



Toolern Precinct Structure Plan

Transport and Movement Study

Melbourne, February 2008

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1 Transport and Movement

1.1 Introduction

This is the Integrated Transport Plan for Toolern. It presents overarching transport planning guidelines for Toolern and individual initiatives for all modes (active, public and private transport).

The Toolern transport network is to have a transit orientated focus to encourage and facilitate sustainable travel patterns and ensure a high level of accessibility for people without access to a motor vehicle.

1.1.1 Transport Planning Overarching Objectives

Transport modes, including infrastructure and services, should be developed in Toolern with the following objectives:

- Toolern should aim to be a transit oriented city
- Transport infrastructure development and management should encourage mode-shift to public and active transport modes
- Facilitate access and mobility through the promotion of active transport (walking and cycling) particularly for trips less than 5 kilometres and to all activity centres
- Prioritise safety upgrades to all new and existing infrastructure
- Enhance accessibility to people with limited mobility in activity centres (particularly the Town Centre)
- Enhance transport permeability between Toolern and existing developed areas in the Melton township
- Promote walking as the most socially equitable mode of transport. Detailed design of development should facilitate all pedestrians including those with limited mobility, reliant on wheel chairs or motorised scooters, the elderly, the under aged and those with vision impairments
- The grid network should encourage low vehicle speeds and provide a high level of connectivity for pedestrians and cyclists particularly around open space areas

Transport throughout Toolern will require infrastructure investment as discussed further in section 4.1. The following major infrastructure items have been identified through the Transport Plan:

- Train station
- Bus interchange at the MAC
- Toolern Creek Bridge
- Grade separations at the rail corridor
- Upgraded Connections to the Western Freeway

2 Active Transport - Cycling and Walking

Cycling and walking promote environmental sustainability and are fundamental to the development of a transit oriented city.

2.1 Cycling Objectives

- All roads should be designed to consider the needs of cyclists
- Arterial, sub-arterial and collector roads should have off-road facilities to encourage cycling as a mode of transport
- Safety for cyclist should be considered at all intersections. In particular, bicycle paths and on-road lanes should not truncate prior to intersections but continue through to the intersections. On-road facilities should have advanced cycle boxes
- Priority should be given to cyclist infrastructure over vehicles in activity centres
- End-of-trip facilities should be provided in all activity centres including bicycle racks for parking and lockers
- The grid network is to be conducive to low vehicle speeds and provide a high level of connectivity for cyclists.

These objectives are to be met by implementing the transport structure shown in the Walking and Trails Plan indicated in the Figure 1 below.

2.1.1 *Open Space Network*

The open space network is expected to provide an off-road alternative for commuters and recreational users. For the north-south direction, paths at the regional park and along Mt Cottrell Road (see walking and trails network) are also an integrated part of this network.

Other local reserves and sporting areas, particularly at the south of Toolern, are expected to contribute to walking and cycling connectivity.

In any case, these recreational paths are not expected to substitute off-road bicycle paths unless they have been designed in such way that both recreational users and commuters can use them safely and efficiently.

2.1.2 *Facilities and Infrastructure*

Opportunities for end-of-trip facilities at activity centres should be considered. In particular, the Town centre is expected to provide a bicycle hub centre with showers, lockers and maintenance services. These facilities should be conveniently located close to the bus interchange.

2.1.3 *Grid Network*

A rectangular road network has been designed for Toolern. This road network is expected to facilitate connectivity between commercial and residential areas.

The design and layout of the road network is the basis of the walking and cycling network, for commuters.

2.1.4 Greenlinks

Where local streets do not provide vehicle access to the arterial or sub-arterial road network, greenlinks should be constructed to facilitate bicycle and pedestrian connectivity throughout the centre. The greenlinks will connect residential areas with parks, transport and activity centres. These streets will also form the neighbourhood boundaries and landmarks of Toolern.

2.2 Walking Objectives

- Provide the greatest walking and cycling connectivity between precincts, residential areas and key community facilities.
- Streets to be more than vehicular movement corridors and act as significant community connectivity corridors, thereby allowing an efficient transport system and contribution to the overall public space network.
- Provide a general layout which can be modified to suit the incorporation of vegetation, waterlines, topography, infrastructure and varied housing densities.
- High emphasis on green elements such as street trees, water sensitive urban design, street furniture, shared pathways and nature strips.
- Act as an extension of the streetscape by being the same width as the local road reserve.

