flyt

Great Eastern Highway Corridor Plan

TRANSPORT STRATEGY

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Contents

1. INTRODUCTION AND CONTEXT

This Transport Strategy has been produced by Flyt in support of the Great Eastern Highway (GEH) Urban Corridor Plan project led by Taylor Burrell Barnett (TBB) on behalf of the City of Belmont (CoB).

1.1 The Great Eastern Highway corridor

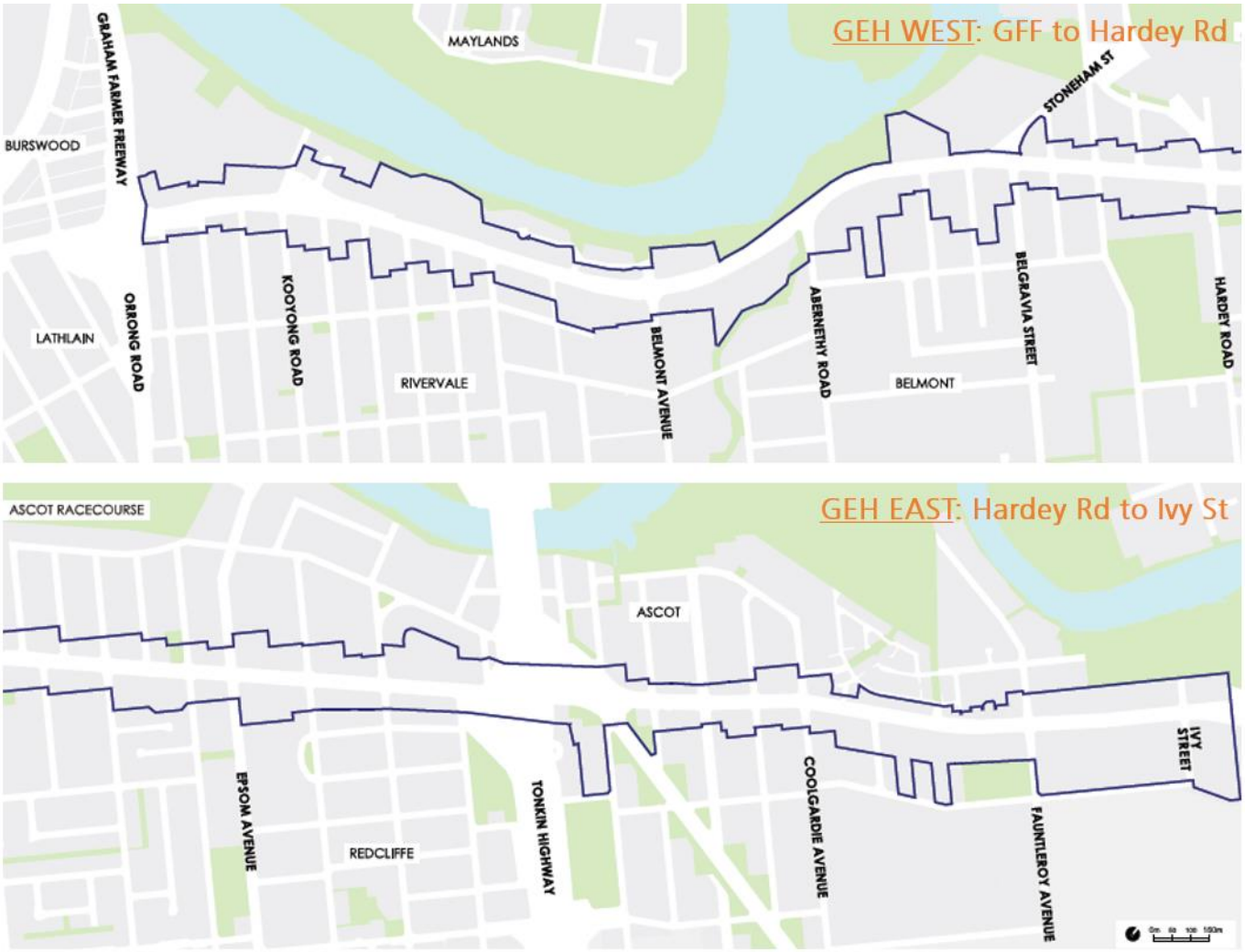
The entire GEH link is a 590km long road that connects Perth with the City of Kalgoorlie. The GEH is a key route for road vehicles accessing the eastern Wheatbelt and the Goldfields, and it is the western portion of the main road link between Perth and the eastern states of Australia.

The GEH commences at The Causeway and is a six-lane road (three lanes in each direction) from The Causeway to Tonkin Highway near Perth Airport. It continues as a four-lane road (two lanes in each direction) to Midland. There are plans in due course to upgrade the section of GEH to the east of the Tonkin Highway within the study area.

With traffic volumes within the study area averaging 65,000 vehicles per weekday, the corridor is not only required to meet the resident's needs with places to live, work, shop, play and feel part of the community, but also to perform a major regional traffic function with a high number of through traffic movements along the corridor.

The geographic scope of the corridor study is centred along the GEH and comprises the lots fronting the GEH between the Graham Farmer Freeway in Rivervale to Ivy Street in Ascot, as shown in Figure 1.

Figure 1 Great Eastern Highway corridor plan study area (source: TBB, February 2018)



1.2 Why do we need a plan for the Great Eastern Highway corridor?

The CoB needs to plan for the future and the corridor has the potential to play a positive role in supporting the City's growth. It is a strategically important transport route for industrial, business and tourism purposes and supports a sense of neighbourhoods along its length.

However, the corridor suffers from congestion in some areas, with up to 80,000 vehicle trips per day. The corridor offers little amenity for pedestrians, cyclists and businesses and access to properties is compromised. These issues have significantly eroded the Road's role as an Activity Corridor: a place to live and work. Change is needed if the full potential of the corridor is to be realised.

As set out in the GEH Urban Corridor Strategy (TBB, February 2018):

> *'Fundamental to the ambition of the Urban Corridor Strategy is growth that encourages a diversity of small to medium sized businesses and housing diversity. There is also an opportunity to better connect existing public open spaces as well as create more and higher quality public spaces. A better network of public places will support healthier lifestyles as development within the Corridor occurs.'*

The GEH Urban Corridor Strategy plan has been developed to establish a vision to support the City's growth and to make the corridor a better place to live, work and visit. To realise this potential the plan provides policy guidance and establishes a framework to deliver:

- A productive business environment that supports a range and variety of employment opportunities
- A managed access strategy
- Well serviced and well connected neighbourhoods in which people will want to live
- High amenity public realm that offers a diverse range of spaces, places and connections for people to use and interact with
- To co-ordinate and deliver land use change in an orderly and efficient manner.

1.3 The opportunity of the Great Eastern Highway corridor

The Strategy seeks to transform the corridor bringing new life to Great Eastern Highway and adjacent communities through investment in homes, jobs, transport, open space and public amenity.

The strategy seeks to optimise the strategic location of the CoB and the neighbourhoods along the corridor to facilitate these urban outcomes.

Every planning decision made along the corridor will be influenced by the outcomes of this project. This includes day to day planning proposals and development applications, and local statutory planning documents such as Local Planning Policies (LPP's).

1.4 Urban corridor attributes

The ideal urban corridor would typically be characterised by the following traits:

- High density residential facilities (i.e. apartments), sometimes as a component of mixed use development
- A variety of non-residential uses, including retail, commercial, food and beverage, health, short-stay accommodation and education facilities, in a fine-grain and street-based built form
- With major destinations or attractions as anchors at each end
- Maximum intensity of development along the primary corridor, with a gradual reduction in intensity behind the corridor
- A rail-based form of high frequency public transport along the length of the corridor

- Buildings that address the street, with minimal front setbacks and parking excluded from the front setback area
- Street trees and awnings to provide climatic relief
- Generous footpaths and cycle paths on both sides of the main corridor and connecting with the surrounding area to encourage walking and cycling
- Regular, safe and formalised pedestrian crossings
- Limited vehicle traffic speeds (up to 50km/hr)
- Parallel rear laneways and local streets (but not continuous along the length of the corridor) that provide for efficient vehicle access. Direct vehicle access is ideally not provided to the activity corridor
- Provide land use that optimises the investment in public transport. New development should significantly assist in optimising a shift in travel choice to walking, cycling and public transport. Non-supportive land uses will be avoided.

Supportive land uses are those that:

- Include high employee and residential densities
- Recognise that the highest densities will be focused at activity nodes and railway stations with strategic opportunities for sustainability (i.e. large sites) and decrease with distance from these areas
- Ensure adequate and appropriate employment space
- Encourage travel time outside of peak periods
- Attract reverse flow travel
- Encourage travel by walking and cycling.

Non-supportive land uses are those that:

- Are oriented more towards travel by automobile rather than walking, cycling or taking public transport
- Generate high levels of vehicular traffic and require significant parking
- Provide low-density building forms
- Create an unpleasant environment for pedestrians
- Have limited hours of operation.

The Strategy encourages the application of these traits and characteristics as redevelopment occurs.

1.5 Report structure

This introduction and context section forms the first of five sections in this Transport Strategy. The remaining sections cover:

- An overview of the GEH urban corridor strategy
- GEH existing movement network – transport, access and parking
- GEH future movement network – transport, access and parking
- GEH strategies and implementation.

2. OVERVIEW OF GREAT EASTERN HIGHWAY URBAN CORRIDOR STRATEGY

The vision for the GEH corridor, based on community and stakeholder engagement, for GEH to become:

'…a vibrant and attractive gateway to the Perth CBD and Belmont from Perth Airport'.

The GEH Urban Corridor Strategy is underpinned by an Urban Design Framework, which seeks to provide guidance for new development along the corridor, under four categories; public realm, land use, built form and movement. These four categories reflect the main investigation and discussion which emerged during the study analysis and community and stakeholder engagement.

Through a focus on the four categories, the Urban Design Framework will seek to ensure that new development reflects the broader vision for the corridor. The remainder of Section 2 provides an overview of the movement category within the Urban Design Framework.

2.1 Movement principles

The GEH Urban Corridor Strategy is founded upon respecting and strengthening the corridor's transport infrastructure through the provision of land uses and access arrangements that ensure ease of movement to, through and within the corridor for the various transport mode options.

The movement principles outlined in the GEH Urban Corridor Strategy include:

- Support dedicated public transport lanes along the corridor
- Ensure safe access and movement through the precinct for cyclists
- Ensure safe access and movement through the precinct for pedestrians, providing a high-quality pedestrian environment with safe crossing points
- Effectively manage vehicular traffic flow along GEH and side streets, acknowledging the highway is a major artery that acts as a strategic trade route and gateway linking Perth Airport through to the Perth City Centre
- Promote parking for mixed use, mixed business and residential development (along GEH) to be at the rear of development. Where parking is required to be at the front of buildings, ensure it has an appropriate interface with the corridor, and appropriate landscaping is provided
- Remove cross-overs from GEH to only provide access to mixed use, mixed business and residential development (along GEH from secondary streets or laneways (Main Roads WA Strategic Access Plan requirement)).

The fundamental movement aspects of the corridor include consideration of vehicular access arrangements and parking locations to ensure safe pedestrian and cyclist movement and landscape amenity is achieved as identified in the public realm typologies.

It is also essential to consider the provision of a network of safe, accessible and convenient pedestrian and cyclist crossings to complement the range of land uses, built form and network of connections along the corridor. The movement typologies included in the Urban Design Framework cover Access and Parking, and Crossings.

2.2 Vehicular access and parking typologies

The location and arrangement of access into properties and parking within properties should ensure efficient vehicular movement, while also providing safe and efficient pedestrian and cyclist movement, ensure amenity of the landscape, as well as align with the land use, built form and public realm elements of the corridor.

The Access and Parking typologies included in the Urban Design Framework are: Type 1, Type 2 and Type 3.

- Type 1 - provides for lot access via the rear with parking provided at the rear of the lot
- Type 2 - provides for lot access via the rear with parking provided at the front of the lot
- Type 3 - provides for lot access from the front with parking provided at the front of the lot

Further details on the vehicular access and parking typologies is provided in Section 4.

2.3 Pedestrian and bike crossings typologies

The provision of a network of safe, accessible and convenient pedestrian and cyclist crossings is crucial to improving the existing pedestrian and cyclist environment of the corridor. Providing a multitude of pedestrian and cyclists crossing opportunities will encourage walking and cycling, creating a catalyst for active spaces, as well as enhance the connection of the corridor with the Swan River.

The crossings should be strategically located to facilitate access to and from existing bus stops, activity nodes, public open space and places which attract a high volume of pedestrians and cyclist activity. The crossings should be integrated with the extensive network of connections along and surrounding the corridor. The crossing typologies included in the Urban Design Framework are: at-grade crossings, underpasses and overpasses.

Further details on the pedestrian and bike crossing typologies is provided in Section 4.

2.4 Urban corridor precincts

The GEH corridor is both a single linear road used for the movement of people and goods, and a series of distinct but interconnected places that have their own identity and play a particular role in the character of the corridor. The east and west and north and south sections of the corridor are distinctly different in many ways including topography, land use, subdivision pattern, built form, economic and demographic characteristics. As a result, the challenges and opportunities presented along the corridor require varied approaches to redevelopment, access and parking.

For the purposes of the project, the corridor has been separated into four precincts as follows:

- Precinct 1 – Graham Farmer Freeway to Belmont Avenue
- Precinct 2 – Belmont Avenue to Hardey Road
- Precinct 3 – Hardey Road to Tonkin Highway
- Precinct 4 – Tokin Highway to Ivy Street.

Further details on the proposed access and parking and transport network within each of the four precincts is provided in Section 4.

2.5 Community and stakeholder engagement outcomes

Community Visioning and Design Workshops were held in November 2017. The workshops involved two exercises:

- Exercise 1 involved a values analysis, review of draft design principles and the preparation of a vision statement for the GEH corridor
- Exercise 2 required attendees to provide feedback in relation to their 'place', and in relation to the GEH corridor in terms of land use, public realm, movement and built form aspects to inform draft design scenarios.

A summary of the movement related key findings from the two exercises is provided below:

- Need to improve the pedestrian and cycle network within and connecting to the GEH corridor
- Improve pedestrian environment – crossing points, accessibility, walkability and shade
- Improve cycle network – preference for better cycle paths parallel to the GEH corridor, separating cyclists from the road
- Need to enhance river walks, cycle paths and connection to and along the Swan River

- Value access/location to airport, CBD, Swan Valley, regional road network, employment and facilities, to good public transport
- Value exposure for businesses
- More pedestrian overpasses
- Wider footpaths
- Improve pedestrian/cycle access to Optus Stadium
- Enhance access to public transport within and along the GEH corridor
- Improve bus connections to local hubs within adjacent neighbourhoods
- Reduce traffic noise
- Enhance traffic flows, particularly in peak hour
- Manage control of access into adjacent neighbourhoods
- Enhance movement and safety
- Traffic lights to include u-turns to enhance access to businesses and for residents in adjacent neighbourhoods
- Upgrade GEH corridor to the east of Tonkin Highway
- Preference for car parking to be located either underneath or behind buildings as opposed to in front of buildings
- It was generally considered by workshop attendees that the current amount of car parking along the corridor did not seem sufficient.

3. EXISTING MOVEMENT NETWORK – TRANSPORT, ACCESS AND PARKING

This section of the Transport Strategy sets out the existing movement network of the GEH study area. This section of the report covers:

- Corridor upgrade works
- Road network
- Vehicle access
- Pedestrian and bike networks
- Public transport networks
- Freight movements
- Parking.

3.1 Corridor upgrade works

Between June 2011 and February 2013 the GEH corridor from Kooyong Road in Rivervale to Tonkin Highway in Redcliffe, was subject to significant upgrade works. These works included:

- Widening GEH, from four to six lanes, between Kooyong Road and Tonkin Highway – a distance of 4.2km
- Constructing a central median for the full length of the project
- Upgrading all major intersections to include dedicated turning movements
- Providing U-turn facilities at key locations in order to maintain access to businesses fronting GEH
- Incorporating bus priority lanes into key intersections
- Providing dedicated on-road cycling facilities
- Constructing footpaths for pedestrians
- Relocating, replacing and protecting service utilities such as telecommunications, water, power and gas.

It should be noted that Main Roads are currently working on future plans to upgrade the section of GEH between Tonkin Highway and the GEH Bypass. It is anticipated that the upgrade works will include continuous two-lanes of general traffic in each direction, bus priority lanes at key intersections, dedicated cycling facilities within the corridor and higher quality/wider footpaths.

Figure 2 shows the upgrade works completed by Main Roads in 2013. Figure 3 shows the GEH corridor between Belgravia Street and Hardey Road before and after the works.

Figure 2 Great Eastern Highway upgrades – June 2011 to February 2013 (source: Main Roads)

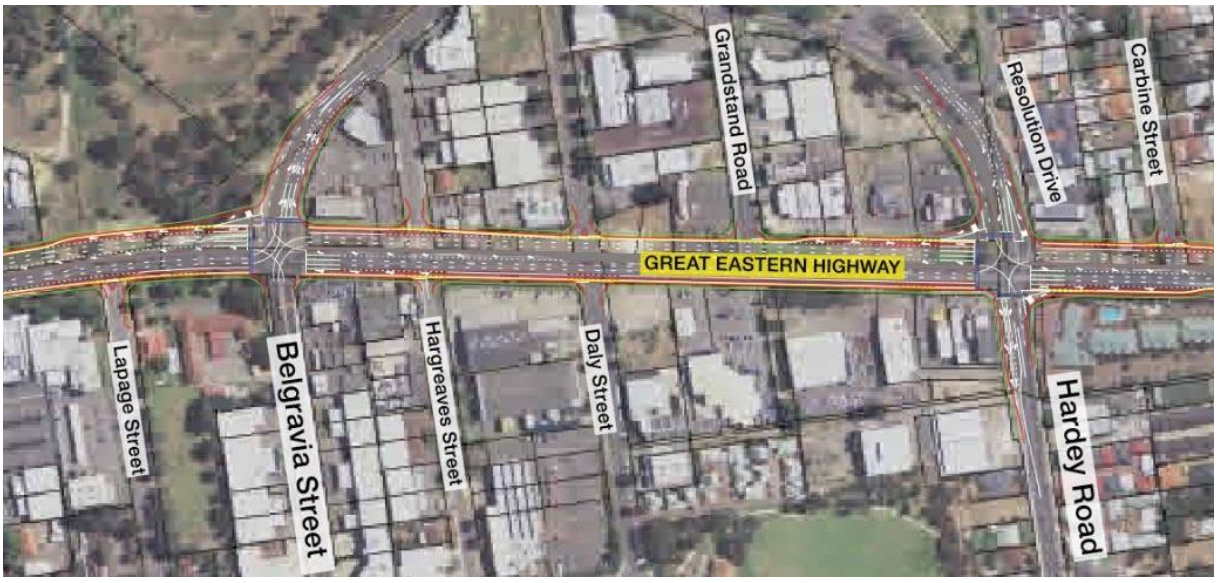


Figure 3 Great Eastern Highway corridor between Belgravia Street and Hardey Road – 2009-2015 view eastbound prior to Daly Street intersection (source: Google Streetview)

3.2 Road network

3.2.1 Traffic volumes

Existing traffic count data was sourced through the Main Roads Reporting Centre. Figure 4 shows the count locations where classified or volume counts have been collected by Main Roads between 2013 and 2015 (the most recent count data available). The traffic volumes presented represent two-way average weekday traffic volumes (vpd) for each count location along the GEH corridor.

The traffic count data shows that at the eastern end of the corridor (Ivy Street) average weekday traffic is around 43,000 vpd, this volume of traffic steadily increases along the corridor towards Perth city. Through the central area of the corridor (Hardey Road) average weekday traffic is around 65,000 vpd, and at the western end of the corridor (Orrong Road) average weekday traffic is around 70,000 vpd.

