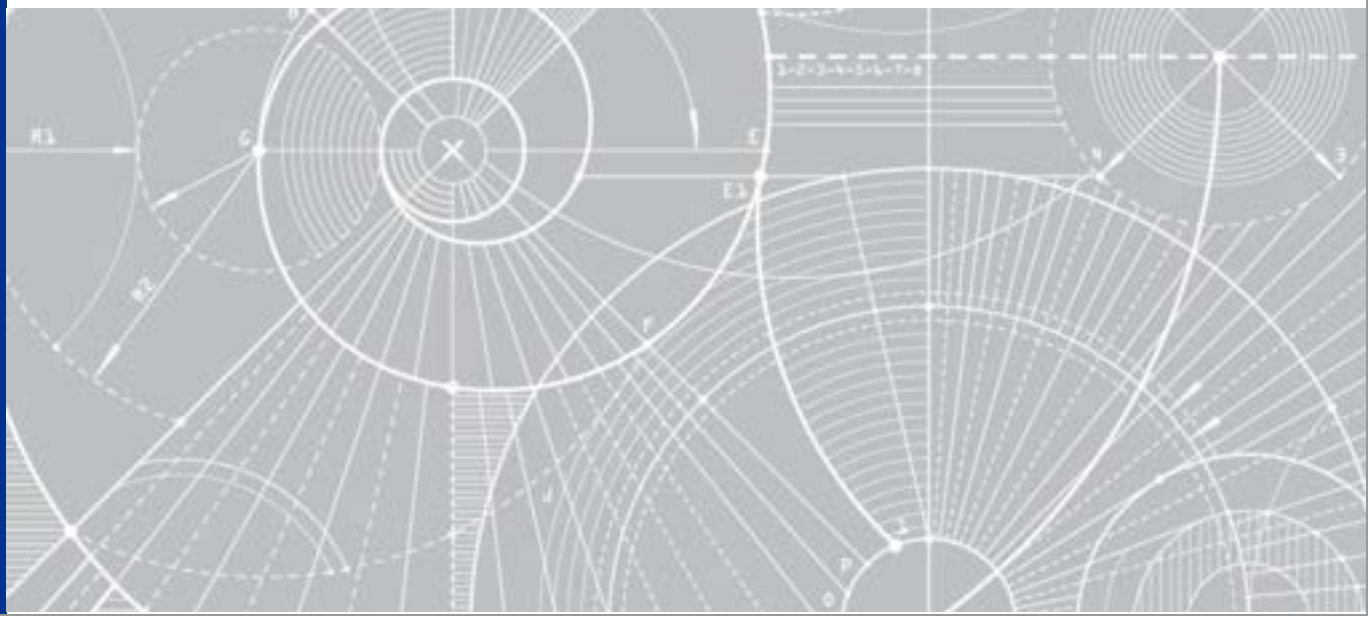
Scarborough Beach Road Activity Corridor West

CITY OF STIRLING

Integrated Transport Strategy

PB50675_RT_0001 |Final

29 May 2015



JACOBS

Scarborough Beach Road Activity Corridor West

Project no:	PB50675
Document title:	Integrated Transport Strategy
Document no:	PB50675_RT_0001
Revision:	Final Rev J
Date:	29 May 2015
Client name:	City of Stirling
Project manager:	Richard Isted
Author:	Emmerson Richardson/Angela Sun/ Richard Isted
File name:	PB50675_SBRWAC _Final_Rev J

Sinclair Knight Merz Pty Ltd (Jacobs)
ABN 37 001 024 095
11th Floor, Durack Centre
263 Adelaide Terrace
PO Box H615
T +61 8 9469 4400
F +61 8 9469 4488
www.jacobs.com

Document history and status

Revision	Date	Description	By	Review	Approved
A		Preliminary Draft Report	Emmerson Richardson /Angela Sun	Richard Isted	-
B		Draft	Emmerson Richardson /Richard Isted	Richard Isted	-
C	13.08.14	Draft Rev 2	Emmerson Richardson/ Richard Isted	Susan Kreemer Pickford	Susan Kreemer Pickford
D	22.08.14	Draft Final	Emmerson Richardson/ Richard Isted	Susan Kreemer Pickford	Susan Kreemer Pickford
E	25.08.14	Draft Final – Rev 1	Emmerson Richardson/ Richard Isted	Susan Kreemer Pickford	Susan Kreemer Pickford
F	16.01.15	Final	Emmerson Richardson/ Richard Isted	Richard Isted	Emmerson Richardson
G	17.04.15	Revised Final	Emmerson Richardson/Angela Sun	Richard Isted	Emmerson Richardson
H	29.05.15	Revised Final	Emmerson Richardson	Angela Sun	Emmerson Richardson
I	19.06.15	Revised Final	Emmerson Richardson	Richard Isted	Richard Isted
J	24.06.15	Revised Final	Emmerson Richardson	Richard ISted	Richard Isted

Contents

Appendix A. SIDRA results

1. Overview

The Scarborough Beach Road West Activity Corridor (SBRWAC) area is located in the City of Stirling, west of the Stirling City Centre. The study area extends from west of Odin Road in Innaloo to Hinderwell Street in Scarborough. The section of Scarborough Beach Road west of Hinderwell Street is being planned by the Metropolitan Redevelopment Authority (MRA).

Scarborough Beach Road (SBR) is an arterial northwest-southeast road located in the inner northern suburbs of Perth. It connects North Perth to Scarborough Beach, and is mostly a single carriageway road, with two lanes in each direction. **Figure 1.1** shows the boundary of SBRWAC. SBRWAC currently carries between 15,000 vehicles per day (vpd) at the west end of corridor rising to about 30,000 vpd at the east end of the corridor.

Figure 1.1 : SBRWAC location map and boundary

In 2010, SKM completed a transport report for the City of Stirling and the Department of Planning for the entire length of SBR from Scarborough to Charles Street in North Perth. Following this study the Western Australian Planning Commission (WAPC) developed and approved the Scarborough Beach Road Activity Corridor Framework that establishes a vision for the corridor and is designed to guide more detailed planning and policy for development and transport infrastructure.

As part of the development of this framework, the Scarborough Beach Road transport strategy was developed. The following sustainable transport principles were adopted to guide design ideas for the project:

1) Improve the health and fitness of the community by creating enjoyable and safe places for people to walk and cycle.
2) Reduce energy consumption and greenhouse gases from transport.
3) Reduce car dependency and use by providing a high level of accessibility by public transport, walking and cycling.
4) Constrain vehicular traffic to levels that can be accommodated on streets designed for all modes of transport while retaining human scale.
5) Ensure that the level of car and bicycle parking provided reflects the needs of mixed-use transit-oriented development.
6) Provide a fine-grained network of streets and lanes adjacent to the road.

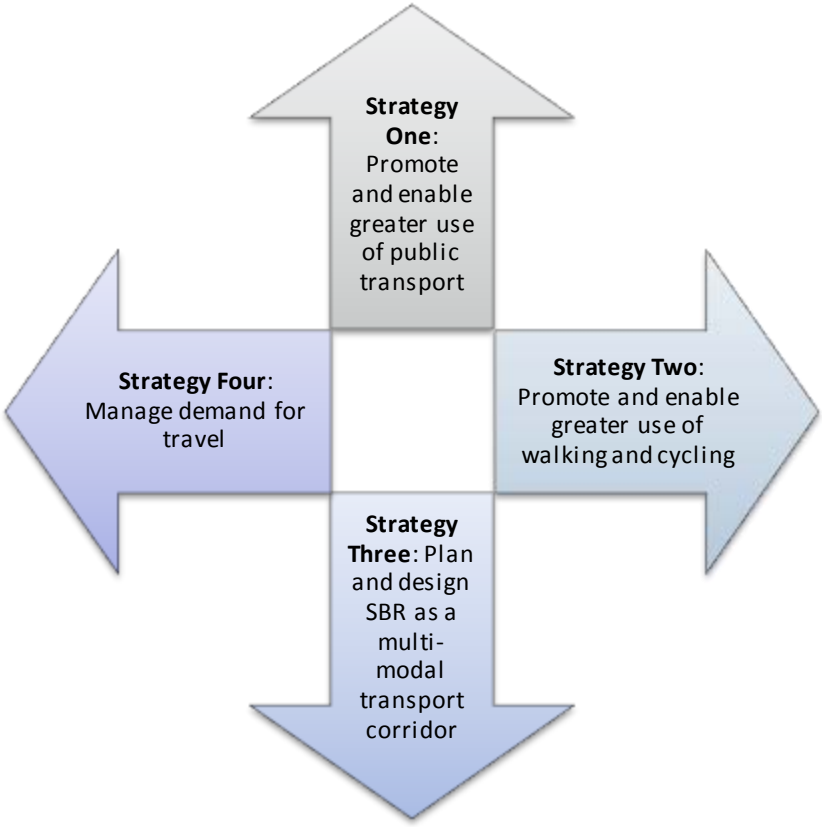
7) Design Scarborough Beach Road to be compatible with adjacent land uses along its length and to accommodate and support all modes of transport, with connectivity for vehicle traffic taking precedence over speed and capacity.

8) Give priority to public transport over private vehicles along Scarborough Beach Road.

9) Ensure safe and effective access to existing and future land uses.

A significant amount of stakeholder consultation has been undertaken to agree on the strategies for this area. The purpose of this document is to collect and compile these discussions and agreements into an integrated transport strategy.

This document outlines four key strategies that will allow careful management of all modes. These are:



2. Previous studies

A number of strategic transport studies have been carried out in Perth and Stirling in recent years. This section outlines the key outcomes and issues from previous studies as they relate to the SBRWAC area.

2.1 Directions 2031 and Beyond (WAPC, 2010)

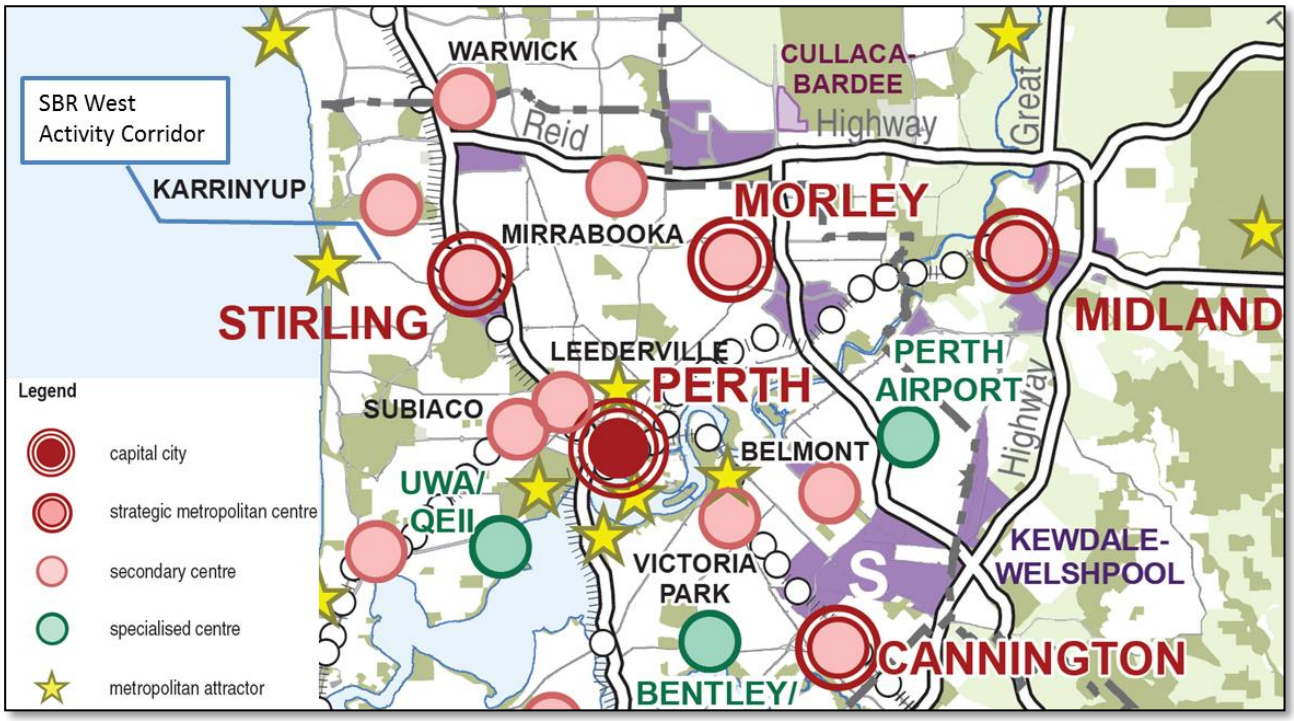
Directions 2031 and Beyond is the highest strategic land use planning document for Perth and Peel. It provides a framework for the detailed planning and delivery of housing, infrastructure and services necessary to accommodate population growth to 2031.

