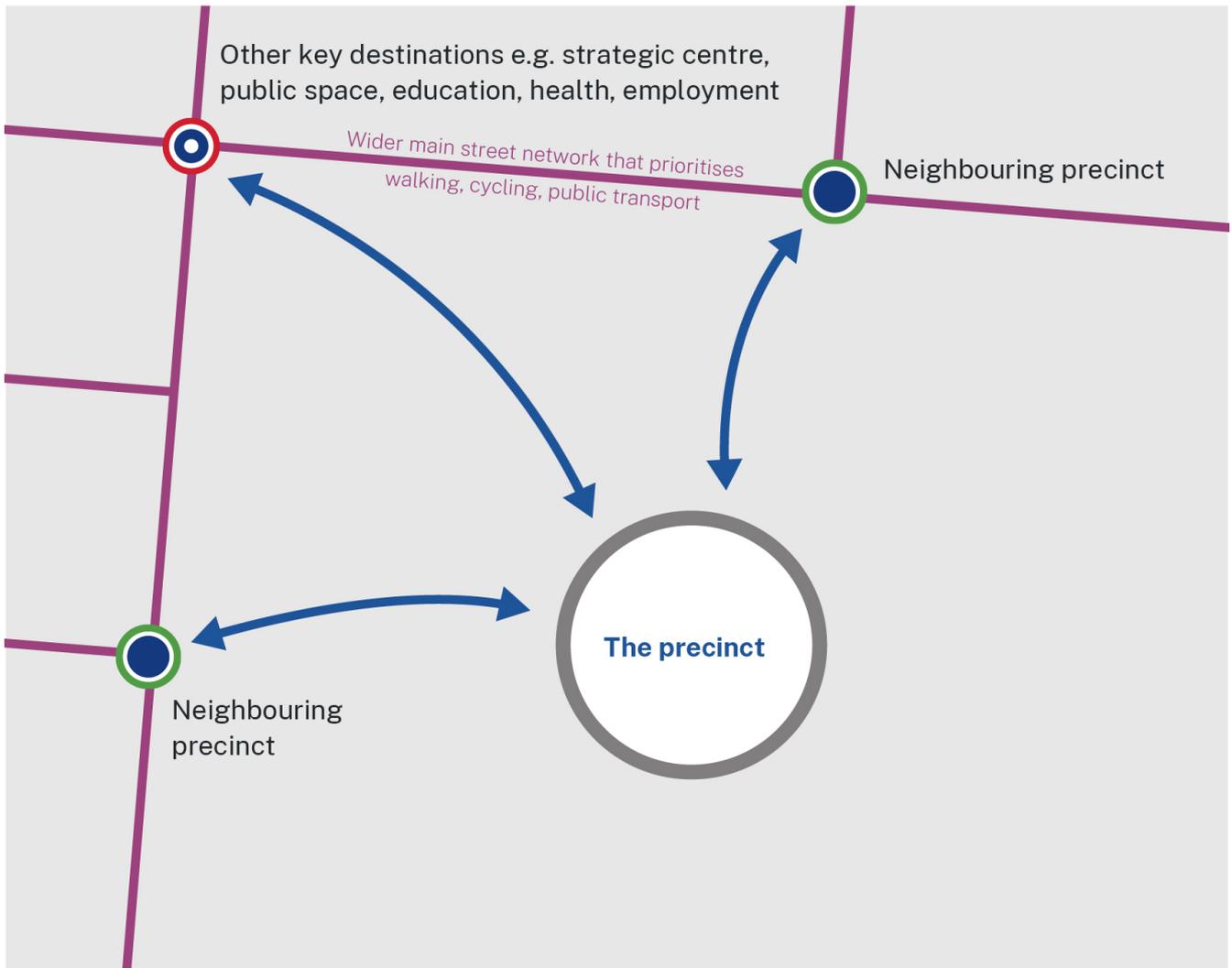
# Principle 1: Identify the desired outcomes for the precinct

Before developing the precinct's transport network, consider the wider transport network and the key destinations (including metropolitan, strategic and local centres) beyond the precinct. Identify the desired long-term outcomes the transport network needs to support, as shown in Figure 7. As well as supporting movement between places, the transport network can form a place in its own right or may be a component of the place in which it is situated.

In greenfield precincts, this means integrating the precinct's transport network with the wider transport network and key destinations beyond the precinct. Brownfield precincts may have established networks; however, you need to evaluate whether these networks are fit for purpose for the precinct's current context and desired outcomes. For example, new key destinations or transport connections may have emerged since the precinct's establishment, and they may require better integration with the precinct's transport network.



**Principle 1**  
Identify the desired outcomes for the precinct



*Figure 7: Understanding the precinct's context and desired outcomes*

Note: this diagram illustrates journeys within a district (not intercity or regional journeys).

## Best practice guidance

### Understand the precinct's context, cultural significance and planning intent using the Movement and Place Built Environment Indicators

Undertake a multidisciplinary site review and context analysis early in the precinct planning process, involving designers, planners and other specialists, to understand key characteristics and the planning intent. This will inform the foundation of a network plan that serves the precinct's residents, workers and visitors. Use the Movement and Place [Built Environment Indicators](#) as a starting point:

- [Access and connection](#) theme measures the user outcomes of mode choice, reliable transport and equity (of access). These user outcomes demonstrate how well-connected a place is and how equitable the transport network is.
- [Amenity and use](#) theme explores the mix of local opportunities and convenient facilities. The design, planning, and management of streets and roads need to consider potential impacts on the amenity of adjacent places – public spaces and land use.
- [Character and form](#) theme explores whether a place is human-scaled and celebrates its distinct features. When the blocks, lots and connections which adjoin our transport network are designed at a human scale, they encourage walking and active lifestyles and interaction between people through the use of varied and active frontages.
- [Green and blue](#) theme refers to the network of green spaces (including 'blue' water systems) that deliver multiple environmental, economic, and social values and benefits to communities. This network includes parks and reserves, backyards and gardens, waterways and wetlands, drainage corridors, streets and transport corridors, pathways and greenways, squares and plazas, tree canopy, roof gardens and 'living' walls, sports fields, and cemeteries.

- **[Comfort and safety](#)** theme explores whether streets and roads are sensitive to place with self-explaining speed limits and infrastructure that aligns with the surrounding context. It also considers other forms of safety, such as personal safety.

An analysis of future travel patterns may employ benchmarking against existing successful precincts in NSW or other jurisdictions that deliver the desired movement and place outcomes.

[Connecting with Country](#) is an important aspect of gaining both a broader and deeper understanding of place. Practitioners can learn from this cultural understanding of the interdependency between people, their environment, and their wellbeing, and apply this as the primary framework through which we consider the design of the built environment. Before planning for the precinct's transport network, practitioners should connect with Country by learning the cultural expressions, developing mutually beneficial relationships with Country, reawakening memories of cultural landscapes and finding common ground.

## Identify the vision for the precinct's transport network

A precinct's network plan should be informed by the cross-government visioning process and the desired outcomes for the precinct and its surrounding area. This is usually documented in various local and statewide strategies and plans. At this stage, it is important to understand and communicate the likely cadastral patterns, development practices, and built form types at the scale of streets or roads, beyond relying on the land-use plan, an abstract vision or a large-scale map.

For example, suppose a new metro station is planned for the precinct. In that case, some of the transport network's desired outcomes may be, for example, to create a walkable core within 800m of the station, provide direct cycleways to all cardinal directions to facilitate cycling trips up to 2km to and from the station, create a high-quality bus interchange at the station, and provide direct, frequent buses that connect the station with nearby precincts. These outcomes can be translated into initial sketches that reflect the outcome at the scale of streets, roads and buildings.

## Identify key centres, places and precincts and how the transport network can connect them

Identify the key centres, places and precincts to connect to within and beyond the precinct and how the existing and future transport network will support these connections. The precinct's networks should provide seamless connectivity to the wider transport network with multiple access points (see Principle 4) to the wider walking, cycling and public transport links beyond the precinct.

### Resources

- Relevant transport network plans and other strategic priorities of different modes across the different aspects or parts of the network (TfNSW and local government)
- Relevant regional and district plans, place strategies and precinct plans that identify strategic land uses and the desired outcomes for the precinct (DPE, Greater Sydney Commission and local government)
- Relevant State environmental planning policies (SEPPs), local strategic planning statements (LSPS) and other planning documents
- [Movement and Place website](#) (NSW Government 2021)
- [Connecting with Country](#)  (GANSW 2020)

## Principle 2: Develop an urban structure that supports successful places and encourages walking, cycling, and public transport journeys

Urban structure is the arrangement of green and blue networks, public open spaces, paths of movement, pedestrian permeability and cycling infrastructure integrated into the pattern of blocks and streets that connects activity centres and public transport nodes to form urban neighbourhoods, paired with suitable built form and land uses (see [Principle 3](#)). A precinct's urban structure should encourage walking, cycling and public transport journeys, creating streets as public spaces that communities enjoy, and reduce private vehicle mode share.

A well-established urban structure creates attractive, centre-serving, main-street corridors that extend into adjacent precincts, providing an interconnected network for walking, cycling and public transport and an opportunity to serve higher intensity land uses between centres. Main-street corridors need to be designed and managed for a moderate speed and volume of vehicles that will sustain centres and commercial frontages but will not be attractive to private vehicles seeking faster through-routes. Some forms of filtered permeability, such as walking and cycling-only bridges and bus-only streets can be considered in certain contexts.



## Principle 2

Develop an urban structure that supports successful places and encourages walking, cycling, and public transport journeys



Figure 8 The precinct's urban structure should prioritise walking, cycling and public transport

The urban structure may need to be developed iteratively for greenfield precincts as future land uses are identified over time. Even in a relatively remote precinct with low demand or justification for conventional public transport, the urban structure can support active modes, approved forms of micromobility and on-demand services. Although dynamic, the movement of these modes can still be shaped through infrastructure provision.

In brownfield precincts, this means identifying existing and desired main-street corridors and ensuring they facilitate direct connections within and beyond the precinct. This may mean creating new access points and walking and cycling routes to neighbouring precincts, reallocating road space to prioritise walking, cycling and public transport, or using filtered permeability to limit private vehicle access.

## Best practice guidance

### Identify priority walking and cycling corridors that connect precincts and centres

People walking and cycling should be able to enjoy the freedom of travelling anywhere in the precinct and to neighbouring precincts and centres to make these modes more attractive than driving for short or medium trips, and achieve the 15-minute neighbourhood vision.

In some cases, priority walking and cycling corridors may be found in the planned cycling network, supported by designated low-speed zones. Otherwise, you can identify network gaps by mapping areas that can be accessed either via segregated footpaths and cycleways, or corridors with a speed limit lower than 30 km/h (see [Distance to Cycling Network on the Movement and Place Built Environment Indicators](#) web map). The precinct's priority walking and cycling corridors should be positioned to enable direct connections within the precinct and beyond, forming a dense network that is attractive and comprehensive.

Having priority walking and cycling corridors does not mean people cannot walk or cycle beyond those corridors – rather, people should be able to walk and cycle everywhere, but their access is prioritised on those key walking and cycling corridors (see [Principle 5](#)).

## Identify priority public transport corridors that connect precincts and centres

Easily accessible public transport can be an attractive alternative to driving for most medium and long trips between precincts and centres. To deliver the 30-minute city vision, precincts should maximise the percentage of the population that can access metropolitan or strategic centres, major health and education precincts and significant cultural or leisure destinations within 30 minutes by public transport.

Precincts that are anchored by major public transport investments such as a new metro may already incorporate these transport connections in their master plans. However, identify any other potential public transport services that may traverse through or near the precinct, and identify their hierarchy in the transport network.

If such information is unavailable for the precinct, the priority public transport corridors need to be positioned to enable direct movements within the precinct and beyond, including inter-regional travel. Prioritise direct connections to key land uses (see [Principle 3](#)) and avoid circuitous public transport routes. These public transport corridors should also be accessible by walking and cycling.

With separated facilities, walking, cycling, and public transport movements can typically share a corridor, as they are often complementary – people often walk and cycle to access public transport, and vice versa. These modes also support higher amenity and activity places. The zero-emission bus fleet and the light rail network also make these corridors even more attractive to walking, cycling and civic uses as they create quieter, cleaner environments than along conventional bus routes. These corridors should directly front key land uses (such as shops and parks) and need to be supported by priority infrastructure to optimise walking, cycling and public transport movements and reduce congestion.

## Separate high-speed and high volumes of private vehicle movement from places

Precincts should be designed to reduce trips by private vehicles. High volumes of private vehicle movements often result in road environments with a low amenity that conflict with many other journeys and desired place outcomes, creating urban barriers and severance between neighbourhoods, places and communities.

Where needed (such as on the motorway), high-volume and high-speed private vehicle movements should be located away from key places and priority walking, cycling and public transport corridors at a distance of at least 1km. The severance caused by this movement activity can be strategically used to create areas of self-containment and neighbourhood identity, reducing the need for people walking and cycling to traverse these corridors.

High volumes of private vehicle movements are compatible and can be co-located on the same motorway corridor. However, clustering such movements beyond the motorway network typically creates unattractive street environments that are dominated by traffic, requiring larger intersections, expensive signalling and, in the worst cases, grade separation, which undermines the safety and attractiveness of walking, cycling and public transport. To avoid this outcome, private vehicle movements in a precinct can be distributed onto a network of streets with medium speed and medium volumes of private vehicle movements.

## Ensure rational and serviceable land releases with sufficient road reserve

Staging of land releases should be rational and serviceable to form viable walking, cycling and public transport networks. When new land is released, the transport network should be easily adapted with minimum rerouting required to limit the impact on the network's efficiency. Construction vehicles should also be able to access the development site without affecting residents' access to, and use of key land uses within and near the precincts.

Corridor preservation is vital in planning for growing precincts. The corridors' road reserve should have sufficient space considering the desired network functions, street width relative to adjacent building height, quality of surface finishes, and provision of utilities and adequate canopy.

If a corridor is mainly intended for walking and cycling, it should be relatively more compact to make it an attractive option. To ensure bus routes can be easily adapted, all corridors on which general traffic can travel (except on laneways) should have enough road reserves to allow bus movements, also considering any potential to convert them for light rail or rapid bus services at later stages (see [Guidelines for Public Transport Capable Infrastructure in Greenfield Sites](#)).

Typically transport corridors are reserved for their ultimate width even though physical infrastructure or public services will be established over time. How streets evolve relative to land-use changes should be considered, so they don't feel undesirably empty while the area is established. A staging plan matching transport and development should accompany greenfield developments.

## Enable walking, cycling and public transport from the outset and during all stages

A precinct's residents, workers and visitors should be able to walk, cycle and take public transport from the outset and during staged development – driving should not be the only viable way to travel at any point of the precinct's development. Provisions can be delivered incrementally to encourage their usage from the inception of place. For example, a precinct may be served by high-frequency bus services before the corridor is upgraded into metro, heavy rail or light rail in the future.

### Resources

- Integrated network plans (TfNSW and other agencies)
- [Cycleway Design Toolbox](#) (TfNSW 2020)
- [Walking Space Guide](#) (TfNSW 2020)
- [Bus Priority Infrastructure Planning Toolbox](#) (TfNSW 2021)
- Guide to Transport Impact Assessment – Section 5.2.2 Network Assessment Process

## Principle 3: Co-locate key land uses along priority walking, cycling and public transport corridors

While land use drives transport demand, the accessibility provided by the transport network drives demand for development. Land-use integration with urban structure (see [Principle 2](#)) can be achieved by clustering key land uses on main streets that prioritise walking, cycling and public transport. These streets have a higher capacity to enable efficient movement and deliver place outcomes, as illustrated in Figure 9.

The co-location of key land uses in greenfield precincts should be developed iteratively with the urban structure and based on main street frontage, rather than large superblocks. Co-locating key land uses may be more difficult in brownfield precincts; however, infill development or increased density can help 'reshape' urban structure. Alternatively, road space can be re-allocated on corridors with key land uses to shift the urban structure from car-based to walking, cycling and public transport-based.

The process of integrating land use and transport needs to be iterative and dynamic. Identify a clear framework to ensure this iterative process remains informed by the vision and community-driven from planning to delivery and maintenance phases.



