

City of Armadale
**Armadale Strategic Metropolitan
Centre Structure Plan**
Transport Assessment

Rev B | 15 October 2018

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Contents

	Page	
1	Introduction	7
1.1	Background	8
1.2	Recent Developments	10
1.3	Structure Plan Proposal	12
1.4	Stakeholder Engagement	16
1.5	Report Structure	18
2	Policy and Planning Context	19
2.1	State Policy and Planning	19
2.2	Local Policy and Planning	24
2.3	Local Transport Assessments	30
3	Existing Conditions	38
3.1	Existing Land Uses Within the Activity Centre	38
3.2	Travel Patterns	39
3.3	Existing Pedestrian and Cycle Networks	39
3.4	Existing Public Transport Services	43
3.5	Existing Road Network	48
3.6	Existing Parking	54
4	Traffic and Transport Assessment	55
4.1	Structure Plan Proposal	55
4.2	Walking and Cycling Network	60
4.3	Public Transport Network	64
4.4	Road Network	66
4.5	Trip Generation	70
4.6	Assessment	73
5	Conclusion	76

Executive Summary

Arup, together with Hassell and Syme Marmion & Co, was engaged by the City of Armadale to prepare a Structure Plan for the Armadale Activity Centre. Arup's role was specifically to provide input to the Structure Plan covering 'movement' aspects and to develop a Transport Assessment in accordance with the Western Australian Planning Commission (WAPC) Guidelines on Transport Assessments for Activity Centres (2016) as appropriate. The draft version of the Transport Assessment was prepared in November 2017. Following further discussions with The City of Armadale, the document was subsequently updated in March 2018 to reflect current conditions. The current Transport Assessment was updated in October 2018 to reflect further consultation.

Armadale is designated as a Strategic Metropolitan Centre in State Planning Policy 4.2 – Activity Centres for Perth and Peel (SPP 4.2). According to SPP 4.2, the main role and function of a Strategic Metropolitan Centre is:

“Strategic metropolitan centres are the main regional activity centres. They are multipurpose centres that provide a diversity of uses. These centres provide the full range of economic and community services necessary for the communities in their catchments”.

Placed second-highest in the hierarchy, this type of centre is expected to function at a high level in terms of:

- Strategic Metropolitan Centres are multi-purpose centres that provide a diversity of uses. These centres provide a full range of economic and community services necessary for the communities in their catchments.
- Focus for passenger rail and high frequency bus networks
- Typical types of retail including department stores, discount department stores, supermarkets, full range of speciality stores.
- Office development will typically be major offices and government agencies.

The Armadale Activity Centre Structure Plan provides a framework for maturation and urban regeneration so that the existing and future population has access to the appropriate services, facilities and amenity. The Structure Plan establishes the vision and sets a strategic planning framework to guide development within its boundary, which covers an 85 hectares area of Armadale's city centre and its immediate surrounds.

Existing public transport provision to the Activity Centre is limited and to allow Armadale to fulfil its potential will require a step change in service choice and provision (rail and bus). Current transport infrastructure (including the rail corridor, Armadale Road and South Western Highway) acts as significant barrier to permeability from the neighbouring residential districts. The provision of large at grade parking precincts and low levels of activation along key city centre connections impact significantly on permeability through the Activity Centre for walking and cycling.

Three options were tested through the activity centre design process. Community and stakeholder preferences and values were tested throughout two workshop sessions. A number of meetings between the City of Armadale and the Metronet team, Department of Planning, Lands and Heritage, Main Roads WA and Department of Transport have also been held. Following review of the three options, a preferred plan was created to describe the aspirational vision for the Activity Centre which includes:

- Rail in covered trench, covered for most of its length by public open space and buildings;
- Underground rail station.
- Road connections across the rail corridor at Armadale Road, Forrest Road, William Street, John Street / Fifth Road and Church Avenue.

Only the preferred scenario has the capacity for Armadale to become a significant employment centre and to fulfil its role as the major metropolitan centre for a wide region.

A mixed-use approach to land use has been taken for Armadale in the development of the Structure Plan. The Structure Plan provides a framework for further residential development, employment creation, a strengthened retail offer and support service industries to these new uses. The Structure Plan is ambitious in its vision to make the City Centre meet the full potential of a Primary Centre within the Activity Centre hierarchy and makes allowance for the following new development:

- An increase in dwellings from the current 236 to between 1,250 and 2,300 (increasing the resident population from the current 456 to between 5,000 and 7,500) through a significant increase in residential density.
- An increase in non-residential floor space from the current 54,900m² to approximately 80,000m².
- Increasing the percentage of public open space for regional open space and local open space from 7% to 7.5%.
- Estimated employment (number of jobs) in the activity centre area increasing from approximately 3,000 to 18,000.

The movement network developed for the activity centre is aimed at contributing to the following vision statement:

Armadale – the capital of Perth’s south east, where the city meets the hills.

People First

- **Seize opportunities to foster vitality and create human scaled spaces. A walkable city full of destinations.**
- **A Reinforced Urban Structure: Build on Armadale’s underlying urban structure and manage growth to fill gaps in urban form.**
- **An Urban Landscape: Strengthen the unique character and assets of Armadale and build on its natural setting.**

A Connected City

- **Create a connected, sustainable, efficient and convenient network for all modes of travel.**

The Structure Plan establishes a long-term blueprint for development and the exact timing of build out cannot be identified as it depends on market conditions and demands. It is expected that the proposed yields will not be fully realised until post 2031.

By 2031, it is estimated that the Structure Plan will lead to a substantial increase of up to 3,500 vehicles in the peak hour for the residential and commercial (office and retail) land uses; respectively on the road network if current mode shares continue. As the Structure Plan proposes a significant uplift in both residential and employment opportunities within the Activity Centre itself it is reasonable to assume that this will be a catalyst to encourage a change in travel behaviour.

It should also be noted that as further details of the Structure Plan are developed there may be scope to review these assumptions based on the extent that new trips generated by the office and retail land uses may be linked trip or internal trips (i.e. with the origin and destination both occurring within the Activity Centre). This will provide the opportunity to significantly increase the public transport, walking and cycling mode shares which in turn will reduce the impact of the development proposals on the road network.

The additional trips will need to be managed within the existing road network and will depend significantly on the outcome of the current METRONET study examining appropriate treatments for the removal of rail level crossings along the Armadale line.

The preferred concept plan proposes the connection of Cornish Street to William Street, providing an integrated street network across the rail corridor. The preferred concept plan also identifies this road, owing to its district connections, as a public transport boulevard.

Armadale is currently served by the Armadale Train Station and bus interchange. Future modifications to the rail corridor to accommodate City Centre outcomes will need to integrate bus and rail services to maintain passenger convenience.

The future model applied to rail / bus integration will depend on the outcome of grade-separation and treatment of the railway corridor. The City’s preferred

outcome presumes undergrounding the rail and bus stands provided within a public transport boulevard. This is because:

- On-road bus stops free up land for urban development outcomes
- The use of city centre land for bus-layover, whilst pragmatic for PTA operations, impacts on pedestrian and user experience

As an alternative to a dedicated, off-street bus station, a public transport boulevard is proposed. The boulevard, connecting on the alignment of William Street provides both private vehicle and public transport connections between Forrest Road and South Western Highway.

The central core of the public transport boulevard adjacent to the civic plaza will be designed as a shared road providing pedestrian priority. The design will be similar to the existing arrangement of Wellington Street in Central Perth adjacent to Forrest Place.

Recognising the Transperth operational requirements a number of potential sites within the structure plan proposals have also been identified as potential bus facilities and their feasibility would be further investigated as part of any future development proposals.

Recommendations for improving the movement network within the Activity Centre to support the Structure Plan include:

- Advocate for lowering the rail corridor to facilitate at grade pedestrian, cycle and road connections across the Activity Centre.
- Significant improvements to the provision and location of pedestrian and cycle paths throughout the Activity Centre including the provision of:
 - Generous pedestrian and cycle paths (4m wide) on both sides of the road along commercial streets such as Church Avenue.
 - Footpaths and Principal Shared Paths set back from vehicle traffic lanes along Armadale Road and Forrest Road.
 - Wide shared surface treatments that are flush with footpaths in share zones such as Jull Street.
 - Wide (3.5m) footpaths along the proposed public transport boulevard on William Street.
- Improve the pedestrian and cycle crossings at the major intersections along Armadale Road and South-Western Highway particularly at the intersections with the Albany Highway, William Street and Streich Avenue.
- Expansion of the Principal Shared Path (PSP) network by 2031 including the following sections along the Armadale Railway PSP:
 - Great Eastern Highway – Welshpool Station.
 - Lacey Street – Ladywell Street.
 - Kelvin Road – Albany Highway.
 - Dorothy Street – Armadale Station.

- Expand the 40kph speed limit throughout the Activity Centre to reflect the changing focus to pedestrian and cycle priority.
- Investigate the introducing a High Priority Transit Corridor connecting Fremantle, Cockburn Central and Armadale.
- Introduction of a public transit boulevard connecting the existing William Street with Cornish Street to allow frequent west/ east movements for bus services through the activity centre and allow bus stops to be located immediately adjacent to the underground train station and civic centre.
- Improve service frequencies of bus services at the weekend to encourage more people to use this centre during this time.
- To adopt the parking supply and management strategy including the proposed refinement of parking standards for the different land uses as follows:
 - 1 bay per residential dwelling in line with the R-code under criteria A.
 - Residential parking must be provided off street.
 - 1 space per 45m² NLA for retail and office uses.
 - 15 bays per 100 Full Time Equivalent (staff and students) for education uses.
 - 1 space per 50m² for civic and community uses.
 - A minimum of 10% of commercial/office and 50% of retail parking shall be designated as publicly available.
- Increase the provision of end of trip facilities based on the amount of bicycle parking spaces required.

Further investigation is required as follows;

- Work with the METRONET team to confirm the position regarding the grade separation of the rail corridor and the impact this has on the three current road crossing points at Armadale Road, Railway Avenue and Church Road;
- Work with Main Roads WA to confirm the position regarding the grade separation of Streich Avenue and the impact this has on the ability to provide additional north south road connections;
- Work with the METRONET team to confirm the position regarding the Armadale rail station catchment in relation to the line being extended to Byford.
- Work with Main Roads WA to determine when upgrades to the signalised crossings along Armadale Road (at the intersection with Railway Avenue and the South-Western Highway) and along the South-Western Highway (at William Street) will be required.
- Once a defined base road network is identified (following the agreed outcomes of the grade separation of the rail corridor investigations), further consultation with Main Roads WA should be completed. The approach to conducting a detailed assessment of the road network should be agreed. It is expected that this will be based on running the confirmed development scenario through the

Main Roads ROM (with the associated network changes such as lowering the rail line) and then conducting local traffic intersection analysis (using an appropriate modelling package such as SIDRA or AIMSUM).

1 Introduction

Armadale City Centre is a Strategic Metropolitan Centre servicing Perth's south east metropolitan region, as identified by State Planning Policy and the South Metropolitan Peel Sub Regional Planning Framework. The centre services a broad and rapidly growing catchment. This Activity Centre Structure Plan provides a framework for maturation and urban regeneration so that the existing and future population has access to the appropriate services, facilities and amenity. The Structure Plan establishes the vision and sets a strategic planning framework to guide development within its boundary (as shown in Figure 1).



Figure 4 Activity Centre Boundary, showing 400 metre and 800 metre walkable catchments from the Armadale Train Station.

Figure 1 Activity Centre Boundary

Source: Figure 4 Armadale Activity Centre Structure Plan Report, Hassell

This Transport Assessment has been prepared by Arup to support the wider Structure Plan in delivering an effective and efficient transport system that supports the growth of the Armadale Strategic Metropolitan Centre.

It provides a high-level assessment of existing transport provision that may be affected by the development. Furthermore, where information is available, it highlights potential risks that are anticipated to arise as a result of the future development, and outlines potential transport mitigation measures that may be required to future proof the transport network.

1.1 Background

The City of Armadale is located approximately 30km south-east of the Perth CBD. The area spans over 560 square kilometres bounded by Warton Road, Ranford Road, Rowley Road and Tonkin Highway.

Armadale is designated as a Strategic Metropolitan Centre in State Planning Policy 4.2 – Activity Centres for Perth and Peel (SPP 4.2). According to SPP 4.2, the main role and function of a Strategic Metropolitan Centre is:

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Placed second-highest in the hierarchy, this type of centre is expected to function at a high level in terms of:

- Strategic Metropolitan Centres are multi-purpose centres that provide a diversity of uses. These centres provide a full range of economic and community services necessary for the communities in their catchments.
- Focus for passenger rail and high frequency bus networks
- Typical types of retail including department stores, discount department stores, supermarkets, full range of speciality stores.
- Office development will typically be major offices and government agencies.

Armadale lacks the diversity of attractors present within other Strategic Metropolitan Centres that contribute to a robust local economy and destination. Enhancing the unique offering of Armadale which make it an attractive destination is key to Armadale’s long-term success as a strategic centre of the Perth Metropolitan Area.

Armadale’s centre catchment is growing – expected to reach a population of between 280,000 and 300,000 people by 2036 (from a current population of 120,000 people). This substantial growth, within a relatively short time frame, requires Armadale’s service offering to expand beyond its current provision. Importantly, Armadale will need to mature beyond its existing retail focus to provide services, jobs, amenity, living and leisure opportunities – consistent with its Strategic Metropolitan Centre designation.

Increased residential densities are required not just to meet State Policy targets, but to increase the population of Armadale’s walkable catchment, providing a diversity of housing choice, improving the use of existing infrastructure and enabling development that contributes to the intended amenity and intensity of the centre.

Transit-led renewal offers the best opportunity to provide this and so combining strategic planning regarding the activity centre with the requirements of extension of the Armadale line to Byford is appropriate. For a large centre such as Armadale, in transit terms this means it being both an origin and a substantial

destination, maximising the destination elements (employment, education and community services) in the rail station precinct.

Employment self-sufficiency – the ratio of local jobs to employed residents – in the City of Armadale is very low. In 2015/16 there were around 20,109 local jobs and 40,222 employed residents, giving an employment self-sufficiency ratio of 50%. To maintain the current employment self-sufficiency ratio, an additional 15,300 jobs will be required in the City between 2016 and 2036 and an additional 19,000 by 2051. If the ratio were to increase to a more respectable 70% by 2051, an additional 29,400 jobs would be required in the City between 2016 and 2036 and an additional 34,600 by 2051.

Three options were tested through the activity centre design process. Community and stakeholder preferences and values were tested throughout two workshop sessions. A number of meetings between the City of Armadale and the Metronet team, Department of Planning, Lands and Heritage, Main Roads WA and Department of Transport have also been held. Following review of the three options, a preferred plan was created to describe the aspirational vision for the Activity Centre which includes:

- Rail in covered trench, covered for most of its length by public open space and buildings;
- Underground rail station.
- Road connections across the rail corridor at Armadale Road, Forrest Road, William Street, John Street / Fifth Road and Church Avenue.

Only the preferred scenario has the capacity for Armadale to become a significant employment centre and to fulfil its role as the major metropolitan centre for a wide region. It has:

- The greatest employment capacity;
- The most development land created for sale and for financial cost offset;
- The highest transport-related environmental and efficiency outcomes;
- A positive effect on centre land values;
- The greatest capacity, by far to unlock the potential for private investment in the Centre;
- The greatest construction-related employment;
- The most substantial contribution to the strategic and regional role of the Armadale SMC;
- The maximum benefit to rail investment, with Armadale becoming a substantial destination station;
- The highest degree of policy alignment; and
- The highest amenity and attraction for all economic and community functions and uses, including greatly upgraded public spaces (such as creating a Town Square)', increasing development opportunities east and west of the railway

line and providing the opportunity to create high quality development for business, education and health services.

The future Strategic Metropolitan Activity Centre Structure Plan will acknowledge the role of the Armadale City Centre in the south-east corridor of Perth, and the aspiration of the City of Armadale for the City Centre to meet the full potential of a Primary Centre within the Activity Centre hierarchy (refer Figure 2).

1.2 Recent Developments

In recent years the Armadale Activity Centre has seen significant redevelopment of the City Centre and the Armadale Central and Armadale Shopping City shopping centres along with smaller scale developments including the redevelopment of Orchard House in the Civic Precinct. However, this has not generated the level of development that other comparable Strategic Activity Centres across Perth have achieved.

Outside the City Centre, development within the City of Armadale has been rapid which has put pressure on the existing road network including Armadale Road. Through the work completed as part of the North Forrestdale DCP the City played a crucial role in advocating for the upgrade of Armadale road and the Commonwealth and State Governments have committed to upgrading Armadale Road into two lanes along its entirety including new shared pedestrian and cycling facilities. Upgrading the last single lane section of Armadale Road into two lanes between Tapper Road and Anstey Road is due for completion by 2019.

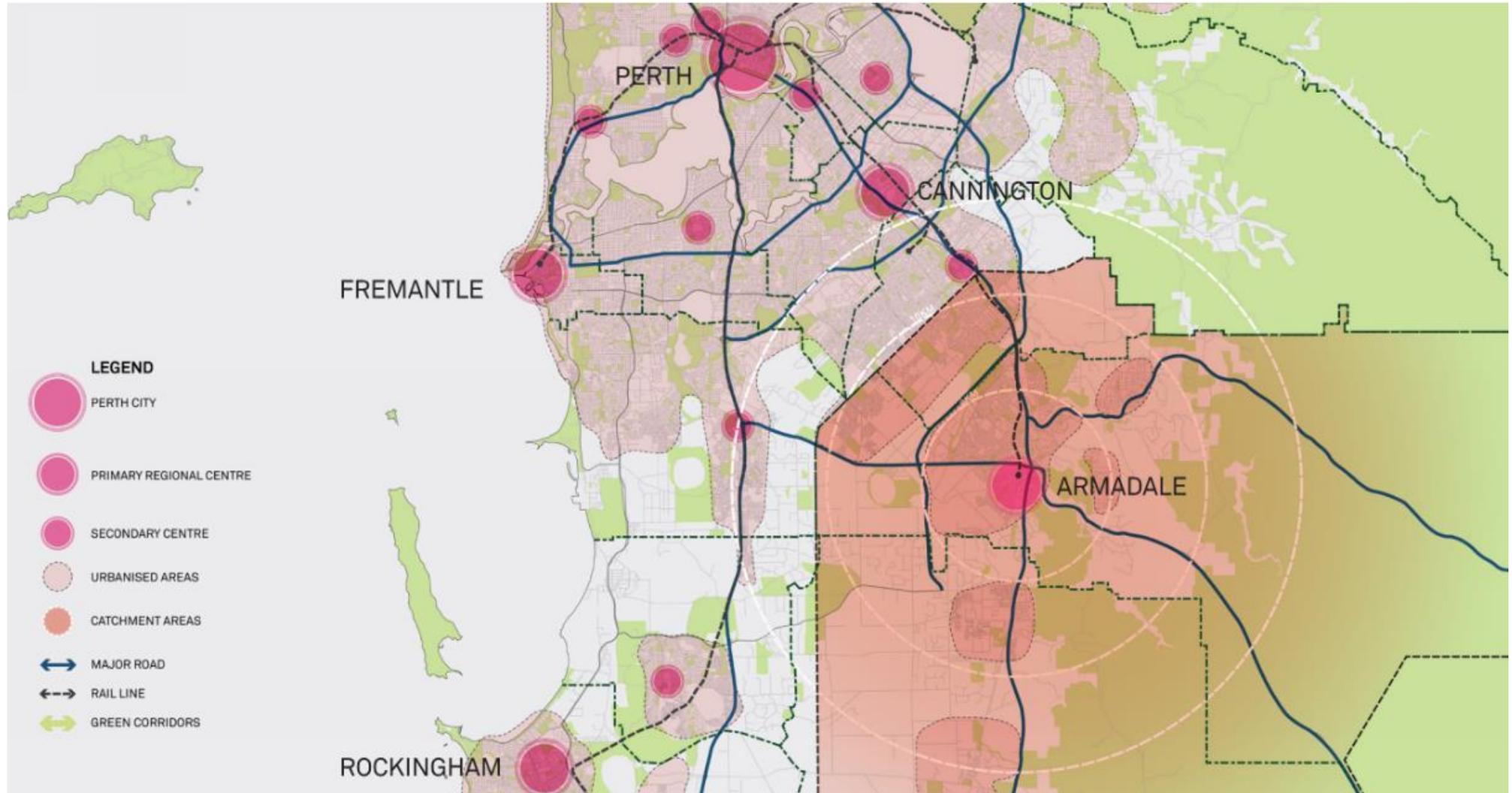


Figure 2 Armadale City Centre Catchment

Source: Figure 1 Armadale Activity Centre Structure Plan Report, HASSELL

1.3 Structure Plan Proposal

Addressing the current gaps in services, amenity, infrastructure and key institutions are vital to the long-term resilience of the precinct as a place to live, work and visit. Particularly with regard to:

- Providing opportunity for urban regeneration
- Filling service gaps
- Acknowledging high levels of disadvantage
- Improving opportunities for employment, particularly strategic employment
- Maximising the potential of strong population growth in the region
- Enhancing Armadale's sense of place and unique position as a transition from city to country; and from Swan Coastal Plain to Perth Hills
- Building upon Armadale's strong underlying urban structure

The Structure Plan's overarching transport vision is to create a connected, sustainable, efficient and convenient network for all modes of travel. The wider objectives for the transport network are:

- Advocate for an underground passenger rail as the spine of a seamless public transit network.
- Enable Seamless modal interchange provision.
- Promote additional cross-rail links.
- Improve wayfinding and access to the city centre.
- Provide an integrated mesh of safe active transit links.
- Improve pedestrian priority and experience in the city centre.

