



Glen Eira Transport Analysis and Forecasting

Discussion Paper: Carnegie Activity Centre

Glen Eira City Council

Prepared by

MRCagney Pty Ltd

30 October 2017



MRCagney

Document Information

Project Name	Glen Eira Transport Analysis and Forecasting
Document Name	Discussion Paper: Carnegie Activity Centre - Draft Report
Client	Glen Eira City Council
Job Number	6307
Prepared by	MRCagney Pty Ltd Melbourne

Quality Assurance Register

Issue	Description	Prepared by	Reviewed by	Authorised by	Date
1	First Draft Issue	KB, MW, TL, LA	KB	KB	11 August 2017
2	Additions to Sections 4.3.3 and 6.2 following receipt of parking surveys	MW	KB	KB	11 September 2017
3	Final Issue	KB	TL	KB	30 October 2017

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1 Introduction

1.1 Purpose

The purpose of this report is to provide an independent and expert view on transport-sector interventions that can support planned land-use change and development within the Carnegie Activity Centre.

Glen Eira City Council is currently preparing structure plans for the Carnegie Centre, alongside plans for the Carnegie and Elsternwick centres. These structure plans establish a vision, policy objectives, planned building typologies to guide future development and identify public sector interventions such as public realm projects to support the desired function and vision for each activity centre.

This report identifies potential transport sector interventions that can support planned land-use change at the Carnegie Activity Centre during the next 10-15 years. This discussion paper will be used by the Glen Eira City Council to inform development of their Structure Plan for the centre. The discussion paper will be used internally by Council staff and will also be made publicly available as part of community consultation on the ITS.

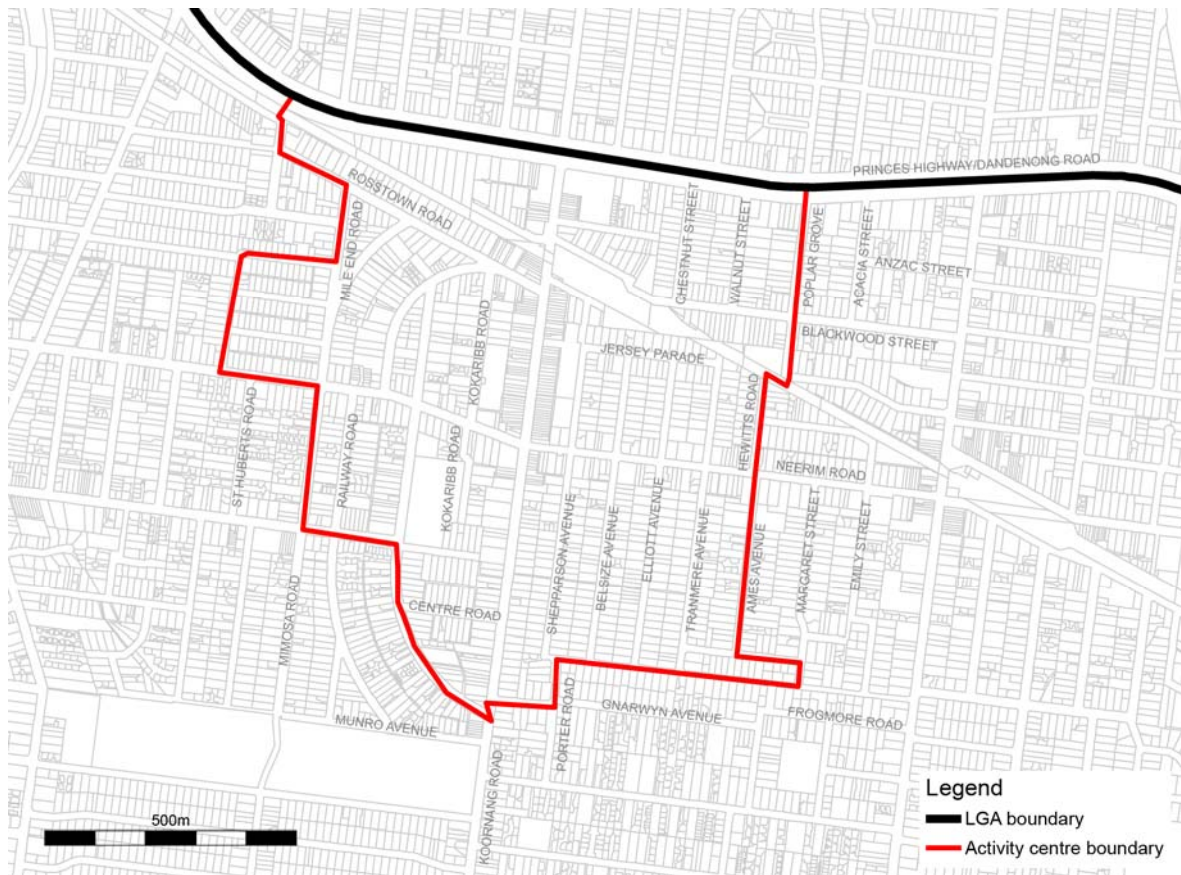
1.2 Scope

This report considers transport-sector performance and interventions across all land transport modes operating within the Carnegie Activity Centre (walking, cycling, public transport and motor vehicle traffic). The focus of recommended interventions, however, is on actions that are within the Council's jurisdiction. This means a focus on the Glen Eira City Council's role in influencing the physical street environment that it manages in partnership with VicRoads, walking and cycling networks, car parking management that is directly controlled by Council and opportunities for advocating improvements to public transport operations delivered by PTV within the area.

The report focuses on transport-sector performances and interventions. While land-use planning policy and transport outcomes are closely inter-related this report generally avoids recommendations on land-use planning policy. The land-use approach is taken 'as given' and is based on Glen Eira City Council's *Carnegie: Draft Concept Plans* (July 2017 for consultation). This report identifies how this planned approach to land-use change and development can be effectively supported by the local transport system.

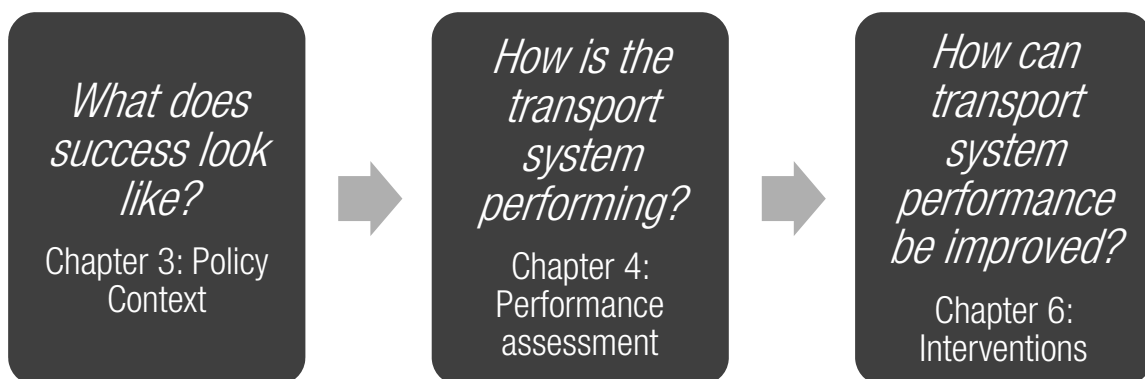
The study area considered in this report is illustrated below in Figure 1-1. It focuses on the Carnegie Activity Centre area, as defined by Glen Eira City Council.

Figure 1-1: Carnegie Activity Centre study area



1.3 Approach

The approach used to guide this study follows a three-part structure as illustrated below. A review of existing local and state transport, urban growth and land-use policy is used to establish 'what success looks like' for the Carnegie activity centre's transport system. This understanding of desired objectives for the transport system provides a framework for assessing 'how the system is performing' during both the recent past and into the future if current trends continue. From the assessment, a set of key challenges and opportunities are identified which provide a framework for identifying 'how performance can be improved'. A set of potential interventions that address key challenges and opportunities are included to prompt discussion.



The performance assessment and recommended interventions chapters are structured around a set of indicative policy directions that were established during the preparation of the accompanying *Glen Eira Transport Analysis and Forecasting Discussion Paper* for the overall municipality. These policy themes summarise desirable directions for transport sector performance and provide an organising device for structuring the assessment and identification of interventions.

These six policy directions are consistent with the directions provided by existing local and state-level policy and are:

- **Put walkability first** – providing good conditions for walking improves the safety of the overall transport system, supports public transport use and local amenity while reducing traffic congestion.
- **Manage parking for streetscape amenity, town centre vitality and to support mode shift** – parking management can play a major role in changing transport behaviour.
- **Intensify development around rapid transit** – public transport works best in locations with dense walk-up catchments and excellent walking facilities to stations and stops.
- **Ensure cycling plays its role** – cycling can play a significant role in providing for short-medium distance trips, extending the range of trips that can use active transport.
- **Work toward 'vision zero' road deaths and serious injuries** – improving the safety of the transport system is a critical component of encouraging walking and cycling.
- **Plan for attractive congestion-free networks rather than reducing congestion** – prioritising congestion reduction with road capacity expansion risks making the environment for other modes less attractive. Public transport and cycling networks can provide congestion-free networks which is a more financially viable and effective measure.

These six policy directions draw on common themes that are prioritised in the four core policy documents that need to inform transport policy for Glen Eira:

- Plan Melbourne 2017-2050 (2017)
- Glen Eira Draft Council and Community Plan 2017-21 (2017)
- Glen Eira Activity Centre, Housing, and Local Economy Strategy (2017)
- Glen Eira Planning Scheme (2017).

Across the core policy documents the following are key common themes relevant to the transport sector:

- Providing for significant growth in transport demand – and doing so by prioritising sustainable transport modes including walking, cycling and public transport.
- Managing increased transport demand by promoting distributed employment across Melbourne activity centres with 'local jobs for local residents'.
- Ensuring good transport accessibility to activity centres – particularly by sustainable modes.
- Promoting good local accessibility, with the concept of the '20-minute neighbourhood' and a particular emphasis on highly walkable neighbourhoods.
- Encouraging increased cycling.
- Managing the potential impacts of increased traffic and parking demand associated with land-use change and intensified development.

Table 1-1 summarises examples of connections between objectives established by existing core policy documents and the six key policy directions established for this study.

Table 1-1: Six key policy directions and examples of connections with established policy

Policy direction	Relevant supporting statement/ theme in core existing policy document
<i>Put walkability first</i>	<p>"A city that is easy to move around: full of safe travel options and walkable neighbourhoods" (Long Term Community Goal from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>).</p> <p>"We will construct five per cent of our missing link footpaths" (Target from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>).</p> <p>"We will achieve a five per cent improvement in the 'Walk Score' across the municipality" (Target from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>).</p>

Policy direction	Relevant supporting statement/ theme in core existing policy document
<i>Manage parking for town centre vitality and to support mode shift</i>	"Address the community's parking needs to minimise impacts on community wellbeing, and improve the connections and the vibrancy of the city" (Objective from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>).
<i>Intensify development around rapid transit</i>	<p>"A greater percentage of people (compared to 2017 numbers) will live within walking distance of a major transport node" (Target from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>)</p> <p>Reduce car congestion by encouraging greater local employment, health, education and shopping opportunities close to home and public transport networks (Objective from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>).</p> <p><i>Plan Melbourne</i> prioritises 20-minute neighbourhoods including promoting increased employment closer to where people live and increased proportion of new housing in established areas and in activity centres.</p>
<i>Ensure cycling plays its role</i>	<p>"We will increase bicycle usage by 10 per cent from 2017 figures" (Target from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>)</p> <p><i>Plan Melbourne</i> aims for cycling to become a more important transport mode.</p>
<i>Work toward 'vision zero' road deaths and serious injuries</i>	"Enhance road user safety with particular focus around schools and activity centres" (Objective from the <i>Draft Glen Eira Council and Community Plan 2017-21</i>).
<i>Plan for attractive congestion-free networks rather than reducing congestion</i>	<p><i>Plan Melbourne</i> aims for increased use of public transport.</p> <p><i>Glen Eira Activity Centre, Housing, and Local Economy Strategy (2017)</i> aims for activity centres to be highly accessible by sustainable transport modes; walking, cycling and public transport – reducing car dependency.</p>

2 Carnegie's transport network and urban environment

This section provides a brief descriptive overview of the transport networks available within the Carnegie Activity Centre, outlining major elements of the road, public transport, walking and cycling networks, transport user groups and the land-use context within which the transport system operates.

2.1 Transport network

Carnegie activity centre is 13km south east of Melbourne's CBD. The centre is serviced by an extensive road network, Carnegie Station on the Cranbourne/ Pakenham passenger rail line, and multiple bus routes (see Figure 2-1). The Carnegie shopping strip is located on the Koornang arterial road, running north-south from its junction with Dandenong Road/ Princes Highway, a major east-west traffic route for the metropolitan region. Neerim road is the other major east connection within the activity centre.

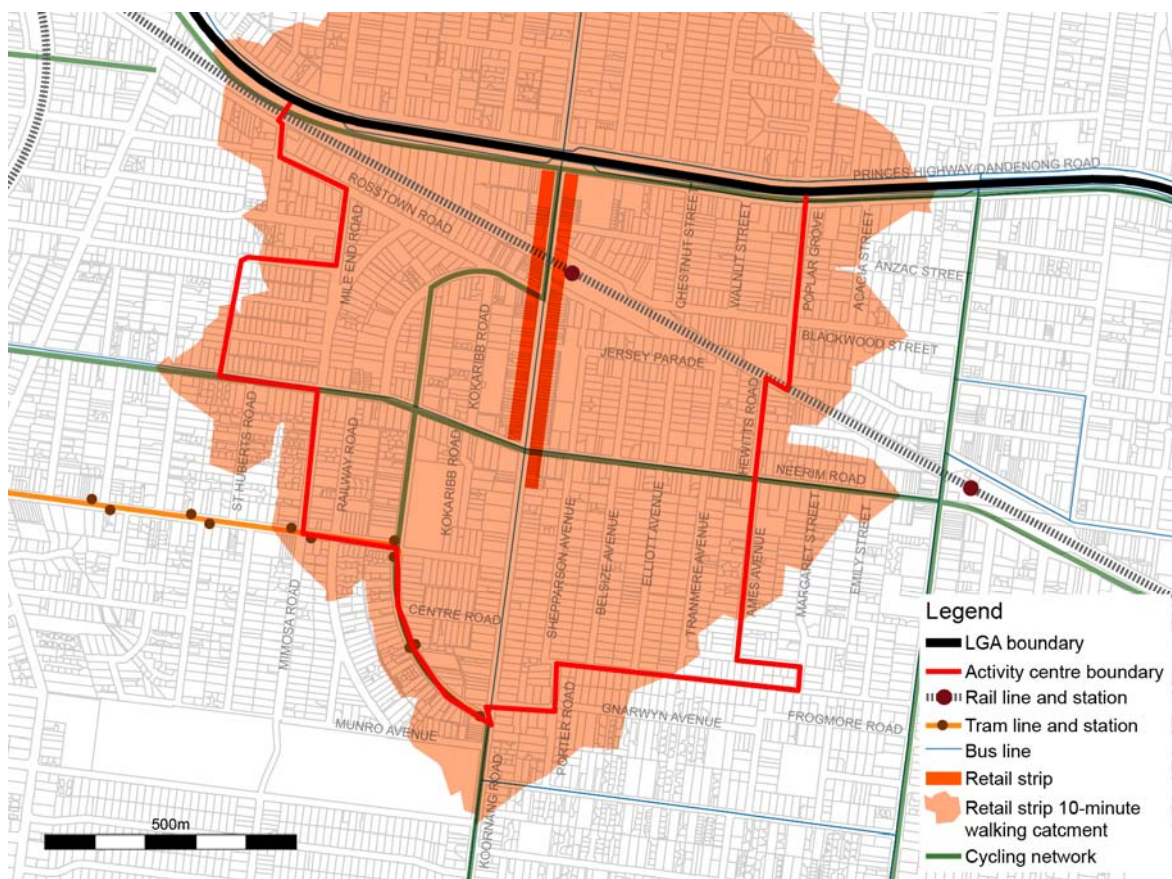
The Cranbourne/ Pakenham rail line provide frequent passenger services between Carnegie and the Melbourne CBD while also providing connections to major employment and activity centres in the South-East of the Melbourne metropolitan area. Multiple bus routes and a tram route also serve the activity centre area, with trams providing east-west connectivity toward Elsternwick and onward to the CBD.

Walking networks are primarily comprised of footpaths that are near-universally provided on all streets within the activity centre. Major road intersections include signalised pedestrian crossings. Cyclists use the road network and dedicated cycling facilities are limited to a painted lane on Neerim Road.

Figure 2-1 illustrates the area within a 10-minute walk from the Koornang Road retail strip. The 10-minute catchment extends a maximum of approximately 700m distance from the retail strip. The relatively regular shape of the walking catchment reflects the good pedestrian connectivity enabled by the regular street grid. The railway and Princes highway introduces some barriers to north-south pedestrian connectivity.

Current changes underway to the transport network within the Carnegie activity centre include construction of a new elevated railway station at the site of the current station alongside elevation of the railway line as part of the broader Caulfield to Dandenong Level Crossing Removal Project being delivered by the Level Crossing Removal Authority. The project will upgrade the quality of the rail station and surrounding public spaces as well as enabling improved walking and cycling connectivity beneath the elevated line. The project is primarily designed to reduce road congestion at the level crossing on Koornang Road.

Figure 2-1: Carnegie's transport network



2.2 Land-use

The Carnegie activity centre area comprises a local shopping strip on Koornang Road, light industrial and commercial land uses on the Princes Highway corridor and residential land-uses in the surrounding areas. The Centre is also near to Monash University Caulfield Campus (although this is outside the activity centre area).

The centre has a range of food retailing, hospitality business and other specialist retail shops (see Table 2-1). The nearby university attracts a younger demographic to the area than other Glen Eira activity centres and there is a major dining and emerging evening economy precinct on Koornang Road. For context, Table 2-1 compares the retail and hospitality offer in Carnegie with two other major activity centres in Glen Eira; Elsternwick and Bentleigh.

