Transport Impact Review

BEDFORD NORTH CORRIDOR

PROJECT	Bedford North Corridor – Transport Impact Review			
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0	Draft	MDR	CAS	09/04/2021
1	Final	MDR	CAS	20/04/2021
2	Amended Final	MDR	CAS	03/05/2021
3	Amended Final v2	MDR	CAS	09/06/2021
4	Finalised Conclusions	MDR	CAS	05/07/2021

Contents

1. INTRODUCTION AND BACKGROUND

In 2020 the City of Bayswater (the City) commissioned Hames Sharley to prepare an Urban Design Study for the Bedford North Corridor, with support of Shape Urban (community engagement) and Flyt (transport and movement).

The Bedford North Corridor study area covers the northern portion of Bedford generally bounded by Walter Road West (to the north), Coode Street (to the east), Clement Road (to the south) and Salisbury Street (to the west) – with some additional properties that fringe R.A. Cooke Reserve and Birkett Reserve – as shown in Figure 1.

Figure 1 Bedford North study area (source: Bedford North Urban Design Study, Hames Sharley)

It is noted in the Urban Design Study Report (Hames Sharley, 2021), that the Bedford North area is in transition – the suburban qualities that have made it a great place to live have attracted more residents and businesses to the area, including:

- Original high-quality brick detached houses with generous yards.
- Easy access to the Morley Activity Centre and employment areas beyond (in Malaga and Bayswater).
- Education facilities at ECU Mt Lawley, Mt Lawley High School and a range of primary and non-government schools.
- Easy access to road, suburban rail (a quick trip to Meltham Station) or direct buses into Perth CBD or Morley.
- Relatively affordable price points for new homeowners or renters.

In addition, it is noted in the Urban Design Study Report (Hames Sharley, 2021) that the increased desirability of the Bedford North area has increased traffic volumes on Walter Road West, seen backyard infill subdivision and development, and greater use of public open space in the area.

As part of the Urban Design Study the future for Bedford North has been a focus for community discussions – the following three statements present a vision for Bedford North based on community input into the Urban Design Study.

1. *"Community life is built around places to meet, eat, drink, shop and play. Bedford North can become a place where corner stores, cafes and small workplaces pop up in new mixed use developments along a pedestrian friendly Walter Road."*
    - Considerations for Bedford North:
        - Promoting mixed use development on important roads.
        - Promoting slower speed pedestrian environments along important roads.
        - Exploring opportunities to upgrade and enhance existing open spaces.

2. *"Shade and shelter are critical to a quality suburban experience, and Bedford North's next generation of development can leave space for mature trees to grow."*
    - Considerations for Bedford North:
        - Design provisions that promote growth of mature trees canopy in yard spaces and setbacks.
        - Exploring opportunities to bring more street trees onto Walter Road West.
        - Exploring opportunities to plant more trees on existing reserves/verges throughout Bedford North.

3. *"Opening new homes onto Bedford North's streets will help residents stay connected. Courtyards, balconies, low fences and front gates will bring in more ways to strengthen neighborhood relationships over the long term."*
- Considerations for Bedford North:
    - Design provisions that promote active living towards the front of the street.
    - Exploring opportunities for Walter Road West to evolve into a more pedestrian friendly street, similar to many other regional roads through the inner-north.

1.1 Transport Impact Review

A high-level transport impact review has been developed by Flyt to support the Urban Design Study for the Bedford North Corridor.

This high-level transport impact review report has been prepared to cover the broad requirements of the WAPC *Transport Impact Assessment Guidelines Volume 2 Planning Schemes, Structure Plans and Activity Centre Plans* (August 2016).

The primary focus of the high-level transport impact review for the Bedford North Corridor is to:

- Outline the existing land uses within the study area.
- Outline the existing movement networks through the study area.
- Consider a range of sources of transport data to outline the existing movement patterns
- Consider the urban growth scenarios identified in the Urban Design Study (Hames Sharley, 2021) – and consider the impacts of these growth scenarios on the transport network based on existing transport count data and future year modelling by Main Roads WA.
- Considering the above items, provide a series of conclusions in relation to the future development of the Bedford North study area.

2. PLANNING AND DEMOGRAPHIC CONTEXT

2.1 Perth and Peel @3.5 million

The Perth and Peel @3.5 million suite of strategic land use planning documents provide a framework for future growth in the Perth and Peel regions. The strategy recognises the benefits of a consolidated and connected city utilising the region's previous historic patterns of urban growth.

This strategy promotes more efficient use of land and infrastructure and maintains a target of 47% of new development in the form of urban infill. The frameworks provide for different lifestyle choices, vibrant nodes for economic and social activity and a more sustainable urban transport network.

Perth and Peel @3.5 million identifies that the City has an estimated population target of 100,000 by 2050 representing an increase of 34,660 from 2011-2050. To facilitate this growth, the framework seeks to achieve a more consolidated urban form, underpinned by the ten key principles identified in Table 1 which demonstrate how growth is accommodated.

Table 1 – Principles for Urban Consolidation (source: Perth and Peel @3.5 million)

Principle	Description
Housing	Provide well-designed higher-density housing that considers local context, siting, form, amenity and the natural environment, with diverse dwelling types to meet the needs of the changing demographics.
Character and Heritage	Ensure the attractive character and heritage values within suburbs are retained and minimise changes to the existing urban fabric, where appropriate.
Activity Centres	Support urban and economic development of the activity centres network as places that attract people to live and work by optimising land use and transport linkages between centres; protecting identified employment land from residential encroachment, where appropriate, and avoiding contiguous linear or ribbon development of commercial activities beyond activity centres.
Urban Corridors	The focus for higher-density residential development. Where appropriate, located along transit corridors and promoted as attractive places to live by optimising their proximity to public transport while ensuring minimal impact on the surrounding urban fabric and the operational efficiency of the regional transport network.
Station Precincts	Where appropriate, focus development in and around station precincts (train stations or major bus interchanges as set out under the METRONET initiative) and promote these precincts as attractive places to live and work by optimising their proximity to public transport while ensuring minimal impact on the operational efficiency of the regional transport network.
Industrial Centres	Promote the current and proposed supply and/or development of industrial centres as key employment nodes and prevent incompatible residential encroachment on these areas.
Public Transport	Ensure that most transit corridors are supported by quality higher-density residential land uses and identify where new or improved public transport services will be needed to meet long-term growth, especially current and future train station precincts.
Infrastructure	Ensure more efficient use of and add value to existing and planned infrastructure to achieve a more sustainable urban environment. Protect existing and proposed infrastructure from incompatible urban encroachment to promote a system where land use developments and infrastructure are mutually compatible.
Green Network	Preserve, enhance and consolidate the green network of parks, rivers, sport/recreation areas, facilities for active open space, conservation and biodiversity areas, and areas with a high level of tree canopy coverage, considered important for the health and wellbeing of the community.
Protection	Avoid, protect and mitigate environmental attributes and promote development that contributes to maintaining air quality and minimises risks of inundation from sea-level rise, flooding or storm surge events and bushfire damage.

Under Perth and Peel @3.5 million growth is proposed to occur primarily via infill development due to the lack of availability of land. Figure 2 shows that the Walter Road West study area makes up part of the urban corridor network. The urban corridor network has the following description:

"Urban corridors provide connections between activity centres and maximise the use of high-frequency and priority public transport. Urban corridors shown in the framework represent significant opportunities to accommodate increased medium-rise higher density residential development by good quality, high-frequency public transport."

(source: Perth and Peel @3.5 million)

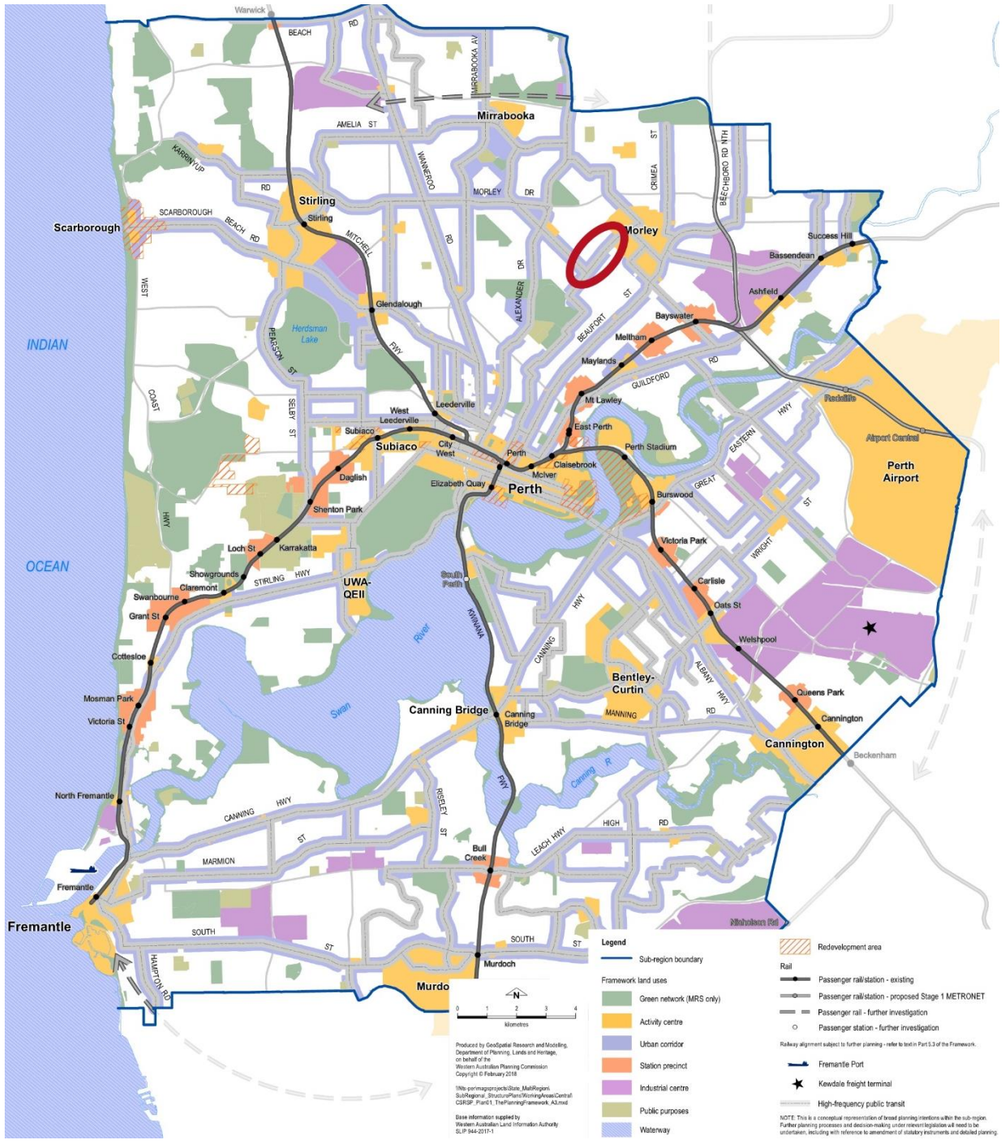

Figure 2 Central Sub-Region Planning Framework with Walter Road West highlighted (source: Perth and Peel @3.5 million)

2.2 State Planning Policies and Local Planning Framework

The Bedford North Corridor Study is influenced by a range of State planning policies and local planning framework – these are covered in detail in the Urban Design Study for the Bedford North Corridor (Hames Sharley, 2021). The key policies and strategies are:

- State Planning Policies:
  - State Planning Policy 7.0 – Design of the Built Environment
  - State Planning Policy 7.2 – Precinct Design
  - State Planning Policy 7.3 – Residential Design Codes Volume 1 – Detached and Grouped Dwellings
  - State Planning Policy 7.3 – Residential Design Codes Volume 2 – Apartments
  - State Planning Policy 5.4 – Road and Rail Noise
- Local Planning Framework:
  - Local Housing Strategy
  - Town Planning Scheme No. 24
  - Building Bayswater and Local Planning Strategy
  - Landscaping Policy and Landscaping Guidelines

2.3 City of Stirling Walter Road West Neighbourhood Centre Local Development Plan

The City of Stirling Walter Road West Neighbourhood Centre Local Development Plan guides new development in the formerly zoned Dianella Industrial Area, to the west of the current study site. The plan has several objectives, of which some relate directly to Walter Road West. These are:

- To establish Walter Road West as a local 'main street' activity centre with street-focused retail and other commercial uses.
- To set buildings back from Walter Road West to enable public realm enhancements such as wider footpaths and street trees.
- Provisions to ensure all mixed-use buildings fronting on to Walter Road West will have a continuous solid canopy for pedestrian shelter.
- A public plaza is proposed on the corner of Walter Road West and Grand Promenade and another on the corner of Walter Road West and Cleveland Street.
- The building types along Walter Road West include multi-storey residential limited to 5 storeys. The ground floor is to be used for non-residential, whilst the upper floors are to be a mix of residential and non-residential.

The production of this Local Development Plan has helped to inform the design responses in the Bedford North Corridor Study (Hames Sharley, 2021), in particular the way commercial lots in the Bedford North Centre may be redeveloped.

Collaboration between the City of Stirling and City of Bayswater will be critical to enhance the opportunities for Bedford North. Matters such as: Walter Road West streetscape upgrades, car parking management and place planning will all benefit from a collaborative approach.

2.4 Demographic Analysis

The Bedford North Corridor Urban Design Study (Hames Sharley, 2021) includes an analysis of the Bedford North community's defining characteristics and how they influence the Study. From a movement and transport perspective the key demographic information for the suburb of Bedford is age, household/family type and car ownership.

2.4.1 Population growth

Between the Census periods of 2006 and 2016, the population of Bedford increased by 18.9% from 4,575 to 5,438 persons. This is a similar growth to neighboring suburbs such as Inglewood (12%), Maylands (20%), Bayswater (19%), Morley (16%) and Dianella (9%).

With Bedford being an established residential area, a population growth of 15%-20% between 2006 and 2016 would be expected as the availability of new land and opportunities for redevelopment are limited.

2.4.2 Population Age

As noted in the Urban Design Study (Hames Sharley, 2021), the age of a community can help determine the stages of life people are typically in – with age and life cycle having a direct correlation to a variety of factors associated with housing. A summary of key findings is provided below:

- In 2016 31% of people in Bedford were aged 24 years or younger – suggesting a relatively strong representation of households with children and young adults present.
- The proportion of adults in the home making and career phases (aged 25-54 years) is almost 45% in Bedford, slightly above the Greater Perth level of 43%.
- Retirees and Seniors (aged 55 years+) are more prevalent in Bedford in contrast to Greater Perth – 24.5% compared to 22.7%. Options for housing to accommodate the needs of these households who may be no longer working and have children leaving home are important to consider. Smaller lots to maintain, secure and compact dwellings, well serviced by public transport and do not cost a lot to run or maintain are attractive to a lone person or older couple households.

2.4.3 Household/Family Type

Bedford has 72% of family households compared to 73% for Greater Perth – which aligns with the age profile.

Due to Bedford's location in the middle ring of metropolitan suburbs, Bedford is aligned closely to the average household type across Greater Perth – this requires a diverse range of housing choices to cater not only for larger family households but also for those in phases where they are living alone or in groups.

In relation to family type, since 2006 there has been a 5% increase in the number of couples with children living in Bedford – over the same period there has been a decrease in couples without children (-3%) and single parent families (-2%). A greater proportion of children or young adults living at home as dependents often translates into larger homes/more bedrooms being required and possibly more outdoor space.

2.4.4 Car Ownership

Car ownership in an area is typically reflective of locational characteristics such as proximity to employment and public transport.

The suburb of Bedford has a lower percentage of 3+ cars per dwelling (17%) compared to Greater Perth (21%). In line with the City and Greater Perth trends, between 2006 and 2016, the proportion of households with 0-1 car has decreased while those households with 2+ cars have grown.

Walter Road West is a high-frequency public transport route, there is an opportunity to try to reduce the amount of car ownership in Bedford, which will provide health, financial and environmental benefits to households and the community. Further, the requirement for parking within redeveloped residential lots can be minimized and the spillover to streets and verges can be reduced – both creating a more attractive and efficient urban area.

3. EXISTING SITUATION

3.1 Regional Context

The Bedford North area (also known as the Walter Road West Precinct) is located in Perth's inner north-eastern suburbs, sharing a border with the City of Stirling to the north-west.

Bedford North is well connected with regional roads and buses servicing Morley Activity Centre and central Perth. Rail connections to Maylands and a future Morley Station offer more attractive travel opportunities.

Walter Road West and Grand Promenade are the main arterial roads servicing the study area. They provide connectivity to Morley Activity Centre, inner northern suburbs like Inglewood and Mt Lawley, and Perth CBD beyond. The future Morley Station at Broun Avenue and Tonkin Highway will help with additional connections to Bedford North, as bus services will be modified to connect to rail, opening up regional connections on the wider public transport network. Tonkin Highway is close by, providing access to Perth Airport and surrounding employment precincts.