Unlike other strategic metropolitan centres such as Fremantle, Rockingham, Midland and Joondalup, Armadale has lacked substantial diversification of land use and employment opportunities, making the centre susceptible to market volatility. This condition is exacerbated by the existing rail corridor dividing the Activity Centre. There are only three crossing points; at Armadale Road, Forrest Road and Church Avenue. The centre's division significantly limits its capacity to address identified service gaps and policy targets leading to the consideration of underground or raising the railway line to create a highly integrated and connected city centre.

The Structure Plan proposal is therefore cognizant of the need to address the following key transport issues:

- Managing road network capacity and addressing congestion by promoting greater use of alternative, sustainable modes of transport such as walking, cycling and public transport.
- Planning for increased mode share to public transport and providing strong pedestrian and cycling connections to the station with a focus on improving

lighting and security and providing attractive routes and appropriate end of trip facilities.

- Improving people’s knowledge of the opportunities and providing encouragement for people to change their travel habits resulting in greater use of sustainable travel modes.
- Providing car parking at levels which keep up with the capacity of the road network within a framework of managing supply and demand over time.
- Holistic transport networks: working with adjacent local governments to make sure that transport networks, particularly walking and cycling networks, are well connected with surrounding neighbourhoods.

Managing parking and congestion and the ability to cater for population growth on a well-established transport network is critical for the City of Armadale moving forward. An increased modal shift from private vehicles to public transport, walking and cycling must be encouraged to enhance economic and social outcomes, whilst recognising the transition from a private vehicle based culture should be undertaken over time.

Three development concept options were tested through the activity centre design process. Community and stakeholder preferences and values were tested. A number of meetings between the City of Armadale and the METRONET team, Department of Planning, Lands and Heritage, Main Roads WA and Department of Transport have also been held. The Activity Centre Structure Plan proposes the City’s preferred approach (as shown on Figure 3) to grade separate road and rail, but has also been prepared to integrate with a range of potential outcomes. It is understood ongoing engagement will occur between the City and METRONET team to progress the outcome of grade-separation as part of the Byford Rail extension project.

The Structure Plan is proposing a substantial uplift in both residential and non-residential development within the Activity Centre as shown in Table 1. Whilst detailed information is not available on the form this development will take it is expected to increase demand for all utilities significantly compared to current provision. This report provides background on the existing infrastructure in the Activity Centre and highlights where upgrades may be required to service the proposed Structure Plan.

Table 1 Summary Table of Areas

Item	2017	Future
Total area covered by the Activity Centre Structure Plan	85 Hectares	85 Hectares
Estimated number of dwellings	236	1250-2300
Estimated Population	456	5000-7000

Source: Table 1 Armadale Activity Centre Structure Plan Report, Hassell

For the purpose of assessment, this report considers the preferred scenario only because it is anticipated that this scenario will result in the greatest impact on the

transport network in relation to the number of future development trips generated across the transport network.

As the yield data available at this stage of planning is very conceptual and covers a range of scenarios, a traditional approach to assessing the transport impacts from the Structure Plan has not been taken. The reasons for this are discussed in more detail in Section 4. However, it is acknowledged that as the Structure Plan process progresses and further detail is available on the type and scale of land uses to be included within the approved development scenario additional assessment can be undertaken on the impacts on the transport network.

PREFERRED PLAN

This preferred plan has formed the basis of the Activity Centre Structure Plan.

- Rail tunnelled between Armadale Road and Church Avenue with the dive structures extending north and south of the centre
- Limited built form over the rail tunnels within the centre core only
- Central focus provided by way of a grand civic plaza integrating with a new station entrance structure
- The civic plaza connects directly with Jull Street Mall
- The preferred plan requires closure to part of Commercial Avenue

1. Armadale underground train station.
2. Train line dive cutting.
3. Public open space / tunnel ventilation.
4. Neerigen Brook reintroduced as a living stream.
5. Jull Street Mall.
6. New civic plaza anchoring Jull Street Mall.
7. Retail and mixed use core focussed around Jull Street and new shared streets - car parking provided in basements, decked structures or on rooftop.
8. Education / mixed use.
9. Performing arts centre / mixed use.
10. Activated buildings address Memorial Park.
11. Commercial office core and mixed use including desirable mid block link.
12. Mixed use development.
13. Landscaped plaza surrounds the heritage listed jarrah tree.
14. Landmark building.
15. Landscaped mid block pedestrian links.
16. Desirable shared streets as a mid block link.
17. New Justice Precinct.
18. High density residential development.
19. Desirable pedestrian link / open space.
20. William Street public transit boulevard.
21. New principal shared path.
22. New development addresses Neerigen Brook.
23. Improved landscaping and pathway systems along Neerigen Brook.
24. Landmark Short stay or mixed use development site.
25. Boulevard planting to Armadale Road.
26. Former Post Office activates Jull Street Mall.
27. District Hall upgrade to facility.
28. Streich Avenue to Commerce Avenue bridge investigation.
29. Mixed use development activating the civic plaza.



Figure 3 Armadale Activity Centre Indicative Development Plan: Preferred Scenario

Source: Figure 41 Armadale Activity Centre Structure Plan Report, HASSELL

1.4 Stakeholder Engagement

1.4.1 Community Engagement

A series of community engagement workshops were undertaken between April 2017 and December 2017 the feedback from which is included in the Explanatory Section of the Structure Plan Report, prepared by Hassell. In summary, the critical issues for transport were identified as:

- Improving access across the railway line – the desired outcome is to underground the rail line.
- Understanding the impacts and opportunities in relation to the proposed Byford rail extension.
- Create a connected sustainable efficient and convenient network for all modes of transport – providing a seamless modal interchange.
- Improve wayfinding and access to and within the city.
- Develop an integrated mesh of safe active transit links.
- Improve pedestrian priority and experience in the city centre.

1.4.2 Government Agencies

To understand the transport context in more detail Table 2 summarises the initial meetings held with government agencies in relation to the Armadale Activity Centre Structure Plan proposals.

Table 2 Stakeholder Consultation Meetings

Agency	Date, Location and Attendees	Issues noted
Department of Transport (DoT)	19 April 2017, 140 William Street, Perth David Iglesden - DoT Martin Keen - DoT Sergio Famiano - City of Armadale Scott Davies - HASSELL Emma Forde - Arup	To make use of the relevant DoT guidance on transport assessments for Activity Centres. To consider approach to parking caps and public parking to manage the impact on the Activity Centre. Need to understand the capacity of intersections in particular, having regard to future land use intensifications.
MainRoads WA (MRWA)	1 August 2017, Don Aitken Centre, Perth Lindsay Broadhurst – MRWA David Van den Dries – MRWA Justin McKirdy – MRWA Sergio Famiano – City of Armadale Scott Davies - HASSELL Emma Forde - Arup	Recognised that Armadale is an under developed Activity Centre. To understand the regional function of Armadale Road, South Western Highway and Albany Highway. Current projects being developed included reviewing grade separation of Armadale Road in conjunction with the PTA.

Agency	Date, Location and Attendees	Issues noted
Public Transport Authority (PTA)	10 August 2017, 140 William Street, Perth Elena Marr – PTA/ METRONET Andrew Neale - PTA/ METRONET Brett Wood-Gush – MRA Sergio Famiano – City of Armadale Scott Davies - HASSELL Emma Forde - Arup	Need to provide good bus to train interchange if considering a transit boulevard – PTA would specify the size of bus interchange facility required (in relation to stops and stands) and desired park and ride facilities. The Station Access Strategy for Armadale Station is to be assessed and completed by the end of 2018. Extension of the electrified network from Armadale to Byford is likely to enter planning stage shortly
Public Transport Authority (PTA)	26 October 2017, 140 William Street, Perth Jamie Mullins – PTA/ METRONET Andrew Neale - PTA/ METRONET Brett Wood-Gush – MRA Sergio Famiano – City of Armadale Scott Davies - HASSELL Emma Forde – Arup	Study is currently underway to consider the impact on the road network of rationalising and / or grade separating the current at grade crossings (Armadale Road, Forrest Road and Church Avenue). This should be used to inform the transport assessment of the Structure Plan when available.
Transperth Service Development	18 June 2018, Public Transport Centre, West Parade, Perth 6000 Simon Cox – Transperth Lom Piggott – Transperth Emma Forde - Arup	Confirmed that the provision of stops and stands documented in the structure plan and supporting documents was correct – 10 active stops and 5 stands were required. Confirmed that previous work undertaken by the PTA has identified that the typical dog bone style bus station arrangement was deemed to work best operationally for the PTA but that they were open to review alternative layouts. Identified that bus routes and frequencies were expected to increase to Armadale, particularly in relation to providing new connections to Cockburn Central and in the longer term as part of a public transport priority route along Armadale Road to the coast. It was also identified that the nature of the surrounding bus network and appropriate trip attractors did not lend itself to Armadale being served by through bus services. Focus should be on maintaining the current level of service provided with direct access for bus passengers to the train platforms from the bus station. The structure plan proposals should not make passengers worse off than existing, particularly in relation to walk distances.

1.5 Report Structure

The remainder of this report is structured as follows:

- **Section 2** examines the transport policy and planning context within which the transport assessment was completed.
- **Section 3** describes the existing transport networks that support the Activity centre.
- **Section 4** assesses the implications of the Structure Plan proposals on the future transport networks.
- **Section 5** summarises the conclusions of the transport assessment and the mitigation measures required to support the Structure Plan proposal. It also identifies where further investigation is required to support the Structure Plan proposals.

2 Policy and Planning Context

2.1 State Policy and Planning

2.1.1 Perth and Peel @3.5million

In March 2018, the State Government released the final Perth and Peel@ 3.5 million suite of documents and the supporting sub regional planning framework documents. Following consultation responses, the framework plans are intended to define the urban form over the next 30 years allowing for a population of 3.5 million people in Perth and Peel nominally by 2050.

The South Metropolitan Peel Region (of which Armadale is a part) is anticipated to accommodate job growth from 143,970 in 2011 to 437,730 by 2050 - a total change of 293,750 jobs. Employment opportunities are expected to focus on manufacturing, construction, retail, healthcare and social assistance.

The south east sector is specifically expected to reach 137,030 jobs. To achieve this degree of growth, the Armadale Activity Centre must function at a more mature level, with a richer mix of uses and services to attract regional employment at appropriate densities.

As a Strategic Metropolitan Centre, population growth will increase the importance of Armadale and the additional proposed public transport options will enhance the effectiveness of the centre in supporting future growth and attracting new businesses, while increasing employment opportunities and investment.

2.1.2 South Metropolitan Peel Sub-regional Planning Framework (March 2018)

The sub-regional plan identifies that for Armadale to develop as an Activity Centre public transport services need to be enhanced to facilitate growth and employment opportunities. Non-car based access to the City Centre is regarded as critical. The plan outlines that the Byford line extension as well as a future transit corridor between Byford and Mundijong will help to achieve this.

This plan identifies the objective for movement and access across the sub-region is to provide efficient and effective regional movement network for people and freight. Specific transport related priorities relevant to the Armadale Activity Centre include that have been identified for implementation by 2031 include:

- Extending the Armadale rail line to Byford.
- Introducing a High Priority Transit Corridor connecting Fremantle, Cockburn Central and Armadale.
- Partial extension of the Tonkin Highway to Forrest Highway
- Expanding the off-road cycle network across the Perth and Peel regions

Longer-term priorities include:

- Completing the extension of the Tonkin Highway to the Forrest Highway and upgrading to Freeway standard as far as Mundijong Road.
- Investigating a proposed future Circle Line that connects Armadale to Joondalup, Ellenbrook/ east Wanneroo, Midland, Mandurah and Fremantle.
- Investigating how to achieve better integration of the Australind service with metropolitan passenger services between Perth and Mundijong.
- Increasing capacity on the road network including the proposed extension of Rowley Road to connect with Wungong Road as a primary distributor to the south of the Activity Centre and the extension of Eleventh and Twelfth Roads to the west of the Activity Centre as integrator arterial routes.

The plan notes that all non-Stage 1 METRONET public transport proposals require further investigation and refinement.

2.1.3 Perth and Peel Transport Plans (July 2016)

The draft Perth and Peel @ 3.5 million land use plan included the release of several Technical Reports in July 2016 which were prepared by the Department of Transport (DoT) and Main Roads WA (MRWA). Whilst these plans have been superseded by the release of the final Perth and Peel @ 3.5 million a number of additional transport related projects were noted to be of relevance to transport network connections to the Armadale Activity Centre. Stakeholder engagement with the different government, agencies also indicated that there is an appetite to investigate the following transport infrastructure improvements:

- Upgrading the South-Western Highway to a 4-lane divided standard through to Mundijong Road.
- Upgrading Armadale Road to a 6-lane divided standard from east of Tapper Road to Tonkin Highway.
- Expansion of the Principal Shared Path (PSP) network by 2031 including the following sections along the Armadale Railway PSP:
 - Great Eastern Highway – Welshpool Station
 - Lacey Street – Ladywell Street
 - Kelvin Road – Albany Highway
 - Dorothy Street – Armadale Station.

2.1.4 METRONET (March 2016)

In March 2016, the State Government in WA announced the \$2.95 billion first stage of the new Government's METRONET rail project commitment. This first stage includes the 8km extension of the Armadale Railway Line to Byford with a new station either 1.5km to the north of the Byford Town Centre, or within the Town Centre itself¹. It is estimated the project business case and Project Definition Plan for extending the line and locating a station at Byford will be completed in late 2018.

Throughout Perth's road and rail network, predominantly on the Midland and Armadale Lines, there are 31 level-crossings. The first level-crossing to be removed from the network is Denny Avenue in Kelmscott, with works due to begin in 2019. The Denny Avenue crossing will close, offering an alternative east/west connection built at Davis Road. The Davis Road grade separation will provide safer and quicker access between Albany Highway and Railway Avenue, while also increasing safety for pedestrians, cyclists and drivers, as well as reducing road congestion.

METRONET also includes longer term plans to consider new stations south of Armadale at Mundijong, Serpentine and Pinjarra (Figure 4) as part of the Pinjarra extension to the Armadale Railway Line, significantly increasing Armadale's public transport connectivity to the south. As highlighted in the final Perth and Peel @3.5 million document, all non-Stage 1 METRONET public transport proposals require further investigation and refinement.

¹ Public Transport Authority 2018 <http://www.pta.wa.gov.au/projects/current-projects/metronet> (accessed 28 March 2018).



Figure 4 METRONET Map

Source: METRONET Policy Statement 2017

A key METRONET project is also the removal of level crossings across the Transperth Network and it has been identified that removal of level crossings along the Armadale line has significant community benefits.

As part of the first phase of level crossing removal, three along the Armadale line are scheduled for removal (as shown in Figure 5) and it is estimated that this will take up to four years.

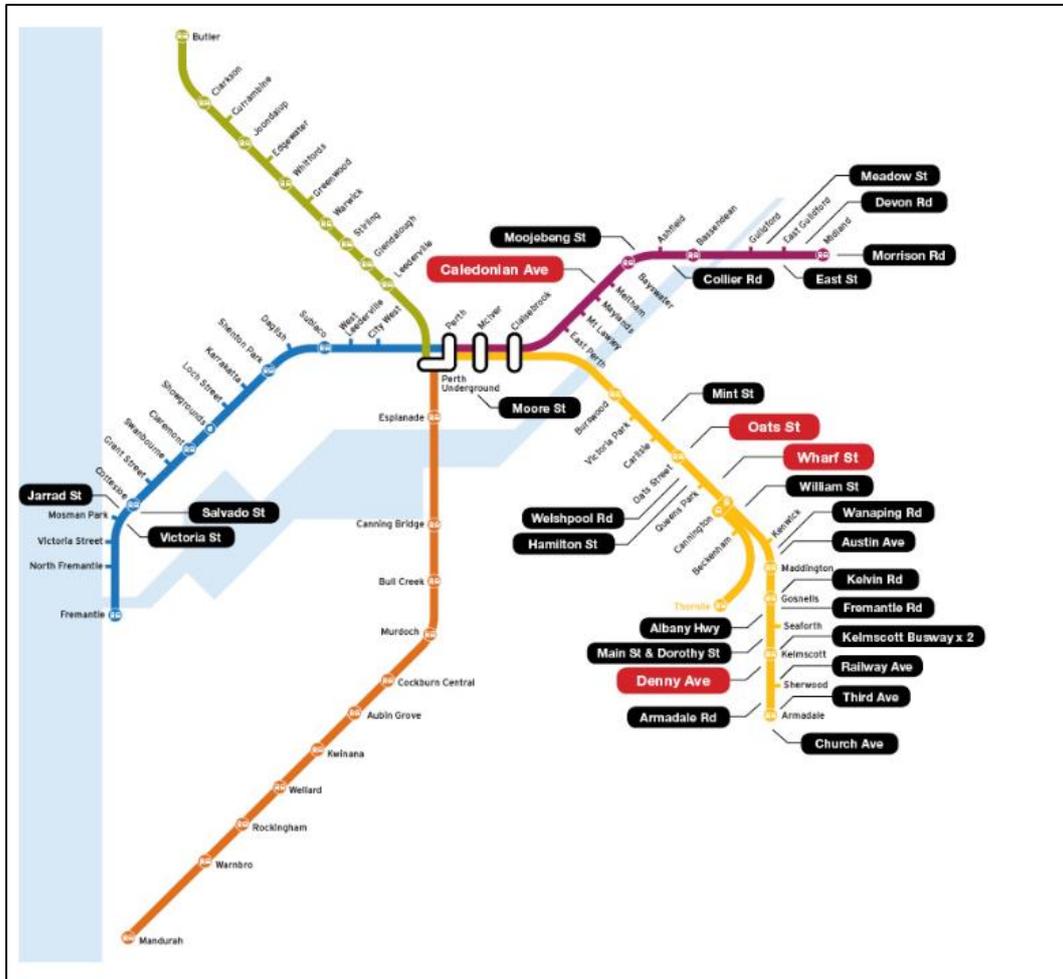


Figure 5 Proposed Level Crossing removals as part of METRONET

Source: www.metronet.wa.gov.au/projects/level-crossing-removal

The program for future level crossing removal is likely to directly impact the Armadale Activity Centre, as there are three level crossings in the study area at Armadale Road, Church Avenue and Forrest/ Third Road and the approach to grade separation may significantly impact future traffic flows to and through the Activity Centre.

2.1.5 WAPC State Planning Policy 4.2 (2011)

The ‘State Planning Policy 4.2 Activity Centres for Perth and Peel’ consolidates the concepts presented in ‘Directions 2031’. The main purpose of the policy is to specify the broad requirements for the planning and development of new activity centres and the redevelopment and renewal of existing centres in Perth and Peel.

The Policy reinforces that activity centres should act as community focal points providing an extensive range of services, facilities and activities.