Figure 1: Transport and Movement Plan – Walking, Cycling Paths and Trails

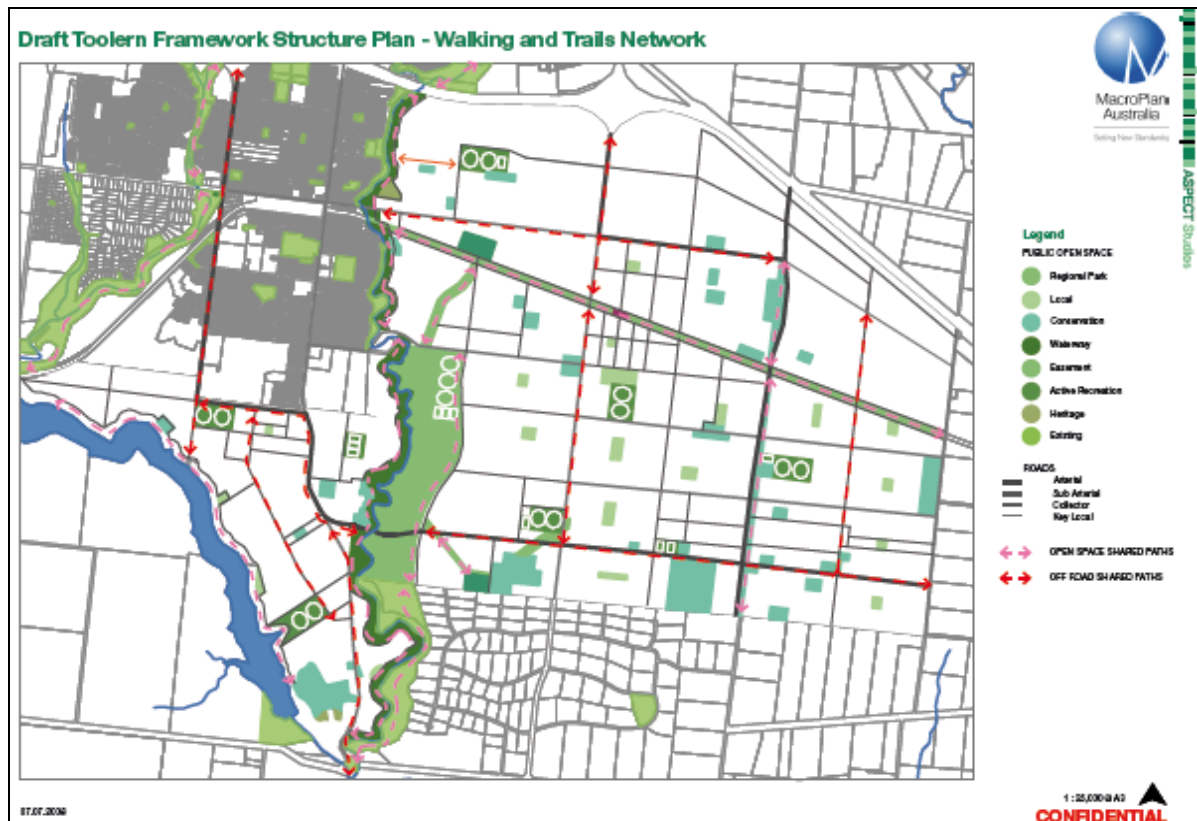
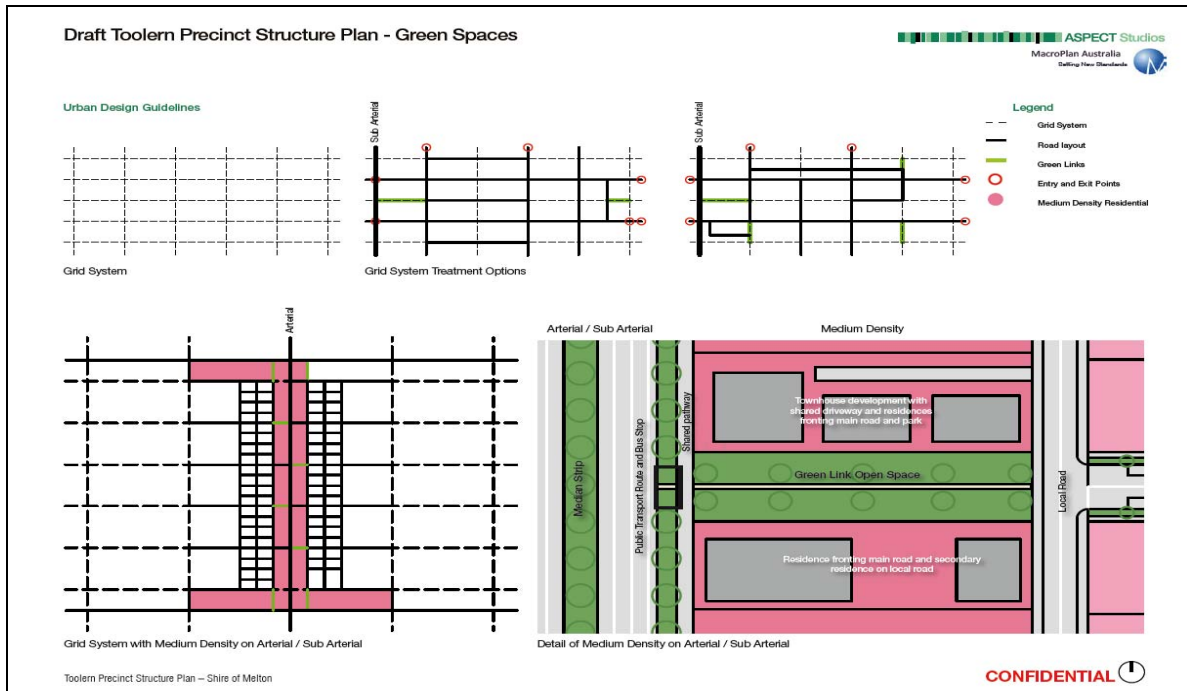


Figure 2: Transport and Movement Plan – Greenlinks



3 Public Transport Network

Land use and development is designed around a multi modal network, giving high priority to public transport.

3.1 Objectives

- Provide an efficient and competitive public transport service, that is a viable alternative to the car.
- Achieve a coverage of at least 90% of the entire area
- The train service is the primary link to the Melbourne CAD
- Bus services should provide an alternative link to the west of the metropolitan area and the CAD

The following information dictates the supporting details and specifications of Toolern's public transport plan.

The key services and infrastructure for the development of public transport in Toolern are:

- Transport hub
- Rail corridor and services
- Train station
- Bus routes

3.1.1 *Transport Hub*

The integrated transport hub will be located to the east of Ferris Road and developed around the train station. Development of a well-planned and well-designed hub is fundamental to achieve a vibrant, well serviced activity centre with a sustainable transport network. The transport hub is a vital catalyst for:

- The development of the major activity centre
- The provision of accessible community facilities
- Increased employment and commercial activity

Land uses that generate and attract high levels of trips will be located in and immediately around the hub. This will increase the hub's attractiveness and make it easier for people to get to and from their destination. From a design perspective, the transport hub will be:

- A fundamental part of the Principal Public Transport Network (PPTN)
- Allow a safe, efficient and comfortable interchange between modes
- The primary transport interchange between local and regional bus services in Toolern
- Provide an efficient bus-rail interchange at the station
- Accessible for people with limited mobility
- Grade separation at the intersection with Ferris Road
- Direct access to the Major Activity Centre through all stages of development
- Ability to generate street activation and associated economic activity

- A park and ride facility for bus and train services designed to service commuter traffic during weekdays and retail trade on weeknights and at weekends. In any case, the size of this facility should be limited in such way that parking is used as a demand management tool
- Distributed short-term on-street and off-street parking to complement parking provided at the interchange
- Pedestrian friendly design of the street layout within and surrounding the hub, including direct linkage to higher density housing areas
- Bicycle friendly design of the street layout within and surrounding the hub
- End-of-trip facilities for cyclists including bicycle storage lockers and showers. For this a public-private partnership might be considered
- Increase connectivity between the areas north and south of the rail corridor.

3.1.2 Rail Corridor And Services

The Melbourne-Ballarat rail corridor is the main pillar for a transport oriented development in Toolern. Recent State policy concerning grade separation at new rail crossings has led to the identification of two potential grade separation points within the study area.

The Melbourne-Ballarat rail should be upgraded to accommodate the new demand from Toolern residents and reduce car-use for commuting purposes. The minimum service levels for the train in order to support the development should be:

Table 1: Train Minimum Services Levels

Train Minimum Service Levels		
Service Span	Frequency Peak	Frequency Off-peak
15 hours weekdays and weekends	15 minutes	30 minutes

These service levels should be introduced in parallel with the development of the area to encourage sustainable travel behaviour by commuters, To achieve this, upgrading infrastructure, including electrification, will be required.

3.1.3 Railway Station

The railway station should be developed early in the life of Toolern, both to maximize the catalytic effect of the rail services using the station and to encourage the use of public transport amongst those living in the area.