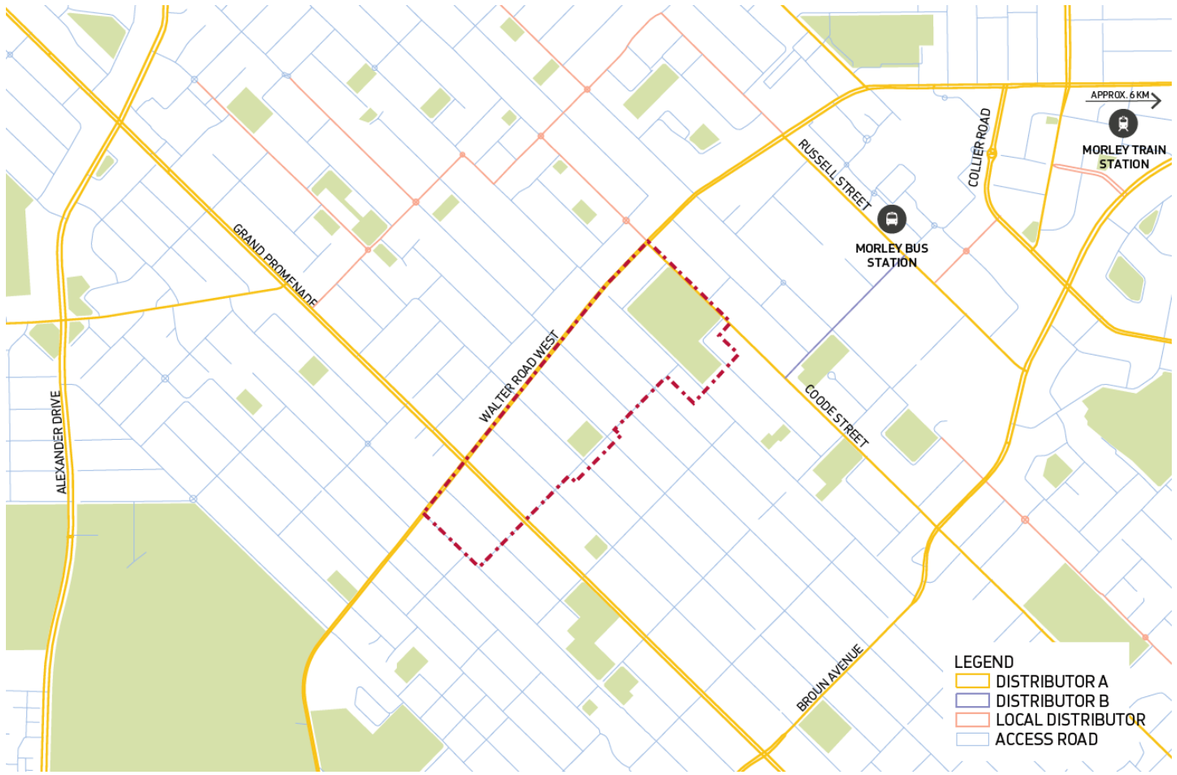

Figure 3 Regional movement network (source: Bedford North Urban Design Study, Hames Sharley, 2021)

3.2 Local Context

As the Bedford North area evolves to a more urban condition, public transport services will become important for residents and visitors accessing home or commercial offerings on main street environments.

Bus route 60 and the Circle Route 998/999 run along Walter Road West, providing direct access to Perth CBD and Morley Activity Centre to the North-East. Lots closer to public transport are more likely to use public transport. These lots should be encouraged to have a higher density of development.

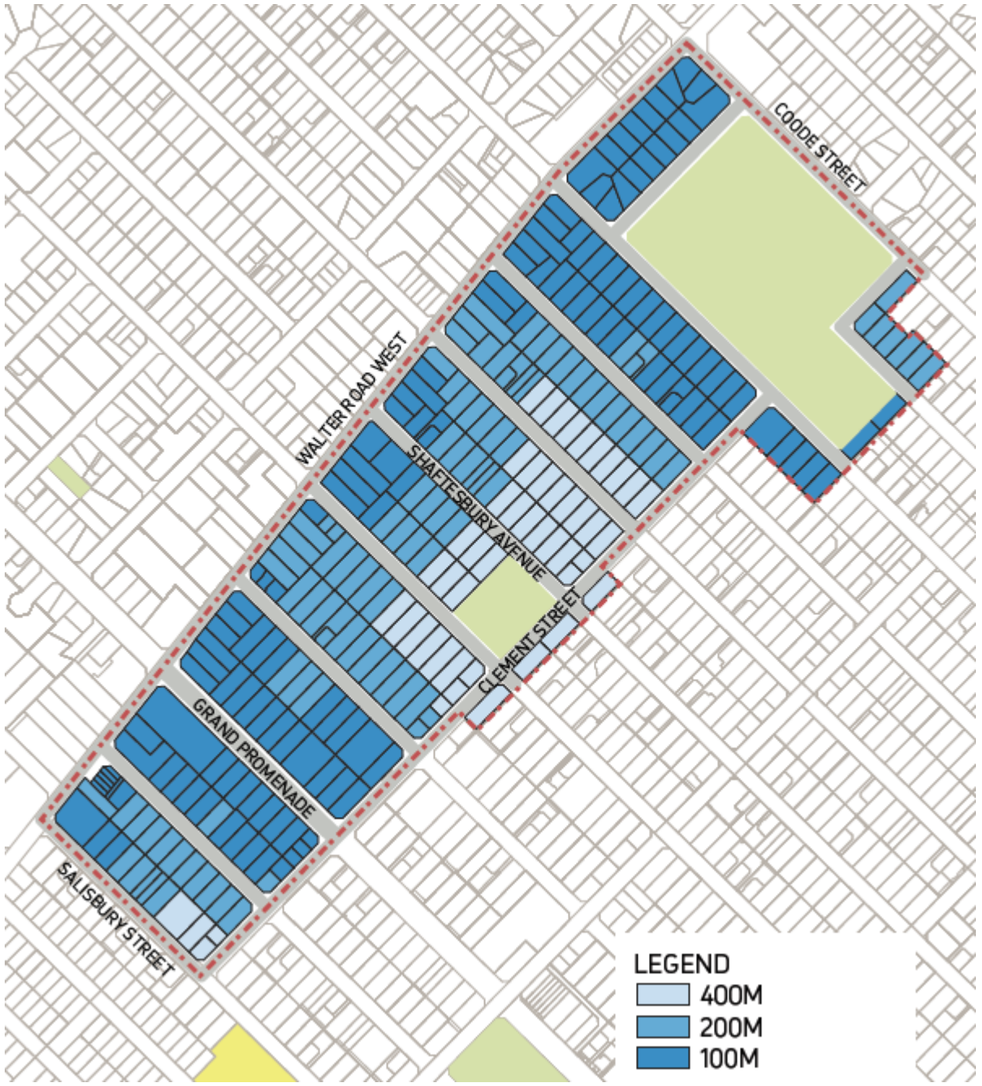

Figure 4 Lot distance to access public transport services (source: Bedford North Urban Design Study, Hames Sharley, 2021)

3.3 Location History

The history of the Bedford North location is outlined in the Urban Design Study (Hames Sharley, 2021), which notes that in the 1950's the area was 'edge of the city' with access via Grand Promenade and Walter Road East – the area offered the suburban ideal of large blocks with generous house and gardens attracting residents to the area.

Through the 1960's the Bedford North area saw commercial development begin along the Walter Road West corridor, as well the establishment of industrial development areas within proximity of the Bedford North area.

From the mid-1990's infill development has replaced many of the original houses in the precinct – with changing planning frameworks that have permitted grouped dwellings that follow battleaxe configurations. The Urban Design Study notes that the suburban qualities of the area are still visible, but that this period of development has impacted building/street interfaces and tree canopy.

3.4 Existing Land Uses

For the purposes of analysis and comparison the Bedford North study area has been split into seven (7) zones. The study area zone structure is shown in Figure 5 – with Zone 1 only containing commercial land uses, Zone 2 a small area of commercial land use and residential dwellings, and Zones 3-7 containing residential dwellings.

Table 2 outlines the breakdown of existing land uses across the Bedford North study area. The study area includes a total of approximately 497 residential dwellings and approximately 3,443m² (NLA) of commercial floor area – with the commercial land uses concentrated along the Walter Road West corridor either side of the intersection with Grand Promenade.

Table 2 – Bedford North study area existing land uses

Zone	Residential Dwellings (no.)	Commercial Floor Area (NLA m²)
1	0	3,342
2	29	202
3	40	0
4	68	0
5	168	0
6	172	0
7	20	0
TOTAL	**497**	**3,443**

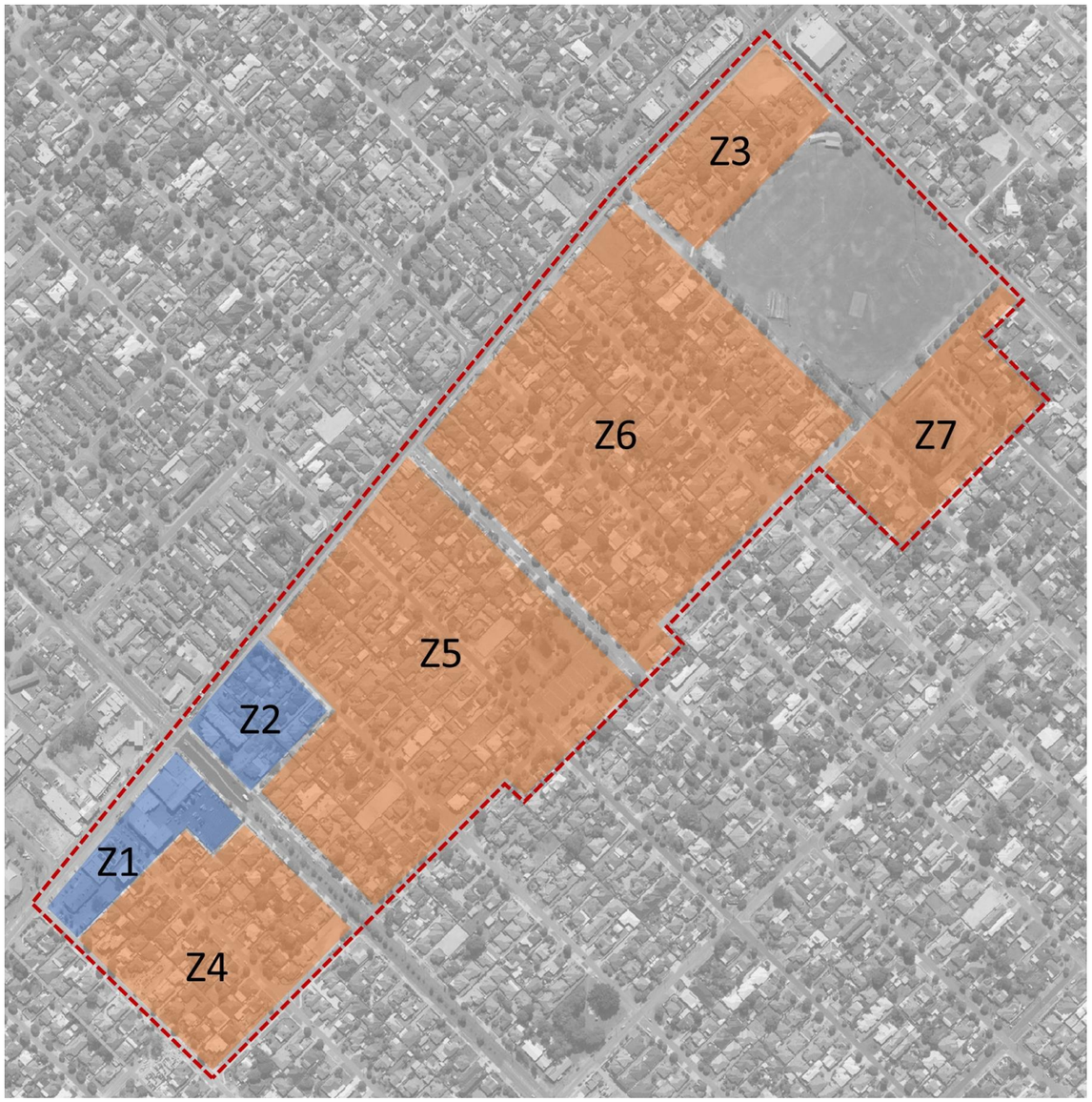

Figure 5 Bedford North study area zone structure for analysis of land use data (aerial image source: Nearmaps)

3.5 Pedestrian Connections

The Bedford North study area is located in an inner north-eastern suburb of Perth, with a well-established grid network of streets. Typical to this type of location the pedestrian network is typically formed by a path network on one side of residential streets only and on both side of major Local Distributor roads – often residential streets that form a cul-de-sac do not have paths on either side of the street.

Figure 6 shows the existing pedestrian network through the study area and the significance of these routes.

Figure 6 Existing pedestrian connections through the Bedford North study area (aerial image source: Nearmaps)

The Walk Score walkability assessment tool considers the Bedford North study area to be "somewhat walkable" where some errands can be accomplished on foot, with a walk score of 66 out of 100. This is a typical walk score for a suburban location in Perth – with a mix for residential and commercial/light industrial land uses.

The 15-minute walkable catchment from a central location within the study area is shown in Figure 7. This analysis shows that from a central location in the study area, the entire study area is walkable within 15 minutes, as well as the following locations/land uses:

- St Peter's Primary School
- Grand Promenade Reserve/Bedford Bowling Club
- IGA Bedford Supermarket (174 Grand Promenade)
- Walter Road West/Coode Street commercial area (including Morley Police Station)
- Walter Road West/Grand Promenade commercial area (including City Farmers Store)
- Birkett Reserve
- R.A. Cook Reserve

Figure 7 15-minute walking catchment from a central location in the Bedford North study area (source: www.app.TravelTime.com)

Figure 8 shows the 15-minute walkable catchment from an eastern location within the study area. This analysis shows that from an eastern location in the study area, the majority of the study area is walkable within 15 minutes, as well as the following locations/land uses:

- IGA Bedford Supermarket (174 Grand Promenade)
- Walter Road West/Coode Street commercial area (including Morley Police Station)
- Coventry Village Shopping Centre
- Birkett Reserve
- R.A. Cook Reserve
- Rudloc Reserve
- Brown Lake Reserve

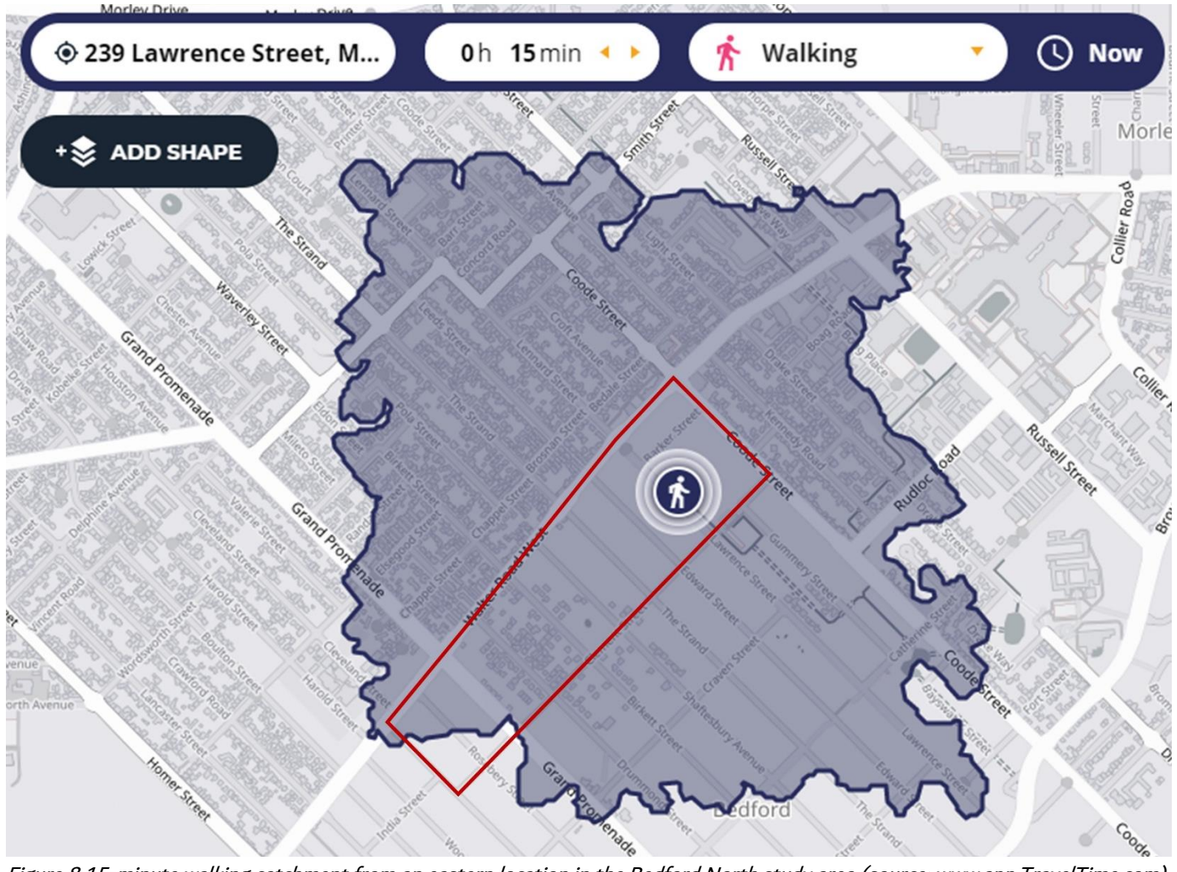

Figure 8 15-minute walking catchment from an eastern location in the Bedford North study area (source: www.app.TravelTime.com)

Figure 9 shows the 15-minute walkable catchment from a western location within the study area. This analysis shows that from a western location in the study area, the western half of the study area is walkable within 15 minutes, as well as the following locations/land uses:

- St Peter's Primary School
- Grand Promenade Reserve/Bedford Bowling Club
- IGA Bedford Supermarket (174 Grand Promenade)
- Walter Road West/Grand Promenade commercial area (including City Farmers Store)
- IGA Bedford Supermarket (174 Grand Promenade)
- Birkett Reserve
- Macaulay Park/Walter Road Reserve/Inglewood Stadium