2.1.6 State Guidance Documents

The preparation of this transport assessment has been completed using the following guidance documentation:

- Transport Impact Assessment Guidelines (August 2016)
- Transport Modelling Guidelines for Activity Centre Structure Plans (June 2016)
- Transport Modelling Guidelines for developments in Activity Centres (June 2016)
- Parking Guidelines for Activity Centres (June 2016)
- Travel Plan Guidelines for Large Shopping Centres (June 2016)

2.2 Local Policy and Planning

2.2.1 Local Planning Strategy – Town Planning Scheme No. 4 (WAPC endorsed December 2016)

The Local Planning Strategy (LPS) sets the strategic planning framework for City of Armadale until 2025. The LPS was endorsed in 2016 by the WAPC and is the mechanism used to implement the Review of Town Planning Scheme (TPS) No.4 through Scheme Consolidation and Amendment/s. The LPS and related Scheme Review Report respond to emerging issues and changing patterns of land development and also implements the requirements of the Planning and Development (Local Planning Schemes) Regulations (2015) for review of Local Planning Strategies and Schemes.

In terms of transport and movement in the Armadale Activity Centre, the values set out in TPS No.4 remain unaltered and are not updated in the Strategy. However, the LPS does refer to potential public transport routes along Armadale Road and Forrest Road but does not identify the desired timeframes for implementing such routes.

The City of Armadale is an advocate for a flexible efficient public transport system serving the outer suburbs of Perth and considers current levels of service as deficient and in need of priority investment. Preparation of the Activity Centre Structure Plan and transport related elements was a key implementation outcome of the 2016 LPS and forms a key strand of the 2016 Advocacy Strategy.

2.2.2 Town Planning Scheme No. 4 (2005)

The Town Planning Scheme divides the City of Armadale into zones to identify areas for particular uses and identifies land reserved for public purposes. It controls the types of uses and development allowed in different zones, with particular controls for heritage and special control areas. It also sets out the requirements for planning approval, enforcement of the Scheme provisions and non-conforming uses.

Car parking standards are supplied in the Scheme. Residential parking is as prescribed by the Residential Design Codes, while parking for other land uses is broken down into a number of smaller categories. End-of-trip facilities (EOTF) for bicycle users are also prescribed in the Scheme.

The full car and bicycle parking standards as detailed in the Scheme are discussed in full in the Parking Supply and Management Strategy (PSMS) prepared to support this Structure Plan. Standards are broken down by land use and the PSMP recommends where current standards should be changed to support the future development proposals as part of this Structure Plan.

2.2.3 Local Planning Policy Manual (2012)

Town Planning Scheme No.4 is supported by Local Town Planning Policies (LPPs), which guide decision-making and the implementation of the Scheme. These LPPs are to be consistent with the intent of the Scheme and the Residential Design Codes.

Within the Transport and Infrastructure Policies in the Manual, three key areas are defined:

- **Highway Development** - the aim of this policy is to control the development of land along all Primary Distributor Roads (according to MRWA's road hierarchy) so as to maintain and improve efficiency and safety.
- **Commercial Vehicle Parking** - this policy details the requirements for applications for parking for commercial vehicles. It aims to control this type of parking in residential areas as it can cause the loss of amenity.
- **Sea Containers, Railway Carriages and Other Decommissioned Transport Conveyances** - this policy controls the use of sea containers, railway carriages and other decommissioned transport conveyances as storage devices.

2.2.4 Advocacy Strategy (2018)

Building on the success of the 2016 Advocacy Strategy, the City has prepared a new Armadale Advocacy Strategy to continue the goal of influencing decision-makers and relevant stakeholders in key priority projects and timelines to assure long-term benefits for the area.

The strategy recognises the significant opportunity that the Structure Plan process will generate in terms of activation and expansion of the city centre.

In terms of transport, the Strategy focuses on the lack of connectivity experienced by the south-east metropolitan region of Perth. Key factors affecting the transport context in the area include the following:

- Armadale is the third-fastest growing LGA in WA
- Enhanced access to public transport and improved road connectivity are required to address the very low level of employment self-sufficiency
- Transport infrastructure growth is not matching the extent of population growth and industrial development occurring within the Armadale and Serpentine Jarrahdale region
- The City Centre requires effective and efficient connections to the road and rail networks of metropolitan Perth

A key issue described in the Strategy is the current attractiveness and efficiency of public transport. The Armadale Railway Line is one of Perth's "Heritage" lines, meaning it is older and of lower quality than the newer lines. There is also limited access to public transport in the region. This combination of factors leads to a large proportion of residents choosing to travel via private car, with a long list of negative impacts as a result, including social disadvantage, environmental damage, traffic congestion, delays to goods and services and limited access to higher education.

Three key transport infrastructure projects are listed in the Strategy as a means of improving the current situation:

- Upgrade Armadale Railway Line and extension to Byford including new Wungong Station:
 - Estimated Cost: \$351 million
 - Timeframes: Commencement 2020
 - Partnerships: METRONET, Shire of Serpentine-Jarrahdale.
- Tonkin Highway Extension from Thomas Road to Mundijong:
 - Estimated Cost: \$405 million (dual carriageway)
 - Timeframes: Commence 2020.
 - Partnerships: Main Roads WA, Shire of Serpentine-Jarrahdale
- Rowley Road Corridor- Freight Link to Westport (Outer Harbour):
 - Estimated Cost: \$600 million
 - Timeframes: Commence 2033
 - Partnerships: Main Roads WA, Infrastructure Australia, WA State Government.

2.2.5 City of Armadale Urban Forest Strategy (2014)

The vision described for the City of Armadale Urban Forest Strategy is:

“to strengthen a diverse landscape character through allocating suitable tree diversity, to be proactive in appropriate landscape planning while showcasing the city’s botanic heritage and to distinguish an expanding ‘tree change’ destination from the existing Perth vernacular.”

The Strategy aims to achieve the holistic benefits of urban forest tree and vegetation plantings and retention through alignment with the Liveable Neighbourhoods planning policy.

In order to achieve this, the Strategy defines four landscape character precincts, one of which is the Armadale Strategic Metropolitan Centre. A street tree hierarchy is also determined based four main road categories:

- Primary Distributors
- Integrator Arterials
- Neighbourhood connectors
- Access Streets

The opportunities, role and purpose of the urban forest for each street typology is outlined in the Strategy. In particular, the key purposes for the Activity Centre are to improve pedestrian amenity and strengthen street hierarchy.

2.2.6 Economic Development Strategy 2018-2022 (2018)

The Economic Development Strategy (EDS) puts forward a vision *“To have a vibrant and sustainable economy that provides a diversity of jobs and investment opportunities.”* The strategy’s action plan seeks to achieve the following three outcomes:

- Encourage Infrastructure and Investment
- Promote and Market Armadale
- Support Businesses

The strategy builds on previous economic plans and puts forward the significance of developing the City’s competitiveness in providing strong transport linkages to the wider metropolitan region of Perth. Its strategic location, adjacent to the Metropolitan passenger rail network and key distributor roads (Tonkin Highway, Kwinana Freeway, Albany Highway, Brookton Highway), provides opportunities for businesses investing in the City. The City’s close proximity to key economic infrastructure (Perth and Jandakot Airports, Kewdale, Canningvale and Welshpool industrial areas and the proposed Westport Development) is also recognised as important to future growth.

The EDS also advocates the benefits of METRONET’s expansion of the Armadale Line on the development of the Armadale Strategic Metropolitan Centre.

2.2.7 Armadale City Centre Concept Plan and Redevelopment Scheme (2004)

In 2011 the Armadale Redevelopment Authority (ARA) normalised the Armadale City Centre east of Commerce Avenue/rail line and relinquished planning controls back to the local government. The ARA retained planning controls over the City West Precinct. The objectives of this document released in 2004 by the ARA (now absorbed into the Metropolitan Redevelopment Authority) are as follows:

- Facilitating the development of Armadale City Centre as a vibrant, multi-dimensional place of civic, cultural and economic significance consistent with its standing as a strategic regional centre
- Encouraging excellent urban form that contributes strongly and positively to the public realm, in particular to traits and characteristics unique to Armadale
- Making it easier to access and move through the centre of the City and promoting a safe and friendly environment for pedestrians
- Ensuring building and street design enhances security and safety.

The components of the development concept are shown in Figure 6.

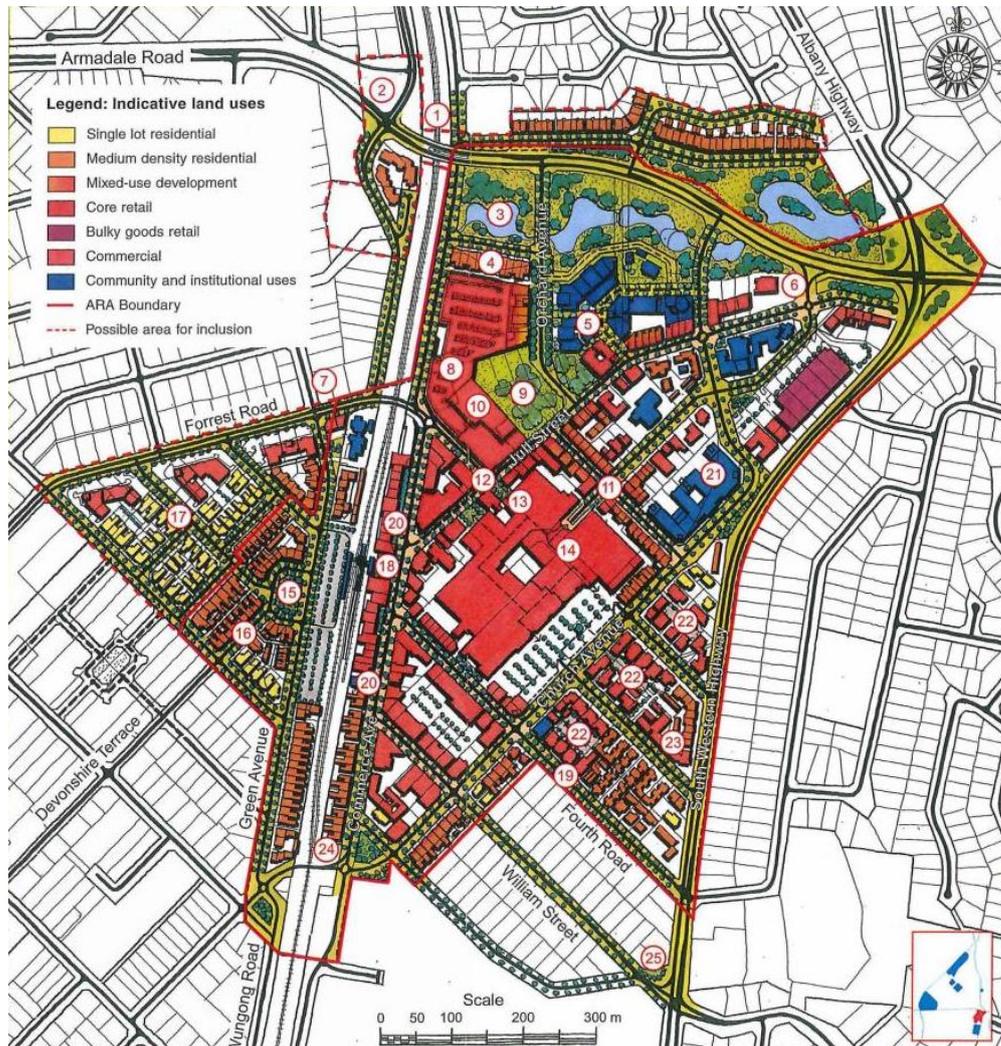


Figure 6: Armadale City Centre Development Concept

The key components numbered in the figure are described below with transport related items are denoted in bold text:

1. **Long term proposal to grade separate Armadale Road and the railway**
2. **Traffic signals at the Armadale Road and Railway Avenue intersection with a new road connection leading to Forrest Road**
3. Extension and enhancement of Minnowarra Park
4. Mixed-use development to create a 'gateway' feature and civic presence to the park
5. Indicative structure for future redevelopment or enhancement of the civic precinct
6. **New road connection to Armadale Road**
7. **Connection of Abbey Road to Green Avenue to create a western city centre perimeter road**
8. Consolidation of land to the west of Jull Street to create a new retail and mixed-use development opportunity
9. Rationalisation of Memorial Park to create enhanced edge conditions and natural surveillance

10. New cinema complex
- 11. New street connection between Jull Street and Church Avenue**
- 12. Restoration of two-way traffic to that part of Third Road between Jull Street and Forrest Road, and that part of Jull Street between Orchard Avenue and Third Road**
13. New pocket park at the end of Third Road
14. Expansion of Armadale Shopping City
15. Creation of a small station park to catalyse redevelopment to the west of the station
- 16. Extension of Devonshire Terrace towards the station**
17. Potential residential development with commercial uses on Forrest Road and mixed uses on Green Avenue
18. **Relocated station**, new civic forecourt and public square
19. Enhancement of the Fourth Road streetscape to create a strong civic identity between the City Centre and South Western Highway
20. Development opportunities on the existing railway land
- 21. Realignment of Church Avenue to create a suitable site for office/commercial development**
22. Business courts with common car-parking areas, utilising existing buildings where appropriate
23. Re-use of school for residential/commercial purposes
- 24. Reprioritisation of traffic around the Church Avenue railway crossing to improve the legibility of traffic flow into the City Centre**
- 25. Improvement to the South Western Highway and William Street intersection to establish a prominent point of arrival to the City Centre.**

The components of the concept plan were reviewed as part of the Structure Plan process and used to inform the development of the three development scenarios.

2.3 Local Transport Assessments

The City of Armadale indicated that over the past ten years a series of traffic assessments have been completed on the road network surrounding the Activity centre. The outcomes from the modelling undertaken within these assessments has been used to inform the potential mitigation measures required to support the Structure Plan.

2.3.1 Armadale City Centre Traffic Study (2004)

The City of Armadale together with the Armadale Redevelopment Authority's (ARA) commissioned the Armadale City Centre Traffic Study (Armadale City CentreTS) in 2004 to model traffic across the area shown in Figure 7. The object of the study was to guide the development of a road network and layout to support the Armadale Redevelopment Authority's (ARA) concept plan for the City.

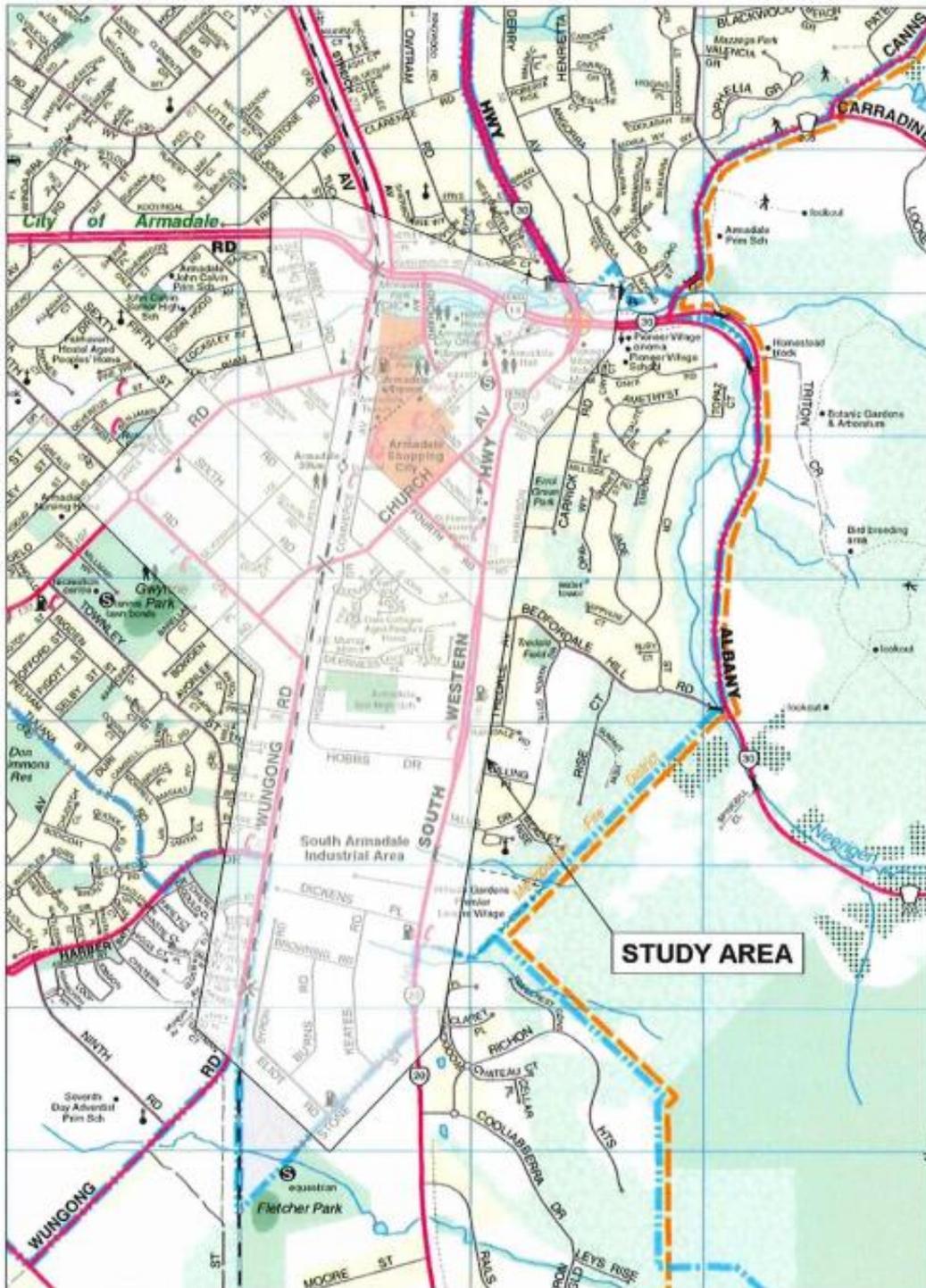


Figure 7: Armadale City Centre TS Study Area (Maunsell 2004)

The following tasks were completed as part of the study:

- Data collection
- 2001 calibrated base model (based on ROM)
- 2021 base traffic model
- Testing of twelve alternative 2021 traffic model network scenarios

- Intersection analyses (using SIDRA) and conceptual designs based on the information gained from the traffic model.

The findings of the report showed that the intersections of Armadale Road/ Railway Avenue and Streich Avenue in conjunction with the level crossings between the intersections required further detailed modelling.

The report indicated high levels of congestion could be expected, particularly on the sections of Armadale Road approaching the crossing. It recommended that grade separation be considered and planned by 2011.

The Forrest Road rail crossing was predicted to operate at a sufficient level of efficiency during peak periods in 2021 (assuming at-grade crossing).

2.3.2 Armadale TRIPS Model (2007)

The City of Armadale commissioned an update to the previous TRIPS/ CUBE model developed in 2003/4. The purpose of the model was to assist in the selection of potential changes to the existing road network around Armadale Activity Centre for 2021.

Two network options were modelled in the update, as described below:

2021 Option 1

- Existing intersection of Railway Avenue/ Armadale Road moved east to form a four-way intersection, with a new link created between Armadale Road/ Abbey Road
- Removal of the intersection of Abbey Road/ Armadale Road and closure of the link north of the new 3-way intersection with proposed Railway Avenue alignment.
- New 4-way intersection at Green Avenue/ Abbey Road/ Forrest Road
- Removal of intersection of Railway Avenue (South)/ Armadale Road and effective closure of Railway Avenue (South) north of Forrest Road
- Closure of Neerigen Street link between Orchard Avenue and Third Avenue
- Old Neerigen Street Link replaced by new link between Orchard Avenue/ Streich Avenue
- Whitehead Street connection between Jull Street/ Church Avenue
- Jull Street modelled as two-way
- Commerce Avenue extended to form 4-way intersection with Church Avenue/ Hobbs Drive
- Extension of Wungong Road (North) to form additional junction with Church Avenue by a new 4-way intersection with Green Avenue
- New signalised intersection at William Street/ South Western Highway.

2021 Option 2

This option includes the network changes described above with the following additions:

- Streich Avenue grade separated with Armadale Road
- Streich Avenue extended to form new link with Third Avenue
- Existing intersection of Streich Avenue and Armadale Road removed.

Results

The following list of results are detailed in the document:

- The addition of the new development in the Wungong Waters area results in increases in link volumes on Wungong Road and Forrest Road with less significant change in major links at the cordon
- The addition of the new shopping development between Orchard Avenue/ Neerigen Street likely to cause significant changes to predicted volumes in the area
- The grade separation of Streich Avenue in Option 2 leads to increased link flows along Streich Avenue and small increases on Orchard Avenue and Forrest Road / Third Avenue / Jull Street
- Small reduction in volumes at the intersection of Orchard Avenue/ Armadale Road. Small reductions are also estimated on Church Avenue and on the proposed Railway Avenue / Abbey Road link
- A reduction in traffic on Armadale Road west of Railway Avenue, when the latest model is compared to the previous 2003 model.