Figure 4 Existing traffic count data – two-way average weekday traffic volumes (source: Main Roads)

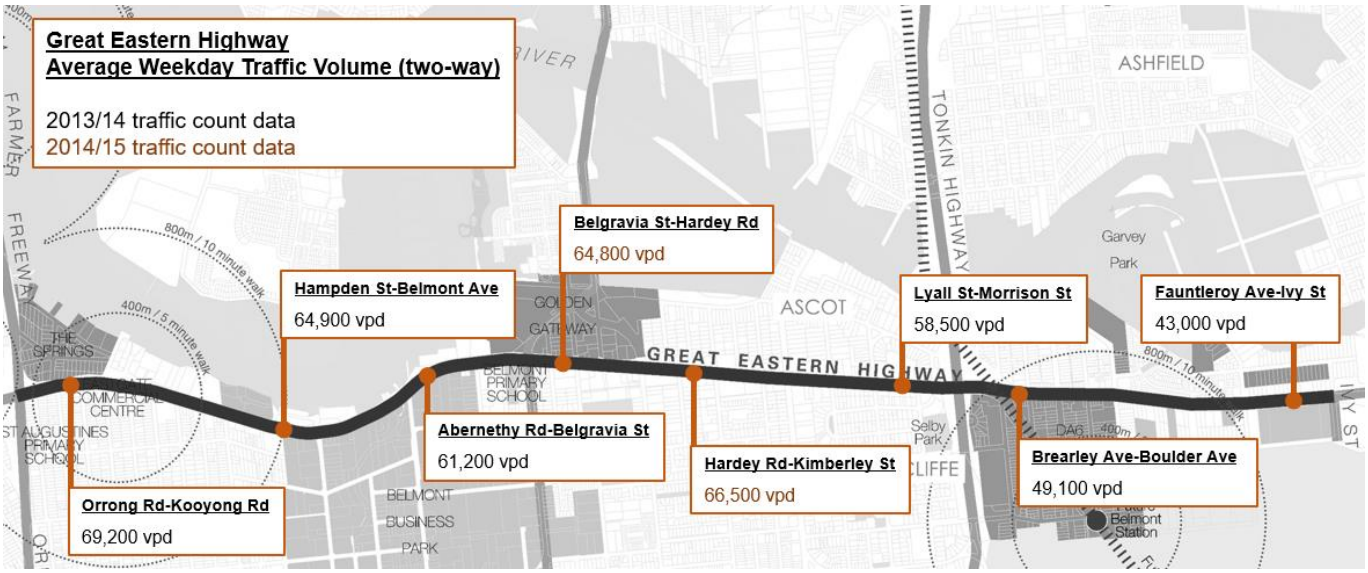


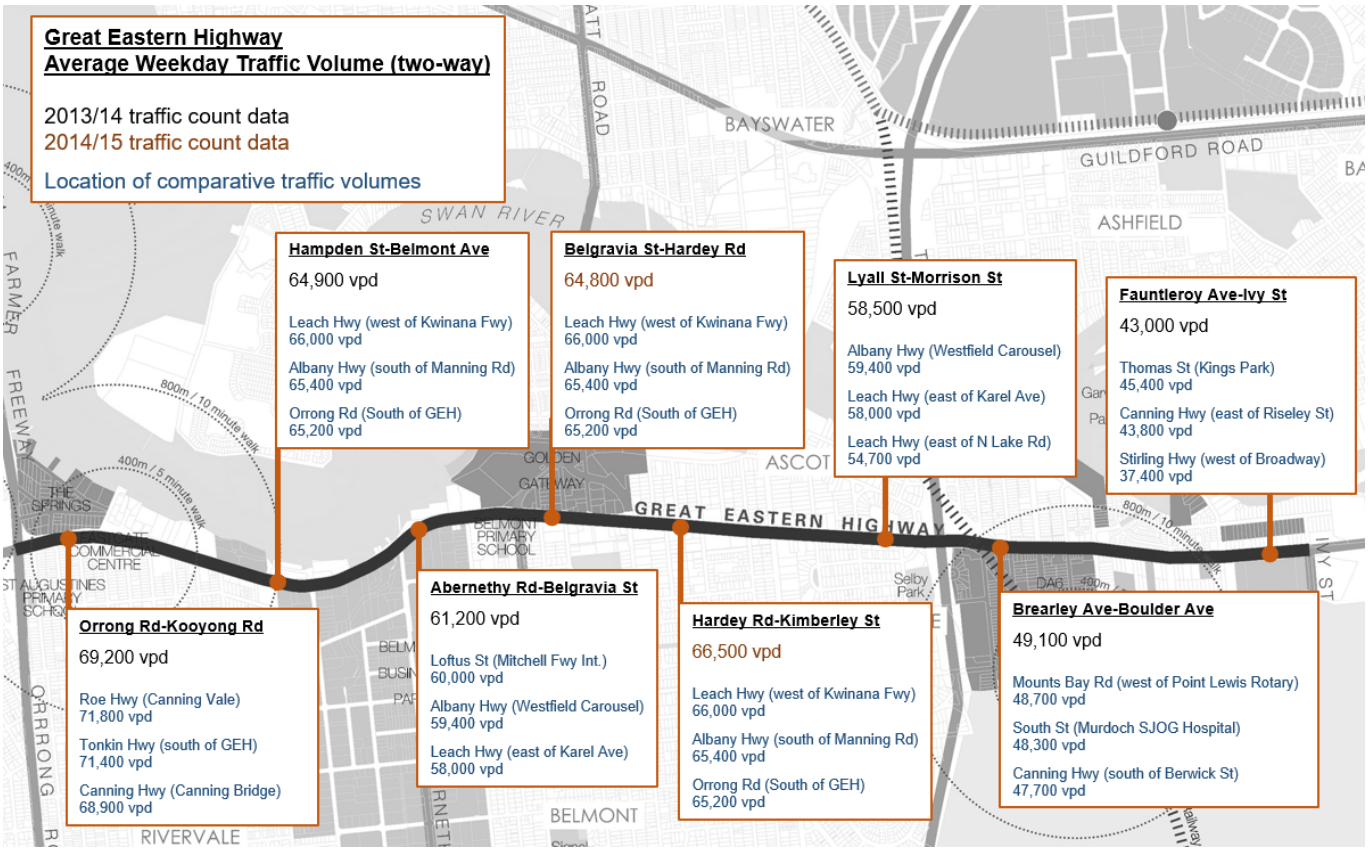
Figure 5 shows the existing traffic count data and a series of comparative traffic volumes from other corridors across Perth, to provide context in relation to the volume of traffic being moved through the GEH corridor.

The volume of traffic moving along the eastern end of the corridor (43,000 vpd at Ivy Street) is similar to the level of traffic using Canning Highway at Riseley Street or Stirling Highway at Broadway.

The significant volume of traffic moving along the central area of the corridor (65,000 vpd at Hardey Road) is similar to the level of traffic using Leach Highway west of the Kwinana Freeway, Albany Highway at Manning Road or Orrong Road south of GEH.

The major volume of traffic moving along the western end of the corridor (70,000 vpd at Orrong Road) is similar to the level of traffic using Roe Highway through Canning Vale, Tonkin Highway south of GEH or Canning Highway at Canning Bridge.

Figure 5 Comparative traffic count data – two-way average weekday traffic volumes (source: Main Roads)



Whilst Figure 4 provides details of existing traffic volumes at key locations along the corridor and Figure 5 provides a comparison to traffic volumes along other major metropolitan Perth road corridors, Figure 6 and Figure 7 provide context in relation to the forecast traffic volumes along the corridor.

In order to support this project, Main Roads provided the project team with outputs from their strategic transport model (ROM24) for both the base year (2016) and forecast year (2031).

For each traffic count location along the corridor, Figure 6 shows a comparison between the existing observed traffic volume, the 2016 base year ROM24 model traffic volume and the 2031 forecast year ROM24 model traffic volume. The data shows that whilst in the centre of the corridor (around Hardey Road) the existing traffic volumes and 2016 base year ROM24 traffic volumes are similar – at the two ends of the corridor there are significant differences between the existing traffic volumes and 2016 base year ROM24 traffic volumes. This is shown as follows:

- Ivy Street:
  - Existing traffic - 43,000 vpd
  - 2016 ROM24 - 50,100 vpd
- Hardey Street:
  - Existing traffic - 64,800 vpd
  - 2016 ROM24 - 66,100 vpd
- Orrong Road:
  - Existing traffic - 69,200 vpd
  - 2016 ROM24 - 77,900 vpd

In instances where the 2016 base year ROM24 model traffic volumes are higher than the existing traffic count traffic volumes, a ratio (the difference between 2016 ROM24 data and existing traffic data) has been applied to future year 2031 ROM24 model data to scale back the forecast traffic volumes to reflect the ROM24 models over prediction of traffic movements through a given section of the corridor.

Figure 7 shows the 2016 base year ROM24 model traffic volumes scaled back to the same level as the existing traffic data volumes, and the 2031 forecast ROM24 model traffic volumes scaled to reflect the recasting of the base year.

Figure 6 Existing, 2016 ROM24 and 2031 ROM24 traffic data – two-way average weekday traffic volumes (source: Main Roads)

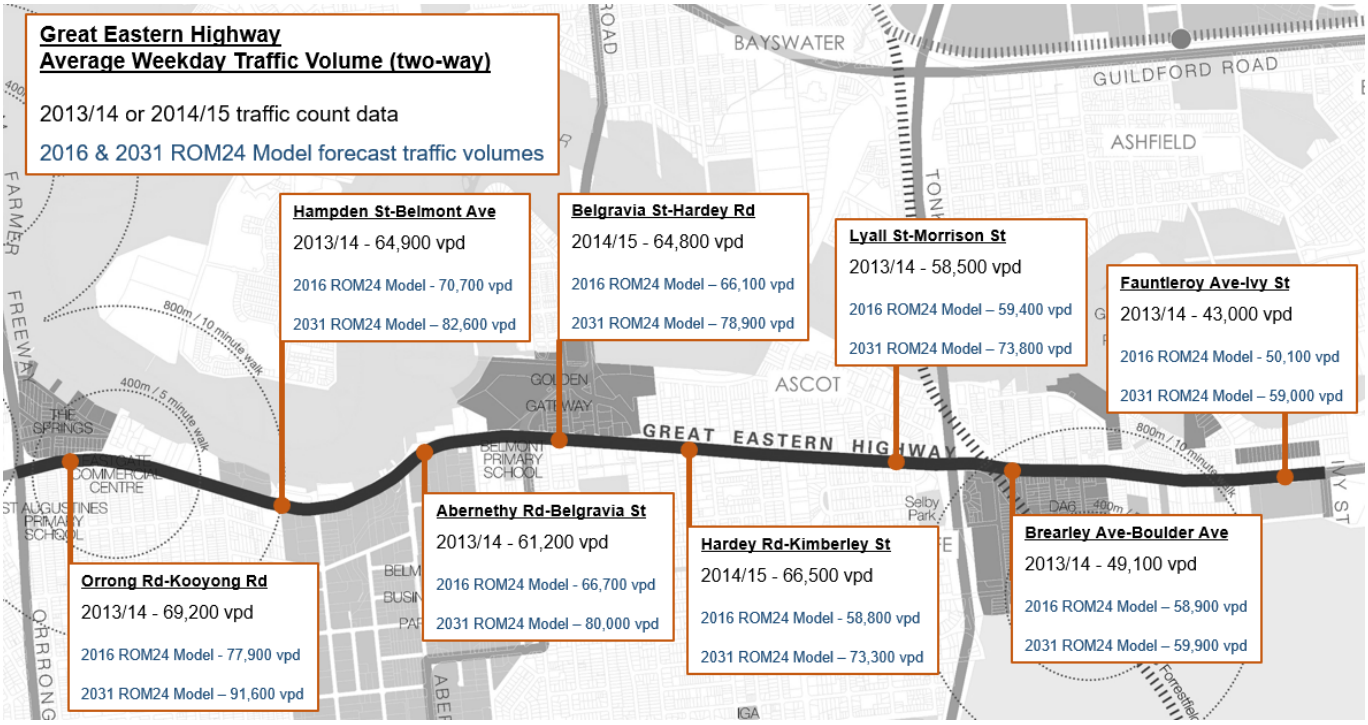
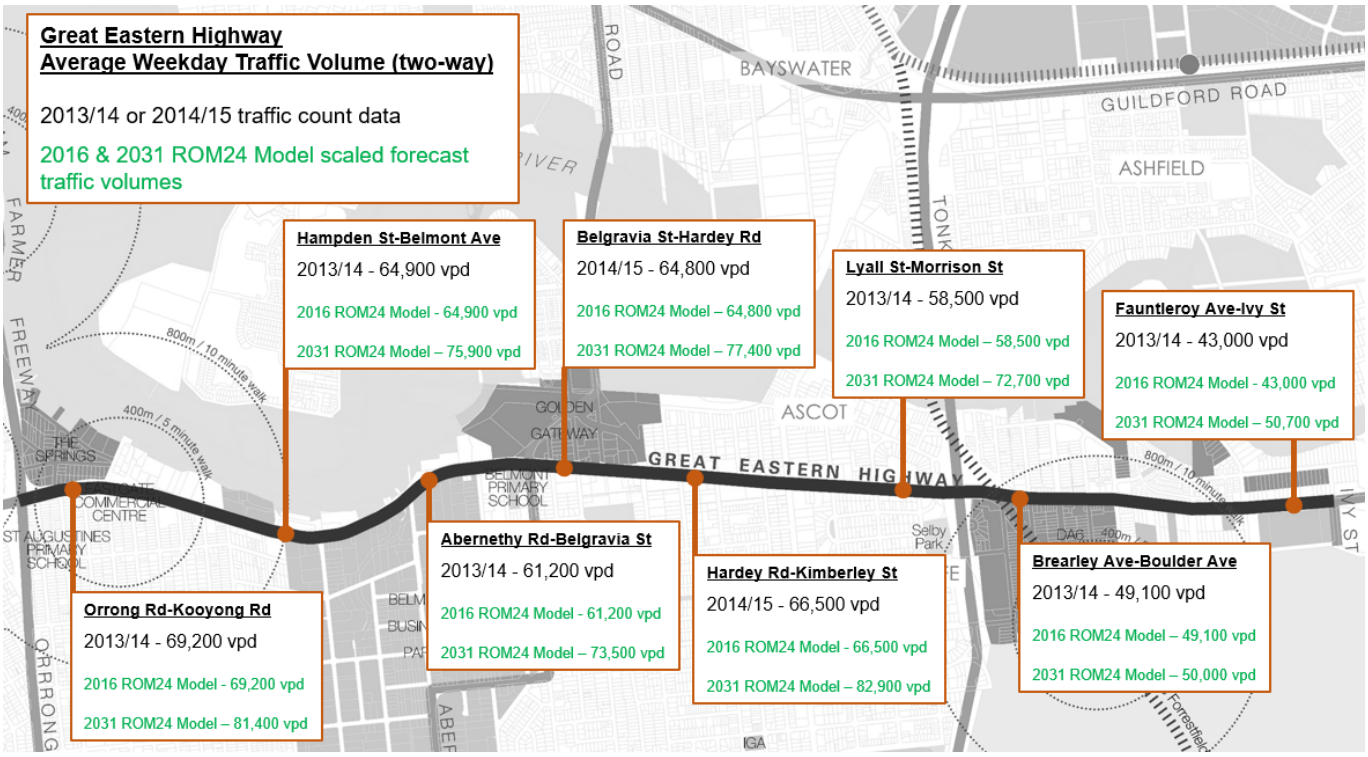


Figure 7 Recast existing, 2016 ROM24, 2031 ROM24 traffic data – two-way average weekday traffic volume (source: Main Roads)



The information below shows the existing traffic volumes, recast 2016 base year ROM24 traffic volumes and recast 2031 forecast year ROM24 traffic volumes. The 2031 traffic volumes are shown as a range, which indicates the recast volumes (lower end of the range) and ROM24 forecasts (upper end of the range).

This information shows that the Main Roads ROM24 model forecast process is predicting an average 1.3% growth in traffic per annum between 2016-2031 across the traffic count data sites (with a range of 1.2-1.6% growth per annum across the traffic count data sites).

The corridor is forecast to accommodate between 50,000-60,000 vpd at the eastern end (Ivy Street), between 77,000-80,000 vpd through the central area of the corridor, and between 81,000-91,000 vpd at the western end (Orrong Road).

- Ivy Street:
  - Existing traffic - 43,000 vpd
  - Recast 2016 ROM24 - 43,000 vpd
  - Recast 2031 ROM24 - 50,000-60,000 vpd
- Hardey Street:
  - Existing traffic - 64,800 vpd
  - Recast 2016 ROM24 - 64,800 vpd
  - Recast 2031 ROM24 - 77,000-80,000 vpd
- Orrong Road:
  - Existing traffic - 69,200 vpd
  - Recast 2016 ROM24 - 69,200 vpd
  - Recast 2031 ROM24 - 81,000-91,000 vpd

3.2.2 Road hierarchy

The overall functional hierarchy map from the Main Roads Road Information Mapping System is shown in Figure 8. Main Roads criteria for the various hierarchy of roads are detailed below:

Primary Distributor Roads: Provide for major regional and inter-regional traffic movement and carry large volumes of generally fast moving traffic. Some are strategic freight routes and all are State Roads. They are managed by Main Roads and typically carry above 15,000 vehicles per day. Within the vicinity of the GEH corridor study area the following are classified as Primary Distributor roads; Great Eastern Highway, Graham Farmer Freeway, Orrong Road and Tonkin Highway.

Distributor A Roads: Carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property. They are managed by local government and typically carry between 8,000-15,000 vehicles per day. Within the vicinity of the GEH corridor study area the following are classified as Distributor A roads; Grandstand Road (Garratt Road Bridge), Resolution Drive, Stoneham Street and Belgravia Street.

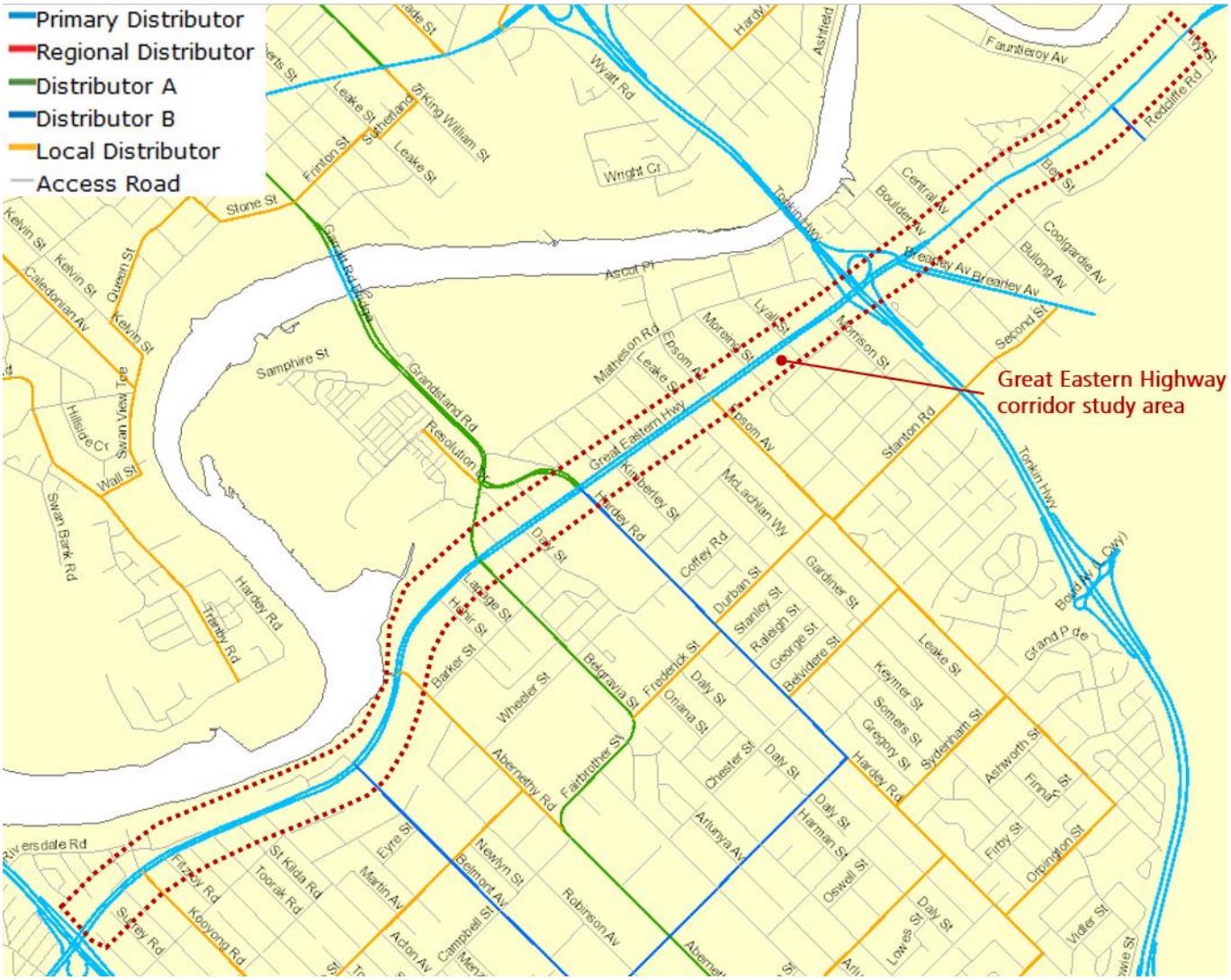
Distributor B Roads: Perform a similar function to Distributor A roads, but with reduced capacity due to flow restrictions caused by frequent property accesses and roadside parking in many instances. These are often older roads with a traffic demand in excess of that originally intended. They are managed by local government and typically carry between 6,000-8,000 vehicles per day. Within the vicinity of the GEH corridor study area the following are classified as Distributor B roads; Belmont Avenue and Hardey Road.

Local Distributor Roads: Roads that carry traffic within a cell and link District Distributors or Regional Distributors at the boundary, to Access Roads. The route of Local Distributors should discourage through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to, or serving the area. These roads should accommodate buses, but discourage trucks. They are managed by local government and typically carry between

3,000-6,000 vehicles per day. Within the vicinity of the GEH corridor study area the following are classified as a Local Distributor roads; Kooyong Road, Abernethy Road and Epsom Avenue.

Access Roads: Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly. They are managed by local government and typically carry less than 3,000 vehicles per day. All other roads are classified as Access Roads.

Figure 8 Main Roads functional road hierarchy within the vicinity of the Great Eastern Highway corridor (source: Main Roads)



3.2.3 Posted speed limits

The Great Eastern Highway corridor operates with a 60km/h posted speed limit through the study area.

The higher order Tonkin Highway corridor has a posted speed limit of 100km/h, the Orrong Road corridor has a posted speed limit of 70km/h and the Graham Farmer Freeway corridor has a posted speed limit of 80km/h.

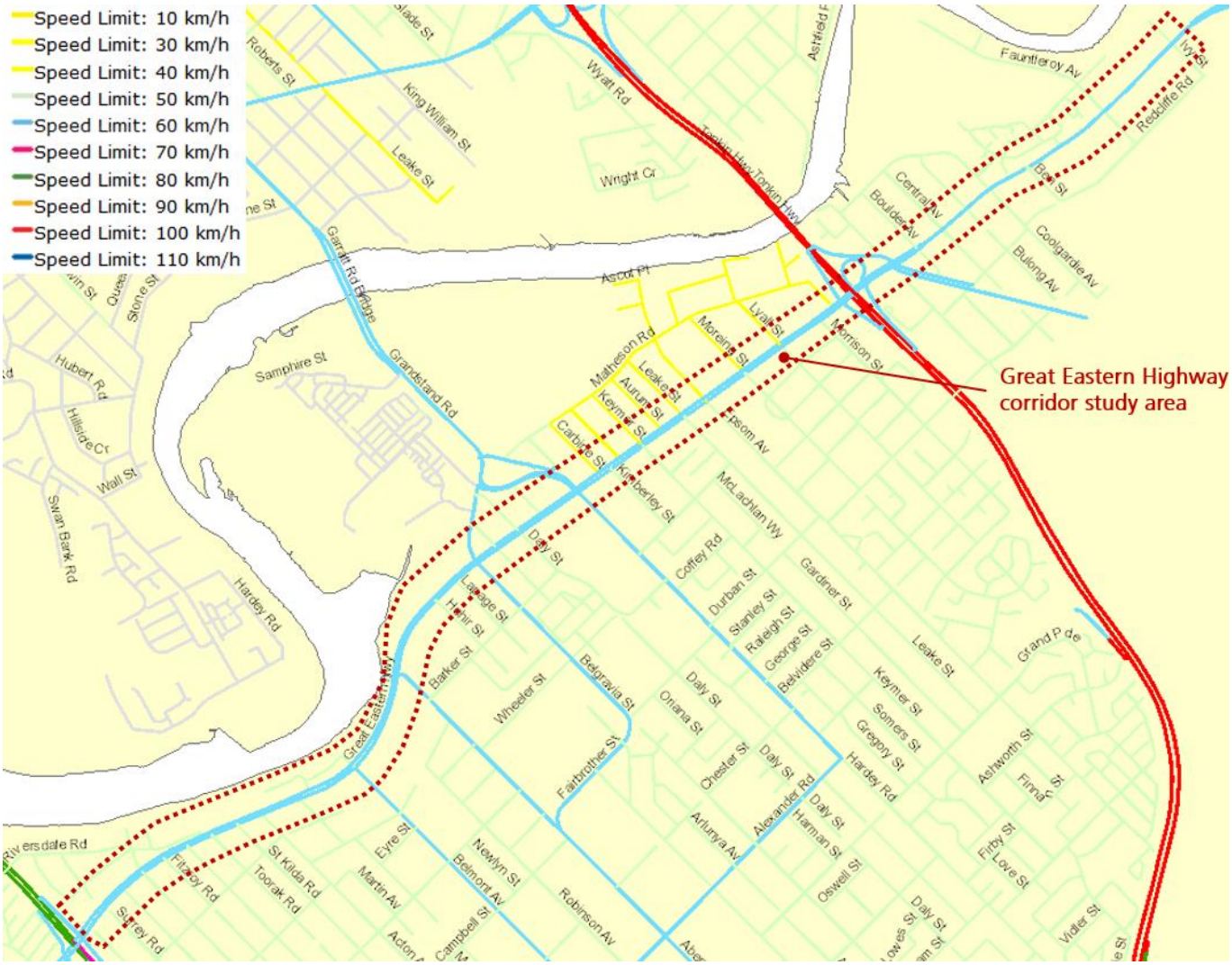
The Grandstand Road (Garratt Road Bridge), Resolution Drive, Stoneham Street, Hardey Road, Abernethy Road and Belmont Avenue corridors all have a posted speed limit of 60km/h.