Stirling is one of the strategic metropolitan centres under Direction 2031:

"Strategic metropolitan centres are multi-purpose centres that provide a mix of retail, office, community, entertainment, residential and employment activities, and are well serviced by high frequency public transport."

Figure 2.1 illustrates the activity centre network in Perth under Direction 2031. It can be seen that SBRWAC is the key connection between the Stirling strategic metropolitan centre and Scarborough Beach, one of the metropolitan attractors which are popular destinations highly visited by Perth residents and tourists.

Figure 2.1 : Activity centre network in Direction 2031



2.2 Public Transport for Perth in 2031 (Draft, 2011)

The draft Public Transport for Perth in 2031 plan identifies the public transport network needed to support Perth's growing population. It links to and between strategic centres as identified in Directions 2031 and Beyond. It recommends the development of a dedicated light rail transit system between Stirling and Glendalough and a bus rapid transit system between Stirling City Centre and Scarborough Beach prior to 2031. **Figure 2.2** provides the public transport network to accommodate a population of 3.5 million in Perth, now expected to occur about 2040. The link between Stirling and Scarborough is shown as a dedicated transit facility, initially for buses, but potentially for light rail in the longer term.

Figure 2.2 : Public Transport Masterplan – Ultimate Network for 3.5 Million

2.3 City of Stirling Integrated Transport Strategy (2009)

The key objectives of the City's Integrated Transport Strategy are:

- **Objective 1 -** "*To encourage more sustainable transport of people and goods;*
- **Objective 2 -** *To enable efficient movement of people and goods;*
- **Objective 3 -** *To improve accessibility for pedestrians cyclists and public transport users to a variety of destinations;*
- **Objective 4 -** *To equitably provide for transport needs throughout the community*;
- ***Objective 5 -*** *To encourage public transport modes over other modes".*

The strategy identifies the need to change travel behaviour through managing demand for travel, reducing dependence on cars for travel and improving facilitation for walking, cycling and public transport. Key strategies in respect to the Scarborough beach Road West corridor are:

- Development of an activity corridor to provide a linkage between activity centres with activity oriented towards the main thoroughfare to form a chain of activity or central axis:
- Development of a light rail network along Scarborough Beach Road linking Scarborough Beach with the Stirling Regional centre and Stirling and Glendalough rail stations.

2.4 Scarborough Beach Road Activity Corridor transport report (SKM, 2010)

The transport strategy was developed to guide the planning, design and development of the future Scarborough Beach Road activity corridor. It developed transport planning strategies to support the WAPC and City of Stirling vision to transform Scarborough Beach Road into an activity corridor where :

- "*The barrier effect of traffic is reduced;*
- *The street is safe and comfortable to use by all transport modes, including pedestrians, cyclists and public transport users;*
- *A high frequency public transport system operates in an efficient manner;*
- *A significant level of traffic continues to use the street for access to adjacent mixed uses, but at a low speed;*
- *There are frequent opportunities for pedestrians to access public transport stations and to cross the street to access shops, restaurants or businesses;*

- *The street becomes known for movement and vibrancy of people rather than for the movement of vehicles and associated segregation."*

The key recommendations of the report are:

- "*Priority be provided for public transport vehicles (including light rail) within a centrally located transitway;*
- *Provision be made for dedicated off street cycle paths along the busier sections of Scarborough Beach Road to encourage greater use of cycling;*
- *Provision be made for vehicular traffic at a level that can be accommodated on streets designed for all modes of transport, while retaining a human scale;*
- *Street design be based on a 50kph speed limit to enhance safety and amenity for pedestrians."*

2.5 Scarborough Beach Road Activity Corridor framework (WAPC, 2012)

This Framework provides an integrated and logical vision for the future development of Scarborough Beach Road and responds to the growth of Stirling City Centre and other activity centres along its length. The Framework reiterates the importance of Scarborough Beach Road in linking the activity centres; and the role that alternative travel modes (bus, train, light rail, walking and cycling) can play in its improvement over time.

For the section of Scarborough Beach Road west of Odin Road, the Framework recommends:

- The road be enhanced over the longer term to improve safety and provide more effective public transport, cycling and pedestrian movement; and
- Additional detailed transport design and consultation is required.

2.6 Stirling City Centre Alliance Integrated Transport Strategy (GHD, 2013)

A suite of documents has been prepared by GHD in May 2013, under the heading of integrated transport strategy. Essentially they focussed on the future Stirling City Centre with a commercial floor space of 970,000 m^2 and a residential population of 25,000 people (currently 3,800).

The reports note the target mode share for the city centre to be:

- Car driver 35%;
- Car passenger 15%;
- Public transport 18%; and
- Walking and cycling 32%

To achieve these mode shares at full development of the centre, the report supports a sustainable mode based transport system to support the city centre, which includes:

- Public transport strategy
- Road network improvement strategy
- Bicycle network improvement strategy
- City centre walking strategy
- Demand management, access and parking strategy

3. Planning strategy development

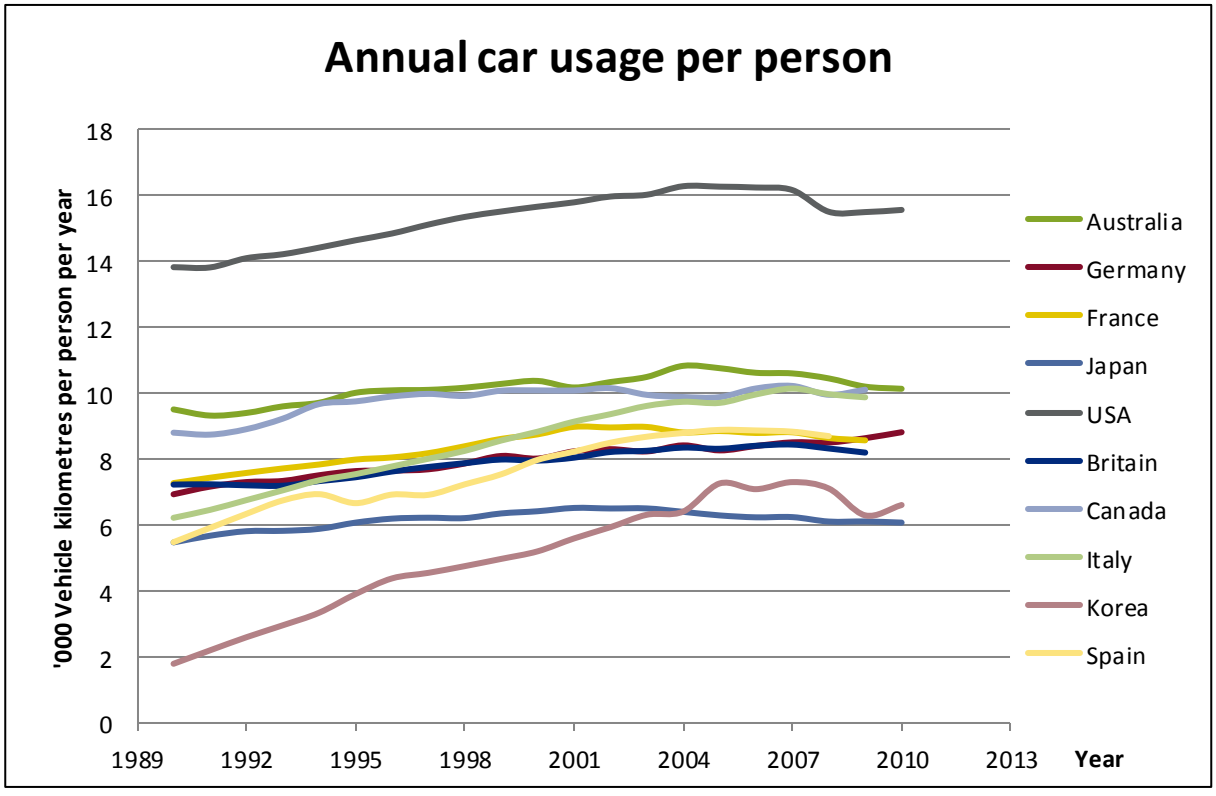
There has been extensive consultation and engagement with the community, landowners and government agencies in development of the planning strategy for SBRWAC. The key steps in development of the planning strategy from a transport perspective were:

- Assessment of transport patterns and trends, particularly as it relates to mixed use areas in proximity to high quality public transport;
- Understanding the proposed mix of residential and non-residential uses and how this is likely to encourage greater use of walking and cycling as a primary transport mode;
- Consideration of the previous transport studies for Scarborough Beach Road and the Stirling City Centre; and
- Development of mode share targets for travel to/from the structure plan area, based on a realistic road network capacity to, from and within the structure plan area.

3.1 Transport trends and implications for SBRWAC structure planning

For the last half of the 20th century there was a continuous increase in car driving in most OECD countries, with an associated decline in walking, cycling and public transport usage. This resulted in growing congestion on the road system. There is now strong evidence that this trend changed at the beginning of the 21st century. Over the past ten years car driver trips per person has declined in almost every OECD country (refer **Figure 3.1)**.

Figure 3.1 : Annual car usage per person in OECD countries [1]



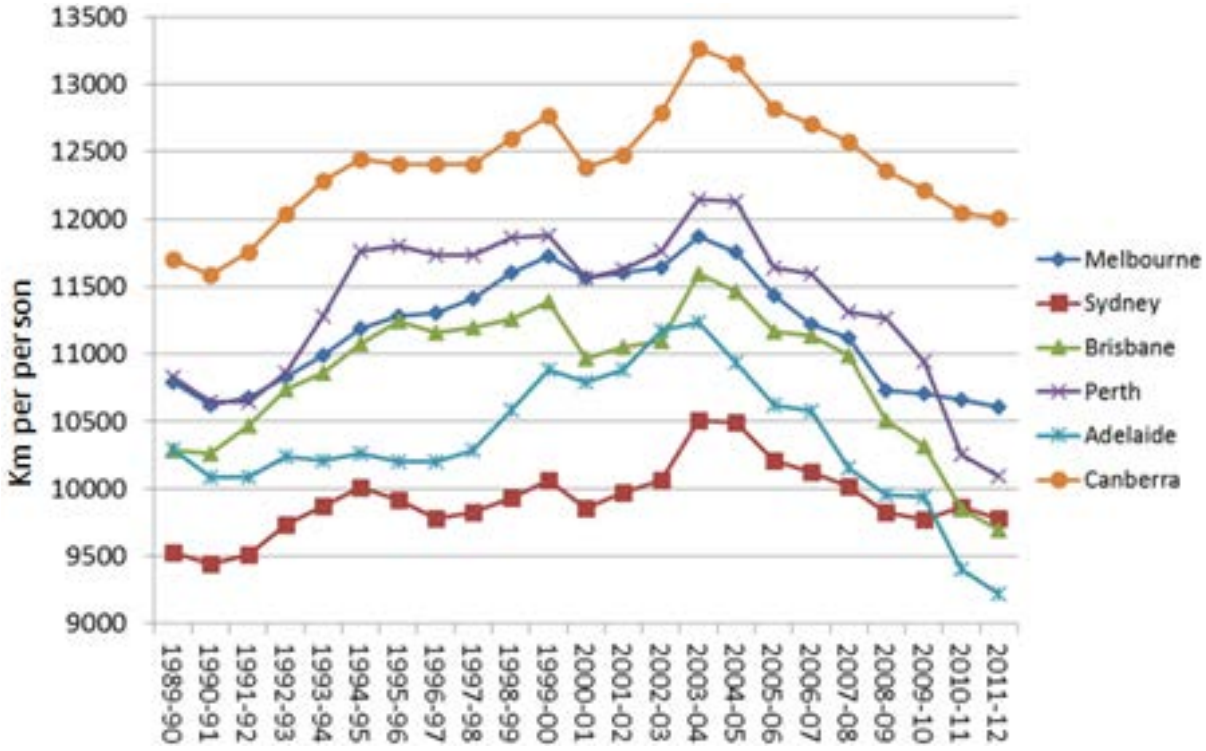
[1] Source: International Transport Forum, 2011

There are a wide range of factors that have caused this significant change in travel patterns that are discussed more fully in a paper presented to the AITPM conference in Perth in 2013 by Richardson and Elaurant. They include:

- Congested streets are making car driving less attractive;
- Improved public transport systems with higher frequency services along priority routes are a more attractive travel alternative for some travellers;
- Price factors such as increased petrol price and higher parking fees are influencing travel behaviour;
- Young people are driving less; they are substituting some travel for electronic communications or travelling by public transport where they can communicate en route by electronic devices; and
- Many young people appreciate the growing inconvenience of driving and owning a car. Insurance fees are increasing and it is becoming more difficult to obtain a driving licence. There has been a substantial decline in young people with a driving licence.