2.3.3 Forrest Road Upgrade Transport Assessment (2016)

The City of Armadale commissioned a transport assessment for the Forrest Road Upgrade project in 2016 to both assess existing traffic conditions and understand the impacts of the proposed upgrade on future conditions in the area. The study area for the assessment is shown in Figure 8.

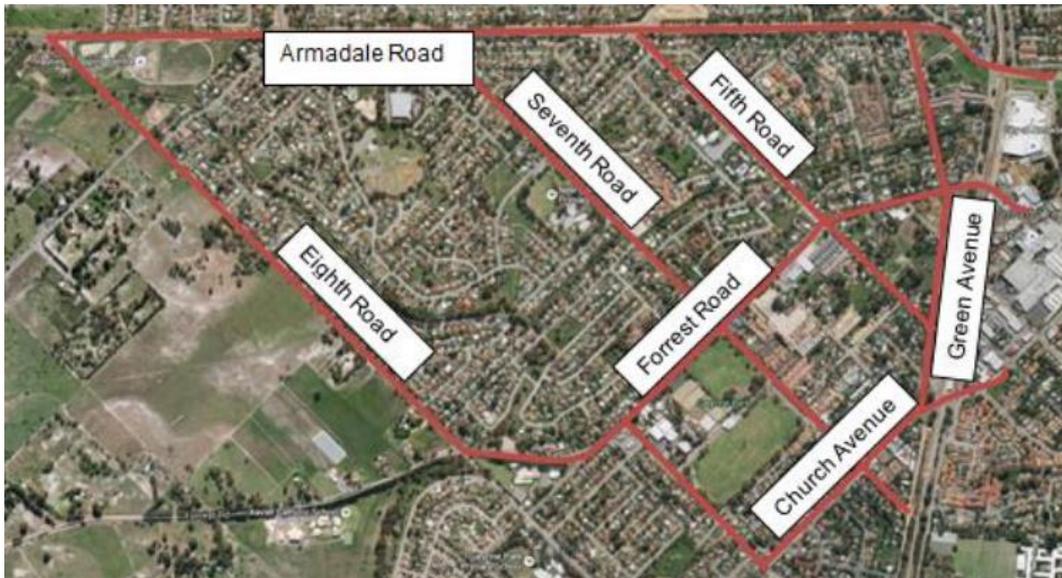


Figure 8: Forrest Road Upgrade TA Study Area (Jacobs, 2016)

Two scenarios were modelled and are detailed in the report: a “do nothing” scenario and an “option” scenario, in which a number of proposed improvements to Forrest Road are applied. Based on the 2031 models, significant traffic growth is expected along Forrest Road. This is partially due to the MRA’s nearby Wungong Urban Development. The following intersections were modelled including proposed upgrades:

- Forrest Road/ Abbey Road/ Green Avenue
- Forrest Road/ Fifth Road
- Forrest Road/ Seventh Road

The report recommends that new bus routes be considered in the medium/ long term to provide a connection between Armadale City Centre and the Wungong Urban Water redevelopment area, and that bus frequency be increased to a maximum interval of 15 minutes in the short term along Forrest Road.

2.3.4 Transport Infrastructure Needs Assessment (2016)

The Transport Infrastructure Needs Assessment (TINA) was prepared to contribute towards realising the desired outcomes for the City of Armadale. It evaluates the performance of both the existing transport network and the predicted future network, with allowance for current planned improvements.

Included in the TINA is a transport masterplan summarising Armadale’s transport infrastructure needs over the short (0-4 years), medium (4-10 years) and long (10+ years) terms. Areas requiring improvement/ upgrade to address future congestion are identified using MRWA ROM24 modelling. These include:

- Eighth Road/ Armadale Road
- Seventh Road/ Armadale Road

- Railway Avenue/ Denny Street
- Forrest Road/ Tonkin Highway
- Tonkin Highway from Albany Highway to Rowley Road
- South Western Highway from Hobbs Drive to Eleventh Road
- Rowley Road from Kwinana Freeway to Tonkin Highway

The Masterplan notes the issue of how to provide public transport services to the rapidly-growing western region of Armadale. This study has no status in planning but has been used to identify which transport infrastructure will require upgrading as part of the Structure Plan process.

2.3.5 Armadale Rail Crossing Modelling (2017)

The PTA commissioned the development of a base model of the current road network surrounding the Armadale Rail Line with the objective of identifying the impact on the road network of consolidating or grade separating rail crossings. The report is not yet finalised but it is understood through consultation with both Main Roads WA and the METRONET team at the PTA that the grade separation of Armadale Road is proposed. Figure 9 and Figure 10 depict the draft concept designs for the Armadale Road grade separation, which also identifies the closure of the Forrest Road crossing. At this stage no information is provided in relation to the current at grade crossing at Church Avenue.

The City identified that the Armadale Rail Crossing Modelling did not adequately address traffic volumes and movements associated with the connection of Forrest Road to the City Centre. It is understood that more recent modelling by the City and the Department for Planning, Lands and Heritage has identified the importance of this road connection to serve the growing population and connectivity to the City Centre. It is strongly recommended that consultation with both METRONET and Main Roads WA continues to allow the impact of consolidating or grade separating the rail crossings on access to the Activity Centre is fully understood.

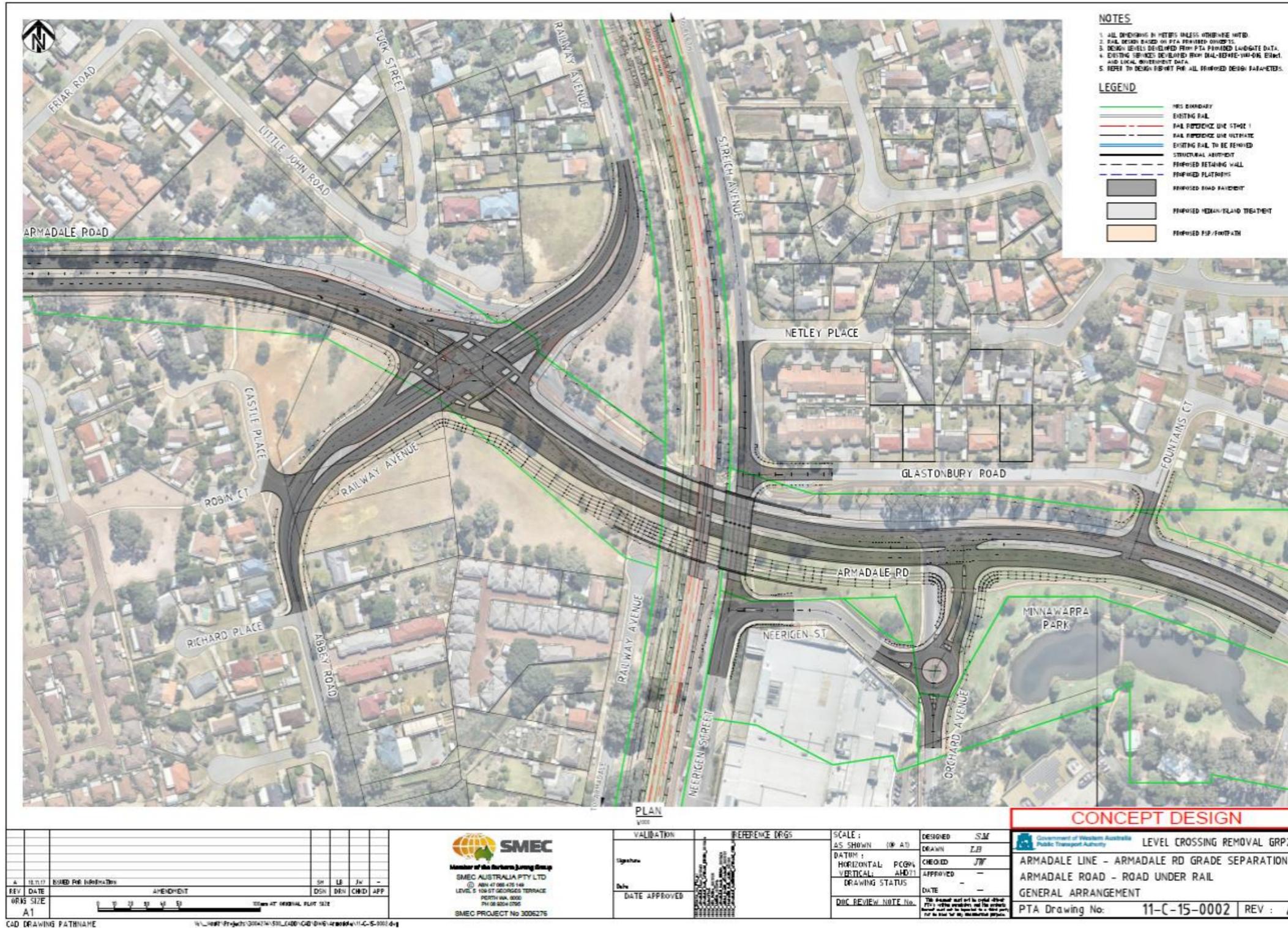


Figure 9 Draft Concept Sketch for Armadale Road Grade Separation (supplied by PTA)

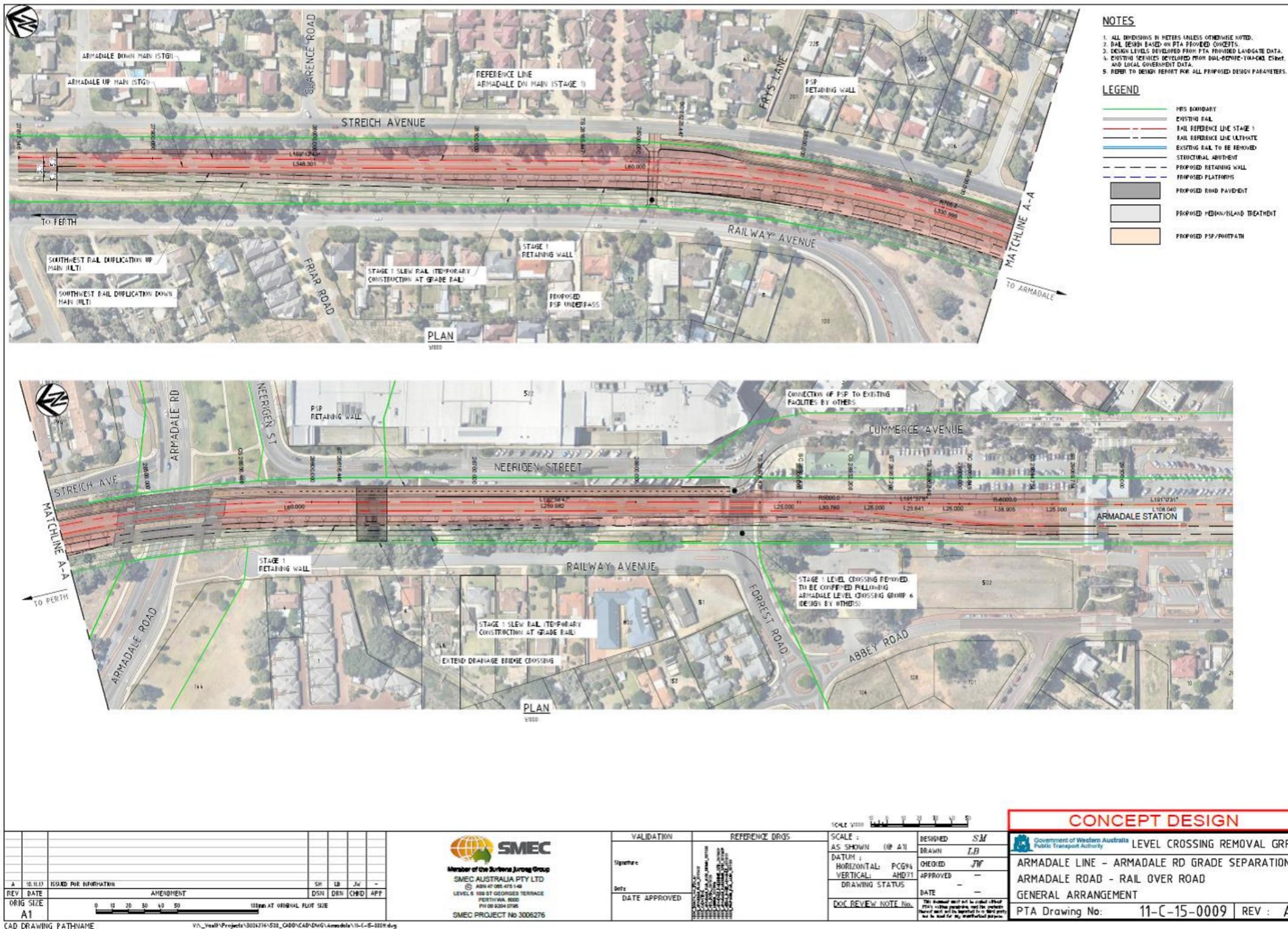


Figure 10 Draft Concept Sketch for Armadale Road Grade Separation at Forrest Road (supplied by PTA)

3 Existing Conditions

3.1 Existing Land Uses Within the Activity Centre

As the main regional centre for a substantial catchment area in the south-east of the metropolitan region of Perth, the Armadale Activity Centre exhibits a diverse mix of land uses reflective of an activity centre (Figure 11). Retail, public administration and safety, accommodation and food services, and health care and social assistance are the major attractors and places of work. These land uses are predominantly located to the east of the Armadale Activity Centre, while residential land uses and vacant lots dominate the west side of the rail line. Notable to the Armadale Activity Centre, the expansion of existing land uses to the east/ west are restricted by the at-grade rail line, while north/ south expansion is restricted by Armadale Road.

Future growth of the region will place pressure on these land uses to expand beyond these existing barriers and cater for the entire population, while increasing its attractiveness and character as an activity centre. In a comparison undertaken by Syme Marmion & Co with competing activity centres with overlapping catchments (Cannington, Cockburn and Rockingham), Armadale is relatively small across all major land uses including: retail; office; health; and entertainment.

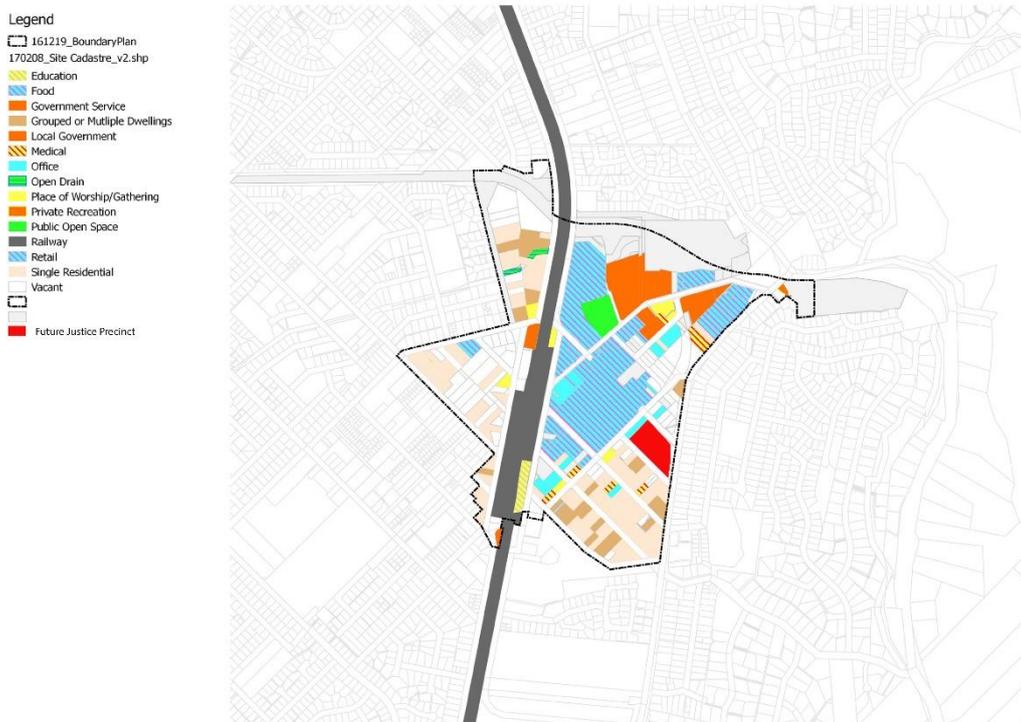


Figure 11 Existing land uses

Source: Figure 22, Armadale Activity Centre Structure Plan Report, HASSELL

3.2 Travel Patterns

Figure 12 shows a comparison of 2011 and 2016 Journey to work data recorded in the Census. The Census information indicated that there has been an increase in the number of people employed in the City of Armadale and there has been a 2% increase in car trips (as driver or passenger) and a slight reduction in trips by train (1%) and walking (1%). Analysis of the Census data also indicates that households owning two cars is also increasing across the Armadale Local Government Area.

When compared to the Greater Perth area the number of people walking or cycling to work is lower, which may reflect the extent to which the Activity Centre is not performing to the level required for a Primary Centre within the Activity Centre hierarchy.

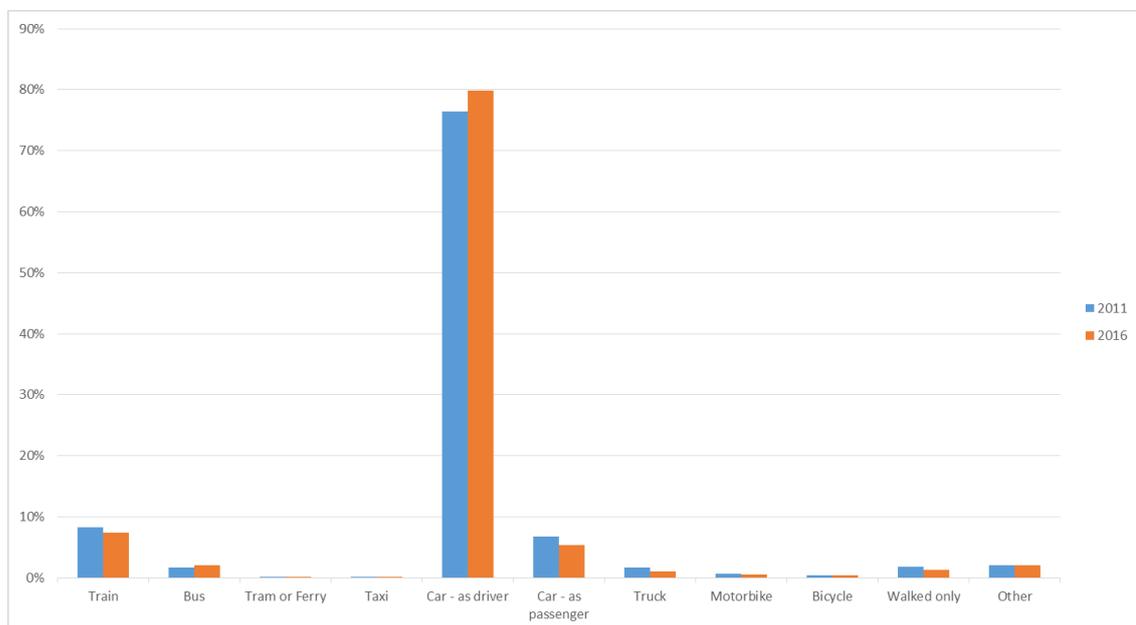


Figure 12 Mode share comparisons - Journey to Work Census Data 2011 and 2016 Armadale Local Government Area

Source: <https://profile.id.com.au/armadale/travel-to-work>

3.3 Existing Pedestrian and Cycle Networks

Pedestrian accessibility within the Armadale Activity Centre is shown in **Figure 13**. Pedestrians can access the majority of the Armadale Activity Centre area within 10 minutes and all of it within 15 minutes. This is generally acceptable but by no means exceptional pedestrian amenity. Barriers to pedestrian connectivity within the Armadale Activity Centre include the large amount of parking lots and parking access driveways and the railway line.

Pedestrians/ cyclists can cross the railway line at Armadale Road, Church Avenue, Third Road/ Forrest Road and south of the train station via level crossings, as well as through the train station via stairs or a lift. These key points of connectivity are also shown in **Figure 13**.