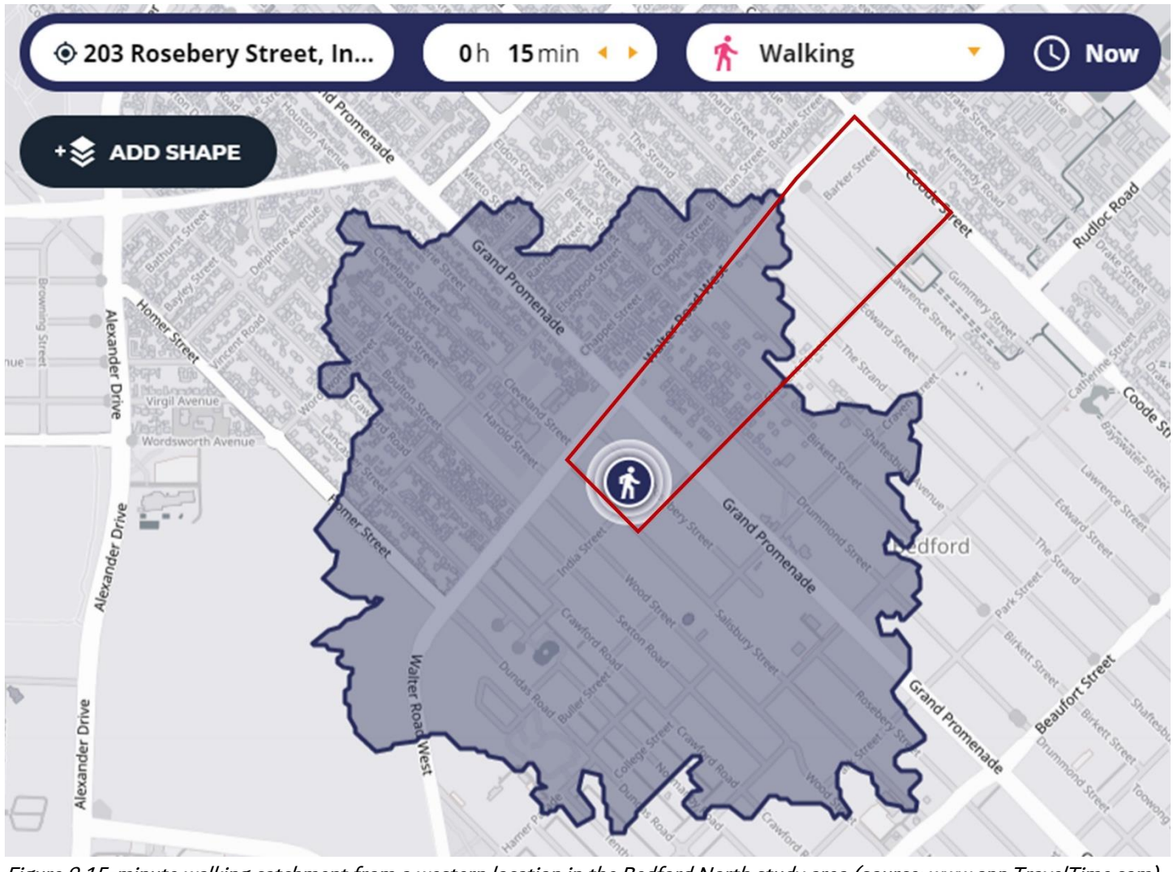

Figure 9 15-minute walking catchment from a western location in the Bedford North study area (source: www.app.TravelTime.com)

3.6 Bicycle Routes

3.6.1 Existing Bicycle Network

The Bedford North study area is located within proximity to several lower order existing bicycle routes, with the majority of these routes running on a northwest to southeast axis. These bicycle routes include:

- The Strand – identified as a 'good road rising environment' running northwest to southeast through the centre of the study area. Connecting the Midland Line Principal Shared Path (PSP) with Morley Drive Shared Path.
- Perth Bicycle Network (PBN) continuous signed route NE6 – a strategic route running from Maylands Swan River Foreshore to Reid Highway via the suburbs of Maylands, Inglewood and Dianella.
- Drake Street – identified as a 'good road rising environment' running northwest to southeast to the east of the study area. Connecting Bayswater Town Centre/Midland Line PSP with Morley Drive Shared Path.

Figure 10 shows the existing bicycle routes within vicinity of the Bedford North study area.

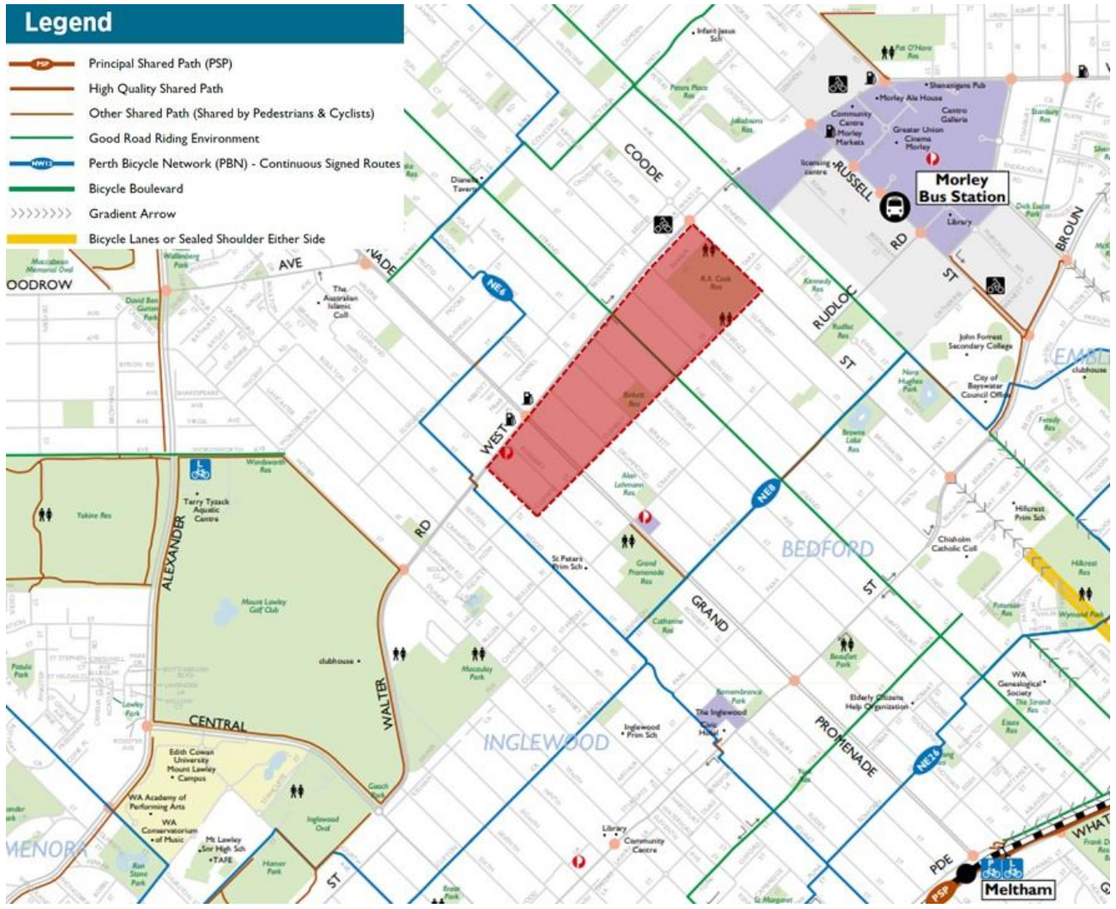

Figure 10 Existing bicycle route network (source: Department of Transport – Perth, Fremantle and Stirling Bike Map)

The route through the study area identified as a 'good road riding environment' along The Strand, is along a typical residential suburban street for the local area, with a typical 7.0m-7.4m wide carriageway, with unrestricted kerbside on-street parking and a speed limit of 50km/h. A view along The Strand is shown in Figure 11.

The Strand has priority at its intersection with Clement Street, with both the Clement Street approaches operating under stop sign control. However, at Walter Road West movements from both The Strand approaches are restricted to left in and left out only, with a central median preventing right turn movements.

Cyclists wishing to remain on The Strand and cross Walter Road West, can do so via the pram ramps and central median island refuge (approximately 1.8m deep) – the northbound crossing is most difficult with no path extension on the western side of The Strand (south of Walter Road West), preventing cyclists moving off carriageway on the approach to Walter Road West (see Figure 12 right hand side of image). In addition, the northbound crossing is made difficult by the shallow path deep on the northern side of Walter Road West and the property boundary wall (see Figure 12 left hand side of image).

Figure 11 View along The Strand (between Walter Road West and Clement Street) identified as a 'good road riding environment' (source: Google Streetview)

Figure 12 View along Walter Road West at the intersection with The Strand (identified as a 'good road riding environment') (source: Google Streetview)

Whilst the Bedford North study area is located within 1km of Morley Activity Centre (to the northeast) and 2km of Mt Lawley Senior High School and Edith Cowan University Mt Lawley Campus (to the southwest) – there are no existing clear, safe, identified bicycle routes for those living or working within the study area to travel to these key destinations of education, employment and retail services.

3.6.2 Future Bicycle Network

Between 2018-2020 the Department of Transport (DoT) has worked with 33 local governments across Perth and Peel on the Long Term Cycle Network (LTCN) project. The LTCN project has been a collaboration between State and local governments to agree on an aspirational network of bicycle routes that link parks, schools, community facilities and transport services, to make cycling a convenient and viable option for more people and more journeys.

The aim of the project was to develop an aspirational blueprint to ensure State and local governments work together towards the delivery of one continuous cycling network providing additional transport options, recreational opportunities and support for tourism and commercial activity.

In June 2020 the City of Bayswater Council endorsed their LTCN – from July 2020 the LTCN is eligible for the City to seek grant funding support from DoT to deliver bicycle infrastructure along the identified routes – as shown in Figure 13.

Two routes identified in the LTCN are of key importance to the study area in relation to the longer term planning of movement and access, these are:

- Clement Street – identified as a Local Route connection between the Bedford North study area and Morley Activity Centre to the northeast and between the study area and Wood Street/Boulton Street to the southwest.
- Catherine Street – parallel to Clement Street and 600m to the south of the study area, is identified as a key Secondary Route connection between Morley Activity Centre and North Perth via Mt Lawley Senior High School and Edith Cowan University Mt Lawley Campus.

Both of these LTCN routes would help to address the lack of existing east-west or northeast-southwest bicycle routes in proximity of the Bedford North study area.

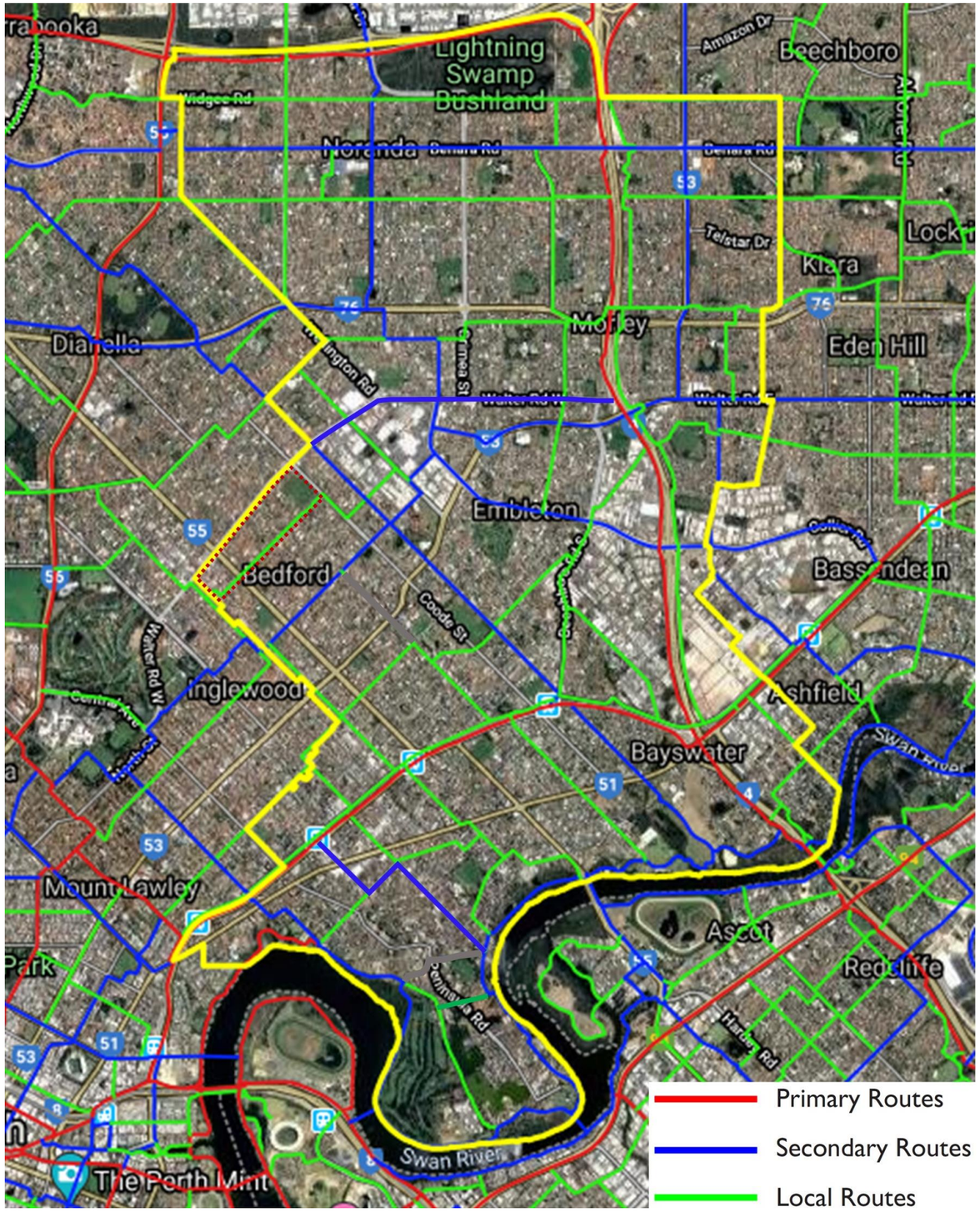

Figure 13 Long Term Cycle Network (source: Department of Transport Long Term Cycle Network project)

3.7 Public Transport Access

The Bedford North study area is conveniently located to be accessed by public transport services – these include:

- Bus services – bus routes along Walter Road West, Grand Promenade and Lawrence Street-Barker Street-Coode Street provide bus route connections to the north, east, south and west.

Figure 14 shows the location of the Bedford North study area in relation to public transport routes.

Figure 14 Public transport network in vicinity of the Bedford North study area (source: Transperth)

3.7.1 Train Services

The Bedford North study area is not served by direct access to the metropolitan rail network. The nearest train stations to the study area are Meltham Station (2.5km) with no bus connection from the study area and Bayswater Station (2.9km) with direct bus connections from the study area as set as detailed in the following section.

- Bayswater Station services operate towards Perth (12 minute journey time) and Midland (13 minute journey time):
  - Weekday rail services operate between 5.30am and 12 midnight – operating on a 10 minute frequency during the morning and afternoon peak periods and operating on a 15 minute frequency at other times (other than after 8pm where services operate on a 30 minute frequency).
  - Saturday rail services operate between 5.30am and 12 midnight (there are two late night services on Friday and Saturday nights that run in the early hours of the morning) – operating on a 15 minute frequency (other than after 8pm where services operate on a 30 minute frequency).
  - Sunday rail services operate between 7am and 12 midnight – operating on a 15 minute frequency (other than after 8pm where services operate on a 30 minute frequency).

3.7.2 Bus Services

Bus routes along the study areas boundary road of Walter Road West and along Grand Promenade and Lawrence Street-Barker Street-Coode Street provide bus service connections to the north, east, south and west:

- Bus Route No. 60
  - Route 60 operates between Elizabeth Quay Bus Station and Morley Bus Station via William Street, North Street, Dundas Road and Walter Road West, and provides access to central Perth, Highgate, Mt Lawley, Inglewood, Bedford and Morley Activity Centre.
  - Weekday bus services operate between 6.30am and 12 midnight – operating on a 15 minute frequency between 7.30am-7.30pm and on a 30-60 minute frequency outside of these times.
  - Weekend bus services operate between 8am and 9pm – operating on a 20-30 minute frequency on Saturdays and a 30 minute frequency on Sundays.
- Bus Route No. 67 and 68
  - Route 67 operates between Elizabeth Quay Bus Station and Mirrabooka Bus Station via Beaufort Street, Grand Promenade, Dianella Drive and Yirrigan Drive, and provides access to central Perth, Highgate, Mt Lawley, Inglewood, Bedford, Dianella and Mirrabooka.
  - Route 68 also operates between Elizabeth Quay Bus Station and Mirrabooka Bus Station via Beaufort Street, Grand Promenade, Dianella Drive and Yirrigan Drive – however the route travels via Lawrence Street-Barker Street-Coode Street within proximity of the Bedford North study area. The route also provides access to central Perth, Highgate, Mt Lawley, Inglewood, Bedford, Dianella and Mirrabooka.

- Combined weekday bus services operate between 6am and 9pm – operating on a 15-30 minute frequency until 7pm and on a 60 minute frequency until 9pm.
- Combined weekend bus services operate between 7am and 8pm – operating on a 30 minute frequency

- Bus Route No. 998/999 Circle Route (998 clockwise route / 999 anticlockwise route)
  - Routes 998/999 operate as a circular route connecting a range of key transport hubs, activity centres, and town centres within the inner metropolitan ring of local governments.
  - In proximity of the study area the circle route provides access to the east and southeast to Morley Activity Centre and onto Bayswater Station, via Walter Road West and Coode Street– and to the north and northwest to Dianella Plaza and onto Stirling Station, via Grand Promenade, Morley Drive, Karrinyup Road and Cedric Street.
  - Weekday bus services operate between 6am and 10pm – operating on a 15 minute frequency and a 30 minute frequency after 8pm.
  - Weekend bus services operate between 7am and 7pm – operating on a 15 minute frequency on Saturdays and a 30 minute frequency on Sundays.

3.8 Local Road Network

The local road network within the Bedford North study area consists of higher order roads along its northern and eastern boundary and supported by a network of lower order residential streets within the study area.

The study area is bound by Walter Road West to the north and Coode Street to the east – both designated as Distributor A Roads under the Main Roads WA Functional Road Hierarchy.

The study area is bound by Clement Street to the south and Wood Street to the west – both residential streets designated as Access Roads under the Main Roads WA Functional Road Hierarchy.

In addition, Grand Promenade runs through the study area and is also designated as a Distributor A Road. All other streets in the study area are residential streets designated as Access Roads under the Main Roads WA Functional Road Hierarchy as shown in Figure 15.

