ARDEN URBAN RENEWAL PRECINCT TRANSPORT CAPACITY STUDY

Department of Economic Development, Jobs, Transport and Resources – Transport for Victoria

V161820

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INTRODUCTION

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CONTEXT

'Arden's strategic proximity to the CBD and Parkville will enable Arden to support Melbourne's growth as a city that attracts investment, supports innovation and creates jobs.' (pg. 16, Arden Vision)

The Arden Precinct (Arden) is located in the heart of North Melbourne just 2km north-west of the CBD and 1.5km east of the Parkville NEIC. The CBD is a major part of Victoria's ability to attract investment, support innovation and create jobs. Growth in the CBD will ultimately enable Victoria to continue to be a global city region of opportunity and choice. Arden's inner city location makes it ideal to support the future success of Melbourne's CBD.

Plan Melbourne identifies Arden as a Major Urban Renewal Precinct. The Plan states that Major Urban Renewal Precincts will play an important role in accommodating future housing and employment growth and making better use of existing infrastructure.

Plan Melbourne identifies Arden as a Priority Precinct. The Plan specific states that '*The timing of land release in these precincts needs to be in sync with policy drivers, market demand and the delivery of infrastructure and services*.'

The major uplift in transport infrastructure servicing Arden will be delivered in 2025 through the Melbourne Metro Rail Project (MMRP). The new station will be located on the southwest corner of Arden Street and Laurens Street.

Arden has a strong aboriginal and post-settlement cultural significance. It is also the home to the North Melbourne Football Club.

North Melbourne, like most inner city suburbs, was traditionally working class. To address the 'slum-like' conditions that were prevalent within the area, large government housing development projects were completed in the 1960s, many of which still stand today. The streets in the area are generally wide and have not changed significantly (apart from more line markings) since the 1960's.

Figure 1.1: Curzon Street east between Molesworth and Arden Streets, North Melbourne, Vic. 1964

Source: State Library of Victoria

Arden's strategic location and the investment in infrastructure has meant that it has been recognised by the State Government as a major urban renewal opportunity. If successful, this will make Arden a highly sought-after place to work, live, visit and spend time.

In July 2018, the VPA and the City of Melbourne released the Arden Vision document. This document states the following vision.

'*Arden will be a new destination for Melbourne, setting the standard for urban renewal. It will contribute to a future Melbourne that is not only the world's most liveable city, but also one of the most forward- looking.'*

The Arden Vision sets out a 20 year timeline for development, responding to the delivery of a new 'north Melbourne station' in Arden (with the current north Melbourne station being renamed to west Melbourne).

PURPOSE

With an existing transport network that is constrained and congested, there are major challenges and questions as to how this level of development is able to be supported and thrive.

Work is underway to take the Arden Vision and develop a supporting structure plan, guiding the delivery of 34,000 jobs and 15,000 residents by 2051.

With such significant numbers of new people working and living in the area, the existing transport infrastructure will become more and more strained over time. While strategic transport infrastructure is currently being constructed, such as the MMRP and West Gate Tunnel Project (WGTP), there is also a need to deliver a range of more localised transport option.

Arden's central location will make it a it a highly attractive place to live and work into the future, as long as it is connected and integrated at a precinct, inner city and metropolitan level.

Should the 'Business as Usual' approach to planning be adopted, the area will continue to see a high car mode share, with increased congestion and delay. This will lead to growth being inhibited, resulting in lower returns on investment, and failure to deliver the Vision for Arden. As such, early planning and development of a coordinated approach is required. This will help to understand the ultimate transport task of Arden and how the surrounding network will need to change in the context of a growing Melbourne.

GTA Consultants (GTA) has been engaged by the Department of Economic Development Jobs Transport and Resources (DEDJTR) to undertake a high level strategic transport capacity study. The purpose of this study is to understand the ability, impact and resulting transport network arrangements needed to support the ultimate development in Arden.

Figure 1.2: Arden Key Connections

LOCAL

How do we make Arden a great place through transport?

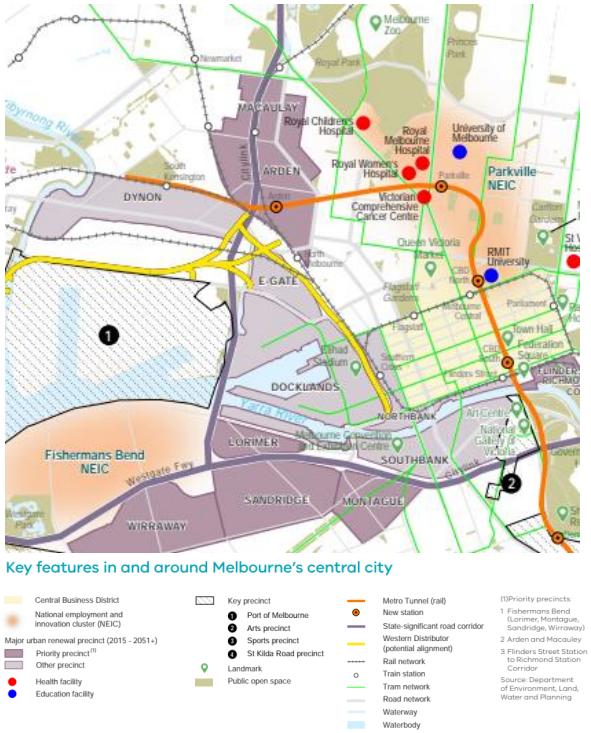
NEIGHBOURHOOD

How do we connect into CBD?

CITY-WIDE

How do we increase the accessibility of Arden to wider Melbourne?

Figure 1.3: Arden Key Connections



Source: Plan Melbourne 2017 – 2050
Note: Arden station will be called North Melbourne and the existing North Melbourne station renamed West Melbourne

BACKGROUND

02

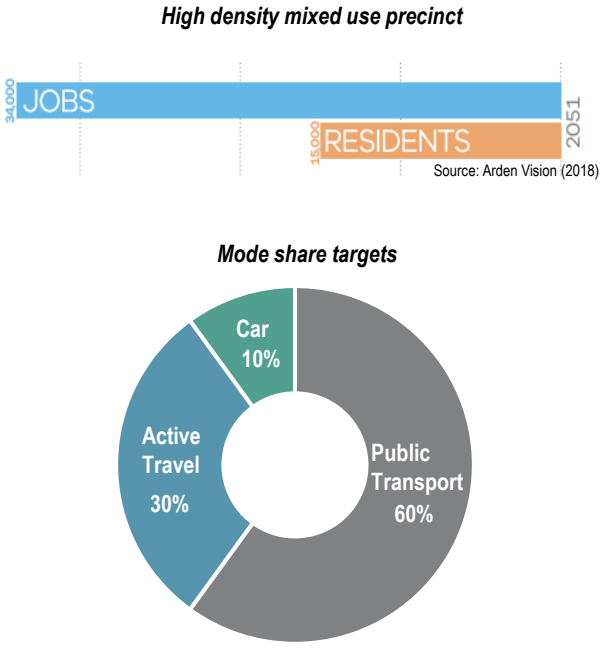
ARDEN VISION

'Arden will be a new destination for Melbourne, setting the standard for urban renewal. It will contribute to a future Melbourne that is not only the world's most liveable city, but also one of the most forward- looking.' (pg. 8, Arden Vision)

Arden Vision - Victorian Planning Authority, 2018
The Arden Vision confirms the state and local government intentions for Arden. It acts as a first step in guiding local-level planning in the urban renewal process. The document outlines several key planning directives:

- Designing a Distinctive Place
- Embedding Sustainable Change
- Accommodating Diverse Communities
- Prioritising Active Transport
- Investing in Community Infrastructure
- Creating Diverse Open Spaces

Figure 2.1: Key Transport Implications of Arden Vision



Source: Arden Vision (2018)

Figure 2.2: Proposed Arden Transport Network

Source: Arden Vision (2018)

STATE POLICY

State Government Policies identify that significant population growth is coming, and that our current land use patterns and travel behavior can't support this growth. Therefore, a more strategic approach to planning for how we live is being pursued by the State Government.

Table 2.1: State Policy Overview

State Policy	Description	Arden Implications
Plan Melbourne	The Victorian Government released Plan Melbourne in 2016 (update of the previous plan released in 2014). The Plan looks to build on Melbourne's reputation as a global city of opportunity and choice, as it caters for an almost doubling of the population over the next 35 years (i.e. out to 2051).	The Plan identifies Arden as a Major Urban Renewal Precinct and future Activity Centre. The Plan states that Major Urban Renewal Precincts will play an important role in accommodating future housing and employment growth whilst making better use of existing infrastructure.
Transport Integration Act (TIA)	The TIA is the primary transport statute for Victoria, which enshrines a triple bottom line approach to decision making about transport and land use matters. The Act requires that all transport agencies work together to achieve an integrated and sustainable transport system, and that land use agencies take account of transport issues in land use decisions. Ultimately, this integration aims to help facilitate efficient, coordinated and reliable access to social and economic opportunities in a more sustainable, safe and healthy way, both now and into the future.	The TIA requires that Arden is developed in an integrated manner in terms of transport and land use. The type of access should support the activities proposed to occur within and proximate to it in a sustainable, safe and efficient manner.
Movement & Place	The Movement and Place approach, based on the original Link and Place book produced in 2007 (Jones), recognises that transport links perform two functions: movement of people and goods, and serving as a place (a destination in its own right). The movement function is about minimising travel time and throughput, whilst the place function is about encouraging people to stay and spend time in the location. The conflict of these functions aims to be better managed by setting their priorities and identifying the conditions needed to better support their desired operation.	Arden will be a destination in its own right. As such, the place function should be prioritised, with accessibility achieved through a connecting network and modes that don't overly impact its placemaking. This is expected to be achieved by making Arden a pedestrian prioirity precinct, with the majority of access achieved through the most space efficient transport modes and interchange in a manner that doesn't impact the amenity / liveability of Arden overall.