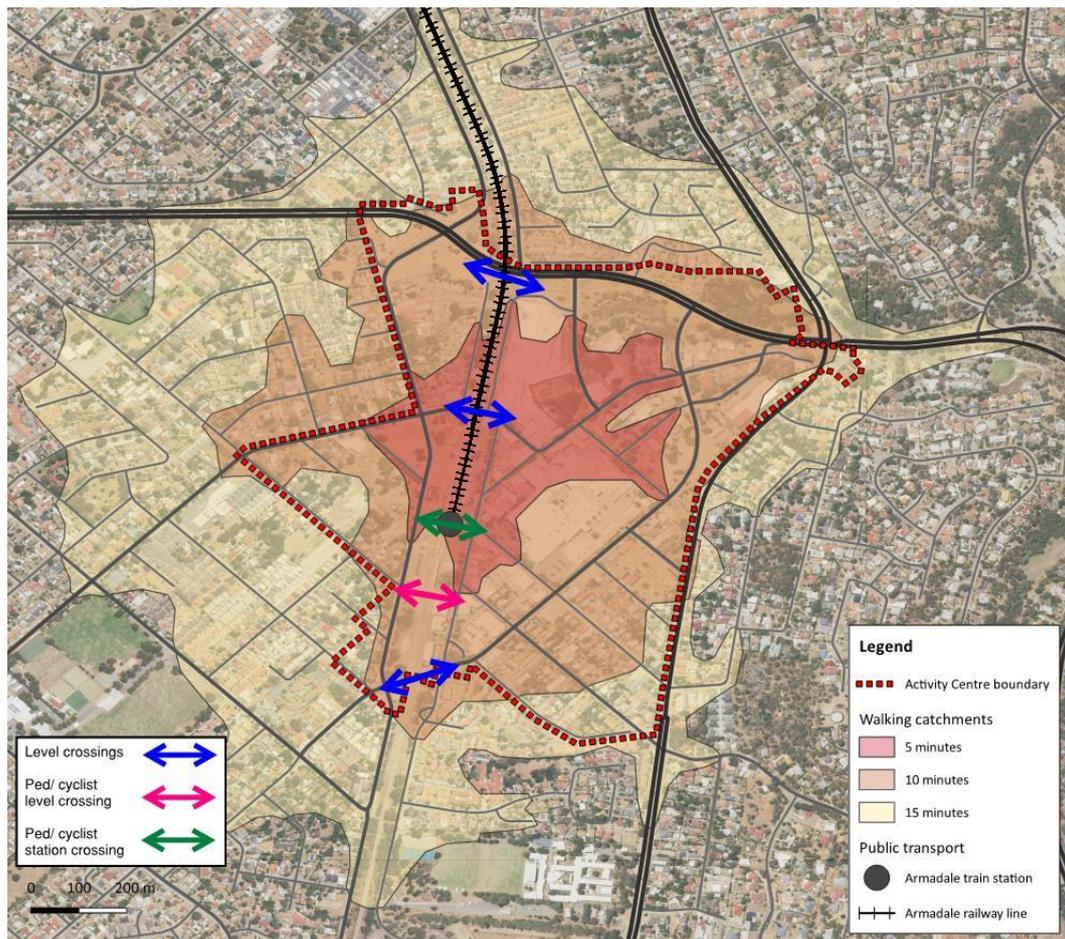


Figure 13: Armadale Activity Centre walking catchments

The pedestrianised connection through Jull Street from the train station is a significant asset but legibility in general through the Armadale Activity Centre is poor. Current activation through Jull Street is limited which impacts on people's desire to use it as a connection.

The theoretical cycle connectivity within the Armadale Activity Centre is similarly strong. **Figure 14** shows that the entire study area can effectively be accessed within 10 minutes, along with a substantial area predominantly to the south and west of the Armadale Activity Centre.

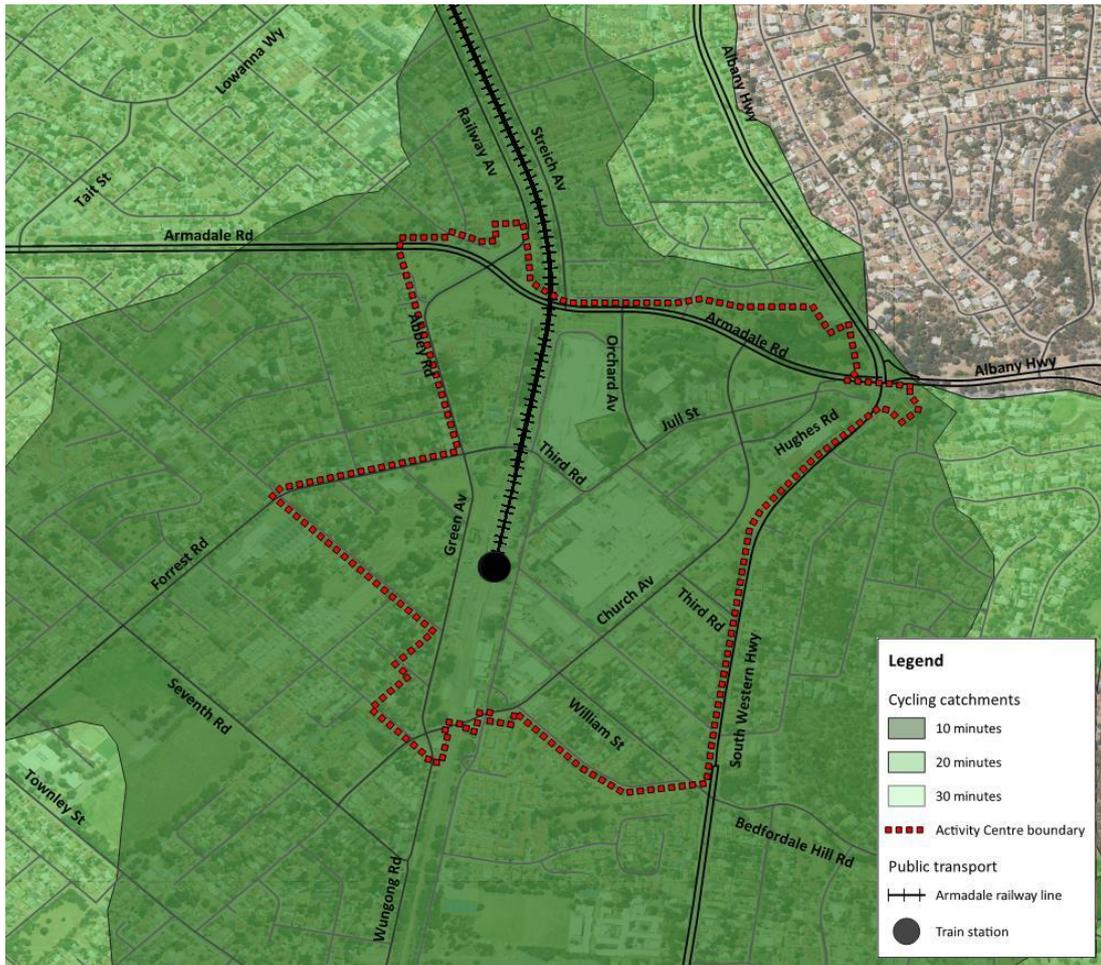


Figure 14: Armadale Activity Centre cycling catchments

Moving beyond the Armadale Activity Centre area boundary, however, significant barriers exist which inhibit pedestrian and cycle movement. In particular, Armadale Road and South-Western Highway inhibit access.

Figure 15 depicts the full cycling catchments. It is shown that whilst cycling accessibility to the north, west and south of the Armadale Activity Centre area is relatively good, access to the east and north-east is restricted.

The Armadale Activity Centre’s connection with the Perth PSP network is limited and intermittent, but set to benefit from future improvements as outlined in section 2.1.3. as stated in the WA Bicycle Network Plan:

“The intention of the 2023-2031 program will be to complete the entire PSP network to Yanchep, Rockingham, Fremantle, Midland and Armadale.”

The change in topography also impacts people’s ability to comfortably cycle east of the South-Western Highway and Albany Highway. To the east of the rail corridor the land rises substantially within a relatively short distance from 58m AHD at the railway station to 90m AHD on the South West Highway.

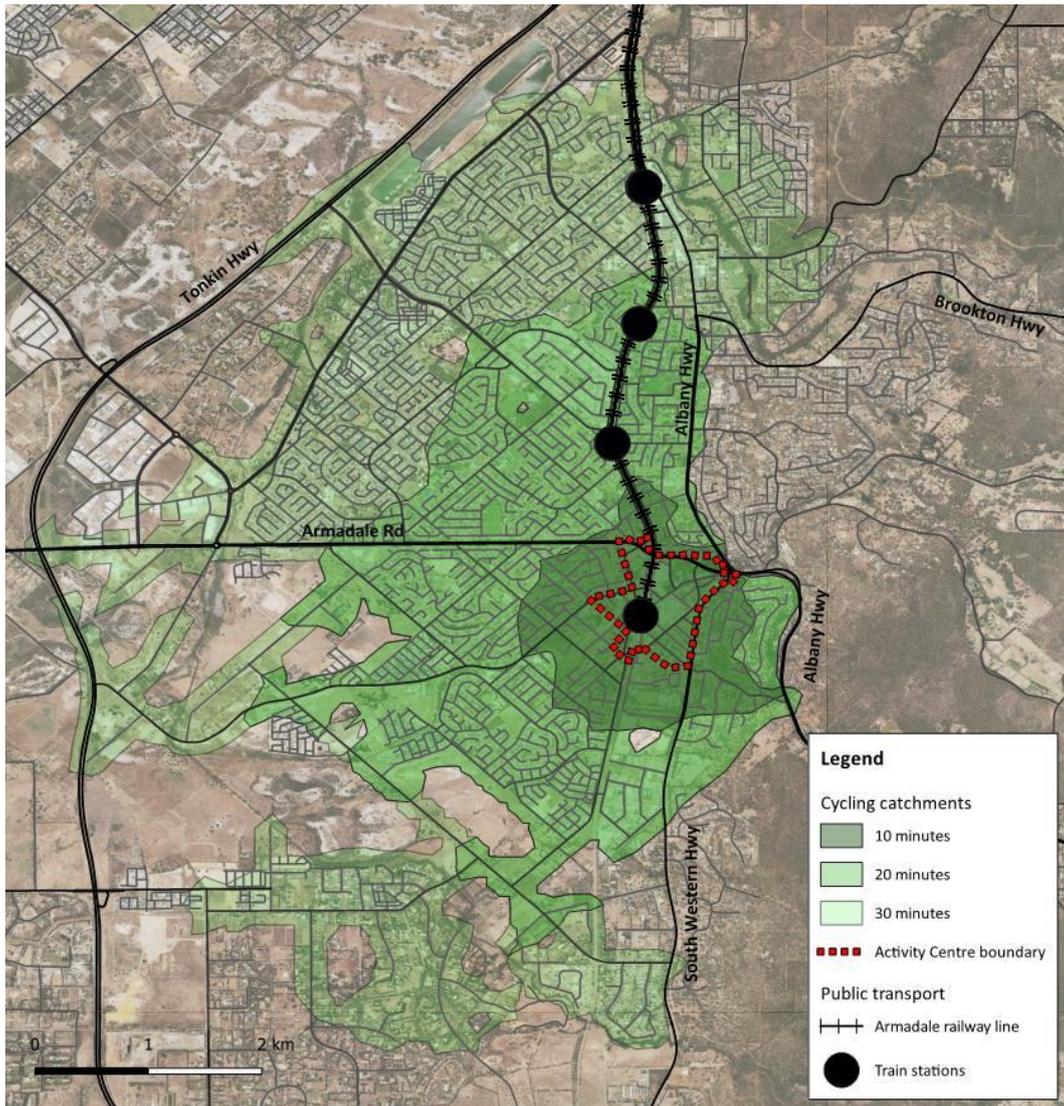


Figure 15: Armadale Activity Centre cycling catchments (full extent)

The major barriers to pedestrian and cycling connectivity are Armadale Road along the northern boundary and South-Western Highway along the eastern boundary, as well as the intersection of the two. These barriers mean some areas to the north-east of the Armadale Activity Centre are not accessible to cyclists within 30 minutes, despite being significantly closer than some areas accessible within 10 minutes as shown in **Figure 16**.

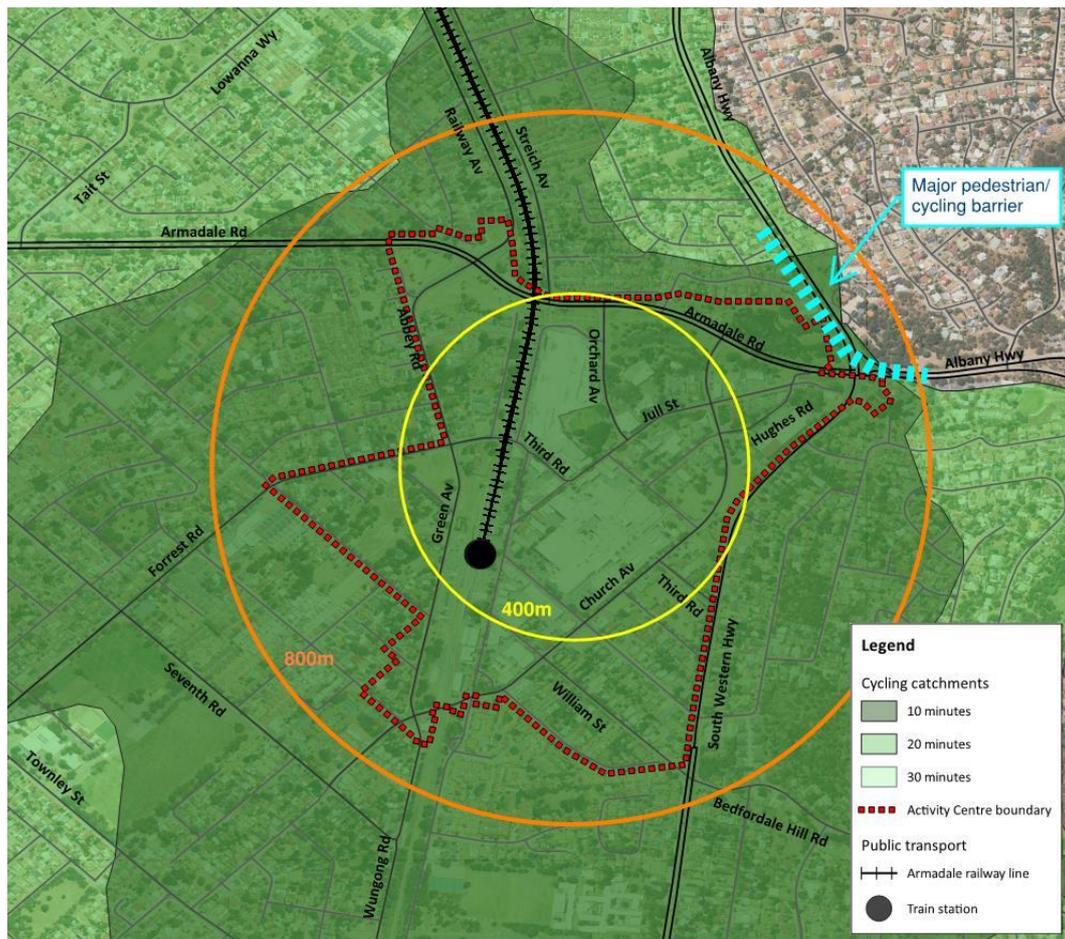


Figure 16: Armadale Activity Centre cycling catchments and radii from city centre

3.4 Existing Public Transport Services

Armadale train station is located close to the centre of the Activity Centre and connects the area via the Armadale Railway Line to the Perth CBD. It is currently the end of the line stop on the Armadale Line. The current population catchment for the station extends to the south including Byford, Jarrahdale and Serpentine.

Australind train services between Perth and Bunbury also stop twice a day at Armadale providing connections to the wider south west region.

The central location of the station in the Armadale Activity Centre means that passengers are in close proximity to key activity nodes such as Armadale Shopping City, Armadale Central and the civic precinct on the east side. The west side of the station currently consists of residential or vacant land, which forms part of the MRA development land. There are car parks serving the station on each side of the railway line and the station acts as a rail to bus interchange.

Figure 17 and Figure 18 show the accessibility assessment for public transport services which takes into consideration the current frequency of train and bus connections and was assessed for a weekday peak period. Connections to Perth CBD are possible within 40 minutes in the weekday peak but with train

frequencies in off peak periods dropping to every 15 minutes, this limits the attractiveness of the public transport network.

The figures also show the lack of good connection to the lower-density areas to the east and north-east, as well as limited connectivity to areas in the south such as Wungong and Byford (although this is set to improve with the slated future line extension).