### Principle 3

Co-locate key land uses along priority walking, cycling and public transport corridors

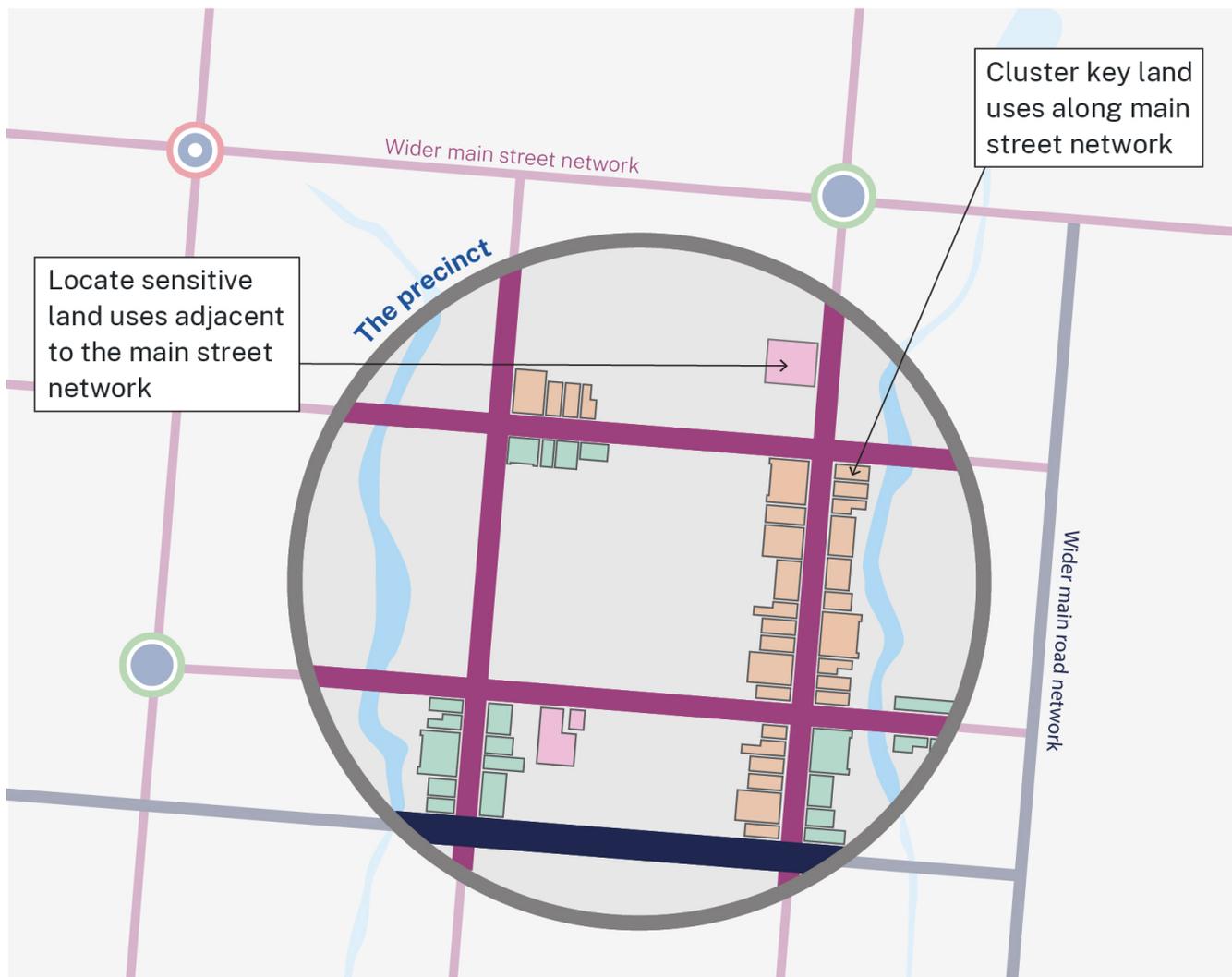


Figure 9 Co-locating key land uses along main streets to prioritise walking, cycling and public transport provides better connectivity and supports 15-minute neighbourhoods and 30-minute cities.

## Best practice guidance

### Cluster key land uses on priority walking, cycling and public transport corridors

Key land uses with high place intensity – such as shops, offices, hospitals, community facilities, recreational opportunities, local centres, strategic centres and specialised precincts like stadiums, universities and significant community open space – should be co-located along priority walking, cycling and public transport corridors. When key land uses are dispersed across the precinct, the walking and cycling trips become longer, and public transport routes become circuitous and indirect.

Entrances to key land uses should be directly located on the priority walking, cycling and public transport corridors – avoid isolating commercial uses behind large or landscaped setbacks, car parks, fencing or inactive building frontages. They should also be located away from main roads where pollution, noise or congestion can affect place qualities.

#### *Enabling high-frequency public transport using a transit-oriented neighbourhood (TON) approach*

*TON (also known as transit-oriented development or TOD) is an approach to designing and developing precincts that prioritise activity and residential density around the use of public transport. Successful TONs rely on an interconnected network of safe, well-designed public spaces, streets and laneways that encourage people to use public transport, walk and cycle. Successful TON corridors typically have a main street environment (see [Principle 8](#)) with a critical mass of demand needed to support frequent public transport services, like a rapid bus or light rail, and a high-amenity public domain.*

*Successful clustering of commercial activity along a main street with public transport will result in neighbourhood centres taking the form of a more traditional linear high street, as opposed to a roadside shopping centre or parking lot.*

### Locate sensitive land uses adjacent to priority walking, cycling and public transport corridors

Sensitive land uses such as schools, childcare centres, senior housing and places of worship should be located adjacent to priority walking, cycling and public transport corridors and away from main roads.

Their entrance should face the adjacent, quieter and low-speed streets to reduce conflict between walking access, bus movements, drop-off areas, and high-volume traffic, and improve road safety. However, they should be within walking distance to public transport stops and adjacent to other complementary facilities in and around centres (see [School Site Selection and Development](#) )

## **Locate industrial employment lands on or adjacent to main roads**

Intensifying employment in commercial areas adjacent to interchanges and stops provides more opportunities for living and working locally.

Industrial employment lands typically require fast and direct freight access. They should be located on main roads (including motorways), away from main streets and priority corridors for other modes. Interface with a priority walking, cycling and public transport corridor should be buffered with specialty land uses, such as smaller warehouses, bulky goods and car dealerships – ensuring the built form remains human-scale and consistent with the rest of the precinct.

## **Distribute density across a precinct to reach a minimum average density of 30 dwellings/ha in urban areas**

Historically, neighbourhoods that achieve an average net density of at least 30 dwellings/ha can support more walking, cycling and public transport trips<sup>1</sup>. Homes in residential areas should be located within 800m from frequent public transport (or 400m in areas with fewer public transport services) to maximise public transport catchment. All homes should be within a 15 to 20 minutes walk from a collection of local shops, a primary school, public transport, a supermarket or a grocery store.

Density can be distributed across a precinct to avoid polarised neighbourhoods with stark density, scale and access requirement changes. It may take the form of apartment buildings and mixed-use neighbourhood centres, particularly within the walking catchments of high-quality public transport stops and public spaces. These densities would taper down to townhouses and dual occupancies within a short walk of the corridor. Finally, lower density detached housing is located furthest from the corridor. This

densification and clustering of land use not only supports walking, cycling and public transport but also provides a more diverse range of housing choices to meet communities' diverse needs. In very-low-density precincts without any public transport services or centres, public space may become the anchor for density.

### **Minimise car parking provision across a precinct by providing safe, accessible and viable walking, cycling and public transport options**

Car parking provision should be minimised, adaptable and integrated across a precinct with more flexible requirements. Areas with good access to public transport following the public transport accessibility level measure should have fewer car parking spaces than the minimum required under an applicable environmental planning instrument or development control plan.

Other tools to consider include setting maximum parking space provision, or providing parking on a needs basis (decoupled, unbundled or remote parking), particularly along priority walking, cycling and public transport corridors.

## **Resources**

- [Better Placed: An integrated design policy for the built environment of NSW](#) [↗](#) (GANSW 2017)
- [School Site Selection and Development](#) [↗](#) (School Infrastructure 2020)
- [Development near Rail Corridors and Busy Roads - Interim Guideline](#) [↗](#) (DPE 2008)
- [State Environmental Planning Policy \(Infrastructure\) 2007](#) [↗](#)

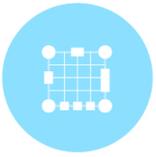
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*, Density Matters, Presentation to the Australian Institute of Urban Studies (NSW Branch), 21 February 2019*

## Principle 4: Create a permeable network with a grid-like structure, short block length and high intersection density

The precinct's urban structure (see [Principle 2](#)) should be supported by a grid network that follows the established urban structure and the blue-green grid within the precinct, underpinned by shorter block length and higher intersection density, as shown in Figure 10. A grid network can enable certain modes to be prioritised where needed. For example, filtered permeability for walking, cycling and public transport can be used on the most direct routes between major land uses to prioritise these more efficient and sustainable travel modes over driving.

When developing a grid network in greenfield precincts, ensure it is oriented towards the blue-green grid and makes the most of the recreational, stormwater management and scenic opportunities inherent in the blue-green grid. In brownfield precincts with existing networks, the grid-like arrangement can be emulated through mid-block crossings, integrating dead-end streets with the wider network and creating more access points within a precinct.



#### Principle 4

Create a permeable network with a grid-like structure, short block length and high intersection density

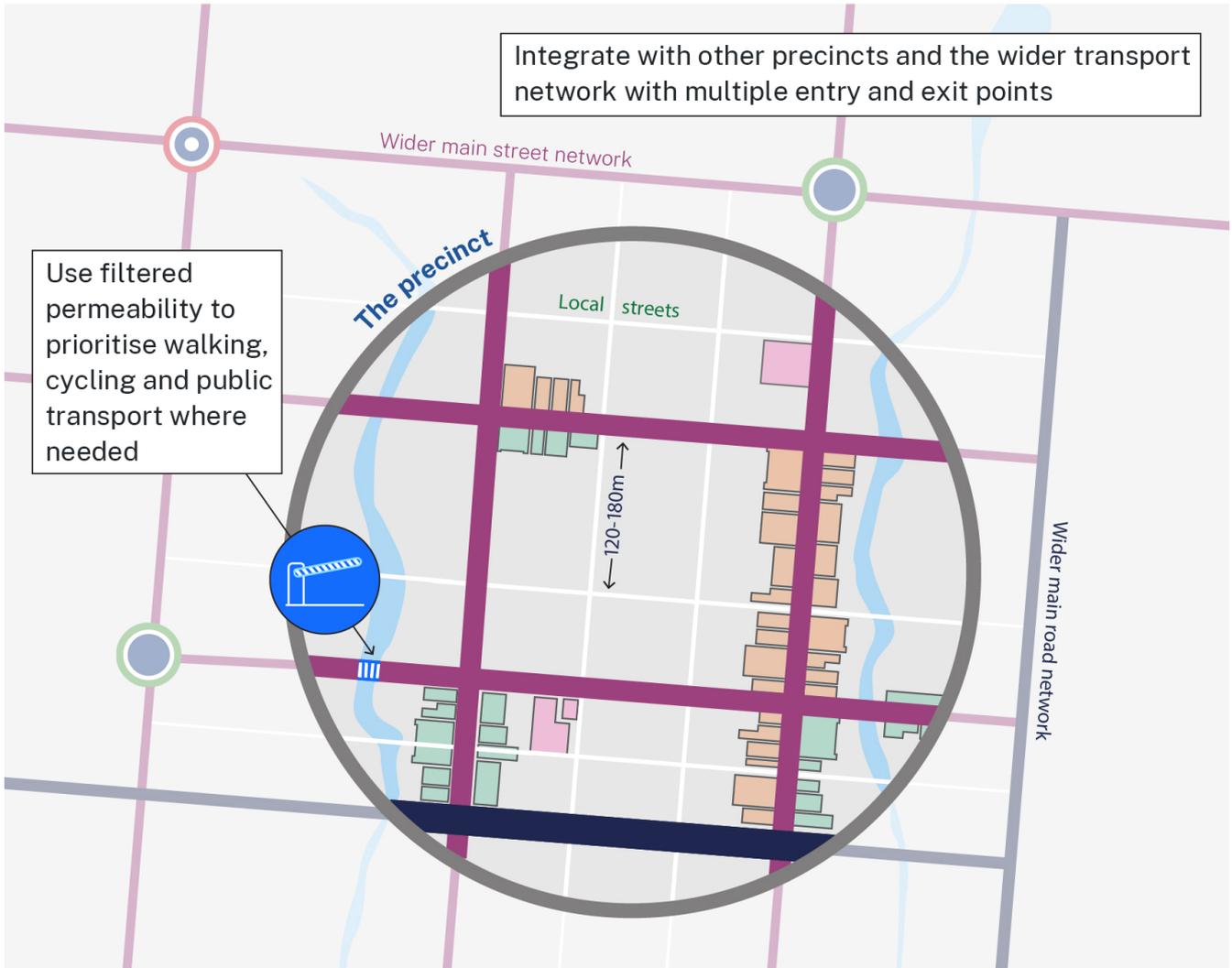


Figure 10 The grid network should follow the established urban structure and the blue-green grid.

## Best practice guidance

### Create a grid-like structure with less than 250m block lengths and more than one intersection per ha

A transport network with a grid-like or modified grid structure is an interconnected pattern of streets that follows a predictable, roughly orthogonal layout that suits the topography, land uses and building forms. With fine-grained block size and high intersection density, grid street networks can make a precinct more walkable, navigable and adaptable compared to a network with winding roads and cul-de-sacs.

The grid-like structure should be supported by shorter block lengths and higher intersection densities with minimal dead-end streets. In greenfield settings, the recommended block length is 120–180m with an average block perimeter of 360m. The maximum block length on any one side is 220m in residential and mixed-use areas, and 250m for industrial areas. A precinct should have at least one intersection per ha on average to create smaller intersections and more frequent crossing opportunities. This intersection density refers to all modes, not just cars. For example, an intersection that is accessible for walking and cycling only would still count towards the intersection density matrix.

Grid-like transport networks yield regular lots in well-packed sequences and maximise the number of lots that can front a given street. The blocks in a street grid can be entirely subdivided, without any leftovers, into rectangular lots.

In brownfield settings where creating a new grid is not an option, a grid-like structure can be emulated by creating new connections in the precinct. For example, paths that end in cul-de-sacs and dead-ends can be extended to their surrounding network, even if it's just for select modes like walking or cycling. Additional mid-block crossings and through-site links every 130m can be provided in larger blocks to increase the intersection density and overall network permeability.

A TfNSW study found that network connectivity is one of the top five structural factors influencing walking in Greater Sydney and regional and outer metropolitan centres in NSW. In Greater Sydney, centres with more than 50 intersections per square kilometre (equal to 0.5 intersections per ha) have increased walking activity in comparison to other centres.

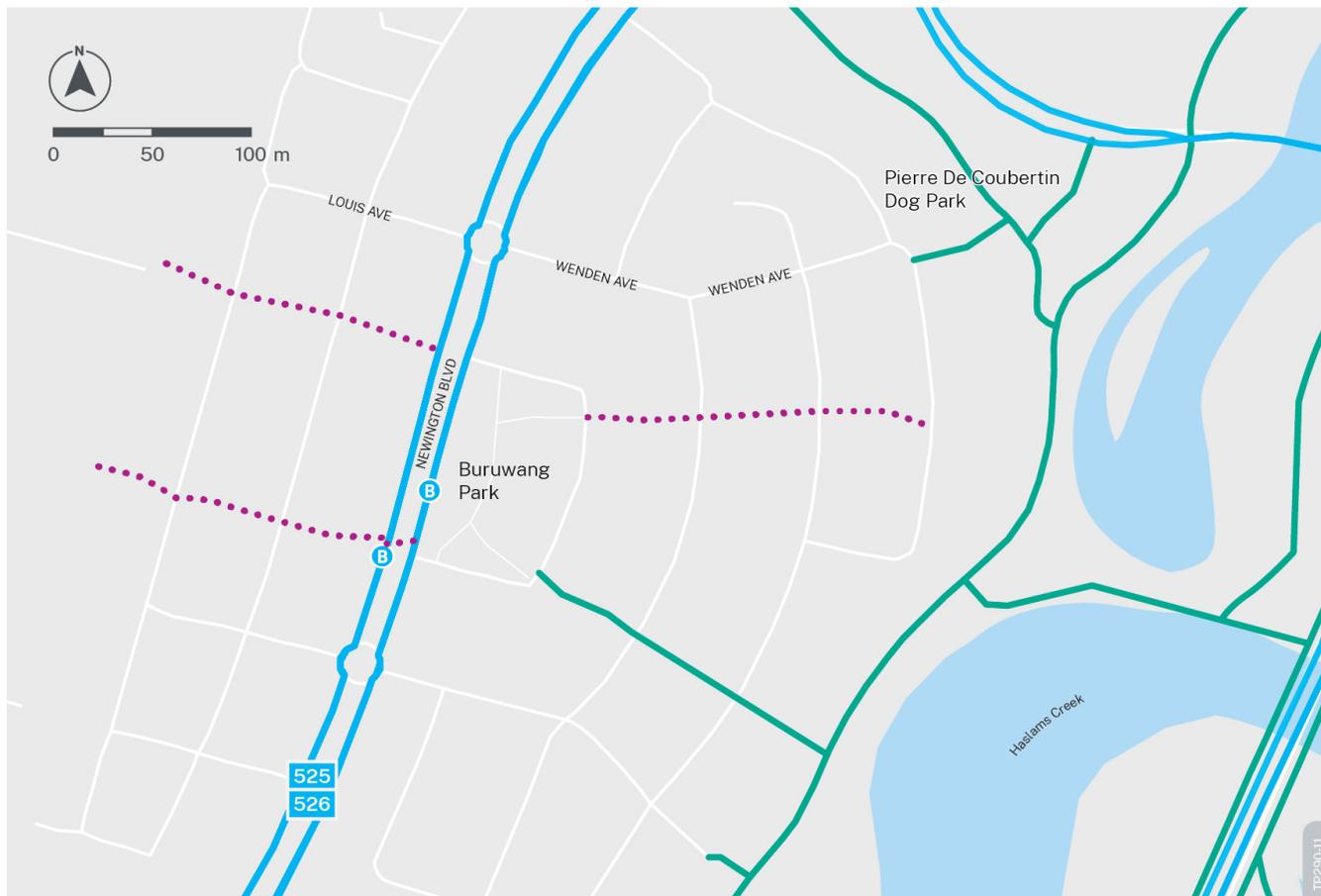
## Use filtered permeability to make walking, cycling and public transport the most convenient options

For many trips, direct routes for people walking, cycling and taking public transport, with the shortest and fastest ways of travelling from place to place, can make these modes more attractive than driving.