Development of Toolern Rail Station within the transport hub will:

- Encourage commuter trips to and from the Melbourne CAD
- Support sustainable transport options which minimise environmental impacts and increase accessibility for all residents
- Reduce residents tendency to purchase second and third motor vehicles
- Be a catalyst for development within the Major Activity Centre by activating the area and generating economic activity

- Minimise or delay the need for investment in arterial road upgrades between Toolern and areas to the east

It is expected that the design will need to accommodate for:

- Future electrification of the rail line
- Long-term development of the rail line to a four track configuration

Multiple platforms to provide capacity for 'limited stops' train services from western Victoria as well as 'all/multiple stops' train services within the metropolitan area.

3.1.4 Bus Services

The operation of both local and regional/PPTN buses throughout Toolern is critical to providing a sustainable transport network, accessible community facilities and Infrastructure. The bus services will support the plans objectives by:

- Providing access from within Toolern to the higher order retail facilities and social infrastructure
- Providing a high density of buses along the principal north-south route through the Toolern area which will support high density housing
- Integrating and facilitating high level of connectivity between local and PPTN bus services.
- Enabling passengers to interchange between local and PPTN buses, thereby increasing the attractiveness of the public transport system

Regional buses are expected to:

- Provide the necessary connections with the rail line and local bus routes
- Service major trip generators such as tertiary education and medical facilities built around the transport hub
- Support retail development within the MAC

A large proportion of local bus routes are expected to pass through the hub itself, thereby bringing residents directly into the retail heart of the city centre. This is intended to encourage development and promote on-going retail activity within the hub. Local bus services through the hub will ensure that 'deviations' of otherwise direct routes are kept to a minimum. Such deviations would make the routes slower and therefore less attractive to passengers and more costly to users, bus operators and government.

Table 2: Minimum Service Level for Local and Regional Buses

	Minimum Service Level		
	Service Span	Frequency Peak	Frequency off-peak
Regional	15 hours weekday and weekends	20 minutes	30 minutes
Local	15 hours weekdays 12 hours Saturday - Sunday	30 minutes	45 minutes

4 Road Network

The higher order road network comprises arterial roads based on a mile grid spacing system supported by sub arterial road based on a half mile grid system to provide safe and efficient movement of vehicles and cyclists, high quality pedestrian facilities and inclusion of priority measures for PPTN bus services to optimise service provisions.

4.1 Objectives

- Provide the appropriate infrastructure for road-based public and active transport modes
- Generate and inclusive environment not only for vehicle movement but a place where people can socialise
- A safe environment for all road users, particularly cyclists and pedestrians

These objectives are to be met by implementing the transport structure shown in the Road network and cross sections plan indicated in Figure 3.

The following information dictates the supporting details and specifications of the operational Road network plan.

An important component of this road network is the new bridge over the Toolern Creek. This bridge will allow connectivity between precinct 1 and the rest of Toolern (particularly the town centre). Design and development of this bridge should:

- Allow for north/south pedestrian and cycle connections under the bridge
- East/west cycle pedestrian connections over the bridge.
- Connection of the arterial road with the NAC in Precinct 1 – keeping the NAC as far south as possible
- Connection with the east/west arterial
- Protection of native vegetation
- Minimise visual impact from within the Regional Park.

The higher order road network will provide connections to the road network external to the study area and integrate the township with its surrounds. The lower order road network will consist of collector streets and local streets provided in a traditional 'fine grain' grid network arrangement, which will provide many alternate routes and a high level of permeability. Design of the road layout needs to ensure that roads spanning between higher order roads are indirect in order to discourage rat running.

Classification of roads and the hierarchy in the road network is based on a descending/ascending function of transport mobility and land access/transport connectivity and associated roadway capacities as in Table 3 below.

Table 3: Roadway Capacities

Road Classification	Road Function	Daily Traffic Volumes	Design Speeds
Arterial Road	Transport Mobility	<20,000	60km /h
Sub-arterial Road (divided)	Transport Mobility	12,000-20,000	60km /h
Sub-arterial Road (divided)	Transport Mobility	7,000-12,000	60km /h
Collector Road	Land Access Connectivity	3,000-7,000	50km/h
Local Street	Land Access Connectivity	<3,000	40km/h

The following sections provide an explanation of the abovementioned Road Classifications:

- Arterial Roads
- Sub Arterial Roads
- Collector Roads
- Local Roads

Table 4: Road Classifications

	Role and Function	Design Guidelines
Arterials	<p>A network of arterial and sub-arterial roads has been designed to inter-connect the precincts and the regional road network. The network consists of primary arterials and supporting sub-arterials in both directions. The network will:</p> <ul style="list-style-type: none"> ▪ Emphasise the primary gateway to Toolern at the Ferris Road and Western Freeway interchange ▪ Link Toolern to other parts of Melton and Melbourne ▪ Provide the principal routes for both public and private transport ▪ Provide high quality pedestrian and cyclist facilities ▪ Managed by Vic Roads ▪ Act as a catalyst for development of higher density land uses along and around the network 	<ul style="list-style-type: none"> ▪ On-street parking is not permitted ▪ No vehicular access is permitted to abutting properties ▪ Adjacent lots are to have dual frontage with pedestrian and cycle access to arterial road and vehicular access to rear local street ▪ Arterial roads to have a posted speed limit of 60km/h ▪ Signalised pedestrian crossings are to be provided at bus stops located in mid-block sections on arterial roads. When possible, this bus stops should be developed using the green-scape concept ▪ Arterial roads should balanced the needs of all modes ▪ Management of arterial roads is to be transferred to Vic roads once individual roads are performing this function.
Sub-Arterials	<p>Sub arterial roads support the arterial road network and provide an efficient arterial road network by providing high mobility roads with approximately half mile spacing's.</p>	<ul style="list-style-type: none"> ▪ On-street parking is not permitted ▪ No vehicular access is permitted to abutting properties ▪ Adjacent lots are to have dual frontage with pedestrian and cycle access to arterial road and vehicular access to rear local street ▪ Sub-arterial roads to have a posted speed limit of 60km/h ▪ Signalised pedestrian crossings are to be provided at bus stops located in mid-block sections on arterial roads ▪ Sub-arterial could have an access function at fringe areas of Toolern and when providing connectivity with Melton ▪ Management of sub-arterial roads is to be transferred to Vic roads once individual roads are performing this function ▪ In sub-arterial, priority should be given to public transport, then walking and cycling.