All other roads leading from the GEH corridor have a posted speed limit of 50km/h, accept for the area known as the 'Residential and Stables' area, which has a posted speed limit of 40km/h. This special area is bounded by the Swan River, Tonkin Highway, GEH, Hardey Road, Matheson Road and the Ascot Racecourse. The special area is unique and close to the Ascot Racecourse which is firmly ingrained in Belmont history and character. Due to the nature of the

vehicle activity and movements within this special area (transportation of horses by horse box/float) and horses being walked between residential stables and the racecourse, a lower posted speed limit of 40km/h is used to restrict vehicles speeds.

Figure 9 shows the posted speed limit on the road network within the vicinity of the GEH corridor study area.

Figure 9 Posted speed limits within the vicinity of the Great Eastern Highway corridor (source: Main Roads)



3.3 Vehicle access

The Austroads *Guide to Traffic Management Part 5: Road Management (2017)*, provides guidance in relation to traffic management at mid-block locations along individual roads. The Guide defines mid-block as being a location 'between significant intersections', so that issues associated with vehicles turning to enter or leave minor roads or access driveways to roadside properties (for example) are addressed.

The Austroads Guide sets out that the road network needs to provide for all users of the network in an equitable and balanced manner. This is a challenge in along urban corridors such as GEH where there are various types of users of the road network and their needs vary depending on their mode of travel.

The Austroads Guide sets out a Movement and Place framework to consider the relative priorities of the movement of people and goods to their destination.

3.3.1 Movement and Place framework

The Movement and Place framework recognises that roads serve two primary roles for users:

- To facilitate the movement of people and goods
- To act as places for people.

The movement function is determined by the strategic significance of the road within the network. This is identified by the volume of people and goods moved and the longer journeys that it serves. Movements include all forms including those of pedestrians and cyclists.

The place function is determined by the strategic significance and community value of a place. Roads can be places and are often located within areas such as urban activity centres, strip shopping centres, transport hubs, educational institutes and community centres.

Figure 10 shows the Movement and Place framework – this has been illustrated (in orange) to show that the existing situation along GEH is a corridor with a significant traffic movement function and limited place function. Over time the objective of the GEH Urban Corridor Strategy is to maintain the significant traffic movement function but enhance the place function in transition area either side of major nodes of activity, and within the nodes themselves the objective is to maintain the significant traffic movement function as well as significantly enhance the place function.

Figure 10 Movement and Place framework in relation to the Great Eastern Highway context (source: Austroads 2017)

The Austroads Guide sets out that the implementation of the Movement and Place framework will enable more effective management of infrastructure to prioritise the user's needs, reduce potential conflicts and facilitate safe and timely journeys with minimum disruption.

In relation to the GEH corridor the primary objective is the safe movement of people and goods, however the road serves a combination of other functions including:

- provision of access to abutting land
- provision for loading, unloading and parking
- use of the road as public open space and space for trading and commerce, entertainment, informal recreational use, and in more densely populated areas is seen as part of the living space.

Therefore, the two essential functions of a road when viewed from the movement component of the Movement and Place framework are to provide:

- Mobility, which is concerned with the movement of through-traffic and is focused on the efficient movement of people and freight
- Access, which relates to the ease with which traffic from land abutting roads can enter or leave the road.

3.3.2 Road type and function

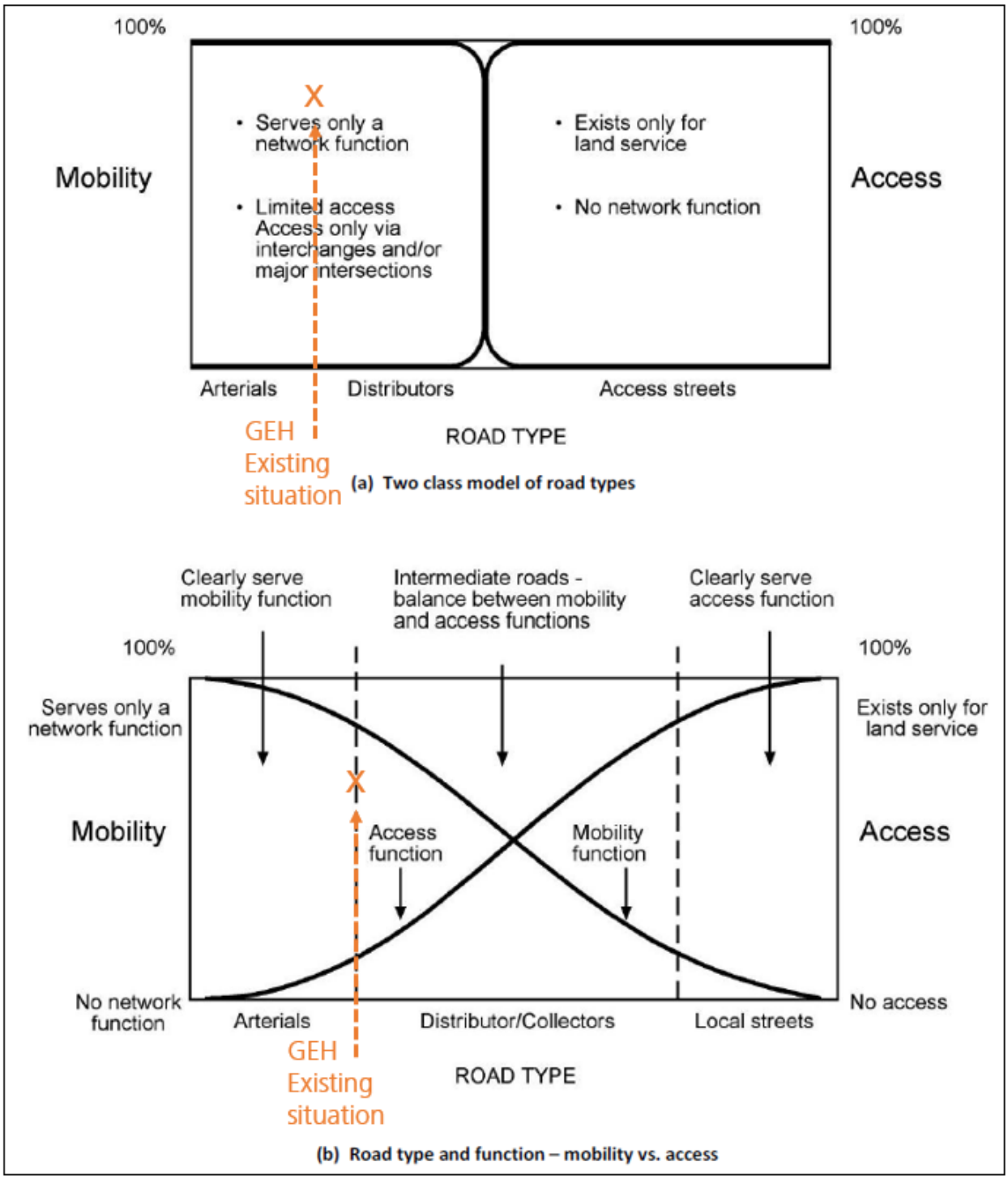
Historically the road type and function were considered in a 'two class model' whereby roads were separated by those that provided high levels of mobility and those that provided high levels of access. The two-class model typically leads to a high level of mobility on arterial roads but was considered to not result in roads systems/environments desired by the broader community.

As such, over time a model of mobility versus access was developed, which attempted to develop road corridors with a dual function of providing for both mobility and access. This model was employed extensively across Australia and led to the development of many corridors similar to GEH, which has a mixed function of providing for both mobility and access.

For some road corridors there is a legitimate demand for a strong emphasis on mobility and an increased emphasis on local amenity. However, the dual function model has typically led to conflict and difficulty in achieving an appropriate balance.

Figure 11 shows the two road type/road function models and has been illustrated (in orange) to show where on each model the GEH corridor currently sits in relation to mobility and access.

Figure 11 Road type and function in relation to the Great Eastern Highway context (source: Austroads 2017)



3.3.3 Access management strategic approach

There is a trend in Australia towards going back to the two-class model, whereby roads are separated by those that provided high levels of mobility and those that provided high levels of access.

Austroads has developed a framework for arterial road access management based on more refined road corridor categories. The framework provides the basis for categorising and managing specific routes and sections of roads within arterial networks, and the framework seeks to resolve the balance to be achieved between the mobility and access functions.

The framework identifies the following arterial road categories:

- Cat 1A: roads with minimal access – motorways and expressway
- Cat 1B: roads with minimal access – rural or urban roads
- Cat 2A: roads with restricted access – higher speed urban arterials
- Cat 2B: roads with restricted access – intermediate speed urban arterials
- Cat 3A: roads with frequent but regulated direct access – mixed function urban or rural secondary arterials
- Cat 3B: roads with frequent but regulated access – mixed function secondary urban arterial
- Cat 4: roads with unrestricted access – local roads providing local access to properties.

For each road category the framework provides a generic description, typical road type and function, specific access control tools and details regarding good practice for implementation.

Whilst Section 3.2.1 sets out details of the traffic volumes along the corridor and how busy the corridor is from a traffic movement perspective compared to other major traffic corridors in metropolitan Perth – when reading the description of the road categories in the framework, based on existing access arrangements and other factors, you would conclude that the GEH corridor is operating currently as a Category 3A type road:

- Description: Road with frequent but regulated direct access and median control/protection of right turns
- Typical road type/function: Mixed function urban arterial road, serving both community and traffic roles
- Access control: Medians preventing right turns except for selected locations, some u-turn facilities.

Over time the objective of the GEH Urban Corridor Strategy is to restrict direct access to lots, which would result in the corridor moving up from a Category 3A road to a Category 2B road, which have the following characteristics:

- Description: Road with restricted access, with medians with restricted provisions of access (200-500m)
- Typical road type/function: Intermediate speed urban arterial road
- Access control: Use of service roads with limited number of access points to the major road.

It is important that whilst the GEH Urban Corridor Strategy seeks to restrict direct lot access over time, that the reduction in friction along the corridor does not lead to an increase in speed limits. As such the existing 60km/h speed limit should be retained along the corridor.

Table 1 shows the full details for the Category 2b and 3A road corridors – this has been illustrated (in orange) to shows the transition over time of the GEH corridor.

Table 1 – Access categories as a basis for planning policy and development control (source: Austroads 2017)

Category	Generic description	Typical road type and function	Specific access control tools	Good practice in implementation
2B	**Roads with restricted access** – roads with no direct access to a major road except via service road exit/entry, minor road junction or driveway constructed as a junction (70–80 km/h). With medians and subject to restricted provision of access points (e.g. 200 to 500 m) and median design standards, consistent with intermediate speed and moderate traffic service.	Intermediate-speed urban arterial providing a primary arterial function at a lesser level of service to Category 2A roads, with more frequent median breaks, minor junctions and regulated driveways. Not normally applicable to non-urban areas.	• Service roads with a limited number of access points to the major road. • Some minor side roads have access only to the service road. • Medians preventing right-turns except at selected locations. • Median-opening geometry allowing right-turns in one direction only. • Indented turn lanes in median where turns are allowed. • Some median openings for U-turns only. • Turn bans may apply at specified times.	• All driveways, some side roads have access to service road only, as for Category 2A. • Closer spacing of access points from service roads than for Category 2A but still check effects on the major road traffic flow. • At lower major-road speeds, angled median openings can be used to allow exiting right-turns while preventing entering right-turns. This may be appropriate, for example, where sight distance is restricted in one direction. • At the lower speeds for Category 2B roads compared with 2A, long deceleration lengths are not needed in right-turn or U-turn slots indented in the median. • Locate U-turn slots and apply time-specific right-turn bans as advised for Category 2A roads.
3A	**Roads with frequent but regulated direct access** and median control/protection of right-turns.	Mixed function urban or rural secondary arterial roads with medians, serving both community and traffic roles.	• Median preventing right-turns except at selected locations. • Some median opening geometry allowing right-turns in one direction only. • Some median openings for U-turns only. • Right-turn bans may apply at specified times.	• As property driveways directly access the major road, use a median to ensure that, generally, only left-turns are used to enter or exit driveways of abutting properties. • Good practice for Category 2B roads in relation to angled median openings, median right-turn or U-turn slots and time-specific right-turn bans, also apply to Category 3A roads.

GEH Transition over time

This should be kept to 60km/h. Speed is the primary reason why Cat 2A is not appropriate.

GEH Existing situation

3.3.4 Access and intersection density

Austroads has developed a methodology to calculate the average number of standard vehicle assesses per 100m of a corridor, based on driveways, business access points, minor and major intersections.

The methodology requires the total number of accesses to be counted on both sides of the road for the full length of the section being reviewed. Crossroads are counted once on each side of the road. Each type of access is weighted as per Table 2 to convert it to equivalent standard driveways. The total is summed and divided by the road section length in kilometres x 0.1.

Table 2 – Access and intersection weighting (source: Austroads 2017)

Access category	Weighting
Residences, small commercial establishments, small public buildings and other units that generate light and/or occasional activity.	1
Average commercial establishment, local schools, caravan parks, light industries, public buildings and units generating activity, which is either: • continuously light • moderate at certain times, such as commuting hours • substantial at infrequent intervals.	2
Heavy industry, schools, shopping centres and other units generating continuous moderate activity or substantial activity at certain regular times.	3
Large shopping centres and other units generating substantial and continuous activity. Some large industries, which are tourist attractions or for some other reason generate substantial traffic volumes, would be included in this activity.	4
Unsignalised intersecting roads of substantially lesser importance than the road being assessed, or intersecting roads where side traffic and turning movements have little effect on the traffic flow pattern of the road being considered.	1
Unsignalised intersecting roads of lesser importance than the road being assessed but where the side-road traffic and turning movements are such that the intersection has an appreciable effect on the traffic flow pattern of the road being considered.	2
Unsignalised intersecting roads of comparable or greater significance than the road being assessed. Intersections that have a pronounced effect on the traffic flow pattern of the road being considered.	3
Roundabouts, signalised intersecting roads and any at-grade rail crossings.	3

Table 3 shows the raw data for each section of the GEH corridor between Orrong Road and Ivy Street.

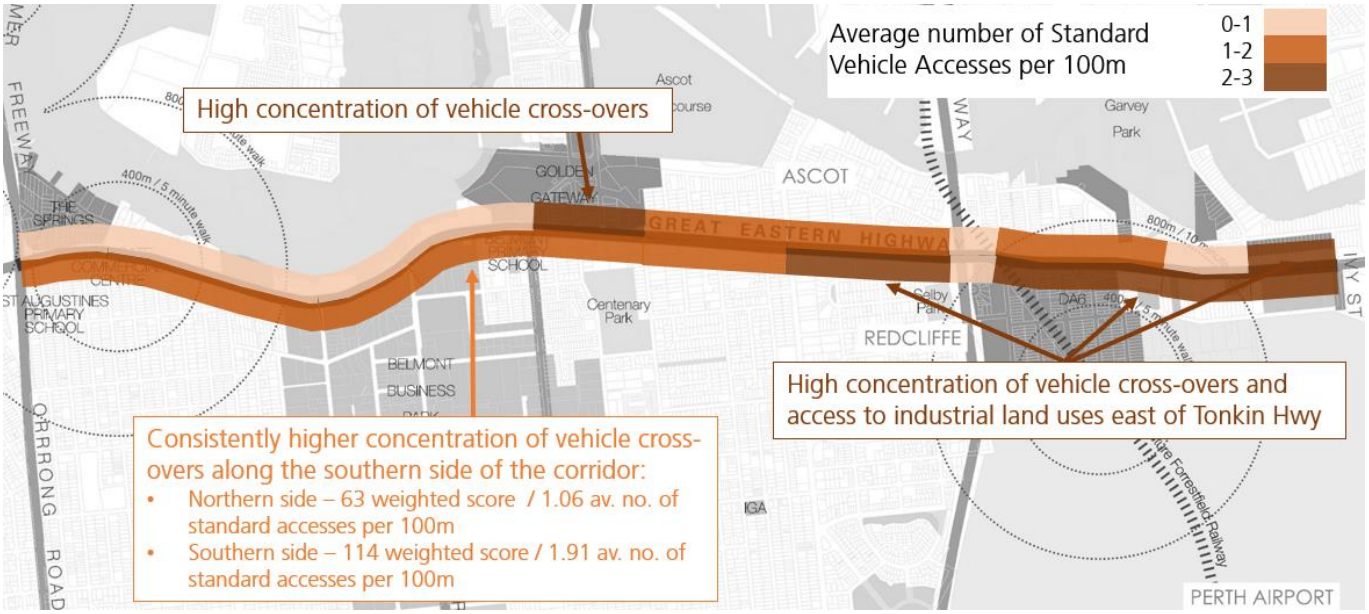
Table 3 – Great Eastern Highway corridor intersection density assessment

GEH Road Section		Side of Corridor	KM	Total Veh Accesses/Crossovers	Total Veh Accesses Weighted Score	Av. No. of Standard Veh Accesses per 100m	Comparison to the Corridor Average
Orrong Rd	Kooyong Rd	North	0.37	1	2	0.54	-0.92
		South	0.37	4	5	1.35	-0.11
Kooyong Rd	Belmont Ave	North	1.00	6	6	0.60	-0.86
		South	1.00	14	19	1.90	0.44
Belmont Ave	Abernethy Rd	North	0.44	1	2	0.45	-1.01
		South	0.44	6	8	1.82	0.36
Abernethy Rd	Belgravia St	North	0.58	2	3	0.52	-0.94
		South	0.58	7	9	1.55	0.09
Belgravia St	Hardey Rd	North	0.49	7	10	2.04	0.58
		South	0.49	5	6	1.22	-0.24
Hardey Rd	Epsom Ave	North	0.65	7	8	1.23	-0.23
		South	0.65	7	10	1.54	0.08
Epsom Ave	Tonkin Hwy	North	0.71	7	9	1.27	-0.19
		South	0.71	17	18	2.54	1.07
Tonkin Hwy	Brearley Ave	North	0.24	1	1	0.42	-1.04
		South	0.24	2	2	0.83	-0.63
Brearley Ave	Coolgardie Ave	North	0.50	9	9	1.80	0.34
		South	0.50	11	14	2.80	1.34
Coolgardie Ave	Fauntleroy Ave	North	0.59	1	1	0.17	-1.29
		South	0.59	9	15	2.54	1.08
Fauntleroy Ave	Ivy St	North	0.40	11	12	3.00	1.54
		South	0.40	3	8	2.00	0.54
		Total KM	**5.97**			**1.46**	
						GEH Corridor Average	
Orrong Rd	Ivy St	North	5.97	53	63	1.06	-0.41
Ivy St	Orrong Rd	South	5.97	85	114	1.91	0.45

Figure 12 shows the raw data displayed along a map of the corridor. The data is displayed in bands of 0-1, 1-2 and 2-3 equivalent standard driveways (cross-overs). The data shows the following:

- Consistently a higher concentration of vehicle cross-overs along the southern side of the corridor
- High concentration of vehicle cross-overs along the Golden Gateway frontage to GEH
- High concentration of vehicle cross-overs and access to industrial land uses east of Tonkin Highway along the southern side of the corridor.

Figure 12 Great Eastern Highway corridor intersection density assessment



The information displayed above will assist with identifying sections of the GEH corridor where restricting direct lot access will have the biggest impact upon the reducing access and intersection density.

3.4 Pedestrian network

The extent and quality of the existing pedestrian infrastructure along the GEH corridor is of a standard commensurate with the form of the transport corridor, extent of existing development, form of land uses and recent (2011-2013) upgrade works. The existing pedestrian infrastructure is summarised in the following section.

3.4.1 Pedestrian infrastructure

As part of the 2011-2013 upgrade works along the GEH corridor between Kooyong Road and Tonkin Highway, footpaths of 3.0m were installed on both sides of the corridor. The footpaths are typically located adjacent to the on-road bike lanes with no buffer between the footpath and on-road bike facility.

Along the southern side of the corridor between Orrong Road and Tonkin Highway there is typically a planted buffer between the footpath and property boundary – in some locations this is a wide planted strip featuring street tress, in other locations this is a narrower planted strip featuring small native planting.

Along the northern side of the corridor between Orrong Road and Tonkin Highway there is typically no buffer between the footpath and property boundary and the footpath typically runs adjacent to a property fence, wall or sound wall.

Along both the northern and southern sides of the corridor between Tonkin Highway and Ivy Street the footpath is older and narrower – typically 1.5m wide. For the majority of this section of the corridor that is a planted buffer between the footpath and the road, typically between 1.5-2.5m wide.

