Ordinary Council Meeting 23/03/21

Item 12.1 refers

Attachment 6

Traffic Impact Assessment

Transport Assessment

REDCLIFFE STATION PRECINCT ACTIVITY CENTRE PLAN

PROJECT	81113-215 Redcliffe Station Precinct Activity Centre Plan			
Revision	**Description**	**Originator**	**Review**	**Date**
0	Draft	CAS	MDR/JR	18/04/18
1	Reviewed	CAS	MDR/JR/COB	14/05/18
2	Reviewed	CAS	SCK/JR/COB	25/09/19
3	Reviewed	CAS	SCK/JR/COB	10/10/19
4	Reviewed	CAS	SCK	17/10/19
5	Issued	CAS	SCK	25/01/21

Contents

Figures

Tables

EXECUTIVE SUMMARY

The Redcliffe Station Precinct Activity Centre Plan is being developed for the City of Belmont on the basis that it forms part of the Specialised Activity Centre under State Planning Policy (SPP) 4.2 that covers Perth Airport. This designation is confirmed through the Perth and Peel @3.5million Central Sub-regional Planning Framework.

Although the designation of the area within the strategic planning framework for Perth is as an Activity Centre, assessment of the impacts related to the Redcliffe Station Activity Centre has been completed based on the requirements of the Western Australia Planning Commission (WAPC) Transport Impact Assessment Guidelines – Volume 2 Planning Schemes, Structure Plan and Activity Centre Plans as opposed to the Movement Network Plan requirements of SPP 4.2. The principle reasons for this approach relate to a greater level of detail required within the WAPC Guidelines and more immediate demands relating to the development of the Station and impacts on the local street network.

As set out in Section 7 of the Guidelines, the key objectives of this TIA are:

- "assess the proposed internal transport networks with respect to accessibility, circulation and safety for all modes, that is, vehicles, public transport, pedestrians and cyclists;
- assess the level of transport integration between the structure plan area and the surrounding land uses;
- determine the impacts of the traffic generated by the structure plan area on the surrounding land uses; and
- determine the impacts of the traffic generated by the structure plan area on the surrounding transport networks".

This TIA has been set out using the structure established in Section 9.3 of Volume 2 of the WAPC Guidelines. For completeness, in addition to the assessment requirements with the WAPC TIA guidelines, additional assessment on parking requirements within the Activity Centre, as per the SPP4.2 Movement Network Plan requirements, has been set out in this assessment.

The Redcliffe Station Precinct Activity Centre Plan (RSPACP) area sits within the suburb of Redcliffe and is located approximately 10km by road from Central Perth. It is located directly adjacent to Perth Airport and flanked by the Tonkin Highway to the west and Great Eastern Highway to the north. At present, the area is predominantly single residential land uses, a primary school, street and local open space reserves and commercial activity fronting on to Great Eastern Highway.

The RSPACP has been developed to transition the existing land uses to a location that maximises the benefit of the new Redcliffe Train Station. Accordingly, the proposed development quantum is focussed around higher density residential and mixed use outcomes. The actual outcomes achieved through the RSPACP will be dependent on a site by site delivery of land uses within the framework of the RSPACP and associated Planning Policies, including those relating to the impact of Perth Airport limitations.

The RSPACP area has already undergone substantial change in respect of its transport network over the past year through:

- Opening of Gateway WA infrastructure, including the new interchange at Boud Avenue which forms the access point from the north to Perth Airport
- Construction activities associated with the FAL project with changes to local access, local intersections and priority turn movements
- Closure of Brearley Avenue through the RSPACP area and removal of the historical primary access point through to Terminal 3 and 4.

The completion of the RSPACP implementation will see the evolution of the local street network that will support the opening of Redcliffe Station and redevelopment of land within the RSPACP area. Whereas the internal street network was previously dominated by the presence of Brearley Avenue, the proposed future network will cater for trips to and from the area rather than through. The key changes to the (ultimate) internal network, are:

- Complete removal of Brearley Avenue
- New local street connection between Boulder Avenue and Kanowna Avenue
- Connection of Central Avenue to Dunreath Drive
- Connection between Bulong Avenue and Central Avenue to the north of Redcliffe Station
- Connection of Central Avenue and Bulong Avenue through to Great Eastern Highway to provide left in, left out connections.

The RSPACP is seeking to develop a location that supports walking and cycling and discourages use of private vehicles for completing local trips. In order to achieve this, a pedestrian network has been devised that will prioritise movement of pedestrians along key routes and support future development.

The RSPACP cycling network will largely replicate the pedestrian connections along Shared Paths with a number of key differences. The overall network comprises of elements including a shared use path network, on-street cycle lanes, connections to the wider shared use and PSP network, bike parking facilities in open space , bike parking in front of development lots around Redcliffe Station and bike shelters on two entrance points to Redcliffe Station to provide for cycle and ride patrons.

Redcliffe Station will open in 2021 along with the entire FAL spur line and provide a 15 minute trip to Perth Station via Bayswater. Trains will run through Redcliffe Station in both directions every 10 minutes during the peak periods. On opening, Redcliffe Station is forecast to handle over 2,000 one-way boardings comprised of bus transfers, park and ride, kiss and ride and walking and cycling trips. This forecast volume of boardings is anticipated to grow to around 3,000 by 2031 which will also depend on the progression of delivery of land use outcomes around Redcliffe Station.

Redcliffe Station will be supported by a change in bus network operations in this location. This will be in part driven by Redcliffe Station but also by the changing nature of network operations for Transperth with the introduction of high frequency routes that link key Activity Centres around the Perth Metropolitan Region.

Redcliffe Station will comprise of an active bus way loop around the Station providing for 6 active bus stands and 4 layover stands.

All modes have been considered in the development of the RSPACP, with a specific focus on the movement of people to and from Redcliffe Station and the importance of pedestrian and cycling movements through the area. Strategies relating to overall street form and management have been set out in this assessment, with localised strategies including:

- Overall 40km/h posted speed limit for entire RSPACP area subject to approval processes
- Street management measures on local streets including horizontal and vertical treatments to reduce speed and traffic volumes
- Pedestrian and cycling priority through the central open space spine of RSPACP area
- Retaining the closure of Bulong and Central Avenue near Great Eastern Highway until three specific conditions have been met, namely:
  - Qantas have relocated from Terminal 3
  - Great Eastern Highway has a solid median
  - City of Belmont and Main Roads WA are satisfied with traffic impacts

- Bus only route around Redcliffe Station to remove private vehicle trips from the immediate Station precinct where pedestrians will be predominant
- Kiss and Ride location being segregated from the Station area to limit impact
- Existing priority turn at Coolgardie Avenue to First Street being retained to reduce impact on Coolgardie Avenue
- Future access to development lots on Great Eastern Highway being from side streets only to reduce impact on regional traffic route.

Substantial traffic modelling has been previously undertaken for the area by PTA and Main Roads WA. This includes detailed assessment of the opening year of Redcliffe Station, 2021. The assessment for the RSPACP for the 2031 forecast year has been based on:

- The RSPACP network as proposed
- Redcliffe Station being fully operational with the bus network plans proposed within this assessment in place
- Known land use details based on likely yield and development quantum using full build out of the moderate yield outcome to understand what is a conservative approach
- Relocation of Qantas from Terminal 3
- Vehicle distribution from ROM24 that is consistent with the approach used for the 2021 assessment.

It is important to note that the 2031 modelling exercise used the full build out of the moderate land yield calculations which represents a conservative, over estimation approach so that the CoB and stakeholders would be aware of the implications for the forecast year should development in the area accelerate and achieve full build out. Comparison of previous modelling iterations and the one examined in this report indicate that the total increase in vehicle trips in the forecast year of 2031 attributed to the RSPACP zones is around 30% higher.

The modelled flows for 2031 were analysed using standard traffic engineering analysis set out in Table 4 from the Austroads Guide to Traffic Management. The Austroads analysis applies a typical mid-block lane capacity for urban streets that have interrupted flows – streets that have access points, on-street parking and are designed to be lower speed urban environments. The modelled traffic flows set out for local streets were examined for the type of lane and capacity to understand if any local streets would experience vehicle capacity issues in 2031.

Only Coolgardie Avenue southbound during both the AM and PM peaks is approaching what would be considered a typical capacity design. During these times this traffic represents flows that are largely accessing the Park and Ride and commercial land uses in Perth Airport land.

In addition to the volumetric outputs, intersections where capacity may become an issue were examined to inform the traffic management recommendations in this TIA.

The PM Peak hour experiences a higher level of vehicle traffic across the network and therefore is also modelled to experience greater capacity and delay issues – this is related to commercial land uses in the Airport area rather than RSPACP. Where Central Avenue and Bulong Avenue are cut, the only local option for egress from the RSPACP area is the left turn from Boulder Avenue onto Great Eastern Highway or through the signalised intersection of Coolgardie Avenue and Great Eastern Highway. The wider area movements would be accommodated via Boud Avenue, Fauntleroy Avenue and Stanton Road.

Some movements are constrained due to the general turning patterns related to limited access points to sites and the wider network. This would be resolved through the staged introduction of access to Great Eastern Highway from the RSPACP area and mode shift associated with Redcliffe Station.

In order to address the more immediate issues of the RSPACP network, a prioritisation approach for the delivery of traffic management and street management measures is set out within the TIA. This will assist the CoB in addressing existing issues relating to through traffic movements and can form part of a wider approach by the CoB to manage traffic flows.

Overall, the street network functions within peak periods as also concluded during the initial assessment undertaken by the PTA for planning associated with Redcliffe Station.

The position of the activity centre precinct adjacent to the Perth Airport estate and its growing business and retail precinct, along with the development of the Redcliffe Train Station, is anticipated to place significant parking pressure on the precinct over the coming years. The management of both the supply and demand of parking will be necessary to ensure the right level of parking is available to meet local demand without negatively impacting on the function or design of the urban area. It will also be required from the point that Redcliffe Station opens to manage potential issues with on-street informal Park and Ride that is seen at other locations around the Perth Metropolitan Region.

Parking management measures, both on and off-street, are included within the RSPACP.

Introduction and Background

1. INTRODUCTION

1.1 Impact Assessment

This Transport Impact Assessment (TIA) for the Redcliffe Station Precinct Activity Centre Plan (RSPACP) has been completed based on the requirements of the Western Australia Planning Commission (WAPC) Transport Impact Assessment Guidelines – Volume 2 Planning Schemes, Structure Plan and Activity Centre Plans. As set out in Section 7 of the Guidelines, the key objectives of this TIA are:

- "assess the proposed internal transport networks with respect to accessibility, circulation and safety for all modes, that is, vehicles, public transport, pedestrians and cyclists;
- assess the level of transport integration between the structure plan area and the surrounding land uses;
- determine the impacts of the traffic generated by the structure plan area on the surrounding land uses; and
- determine the impacts of the traffic generated by the structure plan area on the surrounding transport networks".

This TIA has been set out using the structure established in Section 9.3 of Volume 2 of the WAPC Guidelines. The RSPACP is being developed for the City of Belmont on the basis that it forms part of the Specialised Activity Centre under State Planning Policy (SPP) 4.2 that covers Perth Airport. This designation is confirmed through the Perth and Peel @3.5million Central Sub-regional Planning Framework.

This TIA has been set out using the structure established in Section 9.3 of Volume 2 of the WAPC Guidelines. For completeness, in addition to the assessment requirements with the WAPC TIA guidelines, additional assessment on parking requirements within the Activity Centre, as per the SPP4.2 Movement Network Plan requirements, has been set out in this assessment.

Within this TIA, there are references to a range of titles relating to the naming of Redcliffe Station. In particular, reports and technical work completed prior to 2017 refer to alternate Station names Airport West and Belmont. For clarity, these titles refer to the same Station location however in December 2017, the Station was formally named as Redcliffe Station.

1.2 Background

This TIA has been completed by Flyt for the RSPACP for the City of Belmont in conjunction with Taylor Burrell Barnett (TBB). Input for the TIA has been provided from a range of organisations and stakeholders associated with the Activity Centre Plan.

The RSPACP is an extension of the Development Area 6 (DA6) Vision Plan and Implementation Strategy adopted by the City of Belmont in 2014. As set out on Council's website:

"Development Area 6 (DA6) is located in Redcliffe and bounded by Tonkin Highway, Great Eastern Highway, Coolgardie Avenue, Redcliffe Road, Fauntleroy Avenue and Airport Precincts (as defined under the Perth Airport Masterplan). The DA6 Vision involves the reintroduction of great streetscapes that will reconnect an area which has long been divided and allow DA6 to truly integrate with itself and its surrounds. A regeneration that will allow people to enjoy safe and inviting movement by foot, bicycle, rail, bus and car, through a pedestrian-friendly environment".

The finalisation of the DA6 Vision Plan process was formalised by the City of Belmont on the 24 February 2016 with the adoption of Local Planning Policy No.14. The area subject to LPP 14. is shown in Figure 1. The Vision Plan is shown in Figure 2 with the Movement Network shown in Figure 3.

Figure 1 DA6 boundary (City of Belmont)

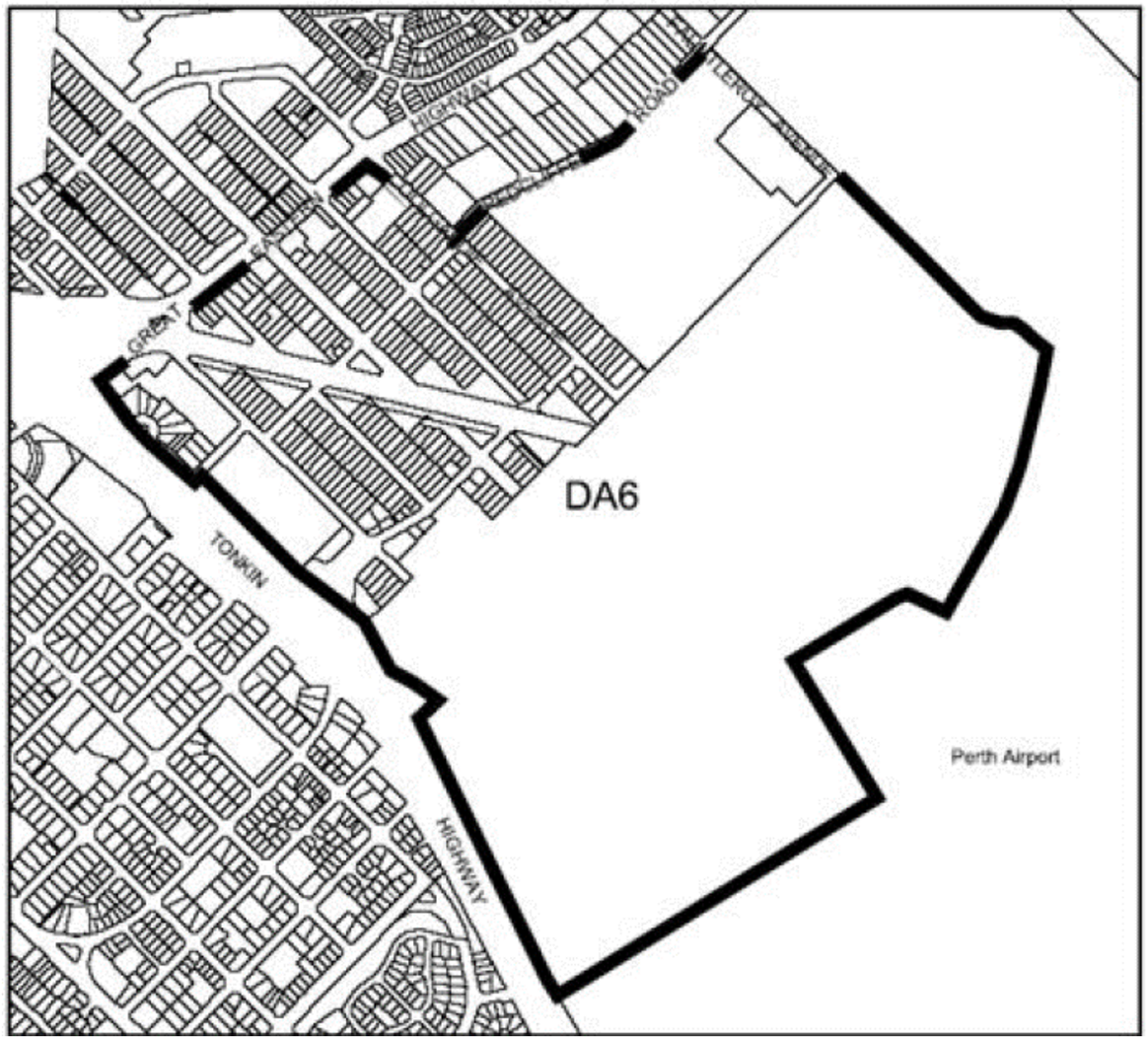


Figure 2 DA6 Vision Plan

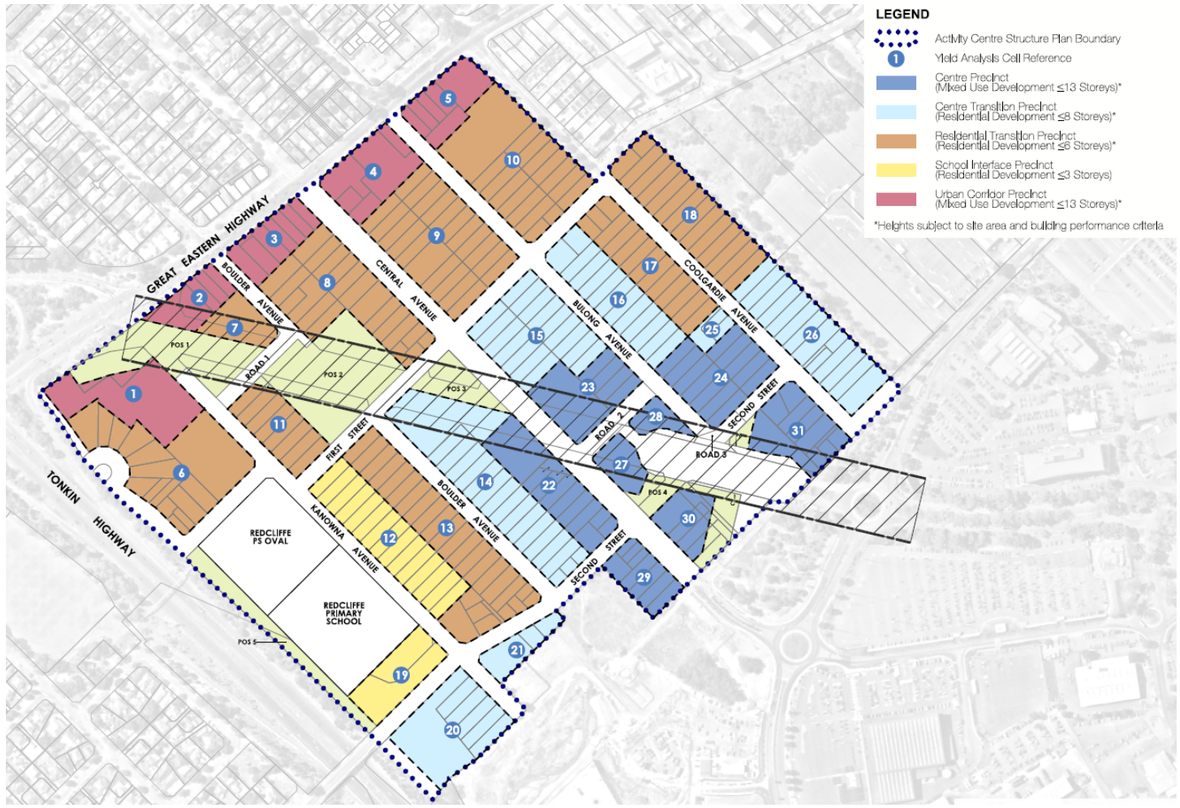
Figure 3 DA6 Vision Plan Movement Network

1.3 RSPACP Indicative Land Use Plan

The RSPACP Indicative Land Use Plan is shown in Figure 4. The Indicative Land Use Plan covers a total area of 49.1 ha and is comprised of the following land use precincts and reserves:

- Redcliffe Train Station and surrounds, including bus interchange and associated short term at-grade drop-off facility
- Centre Precinct (mixed use development)
- Centre Transition Precinct (residential)
- Residential Transition Precinct (residential)
- School Interface Precinct (residential)
- Urban Corridor Precinct (mixed use development)
- Local Open Space
- Redcliffe Primary School (and oval)
- Great Eastern Highway Primary Regional Road reserve
- Local Road reserves.

Figure 4 RSPACP Indicative Land Use Plan



1.4 Prior Technical Studies

There has been substantial technical planning and transport assessment work undertaken within this location over the past five years as a result of complimentary projects and strategies including:

- DA6 Vision Plan and Implementation Strategy
- Forrestfield-Airport Link assessment and construction
- Perth Airport Master Plan
- Gateway WA Freeway build
- Belmont on the Move Integrated Transport Strategy.

This concentrated delivery of projects and strategies has reflected the rapidly changing nature of the land use form and transport network in this area over the past decade and highlights the reality that the area will experience further change over the next decade and beyond.

The changes in the RSPACP are best illustrated through the aerial imagery in Figure 5. The key changes during this period are:

- Advance construction of Forrestfield Airport Link, including Redcliffe Station and associated road network diversions
- Gateway WA
- Delivery of Great Eastern Highway widening west of Tonkin Highway
- Development around Perth Airport, including business park area, additional at-grade car parking and the Direct Factory Outlet (DFO).

Technical work relevant to this TIA that has informed or supported these projects, as well as other strategic planning documents, include:

- DA6 Vision Plan and Implementation Strategy
- Forrestfield Airport Link Project – Traffic and Transport Analysis – DA6 (PTA)
- Forrestfield Airport Link Transport Modelling Airport West Station and associated technical notes (PTA)
- Belmont Station Precinct Civil Works – Design Report
- Belmont on the Move Integrated Transport Strategy
- Perth Airport Master Plan
- Perth Airport Direct Factory Outlet – Final Major Development Plan (Perth Airport)
- Gateway WA Project Master Plan April 2012 (MRWA).

Where applicable in this TIA, these documents have been referred to. Given the substantial volume of information already produced relating to Redcliffe Station and RSPACP, the assessment within this TIA has focussed on the forecast year assessments of 2021 (with the opening of Redcliffe Station and operation of the Qantas Domestic and International Operation from Terminal 3) and 2031. These forecast years align with present strategic planning and transport modelling thresholds and address the 10 year horizon required within the WAPC Guidelines.

Figure 5 RSPACP surrounds 2008 (top image) and 2019 (bottom image) (source: Nearmap)

Redcliffe Station Precinct Activity Centre Plan

2. REDCLIFFE STATION PRECINCT ACTIVITY CENTRE PLAN

2.1 Activity Centre Plan

The Redcliffe Station Precinct Activity Centre Plan (RSPACP) area sits within the suburb of Redcliffe and is located approximately 10km by road from Central Perth. It is located directly adjacent to Perth Airport and flanked by the Tonkin Highway to the west and Great Eastern Highway to the north. At present, the area is predominantly single residential land uses, a primary school, street and local open space reserves and commercial activity fronting on to Great Eastern Highway.

The location of the RSPACP area in a regional context is shown in Figure 6 and Figure 7. In the context of the Perth Metropolitan Region, it is centrally located and, by direct distance, is:

- 6km from Morley Strategic Centre
- 7km from Midland Strategic Centre
- 9km from Central Perth
- 9km from Cannington Strategic Centre
- 9km from Bentley-Curtin Specialised Centre.

The RSPACP has been developed to transition the existing land uses to a location that maximises the benefit of the new Redcliffe Train Station. Accordingly, the proposed development quantum is focussed around higher density residential and mixed use outcomes.

The actual outcomes achieved through the RSPACP will be dependent on a site by site delivery of land uses within the framework of the RSPACP and associated Planning Policies, including those relating to the impact of Perth Airport limitations.

The areas per land use are shown in Table 1 which captures the land use and reserve classes shown in the Indicative Land Use Plan in Figure 4. The overall volume of potential residential units at full build out ranges from around 4,800 to 6,600 with the potential commercial floorspace adding around 30,000m^2 to adjoining commercial developments in PAPL.

Table 1 RSPACP land uses

Land Use	Area (m^2)
Residential	221563.55m²
Mixed Use	85962.87m²
Station	12871.33m²
School	32624.53m²
Local Open Space	40442.84m²
Street Reserves	94882.73m²
Primary Regional Road	2464.18m²

Figure 6 Redcliffe Station Precinct Activity Centre Plan regional location

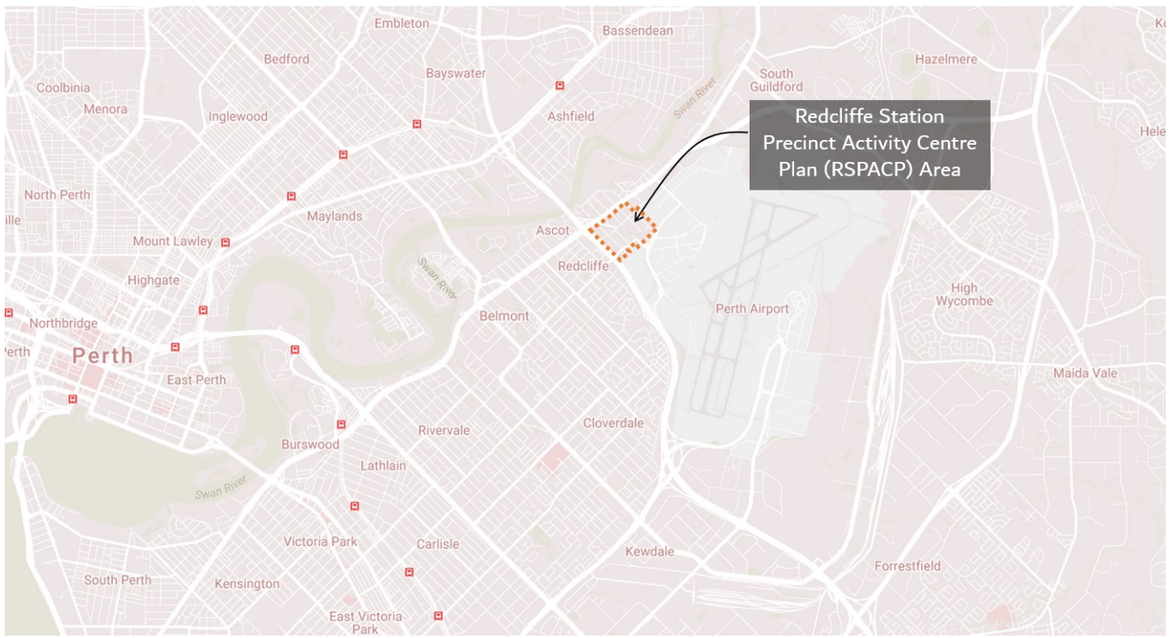


Figure 7 Redcliffe Station Precinct Activity Centre Plan regional location (Source: Nearmap)

Existing Situation

3. EXISTING SITUATION

3.1 Land Uses

At present, the RSPACP area is comprised of a mixture of low density residential, commercial land uses fronting on to Great Eastern Highway, Redcliffe Primary School and local street and open space reserves. The Forrestfield-Airport Link (FAL) works site takes up a portion of the site which was previously the Brearley Avenue road reserve. The City of Belmont Local Planning Scheme (LPS) No.15 Zone Maps are shown in Figure 8. The Metropolitan Region Scheme (MRS) map is shown in Figure 9.

Residential land within the Activity Centre Plan area is zoned as R20 under the Residential Planning Codes (R-Codes). Existing areas of Mixed Use zoned sites within the Activity Centre Plan area include commercial premises fronting Great Eastern Highway which are comprised of:

- Hotel
- Service Station
- Tavern
- Adult Shop
- Tattoo Parlour
- Motor trade outlets
- Funeral Home
- Bottle Shop
- Various retail establishments.

There is a serviced apartment complex along Coolgardie Avenue that is also zoned Mixed Use in LPS 15.

3.2 Land Uses Within 800m

The area around the Activity Centre Plan boundaries are broadly split between the following characteristics:

- Perth Airport land to the south, including extensive at-grade parking areas, existing office and commercial premises and the DFO
- Low density residential land use to the north between Great Eastern Highway and the Swan River. Local recreation reserved land along the Swan River
- Low density residential (R20) land use to the west of the RSPACP area within the Redcliffe locality
- Commercial premises fronting on to Great Eastern Highway on both sides of the carriageway to the west of the site
- Low density residential and stables zoned land associated with Ascot Racecourse between Great Eastern Highway and the Swan River within the locality of Ascot
- Industrial zoned land uses to the east of the RSPACP area extending from Coolgardie Avenue to the boundary of the City of Belmont east of Ivy Street.