Collectors	<p>Collector roads form the link between the arterial road network and local roads. Their function is to distribute local traffic and provide access to abutting properties. Collector roads will provide on-street parallel parking, safe off-road facilities for cyclists and pedestrians and may form part of a local bus route.</p> <p>Detailed design of collector roads need to ensure a road environment conducive to low vehicle speeds and suitable for designated local bus routes.</p>	<ul style="list-style-type: none"> ▪ Vehicle access to abutting properties permitted. ▪ Roads to be managed by Council ▪ Passive traffic management measures to be incorporated into road design including kerb outstands and traffic islands to restrict speeds to 40km/h or less ▪ Parking on-street is permitted
Local	<p>Local roads are to provide a permeable network within local areas and facilitate access to abutting properties, accommodate pedestrian movements and provide shared road space for vehicles and bicycles. The proposed local road cross section will satisfy the access requirements by emergency vehicles.</p> <p>Proposed is a strong but flexible street grid pattern for all of Toolern. The street grid will be predominantly north-south and east-west in form.</p>	<ul style="list-style-type: none"> ▪ Local roads should have priority for pedestrians and cyclists ▪ Permeable network to be provided with multi-path vehicle access routes available to surrounding arterial or sub-arterial roads. ▪ Local streets to form a finely spaced grid with local street intersections to intersect at right angles. ▪ Vehicle access to abutting properties permitted. ▪ Roads to be managed by Council ▪ Passive traffic management measures to be incorporated into road design including kerb outstands and traffic islands to restrict speeds ▪ Traffic management devices should be spaced no greater than 200 to 250 metres apart to restrict traffic speeds ▪ Internal layout of the local street grid network is to be discontinuous to discourage the likelihood of rat-running in the local area i.e. no direct linear link is to span between the arterial network through the local area ▪ Cul-de-sacs are not permitted without pedestrian and cycle links providing access to adjacent streets. ▪ Pedestrian and cycle routes should be relatively direct through to arterial and sub-arterial roads to provide high quality access to public transport. ▪ Cross intersections to be controlled by roundabouts (desirable) or paired stop signs or give way signs. ▪ A general layout which can be modified to suit the incorporation of vegetation, waterlines, topography, infrastructure and varied housing densities.

		<ul style="list-style-type: none">▪ Water sensitive design urban design, green streetscapes and other environmentally friendly designs are encouraged.
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4.2 Arterial Road Descriptions

Median openings may be provided at local street intersections, however right turn deceleration lanes must be provided. The Arterial network consists of five main links which are described in the following sections.

4.2.1 *Ferris Road - North of the rail line (between the freeway and Abbey/Shogaki Road)*

The development of Ferris Road will emphasise the existing interchange as the primary gateway to Toolern. Ferris road will support development of the transport hub and the attainment of the plan objectives by:

- Providing high standards of access to the retail and commercial development within the transport hub, both from within and outside Toolern
- Incorporating bus priority measures to ensure bus services can access both the hub and the railway station within minimal delays due to traffic congestion
- Encouraging development within the centre
- Incorporating high quality separated cycling and pedestrian facilities
- Providing the highest quality conditions for buses to operate on and for passengers to interchange to/from the trains
- Enabling residents in the first stage of the Toolern development to gain access to the hub and the Western Freeway at the northern end of Ferris Road.
- Providing widening in the vicinity of intersections to provide additional turn lanes as required to accommodate projected traffic volumes
- Providing grade separation at the Melbourne-Ballarat railway line to ensure efficient and safe operation of the crossing
- Enabling residents north of the Western Freeway to gain access to the amenities within the Major Activity Centre.

It is expected that the road reservation will need to be designed to provide for the road's ultimate development to six lanes (inclusive of bus priority lanes). The design of the southern portion of Ferris Road, south of the proposed east-west road, will need to consider how it will connect with the Strathtulloh Estate to the south of Greigs Road. Specifically, it is envisioned that this portion could be constructed as undivided carriageway with a cross section consistent with the existing carriageway the Strathtulloh Estate with appropriate transitioning provided.

At the northern end, future improvements to the freeway interchange should consider should consider pedestrian and cycling connectivity over the freeway.

4.2.2 *Abey Road*

The development of Abey Road will support the development of the mixed-use and industrial/commercial employment regions and the attainment of the plan objectives by:

- Providing high standards of access to the employment regions within Toolern, both from within and outside Toolern, including direct connection with Melton township
- Incorporating bus priority measures to ensure bus services can access the Toolern Major Activity Centre, Melton Township and employment regions with minimal delays due to traffic congestion

- Incorporating high quality separated cycling and pedestrian facilities
- Providing the highest quality connectivity for passengers to bus services with signalised pedestrian crossing facilities.
- Providing widening in the vicinity of intersections to provide additional turn lanes as required to accommodate projected traffic volumes.
- Providing high quality routes for residents of the Melton Township to gain access to the amenities within the Major Activity Centre

It is expected that the road reservation will need to be designed to provide for the road's ultimate development to six lanes (inclusive of bus priority lanes). The design of the western portion of Abey Road, east of the existing Bridge Crossing, will consider how it connects with the Toolern Creek bridge crossing.

4.2.3 Mount Cottrell Road

The upgrade of Mount Cottrell Road to an arterial road will provide a primary north-south route through precinct 2 and 3. This primary arterial will:

- Provide high standard or access to the Toolern employment region and existing township south of Toolern
- Incorporate high quality separated cycling and pedestrian facilities.
- In the longer term, provide grade separation at the Melbourne-Ballarat railway line to provide a safe and efficient crossing.
- Provide a high quality alignment for local and PPTN bus services.
- Provide widening in the vicinity of intersections to provide additional turn lanes as required to accommodate projected traffic volumes.
- In the longer term, form part of a major route providing access to the Outer Metropolitan Transport Corridor (OMR), east of Toolern.

It is expected that the road reservation will need to be designed to provide for the road's ultimate development to six lanes (including bus priority features along its length).

4.2.4 Coburns/Rees Road

An extension of Coburns / Rees Road will provide access between Precinct 1 and the existing Coburns Road interchange. This arterial road will:

- Provide a direct route between Precinct 1 and the Coburns Road
- Ease pressure on the northern part of the Exford Road sub-arterial road which has capacity constraints
- Provide a high quality alignment for local and PPTN bus services
- Accommodate additional turn lanes at intersections as required to accommodate projected traffic volumes by providing widening in the vicinity of intersections

4.2.5 East-West Arterial

A new east-west road will have a straight alignment across the southern portion of the Precinct 2 and be a primary transport route through Toolern. There is potential for this road to bend once it enters the Regional Park in order to provide an appropriate connection point with Precinct 1 and Exford Road. This primary arterial will:

- Support development of the first stage of Toolern, by providing a connection between Precinct 1 and Ferris Road.
- Ease pressure on the northern part of the Exford Road sub-arterial road which has capacity constraints.
- Provide access to the Leakes Road interchange
- Reduce the impact of the new development on the established parts of Melton
- Provide access to the activity centre for residents in Precinct 1
- Provide a high quality alignment for local and PPTN bus services
- In the longer term, provide a potential connection to the Outer Metropolitan Transport Corridor (OMR), east of Toolern

It is expected that the road reservation will need to be designed to provide for the road's ultimate development to six lanes including bus priority features along its length. The alignment will be determined by:

- Environmental considerations along the southern boundary of the study area
- The ability to establish appropriate sized residential land areas between the arterial and the Strathtulloh Estate.