It is anticipated that the future Main Roads upgrade of the GEH corridor between Tonkin Highway and the GEH Bypass will feature higher quality footpaths wider than the existing 1.5m paths.

Crossing the GEH corridor as a pedestrian is currently facilitated by at-grade pedestrian crossing facilities at traffic signal controlled intersections and by grade-separated pedestrian underpasses.

At-grade pedestrian crossings facilitates are provided at the following locations through the study area:

- Graham Farmer Freeway/Orrong Road ramps and GEH – across all approaches
- Kooyong Road/Brighton Road and GEH – across only the north, east and south approaches
- Acton Avenue and GEH – two-stage pedestrian crossing facility to the east of the intersection
- Belmont Avenue/Tanunda Drive and GEH – across only the north, south and west approaches
- Abernethy Road and GEH – two-stage pedestrian crossing facility to the east of the intersection
- Belgravia Street/Stoneham Street and GEH – across only the north, south and west approaches
- Hardey Road/Resolution Drive and GEH – across only the north, south and west approaches
- Epsom Avenue and GEH – across only the north, south and west approaches
- Brearley Avenue and GEH – across all approaches
- Coolgardie Avenue and GEH – across all approaches
- Fauntleroy Avenue and GEH – across all approaches.

Grade-separated pedestrian underpasses are provided at the following locations through the study area:

- Underpass between Surrey Road and The Springs
- Underpass between Selby Park and Davis Street (to the west of the Tonkin Highway interchange.

Figure 13 shows the typical arrangements of footpaths and pedestrian crossing facilities along the GEH corridor.

Figure 13 Typical pedestrian infrastructure along the Great Eastern Highway corridor (source: Nearmap and Google Streetview)

At-grade pedestrian crossing facilities across only the north, south and west approaches to the intersection

At-grade pedestrian crossing – requiring pedestrians to cross 8 lanes (38m) in a single movement. No pedestrian call button in the central median

At-grade two-stage pedestrian crossing facility. With pedestrian call buttons in the central median

Grade-separated pedestrian underpass

3.4.2 Pedestrian accessibility

Walkscore is a commercial product that provides a geographical based rating score of a location based on availability of services within a walking catchment. Walkscore measures the walkability of a location based on the distance to nearby places and pedestrian facilities, the overall scoring is ranked as follows:

- 90–100 Walker's Paradise: Daily errands do not require a car
- 70–89 Very Walkable: Most errands can be accomplished on foot
- 50–69 Somewhat Walkable: Some errands can be accomplished on foot
- 25–49 Car-Dependent: Most errands require a car
- 0–24 Car-Dependent: Almost all errands require a car.

For the purposes of the GEH corridor study, three locations (addresses) along the corridor have been analysed to provide context in relation to the existing walkability of locations along the corridor. The three locations (addresses) analysed are:

- Eastern end of the GEH corridor: Airport Apartments Hotel by Aurum (100 Coolgardie Avenue)
- Central location along the GEH corridor: Country Comfort Intercity Hotel (49 Hardey Road)
- Western end of the GEH corridor: The Springs (8 Hawksburn Road).

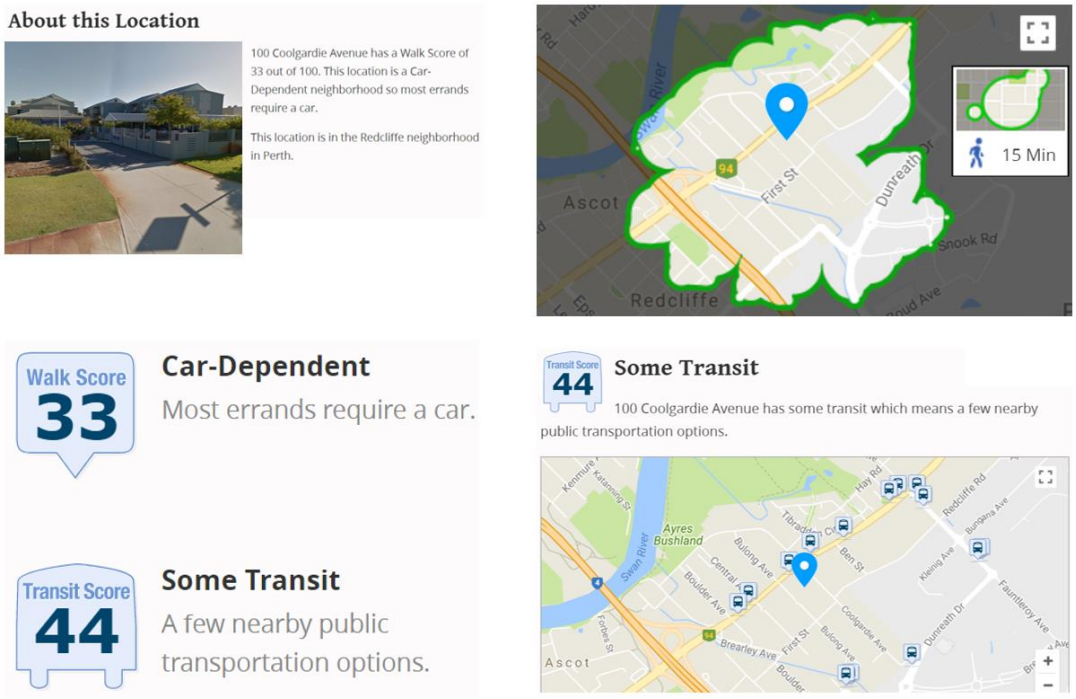
<u>Eastern end of the GEH corridor</u>

The Walkscore rating for a location towards the eastern end of the GEH corridor is 33 out of 100 (the address used for the purposes of this analysis was 100 Coolgardie Avenue, Redcliffe) – this is summarised in Figure 14.

As such the eastern end of the GEH corridor is considered on the Walkscore ranking system to be 'Car Dependent – most errands require a car'. Whilst the subject location benefits from good access to dining and drinking, shopping and general errands, the location is less well situated to access groceries, culture and entertainment, parks and schools.

The subject site scores a below average 44 out of 100 in terms of access to transit services (public transport services). The Transperth bus network provides services along the GEH corridor (bus route numbers 36, 40, 295, 296 and 299), which provides access to the west to Perth city and to the east to Perth Airport, Midland, Walliston and Kalamunda.

Figure 14 Walkscore rating for a location at the eastern end of the Great Eastern Highway corridor (source: Walkscore.com)



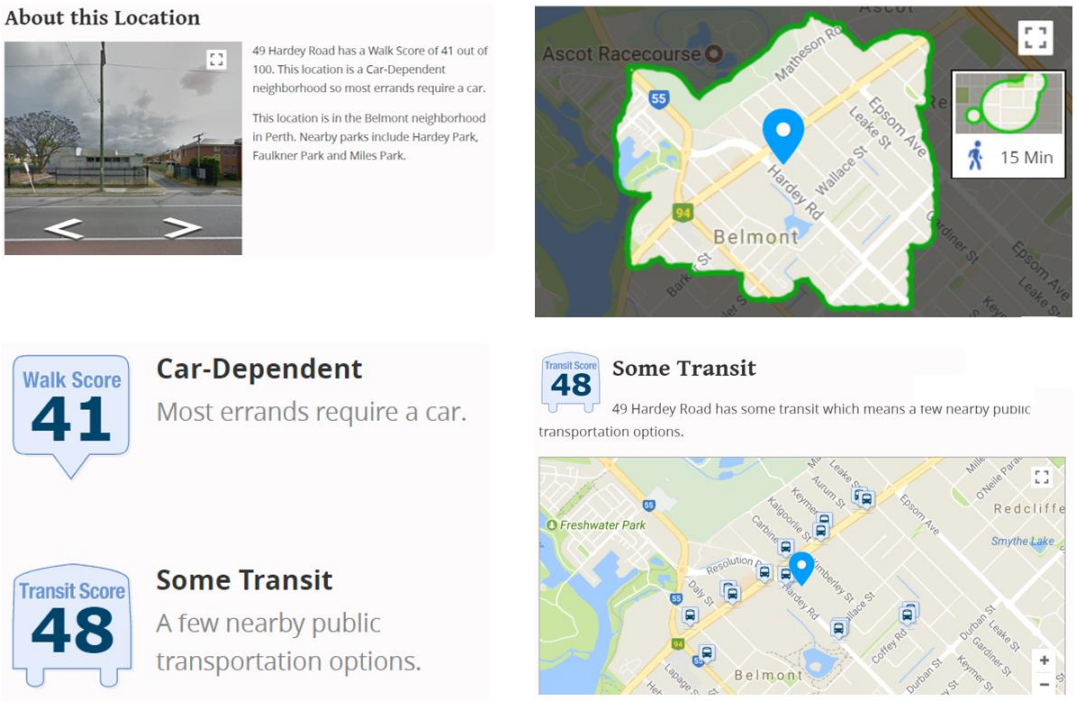
Central location along the GEH corridor

The Walkscore rating for a central location along the GEH corridor is 41 out of 100 (the address used for the purposes of this analysis was 49 Hardey Road, Belmont) – this is summarised in Figure 15.

As such the central area of the GEH corridor is considered on the Walkscore ranking system to be 'Car Dependent – most errands require a car'. Whilst the subject location benefits from good access to dining and drinking, shopping, general errands and schools, the location is less well situated to access groceries and parks.

The subject site scores a below average 48 out of 100 in terms of access to transit services (public transport services). The Transperth bus network provides services along the GEH corridor (bus route numbers 36, 40, 295, 296 and 299), which provides access to the west to Perth city and to the east to Perth Airport, Midland, Walliston and Kalamunda.

Figure 15 Walkscore rating for a central location along the Great Eastern Highway corridor (source: Walkscore.com)



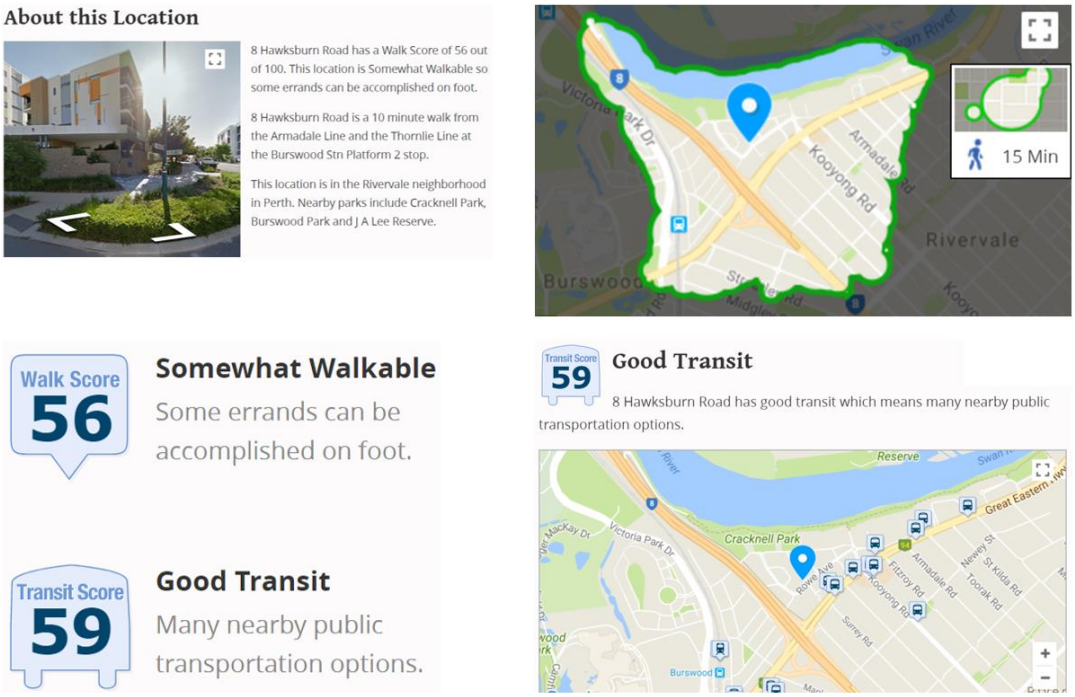
Western end of the GEH corridor

The Walkscore rating for a location towards the eastern end of the GEH corridor is 56 out of 100 (the address used for the purposes of this analysis was 8 Hawksburn Road, Rivervale) – this is summarised in Figure 16.

As such the western end of the GEH corridor is considered on the Walkscore ranking system to be 'Somewhat Walkable – some errands can be accomplished on foot'. Whilst the subject location benefits from good access to parks, schools, dining and drinking, groceries, shopping and general errands, the location is less well situated to access culture and entertainment.

The subject site scores a slightly above average 59 out of 100 in terms of access to transit services (public transport services). The Transperth bus network provides services along the GEH corridor (bus route numbers 36, 40, 286, 287, 293, 295, 296, 299, 380 and 935), which provides access to the west to Perth city and to the east to Belmont Forum, Perth Airport, Maida Vale, Forrestfield, Kewdale, Midland, Walliston and Kalamunda.

Figure 16 Walkscore rating for a location at the western end of the Great Eastern Highway corridor (source: Walkscore.com)



3.5 Cycling network

As part of the 2011-2013 upgrade works along the GEH corridor between Kooyong Road and Tonkin Highway, dedicated on-road cycling facilities were installed. The on-road cycling facilities installed are as follows:

- Typically consist of on-road kerb side bike lanes at 1.5m wide (eastbound and westbound)
- Mid-block arrangement:
    - On-road kerb side bike lane with solid edge line
    - Bike lane in red asphalt
    - Bike lane either adjacent to near side general traffic lane or adjacent to bus lane (where provided)
- Intersection arrangements:
    - On approach to traffic signal controlled intersections the on-road bike lane transitions from red asphalt to green asphalt – with dashed edge line to permit left turning vehicles to cross the bike lane
    - On approach to traffic signal controlled intersections the on-road bike lane is typically adjacent to a bus lane (used by left turning general traffic)
    - At mid-block left in/left out intersections the on-road bike lane continues through the intersection in red asphalt – with dashed edge line to permit left turning vehicles to cross the bike lane
    - At mid-block left in/left out intersections the on-road bike lane is typically adjacent to the near side general traffic lane, with no buffer provided by a bus lane

Figure 17 shows the typical arrangements of the on-road bike lanes along the GEH corridor. Figure 18 and Figure 19 show the bike network along the GEH corridor and along parallel routes, including the continuous high quality shared path along the Swan River between Cracknell Park (The Springs) and Resolution Drive (Ascot Waters), and a broken shared path between Ascot Racecourse and Garvey Park.

It is anticipated that the future Main Roads upgrade of the GEH corridor between Tonkin Highway and the GEH Bypass will feature dedicated cycling facilities within the corridor.

Figure 17 Typical bike lane arrangements along the Great Eastern Highway corridor (source: Nearmap and Google Streetview)

On-road bike lane on approach to traffic signal controlled intersection:

- Green asphalt treatment
- Dashed edge line to permit left turning vehicles to cross the bike lane

On-road bike lane mid-block adjacent to bus lane:

- Red asphalt treatment
- Solid edge line

On-road bike lane at mid-block left in / left out intersection:

- Red asphalt treatment
- Dashed edge line to permit left turning vehicles to cross the bike lane

On-road bike lane mid-block adjacent to general traffic lane:

- Red asphalt treatment
- Solid edge line

Figure 18 Bike network along the western section of the Great Eastern Highway corridor (source: Belmont Local TravelSmart Map)

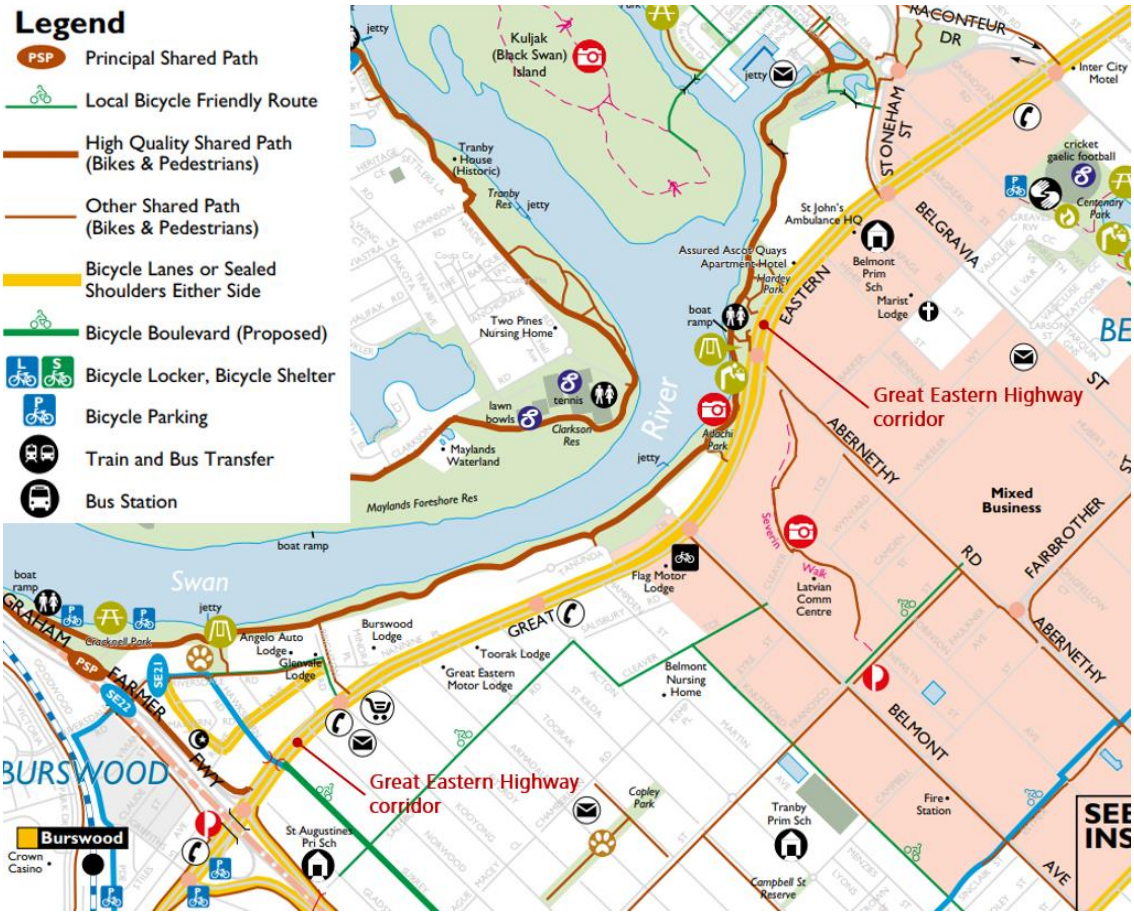
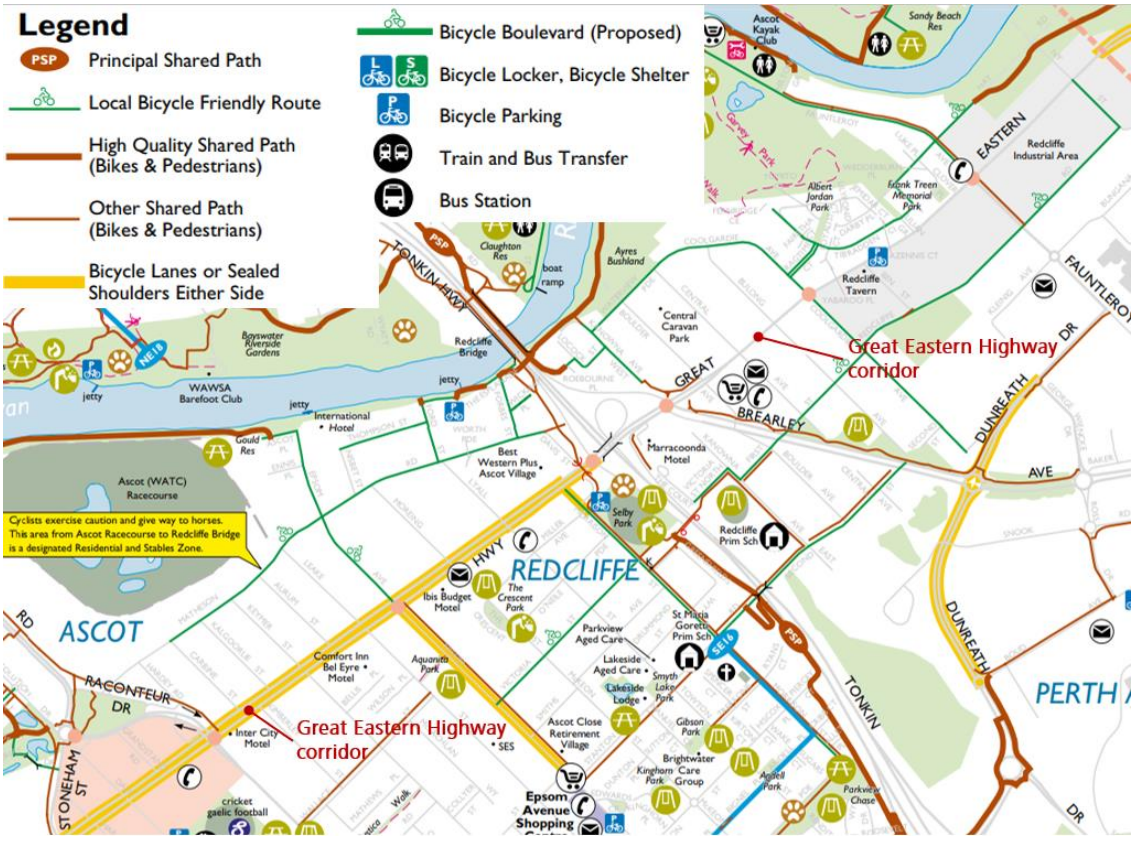


Figure 19 Bike network along the eastern section of the Great Eastern Highway corridor (source: Belmont Local TravelSmart Map)



3.6 Public transport network

The GEH corridor is serviced by frequent bus services with weekday AM peak period frequencies towards Perth city and PM peak period frequencies towards Perth Airport of 1 bus every 3 minutes at the western end of the corridor, 1 bus every 5 minutes along the centre of the corridor and 1 bus every 6 minutes at the eastern end of the corridor.