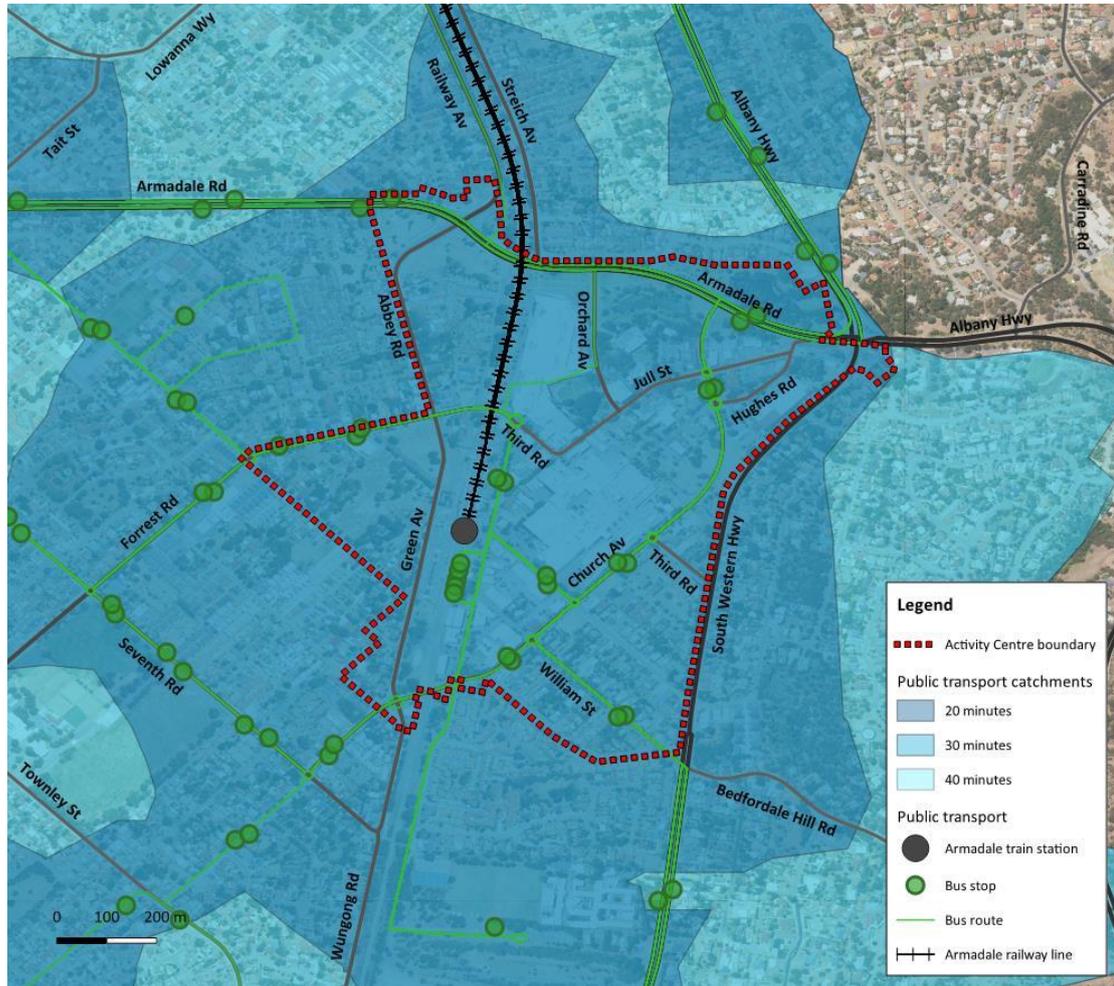


Figure 17: Armadale Activity Centre public transport catchments

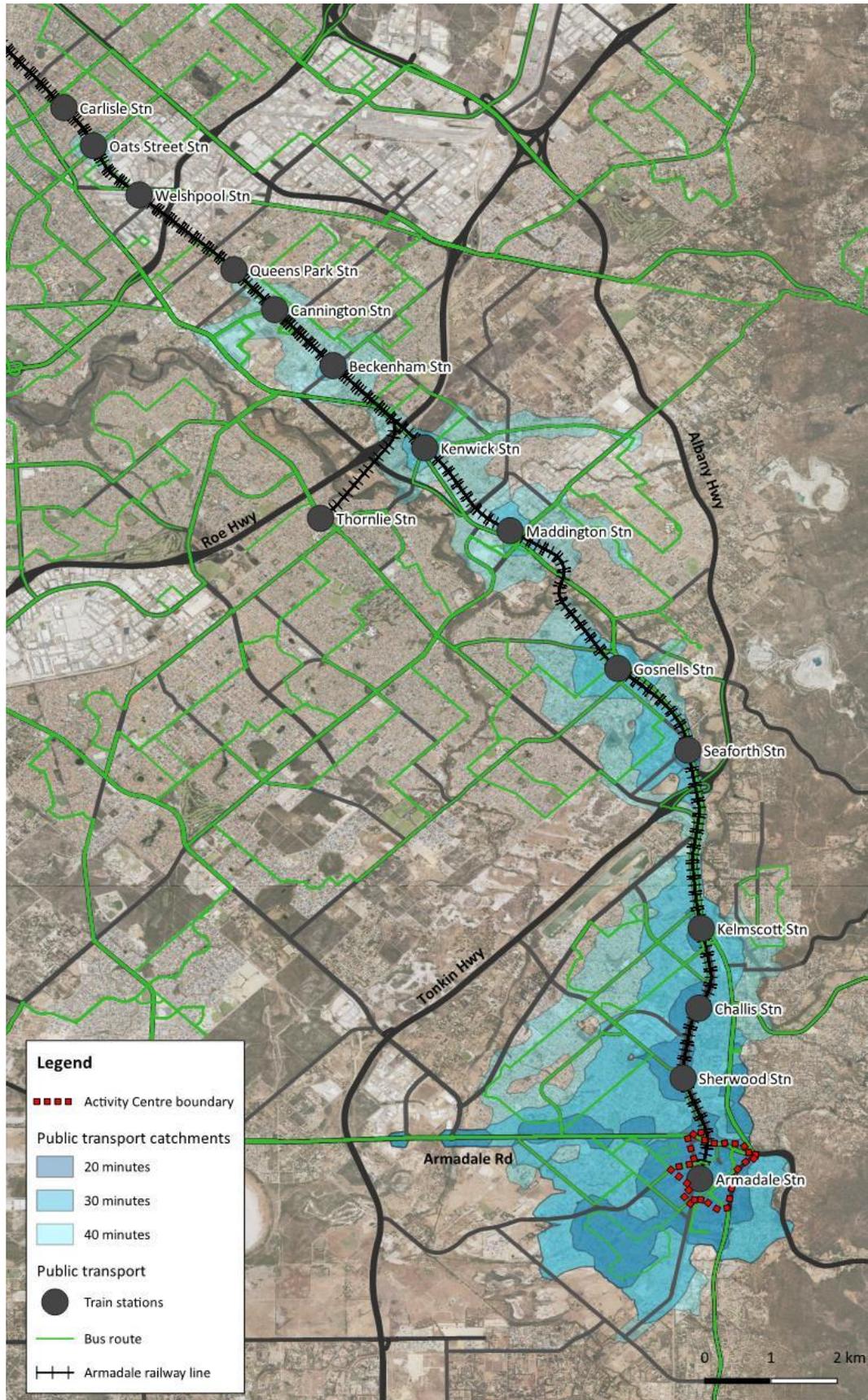


Figure 18: Armadale Activity Centre public transport catchments (full extent)

Table 3: Existing Bus Services in Armadale Activity Centre Network (colour coded to define service type to DoP Transport Impact Assessment Guidelines 2016)

Bus No.	Departure	Destination	AM Peak Services (buses per hour)	PM Peak Services (buses per hour)	Sat Peak Services (buses per hour)
220	Perth Busport	Armadale Stn	2	4	1
220	Armadale Stn	Perth Busport	1	1	1
243	Armadale Stn	Kelmscott Stn	1	1	1
243	Kelmscott Stn	Armadale Stn	1	2	1
244	Armadale Stn	Kelmscott Stn	1	1	1
244	Kelmscott Stn	Armadale Stn	2	2	1
245	Armadale Stn	Kelmscott Stn	1	3	1
245	Kelmscott Stn	Armadale Stn	2	2	1
249	Armadale Stn	Kelmscott Stn	0	0	0
249	Kelmscott Stn	Armadale Stn	0	0	0
250	Armadale Stn	Armadale Stn	4	4	1
251	Mundijong	Armadale Stn	0	0	0
251	Armadale Stn	Mundijong	0	0	0
252	Mundijong	Armadale Stn	2	0	0
252	Armadale Stn	Mundijong	1	2	0
253	Jarrahdale	Armadale Stn	0	0	0
253	Armadale Stn	Jarrahdale	0	0	0
254	Byford	Armadale Stn	2	1	1
254	Armadale Stn	Byford	1	1	1
519	Murdoch	Armadale Stn	2	4	0
519	Armadale Stn	Murdoch	2	1	0

Table 4: Bus Frequency Colour Scheme

Colour	Frequency	Services in peak
Green	High frequency	Every 10 minutes (6 buses per hour)
Orange	Moderate frequency	Every 11-29 minutes (3-5 buses per hour)
Red	Low frequency	30-60 minutes (0-2 buses per hour)

3.5 Existing Road Network

The road network surrounding the Armadale Activity Centre includes a number of key regional and local distributor roads. Details of the existing highway network are provided in **Table 5** and **Figure 20**, including each road's classification in accordance with WAPC's function road classification system (WAPC Policy No. DC 1.4) and MRWA function road hierarchy. The current speed limits for roads in the area are shown in **Figure 21**.

Figure 20 identifies the internal road network within the Armadale Activity Centre Structure Plan area. It identifies that the Armadale Activity Centre benefits from having a series of access routes in all directions from the regional road network. Currently the Armadale Activity Centre can be accessed by road in the following ways:

- From Armadale Road via Railway Avenue / Abbey Road, Orchard Road, Church Avenue and Jull Street (left in only).
- From South Western Highway via Hobbs Drive, William Street, Third Road and Fourth Road.
- From Wungong Road via Church Avenue.
- Directly from Forrest Road.

Permeability through the Armadale Activity Centre by road is similarly good with Church Avenue, Green Avenue and Commerce Avenue providing strong north – south links. The railway line currently acts as a barrier to connections east-west but the presence of three at grade road crossings minimises the impact on the internal road network.

Table 5: Existing traffic flows and hierarchy along major roads within the Activity Centre

Road Name	Location of Count	Speed Limit (km/h)	AAWDT	Count Year	MRWA Road Hierarchy	Source
Abbey Road	S of Forrest Road	50	2448	2015	Distributor B	City of Armadale Count
Armadale Rd	E of Railway Ave	70	25940	2014/2015	Primary Distributor	MRWA Traffic Digest 2014/15
Armadale Rd	W of Albany Hwy	70	18250	2014/2015	Primary Distributor	MRWA Traffic Digest 2014/15
Church Ave	S of Armadale Rd	50	5760	2014/2015	Distributor B	MRWA Traffic Digest 2014/15
Church Ave	N of William St	50	4955	2014	Distributor B	City of Armadale Count
Fifth Road	N of Forrest Road	50	1269	2015	Access Road	City of Armadale Count
Fifth Road	S of Forrest Road	50	686	2015	Access Road	City of Armadale Count
Forrest Road	E of Abbey Rd	60	8080	2011-2012	Distributor B	MRWA Traffic Digest 2014/15
Forrest Road	S of Abbey Road	60	7678	2015	Distributor B	City of Armadale Count
Forrest Road	N of Fifth Road	60	5512	2015	Distributor B	City of Armadale Count
Fourth Road	W of Church Ave	50	5285	2017	Access Road	City of Armadale Count
Fourth Road	E of Commerce Rd	50	3450	2017	Access Road	City of Armadale Count
Jull Street	E of Orchard Ave EB	40	1988	2015	Local Distributor	City of Armadale Count
Jull Street	W of Whitehead St WB	40	3812	2015	Local Distributor	City of Armadale Count
Jull Street	E of Church Ave	50	4695	2015	Access Road	City of Armadale Count
Railway Ave	N of Armadale Rd	60	10980	2011/2012	Distributor A	MRWA Traffic Digest 2014/15
SW Highway	S of Armadale Rd	60	19440	2014/2015	Primary Distributor	MRWA Traffic Digest 2014/15
Third Road	E of Church Ave	50	3452	2014	Local Distributor	City of Armadale Count
William Street	W of SW Highway	50	5284	2011	Local Distributor	City of Armadale Count

Table 6 defines the road hierarchy classifications as adopted by both the WAPC and MRWA.

Table 6: Road Hierarchy Definitions

	Primary Distributor	Regional Distributor	District Distributor A	Distributor B	Local Distributor
MRWA Function Road Hierarchy	Provide for major regional and inter-regional traffic movement and carry large volumes of generally fast-moving traffic. Some are strategic freight routes and all are State Roads. They are managed by Main Roads Western Australia.	Roads that are not Primary Distributors, but which link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas. They are managed by local government.	District Distributor A and B roads run between built up area land-use cells and generally not through them, forming a grid which would ideally space them about 1.5 kilometres apart. They are managed by local government.		Local Distributor roads are managed by local government. Built Up Area - Roads that carry traffic within a cell and link District Distributors or Primary Distributors at the boundary, to access roads. The route of Local Distributors should discourage through traffic so that the cell formed by the grid of higher order distributor roads, only carries traffic belonging to, or serving the area. Local Distributors should accommodate buses, but discourage trucks.
			Carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property.	Perform a similar function to type A District Distributors, but with reduced capacity due to flow restrictions caused by frequent property accesses and roadside parking in many instances. These are often older roads with a traffic demand in excess of that originally intended.	
WAPC Functional Road Classification System - Policy No. DC 1.4	Primary Distributors form the top-level network for the urban region. They carry longer distance traffic to, from, and across the urban area. Some will connect with the State or national road network running between urban areas.	NA	District Distributors carry traffic between different industrial, commercial, and residential areas and link these cells to the primary network. Roads of this type run between cells of compatible land use, not through them, and therefore tend to form a grid system. The spacing of the grid depends upon the land use and traffic generation within the cell and is often up to 1.5 kilometres square.		Local Distributors carry traffic within a cell and link district distributors at the boundary to access roads. The route of the local distributor discourages through traffic so that the cell formed by the grid of district distributors is free from extraneous traffic. The local distributor carries only traffic belonging to or serving the cell.

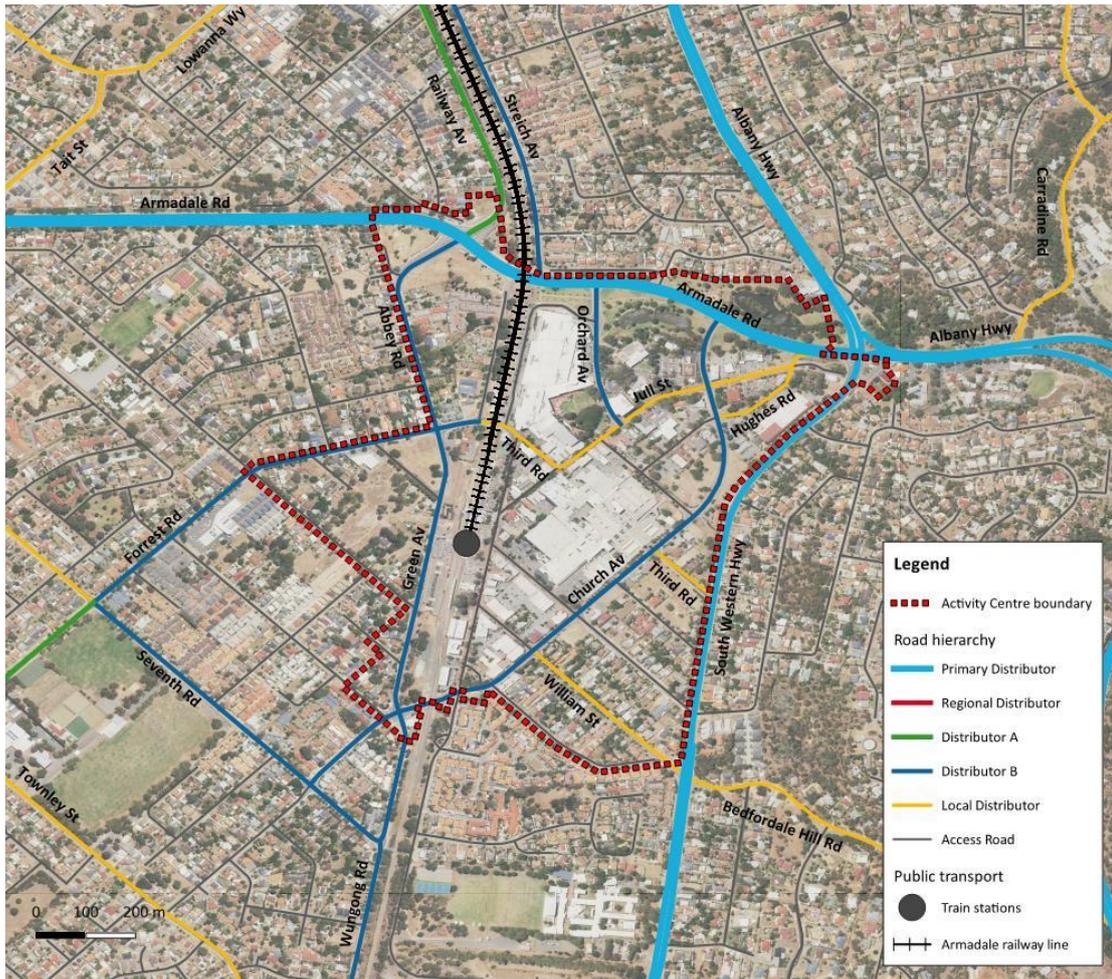


Figure 20: MRWA Road Hierarchy in Armadale Activity Centre

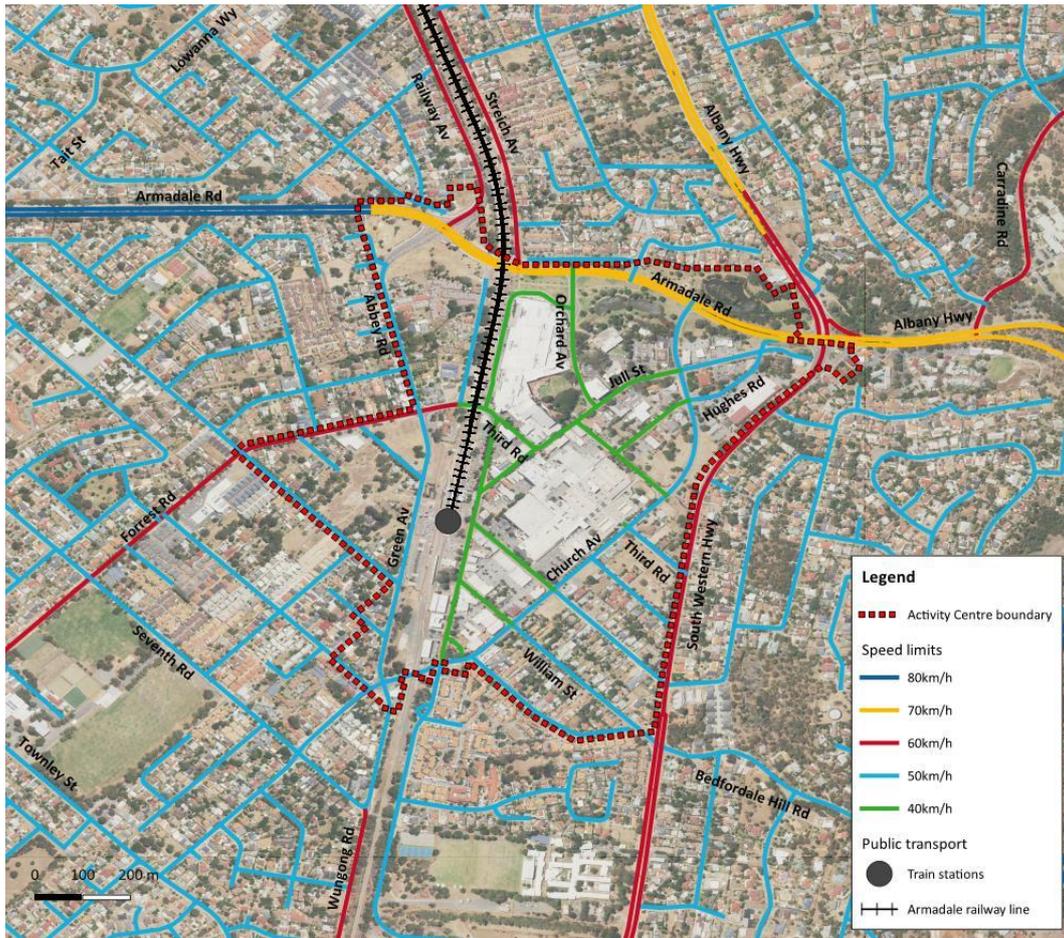
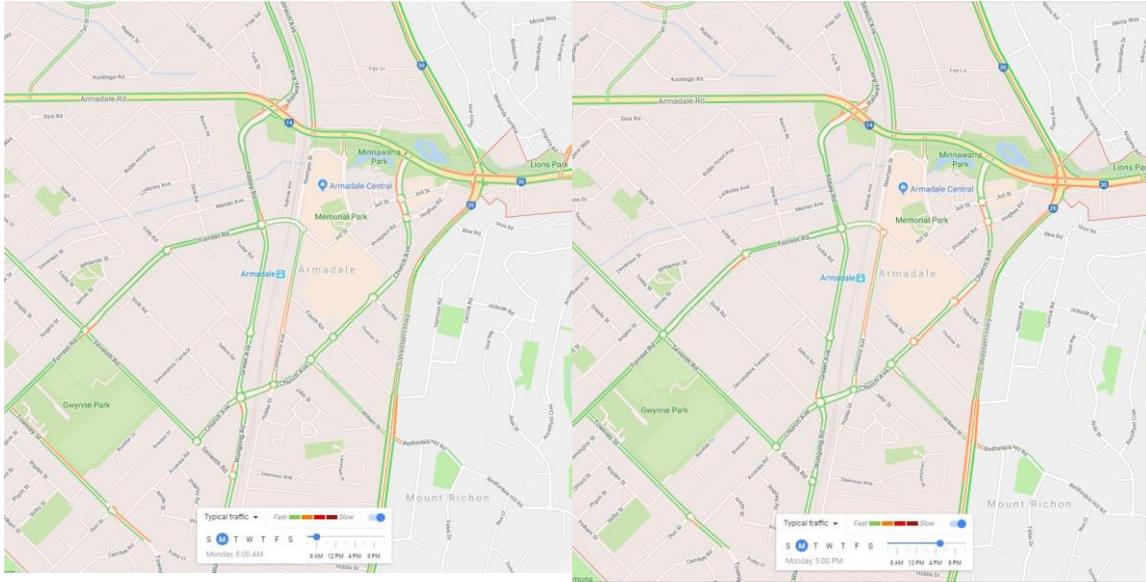


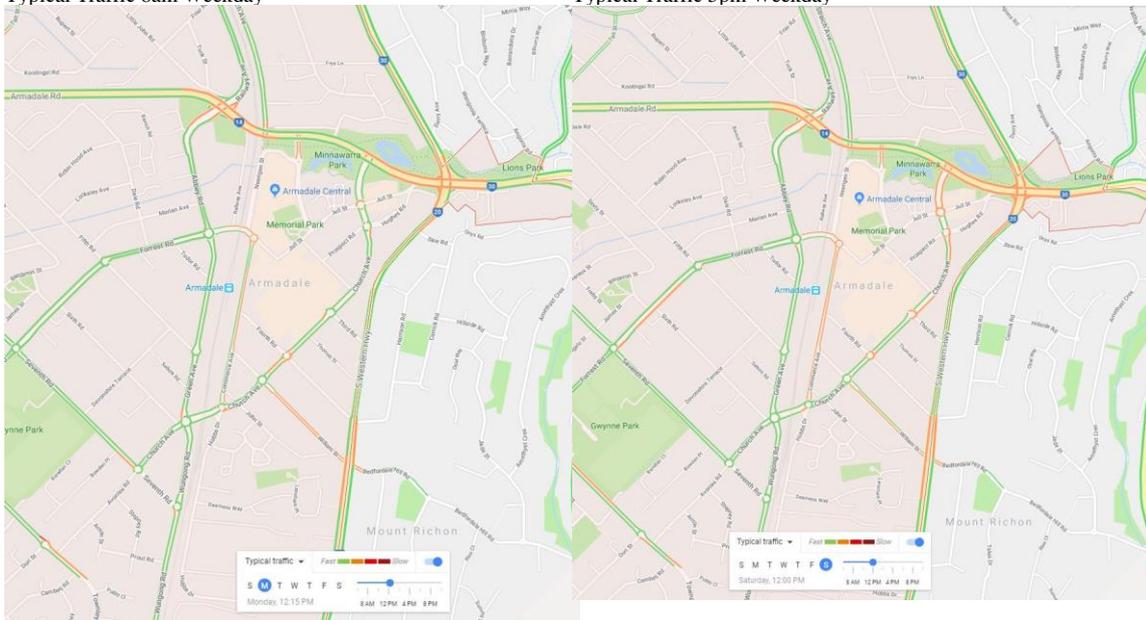
Figure 21: Armadale Activity Centre Legal Speed Limits (Source: MRWA, 2014)

Information on current traffic delays can be summarised based on the typical traffic mapping shown in Figure 22. This indicates that generally the major signalised intersections along Armadale Road experience small levels of delay throughout the day.