LOCAL POLICY

Local Planning Policies and Local Plans for the broader Strategic area will influence and be influenced by the future of Arden. A cohesive planning approach is an opportunity to leverage opportunities.

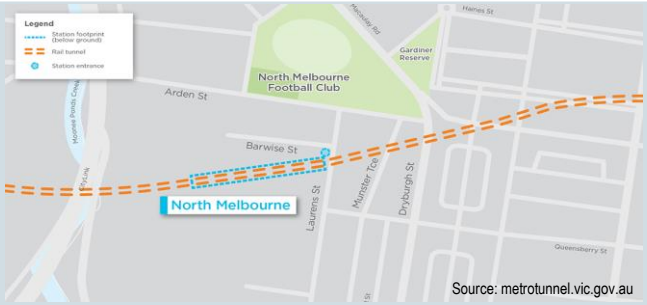
Table 2.2: Local Policy Overview

Local Policy	Description	Arden Implications
Melbourne Transport Strategy, City of Melbourne	The Melbourne Transport Strategy, focuses on planning for the expected growth of the city and how transport can facilitate this through aggressive mode split targets by 2030, i.e. 30% walk, 10% bike, 20% car, 40% public transport. The City of Melbourne is currently refreshing its Transport Strategy, which is likely to include more ambitious targets for improved outcomes for transport to 2050.	Key emerging themes include: bicycles should be seen as everyday transport; traffic (and congestion) should be reduced to create better streets; freight planning needs to make the last mile more 'sustainable' (lower impact); car parking needs to be supplied in accordance with the local vision; connecting the city by public transport is essential, including thinking about the experience of people, including at interchanges and transfer points.
City of Melbourne Bicycle Plan, 2016 - 2020	The Melbourne Bicycle Plan focus areas include increasing End of Trip Facilities, creating neighbourhood routes and improving connection into and through the city centre. As a part of the Transport Strategy refresh this is also being updated.	The plan highlights Arden as a major growth area. The plan specifically identifies opportunities to improve cycling connections to the existing cycling route on Arden Street. It is assumed that all new buildings at Arden will provide high quality end-of-trip facilities.
City of Melbourne Walking Plan, 2014 - 2017	The City of Melbourne Walking Plan, which is currently also be refreshed, states that walking is the most important mode of transport for the City. The aim of the plan is to increase the number of walking trips in 2030 by 63% from 2009 levels.	The updated CoM Transport Strategy is tackling walking from a number of perspectives, including rethinking city space, providing better experience, reallocation of road space, making it safer and how it support infrastructure investment.
West Melbourne Structure Plan, 2018	The 'Vision' of the Structure Plan is for West Melbourne to retain its unique identity, varied areas of character and mix of uses it evolved into one of Melbourne's distinct inner urban neighbourhoods and a counterpoint to the central city.	The West Melbourne Structure Plan highlights specific transport interventions relevant to Arden. This includes tram and priority bus services that will be extended along Spencer Street to connect to Arden in the medium to long term. One of the key actions of the plan (Action 11) is to create excellent walking and cycling connections to the new community hubs in Arden (and QVM).
Fishermans Bend Framework, 2018	The Framework is a long-term strategic plan which will guide the transition of Fishermans Bend to home a target of 80,000 residents and host to 80,000 jobs.	One of the major transport initiatives for Fishermans Bend was setting an ambitious mode split target of 80% sustainable transport modes. With the mode share targets for Arden being even more aggressive (90% sustainable travel) the initiatives used for Fishermans Bend should be considered at a minimum for Arden.

MAJOR PROJECTS

There are several major infrastructure projects around the study area that will affect the accessibility of Arden, and North Melbourne more broadly.

Table 2.3: Major Projects Overview

Project	Description	Arden Implications
Melbourne Metro Rail Project (MMRP)	 Source: metrotunnel.vic.gov.au	The new station at Arden will provide high capacity underground trains, running along new twin tunnels between Kensington and South Yarra. The project will see the installation of five additional stations, including the new North Melbourne station to be located within the Arden urban renewal area. The MMRP will also alleviate congestion in the exiting city loop by creating two loops. Ultimately, more services will be able to be provided on all metropolitan lines which will improve Arden's accessibility by public transport.
West Gate Tunnel Project	 Source: westgatetunnelproject.vic.gov.au	The West Gate Tunnel will provide a second freeway river crossing and connection between the Tullamarine Freeway and Geelong. It key aims are to divert freight traffic from local roads in the inner west and improve access to the Port of Melbourne. The associated transport modelling undertaken as part of the West Gate Tunnel Project and presented in the Environmental Effects Statement, identifies an approximately 50% increase on existing volumes on east-west roads such as Arden Street (ex. 6,000vpd), Victoria Street (ex. 6,000vpd) and Queensberry Street (ex. 3,000vpd). As these roads are already near to capacity, much of this traffic is forecast to be outside of the peak period.
Broader freeway network upgrades	Monash Freeway, City Tulla Widening and the North East Link are major state infrastructure projects that are underway.	These major road-based infrastructure improvements will continue to support high levels of car travel in many parts of Melbourne. By increasing the capacity along existing corridors and, given Arden's location near to a freeway, if access roads are upgraded and parking provided people will respond by driving to Arden.

LAND USE DENSITIES & MODE SHARES

The Arden Urban Renewal proposes a very high job density, which typically relates to lower private car use. However, further actions will be required to deliver Arden Vision's target car mode share of 10%

Figure 2.3: Job density vs car mode share for work trips

Source: http://infrastructurevictoria.com.au/sites/default/files/images/Five-year%20focus%20-%20Immediate%20actions%20to%20tackle%20congestion%20-%20April%202018.pdf

The current general relationship that exists between employment density and car mode shares in Melbourne is shown in Figure 2.3. As the density increase, car mode shares tend to decrease (This occurs at least beyond a critical level of density of approximately 1,000 jobs per square kilometre).

The urban renewal of Arden anticipates job densities of 68,000/km2. According to the current relationship between density and mode share, a private car mode splits of 30% or under could be expected based on mode splits currently experienced in the CBD. This makes the 10% private car mode share target (a 50% point reduction from today) a difficult target to achieve, based on current behaviour.

While there is a general downward trend in car use beyond the tipping point, there is variability in the resulting mode shares for a given employment density. There are a number of factors that may cause this, which should be considered as part of developing Arden:

- **Population Density:** relates to the majority trip generator or destination population type
- **Land Use Diversity:** relative mix of generation and destination based trips
- **Pedestrian Orientated Environment:** attractiveness of an area for people to spend time
- **Distance to Public Transport:** walking distance to transit (i.e. light/heavy rail/ etc.)
- **Provision for End of Trip:** Car parking (free or paid) and cycling
- **Access:** travel time and capacity of each mode
- **Price**: cost per mode

[1] https://umanitoba.ca/faculties/management/ti/media/docs/cervero_-_5Ds_and_transit-Winnepeg-Nov2011.pdf

LIVING AND WORKING LOCALLY

A key part of increasing walking and cycling mode shares is to make decisions that support people to live locally

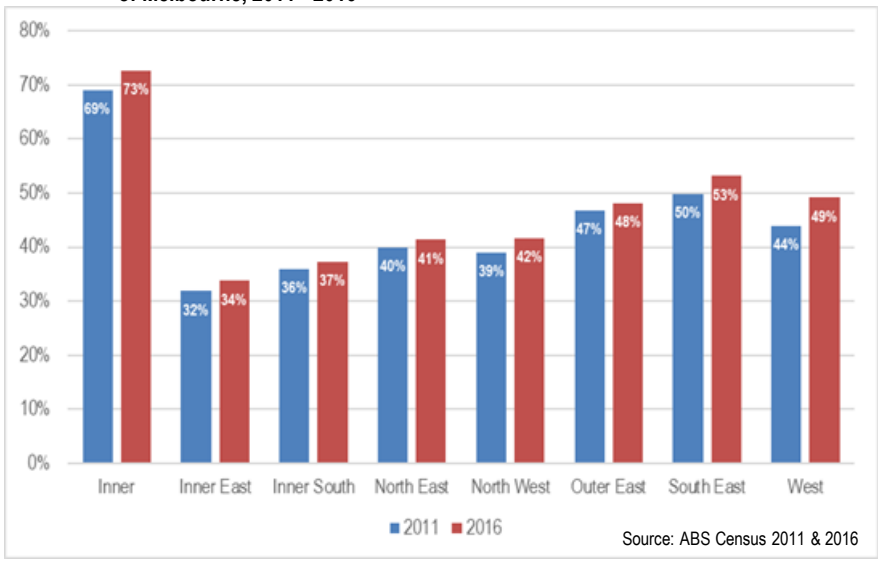
Living and working locally

The shorter the trip the more likely that it will be walked or cycled. Given that the mode share targets for Arden aim to achieve a high number of trips by walking and cycling, 'self contained' trips within the precinct should form an important aspect of both land use and transport planning.

Self-containment is the idea that an area can provide for a persons' daily needs, reducing the need to travel long distances. It is achieved through the concentration of housing, services and employment options for residents within their local municipality. The degree of self-containment of a region impacts transport demand to and from the region, as employment outcomes and service distribution influence travel distance and mode shares.

Figure 2.4 shows a comparison of 2011 and 2016 ABS Census data. Melbourne has seen increased self-containment rates (as reflected by the proportion of people living and working in the same suburbs) , with one of the largest increases of 4% seen in Inner Melbourne, the sector inclusive of Arden, with a 73% containment rate.