Walter Road West, Coode Street and Grand Promenade have a posted speed limit of 60km/h – reflecting their role as higher order Distributor A Roads. While all of the residential streets across the study area have a 50km/h default urban areas speed limit – reflecting their role as lower order local residential streets. The posted speed limits for the road network in proximity of the study area is shown in Figure 16.

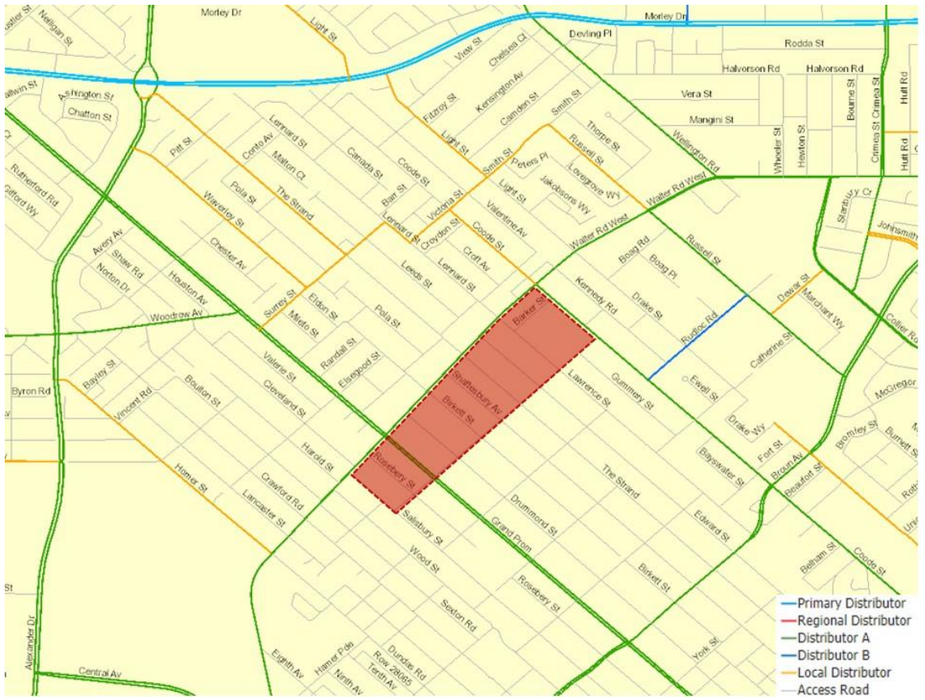

Figure 15 Local road hierarchy (source: Main Roads WA)

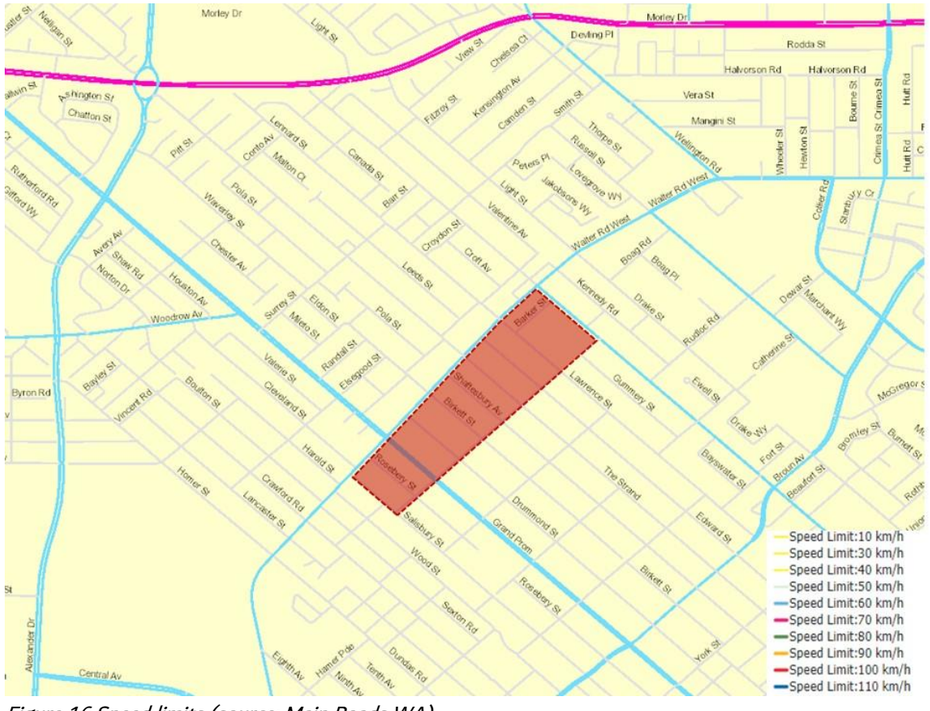

Figure 16 Speed limits (source: Main Roads WA)

3.8.1 Walter Road West

The Walter Road West corridor adjacent to the study area is a Distributor A Road with a 60km/h speed limit and existing weekday traffic volumes ranging from 18,500-23,250 vehicles per day (vpd) – 18,500vpd west of Grand Promenade, 23,250vpd near Drummond Street and 19,500vpd east of Coode Street.

The Walter Road West corridor is a four lane road (two lanes in each direction), featuring both painted medians and kerbed median islands – with the kerbed median used to provide central refuge for pedestrians at key crossing locations.

The corridor features multiple crossovers into residential properties and into parking areas for commercial properties. Bus stop infrastructure is located within the footpath, with buses dwelling at bus stops in the nearside traffic lane, temporarily reducing the travel lane down to one lane.

Figure 17 and Figure 18 show the typical arrangement of Walter Road West.

Figure 17 View eastbound along Walter Road West on approach to the Grand Promenade intersection (source: Google Streetview)

Figure 18 View eastbound along Walter Road West on approach to the Coode Street intersection (source: Google Streetview)

3.8.2 Grand Promenade

The Grand Promenade corridor adjacent to the study area is a Distributor A Road with a 60km/h speed limit, weekday traffic volumes from 16,000-23,500vpd – 16,000vpd to the south and 23,500vpd to the north of Walter Road West.

The Grand Promenade corridor is a four lane road (two lanes in each direction), featuring a kerbed median islands and wide planted medians – with the kerbed median used to provide central refuge for pedestrians at key crossing locations and the wide planted median used to create right turn pockets at key locations (such as right turn access to the Growers Market rear car parking area). Figure 19 shows the typical arrangement of Grand Promenade.

Figure 19 View northbound along Grand Promenade on approach to the Walter Road West intersection (source: Google Streetview)

3.8.3 Coode Street

The Coode Street corridor adjacent to the study area is a Distributor A Road with a 60km/h speed limit and weekday traffic volumes from 10,000-11,250vpd – 11,250vpd to the south and 10,000vpd to the north of Walter Road West.

The Coode Street corridor is a two lane road (one lane in each direction), featuring both painted medians and kerbed median islands – with the kerbed median used to provide central refuge for pedestrians at key crossing locations. Figure 20 shows the typical arrangement of Grand Promenade.

Figure 20 View northbound along Coode Street on approach to the Walter Road West intersection (source: Google Streetview)

3.8.4 Clement Street

The Clement Street corridor runs along the southern boundary of the study area and is an Access Road with a 50km/h speed limit – with the weekday traffic volumes along this corridor unknown (neither published by Main Roads or available from the City's traffic count data).

The Clement Street corridor is a two lane street (one lane in each direction), with no median treatments – the street has a typical residential character featuring multiple crossovers into residential properties. Figure 21 shows the typical arrangement for Clement Street.

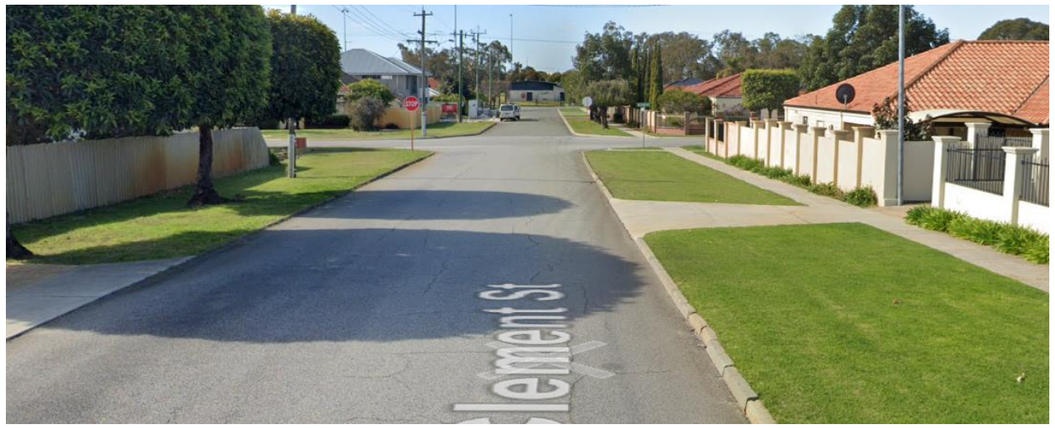

Figure 21 View eastbound along Clement Street on approach to the Edward Street intersection (source: Google Streetview)

3.8.5 Study Area Residential Streets

Figure 22 shows the typical street arrangement for the residential streets within the study area. These are all Access Roads with a 50km/h speed limit and feature one lane in each direction, with no median treatments and provide access to multiple residential crossovers. Known weekday traffic volumes range between 700-1,000vpd.

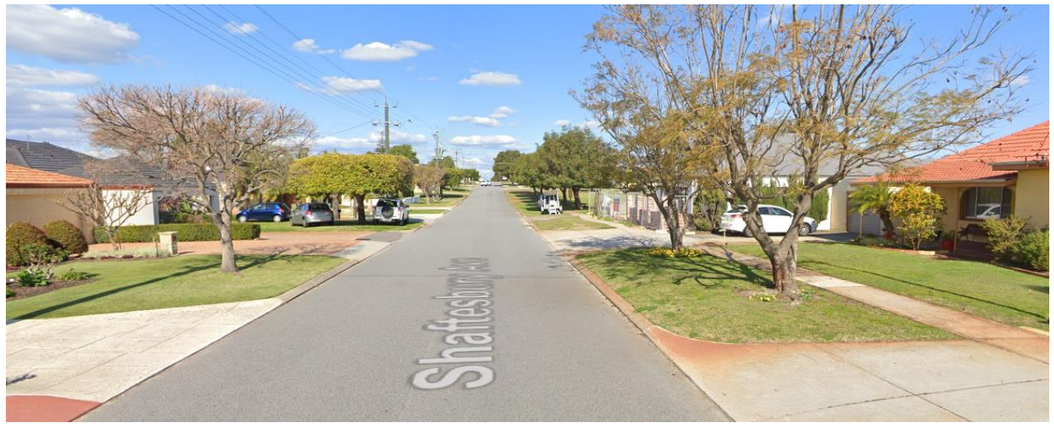

Figure 22 View northbound along Shaftesbury Avenue towards Walter Road West (source: Google Streetview)

3.9 Existing Vehicular Access Arrangements

Existing vehicular access to the Bedford North study area is provided off Walter Road West, Coode Street and Clement Street. The vehicle access arrangements are as follows:

Walter Road West

- Two traffic signal controlled intersections:
  - Grand Promenade and Walter Road West (four arm intersection)
  - Coode Street and Walter Road West (four arm intersection)
- One restricted access intersection with left in and left out movements only permitted:
  - The Strand and Walter Road West (four arm intersection)
- Three stop sign controlled intersections:
  - Drummond Street and Walter Road West (t-intersection)
  - Birkett Street and Walter Road West (four arm intersection)
  - Shaftsbury Avenue and Walter Road West (t-intersection)
- Four give way sign controlled intersections:
  - Salisbury Street and Walter Road West (t-intersection)
  - Cleveland Street and Walter Road West (t-intersection)
  - Roseberry Street and Walter Road West (t-intersection)
  - Lennard Street and Walter Road West (t-intersection)
- Two uncontrolled intersections:
  - Edward Street and Walter Road West (t-intersection)
  - Lynas Lane and Walter Road West (t-intersection)
- Numerous crossovers to residential properties and to parking areas for commercial properties

Coode Street

- One traffic signal controlled intersection:
  - Walter Road West and Coode Street (four arm intersection)
- Two uncontrolled intersections:
  - Barker Street and Coode Street (t-intersection)
  - Gummery Street and Coode Street (t-intersection)
- On the eastern side of Coode Street adjacent to the study area there are a number of crossovers to residential properties and to parking area at the back of Zone Bowling Morley.

Clement Street

- One restricted access intersection with left in and left out movements only permitted:
  - Grand Promenade and Clement Street (four arm intersection)
- Six stop sign controlled intersections:
  - Roseberry Street and Clement Street (four-intersection)
  - Drummond Street and Clement Street (four arm intersection)
  - Birkett Street and Clement Street (four arm intersection)
  - Shaftesbury Avenue and Clement Street (four arm intersection)
  - The Strand and Clement Street (four arm intersection)
  - Edward Street and Clement Street (four arm intersection)
- One give way sign controlled intersection:
  - Salisbury Street and Clement Street (t-intersection)
- Two uncontrolled intersections:
  - Lawrence Street and Clement Street (t-intersection)
  - Gummery Street and Clement Street (t-intersection)
- Numerous crossovers to residential properties

The existing vehicular access arrangements are shown in Figure 23.

3.10 Existing Car Parking Arrangements

It is outlined in the Urban Design Study for the Bedford North Corridor (Hames Sharley, 2021), that parking provision on development sites varies across the study area.

It is noted that most grouped dwellings and newer residential developments include double enclosed garages, and older houses typically feature open carports or in-front at grade parking – this is a reflection of recent design preferences to place car parking convenience as a priority for house frontages.

It is also noted that replacing more traditional carport / at grade parking spaces with double garages fronting onto the street has had a large impact on the relationship between buildings and the public realm. It is noted that this impacts the street character – although it is noted that this can be improved through appropriate design provisions.

Figure 23 Bedford Street study area existing vehicular access arrangements (aerial image source: Nearmaps)

4. ANALYSIS OF TRANSPORT NETWORKS

4.1 Development Scenarios – Residential Dwellings

For the purposes of analysis and comparison the Bedford North study area has been split into seven (7) zones. The study area zone structure is shown in Figure 24– with Zone 1 only containing commercial land uses, Zone 2 a small area of commercial land use and residential dwellings, and Zones 3-7 containing residential dwellings.

Figure 24 Bedford North study area zone structure for analysis of land use data (aerial image source: Nearmaps)

The Hames Sharley Urban Design Study for the Bedford North study area has considered development outcomes from design tests and made a series of projections about the number of dwellings (or floor space for non-residential uses) that could occur in the area if modifications to the planning framework were to occur. This information has been utilised to inform the analysis of the transport networks outlined in this section of the Transport Impact Review report.

The residential dwellings development scenarios considered are:

- Low Growth – based on a North Perth development model
- Medium Growth – based on a Leederville development model
- High Growth – based on a Mt Lawley development model

Figure 25 outlines the characteristics of the three development scenarios.

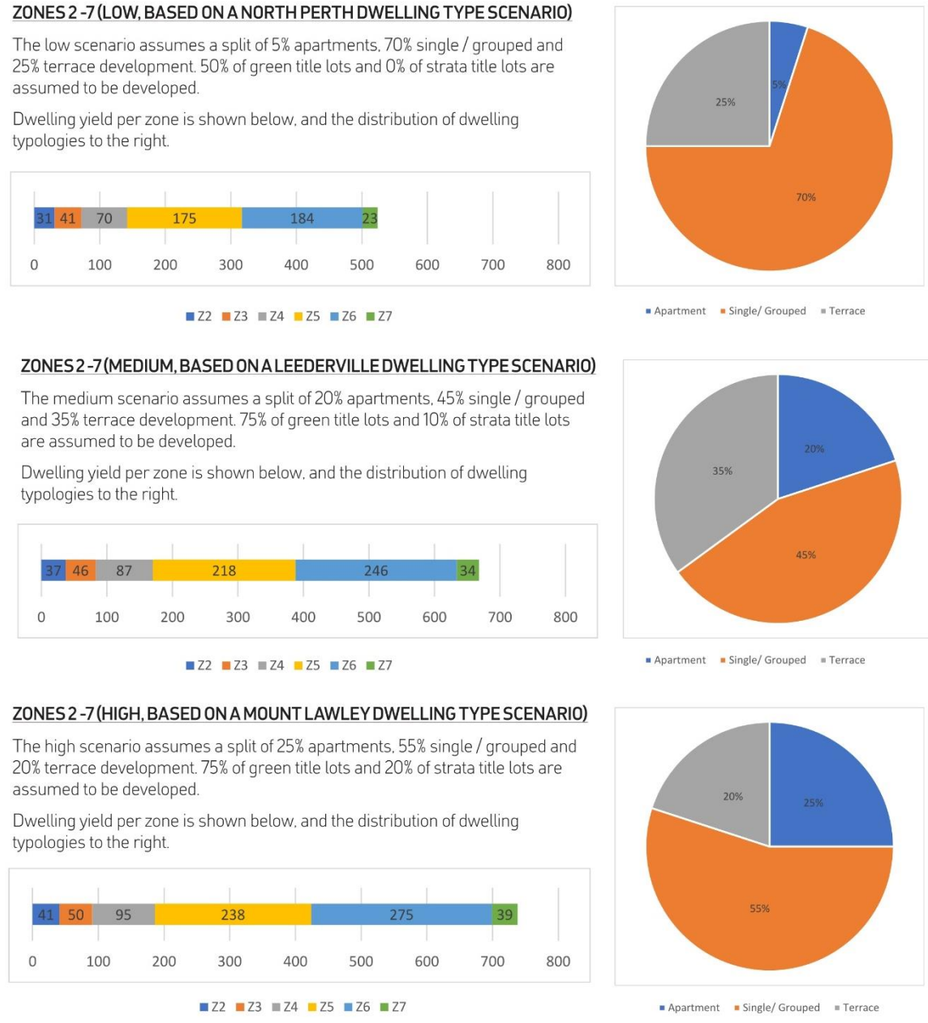

Figure 25 Bedford North study area – development scenarios (source: Bedford North Urban Design Study, Hames Sharley)

Based on the characteristics of the three development scenarios, Table 3 provides a comparison between the number of dwellings per zone that could be accommodated across the study area in each of the development scenarios.