Figure 3.2 shows how car driving per person has declined in every Australian city.

Figure 3.2 : Car driving trends in Australian cities [2]



In Perth, car driving per person declined by more than 15% between 2004/05 and 2011/12. This is broadly consistent with a reduction in car driver mode share from about 63% at its peak to an estimated 55% to 56% at present.

The trend to lower levels of car driving and higher levels of travel by public and active transport (walking and cycling) is collaborated by the Australian Bureau of Statistics (ABS) data for journey to work.

[2] Car and transit use per capita in Australian cities, Charting Transport, October 2013

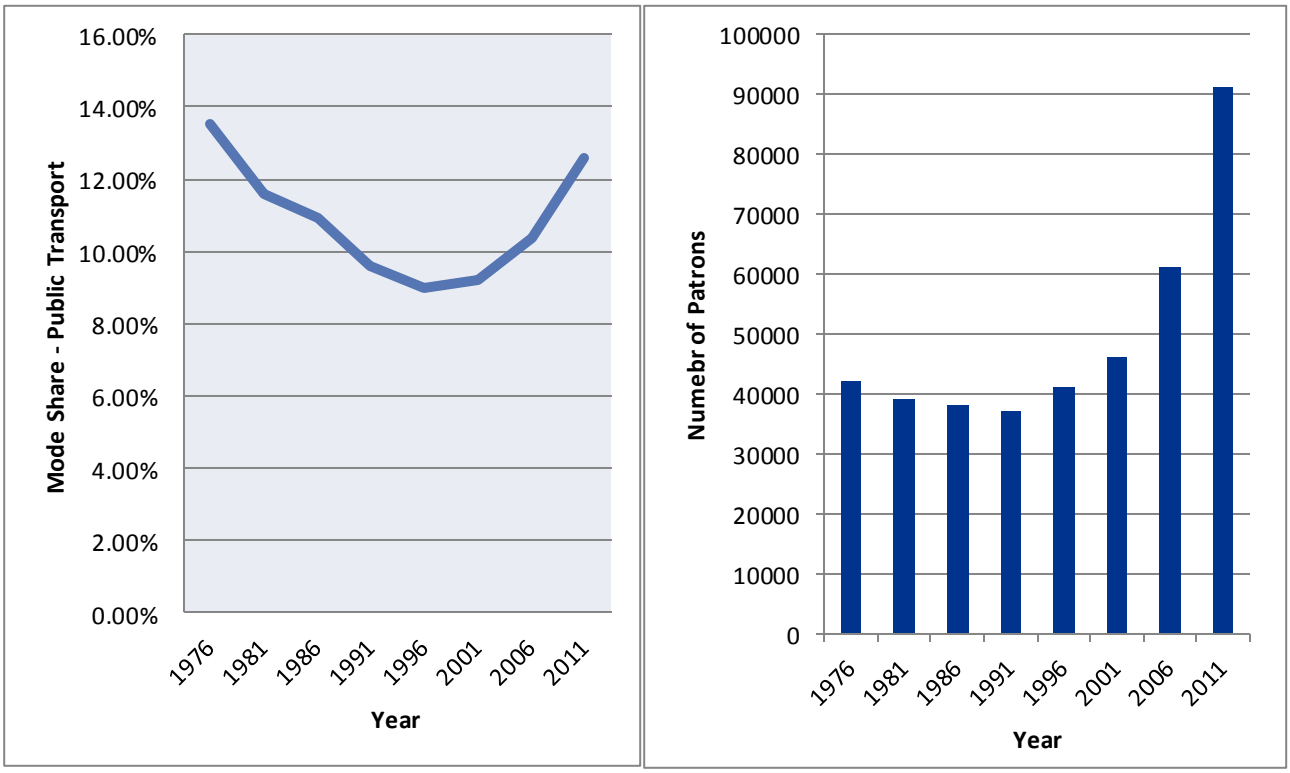
Table 3.1 shows that the trend to higher levels of walking, cycling and public transport commenced between 2001 and 2006, but became more pronounced between 2006 and 2011.

Table 3.1 : Journey to Work Mode Change between 2001 and 2011 for Perth and Peel

	Mode Change 2001 – 2006	Mode Change 2006 – 2011	Mode Change 2001 – 2011
Car Driver	- 1.2%	- 3.9%	- 5.0%
Car Passenger	0%	- 8.7%	- 8.7%
Public Transport	+ 11.1%	+ 25.9%	+ 40.0%
Walking	+ 11.8%	+ 11.7%	+ 24.9%
Cycling	+ 4.5%	+ 11.2%	+ 16.2%

Figure 3.3 shows the longer term trends in public transport usage with a substantial upturn starting in the late 1990's after years of decline. The mode share of journey to work by public transport has grown by about 40% in the decade to 2011. However, when population growth is factored in, public transport patronage almost doubled over that period.

Figure 3.3 : Public Transport in Perth Mode Share Usage (Journey to Work)[3]



[3] Journey to Work Statistics, Australian Bureau of Statistic, 2011

Table 3.2 shows that car driver mode share journey to work has declined more in inner areas of Perth than outer areas and cycling has increased much more in inner areas, whilst public transport mode share has increased by between 40% and 45% in all areas.

Table 3.2 : Journey to work mode share changes by region[4]

	2011 Population	2001 Mode Share			2011 Mode Share (Growth for 2011)		
		Car Driver	Public Transport	Bicycle	Car Driver	Public Transport	Bicycle
Inner Councils (Vincent, South Perth, Victoria Park, Subiaco, Cambridge)	149,966	70.5%	12.6%	2.5%	63.3% (-9%)	17.8% (+43%)	3.8% (+50%)
Middle Councils (Stirling, Melville, Cockburn, Canning)	466,899	77.4%	9.1%	1.1%	73.9% (-6%)	13.2% (+45%)	1.4% (+25%)
Outer Councils (Joondalup, Kwinana, Rockingham)	285,788	78.1%	9.0%	0.6%	73.9% (-5%)	12.6% (+40%)	0.6% (0%)
Edge Councils (Mandurah, Swan, Armadale, Wanneroo)	392,737	78.2%	6.7%	0.65%	75.9% (-3%)	9.7% (+45%)	0.5% (-23%)
Perth and Peel Metro Area	1.83M	76.8%	9.0%	1.1%	72.9% (-5%)	12.6% (+40%)	1.3% (+18%)

The journey to work statistics for Inner Councils show that places with a mix of housing and jobs in close proximity to an area well-served by public transport and with reasonable bicycle infrastructure will have quite different travel patterns than suburbs developed primarily to cater for car use.

The relevance of this travel trend data for the SBRWAC can be summarised as follows:

- If the SBRWAC and the adjacent Stirling City Centre area are developed (as proposed in current structure plans) as mixed use areas with excellent public transport networks and services with a safe, continuous network of cycleways, public transport, walking and cycling can be expected to increase significantly as the level of car driver per person declines.

This would suggest that a future projected car driver mode share for SBRWAC of between 40% or 45% is likely to be a realistic prospect over the structure planning horizon timeline to about 2040 as the Perth Metropolitan Area population grows to about 3.5 million.

[4] ABC Journey to Work Data

3.2 High level access and street design principles

A series of high level access and street design principles were identified to guide development of the Integrated Transport Strategy. These principles had much in common with the concurrent transport studies for the Stirling City Centre and the Scarborough Beach Road Activity Centre Framework that have been presented for discussion at a number of community and landowner workshops.

The following access and street design principles have been used in development of the structure plan:

- **Principle One:** Develop a sustainable transport corridor based on mixed use development that provides a wide range of transport mode choice and high degree of accessibility within the SBRWAC;
- **Principle Two**: Constrain vehicular traffic movement along Scarborough Beach Road so that it is compatible with mixed use development and activities that generate high volumes of pedestrians;
- **Principle Three**: Design Scarborough Beach Road in a manner that maximises accessibility by all modes of transport, both along and across the street, with connectivity and integration taking precedence over vehicle speed and capacity.
- **Principle Four**: Maximise SBRWAC corridor transport capacity, through provision of a frequent, legible and direct public transport system that operates in its own right of way and connects Scarborough Beach with the Stirling City Centre.
- **Principle Five**: Develop a connected, safe bicycle network along the length of Scarborough Beach Road that is separated from both vehicular traffic and pedestrians and has high capacity.
- **Principle Six**: Encourage walking as a preferred option for short trips by providing safe, secure, comfortable and attractive walking routes and facilities.
- **Principle Seven**: Reduce the number of driveways off Scarborough Beach Road by providing rear laneway access to most premises to maximise safety for pedestrians and cyclists.
- **Principle Eight**: Provide a level of mainly public parking, at the rear or properties, to meet the needs of businesses at centres along the route, which is compatible with higher levels of active and public transport and lower levels of driving.
- **Principle Nine**: Provide a small supply of on-street convenience public parking to meet the needs of business in centres along the route and assist in reducing vehicle speeds through the centres.
- **Principle Ten**: Provide narrower traffic lanes at centres along the corridor to assist in slowing traffic through the centres and improving safety for pedestrians crossing the street and accessing public transport stops.

3.3 Projected Future Traffic Volumes

The projected future traffic volumes along the corridor are an important input to the structure planning. There are a range of factors to consider in developing the most likely estimates of future daily travel and these include:

- Most recent travel trends (discussed in Section 3.1).
- Projected improvements to the public transport system.
- Land use changes along the corridor and at Scarborough, Stirling City Centre, and the Herdsman/ Glendalough area (different uses in close proximity to each other make shorter travel trips more likely and this is likely to make walking and cycling more popular modes of travel).
- Planned high quality safe, connected, off-street bicycle facilities.
- Capacity constraints on the sub-regional road network, including West Coast Highway and the Mitchell Freeway that will limit the ability of vehicular traffic to grow in the area.

In theory, transport models should be able to take account of the above and project future travel by the different modes. However, a range of different model runs has provided widely different projected vehicular trips along Scarborough Beach Road and this has resulted in a lack of confidence in current modelled traffic estimates in

the area. A review of modelling in the Stirling area conducted by Parsons Brinkerhoff in 2014 has recommended:

- Check the land use inputs adopted by strategic models not only for the Stirling City Centre area but also for the Herdsman Glendalough area
- Check the employment growth by type
- Use the existing regional multi-modal travel demand models to estimate the future mode shares.
- Ensure the land use inputs and future public transport and road network assumptions of the STEM (or ROM24) are up to date.
- Develop a mesoscopic model covering Stirling City Centre (potentially extends to Herdsman Glendalough) to assess future network improvements and operation
- Develop microscopic models, as necessary, to undertake more detailed operational assessment of key corridors and interchanges.