Figure 2.4: People that live and work in the same suburbs of Melbourne, 2011 - 2016



Transport and land use policy

Creating a successful self-contained suburb requires a number of policies to work together, including:

- Land use planning needs to creates a mix of uses to satisfy residential and commercial demand
- Land uses need to focus on local catchments and not those that draw people by car from across Greater Melbourne and Regional areas (this is not something currently considered by our planning scheme)
- Economic investment /incentives need to create local employment opportunities that cater for the populations that live in the area – e.g. the inner city is more likely to be professional services workers
- Transport planning should prioritise local transport links and potentially constrain connection to the strategic network.

CASE STUDY – FISHERMANS BEND FRAMEWORK

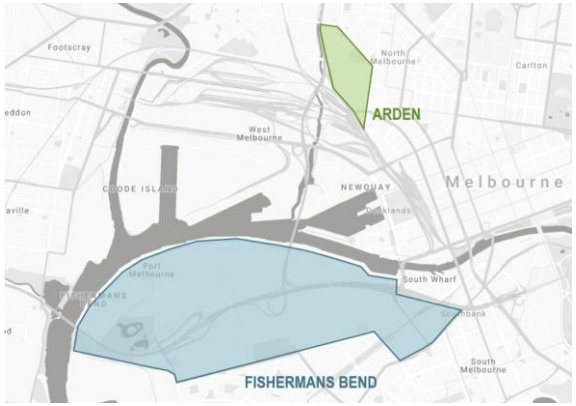
Fishermans Bend and Arden are comparable urban renewal sites with similar mode share aspirations.

Table 2.4: Arden and Fishermans Bend development characteristics

Characteristic	Fishermans Bend	Arden
Distance to CBD	3km	2km
Area	4.8km^2	0.5km^2
Proposed Residents	80,000 people	15,000 people
Population density	16,667 residents per km^2	30,000 residents per km^2
Proposed Jobs	80,000 jobs	34,000 jobs
Employment Density	16,667 jobs per km^2	68,000 jobs per km^2
Sustainable mode share target	80%	90%

Source: Fishermans Bend Framework and Arden Vision

Figure 2.5: Map of Arden and Fishermans Bend precincts



Source: GTA Consultants

Fishermans Bend public realm

Source: Studio Magnified

Much like Arden, Fishermans Bend is envisaged as an extension of the central city. Close similarities are present between the two urban renewal areas, which are outlined in Table 2.5.

A major component of the Fishermans Bend urban renewal project was to establish new benchmarks for sustainable transport in inner-Melbourne. This would place the precinct among the most sustainable transport cities in the world. A high sustainable transport mode share target reflects an aim to shift away from the car-centric 'business-as-usual' approach (particularly for short-to-medium length trips). Adopting a different approach is the only way to sustainably accommodate the population and employment levels envisioned for the precinct.

Detailed investigations were undertaken as part of the review of Fishermans Bend. These indicated that 2050 mode share targets of 20% to private vehicle and 80% towards sustainable transport are realistic and broadly consistent with comparable suburbs. These suburbs that are located within inner city Melbourne have a holistic public and active transport network, and are implementing measures to minimize the use of private cars.

As such, given the similarities between two developments, it is reasonable to assume that the strategies that have been developed for Fishermans Bend would be appropriate to implement in Arden. These strategies are outlined on the next page.

FISHERMANS BEND TRANSPORT OBJECTIVES

Through the Fishermans Bend Framework a set of transport objectives have been developed to help achieve the 80% sustainable mode share target.

Table 2.5: Fishermans Bend Transport Objectives

Transport Mode	Objectives
Public Transport	▪ Objective 1.1: Deliver public transport services that connect to the existing Melbourne network and are a ten minute walk from all residence and workplaces ▪ Objective 1.6: Support long-term sustainable transport patterns
Walking	▪ Objective 1.2: Make Fishermans Bend a great place to walk for people with a wide range of abilities and needs ▪ Objective 1.4: Create a street network that priorities walking and cycling while still facilitating vehicle access ▪ Objective 1.5: Enable residents and workers to access public spaces and community facilities within an easy walk ▪ Objective: 1.9: Create thriving, lively mixed-use neighborhoods that have a distinct identity and character, which fosters social cohesion ▪ Objective 1.11: Align population, job growth and residential densities with the provision of infrastructure and amenities
Cycling	▪ Objective 1.3: Make Fishermans Bend an exceptional place to cycle
Private Vehicles	▪ Objective 7.1: Develop Fishermans Ben as a zero net emissions precinct ▪ Objective 1.4: Create a street network that prioritises walking and cycling while still facilitating vehicle access
Servicing Vehicles	▪ Objective 1:7 Support low-impact methods of delivering last-km-freight and waste removal ▪ Objective 8.2: Reduce amenity impacts from waste collection

Source: Fishermans Bend Framework

Table 2.5 outlines the transport objectives set out as part of the Fishermans Bend Framework (cover shown below)

The following mode share targets have been set in addition to the transport objectives and the 80% sustainable mode share target:

- People with a wide range of abilities are able to get around independently
- Accesses to services (community infrastructure, open space and public transport) generally within 400 metre walk of homes and businesses
- A walkability score of more than 90 via WalkScore is achieved for all dwellings and workplaces

Fishermans Bend Framework

Source: Fishermans Bend Framework

EVIDENCE & TESTING

03

ARDEN LAYOUT CONTEXT

A preliminary built form and land use concept plan has been prepared for Arden to test the aspirations outlined in the Vision and enable further work to be undertaken to develop a structure plan.

The proposed layout of Arden is shown in Figure 3.1. It generally consists of two parts that are separated by Arden Street:

- **Arden North:** A high density residential land uses provided to the north around the existing sports fields and park lands. A potential school is proposed on the north site of Arden Street.
- **Arden Central:** A high density mixed use precinct to the south that is centered around a station. Arden has a potential hospital on the south side of Arden Street and separated car parking stations along the western side.

Access to the new North Melbourne train station is at the heart of Arden, with only one street access proposed at this stage to Laurens Street. A second portal access to the central open public space of Arden is also being considered. This access will cater to the increasing demands from Arden as it continues to develop. The new North Melbourne Station is also located within walking distance of North Melbourne Station and Macaulay Station. Both of these train stations are located on different Metro lines, and are likely to generate movements and activity between them.

An extension of the Spencer Street tram along Laurens Street is also proposed. This tram line will stop at the new North Melbourne Station, which will provide public transport access for more local trips (longer trips will be better serviced via the proposed rail services). Like the CBD Arden needs to be connected by a number of different public transport options servicing different needs.

The internal road network to the south of Arden Road will generally limit vehicle access, with only service vehicles expected to need to access each building. Car parking is planned to be accommodated through structured facilities that are accessible via the internal road along the western frontage of Arden.

There is limited detail around the pedestrian and bicycle facilities. The provision of active travel infrastructure is expected to be of a very high-quality, wide and give priority to users at road intersections.

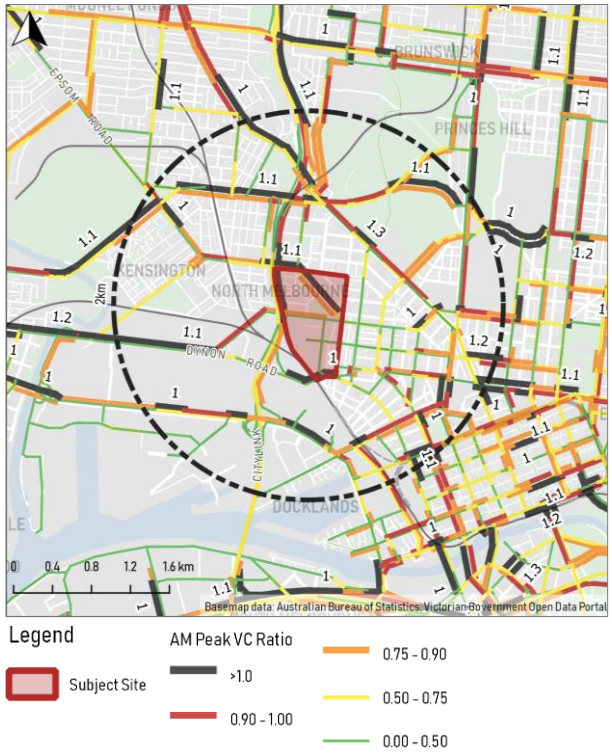
Given the target mode shares establish people walking and cycling as the majority mode, even at this early concept stage, we would expect the transport networks to clearly link to the wider sustainable transport network.

Figure 3.1: Preliminary built form and land use concept plan

TRAFFIC CONDITIONS – YEARS 2016 AND 2051

Utilising the 2016 and 2051 State Government's Transport Modeling (S-VITM) it can be seen that the road network connecting Arden is currently congested and expected to get worse.

Figure 3.2: 2016 AM Peak 2hr Volume / Capacity Plot



Based on the 2016 S-VITM (State-wide Victorian Integrated Transport Model) reference case shown in Figure 3.2, the road network proximate to and connecting Arden generally has sections along each arterial road that are highly congested, i.e. V/C > 0.9.

There are a number of roads on the north and east sides of the precinct that are proximate, such as Boundary Road, Abbotsford Street, Curzon Street , Arden Street and Queensbury Street. These roads seem to be operating reasonably well, and therefore present an opportunity for road space to be reallocated to other modes.