- Existing 2020 – residential dwellings = 497 (baseline)
- Low Growth Scenario – residential dwellings = 524 (+27 dwellings / 5% increase)
- Medium Growth Scenario – residential dwellings = 668 (+171 dwellings / 34% increase)
- High Growth Scenario – residential dwellings = 738 (+241 dwellings / 48% increase)

Table 3 – Bedford North study area development scenarios – residential dwellings comparison

Zone	Existing 2020 Residential Dwellings (no.)	Low Growth Scenario Residential Dwellings (no.)	Medium Growth Scenario Residential Dwellings (no.)	High Growth Scenario Residential Dwellings (no.)
1	0	0	0	0
2	29	31	37	41
3	40	41	46	50
4	68	70	87	95
5	168	175	218	238
6	172	184	246	275
7	20	23	34	39
TOTAL	**497**	**524**	**668**	**738**

Table 4 provides additional context in relation to the increases in dwellings from scenario to scenario (i.e. Existing 2020 to Low / Low to Medium / Medium to High).

Table 4 – Bedford North study area development scenarios – residential dwellings comparison scenario to scenario

Zone	Existing 2020 Residential Dwellings (no.)	Existing to Low Growth Scenario – Residential Dwellings (no.)	Low to Medium Growth Scenario – Residential Dwellings (no.)	Medium to High Growth Scenario – Residential Dwellings (no.)
1	0	0	0	0
2	29	2	6	4
3	40	1	5	4
4	68	2	17	8
5	168	7	43	20
6	172	12	62	29
7	20	3	11	5
Additional Dwellings Added to Previous Scenario:		**27**	**144**	**70**
% Increase from Existing 2020 Baseline:		**5%**	**34%**	**48%**

4.2 Development Scenario – Commercial Floor Area

A single development scenario has been considered in relation to the commercial floor area within the Bedford North study area.

In relation to Zone 2 a single development scenario considers the existing minimal commercial floor area (202 NLA m^2) to be retained, alongside the growth in residential dwellings previously outlined in relation to the Low-High growth scenarios.

In relation to Zone 1 a single development scenario considers the existing commercial floor area to reduce from approximately 3,342 NLA m^2 to 2,214 NLA m^2, with Zone 1 being supplemented with new residential apartment development (145 units).

Table 5 outlines the single development scenario in relation to the zones containing commercial floor area.

Table 5 – Bedford North study area development scenario – commercial floor area

Zone	Existing 2020 Commercial Floor Area (NLA m^2)	Development Scenario Commercial Floor Area (NLA m^2)	Development Scenario Residential Apartments (no.)
1	3,342	2,214	145
2	202	202	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
TOTAL	**3,443**	**2,416 (-1,128)**	**145 (+145)**

4.3 Understanding Transport Networks Impacts of Development Scenarios

To understand the impacts on the transport networks of the development scenarios – in particular the impact on the road network – outputs from the Main Roads WA Regional Operations Model (ROM) were provided to the project team and analysed.

Figure 26 shows a geographical comparison of the location and coverage of the Bedford North study area compared to the coverage of the equivalent Main Roads WA ROM zone, which includes the Bedford North study area (ROM Zone 447). As is shown the Main Roads ROM zone covers a far wider area than just the Bedford North study area.

The figure also shows that in the Main Roads WA strategic model the zone is loaded with traffic to/from connections with Walter Road West (to the north) and Beaufort Street (to the south).

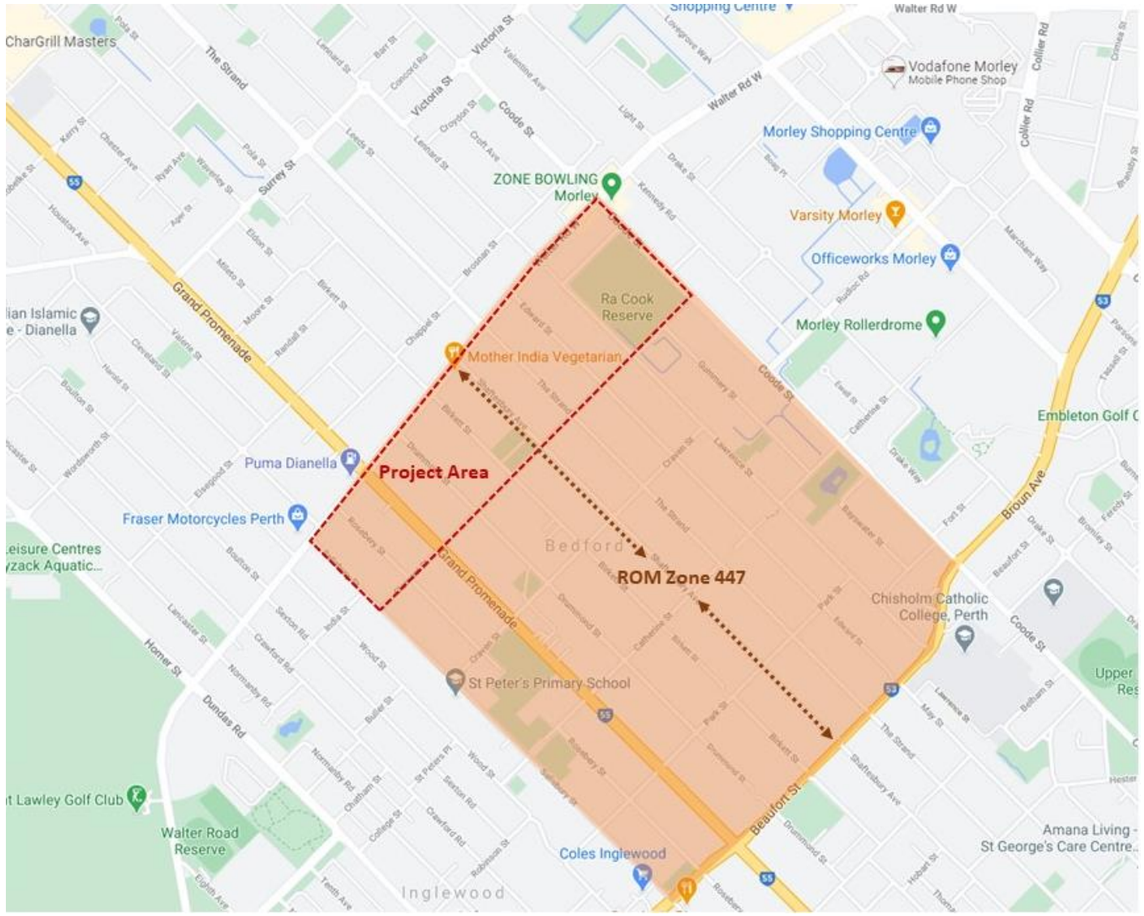

Figure 26 Geographical comparison of the Bedford North study area and Main Roads WA ROM Zone 447 (map source: Googlemaps)

ROM outputs provided to the project team included the land use data inputs into the model for ROM Zone 447 – the land use data provided was for the modelled years of 2016, 2021, 2026 and 2031. The ROM land use input data is based upon information provided to Main Roads WA from the Department of Planning, Lands and Heritage (DPLH) via Metropolitan Land Use Forecasts (MLUFS) and infill data from various Local Government Authorities (LGAs).

The information provided to the project team has enabled a comparison of the increases in population, dwellings and employment opportunities within the area covered by ROM Zone 447 across the modelled years. Table 6 shows the increase in total population and dwellings, whilst Table 7 shows the increase in total employment opportunities across ROM Zone 447 over the modelling years.

As shown in the tables below, the land use data inputs into ROM for 2021 and 2031show a 28% increase in dwellings and a 48% increase in employment opportunities across this 10 year period within ROM Zone 447.

Table 6 – Main Roads WA ROM Inputs for Zone 447 – Total Population and Dwellings – MLUFS Data Version 1.4

Modelled Year	Total Population	Total Dwellings	Dwellings Increase on Previous 5-Year Period	Dwellings % Increase on Previous 5-Year Period	Dwellings Increase on Previous 10-Year Period	Dwellings % Increase on Previous 10-Year Period
2016	4,805	2,190				
2021	4,536	2,180	-10	+0%		
2026	4,995	2,382	+201	+9%	+192	+9%
2031	5,970	2,789	+407	+17%	+609	+28%

Table 7 – Main Roads WA ROM Inputs for Zone 447 – Total Employment Opportunities – MLUFS Data Version 1.4

Modelled Year	Total Employment Opportunities	Employment Opportunities Increase on Previous 5-Year Period	Employment Opportunities % Increase on Previous 5-Year Period	Employment Opportunities Increase on Previous 10-Year Period	Employment Opportunities % Increase on Previous 10-Year Period
2016	561				
2021	499	-62	-11%		
2026	602	+104	+21%	+42	+7%
2031	740	+138	+23%	+242	+48%

The ROM outputs provided to the project team also included a sub-area matrix for the network shown in Figure 27. The figure shows the extents of the road network covered in the sub-area matrix provided by Main Roads WA, as well as the zone structure for the sub-area matrix.

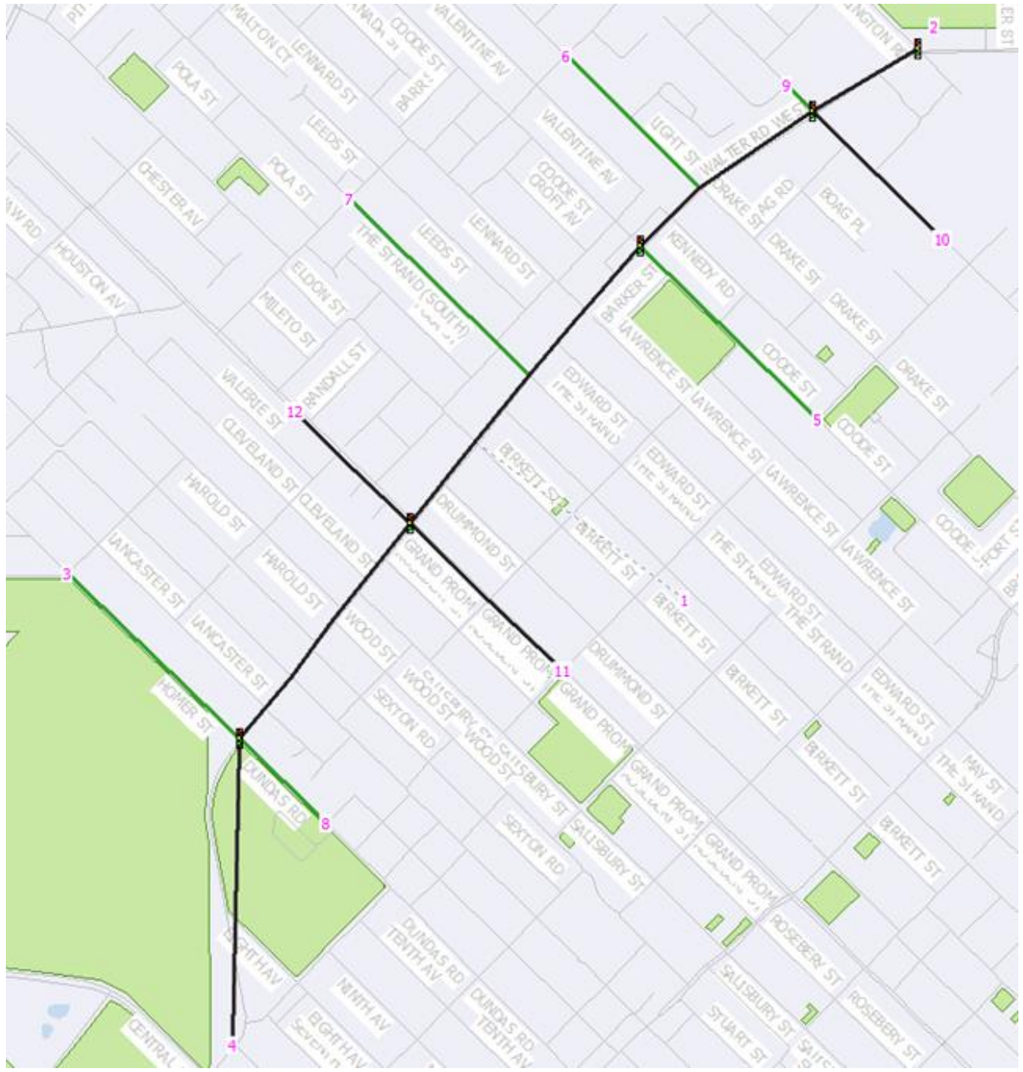

Figure 27 Network extents and zone structure for the ROM sub-area matrix provided by Main Roads WA (source: Main Roads WA)

The sub-area matrix volumes have been analysed to understand the relationship within ROM as to the future year land use inputs into the model and the predicted future year traffic generation.

Table 8 shows the total sub-area matrix weekday traffic for the modelled years of 2021, 2026 and 2031. The sub-area matrix shows a 2.0%-2.5% annual increase in traffic through the study area – which is a typical annual traffic growth rate from ROM and Main Roads WA led traffic modelling.

From the information available to the project team, there is no way to determine if the increase in traffic across the modelled years, is associated with typical Main Roads WA background growth factor or associated with localised land use uplifts (through increased residential density and commercial activity) within the MLUFS data utilised in ROM modelling.

Table 8 – Study area sub-area matrix weekday traffic volumes from the Main Roads WA ROM model

Year	Total Sub-Area Matrix Weekday Traffic	Daily Traffic Increase on Previous 5-Year Period	% Increase on Previous 5-Year Period	Daily Traffic Increase on Previous 10-Year Period	% Increase on Previous 10-Year Period
2021	67,500				
2026	75,600	+8,100	12%		
2031	85,200	+9,600	12%	+17,700	26%

As shown in Figure 27, Zone 1 in the sub-area matrix reflects a zone connector – as such this point of connection will broadly reflect land uses within the Bedford North study area and represent traffic volumes into and out of the study area. It should be noted that the information available to the project team, does not enable any conclusions to be draw as to the exact geographical area covered by this zone connector.

Table 9 shows the total weekday traffic entering and exiting Zone 1, which is broadly reflective of the Bedford North study area. The ROM outputs show an increase in weekday traffic movements between 2021 and 2031 of 1,075vpd.

Table 9 – Sub-area matrix Zone 1 weekday traffic volumes from the Main Roads WA ROM model

Year	Zone 1 Weekday Traffic	Daily Traffic Increase on Previous 5-Year Period	% Increase on Previous 5-Year Period	Daily Traffic Increase on Previous 10-Year Period	% Increase on Previous 10-Year Period
2021	3,511				
2026	3,867	+357	10%		
2031	4,586	+719	18%	+1,075	30%

If you conclude that the traffic entering and exiting Zone 1 is broadly reflective of the Bedford North study area, and the increase in land uses outlined previously in relation to the MLFS data, you can conclude that the increase in traffic between 2021 and 2031 of 1,075vpd is reflective of the increase in residential dwellings and employment opportunities across the broader ROM Zone 447.

If you conclude that the residential dwellings increase across ROM Zone 447 is likely to be evenly distributed (even taking into account potential nodes of higher density residential development along the Beaufort Street and Walter Road West corridors), you can conclude that the increase in weekday traffic of 1,075vpd is likely to be representative of an approximate 28% increase in residential development.

Applying a typical average daily vehicle trip rate per dwelling of 6.0 (noting that future higher density developments in the study area are likely to generate fewer daily vehicle trips and lower density developments are likely to generate a few more) the 1,075vpd equates to an increase of approximately 180 dwellings from the existing baseline.

Based on the above analysis, the MLUFS data input into the Main Roads ROM model and the associated model outputs, appear reflective of an approximate increase in residential development in the study area between 2021 and 2031 of 180 dwellings – from 497 to 677 (approximately). This represents a 36% uplift in residential development – which is broadly reflective of a Low-Medium Growth development scenario considered in this study.

4.4 High-Level Assessment of Traffic Signal Controlled Intersections

To provide a high-level analysis of the impacts of the increased traffic from the ROM model outputs, passing through the Walter Road West traffic signal controlled intersections with Grand Promenade and Coode Street – Sidra intersection models have been developed for each intersection. Main Roads WA traffic signal times were used to accurately reflect the existing operation of the traffic signals.

High-level AM and PM peak hour models have been constructed and summary Sidra outputs are presented in Table 11 and Table 12. The tables show the overall intersection Level of Service (LoS) and the average delay (seconds) and worse degree of saturation (%).

Level of Service provides an indication of performance and is based on ranges of delays for vehicles. The Highway Capacity Manual sets out the following ranges for signalised intersections included in Table 10.

Table 10 - Level of Service Ranges for Signalised Intersections

LoS	Delay (Seconds)	
A	0	10
B	10	20
C	20	35
D	35	55
E	55	80
F	80	Infinity

Table 11 – Walter Road West and Grand Promenade Traffic Signal Controlled Intersection

	AM PEAK HOUR			PM PEAK HOUR		
	Base 2020	2026	2031	Base 2020	2026	2031
LoS	F	F	F	E	F	F
Av. Delay (sec)	137.1	262.7	395.8	74.3	100.1	144.3
Worst DoS (%)	109	123	136	118	132	146

Table 12 - Walter Road West and Coode Street Traffic Signal Controlled Intersection

	AM PEAK HOUR			PM PEAK HOUR		
	Base 2020	2026	2031	Base 2020	2026	2031
LoS	C	C	C	C	D	E
Av. Delay (sec)	29.2	30.1	33.1	31.0	38.1	66.7
Worst DoS (%)	60	69	87	82	92	102

The intersection assessment tables highlight that the Walter Road West and Grand Promenade intersection is already operating at a LoS F in the AM peak and LoS E in the PM peak – and the intersection performance will only deteriorate with the predicted growth in traffic by 2031 – which as outlined previously includes an approximate 36% uplift in residential development (+180 dwellings) in the Bedford North study area, as reflected in the MLUFS data input into the Main Roads ROM model.