Table 2-1: Retail and hospitality businesses in Glen Eira activity centres

	Food retailing		Non-food retailing		Hospitality		Total	
	Floorspace (m2)	Number of businesses	Floorspace (m2)	Number of businesses	Floorspace (m2)	Number of businesses	Floorspace (m2)	Number of businesses
Bentleigh	12600	32	15500	77	7200	56	35300	165
Carnegie	11900	25	8000	30	8200	55	28100	110
Elsternwick	6000	18	13700	65	9300	71	29000	154

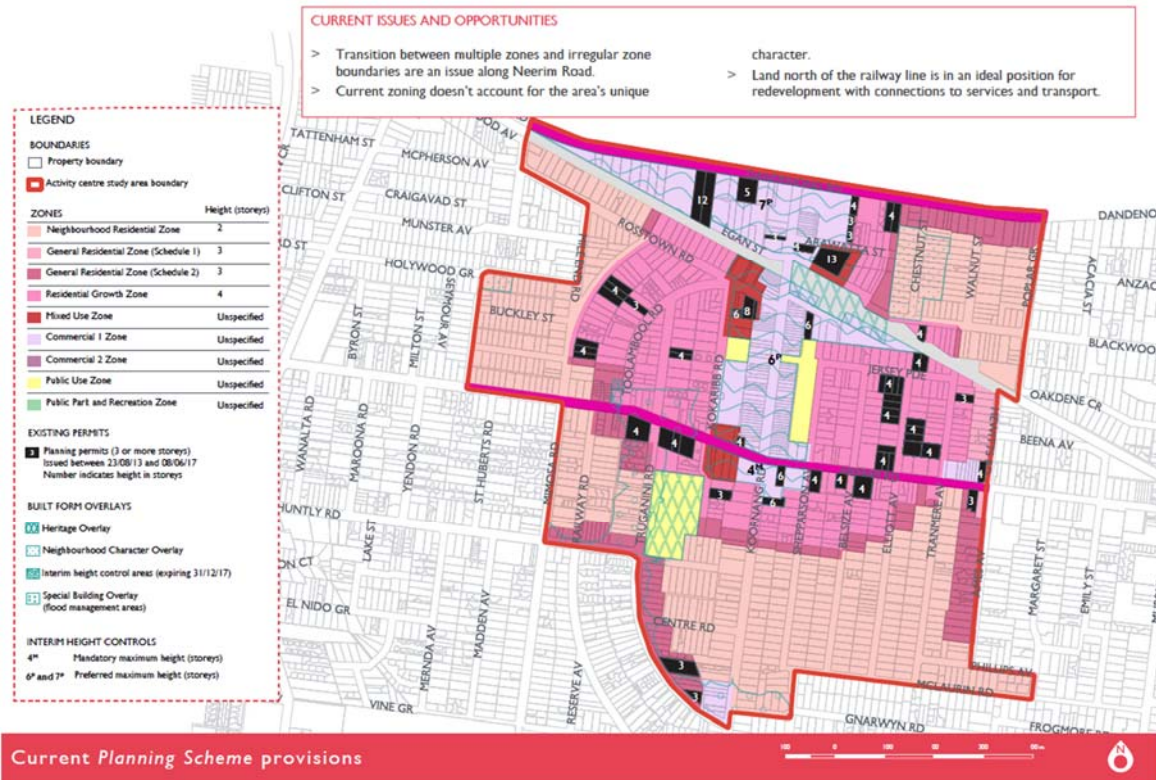
Source: BWEC (2017) Glen Eira Economic Analysis and Forecasting Study.

Residential buildings include a high proportion of 2-storey attached units (particularly to the west of the shopping strip) and detached single or double-storey houses. At least twenty planning permits have been issued during the past four years for higher-density residential buildings of between 3 and 13 storeys, and

typically of 20-45 dwellings. This higher density development is located across the activity centre area, with clusters along the Neerim Street corridor, the Princes Highway corridor and to the east of the shopping strip.

Employment-related land use includes the retail and hospitality strip on Koornang Road, small office spaces in shoptops, commercial and light industrial uses on the Princes Highway corridor and a recently developed small shopping centre and supermarket at the corner of Princes Highway and Koornang Road.

Figure 2-2: Existing land-use and location of recent planning permits for higher-density development, Carnegie Activity Centre



Source: Glen Eira City Council (2017) *Carnegie: Draft Concept Plans* (July 2017 for consultation).

The resident population of the activity centre area is just under 5,000 people, while there are around 1,100 jobs in the area (see Table 2-2). The area has the highest resident population density of all Glen Eira's major activity centres.

Table 2-2: Jobs and population in three Glen Eira activity centres

	Jobs	Job density (jobs/Ha)	Population	Population density (people/ Ha)
Bentleigh	1813	11	6080	35
Carnegie	1113	12	4899	52
Elsternwick	2730	18	6563	42

Source: MRCagney analysis of ABS 2011 Census data.

2.3 Forecast growth and implications for transport demand

The population of the Carnegie activity centre has recently grown and is expected to continue doing so, alongside forecast growth across the Glen Eira municipality.¹ A total of 1,302 new dwellings were approved for construction in the past decade (2006-2016) within the activity centre area, more than in any other area of Glen Eira.² Recent assessment of the potential for further growth in dwellings found potential for adding almost 2,600 new dwellings within the activity centre area and over 300 new dwellings within the immediate suburb outside the activity centre area.³

This assessment of new dwelling potential is not a forecast for future growth but rather an assessment of development opportunities. Whether development opportunities are taken up, and over what time period will be subject to various market and policy factors. Nevertheless, the assessment highlights that there is significant potential for further residential growth in the area. For example, if all opportunities for additional dwellings within the activity centre area were to be built out this could result in approximately 7,000 additional residents (2,600 dwellings*average 2.7 people/ dwelling⁴), more than doubling the local population.

Additional population will have implications for transport demands. It will increase demands for commute travel, particularly to major service-sector jobs centres such as the CBD. The municipality has a relatively low level of employment self-containment, with the fourth-lowest level of locally-employed working residents among the 31 Melbourne local government areas.⁵ High levels of employment outside Glen Eira for its residents reflects the absence of any major employment centre within the municipality and the dominant 'white collar', service-sector occupations of Glen Eira residents that tend to be concentrated in central Melbourne. While some additional local jobs may be created, there will likely be continuing high demands for commute movements in and out of Carnegie, the bulk of which will need to be provided for with private vehicles or public transport due to trip distances that are beyond the range of walking and cycling for most users.

A growing local population in the activity centre will also be accompanied by increased walking and cycling demands for short-distance local trips, particularly between new student-oriented residential development and the university campus. With recent population growth concentrated around the retail strip and rail station and future growth oriented toward these areas through planning policy, there is likely to be increasing demand for walking and cycling access to local shops and services.

¹ Across the Glen Eira municipality, annual population growth is forecast to average 1.3% between 2011-21 and 0.9% between 2021-31. See: The State of Victoria Department of Environment, Land, Water and Planning (2016) *Victoria in Future 2016: Population and household projections to 2051*.

² Id Consulting (2017) City of Glen Eira – Housing id – analysis of housing consumption and opportunities

³ Ibid.

⁴ Average people/ dwelling for the Greater Melbourne Statistical Area, http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/2GMEL?opendocument

⁵ For further analysis see: BWEC (2017) *Glen Eira Economic Analysis and Forecasting Study*.

3 Policy context

This section reviews the policy context relevant to transport and land-use planning for the Carnegie Activity Centre. It identifies recently proposed changes to land-use planning policy for the Activity Centre that future transport sector interventions will need to support.

This section uses already established policy themes to identify key 'desired directions' for Carnegie's transport system. This set of policy directions provides a framework for assessing existing and forecast transport sector performance within the Activity Centre (to be undertaken in the following chapter).

3.1 Overview of policy landscape

Figure 3-1 illustrates the key policy documents guiding future development of the Carnegie Activity Centre. At a high-level, Plan Melbourne provides the overarching framework within which Glen Eira's policy documents fall. The Carnegie Structure Plan (currently in preparation) will translate the principles of the *Activity Centre, Housing and Local Economy Strategy* to the Carnegie local context. The Council's Planning Scheme will provide the detailed planning provisions that allow implementation of the vision developed by the Structure Plan.

Figure 3-1: Policy framework relevant to transport and land-use planning at Carnegie

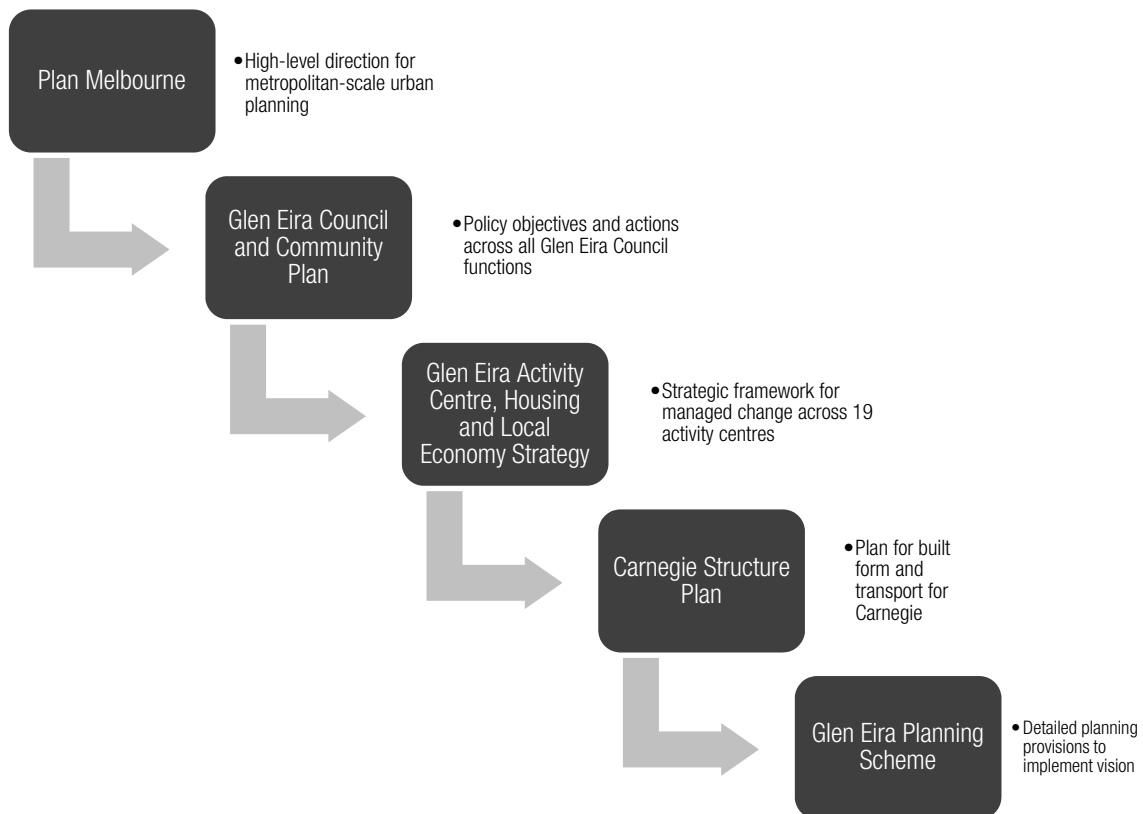


Table 1 summarises these key relevant policy documents, describing the relevant policy directions from each document and how these translate to the Carnegie context.

Table 3-1: Key policy documents and implications for transport and land-use change in Carnegie

Policy document	Role of document and summary of key relevant policy directions	Implications for Carnegie: 'what does success look like for transport and land-use in Carnegie?'
<i>Plan Melbourne 2017-2050 (2017)</i>	<p>High-level direction for metropolitan-scale urban planning and managing strong growth in forecast transport demand and housing needs.</p> <p>Prioritises 20-minute neighbourhoods including promoting increased employment closer to where people live, and local walking and cycling connections.</p> <p>Promotes increased proportion of new housing in established areas and in activity centres.</p>	<p>Good local transport connectivity to the Carnegie Activity Centre, particularly walking and cycling connections.</p> <p>Public transport, walking and cycling become more important transport modes.</p> <p>Transport capacity across all modes is sufficient to cater to growth in demand.</p> <p>New housing is concentrated within the activity centre.</p>
<i>Glen Eira Draft Council and Community Plan 2017-21 (2017)</i>	<p>Five themes guiding policy objectives across all Glen Eira Council functions: Liveable and well designed, Accessible and well connected, Safe healthy and inclusive, Clean and sustainable, Informed and engaged.</p>	<p>Increased walkability in the Carnegie neighbourhood.</p> <p>Increased levels of cycling.</p> <p>Parking and traffic demands accompanying growth are well-managed.</p>
<i>Glen Eira Activity Centre, Housing, and Local Economy Strategy (2017)</i>	<p>Establishes a long-term strategic framework for 'managed change' in Glen Eira's activity centres – covering place-making, local economy and housing.</p> <p>Three policy themes: Well-connected and distinctive neighbourhoods, Vibrant activity centres with a thriving local economy, Quality housing and buildings for the future.</p>	<p>Carnegie is highly accessible by sustainable transport modes; walking, cycling and public transport – reducing car dependency.</p> <p>Neighbourhoods are highly walkable and safe.</p> <p>Parking and traffic demands accompanying growth are well-managed.</p>
<i>Carnegie Draft Concept Plans (2017) - consultation document to inform structure plan</i>	<p>Establishes a vision for Carnegie and place-making, housing, economy and transport objectives.</p> <p>Identifies opportunity areas for public sector interventions.</p> <p>Provides an outline of desired built form; 'the right buildings in the right locations'.</p>	<p>"Carnegie will be an accessible local shopping destination with a vibrant café and restaurant culture".</p> <p>High levels of walking, cycling and public transport.</p>
<i>Glen Eira Planning Scheme (2017)</i>	<p>Provides a framework for land-use and development in Glen Eira, consistent with State-level policy – though objectives, zoning and planning provisions.</p> <p>Plan-enabled capacity for housing and employment growth is focused on activity centres – particularly designated 'urban villages' which include Elsternwick, Carnegie and Carnegie.</p>	<p>Population and employment growth and land-use development is accompanied by and well-coordinated with sufficient transport facilities and infrastructure.</p>

The five policy documents have been prepared to be deliberately coordinated. As such, there are a considerable number of shared policy directions. We identify the following key common directions across the documents for the transport sector:

- Providing for significant growth in transport demand – and doing so by prioritising sustainable transport modes including walking, cycling and public transport.
- Managing increased transport demand by promoting distributed employment across Melbourne activity centres with 'local jobs for local residents'.
- Ensuring good transport accessibility to activity centres – particularly by sustainable modes.
- Promoting good local accessibility, with the concept of the '20-minute neighbourhood' and a particular emphasis on highly walkable neighbourhoods.
- Encouraging increased cycling.
- Managing the potential impacts of increased traffic and parking demand associated with land-use change and intensified development.

These shared policy directions provide a basis for identifying a

3.2 Carnegie Draft Concept Plans and implications for the transport sector

The Glen Eira City Council's *Carnegie: Draft Concept Plans* (July 2017 for consultation) provides the most detailed level of policy direction specific to the activity centre. The performance assessment and proposed interventions seek to respond to this policy direction and improve understanding of the transport implications of realising this vision.

The *Concept Plan* establishes the following vision for the centre:

Carnegie will be a safe, connected and welcoming centre that embraces its authentic urban character and cultural identity. The centre will be a destination for night-life, shopping and employment, supporting a range of businesses and interconnected community spaces that meet the needs of the local community.

It also details a set of objectives across place-making, housing, economy and transport topics. For the transport sector the two objectives are:

Encourage walking, cycling and use of public transport

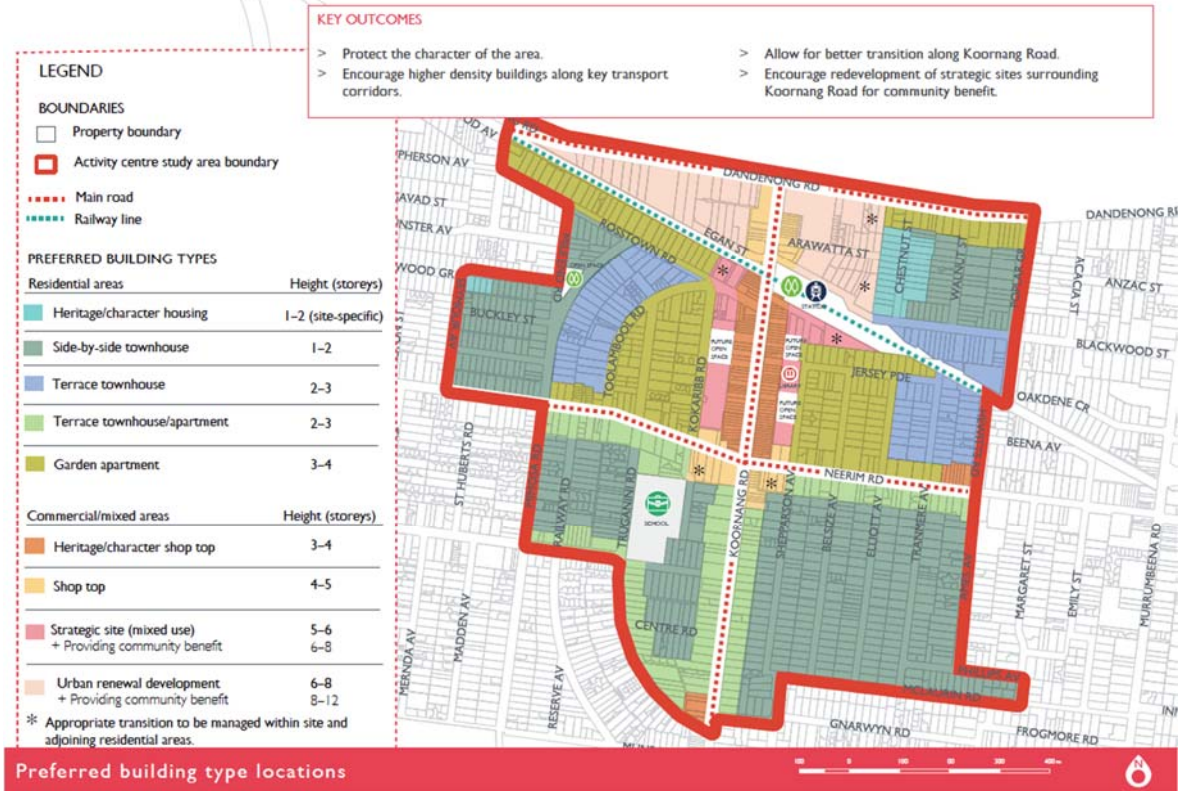
Explore innovative approaches to car parking and traffic management.

The Plan outlines a set of potential interventions or 'transformation concepts'. Interventions with particular relevance for transport include:

- Replacing the existing surface car parking lot at Shepparson Road with a multi-storey parking building with potential market space at ground level.
- Developing a safe cycling facility on Shepparson Road to connect with new cycling links accompanying the elevated rail
- Advocating to state government for improved public transport including better buses and an extension of tram services through Carnegie town centre.

The Plan finally specifies a proposed 'building transitions plan' that could form the basis of revised Planning Scheme provisions for building height and bulk in the activity centre (see Figure 3-2). Key features of the plan are to concentrate higher density development around the Princes Highway/ Dandenong Road Corridor, to the rear of the Koornang Road shopping strip and to the north of Neerim Road.

Figure 3-2: Planned future land-use, Carnegie Activity Centre



Source: Glen Eira City Council (2017) *Elsternwick: Draft Concept Plans* (July 2017 for consultation).

4 Transport performance assessment

4.1 Approach to performance assessment

The performance assessment aims to identify the extent to which current and forecast future performance of the transport sector is likely to be in line with the desired directions expressed by policy. This highlights policy goals that may be particularly difficult to achieve under 'business-as-usual' trends and opportunities for interventions that can shift these trends.

In general, performance assessment requires definition of what is meant by 'desirable' performance. Current performance can then be compared with a benchmark to identify gaps between desired performance and current and forecast future performance. We take desirable performance to be summarised by the six policy directions established in the previous chapter.

The performance assessment for Carnegie has use the following sources of data and information:

- Quantitative indicators of recent transport activity (eg counts, surveys, government statistics)
- Network connectivity assessment
- Qualitative 'design assessment' of current ground conditions against best-practices standards.

Table 4-1 summarises the approach used for assessment under each of the six policy directions. A mix of quantitative key performance indicators are reported on, alongside network connectivity assessment and qualitative assessment of design performance.