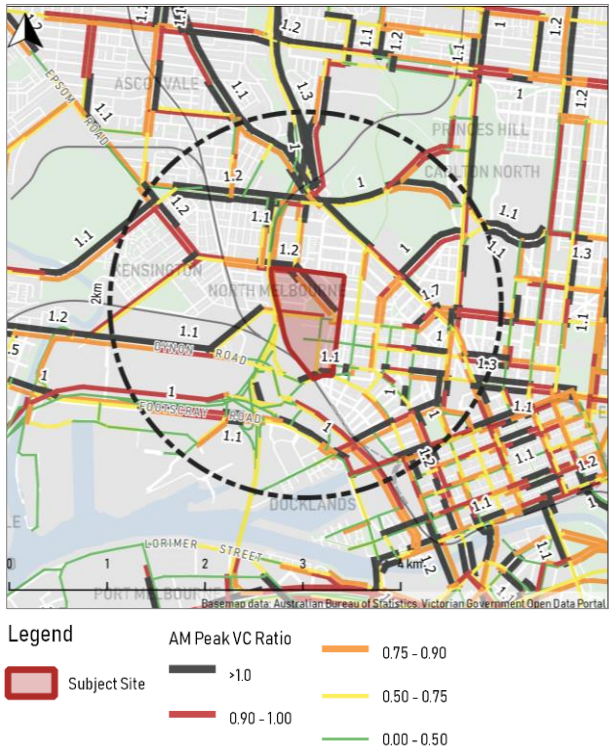
At a broader level, Arden is difficult to access by car. Major arterial roads in the surrounding area such as Macaulay Road, Spencer Street, Flemington Road, Dynon Road and Racecourse Road are very congested. This clearly poses an issue in attempting to cater for demands into the future.

Based on the 2051 S-VITM reference case shown in Figure 3.3, the road network proximate to and connecting Arden will become even more congested. Many additional sections of the arterial roads in the area have reached capacity when compared to the previous years model.

This increased level of congestion is shown to be spreading along the busy main roads. Many of the proximate roads in the north and east, however, maintain similar congestion levels into the future.

The above traffic information is very preliminary in nature and should not be relied on to understand the current operation of specific roads and/or sections of them. Rather, it has been provided to give context around general levels of use and operation at a network level.

Figure 3.3: 2051 AM Peak 2hr Volume / Capacity Plot



STRATEGIC ACCESSIBILITY MAPPING OVERVIEW

Mode split targets have been set for Arden. The ability for targets to be achieved has been investigated through the 2051 S-VITM model year and mapping the accessibility of each modal catchment.

Understanding how the people who are proposed to live and work access Arden was undertaken by analysing S-VITM demographic data outputs. The 2051 S-VITM model year was used with the associated Arden zone's accessing population increased to reflect the envisioned resident and jobs numbers.

The resulting S-VITM demographic outputs showed where the trips of people living in Arden go to, and those accessing it for employment originated from.

With this understanding and what modes could reasonably be used to support these trips to and from Arden, an understanding of what mode splits could potentially be achieved for Arden.

It is noted that if you let S-VITM determine what the mode splits will likely be accessing Arden it will be based on associated modal travel times. However, human behaviour is a bit more complex than this and can be significantly impacted through various hard and soft transport demand measures,

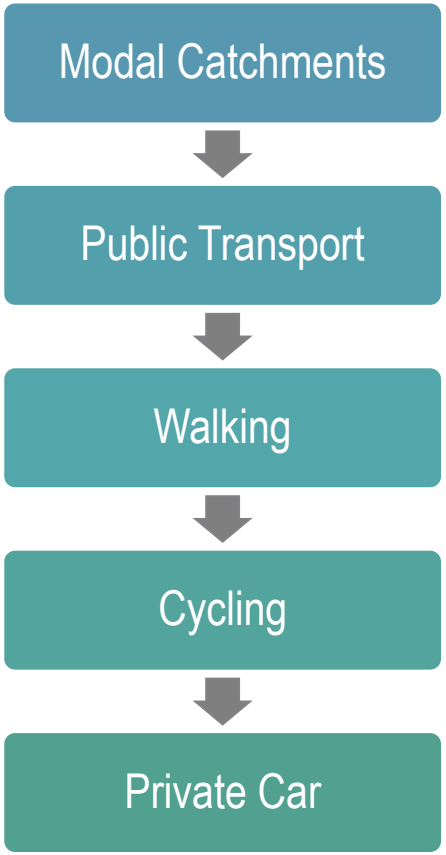
As such, the focus of this accessibility mapping is to understand what mode splits are possible and what level of hard and soft transport demand measures are needed to achieve the desired mode split targets for Arden.

The associated modal accessibility mapping process is shown in Figure 3.4. A description is provided below and the results presented hereafter:

- **Modal Catchments:** Identify the likely typical travel times and / or distances that people would use for each mode in accessing Arden. This will utilise S-VITM's estimation of where the accessing population is within each of the below modal catchments.
- **Walking:** Within 2km of Arden. This broadly relates to a 20min walking distance (except those within the 20 minute public transport catchment).
- **Cycling:** Within 5km of Arden. This broadly relates to a 20min cycling distance (except those within the 40 minute public transport catchment).
- **Public Transport:** Residents and places of employment within 60 minutes travel time of Arden. This is based on the public transport network and services assumed to be in place as part of the 2051 S-VITM reference case.
  (20 minute travel time has been utilized within the walking and 40 minute catchment travel time has been utilized within the cycling catchment).
- **Private Car:** Residents and places of employment within a 60 minute travel time catchment of Arden (beyond the walking and cycling catchments. This is Based on the road network assumed to be in place as part of the 2051 S-VITM reference case.

Those that reside or employment that is located beyond 60 minutes travel have been excluded from this analysis. This decision was made as the ability to identify which modes they will use is considered to be uncertain.

Figure 3.4: GTA Strategic Accessibility Mapping Approach



MODAL CATCHMENTS

Transport demands are essentially built off the need for people to travel between where they are and where they need to be, such as getting from home to work or school.

S-VITM is built on the Victoria in Future (VIF) demographic projections. This data is provided for each five years between 2016 and 2051 for metropolitan Melbourne (link below).

https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future-2016

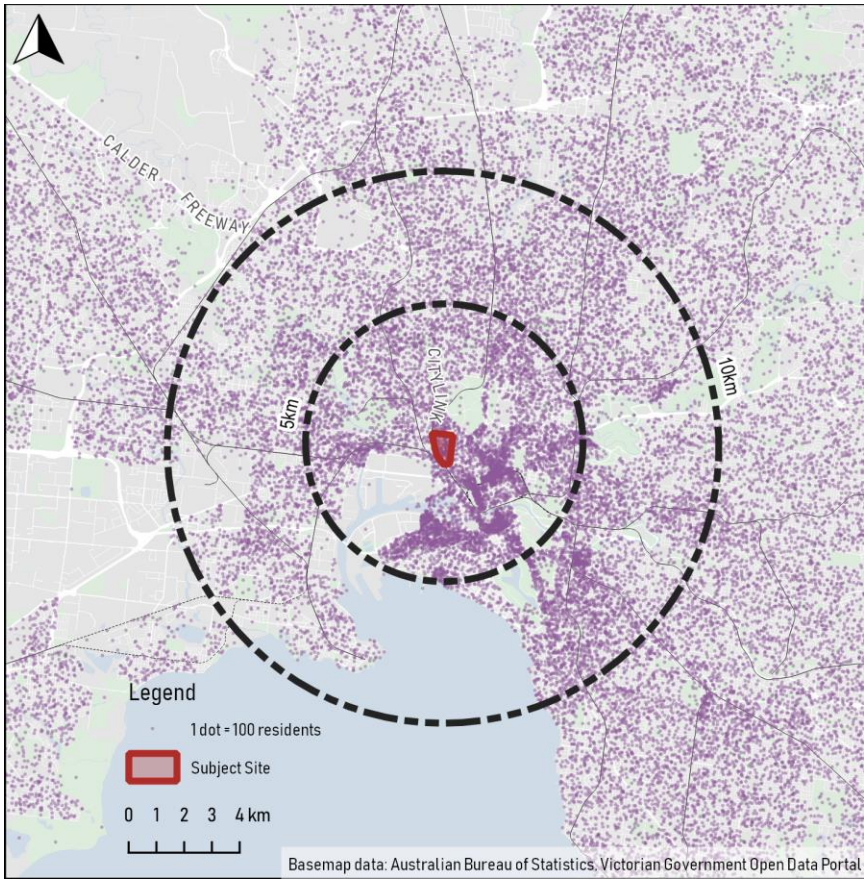
The VIF projections are distributed across metropolitan Melbourne based on best estimates around where people will live, work, shop, go to school, etc. (residential distributions in metropolitan Melbourne relative to Arden are shown in Figure 3.5).

S-VITM is not considered to be exact or comprehensive. In 2051 the associated zone in the model for Arden had only a small portion of the proposed level of residents and jobs. This model however is considered to provide a best estimate understanding of what is expected, and is helpful in understanding the general level of change.

The demographic projection data is then taken by S-VITM and used to identify a volume of information, such as: where people will be located, want to travel, what mode / route they will take and the resulting demands on the network. This is done using a gravity based approach between trip generators and destinations.

The accessibility and mapping presented in this report have been based on the outputs of S-VITM. These assume the associated population distribution of those that are expected to access Arden in 2051 when fully built out (i.e. accommodates 34,000 job and 15,000 residents) .

Figure 3.5: Resident Locations Relative to Subject Site



WALKING

Arden and surrounding area is expected to be highly walkable. This will be achieved through the provision of a comprehensive and fine-grain network, low speed environment, priority crossing facilities, high-quality landscaping and supportive facilities. However, works outside Arden and behavior change initiatives will also be required to cater for movements to Arden.