In addition, a review of transport modelling in WA conducted by PATREC in 2014 identified three feasible modelling options for development and assessment:

1. Continue the current development of both STEM and ROM24 models, attempting to improve their integration, rather than pure parallel development, duplicating many tasks;
2. Develop a model that takes the best features of the current two models plus additional best practice developments;
3. Develop a new best practice model, with strong feedbacks from the transport model to the land-use model and from the dynamic traffic assignment to the previous stages of the strategic model, also integrating the freight component.

The study recommended option 3 as the preferred solution for addressing the modelling needs in WA and describes the features of this new (best) model (called PLATINUM – Perth LAnd and Transport INtegrated Urban Model). It is likely that this model would take 3 to 4 years to develop and calibrate.

Mode share for car driving has reduced from 63% in the mid-1990s to about 56% now. Given that total travel (all modes) per person is likely to have remained constant or decreased slightly, it can be deduced that car driving trips per person is likely to have reduced around 12% since the mid-1990s.

Since the mid-1990s, mode share of public transport has increased by about 50%. The draft long term public transport plan for Perth (Public Transport Plan for Perth in 2031) predicted that the mode share of public transport would increase from 6% in 2010 to about 15% (or between 1.5 and 2.0 million trips/day) by the time the city doubled in population to 3.5 million (now expected to be before 2040 according to ABS estimates).

Bicycle travel has grown slowly and the mode share remains below 2% on average across Perth. However, in Inner Council areas the mode share of cycling is more than double the Perth average and has grown by 50% over the last decade. If a safe and connected off-street network is constructed (as proposed in the structure plan) there is every likelihood that cycling mode share in and around Scarborough Beach Road West will increase from around 2% to 10% over 20 years.

The mode share of walking is very largely dependent on how closely people live to their place of work and to other activities. The 2011 walking mode share to work in Subiaco was 12.4% compared to the average of 2.8% for the Perth Metropolitan Area. Car driving to work in Subiaco was 28% less than the average for metropolitan Perth in 2011.

If, as is planned for the SBRWAC, land use development creates more mixed use areas and public transport, facilities and networks for walking and cycling are improved significantly over the next 25 years as described above, the mode share of travel in the SBRWAC between 2014 and about 2040 (Perth Population of about 3.5 million) is likely to change as shown in **Table 3.3**.

Table 3.3 : Estimated Change in Mode Share of Travel (2014 to 2040)

Mode of Travel	Estimated Mode Share Perth (2014) (%)	Estimated Mode Share 2040 (3.5 m pop.)	
		Perth Metropolitan Average (%)	SBRWAC (%)
Car Driver	56	45	40
Car Passenger	22	16	14
Public Transport	7	15	17
Cycling	2	7	10
Walking	12	16	18
Other	1	1	1

The estimated 28% reduction in car driver mode share from 56% to 40% will be offset to some extent by the increase in population and employment in the area, leading to the conclusion that the traffic volume along Scarborough Beach Road would remain relatively stable in the future.

Because the improved public transport and cycling systems will provide a real choice for travellers, there is likely to be a move away from car driving as a preferred mode choice as congestion increases, and car driving becomes more inconvenient for most people. In that sense, daily travel on the proposed more balanced transport system will be highly influenced by the capacity of the different modal systems.

The ROM24 is a new modelling tool developed by Main Roads Western Australia. The tool has the following advantages over its predecessor ROM:

- An in-built mode choice model – ROM24 predicts mode shares based upon the future road, public transport, walking and cycling infrastructure and public transport service proposed, in conjunction with how well those options for each mode suit the types of trips being made by the people that live in the area;
- More realistic congestion management during peak hours – ROM24 models all 24 hours of the day. Where traffic exceeds the capacity of the road network, the effective capacity in the subsequent hour is reduced, causing significant increases in delay, which better replicates the situation on the freeways, in particular.

ROM24 2021 and 2031 AM and PM Peak Hour traffic volumes (in the form of Origin Destination Matrices along the corridor) have been extracted for the purposes of the traffic assessment for SBRWAC, discussed in Section 8. In this modelling forecast traffic volumes within the corridor (to the East of Duke Street) either remain the same or go down. In querying the reasons with the Main Roads modelling team, it was explained that due to the coding of a rapid transit system along the corridor (as per the 2031 Public Transport Masterplan) a large mode shift to public transport was predicted, which consequently impacted on the traffic volume. To the West of Duke Street traffic volumes were projected to increase by 15% during the PM Peak Hour but no change was projected for AM peak period traffic.

Historical traffic volumes along Scarborough Beach Road through Doubleview show traffic has decreased over the last 13 years. Current traffic volumes are now 13% less than they were in 2001/ 02 (Refer Table 3.4).

Table 3.4 : Average 24 hour traffic volumes on SBR through Doubleview

Year	Average 24 hour traffic volume
2001/02	18,500
2003/04	18,250
2010/11	15,000
2014/15	16,000

It is difficult to find a rational explanation for future traffic increases in one section of SBR in one peak only and substantial decreases in other areas, as is predicted by the modelling. In the light of current uncertainties with current modelling outputs in the area, Jacobs has examined current trends for reducing car travel associated in increased population in the area and concluded that the most likely outcome is that traffic volumes will remain at about the current levels. Given the uncertainty, the traffic analysis in section 6 of this report has taken a conservative approach by undertaking analysis based on existing 2014 volumes with a 10% increase.

The estimated future traffic along SBR based on this approach (existing + 10%) is shown in Table 3.5.

Table 3.5 : Estimated future traffic along SBR (2031)

	AM Peak		PM Peak	
SBR Section	**EB**	**WB**	**EB**	**WB**
West of Duke St	518	514	440	826
Duke St – St Brigids Tce	635	442	529	814
St Brigids Tce – Huntriss Rd	1210	528	770	1320
East of Huntriss Rd	1825	559	886	1739

3.4 Key Movement and Design Issues Discussed at Community Workshops

Jacobs has worked with the City of Stirling, Taylor Burrell Barnett, EPCAD Landscape Architects and Gresley Abas Architects in the development of the SBRWAC planning strategy. Jacobs attended the Vision and Design workshops held for the planning strategy of the SBRWAC on 29 March 2014 and 10 May 2014 respectively, and outlined the principles and key considerations guiding movement in the corridor.

Whilst there were a range of different opinions expressed at the workshops, there was majority agreement on the following transport related matters proposed by Jacobs and the study team:

- Plan for dedicated central transit lanes along the entire length of SBR that are suitable for introduction of a light rail system in the future.
- Plan for provision of dedicated off-street bicycle lanes along SBR (separate from both vehicles and pedestrians).
- Design SBR for a vehicle speed of 60kph, except through centres, where the speed limit would be 50kph.
- Provide signalised crossings for pedestrians to public transport stops and at intersections where crossing traffic is permitted. Limit crossing traffic to these points and permit only left in and left out movements at other intersections, when the central transit lanes are installed.
- Provide for two traffic lanes in each direction, in addition to public transport lanes, to the east of St Brigids Terrace, where traffic volumes are higher.
- Provide for one through lane in each direction, plus one dedicated right turn lane where right turns are permitted, to the west of St Brigids Terrace, where traffic volumes are lower.

- Provide for tree planting along both sides of Scarborough Beach Road, but not in the median because of space constraints and likely interference with power lines for light rail.
- Ensure parking and traffic impacts are properly assessed as more detailed design and redevelopment occurs.

4. An Integrated Transport Strategy Approach

4.1 The role of transport in the corridor

Transport is not an end in itself. Its role is to provide good accessibility and contribute to a good quality of life for those people who live or work in the area or who visit it for whatever reason. It is acknowledged that there are some negative aspects associated with transport systems, such as noise, segregation and congestion. In developing this integrated transport strategy, the objective has been to provide a choice of travel modes to ensure good accessibility for all whilst minimising potential disadvantages associated with too much traffic and congestion.

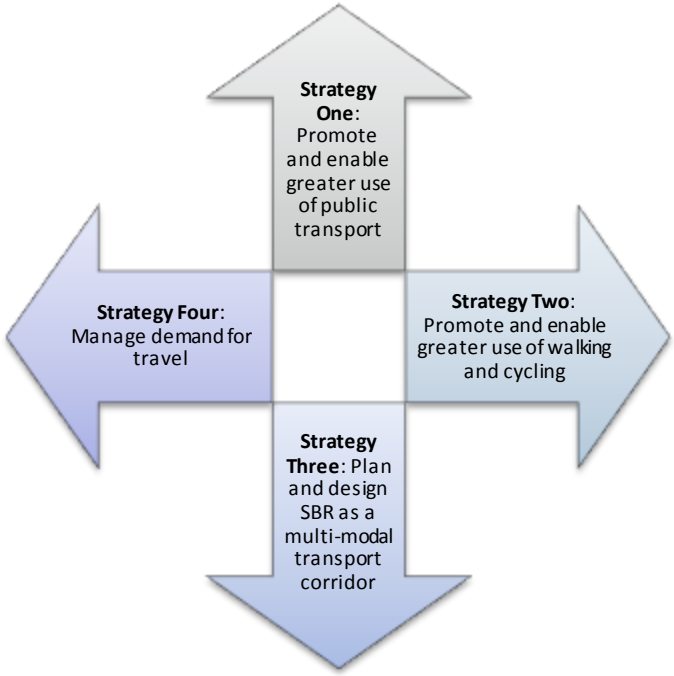
The role of transport is to provide a high level of accessibility for all to work, education, shops, entertainment and other activities within and adjacent to the activity corridor now and in the future. It is intended the future transport system will:

- Provide connectivity along the corridor between Scarborough Beach and Stirling Regional Centre
- Offer travel choice for a variety of travel purposes
- Support sustainable growth opportunities through integration with land use planning
- Be an economic enabler
- Promote health and fitness by facilitating, more walking and cycling
- Provide efficient access to residences and businesses and service and emergency service vehicles
- Meet the lifestyle needs of the community by limiting segregation and integrating communities
- Be affordable and equitable for all social and age groups within the community
- Be environmentally responsible
- Be adaptive and sustainable

4.2 Sustainable mobility management approach

This integrated transport management approach incorporates four key strategies (shown in **Figure 4.1)**, which are described in more detail in Section 5.

Figure 4.1 Four key strategies



These strategies have not been developed in isolation from each other. They have been planned as part of an integrated strategy to facilitate the movement of people within and along the corridor in a sustainable manner.

This approach is often known as sustainable mobility management (SMM). It incorporates a suite of measures designed to manage and shape the demand for travel in a way that will improve the liveability of the city, protect and enhance the environment and provide good accessibilty for residents and visitors.

SMM acknowledges that there will be a potential limit to the amount of traffic that can travel along the corridor whilst optimising the social, economic and environmental potential of the corridor. SMM therefore employs demand management strategies in association with transport network management and service delivery improvements at a size and scale appropriate for an activity corridor with high levels of pedestrian movements. It accepts that car driving will remain popular with many people and accommodates a reasonable level of car driving. However, it differs from some more traditional strategies in that, instead of accepting and encouraging car growth at the expense of other modes, it provides more options for travel and provides some disincentives to driving to encourage greater use of walking, cycling and public transport.

A major advantage of SMM is that it uses supply measures for public transport and cycling in combination with demand management measures for car travel, such as parking policy and pricing to induce greater use of public transport, walking and cycling and a more modest level of car use that is compatible with network capacity along the corridor.

4.3 Strategic merit test for projects

It is important that projects implemented along the corridor over time support the strategic intent of the integrated transport plan. In the past, transport projects developed by different agencies have not always provided positive synergy and support for the agreed strategic plan.