4.3 Sub Arterial Road Descriptions

The sub-arterial network comprises three sub-arterials in each direction.

4.3.1 *Ferris Road (south of Abey/Shogaki road)*

A section of Ferris road has been defined as a sub-arterial. This is with the objective of discouraging large volumes of through traffic (Mt Cottrell is expected to be the main north-south connection) but at the same time provide a high level of connectivity from and to the MAC.

In the vicinity of the MAC, Ferris road should be designed to enhance the economic viability of the area by providing a good permeability for pedestrians and cyclists, but at the same time work efficiently to allow quick access to services in the MAC. In all this, bus priority should be considered at intersections and access to the proposed bus interchange.

Ferris road's section as sub-arterial will:

- Allow good vehicular connectivity to the MAC
- Have priority to buses as it is an integral part of the PPTN
- Provide good connectivity for buses entering and exiting the activity centre
- Allow for good pedestrian permeability, particularly in the vicinity of the MAC

4.3.2 *Exford Road*

The significance of Exford Road will increase as it becomes a primary connection between Eynesbury Township, Precinct 1 and the Melton Township. In the early stages, it will also provide access to Melton Station until completion of the Integrated Transport Hub in the Toolern MAC. As such, it is important for Exford Road to provide a high quality alignment for local bus services.

It is not envisaged that the road will perform a primary arterial road function, as the characteristics of the northern part of Exford Road has a limited number of lanes and a level rail crossing which place constraints on its expansion. Accordingly, Exford Road will be designed for four lanes with some bus priority measures at neighbourhood centres and the junction with the east-west primary arterial road.

4.3.3 Precinct 2+3 Connector

A sub-arterial road will follow the existing Abey Road/Shogaki Drive alignment in Precinct 3 and bend south to connect with the primary north-south arterial in Precinct 2 (Mt. Cottrell Road).

This road will:

- Support development within the area between the rail line and the Western Freeway
- Increase connectivity between residential and employment land.
- Distribute traffic within the northern part of Toolern, providing a connection on to the Western Freeway via Ferris Road
- Provide an east-west connection into the existing Melton town centre
- Provide an alignment for local bus services.
- Provide an alternate crossing of the rail line within the Toolern area, thereby minimising traffic volumes around the Major Activity Centre
- Provide an alternate crossing of the line in the event of blockages on Ferris Road.

The road would be designed as a four lane road, with some bus priority measures at neighbourhood centres and at the junction with the east-west arterial. Its location midway between Mt Cottrell Road and Paynes Road takes into consideration the potential development of land east of the study area.

4.3.4 Precinct 2 North-South Road

A sub-arterial road will be located mid-block between Ferris Road and Mount Cottrell Road and form the western boundary of the Toolern Major Activity Centre. This road will:

- Provide a north-south access to the Toolern Major Activity Centre and support development
- Provide connectivity to the Toolern Railway station and integrated transport hub
- Distribute traffic within Precinct Three by providing connection to a number of arterial and sub arterial roads
- Provide access to the regional recreation centre
- Provide an alignment for local bus services.

The road would be designed as a four lane road, with some bus priority measures at neighbourhood centres and at the junction with the east-west arterial. Its location midway between Mt Cottrell Road and Paynes Road takes into consideration the potential development of land east of the study area. On-street parking provisions adjacent to retail frontages will require an adjacent service road(s).

4.3.5 Precinct 2 East-West roads (south of the trail line)

Two east-west sub-arterial road will provide a connection between Ferris Road and Paynes Road. A northern arterial will bound the Major Activity Centre to the south and a southern arterial will support a neighbourhood regional centre. These roads will:

- Support development and provide access to the Toolern Major Activity Centre (north arterial) and a neighbourhood regional centre (south arterial)
- Distribute traffic within Precinct Three by providing connection to a number of arterial and sub arterial roads
- Provide access to the Western Freeway, via Ferris Road
- Provide alternate access to the major activity centre
- Provide a high quality alignment for local bus services

The road reservation will need to be designed to accommodate four lanes. The northern east-west road will need to provide for bus priority measures in the vicinity of the MAC. On-street parking provisions adjacent to retail frontages will require an adjacent service road(s).

4.4 Collector Road Descriptions

4.4.1 Bridge Road

The existing Bridge Road alignment in Precinct 2 is to be upgraded to collector status and extended to provide a connection to the north-south sub-arterial road in Precinct 3. Bridge Road will be the main road running through the centre of the Major Activity Centre and as such it is important for Bridge Road to provide for local bus services. A bridge upgrade will be provided at the Toolern Creek crossing. It is suggested the bridge remains open til such time that the crossing in the south of the regional park is constructed. At this point, the heritage bridge could become a pedestrian/cycle bridge.

Bridge Road will:

- Provide access to the proposed Toolern Railway station car park and integrated transport hub
- Support development of the Toolern Major Activity Centre, and neighbourhood regional centre's
- Provide an east-west connection between the Melton township and Toolern Major Activity Centre,
- Providing a connection on to the Western Freeway via Ferris Road
- Provide access to, and through out the major activity centre
- Provide an alignment for local bus services

The road would be designed as a four lane road, with some bus priority measures and service within the Toolern Major Activity Centre and at the Integrated Transport hub. On-street parking provisions adjacent to retail frontages will require an adjacent service road(s).

4.4.2 Precinct 1

The proposed North South collector will provides a connection for residents in Precinct 1 south of the East West Arterial Road to Coburns Road and the East West Arterial Road.

4.4.3 Precinct 2

Collector roads within Precinct 2 serve the function of providing connectivity to the arterial road network from development pockets that are bound by land features i.e. railway line and Toolern Creek. They would also facilitate potential local bus routes within the Precinct 2 residential region and importantly provide for access to the regional park.

4.4.4 Precinct 3

Two collector roads are located to the north of Abey Road/Shogaki Drive alignment and will ensure that local bus routes are able to service the Precinct 3 employment regions.

Proposed collector roads north of the railway line provide alternate connections to the arterial road network for the land use pockets which are bound by the railway line.