Table 4-1: Approach to assessing transport system performance

Policy direction	What does success look like?	Key performance indicators	Other tools for performance assessment
<i>Put walkability first</i>	High levels of walking for a range of trip purposes. Excellent walking environment.	Walking commute mode share Walking access to Activity Centres	Design assessment of infrastructure: comparison with international best practice 'complete streets' design guidance. Assessment of walking network connectivity.
<i>Manage parking for streetscape amenity, town centre vitality and to support mode shift</i>	Peak-period parking occupancy of 70-90% (reflecting sufficient supply but not oversupply of parking spaces). High turnover of parking spaces allowing accessibility by high number of users. Parking does not detract from streetside amenity or reduce attractiveness of walking, cycling environment.	Parking turnover Parking occupancy Parking revenue	Assessment on suitability of current parking management regime. Assessment of allocation of road space to parking vs other uses and impact of parking on other uses.
<i>Intensify development around rapid transit</i>	Residential and commercial development is concentrated within 800m walking catchment of high quality public transport (rail and trams). New development is well integrated with public transport through provision of good walking links to stations.	% of recent development within walking catchment of high quality PT	Assessment of development potential enabled by Planning Scheme. Development feasibility forecasting/modelling

Policy direction	What does success look like?	Key performance indicators	Other tools for performance assessment
<i>Ensure cycling plays its role</i>	High levels of cycling for a range of trip purposes.	Cycling commute mode share	Assessment of cycling network connectivity.
	Excellent cycling environment.	Cycle counts	Assessment of network infrastructure quality against best-practice guidelines.
<i>Work toward 'vision zero' road deaths and serious injuries</i>	Low level of road crashes, all modes. Road infrastructure conforms to best-practice design standards for safety.	Number of road crashes, by mode	Assessment of road speed limits.
<i>Plan for attractive congestion-free networks rather than reducing congestion</i>	Provision of high-quality public transport (spatial extent, temporal span of service, vehicle and facility quality, etc).	PT commute mode share % of population/jobs within 800m of high quality PT station.	Assessment of spatial extent and connectivity of PT network.

4.2 Assessment: putting walking first

4.2.1 Recent trends in walking activity

Walking is a reasonably popular mode of transport to access Carnegie and within the activity centre, although many people access town centre by car.

A recent Shopping Strip Survey⁶ of Glen Eira residents indicated that while the highest proportion of trips to Carnegie are made on foot (47%), a significant proportion of trips is made by car (36%). The remaining 17% use other modes including public transport and cycling.

The reasonably high proportion of access by car is emphasised by the results of car park surveys of Carnegie⁷, which indicate that the highest proportion (around 30%) of people who arrive by car live within the town centre's post code (29% for the Carnegie (Koornang Road) Trade Area and 27% for the Carnegie Central Trade Area). When overlaid with the 10-minute walking catchment of the retail strips of Koornang Road and Carnegie Central, it is clear that many journeys to Carnegie that could easily be made on foot by most people are currently made by car (see Figure 4-1).

As a proportion of Carnegie train station users, people who walked all the way comprised 72% in 2013-2014⁸. In addition, 9% arrived by bus, 1% by train and 1% by bicycle, leaving that 18% of train passengers accessed the station by car. Public transport trips to the station and even trips by car (assuming the driver leaves the car parked at or nearby the station) result in some distance being covered on foot (point of origin to vehicle and vehicle to station entrance).

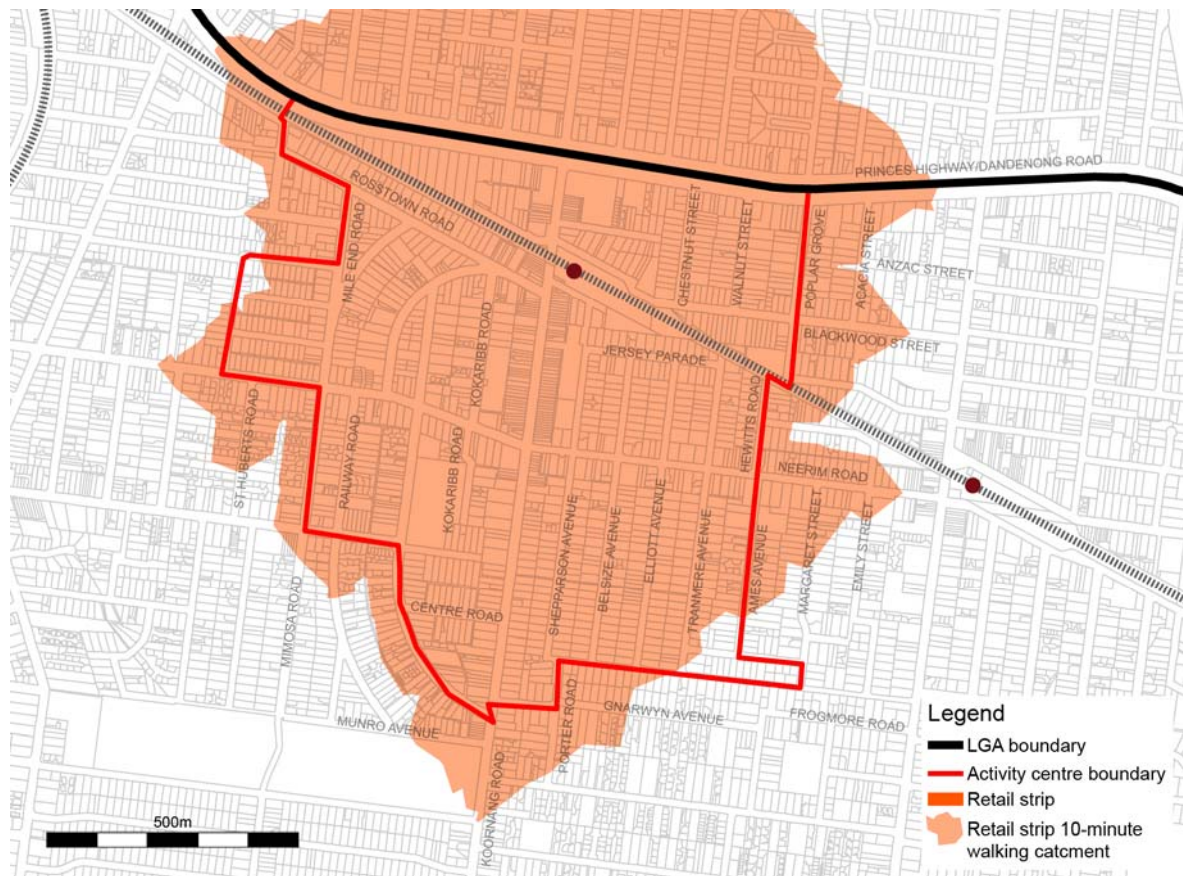
⁶ Shopping Strip Survey (2017) Glen Eira City Council.

⁷ BWEC (2017) *Glen Eira Economic Analysis and Forecasting Study*. Melbourne: Glen Eira City Council.

⁸ Public Transport Victoria Train Station Patronage fact sheet. Available at: <https://www.ptv.vic.gov.au/about-ptv/ptv-data-and-reports/research-and-statistics/>. Accessed 27 July 2017.

These figures compare favourably with other Melbourne stations that have similar levels of patronage (place 50 of 198 stations with between 500,000 and 1.5 million annual boardings for 2013-2014). Among stations within Glen Eira, Carnegie is toward the upper end of the range of access by walking only (range: 51 to 79%).

Figure 4-1: Carnegie retail strip's 10-minute walking catchment



4.2.2 Current state of walking facilities

Walking facilities in Carnegie are generally reasonable. Footpaths on Koorng Road are generally 3.0-3.5m wide with kerb build-outs in places and crossings are provided at 100-180m spacings. Pedestrian connectivity will improve with the construction of the Caulfield to Dandenong Level Crossing Removal Project, although the elevated rail line is also likely to have an adverse visual and landscape impact on the area, potentially creating undesirable undercroft-type spaces. The most important issues are the main streetscape's lack of pedestrian safety and amenity and over-dimensioned signalised intersections.

The streetscape along Koorng Road is deficient of quality of place due to the presence of pedestrian barriers, a shortage of street trees and its aesthetically dated appearance. The low wall and steel fence style barriers used in places along Koorng Road restrict pedestrian movement and encourage higher travel speeds, making the street environment less safe for vulnerable street users. Street trees have a positive impact in the two locations where they are provided, but generally the streetscape misses the numerous benefits street tree and mass low planting bring.

Signalised intersections occur frequently along Koorng Road in the centre. While each has pedestrian crossings across every leg of the junction, the provision of turning lanes means that pedestrian amenity and safety is compromised due to long crossing distances.

4.2.3 Providing for future walking needs

Increased residential density is planned to be located along Koornang Road and to the north of the study area between the rail line and Dandenong Road, with accommodation of buildings up to 12 storeys proposed in the Carnegie Draft Concept Plans (for consultation). This pattern of development will increase pedestrian traffic on the main streets, placing further importance on the level of provision made for pedestrians with regard to safety for vulnerable street users, streetscape amenity and signal phasing.

4.3 Assessment: parking management

4.3.1 Current parking supply

The Carnegie Activity Centre has a moderately high level of parking provision primarily in the form of some medium and large at-grade public parking facilities provided behind the established shopping strip on Koornang Road. There are over 1,000 publicly-accessible car parking spaces in the activity centre, with 57% provided by Council (on- or off-street) and 43% on privately-held land (see Table 4-2).

Table 4-2: Publicly-accessible car parking supply, Carnegie Activity Centre

Council Owned Car Parks		% of total
On Street	409	39%
Off Street	193	18%
Total	602	57%
Privately Owned Public Car Parks		
Woolworths	81	8%
Carnegie Central	376	36%
Total	457	43%
Grand Total	1059	100%

Source: Glen Eira City Council.

Pending upgrades to Carnegie Railway Station currently being completed as part of the State Government's level crossing removal project, the station will include a reinstated commuter car park off Woorayl Street.

The following provides an analysis of how current parking supply for commercial uses in the Carnegie activity centre compares with parking supply guidance provided by Victorian standard parking rates and by best-practice guidance for appropriate levels of parking supply in centres well-served by public transport.

Using data on non-residential floorspace within the activity centre, an approximation of statutory parking supply requirements based on the Glen Eira Planning Scheme has been made to help contextualise the extent of existing non-residential parking supply in the precinct. This assessment is summarised in Table 4-3 below.

Table 4-3: Notional non-residential parking requirements, based on Glen Eira Planning Scheme parking rates

Type of Tenancy	Number of Tenancies ^a	Total Gross Floor Area ^a	Corresponding Land Use (Cl. 52.06)	Adopted Parking Rate per 100m ² floor area (Cl. 52.06) ^b	Stipulated Parking Supply
Housewares retailing	1	50	Shop	3.5	2
Manchester and other textile good retailing	2	3315	Shop	3.5	116

Type of Tenancy	Number of Tenancies ^a	Total Gross Floor Area ^a	Corresponding Land Use (Cl. 52.06)	Adopted Parking Rate per 100m ² floor area (Cl. 52.06) ^b	Stipulated Parking Supply
Electrical, electronic and gas appliance	2	234	Shop	3.5	8
Computer and computer peripheral	1	170	Shop	3.5	6
Hardware building and garden supplies	2	361	Warehouse	1 plus 2 spaces to each premises	8
Newspaper and book	3	748	Shop	3.5	26
Clothing retail	4	342	Shop	3.5	12
Footwear retail	1	182	Shop	3.5	6
Watch and jewellery	1	55	Shop	3.5	2
Pharmaceutical, cosmetic and toiletry	4	1038	Shop	3.5	36
Other store based retailing	9	1481	Shop	3.5	52
Cafes and restaurants	47	7201	Restaurant	3.5	252
Takeaway Food Services	8	1010	Convenience Restaurant	3.5	35
Bakery Product Manufacturing	4	471	Food and drink, other	3.5	16
Supermarket and grocery stores	10	9312	Supermarket	5	466
Fresh meat, fish poultry	5	600	Food and drink, other	3.5	21
Fruit and vegetable retailing	3	880	Food and drink, other	3.5	31
Liquor	1	218	Shop	3.5	8
Other specialised food retailing	2	419	Food and drink, other	3.5	15
Total					1,118

^a Source: BWEC (2017) *Glen Eira Economic Analysis and Forecasting Study*. Melbourne: Glen Eira City Council.

^b Reduced Column B rates have been adopted for the Activity Centre.

As detailed above, parking for non-residential uses appears notably undersupplied compared to Glen Eira Planning Scheme requirements when adopting reduced Column B rates from Clause 52.06, however this does not consider that peak demand periods for different land uses occur at different times of day. In practice, different uses with different peak parking demand periods tend to complement each other such that less parking is needed to satisfy the peak parking demand of the precinct, compared to a simple assessment of individual parking requirements. It is also noted that all on-street parking is assumed to be available to cater to this non-residential parking demand.

While this analysis suggests parking is undersupplied in Carnegie, consideration of some additional best practice benchmarks for parking supply is instructive, and highlights the extent to which parking may in fact be oversupplied in the activity centre. The *Transit Oriented Development: Guide for Practitioners in*

*Queensland*⁹ is designed to build understanding of the transit oriented development (TOD) concept and provides guidance covering urban density, community diversity and various technical standards and specifications, including parking rates.

Rather than minimum rates, the TOD Guidelines support the adoption of *maximum* parking rates, in addition to a suite of demand reduction measures including unbundling parking from dwelling sales, consolidation and sharing of parking between different developments and land uses, introduction of car share schemes, and priced parking. Table 4-4 outlines the suggested maximum parking rates for different TOD precinct types. The varying rates recognise the different functions, demand for parking, density and supply of transit in different precinct types. The guideline suggests that parking should not exceed the base maximums, and adoption of the preferred maximums is strongly encouraged. An additional key feature of the TOD Guidelines is the simplification of land uses to residential and retail and office, preventing the transition to different uses being stifled by onerous and complex parking requirements.

Table 4-4: TOD Guidelines – Maximum Parking Rates

Precinct Types	Residential (Car Spaces per Unit)		Retail and Office (Square Metres per Car Space)	
	Base Maximum	Preferred Maximum	Base Maximum	Preferred Maximum
City Centre	0.75	0.5	400	600
Activity Centre	1	0.75	100	200
Specialist Activity Centre	1.25	0.75	100	150
Urban	1	0.75	200	300
Suburban	1.25	1	75	100
Neighbourhood	1.25	1	50	100

*Complete Streets*¹⁰ provides an additional set of benchmark parking rates with which to compare parking supply in Carnegie. Similar to the TOD Guidelines, adoption of maximum rates is recommended throughout, particularly in areas where alternative transport options such as public transport, walking and cycling exist. Recommended maximum parking rates are derived from a review of parking rates from planning schemes throughout Queensland and from extensive research on urban mixed-use areas.

Table 4-5 provides an overview of the suggested maximum parking rates from *Complete Streets*.

Table 4-5: Complete Streets Maximum Parking Rates

Location	Commercial (Locations with Quality PT Access)		Residential (Locations with Quality PT Access)	
	Commercial	Commercial	Residential	Residential
Capital CBD	1 space / 500m ²	1 space / 200m ²	0.5 spaces per unit	1 spaces per unit
Regional CBD	1 space / 150m ²	1 space / 100m ²	1 spaces per unit	1.25 spaces per unit
Capital Suburb	1 space / 100m ²	1 space / 75m ²	0.75 spaces per unit	1 spaces per unit
Regional Suburb	1 space / 75m ²	1 space / 50m ²	1 spaces per unit	1.25 spaces per unit

Adopting appropriate rates from Table 4-4 and Table 4-5 provides a basis for an assessment of existing parking supply in comparison to best practice benchmarks, as outlined in Table 4-6.

⁹ Queensland. Dept. of Infrastructure and Planning 2010, Transit oriented development guide, Dept. of Infrastructure and Planning, Brisbane

¹⁰ Institute of Public Works Engineering Australia. Queensland Division Inc & Parsons Brinckerhoff 2010, *Complete streets : guidelines for urban street design (based on the standards presented in the IPWEAQ Queensland streets)*, [New ed.], Institute of Public Works Engineering Australia - Queensland Division, Fortitude Valley, Qld

Table 4-6: Benchmark parking requirements – Bentleigh Activity Centre

Total Commercial Floor Area	Existing Supply	Glen Eira Planning Scheme	Complete Streets 1 / 100 (max)	TOD Guidelines 1 / 200 (max)
28,087m ² GFA	1059	1,118 (minimum)	281 (maximum)	140 (maximum)

Table 4-6 provides compelling evidence that the Carnegie activity centre has an existing oversupply of car parking relative to best practice guidance for centres well-served by public transport, and further highlights the extent to which Council's existing statutory parking supply rates are inappropriate in the context of Council's visions and objectives for the activity centre.

4.3.2 Current parking management tools

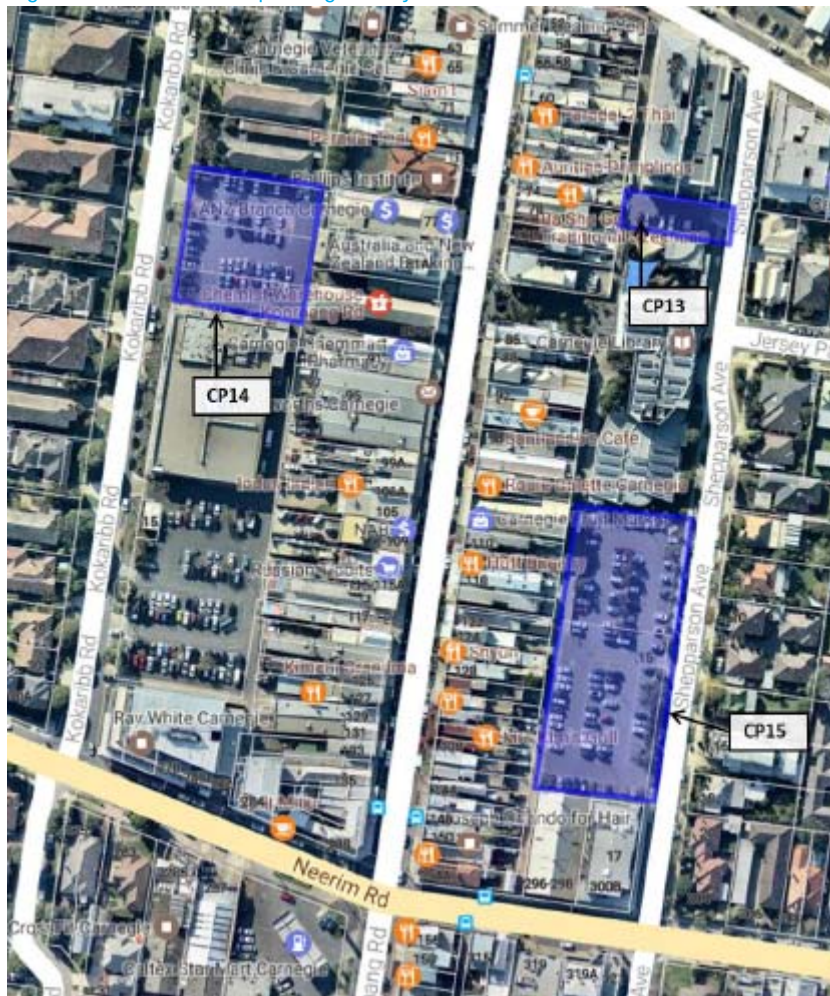
Existing parking management regimes in Carnegie include time limits, however parking is not priced. In addition, there are a number of marked loading zones and equal access parking spaces. Time limits for off-street parking in Carnegie are generally 2 hours, while on-street parking is generally a mix of 1P and 2P restrictions, with some 4P parking provided on Shepparson Avenue. Koornang Road is restricted to 1-hour parking, while 2P restrictions apply on Kokaribb Road.