The directness ratio measures an available route against the shortest possible connection within the network. Measured in both time (effort) and distance, walking, cycling and public transport trips on the network should be more direct compared to private vehicle trips. If driving is still more direct, consider implementing filtered permeability to filter out private vehicles in some key locations to improve the relative directness for walking, cycling and public transport. This can be achieved using tools such as signage, bollards, pocket parks and bus gates. Exceptions can be extended to emergency services where needed. Solutions may be temporary and reversible so they can be installed quickly and tested for effectiveness before a more permanent solution is provided.

In Newington, in Sydney's west, the street network is more permeable by walking and cycling than using private vehicles due to an extensive network of shared paths and linear parks. The paths and parks break up longer blocks and provide direct connections to key destinations such as schools, parks and the wider cycling network.

## Newington



### KEY

 Streets (all modes)	 Linear Park (walking)	 Off road shared paths (walking and cycling)	 Local bus routes
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Figure 11 Newington's network is more permeable by walking and cycling than driving

## Integrate with other precincts and the wider transport network using multiple access points

Planning for a precinct doesn't stop at the precinct boundary. To create seamless neighbourhoods, precincts should be integrated with the existing street network wherever possible. A gated precinct with only one access point suffers from indirect and limited connections to its surrounding areas.

A grid street network should allow walking, cycling and public transport entry and exit at multiple points within a precinct to provide direct connections to main streets and neighbouring centres and precincts. In many cases, having more connections results in passive surveillance and improved community and personal safety. It is desirable to avoid main roads through centres to encourage walking, cycling and public transport and reduce high-speed traffic and noise, particularly in sensitive areas.

When a precinct is surrounded by major barriers such as motorways, railways and utility connections, crossings for people walking and cycling should be provided at least every 400m to maximise the 15-minute walking and cycling catchment. Crossing for buses and public transport should be provided at least every 1200m to enable acceptable spacing and connectivity for public transport stops.

## Orient the street grid towards the blue-green grid

The street grid should respond to the landscape as this can influence the location and function of places in the network. The blue-green grid can be primary walking and cycling routes for recreation, local trips and commuting. Orientating and providing frequent network connections to the blue-green grid can enable walking and cycling.

## Resources

- [Greener Places: An urban green infrastructure design framework for NSW](#) [🔗](#) (GANSW 2020)
- [Guide to Traffic Management Part 8: Local Street Management](#) [🔗](#) (Austroads 2020)
- [Habitat III Issue Papers](#), 11 – Public Space (UN 2016)
- [Street Design Guidelines for Landcom Projects](#) [🔗](#) (Landcom 2008)

# Principle 5: Enable connected, direct and comfortable walking and cycling movements

People walking and cycling have unique needs and require different infrastructure solutions. People of all ages and abilities, including people using assisted mobility devices, walking aids, different types of bicycles and carers with prams, should be able to safely walk and cycle everywhere within a precinct.

To support thriving and healthy 15-minute neighbourhoods, people walking should be prioritised in the vicinity of key destinations, while low-speed zones and separated cycleways (on higher speed routes) should be provided to improve cycle safety and increase mode share. Figure 12 illustrates the extensive walking and cycling network required in a precinct, which includes the priority corridors on the main street, off-road recreational corridors and mid-block connections where needed.

Following the TfNSW RUSA Policy, walking (including access by people of all abilities) and cycling (including larger legal micromobility devices) needs should be considered ahead of other road users



## Principle 5

Enable connected, direct and comfortable walking and cycling movements

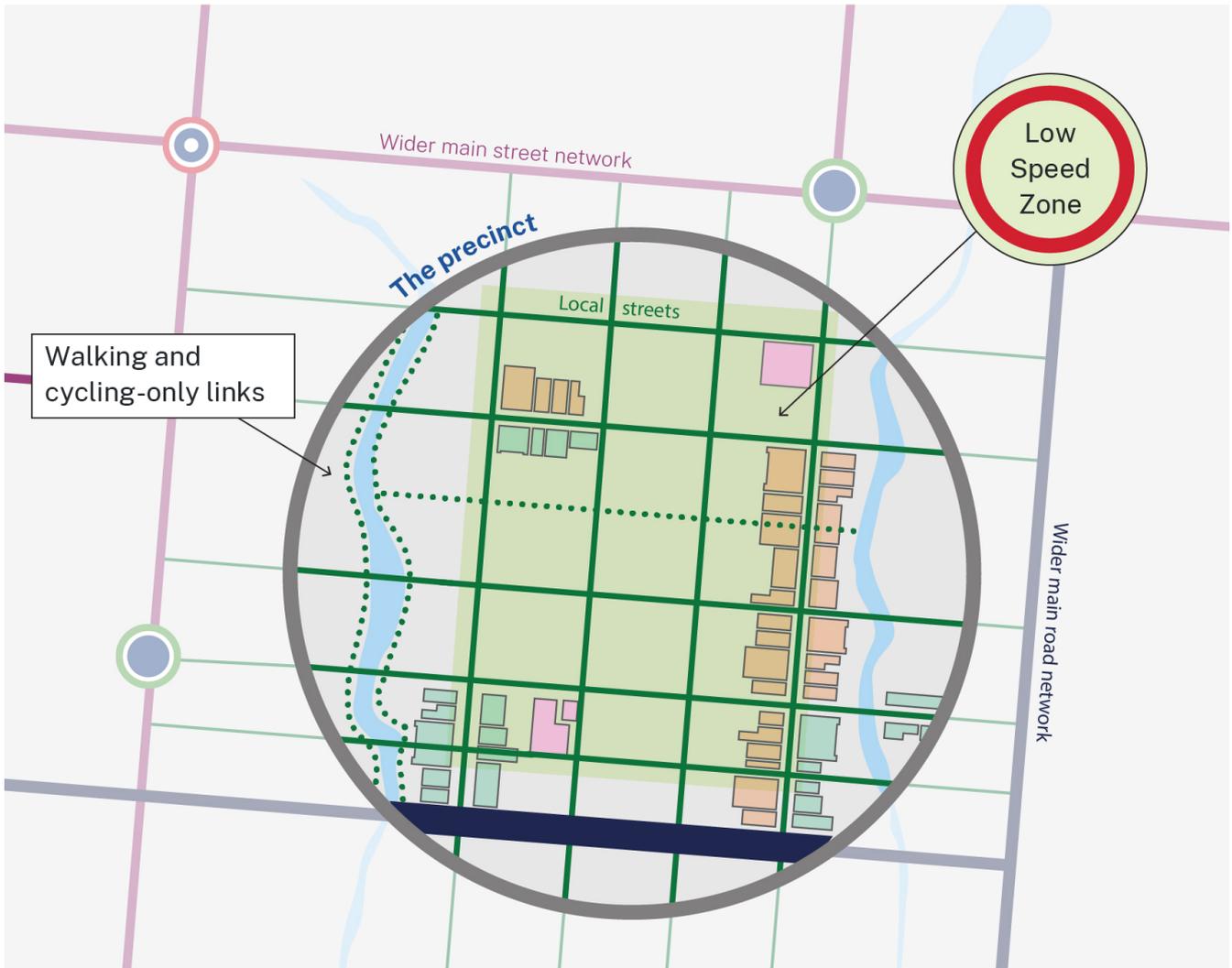


Figure 12 People should be able to walk and cycle everywhere in a precinct with more provisions on the priority walking and cycling corridors that form the main street network

## Best practice guidance

**Create low-speed zones in the network that encourage walking and cycling**

When streets and roads are designed for motor vehicles that travel at high speed, other road users are exposed to higher risk and people are less likely to walk or cycle.

Identify low-speed streets (30 km/h speed limit or lower) and areas in the network that encourage walking and cycling, and designate these as local traffic areas (LTAs) and high pedestrian activity areas (HPAAs) with quietways. Local centres and other key destinations are good candidates for this treatment.

### **Provide dedicated footpaths on both sides of streets**

Dedicated footpaths should be provided on all streets except on shared paths. For 'one-sided' streets, such as a street fronting a bushland reserve with lots on one side only, a footpath is required on the lot side. This enables vulnerable people such as children, the elderly, people with disabilities and prams to safely access the walking network without needing to cross the street.

### **Provide sufficient space, shade, wayfinding and amenities**

Priority walking and cycling corridors require additional provisions to allow comfortable access for a large volume of users. Unlike other modes, people who walk often stop to enjoy a place, interact with others or wait for something, particularly around key destinations and public transport stops. Rather than basing a design on existing or predicted future demand, focus on a vision for the place and its desired use when planning for walking and cycling.

These priority corridors should have sufficient space to allow groups of people to congregate without blocking others' paths (see the [Walking Space Guide](#)). Footpaths in front of sensitive land uses like aged care facilities may need to be wider to accommodate people who need to rest more often or multiple people on wheelchairs.

Integrating walking and cycling corridors with green infrastructure such as tree canopy (see [Principle 8](#)) can also provide shade, protect users from noise and air pollution and create a more comfortable space to enjoy. This results in secondary benefits of improved health and wellbeing.

## **Provide separated cycleways on the cycling network and on streets where the speed limit is higher than 30 km/h**

Separated cycleways should be provided on the planned cycling network, as well as on streets where the speed limit is higher than 30 km/h, and near schools and areas with a high volume of vehicle movements.

The cycleways should provide adequate width for the volume of users, enable minimal stopping and starting, avoid steep gradients, and limit interaction with high speed, high volumes of motorised traffic and noise and pollution where possible. The infrastructure design should be able to evolve to accommodate changes in the needs and demands of its users over time, including innovations in the approved forms of micromobility.

Off-road cycleways (or shared paths) through popular recreational areas such as parks, lakes and waterways will also support cycling uptake and reduce car reliance. Such connections can be delivered through the blue-green grid (see [Principle 4](#)) with an optimum level of passive surveillance for safety.

## **Create a connected walking and cycling network with crossing facilities every 130m and priority at intersections**

Historically, walking tends to be well-catered for in centres and leading to centres. However, cycling often gets pushed aside to recreational areas or quiet streets that are further away from centres because cycling is assumed to be mainly recreational. To be useful for other journeys, the cycling network needs to be connected to key destinations, as discussed in [Principle 3](#).

The entire network should be planned and designed, so people walking and cycling can reach their day-to-day destinations easily, along routes that are connected, direct, safe, simple to navigate and of consistent quality.

A connected network provides multiple routes to move between key destinations, creating a resilient network where, for example, if one path is closed for maintenance, others are still available. This includes providing safe and convenient crossing facilities every 130m and giving priority to walking and cycling at intersections following desire lines.

Following the [Safe System approach](#) <sup>2</sup>, the design of crossings should recognise that people are human and sometimes make mistakes. Avoid forcing people to cross at unsuitable crossing points such as multiple stage crossings with lags between phases, long wait times, or where other road users can't properly anticipate their movements. Areas near schools should also have [crossing supervisors](#) <sup>2</sup> as children under the age of 10 may not have fully developed their peripheral vision<sup>2</sup> to cross the street independently. If critically needed, a grade-separated crossing can be used with walking and cycling access provided at grade.

## Resources

- [Providing for Walking and Cycling in Transport Projects Policy](#) (TfNSW 2021)
- [Walking Space Guide](#) (TfNSW 2020)
- [Cycleway Design Toolbox](#) (TfNSW 2020)

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<sup>2</sup><https://www.yourhealth.net.au/articles/family-health/childrens-health/pedestrian-safety-for-kids/> <sup>2</sup>

## Principle 6: Plan public transport infrastructure, services and technology concurrently

The [Greater Sydney Region Plan: A Metropolis of Three Cities](#)  envisages communities having all day, everyday, equitable access to jobs, tertiary education, health facilities and major cultural and recreational activities. In regional and outer metropolitan NSW, the focus will be on creating an equitable transport system that provides greater coverage across NSW and gives customers more travel options, for both local and longer distance trips.

To achieve this, public transport should enable direct connections between key centres from the outset, facilitate interchange between services and modes, and be safely integrated into the built environment. Public transport infrastructure should be planned concurrently with other components of the network to achieve the best outcomes for a precinct. This reduces the need to retrofit infrastructure to meet service needs.

This principle focuses on creating a transport network that enables good route design, rather than the actual route design that often emerges, expanding across multiple precincts. When public transport needs are planned from the outset, such precinct-to-precinct connectivity can be provided directly, free of large volumes of fast-moving traffic. Public transport services can be direct, without the need for circuitous routes. Interchanges can also be located near key land uses where people want to be and integrated into pleasant street environments, resulting in seamless end-to-end journeys by public transport.



## Principle 6

Plan public transport infrastructure, services and technology concurrently

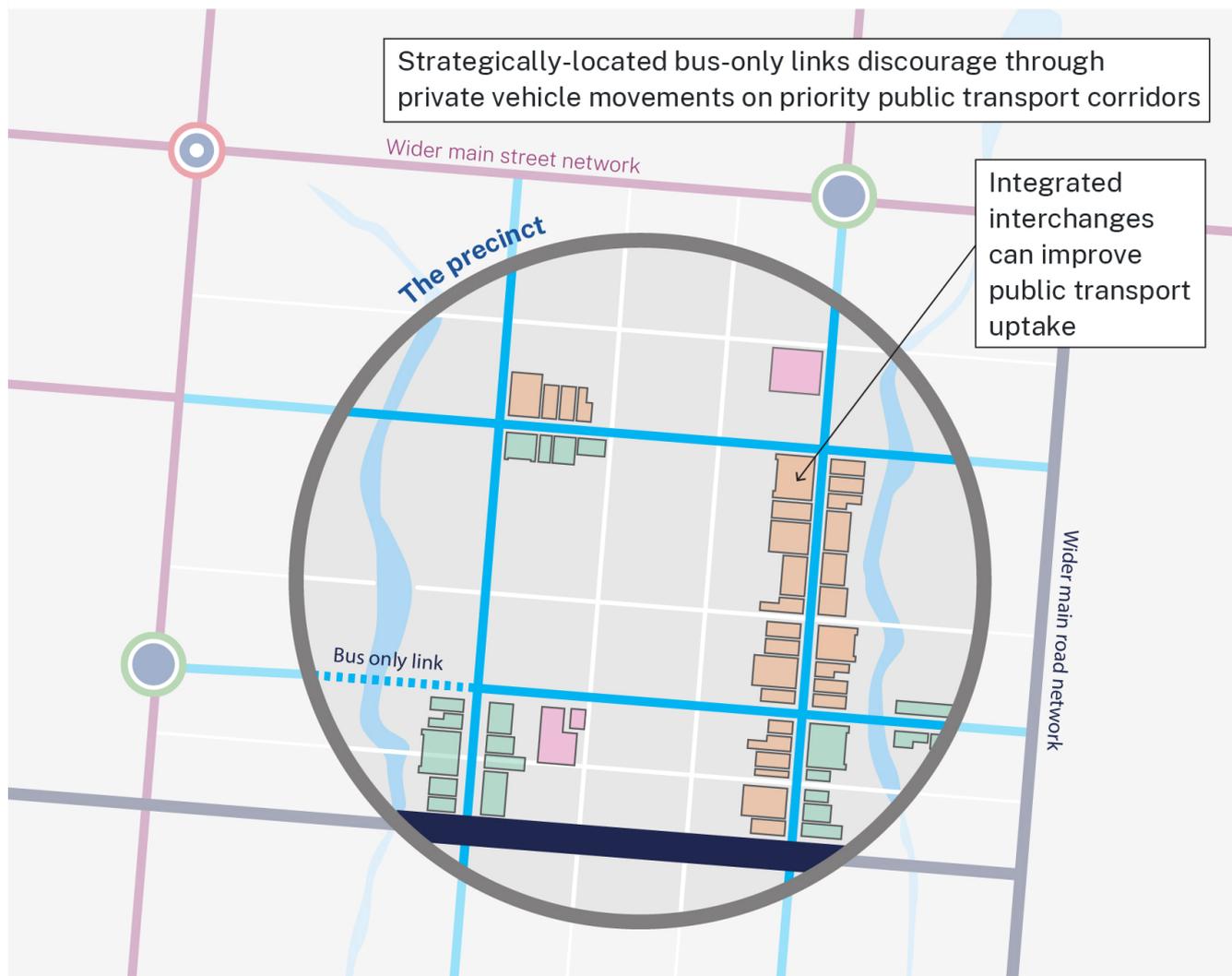


Figure 13 Public transport infrastructure, services and technology should be planned concurrently to inform the desired urban structure (see [Principle 2](#)).