Figure 8 City of Belmont Local Planning Scheme (LPS) No.15 Zone Map

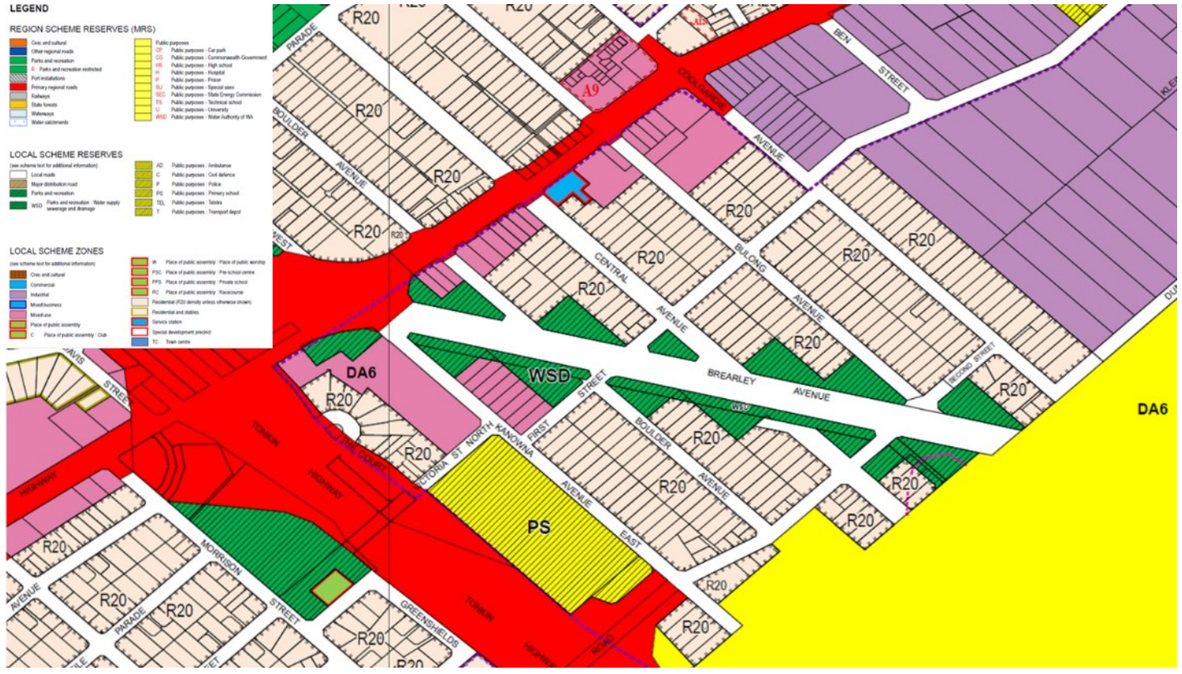
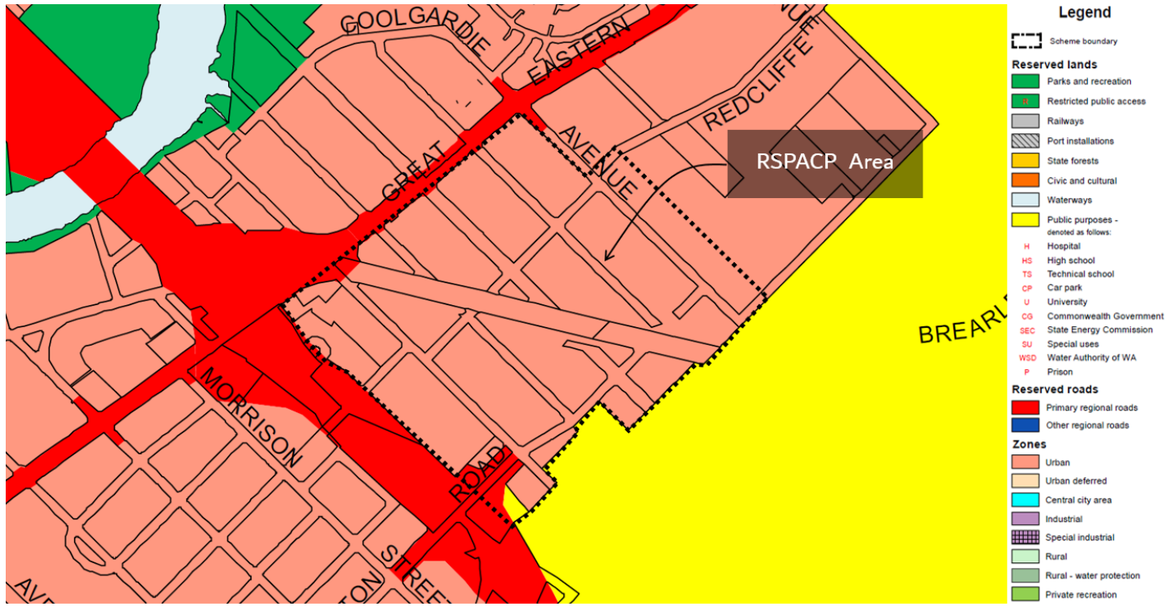


Figure 9 Metropolitan Region Scheme (MRS) map

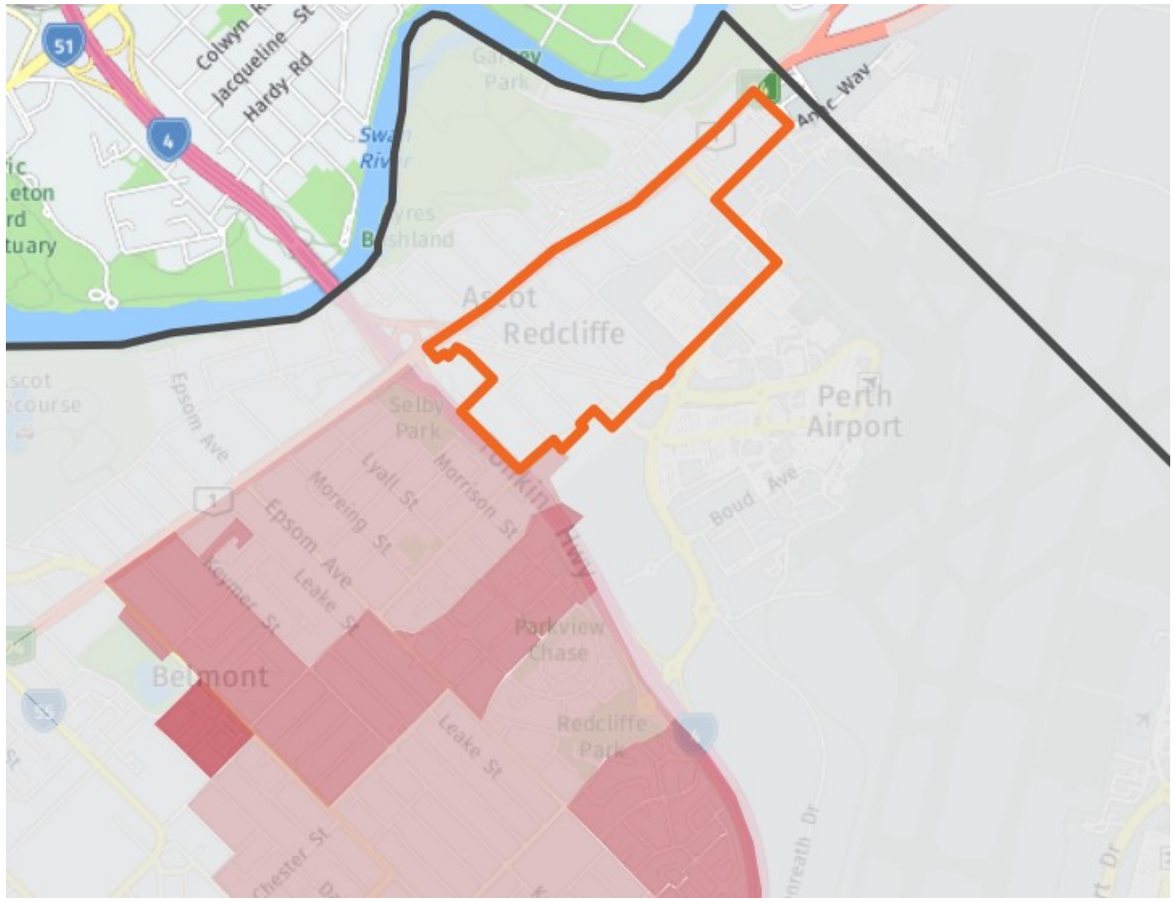


3.3 Existing Population

From the 2016 Census, the relevant information from the Social Atlas was examined to understand population characteristics. The RSPACP area is included within a statistical area that includes industrial land uses to the east. The overall population of SA 5111814 covering an area of 87.5ha, shown in Figure 10, is 550 people.

Within the RSPACP area, the population density is presently 11.2 people per hectare and 97.2% of dwellings are single residential houses and the average number of people per household is 2.44. The median age of the population within the area covering the RSPACP is 37 years of age.

Figure 10 SA 5111814 boundary



3.4 Road Transport Network

Although not within the boundaries of the immediate area, the RSPACP is dominated by the presence of major primary distributor roads on the northern and western boundaries (Great Eastern Highway and Tonkin Highway) as well as substantial Distributor level roads within the boundaries of Perth Airport (Dunreath Drive and the former Brearley Avenue).

The existing road network form within the RSPACP boundary has been dominated by the alignment of Brearley Avenue which, until late 2017, was the primary route into Terminals 3 and 4 at Perth Airport and surrounding commercial land uses associated within the Airport boundary. Prior to its closure as a through route from Great Eastern Highway to the Perth Airport boundary, it carried upwards of 36,000 vehicles per day.

The majority of the local streets within the RSPACP area are lower order local streets, as seen on the Main Roads WA Road Hierarchy plan shown in Figure 11. This local street network formed a traditional grid network with access from Great Eastern Highway prior to the development of Brearley Avenue as the main access road to Perth Airport in the 1950's. Brearley Avenue is still included in the rod hierarchy despite being closed during the Activity Centre Plan process.

The majority of local streets are classified as Access Roads under the Main Roads WA hierarchy, with Second Street performing the function of a Local Distributor Road.

The posted speed limits for streets within the RSPACP area are 50km/h on Access Streets and Second Street, with a residual 60km/h posted speed limit on the former Brearley Avenue alignment. There is a school speed zone associated with Redcliffe Primary School that is in operation at posted times. The posted limits are shown in Figure 12.

The area has good access to the existing Restricted Access Vehicle (RAV) network. As shown in Figure 13, there are no classified roads within the RSPACP area that have a RAV designation with the removal of Brearley Avenue.

Although the roads within Perth Airport adjacent to the RSPACP are not classified, they generally perform the function of District Distributor level roads with their principal function being movement of vehicles as opposed to providing access to urban form.

There are no signalised intersections wholly within the RSPACP area, however there are signalised intersections along Great Eastern Highway which provide access to and from the RSPACP network at Brearley Avenue and Coolgardie Avenue. The majority of internal intersections are Stop or Give Way sign controlled intersections.

Figure 11 RSPACP road classification

Figure 12 RSPACP posted speed limit

Figure 13 RSPACP RAV network plan

3.5 Pedestrian Network

The existing pedestrian network is limited with many streets having a footpath on one side of the street and some sections of cul-de-sac not having footpaths at all. There are existing shared use classified paths along the Brearley Avenue corridor, Second Street and Kanowna Avenue that are higher order paths. There are shared use path connections on bridges over the Tonkin Highway to the existing Principal Shared Path that runs along the western side of the Tonkin Highway road reserve. These bridges provide pedestrian connections to the western side of Redcliffe.

There are pedestrian crossing phases at the signalised intersections on Great Eastern Highway at Brearley Avenue and Coolgardie Avenue. These connections provide pedestrian access through to open space and path networks along the Swan River. The Walkscore analysis shown in Figure 14 reflects the very poor pedestrian accessibility rating at present, with most trips requiring a car.

Figure 14 RSPACP Walkscore ratings

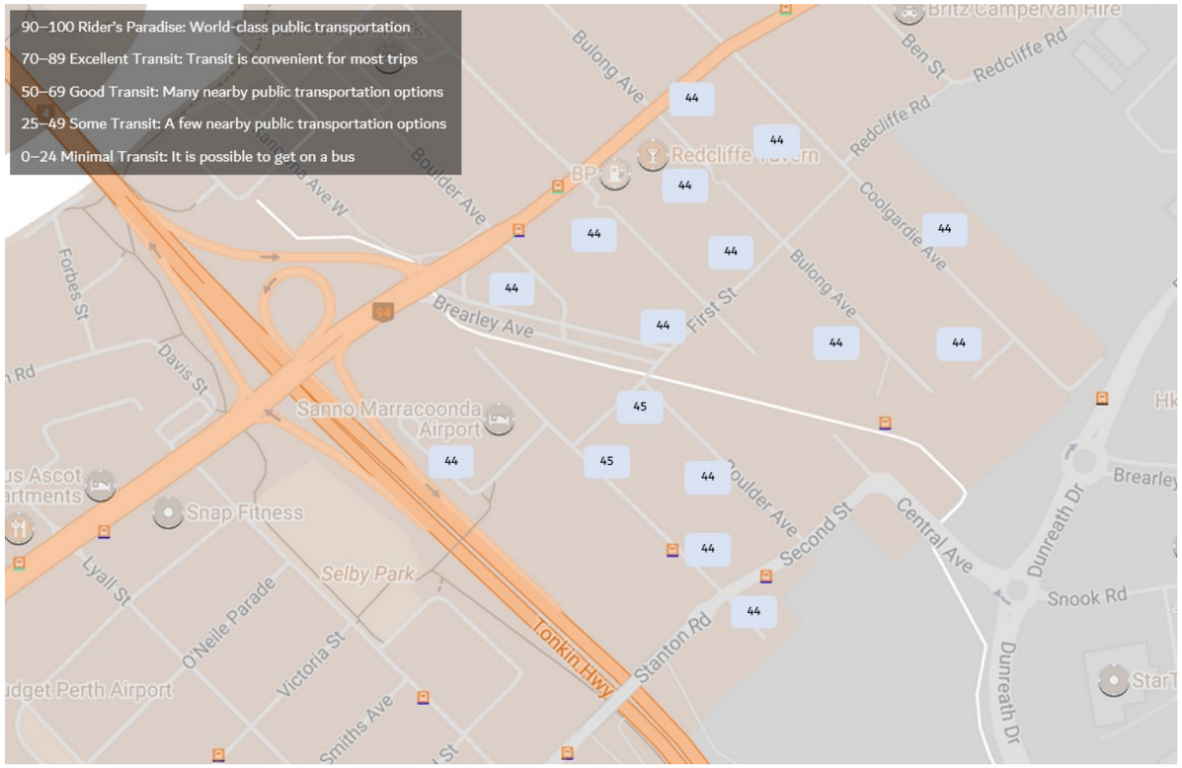
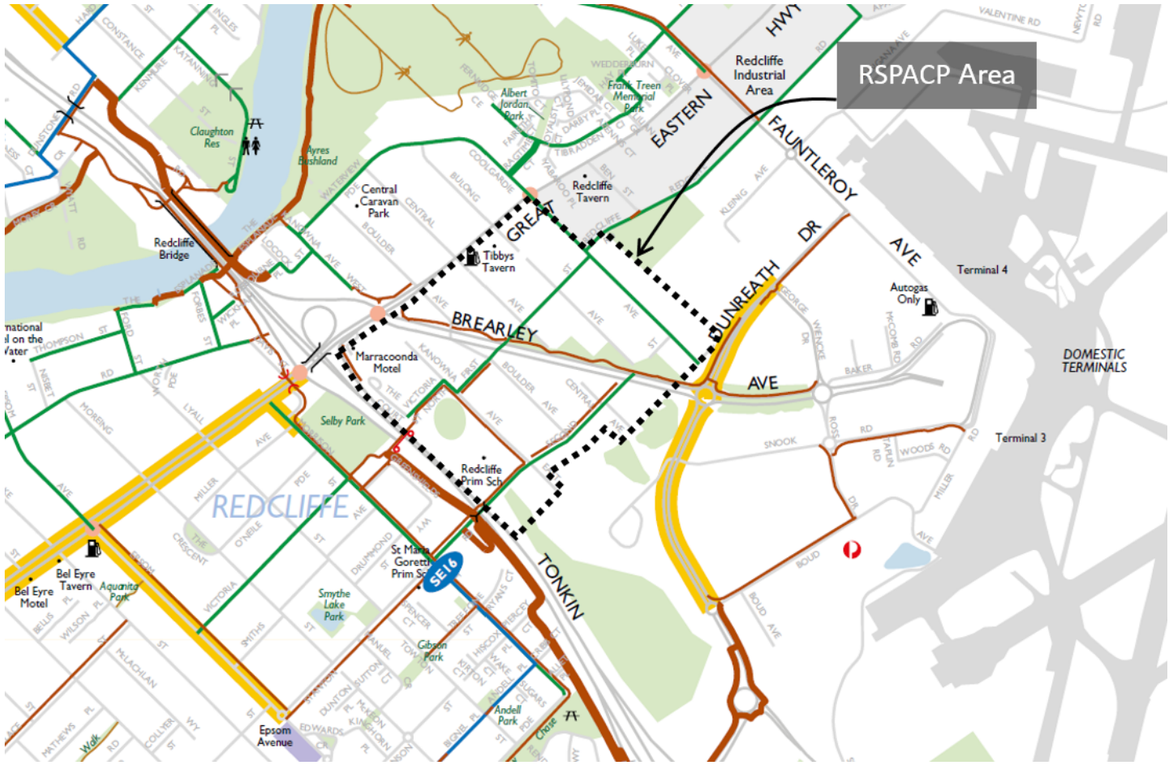


Figure 15 RSPACP Cycling and Walking Network



3.6 Cycle Network

Similar to the pedestrian network, there are a number of existing shared use paths and connections to wider area shared path networks in the RSPACP area. The overall network and connections are shown on the DoT image shown in Figure 15. Within the RSPACP area, Coolgardie Avenue, First Street, Second Street and Victoria Street North are all classified as having good on-street riding environments. This version of the cycling network has not been updated to include the new path connections through Perth Airport along Dunreath Drive.

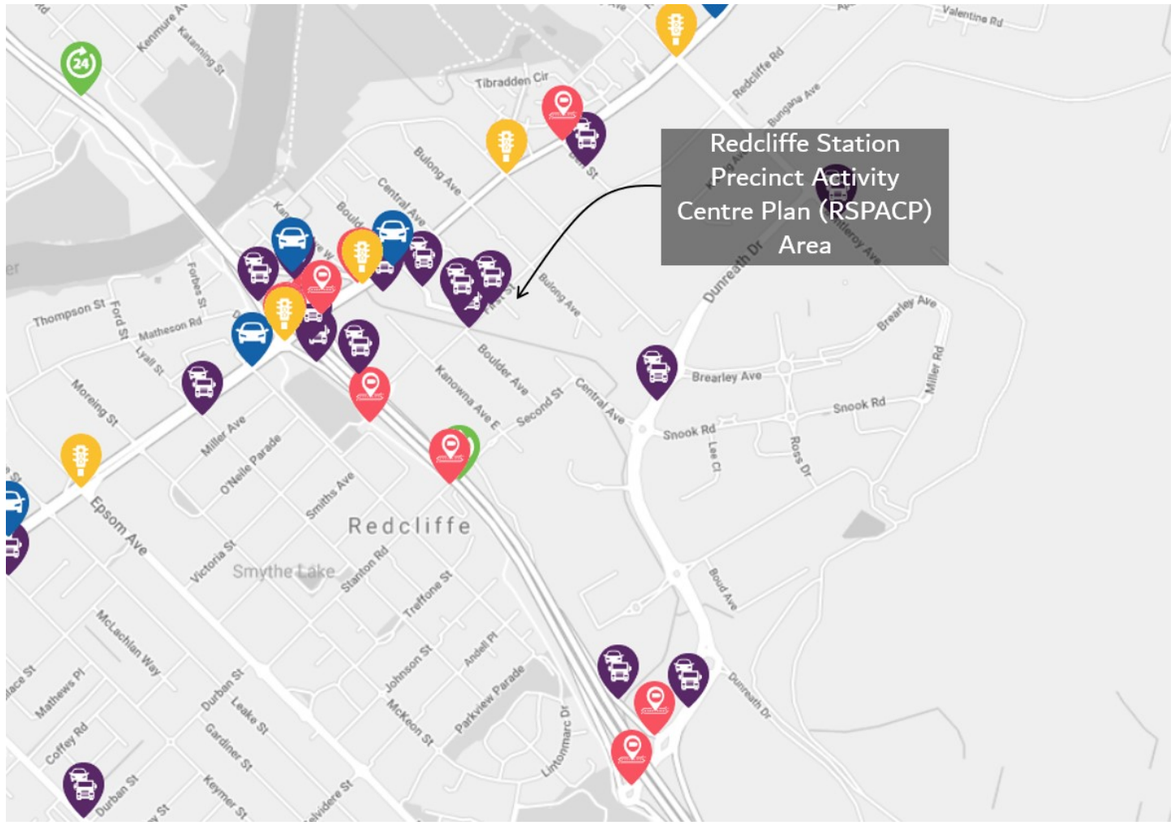
3.7 Traffic Data within 2km of RSPACP

There is a substantial amount of existing daily and hourly traffic data available within 2km of the RSPACP area, as shown on the extract from the MRWA mapping system in Figure 16. This most relevant of these are the major primary distributor connections radiating from the RSPACP area being:

- Great Eastern Highway (west of Aurum Street) 2019 – average weekday all day 56,439 vehicles
- Tonkin Highway on Redcliffe Bridge average counts over 2014/15 period average weekday all day 89,475 vehicles
- Great Eastern Highway west of Great Eastern Highway Bypass February 2014 – average weekday all day 41,440 vehicles
- Tonkin Highway (south of Great Eastern Highway) average counts over 2019 period average weekday all day 109,076 vehicles.

These primary roads have been subject to substantial additional capacity expansion within the past 5 years. The completion of the Gateway WA Freeway project, Northlink and Great Eastern Highway widening during this period of time has seen additional road infrastructure and capacity added to provide for vehicle movements. Gateway WA included expansion of shared path networks within the Freeway reserve and the Great Eastern Highway project resulted in the addition of bus queue jump facilities and pedestrian connections to the west of the RSPACP area.

Figure 16 Traffic data within 2km of RSPACP



Internal Networks

4. INTERNAL NETWORKS

4.1 Proposed Network

The RSPACP area has already undergone substantial change in respect of its transport network over the past few years through:

- Opening of Gateway WA infrastructure, including the new interchange at Boud Avenue which forms the access point from the north to Perth Airport
- Construction activities associated with the FAL project with changes to local access, local intersections and priority turn movements
- Closure of Brearley Avenue through the RSPACP area and removal of the historical primary access point through to Terminal 3 and 4
- Completion of elements of the Northlink project to the north of the Swan River.

The completion of the RSPACP implementation will see the evolution of the local street network that will support the opening of Redcliffe Station and redevelopment of land within the RSPACP area. Whereas the internal street network was previously dominated by the presence of Brearley Avenue, the proposed future network will cater for trips to and from the area rather than through. The key changes to the (ultimate) internal network, as shown in the network plan in Figure 17, are:

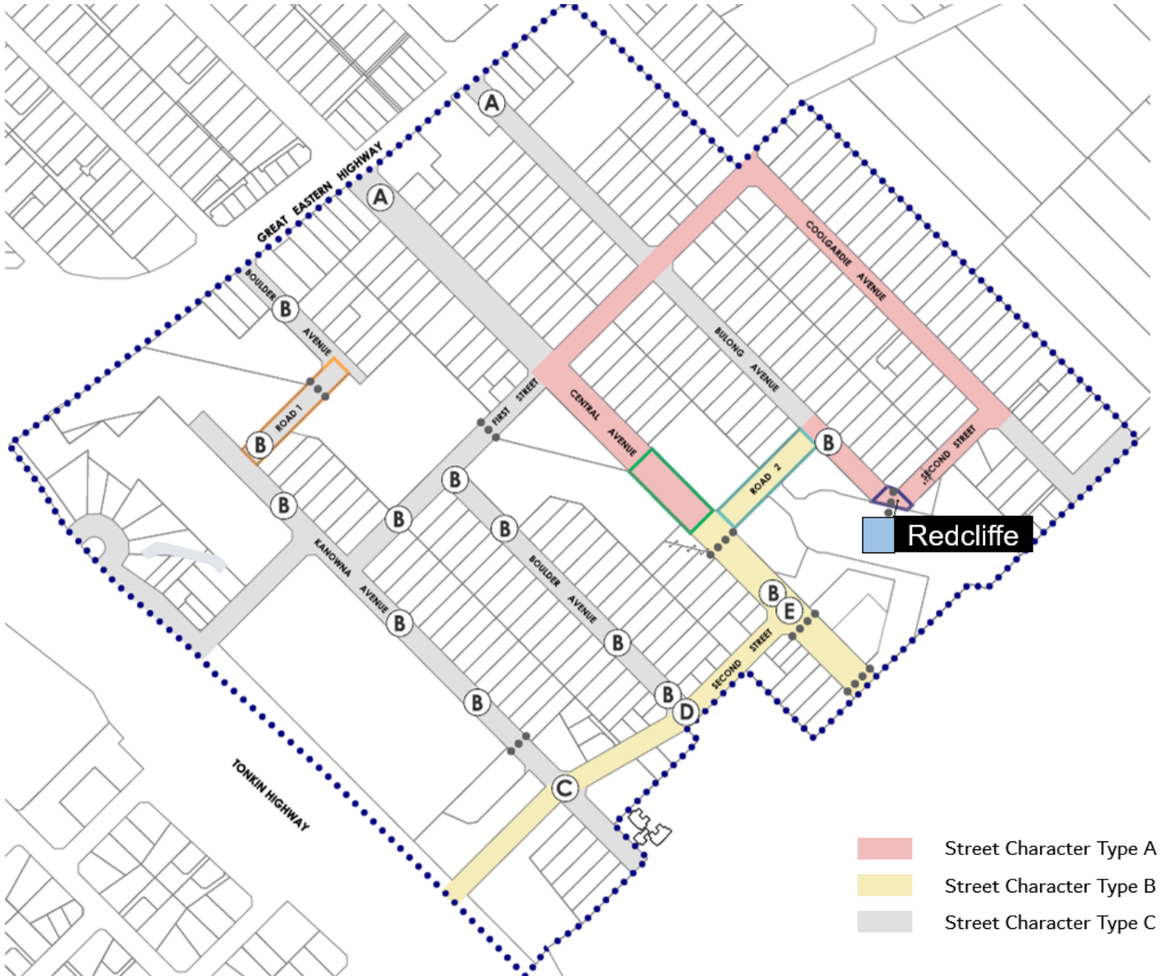
- Complete removal of Brearley Avenue
- New local street connection between Boulder Avenue and Kanowna Avenue
- Connection of Central Avenue to Dunreath Drive
- Connection between Bulong Avenue and Central Avenue to the north of Redcliffe Station
- Connection of Central Avenue and Bulong Avenue through to Great Eastern Highway to provide left in, left out connections.

4.2 Street Hierarchy and Posted Speed Limits

The hierarchy within the RSPACP area has been based on the predominance of local streets supporting movement to and from sites within the area and the Redcliffe Station. The RSPACP establishes three types of streets in the local network that have been taken from the DA6 Vision Plan, being:

- Street Character Type A – Coolgardie Avenue and parts of First Street, Central Avenue, Second Street and Bulong Avenue
- Street Character Type B – Second Street, part of Central Avenue and the new connection street along the north of Redcliffe Station between Central Avenue and Bulong Avenue
- Street Character Type C – all other streets within the RSPACP area.

Figure 17 RSPACP internal street network form



For each of the street typologies provided, the descriptions are set out below:

Street Character Type A

These streets are intended to facilitate primary movement of vehicles between the station precinct and signalised intersection of Coolgardie Avenue and Great Eastern Highway. These streets will generally be designed with:

- A standard road carriageway to accommodate the movement of cars with limited conflict;
- On street parking to assist in slowing traffic and providing visitor parking for residents and businesses; and
- High quality pedestrian infrastructure including footpaths, shade and shelter and street trees to ensure a high quality amenity and ease of use of the network.

Street Character Type B

These streets represent the key streets proposed to accommodate the movement of the bus network, connecting this to the new Redcliffe Station as the primary public transport node. These streets will generally be designed with:

- A widened road carriageway to accommodate the movement of buses and cars without conflict and minimise delays to the movement of the buses
- High quality pedestrian infrastructure including footpaths, shade and shelter and street trees to ensure a high quality amenity and ease of use of the network
- Clear directional signage and locational markers to assist in legibility of the public transport network.

Street Character Type C

Street Character Type C streets represent the all other residential streets within the precinct where priority is to be given to pedestrians and cyclists over motorised vehicles. These streets will generally be designed with:

- A narrowed road carriageway designed to slow the speed of vehicles through deviations in its alignment, traffic calming devices and paving treatments
- On street parking to assist in slowing traffic and providing visitor parking for residents
- High quality pedestrian infrastructure including footpaths, shade and shelter and street trees to ensure a high quality amenity and ease of use of the network
- Clear signage identifying that these are local roads not intended to be used as thoroughfares.

In practice relevant to the existing Main Roads WA Road Hierarchy, all streets in the RSPACP area will be retained as Access Roads, with Second Street and the southern end of Central Avenue being Local Distributor Roads.

The development of the RSPACP area, and the preceding analysis undertaken for the development of the FAL, proposes a staged approach to the connection of some streets to Great Eastern Highway. The two additional street connections at Bulong and Central Avenue will only be completed when three criteria have been met:

- Widening of Great Eastern Highway to six lanes with a solid median that only allows left-in, left-out movements at both intersections
- When Qantas relocate all operations from Terminal 3
- When the City of Belmont, in consultation with Main Roads WA, is satisfied that the overall function of the network requires connections for local traffic movements from the RSPACP area to Great Eastern Highway via Bulong and Central Avenues.

The classification under the current guidelines for the initial stage of the street network is shown in Figure 18. The ultimate network, including the two local connections to Great Eastern Highway, is shown in Figure 19.

The designation of the streets based on the Main Roads WA hierarchy is secondary to the stated outcomes of the RSPACP in that the street network and controls on the streets have been recommended to provide the relevant level of priority and management, rather than focussing explicitly on volumes of vehicle movements. Whilst some sections of streets within the ACP may approach the desired volumes for lower order distributor roads in the forecast year, the roll of the streets within the ACP that are shown as Access Streets focuses on other elements of the designation relating to use, parking, speeds and purpose.

Figure 18 RSPACP initial street network

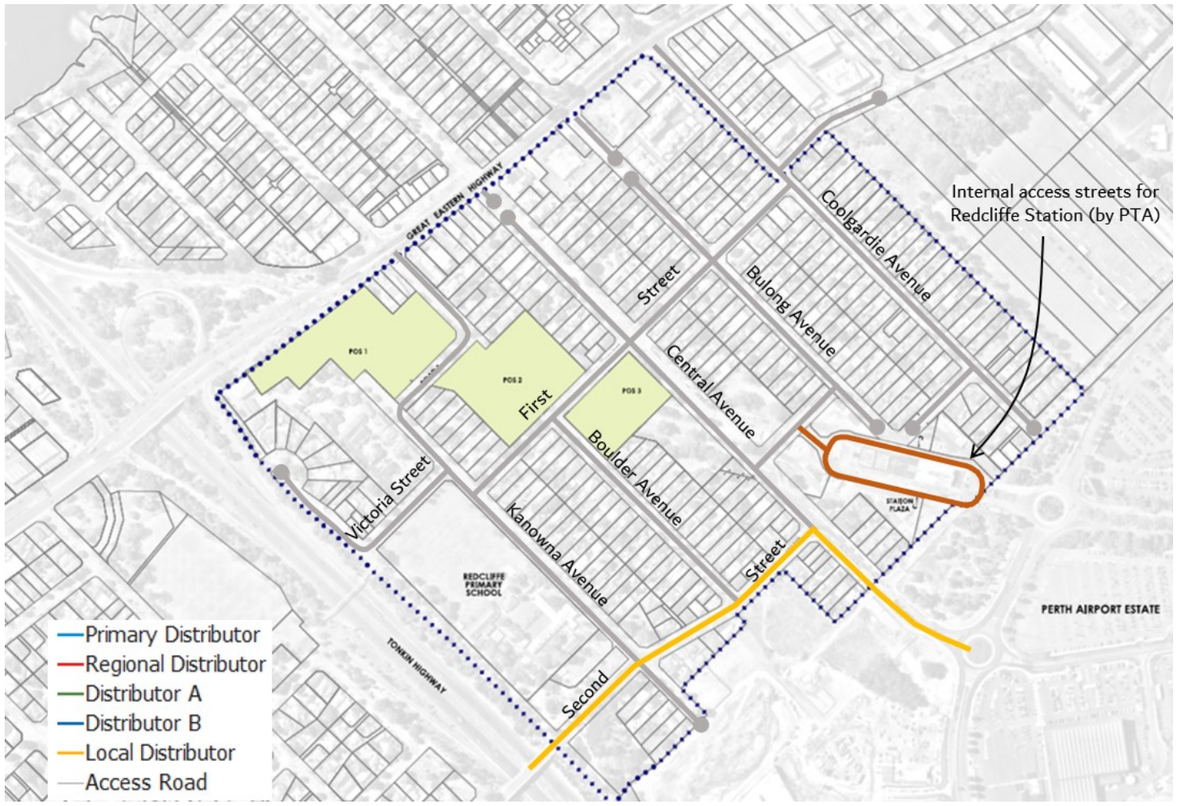


Figure 19 RSPACP ultimate street network

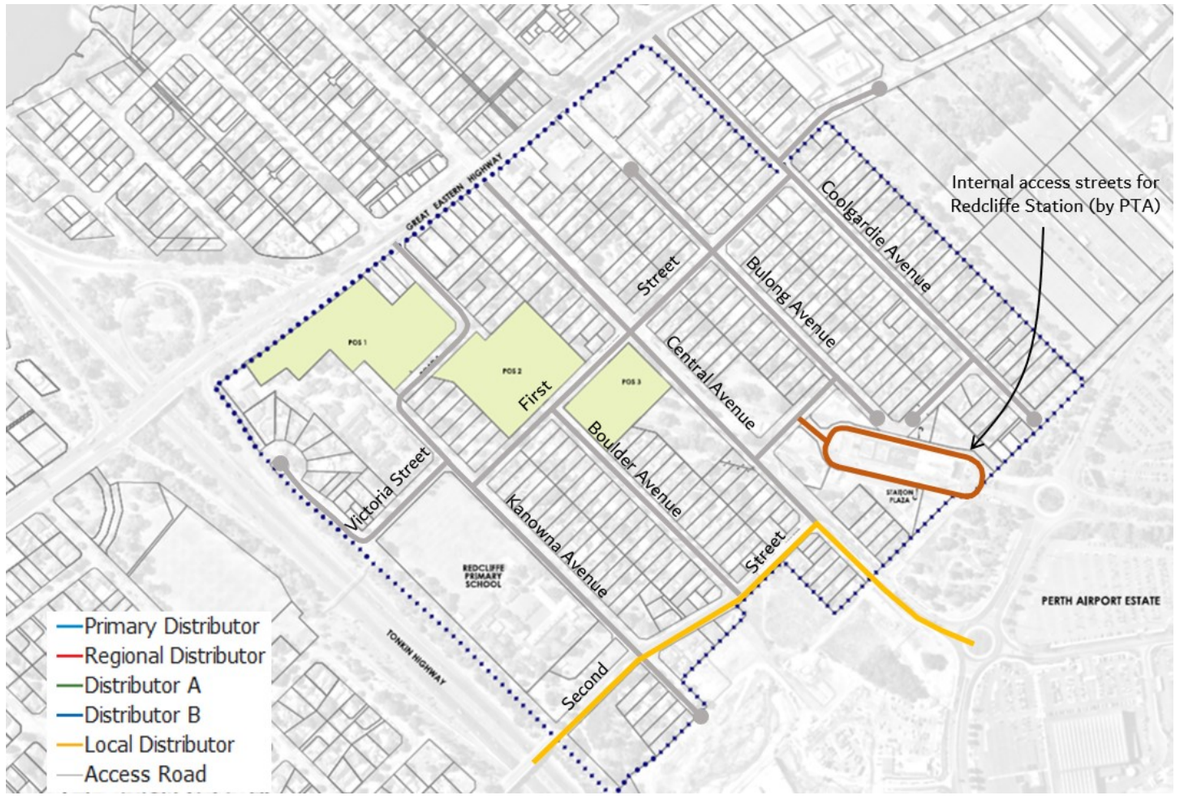
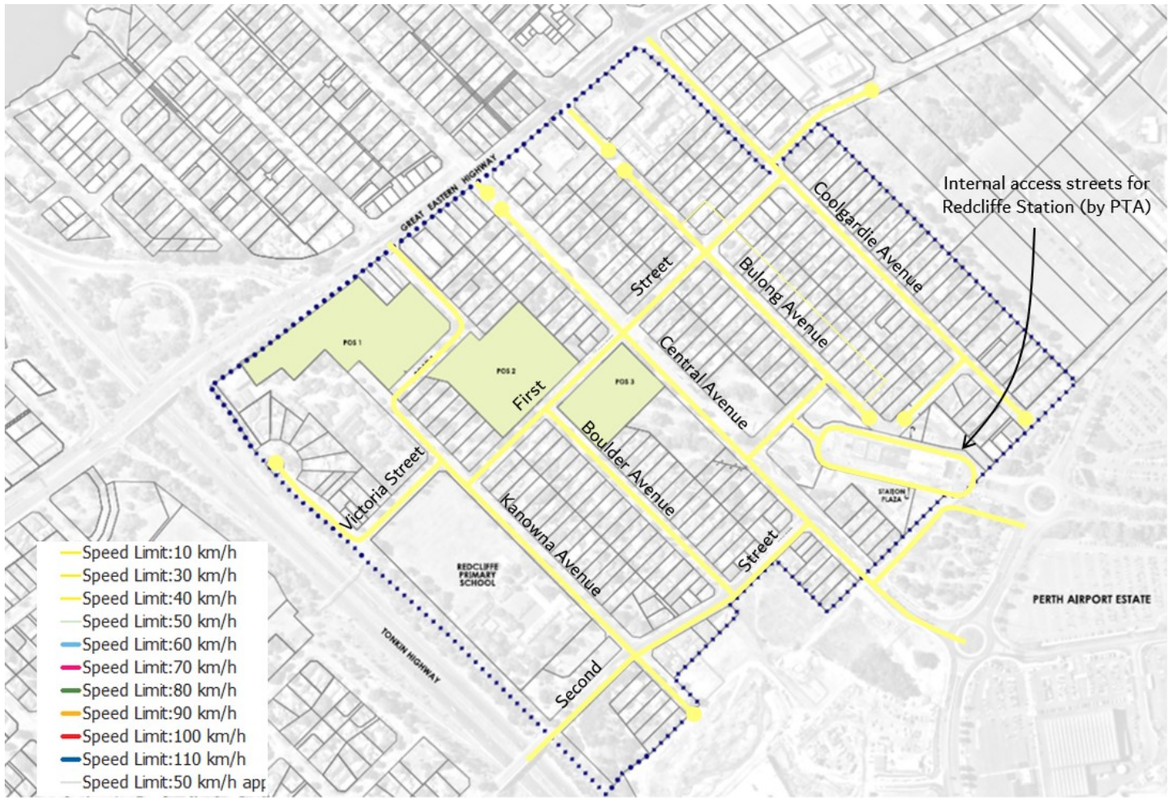


Figure 20 RSPACP street network posted speed limits



In keeping with the design intent of the RSPACP area, all streets within the area are proposed to have a posted speed limit of 40km/h as shown in Figure 20. The posted speed limit, subject to approval processes, will ensure consistency, reduce the impact of traffic, improve pedestrian safety and reduce the potential for through traffic movements.