Figure 4: Transport and Movement Plan – Road Network

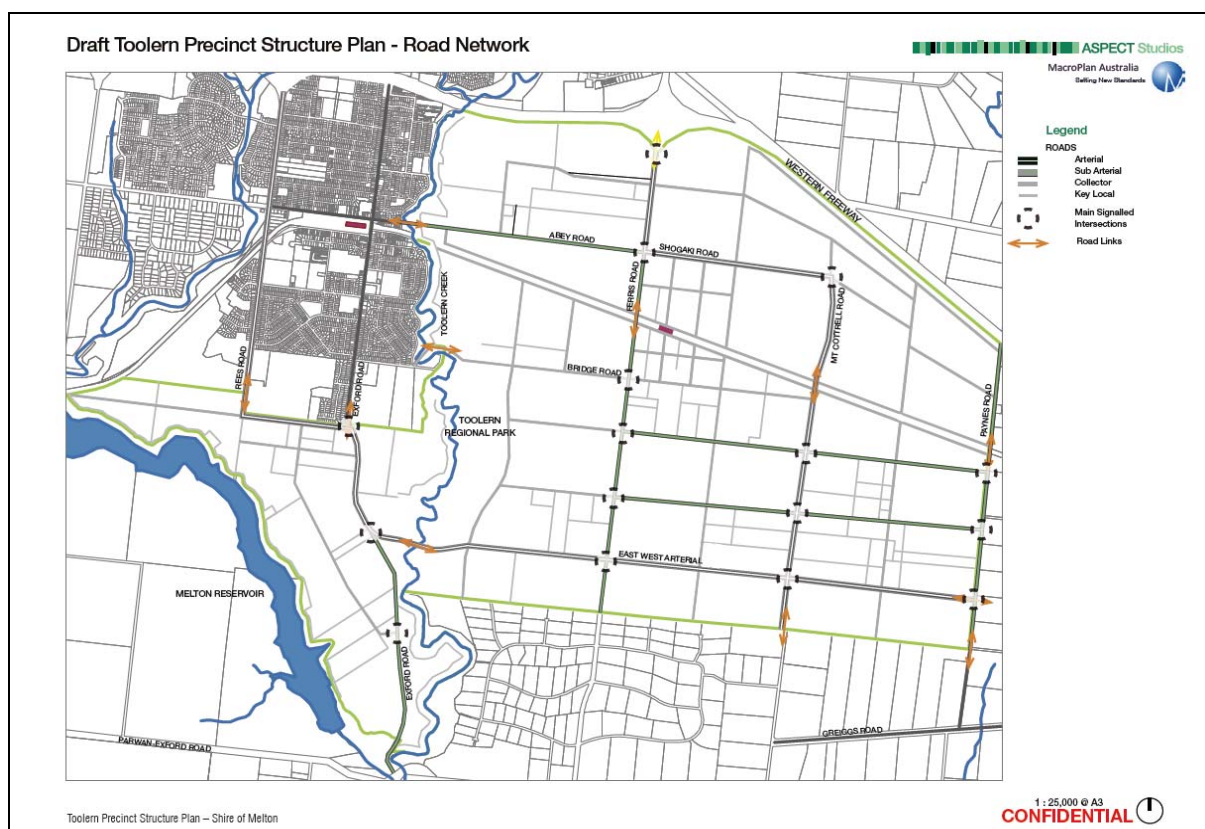
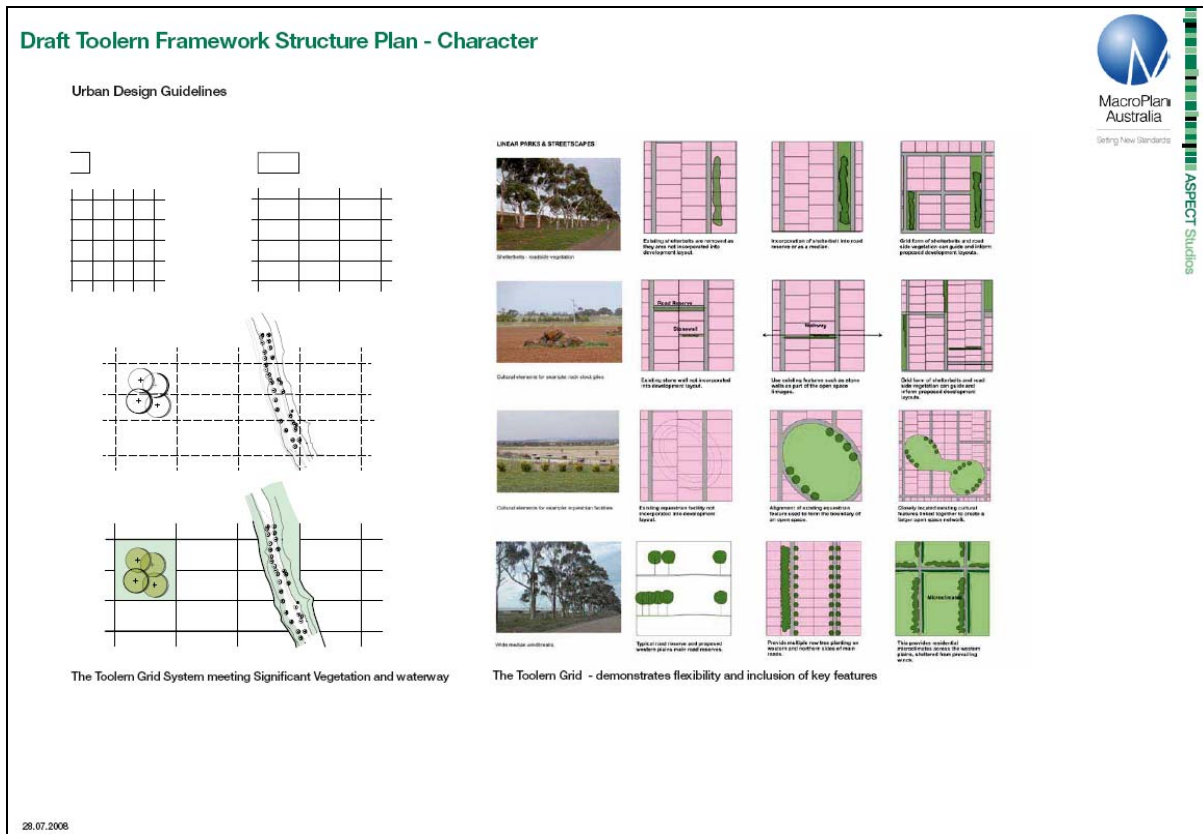