## Best practice guidance

### Identify the precinct's future public transport network and services and provide the required infrastructure

Once the precinct's priority public transport corridors have been identified ([Principle 2](#)), identify the required infrastructure to ensure service reliability and operational efficiency. Journey time and reliability savings from bus priority measures, combined with bus service improvements, have translated to direct patronage gains in Australian cities<sup>3</sup>.

Some higher-level services may need more infrastructure than others. For example, a typical segregated or exclusive bus right-of-way facilitates reliable high-frequency bus services. A kerbside bus lane without segregation may not be able to facilitate a similar level of movement due to potential conflict with left-turning vehicles and driveway access. The [Bus Priority Infrastructure Planning Toolbox](#) documents various types of bus priority infrastructure to consider for different street environments.

Where required by TfNSW, space for bus layovers, depots and turnaround facilities should also be identified and appropriately reserved in early precinct plans to ensure land dedication by developers and infrastructure delivery (see [Guidelines for the Planning of Bus Layover Parking](#)). As a precinct changes, some public transport services may also be upgraded. For example, a current rapid bus service may later be replaced by light rail. The infrastructure should be built in a way that does not limit future public transport delivery options.

### Provide safe and convenient transport interchanges that integrate with place

Generally, people want to access a destination when they travel through an interchange. Interchanges should be integrated with key land uses where possible, for example by offering complementary activities including meeting places, shopping, and services and ensuring interchanges are adjacent to and visible from them. This may require dedicated infrastructure to enable seamless changing between public transport modes.

To better integrate with place, the public transport fleet should be identified so the interchange is fit-for-purpose while also remaining integrated with the surrounding built environment. For example, because double-decker buses require greater height clearances, the streetscape should be designed to cater for their height. The types of trees planted, the type of street lighting used, and built form such as awnings, should be suitable from the outset to avoid poor place outcomes and the need for retrofitting.

Access to interchanges should be prioritised for transfers from more equitable, efficient and sustainable modes, such as walking and cycling, over vehicle-based modes. Clear wayfinding and visibility should be provided for all available connections at an interchange, with access to public transport identifiable from the street. To avoid congestion, interchange design should encourage people to walk, cycle and take public transport rather than drive to the interchange. In some regional contexts, drop-off areas for on-demand transport may be desirable.

## **Leverage transport investment with travel demand management (TDM) measures**

TDM is the application of a focused, data-led strategy that seeks to change demand on transport networks by redistributing journeys across modes. As some precincts are selected for growth due to new transport investment (e.g. a new metro, heavy rail, light rail, ferry and rapid bus investments), you may need to use TDM measures to optimise demands across modes and take advantage of additional transport capacity. Technology can support these measures by dynamically optimising existing networks, infrastructure and services.

TDM measures should be supported by a travel plan, including a management strategy for delivering long-term behavioural change and sustainable travel patterns across a precinct or organisation. The travel plan needs to identify how residents, workers and visitors make their transport decisions and use this to influence behaviour that leads to better customer outcomes while reducing adverse impacts such as congestion. The [Travel Plan Toolkit](#) provides steps, templates and resources for developing a comprehensive travel plan. If a travel plan is a condition of planning consent, you may need to consult with

relevant planning authorities for advice on any additional specific requirements.

## Resources

- [\*Future Transport Technology: Roadmap 2021-2024\*](#) (TfNSW 2021)
- Integrated network plans (TfNSW and other agencies)
- [\*Bus Priority Infrastructure Planning Toolbox\*](#) (TfNSW 2021)
- [\*Guidelines for Public Transport Capable Infrastructure in Greenfield Sites\*](#) (TfNSW 2018)
- [\*Guidelines for the Planning of Bus Layover Parking\*](#) (TfNSW 2018)
- [\*Prioritising On-Road Public Transport\*](#) (Austroads 2017)
- [\*Travel Demand Management\*](#): resources (TfNSW 2021)

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<sup>3</sup>Currie, G., and Sarvi, M. (2012). New Model for Secondary Benefits of Transit Priority. *Transportation Research Record*, 2276(1), 63-71.

# Principle 7: Accommodate the movement of goods, freight and urban services based on the desired place outcomes

Movements of goods, freight and urban servicing, are essential to support communities' demands for goods and services while also supporting attractive urban environments. The range of possible freight journeys is as varied as the goods and services we consume, from raw materials, containerised goods, construction materials and waste collection, to parcel and meal deliveries. This can generate significant freight movements with 24/7 operation.

The transport network can support the efficient movement of goods, freight and urban services in a way that is both efficient and inconspicuous through spatial separation where possible, as shown in Figure 14. Last-mile freight presence should be reduced in our main streets and civic spaces in favour of opportunities for loading and servicing to occur off-street or on laneways. Long-distance freight trips should be facilitated where needed with access to loading facilities or micro hubs from main roads, suitable turn radius and swept paths, and traffic calming treatments appropriate for the freight task and vehicle size.



### Principle 7

Accommodate the movement of goods, freight and urban services based on the desired place outcomes

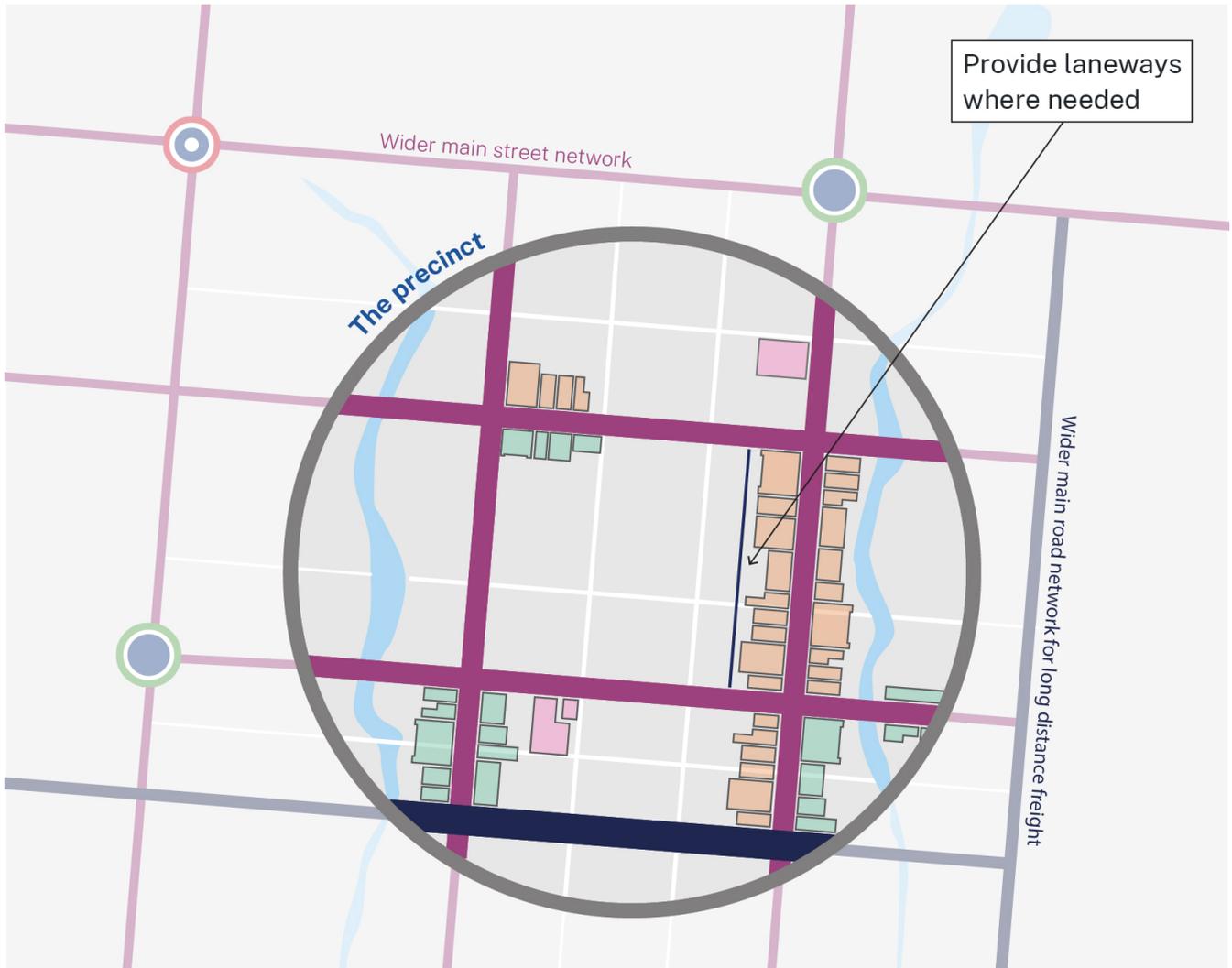


Figure 14 Preferred freight and urban servicing routes should be identified from the outset and separated from priority walking, cycling and public transport corridors.

## Best practice guidance

### Allocate long-distance freight trips for large vehicles adjacent to main road corridors

As industrial land uses are strategically located adjacent to main roads (including motorways, see [Principle 3](#)), long-distance freight traffic using large freight vehicles should be allocated to these corridors. Where needed, temporal road user space allocations can be enforced during desired time windows to limit freight and service vehicle movements on high amenity places and corridors.

### Establish appropriate freight and servicing vehicle access throughout the precinct

Last-mile freight and servicing vehicles need to travel everywhere in a precinct. Loading provision is key in ensuring that freight vehicles can access their final destinations safely and efficiently. Solutions may vary according to the size of the building or precinct, and the land use.

In high-density areas, buildings and precincts should have enough on-site, off-street capacity to accommodate the freight and servicing vehicle movements their demand generates – they should be self-sufficient where externality costs of shared unloading capacity are high. In low-density areas, a shared (usually kerbside) loading facility is generally sufficient.

Loading facilities and access points should be appropriately orientated to the relevant parts of the transport network. They should not rely on the centre's street intersection with freight and private vehicle corridors.

### Prioritise smaller, quieter and more sustainable freight and service vehicles in mixed-use and residential precincts

In mixed-use and residential precincts, last-mile and local freight and servicing activity is best served by smaller, quieter and often more sustainable modes such as electric vans, cargo bicycles and approved forms of micromobility as they pose less conflict with other road users.

These modes can be prioritised in the network by:

- providing micro hubs on the edge of local centres to enable last-mile freight, where suitable
- providing laneways to service a cluster of shops and businesses on main streets and civic spaces, where suitable
- adopting suitable swept paths and lane widths; where large swept paths are required, use traffic calming measures to reduce vehicle speeds (see Principle 8)
- providing cycling paths between local freight destinations such as micro hubs and other logistics centres, commercial centres and high-density residential neighbourhoods
- investing in technology that improves place making outcomes and movement efficiencies for last-mile freight.

## Resources

- [\*Freight and Servicing Last Mile Toolkit\*](#) (TfNSW 2021)
- [\*NSW Freight and Ports Plans 2018-2023\*](#) (TfNSW 2018)
- [\*Guide to Road Design\*](#) (Austroads 2021)

# Principle 8: Design self-explaining street environments following the NSW Movement and Place Framework

The streets and roads in a precinct should be planned and designed simultaneously to reflect the network's desired place outcomes and corridor functions as well as attract the intended users and travel behaviour.

A well-designed street is human-scale and compact in form, so limited road space needs to be allocated to suitable modes to deliver the desired functions for both the corridor and the place. The NSW Movement and Place Framework helps practitioners to balance the demand for limited road space, support successful and vibrant places and encourage travel behaviour that fits the desired street environment.

Based on their movement function and place intensity, under the NSW Movement and Place Framework street environments can be identified as either [main roads, main streets, local streets or civic spaces](#). Some corridors change their function along a route as they encounter different land uses – it is fundamental to identify any changes and reclassify these segments appropriately as needed. Having a complete network with a variety of street environments provide inviting and well-integrated urban environments that enable vibrant public life and a strong economy.

Once the street environment has been identified, refer to the Design of Roads and Streets Guidelines (DORAS) for design considerations and examples for each type of street environment.



### Principle 8

Design self-explaining street environments following the NSW Movement and Place Framework

#### Movement and place

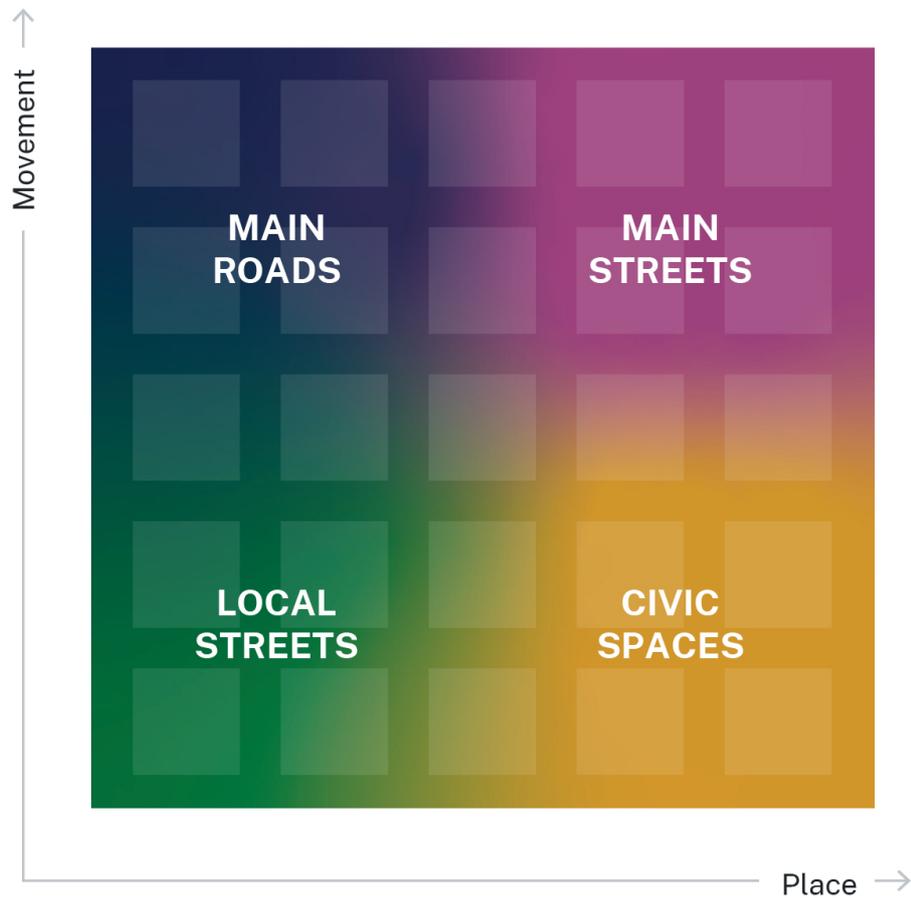


Figure 15 Streets should be designed following the desired street environments and street types from DORAS.

## Best practice guidance

### Create a complete network with diverse street environments – and various street types

Depending on a precinct's size, a complete network should have diverse street environments that are fit for purpose as main streets, local streets or civic spaces – as well as main roads if needed. A complete network should have complementary street environments fulfilling different roles. Each corridor or segment of a corridor should be considered as one desired street environment to avoid forcing a street environment to be everything for everyone.

In addition to the four street environments, the upcoming Design of Roads and Streets Guidelines include a limited palette of street types. Each street environment has many street types that reflect a rich variety of built forms, street characters, topography, place intensity, movement function, lot types and land uses. A diverse street network enables all kinds of activities to occur across different kinds of street environments and street types.

For further information on Movement and Place street environments see the [\*Practitioner's Guide to Movement and Place\*](#), which provides a consistent way to measure existing performance levels against desired outcomes.