The implementation of a slower posted speed zone, accompanied by a range of traffic calming and management measures set out in this report, will have a range of benefits for the City of Belmont and residents in the area:

- There will be a consistent approach to speed zones with no fluctuations – this makes interpretation from the drivers perspective easier, as well as enforcement.
- It is a safer outcome for the instances where there may be a collision involving a driver of a car and a pedestrian or cyclist.
- There will be embedded road safety around the Primary School area.
- It will not impact on travel times for vehicle trips through the area given the small network and lack of substantial through-routes with high capacity roads.

4.3 Road Reservation Widths

The existing road reserve widths for the RSPACP plan area will be largely retained as is:

- Central Avenue – 30m Reserve Width
- The Court – various, including some area within the existing Tonkin Highway reserve
- New internal street sections associated with Redcliffe Station – carriageways as per PTA requirements with no specific reserve
- All other streets – 20m.

The reserves will cater for a range of street typologies depending on their location and ultimate use. Current carriageway widths vary as follows:

- 5.6m - 6.0m – Boulder Avenue South, Central Avenue and Bulong Avenue
- 7.0m – 7.6m – The Court, Victoria Street, Boulder Avenue North, Kanowna Avenue, Coolgardie Avenue, First Street and Second Street
- 8.8m – Redcliffe Road.

The overall configuration and form of streets within the RSPACP area is shown in Table 2. Road reservation reserve widths will either be retained from the current layout or the new connection streets will replicate the 20m road reserves that are generally present in the area. This is to ensure there is continuity in street design and space within the reserves for footpaths, street furniture, trees and utilities.

The road reserve widths for the ultimate configuration of the RSPACP street network is shown in Figure 21.

4.4 Cross Sections

Indicative cross sections for the street network have been developed to reflect both existing planned configurations and likely future configurations. The design elements for the 30m wide Central Avenue have been taken directly from as constructed sections of the street adjacent to Redcliffe Station.

There will be fluctuations in the carriageway widths of many of the Type C design streets given that many of them will remain as is. Some alterations to kerbing, drainage or other asset management may impact on the ultimate width of the carriageway for all Type C streets, however the general width of one direction of travel should aim to be 3.2m wide.

20m road reserve streets will vary based on future detailed design and other considerations. The cross sections shown in Figure 22 provide an indication as to the form of likely street design in order to include the following:

- Shared use paths
- Embayed parking
- Street trees, furniture and utilities
- Carriageways appropriate to type of street
- Bus routes.

The indicative cross sections are shown from Figure 23 to Figure 31.

Figure 21 RSPACP road reserve widths

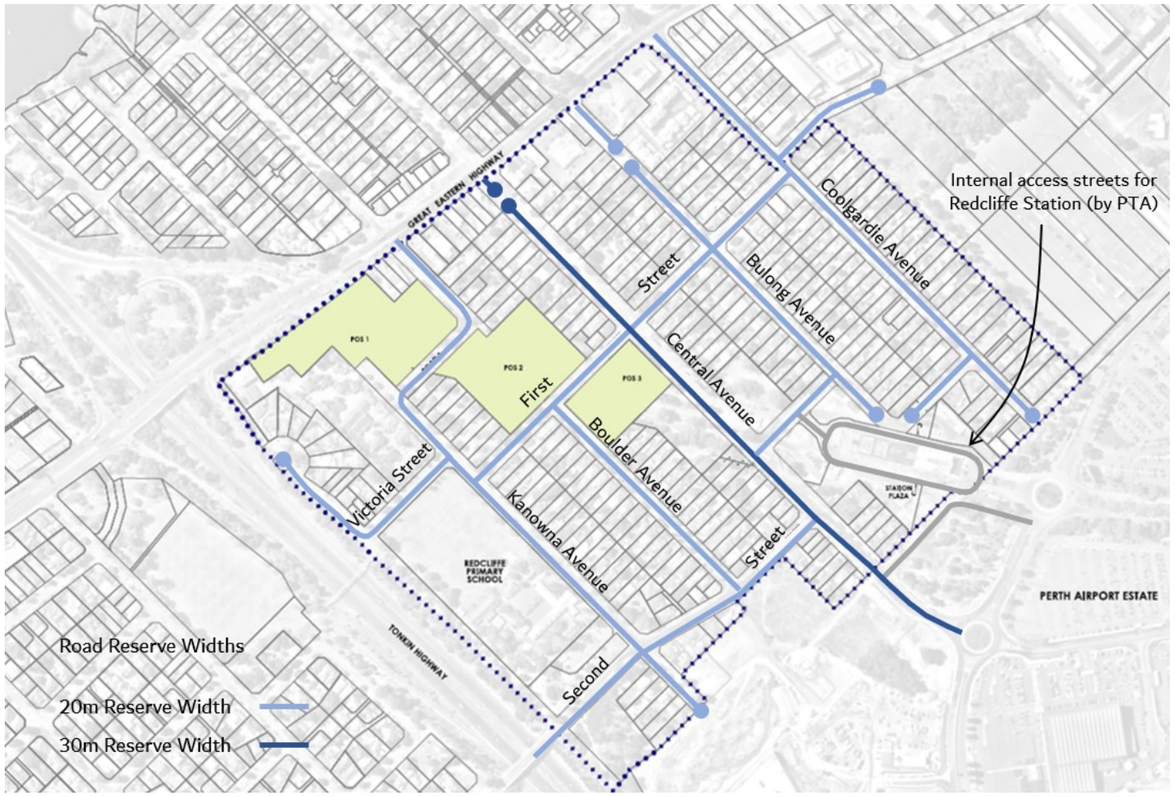


Figure 22 Schematic cross sections - 20m and 30m reserves

Table 2 Street network characteristics

Name	Type	Reserve Width	Existing Carriageway	Future Carriageway	Additional Traffic Management?	Parking?	Bus Routes?	Indicative Figure Ref.
The Court	Type C	Approx. 20m	7.60	As is	No	Unmarked on-street	No	Figure 25
Victoria St	Type C	20	7.40	As is	No	Unmarked on-street	No	Figure 25
Boulder Ave North	Type C	20	7.60	As is	No	Marked on-street	No	Figure 25
Boulder Ave South	Type C	20	6.00	As is	No	Marked on-street	No	Figure 25
Kanowna Ave	Type C	20	7.40	As is	Yes, street treatments around school and horizontal design elements to limit speeds	Existing embayed parking for school. Future embayed verge parking.	No	Figure 31
Central Ave North	Type C	30	6.40	As is	Yes, Cul-de-sac for initial stage. Substantial horizontal elements to retain very low street speeds and limit attractiveness of through route in full build.	Future embayed verge parking in reserve.	No	Figure 25
Central Ave South	Type B	30	6.00	Split road with 2 x 3.5m single lanes in each direction, turning pocket on to Second Street.	Extension of split carriageway through to First Street, pedestrian crossing points during initial stage and then signalisation of intersection with Second Street. Initial controls to be stop sign leg on Second Street.	Yes, embayed short term parking bays.	Yes	Figure 23 Figure 24
Bulong Ave	Type C	20	5.60	As is	Yes, Cul-de-sac for initial stage at Great Eastern Highway end. Substantial horizontal elements between First Street and Great Eastern Highway at full build. Intersection and horizontal alignment treatments south of First Street combined with pedestrian connections adjacent to Redcliffe Station.	Yes, embayed short term parking bays.	No	
Coolgardie Ave	Type A	20	7.20	As is	Retain existing form of treatments.	Marked on-street	No	
First St East	Type A	20	6.40	As is, with parking	Horizontal deflection treatments between Bulong Avenue and Coolgardie Avenue, other treatments as required.	Future embayed verge parking in reserve.	No	Figure 27 Figure 28
First St West	Type C	20	6.40	As is, with parking	Horizontal treatments west of Central Avenue.	Future embayed verge parking in reserve.	No	Figure 27 Figure 28
Second St	Type B	20	7.30	As is	Roundabout to be constructed at entrance to new parking area for Redcliffe Station. Provision for future signalisation of Central Avenue, with stop sign control used in interim.	Future embayed verge parking in reserve.	Yes	Figure 29 Figure 30
Redcliffe	Type C	20	8.80	As is	No	No	No	

Figure 23 Indicative 30m reserve - Central Avenue (First Street to Dunreath Drive)

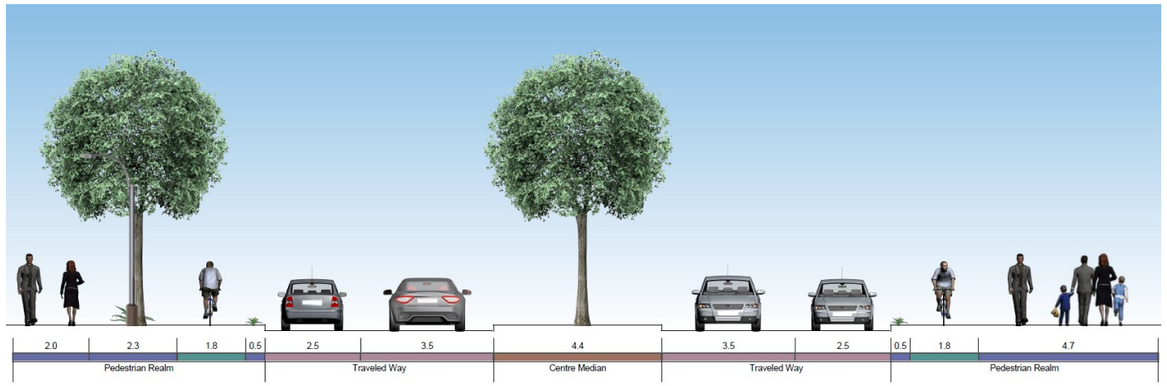


Figure 24 Indicative 30m reserve with embayed parking - Central Avenue (First Street to Dunreath Drive)

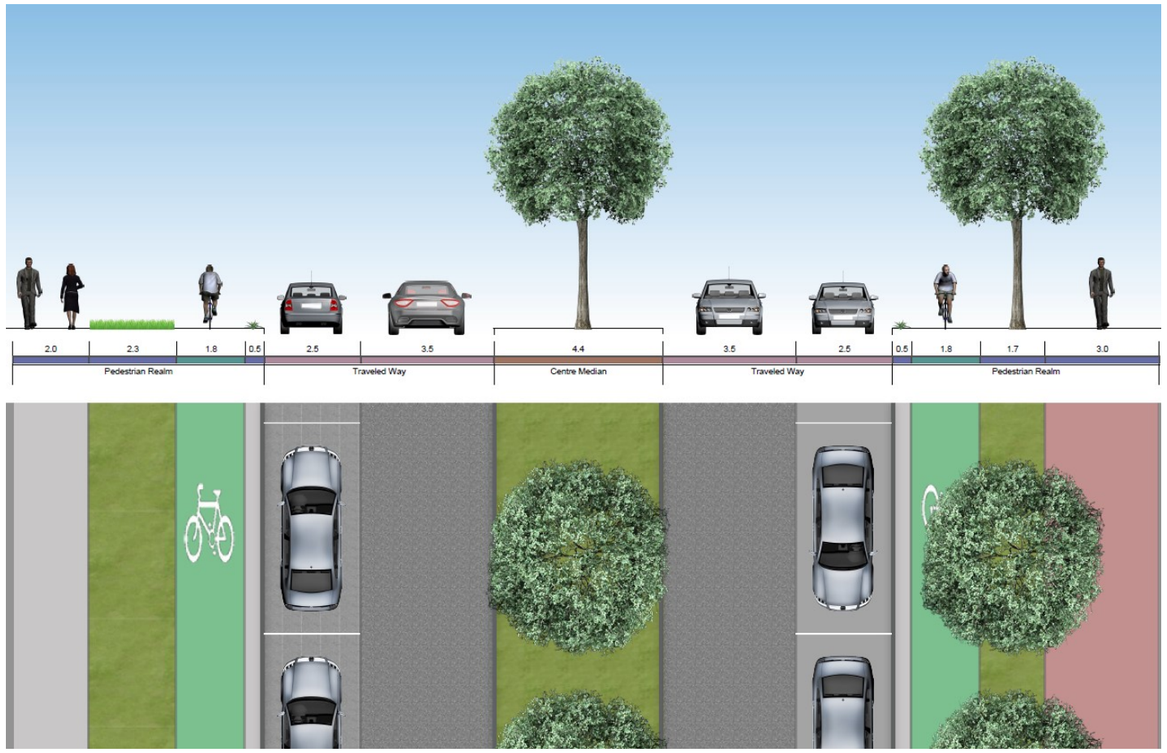


Figure 25 Indicative 20m reserve - Street Character Type A and Type C Roads

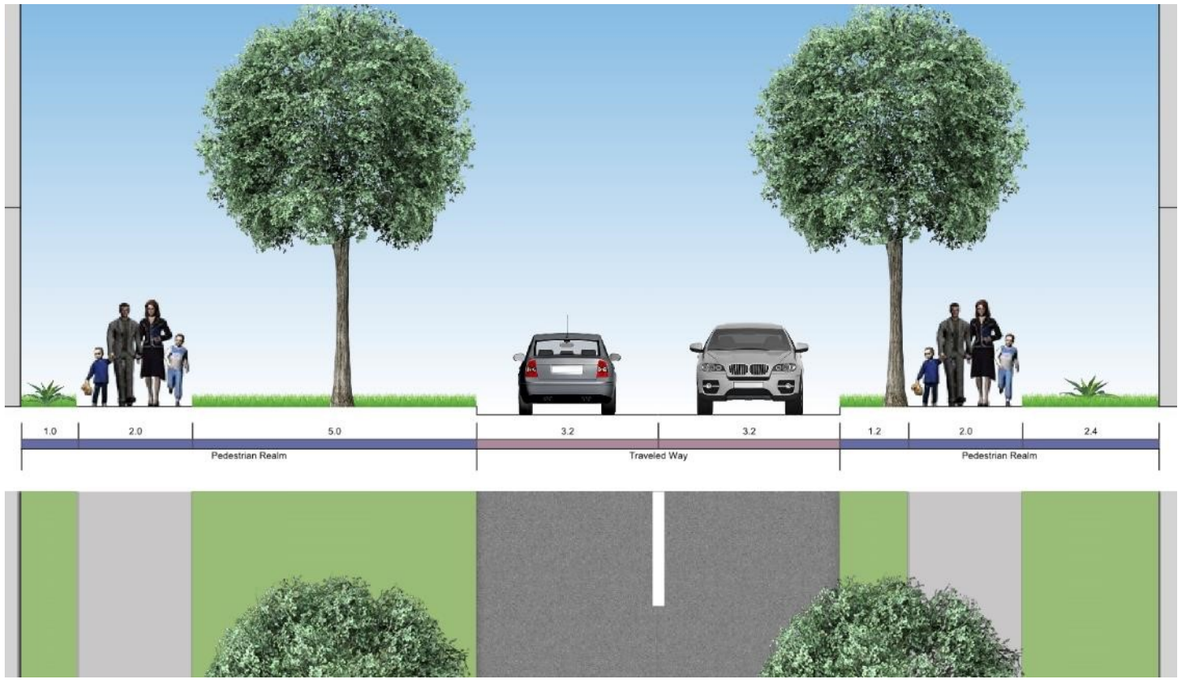


Figure 26 Indicative 20m reserve with embayed parking - Street Character Type A and Type C Roads

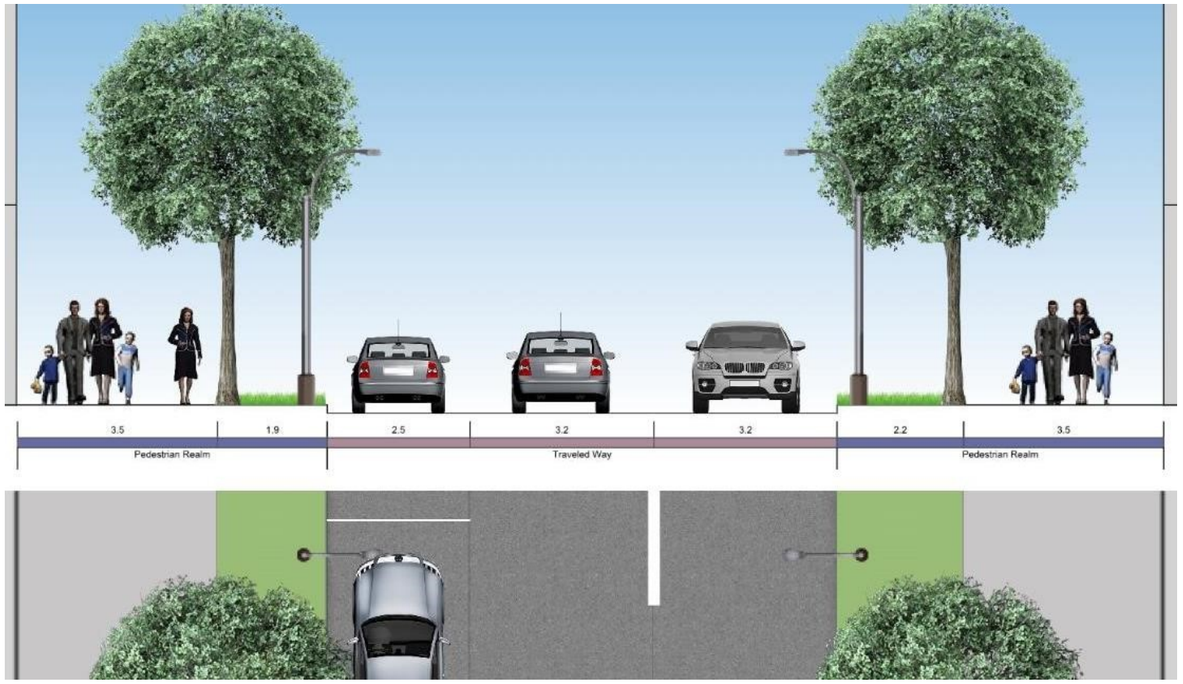


Figure 27 Indicative 20m reserve with parking and Shared Path - Street Character Type A and Type C Roads

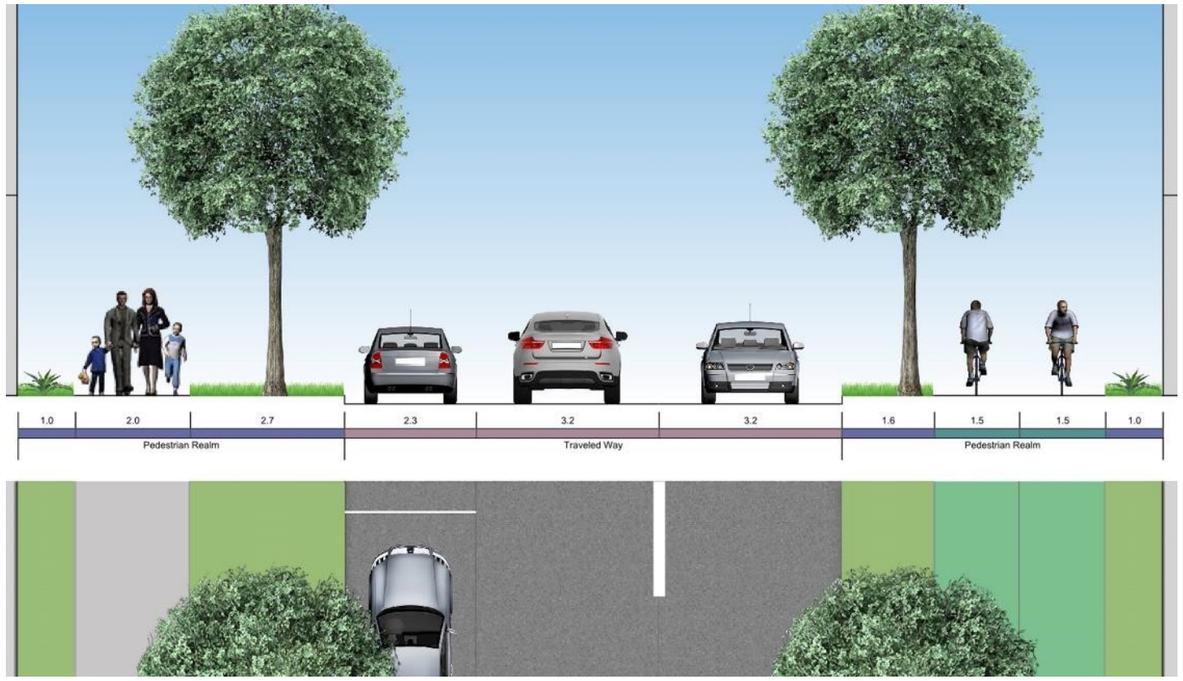


Figure 28 Indicative 20m reserve with Shared Path - Street Character Type A and Type C Roads

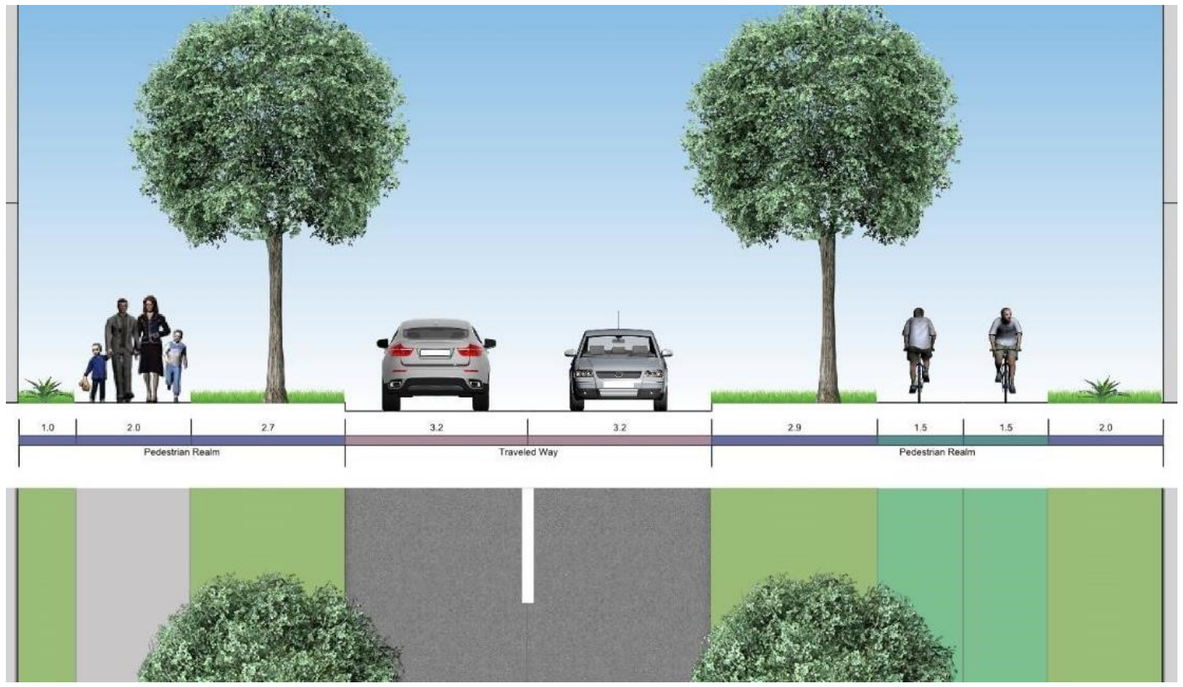


Figure 29 Indicative 20m reserve with Bus Route - Stanton Road / Second Street and New Road 2

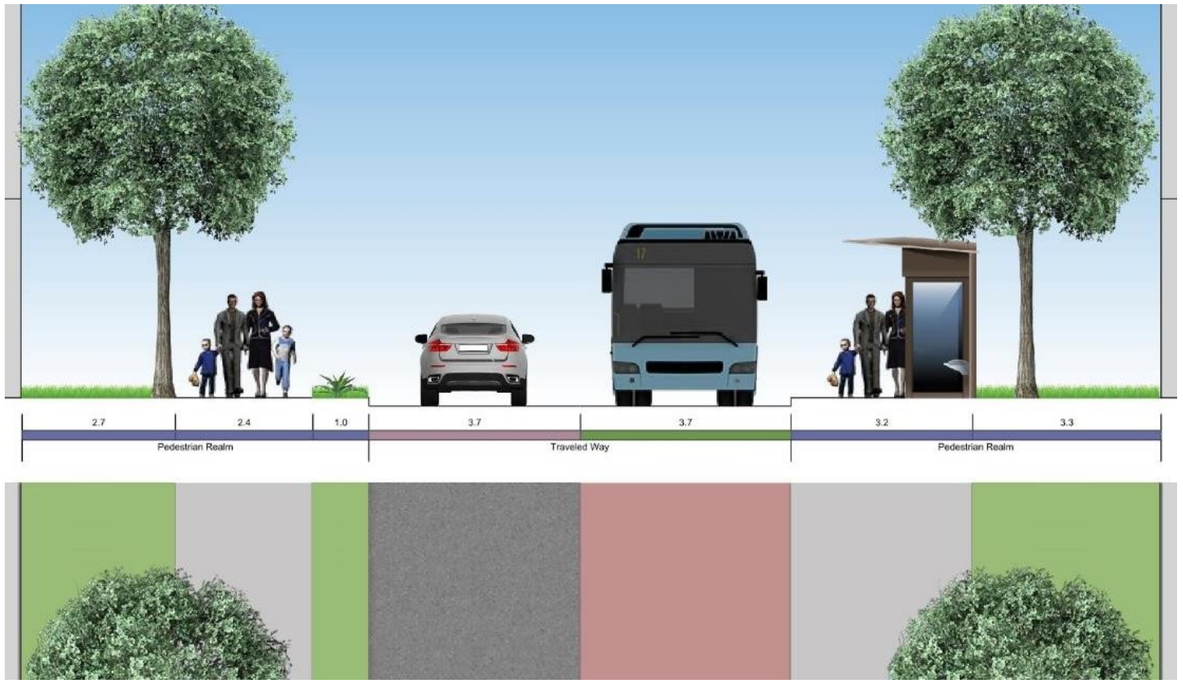


Figure 30 Indicative 20m reserve with Bus Route and parking - Stanton Road / Second Street and New Road 2

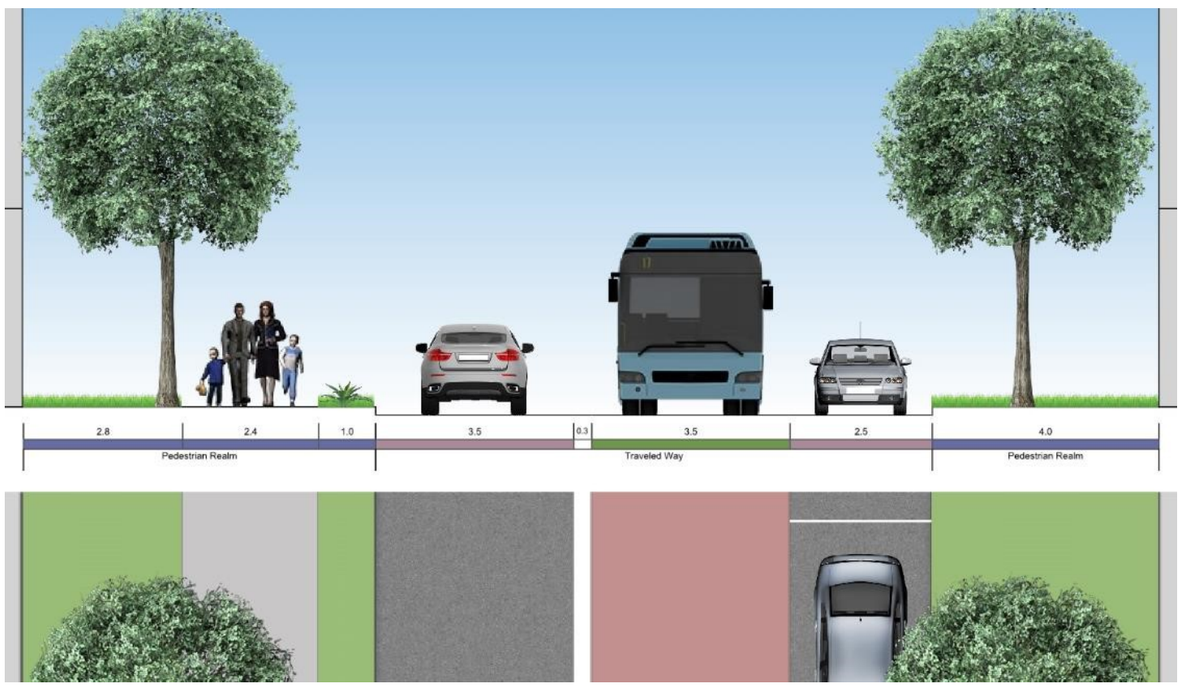
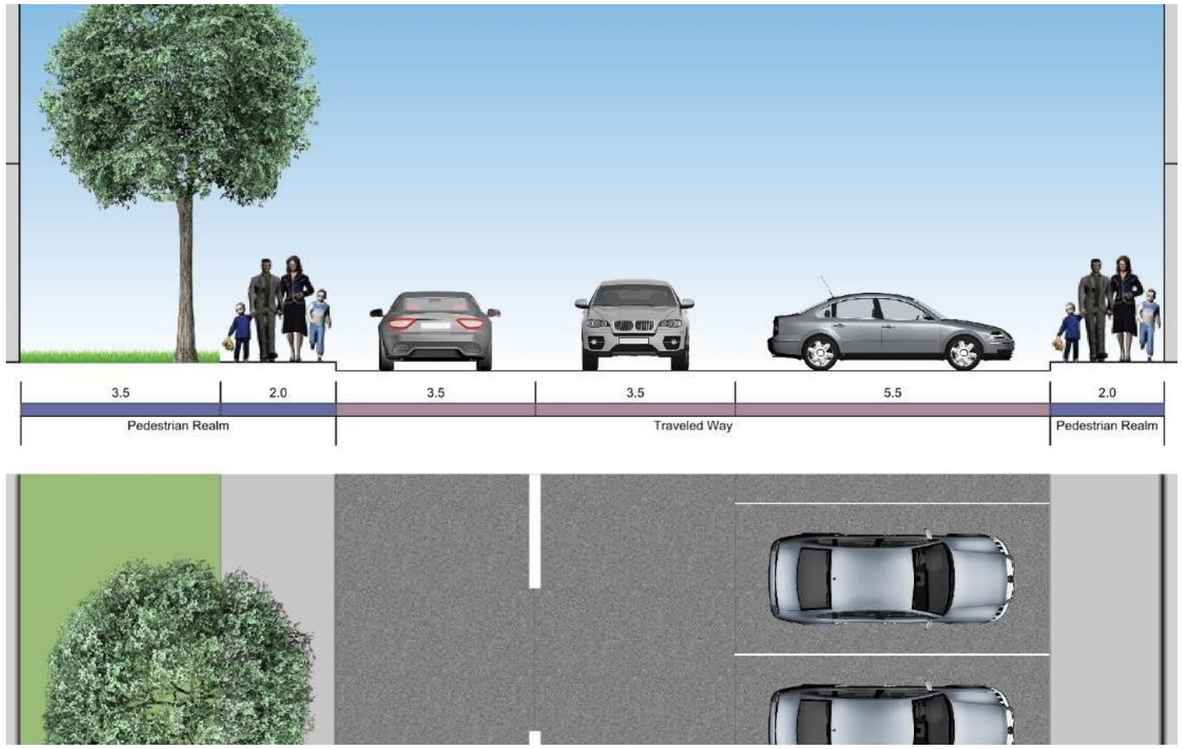