Analysis of S-VITM shows that in 2051 there are 134,000 residents within a 2km walking catchment to Arden. As shown in Figure 3.6. Of these 60% come from the adjoining neighborhoods.

The 2km walking catchment **to** Arden (i.e. those accessing employment at Arden) is show in by the pink shading in Figure 3.6. It also shows that there is good access to North Melbourne, Kensington, Kensington Banks, and parts of Flemington.

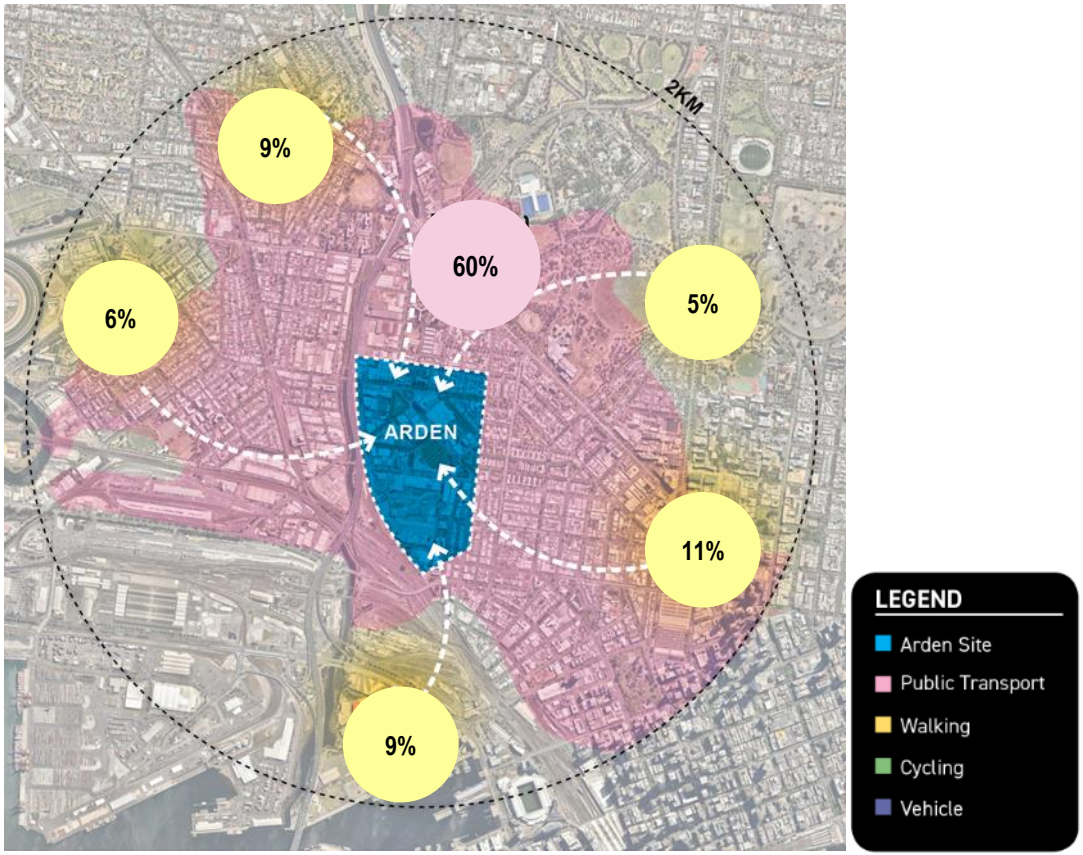
The areas show in yellow are those that do not have good public transport but, given the proximity, people within these areas have a higher likelihood for walking to Arden if the right environment is provided.

There is expected to be a significant proportion of internal trips, given the mixed use nature of Arden. Guidance on internal trip generation rates can be sourced from VISTA (the household survey for travel patterns) for residential land uses. The breakdown of trips by purpose across metropolitan Melbourne is shown below:

- Employment trips: 25.5%
- Education trips: 9.5%
- Retail/Shopping trips: 17.4%
- Social trips: 12.4%
- Recreation trips: 5.3%
- Other Trips: 30.1%

For strategic planning purposes we have adopted a 25% internal resident trip rate. This could be adjusted based on further planning and high levels of self-containment (e.g. the mix of land uses is conducive to local-living)

Figure 3.6: Proportion of people likely to walk to Arden



CYCLING

The cycling catchment to Arden is expected to be fully developed by 2051, with high quality and separated routes along strategic routes, with connected feeder routes to neighborhoods with low speed and traffic volumes.

There are 629,000 residents between 2km and 5km of Arden. Analysis of S-VITM shows a high proportion of people travelling to and from Arden by bike (1,200 travel to Arden in the AM peak period by bike; 400 travel from Arden in the AM peak period by bike).

Shaded in pink Figure 3.7 shows the 5km cycling catchment **to** Arden (i.e. those accessing employment at Arden).\

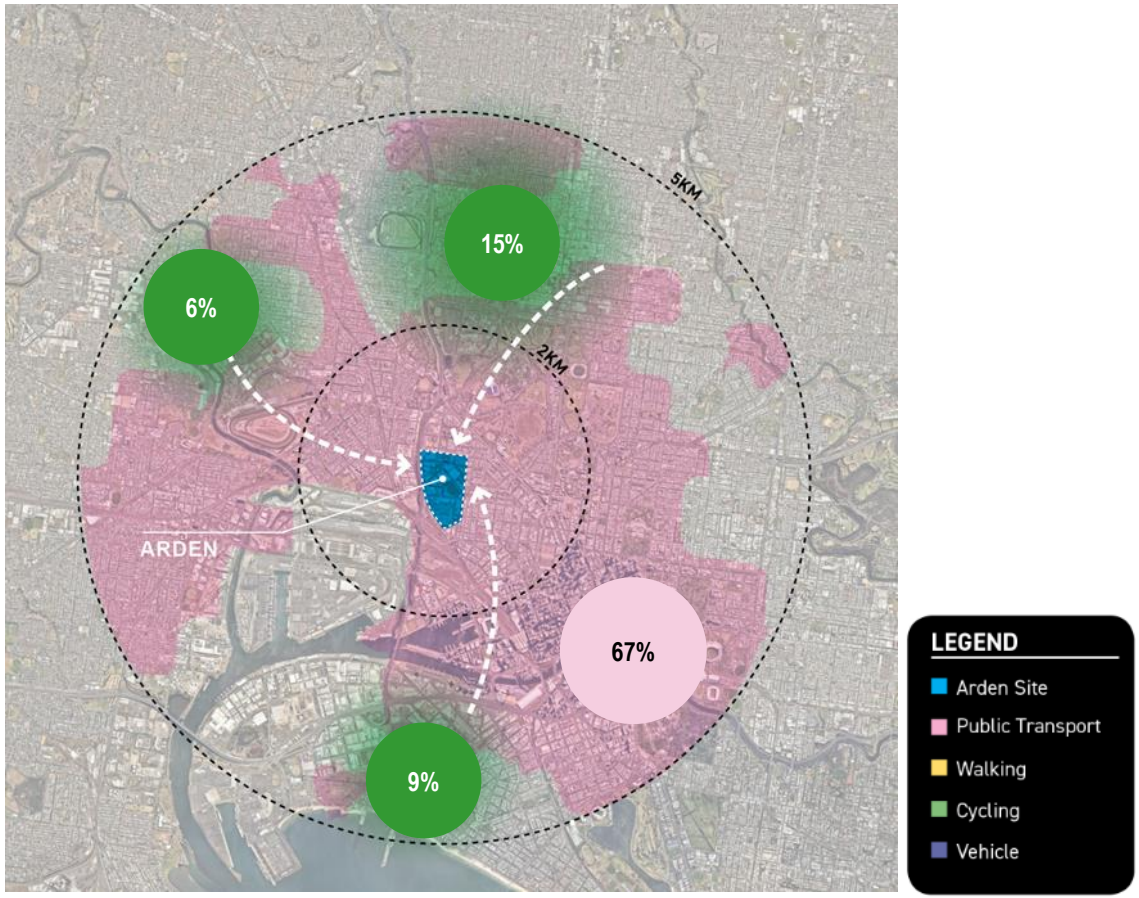
The remaining areas that are highlighted in green are those that don't have good public transport but given the proximity to Arden these areas have a higher likelihood for cycling to Arden if the right environment is provided. This analysis suggests that there is significant opportunity to provide well-used cycling corridors if you connect the Inner North, Inner West and Fishermans Bend.

These areas will need to be connected through high quality facilities to allow people that reside in the adjoining neighborhoods to cycle. Currently, there are significant barriers – mostly relating to unsafe infrastructure - to accessing the surrounding areas by bike.

Analysis undertaken by the City of Melbourne suggests that 11 per cent of people used a bicycle during some part of their travel day whereas 25 per cent used a bicycle over the previous week. This creates a significant 'near-market' of people who will cycle more if provision is made.

Achieving high mode shares for cycling is about making it an option (for some but not all trips) for a wide range of users through strategic routes with connectors into low traffic neighborhood streets. To make the most of Arden's central location safe continuous infrastructure that connects it to surrounding areas needs to be a priority.

Figure 3.7: Cycling Catchment & User Numbers Travelling *to* Arden



PUBLIC TRANSPORT

In 2051 Arden is expected to be highly accessible by public transport. Arden will contain North Melbourne Station, two other stations within walking distance, a potential tram route extending through it and a bus network filling in the gaps.

To understand how many people can access Arden via public transport we have analysed the 2051 S-VITM transport model.