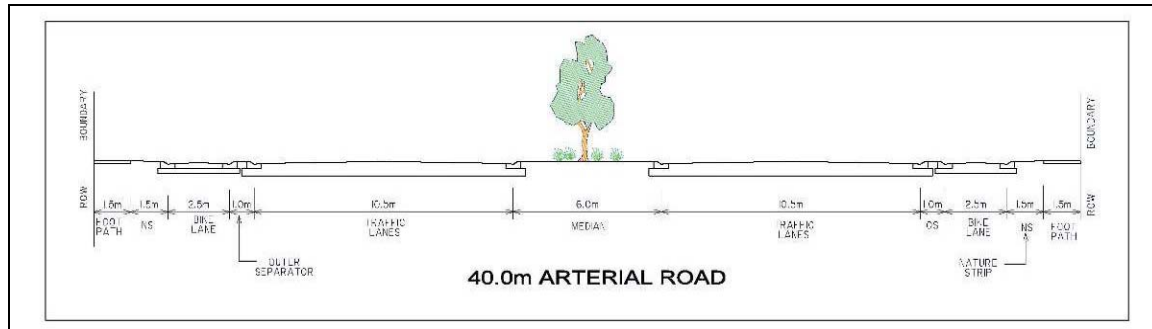
Figure 5: Transport and Movement Plan – Toolern Grid Network



5 Transport Infrastructure

5.1 Road Cross Sections - Arterial Roads

Figure 6: 40.0m Arterial Road



A 40m road reservation will be provided for all arterial roads. All arterial roads should be provided with a cross section which provides all of the necessary design components shown in the following diagram.

5.1.1 Verges

A 6.5m wide verge will accommodate a footpath, bicycle path, street tree planting and underground service provisions (at least on one side).

5.1.2 Footpaths

Provision of a 1.5m wide (minimum) footpath located adjacent to active residential frontages on either side of the carriageway will provide for safe pedestrian movements.

5.1.3 Bicycle Paths

A 2.5m wide (minimum) constructed exclusive bicycle path will be provided on each side of the carriageway and provide suitably for both commuter and recreation cyclists by allowing sufficient width for two cyclists side by side i.e. over-take/ride two a breast. The location of the bicycle path will be between the footpath and the adjacent nature strip to provide a bicycle treatment and designates priority to cyclists at local/collector side street intersections. Bicycle paths will need to be realigned in the vicinity of bus stops to allow for the provision of bus facilities.

5.1.4 Outer Separator

A 1.0m outer separator is to provide physical separation between the Copenhagen bicycle paths and through carriageway. The width of the outer separator will need to be increased in the vicinity of bus stops to accommodate facilities.

5.1.5 Carriageway

The provision of a 27.0m wide carriageway allows for six 3.5m wide traffic lanes separated by a 6.0m wide median to ultimately be provided. A 6.0m wide median will provide adequate width at median breaks and facilitate the provision of auxiliary turn lane treatments as required. Arterial roads identified on the PPTN network will ensure priority to bus services by designating the outer lane (mid-block) as a bus lane.

Arterial roads that are part of the PPTN should have bus lanes. For this, the following cross section should be used:

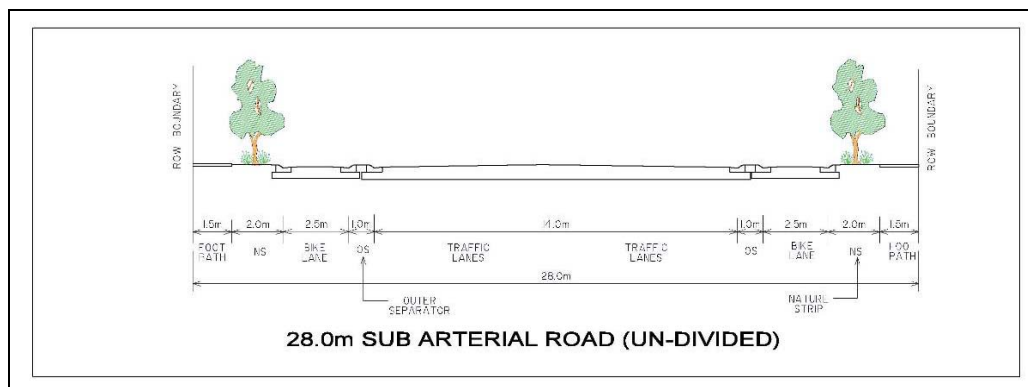
5.1.6 Arterial Roads Intersections

- Widening may be required in the vicinity of intersections to provide additional turn lanes (subject to detailed modelling).
- Bus lanes may need to be set-back at intersections to provide additional through traffic capacity (subject to detailed modelling)
- Intersections with other arterials, sub-arterials or collector roads to be controlled by traffic signals
- Local street intersections to be spaced at intervals of no less than 200 metres
- Traffic signals are not required at local street intersections, however cross intersections are not permitted with median openings.

5.2 Sub Arterial Roads

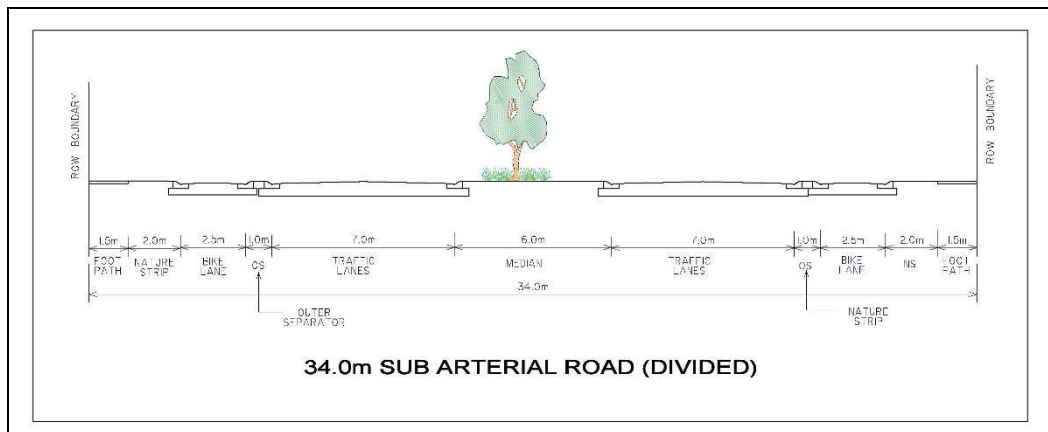
As shown below; a 28m wide road reservation will be provided for all sub-arterial roads with traffic volumes projected to be between 7,000 and 12,000 per day. A 28m wide cross section is to accommodate an undivided carriageway with design components is shown in the following diagram.

Figure 7: 28.0m Sub Arterial Road (Un-Divided)



A 34m wide road reservation will be provided for all sub-arterial roads with daily traffic volumes greater than 12,000 per day. As shown in diagram X a 34m wide cross section allows for a 4-lane divided carriageway with pedestrian and cyclist provisions.