Figure 31 Indicative 20m reserve at Primary School – Kanowna Avenue



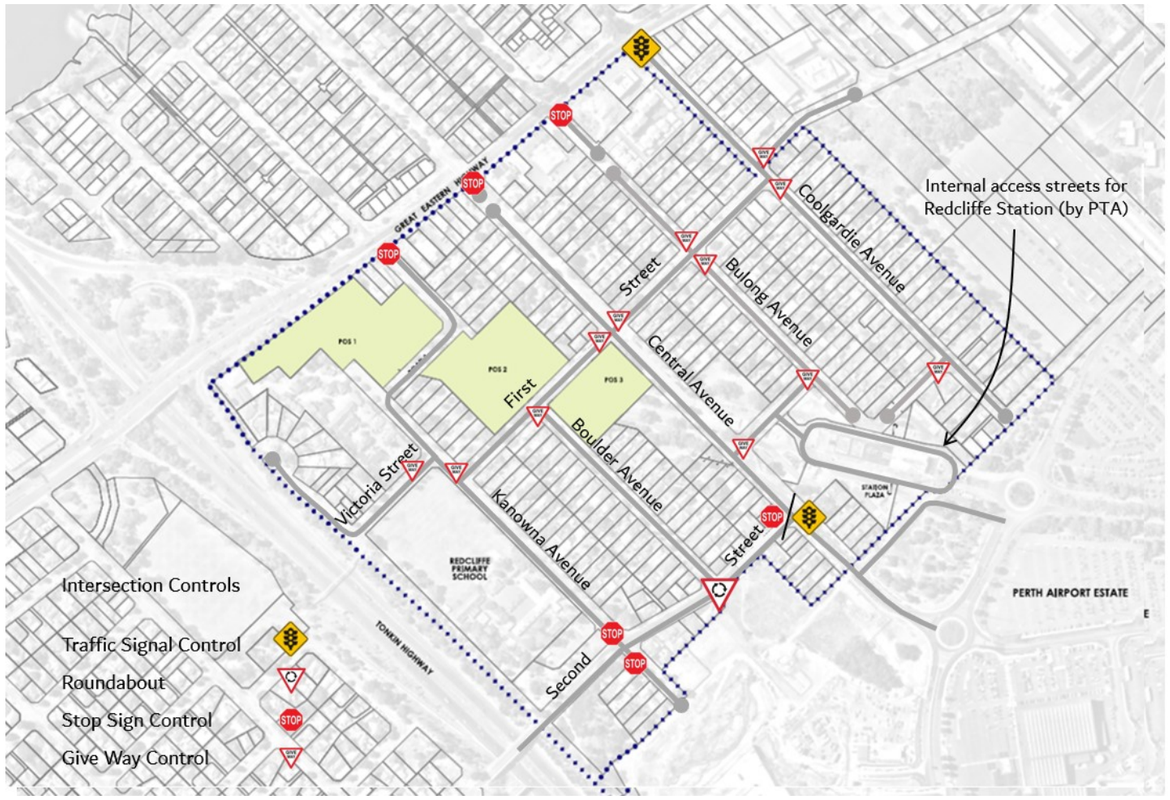
4.5 Intersection Controls

The proposed street network within the RSPACP will largely dictate the form of intersection controls with the major of local streets only requiring lower level give way or stop sign controlled intersections. The removal of through traffic flows (with the relocation of Qantas operations) and lack of distributor roads within the RSPACP boundary will ensure that there is no requirement for higher order intersection controls in the initial stages of development.

The proposed intersection controls are shown in Figure 32. These controls are for the total build out of the network but the majority will be in place from the opening of Redcliffe Station. The general form of controls are:

- Retention of the signalised intersection at Coolgardie Avenue and Great Eastern Highway – either in present form or altered as part of any at-grade capacity widening undertaken by Main Roads WA
- Provision for signalisation of intersection of Central Avenue and Second Street, with stop sign control used in interim
- Use of give-way priority controls on lower order streets to denote the priority of vehicle movements
- Changing in priority that exists at the intersection of Central Avenue and First Street
- Use of stop sign control at Kanowna Avenue and Second Street near the Redcliffe Primary School to reflect the current priority and place additional controls near the school site.

Figure 32 Proposed intersection controls



4.6 Pedestrian Networks

The RSPACP is seeking to develop a location that supports walking and cycling and discourages use of private vehicles for completing local trips. In order to achieve this, a pedestrian network has been devised that will prioritise movement of pedestrians along key routes and support future development. The overall network is shown in Figure 33. It comprises of:

- Shared use path network along a two-street square grid of Kanowna Avenue, Central Avenue, Second Street and First Street
- Pedestrian and cycle friendly environments on alternate streets supported by low speeds, pedestrian paths and street management treatments
- Path network through the Public Open Space corridor
- Pedestrian connection through Redcliffe Station for permeability
- Connections to the wider shared use and pedestrian path networks at Victoria Street Bridge, Second Street (Stanton Road Bridge), Kanowna Avenue (Brearley Street signals), Coolgardie Street , Redcliffe Road and Central Avenue (south towards Perth Airport)
- Key crossing points discussed on the following page.

The internal street network must prioritise pedestrian crossing points of the network at key intersections and access locations for Redcliffe Station. To achieve this, wombat treatments are proposed at pedestrian crossing points to raise the level of paths so that pedestrians have an at-grade crossing and vehicles must slow or stop. Examples of this crossing are shown below.

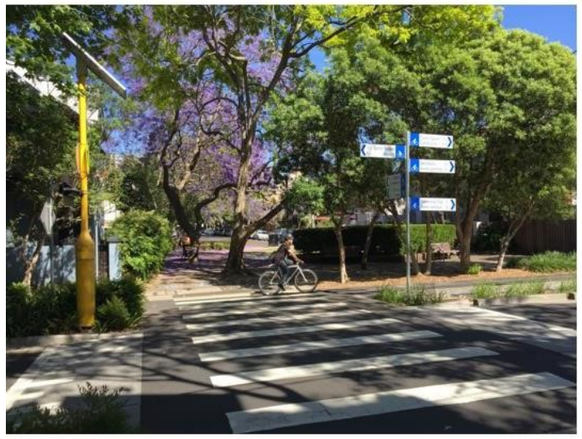
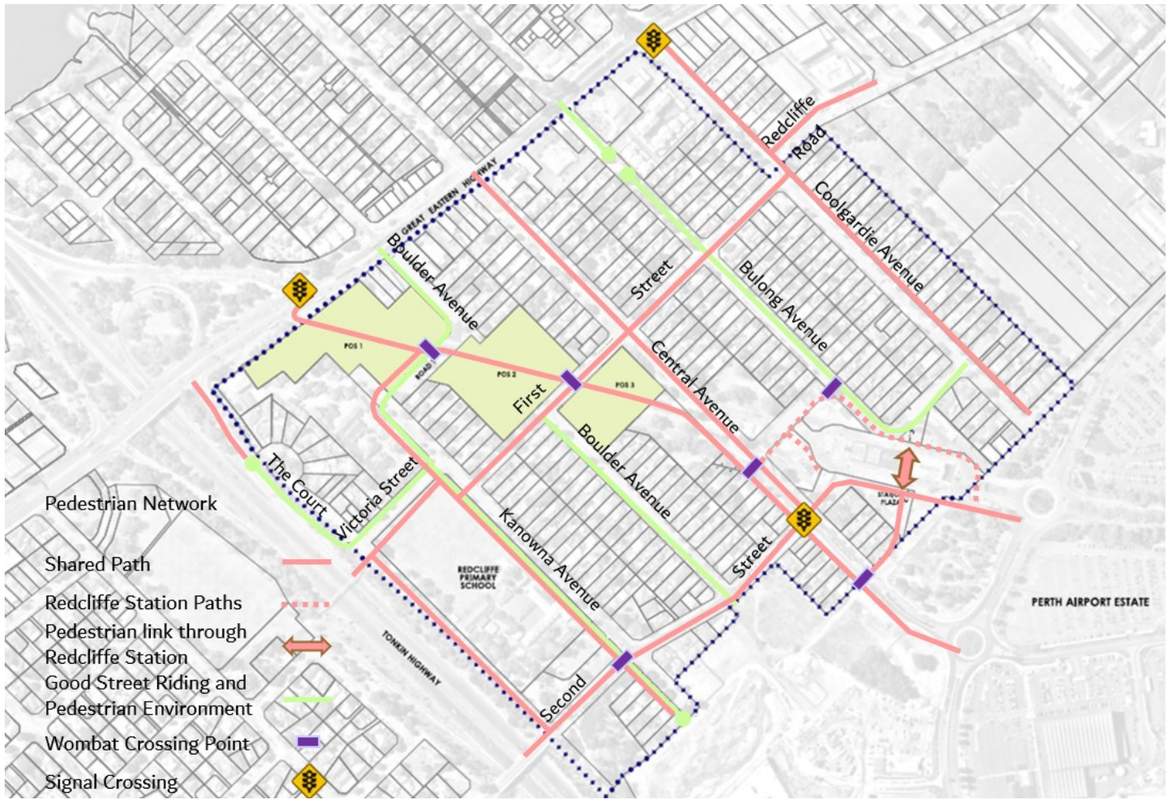


Figure 33 RSPACP pedestrian network

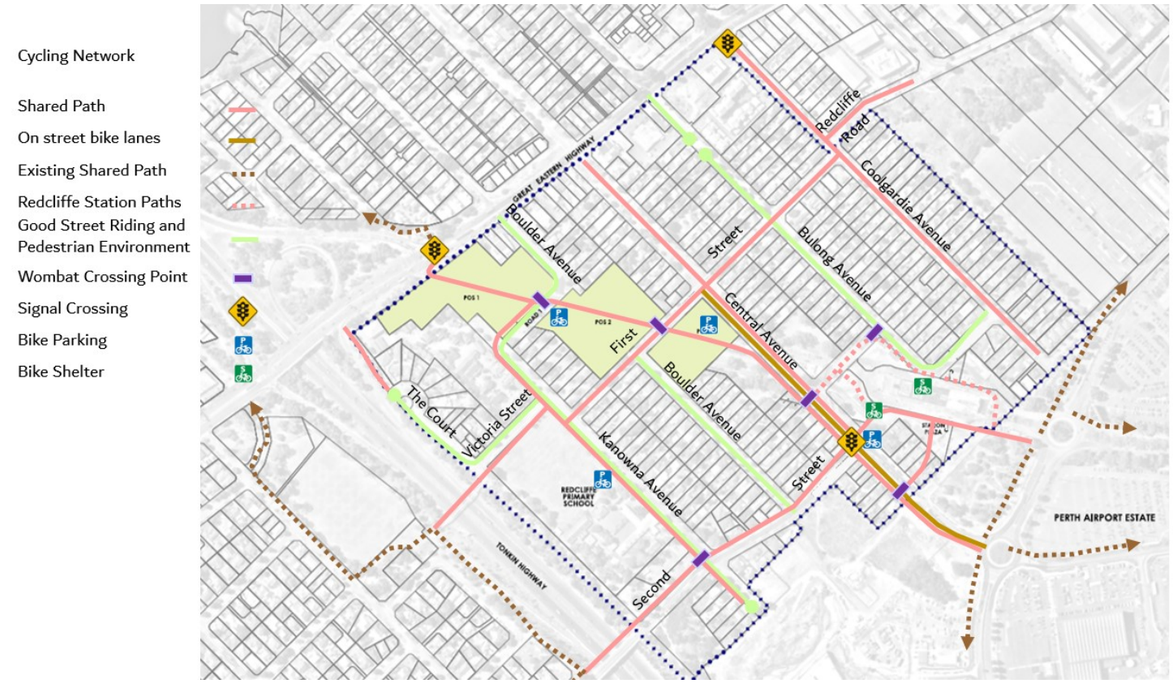


4.7 Cycling Networks

The RSPACP cycling network will largely replicate the pedestrian connections along Shared Paths with a number of key differences. The overall network is shown in Figure 34. It comprises of:

- Shared use path network along a two-street square grid of Kanowna Avenue, Central Avenue, Second Street and First Street
- On-street cycle lanes on Central Avenue
- Cycle friendly environments on alternate streets supported by low speeds, and street management treatments
- Connections to the wider shared use and PSP network at Victoria Street Bridge, Second Street (Stanton Road Bridge), Kanowna Avenue (Brearley Street signals), Coolgardie Street, Redcliffe Road and Central Avenue (south towards Perth Airport)
- Location of proposed bike parking facilities in open space throughout the main corridor from Great Eastern Highway to Redcliffe Station
- Including bike parking in front of development lots around Redcliffe Station
- Bike lockers on two entrance points to Redcliffe Station to provide for cycle and ride patrons.

Figure 34 RSPACP Cycling network



The new configuration of Central Avenue with on-street bike lanes is shown in Figure 35. Given the level of traffic and development form along Central Avenue, these lanes should be segregated in the future with as much protection for on-street cycling movements as possible. This would be possible through the creation of an off-street segregated cycle path as set out in section 4.4.

Figure 35 Central Avenue cross section (source: Google)

4.8 Public Transport Services

Planning for the RSPACP area has progressed in concert with progression of planning and construction of the FAL urban rail project. RSPACP represents the City of Belmont land use planning response to the immediate urban hinterland of Redcliffe Station and therefore the role of public transport services in the future transport network is the primary consideration of this assessment.

Redcliffe Station will open in 2021 along with the entire FAL spur line and provide a 15 minute trip to Perth Station via Bayswater. Trains will run through Redcliffe Station in both directions every 10 minutes during the peak periods. On opening, Redcliffe Station is forecast to handle over 2,000 one-way boardings comprised of bus transfers, park and ride, kiss and ride and walking and cycling trips. This forecast volume of boardings is anticipated to grow to around 3,000 by 2031 which will also depend on the progression of delivery of land use outcomes around Redcliffe Station.

Redcliffe Station will be supported by a change in bus network operations in this location. This will be in part driven by Redcliffe Station but also by the changing nature of network operations for Transperth with the introduction of high frequency routes that link key Activity Centres around the Perth Metropolitan Region.

Redcliffe Station will comprise of an active bus way loop around the Station providing for 6 active bus stands and 4 layover stands.

Seven bus routes are proposed to service Redcliffe Station as shown in Figure 36 and Figure 37, broadly comprised of:

- The existing 39 service linking Redcliffe Station to Elizabeth Quay via Belmont and Carlisle
- High Frequency 935 service which links Redcliffe Station with Kings Park and Belmont

- 293 running between Forrestfield and Redcliffe Stations via Belmont and Great Eastern Highway
- High Frequency 940 service which would link Subiaco with Redcliffe Station.
- 303, 304 and 305 services which would connect locations to the east of Redcliffe Station and act as feeder bus services for connecting patrons.

The local street network within the RSPACP area that would support bus routes would be limited to the immediate bus way around Redcliffe Station, Second Street and Central Avenue. The Busway would be connected to the road network within Perth Airport to provide direct connection to the Station. The only on-street bus stops in the RSPACP area would be on Second Street, with most patrons accessing services at Redcliffe Station or Great Eastern Highway. Outside of the busway area adjacent to Redcliffe Station, there are no priority measures for buses proposed as part of the internal street network.

Figure 36 RSPACP future bus network

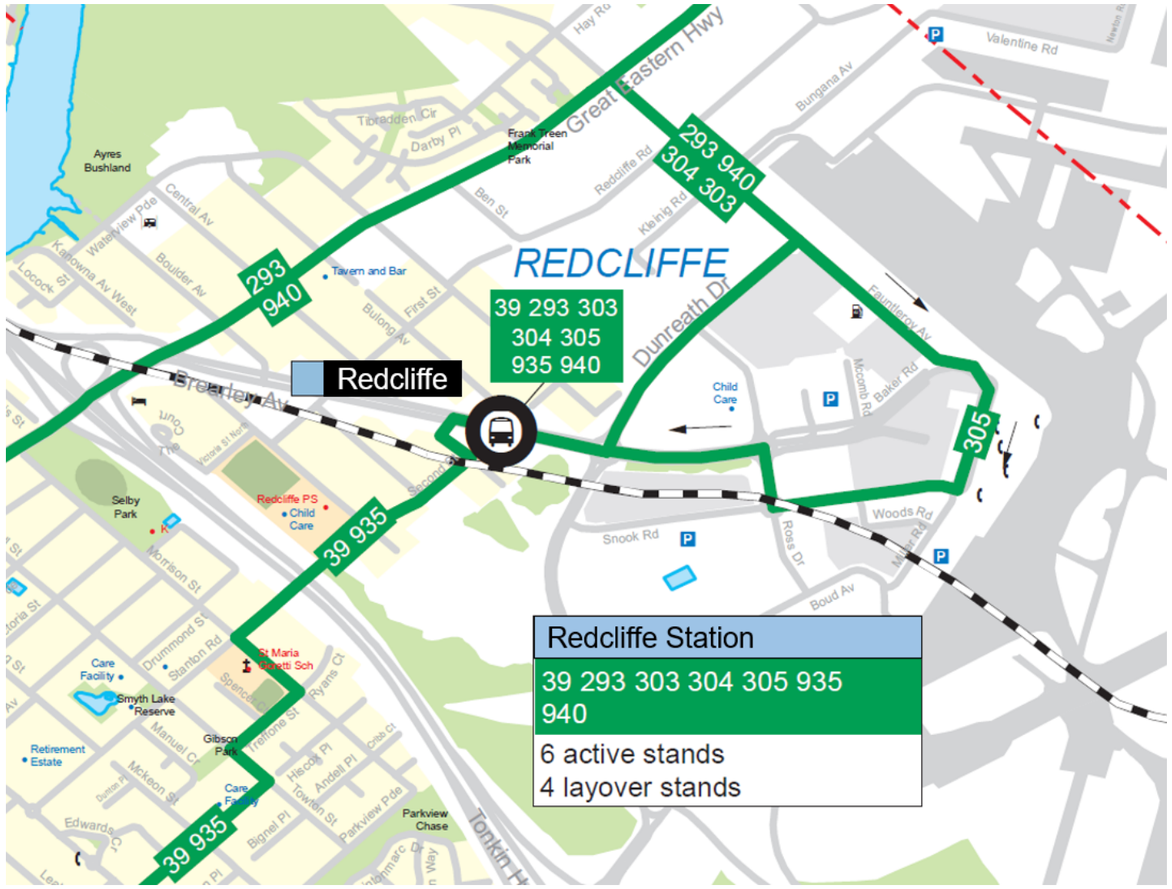
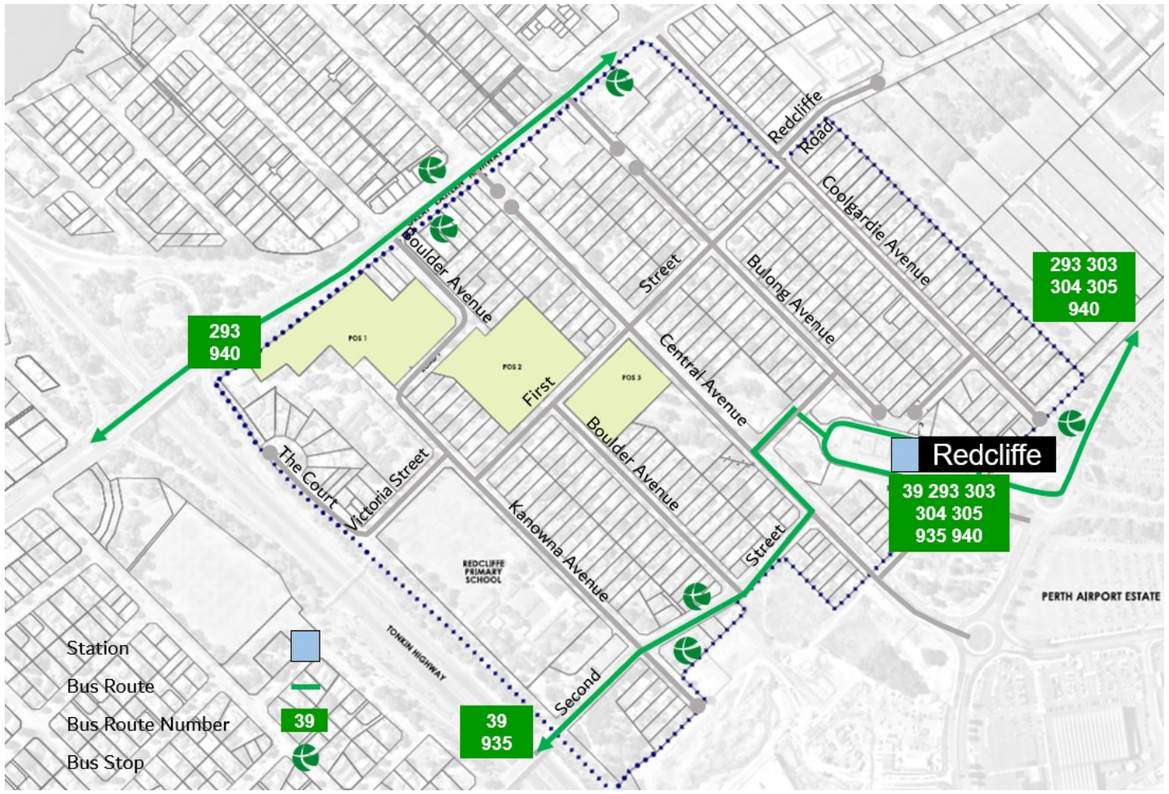


Figure 37 RSPACP bus routes



4.9 Street Access Strategies

All modes have been considered in the development of the RSPACP, with a specific focus on the movement of people to and from Redcliffe Station and the importance of pedestrian and cycling movements through the area. Strategies relating to overall street form and management have been set out in this assessment, with localised strategies set out in Figure 38:

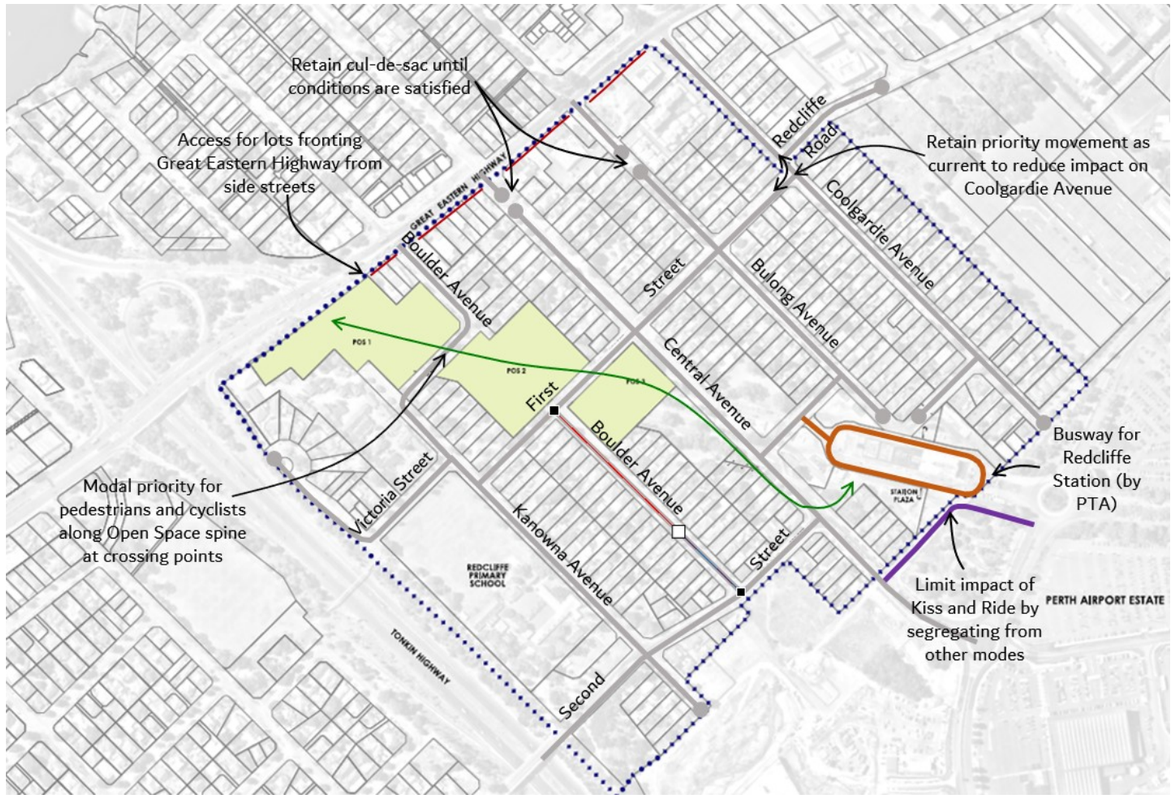
- Overall 40km/h posted speed limit for entire RSPACP area subject to approval processes
- Street management measures on local streets including horizontal and vertical treatments to reduce speed and traffic volumes
- Pedestrian and cycling priority through the central open space spine of RSPACP area
- Retaining the closure of Bulong and Central Avenue near Great Eastern Highway until three specific conditions have been met, namely:
  - Qantas have relocated from Terminal 3
  - Great Eastern Highway has a solid median
  - City of Belmont and Main Roads WA are satisfied with traffic impacts
- Bus only route around Redcliffe Station to remove private vehicle trips from the immediate Station precinct where pedestrians will be predominant
- Kiss and Ride location being segregated from the Station area to limit impact

- Existing priority turn at Coolgardie Avenue to First Street being retained to reduce impact on Coolgardie Avenue
- Future access to development lots on Great Eastern Highway being from side streets only to reduce impact on regional traffic route.

As the RSPACP area evolves, access to the development sites should be encouraged from primary frontage streets with access points to each site being limited to one per site or use amalgamated access points between lots. Access to lots should avoid streets with shared paths where practical (Central Avenue, First Street, Kanowna Avenue and parts of Coolgardie Avenue).

For development lots around the immediate proximity of the Station, on-street accessible bicycle storage facilities should be provided in a prominent, visible and easy to access location to provide at-grade parking facilities separate to those at Redcliffe Station.

Figure 38 RSPACP street access strategies



External Transport Networks

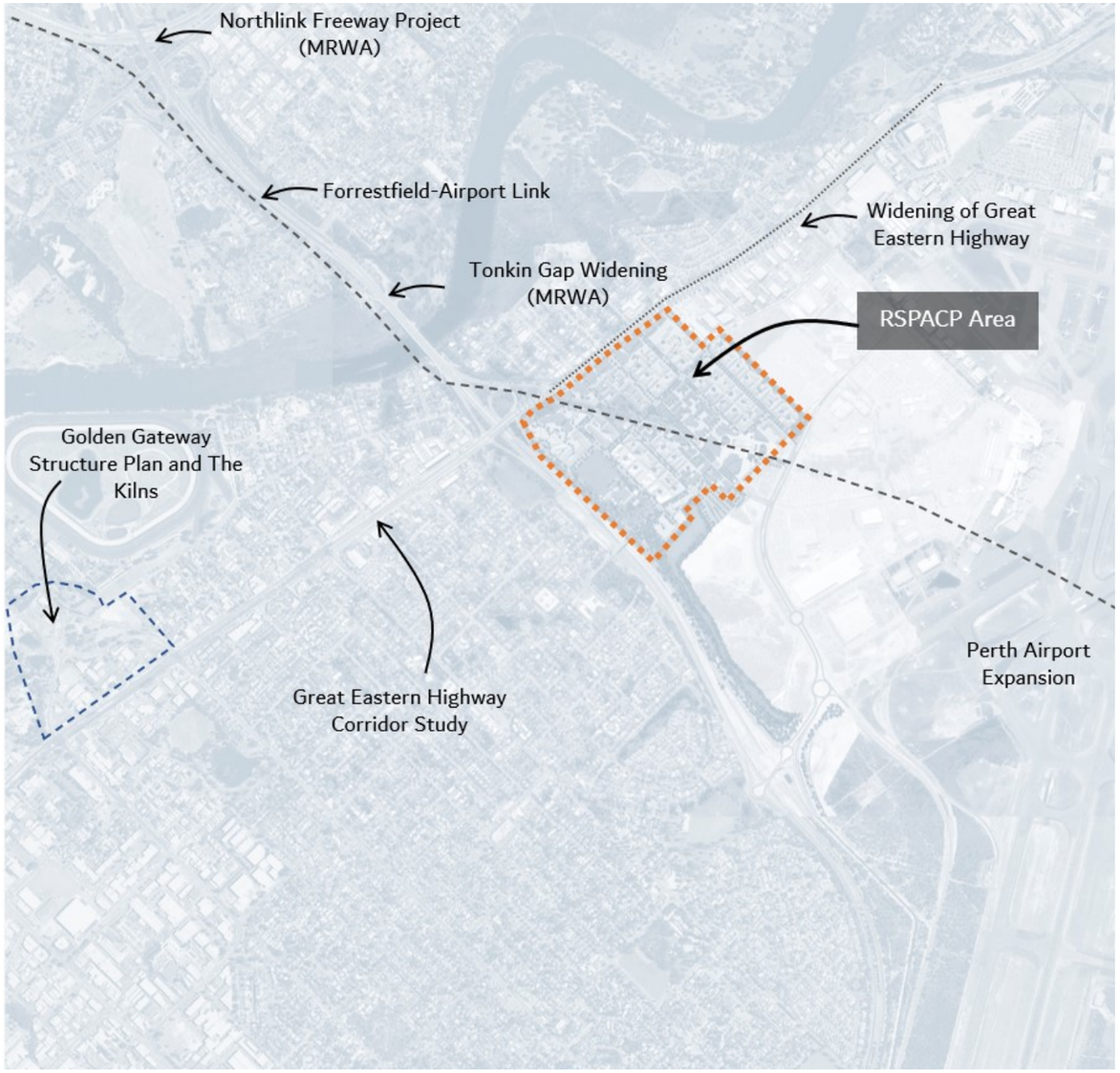
5. EXTERNAL NETWORK CHANGES

5.1 External Changes

There are a range of land use and transport proposals external to the RSPACP area that will have influence over both land use outcomes and the transport network over the forecast period. These are shown in Figure 39 and include:

- Golden Gateway Structure Plan and the Kilns – CoB and DoPLH are undertaking planning assessment over the future of the Golden Gateway area which extends north from Great Eastern Highway to Ascot. RSPACP proposes an uplift in land uses, primarily residential and commercial, and minor alterations to the road network. It is in progress.
- Great Eastern Highway Corridor Study – the CoB are completing a study into access and servicing arrangements for Great Eastern Highway, including lots within the RSPACP boundary. The aim is to consider future access to development sites and management of local street connections. It is in progress.
- Perth Airport Expansion – the 2014 Perth Airport Master Plan sets out the proposed expansion of the airport operations and land side land use development. The expansion includes an additional runway, terminal structures, the under construction Direct Factory Outlet and ancillary development. The expansion of the airport will have major ramifications for the transport network, as set out in the Master Plan and taken into account during the course of the RSPACP exercise.
- Great Eastern Highway widening – the CoB have flagged up the reconfiguration of Great Eastern Highway adjacent to RSPACP area as a major prerequisite prior to instigating local changes. This would be progressed by Main Roads WA.
- Forrestfield-Airport Link – the opening of the FAL in 2021 will underpin the revitalisation of the RSPACP area and change travel patterns from the south-east corridor of Perth. With the opening of each rail line extension, station or new urban rail line in Perth, travel patterns in the immediate area change measurably. The opening of Redcliffe Station will attract trips into and out of the RSPACP area on a daily basis.
- Northlink Freeway and Tonkin Gap Widening Projects – the construction of a six lane Freeway north from Great Eastern Highway is in progress with staged opening occurring from 2019 onwards (with the section between Gnangara Road and The Promenade opened in August 2019). This route will largely cater for freight movements between key economic areas as well as catering for substantial flows of unconstrained private vehicle trips.