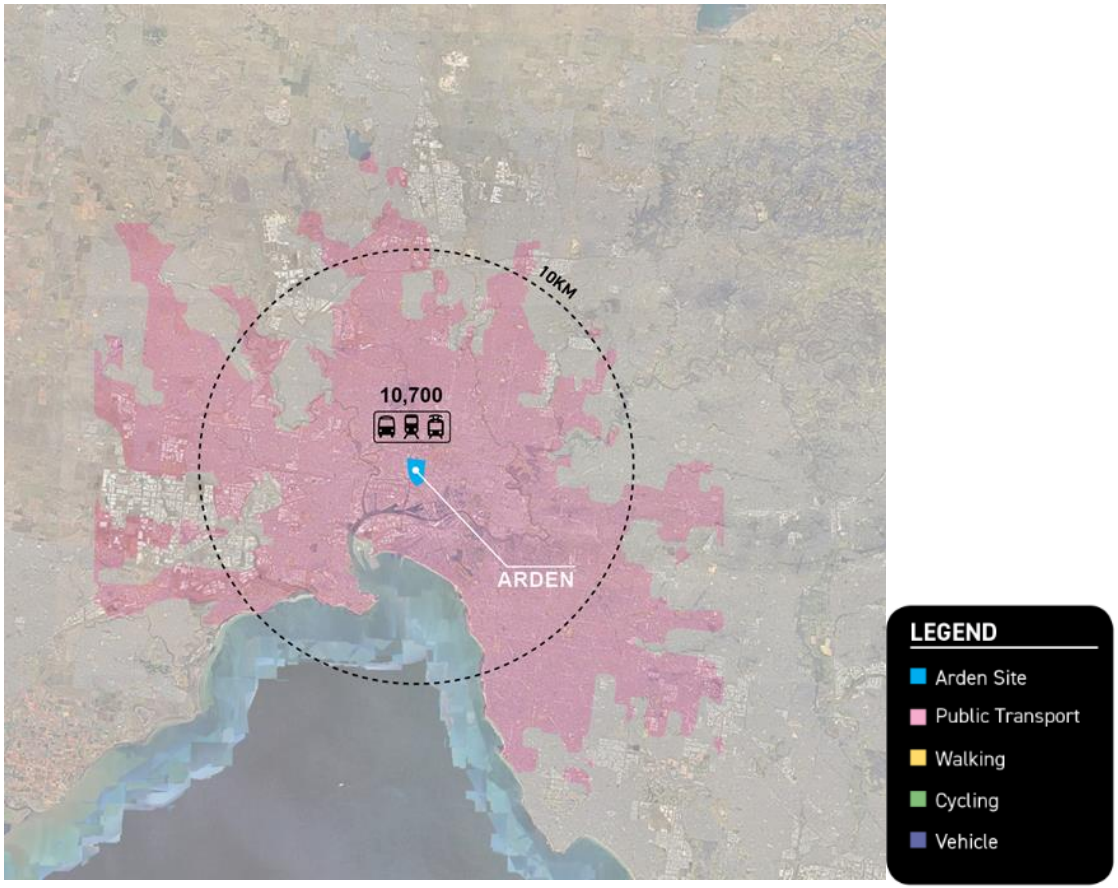
The 60-minute public transport network catchment for Arden is shown in Figure 3.8.

Our analysis shows that 3,034,000 residents (including those that could also walk and cycle as they live locally) can access Arden in less than 60 minutes in 2051.

This suggests that Arden will be highly accessible by metro train and, via interchange at Sunshine, regional areas to the North and West of Victoria.

Strategic analysis of VITM suggests further work is needed to understand the relationship between Arden and Melbourne, analysis of S-VITM suggests that nearly 11,000 people travel **to** Arden in the AM peak by public transport (includes 700 from within the walking catchment and 2,400 from within the cycling catchment).

Figure 3.8: Public Transport Catchment & Users Numbers Accessing Arden



PRIVATE VEHICLE ACCESS

A large part of metropolitan Melbourne will still access Arden by private vehicle. This is due to close access to the existing Freeway network and major road projects that are set to come online.

A large part of metropolitan Melbourne is within a 60-minute drive, including the northern growth corridor. Arden is highly accessible by car in 2051 due to its connections to an extensive freeway network, and the continued investment into the freeway network, such as North East Link and the West Gate Tunnel.

To understand how many people who could drive to Arden (or to a station and then catch public transport to Arden) we extracted the number of people who are outside of public transport-only catchment.

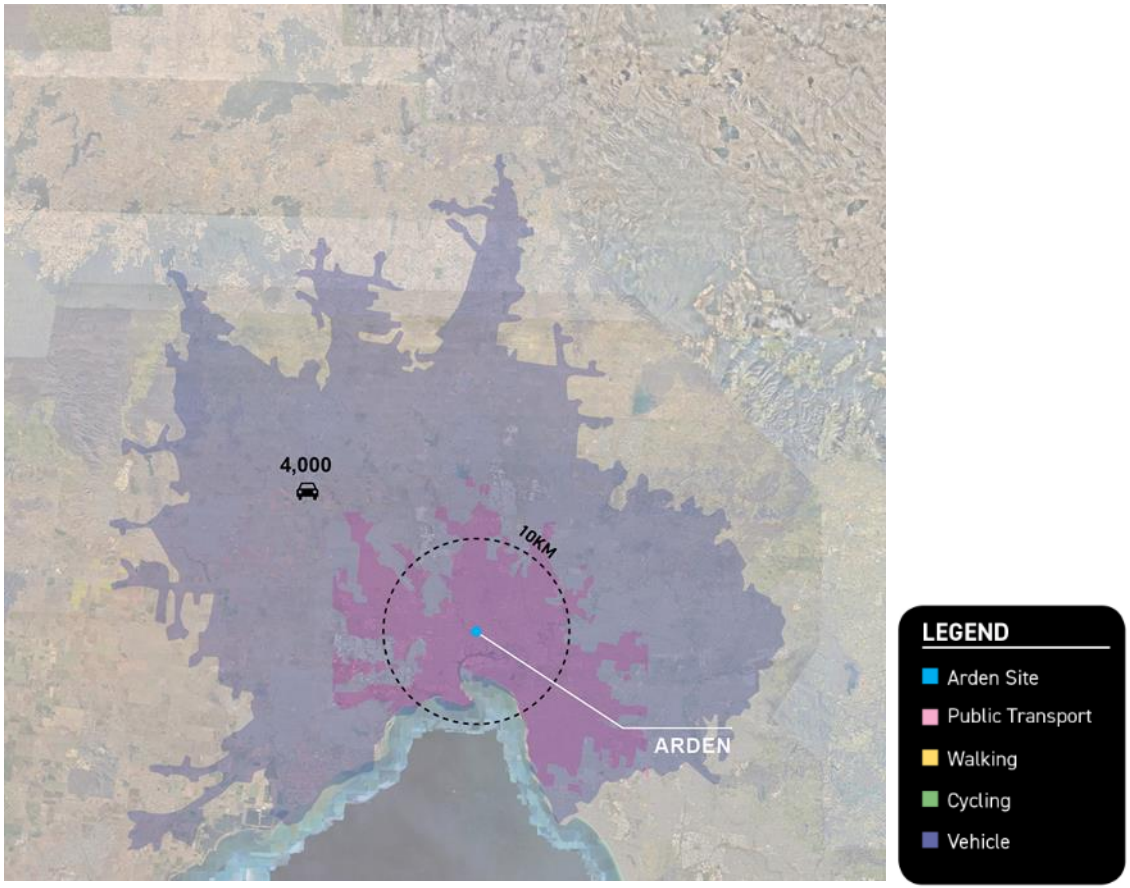
According to the S-VITM model in 2051 there are 2,394,000 residents within driving catchment or Arden (but not within the walking, cycling and public transport catchments).

S-VITM also shows that 4,000 drive **to** Arden in the AM peak period by car, and 500 drive **from** Arden in the AM peak period by car.

These model results show low use of car for travel to Arden, but also intimates that, if the mode share targets in the Arden Vision are to be achieved, access to Arden by private car will require need to be reduced through management of demand.

International evidence, evidences that the provision of car parking is critical to managing demand for demand for car travel. The current level of car parking provision provided in the preliminary built form and land use concept plan equates to 0.11 spaces per resident and employee. If all these spaces were used daily, this would broadly equate to an 11% mode share. Given the targets, this should therefore be reduced to 10% to achieve the targeted mode share.

Figure 3.9: Private Vehicle Catchment & Users Numbers Accessing Arden



STRATEGIC ACCESSIBILITY MAPPING SUMMARY

The strategic accessibility mapping indicates that more than 10% of people will likely access Arden by car[1], so transport demand and site arrangement measures will be required to suitably discourage private car use.

The expected mode splits for residents and employees in Arden are shown in Table 3.1. The table indicates there will be 18% car, 58% public transport and 24% active travel in the AM peak period (if internal trips are not included then the car mode split would be 21%).

The 18% car mode share in the AM peak 2 hours is expected to result in 4,500 people access Arden. If we assume typical car occupancy levels of 1.1 person per car, then some 4,090 vehicles will access the site in the AM peak 2-hours. If the car mode split can be reduced to 10% then the volume of vehicles will be reduced to 2,000 accessing the site. This would be well within daily fluctuation levels of most major arterial roads in the area.

A comparison of the 'Resulting' and 'Target' mode splits is shown in Figure 3.10. This indicates that the active travel split is slightly lower than targeted. Car use is, however, nearly double what is being targeted.