The intersection assessment table for the Walter Road West and Coode Street intersection also highlights the PM peak deterioration in intersection performance based on the predicted growth in traffic by 2031 – which as outlined previously includes an approximate 36% uplift in residential development (+180 dwellings) in the Bedford North study area, as reflected in the MLUFS data input into the Main Roads ROM model.

Based on the intersection performance it would indicate that the strategic road network in proximity of the study area is going to experience peak period delays and deterioration in performance by 2031 based on the growth scenario within the MLUFS data input into Main Roads ROM model – this suggests that future residential uplift in the order of 36% (broadly reflective of a Low-Medium Growth scenario) should be considered and balanced against broad State and Local Government priorities of housing and economic opportunities to develop the main street and additional living options.

4.5 Future Traffic Volumes

Figure 29 to Figure 32 show the existing traffic count data available for the study area (in red text) and the future traffic volumes from the ROM model (in brown text). The traffic volumes are consistent across all four figures, with the only difference on each figure being the residential dwellings information for the various base case /three growth scenarios.

Figure 28 presents the typical mid-block capacity for urban roads – note that peak period lane capacities can increase to between 1,200-1,400 passenger cars per hour (pc/h) per lane, if there are parking controls or absence of parking / good traffic signal coordination / control or absence of uncontrolled right turn movements.

In the case of Walter Road West, you would expect the road to have a mid-block capacity of 1,800-2,000pc/h across both lanes. The future traffic volumes from the ROM model (shown on the following four figures) would suggest that the Walter Road West corridor would be operating close to its mid-block capacity for much of the day between the AM and PM peaks. This again points to considering residential uplift in the order of 36% (broadly reflective of a Low-Medium Growth scenario) balanced against broader State and Local Government priorities of housing and economic opportunities to develop the main street and additional living options.

Type of lane	One-way mid-block capacity (pc/h)
Median or inner lane	
Divided road	1000
Undivided road	900
Middle lane (of a 3 lane carriageway)	
Divided road	900
Undivided road	1000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900

Figure 28 Typical mid-block capacity of urban roads (source: Austroads, 2020)

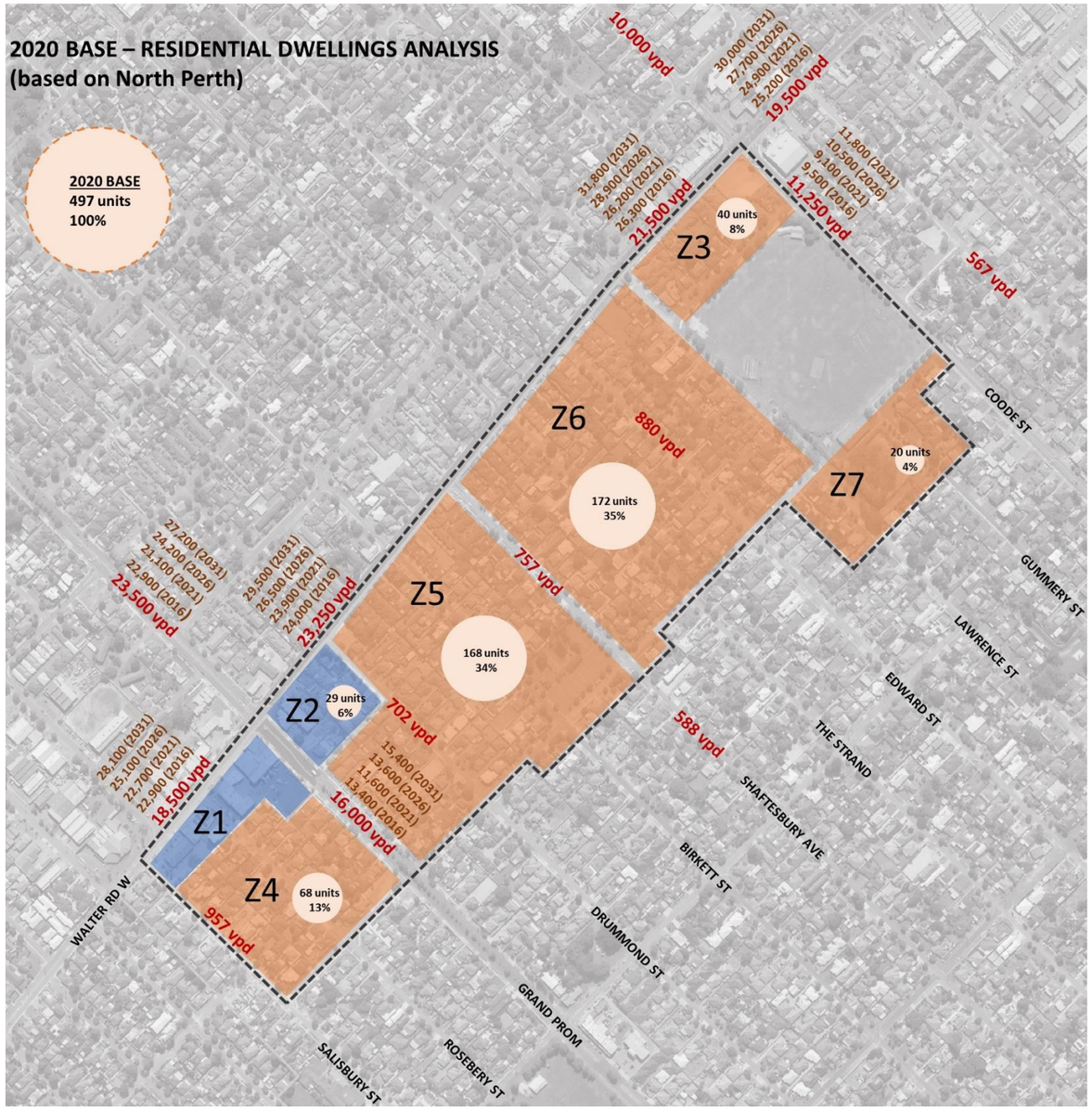

Figure 29 Existing traffic (red text) and future ROM model traffic (brown text) – with existing dwellings data (aerial image source: Nearmaps)

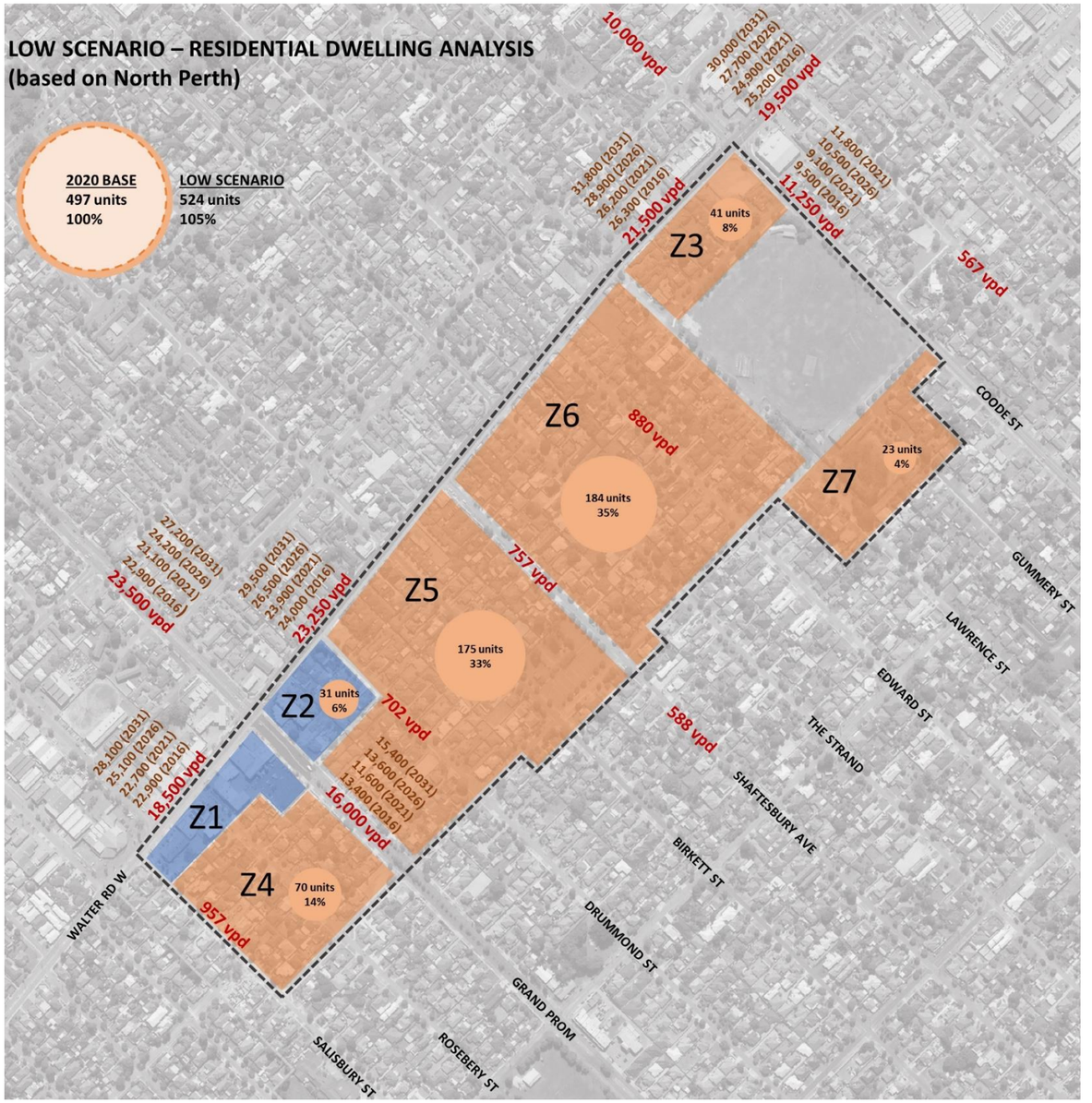

Figure 30 Existing traffic (red text) and future ROM model traffic (brown text) – with Low Growth scenario dwellings data (aerial image source: Nearmaps)

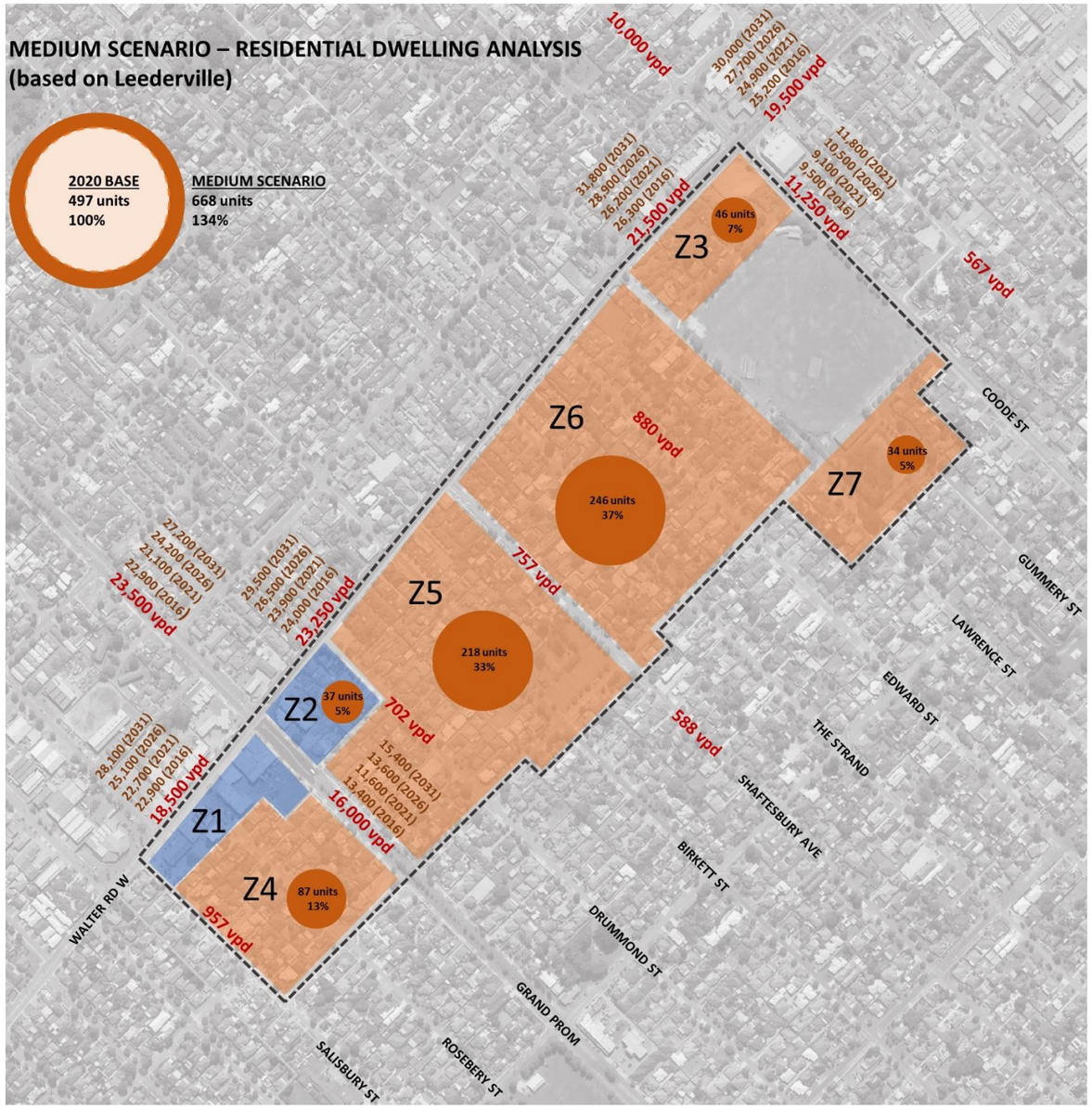

Figure 31 Existing traffic (red text) and future ROM model traffic (brown text) – with Medium Growth scenario dwellings data (aerial image source: Nearmaps)

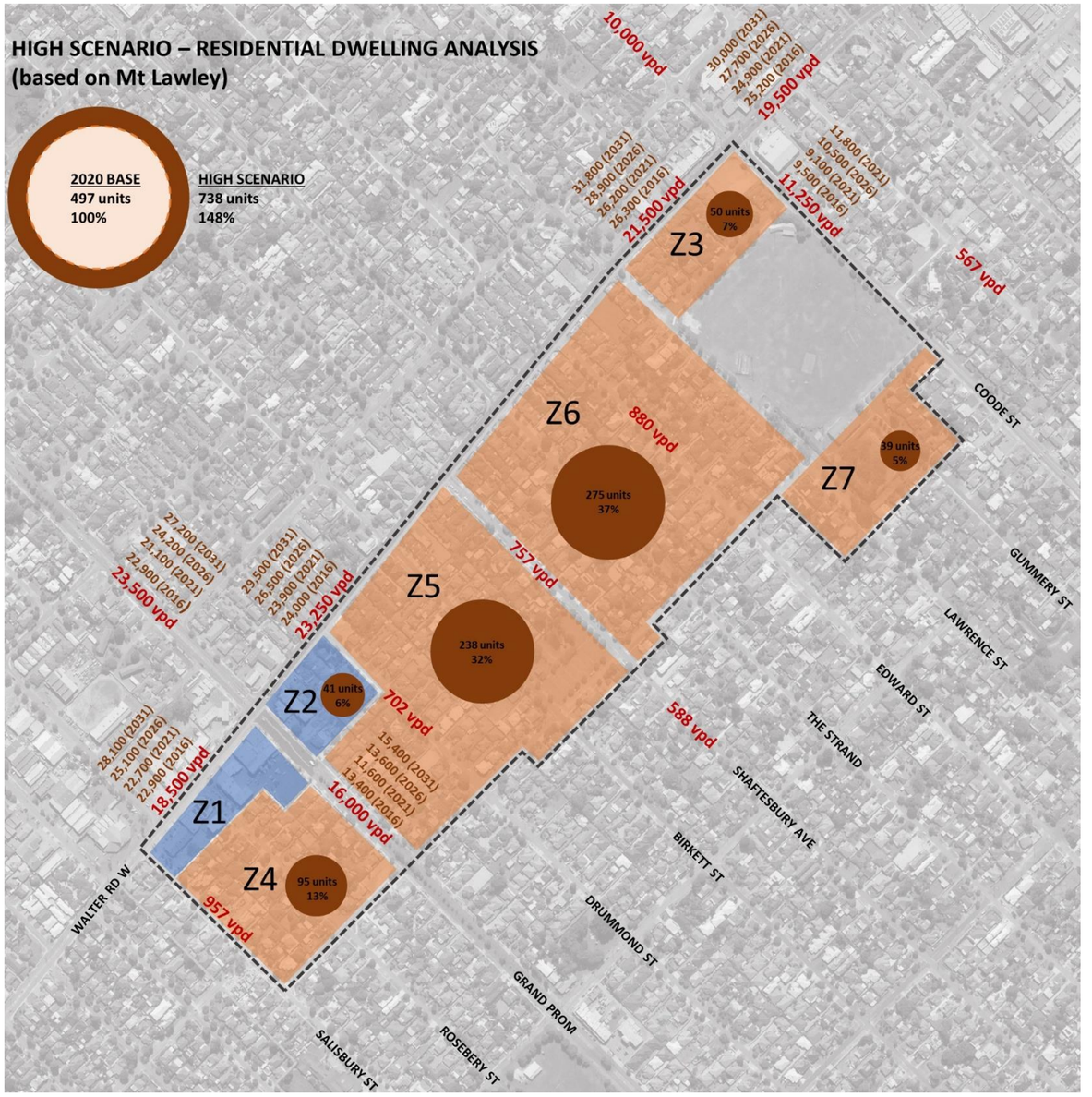

Figure 32 Existing traffic (red text) and future ROM model traffic (brown text) – with High Growth scenario dwellings data (aerial image source: Nearmaps)

4.6 Car Parking Considerations

In developing the Urban Design Study for the Bedford North study area, the project team prepared schematic tests across a limited number of sites to understand the possibilities for the projects urban design principles to be accommodated while still achieving increased density and dwelling diversity as redevelopment occurs in Bedford North.