Figure 39 External changes to network



Integration with Surrounding Area

6. INTEGRATION WITH SURROUNDING AREA

6.1 Integration

As established in this assessment, the area around the RSPACP boundaries are broadly split between the following characteristics:

- Perth Airport land to the south, including extensive at-grade parking areas, existing office and commercial premises and the DFO
- Low density residential land use to the north between Great Eastern Highway and the Swan River. Local recreation reserved land along the Swan River
- Low density residential (R20) land use to the west of the RSPACP area within the Redcliffe locality
- Commercial premises fronting on to Great Eastern Highway on both sides of the carriageway to the west of the site
- Low density residential and stables zoned land associated with Ascot Racecourse between Great Eastern Highway and the Swan River within the locality of Ascot
- Industrial zoned land uses to the east of the RSPACP area extending from Coolgardie Avenue to the boundary of the City of Belmont east of Ivy Street.

Planning for these areas, and the integration of the RSPACP with surrounding locations, have been subject to a substantial planning effort, ranging from high level strategic exercises through to detailed design elements and location specific planning. The area within, and around, the RSPACP area has been examined through the following exercises:

- Planning for the RSPACP commenced with the development of the DA6 Vision Plan and Implementation Strategy which commenced in 2013 and was adopted in February 2016. The Vision Plan was required to precede the RSPACP and provide an overall framework for integration of land uses and the transport network. It was completed in conjunction with Perth Airport and was developed during the period of time the Perth Airport Master Plan (2014) was developed. Objectives of the Vision Plan included:
  - Responds sensitively to interface issues, particularly between residential development on the land under the planning control of the City and future development on land owned by PAPL
  - Delivers an optimal Transit Oriented Development (TOD) outcome surrounding the potential future (Redcliffe)Train Station as part of the State Government's Forrestfield Airport Link Project
  - Examines and improves the existing movement network Forrestfield Airport Link
- Planning for the Forrestfield Airport Link, including the completion of the "Forrestfield Airport Link Project Traffic and Transport Analysis – DA6 FAL Document Number: FAL-PTAWA-TM-RPT-00008"
- Perth Airport Master Plan (2014)
- City of Belmont Town Planning Scheme No.15
- City of Belmont "Belmont on the Move" Integrated Transport Strategy
- Planning and delivery of Gateway WA Freeway project.

On the basis of the technical work completed for these projects and strategies, integration between the RSPACP area and the surrounding area has been examined in substantial detail.

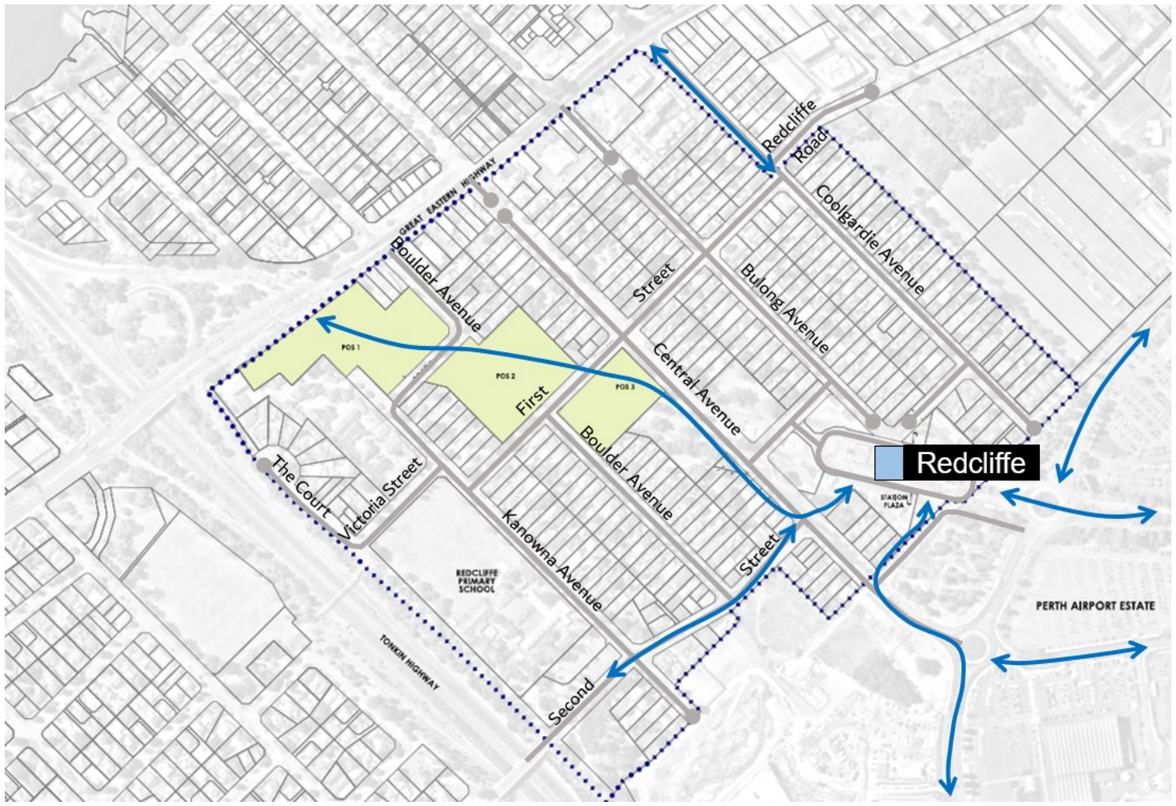
6.2 Desire Lines

The key desire lines to and from the RSPACP area will follow the existing and new connections to the local and wider area transport networks, as shown in Figure 40, these are largely comprised of:

- Public transport connections via Redcliffe Station to destinations around Perth
- Driving trips to and from RSPACP to major local activity areas, including Central Perth, Belmont City Centre, Morley Activity Centre, Midland and residential areas around the inner area of Perth
- Connections to the west over Tonkin Highway via Stanton Road, Great Eastern Highway or Dunreath Drive, Boud Avenue and Tonkin Highway
- Connections to the east via Coolgardie Avenue or Dunreath Drive/Fauntleroy Avenue to Great Eastern Highway
- Local connections to commercial premises in Perth Airport area (and to Terminal 3 and 4 with and without Qantas).

Pedestrian and cycling desire lines will also likely follow the established network, including the new path network through the open space spine and connections via Victoria Street and Second Street to the PSP and shared path networks. Pedestrian movements associated with employment land uses in Perth Airport are also likely to be present when Redcliffe Station is opened.

Figure 40 Desire lines



6.3 Suitability of Network to Satisfy Desire Lines

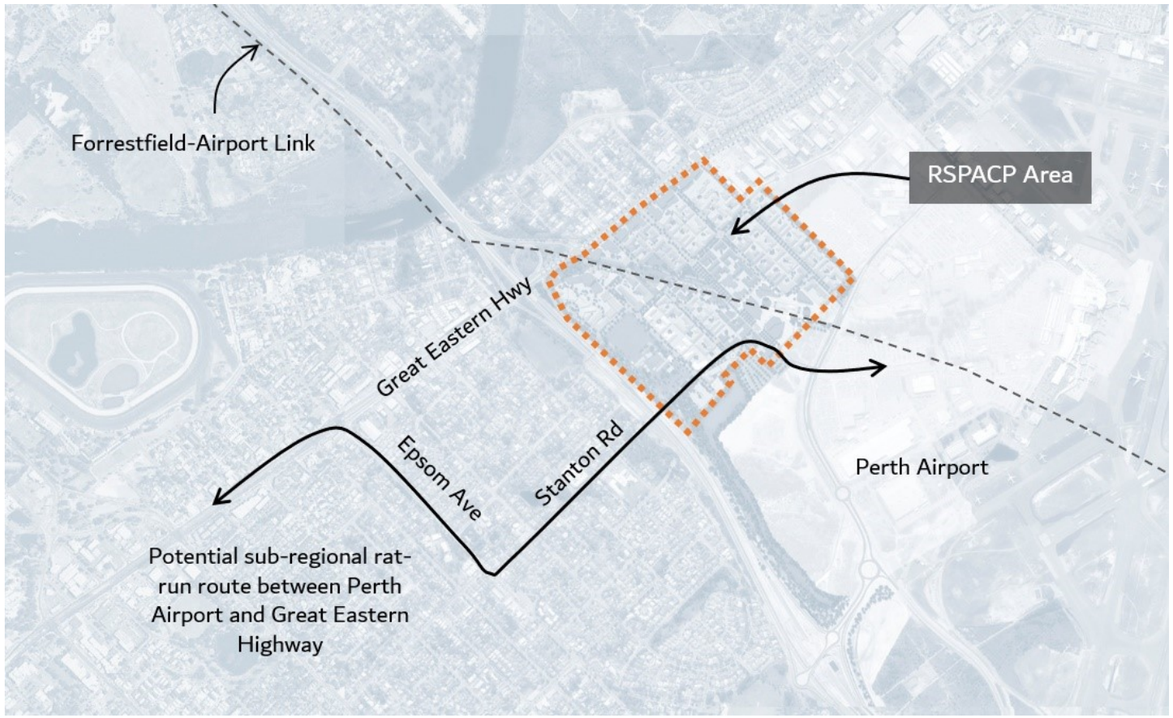
The development of the transport network elements described in this assessment, alongside the FAL public transport network and substantial distributor standard road network associated with Perth Airport infrastructure programme, are substantial investments in a transport network that will accommodate future growth in this location.

This conclusion is based on the assessment of the transport impacts associated with the FAL project in the "Forrestfield Airport Link Project Traffic and Transport Analysis – DA6 FAL Document Number: FAL-PTAWA-TM-RPT-00008", the assessment of the transport network associated with the Perth Airport Master Plan and the substantial traffic modelling assessments undertaken for the PTA and Main Roads WA on the capacity and form of intersections for both Gateway WA and Great Eastern Highway.

Notwithstanding the longer term ability of the wider area network to cater for traffic generated from the wider network and RSPACP, there remains the potential for shorter term implications for the area, primarily due to activity around Perth Airport. This will be amplified by the Costco and the DFO sites adjacent to RSPACP and the retention of Qantas operations at T3 until 2025. The broader potential impacts could be:

- Use of a route combining Epsom Avenue, Stanton Road and Second Street to access T3 and the commercial land uses around Perth Airport. This has the potential to provide a rat run for vehicles rather than using alternative routes such as Great Eastern Highway to Tonkin Highway and then Boud Avenue interchange or Great Eastern Highway to Fauntleroy Avenue. This has potential implications for the City of Belmont as the local distributor network is not designed to cater for a high volume of through traffic trips. This could be ameliorated by examining potential alterations to the corridor including (but not limited to) signage elements, signal phase changes at Epsom Avenue and Great Eastern Highway intersection, vertical traffic calming along Epsom Avenue at existing horizontal calming points, redesigning the roundabout intersection of Epsom Avenue and Stanton Road to remove priority sweep and traffic management measures along Stanton Avenue which reduce speed – primarily vertical treatments. These measures would likely require wider area traffic management for side streets such as Victoria Street and Moreing Street to avoid moving through traffic into quiet residential streets.
- Use of the RSPACP local street network to access Costco and DFO. This would be largely ameliorated by the measures proposed in this assessment.
- Use of the RSPACP local street network to access Great Eastern Highway via new connections. This would be largely ameliorated by the measures proposed in this assessment.

Figure 41 Potential sub-regional rat run



Analysis of Transport Networks

7. ANALYSIS OF TRANSPORT NETWORKS

7.1 Introduction

As set out in this assessment, there has been a substantial amount of analysis undertaken for the RSPACP area and surrounding land uses. This includes:

- DA6 Vision Plan and Implementation Strategy and Movement Network Strategy covering all transport elements
- Forrestfield Airport Link Project Traffic and Transport Analysis – DA6 FAL Document Number: FAL-PTAWA-TM-RPT-00008
- Transport Assessment of the Perth Airport Master Plan and Major Development Plan for both the Forrestfield-Airport Link and Direct Factory Outlet
- Transport assessment of the Gateway WA project
- Modelling associated with the RSPACP and FAL projects, including access to Great Eastern Highway and configurations of intersections associated with the potential closure of Brearley Avenue as an access point to the RSPACP area.

Given the high level of assessment, the replication of technical work that has underpinned much of the network as it presently stands would not be an appropriate level of reporting.

On the basis of the technical work completed, and the existence of much of the transport network required to deliver RSPACP, the following assessments were undertaken:

- A review of the 2021 outputs for the FAL project which including modelling that assumed the retention of Qantas operations at Terminal 3, the opening of Redcliffe Station (including full Park and Ride component of 500 bays and the bus network) and retention of closures of Central Avenue and Bulong Avenue south of Great Eastern Highway
- A 2031 forecast year assessment which is ten years beyond the opening of Redcliffe Station
- Commentary on the future year(s) development of the precinct and impact of trip generation on the network.

This assessment section covers both the internal and external transport networks.

7.2 Previous Assessment – 2021

The PTA commissioned an extensive modelling exercise in 2015 to examine a range of scenarios relating to the development of the FAL and Redcliffe Station. The reporting for the project summarised the outputs as follows:

"(*Redcliffe) Station will comprise of a bus rail interchange with both 'Park-n-Ride' and 'Kiss-n-Ride' parking facilities available. Future year assessments for the 'Do-minimum' scenario (i.e. where no infrastructure upgrades have been undertaken) and the 'Option' scenario (i.e. where infrastructure upgrades have been undertaken) have been assessed for the following:*

- *2017 FAL Construction Year*
- *2021 FAL Opening Year*
- *2031 Main Roads WA (MRWA) Future Year.*

From the 'Do-minimum' scenario options across the three model years, the modelling highlighted several pinch points that would require upgrades to accommodate the future year volumes, especially for 2021. The majority of the upgrades were along Great Eastern Highway in order to allow this arterial link to operate efficiently, whilst also allowing access to and from the side roads.

This was tested within the 'Option' scenarios for each modelling year.

With the modifications in place, the road network performs at a satisfactory level, with the following key points:

- *In order to close Brearley Avenue, the Tonkin Highway/ Dunreath Drive Interchange must be open, as well the upgrade to the Great Eastern Highway/ Fauntleroy intersection.*
- *The closure of Brearley Avenue greatly improves the performance of Great Eastern Highway and therefore removes the desire for drivers to rat run through Perth Airport land or Redcliffe.*
- *The Tonkin Highway/ Dunreath Drive Interchange will be the most attractive entry for vehicles heading to or from the Perth Airport West precinct. Signage would emphasise this further.*
- *Minimal delay or congestion is present within the Redcliffe precinct.*
- *Construction traffic causes minimal additional delay".*

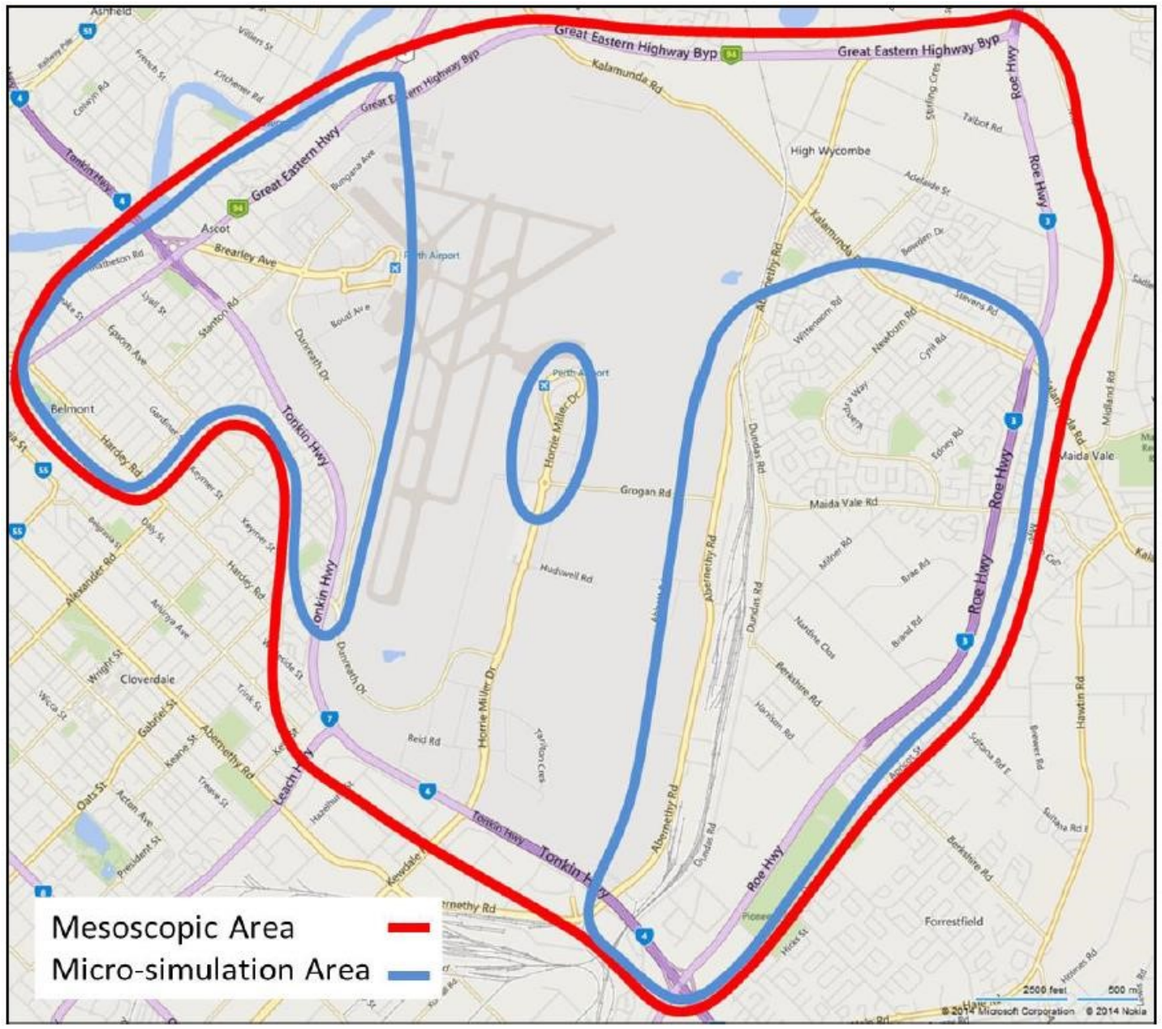
This assessment completed for 2021 is considered the base for the RSPACP exercise as the model included:

- Distribution using the Main Roads WA ROM24 model
- Qantas operations still in place from Terminal 3
- Redcliffe Station open with full demands for Park and Ride, Kiss and Ride and Bus operations
- Demands associated with the existing development in the RSPACP area in place.

The PTA commissioned model also crucially took into consideration the wider area impacts through the use of a hybrid mesoscopic and microscopic model. This allows the model to take into account wider area impacts of traffic movements as well as detailed movements in the RSPACP area. The modelled area for the entire exercise is shown in Figure 42. The 2021 Do Minimum model included:

- Gateway WA complete
- Upgrade of Fauntleroy Avenue and Great Eastern Highway works
- Closure of Brearley Avenue
- Change in priority at Brearley Avenue and First Street
- Boulder Avenue connecting to First Street
- Dunreath Drive changes at Snook Road and Boud Avenue
- Connection of Central Avenue to Dunreath Drive
- Completion of FAL
- Completion of (Redcliffe) Station
- Implementation of Park n Ride facilities for (Redcliffe) Station
- New connection link between Central Avenue and Bulong Avenue
- Roundabout at Second Street/ Boulder Avenue
- An additional lane in each direction of Tonkin Highway west of Great Eastern Highway (to replicate Gateway WA).

Figure 42 PTA 2021 model assessment boundaries



The 2021 Option model included:

- Reconfiguration of the Tonkin Highway eastbound off-ramp at Great Eastern Highway
- Reconfiguration of the Tonkin Highway westbound off-ramp at Great Eastern Highway
- Reconfiguration of the Great Eastern Highway right turn bay into the Tonkin Highway northbound on-ramp
- Right turn auxiliary lanes on Great Eastern Highway at Coolgardie Avenue.

The network changes made in ROM24 for the 2021 forecast year were:

- Gateway WA network changes consisting of grade separation at:
  - Tonkin Highway/ Roe Highway, additional ramps from the existing
  - Tonkin Highway/ Horrie Miller Drive
  - Tonkin Highway/ Leach Highway
  - Tonkin Highway/ Dunreath Interchange
  - Roe Highway/ Berkshire Road
  - New access road to Airport Central
- An additional lane in each direction of Tonkin Highway from west of Great Eastern Highway
- Closure of Brearley Avenue
- Closure of Grogan Road.

In addition to network changes, minor alterations were made to land use values, with an additional 79,000m^2 commercial floor area being included in the immediate area to reflect Qantas terminal operations being retained, the DFO being constructed and other office and commercial buildings in the Perth Airport area.

Background growth in traffic volumes for the period 2014 to 2021 were set at just over 20% for each peak hour period modelled.

The demands for the traffic associated with Redcliffe Station being open by 2021 were set as:

"*The future station demands and distribution for the 2021 and 2031 models were sourced from the "Forrestfield-Airport Link, (Redcliffe) Station Access Strategies". With the (Redcliffe) Station now only proposed to contain 500 car parks, the following trip values were used:*

- *30% of the 500 trips (150 trips) were assumed to be new network trips destined for the Park n Ride arriving in the peak hour of the road network*
- *Another 30% of trips (150 trips) were assumed to be trips that were reallocated from other network routes to the Park n Ride*
- *200 trips were assumed to arrive as Kiss n Ride trips*
- *200 trips were assumed to leave as Kiss n Ride trips*

The remaining 40% of the Park n Ride trips are assumed to arrive outside of the peak hour periods".

7.3 2021 Assessment – Results

The outcomes of the modelling exercise for the 2021 forecast year are set out below.

7.3.1 Morning Peak

"*The closure of Brearley Avenue removes the large amounts of queuing that currently occurs on both Great Eastern Highway and the Tonkin Highway off-ramp. In 2021 some queuing does begin to develop on Great Eastern Highway on the north approach to the Fauntleroy Avenue intersection but this is insignificant and does not cause rat running through the Redcliffe area.*

With the (Redcliffe) Station and Park n Ride open in 2021, there are no congestion issues present in the area due to the relatively low volume of cars dispersed over multiple access points.

Of all of the access points, Stanton Road carries the highest proportion of Park n Ride vehicles due to the surrounding residential catchment area, however it exhibits minimal congestion during peak periods.

The Dunreath Drive interchange does carry a large volume of traffic in 2021 with some queuing present on the Tonkin Highway northbound off ramp. This queuing does not extend back to Tonkin Highway".

7.3.2 Afternoon Peak

"*The evening period has the heavier traffic flows during the two peak periods in 2021 with traffic flows steady in various directions, not just towards the Perth CBD or Airport. It is during this period that traffic turning right on both the north and south approaches of the Great Eastern Highway/ Coolgardie Avenue intersection have less opportunities to make their manoeuvre. This traffic causes congestion on Great Eastern Highway by blocking one of the through lanes for extended periods of time.*

Therefore in the Option model, right turn auxiliary lanes with a length of 90 metres have been added to ease congestion on Great Eastern Highway (n.b. already installed).

Within the Redcliffe area, no high levels of delay are experienced with the only prevalent queuing occurring on the Coolgardie Avenue approach to Great Eastern Highway.

This queuing however is not to a level that causes this approach to fail. Within the Perth Airport land the southern approach to the Dunreath Drive/ Snook Road roundabout does display some levels of delay with a high volume using this approach but this does not cause excess congestion".

7.3.3 Intersection Results

Assessment of key intersection performance was included within the 2021 modelling exercise. The assessment was based on average delay level of service outputs from the microsimulation model for AM and PM peak hours. The measurement applied to the different categories is shown below:

Level of Service	Average Delay (seconds)
A	<10
B	10 to 20
C	20 to 35
D	35 to 55
E	55 to 80
F	>80

The wider area intersections assessed (shown in Figure 43) were:

- Tonkin Highway and Great Eastern Highway
- Great Eastern Highway and Brearley Avenue
- Great Eastern Highway and Coolgardie Avenue
- Great Eastern Highway and Fauntleroy Avenue
- Dunreath Drive and Brearley Avenue.

The results are set out in Table 3 to Table 7.

Figure 43 2021 intersections assessed

Table 3 Tonkin Highway and Great Eastern Highway

		AM Peak Hour		PM Peak Hour	
Approach	Street Name	2021 Do Min	2021 Option	2021 Do Min	2021 Option
North-East	Great Eastern Highway	B	B	C	C
South-East	Tonkin Highway	F	C	F	C
South-West	Great Eastern Highway	F	C	F	D
Overall		E	C	F	C

Table 4 Great Eastern Highway and Brearley Avenue

		AM Peak Hour		PM Peak Hour	
Approach	Street Name	2021 Do Min	2021 Option	2021 Do Min	2021 Option
North-East	Great Eastern Highway	E	E	C	C
South-East	Brearley Avenue	n/a	n/a	n/a	n/a
South-West	Great Eastern Highway	F	C	F	D
North-West	Tonkin Highway	F	D	F	C
Overall		F	D	F	C

Table 5 Great Eastern Highway and Coolgardie Avenue

		AM Peak Hour		PM Peak Hour	
Approach	Street Name	2021 Do Min	2021 Option	2021 Do Min	2021 Option
North-East	Great Eastern Highway	C	C	F	C
South-East	Coolgardie Avenue	D	D	F	E
South-West	Great Eastern Highway	F	C	F	D
North-West	Coolgardie Avenue	F	E	E	F
Overall		E	C	F	D

Table 6 Great Eastern Highway and Fauntleroy Avenue

		AM Peak Hour		PM Peak Hour	
Approach	Street Name	2021 Do Min	2021 Option	2021 Do Min	2021 Option
North-East	Great Eastern Highway	E	F	F	D
South-East	Fauntleroy Avenue	E	E	F	E
South-West	Great Eastern Highway	D	D	C	D
North-West	Fauntleroy Avenue	E	D	F	D
Overall		D	E	F	D

Table 7 Dunreath Drive and Brearley Avenue

		AM Peak Hour		PM Peak Hour	
Approach	Street Name	2021 Do Min	2021 Option	2021 Do Min	2021 Option
North-East	Dunreath Drive	A	A	E	A
South-East	Brearley Avenue	A	A	F	A
South-West	Dunreath Drive	A	A	A	A
North-West	Brearley Avenue	n/a	n/a	n/a	n/a
Overall		A	A	E	A

7.4 Local Intersection Assessment

In addition to the assessment of intersections where the internal network meets external road connections, the PTA assessment of the forecast years also examined intersections that were within close proximity to Redcliffe Station as they would be expected to experience the highest levels of impact during peak periods.

The intersections assessed are shown in Figure 44 with results set out in Table 9 to Table 12. The overall volumes of traffic associate with the RSPACP area in 2021 are all within the practical design capacity of the street network and can easily be accommodated. The 2021 two-way peak hour volumes for local streets as set out in the Forrestfield Airport Link Project Traffic and Transport Analysis are shown below.

Table 8 Local street network volumes

Street	Approach	2021 AM	2021 PM
Coolgardie Avenue	South of Great Eastern Highway	480	500
First Street	East of Central Avenue	180	200
Kanowna Avenue	South of First Street	40	90
Second Street	East of Kanowna Avenue	890	1230
Central Avenue	North of Dunreath Drive	840	1260

Figure 44 Local intersections assessed

Table 9 Central Avenue and Second Street

Approach	Street Name	AM Peak Hour 2021 Option	PM Peak Hour 2021 Option
North-East	Dunreath Drive	A	A
South-East	Brearley Avenue	A	A
South-West	Dunreath Drive	A	B
Overall		A	A

Table 10 Central Avenue, Dunreath Drive and Snook Road

Approach	Street Name	AM Peak Hour 2021 Option	PM Peak Hour 2021 Option
West	Central Avenue	B	B
North	Dunreath Drive	A	B
East	Snook Road	A	B
South	Dunreath Drive	A	A
Overall		A	B

Table 11 Boulder Avenue and Second Street

Approach	Street Name	AM Peak Hour 2021 Option	PM Peak Hour 2021 Option
West	Second Street	A	A
North	Boulder Avenue	A	A
East	Second Street	A	A
South	Boulder Avenue	A	A
Overall		A	A

Table 12 Central Avenue and Park and Ride Access

Approach	Street Name	AM Peak Hour 2021 Option	PM Peak Hour 2021 Option
North	Central Avenue	A	A
South	Central Avenue	A	A
West	Perth Airport Access Road	A	B
Overall		A	A

7.5 Conclusions – 2021 Assessment

As set out in the Forrestfield Airport Link Project Traffic and Transport Analysis – DA6 FAL Document Number: FAL-PTAWA-TM-RPT-00008:

"*The development of DA6 provides a reconnected grid pattern for the road network, which is an improvement on the existing fragmented local road network. The Movement Network provides for appropriate street characteristics, based on traffic volumes and adjacent land use.*

Great Eastern Highway is congested due to background increases in traffic, giving rise to the need to upgrade Fauntleroy and Coolgardie Avenues.

The traffic volumes generated by the intensification of land use as part of DA6 can be readily accommodated within the existing local road network. The consolidation of the domestic and international terminals at Perth Airport, the opening of Gateway WA and the subsequent closure of Brearley Avenue provide an opportunity to remove the majority of the 36,000 VPD that pass through DA6 and replace it with traffic wishing to access and interact rather than passing through".

The impact on the local street network from traffic volumes will be minimal, as seen in the two-way peak hour volumes forecast within the Forrestfield Airport Link Project Traffic and Transport Analysis.

No intersection within the RSPACP area is forecast to have any form of localised congestion and the street network associated with Redcliffe Station has been specifically designed to cater for the forecast traffic volumes established by the PTA in their assessment.

7.6 2031 Assessment Introduction

The assessment for the RSPACP for the 2031 forecast year has been based on:

- The RSPACP network as proposed
- Redcliffe Station being fully operational with the bus network plans proposed within this assessment in place
- Known land use details based on likely yield and development quantum
- Relocation of Qantas from Terminal 3
- Vehicle distribution from ROM24 that is consistent with the approach used for the 2021 assessment.

Outputs from previous modelling work undertaken for FAL were provided to ensure consistency with approved work. The outputs provided were cordoned travel demand matrices for the forecast year specific to the RSPACP study area; taken from a much wider area model of the airport and surrounding road network.

The cordoned model extents are shown in Figure 45. It should be noted that the RSPACP area is covered by only two model zones with the Redcliffe Station Park and Ride as a third.

The primary purpose of the current modelling (referred to as the RSPACP model) is to calculate latest trip generation figures for the RSPACP development yields and to inform the trip distribution onto the network.

Through the modelling, we have also sought to understand any impacts to the internal or external road network and the potential level of trips that travel through the RSPACP road network. The following points summarise the major details about the previous and current work:

- The previous FAL modelling included RSPACP yields although at a much-reduced level of development
- The previous 2031 FAL modelling assumed the relocation of the Qantas Terminal; this assumption has been carried forwards to the RSPACP model
- The FAL modelling road network assumptions have been carried forward to the current work, with the exception of Central Avenue and Bulong Avenue that have been modelled in their current, cul-de-sac configuration south of Great Eastern Highway
- The RSPACP model also includes the DFO and Costco developments that are accessed off Dunreath Drive.