Time restrictions are enforced manually by parking officers without assistance from parking bay occupancy sensors.

4.3.3 Current parking demand

Parking occupancy surveys have been undertaken at Council car parks within the Carnegie Activity Centre in order to audit existing parking supply, existing parking restrictions, and measure utilisation. Surveys were conducted by O'Brien Traffic on Tuesday 25 July and Saturday 29 July 2017 from 8:00am - 10:00pm and 9:00am – 2:00pm, respectively. A map of the surveyed parking areas is provided below.

Figure 4-2: Location of parking surveys



Source: O'Brien Traffic

Table 4-7 and Table 4-8 below show the parking occupancy with the surveyed parking areas across the Tuesday survey period and the Saturday survey period, respectively. The results indicate that parking occupancy consistently exceeds ideal levels of 70-85% in Carnegie, suggesting that some mitigating measures, potentially including demand management strategies, are warranted.

As shown in Table 4-7, Tuesday parking demand is very low at 8 am, before ramping up steadily to a peak from approximately 12 noon – 3 pm. There is a minor dip in parking demand from 4 pm – 5 pm, particularly in the large parking area CP15, before a second peak that lasts from 6 pm – 8 pm. Parking area CP13 is notable for its sustained high parking demand from 9 am – 7 pm, however the very small size of this parking area suggests this of very little significance in the context of the greater Activity Centre.

Table 4-7: Parking survey results – Tuesday 25 July 2017

Parking Area	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM
CP13	33%	89%	100%	89%	100%	78%	100%	89%	89%	89%	78%	89%	56%	44%	33%
CP14	10%	21%	54%	75%	97%	94%	82%	90%	90%	99%	94%	91%	88%	43%	22%
CP15	8%	28%	62%	82%	86%	92%	98%	93%	69%	55%	82%	97%	94%	37%	16%

Parking Area	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM
Total	10%	28%	61%	80%	91%	93%	93%	92%	77%	71%	86%	94%	90%	40%	19%

Green highlighted cells indicate occupancy below one third; Red highlighted cells indicate >85% occupancy

As shown in Table 4-8, Saturday parking demand is generally very low at 9 am, before ramping up to high levels from 10 am – 2 pm, with an Activity Centre-wide peak that occurs from 12 noon – 1 pm.

Table 4-8: Parking survey results – Saturday 29 July 2017

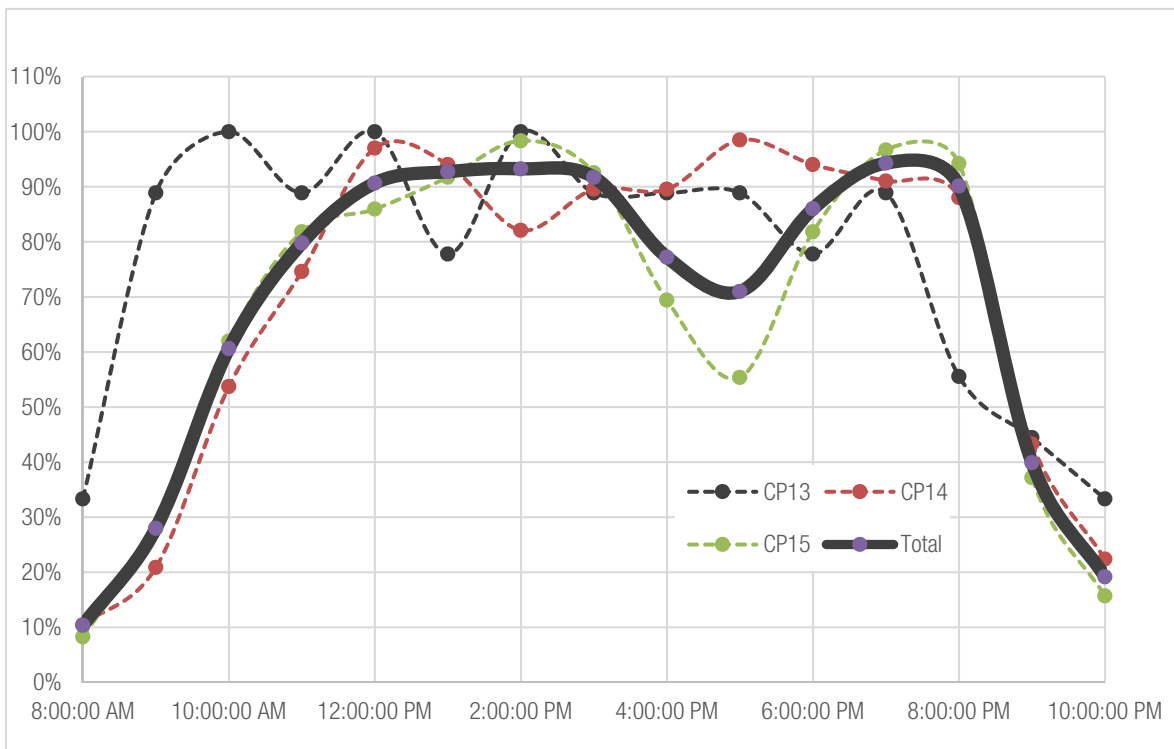
	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM
CP13	78%	89%	89%	100%	100%	100%
CP14	25%	90%	99%	87%	88%	70%
CP15	25%	44%	77%	100%	98%	83%
Total	27%	61%	84%	96%	96%	80%

Green highlighted cells indicate occupancy below one third; Red highlighted cells indicate >85% occupancy

Figure 4-3 and Figure 4-4 below presents graphs of parking occupancy recorded across the Tuesday survey period and Saturday survey period, respectively, and provide a clearer picture of the change in parking demand recorded across the day.

Figure 4-3 shows that occupancy is consistently around 90% from 12 noon – 3 pm for all parking areas, and while a significant dip in total demand occurs after 3 pm until around 6 pm, this dip in demand almost entirely occurs in CP15.

Figure 4-3: Surveyed parking occupancy – Carnegie, Tuesday 25 July 2017



Similarly, Figure 4-4 illustrates that Saturday parking demand is generally consistent across all parking areas during peak periods from 11 am – 1 pm, however parking demand at CP15 is noticeably lower earlier in the

day, suggesting that CP15 is in a less desirable location for parking in comparison to the comparably sized CP14.

Figure 4-4: Surveyed parking occupancy – Carnegie, Saturday 29 July 2017

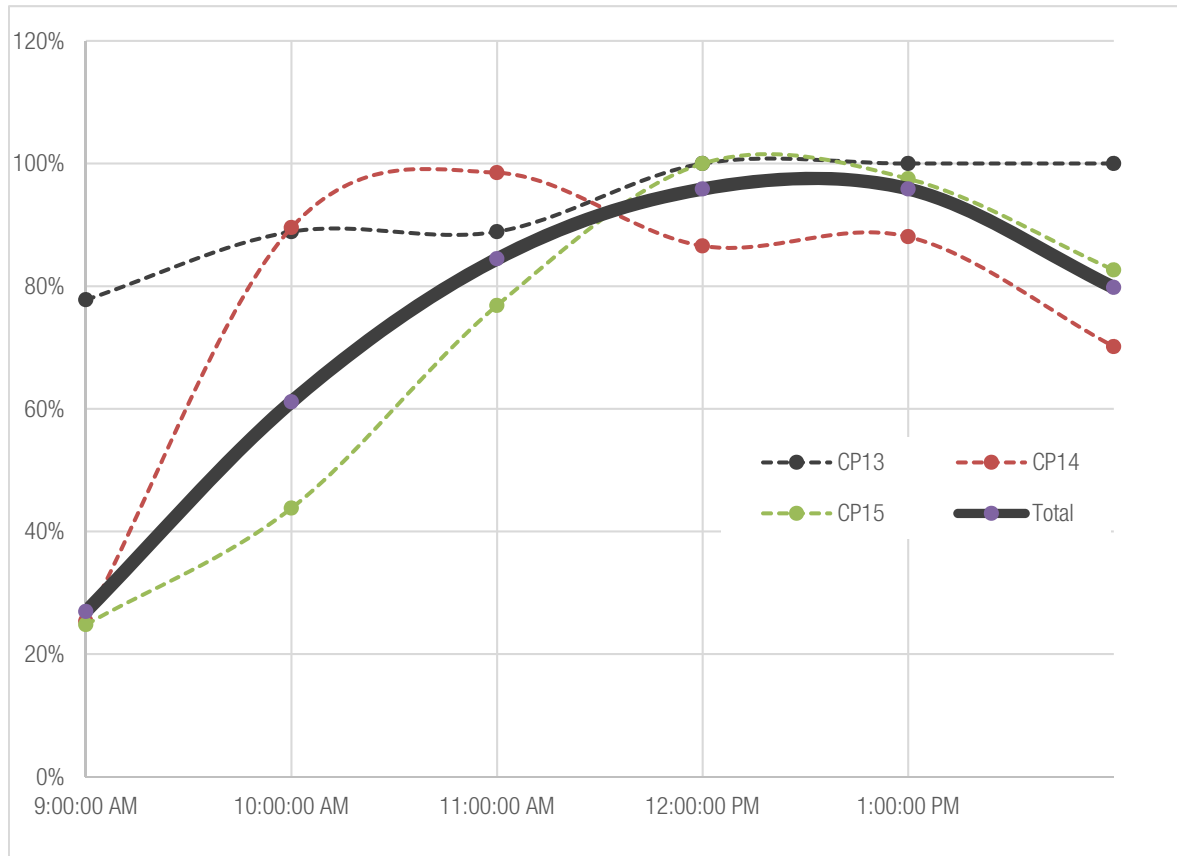


Figure 4-5 outlines the average 4-hour peak parking occupancy for the Tuesday and Saturday survey periods. The average 4-hour peak occupancy is a metric that is often used as a reference to judge whether additional parking management strategies, including priced parking, are warranted. The average 4-hour peak occupancy represents the average of the four highest hourly parking occupancies recorded across the day. The four highest parking occupancies do not have to occur across consecutive hours. Generally, if the average 4-hour peak occupancy is greater than 85%, then further parking management strategies should be considered.

Figure 4-5: Average peak occupancy across carpark locations, Carnegie Activity Centre

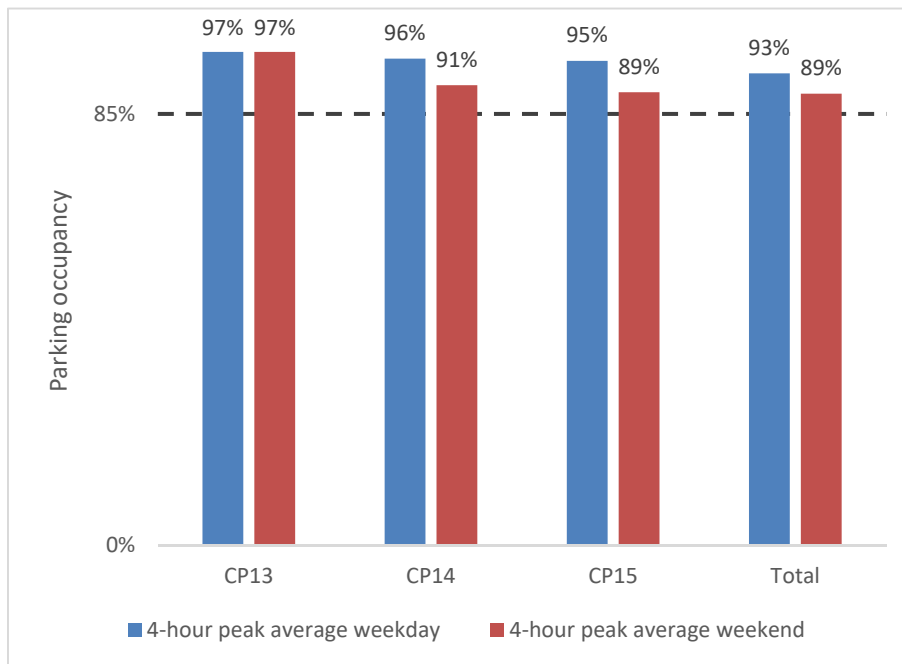


Figure 4-5 shows that Tuesday parking occupancy at 93% comfortably exceeds the 85% threshold, suggesting that there is a strong basis for introducing management tools such as pricing if current levels of supply are maintained. Saturday parking occupancy at 89% lends further support to rationale for an expansion of parking management strategies, and given that parking occupancy exceeds the 85% threshold in all three surveyed parking facilities during both Tuesday and Saturday survey periods, there is little scope for existing facilities to cater for greater demand. This suggests that demand management strategies such as pricing are required.

It is noted that parking surveys do not cover on-street locations. Demand for on-street parking spaces in town centres is generally than off street locations due to convenience, and as such this may mean that survey results somewhat under-represent true demand for parking.

4.3.4 Impacts of parking facilities on public realm quality

The extent of surface parking provision in the Activity Centre is having some negative impact on the quality of the public realm. Significant space is devoted to surface parking within accessible public transport catchments and the walkable catchment of the main street. This is contributing to a somewhat dispersed and disjointed main street environment that feels disconnected from surrounding residential catchments (see Figure 4-6).

Large car parks on Kokarrib Road separate the existing Woolworths from surrounding nearby frontages, may discourage multi-destination trips on foot, and provide poor amenity to adjoining residences. The location of these parking areas behind the main street shops is somewhat redemptive in that it helps create consistent and unbroken frontages on Koornang Road, however this is at the expense of surrounding streets and the significant car park frontages of Shepparson Avenue and Kokarrib Road combine to create an activity centre environment that offers a poor pedestrian experience for people walking to and from the main street from nearby residences.

Common issues inherent to town centre environments dominated by surface parking are present in Carnegie, including a lack of 'eyes on the street', unamenable and uninteresting walking environments, poor landscaping and lack of shade.

Figure 4-6: Significant car parking frontage on Kokarrib Road



The impact of these parking facilities is at odds with several aspects of Council's Building Transition Plan Background Report for Carnegie, in particular:

- Policy Direction, Transport: "Due to broader catchment, driving to the centre is required, however aim for majority of visits to be accessible by public transport, foot or bike.
- Objective, Placemaking: Support a network of urban laneways, active streets and shared community and open spaces
- Objective, Placemaking: Support safe, accessible and friendly streets
- Objective, Transport: Encourage walking, cycling and use of public transport
- Objective, Transport: Explore innovative approaches to car parking and traffic management.

4.3.5 Providing for future parking needs

Non-Residential Parking

Quantifying future parking needs is somewhat difficult as it requires balancing various factors including demand, ability to provide supply, support for pricing and management mechanisms, and broader transport, movement, urban form and character considerations.

It will be necessary to maintain an appropriate level of parking supply in Carnegie to support accessibility for people who genuinely rely on travel by private vehicle, however more broadly, parking policy should be treated as a tool that must support the urban form, sustainable transport and public realm visions for the precinct.

The Glen Eira Economic Analysis and Forecasting Study¹¹ recommends that there are no strategically significant development sites with the activity centre, suggesting there is limited opportunity for Carnegie to support further retail growth and hospitality growth. Notwithstanding, it is prudent to give consideration to some level of retail and hospitality growth that may occur as residential uses intensify, and as such this assessment considers the impact on parking supply associated with a proportionate increase in retail and hospitality floor space of 10%.

Table 4-9 below provides an assessment of potential future non-residential parking needs based on Council's Cl. 52.06 parking rates, and maximum parking rates outlined in Complete Streets and the TOD Guidelines.

¹¹ Add full reference

Table 4-9: Potential additional future non-residential parking needs

	Total Commercial Floor Area	Glen Eira Planning Scheme (min)	Complete Streets 1 / 100 (max)	TOD Guidelines 1 / 200 (max)
Current Parking Needs	28,087 m ² GFA	1,118	281	140
Additional Future Parking Needs (10%)	2,809 m ² GFA	112	28	14
Future Parking Needs	30,896 m ² GFA	1230	309	154
Existing Parking Supply	-	1059 (see Table 4-2)		

Table 4-9 clearly highlights the disparity between existing parking provision regulations and best practice approaches to parking supply in Activity Centres.

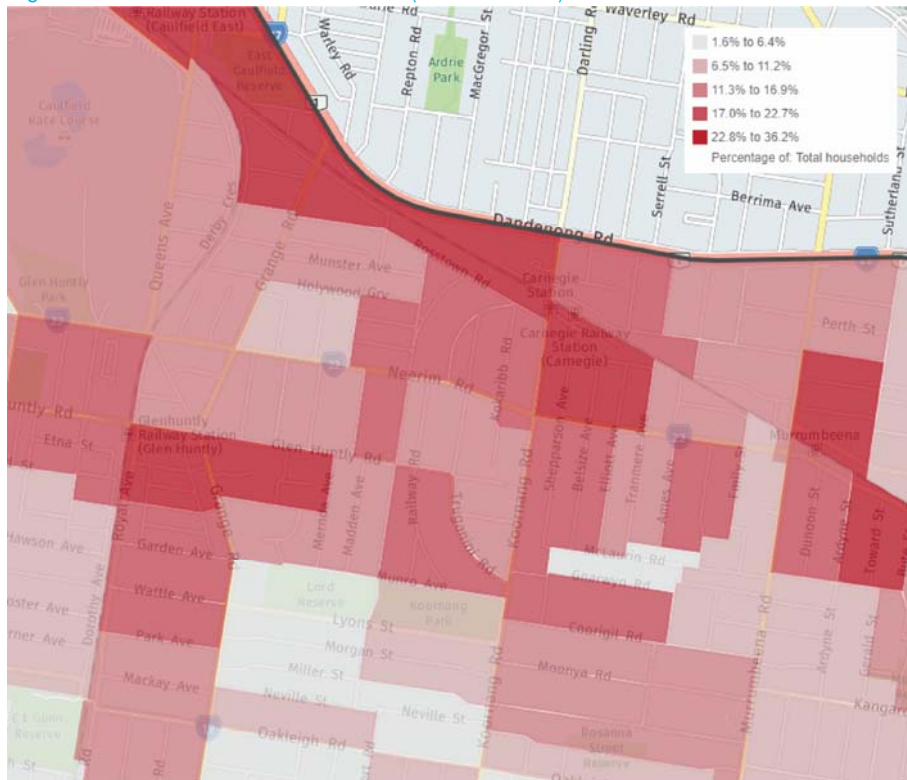
Reconciling this with observations that existing parking supply is generally well utilised requires consideration of the policy intent behind these differing rates of parking provision. Minimum parking rates such as Council's Cl. 52.06 rates are designed to provide parking supply that matches demand, essentially ensuring parking does not become a scarce resource. This however removes a potential signal to encourage people to alter parking behaviour and travel choices. The unintended consequence of this is that the extent of parking supplied in adherence to minimum parking rates significantly detracts from the vibrancy and quality of the public realm, and excessive space allocated to parking can crowd out the potential for greater active travel participation.

Conversely, maximum parking rates such as those adopted within Complete Streets and the TOD Guidelines do not necessarily seek to fully cater to unmanaged parking demand, but rather seek to provide an appropriate level of parking that is congruent with desired outcomes for walkability, active travel, mode share and footpath activity. A suite of demand management initiatives such as priced parking, car share schemes, unbundled parking, and shared parking are generally employed to manage demand in conjunction with the adoption of maximum parking rates.