To ensure this does not occur for SWRWAC it is proposed that a strategic merit test be applied to test the strategic fit and to filter projects for inclusion in an implementation plan. The strategic merit test would assess specific projects against social, environmental and economic needs and the strategic objectives for development of the SBRWAC. In particular it is proposed the strategic merit test would assess projects against their ability to:

- Make a substantial contribution to congestion reduction at a sub-regional level – more than local impacts that may move congestion from one area to another.
- Contribute to land use – transport integration by matching appropriate transport improvements with priority growth areas.
- Recognise that improved access along the corridor cannot be satisfied by increasing capacity for car drivers and must be addressed by improving capacity and service for alternative modes.
- Understand the merits of managing demand for certain modes at certain times when increasing supply would most likely just increase demand and limit benefits.
- Give priority to the vehicle that provide the most benefit – vehicles carrying the most people, delivery vehicles and emergency vehicles.
- Remove bottlenecks in the network without creating new bottlenecks and provide consistent capacity and service level along the corridor.
- Provide workers and visitors with a range of different travel options with view to encourage people to use more efficient means of travel, particularly to congested centres and more short trips.
- Improve the safety of the transport network for people travelling by all modes.

5. Key Integrated Transport Strategies

The four key strategies for the SBRWAC are described in the following sections, including:

- Objective of the strategy
- Guiding principles
- Outline and description of key components

5.1 Strategy One – Promote and enable greater use of public transport

5.1.1 Objective

The objective of this strategy is to increase the amount of travel along the corridor by public transport and decrease the proportion of travel by private car.

The strategy sets a mode share target for travel by public transport of 17% along the corridor. In conjunction with the other strategies this should enable the proportion of travel by car drivers along the corridor to be reduced from 56% to 40% – a reduction of car driver mode share of 28%.

5.1.2 Guiding principles

The guiding principles of this strategy are:

- **Principle One**: Provide a sustainable transport corridor that provides a wide range of transport mode choices and high degree of accessibility within the SBRWAC
- **Principle Three**: Design Scarborough Beach Road in a manner that maximises accessibility by all modes of transport, both along and across the street, with connectivity and integration taking precedence over vehicle speed and capacity.
- **Principle Four**: Maximise SBRWAC corridor transport capacity, through provision of a frequent, legible and direct public transport system that operates in its own right of way and connects Scarborough Beach with the Stirling City Centre.
- **Principle Ten**: Provide narrower traffic lanes at centres along the corridor to assist in slowing traffic through the centres and improving safety for pedestrians crossing the street and accessing public transport stops.

5.1.3 Key public transport strategy components

In the short term:

Provide a high frequency bus service along the corridor between Scarborough Beach and the Stirling Strategic Regional Centre that links to both the Stirling and the Glendalough rail stations. The service should operate at no more than a 10 minute frequency during peak periods with frequency increased as necessary to meet capacity. The frequency of service should be at least 15 minutes between peak periods and until 7.30pm. The service should operate at no more than 30 minute frequency at other times between 5.30am and 12.00 midnight. Weekend services should operate at 15 minute frequency during the peak weekend times and at 30 minute frequencies during the remainder of the daytime and evening period.

In the medium to longer term:

- Plan for and provide a light rail service between Scarborough Beach and the Stirling and Glendalough rail stations.
- Prior to funding being secured for light rail, construct a dedicated busway along the proposed light rail alignment.
- Plan for and provide quality light rail stations along the SBRWAC section of the route at Abbott Street, Grand Promenade, St Brigids Terrace and Huntriss Road.

- Ensure the stations can be used for buses in the timeframe prior to operation of the light rail service.
- Provide signalised access to the light rail/bus stations.
- Plan for extensions of the light rail service to Subiaco and UWA as proposed in Public Transport for Perth, 2031.

5.2 Strategy Two – Promote and enable greater use of cycling and walking

5.2.1 Objective

The objective of this strategy is to increase the amount of travel within and along the corridor by both walking and cycling and decrease the proportion of travel by private car.

The strategy sets a mode share target for travel by walking of 18%, an increase of 50% on the current estimated mode share by walking of 12%. The proposed greater mix of residential and other uses will result in potential for many more short trips that will make this target achievable.

The strategy sets a mode share target for cycling of 10%, a large increase on the estimated 2% at present. Achievement of this target will be assisted by the proposed greater mix of land uses and shorter trip lengths for many purposes, but its achievement will be dependent on construction of a safe, connected network of off street bicycle paths along the corridor and more broadly in the area that is separate from the pedestrian network.

Taken together the walking and cycling strategies are likely to reduce car driver mode share by between 10% and 15%.

5.2.2 Guiding principles

The guiding principles of this strategy are:

- **Principle One**: Provide a sustainable transport corridor that provides a wide range of transport mode choices and high degree of accessibility within the SBRWAC;
- **Principle Three**: Design Scarborough Beach Road in a manner that maximises accessibility by all modes of transport, both along and across the street, with connectivity and integration taking precedence over vehicle speed and capacity.
- **Principle Five**: Develop a connected, safe bicycle network along the length of Scarborough Beach Road that is separated from both vehicular traffic and pedestrians and has high capacity.
- **Principle Six**: Encourage walking as a preferred option for short trips by providing safe, secure, comfortable and attractive walking routes and facilities.
- **Principle Seven**: Reduce the number of driveways off Scarborough Beach Road by providing rear laneway access to most premises to maximise safety for pedestrians and cyclists.
- **Principle Ten**: Provide narrower traffic lanes at centres along the corridor to assist in slowing traffic through the centres and improving safety for pedestrians crossing the street and accessing public transport stops.

5.2.3 Key walking and cycling strategy components

The key components of the walking and cycling strategy are:

- Provide a greater mix of land uses along the corridor to provide the potential for shorter trips and make walking and cycling a feasible option for a greater number of trips.
- Provide safe signalised pedestrian crossings of SBR at the proposed light rail stops, where needed at the mixed use centres and at other signalised intersections where no light rail stops are proposed (eg Duke Street)..
- Reduce speed limits at the mixed use centres along SBR to 50kph and narrow vehicle lanes to improve safety for pedestrians.

- Provide continuous dedicated cycle paths along both sides of SBR at the verge level that are separate from both vehicles and pedestrians and with a buffer to parked cars.
- Mandate provision of end of trip facilities including parking for cyclists at apartments and destination uses along the corridor and showers and lockers for use by cyclists, walkers and joggers.
- Ensure footpaths and cycle paths are well maintained and kept free from overhanging branches and foliage.

5.3 Strategy Three – Plan and design SBR as a multi-modal transport corridor

5.3.1 Objective

The objective of this strategy is to plan for a widened SBR to accommodate:

- Footpaths on both sides of the street.
- Separate one way cycleways on both sides of the street.
- An avenue of trees on both sides of the street.
- Laneways for moving traffic to provide capacity and safe access for the desired level of traffic.
- Kerbside parking at mixed uses centres.
- Dedicated centrally located public transport lanes capable of providing a light rail or rapid bus transport service.
- A narrow central median to provide a refuge for pedestrians and to provide space for street lighting and power supply infrastructure for light rail.
- Centrally located transit station platforms.

Street cross sections to accommodate this infrastructure are discussed in **Section 5.3.3**.

5.3.2 Guiding principles

The guiding principles of this strategy are:

- **Principle One**: Develop a sustainable transport corridor based on mixed use development that provides a wide range of transport mode choice and high degree of accessibility within the SBRWAC.
- **Principle Two**: Constrain vehicular traffic movement along Scarborough Beach Road so that it is compatible with mixed use development and activities that generate high volumes of pedestrians.
- **Principle Three**: Design Scarborough Beach Road in a manner that maximises accessibility by all modes of transport, both along and across the street, with connectivity and integration taking precedence over vehicle speed and capacity.
- **Principle Four**: Maximise SBRWAC corridor transport capacity, through provision of a frequent, legible and direct public transport system that operates in its own right of way and connects Scarborough Beach with the Stirling City Centre.
- **Principle Five**: Develop a connected, safe bicycle network along the length of Scarborough Beach Road that is separated from both vehicular traffic and pedestrians and has high capacity.
- **Principle Six**: Encourage walking as a preferred option for short trips by providing safe, secure, comfortable and attractive walking routes and facilities.
- **Principle Seven**: Reduce the number of driveways off Scarborough Beach Road by providing rear laneway access to most premises to maximise safety for pedestrians and cyclists.
- **Principle Nine:** Provide a small supply of on-street convenience public parking to meet the needs of business in centres along the route and assist in reducing vehicle speeds through the centres.

- **Principle Ten**: Provide narrower traffic lanes at centres along the corridor to assist in slowing traffic through the centres and improving safety for pedestrians crossing the street and accessing public transport stops.

5.3.3 Concept design and street cross sections

Concept designs and street cross sections have been prepared by Jacobs and the project team in accordance with the above objective and guiding principles, to establish the future street width required to implement the proposed integrated transport strategy and accommodate the required transport infrastructure. Individual components of the cross section (e.g. station widths, verge widths and lane widths can be varied marginally to achieve an optimum outcome at the detailed design stage. However, the cross sections are considered robust enough to establish street reserve widths.

Figure 5.1 provides an overview of the widening requirements for SBRWAC and indicates where public transport stations will be required.

Figure 5.1 : Proposed SBR widening

To the west of St Brigids Terrace, Jacobs and the study team has proposed that one lane of traffic in each direction, with potential right turn lanes where right turning traffic will be permitted, is sufficient to meet reasonable demand for traffic movement along this part of the corridor. As discussed in section 3.3 traffic volumes along this section of the corridor have declined since 2001. Even allowing for 10% traffic growth above existing, the peak direction, peak hour flows vary between 518 and 717 vehicles per hour. These volumes are well below the capacity of a single lane street with protected turning pockets.

A traffic study undertaken by SKM for the City of Stirling in 2011 showed there were 131 recorded traffic crashes on the 330 metre section of Scarborough Beach Road from Flamborough Street to Gildercliffe Street over a 5 year period. This included 1 fatality and 6 injuries serious enough to require hospitalisation. The existing 4 lane road configuration without protected turn lanes enables vehicles to pass on each side, when vehicles stop or slow down in the carriageway to turn off Scarborough Beach Road. The proposed design of a single lane in each direction with turning lanes would significantly improve the safety of this section of street.

Given that land for road widening will need to be acquired from private property along the length of SBRWAC there is a strong imperative to restrict road widening to that which is necessary. Furthermore good urban design dictates that the activity corridor should be kept as narrow as possible.

The cross sections shown in **Figures 5.2** and **Figure 5.3** have been proposed for SBR west of St Brigids Terrace.

The cross section shown in **Figure 5.2** requires a minimum total road width of 27.5m. The cross section shown in **Figure 5.3** requires a minimum total road width of 29.0m.