The RSPACP model road network is set out in Figure 46, highlighting the different development areas and their relationship to the strategic road network.

Figure 45 RSPACP model network

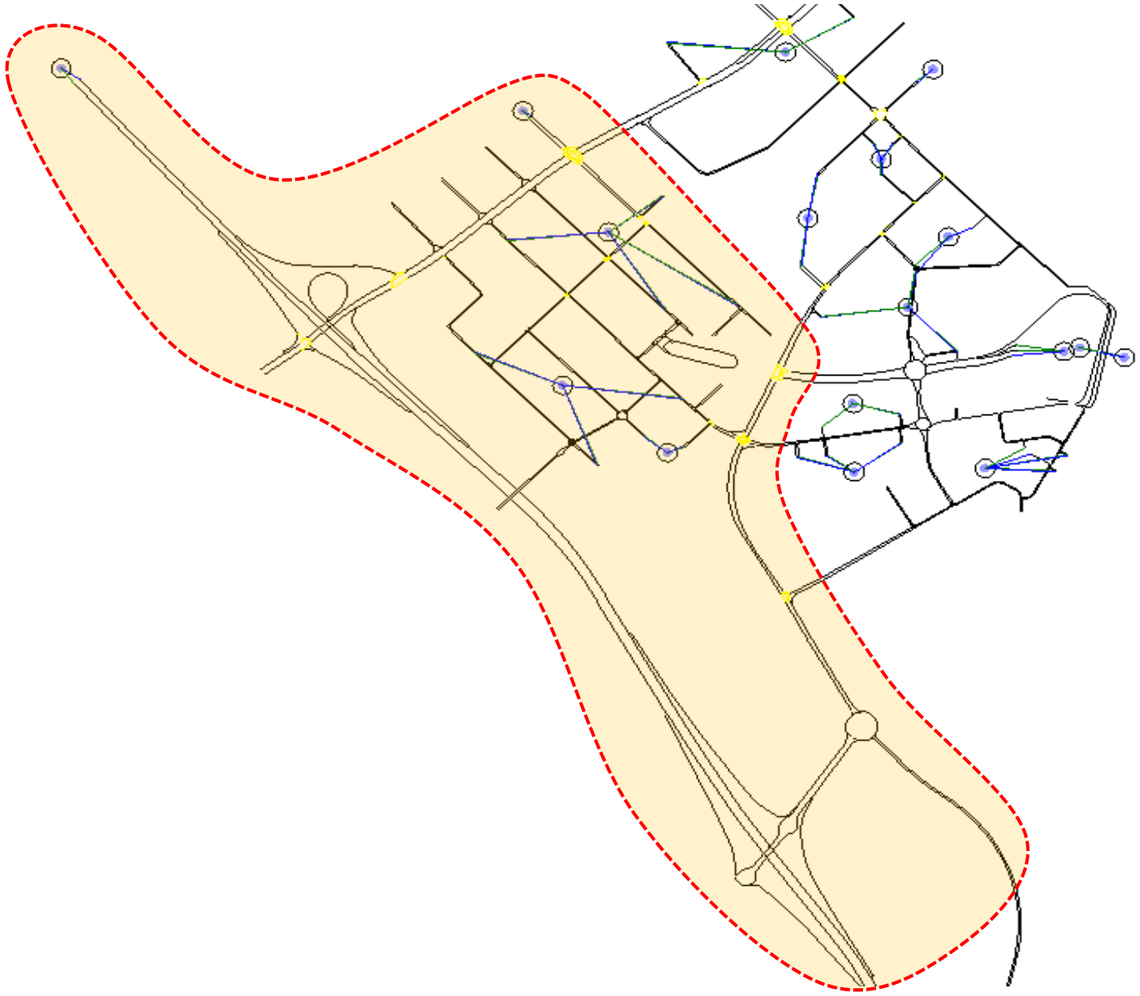


Figure 46 RSPACP model areas

7.7 2031 RSPACP Model

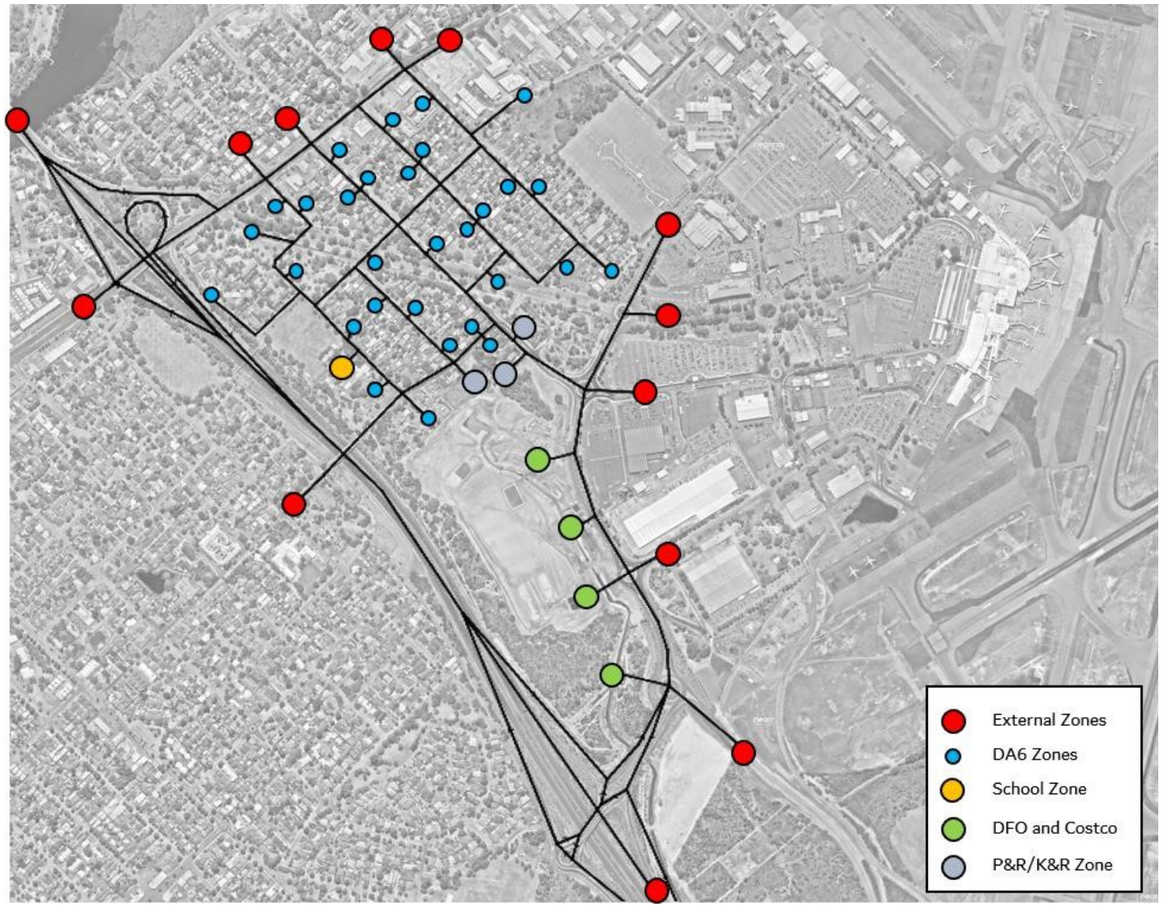
The AM and PM peak hour demand (vehicle trips) on the network have been taken explicitly from the previous FAL modelling. These trips form the majority of the movements across the modelled network as they represent demands between Great Eastern Highway, Tonkin Highway and Dunreath Drive.

The details for the Park and Ride site were also taken from the previous FAL modelling, although the distribution was proportioned across a more detailed zone plan.

To calculate the vehicle demands represented by the RSPACP area, ultimate land use proposals were provided on an individual lot basis. It is important to note that the 2031 modelling exercise used the full build out of the moderate land yield calculations which represents a conservative, over estimation approach so that the CoB and stakeholders would be aware of the implications for the forecast year should development in the area accelerate and achieve full build out. Comparison of previous modelling iterations and the one examined in this report indicate that the total increase in vehicle trips in the forecast year of 2031 attributed to the RSPACP zones is around 30% higher.

The RSPACP model was established to represent each of these lots separately. Trip generation for the lots was calculated using the moderate growth land use details, and the distribution of trips was based on the existing proportions within the previous FAL model. The locations of the zoning areas and types discussed are shown in Figure 47.

Figure 47 RSPACP model zones and types



7.8 Trip Generation

The school site, DFO and Costco trip generation were calculated separately, with the distribution taken from the previous FAL model. The trip generation details from DFO and Costco were taken directly from the documents, “Direct Factory Outlet Final Major Development Plan” and “Site 6: Large Format Retail Outlet Airport West Precinct Preliminary Draft Major Development Plan” and included in the RSPACP model.

Trip generation calculations were undertaken to apportion person trips to dwellings or alternate land uses. At the highest level a daily, all mode trip rate is applied to each land use, that is then split using further detail to output an hourly, directional vehicle trip rate per dwelling that can then be assigned onto the modelled network. The proportion of daily trips for these uses undertaken in each peak hour are provided in Table 13.

Table 13 Peak hour proportions RSPACP model

Land Use	AM Peak Hour	PM Peak Hour
Commercial	12%	12%
Residential	8%	10%

The peak hour rates were then separated into direction movements to show arrivals and departures, as set out in Table 14.

Table 14 Directional movement of trips for RSPACP Model

	AM Peak		PM Peak	
	Arrival	**Departure**	**Arrival**	**Departure**
Commercial	85%	15%	20%	80%
Residential	25%	75%	67%	33%

For the RSPACP area, rates were calculated separately for the Residential, Commercial, and Educational land uses, with details provided below. The following land use assumptions have been used for these calculations and are based on the staged development to the forecast year 2031:

- Commercial – 28,470m²
- Residential – 2,070 apartments split as:
  - 725 1 bedroom,
  - 934 2 bedrooms, and
  - 255 3 bedrooms.
- Residential – 853 single / grouped dwellings.

7.8.1 Commercial trip generation

Commercial trip generation was calculated using a rate of 6 vehicle trips per 100m² GFA which results in the peak hour trip values shown in Table 15. These are based on the example calculation for the AM peak hour arrivals (28,470 / 100) x 6 x 0.12 x 0.85) = 174 trips.

Table 15 Commercial land use trip generation

	AM Peak Hour		PM Peak Hour	
Land Use	**Arrival**	**Departure**	**Arrival**	**Departure**
Commercial	174	31	41	164

7.8.2 Residential trip generation

The residential trip generation is based on 3.7 all-mode trips per day and 60% car use. There would be potential for these figures to be considered for reduction given the proximity of Redcliffe Station to future residential developments.

The residential calculation also assumes an occupancy assumption per apartment type to add further detail to the car trips per apartment outputs (all-mode trips multiplied by proportion of car-based trips multiplied by residential occupancy).

- 1 bedroom – 1.3 persons/apartment (2.9 car trips / day)
- 2 bedrooms – 1.8 persons/apartment (4.0 car trips / day)
- 3 bedrooms – 2.5 persons/apartment (5.6 car trips / day) – these details are also used for the single / grouped dwellings

The full trip generation calculation is then based on (trips per day x proportion of car-based trips x residential occupancy) x (number of apartments multiplied by peak hour factor multiplied by directional factor). The overall inputs to the model from residential land uses is shown in Table 16.

Table 16 Trip generation rates residential

	AM Peak Hour		PM Peak Hour	
Dwelling Type	**Arrival**	**Departure**	**Arrival**	**Departure**
1 Bedroom	36	108	120	59
2 Bedroom	83	249	278	137
3 Bedroom	141	422	472	232
Total	260	779	870	429

7.8.3 Education trip generation

The Redcliffe Primary School trip generation has been calculated using the WAPC Transport Impact Assessment Guidelines rate of 0.5 trips per pupil for each of the AM and PM peak hour arrivals and departures. 250 pupils have been assumed for the calculation. The number of pupils has been based on the generalised pupil number trend extracted from the Department of Education website, as shown in Table 17 which includes 2019 where 253 students were actively enrolled. The generation of trips in the PM peak is limited to teaching staff leaving only as most parents trips would be outside of the traditional PM peak period.

Table 17 Redcliffe Primary School 5 year attendance trend

Semester 1	2014	2015	2016	2017	2018	2019
Primary School	250	186	206	224	239	253

7.8.4 COSTCO and DFO Sites

The trip generation for these sites has been taken directly from the assessment reports provided and are shown below.

Table 18 Trip generation rates Costco and DFO

	AM Peak Hour		PM Peak Hour	
Land Use	**Arrival**	**Departure**	**Arrival**	**Departure**
Costco	59	39	358	358
DFO	86	58	136	136
Total	145	97	494	494

7.8.5 Trip generation summary

The following table summarises the trip generation for the Activity Centre Plan land uses and also details the Costco, DFO sites, and Park and Ride which is taken from the previous FAL modelling.

Table 19 Trip generation summary

	AM Peak Hour		PM Peak Hour	
Land Use	**Arrival**	**Departure**	**Arrival**	**Departure**
Commercial	174	31	41	164
Residential	260	779	870	429
Education	125	125	0	13
Costco and DFO	145	97	494	494
Park and Ride and Kiss and Ride	500	200	200	500
Total	1,204	1,232	1,605	1,600

The trip generation has subsequently been translated into matrices that distribute vehicle trips across the modelled network, along with the trips translated from the previous PTA modelling that accounts for demands across the wider strategic network as well as those associated with Perth Airport.

Table 20 outlines the AM and PM peak hour vehicle trips, summarised by movements between Internal and External Zones. Internal Zones are comprised of Activity Centre Plan zones, Park and Ride, School, DFO and Costco sites. These figures are based on the moderate growth scenario trip generation calculations for the RSPACP area, all assumed to be delivered by 2031.

Table 20 AM and PM Peak Hour vehicle trip demands

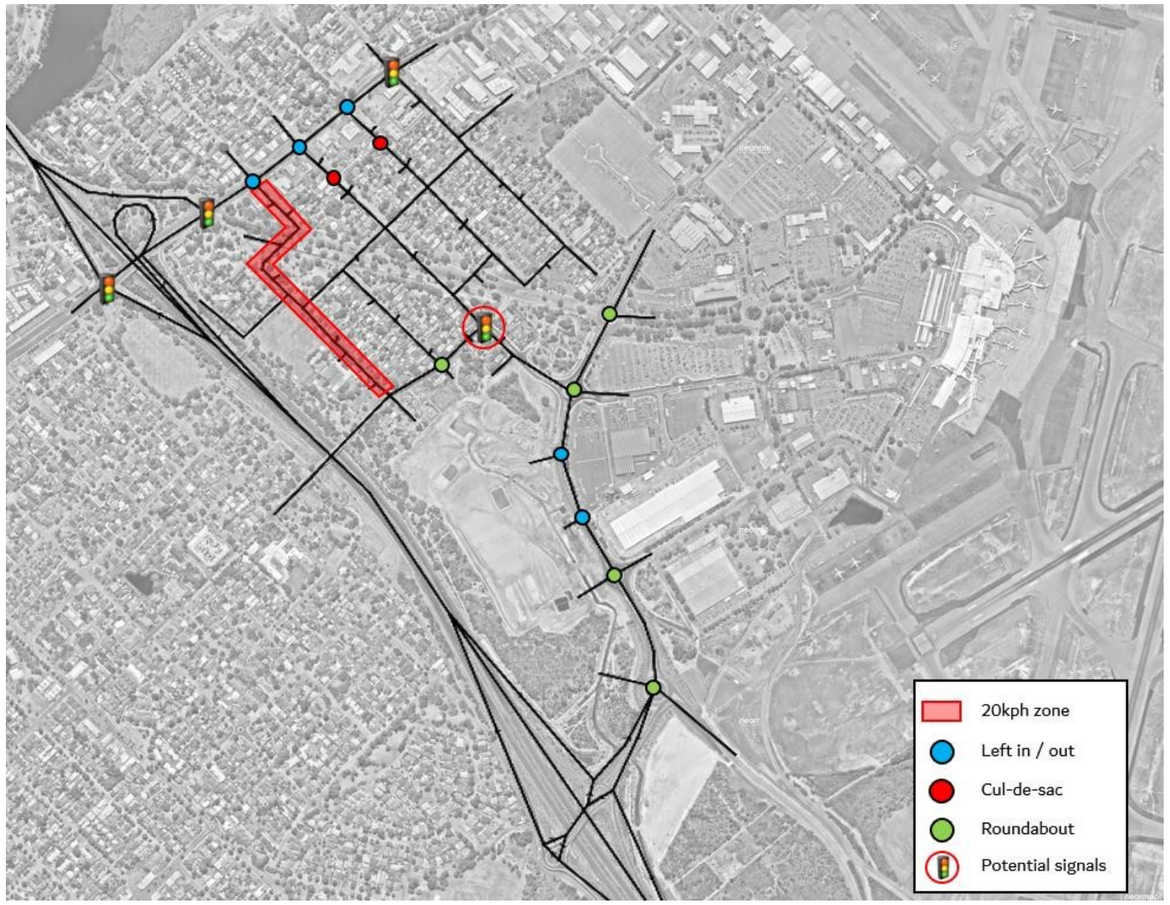
	AM Peak		PM Peak	
	Internal	**External**	**Internal**	**External**
Internal	75	1,188	73	1,539
External	1,169	14,771	1,534	17,430

Through the construction of the RSPACP Model, the internal road network has been assumed as 40kph with the exception of Kanowna Avenue past Redcliffe School and Boulder Avenue (northern section) that are modelled as 20kph.

The arrangement for side roads along Great Eastern Highway between Tonkin Highway and Coolgardie Avenue is assumed to operate as left in, left out. This format has also been set out in documentation for the DFO site intersections in addition to the extension of Boud Avenue.

The existing cul-de-sac locations along Central Avenue and Bulong Avenue are also shown in Figure 48 along with a potential signalised intersection treatment of Central Avenue and Second Street which would operate as a stop sign control in the interim.

Figure 48 RSPACP Model network assumptions



7.9 2031 Outputs

The 2031 AM and PM peak hour models were run and the following section summarises the network outputs. Again, It is important to note that the 2031 modelling exercise used the full build out of the moderate land yield calculations which represents a conservative, over estimation approach so that the CoB and stakeholders would be aware of the implications for the forecast year should development in the area accelerate and achieve full build out. Comparison of previous modelling iterations and the one examined in this report indicate that the total increase in vehicle trips in the forecast year of 2031 attributed to the RSPACP zones is around 30% higher.

The original 2021 FAL model reported on two-way peak hour volumes at Coolgardie Street, First Street, Second Street, Kanowna Avenue and Central Avenue. It should be noted that the volumes in Table 8 represented the year 2021 and are based on a lower proposed yield for the RSPACP area.

Demand volume plots (link volumes and bandwidths separately) for the peak hours are shown from Figure 49 to Figure 52 and highlight the flows at key locations and the scale of volumes across the network. Within the RSPACP network, the more prominent volumes are shown on First and Second Streets, Central Avenue and Coolgardie Street.

Table 21 outlines the two-way volumes split by direction at specific locations while Figure 53 summarises the combined volumes in their locations.