Residential Parking

Recent Census data (2016) shows that 13.1% of households in Carnegie do not own a car, which is notably higher compared to the whole of Glen Eira (8.9%) and Greater Melbourne (8.5%). Furthermore, review of available 2011 Census data mapping for Carnegie shows car-free households are even more prevalent in the activity centre precinct, as shown in Figure 4-7, with the proportion of car-free households exceeding 25% in some areas. This suggests there is a significant appetite for housing options without bundled parking (and the associated cost) within the activity centre precinct given the available services, PT provision, social infrastructure and retail activity.

Figure 4-7: Households without a car (2011 Census)



Source: atlas.id

The Glen Eira Planning Scheme requires a minimum of 1 spaces for every dwelling/unit, even where an overlay applies. As intensification and redevelopment of the activity centre occurs, there is likely to be some demand for car-free housing options. Planning policy that does not cater to this demand will impose unnecessary costs on housing provision and may encourage higher car ownership and usage.

4.4 Assessment: intensification of development around rapid transit

4.4.1 Recent development trends

Recent infill development in the Activity Centre can generally be characterised as small-medium scale, medium-high density development. Planning approval data presented by id Consulting¹² from 2006-2016 shows a fairly consistent spread of new permits around the main street retail area, albeit with some clustering around Carnegie Railway Station, while development around the existing tram service on Truganini Road has been relatively minor. Development yields of between 10 and 40 dwellings are typical, punctuated by several larger developments with yields of greater than 40 dwellings. Between 28 August 2013 and 8 June 2017, 37 planning permits were issued for buildings of 3 or more storeys in the Carnegie Activity Centre, as outlined in Figure 4-8 below, including a number that are now under construction. Most approvals relate to buildings of 3-4 levels (albeit with two approvals for buildings of 9-13 storeys), and some of these permits relate to multiple blocks.

Figure 4-9 provides an example of a recently completed multi-unit dwelling near Carnegie Rail Station that is representative of new development in the activity centre.

¹² Id Consulting (2017), *Analysis of housing consumption and opportunities*.

Figure 4-8: Planning permits (3 or more storeys) from 23/08/2013 to 08/06/2017

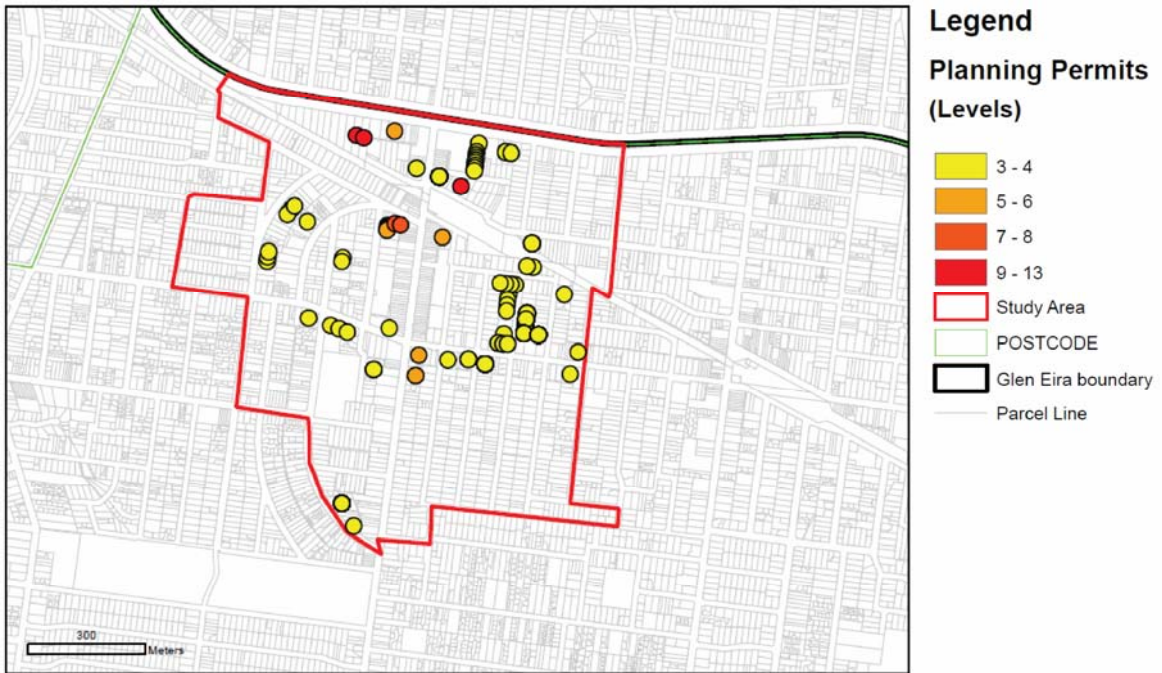


Figure 4-9: Multi-unit dwelling representative of recent development adjacent to Carnegie Rail Station



Further infill development within the Carnegie activity centre, and particularly within walkable distances from quality public transport, will be beneficial in terms of fostering main street activity and capitalising on investment in public transport improvements.

A 2006 study¹³ by Newman and Kenworthy provides some context to inform an assessment of activity density within Carnegie, and to what extent further infill development is required in order to realise Council's and the community's vision for the precinct. The study reviews the relationship between population density, job density and motor vehicle use in various Australian and international cities, and concludes that there is a fundamental threshold density of approximately 35 persons per hectare plus 35 jobs per hectare where motor vehicle dependence is significantly reduced. That is, once this threshold urban intensity is reached, viable public transport and diversity of land uses within a walkable distance tend to result in reduced car use in urban areas. This is an instructive minimum benchmark that should inform plans for the intensification of the Carnegie Activity Centre.

Table 4-10 outlines the existing population and job density within a walkable distance to quality public transport in the Carnegie Activity Centre. The data highlights that while population density is generally at requisite levels to support local activity and a reduction in car dependency, employment density is significantly lagging, suggesting some infill development of existing surface parking would be beneficial. The substantial drop in population density with a 5-minute walkable catchment of Carnegie Rail Station in comparison to a 10-minute catchment is also somewhat of concern, and suggests some additional shop top main street development and infill development at higher density would be welcome.

Table 4-10: Population and employment density within walkable catchment of transit stops – Carnegie

Catchment	Walk Time	Jobs # (% of total activity centre)	Population # (% of total activity centre)	Area (sqm)	Population Density (person / Ha)	Job Density (jobs / Ha)
Carnegie Rail Station	5 min	167 (15%)	419 (9%)	135,172	31	12
Carnegie Rail Station	10 min	743 (67%)	3,093 (63%)	573,295	54	13
Tram stops	5 min	131 (12%)	783 (16%)	184,758	42	7
Tram stops	10 min	642 (58%)	2,700 (55%)	562,573	48	11
Carnegie Activity Centre Area (as defined by Glen Eira City Council)	-	1,113 (100%)	4,899 (100%)	951,209	52	12

4.5 Assessment: ensuring cycling plays its role

4.5.1 Recent trends in cycling activity

Cycling is a minority mode of transport to access Carnegie, despite the flat topography and an orthogonal street pattern of the centre and its surrounding suburbs, which is conducive to cycling. Most people accessing the town centre by car and on foot. The low cycling activity is demonstrated by a number of surveys.

The recent Shopping Strip Survey¹⁴ of Glen Eira residents indicated that around 17% of people access Carnegie by cycling or using public transport. The results did not distinguish between these two modes. This

¹³ Peter Newman and Jeffrey Kenworthy (2006) "Urban Design to Reduce Automobile Dependence", *Opolis: An International Journal of Suburban and Metropolitan Studies*: Vol. 2: No. 1, Article 3.

¹⁴ Shopping Strip Survey (2017) Glen Eira City Council.

figure is reiterated by the results of the car park survey of Carnegie¹⁵ show that around 30% of people who drive to the town centre reside in surrounding suburbs which are within easy cycling distance.

As a proportion of Carnegie train station users, people who cycle are a very small minority of around 0.5%¹⁶. This is similar to most other Melbourne stations that have similar levels of patronage (with between 500,000 and 1.5 million annual boardings for 2013-2014), and also similar to stations within Glen Eira. Most Melbourne stations have a cycle access mode share of 2% or below. 14 stations have numbers above 2%, including Patterson within Glen Eira at around 4%.

Super Tuesday cycle counts sites in and around activity centre show low to moderate numbers of cyclists when compared with the busiest sites in Glen Eira. Three sites immediately outside the study area recorded 93, 91 and 112 cyclists respectively over the two-hour morning peak in the 2016 survey, while over 200 were counted at the busiest sites in the north west of the municipality.

4.5.2 Current state of cycling facilities

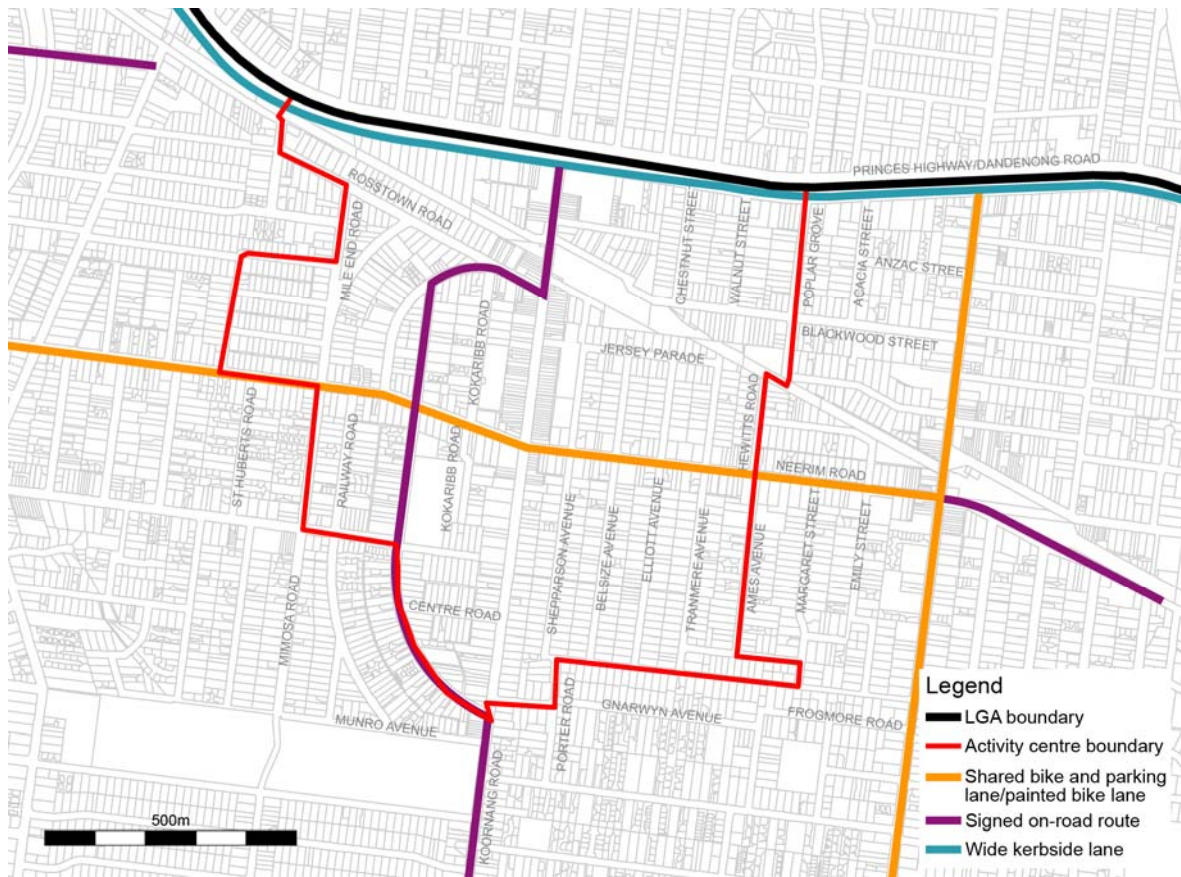
Cycling facilities in Carnegie are limited, with most facilities not meeting best practice standards. The routes identified in the municipality's Cycling Guide¹⁷ are signed on-road routes, shared cycle and parking lanes and wide kerbside lanes, as is summarised in Figure 4-10. Existing facility types do not facilitate all ages and abilities cycling for transport. The north-south route through the town centre, while it may use quieter streets, it has no specific cycle facilities and exposes people on bicycles to conflicts with parked cars. The shared cycle and parking lane along Neerim Road only provides a reasonable quality of service for people on bikes when no cars are parked in the lane; when parked cars are present a conflict between users is generated. While the local access lanes which occur intermittently along Princes Highway provide a useful, low-speed for people on bicycles, they are not specifically designed for cycling. Facilities where a wide kerbside lane occurs adjacent to high speed, high volume traffic without any physical protection should not be considered cycling infrastructure.

¹⁵ BWEC (2017) *Glen Eira Economic Analysis and Forecasting Study*. Melbourne: Glen Eira City Council.

¹⁶ Public Transport Victoria Train Station Patronage fact sheet. Available at: <https://www.ptv.vic.gov.au/about-ptv/ptv-data-and-reports/research-and-statistics/>. Accessed 27 July 2017.

¹⁷ City of Glen Eira (2005) *Cycling Guide*. Melbourne: Glen Eira City Council.

Figure 4-10: Existing cycling infrastructure network



4.5.3 Providing for future cycling needs

The planned increase in residential density along Koornang Road and to the north of the study area between the rail line and Dandenong Road could lead to increased demand for cycling trips around and to/from Carnegie, especially if other planning and design measures are taken to encourage reduced car dependence. The elevation of the rail line will result in the creation of a 12km long shared path which will pass through the Carnegie town centre and form an important trunk cycling route. Key destinations for cyclists in Carnegie include the train station, the retail strip including anchor stores such as the Woolworths supermarket and local schools.

4.6 Assessment: working toward vision zero road deaths and serious injuries

4.6.1 Recent trends in road crashes

A total of 42 crashes were recorded within the Carnegie study area between 2012 and 2017, causing a total of 14 deaths and serious injuries, as detailed in Table 4-11. Of the six deaths and serious injuries, 4 involved pedestrians while 2 involved cyclists.

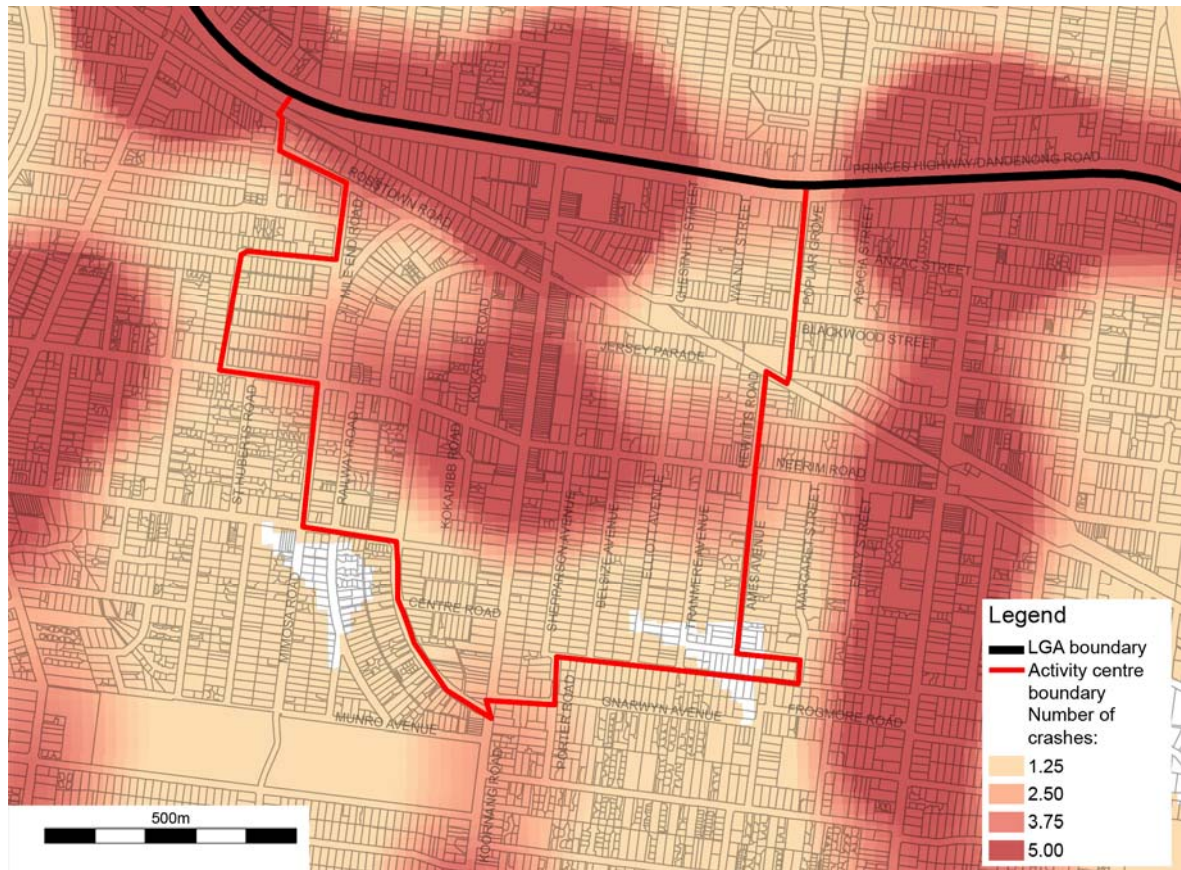
Table 4-11: Summary of crashes in Carnegie 2012-2017 by street user type

Street users type	Number of crashes	Number of people killed or seriously injured
Pedestrian	8	4
Cyclist	7	2
Motor vehicle occupant	27	8

Total	42	14
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Crashes causing injury and fatalities in the study area are clustered along Princes Highway and Neerim Road, where traffic volumes for all modes are highest, particularly at intersections (refer Figure 4-11). Neerim Road's 85th percentile traffic speed (for which data was available) is equal to the speed limit at 60km/h¹⁸. More detailed analysis would be required to establish whether speed is an important factor in crashes locally, however best practice safety for vulnerable street users would be to lower the speed limit 40 or 50km/h.