The GEH corridor has a number of bus routes that operate along its entire length, or through part of the study area, in addition the Circle Route bus crosses the GEH corridor at a central location in the study area (Resolution Drive to Hardey Road). The bus routes that operate along the corridor are:

- Bus Route 36 – Perth to Midland Station via Great Eastern Highway
- Bus Route 40 – Perth to Perth Airport Terminals 3 and 4 via Great Eastern Highway
- Bus Route 286 – Perth to Maida Vale via Belmont Forum
- Bus Route 287 – Perth to Forrestfield via Belmont Forum
- Bus Route 293 – Perth to Kewdale via Belgravia Street and Belmont Forum
- Bus Route 295 – Perth to Walliston
- Bus Route 296 – Perth to Kalamunda via Gooseberry Hill Road
- Bus Route 299 – Perth to Walliston via Kalamunda Road
- Bus Route 380 – Perth to Perth Airport Terminals 1 and 2 via Great Eastern Highway and Belmont Forum
- Bus Route 935 – Perth to Perth Airport Terminals 3 and 4 via Kings Park, Belmont Forum and Perth
- Circle Route – 998 clockwise / 999 anti-clockwise crosses GEH corridor via Resolution Drive/Hardey Road

  Circle Route services provide a high frequency orbital public transport connection around Perth, linking inner suburbs, major activity centres, key land uses and public transport hubs including; Belmont Forum, Oats Street Station, Curtin University, Murdoch Activity Centre, Fremantle, Cottesloe, Claremont, UWA, QEII Medical Centre, Stirling Station and Morley Galleria

Figure 21 shows the Transperth bus route network within the vicinity of the GEH corridor. This figure shows the route of each bus services along the GEH corridor, and which side roads each bus route uses to access the GEH corridor.

Figure 22 shows the bus route service frequency overlaid on the GEH corridor. The bus service frequency information displayed in this format highlights that from a public transport service perspective the existing GEH corridor can be considered as four separate sections of the corridor, as follows:

- Orrong Road to Kooyoog Road:
  - 280 weekday bus services in each direction
  - 170 Saturday services in each direction
  - 125 Sunday services in each direction
- Kooyong Road to Belgravia Street:
  - 180 weekday bus services in each direction
  - 110 Saturday services in each direction
  - 80 Sunday services in each direction
- Belgravia Street to Fauntleroy Avenue:
  - 125 weekday bus services in each direction
  - 75 Saturday services in each direction
  - 40 Sunday services in each direction
- Fauntleroy Avenue to Ivy Street:
  - 85 weekday bus services in each direction
  - 45 Saturday services in each direction
  - 20 Sunday services in each direction

Figure 23 shows the bus passenger boardings and alightings at bus stops along the GEH corridor study area. The data shows the tidal nature of weekday bus passenger movements with a higher number of AM peak period boardings towards Perth city, and higher PM peak period alightings from Perth city (towards Perth Airport). The data shows a

total of 950 passengers using eastbound bus services (towards Perth Airport) and 1,200 passengers using westbound bus services (towards Perth city).

Figure 24 shows the combined bus service provision along the GEH corridor and bus passenger boardings and alightings at bus stops along the GEH corridor.

The GEH corridor features bus priority measures at all main traffic signal controlled intersections. The bus priority measures consist of bus lanes along GEH on the approach to and exit from the traffic signal controlled intersections. These bus priority measures provide bus services with queue jump facilities, ensuring bus services avoid any delays associated with traffic congestion along the corridor. Figure 20 shows the typical bus lane arrangement.

The following intersections feature bus lanes on the GEH approach to and exit from the intersection:

- Kooyong Road/Brighton Road and GEH intersection
- Belmont Avenue/Tanunda Drive and GEH intersection
- Stoneham Street/Belgravia Street and GEH intersection
- Resolution Drive/Hardey Road and GEH intersection
- Epsom Avenue and GEH intersection *(note: there is no bus lane on the westbound approach)*
- Fauntleroy Avenue and GEH intersection

Figure 20 Typical bus lane arrangements at traffic signal intersections along the Great Eastern Highway corridor (source: Nearmap)

Figure 21 Transperth bus route map within the vicinity of the Great Eastern Highway corridor (source: Transperht)

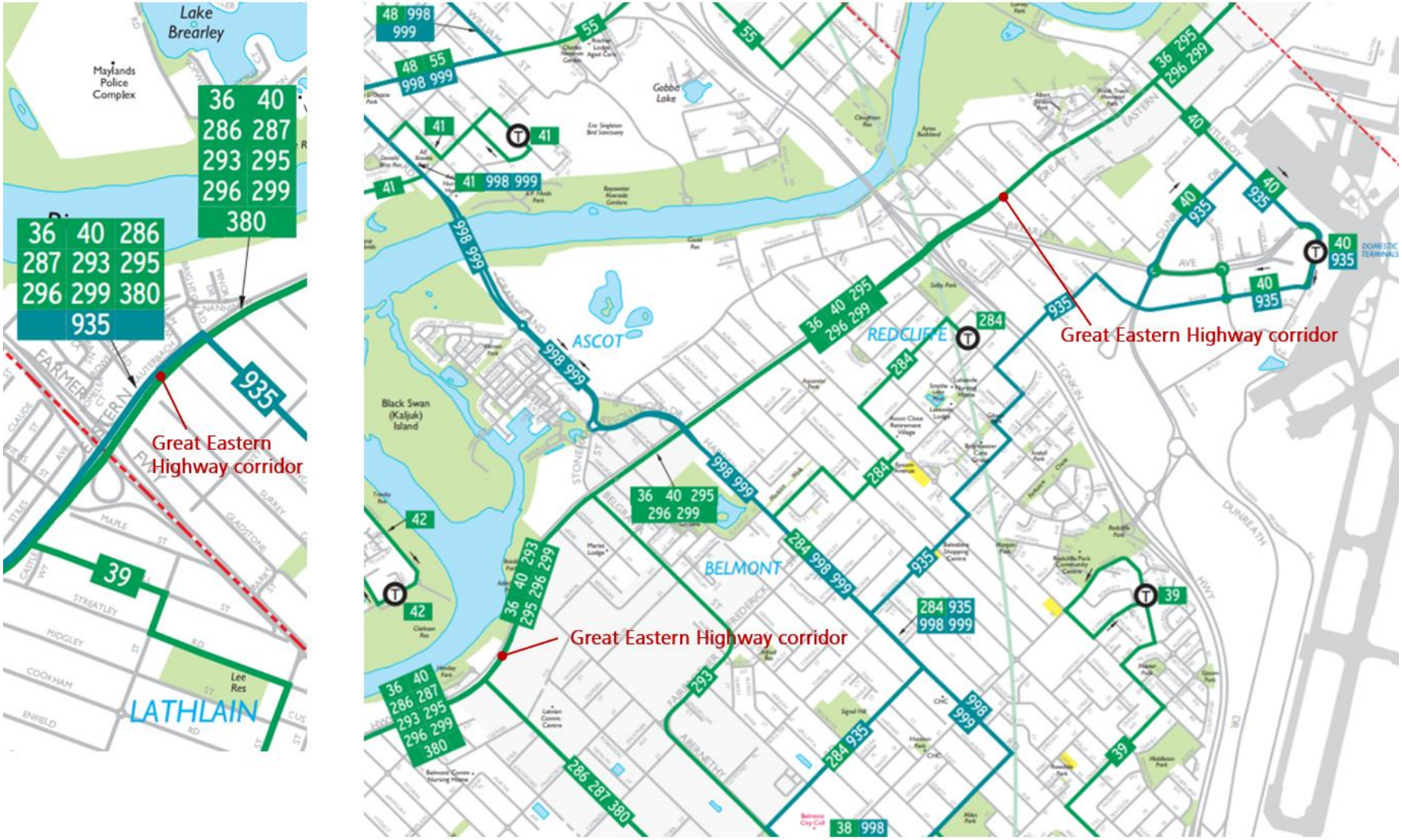


Figure 22 Existing bus service provision along the Great Eastern Highway corridor (source: Transperth)

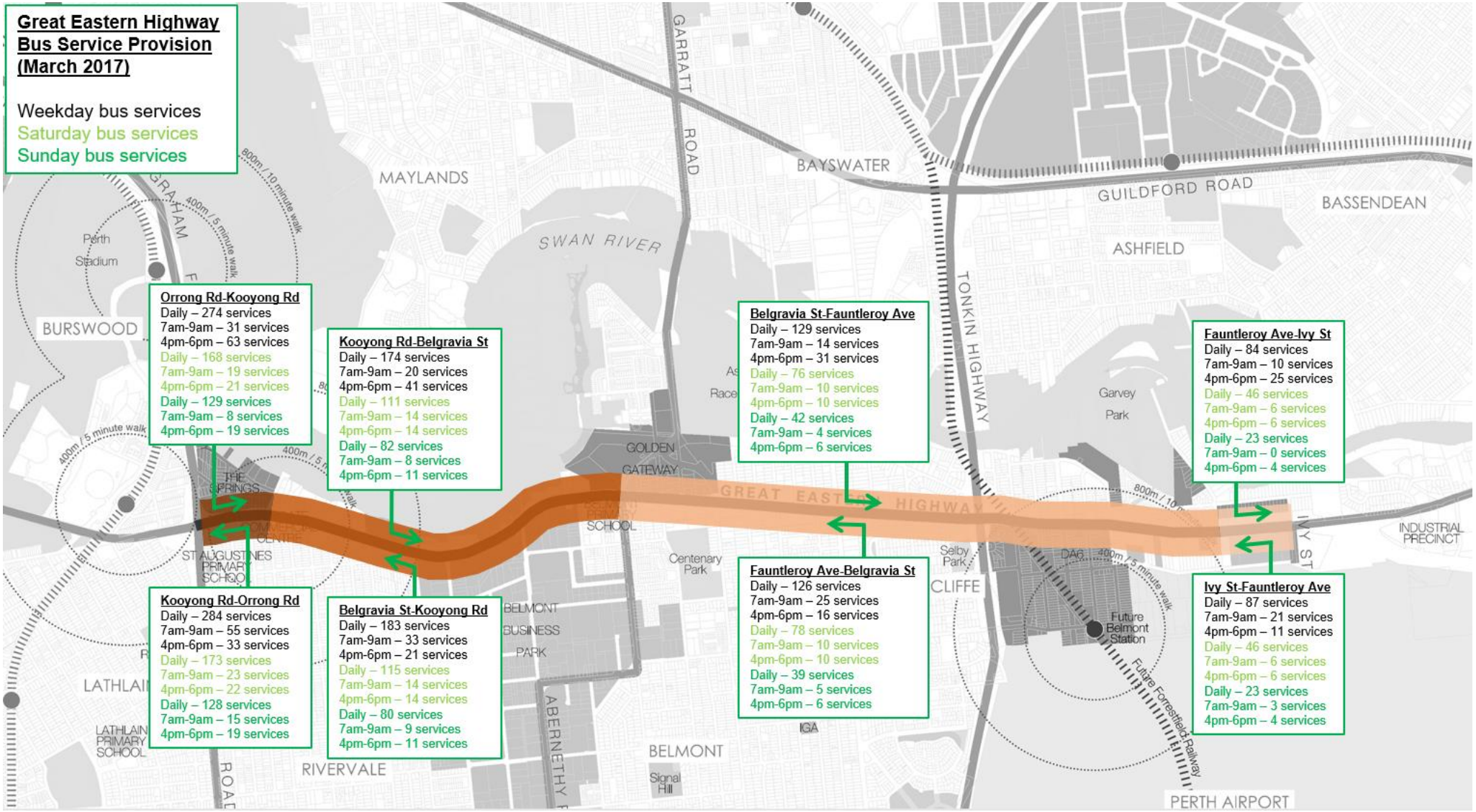


Figure 23 Existing bus passenger boardings and alightings at bus stops along the Great Eastern Highway corridor (source: Transperth)

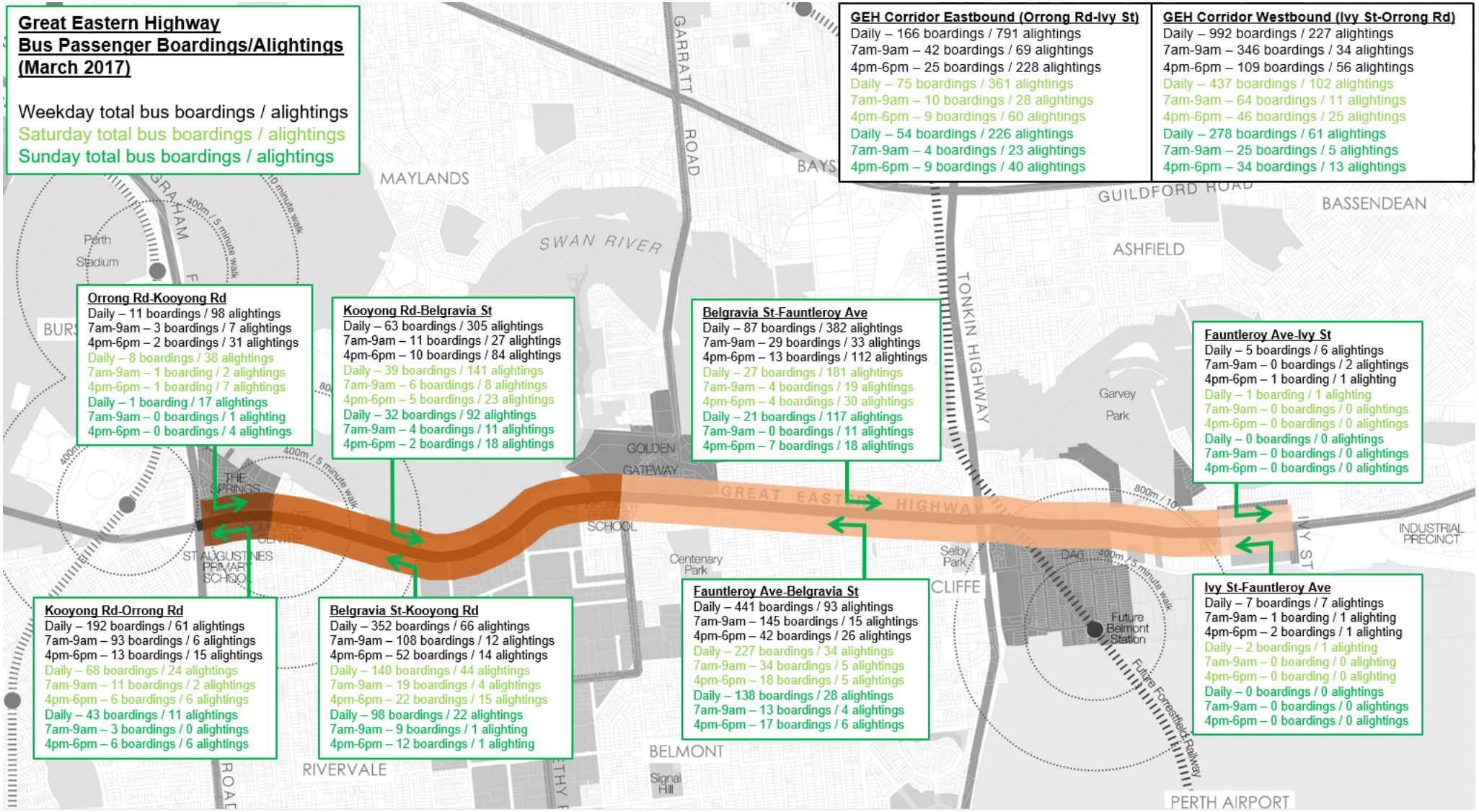
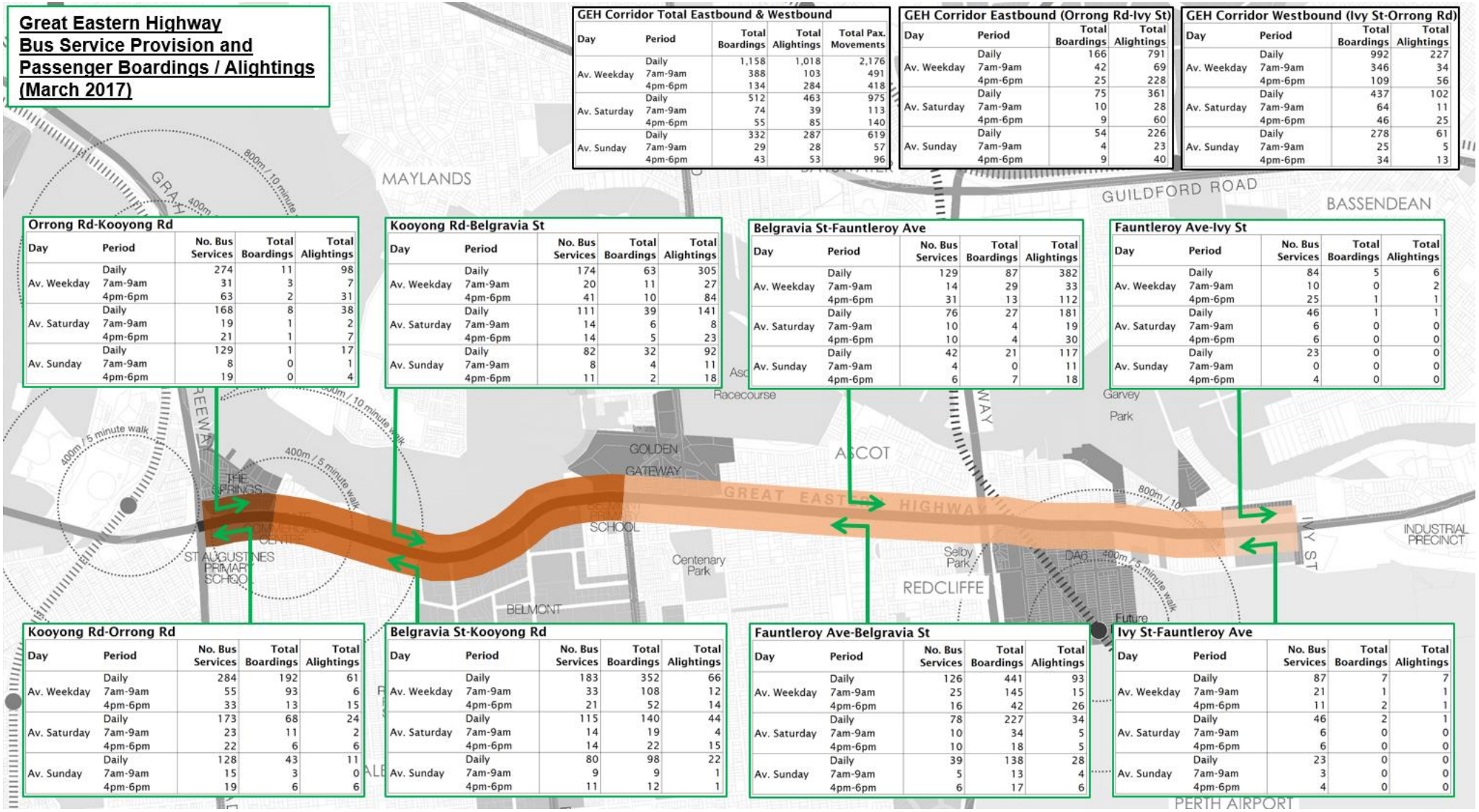


Figure 24 Combined existing bus service provision and bus passenger boardings and alightings at bus stops along the Great Eastern Highway corridor (source: Transperth)



GEH Corridor Total Eastbound & Westbound

Day	Period	Total Boardings	Total Alightings	Total Pax. Movements
Av. Weekday	Daily	1,158	1,018	2,176
	7am-9am	388	103	491
	4pm-6pm	134	284	418
Av. Saturday	Daily	512	463	975
	7am-9am	74	39	113
	4pm-6pm	55	85	140
Av. Sunday	Daily	332	287	619
	7am-9am	29	28	57
	4pm-6pm	43	53	96

GEH Corridor Eastbound (Orrong Rd-Ivy St)

Day	Period	Total Boardings	Total Alightings
Av. Weekday	Daily	166	791
	7am-9am	42	69
	4pm-6pm	25	228
Av. Saturday	Daily	75	361
	7am-9am	10	28
	4pm-6pm	9	60
Av. Sunday	Daily	54	226
	7am-9am	4	23
	4pm-6pm	9	40

GEH Corridor Westbound (Ivy St-Orrong Rd)

Day	Period	Total Boardings	Total Alightings
Av. Weekday	Daily	992	227
	7am-9am	346	34
	4pm-6pm	109	56
Av. Saturday	Daily	437	102
	7am-9am	64	11
	4pm-6pm	46	25
Av. Sunday	Daily	278	61
	7am-9am	25	5
	4pm-6pm	34	13

Orrong Rd-Kooyong Rd

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	274	11	98
	7am-9am	31	3	7
	4pm-6pm	63	2	31
Av. Saturday	Daily	168	8	38
	7am-9am	19	1	2
	4pm-6pm	21	1	7
Av. Sunday	Daily	129	1	17
	7am-9am	8	0	1
	4pm-6pm	19	0	4

Kooyong Rd-Belgravia St

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	174	63	305
	7am-9am	20	11	27
	4pm-6pm	41	10	84
Av. Saturday	Daily	111	39	141
	7am-9am	14	6	8
	4pm-6pm	14	5	23
Av. Sunday	Daily	82	32	92
	7am-9am	8	4	11
	4pm-6pm	11	2	18

Belgravia St-Fauntleroy Ave

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	129	87	382
	7am-9am	14	29	33
	4pm-6pm	31	13	112
Av. Saturday	Daily	76	27	181
	7am-9am	10	4	19
	4pm-6pm	10	4	30
Av. Sunday	Daily	42	21	117
	7am-9am	4	0	11
	4pm-6pm	6	7	18

Fauntleroy Ave-Ivy St

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	84	5	6
	7am-9am	10	0	2
	4pm-6pm	25	1	1
Av. Saturday	Daily	46	1	1
	7am-9am	6	0	0
	4pm-6pm	6	0	0
Av. Sunday	Daily	23	0	0
	7am-9am	0	0	0
	4pm-6pm	4	0	0

Kooyong Rd-Orrong Rd

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	284	192	61
	7am-9am	55	93	6
	4pm-6pm	33	13	15
Av. Saturday	Daily	173	68	24
	7am-9am	23	11	2
	4pm-6pm	22	6	6
Av. Sunday	Daily	128	43	11
	7am-9am	15	3	0
	4pm-6pm	19	6	6

Belgravia St-Kooyong Rd

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	183	352	66
	7am-9am	33	108	12
	4pm-6pm	21	52	14
Av. Saturday	Daily	115	140	44
	7am-9am	14	19	4
	4pm-6pm	14	22	15
Av. Sunday	Daily	80	98	22
	7am-9am	9	9	1
	4pm-6pm	11	12	1

Fauntleroy Ave-Belgravia St

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	126	441	93
	7am-9am	25	145	15
	4pm-6pm	16	42	26
Av. Saturday	Daily	78	227	34
	7am-9am	10	34	5
	4pm-6pm	10	18	5
Av. Sunday	Daily	39	138	28
	7am-9am	5	13	4
	4pm-6pm	6	17	6

Ivy St-Fauntleroy Ave

Day	Period	No. Bus Services	Total Boardings	Total Alightings
Av. Weekday	Daily	87	7	7
	7am-9am	21	1	1
	4pm-6pm	11	2	1
Av. Saturday	Daily	46	2	1
	7am-9am	6	0	0
	4pm-6pm	6	0	0
Av. Sunday	Daily	23	0	0
	7am-9am	3	0	0
	4pm-6pm	4	0	0

3.7 Freight movements

3.7.1 Road freight network

The State Government's integrated long-term transport plan, Transport @3.5m (2016), provides an overview of the plan for a road freight network across Perth. The plan for a road freight network is divided into a two-tier classification system comprising strategic freight routes (tier 1) and major freight routes (tier 2).