The schematic testing included the consideration of car parking layouts, as well as building siting, building entrances and vehicle access locations. For each of the schematic test locations, commentary in relation to the impacts on car parking is noted, along with the schematic images showing the development and parking typologies considered – see Figure 33 to Figure 38.

SITE 1 – Off Corridor, Corner Lot

- The impact of car parking and garages towards the street is minimised through both tests. These functions are largely concealed, and where visible in the apartment configuration they are contained to the rear of the lot and could be screened.
- Assumes visitor parking can be accommodated on or close to the street in parallel bays.

SITE 1 – Off Corridor, Corner Lot (Grouped Dwellings and Apartments Test)

Figure 33 Site 1 development and parking typologies tested (source: Bedford North Urban Design Study, Hames Sharley)

SITE 2 – Off Corridor Lot

- A key consideration for both tests has been to limit the visibility of driveways, garages. This has minimised through both tests through one narrow driveway to the middle or back of the lot. Garages are tucked out of sight of the street.
- Assumes visitor parking can be accommodated on or close to the street in parallel bays.

SITE 2 – Off Corridor Lot (Grouped Dwellings and Terrace Houses Test)

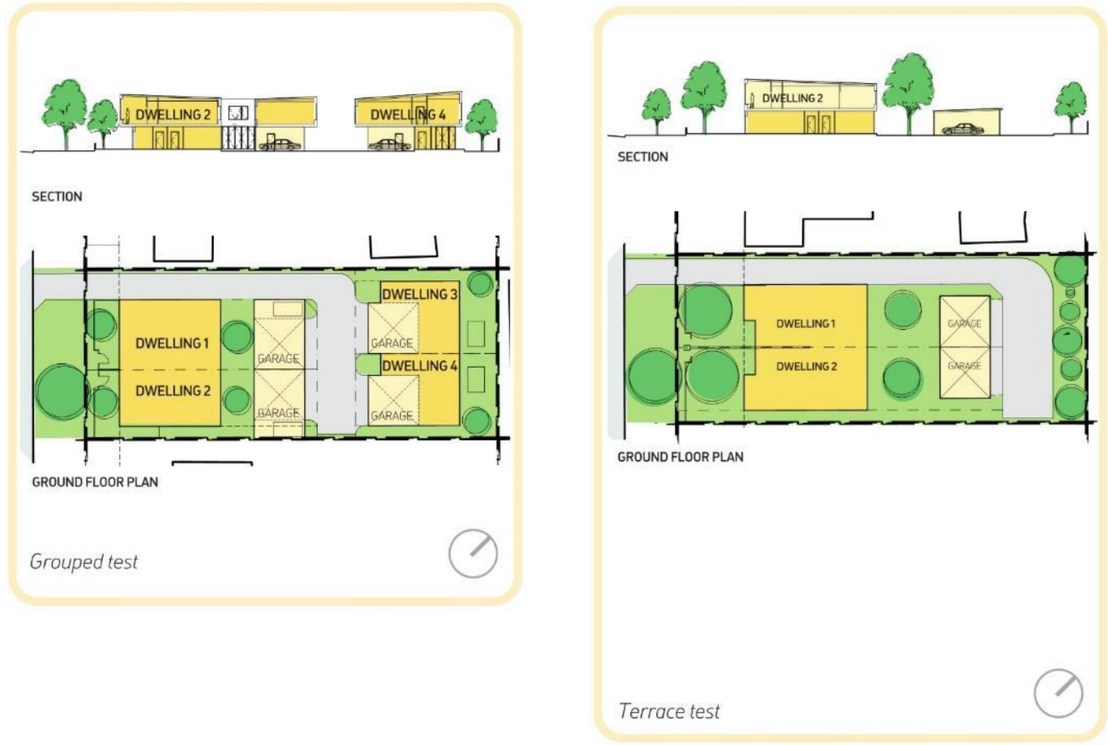

Figure 34 Site 2 development and parking typologies tested (source: Bedford North Urban Design Study, Hames Sharley)

SITE 3 – Off Corridor, Slopped Lot

- A key consideration for both tests has been to limit the visibility of driveways, garages. This has minimised through both tests through one narrow driveway to the middle or back of the lot. Garages are tucked out of sight of the street.
- Visitor parking can be accommodated behind the building envelope to allow for planting in the front setback.
- This test demonstrates that basement car parking can be avoided, with moderate retaining.

SITE 3 – Off Corridor, Slopped Lot (Grouped Dwellings and Apartments Test)

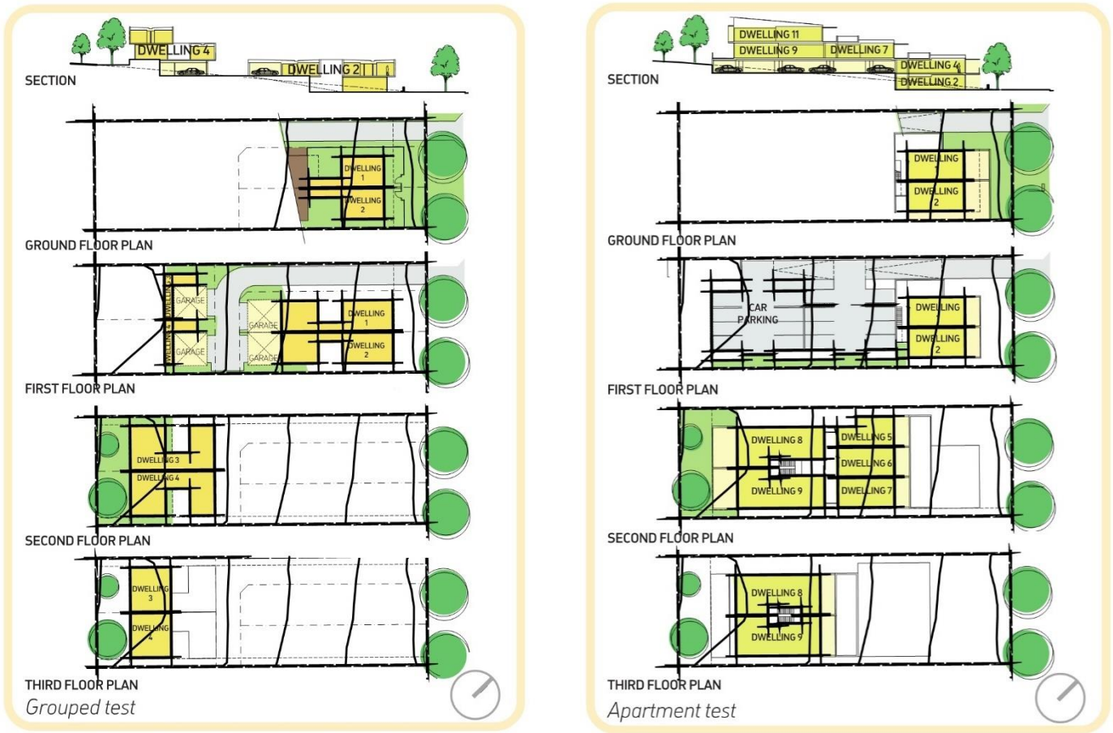

Figure 35 Site 3 development and parking typologies tested (source: Bedford North Urban Design Study, Hames Sharley)

SITE 4 – On Corridor Lot

- A key consideration for this test has been to limit the visibility of driveways, garages through one narrow driveway to the back of the lot. Garages are tucked out of sight of the street.
- This typology sets up an opportunity for corner lot development to amalgamate and 'plug into' the rear car parking space without the need for an individual driveway off Walter Road.

SITE 4 – On Corridor Lot (Apartments Test)

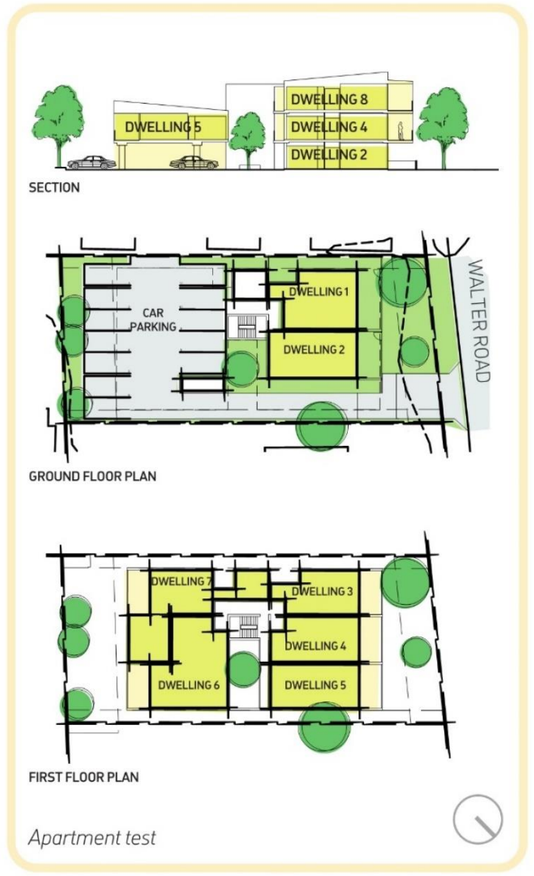

Figure 36 Site 4 development and parking typologies tested (source: Bedford North Urban Design Study, Hames Sharley)

SITE 5 – Off Corridor, Corner Lot

- A key consideration for this test has been to limit the visibility of driveways, garages through one narrow driveway to the back of the lot. Garages are tucked out of sight of the street.
- Parking for the retail space may require dispensation from the City. This could be accommodated on the side street, off Walter Road.

SITE 3 – Off Corridor, Corner Lot (Apartments and Apartments with Mixed Use Test)

Figure 37 Site 5 development and parking typologies tested (source: Bedford North Urban Design Study, Hames Sharley)

COMMERCIAL SITES – Bedford Town Centre

- Car parking is typically accommodated at ground level, with basements for larger sites. The dimensions of larger site make for efficient car parking floor plates, which can deliver more retail opportunities on the ground floor. For example local grocery stores or supermarkets.
- Tests on smaller commercial sites reveal the limited ability to develop individual lots due to their narrow dimensions. Car parking layouts and floor plates are constrained and are likely to require amalgamation.

COMMERCIAL SITE – Bedford Town Centre

Basement Parking

Ground Level Parking

Figure 38 Commercial sites development and parking typologies tested (source: Bedford North Urban Design Study, Hames Sharley)

5. INTEGRATION WITH SURROUNDING AREA

5.1 Main Street Considerations

It is recognised across all disciplines within the project team that the design of Walter Road West is critical to the success of Bedford North into the future. The road corridor provides a regional road function, though there are many improvements that can be made to make the experience safer for pedestrians and encourage more activity on the road.

Whilst Walter Road West does carry regional traffic (with typical weekday traffic volumes in the order of 18,500-23,250vpd), these traffic volumes are lower than many other main street examples in Perth.

As noted in the Hames Sharley Urban Design Study, this presents an excellent opportunity to upgrade the Walter Road West corridor into something that is suitable for the local area, rather than simply there to serve regional traffic needs.

Figure 39 shows a typical view along the Walter Road West corridor, as well as the key characteristics of the corridor – these can be compared against the example main street locations around Perth shown in Figure 40. The examples from Mt Hawthorn and Mt Lawley underline that for corridors with similar traffic volumes to Walter Road West, they can operate with a lower posted speed limit and contain significantly more trees and vegetation, as well as feature wide median island treatments to provide safe pedestrian crossing locations and encourage pedestrian activity.

2020 Average Vehicles Mon-Fri:	18,500-23,250vpd
Road carriageway width:	Typically 14m
Minimum number of lanes:	4 lanes
Typical posted speed:	60km/h
Median street trees:	No
Activity:	Residential, Retail, Commercial

Figure 39 Existing characteristics of the Walter Road West corridor adjacent to the study area (image source: Google Streetview)

SCARBOROUGH BEACH ROAD
MOUNT HAWTHORN

Road Category	Other Regional Road
2015/17 Avg Vehicles Mon-Fri:	22,865
Road carriageway width:	Typically 14m
Minimum number of lanes:	2 lanes
Typical posted speed:	40km/hr
Median street trees:	Yes
Activity:	Hospitality, Residential, Retail, Commercial

BEAUFORT STREET
MOUNT LAWLEY

Road Category	Other Regional Road
2015/17 Avg Vehicles Mon-Fri:	24,798
Road carriageway width:	Typically 15m
Minimum number of lanes:	4 lanes including parking
Typical posted speed:	40 to 60km/hr
Median street trees:	Yes
Activity:	Hospitality, Residential, Retail, Commercial

CAMBRIDGE STREET
WEST LEEDERVILLE

Road Category	District Distributor A
2018/19 Avg Vehicles Mon-Fri:	19,078
Road carriageway width:	Typically 14m
Minimum number of lanes:	2 lanes
Typical posted speed:	60km/hr (traffic calmed)
Median street trees:	Yes
Activity:	Hospitality, Residential, Retail, Commercial

WHATLEY CRESCENT
MAYLANDS

Road Category	Local Distributor Road
2015/17 Avg Vehicles Mon-Fri:	12,624
Road carriageway width:	Typically 14m
Minimum number of lanes:	2 lanes + parking
Typical posted speed:	60km/hr
Median street trees:	No
Activity:	Hospitality, Residential, Retail, Commercial

Figure 40 Main street examples from across Perth (source: Bedford North Urban Design Study, Hames Sharley)

5.2 Public Transport Access Considerations

As the Bedford North area evolves to a more urban condition, public transport services will become important for residents and visitors accessing home or commercial offerings on main street environments.

Bus route 60 and the Circle Route 998/999 run along Walter Road West, providing direct access to Perth CBD and Morley Activity Centre to the North-East. Lots closer to public transport are more likely to use public transport. These lots should be encouraged to have a higher density of development.

In order to create attractive public transport services, there are often three factors which the community point towards:

- Service Frequency – whilst journey time is an important factor, often service frequency (and consequently wait times for services to arrive) is an issue that the community raise when considering the attractiveness of their public transport options.
- Efficient Ticketing System – whilst fare structures and overall public transport cost is an important factor, often ticketing efficiency and "tap and go" payments, along with cross public transport modal ticketing is important when considering the attractiveness of public transport.
- Passenger Comfort – the overall comfort of the public transport experience is an important factor. The refers to the comfort of the entire public transport experience – from ease and comfort of access to public transport stations and stops, to the comfort of the station or stop environment, to the availability of service timetabling and information, as well as on-board comfort – these are all factors that need to be considered.

Whilst service frequency and ticket system efficiency are outside of the control of LGAs, and primarily under the control and influence of the State Government through the Public Transport Authority (PTA) and Transperth – elements of passenger comfort and the overall public transport experience can be influenced by decision and choices made by LGAs.

Figure 41 shows the distance to access public transport services from various part of the Bedford North study area. – the figure also shows the existing location of bus stops along the Walter Road West corridor. Figure 42 to Figure 45 show four examples of the existing bus stop infrastructure at stops along Walter Road West and the location of the nearest provision for safe pedestrian crossing of Walter Road West to access the bus stop.

What is apparent from the comparison of the four example bus stops, is that whilst the provision for safe pedestrian crossing of Walter Road West is relatively well served by kerbed median islands with pedestrian refuge within proximity of the bus stops (20m-80m walk distance) – the consistency and 'comfort' of the bus stop infrastructure varies, with the attractiveness of some of the bus stops for public transport patrons being limited.

The four example bus stops do not have a consistent approach to seating and shelter or to the standard Transperth InfoUnit (containing bus route and timetabling information) – with one location having a very small InfoUnit sign.

As noted in the Hames Sharley Urban Design Study, there is an opportunity to upgrade the Walter Road West corridor into something that is suitable for the local area, rather than simply there to serve regional traffic needs. As part of any upgrades, the City should consider working with PTA/Transperth to deliver a consistent form of bus stop infrastructure along the Walter Road West corridor to improve the attractiveness and comfort of the public transport experience and provide a sense of place, through a consist approach to bus stops as part of the Bedford North study area streetscape.