Figure 8: 34.0m Sub Arterial Road (Divided)



5.2.1 Verges

Verges will accommodate underground services (at least on one side), a footpath, nature strip, street tree planting, bicycle path and outer separator.

5.2.2 Footpaths

Provision of a 1.5m wide (minimum) footpath located adjacent to active residential frontages on either side of the carriageway will provide for safe pedestrian movements.

5.2.3 Bicycle Paths

A 2.5m wide constructed exclusive bicycle path will be provided on each side of the carriageway and provide suitably for both commuter and recreation cyclists by allowing sufficient width for two cyclists side by side i.e. over-take/ride two a breast. The location of the bicycle path will be between the footpath and the adjacent nature strip to provide a bicycle treatment and designate priority to cyclists at local/collector side street intersections. Bicycle paths will need to be realigned in the vicinity of bus stops to allow for the provision of bus facilities.

5.2.4 Outer Separator

A 1.0m outer separator is to provide physical separation between the Copenhagen bicycle paths and through carriageway. The width of the outer separator will need to be increased in the vicinity of bus stops to accommodate facilities.

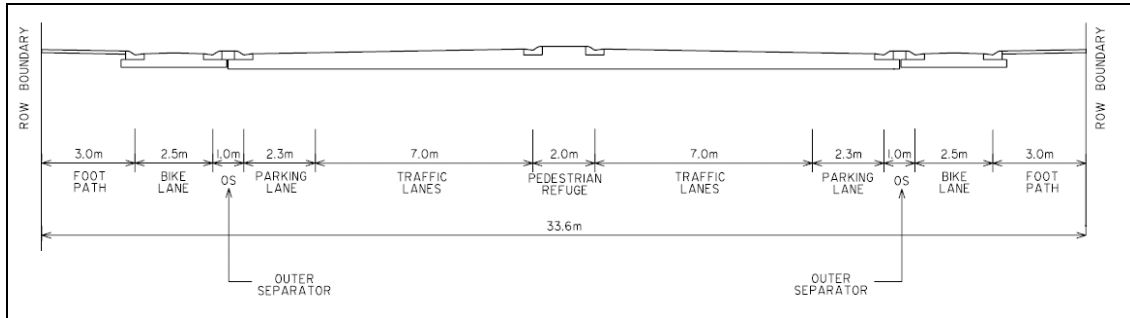
5.2.5 Carriageway

Proposed road reservations will ultimately accommodate two 3.5m wide traffic lanes in each direction.

A 34m wide reservation allows a 6.0m wide median to be provided to accommodate median breaks and facilitate the provision of auxiliary turn lane treatments as required.

In some circumstances, on-street parking in sub-arterial roads is desired in order to support economic activity. For this a particular cross-section should be used (see diagram below). In any case, sub-arterial roads with on-street parking should have the same function as a sub-arterial road divided.

Figure 9: 33.6m sub –arterial road with on-street



5.2.6 Sub-arterial Road Intersections

- Widening may be required in the vicinity of intersections to provide additional turn lanes (subject to detailed modelling).
- Intersections with arterials, other sub-arterials or collector roads to be controlled by traffic signals
- Local street intersections to be spaced at intervals of no less than 200 metres.
- Traffic signals are not required at local street intersections, however cross intersections are not permitted on undivided roads or on divided roads with median openings.
- Median openings may be provided at local street intersections on divided roads, however right turn deceleration lanes must be provided.

5.3 Collector Roads

An 18 metre Collector Road reservation is to incorporate a 6 metre central carriageway for through traffic and 2.3 metre parking lanes for on-street parallel parking as shown in the following diagram.

Figure 10: 18.0m Collector Street



5.3.1 Verges

Verges to accommodate underground service provisions (at least on one side), pedestrian/cyclist path(s), nature strip and tree planting requirements.

5.3.2 Footpaths

A 1.5m wide footpath is provided on one side of the carriageway

5.3.3 Shared path

A 2.5m shared path is provided on one side of the carriageway and is offset 0.4m from the property boundary to maximise cyclists/motorist inter-visibility at intersecting driveways.

5.3.4 Carriageway

10.6m wide carriageway includes two 3.0m wide traffic lanes and two 2.3m wide parking lanes and will accommodate a potential bus route.

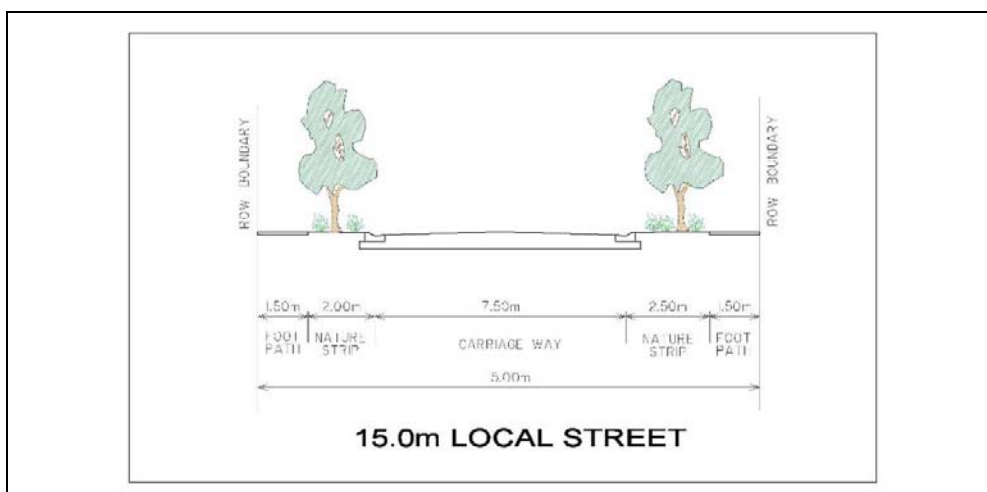
5.3.5 Collector Road Intersections

- Intersections with arterial and sub-arterial roads to be controlled by traffic signals
- Intersections with arterials, sub-arterials or other collector roads to be controlled by traffic signals
- Intersections with local streets or other collector roads to be controlled by roundabouts, stop signs or give way signs.
- Cross intersections to be controlled by roundabouts.

5.4 Local Roads

A 15 metre local road reservation is to incorporate a 7.5 metre central carriageway for through traffic and 2.3 metre parking lanes for on-street parallel parking as shown in the following diagram.

Figure 11: 15.0m Local Street



5.4.1 Verges

Verges to accommodate underground service provisions (at least on one side), footpaths and street tree planting.

5.4.2 Footpaths

1.5m minimum footpaths are to be provided on each side of the road.

5.4.3 Carriageway

A 7.5m wide pavement to provide for through traffic and on-street kerbside parallel parking on both sides.