The GEH corridor is identified as a tier 2 major freight route based on the significant and forecast volumes of freight traffic relative to other transport routes, the strategic functionality of the corridor within the overall network and the overall suitability of the road infrastructure to support both existing and forecast freight traffic volumes. As such, it is expected that the GEH corridor will accommodate significant road freight movements in the future.

3.7.2 Restricted Access Vehicles (RAV) network

The Road Traffic Regulations (Vehicle Standard) 2002 together with the Road Traffic Rules (Vehicle Standard) specify that Heavy Vehicle permits are required for loads and/or vehicles exceeding any of the dimensions set out below:

- A width of 2.5 metres
- A height of 4.3 metres
- A length of 19 metres for a vehicle combination
- A length of 12.5 metres for a rigid vehicle
- A gross mass of 42.5 tonnes
- Any other mass or dimension limit prescribed in the Road Traffic (Vehicles) Regulations 2014.

Any vehicle, or vehicle plus load, that exceeds any of these dimensions is considered to be an Over-Size Over-Mass load. These vehicles are classified as Restricted Access Vehicles (RAVs). Main Roads has created a system of RAV networks and regulates access of RAV vehicles to these networks via a system of notices and permits.

There are many types of RAVs and each of them has different performance characteristics, require a different amount of road space when operating and have a different impact on the road infrastructure. For this reason, it is necessary to assess the roads these RAVs operate on to ensure the road is suitable for the particular type of vehicle and the safety of other road users is not compromised.

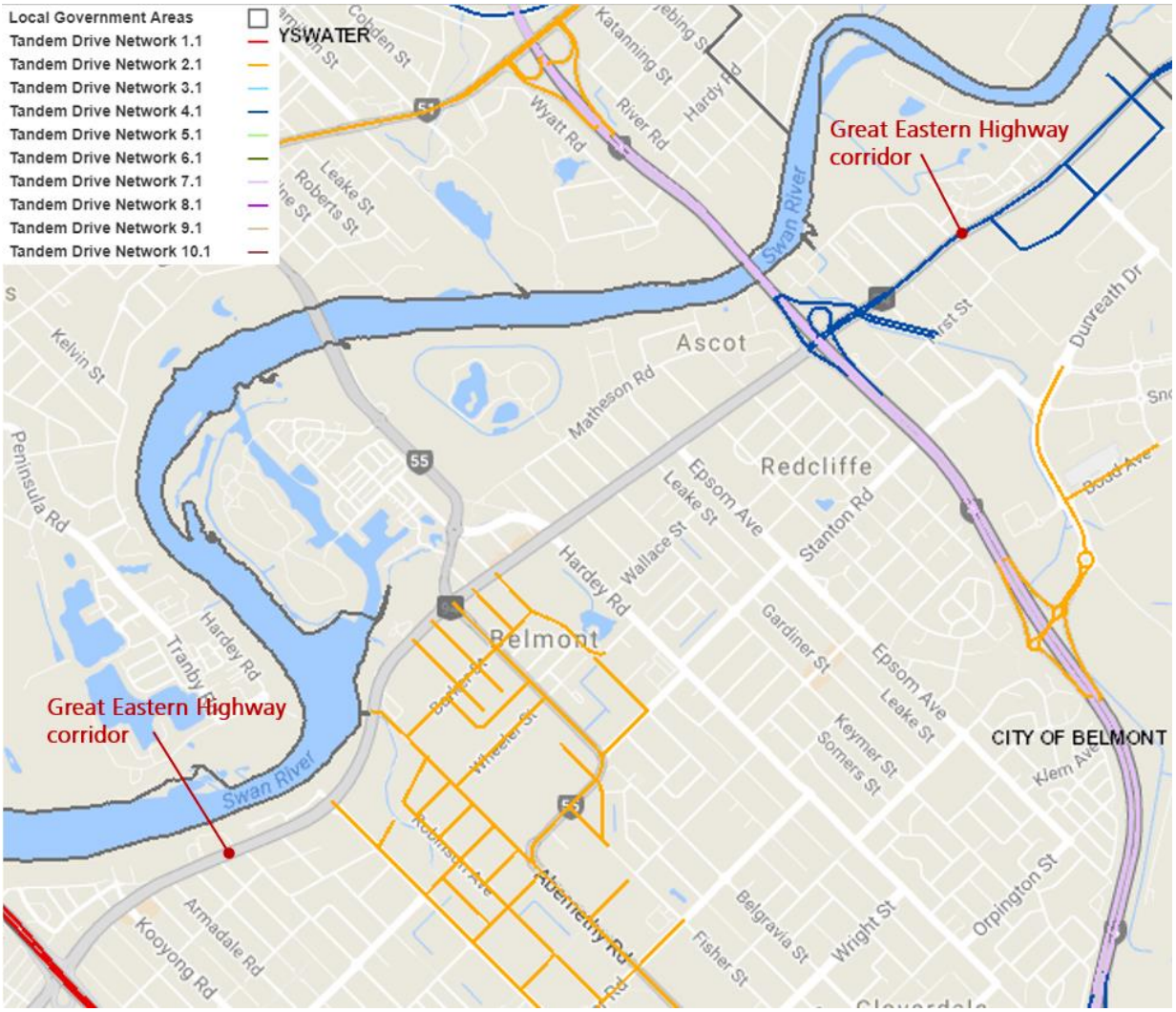
Main Roads HVS works collaboratively with the relevant road asset owner to ensure roads are suitable for RAV access. RAV Networks are maintained for the various types of RAVs and are published in the form of Road Tables and a RAV Mapping Tool.

Figure 25 shows the RAVs network within the vicinity of the GEH corridor – the figure shows the following:

- GEH corridor between Orrong Road and Tonkin Highway:
  - RAVs are not permitted to travel along this section of the GEH corridor
- GEH corridor between Tonkin Highway and Ivy Street:
  - Includes the Tonkin Highway and GEH interchange, as well as Ben Street, Redcliffe Road and Ivy Street
  - Area can be accessed by RAVs via Tonkin Highway, GEH Bypass / Kalamunda Road to Kewdale / Welshpool
  - Maximum RAV Network 4 – vehicles up to 27.5 metres and 87.5 tonnes (prime mover, semi-trailer towing 6 axle dog trailer vehicle)
- Belmont Business Park to the south of the GEH corridor:
  - An area bounded by GEH, Belmont Avenue, Daly Street and Alexander Road
  - Area can be accessed by RAVs via Abernethy Road to Kewdale / Welshpool
  - Maximum RAV Network 2 – vehicles up to 27.5 metres and 87.5 tonnes (short B triple vehicle)

As such the section of GEH between Orrong Road and Tonkin Highway does not carry any RAVs, but the section of GEH between Tonkin Highway and Ivy Street does carry RAV's – providing access to the industrial land uses along that section of GEH and the Ben Street, Redcliffe Road and Ivy Street corridors.

Figure 25 Restricted Access Vehicles (RAVs) networks within the vicinity of the Great Eastern Highway corridor (source: Main Roads)



3.8 Parking

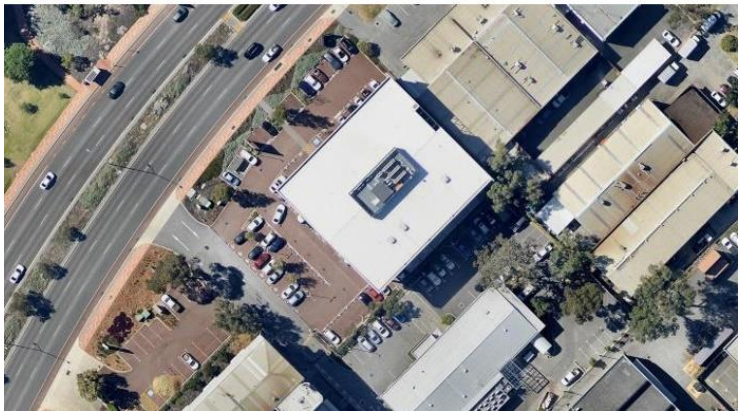
The existing parking arrangements along the GEH corridor include:

- Direct lot access from the front with parking at the front (and including rear parking in some circumstances)
  - Typically accessed via left in/left out vehicle access on GEH
  - Provide for limited landscaping between the footpath and front parking area
- Lot access from the rear with rear parking
  - Typically accessed via minor or major side road, with full movement intersection on the side road
  - Provide for substantial landscaping between the footpath and building edge
- Lot access from the rear with multi-story parking and podium style development above
  - Typically accessed via either left in/left out vehicle access on GEH (less typical) or via minor/major side road, with full movement intersection on the side road (more typical)
  - Provide for limited landscaping between the footpath and building edge – typically provide no street address and a blank wall onto GEH

The existing parking arrangements are shown in Figure 26.

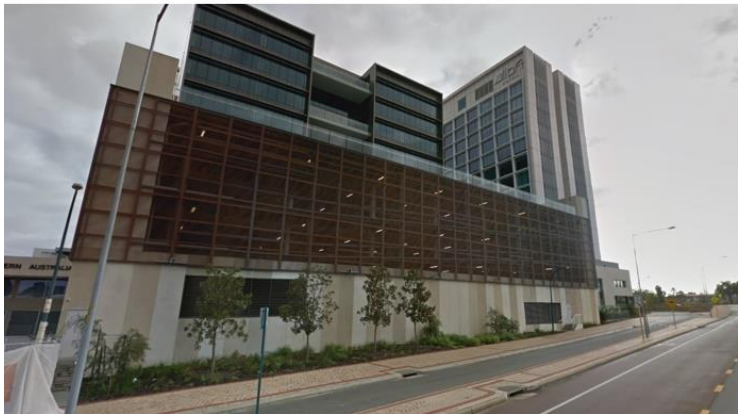
Figure 26 Typical parking arrangements along the Great Eastern Highway corridor (source: Nearmap and Google Streetview)

Lot access from the rear with rear parking



Direct lot access from the front with parking at the front and rear

Direct lot access from the front with parking at the front



Lot access from the rear with multi-story parking and podium style development above

4. FUTURE MOVEMENT NETWORK – TRANSPORT, ACCESS AND PARKING

The GEH Urban Corridor Strategy sets out that the fundamental movement aspects of the corridor include consideration of vehicular access arrangements and parking locations to ensure safe pedestrian and cyclist movement and landscape amenity is achieved as identified in the public realm typologies.

The GEH Urban Corridor Strategy also sets out that it is essential to consider the provision of a network of safe, accessible and convenient pedestrian and cyclist crossings to complement the range of land uses, built form and network of connections along the corridor.

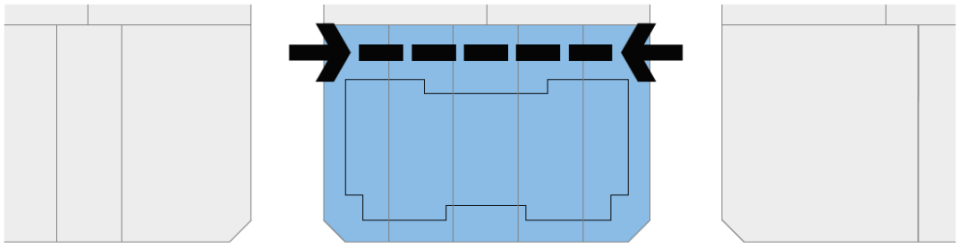
This section of the report provides details of the GEH Urban Corridor Strategy proposals in relation to:

- Vehicular access and parking typologies
- Pedestrian and bike crossing typologies
- Future public transport plans
- Identification of four urban corridor precincts and the internal access and parking, and transport network.

4.1 Vehicular access and parking typologies

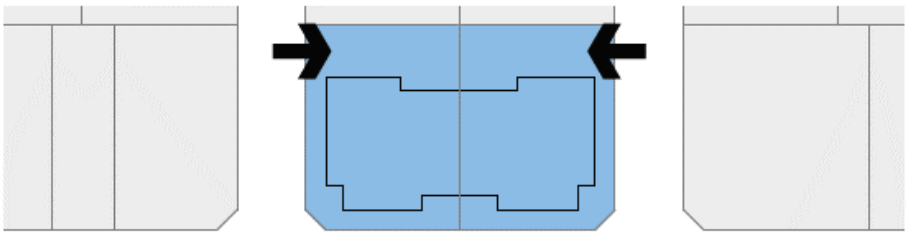
The location and arrangement of access into properties and parking within properties should ensure efficient vehicular movement, while also providing safe and efficient pedestrian and cyclist movement, ensure amenity of the landscape, as well as align with the land use, built form and public realm elements of the corridor. The Access and Parking typologies included in the Urban Design Framework are: Type 1, Type 2 and Type 3 (as outlined in Table 4).

Table 4 – Vehicular access and parking typologies

Typology	Key criteria for each typology
Type 1 Rear Access, Rear Parking	Type 1 • Provide a rear access zone that is approximately 9-10m wide, along the rear boundary • Provide for safe pedestrian movement within the rear access zone, including possible consideration for a minimum footpath width of approximately 1.5m wide • Depending on the nature of the land uses either side of the rear access zone and the required transition scale, provide landscaping within and/or along the rear access zone that benefits the amenity of pedestrians and adjoining properties. **Type 1 (Rear Access, Rear Parking)**  Where Type 1 cannot be achieved, the variation to Type 1 will be achieved. The key criteria for the Type 1 variation is: • No crossover along GEH frontage • No parking in front of buildings along GEH frontage • Crossover access from side streets. *(Type 1 variation image is shown over the page)*

Typology	Key criteria for each typology

Variations to Type 1



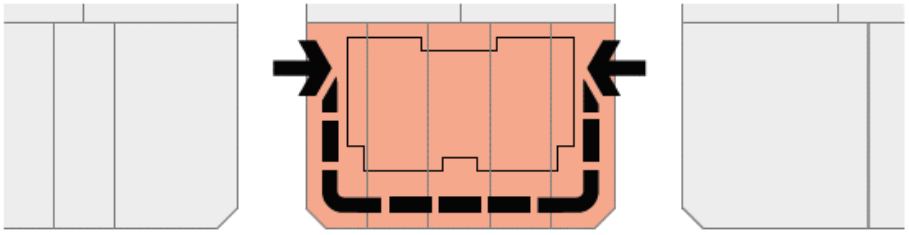
Type 2

Rear Access, Front Parking

Type 2

- No crossover access along GEH frontage
- Parking allowed in front of buildings along GEH frontage
- Crossover access from side streets
- Common accessway (R.O.W or easement – minimum 6m) to service multiple properties.

Type 2 (Rear Access, Front Parking)



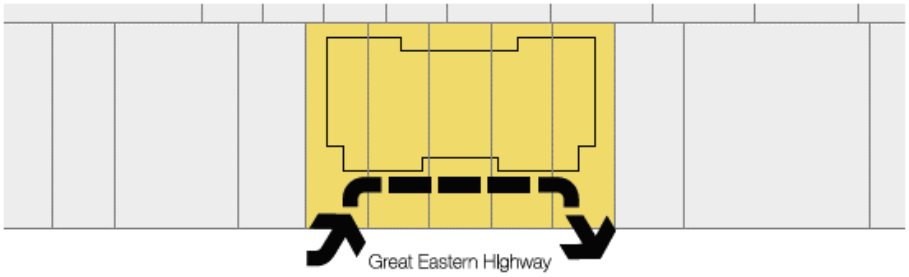
Type 3

Front Access, Front Rear

Type 3

- Crossover access allowed along GEH frontage – limited to one left-in crossover and one left-out crossover for each group of properties
- Parking allowed in front of buildings along Great Eastern Highway frontage
- Common accessway (R.O.W or easement – minimum 6m) to service multiple properties.

Type 3 (Front Access, Front Parking)



4.2 Pedestrian and bike crossings typologies

The provision of a network of safe, accessible and convenient pedestrian and cyclist crossings is crucial to improving the existing pedestrian and cyclist environment of the corridor. Providing a multitude of pedestrian and cyclists crossing opportunities will encourage walking and cycling, creating a catalyst for active spaces, as well as enhance the connection of the corridor with the Swan River.

The crossings should be strategically located to facilitate access to and from existing bus stops, activity nodes, public open space and places which attract a high volume of pedestrians and cyclist activity. The crossings should be integrated with the extensive network of connections along and surrounding the corridor. The crossing typologies included in the Urban Design Framework are: at-grade crossings, underpasses and overpasses (as outlined in Table 5).

Table 5 – Pedestrian and bike crossings typologies

Typology	Key criteria for each typology
At-grade Crossings	At-grade pedestrian crossings associated with signalised traffic intersections provide safe and comfortable opportunities for pedestrian crossings, particularly within Activity Nodes. Signalised intersections should provide pedestrian crossing opportunities across each segment of the intersection to provide convenience to pedestrians. Countdown timers should be provided at signalised intersections to inform pedestrians of the time left to cross the road. 
Underpasses	Underpasses will provide safe, convenient opportunities for pedestrians and cyclists to cross the corridor, providing a high level of protection for pedestrians where there are high volumes of vehicular traffic. Underpasses should be designed to ensure safety and comfort of pedestrians and cyclists, including the provision of bright, attractive and secure lighting, the provision of uninterrupted sight lines to and through the underpass, and be of a sufficient width and height to maintain the feeling openness and safety. 

Typology	Key criteria for each typology
Overpasses	Overpasses are proposed along the corridor to provide safe, convenient crossings opportunities for pedestrians and cyclists at strategic locations adjacent to activity nodes, bus stops or other areas of amenity. Overpasses may either be free standing or connected to adjacent buildings depending on their location. Overpasses should ensure safety and comfort of pedestrians and cyclists, and consideration should be given to the provision of suitable lighting, the provision of a sheltered walkway, and ensuring accessibility to, from and along overpasses.

Integrated green overpasses provide diverse crossings

Architecture to consider including overpasses

4.3 Future public transport plans

4.3.1 Future bus network

The State Government's integrated long-term transport plan, Transport @3.5m (2016), states that transport modelling for 2050 forecasts that the GEH corridor, within the vicinity of Graham Farmer Freeway/Orrong Road, will carry more than 1,000 bus passengers in the peak direction of travel during the morning peak hour. As such, the existing bus priority measures are only likely to be expanded upon over time as the operational need arises.

In order to facilitate higher density development along the GEH corridor, a step change in public transport provision and public transport use will be required to ensure residents, employees and visitors have the potential to travel to/from/along the corridor by a sustainable form of transport – and take up that opportunity.

High level discussions with the Public Transport Authority (PTA) Transperth Service Development Team has informed the information provided below.

It is currently anticipated by the PTA that the introduction of the Forrestfield Airport Link rail connection from central Perth to Perth Airport and onto a park 'n' ride station at Forrestfield, will see the removal of four of the five existing bus routes operating along the GEH corridor (bus routes 36, 295, 296 and 299) and a renumbering and change of route for another bus route (bus route 40).

Subject to consultation it is currently anticipated that the five existing bus routes will be rerouted as follows:

- Bus Route 36 – to be renumbered as Bus Route 303 and operate from Midland Station to the new Redcliffe Station
- Bus Routes 295, 296 and 299 – to feed into Forrestfield Station from Kalamunda and its surrounds
- Bus Route 40 – to be renumbered Bus Route 940 Superbus (details below).

It is currently anticipated that the 940 Superbus would initially operate as a first stage from Redcliffe Station to Elizabeth Quay Station via GEH and Victoria Park Transfer Station and Adelaide Terrace/St Georges Terrace.

It is anticipated that the first stage of the 940 Superbus route is funded as part of the FAL project.

In the longer-term, it is anticipated that the Superbus would become a through routed service to Subiaco Station from Elizabeth Quay Bus Station via West Perth. This would be subject to funding, as well as the longer-term infrastructure requirements from the PTA being in place, including bus lanes along Adelaide Terrace/St Georges Terrace and bus layover capacity at Subiaco Station.

The Superbus route would operate as a high frequency service and as such it is considered unlikely that the PTA would re-route this service through any residential neighbourhoods along the GEH corridor, instead the service would operate directly along the GEH corridor between Redcliffe Station and Victoria Park Transfer Station.

The PTA has indicated that, if sufficient public transport demand was generated by redevelopment along the GEH corridor, they would consider the option of operating a bus network that better served the new higher density residential neighbourhoods along the corridor (such as the Golden Gateway site). This could be achieved by operating public transport services through those neighbourhoods, in addition to public transport services along the corridor. However, this would be contingent upon the newly created residential neighbourhoods generating the requisite public transport demand to warrant the investment in such a public transport network.

4.3.2 Future rail network

The State Government's Metronet plan is a long-term vision to connect Perth's suburbs, reduce road congestion and meet the city's future planning needs. Metronet is an ambitious program of rail projects and stage one is proposed to deliver approximately 72km of new passenger rail and up to 18 new stations.

The focus of Metronet is for an extension of the existing heavy rail network across Perth, rather than the creation of a new light rail network, which was the plan under the previous State Government. One of the stage one projects now badged under Metronet, is the Forrestfield-Airport Link, which is a jointly Federal and State funded rail project to connect the eastern foothills with Perth Airport and Perth CBD and the wider Perth rail network.

The Forrestfield-Airport Link will see the creation of three new stations off an 8.5km spur connected to the Midland Line near Bayswater Station – the three new stations will be: Redcliffe Station in the residential heart of Redcliffe, Airport Central at the consolidated terminal, and Forrestfield Station in the eastern foothills.