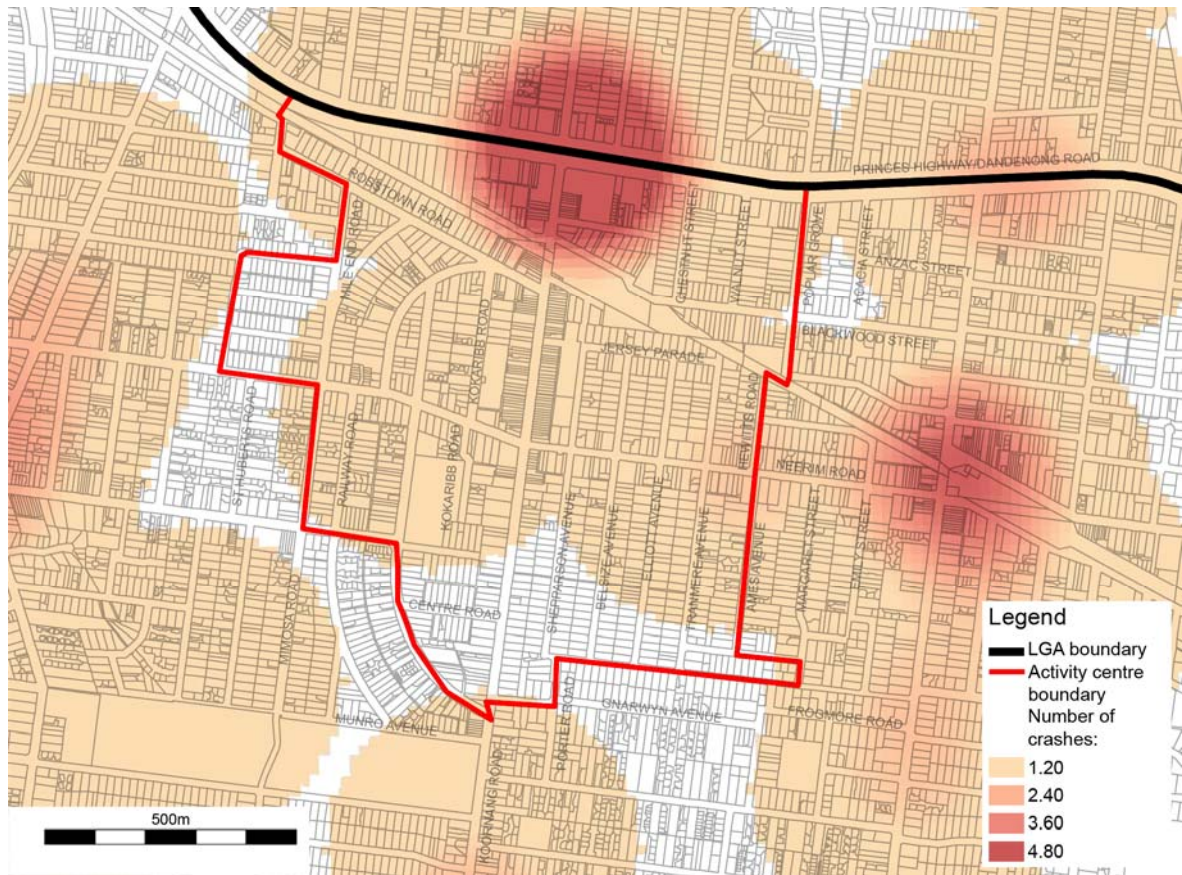
Figure 4-11: Heat map of crashes causing injury and death (all street users) in Carnegie, 2012-2017 (source: VicRoads CrashStats)



¹⁸ Glen Eira City Council (2014) Vehicle Volumes database.

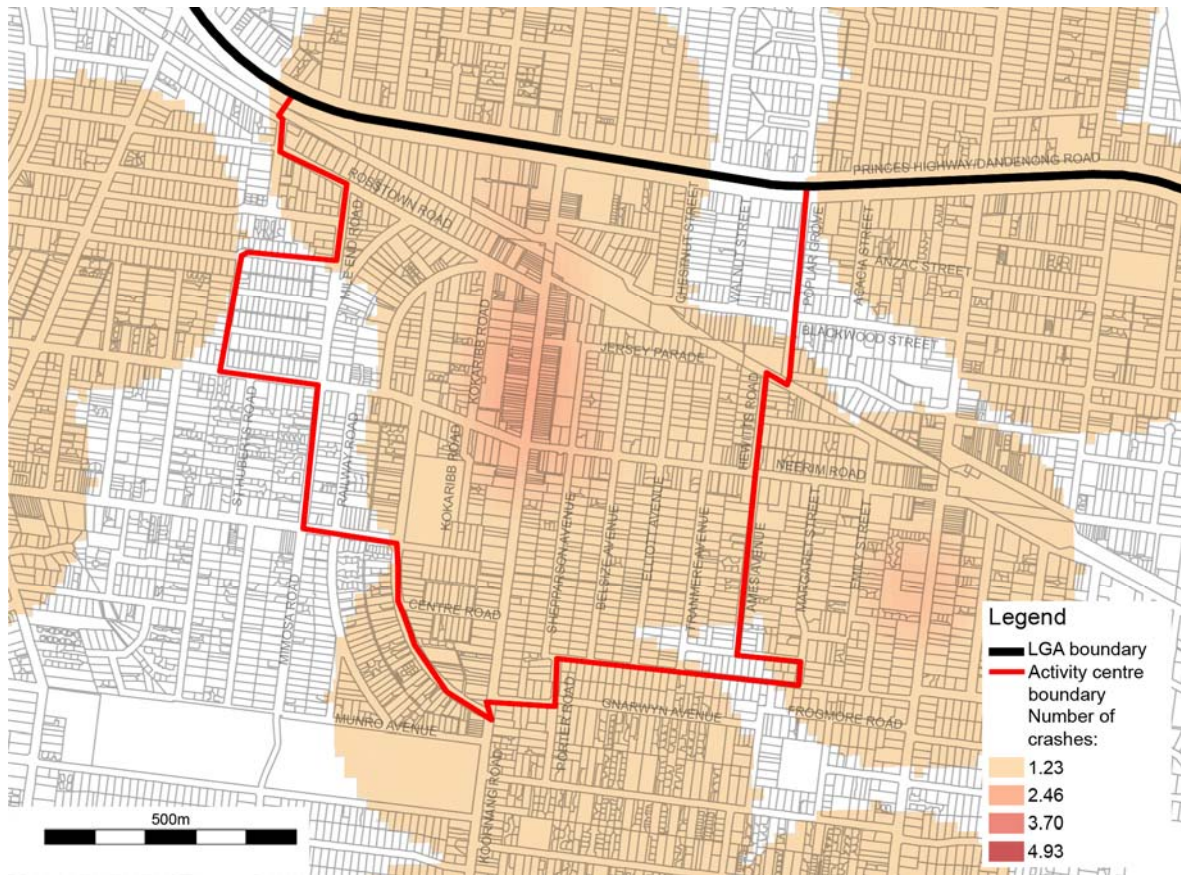
Crashes involving pedestrians are strongly clustered around the intersection of Princes Highway and Koornang Road (refer Figure 4-12).

Figure 4-12: Heat map of number of pedestrians involved in crashes causing fatalities or serious injuries in Carnegie, 2012-2017 (source: VicRoads CrashStats)



Cycle-related crashes are less prevalent than in other parts of the municipality, but are most common within the activity centre along Koornang Road (refer Figure 4-13).

Figure 4-13: Heat map of number of cyclists involved in crashes causing fatalities or serious injuries in Carnegie, 2012-2017 (source: VicRoads CrashStats)



Additionally, crashes at level crossings of rail lines involving people in vehicles as well as on foot are common in Victoria. 192 collisions with vehicles and 51 collisions with pedestrians were recorded for the period 2002-2012, the which contributed to the 139 people killed and 596 injured in rail accidents for the same period.

4.6.2 Current safety of the street network

Speed limits on Carnegie's streets are mostly 50km/h regardless of the street function. Exceptions are Koornang Road, which has a 40km/h speed limit between 7:00 AM and 12:00 midnight and Neerim Road, which as a speed limit of 60km/h as it passes through the town centre. High compliance rates of all posted speed limits are recorded, suggesting that changes to infrastructure design and reductions in speed limits may induce changes in driving behaviour¹⁹. The street network accommodates private vehicles, public transport and walking and cycling, although the balance of priority is tilted toward private vehicles. This is evident in various design parameters, including street geometry, signal phasing, streetscape design and the provision of parking. Public transport, walking and cycling is marginalised in places, diminishing safety for all street users and discouraging the use of alternative modes which have a low impact on their surroundings and contribute positively to public life.

The level crossing of Koornang Road in Carnegie introduces an added safety risk for both pedestrians and people in road vehicles.

¹⁹ Glen Eira City Council (2017) Vehicle Volumes database.

4.6.3 Future road safety outcomes

Glen Eira City Council actively reviews and lowers speed limits on selected streets, which could lead to improvements in road safety. For example, a reduction in the speed limit of some lengths of Neerim Road in Carnegie is currently being consulted on (mid-2017). The Council proposes to lower the speed limit from 60 to 40km/h between Murrumbeena and Hobart Roads and from 60 to 50km/h between Hobart and Poath Roads.

The Caulfield to Dandenong level crossing removals project (under construction as of mid-2017) will remove the risk of crashes between trains and all street users at street level. Improving safety is one of the core drivers of the project along with reducing road traffic congestion.

Ongoing improvements to road infrastructure including safer walking and cycling facilities may have positive impacts on safety outcomes for vulnerable road users.

4.7 Assessment: attractive congestion-free networks

4.7.1 Recent trends in public transport patronage

The Carnegie Activity Centre is well serviced by public transport in the form of bus, tram and train routes, as illustrated in 626 Middle Brighton - Chadstone via McKinnon, Carnegie

- 900 Rowville - Caulfield via Monash University, Chadstone (SMARTBUS Service)
- 969 Night Bus - City - Caulfield - Ferntree Gully Rd - Rowville - Wantirna - Ringwood

Figure 4-14. Existing PT provision includes:

- Carnegie Rail Station (Cranbourne and Pakenham Line)
- Tram Routes
 - 67 Melbourne University - Carnegie
- Bus Routes
 - 623 Glen Waverley - St Kilda via Mount Waverley, Chadstone, Carnegie
 - 624 Kew - Oakleigh via Caulfield, Carnegie or Darling, and Chadstone
 - 626 Middle Brighton - Chadstone via McKinnon, Carnegie
 - 900 Rowville - Caulfield via Monash University, Chadstone (SMARTBUS Service)
 - 969 Night Bus - City - Caulfield - Ferntree Gully Rd - Rowville - Wantirna - Ringwood

Figure 4-14: Existing PT services in Glen Eira



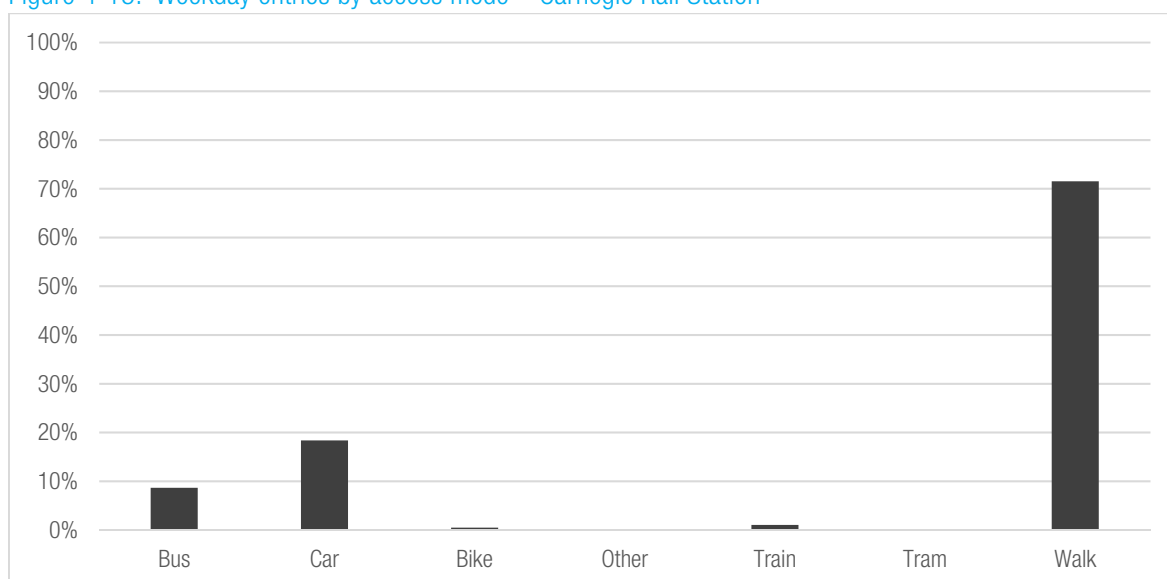
Patronage data for rail stations in Glen Eira is provided in Table 4-12 below. Patronage at Carnegie Station is strong, with patronage generally trending towards growth from 2010-2014. Council should continue to monitor patronage data to assess the impact of ongoing upgrades of the station as part of the State Government's level crossing removal project, including an appropriate period of time post-completion to account for typical gradual ramping up of patronage numbers.

Table 4-12: Annual train patronage (millions) by financial year

Station	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Bentleigh	0.990	1.029	1.006	0.898	N/A	0.785
Carnegie	0.831	0.860	0.894	0.829	N/A	0.951
Elsternwick	1.008	1.047	1.069	1.004	N/A	1.075

Public Transport Victoria conducted passenger behaviour surveys in 2013-14 determining how passengers access transit stops. Figure 4-15 below shows results of the survey for Carnegie Train Station. The survey results indicate a very high proportion (72%) of passengers arriving at Carnegie Station do so by walking.

Figure 4-15: Weekday entries by access mode – Carnegie Rail Station



Source: PTV Passenger Behaviour Survey, 2013-2014

Metropolitan bus services provide quality coverage to support the rail service and provide connections to key destinations such as Chadstone and Monash University. Patronage data for bus routes servicing the activity centre is shown in Table 4-13 below. The 623, 624 and 626 services provide important coverage and accessibility and have reasonable patronage, while the 900 service receives very strong patronage.

Table 4-13: Metropolitan bus patronage – Financial year 2014 to 2015

Route Number	Route Name	Annual Patronage 2014 to 2015	Average Weekday 2014 to 2015	Average Saturday 2014 to 2015	Average Sunday 2014 to 2015
623	Glen Waverley - St Kilda via Mount Waverley, Chadstone, Carnegie	591,992	1,926	961	755
624	Kew - Oakleigh via Caulfield, Carnegie or Darling, and Chadstone	684,531	2,309	888	685
626	Middle Brighton - Chadstone via McKinnon, Carnegie	308,702	1,001	531	381
900	Rowville - Caulfield via Monash University, Chadstone (SMARTBUS Service)	1,876,335	5,789	3,931	3,095

4.7.2 Current state of public transport networks and facilities

Carnegie Rail Station is currently undergoing significant upgrades as part of the State Governments level crossing removal initiative.

Bus stops along Neerim Road and Koornang Road are only of average and sometimes low quality and generally lack amenity, quality shelter, seating, and clear service information (see Figure 4-16). The 623 bus service is wheelchair accessible, however wheelchair access on other services is at best intermittent, and the

67 tram is not accessible. Service frequencies are only average, although the 67 tram service is approaching 'timetable free' frequencies of 10-15 minutes throughout the day. Typical bus service frequencies are however upwards of 30 minutes, albeit with some additional services during morning and afternoon peaks.

Figure 4-16: Bus stop with poor amenity, lack of shelter and seating (Neerim Road, adjacent Koornang Road)



4.7.3 Providing for future public transport needs

Public transport in the activity will need to provide quality service consistent with Council's vision for increased local activity and vibrancy coupled with reduced car dependence as intensification of the activity centre occurs. Planned growth in the centre will require supporting public transport that may require improvements to bus and train service capacity and quality.

Metropolitan Train Load Standard Surveys are conducted once a year in May by Public Transport Victoria to measure passenger loads against benchmark standards of capacity. The survey helps identify times and locations where passenger loads exceed benchmark standards. The results are used to determine when and where extra services may be needed to reduce crowding. Results from 2016 are outlined in Figure 4-17 and Table 4-14 below. As shown below, a significant proportion of AM peak train services are below benchmark standards. This may have some discouraging effect on increased patronage growth in the future.

Figure 4-17: Number of AM Peak services below and above benchmark levels – Dandenong Corridor

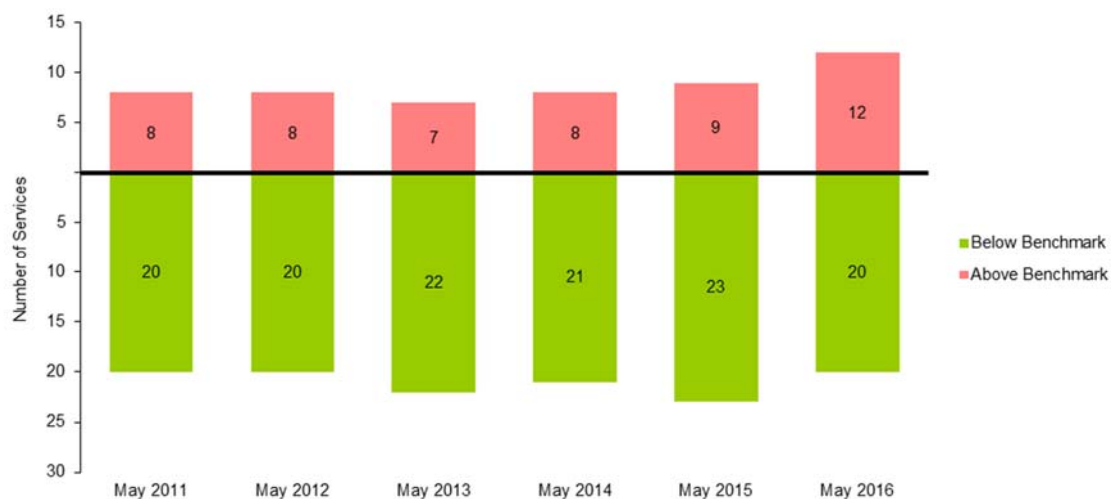


Table 4-14: AM Peak services above benchmark levels and percentage of passengers travelling on services above benchmark levels – Dandenong Corridor

	May 2011	May 2012	May 2013	May 2014	May 2015	May 2016
Number of AM Peak services above benchmark	8	8	7	8	9	12
% of AM Peak services above benchmark	28.6%	28.6%	24.1%	27.6%	28.1%	37.5%
% of AM Peak passengers on services above benchmark	36.1%	36.0%	32.6%	35.5%	39.3%	47.4%

5 Key challenges and opportunities

The assessment in the previous chapter highlights several key challenges for working toward the six policy directions and opportunities to build off current successes. Table 5-1 summarises challenges and opportunities across the six policy directions that were used to structure the assessment in the previous chapter:

- Challenges notes factors that will make it difficult to achieve policy goals and that are realities that will need to be addressed in developing interventions that shift current trends
- Opportunities notes areas where relatively small-scale or low-cost interventions may result in significant change or where Carnegie can build off existing good conditions.

These challenges and opportunities are used to develop a series of recommended interventions in the following chapter.