Typical Traffic 8am Weekday

Typical Traffic 5pm Weekday



Typical Traffic 12pm Weekday

Typical Traffic 12pm Saturday

Source: Google Maps

Figure 22 Typical Level of Traffic Delay

3.6 Existing Parking

Information on the existing parking supply within the Armadale Activity Centre was limited. As part of the Structure Plan process, the following assessment of existing parking supply was undertaken:

- Site visits – conducted on 23 February 2017 and 2 May 2017.
- Review of existing data.
- Occupancy and turnover surveys – conducted on 2 November 2017.

To provide the City of Armadale with updated information on the current parking supply an interactive GIS layer was prepared and included documenting a series of site visit photographs. Table 4 and Table 5 below summarise the existing supply and ownership of parking within the Armadale Activity Centre, which identifies that around 70% of the current parking supply is within private ownership, particularly related to the two existing shopping centres. Going forward the City of Armadale will have to work with the private sector to manage car parking supply for existing and proposed developments to deliver consistency across the Activity Centre area.

It is important to note that as part of this exercise an estimate of the parking supply available at both shopping centres was made as it was not possible to engage with the relevant landowners within the timeframe of the Structure Plan preparation.

Further information on the assessment of existing parking is provided in the Parking Supply and Management Strategy (PSMS). In summary the information collated on existing parking supply and the occupancy survey suggests there is ample supply for the current levels of development.

Table 4: Existing Parking Supply in Armadale Activity Centre

Parking Type	Number of bays	Percentage
Off-Street	1705	36.5%
Off-Street Unmarked	106	2.3%
On-Street	556	11.9%
Private	431	9.2%
Roof Top	645	13.8%
Undercover	1222	26.2%
Total	4665	

Table 5: Existing Parking Ownership in the Armadale Activity Centre

Count Location	Off Street	On Street	Private	Roof Top	Undercover	Grand Total
City of Armadale	415	489	30		55	989
Other	996	13	401	645	1,167	3,222
Rail Reserve	400	54				454
Grand Total	1,811	556	431	645	1,222	4,665

4 Traffic and Transport Assessment

4.1 Structure Plan Proposal

Vision Statement: *Armadale – the capital of Perth’s south east, where the city meets the hills.*

Addressing the current gaps in services, amenity, infrastructure and key institutions are vital to the long-term resilience of the precinct as a place to live, work and visit. Particularly with regard to:

- Providing opportunity for urban regeneration
- Filling service gaps
- Acknowledging high levels of disadvantage
- Improving opportunities for employment, particularly strategic employment
- Maximising the potential of strong population growth in the region
- Enhancing Armadale’s sense of place and unique position as a transition from city to country; and from Swan Coastal Plain to Perth Hills
- Building upon Armadale’s strong underlying urban structure

The Structure Plan focuses on developing a series of precincts and expanding the following land uses:

- Retail.
- Education, including tertiary.
- Government and administration.
- Cultural activities, arts and entertainment.
- Health facilities.
- Justice services.

Reflecting the objectives of Perth and Peel @ 3.5 million, Armadale’s catchment is growing – expected to reach a population of between 280,000 and 300,000 people by 2036 (from a current population of 120,000 people). This substantial growth, within a relatively short time frame, requires Armadale’s service offering to expand beyond its current provision. Importantly, Armadale will need to mature beyond its existing retail focus to provide services, jobs, amenity, living and leisure opportunities – consistent with its Strategic Metropolitan Centre designation.

Increased residential densities are required not just to meet State Policy targets, but to increase the population of Armadale’s walkable catchment, providing a diversity of housing choice, improving the use of existing infrastructure and enabling development that contributes to the intended amenity and intensity of the centre.

Transit-led renewal offers the best opportunity to provide this and so combining strategic planning regarding the activity centre with the requirements of extension of the Armadale line to Byford is appropriate. For a large centre such as Armadale, in transit terms this means it being both an origin and a substantial destination, maximising the destination elements (employment, education and community services) in the rail station precinct.

Employment self-sufficiency – the ratio of local jobs to employed residents – in the City of Armadale is very low. In 2015/16 there were around 20,109 local jobs and 40,222 employed residents, giving an employment self-sufficiency ratio of 50%. To maintain the current employment self-sufficiency ratio, an additional 15,300 jobs will be required in the City between 2016 and 2036 and an additional 19,000 by 2051. If the ratio were to increase to a more respectable 70% by 2051, an additional 29,400 jobs would be required in the City between 2016 and 2036 and an additional 34,600 by 2051.

Three options were tested through the Activity Centre design process. Community and stakeholder preferences and values were tested throughout two workshop sessions. A number of meetings between the City of Armadale and the METRONET team, Department of Planning, Lands and Heritage, Main Roads WA and Department of Transport have also been held. Following review of the three options, a preferred plan was created to describe the aspirational vision for the Activity Centre.

The Structure Plan proposes the City's preferred approach to grade separation, but has also been prepared to integrate with a range of potential outcomes. It is understood ongoing engagement will occur between the City and METRONET team to progress the outcome of grade-separation as part of the Byford Rail extension project.

PTA rail corridor requirements allowed for in each scenario are:

- Rail on the Armadale Line must allow for four tracks (25m wide corridor minimum for cutting).
- Armadale Station must allow for four platform faces, with 150m long platforms to accommodate larger capacity trains. (40m wide minimum in cutting).

Three scenarios have been developed for the town centre, each with different treatments of the rail. Their outcomes are quite different. The capacity of the Armadale centre at full build-out with the three scenarios is shown in Table 7.

Table 7 Scenarios Capacity Outcomes

	Scenario 1	Scenario 2	Scenario 3
Residents	7,000	5,400	5,050
Employment (jobs)	18,000	13,100	9,400
Students	1,600	1,100	190
Total Private Sector Investment	\$2,253m	\$1,665m	\$1,296m

Source: Table 5, Armadale Activity Centre Structure Plan Report, Hassell

It was concluded that only Scenario 1 has the capacity for Armadale to become a significant employment centre and to fulfil its role as the major metropolitan centre for a wide region. It has:

- The greatest employment capacity;
- The most development land created for sale and for financial cost offset;
- The highest transport-related environmental and efficiency outcomes;
- A positive effect on centre land values;
- The greatest capacity, by far to unlock the potential for private investment in the Centre;
- The greatest construction-related employment;
- The most substantial contribution to the strategic and regional role of the Armadale SMC;
- The maximum benefit to rail investment, with Armadale becoming a substantial destination station;
- The highest degree of policy alignment; and
- The highest amenity and attraction for all economic and community functions and uses, including greatly upgraded public spaces (such as creating a Town Square)', increasing development opportunities east and west of the railway line and providing the opportunity to create high quality development for business, education and health services.

Following discussion with Hassell and the City of Armadale, the transport assessment only considers the implications of this preferred scenario on the current transport network. This scenario would see the greatest number of trips generated as the development proposals are the greatest in terms of the numbers of additional residents, employees and students.

Based upon the proposed Structure Plan and the preferred option to introduce a sunken rail line, the net leasable floor-area (NLA) of each land-use of the proposed Armadale Activity Centre development is shown within the Table 8.

Table 8 Net leasable floor-area for the proposed Structure Plan development

Land-use	Ultimate build out NLA (m ²)
Residential	460,000
Office	270,000
Retail	140,000
Education	32,000 (equivalent to 1,600 FTE)
Civic/ Cultural	30,000

The proposed Structure Plan for the Armadale Activity Centre addresses the existing barriers, which restrict the expansion of land uses and connectivity. It allows more land to be developed, introducing a sunken rail line while connecting streets to create a more permeable transport network. The proposed Structure Plan's transport network is shown in Figure 23.

The preferred concept plan proposes the additional connection of Cornish Street to William Street, providing an integrated street network across the rail corridor. This will require modification to the proposed urban plaza within the City West of Rail Structure Plan. The preferred concept plan also identifies this road, owing to its district connections, as a public transport boulevard. The road cross section to accommodate the public transport boulevard will integrate with that proposed in the City West of Rail Structure Plan.

TRANSPORT NETWORK

A Connected City

1. Connections across the rail corridor are critical to unlocking Armadale's urban potential.
2. Armadale's new heart is the focus for activity and transport access.
3. Pedestrian malls and shared streets provide opportunities for people-oriented street activity.
4. A connected network of local streets distribute movement throughout the centre.
5. A hierarchy of streets provide local, district and regional access.
6. A distributed network of public parking locations.
7. William and Cornish Streets function as a public transit boulevard.
8. PSP and shared path extension complemented by bike friendly streets.



Figure 47: Activity centre movement strategy diagram.

Figure 23 Proposed Transport Network Structure Plan (Source: Figure 47 Armadale Activity Centre Structure Plan Report, Hassell)

4.2 Walking and Cycling Network

The proposed active transport network introduces less restricted desire lines by connecting streets, sinking the rail line and opening up public spaces. The walking environment is enhanced by the creation of a civic plaza. This creates a new civic heart, which connects to the pedestrian zones and shared streets of Jull Street Mall and Third Road, and the shared path along the existing Green Avenue. These zones create a higher degree of safety for walking and cycling, while also increasing the attractiveness of active transport through increased connectivity.

The creation of a green circuit with tree-lined streets as shown in Figure 24 connects parks and plazas providing increased amenity for walkers and cyclists.

To encourage an increase in walking and cycling across the Activity Centre the Structure Plan incorporates the following principles within the precinct designs:

- Wide footpaths to accommodate pedestrian volume and the desired walking experience.
- Pedestrian priority at intersections to reduce wait times.
- Reduce slip lanes wherever possible.
- Minimise vehicle crossovers along key walking routes.
- Prioritise pedestrian pavement over crossover finishes.
- Dedicated cycle lanes and cycle parking.
- Attractive frontages to key walking streets.
- Create more places to sit, linger and enjoy the city.
- High quality lighting for clear sight lines at night and to introduce evening 'colour' themed with destinations of events.
- Consistent street tree canopies to provide shade and minimise the urban heat island effect.
- Reduce speed limits in slow streets and pedestrian oriented spaces.
- Reinforce the city's street structure with distinct streetscape treatments.
- Provide clear pedestrian connections to points of activity and destinations.

The form and function of each streetscape proposed within the Structure Plan are detailed in full in the Armadale Activity Centre Design Guidelines (prepared by Hassell). The pedestrian and cycle path provision include:

- Generous pedestrian and cycle paths (4m wide) on both sides of the road along commercial streets such as Church Avenue
- Footpaths and Principal Shared Paths set back from vehicle traffic lanes along Armadale Road and Forrest Road.
- Wide shared surface treatments that are flush with footpaths in share zones such as Jull Street.
- Wide (3.5m) footpaths along the proposed public transport boulevard on William Street.

Extracts from the Public Realm Advisory Guides prepared by Hassell are shown in Figure 25 and highlight the intent of the Structure Plan to prioritise pedestrian, cyclists and public transport movements over the private car.

ACTIVITY CENTRE BUILT FORM

An Unlocked Urban Structure

1. Jull Street 'hills to heart' activity spine.
2. A new civic heart, connecting east and west.
3. A green circuit of treed streets, parks and plazas that powers liveability.
4. Plazas and open spaces.
5. Distributed and connected movement network to drive the local economy.
6. Landmark buildings to providing definition to city precincts and its edges.



Figure 45: Activity centre built form strategy diagram.

Figure 24 Proposed Built Form and Green Circuit (Source: Figure 45, Armadale Activity Centre Structure Plan Report, Hassell)

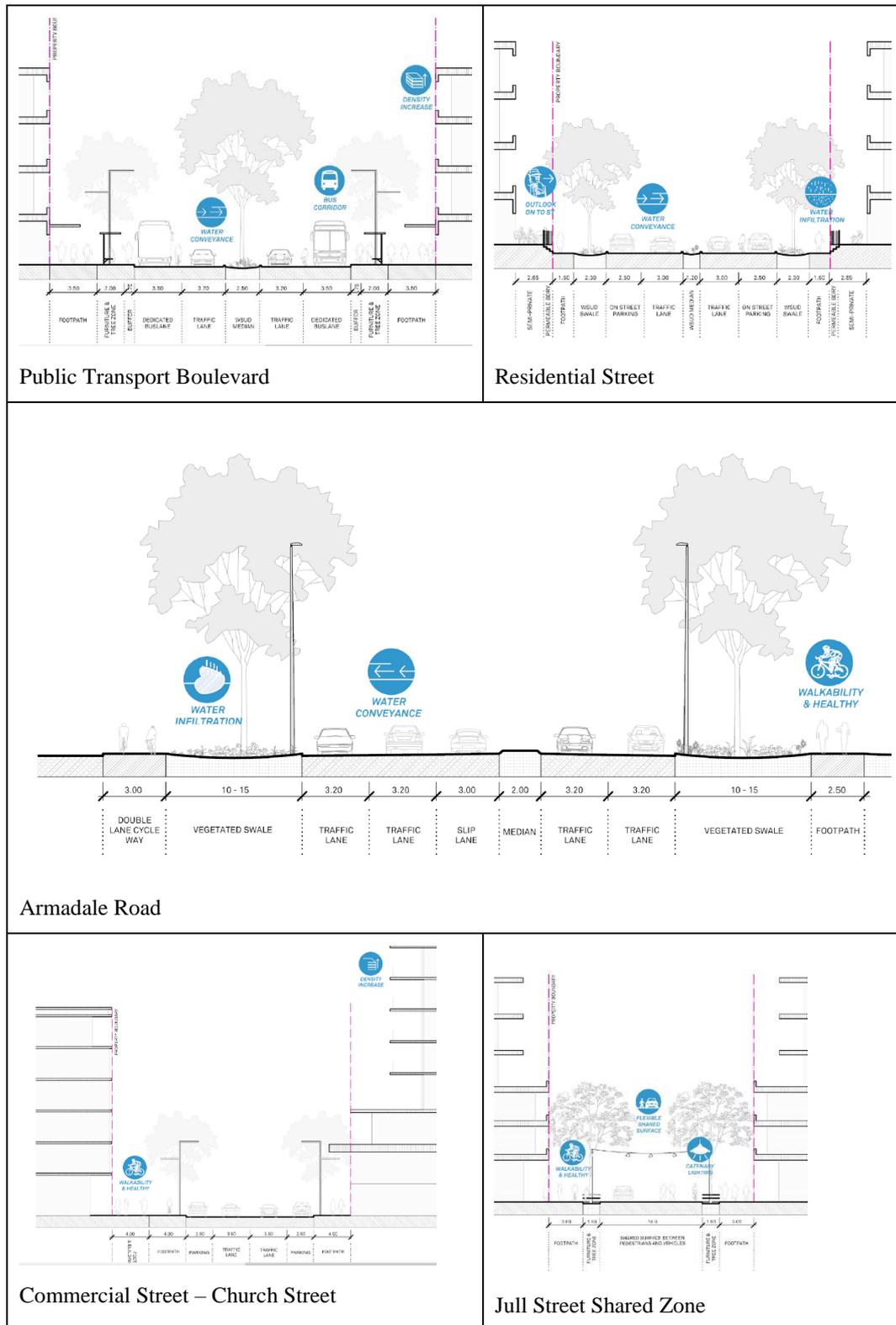


Figure 25 Streetscape Cross Sections

Source: Armadale Activity Centre Design Guidelines, Hassell

4.3 Public Transport Network

The Structure Plan proposes a step change in both residential and commercial development within the Activity Centre and it will be essential that development is supported by a similar uplift in the provision of public transport services.

The most significant change to the public transport network in the Structure Plan proposals is the sunken rail line. Not only does this increase permeability for all modes of transport and increase development potential, it also enhances intermodal connections by allowing more flexibility when routing bus services.

The preferred concept plan proposes the connection of Cornish Street to William Street, providing an integrated street network across the rail corridor. The preferred concept plan also identifies this road, owing to its district connections, as a public transport boulevard.

Armadale is currently served by the Armadale Train Station and bus interchange. Future modifications to the rail corridor to accommodate City Centre outcomes will need to integrate bus and rail services to maintain passenger convenience.

The PTA has identified future bus / train transfer requirements of:

- 10 bus stands as well as 5 layover bays (for which one of each for articulated buses)
- crib facilities for the drivers
- Bus station to be located on the eastern side of the railway to accommodate Transwa services as well as the growing catchment.

The future model applied to rail / bus integration will depend on the outcome of grade-separation and treatment of the railway corridor. The City's preferred outcome presumes undergrounding the rail and bus stands provided within a public transport boulevard. This is because:

- On-road bus stops free up land for urban development outcomes
- The use of city centre land for bus-layover, whilst pragmatic for PTA operations, impacts on pedestrian and user experience

As an alternative to a dedicated, off-street bus station, a public transport boulevard is proposed. The boulevard, connecting on the alignment of William Street provides both private vehicle and public transport connections between Forrest Road and South Western Highway.

The central core of the public transport boulevard adjacent to the civic plaza will be designed as a shared road providing pedestrian priority. The design will be similar to the existing arrangement of Wellington Street in Central Perth adjacent to Forrest Place.

Recognising the Transperth operational requirements a number of potential sites within the structure plan proposals have also been identified as potential bus facilities and their feasibility would be further investigated as part of any future development proposals.

The west/ east connections by public transport will be improved with the establishment of a transit boulevard connecting the existing William Street with Cornish Street. The transit boulevard will allow frequent west/ east movements for bus services through the activity centre and allow bus stops to be located immediately adjacent to the underground train station and civic centre.

There is significant scope to increase the frequency of the current bus services and the provision of additional route connections must be reviewed in collaboration with the PTA to determine how best to serve the new population catchment areas to the south and west of the Armadale Activity Centre. For example, the Forrest Road Upgrade Transport Assessment identified that new bus routes should be considered to provide a connection between Armadale City Centre and the Wungong Urban Water redevelopment area, and that bus frequency be increased to a maximum interval of 15 minutes in the short term along Forrest Road.

Transperth identified that bus routes and frequencies were expected to increase to Armadale, particularly in relation to providing new connections to Cockburn Central and in the longer term as part of a public transport priority route along Armadale Road to the coast. It was also identified that the nature of the surrounding bus network and appropriate trip attractors did not lend itself to Armadale being served by through bus services.

Improving service frequencies of bus services at the weekend should also be considered to encourage more people to use this centre during this time.

With the Byford line extension, Armadale no longer acts as the end of line station, which will potentially change the current catchment for the station. It is likely that the parking provision associated with the station can be consolidated or maintained at existing levels and the focus for access to the station can give greater priority to walking, cycling and bus interchange. The findings from the PTA's Station Access Strategy project will help to inform what infrastructure requirements will be required at the station going forward. It is understood that the Station Access Strategy for Armadale will be undertaken during 2018 and the City of Armadale must make sure the recommendations align with the aspirations of the Structure Plan.

The South Metropolitan Peel Sub-regional Planning Framework published in March 2018 identified that it was a High Priority Transit Corridor connecting Fremantle, Cockburn Central and Armadale would be introduced before 2031. Based on previous transport assessments completed on behalf of the City of Armadale it is likely that this corridor would align with Armadale Road.