### Allocate road space based on the identified modal priorities

Although a mode might be prioritised in a corridor, you still need to consider every mode's road space needs in order, starting with walking (including equitable access for people of all abilities), then cycling (including legal and emerging micro-mobility devices), public transport, freight and deliveries, and point-to-point transport ahead of general traffic and on-street parking. Sufficient space also needs to be provided for tree canopy and street furniture.

For example, even if public transport is prioritised in a corridor, you first need to allocate space for safe walking and cycling access (such as footpaths, cycleways and crossings where needed), before providing for public transport. The remaining space can then be used to prioritise public transport, for example, by providing bus lanes to enable reliable, high-frequency bus services. Finally, you need to consider freight and servicing, point-to-point transport and general traffic. This order of consideration may mean, in some cases, the existing number of travel lanes or free-flowing traffic at peak hours cannot be maintained, and this is an acceptable outcome as the corridor prioritises public transport.

## Adopt lower speed limits of 30–40 km/h and design for lower speeds

Following the Safe System approach, vehicle speeds should be lowered to protect the most vulnerable road users: people who are walking. Small reductions in speed can result in large safety gains in various crash configurations. The [Centre for Road Safety](#) [🔗](#) found that when people are walking, their chance of survival from being hit by a car increases significantly from just 10% at 50km/h to 90% at 30km/h.

Streets should be designed to encourage drivers to slow down. The default speed limit for the whole network in the precinct should be minimised to 30–40km/h where possible, complemented by low-speed zones near schools, hospitals and other sensitive areas. Traffic calming methods, such as pavement types, lane widths, the scale of street furniture (signs and street lighting), canopy coverage and sightlines and on-street parking, should be incorporated into the design of all street environments where appropriate. This exercise needs to be done in conjunction with mode prioritisation (see [Principle 2](#)).

[Centre for Road Safety's report](#) [🔗](#) found that implementing a 40km/h speed limit in high walking activity areas reduces casualty crashes by half. This applies to road users generally, not just people walking. The evaluation also found a broad consensus that low-speed zones lead to broader benefits in creating an environment that supports place amenities.

## Identify and resolve road user conflicts through infrastructure and service design

Large-scale network planning and mapping need to be complemented with designing at a scale where the actual conditions for road users are identified and resolved, at least based on similar-type examples. Balancing the spatial needs of users and resolving any potential conflicts through careful design, particularly at intersections, is evidence a network plan is robust and can deliver the promised benefits in future stages.

If conflict cannot be avoided, follow the same order of modes as outlined in the TfNSW RUSA Policy to resolve the conflict. For example, if both public transport and general traffic are prioritised in a corridor, public transport operations will likely be adversely affected. In this case, public transport should prevail, which may require dedicating space for bus lanes by reducing the number of general traffic lanes and removing space for on-street parking.

If modelling is required, refer to the [Transport Model Selection Guidelines](#) to ensure the modelling approach selected is consistent, rigorous and transparent in answering the transport-related questions. Alternatively, temporary low-cost solutions can be used to test permanent changes ahead of or instead of modelling. These solutions can be made permanent or reversed once their effectiveness can be evaluated. DPE's [Streets as Shared Spaces program](#), for example, allows communities and government to experiment and test changes to streets and places.

### Testing solutions in brownfield developments

Ballina Shire Council is trialling traffic calming and streetscape enhancements to improve amenity and safety for pedestrians and cyclists in and around Park Lane, Lennox Head. During consultation, the community identified safety as an important objective, as Park Lane is a popular shortcut for vehicles wanting to avoid main street traffic.

Council is testing raised speed thresholds and crossing points, kerb buildouts, reduced traffic speeds (30km/h), public art and decorative pavement treatments, a parklet, bicycle parking and maintenance equipment, and solar lighting. Partway into the trial, council has already observed an average speed reduction of 10km/h along Park Lane. This trial has informed council's vision for Lennox Village, to include introducing permanent streetscape improvements.

## Resources

- [\*Practitioner's Guide to Movement and Place\*](#) (TfNSW and GANSW 2020)
- [\*Safe System Assessment Framework for Movement and Place Practitioners\*](#) (TfNSW 2021)
- *Design of Roads and Streets Guidelines* (TfNSW 2022TBC)
- [\*Western Sydney Street Design Guidelines\*](#) (Western Sydney Planning Partnership 2020)
- [\*Guide to Traffic Management\*](#) Part 8: Local Street Management (Austroads 2020)
- [\*Beyond the Pavement\*](#) (TfNSW 2020)
- [\*Walking Space Guide\*](#) (TfNSW 2020)
- [\*Cycleway Design Toolbox\*](#) (TfNSW 2020)
- [\*Bus Priority Infrastructure Planning Toolbox\*](#) (TfNSW 2021)
- [\*City Limits\*](#) (NACTO 2020)
- [\*Evaluation of permanent 40 km/h speed limits: Summary report\*](#) (TfNSW 2018)
- [\*Transport Model Selection Guidelines\*](#) (TfNSW 2021)
- [\*AS 1428.1:2021 Design for Access and Mobility\*](#) (Australia Standards 2021)

# 04

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## Case studies

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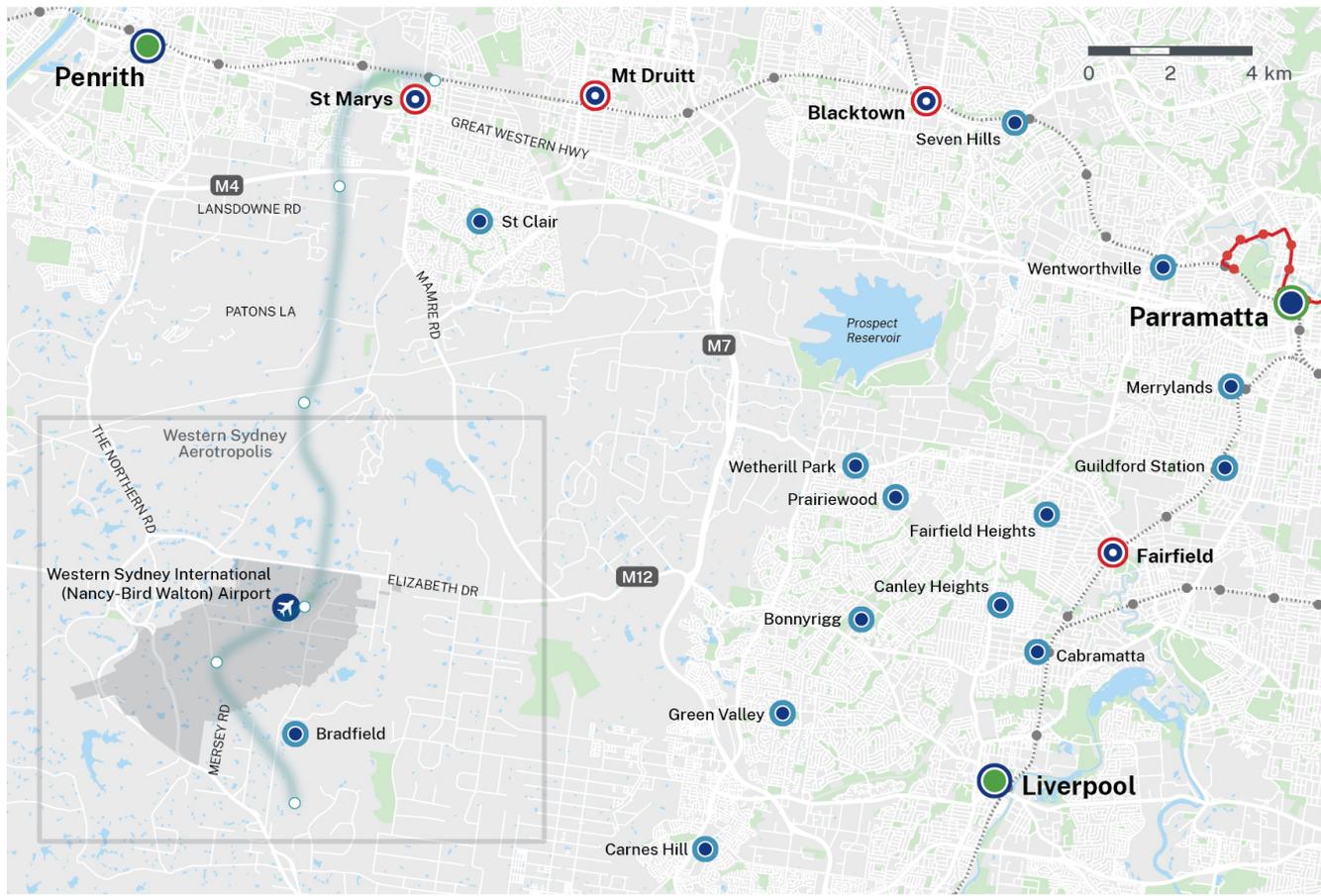
# Case Study 1: Western Sydney Aerotropolis

Western Sydney's new airport is the catalyst for much of Western Sydney's future urbanisation. Propelled by the Australian Government's investment in the airport as well as the Sydney Metro - Western Sydney Airport Line, the aerotropolis will be the beating heart of the Western Parkland City, connecting to Greater Parramatta and the Harbour CBD to realise the vision for Greater Sydney as a metropolis of three cities.

Western Sydney Aerotropolis consists of several precincts. Its transport network is designed to enable movement within and across the different precincts, and focuses on a network of main streets and main roads to provide connections between precincts. The network encourages walking, cycling and public transport connections into centres of high activity while providing efficient routes for freight services to key employment areas. This serves as a starting point when planning for movement within each precinct.

This greenfield precinct case study largely follows the best practice outlined in this guide, while also noting alternative scenarios to better implement the principles. The location was chosen for illustrative purposes only.

### Western Sydney International Airport



**KEY**

- Metropolitan city
  - Metropolitan cluster
  - Strategic centre
  - Local centre
  - Western Sydney Aerotropolis study area
  - Railway line and station
  - Parramatta Light Rail – Stage 1
  - Project interventions**
  - Sydney Metro Greater West (under construction)
- Interventions are shown indicatively and may not be to scale.

Figure 16 Western Sydney Aerotropolis

**Principle 1:** Identify the desired outcomes for the precinct

Benefiting from proximity to the new Western Sydney International Nancy-Bird Walton Airport (WSI Airport), the aerotropolis will contribute towards 200,000 new jobs in the Western Parkland City and become a high-skill jobs hub across aerospace and defence, manufacturing, healthcare, freight and logistics, agribusiness, education and research industries.

The Western Sydney Aerotropolis Plan identified several precincts to support the aerotropolis, classified as urban land, mixed use, enterprise, environment and recreation, agribusiness and Luddenham Village. Each precinct plays a role in supporting the airport and the future centre of Bradfield.

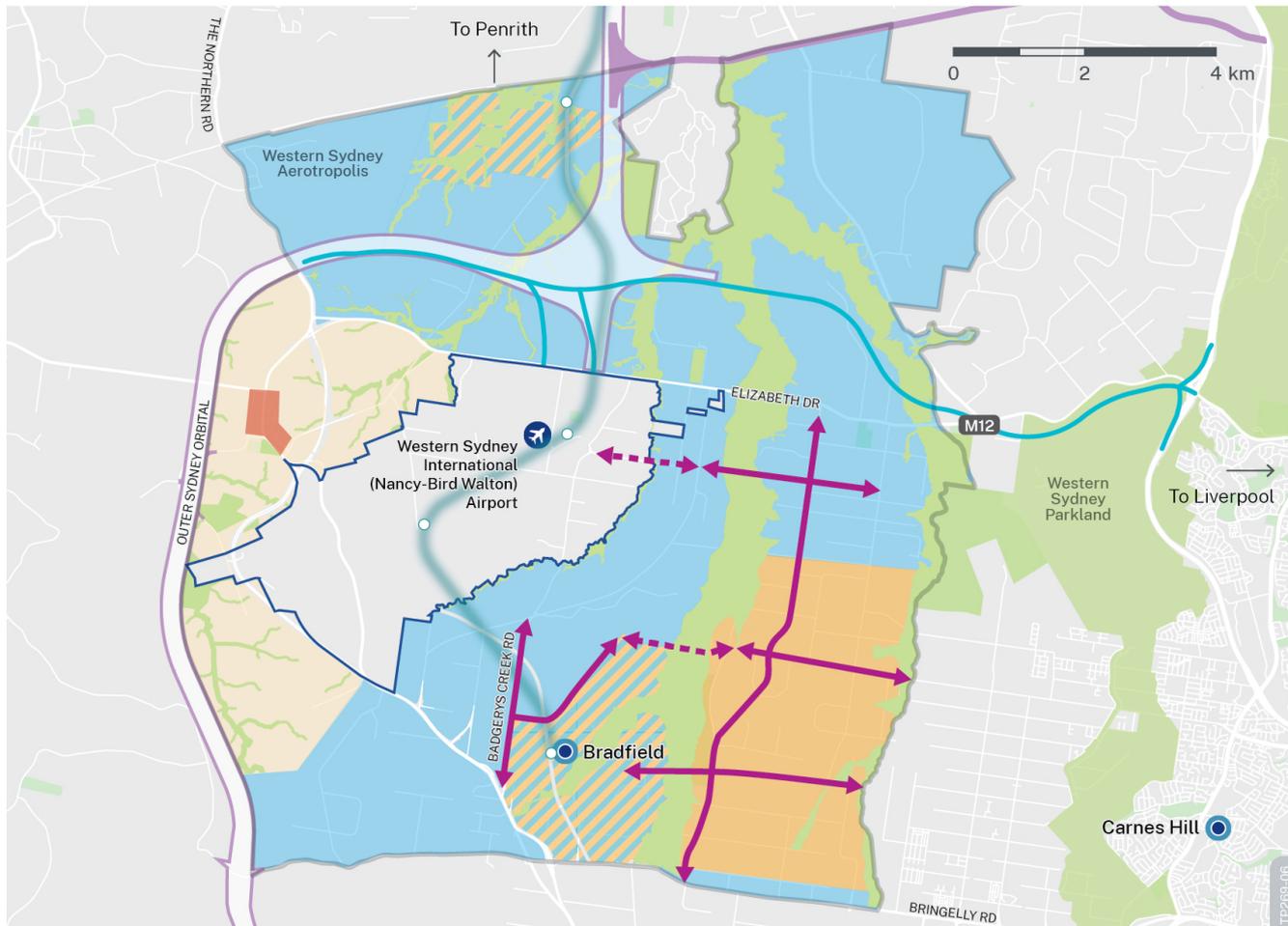
The enterprise precinct surrounding the airport will provide space for industry and jobs. It is conveniently located to provide easy access to the airport and the motorway network to improve efficiency. Mixed-use and urban land precincts are located to the east of the airport, away from any noise impact areas, and will be serviced by a Sydney Metro to improve access by public transport.

### **[Principles 2](#) and [3](#): Develop an urban structure that supports successful places and encourages walking, cycling, and public transport journeys, and co-locate key land uses**

Expecting that future residents within the urban land precinct would be travelling to employment lands and key centres, walking, cycling and public transport corridors were designed to support movements between these precincts as well as to key public transport hubs and the airport. Walking, cycling and public transport connections are deliberately located in the centre of precincts to connect the centre with its surrounding areas. Some level of filtered permeability was also considered with (the dashed) sections of the network proposed for walking, cycling and public transport only. This makes these sustainable modes more attractive and competitive than driving.

While there is limited information about future centres or land uses at this point, the network connects the residential areas to the aerotropolis core and the Sydney Metro station, as well as the WSI Airport. These initial connections and prioritisation for walking, cycling and public transport will allow compatible land uses to be planned around them, creating a network of main streets. The urban structure will need to be developed iteratively following more detailed land-use planning.

### Western Sydney International Airport



#### KEY

- |  |  |                 |                             |                              |  |
|--|--|-----------------|-----------------------------|------------------------------|--|
|  | Metropolitan city  |                 | Western Sydney Aerotropolis | <b>Project interventions</b> |  |
|  | Metropolitan cluster                                     | <b>Land use</b> |                             |                              | Sydney Metro Greater West (under construction) |
|  | Strategic centre   |                 | Luddenham village           |                              | M12 Motorway corridor                          |
|  | Local centre   |                 | Agribusiness                |                              | Outer Sydney Orbital corridor                  |
|  | Railway line and station                                 |                 | Environment and recreation  |                              | Western Sydney Freight Line corridor           |
|  | Priority walking, cycling and public transport corridors |                 | Enterprise                  |                              |  |
|  | Walking, cycling and public transport only               |                 | Mixed use                   |                              |  |
|  |  |                 | Urban Land                  |                              |  |
- Interventions are shown indicatively and may not be not to scale.

Figure 17 The proposed urban structure for Western Sydney Aerotropolis.

#### **Principle 4: Create a permeable network with a grid-like structure, short block length and high intersection density**

The urban structure identifies a network of main streets and main roads on a larger scale. This will be supported by smaller scale civic spaces and local streets within each precinct (not shown on the map), creating a diverse network that encourages local trips by walking or cycling or using the local bus network. The smaller streets will feed into main streets and main roads for longer distance trips.