Table 5-1: Key challenges and opportunities for the transport sector, Carnegie Activity Centre

Policy direction	Key challenges	Key opportunities
<i>Put walkability first</i>	<p>Long trip distances to major employment centres results in limited use of walking for commuting trips.</p> <p>Presence of some major barriers that reduce the connectivity of the walking network; Dandenong Road.</p>	<p>Very high levels of existing walking to the activity centre for accessing shops and rail station (50-70% mode share).</p> <p>Increased pedestrian permeability accompanying elevated rail project.</p> <p>Intensification of population and employment will provide a greater diversity of local services for more people, make walking a more viable choice.</p> <p>High student population living near to university campus mean walking is an easy access option.</p>
<i>Manage parking for town centre vitality and to support mode shift</i>	<p>Managing increased demand for parking accompanying residential and commercial development and population growth.</p> <p>Making trade-offs between kerbside space for parking and other uses such as cycling lanes, tram priority and extended footpaths.</p> <p>Ensuring parking is not 'over-supplied' through application of minimum parking regulations accompanying new development, or through over-supply of public off-street parking facilities.</p>	<p>Potential to consolidate parking supply at Council-owned with multi-story parking buildings.</p> <p>Potential to re-purpose on-street parking on Koornang Road.</p> <p>Potential to reduce council land devoted to off-street parking.</p> <p>Potential to reduce parking demand through increasing use of walking, cycling and PT.</p> <p>Potential to use new parking management tools such as pricing to manage demand.</p>
<i>Intensify development around rapid transit</i>	<p>Ensuring intensification is accompanied by improvements to local amenity and is not accompanied by congestion on local transport networks.</p> <p>Encouraging increased job density alongside residential population density.</p>	<p>High market demand for residential development around rapid transit reflected in highest recent level of development activity in Glen Eira.</p>

<p><i>Ensure cycling plays its role</i></p>	<p>Limited provision of a connected, safe cycling network limits uptake of cycling to a niche user group.</p> <p>Relatively high number of cycle crashes in area.</p> <p>Reallocation of kerbside space for improved cycling facilities will require trade-offs with provision of on-street parking and other potential uses such as extended footpaths.</p>	<p>Provision of safe cycling facilities alongside rail elevation project.</p> <p>Low existing cycle mode share means major opportunities for growth.</p> <p>Flat terrain supports increased cycling uptake.</p> <p>Reasonably high levels of activity density means a diversity of destinations are available with short trips, well-suited to cycling.</p> <p>Provision of high quality infrastructure can lead to major increases in cycling demand.</p>
<p><i>Work toward 'vision zero' road deaths and serious injuries</i></p>	<p>Reducing road crash deaths and serious injuries, particularly pedestrian and cyclist crashes on Glen Huntly Road.</p> <p>Lowering speed limits will require trade-offs with other goals for high speed vehicle movement.</p>	<p>Walking and cycling facility upgrades can improve safety.</p>
<p><i>Plan for attractive congestion-free networks rather than reducing congestion</i></p>	<p>Major mode shift to public transport depends on the quality and connectivity of broader metropolitan-scale networks.</p> <p>High levels of current overcrowding may be reducing the appeal of rail.</p>	<p>Opportunities for tram extensions to better serve the town centre.</p> <p>Future improvements to Carnegie Station and increased rail frequencies accompanying Melbourne Metro project will make rail more attractive.</p>

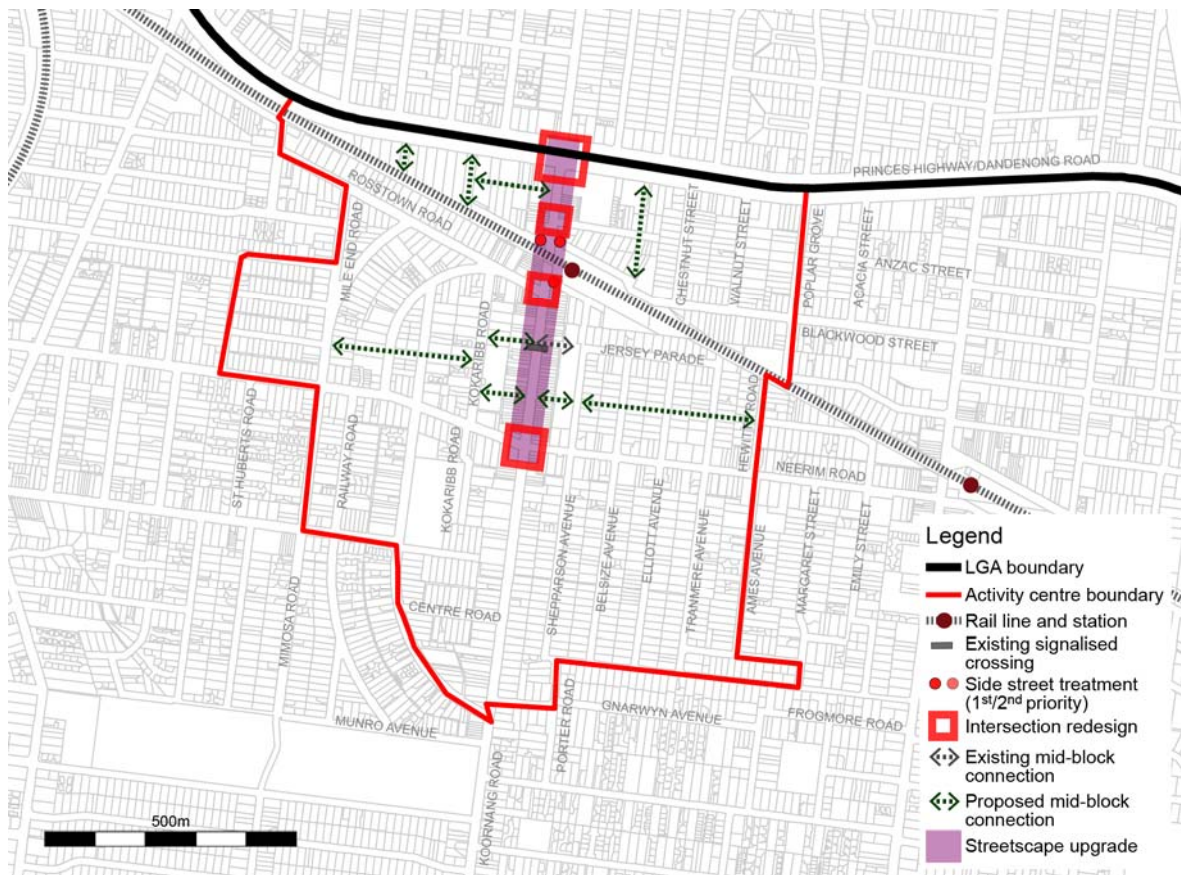
6 Potential interventions

6.1 Potential interventions: putting walkability first

Improving conditions for walking is central liveability and function of Carnegie, particularly in the context of demographic and land use change. The requirement to complete at least part of every journey on foot and the vulnerability of pedestrians in the street environment mean that walking should maintain the highest position when prioritising modes. A safe, convenient, comfortable and attractive walking environment results in improved safety for all street users. With appropriate network and street design, will also result in improved levels of service for cycling and public transport and a reduction in car use and dependence locally.

Interventions in Carnegie focus on improving pedestrian safety and connectivity through new walking connections, a streetscape upgrade, signalised intersections redesigns and side street treatments. Potential interventions are summarised in Figure 6-1.

Figure 6-1: Potential walking interventions



Opportunities for new walking connections should be realised as part of the potential development of parts of Carnegie's centre on the strategic sites and urban renewal developments identified in the Carnegie Draft Concept Plans. These connections would improve pedestrian connectivity to Koornang Road and between Dandenong Road, the station and the linear open space due to open as a result of the elevation of the rail line.

A targeted streetscape upgrade should be implemented to improve pedestrian safety and amenity. Interventions include:

- Remove low wall and steel fence pedestrian barriers.
- Introduce more kerb build-outs.
- Plant street trees and mass planting.

Improvements to pedestrian safety, comfort and convenience can be achieved through installing best practice signalised intersection and side street treatments along Koornang Road in Carnegie. The signalised intersections of Koornang Road with Arawatta Street, Rosstown Road and Neerim Road should be upgraded, including the following measures:

- Re-calibrate signal phasing to minimise pedestrian wait times and maximise crossing times to reduce pedestrian delay and discourage crossing on red.
- Remove through and turning lanes and reduce turning radii to minimise the crossing distance for pedestrians. Smaller turning radii will also encourage lower turning vehicle speeds.

Side street treatments should comprise the following:

- Raised tables which allow pedestrians to cross flush with kerb level.
- Zebra crossings to communicate pedestrian right-of-way.
- Reduced turning radii to minimise the crossing distance for pedestrians and lower turning vehicle speeds.
- Continuity of footpath materials to indicate a continuous path of travel for pedestrians.

6.2 Potential interventions: managing car parking

The assessment of current approaches to parking management in the Carnegie activity centre (see Section 4.3) found that the centre is potentially over-supplied with parking, relative to guidance on appropriate parking supply levels for locations with high levels of public transport accessibility. The centre does nevertheless have lower rates of carparking to commercial space than other Glen Eira centres. High levels of parking may contribute to increased car use, local congestion and negative impacts on pedestrian and public realm amenity. Reforms to parking management in the centre present opportunities to contribute to multiple transport and urban development goals for Glen Eira.

There are opportunities for reforms to:

- Provision of off-street, Council-owned parking
- Provision of on-street parking
- Management regimes for both on- and off-street parking
- Planning regulations for parking provision.

Off-street parking

Glen Eira City Council have identified a number of opportunities for re-purposing and consolidating existing off-street surface parking areas owned and managed by the Council within Carnegie activity centre (see Table 6-1).

Table 6-1: Opportunities identified for repurposing of Council-owned off-street carparks, Carnegie activity centre

Carpark	Opportunity identified by Council for redevelopment
Shepparson Road	Multi-storey carpark and community facility
Kokaribb Road	Underground carpark with greenspace at ground level (potential for collaboration with Woolworths redevelopment).

Replacing current Council-owned surface parking with underground and multi-story carparking buildings will provide a more efficient use of land at these locations with high value for alternative uses. It will also allow for intensification of activity within the centre by freeing up space for commercial and residential redevelopment.

In considering redevelopment of surface carparking lots, we note the following general points:

- Multi-storey parking buildings do not always provide the same functionality as surface lots. Multi-story buildings can introduce additional barriers to potential users (e.g. increased time to find a space) and are likely to be more useful for long-stay rather than short-stay parking. This may reduce demands for parking relative to existing surface lots.
- Ahead of development of multi-storey parking buildings or other replacement uses, Council should improve its understanding of the current use of existing parking facilities. Replacement of parking spaces on a like-for-like basis may not be required, depending on occupancy of current facilities and the future use of management tools such as pricing that may reduce parking demands. Benchmarking of parking supply at Carnegie against best-practice guidelines (see Section 4.3.1) suggests parking supply may be significantly higher than levels that are appropriate in locations such as Carnegie with high levels of public transport accessibility.
- Provision of off-street parking facilities needs to be considered in an integrated way with interventions to on-street parking supply (see below). Enhanced off-street parking facilities may mitigate losses of on-street parking and likewise, more efficient use of on-street parking (e.g. through pricing management tools) may reduce the need for off-street facilities.
- New multi-storey parking buildings should be designed and managed for the widest possible range of uses, including integration with new residential development sites. These car parking buildings should be treated as 'shared' public parking facilities that enable efficiencies in parking supply by providing for complementary demands (e.g. shopping during the day and residents at night).

Parking occupancy is very high at all three surveyed parking facilities in the Activity Centre, however occupancy was generally higher and more consistent at parking area CP13 on Kokaribb Street compared to the Shepparson Road facility (CP15), suggesting that opportunities to multi-storey or underground car park provision should focus on this site, given the communities preference to this location. However, given the scope to manage occupancy through pricing, site selection should ultimately be based on the ability of the project to return the most benefit to the community through public realm and urban form enhancements.

On-street parking

On-street parking is nearly universally provided on all kerbsides either as parallel or angle parking within the Carnegie activity centre. While on-street parking provides valuable access to shops and other facilities within the centre, there may be higher value uses for this kerbside space in some locations and parking demand management or enhanced off-street facilities may enable on-street parking to be re-purposed to enable expanded footpaths, street trees and improved public realm.

The most substantial potential for re-purposing existing on-street, kerbside parking within the Carnegie activity centre is on Koornang Road between Dandenong Road and Neerim Road where pedestrian and public activity is highest.

On the Koornang Road shopping strip there is potential for selected replacement of on-street parking spaces with expanded footpaths, 'parklet' treatments, kerb build outs for alfresco dining and spaces for street trees. These types of interventions can support public life on the street and growth in hospitality business and the night-time economy. Figure 6-2 illustrates an existing alfresco dining area on Koornang Road that has been provided with a kerb built-out. There are opportunities to extend and enhance these types of treatments.

Selected kerb build-outs should also be considered to allow for an avenue of street trees. There are few street trees within the activity centre (see Figure 6-3). Street trees can improve amenity for pedestrians and encourage a more active public life and lingering activity within the centre.

Other options for re-purposing of existing on-street parking space on Koornang Road that have been considered but are not recommended in the short-term are:

- **Replacement of on-street parking space with a separated cycle lane:** while Koornang Road is designated as part of the Principal Bike Network, provision of a separated cycle lane would require a major intervention on the road. Further investigation of the parallel Shepparson Road route for cyclists should be considered.
- **Replacement of on-street parking space with a dedicated bus lane:** current bus frequencies on the road do not warrant provision of a buslane.

Figure 6-2: An opportunity for repurposing kerbside parking for expanded alfresco dining space



Figure 6-3: Lack of street trees on Koornang Road, Carnegie



Parking management

Aside from reforms to off-street and on-street parking supply, there is also potential for changes to the parking management regime to better support policy objectives. On- and off-street parking in the activity centre is currently managed using:

- Time restrictions (e.g. 1P and 2P restrictions)
- Reserved parking (e.g. reserving spaces for particular users such as loading zones, people with disabilities, local residents)
- Accompanying enforcement by council officers of these restrictions.

The major opportunities for reforming the parking management regime at Elsternwick activity centre are:

- **Increased enforcement activity.** If compliance rates are found to be low, additional enforcement can increase parking turnover and ensure that reserved spaces are being used by intended high-value users.
- **Changes to time restrictions.** Parking demand is consistently high in off-street car parks and, while on-street data is not available, it would be expected on-street demand is even higher. Time restrictions of less than 1P would generally not be appropriate in the off-street locations in Carnegie, however Council should consider some widespread introduction of short stay on-street parking (for example, by reducing 1P restrictions to 30 min).
- **Introduction of pricing.** Current occupancy of off-street parking facilities warrants immediate implementation of priced parking. Council should consider implementing a scheme that, rather than restricting length of stay, allow drivers to pay for the time they require, with prices adjusted to manage occupancy as required (with a target of approximately 70-85% set). Priced parking should be applied to both on-street and off-street facilities to avoid distorting demand for one particular form of parking.

Planning regulations for parking provision

Glen Eira City Council's Planning Scheme specifies minimum off-street, on-site parking requirements accompanying development of various types of land-uses. These rates are consistent with standard Victorian rates mandated by the State. However, at Carnegie activity centre these rates may be having negative impacts on:

- Residential and commercial development activity – minimum parking rates can reduce development activity by enforcing a higher rate of parking provision than would otherwise be delivered by market actors in the absence of regulation. This can increase development costs and reduce the feasibility of residential or commercial development.
- Housing affordability – minimum parking rates can increase the cost of residential development, increasing the cost of housing.
- Transport behaviour – minimum parking rates can encourage higher car ownership and use.

At Carnegie activity centre, a location with excellent public transport accessibility and local walking and cycling accessibility to a range of services there is an opportunity for the Council to develop a 'Parking Overlay' covering the activity centre areas that changes the standard State-mandated parking rates. The Parking Overlay may:

- Reduce minimum rates for all or specific types of land uses
- Introduce maximum rates for all or specific types of land uses
- Allow for special provisions such as cash in-lieu payments that allow developers to contribute to development of shared parking facilities rather than private on-site parking.

The accompanying *Re-thinking Parking* Discussion Paper provides further detail on opportunities for reforms to regulation of on-site parking provision, including cash-in-lieu schemes.

In Carnegie, a cash-in-lieu provision requiring financial contribution to be paid in place of providing car parking spaces on-site may provide a funding mechanism for a consolidated public parking facility. The

required financial contribution should relate to the actual cost of providing a car parking space such that the public are not simply excessively subsidising developers' responsibilities to fulfil planning scheme requirements (i.e. when contributions are significantly lower than the real cost of providing parking), nor are developers offered no incentive to reduce on-site parking provision (i.e. when contributions are higher than the real cost of providing parking on-site). Council may identify significant benefits associated with consolidated parking facilities identified in Carnegie, in which case a reduced rate of contribution may be prudent to incentivise contribution to the cash-in-lieu scheme rather than compliance with on-site minimum parking rates.

The amount of money that can be leveraged from cash-in-lieu schemes depends on four factors:

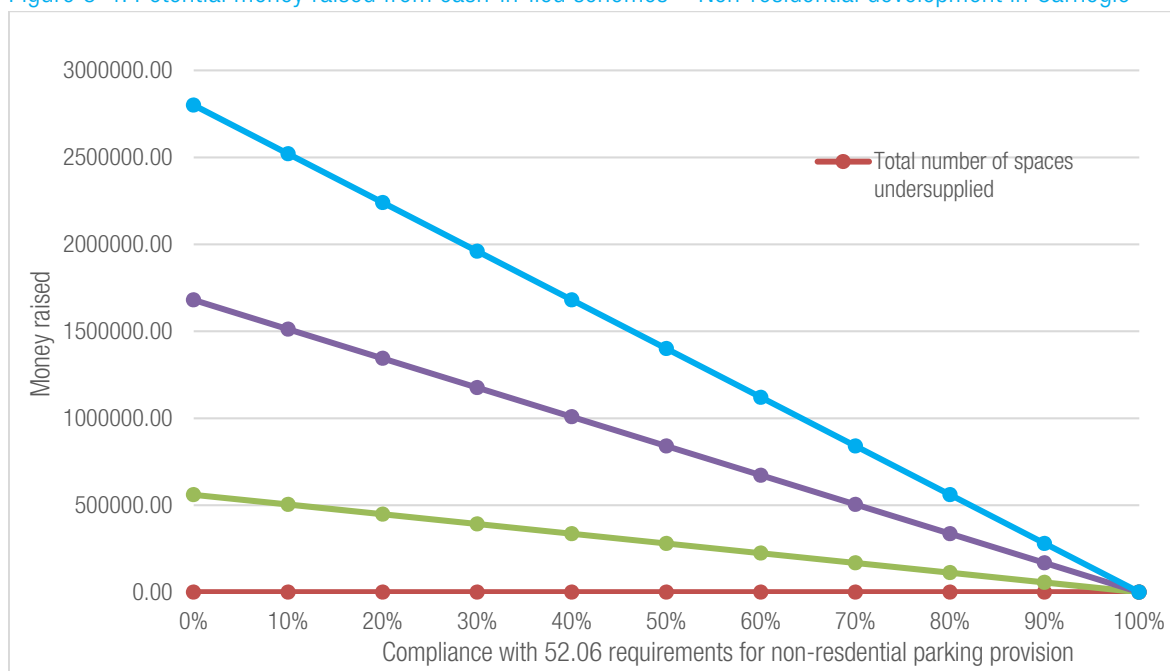
- The per space rate charged for parking shortfalls compared to Council's minimum requirement
The rate charged should ideally match the cost for Council supply commensurate parking provision in a consolidated public facility, however without an appreciable discount, developers may opt to simply comply with minimum parking requirements on-site.
- The minimum rate of parking provision required by Council
Cash-in-lieu schemes generate higher contributions in conjunction with higher minimum parking rates, however this must be weighed against the broader benefits of reduced minimum parking rates (or for that matter the complete removal minimum parking rates)
- The extent of future development
- The extent to which developers comply with minimum parking provisions.

The following provides a picture of the potential range of cash-in-lieu revenue that may be generated by non-residential development in Carnegie assuming future non-residential development will require 112 additional parking spaces based on the analysis of future parking requirements outlined in Table 4-9, which assumes current Council minimum parking rates will continue to apply.

Figure 6-4 below presents the range of potential total contributions raised based on various cash-in-lieu rates and various levels of developer compliance with minimum parking rates for non-residential development. The below is provided as a guide only, and Council must consider how cash-in-lieu rates charged may:

1. Incentivise on-site parking provision rather contribute cash-in-lieu that the market considers poor value; and
2. Discourage development in the activity centre.