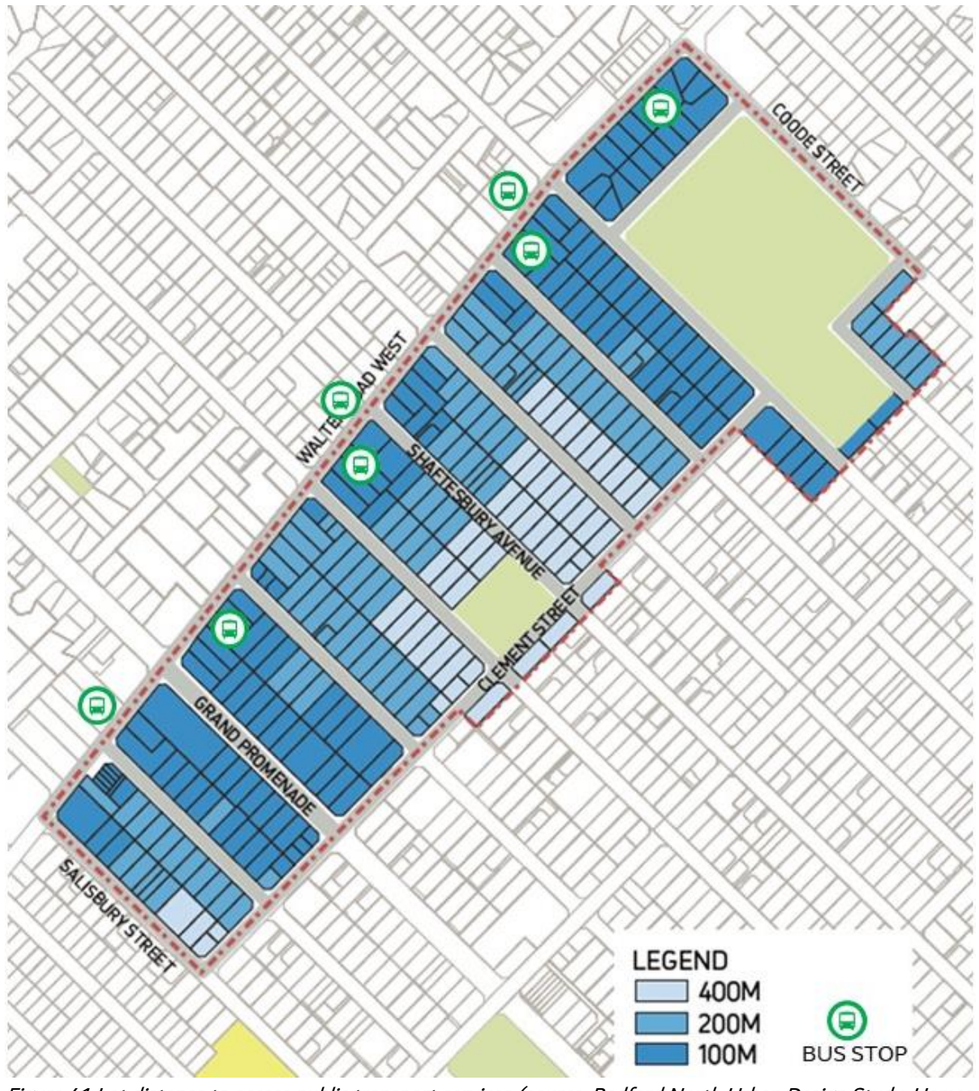

Figure 41 Lot distance to access public transport services (source: Bedford North Urban Design Study, Hames Sharley, 2021)

Figure 42 Walter Road West bus stop located between Grand Promenade and Rosebery Street
(photo image source: Google Streetview / aerial image source: Nearmaps)

Figure 43 Walter Road West bus stop located opposite Shaftesbury Avenue
(photo image source: Google Streetview / aerial image source: Nearmaps)

Figure 44 Walter Road West bus stop located between Lennard Street and Edward Street
(photo image source: Google Streetview / aerial image source: Nearmaps)

Figure 45 Walter Road West bus stop located between Coode Street and Lynas Lane
(photo image source: Google Streetview / aerial image source: Nearmaps)

5.3 Walking and Bicycle Riding Networks Considerations

As outlined in Section 3.6.2, Clement Street (the southern boundary of the Bedford North study area) is identified in the Long Term Cycle Network (LTCN) as a future Local Route connection. Once delivered, the Clement Street route would provide a safe cycling route between the Bedford North study area and Morley Activity Center to the northeast, and to the southwest to the Wood Street/Boulton Street corridors – which provide connections to the wider bicycle network. Figure 46 shows the Council endorsed LTCN for the City of Bayswater.

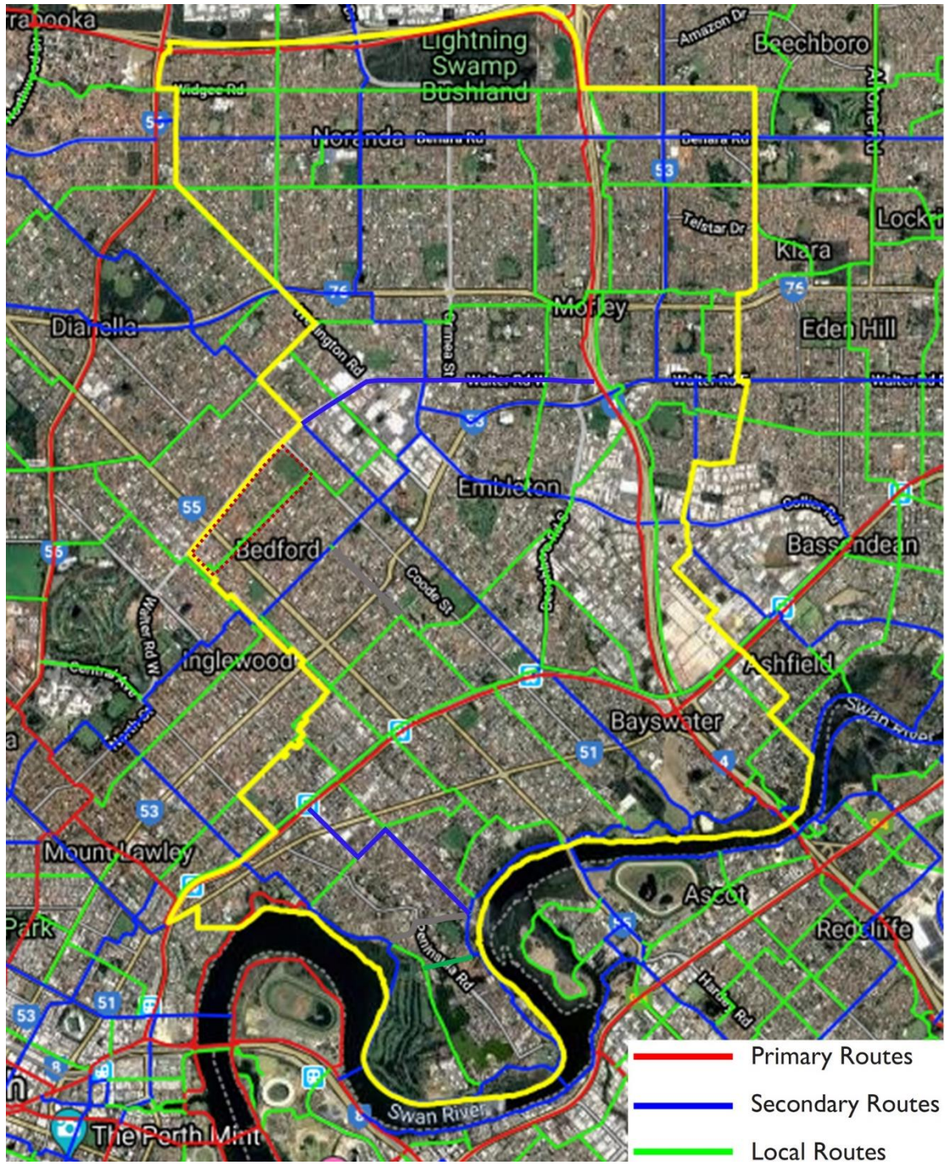

Figure 46 Long Term Cycle Network (source: Department of Transport Long Term Cycle Network project)

The Urban Design Study for the Bedford North Corridor, provides an opportunity for the City to consider the Clement Street corridor and determine how important (based on competing needs across the City), is delivery of the Local Route identified in the aspirational LTCN. The Urban Design Study also provides an opportunity for the City to consider the form of cycling infrastructure that could be delivered along the Clement Street corridor.

In 2018 the DoT adopted a new simplified network hierarchy for the cycling network. The new simplified network hierarchy is built on the principal of a routes function over its built form, and this has formed the basis of the development of the LTCN across Perth and Peel.

The new WA Cycling Hierarchy is shown in Figure 47, and identifies five tiers of bicycle routes:

- Primary Routes
- Secondary Routes
- Local Route
- Road Cycling Routes
- Tourist Trains

The LTCN project only identifies routes based on the top three tiers of the hierarchy: Primary Routes, Secondary Routes and Local Routes. Together the routes across these three tiers of the hierarchy create a network that enables bicycle use for transport – for bicycle riders to access employment, education, services, recreation and leisure.

The WA Cycling Network Hierarchy use of Primary Route, Secondary Route and Local Route classifications is consistent with best practice cycle planning approaches. In terms of allocating classifications to particular routes, this is based on the likely function that that route plays (or will play) within the broader network. This is determined by a number of factors, including surrounding land use (existing and future), the connections being made, demand (existing and future) and the nature of the corridor. For example, Primary Routes are typically located on high demand corridors between major destinations, whilst Secondary Routes would typically have lower demand and connect Primary Routes to activity centres.

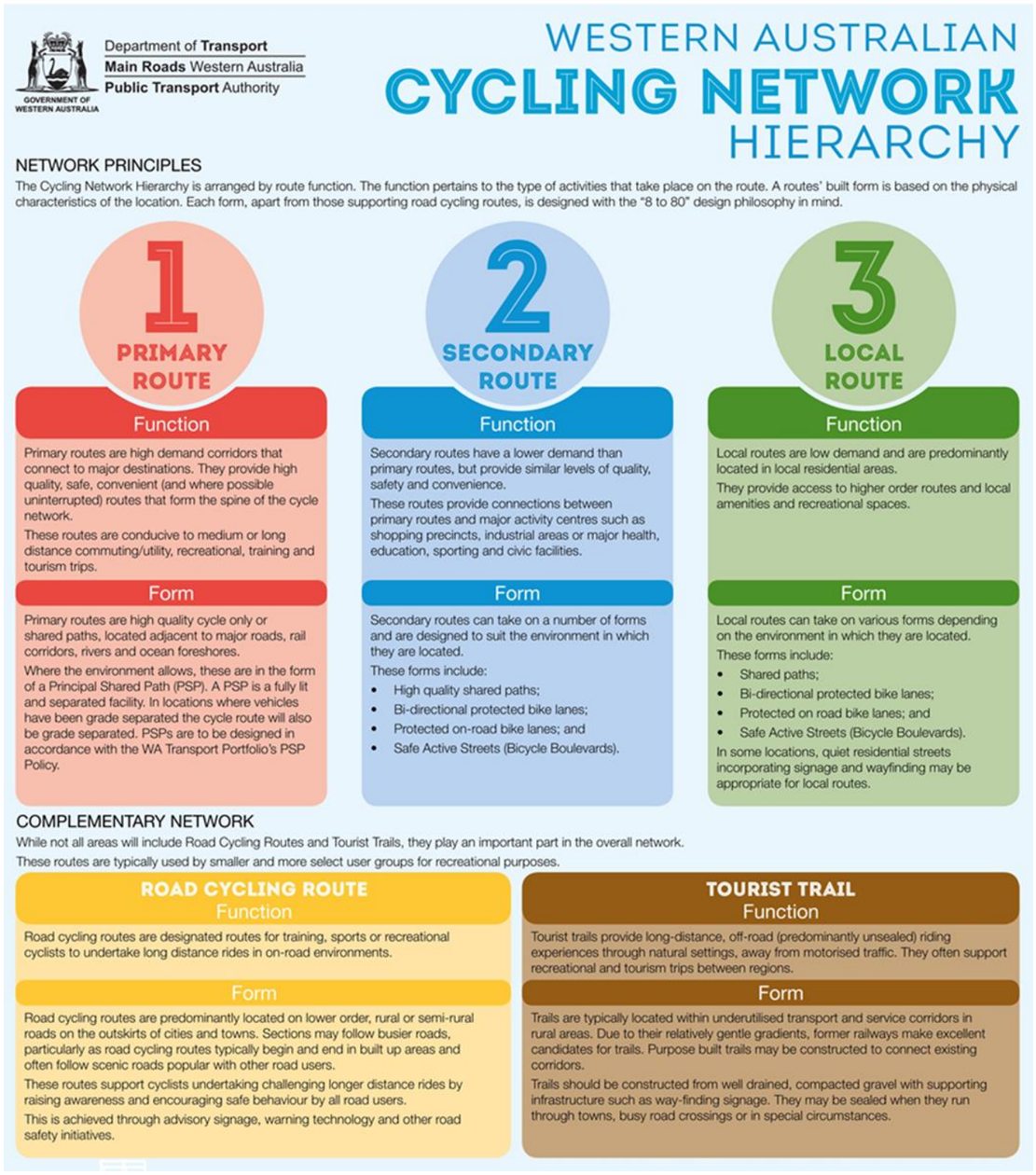

Figure 47 Adopted Western Australian Cycling Network Hierarchy (source: Department of Transport)

Figure 48 focuses on the Local Route function and form as set out in the WA Cycling Network Hierarchy. As per the Local Route function set out in the hierarchy, it is envisaged that the Clement Street route would be located along local residential streets and provide access to higher order routes and local amenities – such as the connection to Morley Activity Centre.

In relation to the built form for a Local Route, the hierarchy sets out a range of built forms, which are considered by DoT to be appropriate for a Local Route. These include, shared paths, bi-directional protected bike lanes, protected on-road bike lanes and Safe Active Streets.

Whilst the list of appropriate forms of bicycle infrastructure for each category within the hierarchy are not exhaustive, these give an indication of the style of treatment that should be delivered in the Local Route context. The City have an opportunity after the completion of the Urban Design Study for the Bedford North Corridor, to consider what the appropriate built form treatment should be for Clement Street and the level of priority that is afforded to the Clement Street route through the study area.

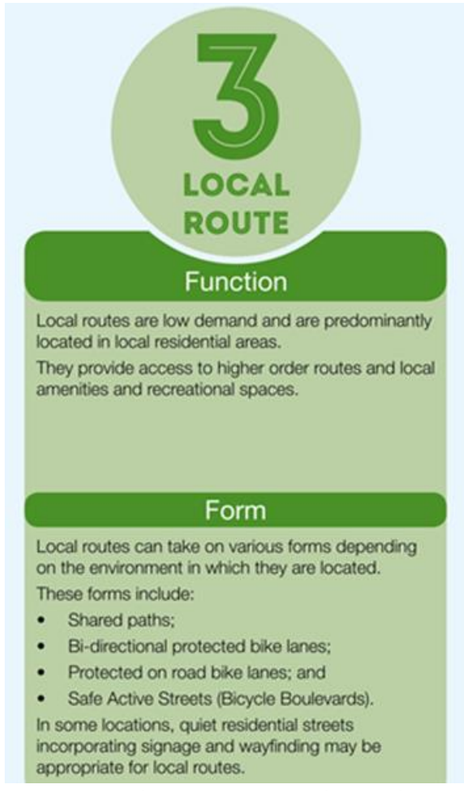

Figure 48 Local Route Function and Form Characteristics (source: Department of Transport)

6. CONCLUSIONS

6.1 Introduction

In 2020 the City of Bayswater (the City) commissioned Hames Sharley to prepare an Urban Design Study for the Bedford North Corridor, with support of Shape Urban (community engagement) and Flyt (transport and movement).

The Bedford North Corridor study area covers the northern portion of Bedford generally bounded by Walter Road West (to the north), Coode Street (to the east), Clement Road (to the south) and Salisbury Street (to the west) – with some additional properties that fringe R.A. Cooke Reserve and Birkett Reserve.

6.2 Existing Situation

The Bedford North area (also known as the Walter Road West Precinct) is located in Perth's inner north-eastern suburbs, sharing a border with the City of Stirling to the north-west.

Bedford North is well connected with regional roads and buses servicing Morley Activity Centre and central Perth. Rail connections to Maylands and a future Morley Station offer more attractive travel opportunities.

As the Bedford North area evolves to a more urban condition, public transport services will become important for residents and visitors accessing home or commercial offerings on main street environments.

Bus route 60 and the Circle Route 998/999 run along Walter Road West, providing direct access to Perth CBD and Morley Activity Centre to the North-East. Lots closer to public transport are more likely to use public transport. These lots should be encouraged to have a higher density of development.

6.3 Analysis of Transport Networks

To assess the operation of the intersections and the impact of additional traffic, an analysis was undertaken in relation to intersection design and by modelling potential network capacity. The model is based on the lane geometry and traffic volumes and provides several outputs including, but not limited to:

- Degree of Saturation: the ratio of demand to capacity on the approach to the intersection
- Average Delay: average of all time delays of vehicles travelling through the intersection
- Average Speed

One of the key outputs of the analysis is the 'Level of Service' for each approach to the intersection. Level of Service is a qualitative measure used to describe the operating conditions of a roadway. By performing an analysis of current conditions and predicted traffic, the Level of Service provides a means of comparison to easily identify overall impact to the intersection.

6.3.1 Development Scenarios

The Hames Sharley Urban Design Study for the Bedford North study area has considered development outcomes from design tests and made a series of projections about the number of dwellings (or floor space for non-residential uses) that could occur in the area if modifications to the planning framework were to occur. This information has been utilised to inform the analysis of the transport networks outlined. The residential dwellings development scenarios considered include:

- Low Growth – based on a North Perth development model
- Medium Growth – based on a Leederville development model
- High Growth – based on a Mt Lawley development model

6.3.2 High-Level Assessment – Intersections

The Walter Road West and Grand Promenade intersection is currently operating at a poor level of service during the AM peak period and PM peak period.

An increase in development within the Bedford North area will impact the performance of the Walter Road West and Grand Promenade intersection and the Walter Road West and Coode Street intersection. This is due to the predicted 36% growth in traffic by 2031 - based on Main Roads ROM modelling.

It should be noted that regardless of an increase in development within the Bedford North area, the performance of the intersections will likely deteriorate due to increases in traffic from surroundings areas generally.

6.3.3 High-Level Assessment – Traffic Volumes

In the case of Walter Road West, you would expect the road to have a mid-block capacity of 1,800-2,000 passenger cars per hour across both lanes. The future traffic volumes from the Main Roads ROM modelling suggest that the Walter Road West corridor would be operating close to its mid-block capacity for the majority of the day between the AM and PM peak periods.

Again, it should be noted that regardless of an increase in development within the Bedford North area, an increase in traffic along Walter Road West will likely occur due to increases in traffic from surroundings areas generally.

6.4 Broader Transport Considerations

Many inner-city locations along strategic local transport corridors (such as Walter Road West), have existing traffic signal controlled intersections operating at a poor level of service during peak hours. This is the nature of urban inner-city locations with significant AM peak school and commuter vehicle trips, as well as PM peak commuter and utility/leisure/recreation vehicle trips.

Overtime Perth's urban transport networks will develop to provide a wider range of opportunities for people to travel by non-car modes, whether that be by active transport or through improved public transport options. This change will occur in the congested areas of the city first and then inner-city locations, such as the Bedford North study area.

The City has an important role to play in the evolution of urban transport networks. The City can influence how corridors like Walter Road West function in the future, by ensuring a better balance is achieved between the interests of car users as opposed to providing an environment that encourages alternative modes of transport, such as walking, cycling and public transport.

In addition, the City has a role to play in making urban corridors, or parts of urban corridors more liveable and attractive as urban 'places' in their own right, through measures such as calming traffic and encouraging a mix land uses.