Figure 5.2: Mid-block cross section through mixed use centre

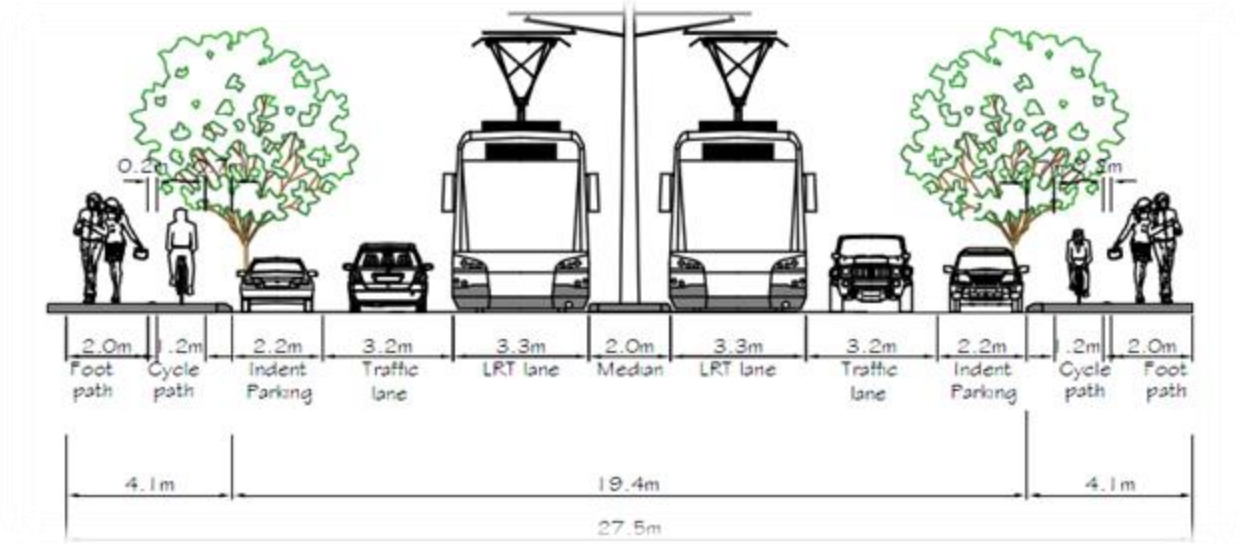


Figure 5.3: Mid-block cross section west of St Brigids Terrace, outside of centres

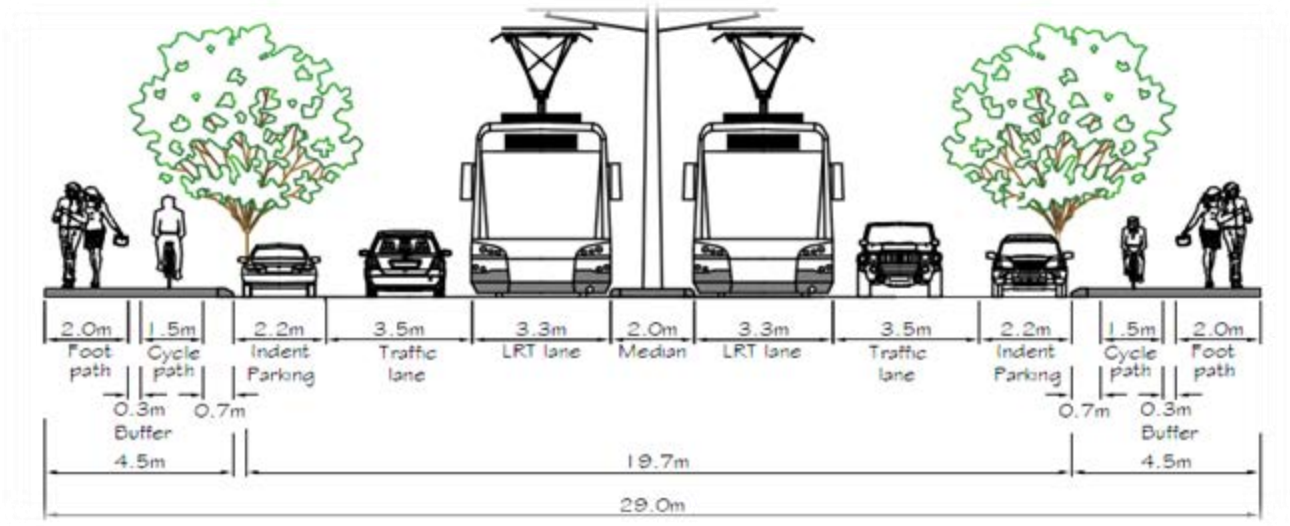


Figure 5.4 shows an indicative concept plan for transit stop locations west of St Brigids Terrace, that are proposed to be located at signalised intersections. Far side transit platforms are proposed. On the near side of the intersection potential right turn lanes are proposed to permit safe right turning and provide acceptable intersection capacity.

Figure 5.4: Indicative intersection treatment at light rail station (concept only)

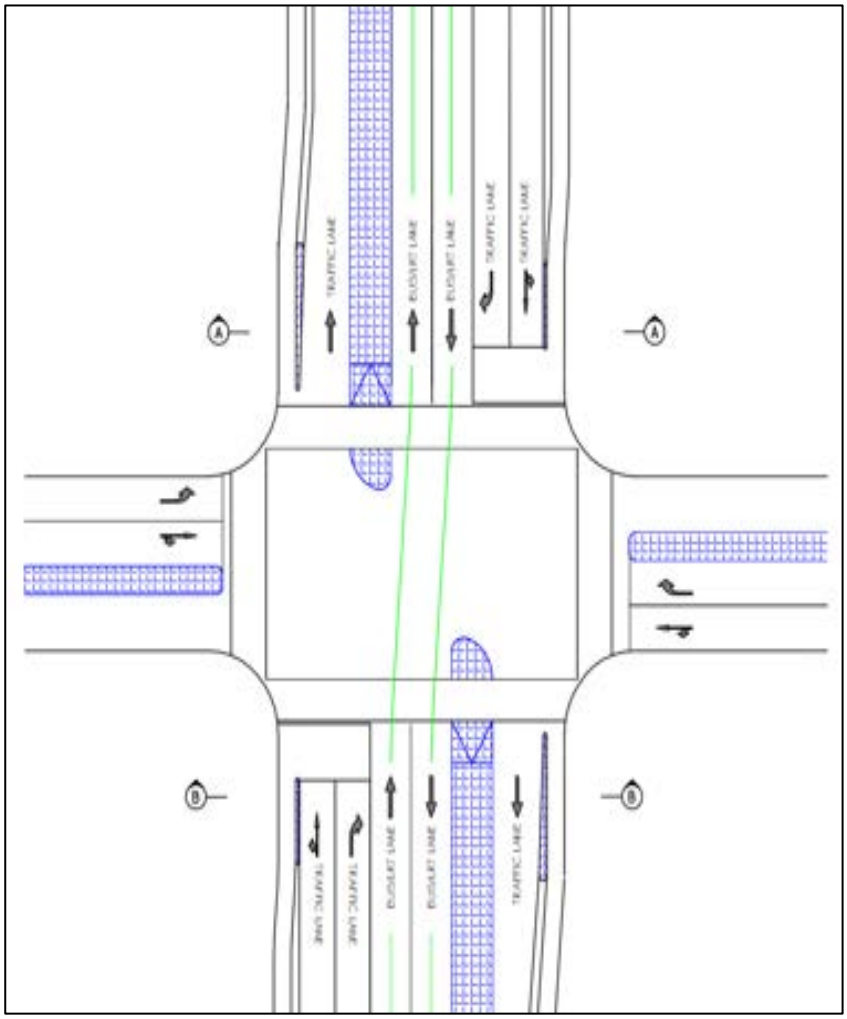


Figure 5.5 shows road cross sections (A-A and B-B as referenced in Figure 5.4) on the near side (approach) and far site (departure) to these intersections.

To the east of St Brigids Terrace existing traffic volumes are higher and this is expected to remain the case in the future. The highest traffic volumes are in the section to the east of Huntriss Road. Traffic volumes decline as you move west with traffic currently filtering off along Huntriss Road and St Brigids Terrace. Jacobs and the study team have acknowledged that two through traffic lanes in each direction should be provided to meet reasonable traffic demand along this section of the corridor. The proposed cross section along this section of SBRWAC is shown in **Figure 5.6**. It should be noted that it is not expected that an additional demand will be placed on Huntriss Road or St Brigids Terrace beyond that modelled in this document. These would be actively designed to discourage so called “rat running” through local area traffic management. Furthermore, both St Brigids Terrace and Huntriss Road can accommodate a traffic increase to the level modelled in this document.

Figure 5.5: Cross sections at transit stations west of St Brigids Terrace

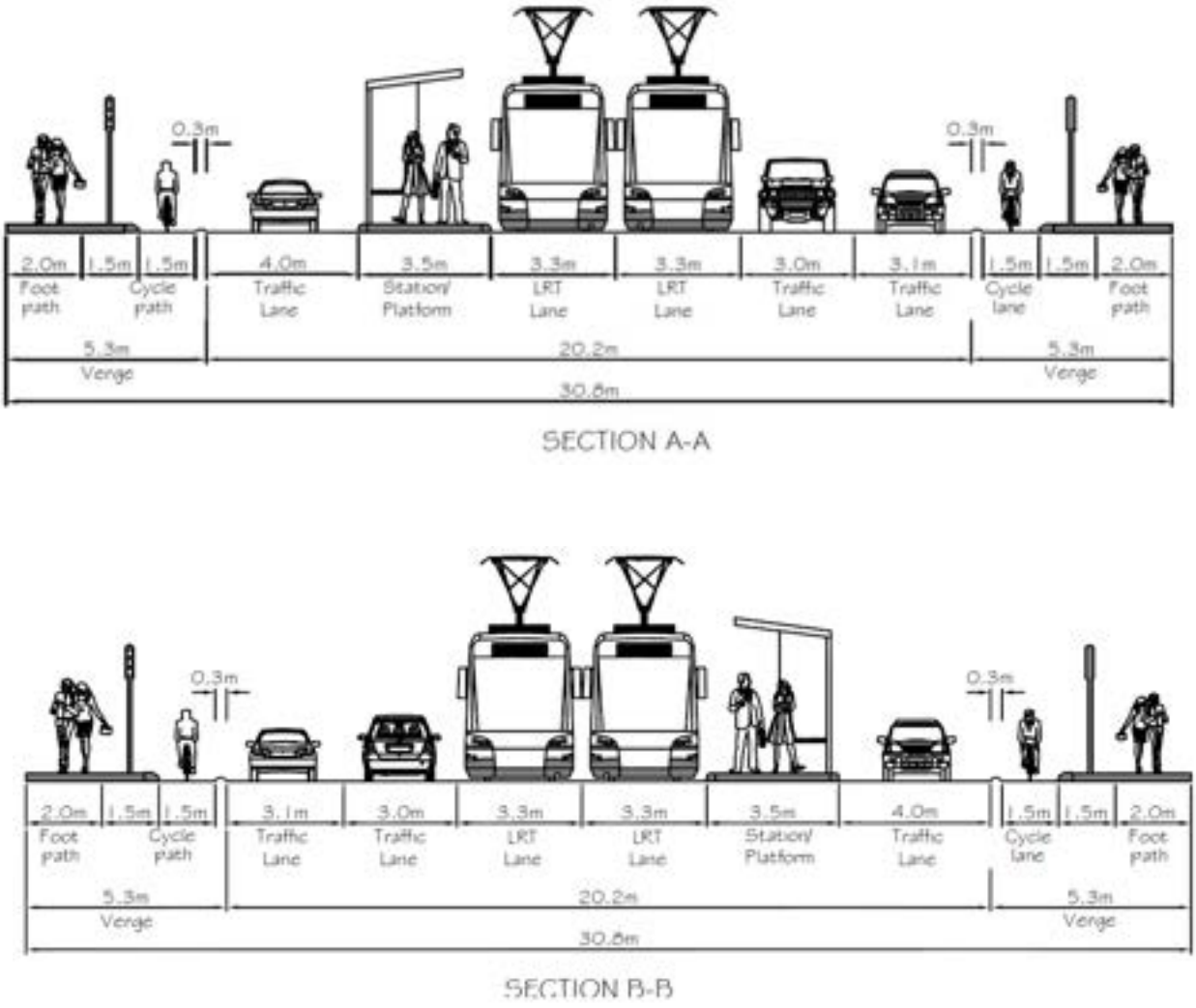
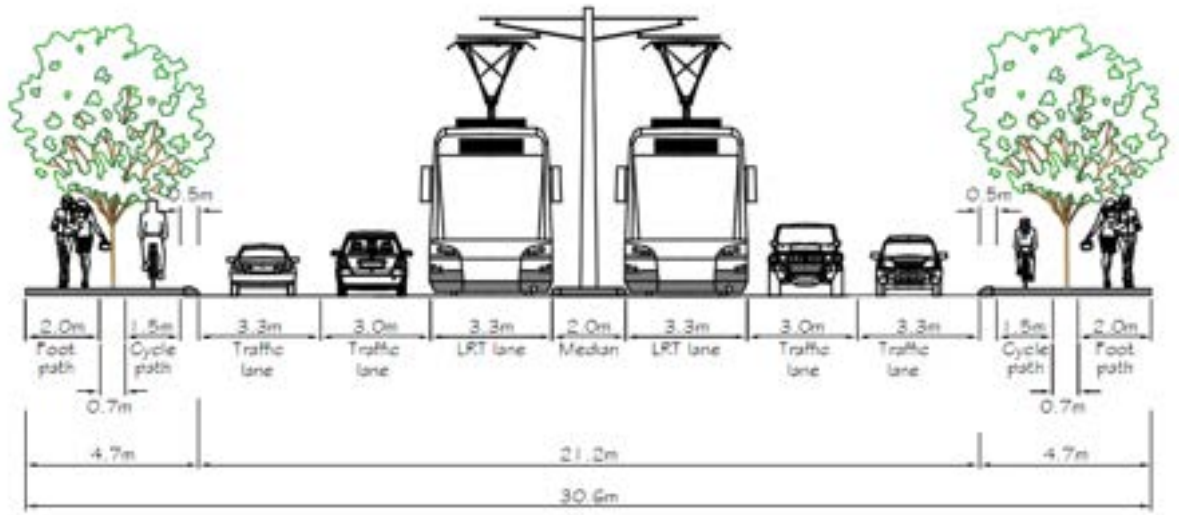


Figure 5.6: Mid-block cross section, east of St Brigids Terrace



There is only one proposed transit station along SBRWAC to the east of St Brigids Terrace, at Huntriss Road. A conceptual intersection plan for this intersection and transit station is shown in **Figure 5.7**.