4.4 Road Network

4.4.1 Access

Arrival points to the centre are important as they give a signpost to the traveller, whatever the mode, that they have arrived in a centre and indicate the transport conditions that they can expect to experience.

The Structure Plan recognises that the first perceptions of a city's character and quality is gained upon approach and arrival. When arriving in Armadale, it is important that people are immediately aware of the special symbolic and functional significance of the centre within the region

Armadale Activity Centre benefits from multiple access points which helps to distribute traffic flows around the centre. The main access points identified in Section 3.5 are

- From Armadale Road via Railway Avenue / Abbey Road, Orchard Road, Church Avenue and Jull Street (left in only).
- From South Western Highway via Hobbs Drive, William Street, Third Road and Fourth Road.
- From Wungong Road via Church Avenue.
- Directly from Forrest Road.

The desired characteristics for these locations are:

- Clear identification signage (i.e. street names) and wayfinding to car parking and key attractions.
- Distance and journey time markers for pedestrians and cyclists to end of trip facilities and key attractions.
- Visual cues that you are entering a slower speed and pedestrian friendly environment through pavement treatments, tighter curve radii and streetscape elements (e.g. landscaping)

The Structure Plan proposes a sunken rail line as the City's preferred approach to the grade separation of the rail corridor. This maximises connectivity of the road network from the west through the Activity Centre.

The METRONET team are currently undertaken an assessment of all at grade level crossings along the Armadale rail line to determine their preferred approach to the removal of the level crossings. The outcomes of this process will have a fundamental impact on the ability of the City to deliver the Structure Plan. It is essential that the City remain engaged with the METRONET team to advocate their preferred approach to grade separation, which will allow the aspirations of the Structure Plan to be realised.

Main Roads WA have also undertaken investigations into the grade separation of Armadale Road across the rail line and the potential to introduce a new road connection into Armadale City Centre directly from Streich Avenue in line with the 2007 TRIPS modelling prepared for the City of Armadale.

Accessibility and property access for local traffic also remains an important consideration for the City. Walking and cycling should be encouraged for local trips (i.e. those trips with an origin and destination inside the Activity Centre). The design elements proposed within the structure plan facilitate this, which will help to achieve high rates of internal walking and cycling trips.

4.4.2 Parking

A detailed assessment of the current parking supply and recommendations for future parking provision are provided in the Parking Supply and Management Strategy prepared to support the Armadale Activity Centre Structure Plan. This document should be reviewed in conjunction with the Transport Assessment. Recommendations for parking standards in the Armadale City Centre are proposed to be in accordance with the relevant clauses in:

- State Planning Policy 3.1 (Residential Design Codes).
- City of Armadale Town Planning Scheme No.4.

Recommendations on development access and parking provisions within this PSMS are based on following the design guidelines for the Structure Plan:

- Individual site access should be arranged to promote greater pedestrian and cycle priority throughout the city centre while providing safe and convenient access to each site.
- Access points for vehicles will be located so as to be discrete elements within the built environment and respond to any requirements for primary regional road functionality.
- On-site parking can be located underground or above ground within a structure. At grade car parking should be limited to enable delivery of intended landscape and communal open space outcomes.

Recommendations on amendments to the parking standards within this PSMS are based on the Structure Plan vision to create a connected, sustainable, efficient and convenient network for all modes of travel. The objectives for the transport network are:

- Advocate for an underground passenger rail as the spine of a seamless public transit network.
- Enable Seamless modal interchange provision.
- Promote additional cross-rail links.
- Improve wayfinding and access to the city centre.
- Provide an integrated mesh of safe active transit links.

- Improve pedestrian priority and experience in the city centre.

The PSMS prescribes limits to parking supply based on forecast land use yields. While the specific mix of land use may change in the future, contingent on market conditions, parking supply may not as it is tied to vehicle trip cap forecasts for the Activity Centre to limit impacts on the wider road network.

The principles for residential car parking provision are as follows:

- 1 bay per dwelling in line with the R-code Clause 6.3.3 Criteria A (i.e. properties within 800m of a high frequency rail line and/ or within 250m of a high frequency bus route) for all developments.
- Average parking supply to be calculated across an entire development.
- All parking proposed for a development must be provided off-street with dedicated access.
- Unbundling of tenant parking from the sale of units is encouraged. In these cases, bodies corporate shall retain responsibility for ongoing reallocation and sales of surplus parking.

The principles for non-residential car parking provision are as follows:

- 1 space per 45m² for office and retail uses.
- 15 bays per 100 full time equivalents (staff and students) for tertiary education.
- 1 space per 50 m² for civic and community uses.
- All other car parking rates shall be provided per the City of Armadale Town Planning Scheme No. 4.
- Reduction in car parking supply will be supported based on shared / reciprocal parking for retail and office uses due to different peak periods.
- A minimum 10% of commercial/office and 50% of retail parking shall be designated publicly-available.

Secure residential tenant bicycle parking shall be provided at a rate of one space per dwelling where there is no storage areas and residential visitor bicycle parking shall be provided at a rate on one space per ten dwellings. The minimum requirements for non-residential bicycle parking and end-of-trip facilities are shown below.

Land use	Long term bays	Short term bays
Commercial	1 bay/ 100 m ² NLA, Class 1 or 2	1 visitor bay per 10 private bays, Class 3
Retail	1 bay/ 100 m ² NLA, Class 1 or 2	1 visitor bay per 10 private bays, Class 3
Other	1 bay/ 100 m ² NLA, Class 1 or 2	1 visitor bay per 10 private bays, Class 3

In addition to the requirements of Schedule 7B of Town Planning Scheme No. 4, end of trip facilities shall be provided in accordance with the following:

Residential Development

Residential developments are not required to provide showers, lockers or changing facilities.

Non-Residential Development

All developments that are required to provide 6 or more employee bicycle parking bays in accordance with Schedule 7B of Town Planning Scheme No.4, must also provide end of trip facilities with the following criteria:

- A minimum of one female and one male shower, located in separate change rooms or a minimum of two separate unisex showers and change rooms.
- Additional shower facilities to be provided at a rate of one shower for every 10 additional bicycle parking bays.
- End of trip facilities are to be located as close as possible to the bicycle parking facilities.

It is recommended the following principles guide the development of parking with the Activity Centre:

- Only one vehicle crossover per lot is permitted except where the City is satisfied that no adverse effects on vehicular or pedestrian traffic and/or conflict will result should a variation be permitted which allows for more than one vehicular crossover to a lot.
- Preferred car parking access locations are identified in the relevant Precinct Plan/s. Publicly available car parking bays should be provided on the edges of the Activity Centre and away from congested locations.
- Increase the proportion of parking supplied and managed as public parking from the current 30% to 50% by the time the Activity Centre is fully built out.
- Parking is to be hidden from public view, located behind buildings where possible or screened from the street by landscaping. Where landscaping is provided, a minimum width of 2 metres shall be provided.
- Where possible car park entrances are to be shared between lots.
- Focus on opportunities for multi-use bays, which are shared between compatible land uses with different peak periods. For example, between the expanded retail offering and uplifted office developments.
- Where it is considered by the City that there is a reasonable expectation in the immediate future that there will be adequate provision of public car parking in the City Centre; and where an applicant proposes a development which is required to provide car parking bays, the applicant may, if so agreed by the City, make cash payment to the City in lieu of the provision of all or any of the required number of car parking bays in accordance with the City of Armadale Town Planning Scheme No. 4.

4.5 Trip Generation

The Structure Plan considers a forecast year of 2031 and for the purpose of this review assumptions were made on the extent of the Activity Centre completed by 2031. The proportion of development assumed to be in place by 2031 was discussed and agreed upon with HASSELL and the City of Armadale and is shown in Table 9.

Table 9 - 2031 Proportion of Full Structure Plan Build Out

Land-use	2031 Proportion of Ultimate build out
Residential	50%
Office	50%
Retail	70%
Education	100%
Civic/ Cultural	100%

As identified in Section 3.2 the current car mode share for journey to work trips in Armadale is high. However, the Structure Plan proposes a significant uplift in both residential and employment opportunities within the Activity Centre itself. It is reasonable to assume that this will be a catalyst to encourage a change in travel behaviour. Two scenarios were, therefore considered in relation to future mode shares:

- Scenario 1 – based on existing high car mode share.
- Scenario 2- reduced car mode share and increased walk, cycle and public transport.

Table 10 summarises the two mode share scenarios.

Table 10 Future Mode Share Assumptions

Mode	Scenario 1 High car mode share	Scenario 2 High walk, cycle and public transport
Train	7%	10%
Bus	2%	5%
Car - as driver	80%	60%
Car - as passenger	5%	5%
Truck	1%	1%
Motorbike	1%	1%
Bicycle	0%	4%
Walked only	1%	12%
Other	2%	2%

Daily trip rates were calculated for the residential and commercial (office and retail uses) based on the two mode share scenarios.

Based on the assumptions in the Structure Plan on the maximum number of proposed dwellings, the daily trip rate per person calculation for residential land uses is shown in Table 11

Table 11 Residential Daily Trip Generation (all modes)

Estimated Number of New Dwellings (full build out)	2,064
Persons per household	1.8*
Population	3,715
Total trips per person per day (all modes)	3.42**
Visitor trips (additional)	0.1
Daily trips (at full build out)	13,977
Daily trips (at 2031)	6,988

* based on a search of ABS 2016 Census data for a number of Statistical Area Level 1 regions, based on relatively high proportions of apartment buildings.

** based on Perth and Regions Travel Survey for the south- east sector.

The estimated additional trips on the transport network for the two mode share scenarios are summarised for both full build out and 2031 in Table 12.

Table 12 Estimated New Residential Trips by Mode

Mode	Scenario 1 – High Car Mode Share		Scenario 2 – High Public Transport, Walk and Cycle Mode Share	
	2031	Full Build Out	2031	Full Build Out
Train	489	978	699	1,398
Bus	140	280	349	699
Car - as driver	5,591	11,181	4,193	8,386
Car - as passenger	419	839	349	699
Truck	70	140	70	140
Motorbike	70	140	70	140
Bicycle	0	0	280	559
Walked only	70	140	839	1,677
Other	140	280	140	280

The preferred Structure Plan scenario is estimated to add between 4,200 and 5,600 private vehicle trips (ie car as a driver) daily to the road network within the Activity Centre by 2031 depending on the mode share assumptions used. A review of the SCATS and count data for the Activity Centre indicates that each peak hour constitutes between 8% and 9% of daily trips. This represents up to an additional 500 trips on the road network during the peak hour by 2031 (assuming a high car mode share is retained). The application of initiatives to encourage walking, cycling and public transport usage could significantly reduce this impact.

For commercial land uses the WAPC guidance on typical land use vehicle trip generation rates per 100 m² of development were used to determine the additional peak hour trips generated. The total number of new vehicle trips generated is summarised for each land use in Table 13.

Table 13 Estimated New Daily Vehicle Trip Generation for Commercial Uses

	Office	Retail
Floor Area (full build out) m ²	97,203	135,112
AM peak trip rate	2.0	2.0
PM peak hour trip rate	1.25	4
Total AM peak hour trips (at full build out)	1,624	1,014
Total PM peak hour trips (at full build out)	1,624	3,244
Total AM peak hour trips (at 2031)	812	710
Total PM peak hour trips (at 2031)	812	2,270

Using this approach to trip generation identified a significant increase in the number of vehicle trips generated in the peak hours. It should be noted that as further details of the Structure Plan are developed there may be scope to review these assumptions based on the extent that new trips generated by the office and retail land uses may be linked trip or internal trips (ie with the origin and destination both occurring within the Activity Centre).

Both the education and civic/ community land uses proposed for the structure plan are relatively small and less likely to impact on the road network during the peak hours.

By 2031, it is estimated that the Structure Plan will lead to a substantial increase of up to 3,500 vehicles in the peak hour for the residential and commercial (office and retail) land uses; respectively on the road network if current mode shares continue. As the Structure Plan proposes a significant uplift in both residential and employment opportunities within the Activity Centre itself it is reasonable to assume that this will be a catalyst to encourage a change in travel behaviour.

4.6 Assessment

A traditional approach to assessing transport impacts from the Structure Plan has not been undertaken. The traditional approach typically involves assigning the trip generation information to the road network and assessing what improvements are required. The following reasons set out why this approach has not been considered appropriate at this stage for the Armadale Activity Centre:

- The preferred outcome for the grade separation of the rail corridor has not yet been established. The PTA commissioned the development of a base model of the current road network surrounding the Armadale Rail Line with the objective of identifying the impact on the road network of consolidating or grade separating rail crossings. This information is not yet finalised and must be used to inform the assessment of the traffic impacts.
- Increasing road capacity is not desirable through the centre as it is at odds with the creation of a pedestrian, cyclists and transit friendly centre. It also has the potential to encourage additional through trips in the centre, particularly those wishing to avoid possible delays caused at the Armadale Road and the South Western Highway intersection. Increasing through trips is highly undesirable.
- The scale and form of proposed development is a step change in terms of encouraging and supporting a significantly higher proportion of internal trips (eg from workplace to shop, home to shop, home to workplace). These are trips that will be increasingly made by foot as the Structure Plan proposals intent is to improve the walking and cycling environment.
- Lower levels of parking provision will be applied to land uses, reducing the ability and desirability to use the car as a travel mode.
- The full extent of the Structure Plan is not expected to be realised until after 2031 and some of the development is expected to align with the proposed extension of the Armadale rail line to Byford. In conjunction with improved bus transit connections, this is expected to see a step change in public transport trips to / from and through the centre.
- The extension of the Armadale rail line to Byford will also result in Armadale no longer being an end of line station, which will potentially change the current catchment for the station. Consequently current trips to Armadale station and parking provision at the station may change with the focus for access to the station giving greater priority to walking, cycling and bus interchange. Once the findings from the PTA's Station Access Strategy project are available, it will be possible to analyse the impact on the change in the public transport network on the road network.

Previous analysis of the road network undertaken by the City of Armadale has identified a series of improvements, which are summarised in Table 14.

Table 14 Summary of Recommended Road Network Upgrades

Transport Infrastructure Needs Assessment (2016)	Forrest Road Upgrade Transport Assessment (2016)	Armadale TRIPS Model (2007)
Intersection upgrades to: <ul style="list-style-type: none"> - Eighth Road/ Armadale Road - Seventh Road/ Armadale Road - Railway Avenue/ Denny Street - Forrest Road/ Tonkin Highway - Tonkin Highway from Albany Highway to Rowley Road - South Western Highway from Hobbs Drive to Eleventh Road - Rowley Road from Kwinana Freeway to Tonkin Highway 	Intersection upgrades to: <ul style="list-style-type: none"> - Forrest Road/ Abbey Road/ Green Avenue - Forrest Road/ Fifth Road - Forrest Road/ Seventh Road Introduce new bus routes between Armadale City Centre and the Wungong Urban Water redevelopment area Increase bus frequencies to a maximum interval of 15 minutes in the short term along Forrest Road	Streich Avenue grade separated with Armadale Road and existing intersection of Streich Avenue and Armadale Road removed

Further investigation is required as follows;

- To confirm the position regarding the grade separation of the rail corridor and the impact this has on the three current road crossing points at Armadale Road, Railway Avenue and Church Road.
- To confirm the position regarding the grade separation of the Streich Avenue and the impact this has on the ability to provide additional north south road connections.
- To confirm the position regarding the Armadale rail station catchment in relation to the line being extended to Byford.
- Once a defined base road network is identified (following the agreed outcomes of the grade separation of the rail corridor investigations), further consultation with MainRoads WA should be completed. The approach to conducting a detailed assessment of the road network should be agreed. It is expected that this will be based on running the confirmed development scenario through the Main Roads ROM (with the associated network changes such as lowering the rail line) and then conducting local traffic intersection analysis (using an appropriate modelling package such as SIDRA or AIMSUM).

It is noted that the City of Armadale in conjunction with the Metropolitan Redevelopment Authority (MRA) commissioned Transcore to prepare a traffic model for the City inclusive of the MRA redevelopment areas in 2011. The modelled area included City of Armadale from Tonkin Highway to the foothills areas east of Albany Highway – Southwest Highway which contains the proposed Armadale Activity Centre Structure Plan area.

With the use of EMME Strategic traffic modelling software, Transcore delivered a base case 2011 scenario and a future strategic transport model for 2031 and in 2015, the City requested Transcore to update the 2031 model to reflect the latest external to external traffic projections as per Main Roads WA ROM.

Given this model is at the City's disposal, the CoA should look to take a cut-out of the Armadale Activity Centre Structure plan area within the model. Inputs could be adjusted for scenario testing to occur with potential for inputs to align with the Activity centre structure plan. Traffic flow outputs can be obtained from the EMME model for detailed operational modelling analysis of major intersections within the Activity Centre Structure Plan area to be assessed, to understand impacts proposed to the City of Armadale on a traffic level.

5 Conclusion

This Transport Assessment has been prepared by Arup to support the wider Structure Plan in delivering an effective and efficient transport system that supports the growth of the Armadale Strategic Metropolitan Centre.

The future Strategic Metropolitan Activity Centre Structure Plan will acknowledge the role of Armadale City Centre in the south-east corridor of Perth, and the aspiration of the City of Armadale for the City Centre to meet the full potential of a Primary Centre within the Activity Centre hierarchy.

Recommendations for improving the movement network within the Activity Centre to support the Structure Plan include:

- Advocate for lowering the rail corridor to facilitate at grade pedestrian, cycle and road connections across the Activity Centre.
- Significant improvements to the provision and location of pedestrian and cycle paths throughout the Activity Centre including the provision of:
 - Generous pedestrian and cycle paths (4m wide) on both sides of the road along commercial streets such as Church Avenue.
 - Footpaths and Principal Shared Paths set back from vehicle traffic lanes along Armadale Road and Forrest Road.
 - Wide shared surface treatments that are flush with footpaths in share zones such as Jull Street.
 - Wide (3.5m) footpaths along the proposed public transport boulevard on William Street.
- Improve the pedestrian and cycle crossings at the major intersections along Armadale Road and South-Western Highway particularly at the intersections with the Albany Highway, William Street and Streich Avenue.
- Expansion of the Principal Shared Path (PSP) network by 2031 including the following sections along the Armadale Railway PSP:
 - Great Eastern Highway – Welshpool Station.
 - Lacey Street – Ladywell Street.
 - Kelvin Road – Albany Highway.
 - Dorothy Street – Armadale Station.
- Expand the 40kph speed limit throughout the Activity Centre to reflect the changing focus to pedestrian and cycle priority.
- Investigate the introducing a High Priority Transit Corridor connecting Fremantle, Cockburn Central and Armadale.
- Introduction of a public transit boulevard connecting the existing William Street with Cornish Street to allow frequent west/ east movements for bus services through the activity centre and allow bus stops to be located immediately adjacent to the underground train station and civic centre.

- Improve service frequencies of bus services at the weekend to encourage more people to use this centre during this time.
- To adopt the parking supply and management strategy including the proposed refinement of parking standards for the different land uses as follows:
 - 1 bay per residential dwelling in line with the R-code under criteria A.
 - Residential parking must be provided off street.
 - 1 space per 45m² NLA for retail and office uses.
 - 15 bays per 100 Full Time Equivalent (staff and students) for education uses.
 - 1 space per 50m² for civic and community uses.
 - A minimum of 10% of commercial/office and 50% of retail parking shall be designated as publicly available.
- Increase the provision of end of trip facilities based on the amount of bicycle parking spaces required.

Further investigation is required as follows;

- Work with the METRONET team to confirm the position regarding the grade separation of the rail corridor and the impact this has on the three current road crossing points at Armadale Road, Railway Avenue and Church Road;
- Work with Main Roads WA to confirm the position regarding the grade separation of Streich Avenue and the impact this has on the ability to provide additional north south road connections;
- Work with the METRONET team to confirm the position regarding the Armadale rail station catchment in relation to the line being extended to Byford.
- Work with Main Roads WA to determine when upgrades to the signalised crossings along Armadale Road (at the intersection with Railway Avenue and the South-Western Highway) and along the South-Western Highway (at William Street) will be required.
- Once a defined base road network is identified (following the agreed outcomes of the grade separation of the rail corridor investigations), further consultation with Main Roads WA should be completed. The approach to conducting a detailed assessment of the road network should be agreed. It is expected that this will be based on running the confirmed development scenario through the Main Roads ROM (with the associated network changes such as lowering the rail line) and then conducting local traffic intersection analysis (using an appropriate modelling package such as SIDRA or AIMSUM).