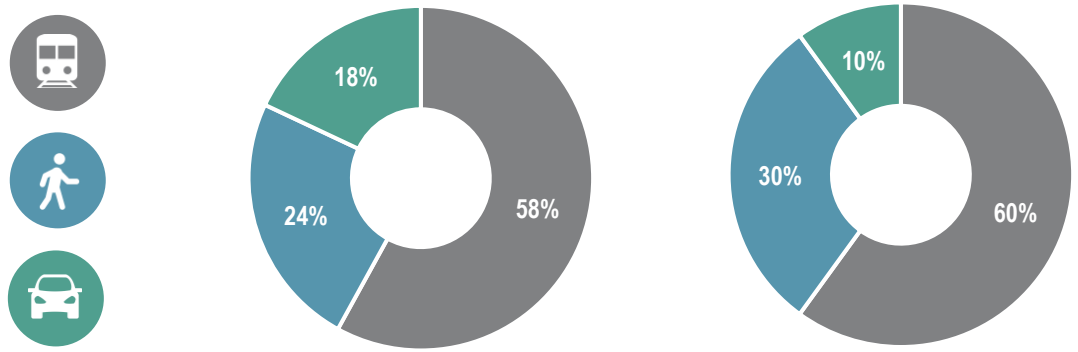
This analysis is indicative but helps understand how accessible the site could be and where people are likely to come from to work in Arden. The results illustrate that Arden is highly accessible by public transport and that there is significant potential for active transport to be the choice for many.

Any analysis of potential catchments assumes a high-quality safe experience. To deliver 10% car travel to the area, and the associated benefits, many transport-related planning/engineering choices need to be made (e.g. priority at junctions, car parking, lane widths and width of cross sections).

Table 3.1: 2051 Arden AM Peak 2-hour Ingress / Egress Mode Shares (based on GTA Strategic Accessibility Mapping)

Mode	Employment (ingress)		Residents (egress)		Total	
Public Transport	10,700	60%	3,400	53%	14,100	58%
Walking	470	3%	486	8%	956	4%
Cycling	1,200	7%	400	6%	1,600	7%
Private Vehicle	4,000	22%	500	8%	4,500	18%
Internal (walking)	1,595	9%	1,595	25%	3,191	13%
Total	**17,965**		**6,4381**		**24,347**	

Figure 3.10: 2051 Mode-Share Comparisons (GTA Strategic Accessibility Mapping vs Target)



GTA Strategic Accessibility Mapping Results

Arden Vision Mode Shares

1. Based on 'business as usual' conditions and assuming no major policy or infrastructure interventions.

Source: Arden Vision and GTA Consultants

MODE SHARES – TOP DOWN ANALYSIS

Use of Mode Split targets to align planning activities is becoming common place in Australia.

Mode share is widely used in strategic transport planning as a strategic performance metric outside of Australia. For example, Transport for London's most recent Mayor's Transport Strategy (the London wide transport strategy) includes a mode share expected value of 80 per cent of trips being made by walking, cycling and public transport by 2041. This target applies to the whole of London and reflects the long-term trend of a shift towards walking, cycling and public transport.

Though Plan Melbourne does not include mode share targets, many local authorities, including the City of Melbourne, use mode share targets to guide decision-making.

To inform our planning, 2016 Census data provided by the Australian Bureau of Statistics (ABS) has been analysed to establish mode shares for inner-city suburbs, as shown in Table 3.2.

Arden's mode share for cars is expected to be 10% based on the accessibility mapping analysis. If achieved, this would make it slightly lower than the existing level of car use in the inner suburbs of Melbourne.

Achieving a mode share target of 10% car trips is not unachievable, but our analysis suggests that it is challenging. It is an unparalleled opportunity but also a significant challenge and requires a change in how we plan transport.

There needs to be early prioritisation of public and active transport, integration of site layout design elements will be required and the implementation of demand management measures.

Table 3.2: Current Mode Share for Inner City Suburbs (ABS Census 2016)

Suburb	Distance From GPO (approx.)	Sustainable Transport	Car	Other
Docklands	1.5km	75%	24%	1%
Carlton (Vic.)	1.6km	78%	21%	1%
Southbank	1.6km	77%	22%	1%
Fitzroy (Vic.)	1.9km	71%	27%	1%
West Melbourne	2.1km	75%	24%	1%
North Melbourne	2.2km	71%	27%	2%
Parkville (Vic.)	3.1km	68%	31%	1%

Source: Fishermans Bend Planning Panel review
Table 5.2:Current Mode Share for Inner City Suburbs (ABS Census 2016)

Noting: 'sustainable transport' is defined as walking, cycling and public transport trips. For the purposes of this assessment of Census data, we have extended upon this definition to also include 'Car as passenger'. This category will likely comprise predominantly carpooling passengers in a shared vehicle. Carpooling could be categorised as sustainable in that the trip does not contribute any additional impact on the transport network or in terms of environmental sustainability (i.e. emissions using a shared vehicle). 'Worked from home' responses are also considered, in this analysis of Census data, as sustainable transport, as this speaks to reducing the need for travel. All other categories ('taxi', 'truck', 'motorbike' and 'other') are classified as 'other'. 'Did not go to work' responses have been excluded from the analysis.

SWOT ANALYSIS

The proposed transport arrangements are expected to generally help achieve the Arden Vision, but this is subject to several issues being resolved and opportunities capitalized on.

Mode Share Targets

The Arden Vision outlines an ambitious goal of 90% of all trips to Arden made by sustainable modes by 2051:

- **Strength** it provides a policy framework for the implementation of measures to prioritise investment and allocate road space
- **Weakness** the target has not been subject to detailed backcasting to test what is needed to achieve it
- **Opportunity** creating a place that caters to people rather than vehicles will improve the vitality and economic success of Arden
- **Threat** there is no detailed information on how the target will be achieved. Arden also has easy access to the Freeway network.

Public Transport

There is a commitment to build the North Melbourne Station within Arden as part of the Melbourne Metro Rail Project:

- **Strength** it will make Arden highly accessible by public transport
- **Weakness** there's no commitment to other public transport and a perception that the train alone will meet the public transport needs of Arden
- **Opportunity** it can greatly reduce local congestion and provide access for a large number of Melbourne
- **Threat** if the station is not well integrated with the rest of Arden it may be underutilised.

Geographical Limitations

The site is land locked by the creek to the west and the rail corridor to the south:

- **Strength** it links well to existing communities of the inner West and North
- **Weakness** it limits the opportunities to access the site via the existing street network and creates congestion
- **Opportunity** limited access may help reduce high through traffic and ensure Arden is treated as a 'destination' rather than a corridor.
- **Threat** it is competing with other inner city urban renewal areas and National Employment Clusters for investment, particularly as it relates to major transport infrastructure (above and beyond MMR).

Internal Network

The preliminary built form and land use layout concept plan shows a high-density, pedestrian friendly area with limited vehicle access:

- **Strength** Arden layout will promote active travel as a viable mode of transport, especially for internal trips
- **Weakness** the usage of the network may be limited by poor integration with neighboring suburbs
- **Opportunity low speeds mean that shared spaces may be appropriate, especially if access is restricted by time of day**
- **Threat** the extension of Langford Street along the western edge of Arden may encourage 'rat running' of vehicles trying to avoid congestion on the major roads outside of the site.

Summary:

The ambitious goal of 90% of all trips to Arden made by sustainable modes by 2051 sets a clear target to work towards.

There is more work to be undertaken to detail how this will be achieved – either in terms of demand (how people will travel) and supply (funding for transport).

Arden sits between established communities and has good transport links but a business as usual approach to transport planning will mean that people use major roads to access the site.

The next section of the report makes some preliminary recommendations on how to address the points raised in this SWOT and provides some direction on next steps for transport planning of Arden.

RECOMMENDATIONS

04

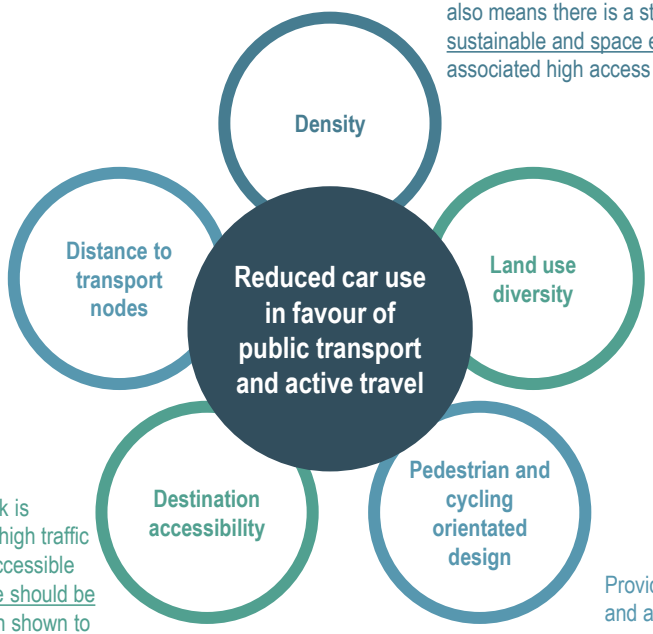
URBAN FORM FACTORS

Below are the urban form factors that have been identified through research to influence travel behaviours. These should be considered when developing the Arden layout and how it is accessed.

Figure 4.1: Urban Form Factors

Arden is proposed to be a densely populated precinct for both residents and workers. This offers an opportunity to leverage off the number of short / internal trips created by this self-containment. It also means there is a strong case for further investment in more sustainable and space efficient transport infrastructure given the associated high access demands.

The new North Melbourne Station and existing adjacent stations will connect Arden to the Melbourne CBD, Parkville NEIC and the broader metropolitan area. The layout of Arden needs to be designed to make access to these train stations easy and attractive by foot and bike.



The mixing of residential, employment and retail land uses help create more internal / short trips via active and public transport. It should be noted that the high employment numbers proposed in Arden will likely service the local residential catchment as well as the internal resident population.