Figure 49 AM 2031 Peak Hour Demand Volumes

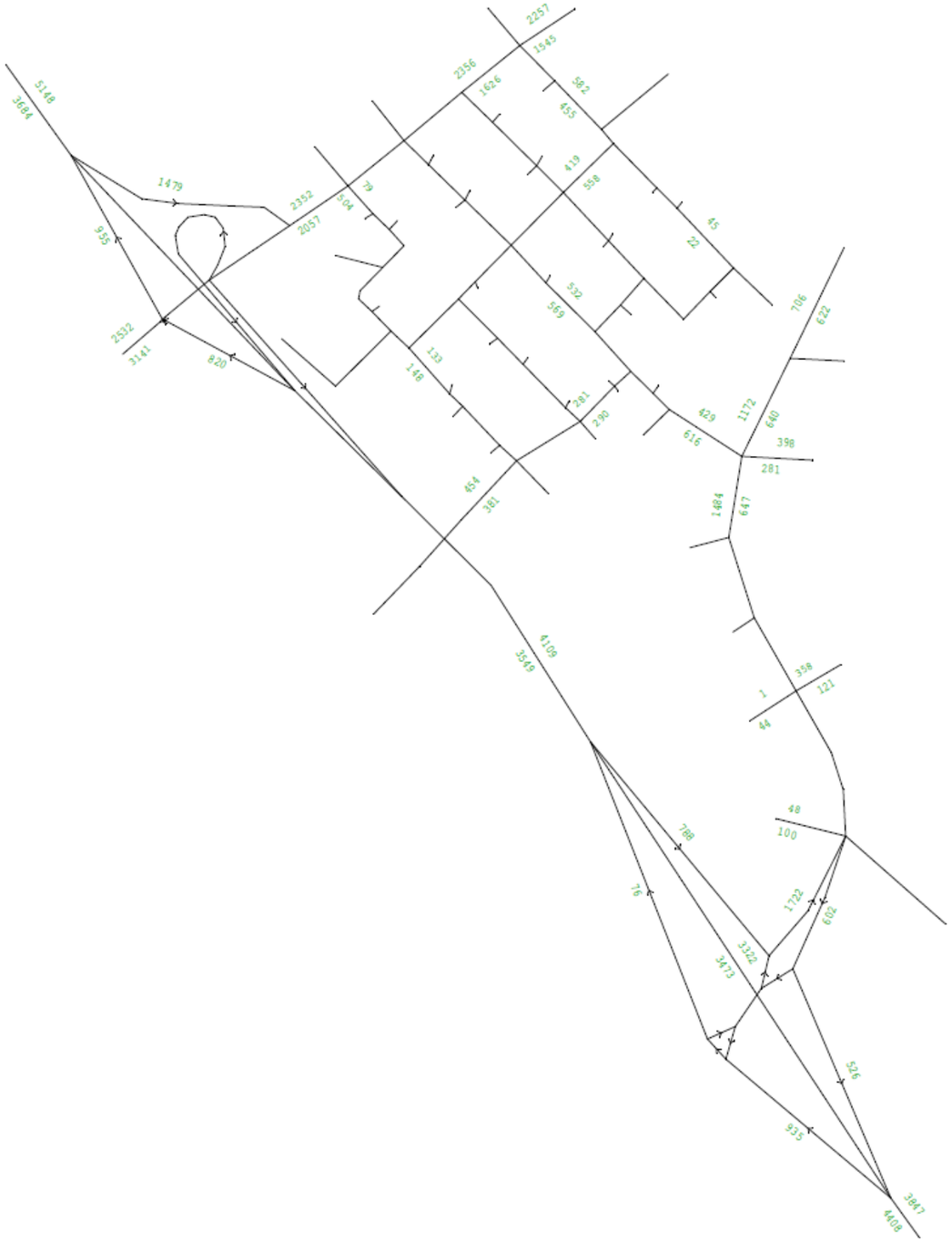


Figure 50 AM 2031 Peak Hour Demand Bandwidths

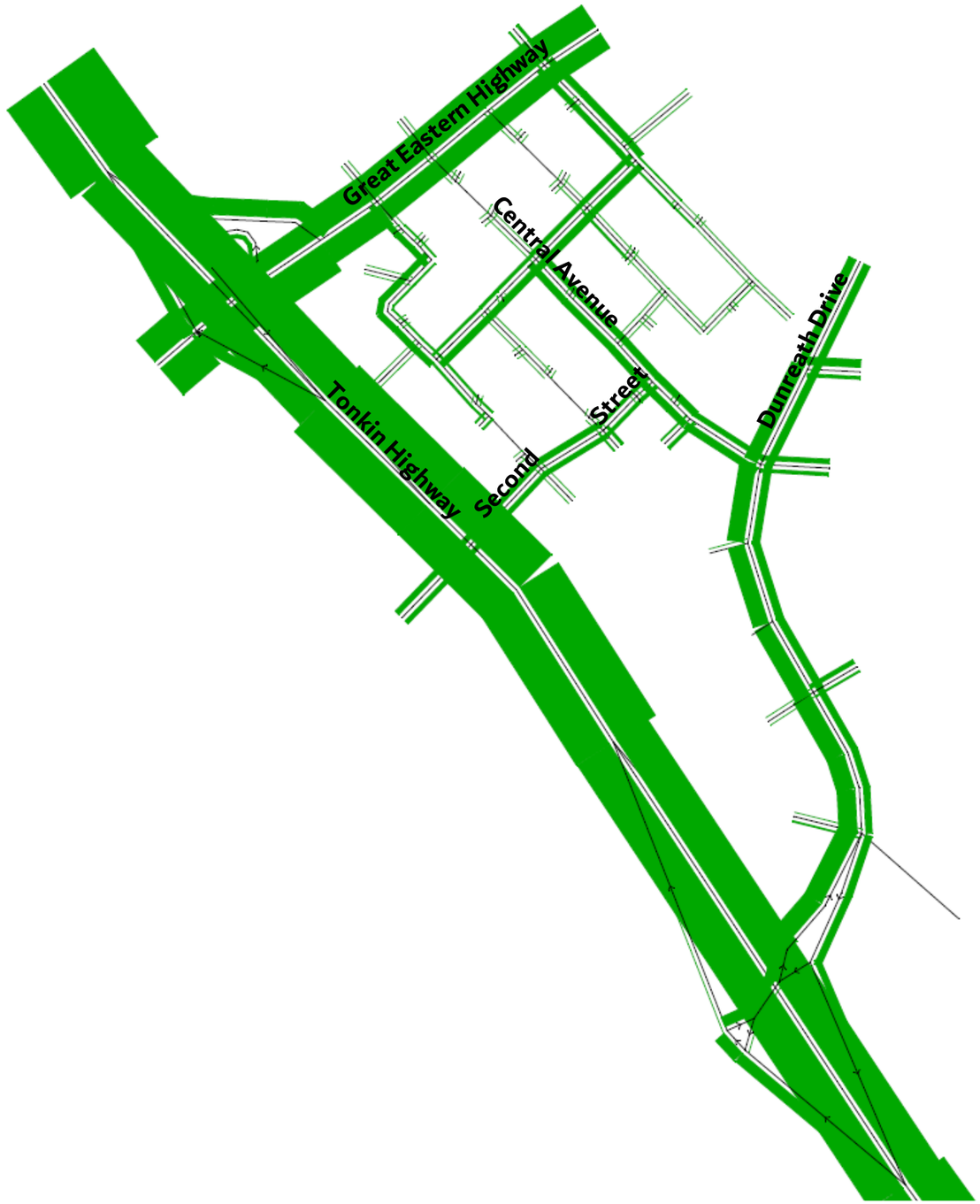


Figure 51 PM 2031 Peak Hour Demand Volumes

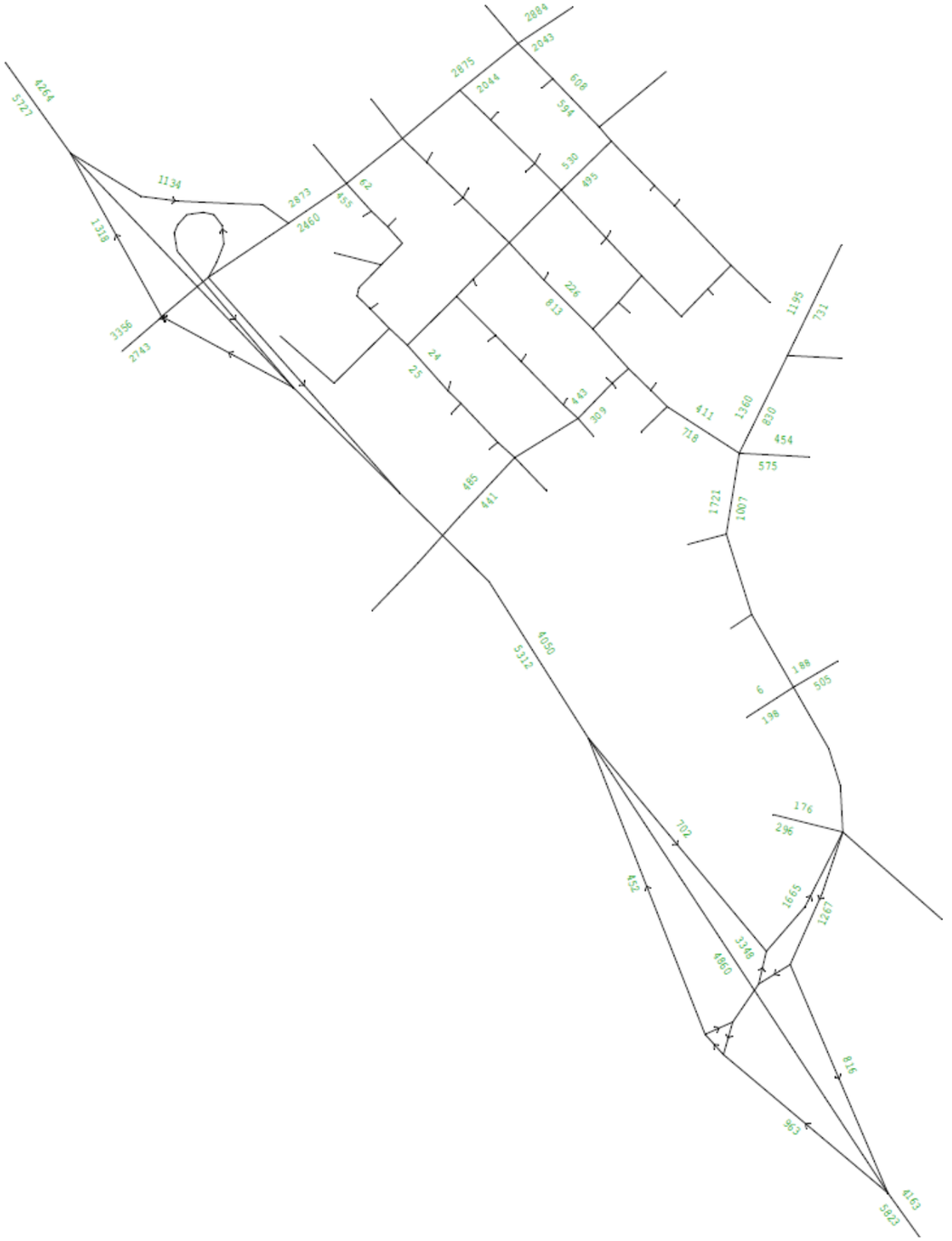


Figure 52 PM 2031 Peak Hour Demand Bandwidths

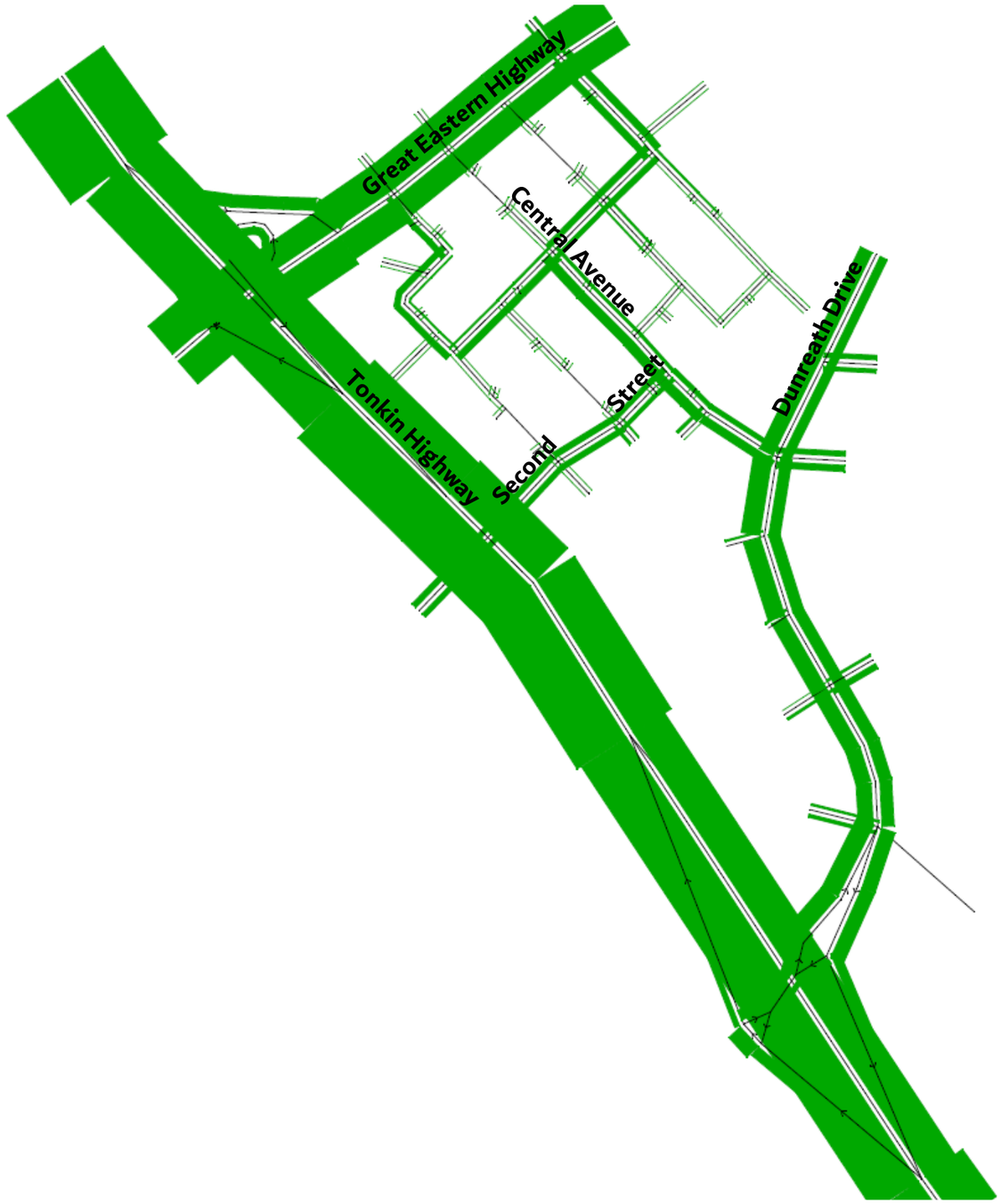
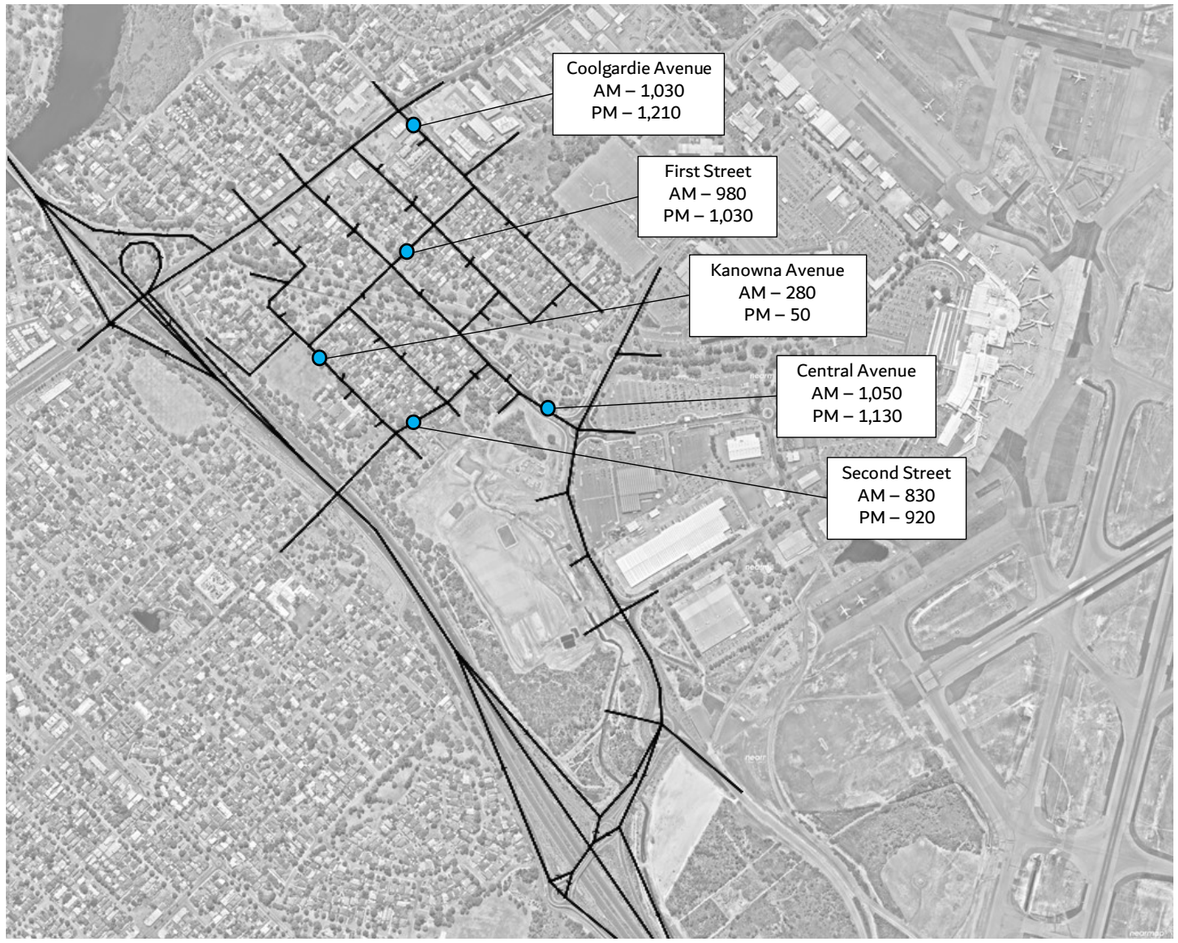


Table 21 2031 street network peak hour volumes

Street	Approach	2031 AM South or West	2031 AM North or East	2031 PM South or West	2031 PM North or East
Coolgardie Avenue	South of Great Eastern Highway	580	450	610	600
First Street	East of Central Avenue	560	420	500	530
Kanowna Avenue	South of First Street	130	150	20	30
Second Street	West of Kanowna Avenue	380	450	440	480
Central Avenue	North of Dunreath Drive	430	620	410	720

Figure 53 2031 street network volumes



A comparison was undertaken for the forecast model traffic flows (two-way) using the outputs from the 2021 modelling undertaken for Redcliffe Station and the 2031 modelling for the RSPACP. Whilst the 2021 outputs could attribute a high level of certainty, it is important to note that the 2031 modelling exercise used the full build out of the moderate land yield calculations which represents a conservative, over estimation approach. Comparison of previous modelling iterations and the one examined in this report indicate that the total increase in vehicle trips in the forecast year of 2031 attributed to the RSPACP zones is around 30% higher.

The comparative flows for the local street network in the two forecast years is set out in Table 22. This highlights the impact of the land uses around the RSPACP as well as the development in the project area itself. Of notice from these forecasts are:

- The more immediate impact of the Qantas terminal traffic, CostCo, the DFO and Park and Ride traffic on Second Street and Central Avenue over the next six years
- Use of Coolgardie Avenue/First Street in the future to access the area and the commercial land uses in the adjoining airport estate
- The relocation of Qantas from the existing Terminal space won't see longer term relief in terms of traffic volumes on Second Street – therefore the measures set out in this report including traffic management and the controls proposed at the intersection of Central Avenue are as important in the immediate term as the longer term.

Table 22 Comparison - 2021 modelled forecast flows and 2031 forecast full build out flows

Street	Approach	2021 AM	2021 PM	2031 AM	2031 PM
Coolgardie Avenue	South of Great Eastern Highway	480	500	1,030	1,210
First Street	East of Central Avenue	180	200	980	1,030
Kanowna Avenue	South of First Street	40	90	280	50
Second Street	East of Kanowna Avenue	890	1,230	830	920
Central Avenue	North of Dunreath Drive	840	1,260	1,050	1,130

7.9.1 Capacity assessment

The modelled flows for 2031 were analysed using standard traffic engineering analysis set out in Table 4 from the Austroads Guide to Traffic Management. The Austroads analysis applies a typical mid-block lane capacity for urban streets that have interrupted flows – streets that have access points, on-street parking and are designed to be lower speed urban environments. The modelled traffic flows set out for local streets in Table 21 were examined for the type of lane and capacity to understand if any local streets would experience vehicle capacity issues in 2031.

As can be seen in the analysis shown in Table 23, only Coolgardie Avenue southbound during both the AM and PM peaks is approaching what would be considered a typical capacity design. During these times this traffic represents flows that are largely accessing the Park and Ride and commercial land uses in Perth Airport land.

Table 23 Mid-block modelled flows capacity assessment - Austroads

	AM Peak Hour				PM Peak Hour			
Land Use	**Southbound or Westbound**	**Practical Capacity**	**Northbound or Eastbound**	**Practical Capacity**	**Southbound or Westbound**	**Practical Capacity**	**Northbound or Eastbound**	**Practical Capacity**
Coolgardie Ave	580	900	450	900	610	900	600	900
First St	560	900	420	900	500	900	530	900
Kanowna Ave	130	900	150	900	20	900	30	900
Second St	380	1,000	450	1,000	440	1,000	480	1,000
Central Ave	430	1,000	620	1,000	410	1,000	720	1,000

7.9.2 Intersection volume over capacity

In addition to the volumetric outputs, intersections where capacity may become an issue were examined to inform the traffic management recommendations in this TIA. Figure 54 and Figure 55 highlight intersections where Volume/Capacity ratios and delays are flagged in 2031 based on present assumptions.

The PM Peak hour experiences a higher level of vehicle traffic across the network and therefore is also modelled to experience greater capacity and delay issues – this is related to commercial land uses in the Airport area rather than RSPACP.

Where Central Avenue and Bulong Avenue are cut, the only local option for egress from the RSPACP area is the left turn from Boulder Avenue onto Great Eastern Highway or through the signalised intersection of Coolgardie Avenue and Great Eastern Highway. The wider area movements would be accommodated via Boud Avenue, Fauntleroy Avenue and Stanton Road.

Some movements are constrained due to the general turning patterns related to limited access points to sites and the wider network. This would be resolved through the staged introduction of access to Great Eastern Highway from the RSPACP area and mode shift associated with Redcliffe Station. Overall, the street network functions within peak periods as also concluded during the initial assessment undertaken by the PTA for planning associated with Redcliffe Station.

Figure 54 2031 AM peak - intersections with emerging forecast V/C issues

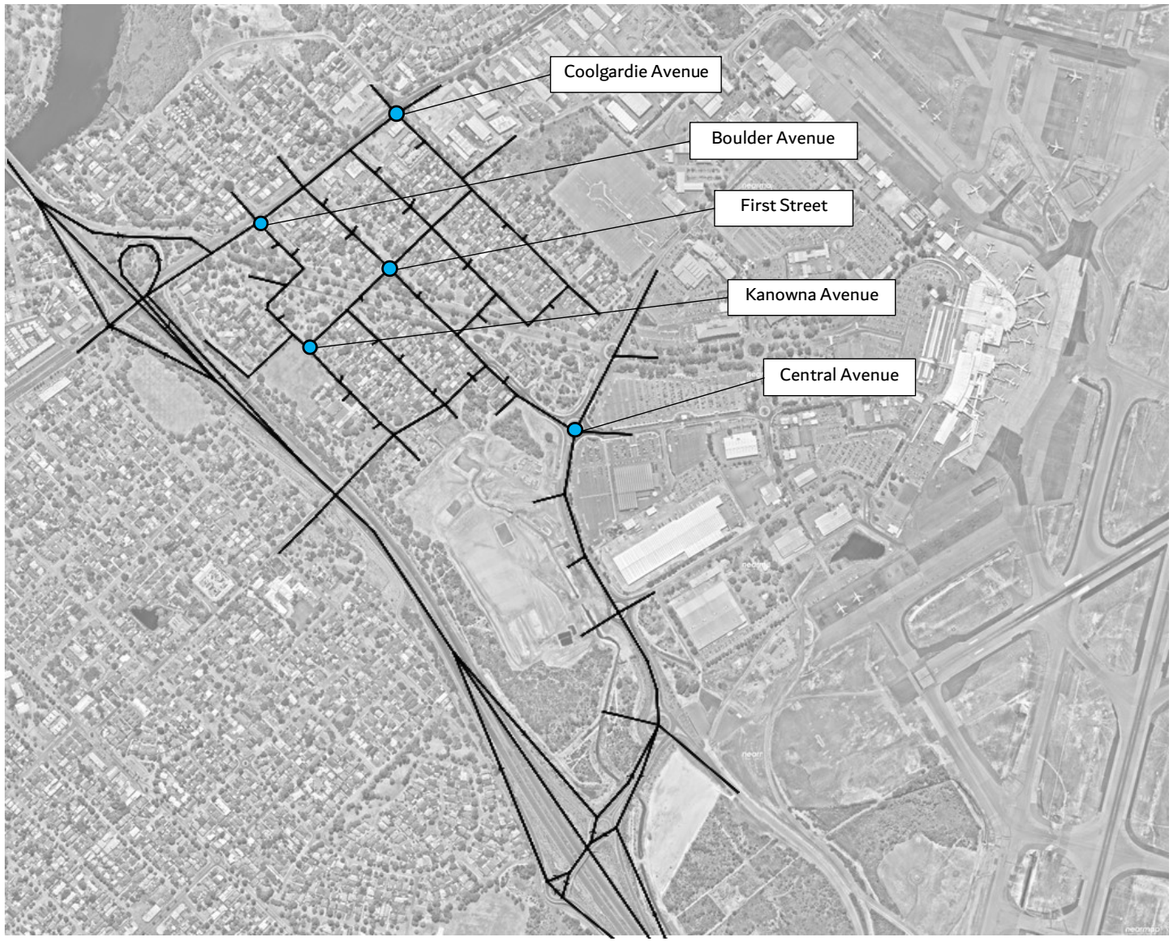
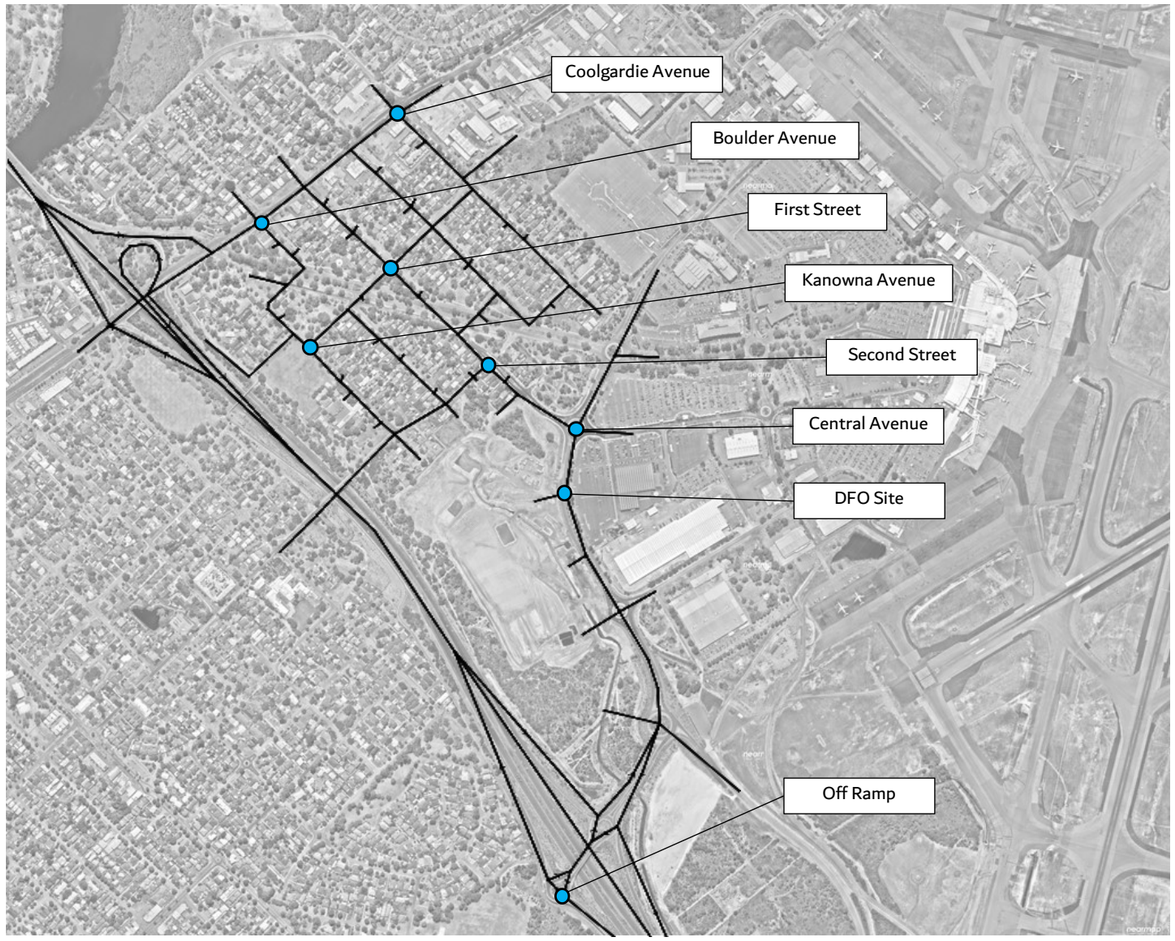


Figure 55 2031 PM peak - intersections with emerging forecast V/C issues



7.9.3 Intersection of Central Avenue and Second Street

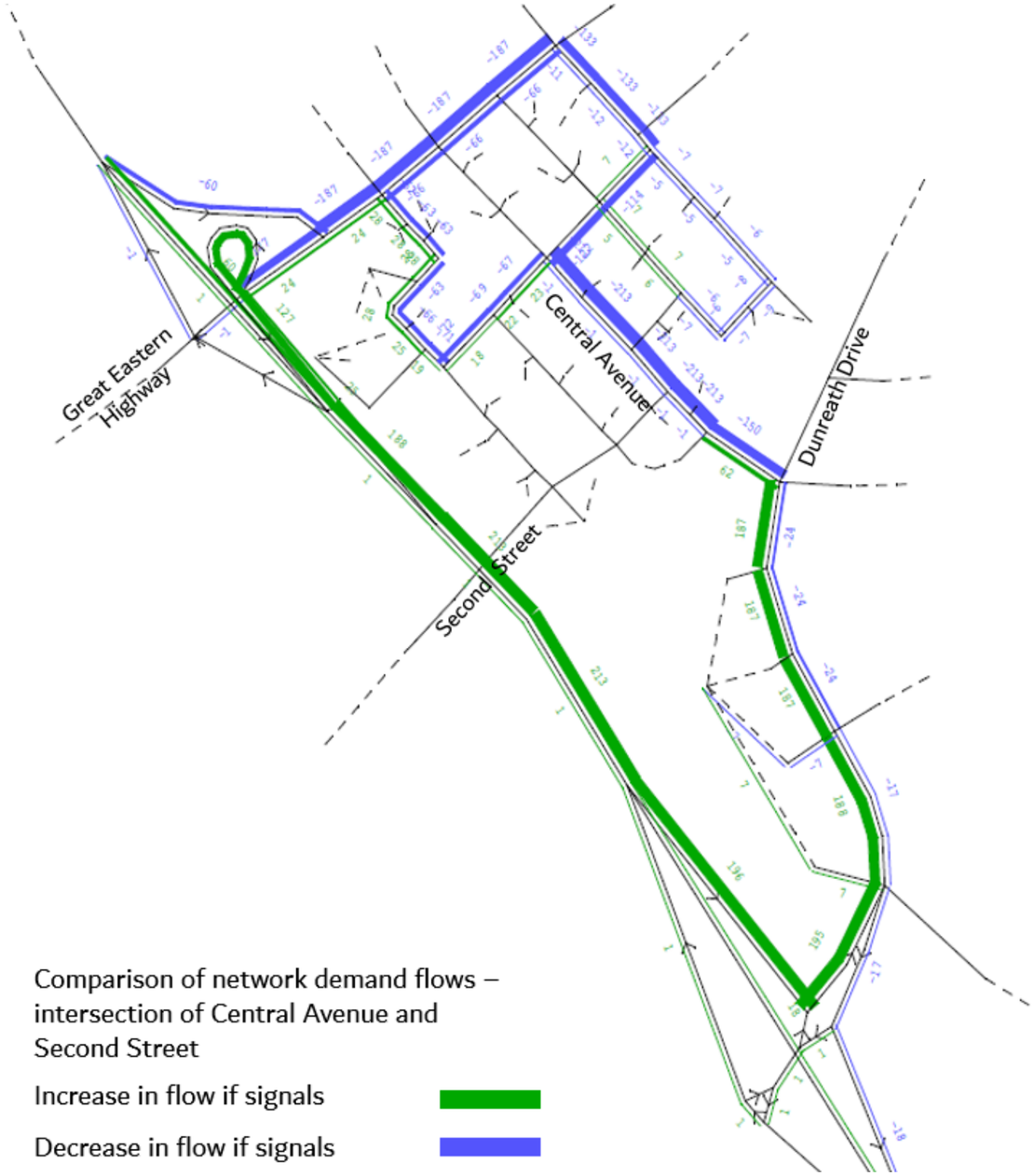
Within the assessment of the RSPACP, a review of the intersection form proposed for Central Avenue and Second Street was undertaken looking at two different options:

- Prioritised intersection with stop sign controls along Second Street
- Signalised intersection with priority movements and allocation of dedicated time to pedestrian phases connecting the Station with the surrounding area.

A roundabout configuration at this location was dismissed as being an inappropriate form of intersection for the Activity Centre, specifically because it is directly adjacent to the Train Station. An intersection that prioritised faster vehicle flows over pedestrian safety and traffic management was deemed to be not a desirable outcome in planning for the site. The area available for a roundabout would also make the design of any larger intersection more problematic for minimal gain.

Figure 56 shows the comparison in vehicle demands through the network when tests for a signalised or priority intersection were run. The impact of the traffic signals is that the through route for traffic passing through the RSPACP area is less attractive than other existing regional routes. This provides a clear indication as to the positive benefit in reducing through traffic, as well as catering for safer pedestrian movements that traffic signals would provide.

Figure 56 Demand flow comparison - signals or no signals at intersection of Central Avenue and Second Street



Installation of traffic signals would be based on the existing processes that are in place within Main Roads WA which dictate the most appropriate form of intersection configuration. Stage 1 approvals would not be pursued with their agreement given that a roundabout would be inappropriate. The installation of traffic signals would come at a point when there are demands that warrant their installation. Up to that point, the intersection would be a stop sign control on Second Street.

7.10 Prioritisation of Street Network Management

In order to address the impact of vehicle traffic on the RSPACP network, a staged approach to the introduction of traffic management measures is proposed to be adopted. The general staging approach of the proposals in this section of the TIA are based on:

- The existing and ongoing demands created by Terminal 3 operations until 2025 that will continue to see traffic associated with that facility continue to grow. This traffic will primarily use the existing regional road network but there is an existing use of the Second Street / Central Avenue corridor through the RSPACP and wider CoB street network.
- Traffic impacts of commercial developments, including office, distribution activities and retail facilities related to land within the Perth Airport Estate. As with the Terminal 3 issue, traffic will primarily use the existing regional road network to access these sites but there is an existing use of the Second Street / Central Avenue corridor through the RSPACP and wider CoB street network.
- The opening of Redcliffe Station will see the immediate introduction of a new morning and afternoon peak period traffic demand associated with the Park and Ride facility that does not currently exist.
- The longer term need to ensure that the demands for the RSPACP proposals are catered for and that development can progress with a street network that can cater for its transport demands.
- Issues related to ongoing amenity of an area that is in transition to more substantial urban development form.

The need for more immediate prioritisation of traffic management measures is illustrated by understanding the flows generated by land uses in the airport and the Park and Ride site. These forecast flows for the AM peak in 2031 are shown in the bandwidth plots in Figure 57 (demand travelling to Perth Airport zones) and Figure 58 (demand travelling to Park and Ride).

Both of these scenarios include traffic signals at the intersection of Second Street and Central Avenue, along with the traffic management measures proposed in this TIA.

Although these are forecast year plots for 2031, these are reflective of the situation when Redcliffe Station opens and Qantas is still operating out of Terminal 3 up until 2025. Without the traffic management measures proposed, including the signalisation of the Second Street and Central Avenue intersection, there will likely be higher flows on the Second Street and Stanton Avenue corridor because it will be easier for people in private vehicles to access this destination, faster.

To counter the impact of the more immediate issues relating to vehicle traffic through the area, the prioritisation of upgrades to various streets has been developed, as set out in Figure 59. This prioritisation programme would see more immediate measures implemented on those sections of the network that would have traffic impacts in the immediate term – Second Street, Central Avenue and Kanowna Avenue.

Figure 57 Example of 2031 AM peak hour vehicle trips generated by Perth Airport zones

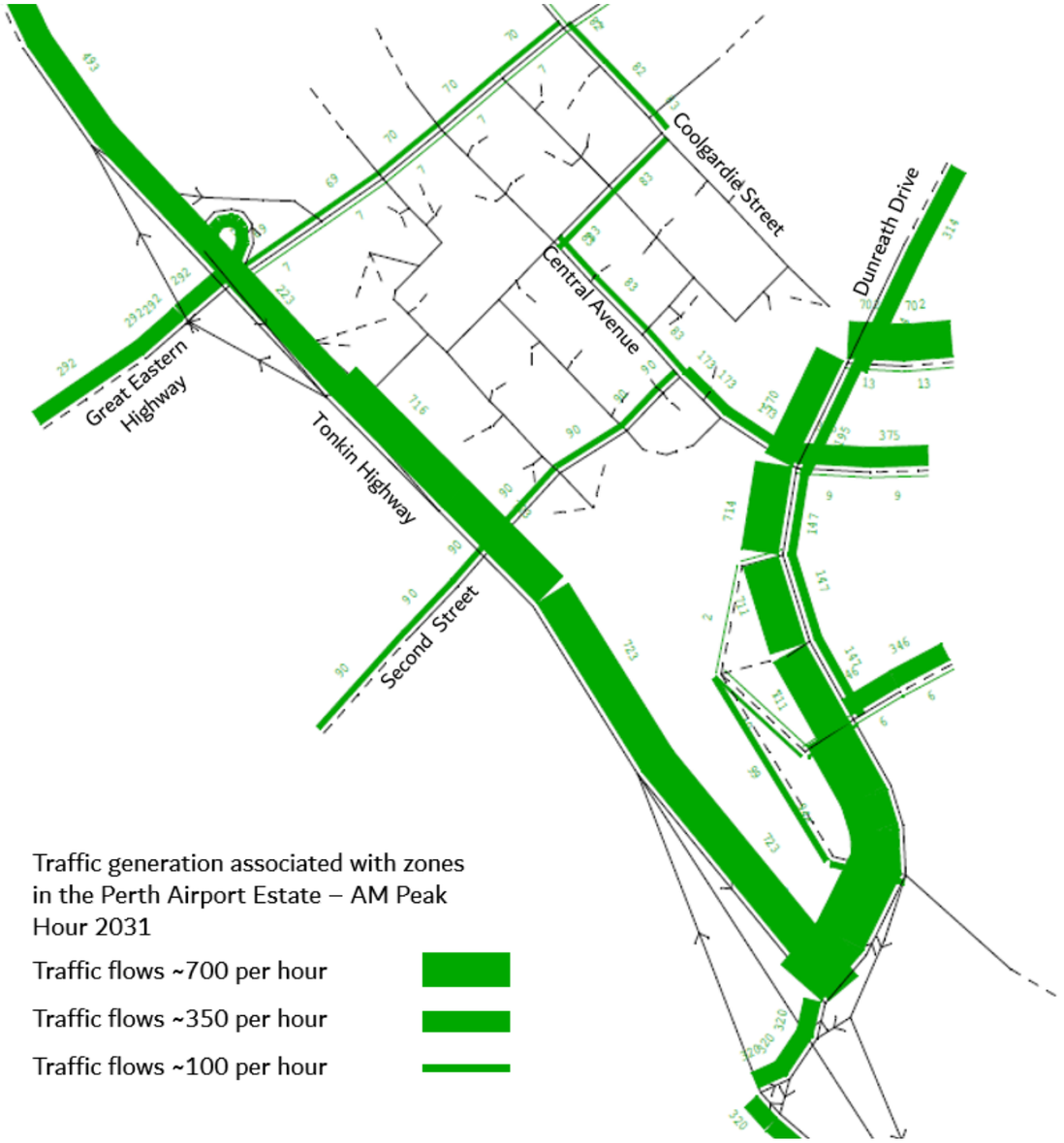


Figure 58 Example of 2031 AM peak hour vehicle trips travelling to Park and Ride zones

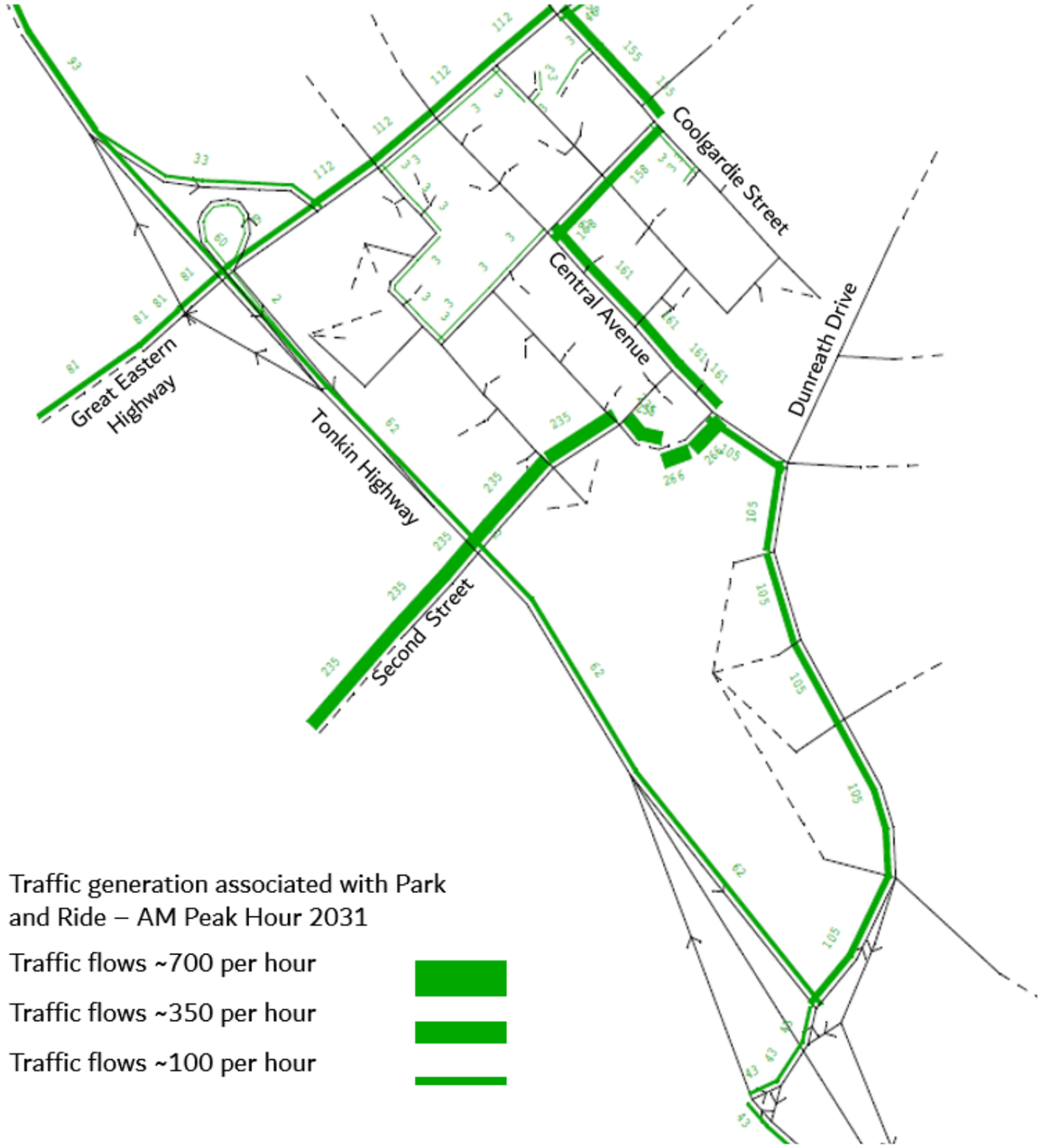


Figure 59 Prioritisation of local street traffic management measures for RSPACP

LEGEND

Activity Centre Plan Area

Priority One
The staging of these local road upgrades is likely to be influenced by:
a) The opening of the Redcliffe Train Station and by traffic generation associated with commercial and retail development within the Perth Airport Estate;
b) The desire to limit through traffic and maintain safety for vehicles using Kanowna Avenue to access the Redcliffe Primary School.