#### **Principle 5: Enable connected, direct and comfortable walking and cycling movements**

All corridors within the aerotropolis have sufficient space available for separated walking and cycling movements. They also provide space for significant tree canopy and amenity to improve the walking and cycling experience. The walking and cycling corridors are also located close to green space where they can be supported by a network of off-road walking and cycling corridors as well as local streets.

#### **Principle 6: Plan public transport infrastructure, services and technology concurrently**

While adjustments may be made along the way, identifying the desired level of public transport service from the outset can help identify the infrastructure support required. For example, the City Deal Rapid Buses for Western Parkland City will provide key connections in the aerotropolis at up to 10-minute frequency. To ensure reliability, the required bus priority infrastructure was identified at the same time as the service planning. It's also critical that key public transport corridors have been identified and planned as early as possible to inform the adjacent land uses.

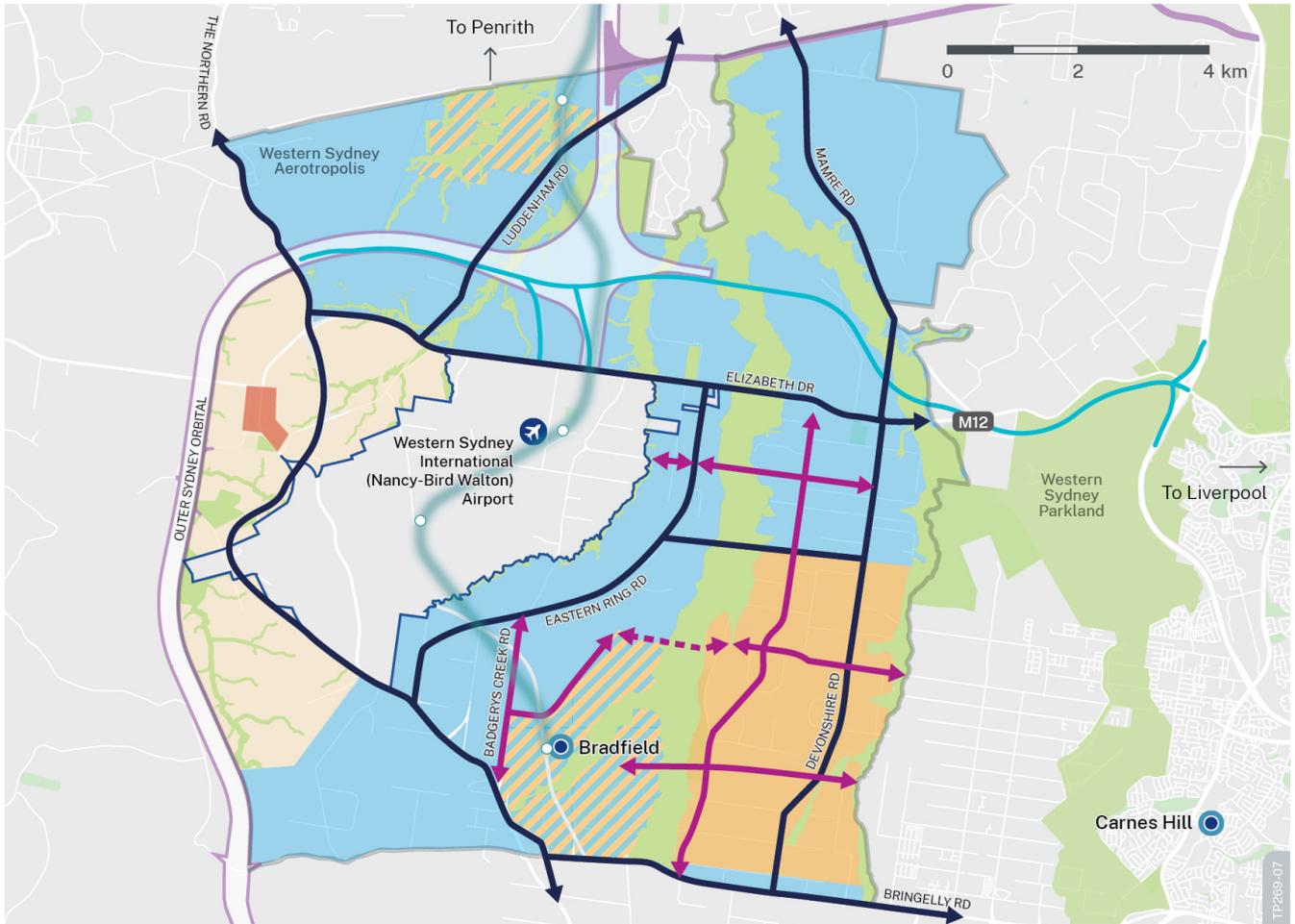
The urban structure and grid transport network provide the flexibility to adjust public transport services as the precinct grows, and the frequency can be improved to best meet demand. However, in this case study, not all priority public transport corridors are wide enough to deliver best practice centre-running transit services, i.e. light rail or rapid bus.

**Principle 7: Accommodate the movement of goods, freight and urban services based on the desired place outcomes**

The WSI Airport will attract significant freight movements, while the urban land precincts will need urban services. These will need to be serviced by an efficient main road network with minimum impact on places and people.

Long-distance freight trips rely on motorways as well as main roads such as The Northern Road, Bringelly Road, Elizabeth Drive and Mamre Road that are separated from urban land or city centres where possible. This allows for faster movement and connections to the existing freight and motorway network to facilitate longer journeys. Loading zones will be identified during more detailed planning when land uses have been confirmed.

### Western Sydney International Airport freight routes



**KEY**

- |  |  |  |                             |  |  |
|--|--|--|-----------------------------|--|--|
|  | Metropolitan city  |  | Western Sydney Aerotropolis |  | Sydney Metro Greater West (under construction) |
|  | Metropolitan cluster                                     |  | Luddenham village           |  | M12 Motorway corridor                          |
|  | Strategic centre   |  | Agribusiness                |  | Outer Sydney Orbital corridor                  |
|  | Local centre   |  | Environment and recreation  |  | Western Sydney Freight Line corridor           |
|  | Railway line and station                                 |  | Enterprise                  |  |  |
|  | Preferred long-distance freight routes                   |  | Mixed use                   |  |  |
|  | Priority walking, cycling and public transport corridors |  | Urban Land                  |  |  |
|  | Walking, cycling and public transport only               |  |                             |  |  |
- Interventions are shown indicatively and may not be not to scale.

Figure 18 Preferred long-distance freight routes in Western Sydney Aerotropolis

## **Principle 8: Design self-explaining street environments following the NSW Movement and Place Framework**

As the network functions have been identified, corridor widths were determined to provide sufficient space for the desired users, while also avoiding wide streets and roads that are not attractive for walking and cycling.

Priority walking, cycling and public transport corridors are proposed to be 40m wide to allow most of the corridor to be dedicated to separated walking and cycling facilities on both sides, significant tree canopy, green medians, amenity, utilities and a maximum of two traffic lanes in each direction (possibly one being a dedicated bus lane). The extension of Fifteenth Avenue is proposed to be 45m to allow for future centre-running bus lanes. During more detailed land-use planning and design, widths could be reviewed where appropriate to design for a human scale. Examples could be reducing the corridor width approaching centres or lower speeds, allowing for smaller lane widths. Alternatively, any additional space could be reallocated to support green space, activation or walking and cycling.

Priority freight corridors are proposed to be 60m wide to allow for a maximum of three traffic lanes in each direction (potentially with bus infrastructure), and space for turning lanes and utility infrastructure. Tree canopy, walking and cycling facilities and amenities will be located further from the traffic lanes to improve safety.

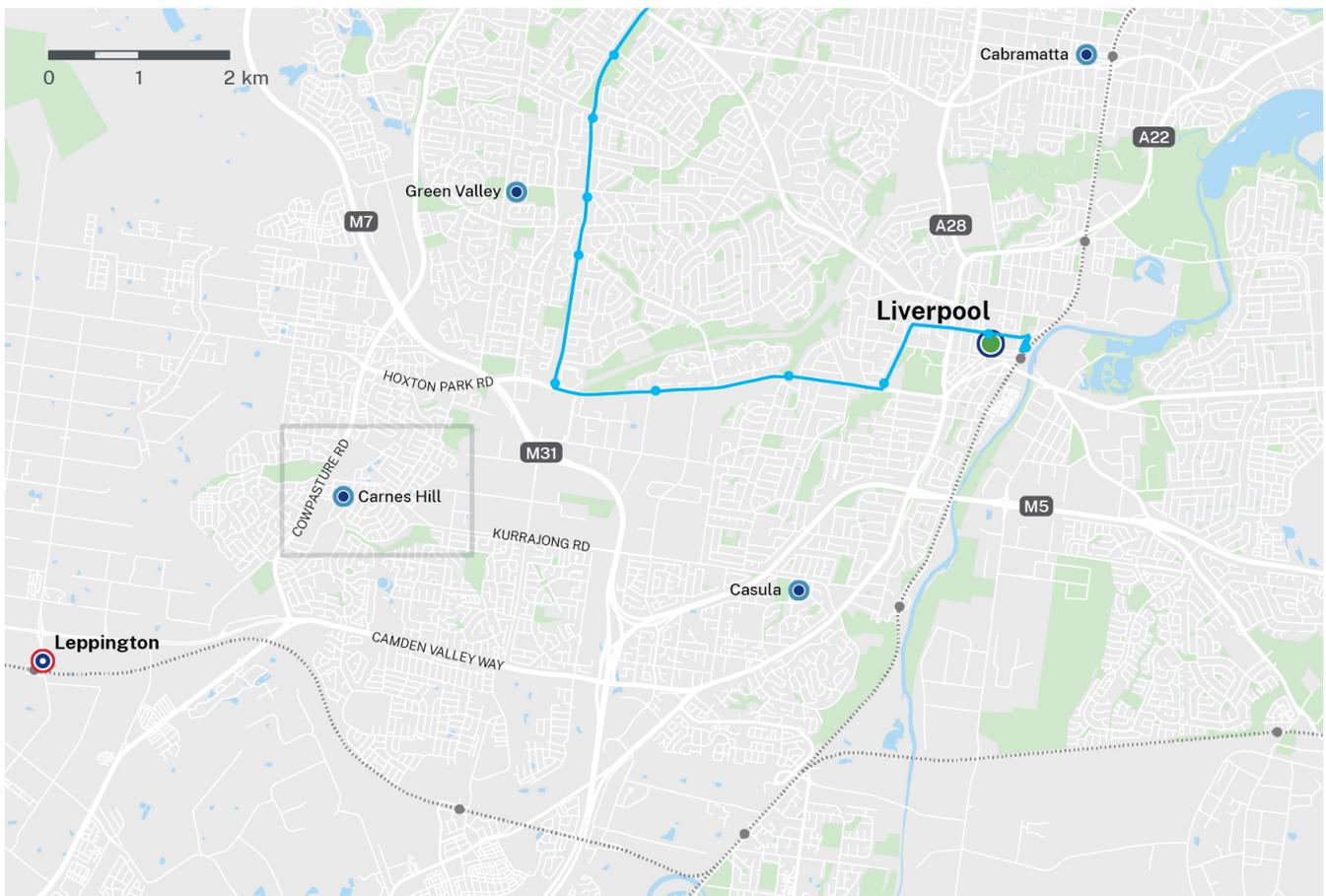
As land use is further developed, the corridors should be designed appropriately to reflect the desired Movement and Place street environments. Coupled with key land uses, priority walking, cycling and public transport corridors should be designed as main streets or civic spaces. Priority freight corridors will likely become main roads except where they directly access loading zones with high place functions. A large part of the network will become local streets.

# Case Study 2: Carnes Hill

Carnes Hill is a suburb located 38km south-west of the City of Sydney, in the City of Liverpool local government area. It is part of Western Parkland City, one of the three cities in Greater Sydney.

This case study is a retrospective review of the transport network around Carnes Hill centre. It aims to investigate options to improve this brownfield precinct's network using the principles outlined in this guide.

## Carnes Hill



### KEY

- |   |                      |   |                            |
|---|----------------------|---|----------------------------|
|  | Metropolitan cluster |  | Carnes Hill study area     |
|  | Strategic centre     |  | Railway line and station   |
|  | Local centre         |  | Liverpool-Parramatta T-way |

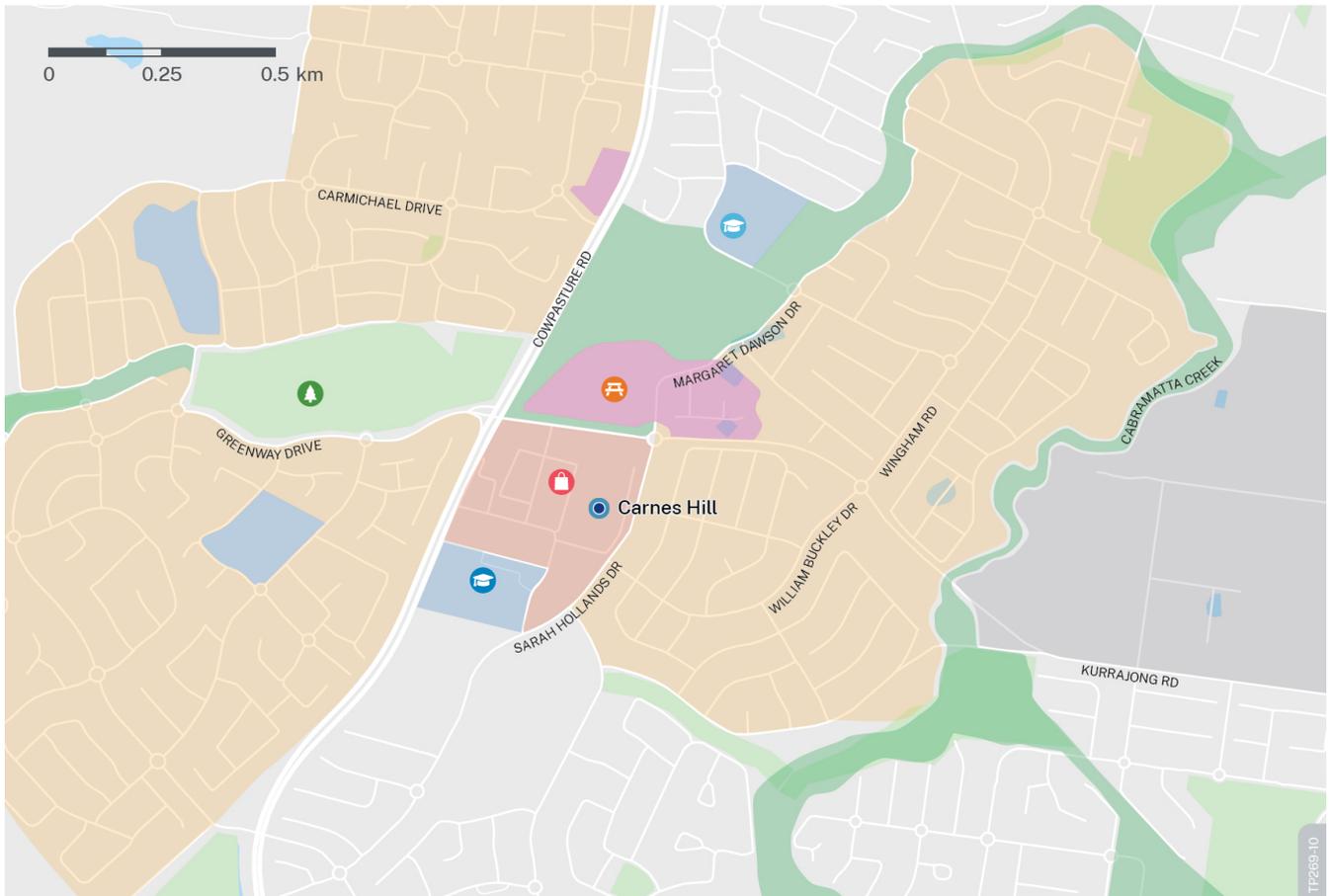
Figure 19 Carnes Hill

## Principle 1: Identify the desired outcomes for the precinct

The heart of the Carnes Hill precinct is defined by a commercial hub (Carnes Hill Marketplace), a community and recreation centre and two schools (Hoxton Park Public School and Holy Spirit Catholic Primary School). It is surrounded by residential and significant open space along Cabramatta Creek, Greenway Park and Carnes Hill community and recreation centre. Industrial land in Prestons is located to the east, separated from the residential area by the creek.