The Forrestfield-Airport Link will provide the primary public transport connection between central Perth and Perth Airport. This new rail link is likely to impact upon the use of existing bus services along the GEH corridor to access Perth Airport, and the PTA are likely to change the bus network along the corridor to address these changes (as set out in Section 4.3.1).

Given the primary role that the Forrestfield-Airport Link will play in terms of connecting the city with the airport, it is unlikely in the short to medium term that the GEH corridor will have any significant upgrades to public transport, beyond upgrades to the existing bus priority measures over time based on an operational and performance need.

It is possible in the longer-term, if State Government priorities shifted to focus on the delivery of a light rail network across the city, that the GEH corridor would be a candidate corridor for consideration of light rail in a second phase of any such system. It is likely that an initial phase of any light rail system would focus on Perth CBD and corridors towards QEII Medical Centre/UWA, Curtin University and inner northern residential catchments (North Perth).

However, in the longer-term the GEH corridor with its existing public transport priority and possible wide spread redevelopment providing increased numbers of residents, employees and visitors, could be considered an ideal candidate for a second phase of any light rail system.

4.4 Urban corridor precincts

The GEH corridor is both a single linear road used for the movement of people and goods, and a series of distinct but interconnected places that have their own identity and play a particular role in the character of the corridor. The east and west and north and south sections of the corridor are distinctly different in many ways including topography, land use, subdivision pattern, built form, economic and demographic characteristics. As a result, the challenges and opportunities presented along the corridor require varied approaches to redevelopment, access and parking.

For the purposes of the project, the corridor has been separated into four precincts as follows:

- Precinct 1 – Graham Farmer Freeway to Belmont Avenue
- Precinct 2 – Belmont Avenue to Hardey Road
- Precinct 3 – Hardey Road to Tonkin Highway
- Precinct 4 – Tokin Highway to Ivy Street.

4.5 Precinct 1 – Graham Farmer Freeway to Belmont Avenue

With its proximity to and excellent access to the Perth CBD, Optus Stadium, Crown Casino and the Swan River as well as good access to the Perth Airport, Precinct 1 will be a vibrant, thriving precinct, with the built environment catering to residents, workers and visitors to the area.

The precinct will offer a diverse range of accommodation to cater for singles, couples and young families likely comprising apartment and maisonette development as well as hotel and short stay accommodation to cater for visitors. Accommodation will be supported by active uses on the ground floor such as restaurants, cafes, small bars, convenience and comparison shopping and potentially some professional and technical service uses. Some small-scale entertainment and leisure based uses may also thrive in the precinct, particularly related to the Swan River and links to the key visitor attractions adjacent to the precinct.

Future development will be designed to transition towards the adjacent residential areas on the southern side of the precinct. This precinct will comprise of the Kooyong Road Activity Node, the Belmont Avenue West Activity Node and the Activity Corridors in between these two nodes.

4.5.1 Precinct 1 – access and parking

The access and parking within Precinct 1 comprises of predominantly Type 1; rear access and rear parking.

The significant amount of the Type 1 access and parking typology will ensure there is safe and efficient vehicular movement along the corridor and allow for the safe movement of cyclists and pedestrians.

There is one site within Precinct 1 where the Type 2 access and parking typology has been identified, accommodating parking within the front setback area which is rear accessed, where parking cannot be relocated to the rear due to narrow lot depth.

A Type 3 access and parking typology; front access and front parking, is included in the centre of the northern edge of the corridor where the site is physically constrained by the Swan River so would not be able to provide rear access or parking.

4.5.2 Precinct 1 – network

Precinct 1 will be supported by an extensive movement network along the Corridor, comprising existing at-grade pedestrian crossings, an existing pedestrian underpass and existing on-street bike lanes. Precinct 1 is also serviced by the high frequency bus route and associated bus stops.

The movement network will be supplemented with the provision of an off-street bike lane on the southern edge of the Corridor and continuous pedestrian paths on the northern and the southern edges of the corridor.

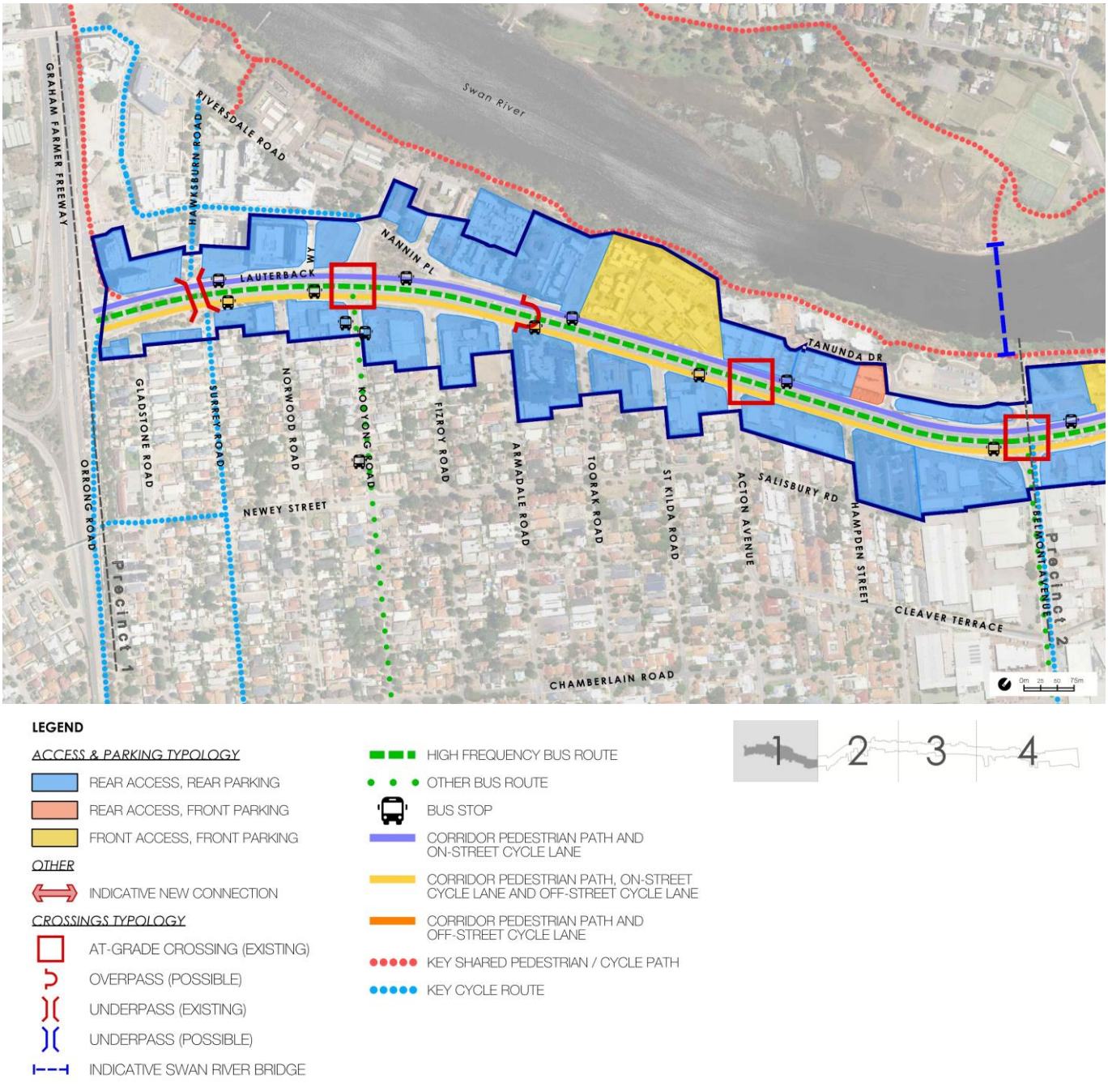
The movement network surrounding the corridor comprises key cycle routes providing north-south connections from the Swan River to the corridor, extending south into the residential areas and into the Belmont Business Park.

The shared pedestrian/ cycle path provides continuous access along the Swan River, which would be enhanced by the provision of Swan River pedestrian bridge to facilitate access to and from the Maylands peninsula.

Bus services also provide a connection from the Kooyong Road Activity Node south into the residential area and from the Belmont Avenue Activity Node into the Belmont Business Park and the Belmont town centre.

Figure 27 shows the transport networks and access and parking typologies for Precinct 1.

Figure 27 Precinct 1 – transport networks and access and parking typologies (source: TBB, February 2018)



4.6 Precinct 2 – Belmont Avenue to Hardey Road

Precinct 2 will form the entrance to the Belmont Business Park to the south, forming the major mixed employment area of the corridor. Precinct 2 will be supported by two Activity Nodes (Belmont Avenue East Activity Node and Hardey Road West Activity Node), which will develop as creative hubs comprising a mixture of commercial uses, civic spaces, offices, professional and technical services uses. Cafes and restaurants may emerge as the local workforce grows and will also be supported by high density residential development.

The Precinct will benefit from a significant improvement to the public realm, making the precinct safer, convenient and enjoyable for pedestrians to be in. The enhancement of Severin Walk will provide a place of leisure for workers to enjoy and coupled with the proposed overpass across the corridor will reconnect Precinct 2 with the Swan River.

4.6.1 Precinct 2- access and parking

The access and parking within Precinct 2 comprises of predominantly Type 1; rear access and rear parking.

The significant amount of Type 1 access will ensure there is safe and efficient vehicular movement along the corridor and allow for the safe movement of cyclists and pedestrians.

There are three sites within Precinct 2 where a Type 3 access and parking typology will be identified, accommodating front access and front parking due to the restrictions the ability to provide rear access and parking due to the physical constraints of the Swan River and Severin Walk.

A connection is proposed on the southern side of the corridor, between Abernethy Road and Hehir Street, which will improve the permeability of the large street block, and improve accessibility to development within this area.

4.6.2 Precinct 2 – network

Precinct 2 will be supported by an extensive movement network along the corridor, comprising existing at-grade pedestrian crossings and existing on-street bike lanes. Precinct 2 is also serviced by the high frequency bus route and associated bus stops.

The movement network will be supplemented with the provision of an underpass adjacent to Abernethy Road to enable a continuous pedestrian link from Severin Walk across the corridor to the Swan River foreshore. The pedestrian underpass will provide a safe crossing opportunity for the significant volume of pedestrians envisaged associated within the Belmont Avenue Activity Node and will provide a convenient crossing point for commuters utilising the existing bus stops.

Pedestrian bridges will also facilitate safe crossing opportunities, with a pedestrian bridge proposed adjacent to the bus stops within the Hardey Road Activity Node and adjacent to the bus stops between Hehir Street and Abernethy Road.

The movement network will be enhanced with the provision of an off-street bike lane on the southern edge of the corridor and continuous pedestrian paths on the northern and the southern edges of the corridor.

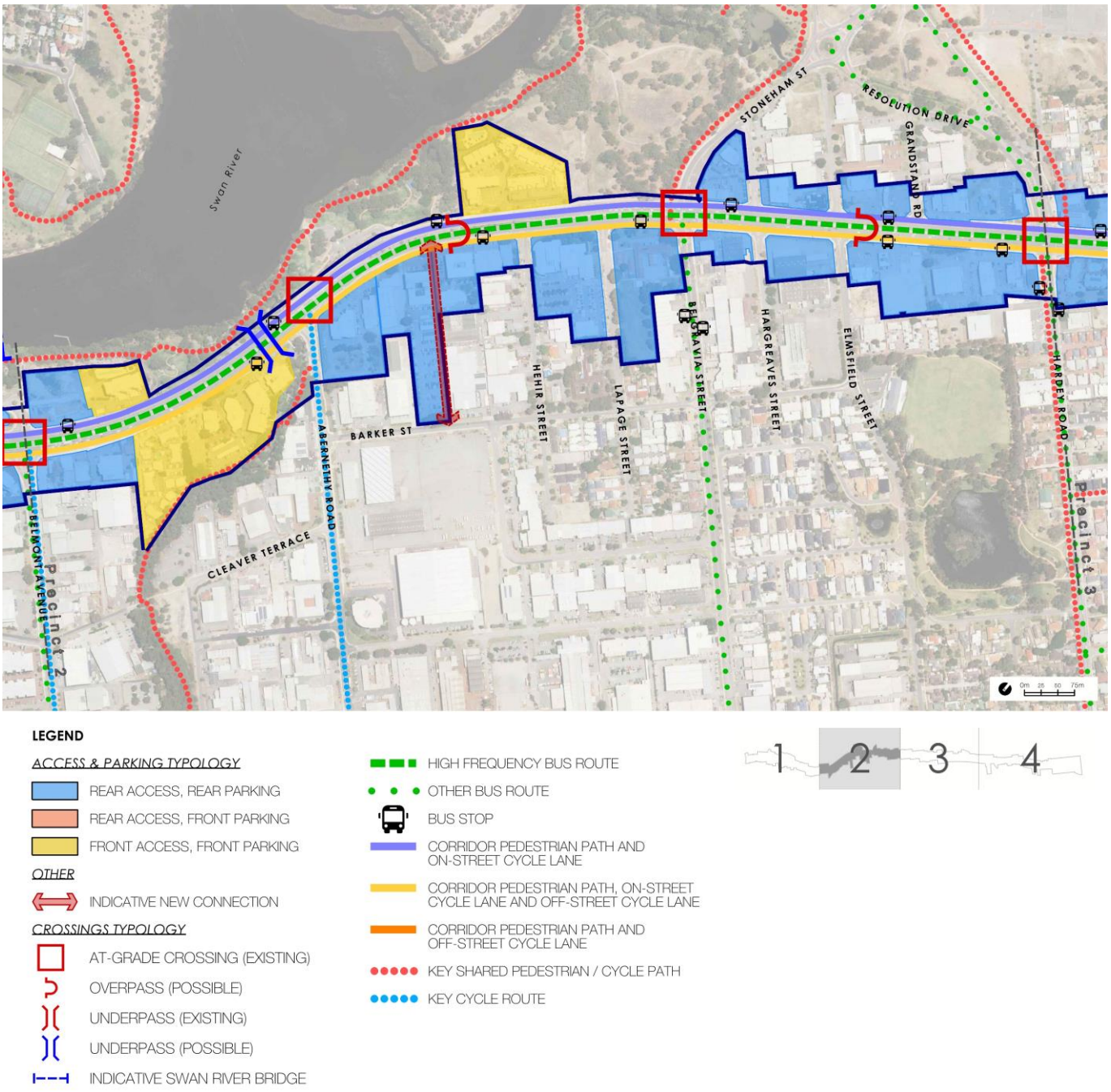
The movement network surrounding the corridor includes a key cycle route which provides a connection from the corridor south along Abernethy Road towards the Belmont Business Park and the Belmont town centre.

The shared pedestrian/cycle path provides continuous access along the Swan River, along with connections along Severin Walk, across the Centenary Park Open Space and north throughout the Golden Gateway precinct the from the Hardey Road Activity Node.

Bus services also provide a connection from the Belmont Avenue Activity Node south towards the Belmont Business Park and the Belmont town centre and from the Hardey Road Activity Node south along Belgravia Street and Hardey Road, as well as to the north along Resolution Drive.

Figure 28 shows the transport networks and access and parking typologies for Precinct 2.

Figure 28 Precinct 2 – transport networks and access and parking typologies (source: TBB, February 2018)



4.7 Precinct 3 – Hardy Road to Tonkin Highway

Precinct 3 will prosper from its proximity to a highly accessible movement network, facilitating access into and out of the precinct. To the north, the precinct has access to the Swan River, Ascot Racecourse and Garratt Road Bridge, facilitating access to Bayswater and surrounding residential development. Hardey Road provides a connection to Alexander Road, which facilitates access to the Belmont town centre to the south. Tonkin Highway provides a connection south to the Perth Airport and further to the industrial area of Welshpool, and north into the industrial areas of Bassendean and Bayswater.

The precinct will benefit from two Activity Nodes (Hardey Road Activity Node and Epsom Avenue Activity Node), which will provide the opportunity to enable employment growth which can take advantage of the prime locality, whilst also enabling additional residential development. The nodes will also provide local convenience for the existing residents in the locality. An improved pedestrian and cycle network will enhance the amenity of the precinct and improve the accessibility to Activity Nodes, open space and adjacent precincts.

4.7.1 Precinct 3 – access and parking

The access and parking within Precinct 3 comprises of predominantly Type 1; rear access and rear parking.

The significant amount of Type 1 access will ensure there is safe and efficient vehicular movement along the corridor and allow for the safe movement of cyclists and pedestrians.

There are three sites within Precinct 3 where the Type 2 access and parking typology has been identified to accommodate the small lots which have a narrow depth.

A Type 3 access and parking typology; front access and front parking, is included in the centre of the northern edge of the corridor given the physical constraint to provide rear access and parking due to the proximity to the Tonkin Highway.

4.7.2 Precinct 3 – network

Precinct 3 will be supported by an extensive movement network along the corridor, comprising existing at-grade pedestrian crossings, an existing pedestrian underpass and existing on-street bike lanes. Precinct 3 is also serviced by the high frequency bus route and associated bus stops.

The movement network will be enhanced with the provision of a pedestrian bridge between the Hardey Road and Epsom Avenue at-grade pedestrian crossings, adjacent to existing bus stops, facilitating a safe crossing point for the significant volume of pedestrians within the surrounding residential areas to the north and south.

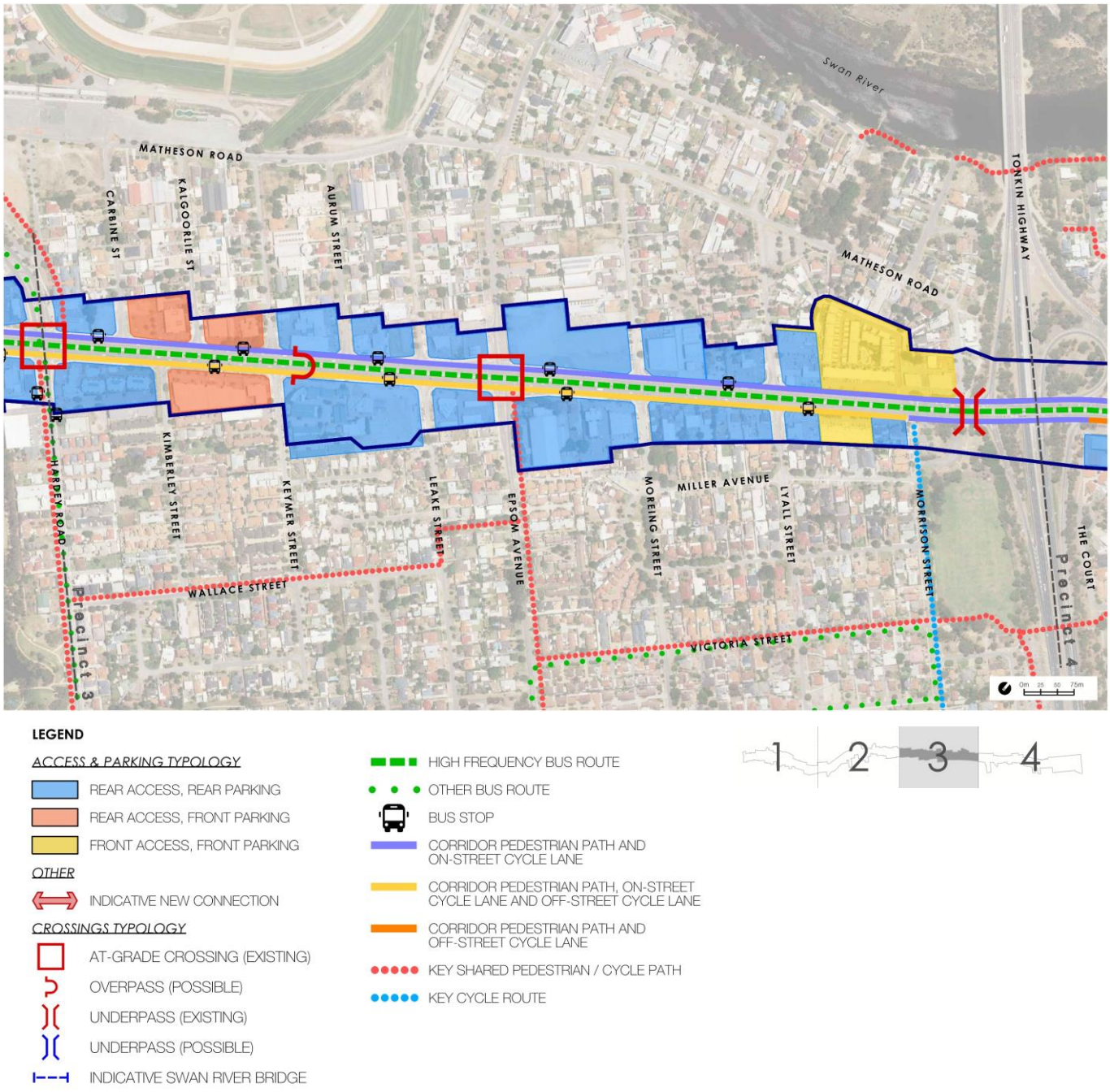
The movement network will be supplemented with the provision of an off-street bike lane on the southern edge of the corridor and continuous pedestrian paths on the northern and the southern edges of the corridor.

The movement network surrounding the corridor includes a key cycle route which provides a connection from the corridor south along Morrison Street towards existing residential development.

A network of shared pedestrian/cycle path exists south of the corridor providing a connection from the Epsom Avenue Activity Node into the surrounding residential areas.

Figure 29 shows the transport networks and access and parking typologies for Precinct 3.

Figure 29 Precinct 3 – transport networks and access and parking typologies (source: TBB, February 2018)



4.8 Precinct 4 – Tonkin Highway to Ivy Street

Precinct 4 will be influenced by the future Redcliffe Train Station and proposed development planned for the Redcliffe locality through the Development Area 6 Structure Planning.

The precinct will comprise of uses which thrive from the proximity to a public transport hub, though can also embrace the benefits of the Swan River.

The precinct will benefit from the Coolgardie Avenue Activity Node, which will build upon the existing medical services and child care services on the northern edge of the corridor.

4.8.1 Precinct 4 – access and parking

The access and parking within Precinct 4 comprises of predominantly Type 1; rear access with rear parking, to ensure efficient vehicular movement along the corridor, and reduce the number of exiting cross-overs, improving pedestrian and cyclist safety.