At the moment, the surrounding road space of the network is generally private vehicle focussed, which has resulted in high traffic volumes and congestion. In order to make Arden more accessible by active and public transport the surrounding road space should be reallocated towards these modes. This potential has been shown to be possible through the accessibility mapping analysis, if the infrastructure to connect Arden exists.

Providing a fine grain pedestrian and cycling orientated network in and around Arden will help reduce the reliance on private car use in accessing Arden and once there (i.e. attractive to access and spend time within Arden for multiple purposes).

Source: GTA Consultants

WORK REQUIRED TO ACHIEVE MODE SHARE OBJECTIVES

Further scenario development and analysis is recommended to validate the network and precinct initiatives required to achieve the target mode share for Arden.

Table 4.1: Next Steps

Topic	Recommendations
Scenario Analysis	▪ Develop a number of precinct and wider area scenarios for the transport network with the given land use projections. This process is similar to the development of the strategic and detailed planning for Fishermans Bend ▪ Understand the need and demand for other public transport services ▪ Identify preferred public transport arrangements to service Arden and how they might integrate with other services and needs in the area
Modelling	▪ Undertake strategic transport and pedestrian modelling of Arden based on the Scenarios developed above. This would be based on an interim year (e.g. 2031) and the ultimate development year (e.g. 2051) ▪ Undertake population modelling to identify the number of people that will be accommodated within Arden and their trip purposes / types. Then based on the mode split targets, identify the associated facilities needed to support them (i.e. car and bicycle parking facilities, restrictions and types, lockers, showers, etc.)
Increasing walking and cycling through living locally	▪ Ensure high quality local walking and cycling links within and to Arden ▪ Plan for land-uses that reduce trips from far afield e.g. limit special uses that draw people from across Melbourne (e.g. a zoo) ▪ Employ travel demand management strategies to disincentivise long trips ▪ Reduce the number of access points to the area by private vehicle (whilst allowing for filtered permeability for pedestrians and bikes)
Engagement with Transport Agencies	▪ Work with the MMR team to ensure the North Melbourne Station is fully integrated with Arden ▪ Work with Bus and Tram planning teams in Government (TfV) to develop the on-road public transport network, including phasing ▪ Reflecting the mode share targets, agree cross sections by street type and junction designs ▪ Agree interfaces with key strategic active transport links, primarily access across major roads to surrounding neighborhoods and the Capital City Trail (as identified above)
Provision of car parking	▪ Promote a fundamental shift away from private car ownership and privately accessed car parking spaces (home or for work) ▪ Aligned with the CBD, Fishermans Bend, London, Mexico City and San Francisco, a maximum car rate appears to be an appropriate tool to achieve sustainability goals at Arden ▪ At the Fishermans Bend Planning Panel a maximum rate of 0.5 space per dwelling was considered appropriate to achieve a 20% car mode share, given this, a similar rate should be adopted at Arden ▪ Deliver car parking structures that can transition to other uses over time

ARDEN ACCESSIBILITY & LAYOUT

Based on the SWOT analysis, the recommendations below should be part of the Scenario Analysis to help make Arden highly accessible by active and public transport in order to achieve the target mode splits.

Table 4.2: Accessibility & Layout Recommendations

Topic	Recommendations
Mode Share Targets	▪ Based on the identified catchments for each mode, review the suitability of the existing arrangements to connect them to Arden ▪ Identify phased infrastructure to deliver the overall mode share targets ▪ Create a land use planning framework that reduces the number of car trips needed for business purposes to the area
Geographical Limitations	▪ Identify the key accessibility barriers to walking and cycling catchments ▪ Develop options to overcome the geographical accessibility barriers, such as new infrastructure, upgrades, alternative routes and/or modes, wayfinding, etc. ▪ Assess the options to identify a preferred approach and develop an implementation plan
Public Transport	▪ Orientate the development to North Melbourne Station and Macauley Station to the north ▪ Understand the need and demand for other public transport services ▪ Identify preferred public transport arrangements to service Arden and how they might integrate with other services and needs in the area ▪ Given the density of Arden, ensure that the public transport interchange at the station (particularly train-bus) is a lower priority than pedestrians
Internal Network	▪ Prioritise pedestrian movement ▪ Minimise the potential for vehicles to access Arden, especially those that can be used as through routes ▪ Locate car parking facilities to allow for shared use and future repurposing ▪ Considered centralising loading, services and waste through a consolidation centre

ADDITIONAL SPECIFIC QUERIES

A number of initial queries about the preliminary built form and land use concept plan layout and connecting transport network have been raised and are considered below.

Table 4.3: Additional Queries

Query	Initial Response
Impact of removing the level crossing on Arden Street	The Arden Street level crossing causes localised road congestion. Delays are expected to increase as the Upfield line train frequencies increase, i.e. post MMRP. Its removal (along with Macaulay Road level crossing) will provide a more reliable road network and improve safety, but given the congestion more broadly in the area, it is not expected to significantly change traffic patterns. Given the importance of connecting local established communities, catering for walking and cycling through direct high-quality routes in this level crossing removal is essential.
Continue Victoria Street through to Laurens Street	Any increase in road capacity in the area will likely increase vehicle use in and around Arden. Moreover, the continuation of Victoria Street through to Laurens Street would provide a potential route to the proposed Langford Street precinct access point. This would be attractive to motorists. Separating the tram from traffic will prevent this impacting the operation of the tram. This will result in there only being a left-in / left-out opportunity to access Victoria Street from Laurens Street. However, providing opportunity for pedestrian and bicycle connections through this area and across Laurens Street would help the accessibility of Arden by these desired modes.
Closure of Langford Street around Green Street / Gracie Street	Langford Street between Arden Street and Macaulay Road is a very direct and attractive alternative route, especially given the congestion that exists on Macaulay Road. As such, the closure of Langford Street between Arden Street and Macaulay Road would help reduce this potential through movement. There are alternative but less attractive routes that local traffic could take to access Arden Street and Macaulay Road, noting that those wanting to access Arden Street would likely use Fogarty Street, where the tram extension is proposed to ultimately extend. However, as long as the local generated traffic volumes are low (i.e. achieve a 10% car mode share), and there are not significant through vehicle movements, there is reasonable potential for the closure of Langford Street working from a local traffic capacity perspective.
Role and function of Langford Street and Fogarty Street within Arden	The portion south of Arden Street is expected to be where the majority of the highest densities of employment and residents is expected. As such, the need for it to be a highly pedestrianised precinct will be key to its success. Moreover, given that 80% of people are proposed to access Arden by active and public transport modes, they will all be walking within Arden, especially in the commuter peak periods. As such, any internal road not connecting to car parking facilities should ideally be fully pedestrianised, or at least restrict vehicle access during the commuter peak periods.
Intersection types along precinct frontages (Arden Street & Laurens Street)	Intersection types and crossing treatments along the Arden Precinct frontages are expected to be signalised intersections. However, movement and mode prioritisation need to be identified. Pedestrian volumes wanting to cross Arden Street & Laurens Street are expected to be significant, so signal phasings should be set to minimise pedestrian delays. Also, with tram and bus services in the area, these should be prioiritised over traffic where possible, especially traffic from side roads.
Closure at a mid-way point of the internal road along the western site frontage	No through traffic movements within the Arden Precinct should be supported. As such, the road along the western side of the precinct between Arden Street and Laurens Street is recommended to at least have a mid-point closure. Consideration of the allocation of the car parking types either side of the closure should be undertaken to minimise the need for vehicles to travel around the precinct (an internal connection between car parking buildings could be provided).
Location of Car Parking Stations	The location (provision and mix) of the car parking stations should ideally minimise the potential for vehicle travel and intrusion into the precinct.

SUMMARY AND NEXT STEPS

'Arden's strategic proximity to the CBD and Parkville will enable Arden to support Melbourne's growth as a city that attracts investment, supports innovation and creates jobs.' (pg. 16, Arden Vision)

Arden will not achieve its vision unless it takes action on transport

Arden will be redeveloped with significant increases to employment and population. It needs a set of transport solutions to deliver the Vision for Arden that calls for a car mode share of 10%, active travel 30% and public transport 60%.

Currently, car mode share for journey's to work from Arden is 60%. As land use intensifies, typically car mode share declines. We estimate the mode share could be 30% with the denser land-use following redevelopment, or down to 18%, but no lower unless a package of interventions are developed and implemented. So, there will be a gap against the target. Car mode share needs to be at least 8 percentage points lower, active travel 6 percentage points higher and public transport 2 percentage points higher. The question is how to deliver this shift from car to other modes, particularly to active travel.

We recommend a package solutions to deliver the Vision

Including… Reduce car mode share

- Limit the number of car parking spaces
- Optimise parking location
- Develop modular designs to enable repurposing car parking

Encourage active travel

- Improve the physical network surrounding the Arden site and within it
- Increase the provision of end-of-trip facilities
- Enhance local and surrounding environment

Increase public transport usage

- Make walking and cycling access to stations easier
- Develop areas near public transport stops and stations
- Engage with Government and operators on service and network changes

Overall

- Reallocate road space from car to other uses
- Develop plans for Arden in context of wider developments and integrate with the surrounding networks
- Maximise learning from case studies and best practice.

This package needs to be supported by studies and planning

Key next steps:

1. Undertake studies to identify and confirm key barriers and incentives to provide greater detail informing planning and design in the next stage
2. Set up and run detailed models on travel demand and behaviour, including tests on different development scenarios
3. Develop more detailed transport network plans for each element in the package, as part of an overall study, supported by preliminary engineering and design
4. Based on the above, establish a phased plan of investment over time
5. Engage with stakeholders and particularly the Government, including the production of advocacy materials to best gain buy-in, with a view for maximising the potential from public funding.

VIC NSW QLD SA ACT SA WA

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