While this has not been documented in any plans, the desired outcome for Carnes Hill could be to develop a walkable precinct with efficient public transport connections to neighbouring precincts (Hoxton Park and Horningsea Park), local centres (Green Valley, Leppington and Casula) and a strategic centre (Liverpool). There is also potential to integrate the precinct with surrounding green spaces, some of which offer continuous walking and cycling paths for recreational purposes. In addition, the network can facilitate goods movements to the neighbouring Prestons industrial land without sacrificing people movements.

## Carnes Hill – land use



### KEY

	Local centre		Greenway Park	<b>Land use</b>	
	Carnes Hill community and recreation precinct		Holy Spirit Catholic Primary School		Commercial
	Carnes Hill Marketplace		Hoxton Park Public School		Community
					Education
					Industrial
					Open space
					Residential

Figure 20 Carnes Hill context

**Principles 2 and 3:** Develop an urban structure that supports successful places and encourages walking, cycling, and public transport journeys, and co-locate key land uses

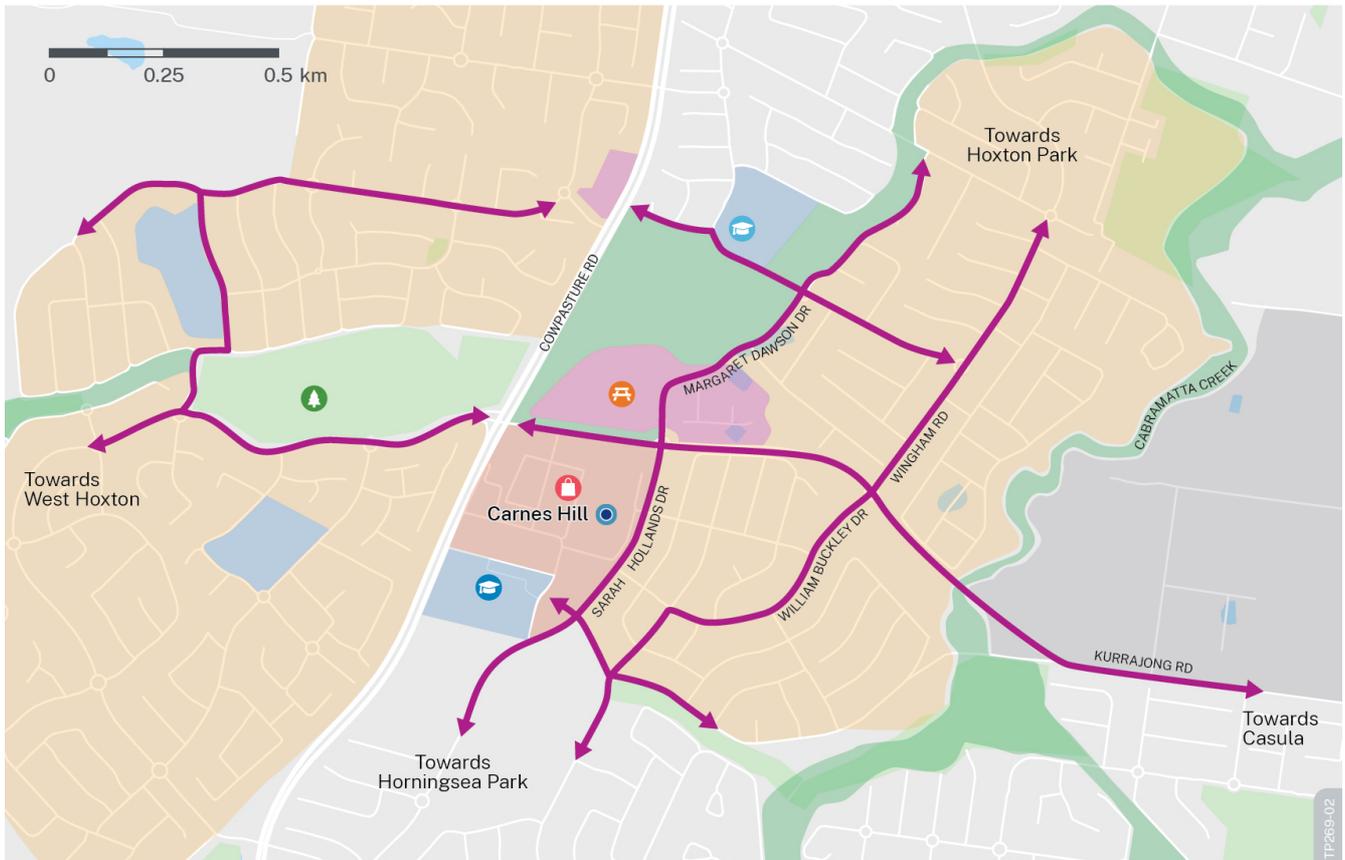
To meet the desired outcomes, priority walking and cycling corridors could be developed beyond recreational areas to enable walking and cycling for most trips, while also supporting longer precinct-to-precinct trips by public transport. Carnes Hill is currently served by main roads such as Cowpasture Road and Kurrajong Road but does not have a network of main streets with priority walking, cycling and public transport corridors that directly connect it

to other precincts, separated from a high volume of freight and private vehicle movements. These main streets would form the urban structure for Carnes Hill.

Sarah Holland Drive, Margaret Dawson Drive, Wingham Road and William Buckley Drive could serve as the north–south main streets as they directly connect community space, open space, the commercial centre and two schools. They also connect the precinct with neighbouring precincts of Hoxton Park and Horningsea Park, which will encourage people travelling between these precincts to walk, cycle or take public transport. The Kurrajong Road section near Carnes Hill centre and Greenway Park could serve a similar main street function before turning into a main road function near Prestons industrial land.

As walking, cycling and public transport are prioritised on these main streets, more intense land uses could be clustered along them through infill redevelopment. The overall gross density could be increased to reach the recommended 30 dwellings/ha. The commercial centre could be reorientated on these corridors to activate the area, making walking, cycling and public transport the more convenient way to reach destinations for most trips. Some parking spaces could also be converted into public spaces to further reduce the demand for driving and enhance public amenity.

## Carnes Hill – urban structure



### KEY

	Local centre		Carnes Hill Marketplace	<b>Land use</b>		Industrial	
	Priority walking, cycling and public transport links		Greenway Park		Commercial		Open space
	Carnes Hill community and recreation precinct		Holy Spirit Catholic Primary School		Education		Residential
			Hoxton Park Public School				

Figure 21 Potential urban structure for Carnes Hill

### **Principle 4:** Create a permeable network with a grid-like structure, short block length and high intersection density

To complement the urban structure of Carnes Hill, the precinct's transport network could be further refined to make it more permeable and connected.

For example, mid-block access and crossings can split blocks that are longer than 220m, such as at the Carnes Hill Marketplace. More streets (e.g. Graziers Way, Merchant Way, Pioneer Drive, Macksville Street, Landholder Road, etc.) should be connected to Kurrajong Road as it transitions into a main street with a lower speed limit, priority for walking, cycling and public transport and other

amenities. This provides more access points to the precinct and increases intersection density.

The resulting grid-like network will make the precinct more permeable and legible, as well as better integrated into the wider transport network.

### Carnes Hill –permeable network



#### KEY

- |   |   |   |            |   |             |
|---|---|---|------------|---|-------------|
|  | Local centre                                  |  | Commercial |  | Industrial  |
|  | Potential connections to improve permeability |  | Community  |  | Open space  |
|   |   |  | Education  |  | Residential |

Figure 22 Potential options to make the Carnes Hill network more permeable

### **Principle 5: Enable connected, direct and comfortable walking and cycling movements**

Walking and cycling should be prioritised on the desired main streets of Carnes Hill, supported by low-speed zones. Connections could be safely separated from conflicting uses and supported by adequate crossings. This will expand the existing shared paths on the green spaces to create a comfortable atmosphere, complete with amenities and appropriate facilities.

On local streets with limited space, the speed limit could be reduced to below 30km/h to make walking and cycling safer and more attractive options in this flat area. This reduces the need for dedicated walking and cycling facilities, although they are still the preferred solution where the space allows them.

### **Principle 6: Plan public transport infrastructure, services and technology concurrently**

Public transport infrastructure could be provided on the main streets with higher frequency public transport services to other precincts and strategic centres.

A north-south bus service on Sarah Holland Drive and Margaret Dawson Drive can directly connect Carnes Hill centre with nearby precincts such as Hoxton Park (and the Miller T-way stop that further connects to Liverpool and Parramatta) and Horningsea Park. Integrated bus stops at the entrances of Carnes Hill Marketplace and Carnes Hill Community and Recreation Precinct will reduce people's walk time and improve their experience. Some level of filtered permeability, such as a bus-only section, could be introduced to avoid private vehicle through-movements on the main street.

Similarly, the east-west bus service on Kurrajong Road can directly connect Carnes Hill with West Hoxton, Prestons and Casula. Carnes Hill residents can easily walk to Kurrajong Road as more access points become available on streets such as Graziers Way and Merchant Way. A lower speed limit on some sections of Kurrajong Road would provide a better environment for people walking, waiting for and taking the bus. Trafficable corridors in Carnes Hill are wide enough to support buses if the services need to be improved in the future.

## **Principle 7: Accommodate the movement of goods, freight and urban services based on the desired place outcomes**

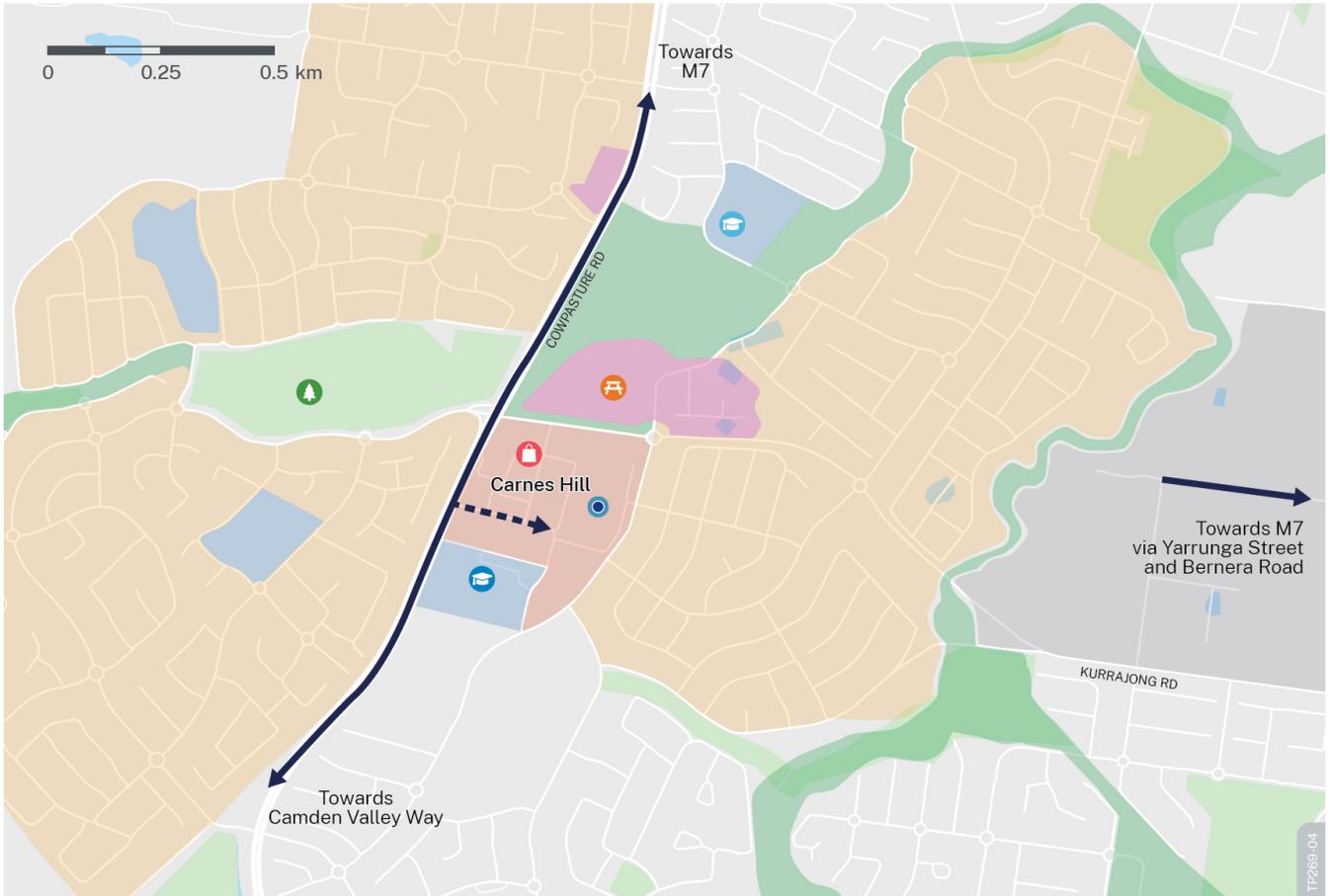
Freight and urban services movement should be encouraged on the main road and motorway network with separate access away from the main streets. They should also avoid sensitive land uses where possible.

In Carnes Hill, Cowpasture Road could continue to serve as a main road that connects freight from the wider motorway network via the M7 and Camden Valley Way. Loading facilities for Carnes Hill Marketplace and the schools should face Cowpasture Road for easy access.

The main road should avoid travelling through the residential precinct. On corridors where the freight task is minimal, or dedicated freight routes are nearby, the road environment should deter through-freight movement. For example, the section of Kurrajong Road that will become a main street could have limited access for large freight vehicles from Prestons. This will encourage smaller freight vehicles for last-mile freight tasks and direct large freight vehicles moving east-west to continue travelling on the M7 instead.

On-street loading zones are mostly sufficient due to the precinct's low density; however, if the density increases in some areas, off-street loading zones should be considered to avoid conflict with people's movements.

**Carnes Hill – freight**



**KEY**

- Local centre
  - Preferred long-distance freight routes
  - Direct access to loading zone at Carnes Hill Marketplace
  - Carnes Hill community and recreation precinct
  - Carnes Hill Marketplace
  - Greenway Park
  - Holy Spirit Catholic Primary School
  - Hoxton Park Public School
- Land use**
- Commercial
  - Community
  - Education
  - Industrial
  - Open space
  - Residential

Figure 23 Potential long-distance and last-mile freight routes for Carnes Hill

**Principle 8: Design self-explaining street environments following the NSW Movement and Place Framework**

As the movement and place functions for the corridors are identified, they need to be translated into self-explaining street environments that reinforce the desired users and behaviour for each corridor or corridor segment. The main streets in Carnes Hill may look different to main streets in older parts of Sydney; however, they should serve both the key users (people who walk, cycle and take public transport) as well as the key land uses in the precinct.

To encourage walking, cycling and public transport use, speed limits on the main streets of Sarah Holland Drive, Margaret Dawson Drive and Kurrajong Road will need to be reduced. The road space should be reallocated to provide a wider footpath, separated cycleway, bus priority infrastructure, and, if the space is available, a general traffic lane for those who are willing to drive slowly. This ensures people will be able to confidently choose the more efficient and sustainable modes over driving because they are faster, healthier, safer and more convenient for most trips. Other streetscaping elements such as tree canopy and outdoor dining spaces can reinforce the main streets' role as public spaces.