Figure 5.7: Indicative intersection treatment at Huntriss Road (concept only)

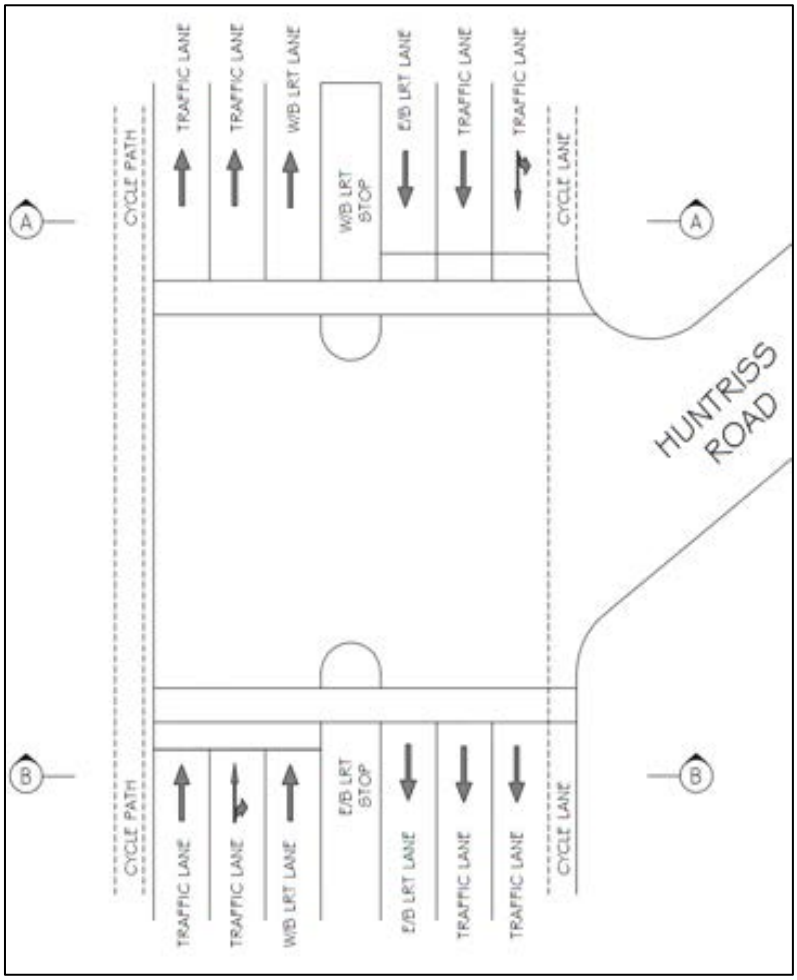
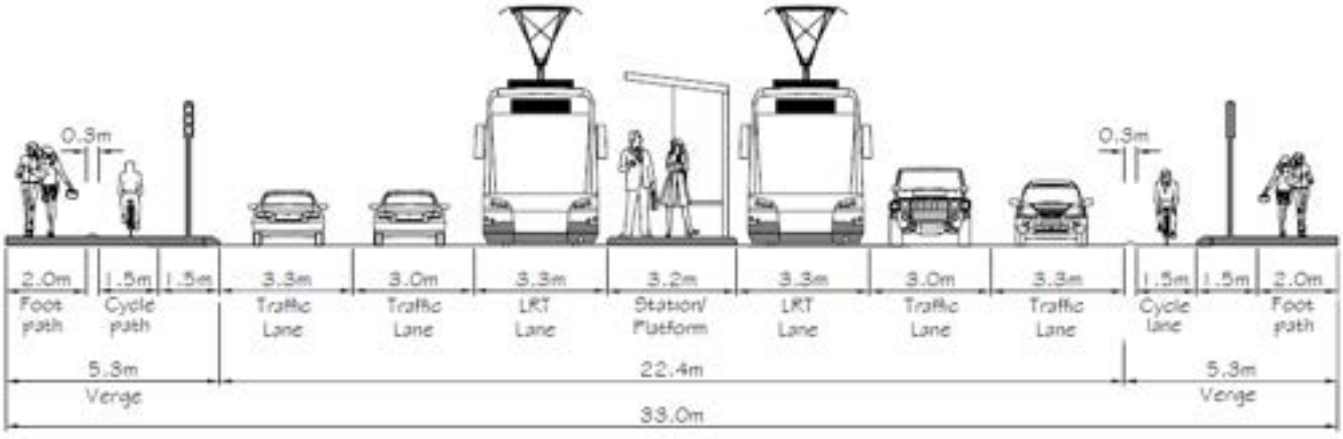
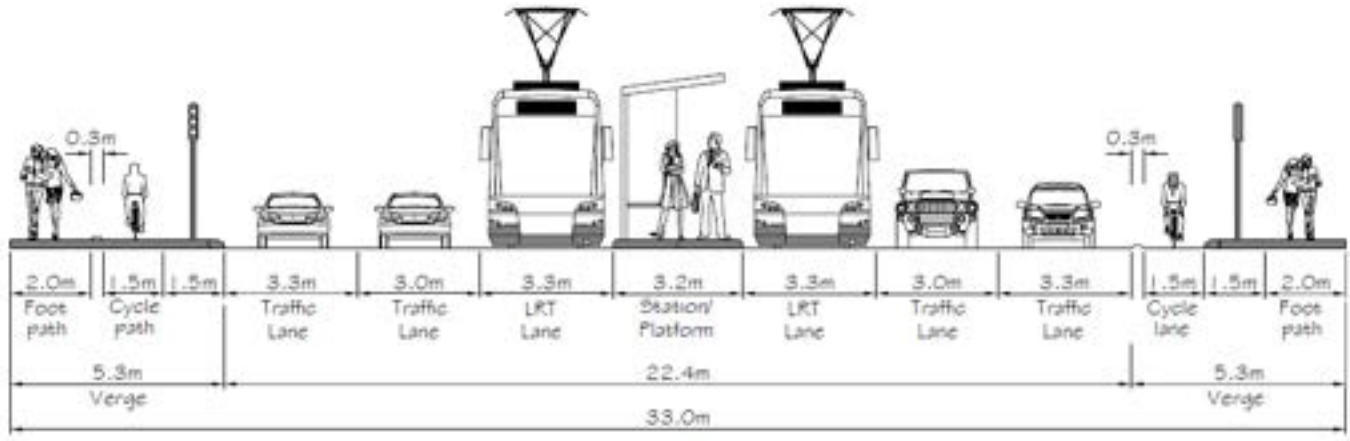


Figure 5.8 shows cross sections to the north and south of Huntriss Road (A-A and B-B as referenced in Figure 5.7) where a future road width of 33m will be required.

Figure 5.8: Cross sections at Huntriss Road Transit Station



SECTION A-A



SECTION B-B

The layout proposed in **Figure 5.7**, which incorporates a central platform for light rail, could not be used by buses in the period prior to light rail being introduced. An arrangement with side platforms for bus loading and unloading could be introduced in the interim period before light rail is constructed (refer **Figure 5.9**). In this interim period the temporary platform may need to be reduced to 2.8 metres to enable wider (3.5 metre) traffic lanes to be provided for passing buses.

Figure 5.9: Interim platform arrangements at Huntriss Road (concept only)

5.3.4 Laneways

Laneways are a current feature of SBR. They provide rear access to properties along most of SBR. With the proposed increase in cycling and pedestrian activity along SBR there is added incentive to provide access from the rear. It is proposed that rear access laneways be retained and or introduced where possible.

There are a wide variety of laneways. Some examples are shown in **Figure 5.10**.

Figure 5.10: Examples of laneway access and parking

Laneways are small scale, narrow public streets designed with the sole or principle intention of providing access to properties. They are designed for very low speed and vehicles can be expected to stop and give way to opposing traffic. In some cases there is a desire to provide some pedestrian activation from the laneway and this sometimes leads to a need for some form of pedestrian protection. In some cases there can be a need for some limited tree planting. Also it may sometimes be advantageous for traffic to move transversely from one side to the other (chicane style) to lower speed and improve safety. There are many possible designs of laneways.

In the context of this structure plan the key principles of laneway design are:

- Provide for very low traffic speed (< 20kph)
- Introduce raised areas for pedestrians where possible
- Consider providing limited parking and tree planting on alternative sides to stagger traffic
- Provide street lighting

One possible cross section of a laneway is shown in **Figure 5.11**. However many different configurations are possible.

Figure 5.11: Possible laneway cross section

5.4 Strategy Four – Manage demand for travel

5.4.1 Objective

The objective of this strategy is to limit the amount of car driving along the corridor by encouraging use of other modes.

5.4.2 Guiding principles

The guiding principles for this strategy are;

- **Principle One**: Develop a sustainable transport corridor based on mixed use development that provides a wide range of transport mode choice and high degree of accessibility within the SBRWAC.
- **Principle Two**: Constrain vehicular traffic movement along Scarborough Beach Road so that it is compatible with mixed use development and activities that generate high volumes of pedestrians.
- **Principle Three**: Design Scarborough Beach Road in a manner that maximises accessibility by all modes of transport, both along and across the street, with connectivity and integration taking precedence over vehicle speed and capacity.
- **Principle Eight**: Provide a level of mainly public parking, at the rear or properties, to meet the needs of businesses at centres along the route, which is compatible with higher levels of active and public transport and lower levels of driving.
- **Principle Nine**: Provide a small supply of on-street convenience public parking to meet the needs of business in centres along the route and assist in reducing vehicle speeds through the centres.
- **Principle Ten**: Provide narrower traffic lanes at centres along the corridor to assist in slowing traffic through the centres and improving safety for pedestrians crossing the street and accessing public transport stops.

5.4.3 Key components of the demand management strategy

The main components of the strategy are:

- TravelSmart behaviour change programme
- Parking policy and management
- Traffic management measures

Each of these components is described below.

5.4.3.1 TravelSmart behaviour change

The TravelSmart programme commenced in Perth in 1997 using individualised marketing that was first developed in Germany. The German strategy was developed to encourage greater use of public transport. However a modified strategy was developed in Perth to encourage greater use of walking, cycling and public transport. The South Perth TravelSmart programme was a world first and established a technique that has been rolled out in over 20 municipalities in Perth, every other capital city in Australia and numerous overseas cities since that time.

In 2008, a TravelSmart programme was undertaken for 26,765 residents in the City of Stirling suburbs of Mt Lawley, Coolbinia, Osborne Park, Yokine, Joondanna, Tuart Hill, Menora, Inglewood and Dianella. The programme resulted in the following travel changes:

- Car driver mode share -11%
- Public transport mode share +24%
- Walking +45%
- Cycling +72% (from a low base)

These results are broadly similar to results achieved in other TravelSmart interventions across Perth. It is proposed that the TravelSmart household programme be undertaken for the area adjacent to the SBRWAC, including the Scarborough Beach precinct and the Stirling City Centre area. In addition, it is proposed that TravelSmart school and workplace programmes are undertaken at schools and centres along the corridor and at Scarborough Beach and the Stirling City Centre.