Figure 6-4: Potential money raised from cash-in-lieu schemes – Non-residential development in Carnegie



Note 1: Insufficient data on future residential yield is available for inclusion in this analysis.

Note 2: Typical cash-in-lieu rates charged by Australian LGAs are in the order of \$5,000 - \$15,000

6.3 Potential interventions: intensifying activity around rapid transit

The assessment of recent development activity (see Section 4.4) found that recent residential development in Carnegie has been highly concentrated around the rail station and retail strip. This is positive, as population growth is occurring in location with high levels of public transport accessibility to regional employment markets, and local walking and cycling accessibility to shops and services. This should assist in minimising additional vehicle transport demands accompanying growth. Analysis of activity density suggests the activity centre area is reaching benchmark levels of residential population density, although could benefit from increased employment density.

Interventions that can influence further intensification around Carnegie rail station are most importantly land-use planning regulations that influence the bulk and form of potential development. However, transport-sector interventions that are the subject of this paper can indirectly encourage further concentration of growth around the activity centre. In particular:

- Improving walking access and public realm quality between the new Carnegie rail station under construction and key strategic development sites may contribute to increased development activity by ensuring a legible, safe and attractive town centre environment
- An effective public transport system, including fast trains with sufficient capacity can support intensification
- Appropriate parking management policy tools, including land-use planning regulations for on-site parking provision, can encourage further high-density development.

These types of interventions interact with other interventions considered in other sub-sections of this chapter.

Improved walkability and public realm

The Carnegie Draft Concept Plan (Glen Eira City Council, July 2017) identifies major areas for intensification to be concentrated in the northern part of the activity centre, adjacent to the railway station, including:

- The area between the rail line and Dandenong Road/ Princes Highway– envisaged as 'urban renewal development' of 8-12 storeys. Realisation of this planned land use will constitute a major uplift in residential density as it replaces current light industrial built form.
- Properties at the rear of the Koornang Road shopping strip, between the rail station and Neerim Road – envisaged as mixed use buildings of 5-8 storeys
- Other areas between Neerim Road and the railway station – envisaged as 3-4 storey garden apartments (see Figure 3-2 in previous section 3).

Walking connectivity and public realm quality at these locations will be particularly important for incentivising residential and commercial development and ensuring development is supported by effective transport infrastructure. The upgrade of Carnegie Railway station and elevation of the rail line will result in significant improvements to walkability and public realm quality in the immediate vicinity of the rail station. Further recommended interventions for walkability follow those noted in Section 6.1 and include:

- **Koornang Road streetscape and intersection upgrades**

As the major shopping strip within Carnegie centre, the attractiveness and quality of the walking environment on Koornang Road is vital for enhancing the attractiveness of the surrounding areas for further development. Walking interventions such as removal of pedestrian barriers, kerb build outs and introduction of street trees and vegetation as described in Section 6.1 will assist in encouraging intensification throughout the activity centre.

- **Mid-block connections within strategic development sites**

With intensive development planned to the north of the railway station and to the rear of the existing shopping strip, mid-block pedestrian links such as laneways that connect on to Koornang Road will be important for ensuring an inviting walking environment that connects new residential and commercial premises with the existing station, shops and other services on Koornang road. Within the strategic development sites facing Princes Road, micro-scale pedestrian connectivity will be important for encouraging walking by new residents. Indicative locations for midblock connections are illustrated in Figure 6-1 in Section 6.1.

- **Pedestrian amenity upgrade on Dandenong Road/ Princes Highway**

Substantial intensification is envisaged for properties facing Princes Highway. Ensuring that residential and commercial development opportunities are taken up at this location may benefit from improvements to the streetside amenity of the highway. Princes Highway is a major traffic thoroughfare with accompanying noise and air pollution. Street design elements such as extensive provision of street trees and vegetation can mitigate some of the impacts of the highway and make adjoining sites more attractive for development.

Public transport

Potential public transport interventions that may contribute to increased development attractiveness in Carnegie are discussed in Section 6.6.

Parking management

The most important aspect of parking management that will impact on intensification outcomes at Carnegie is land-use planning regulations that specify minimum rates of on-site parking provision accompanying development. Current parking regulations may be hindering some types of residential or commercial development due to onerous and costly requirements for providing excessive levels of parking (see also parking regulation interventions in Section 6.2).

At Carnegie activity centre, a location with good public transport accessibility and local walking and cycling accessibility to a range of services, parking provision may not need to be as high as standard rates set by the

State of Victoria. There is an opportunity for the Council to develop a 'Parking Overlay' covering the activity centre areas that changes the standard State-mandated parking rates. The Parking Overlay may:

- Reduce minimum rates for all or specific types of land uses
- Introduce maximum rates for all or specific types of land uses
- Allow for special provisions such as cash in-lieu payments that allow developers to contribute to development of shared parking facilities rather than private on-site parking.

6.4 Potential interventions: cycling

Interventions to improve the safety and attractiveness of cycling in Carnegie is important to offer a viable, low impact travel option for Glen Eira residents in the context of demographic shifts and planned changes to land use. Increased levels of cycling have the potential contribute to transport goals by improving accessibility for local people and reducing congestion and transport emissions, while simultaneously improving people's health, enhancing place and liveability outcomes and helping to sustain the local economy.

Improvements to the cycling infrastructure in Carnegie should work in with the municipality-wide network, incorporating the Strategic Cycling Corridors (SCC) and Principal Bicycle Network (PBN) (as proposed by VicRoads²⁰) and local routes (as proposed in the Glen Eira Transport Analysis and Forecasting Discussion Paper²¹). The proposed network and specific interventions in Carnegie are shown in Figure 6-5. Cycle facilities should be designed according to specific conditions, but will comprise the following types:

- Separated cycle lanes (on-street) or dedicated cycle paths (off-street locations) for SCC and PBN routes
- Mixed user, traffic calmed streets and shared paths for local routes and on some town centre main streets

All works within the street corridor in Glen Eira should be designed and implemented with reference to the cycling infrastructure network. In the case of Carnegie, Koornang Road plays a crucial role as three SCC and PBN routes either follow or cross this main street. Implementing the proposed cycling network includes intersection as well as mid-block treatments.

Due to the number of uses of Koornang Road and its narrow width - approximately 20m between building frontages - the best approach to providing for cyclists is to design for a low-speed, mixed traffic environment in mid-block sections. This could be achieved by, for example, introducing frequent street trees planted in kerb build-outs with parallel car parking in between.

The following intersections should be prioritised for best practice cycle facility designs, including physical protection for people on bicycles and cycle phasing and detection:

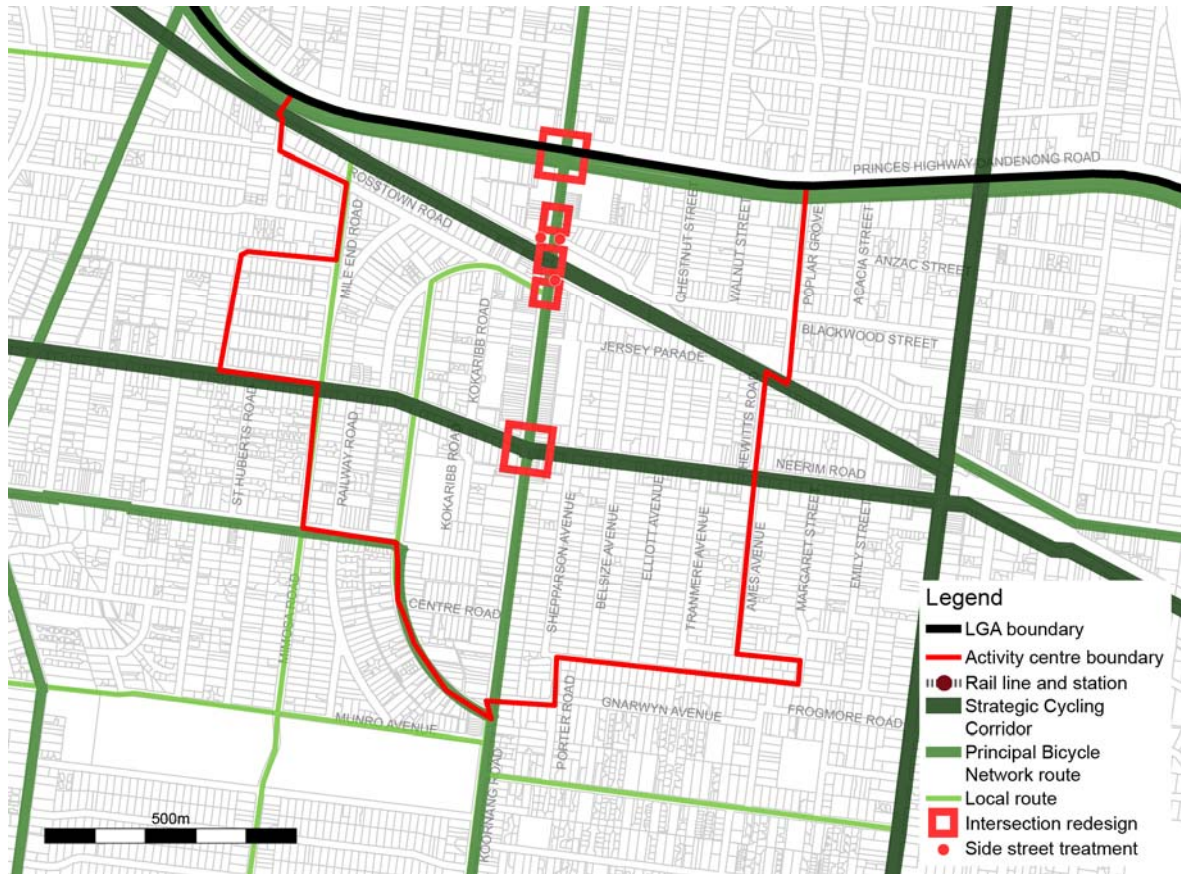
- Darling Road/Dandenong Road/Koornang Road
- Koornang Road/Arawatta Street
- Koornang Road/rail corridor shared path
- Koornang Road/Rosstown Road
- Neerim Road/Koornang Road

²⁰ VicRoads (2016) Bicycle Network Planning. Available at: <https://www.vicroads.vic.gov.au/traffic-and-road-use/cycling/bicycle-network-planning>.

²¹ Glen Eira City Council (2017) *Glen Eira Transport Analysis and Forecasting Discussion Paper*.

Side street treatments that benefit people walking commonly also benefit people on bicycles and should incorporate bicycle-specific measures where relevant.

Figure 6-5: Potential cycling network interventions

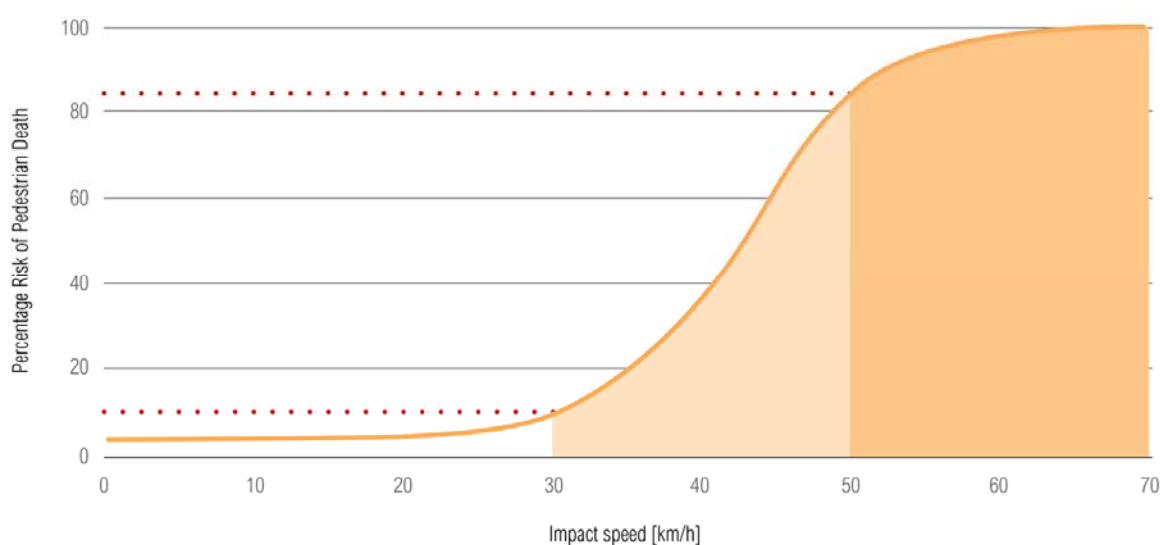


6.5 Potential interventions: road safety

Improvements in road safety should focus on protecting vulnerable road users, which are overrepresented in crash statistics in Carnegie. Prioritising the safety of pedestrians and cyclists through strategies to reduce traffic speeds and improve walking and cycling infrastructure will result in enhanced safety for all road users. While the Carnegie's pattern of streets and development is well suited to active mobility, the design of infrastructure within street reserves requires redesigning in places to prioritise the safety and convenience of vulnerable road users. While the Carnegie's pattern of streets and development is well suited to active mobility, the infrastructure within street reserves needs redesigning in places to prioritise the safety and convenience of vulnerable road users.

Road safety improvements within the study area in Carnegie will be contributed to by improving conditions for walking and cycling, as outlined above. Interventions should be focused on Koornang Road, particularly at the intersections with the Princes Highway and Nerrim Road. The speed limit of Nerrim Road should be lowered to 50km/h along its entire length. The 40km/h speed limit zone currently being consulted on (mid-2017) for Nerrim Road between Murrumbeena Road and Hobart Road (to the east of the study area) should be extend west to the intersection with Emily Street to include both the Murrumbeena and Carnegie town centres. Additionally, a review of traffic speeds on Koornang Road should be conducted to consider whether a further reduction to 30km/h will achieve added safety benefits. Figure 6-6 illustrates that substantial safety benefits are likely to be achieved with the 40km/h speed limit, however further reduction to 30km/h will further reduce risk of pedestrian deaths from vehicle collisions.

Figure 6-6: Traffic speed and risk of death from vehicle-pedestrian collision. Source: World Resources Institute (2015).



6.6 Potential interventions: congestion-free networks

The assessment (see Section 4.7) found that Carnegie activity centre has good access to congestion-free transport options with very frequent rail service on the Pakenham/ Cranbourne line. The current upgrade of Carnegie station will improve the facility's quality while the Melbourne Metro project will allow significant frequency increases on the line, reducing overcrowding. The 67 tram serves the southern end of the activity centre but does not travel on the main shopping street. In addition, a number of bus services provides supplementary public transport connectivity.

Interventions for improving public transport quality and service levels for the Carnegie activity centre will be important for catering to residential growth in the area and increased commuting travel demands to major employment centres such as the Melbourne CBD and student travel demands to university campuses. Potential interventions include:

- Extending tram lines to service Koornang Road and Carnegie station
- Increasing frequencies of existing bus services
- Installing bus priority measures within the activity centre.

Extended tram line

Council's *Draft Concept Plan: Carnegie* (July 2017) identifies the potential for extending existing tram route 3 to connect with the 67 tram by laying new tram tracks on Darling and Koornang Roads. The project would involve approximately 1.9km of new track with track running from the existing terminus of Tram route 3 by turning southbound along Darling Road, continuing past Carnegie Station and along Koornang Road to the existing terminus of the 67 tram at Truganini Road.

The project would be a substantial infrastructure investment and requires more detailed feasibility analysis. The project would also be accompanied by substantial changes to the streetscape and layout of Koornang Road. However, potential benefit from the project could include:

- Improved public transport connectivity for the Carnegie activity centre with improved tram connections along the route of Tram 3 including to Malvern East and Caulfield North
- Improved interchange capability between Tram routes 3 and 67, improving connectivity between the Glen Huntly corridor and Carnegie Centre
- Improved streetscape and amenity on Koornang Road.

Public transport connectivity benefits, may, however be limited:

- The extension of tram route 3 broadly follows the existing rail connection and may not have major benefits for public transport accessibility
- Public transport accessibility benefits may become more meaningful with a more substantial extension of tram route 3 southward beyond the Carnegie activity centre and further along Koornang and either Tucker or East Boundary Roads. This would provide a high quality public transport service and interchange connection to the rail line in an area currently relatively poorly served by public transport.

It is recommended that further more detailed analysis of this proposal is conducted ahead of Council taking a firm position on this proposal.

Buses

Koornang Road is currently served by the 623 and 626 bus services. While these services provide approximately 10-minute frequencies at peak periods they are not classified as 'frequent services' (at least every 15 minutes during inter-peak periods, 7am-7pm).

There are opportunities to increase frequencies at both peak- and inter-peak periods on these services to improve connectivity to the Carnegie rail station and broader public transport networks of the metropolitan region. Increased frequencies should also be accompanied by minor bus-priority measures at intersections and in-line stops to improve travel time reliability and speed.

6.7 Summary of interventions

Table 6-2 summarises the potential interventions discussed in the previous sub-sections into a consolidated list. Some interventions have been discussed previously under multiple headings but are listed only once in the table. The table provides an indicative assessment of the degree to which implementation of the interventions will positively contribute to achieving the six policy directions that structure this discussion paper.

The table highlights that all proposed interventions contribute to at least two of the six policy directions and some interventions have wide-ranging impacts across almost all policy themes. A large number of interventions contribute to improving walkability, encouraging intensification in the activity centre and improving road safety. These interventions generally involve upgrades to the pedestrian environment and public realm. Interventions for improving parking, cycling and public transport require more targeted, mode-specific projects.

Table 6-2: Summary of potential recommendations and contributions to achieving policy directions

Potential Intervention	Put walkability first	Manage parking for streetscape amenity, town centre vitality and to support mode shift	Intensify development around rapid transit	Ensure cycling plays its role	Work toward 'vision zero' road deaths and serious injuries	Plan for attractive congestion-free networks rather than reducing congestion
Improved midblock connections at strategic development sites on Princes Highway	✓✓		✓✓			
Streetscape upgrade – Koornang Road	✓✓✓	✓	✓	✓✓	✓✓	
Upgrade signalised pedestrian crossings along Koornang Road	✓		✓		✓✓	
Side-street treatments along Koornang Road	✓✓		✓	✓		
New multi-storey carpark at Shepparson Road		✓✓	✓✓			
Underground carpark at Kokaribb Road	✓✓	✓✓	✓✓✓			
Revise parking management regime (TBC)		✓✓✓				
Review Planning Scheme provisions for on-site parking requirements		✓✓✓	✓✓✓			
Upgrade pedestrian amenity on Princes Highway frontage	✓✓		✓✓			

Potential Intervention	Put walkability first	Manage parking for streetscape amenity, town centre vitality and to support mode shift	Intensify development around rapid transit	Ensure cycling plays its role	Work toward 'vision zero' road deaths and serious injuries	Plan for attractive congestion-free networks rather than reducing congestion
Improve cycle facilities at major intersections on Koornang Road				✓✓✓	✓✓✓	
Reduce speed on Neerim Road to 40km/h	✓✓			✓✓✓	✓✓✓	
Reduce speed on Koornang Road to 30km/h	✓✓			✓✓✓	✓✓✓	
Advocate for extended tram line to Carnegie Station			✓✓✓			✓✓✓
Advocate for increased bus frequencies for services using Koornang Road						✓✓✓

(✓✓✓ - major impact, ✓✓ - moderate impact, ✓ - minor or indirect impact)