Priority Two
The staging of these local road upgrades is likely to be influenced by:
a) The reappropriation of the Brearley Avenue reservation, the creation of the open space corridor and the realignment of the Southern Main Drain;
b) The opening of the Redcliffe Train Station and by traffic generation associated with commercial and retail development within the Perth Airport Estate;

Priority Three
The staging of these local road upgrades is likely to be influenced by the opening of the Redcliffe Train Station and by commuters seeking to access and egress the station precinct via the Great Eastern Highway intersections with Boulder Avenue and Coolgardie Avenue.

Priority Four
The staging of these local road upgrades is likely to be influenced by the extent of development abutting these roads and the further analysis required to support opening of these roads to Great Eastern Highway following the relocation of Qantas from the T3/T4 terminal and/or the upgrade of Great Eastern Highway.

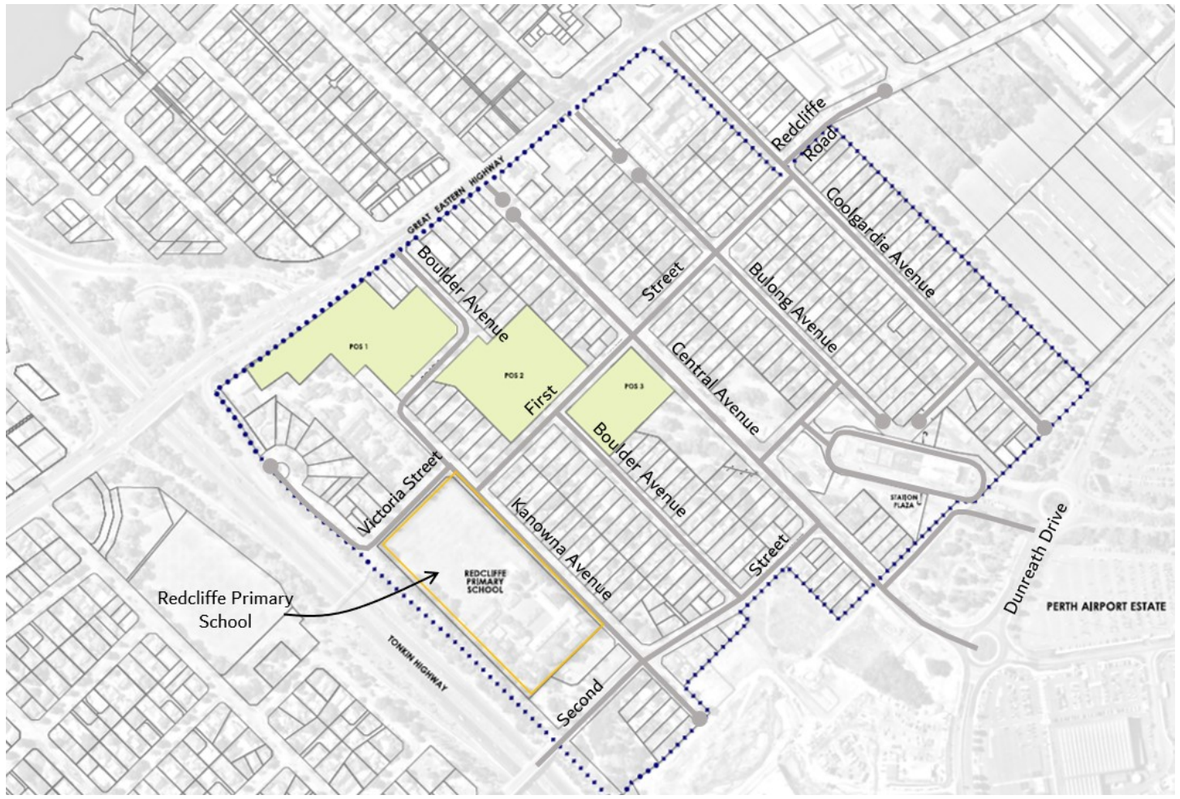
Priority Five
The staging of these local road upgrades is likely to be influenced by proposed redevelopment of private land abutting these roads.

7.11 Safe Walk to School

Redcliffe Primary School is located within the RSPACP area and will be retained as a key community facility. There is no High School in close proximity to the RSPACP area with Redcliffe being in the catchment for Belmont City College which is around 3.4km away.

Redcliffe Primary School sits along the western boundary of the RSPACP area with frontage on to Kanowna Avenue and Victoria Street, as shown in Figure 60. All access to the school site for pedestrians, cyclists and vehicles is from Kanowna Avenue. The school does not have a local catchment however there are no other schools within reasonable proximity and therefore it would be assumed that primary school aged students in the RSPACP area would attend Redcliffe Primary School if in the State School system.

Figure 60 Location of Redcliffe Primary School



7.12 Pedestrian Permeability

The WAPC Guidelines requires an assessment of pedestrian permeability based on the approach established in Liveable Neighbourhoods. Specifically, an assessment of the 400m and 800m ped shed areas (for different land uses and transport network elements). As set out in the WAPC Guidelines:

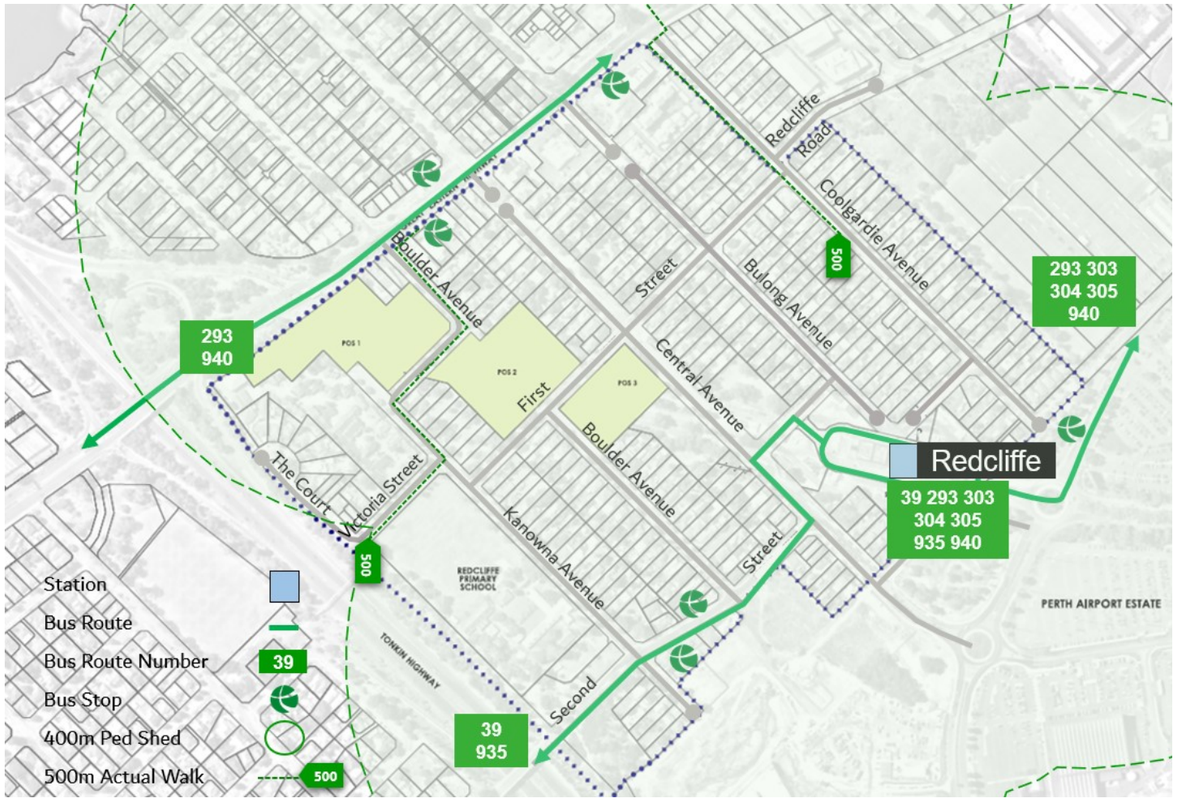
"*Walkable catchment calculations are expressed as the actual area within a five minute walking distance as a percentage of the theoretical area within a five-minute walking distance. The theoretical five-minute walking distance is shown as a circle, with a radius of 400m, drawn around any particular centre. This is an area of about 50ha. When calculating a 10-minute walking distance, the radius used is 800m, resulting in a circle with an area of around 200ha.*

For any urban area, the higher the percentage, the better its walkability (and hence the likely energy efficiency). A good target for a walkable catchment is to have 60 per cent of the area within five-minutes walking distance, or ten minutes in the case of stations".

An assessment of the 400m ped sheds was undertaken based on the existing bus stop locations on Great Eastern Highway, Second Street and Redcliffe Train Station. The 400m radius ped shed areas are shown in Figure 61 which demonstrates the coverage that the RSPACP area will have in respect of pedestrian access to bus stops and Redcliffe Station.

In respect of the WAPC Guidelines, close to 100 percent of the RSPACP areas will be within 800m of the Station gates, as discussed in the following section.

Figure 61 Pedestrian permeability assessment - 400m ped sheds



7.13 Access to Public Transport

As set out in the WAPC Transport Impact Assessment Guidelines – Volume 2 Planning Schemes, Structure Plan and Activity Centre Plans:

"*One of the ongoing KPIs PTA has in its Annual Report measures "the proportion of street addresses within the Perth public transport area which are within 500m of a Transperth stop providing an acceptable level of service." It is recommended that a figure of at least 90 per cent be achieved at the structure plan stage to ensure the above requirements would be able to be satisfied at the local structure plan or subdivision stages, that is, when the local road network and bus stop locations are known*".

On the basis of the existing RSPACP street network and path connections, all existing lots are within 500m walking distance of a bus stop either within the RSPACP boundary or on adjacent streets.

Some properties on Coolgardie Avenue and in the north-western corner of the RSPACP may walk to stops outside of the area. In addition, people either boarding or alighting at stops on the north side of Great Eastern Highway would be required to cross over at signalised intersections, which would add on journey time and distance making these trips less attractive. This is illustrated in Figure 62.

In respect of Redcliffe Station, the entrance gates to the Station itself are located in the mid-point of the Station footprint.

The gate location is based on the permeable through route across the concourse from Central Avenue to Bulong Avenue to provide pedestrians with ease of access. A 500m walking route assessment was completed to examine the accessibility of the Station gates.

As shown in Figure 63, the majority of lots within the RSPACP area are within 500m walking distance to the Station gates. All lots are within 800m walking distance of the Station gates except for those lots in the north-west corner of the site fronting on to The Court. Overall however, the construction of Redcliffe Station will vastly improve public transport accessibility for the RSPACP area by both bus and train making it an attractive option for inbound or outbound trips.

Figure 62 500m walking routes to bus stops

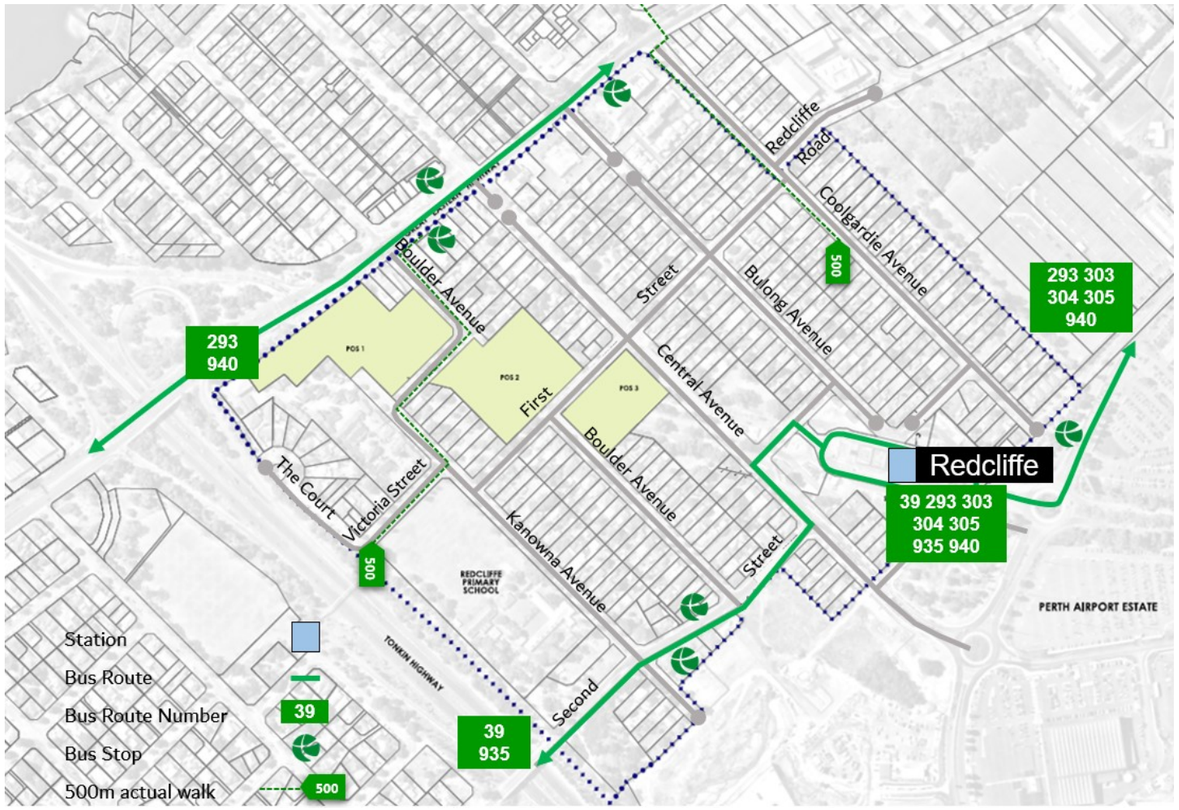
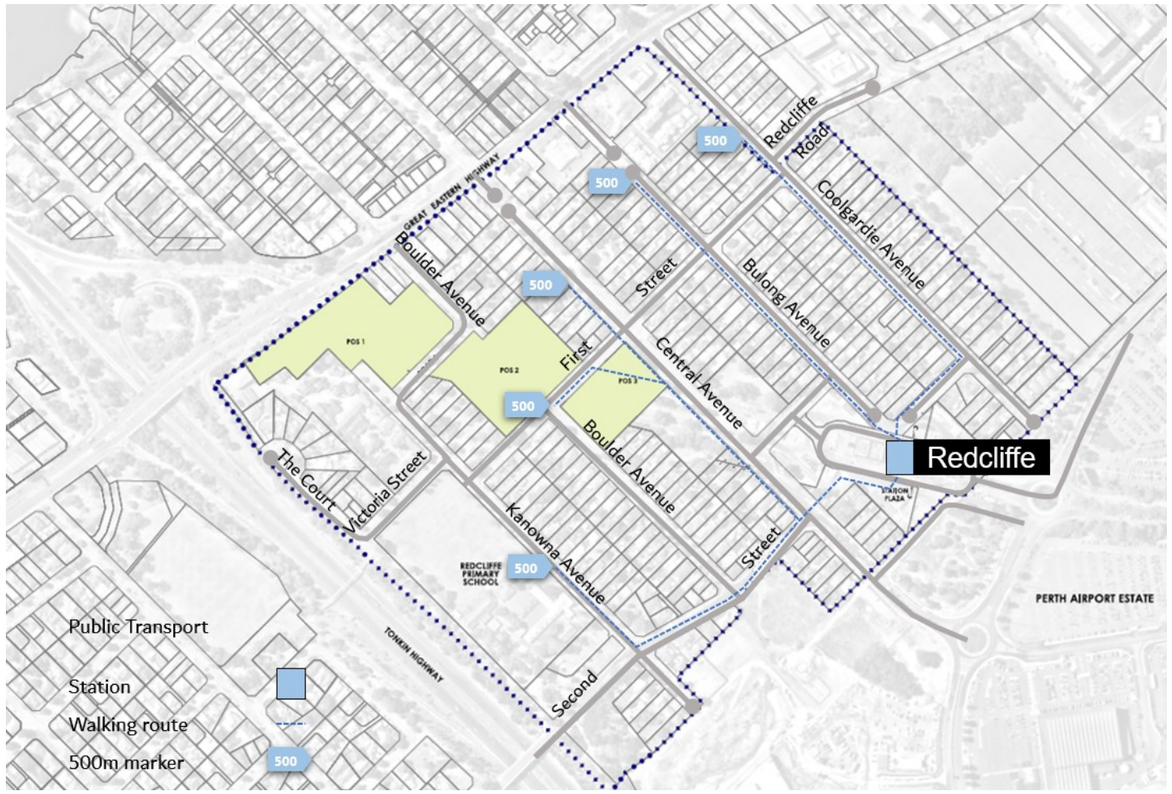


Figure 63 500m walking distance to Redcliffe Train Station gates



8. PARKING

8.1 Introduction

The position of the activity centre precinct adjacent to the Perth Airport estate and its growing business and retail precinct, along with the development of the Redcliffe Train Station, is anticipated to place significant parking pressure on the precinct over the coming years. The management of both the supply and demand of parking will be necessary to ensure the right level of parking is available to meet local demand without negatively impacting on the function or design of the urban area. It will also be required from the point that Redcliffe Station opens to manage potential issues with on-street informal Park and Ride that is seen at other locations around the Perth Metropolitan Region.

8.2 Parking Management Principles

The following principles will guide parking management within the Activity Centre area:

- Encourage the efficient use of available parking resources and minimise land and capital investments in parking
- Prioritise on street parking for short-term use by visitors to residential and mixed use areas
- Maximise the efficient use of public car parking by ensuring a high level of turnover and availability
- Ensure car park design does not hinder safe and secure pedestrian, cyclist and public transport access (including access on foot from public transport)
- Support shared use arrangements between landowners to maximise the efficient use of on-site car parking
- Provide longer term parking for the station and businesses in dedicated locations on-site rather than within the public realm
- Ensure the parking demand created by development is predominantly provided on-site rather than reliant on public parking.

8.3 Parking Demand Management

As a transit oriented development precinct, the RSPACP is designed to maximise the efficiency of walking, cycling and public transport through the investment in public infrastructure and coordinated design of this infrastructure. This is anticipated to greatly reduce demand for private vehicle usage for local and longer distance trips, and in turn greatly reduce the reliance on private and public vehicle parking. In order to encourage residents and visitors to reduce their demand for parking the City of Belmont will undertake an ongoing education campaign about the opportunities and benefits associated with walking, cycling and using public transport within the precinct, as set out in the City of Belmont Integrated Transport Strategy – Belmont on the Move.

8.4 Public Parking Supply Management

Public parking within the precinct is relatively limited, with informal on-street parking available on all local streets, and dedicated on-street parking on Kanowna Avenue abutting the Redcliffe Primary School. In implementing the Activity Centre Plan further public parking will be provided in key locations to ensure that increased demand is met without detriment to the function of the area. In particular public parking will be focused on:

- **PTA Redcliffe Station Carpark**: This dedicated car parking will include 500 parking bays available for commuters parking at the station and travelling on the train.
- **PTA Kiss and Ride**: 25 short term and passenger set down bays adjacent to the station entrance.
- **On-Street Public Parking**: Upgrades to the road designs will include the creation of embayed parking on all streets to provide visitor parking opportunities for the adjacent sites and assist in slowing traffic through local streets. Concept designs for the upgraded road network have indicated the ultimate potential for up to 500 additional on street parking bays within the precinct subject to detailed design of the street network and crossover considerations. Timed parking is anticipated to be required within the Centre sub-precinct (surrounding the train station) upon the station opening to manage behaviour of commuters avoiding the park and ride facility. All other streets will need to be monitored to assist in identifying parking issues and may also require timed parking limitations.
- **Public Open Space Parking**: Upgrades and expansion of open space areas will include the creation of dedicated car parking for users of these areas who choose to travel by car rather than walking or cycling;
- **Redcliffe Primary School Parking**: Short term parking for drop-off and pick-up of students will be made available within the road reservation abutting the Redcliffe Primary School.

The above are outlined spatially in Figure 64.

Figure 64 RSPACP Parking Management

8.5 Off-Street Parking Requirements

The City's Local Planning Scheme No. 15 provides a ratio for the minimum on-site car parking requirements for each of the listed uses within the Scheme. In a transit oriented development precinct it is considered appropriate to reduce the supply of private parking to maximise the availability of land for development purposes and encourage residents and visitors to utilise more sustainable transport options of cycling, walking and using public transportation.

In aligning with this principle it is proposed that on-site parking will be required to comply with a minimum and maximum ratio dependent on the proposed land use(s). The adoption of the State Planning Policy 7.3 Residential Design Codes Volume 2 – Apartments provides a basis from which the future provision of parking within residential development must be applied in this location. Within the guidelines, there are performance based outcomes that supplement the acceptable outcomes that the CoB can use in judging the level of parking per site.

For the RSPACP, the provisions within Element 3.9 of the State Planning Policy 7.3 Residential Design Codes Volume 2 – Apartments have been adopted as set out in Table 24.

Simplification of minimum and maximum ratios for other land uses has been simplified. No provision beyond the maximum number of bays within Table 24 would be permissible.

Table 24 Minimum and maximum parking and minimum bicycle parking requirements for land use

Land Use Category	Minimum Car Parking Bays	Maximum Car Parking Bays	Minimum Bicycle Parking Bays
Residential Uses	Studio and 1 bed - 0.75 bay per dwelling / unit 2 Bed and above – 1 bay per dwelling Visitors - 1 bay per four dwellings up to 12 dwellings, 1 bay per eight dwellings for the 13th dwelling and above	Studio and 1 bed – 1.5 bay per dwelling / unit 2 Bed and above – 2 bays per dwelling subject to design outcomes Visitors - 1 bay per four dwellings up to 12 dwellings, 1 bay per eight dwellings for the 13th dwelling and above	1 bicycle parking space per dwelling/ unit 0.25 visitor bicycle parking space per dwelling/unit
Commercial and Retail Uses	3.5 bays per 100m^2 of gross floor area	4.5 bays per 100m^2 of gross floor area	1 bay per 200m^2 of gross floor area
Civic, Community or other uses	To be determined by the local government based on site specific parking management plan.		

In addition to the requirement for on-site car parking, applicants will also be required to provide a minimum number of bicycle parking bays dependent on the proposed land use. No maximum number of bicycle parking bays is applicable, and the design of bicycle parking facilities will be required to be in accordance with the Redcliffe Station Precinct Design Guidelines.

For any proposed reduction in minimum parking associated with residential developments in the RSPACP, the application must be submitted with an assessment of the Design Guidance DG 3.9.1 to 3.9.13 within the State Planning Policy 7.3 Residential Design Codes Volume 2 – Apartments.

8.6 Cash In Lieu

Where an applicant proposes to provide less than the minimum number of parking bays on site the City may consider the application of a cash-in-lieu payment equivalent to the estimated cost of construction for the shortfall of bays on public land provided that:

a) The shortfall of car parking bays on-site does not exceed 10% of that required for the site; and

b) A suitable location on public land is identified to accommodate the shortfall of car parking bays within 100m walking distance of the subject site;

If a cash-in-lieu payment is considered appropriate in the context of the above criteria it will be included as a condition of development approval and payable prior to lodgment of a building permit.

9. CONCLUSIONS

9.1 Introduction

Assessment of the impacts related to the Redcliffe Station Activity Centre (RSPACP) has been completed based on the requirements of the Western Australia Planning Commission (WAPC) Transport Impact Assessment Guidelines – Volume 2 Planning Schemes, Structure Plan and Activity Centre Plans as opposed to the Movement Network Plan requirements of SPP 4.2. The principle reasons for this approach relate to a greater level of detail required within the WAPC Guidelines and more immediate demands relating to the development of the Station and impacts on the local street network.

As set out in Section 7 of the Guidelines, the key objectives of this TIA were to:

- "assess the proposed internal transport networks with respect to accessibility, circulation and safety for all modes, that is, vehicles, public transport, pedestrians and cyclists;
- assess the level of transport integration between the structure plan area and the surrounding land uses;
- determine the impacts of the traffic generated by the structure plan area on the surrounding land uses; and
- determine the impacts of the traffic generated by the structure plan area on the surrounding transport networks".

The conclusions for the RSPACP Transport Impact Assessment address the four key objectives set out by the WAPC in turn.

9.2 Assessment of Internal Networks

The proposed internal transport networks for the RSPACP provide the relevant level of accessibility and capacity to support the level of development projected in the project area to the year 2031. This conclusion was also reached during the initial assessment of the Activity Centre Plan impacts that was undertaken by the PTA during the planning process for Redcliffe Station. The key components of the internal transport network are:

- Development of Redcliffe Station with the ability and capacity to support a substantial number of inbound and outbound trips via Urban Rail
- Location of a new Bus-Train interchange and realignment of existing bus routes to provide the RSPACP area with high frequency bus connections to locations around Perth, including Belmont
- New shared use and footpath connections throughout the RSPACP area providing the requisite level of priority for pedestrian movements and a safe network to cycle around, including safe access to the local Primary School
- Adequate street network and intersection capacity to cater for local demands, including signalisation at the intersection of Central Avenue and Second Street and the alteration of priority movements at the intersection of First Street and Central Avenue.

9.3 Integration with Surrounding Area

Planning for the integration of the RSPACP with surrounding locations has been subject to a substantial planning effort, ranging from high level strategic exercises through to detailed design elements and location specific planning. The area within, and around, the RSPACP area has been examined through the following exercises:

- Planning for the RSPACP commenced with the development of the DA6 Vision Plan and Implementation Strategy which commenced in 2013 and was adopted in February 2016. The Vision Plan was required to precede the RSPACP and provide an overall framework for integration of land uses and the transport network. It was completed in conjunction with Perth Airport and was developed during the period of time the Perth Airport Master Plan (2014) was developed. Objectives of the Vision Plan included:
  - Responds sensitively to interface issues, particularly between residential development on the land under the planning control of the City and future development on land owned by PAPL
  - Delivers an optimal Transit Oriented Development (TOD) outcome surrounding the potential future (Redcliffe)Train Station as part of the State Government's Forrestfield Airport Link Project
  - Examines and improves the existing movement network Forrestfield Airport Link.
- Planning for the Forrestfield Airport Link, including the completion of the "Forrestfield Airport Link Project Traffic and Transport Analysis – DA6 FAL Document Number: FAL-PTAWA-TM-RPT-00008"
- Perth Airport Master Plan (2014)
- City of Belmont Town Planning Scheme No.15
- City of Belmont "Belmont on the Move" Integrated Transport Strategy
- Planning and delivery of Gateway WA Freeway project.

On the basis of the technical work completed for these projects and strategies, integration between the RSPACP area and the surrounding area has been examined in substantial detail.

9.4 Traffic Impacts on Surrounding Land Use

Traffic generated from land uses contained with the RSPACP area will have a limited impact on surrounding land uses. There are two key reasons for this conclusion. The first is that the RSPACP has been based on maximising benefits provided by the new Redcliffe Train Station. Therefore, longer distance intra-urban trips generated by (and to) land uses in the RSPACP area will include a substantial number or proportion made by Train and Bus.

The same conclusion cannot be made for surrounding land uses in the Perth Airport land where assessments completed for both the CostCo and DFO sites show the substantial number of vehicle trips being made to and from those sites. The combined impact of those two sites, alongside existing and future commercial development within Perth Airport (such as the retention of Qantas at T3 until at least 2025) and Park and Ride trips, have a far greater impact on the road network rather than vice versa. Therefore, the second reason for RSPACP having a limited impact on surrounding land uses is that the type and scale of traffic generated by adjacent commercial land uses has far greater and far more apparent impact on the network.

Given that the traffic impacts of the adjoining Terminal and commercial developments will only likely increase up until 2025 when Qantas may relocate to the Consolidate Terminal, the implementation of management measures proposed in this report relating to speed zones, traffic management, intersection priorities and pedestrian facilities should all be considered as more immediate priorities in order to reduce the impact of through traffic movements.

9.5 Traffic Impacts of Traffic Generated by the Activity Centre Area

As set out in this assessment, there has been a substantial amount of analysis undertaken for the RSPACP area and surrounding land uses. On the basis of the technical work completed, and the existence of much of the transport network required to deliver RSPACP, the following assessments were undertaken to analyse the traffic impacts generated by the RSPACP:

- A review of the 2021 outputs for the FAL project which including modelling that assumed the retention of Qantas operations at Terminal 3, the opening of Redcliffe Station (including full Park and Ride component of 500 bays and the bus network) and retention of closures of Central Avenue and Bulong Avenue south of Great Eastern Highway
- A 2031 forecast year assessment which is ten years beyond the opening of Redcliffe Station
- Analysis of both the mid-block capacity and volume over capacity at local intersections.

The 2021 assessment for the RSPACP area concluded:

"The development of DA6 provides a reconnected grid pattern for the road network, which is an improvement on the existing fragmented local road network. The Movement Network provides for appropriate street characteristics, based on traffic volumes and adjacent land use.

Great Eastern Highway is congested due to background increases in traffic, giving rise to the need to upgrade Fauntleroy and Coolgardie Avenues.

The traffic volumes generated by the intensification of land use as part of DA6 can be readily accommodated within the existing local road network. The consolidation of the domestic and international terminals at Perth Airport, the opening of Gateway WA and the subsequent closure of Brearley Avenue provide an opportunity to remove the majority of the 36,000 VPD that pass through DA6 and replace it with traffic wishing to access and interact rather than passing through ".

The assessment for the RSPACP for the 2031 forecast year has been based on:

- The RSPACP network as proposed
- Redcliffe Station being fully operational with the bus network plans proposed within this assessment in place
- Known land use details based on likely yield and development quantum using full build out of the moderate yield outcome to understand what is a conservative approach
- Relocation of Qantas from Terminal 3
- Vehicle distribution from ROM24 that is consistent with the approach used for the 2021 assessment.

The AM and PM peak hour demand (vehicle trips) on the network were taken explicitly from the previous 2021 modelling. These trips form the majority of the movements across the modelled network as they represent demands between Great Eastern Highway, Tonkin Highway and Dunreath Drive. The details for the Park and Ride site were also taken from the previous 2021 modelling, although the distribution was proportioned across a more detailed zone plan.

To calculate the vehicle demands represented by the RSPACP area, ultimate land use proposals were provided on an individual lot basis. Trip generation for the lots was calculated based on build out of the moderate yield scenario for the year 2031, and the distribution of trips was based on the existing proportions within the previous FAL model. Demands for sites such as CostCo and DFO were taken directly from Perth Airport reports.

It is important to note that the 2031 modelling exercise used the full build out of the moderate land yield calculations which represents a conservative, over estimation approach so that the CoB and stakeholders would be aware of the implications for the forecast year should development in the area accelerate and achieve full build out. Comparison of previous modelling iterations and the one examined in this report indicate that the total increase in vehicle trips in the forecast year of 2031 attributed to the RSPACP zones is around 30% higher.

Demand volume plots for the peak hours highlighted dominant flows across the street network using the build out scenario. Within the RSPACP network, the more prominent volumes are shown on First and Second Streets, Central Avenue and Coolgardie Street.

The modelled flows for 2031 using the build out scenario were analysed using standard traffic engineering analysis set out in Table 4 from the Austroads Guide to Traffic Management. The Austroads analysis applies a typical mid-block lane capacity for urban streets that have interrupted flows – streets that have access points, on-street parking and are designed to be lower speed urban environments. The modelled traffic flows set out for local streets using the build out scenario were examined for the type of lane and capacity to understand if any local streets would experience vehicle capacity issues in 2031.

None of the local streets exceed what is considered a typical capacity, with only Coolgardie Avenue south bound movements approaching what would be considered a typical capacity design. During the afternoon peak period, for instance, this traffic represents flows that are largely accessing the commercial land uses in Perth Airport land (CostCo and DFO).

In addition to the volumetric outputs, intersections where capacity may become an issue were examined to inform the traffic management recommendations in this TIA.

The PM Peak hour experiences a higher level of vehicle traffic across the network and therefore is also modelled to experience greater capacity and delay issues – this is related to commercial land uses in the Airport area rather than RSPACP.

Some movements are constrained due to the general turning patterns related to limited access points to sites and the wider network. This would be resolved through the staged introduction of access to Great Eastern Highway from the RSPACP area and mode shift associated with Redcliffe Station.

In order to address the more immediate issues of the RSPACP network, a prioritisation approach for the delivery of traffic management and street management measures is set out within the TIA. This will assist the CoB in addressing existing issues relating to through traffic movements and can form part of a wider approach by the CoB to manage traffic flows.

Overall, the street network functions within peak periods using the build out scenario as also concluded during the initial assessment undertaken by the PTA for planning associated with Redcliffe Station.