There is one portion on the southern side of the corridor within the eastern end which is identified as Type 2; rear access with front parking, due to the nature of the existing land use and parking on this site.

There are two proposed additional connections within Precinct 4, required to facilitate rear access and parking to multiple sites.

4.8.2 Precinct 4 – network

Precinct 4 will be supported by an extensive movement network along the corridor, comprising of three existing at-grade pedestrian crossings. Precinct 4 is also serviced by the high frequency bus route and associated bus stops.

The movement network will be enhanced with the provision of pedestrian bridges between the Tonkin Highway and Coolgardie Avenue at-grade pedestrian crossings, in proximity to existing bus stops, to enable safe and convenient pedestrian crossing opportunities from the corridor to the Redcliffe Train Station and surrounding area.

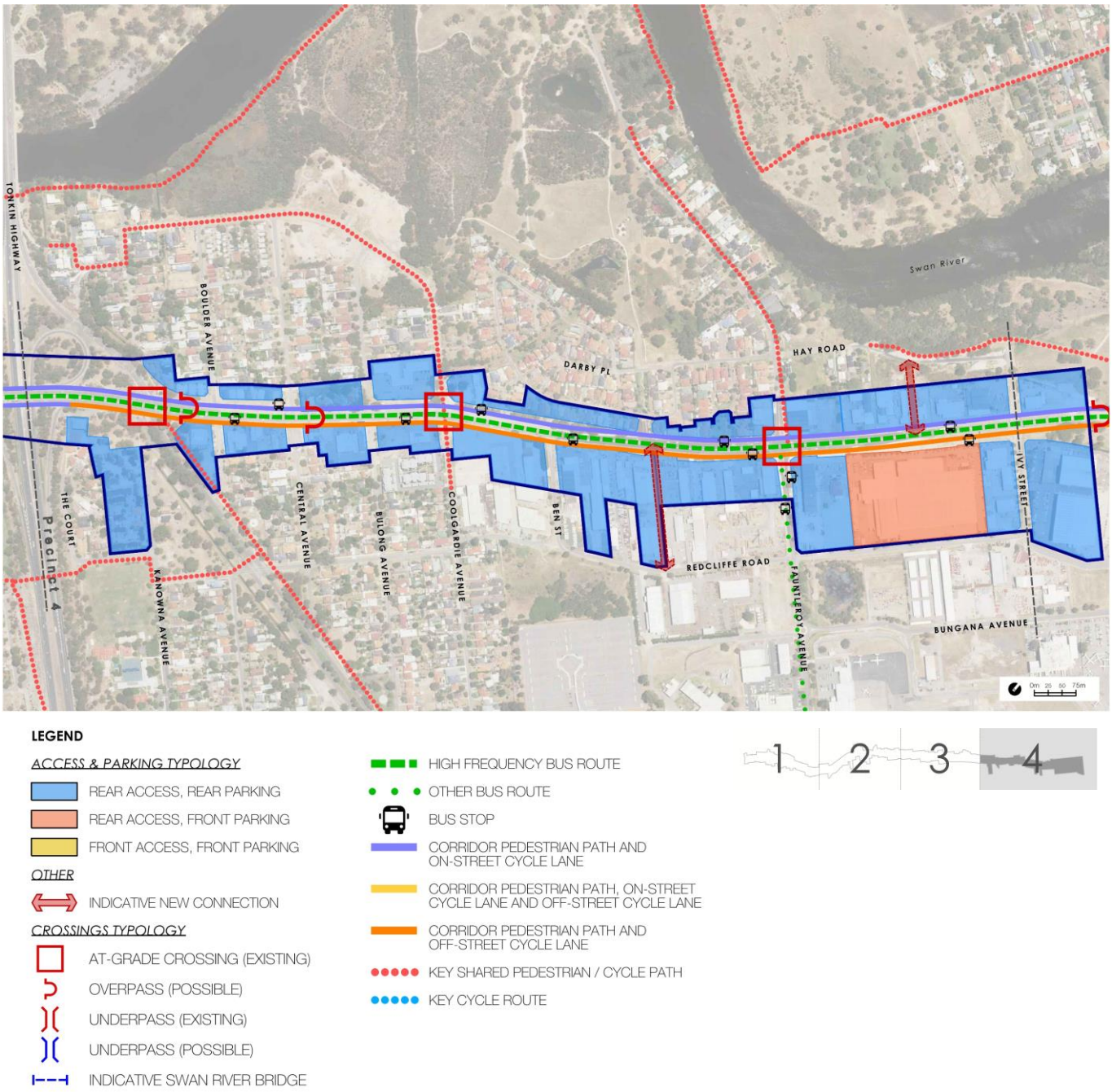
The movement network will be supplemented with the provision of an off-street bike lane and pedestrian path on the southern edge of the corridor and a pedestrian path and on-street bike lane on the northern of the corridor.

The movement network surrounding the corridor includes a network of shared pedestrian/cycle paths with provide connections from the corridor towards the Redcliffe Strain Station to the south, and from the corridor into the residential and areas to the north. A shared/pedestrian path is also located along the edge of the Swan River.

Bus services also provide a connection from the corridor south along Fauntleroy Avenue towards the Redcliffe Train Station.

Figure 30 shows the transport networks and access and parking typologies for Precinct 4.

Figure 30 Precinct 4 – transport networks and access and parking typologies (source: TBB, February 2018)



5. GREAT EASTERN HIGHWAY STRATEGIES AND IMPLEMENTATION

The GEH Urban Corridor Strategy plan establishes a framework to guide, coordinate and facilitate the transformation of the GEH corridor in line with the vision, themes, principles and strategies outlined in the GEH Urban Corridor Strategy plan (TBB, February 2018).

Delivery of the GEH Urban Corridor Strategy plan will rely on the cooperation of stakeholders including State Government, the City, the private sector and the community.

Some initiatives will be implemented more readily than others. As outlined in the GEH Urban Corridor Strategy plan, the study on the GEH Corridor Transition Area could commence immediately, as well as the adoption of the GEH Corridor Strategy as an interim Local Planning Policy, until such time the planning framework has been implemented. However, delivery of physical improvements will be more gradual over a longer period of time.

5.1 Corridor issues and opportunities

The GEH corridor is a significant arterial road managed by Main Roads and is classified as a Primary Distributor Road and identified as a major thoroughfare into the Perth CBD. As a result, it has strong influences on the character of the adjoining properties and neighbourhoods along the corridor, the experience of those who travel along it and how the community feel about their sense of place around it.

The issues and opportunities for the GEH corridor, from a movement perspective, can be summarised as follows:

- Traffic: the GEH corridor currently accommodates average weekly traffic of around 43,000 vpd at the eastern end of the corridor, 65,000 vpd through the central area of the corridor and 70,000 vpd at the western end of the corridor. As such, the GEH is a major barrier for pedestrians, requiring them to cross around 40m of carriageway, and in some locations, several signal phases are required to cross the road.

- Lot access: the corridor currently facilitates vehicular lot access directly off GEH, this is irrespective of lot size, land use or location of lot. As such, the corridor has a number of sections where intersection density is between 2-3 average standard vehicle accesses per 100m. This level of intersection density can result in a corridor with a break down in traffic flow, complex vehicle movements and unsafe driving behaviours.

- Pedestrians: the GEH corridor includes footpaths on both side of the corridor of approximately 3.0m wide between Orrong Road and Tonkin Highway. Through this section there is typically a planted buffer between the footpath and road edge on the southern side of the corridor, but no buffer along the northern side of the corridor. Between Tonkin Highway and Ivy Street the footpath on both sides of the corridor is narrower and typically only 1.5m wide, with a planted buffer on both side of 1.5m-2.5m. As such the existing pedestrian amenity is relativity poor with very high volumes of traffic (including freight traffic on the section between Tonkin Highway and Ivy Street) passing close to pedestrians on the footpaths.

- Cycling: the GEH corridor includes on-road kerb side bike lanes in both directions. The bike lanes are typically 1.5m wide and are either adjacent to the near side general traffic lane or adjacent to bus lanes (where provided). As such the existing cycling amenity is relatively poor with the proximity of cyclists to very high volumes of traffic and/or to sections of high frequency bus lanes.

- Public transport: the GEH corridor is a high frequency public transport corridor serviced by frequent bus services that provide weekday AM peak period frequencies towards Perth city and PM peak period frequencies towards Perth Airport of 1 bus every 3 minutes at the western end of the corridor, 1 bus every 5 minutes along the centre of the corridor and 1 bus every 6 minutes at the eastern end of the corridor. However, access to bus stops is problematic in either the outbound or inbound direction with public transport users having to cross the GEH corridor on one leg of a return journey to access bus stops.

5.2 Strategic directions for the future of movement for the corridor

The GEH Urban Corridor Strategy plan sets out the following strategic directions in relation to movement to achieve the vision and themes for the corridor.

Connecting people and places

- Improve the connectivity of the GEH corridor to adjoining activity areas and open spaces including the Swan River
- Improve the connectivity between public spaces and places of residence and employment.

Creating streets and spaces for people

- Prioritising walking, cycling and public transport as the primary transport modes to and within the GEH corridor
- Ensure the design of streets and adjoining development promotes safe pedestrian and cycling networks along and through the GEH corridor
- Ensure access and parking within the GEH corridor is managed to reduce impact on the corridors functionality and improve and enhance amenity.

Providing managed access for all

- Pursue enhanced access and transport choices for a growing worker and resident population
- Achieve a fully endorsed vehicle access management strategy for properties along the GEH corridor
- Achieve a fully integrated and connected pedestrian and cycle network
- Promote the use of public transport by enhancing accessibility to services within the GEH corridor and increase connecting services to the adjoining neighbourhoods
- Improve the amenity and function of GEH as a key pedestrian spine and adjoining streets that connect with GEH corridor
- Define and upgrade key north-south pedestrian connections that may include consideration of at-grade and grade-separated crossing options
- Define a safe and connected cycling network.

Creating a great place to live

- Mitigate the impacts of through traffic to enhance the adjacent residential neighbourhoods
- Limit traffic speed and volumes in adjacent residential streets
- Ensure that public realm spaces are well-defined, attractive, functional and safe
- Ensure new development is self-sufficient in terms of on-site parking.

The recommended strategies for the following modes of transport are outlined in the following sections of this report:

- Vehicle movement strategies - Section 5.3
- Pedestrian and cycling strategies - Section 5.4
- Public transport strategies - Section 5.5
- Parking strategies - Section 5.6

5.3 Vehicle movement strategies

Capacity

- Identify potential for new connections through the urban structure to better distribute local traffic, alleviate congestion, provide greater pedestrian amenity and safety. The form of intersection is to be determined during detailed planning and design, but possible locations for new connections are:

- Precinct 2 – connection between GEH and Barker Street at a midpoint between Abernethy Road and Hehir Street intersections with GEH
- Precinct 4 – connection between GEH and Redcliffe Road at a midpoint between Ben Street and Fauntleroy Avenue intersections with GEH (opposite Lillian Gove)
- Precinct 4 – connection between GEH and Hay Road at a midpoint between Fauntleroy Avenue and Ivy Street intersections with GEH

- Optimise the integration of the surrounding urban fabric with GEH and the Swan River foreshore.

Managing access to properties along the corridor

- Vehicle access for new development must:
  - Limit direct access from GEH through the application of alternative access arrangements to minimise crossover locations to GEH and the impact on its functionality
  - Comply with the requirements of the access and parking typologies
  - Improve the capacity and network connections of laneways (including through rear building setbacks, where appropriate).

Managing access through adjacent residential neighbourhoods

- Require traffic and parking assessments for new developments to assess and address impacts on the network in adjacent residential neighbourhoods
- Investigate the opportunities to manage the impacts of through traffic, including traffic volumes and speed in the adjacent neighbourhoods.

5.4 Pedestrian and cycling strategies

Improve pedestrian network

- Identify priorities for the development of physical road, bicycle and pedestrian linkages and infrastructure
- Provide infrastructure for pedestrians that enable safe and convenient movement
- Upgrade the pedestrian network to improve accessibility and pedestrian amenity.

Improve pedestrian crossing points

- Create safe crossing points at intersections that do not have traffic signals and in mid-block locations between the signalised intersections
- Work with Main Roads to improve signalised pedestrian crossing times
- Improve pedestrian crossing opportunities at the following locations:
  - Precinct 1 – a pedestrian/bike overpass to the east of the GEH and Armadale Road intersection
  - Precinct 2 – a pedestrian/bike underpass to the west of the GEH and Abernethy Road intersection
  - Precinct 2 – a pedestrian/bike overpass to the west of the GEH and Hehir Street intersection
  - Precinct 2 – a pedestrian/bike overpass to the east of the GEH and Daly Street intersection
  - Precinct 3 – a pedestrian/bike overpass to the east of the GEH and Keymer Street intersection
  - Precinct 4 – a pedestrian/bike overpass to the east of the GEH and Brearley Avenue intersection
  - Precinct 4 – a pedestrian/bike overpass to the east of the GEH and Central Avenue intersection
- Review and upgrade all side-street/laneway crossings to achieve a greater consistency of design and optimise accessibility.

Streetscape / footpath amenity

- Implement public realm upgrades to improve pedestrian amenity in the corridor, side streets and within key connections, including through verandas (within retail/commercial areas), shade trees, seating and wayfinding signage.

Improve cycling network

- Improve the cycling network and facilities within the corridor and connections to the surround cycle network
- Facilitate connections to key cycle routes with priority given to the following locations:
    - GEH corridor – retention of existing on-road bike lanes along the corridor (eastbound and westbound). Supplemented with off-street bike lane or off-street shared path along the southern side of the corridor
    - Precinct 1 – connection either side of the existing pedestrian/bike underpass at The Springs – providing connection to Surrey Road Bike Boulevard and connection through The Springs to the Swan River shared path and Graham Farmer Freeway principal shared path
    - Precinct 2 – connection to the Belmont Avenue shared path and access south towards Belmont town centre
    - Precinct 2 – connection to the Abernethy Road shared path and access south towards Belmont town centre
    - Precinct 2 – connection to the Stoneham Street shared path and access north towards Ascot Waters and the Swan River foreshore path network
    - Precinct 2 – connection to the Raconteur Drive shared path and access north towards Ascot Racecourse and the Swan River foreshore path network
    - Precinct 3 – connection to the Epsom Avenue on-road sealed shoulders and off-street shared path, south towards Epsom Avenue Shopping Centre
    - Precinct 3 – connection to the Morrison Street shared path and access south through the residential suburb of Redcliffe
    - Precinct 4 – connection to the Brearley Avenue shared path and access towards the new Redcliffe Station Precinct
    - Precinct 4 – connection to the Coolgardie Avenue local cycle friendly route and access north towards the Swan River foreshore path network
    - Precinct 4 – connection to the Fauntleroy Avenue local cycle friendly route and access north towards Garvey Park and the Swan River foreshore path network.

Provide infrastructure for cyclists that enable safe and convenient movement

- Investigate the longer-term potential for protected bike lanes
- Review the suitability of on-road cycling on Great Eastern Highway
- Support the proposed local cycling network with appropriate infrastructure and signage.

Landscaped zones providing opportunities for pedestrian and cycle infrastructure

The fundamental aspects of the public realm strategy for the corridor is the creation of quality spaces and connections. It is vital that these spaces and connections provide for a landscape zone which include footpaths, bike paths and landscaping. The design of these elements is fundamental in promoting social interaction and physical activity and developing a high quality urban environment.

The aim of providing enhanced connections through a landscaped zone is to support ease of access, and an enjoyable experience, to and through the corridor for pedestrians and cyclists with a network of high-quality connections.

Within the study area, these connections essentially occur through the side streets, with important routes aligned with existing and proposed crossing points along the corridor. There are a range of connections that have been identified as requiring enhancing in order to improve the public realm of the corridor. The priorities of the connections are to:

- Prioritise pedestrian access by ensuring footpath material is located over driveways
- Create footpaths which are wide enough for people and cyclists
- Retain and protect mature trees
- Plant more trees and prioritise shade to pedestrian areas over medians.

The landscape zone typologies are set out in Figure Figure 31 and the details of each typology is set out below:

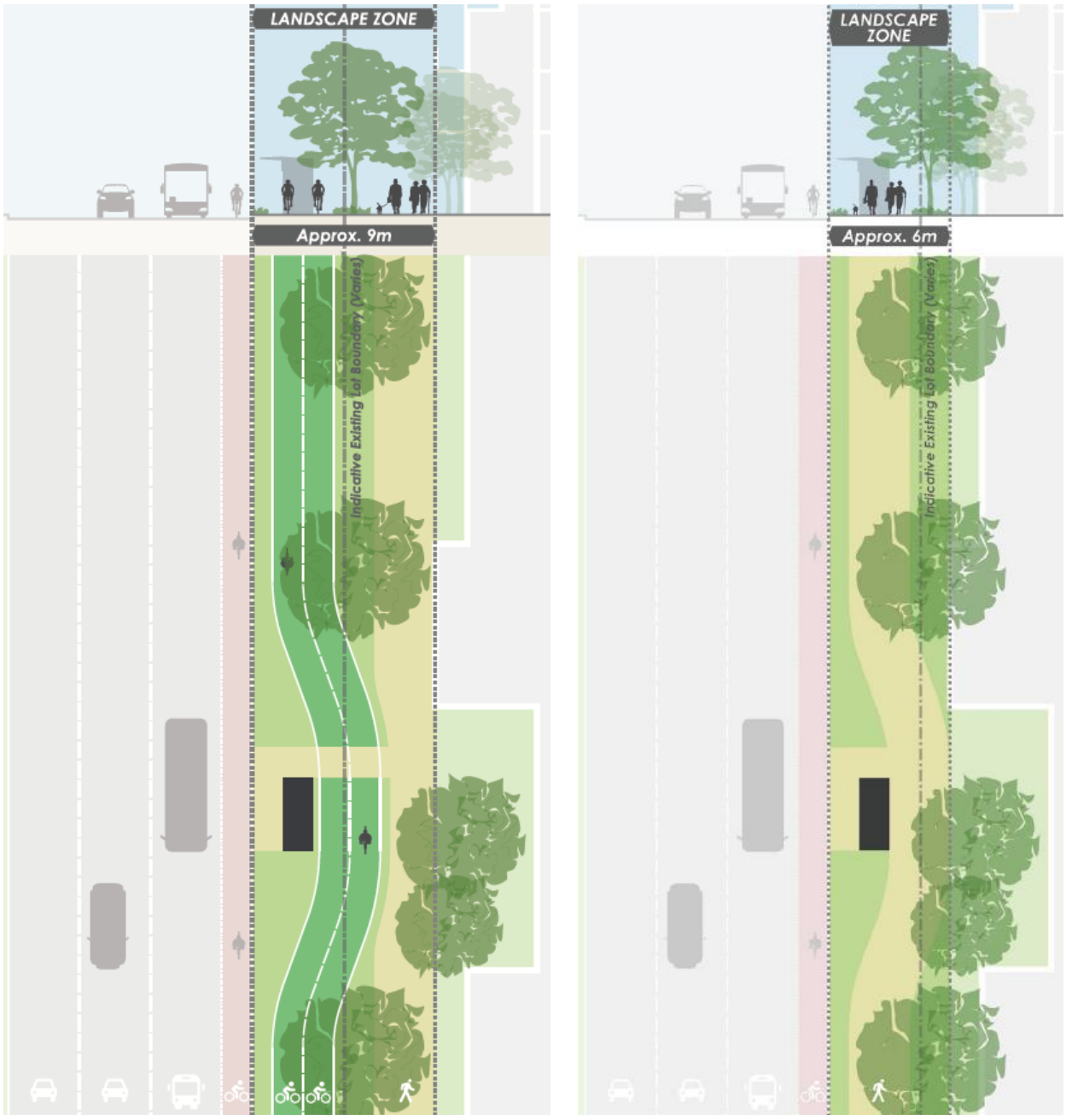
9m landscaped zone includes:

- A landscaped buffer adjacent to the existing on-road bike lane (to be retained)
- Off-street bike path
- Public transport infrastructure (bus stops) as required
- Pedestrian path adjacent to the built form edge.

6m landscaped zone includes:

- A landscaped buffer adjacent to the existing on-road bike lane (to be retained)
- Pedestrian path adjacent to the landscaped buffer (path to be shared with cyclists)
- Public transport infrastructure (bus stops) as required

Figure 31 Pedestrian and bike infrastructure within the landscaped zone typologies (source: TBB, February 2018)



5.5 Public transport strategy

Improved network services from the corridor to adjoining neighbourhoods (including Redcliffe Train Station)

- Advocate for increased bus services to connect adjoining residential neighbourhoods with the existing services provided for within the corridor
- Commence the creation of a green corridor that can accommodate the future introduction of high-frequency transit and more extensive public transport infrastructure.

Improved accessibility to public transport stops

- Enable direct safe access to public transport stops.
- Improve pedestrian access to bus stops along the corridor, with priority given to the following improvements:
    - Precinct 1 – the proposed overpass to the east of the GEH and Armadale Road intersection would provide access to the pair of bus stops to the east of the overpass
    - Precinct 2 – the proposed underpass to the west of the GEH and Abernethy Road intersection would provide access to the bus stops either side of the underpass
    - Precinct 2 – the proposed overpass to the west of the GEH and Hehir Street intersection would provide access to the pair of bus stops to the east of the overpass
    - Precinct 2 – the proposed overpass to the east of the GEH and Daly Street intersection would provide access to the pair of bus stops to the east of the overpass
    - Precinct 3 – the proposed overpass to the east of the GEH and Keymer Street intersection would provide access to the pair of bus stops to the east of the overpass and the pair of bus stops to the west of the overpass
    - Precinct 4 – the proposed overpass to the east of the GEH and Brearley Avenue intersection and the proposed overpass to the east of the GEH and Central Avenue intersection, would provide access to the pair of bus stops located between these two overpasses.

5.6 Parking strategy

Managing on-site parking within the corridor

- Support management of car parking through parking policies and design guidelines
- Design off-street car-parking to have little or no impact on the visual amenity of the public realm
- Managing on-street parking in adjacent access streets.

5.7 Implementation

The GEH Urban Corridor Strategy plan establishes a framework to guide, coordinate and facilitate the transformation of the GEH corridor in line with the established vision, themes, principles and strategies.

The role of the strategy in the context of existing state and local planning, transport and infrastructure frameworks is outlined in detail in the GEH Urban Corridor Strategy Plan (TBB, February 2018). The Plan also provides discussion with regards to the staging/timing and implementation of recommended actions.