5.4.3.2 Parking policy and management

The City of Stirling is developing a parking policy for the Stirling City Centre and the adjacent Herdsman Glendalough area. Key elements of this policy are:

- Maximum levels of parking of 250 bays/Ha
- Maximise the proportion of public parking
- Apply a charge for public parking (already implemented in Herdsman/Glendalough)

These measures that are technically outside of the SBRWAC will assist in reducing the amount of car driving along SBR. Similar measures are likely to be implemented in the MRA controlled area at Scarborough Beach.

A parking policy for the smaller centres along SBRWC will be developed based on similar principles, although the details will be different. For example, it is unlikely that a charge will be applied to public parking for the smaller centres in the short term.

5.4.3.3 Traffic management measures

Traffic management measures are proposed to be introduced at intersections, particularly signalised intersections, to ensure appropriate levels of priority are given in signal phasing to public transport, walking and cycling. Examples include:

- Real time priority through signalised intersections for buses and light rail, when the priority public transport lanes are introduced. Detectors will pick up transit vehicles on approach to the intersection and an immediate green light will be provided through the intersection. Far side transit stops are compatible with this approach, as transit vehicles can move off as soon as unloading/loading is finalised.
- Parallel walks for pedestrians at signalised intersections that provide pre-release for pedestrians before the green signal is activated for vehicles. Similarly it is proposed there would be a pre-release for cyclists who would cross at the same time as pedestrians. Cyclists would continue to cross for the full length of the green phase for vehicles travelling in the same direction. Vehicle drivers turning left would be required to give way to cyclists and pedestrians at all times.

- Signalised pedestrianized crossings may be required between signalised intersections. An example of where this may be necessary is between Alice Street and Hancock Street adjacent to Munro Park.

6. Traffic analysis

Traffic demands for the 2014 base year were obtained from SCATS data and traffic demands for the 2031 horizon year were initially sourced from the Regional Operations Model 24 hour (ROM 24) outputs, obtained from Main Roads WA.

Table 6.1 and **Table 6.2** show the traffic volumes on SBR during the AM peak hour and PM peak hours for 2014 (existing and 2031 ROM24 projections). The mid-block traffic flows were estimated by averaging the flows (from SCATS data) at the signalised intersections at each end of the road section. It was agreed that this was the best approach as the turning data at each signalised intersection infers the mid-block counts without actual mid-block data.

Table 6.1 : Traffic volumes on SBR AM Peak Hour (8:00-9:00)

Section	2014 Observed			2031 ROM24 Projections		
	Eastbound	Westbound	Total	Eastbound	Westbound	Total
West of Duke St	471	467	938	696	598	1294
Duke St – St Brigids Tce	577	402	979	611	555	1166
St Brigids Tce – Huntriss Rd	1100	480	1580	592	442	1034
East of Huntriss Rd	1659	508	2167	965	457	1422

Table 6.2 : Traffic volumes on SBR PM Peak Hour (17:00-18:00)

Section	2014 Observed			2031 ROM24 Projections		
	Eastbound	Westbound	Total	Eastbound	Westbound	Total
West of Duke St	400	751	1151	389	717	1106
Duke St – St Brigids Tce	481	740	1221	332	668	1000
St Brigids Tce – Huntriss Rd	700	1200	1700	395	509	904
East of Huntriss Rd	805	1581	2386	493	715	1208

It was found that the 2031 traffic volume forecasts by ROM24 along the corridor are extremely low to the east of Huntriss Road during PM peak period. This projection may have taken into consideration a future mode share shift from car trips to public transport trips. Future light rail service may also have resulted in the reduction in volumes.

To assess a worst case scenario, a conservative approach has been taken for the intersection analysis in the 2031 scenarios, as discussed in section 3.3. An assumption of 10% overall traffic growth on SBR from 2014 to 2031 was adopted to account for any possible underestimate of traffic growth along the corridor between 2014 and 2031. The adjusted 2031 traffic volumes (shown in Table 6.3) were then used to model the intersection performance in SIDRA. It should be noted that this approach results in AM peak hour volumes West of Duke Street (east and west bound) and between Duke Street and St Brigids Terrace (westbound only), that are less than the ROM24. However for consistency purposes this approach was taken for adjusting these volumes.

Table 6.3 : Adjusted 2031 peak hour traffic volumes used to model intersection performance in SIDRA

Section	2031 AM Peak			2031 PM Peak		
	Eastbound	Westbound	Total	Eastbound	Westbound	Total
West of Duke St	518	514	1032	440	826	1266

Section	2031 AM Peak			2031 PM Peak		
	Eastbound	Westbound	Total	Eastbound	Westbound	Total
Duke St – St Brigids Tce	635	442	1077	529	814	1343
St Brigids Tce – Huntriss Rd	1210	528	1738	770	1320	2090
East of Huntriss Rd	1825	559	2384	886	1739	2625

The following intersections were assessed:

- SBR/ Duke Street
- SBR/Grand Promenade
- SBR/St Brigids Terrace
- SBR/ Huntriss Road

SIDRA measures the performance of intersections in terms of degree of saturation, average delay, Level of Service (LoS) and 95%tile queue length. The assessment assumed the intersection configurations shown in Section 5.3.

Table 6.4 provides a summary of the SIDRA results for the key intersections along SBR. The results were based on optimum signal cycle times ranging from 65 – 120 seconds.

Table 6.4 : Summary of results (2031)

Intersection	AM Peak LoS	PM Peak LoS
SBR/ Duke Street	LOS D	LOS D
SBR/Grand Promenade	LOS C	LOS C
SBR/St Brigids Terrace	LOS C	LOS C
SBR/ Huntriss Road	LOS C	LOS C

The results show that each of the intersections is forecast to operate at LOS D or lower. Each of the assessed intersection provides a good level of operation and has sufficient spare capacity.

For each signalised intersection west of St Brigids Terrace, localised street widening will be required to create a road reserve up to 30.6m to accommodate a through traffic lane and a dedicated right turn pocket as well as transit stops. Suggested turning pocket lengths are based on the 95% back of queue length results from the SIDRA analysis and are provided in **Table 6.5**.

Table 6.5 : Suggested turning pocket length

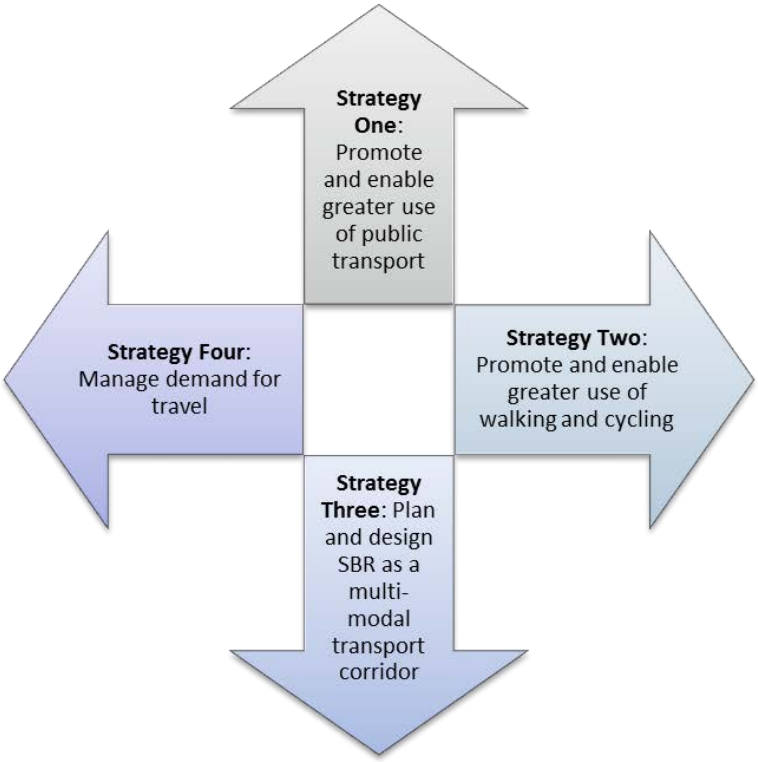
Intersection	Eastbound	Westbound
SBR/ Duke Street	25m	25m
SBR/Grand Promenade	25m	25m
SBR/St Brigids Terrace	25m	N/A

The full extent of the localised widening will be determined when the 15% road design for SBR is undertaken during the first half of 2015.

7. Summary and conclusions

This integrated transport strategy has been prepared for the proposed activity centre corridor along Scarborough Beach Road from west of Odin Road in Innaloo to Hinderwell Street in Scarborough.

An integrated sustainable mobility management approach has been proposed which incorporates the four key strategies shown below.



Each of the strategies is described in Section 5 of this report which outlines the objectives of the strategy, the guiding principles and the key components of the strategy.

Ten high level access and street design principles have been identified to guide development of the integrated transport strategy. These principles (outlined below) were presented to the community and landowners at the vision and design workshops and were supported by a strong majority of attendees:

- **Principle One:** Develop a sustainable transport corridor based on mixed use development that provides a wide range of transport mode choice and high degree of accessibility within the SBRWAC.
- **Principle Two**: Constrain vehicular traffic movement along Scarborough Beach Road so that it is compatible with mixed use development and activities that generate high volumes of pedestrians.
- **Principle Three**: Design Scarborough Beach Road in a manner that maximises accessibility by all modes of transport, both along and across the street, with connectivity and integration taking precedence over vehicle speed and capacity.
- **Principle Four**: Maximise SBRWAC corridor transport capacity, through provision of a frequent, legible and direct public transport system that operates in its own right of way and connects Scarborough Beach with the Stirling City Centre.
- **Principle Five**: Develop a connected, safe bicycle network along the length of Scarborough Beach Road that is separated from both vehicular traffic and pedestrians and has high capacity.
- **Principle Six**: Encourage walking as a preferred option for short trips by providing safe, secure, comfortable and attractive walking routes and facilities.

- **Principle Seven**: Reduce the number of driveways off Scarborough Beach Road by providing rear laneway access to most premises to maximise safety for pedestrians and cyclists.
- **Principle Eight**: Provide a level of mainly public parking, at the rear of properties, to meet the needs of businesses at centres along the route, which is compatible with higher levels of active and public transport and lower levels of driving.
- **Principle Nine**: Provide a small supply of on-street convenience public parking to meet the needs of business in centres along the route and assist in reducing vehicle speeds through the centres.
- **Principle Ten**: Provide narrower traffic lanes at centres along the corridor to assist in slowing traffic through the centres and improving safety for pedestrians crossing the street and accessing public transport stops.

Current transport trends show that car driving per person has decreased in Perth since about 2004 in common with other Australian capital cities and other OECD countries. In Perth there has been a15% reduction in car driving per person since 2004, after half a century of growth.

Taking account of this trend and the proposed growth of population and employment along the activity corridor, it is considered likely that traffic volumes will remain about the same as at present, if the transport strategies are implemented as proposed.

Intersection capacities have been assessed for traffic volumes of 10% greater than the current volumes. Peak hour levels of service have been assessed with results as shown below.

Intersection level of service analysis for 2031

Intersection	AM Peak LoS	PM Peak LoS
SBR/ Duke Street	LOS D	LOS D
SBR/Grand Promenade	LOS C	LOS C
SBR/St Brigids Terrace	LOS C	LOS C
SBR/ Huntriss Road	LOS C	LOS C

Traditionally traffic planners have sought to achieve levels of service of 'C' or better, but this has rarely been achievable in the last decade or so during peak periods when levels of service of 'D' or 'E' or even worse have been more common.

In this context the projected levels of service of between 'B' and 'D' are considered appropriate for an activity corridor in Perth and demonstrate a balanced approach to provision of the different modal transport options - public transport, private car traffic, walking and cycling.

A series of cross-sections have been developed as shown in Section 5.3 of this report to determine the street width required along the different sections of Scarborough Beach Road to accommodate the necessary infrastructure including light rail.

It is recommended that the street widths shown in these cross sections be adopted and used in structure planning to determine future road reservation widths along the corridor.

Appendix A. SIDRA results