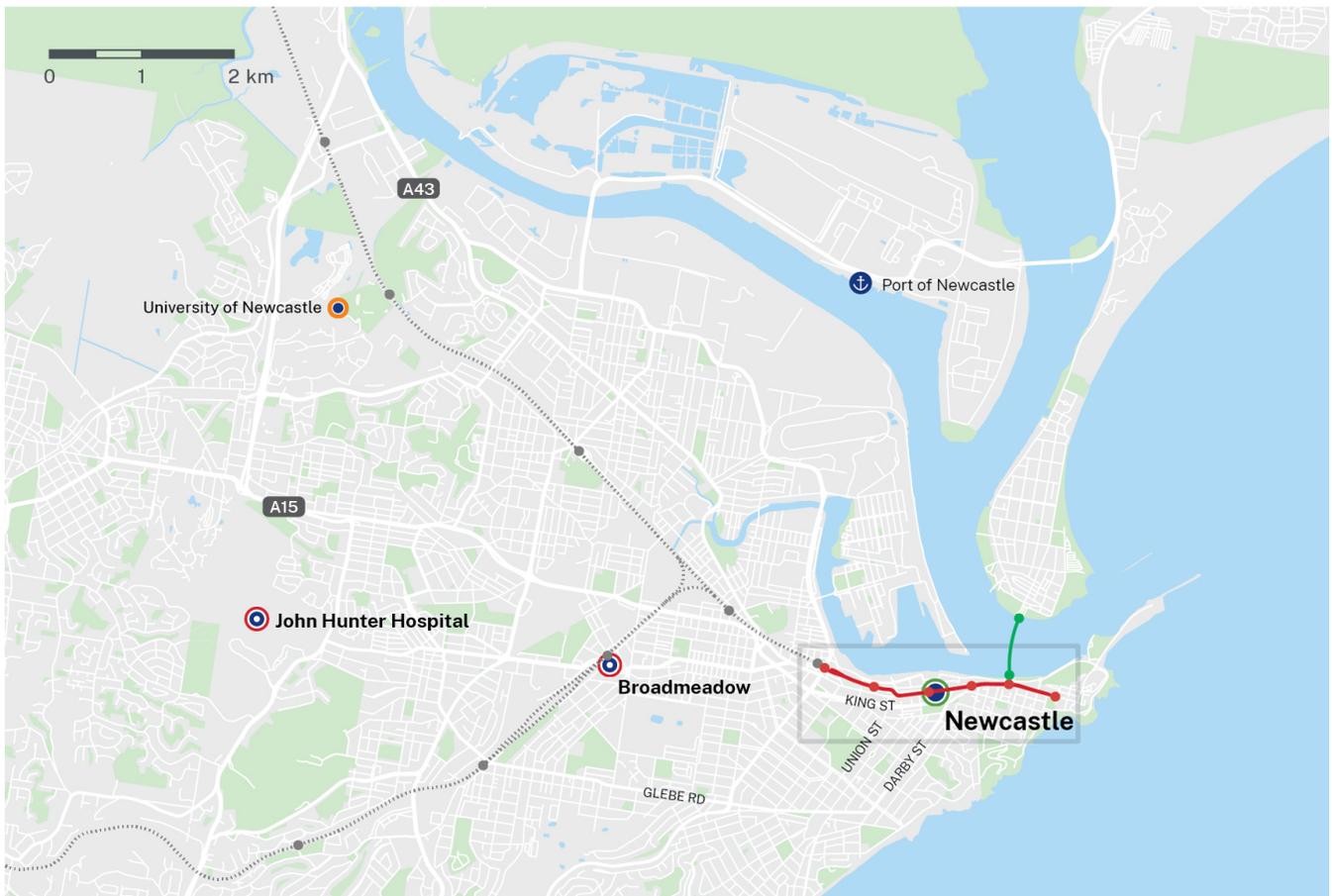
If conflict is observed in some sections, the road user space needs should be considered following the order outlined in the TfNSW RUSA Policy.

# Case Study 3: Newcastle

The Awabakal, Worimi, Wonnarua, Geawegal, Birrpai and Darkinjung peoples are the traditional owners of the land that now makes up the Lower Hunter Region. Following European settlement in the 1790s, Newcastle became a larger town with trams operating through the centre between 1887 and 1950. Newcastle's urban structure largely follows the old tramway alignment.

This case study is a review of a brownfield precinct with a redeveloped city centre to illustrate how a transport network can contribute towards ambitious goals for a place, such as those identified in the Newcastle Urban Renewal Strategy. While there have been some implementation issues, this example shows how prioritising public transport along corridors can activate places and encourage compatible land uses.

## Newcastle



### KEY

- |   |                   |   |                          |   |                         |
|---|-------------------|---|--------------------------|---|-------------------------|
|  | Metropolitan city |  | Study area               |  | Newcastle Light Railway |
|  | Strategic centre  |  | Railway line and station |  | Stockton Ferry          |
|  | Town centre       |   |                          |   |                         |
|  | Port              |   |                          |   |                         |

Figure 24 Newcastle CBD

### Principle 1: Identify the desired outcomes for the precinct

The Newcastle Urban Renewal Strategy outlined a plan to revitalise a previously key industrial centre into a vibrant and innovative regional hub by re-establishing Hunter Street as Newcastle's main street, promoting employment and population growth, connecting Newcastle with the waterfront and giving priority to transport modes other than driving.

Transport initiatives were sought to encourage the use of more efficient and sustainable forms of transport such as walking, cycling and public transport.

**[Principles 2](#) and [3](#): Develop an urban structure that supports successful places and encourages walking, cycling, and public transport journeys, and co-locate key land uses**

The revitalised Hunter Street and Scott Street will serve as a main street with a footpath, cycleway and on-street light rail. A parallel cycleway will also be provided on King Street and along the waterfront, approximately 100m from Hunter Street.

The light rail was a catalyst for change throughout the city, allowing planners to reconsider how the city functioned. Before the light rail, Hunter Street was the main road for private vehicles and public transport. The light rail transforms the role of Hunter Street into a main street with an attractive public domain, which includes the Hunter Street Mall and Newcastle Beach as key destinations. The East End was also significantly redeveloped into a mix of residential apartments, retail and office space along the priority walking, cycling and public transport corridors of Hunter Street and Scott Street.

While private vehicles can still travel on all roads in the city, they are encouraged to use connections that travel around Hunter Street and Scott Street. This was achieved by implementing traffic calming measures such as narrower traffic lanes and reduced speed limits. Some on-street parking spaces are available on one side of the street, although they are timed and ticketed to encourage higher turnover.

Hunter Street and Scott Street, combined with key land uses, form the urban structure of Newcastle as a main street that prioritises walking, cycling and public transport as the backbone.

## Newcastle



### KEY

-  Metropolitan city
-  Railway line and station
-  Newcastle Light Railway
-  Stockton Ferry
-  Hunter Street
-  Commercial land use
-  Priority walking and cycling corridors
-  Priority bus corridors

Figure 25 Potential urban structure for Newcastle CBD

### Principle 4: Create a permeable network with a grid-like structure, short block length and high intersection density

A grid-like structure was already present in Newcastle, although it was largely focused on the movement of vehicles. Having an established grid network, however, reduces the potential amount of work needed to improve the experience for people walking, cycling and taking public transport. For example, the less-costly options of road space reallocation, filtered permeability and crossing upgrades could be considered, rather than building new connections that are significantly more complex and costly.

## **Principle 5: Enable connected, direct and comfortable walking and cycling movements**

A comprehensive network of walking and cycling routes has been identified to support Hunter Street and facilitate end-to-end trips to key destinations and commercial centres.

Where possible, walking and cycling have been improved on all corridors. However, the largest investments have been used to encourage walking and cycling on separated routes that are accessible and have the best amenity, such as on Hunter Street and Scott Street, the waterfront and part of King Street. These interventions generally focus on the flattest routes, nearest to the water. The walking and cycling network also supports public transport trips, with crossings at light rail stops, although more direct and separated cycling facilities are needed to access the stops.

Parts of the cycling improvements were trialed under the Streets as Shared Spaces program. This included a separated, uni-directional cycleway on each side of Hunter Street between National Park Street and Worth Place, supported by a reduced speed limit of 40km/h. These improvements resulted in a 90% increase in morning peak-hour bicycle movement and 16% in the afternoon (data was collected during the COVID-19 Omicron spike and may have impacted the typical number of users). This project was also a catalyst for new cycleway projects, including an extension of the Hunter Street cycleway trial to Ivy Street, Islington.



*Figure 26 Cycleway improvements in Hunter Street have been accompanied by reduced speed limit*

### **Principle 6: Plan public transport infrastructure, services and technology concurrently**

The light rail alignment is aligned with key land uses and provides a direct connection into the centre of the precinct, making it an efficient way to access services.

Stage 1 of the light rail improved public transport offerings on Hunter Street and Scott Street as the main street. The light rail is supported by a priority lane to ensure the public transport services are not only frequent but also reliable.

As Newcastle continues to grow, more connections beyond the light rail may be needed. With a permeable network that provides direct access to the light rail stops, more public transport services can be introduced to expand the network, such as by introducing fast, frequent and reliable bus services on Union Street and Darby Street. Plans for an extension to the light rail are already underway.

### **Principle 7: Accommodate the movement of goods, freight and urban services based on the desired place outcomes**

While the city has changed significantly, it still needs strong freight connections to support the port and industrial areas, as well as last-mile freight into the city centre. King Street provides efficient connections for the latter; however, it still shares the corridor with walking, cycling and public transport.

### **Principle 8: Design self-explaining street environments following the NSW Movement and Place Framework**

To deliver the desired Movement and Place functions of each corridor, appropriate features and space allocation have been used to prioritise the preferred users and behaviour. Wide footpaths, dedicated lanes for light rail, regular crossing points for people walking and cycling, and traffic calming measures reinforce Hunter and Scott streets' role as a main street. Similarly, the dedicated walking and cycling facilities reflect the waterfront's role as a civic space and key destination.

# 05

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## Appendix

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# Network planning in precincts assessment guidance

The following checklist of assessment guidance can help you ensure the principles and desired outcomes outlined in this guide have been achieved in the proposed transport network plan. You can use this guidance to develop and assess documents such as place strategies, structure plans, indicative layout plans, implementation and delivery plans, master plans, precinct plans and other relevant documents such as local strategic planning statements, local environmental plans and local housing strategies, among others.

A proposed transport network plan should show compliance with this assessment guidance. Where compliance with this guidance cannot be achieved, you will need to prepare and justify an alternative proposal.

Principles	Assessment guidance
<p><b>Principle 1:</b> Identify the desired outcomes for the precinct</p>	<ul style="list-style-type: none"> <li>The development is aligned with broader strategic planning, transport strategies and plans, and the case for change is adequately justified.</li> </ul>
<p><b>Principle 2:</b> Develop an urban structure that supports successful places and encourages walking, cycling, and public transport journeys</p>	<ul style="list-style-type: none"> <li>The precinct's urban structure is identified with new centres and key destinations located on main streets, along priority walking, cycling and public transport corridors.</li> <li>New schools, senior housing and other sensitive land uses are located adjacent to main streets with priority walking, cycling and public transport routes and away from major roads, railway lines and freight routes.</li> <li>New industrial employment lands are located adjacent to main roads (including motorways).</li> <li>A minimum density of 30 dwellings/ha across the entire walkable neighbourhood is achieved in urban areas.</li> <li>Homes in residential areas are located within 800m of frequent public transport. In residential areas with fewer public transport services, homes are located within 400m of public transport.</li> <li>All homes are within 15 minutes walking or cycling distance of a collection of local shops, a primary school, public transport, a supermarket or a grocery store.</li> <li>Car parking provisions are less than previously required in areas with good access to public transport based on following the public transport accessibility level measure.</li> </ul>

Principles	Assessment guidance
<p><b>Principle 3:</b> Co-locate key land uses along priority walking, cycling and public transport corridors</p>	<ul style="list-style-type: none"> <li>• If high-speed and a high volume of private vehicle movements are necessary, they are located away from key places and main streets.</li> <li>• Sufficient road reserve is provided in line with staged land release.</li> <li>• Residents, workers and visitors have viable options to walk, cycle and take public transport to and from the precinct from the outset and at all stages.</li> </ul>
<p><b>Principle 4:</b> Create a permeable network with a grid-like structure, short block length and high intersection density</p>	<ul style="list-style-type: none"> <li>• None of the blocks in residential and mixed-use development are longer than 220m on any one side; in industrial areas: 250m.</li> <li>• On average, one street intersection per ha is provided (non-car intersections count toward this).</li> <li>• Additional mid-block crossings and through-site links are provided no more than 130m apart in larger blocks.</li> <li>• Multiple access points are available to access the precinct from surrounding neighbourhoods, with filtered permeability used to prioritise walking, cycling and public transport links where needed.</li> <li>• The street grid is orientated towards the blue-green grid.</li> </ul>
<p><b>Principle 5:</b> Enable connected, direct and comfortable walking and cycling movements</p>	<ul style="list-style-type: none"> <li>• Low-speed zones are identified.</li> <li>• Footpaths are provided on both sides of a street except on shared paths.</li> <li>• Separated cycleways are provided on streets with a speed limit higher than 30km/h or with a high volume of vehicle movements.</li> <li>• Safe crossing facilities are provided every 130m</li> </ul>
<p><b>Principle 6:</b> Plan public transport infrastructure, services and technology concurrently</p>	<ul style="list-style-type: none"> <li>• On-road priority for public transport is provided on streets that connect centres where public transport services will run.</li> <li>• Public transport interchanges are integrated with place.</li> <li>• A travel plan for the precinct has been prepared.</li> </ul>
<p><b>Principle 7:</b> Accommodate the movement of goods, freight and urban services based on the desired place outcomes</p>	<ul style="list-style-type: none"> <li>• Suitable loading zones are provided for various land uses.</li> <li>• The use of smaller vehicles for last-mile freight and servicing are encouraged with micro hubs, laneways, suitable swept paths and cycling paths between local freight destinations, among others.</li> </ul>

**Principles****Assessment guidance**

**Principle 8:** Design self-explaining street environments following the NSW Movement and Place Framework

- The transport network is complete with diverse street environments and street types.
- Road space is allocated based on the identified modal priorities.
- Streets are designed for lower speed limits, except on motorways.

# Shared definitions and terminology

- **Accessible:** The ability for everyone, regardless of disability, personal circumstances or where they live, to use and benefit from the transport system.
- **Amenity:** The ‘liveability’ of a place. For example, a street’s amenity is affected by its design, adjacent land uses, and access to facilities and services. Expectations of amenity and comfort change over time.
- **Comfortable:** A place, street or transport option that provides physical and emotional ease and wellbeing for its people.
- **Connected:** A network that establishes links with its surroundings, allowing people to move about freely and sustainably.
- **Corridor:** A broad, linear geographic area between places.
- **Direct:** The shortest connection with limited, if any, detours. In a bus network context, the directness ratio refers to the length of the bus route divided by the shortest road distance.
- **Development:** An initiating process. It implements methods and actions required to improve cities, precincts, buildings, places or spaces with a socio-economic impact.
- **Emission:** The production and discharge of something. In a transport context, this often refers to carbon and tailpipe emissions generated by vehicles with internal combustion engines.
- **Filtered permeability:** A tool to filter out private vehicle traffic on selected streets to create a more attractive environment for walking, cycling and public transport.
- **Fit for purpose:** A place or street that works according to its intended use.
- **Integrated transport network:** A network that combines different transport modes to maximise ease and efficiency for people and goods movements in terms of time, cost, comfort, safety, accessibility, and convenience.
- **Last-mile:** The last leg of people and goods movements from a hub to a final destination.

- **Liveable:** A built environment that supports and responds to people's patterns of living, and is suitable and appropriate for habitation, promoting enjoyment, wellbeing, safety, and prosperity.
- **Movement:** The movement of people and goods using the transport network.
- **Movement and Place:** A multidisciplinary and cross-government 'place-based' approach to the planning, design, delivery, and operation of transport networks.
- **Permeable:** The extent to which a network permits (or restricts) people and goods movements in different directions.
- **Place:** A social and a physical concept – a physical setting, point, or area in space conceived and designated by people and communities. In this sense, place can describe different scales of the built environment – for example, a town is a place and a building can be a place.
- **Place-based:** A planning approach that requires collaboration and understanding of the physical, environmental, social and cultural attributes of a location. It requires analysing the dynamic conditions of a place that make it unique and recognising this change will continue.
- **Point-to-point:** Transport services that go directly from a user's origin to their destination. Taxis and ridesharing services are the most common point-to-point transport modes.
- **Precinct:** A designated area within real or perceived boundaries of a specific area. A precinct can be of different scales and usually relates to a study area of a particular place.
- **Quietway:** A high-quality mixed traffic treatment where bicycle riders travel in a mixed traffic environment with motorised traffic, and are positioned in the centre of the traffic lane. The key design philosophy of a quietway is the safe integration of people cycling as equal road users to motor vehicles – they are environments where the motor vehicle is a guest on the roadway. This requires drivers to reduce travelling speeds to 30km/h or lower, and discourages them from overtaking through effective design treatments that send visual cues to road users about appropriate speeds and behaviours.

- **Road reserve:** A legally defined area of land within which facilities such as roads, footpaths and associated features may be constructed for public travel.
- **Safe System:** An approach to achieve the ultimate goal of zero deaths and serious injuries on NSW roads, underpinned by safe roads, safe speeds, safe people and safe vehicles.
- **State environmental planning policy (SEPP):** A statutory plan, typically prepared by the Department of Planning and Environment and endorsed by the Minister for Planning. It can be a spatial plan for particular land in NSW, or it can set policy that applies to particular land or all land in NSW.
- **Sustainable:** Relates to the endurance of systems, buildings, spaces, and processes – their ability to be maintained at a certain rate or level, which contributes positively to environmental, economic, and social outcomes.
- **Land uses:** The purpose to which the land cover is committed. Sometimes used interchangeably with ‘places’, ‘destinations’ and ‘trip generators’ in a transport planning context.
- **Walkable:** Measures that support safe, comfortable, and direct walking to destinations such as footpaths, crossings, shading, protection from traffic, connected paths along desire lines and proximity.
- **Vision-led planning:** Also known as ‘vision and validate’, a planning concept centred on a co-design approach based on a partnership between TfNSW, communities, local councils and stakeholders. It starts with co-developing shared visions for places founded in a rich understanding of what people want and need, and validating the visions through scenario testing, stakeholder engagement and policy alignment.

## Network Planning in Precincts Guide

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