ARDEN PRECINCT PARKING PLAN

PART 2 – EVIDENCE BASE

Client: Victorian Planning Authority

Version D – Final
12 August 2021
V200032

CONTENTS & STRUCTURE OF PART 2

Part 2 - Evidence Base

01 Strategic Background	Sets the policy scene for Arden, provides an overview of the structure plan together with how major projects link with the precinct. A case studies are presented as examples of recent relevant transport work.
02 Existing Conditions & Best Practice	Sets out the existing transport conditions for Arden. A review of transport trends has been completed which concludes car use is dropping and is likely to drop further. A review of Movement & Place is also provided in the context of work completed for Arden. Lastly, a review of best practice solutions identifies innovative means of implementing car share, last-km servicing and Electric Vehicles.
03 Trip Analysis and Mode Shares	Evidence is collated here to review if the mode share targets set for Arden are achievable. A first principles trip generation exercise is provided for later use when assessing the movement network.
04 Structure Plan Movement Network Analysis	Provides a comprehensive review of the movement plan network set out in the draft Structure Plan, together with a general review of alignment between the objectives and strategies set out in relevant parts of the structure plan report.
05 Arden Parking Demands	Car parking is a travel demand management tool. This section shows that low car parking provision has a wide market basis and is therefore viable.
06 Arden Parking Strategies	This section shows that consolidated car parking, while efficient, will need public sector delivery and management, at least until the value of the model is accepted by the private sector.
07 Recommendations & Next Steps	Collates recommendations from other sections of the report and draws a number of conclusions. The key ones being that the movement network is fit for purpose and the mode shares are achievable but a non-business as usual approach will be required.

STRATEGIC BACKGROUND

This section of the report sets the policy scene for Arden, provides an overview of the structure plan together with how major projects link with the precinct. Case studies are presented as examples of recent relevant transport work that can be used to guide thinking for Arden.

Part 2
01
Evidence Base

1.1 PURPOSE OF THIS REPORT

The purpose of this study is to assess the objectives and strategies set out in the draft Arden Structure Plan against key movement and parking principles to inform preparation of the final Arden Structure Plan.

Arden is well placed to be an international innovation and technology precinct, given its rapid rail connections to the Parkville NEIC, the Melbourne CBD and Melbourne's west. The Draft Arden Structure Plan provides guidance on the delivery of 34,000 jobs and 15,000 residents by 2051.

With such 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 Metro Tunnel and West Gate Tunnel Project (WGTP), there is also a need to deliver a range of more localised transport options.

The transport connections proposed in the draft Arden Structure Plan are shown on the movement network plan to the right. With the new Arden Station being completed in 2025, the opportunity exists to create a transit-oriented development that is highly accessible and has low car use.

Low car use will be key to delivering a dense mix of land uses in this precinct so that roads in the area are not subject to unmanageable levels of congestion. This is coupled with the vision for Arden as a world-leading sustainable precinct; a significant component will be how people choose to travel.

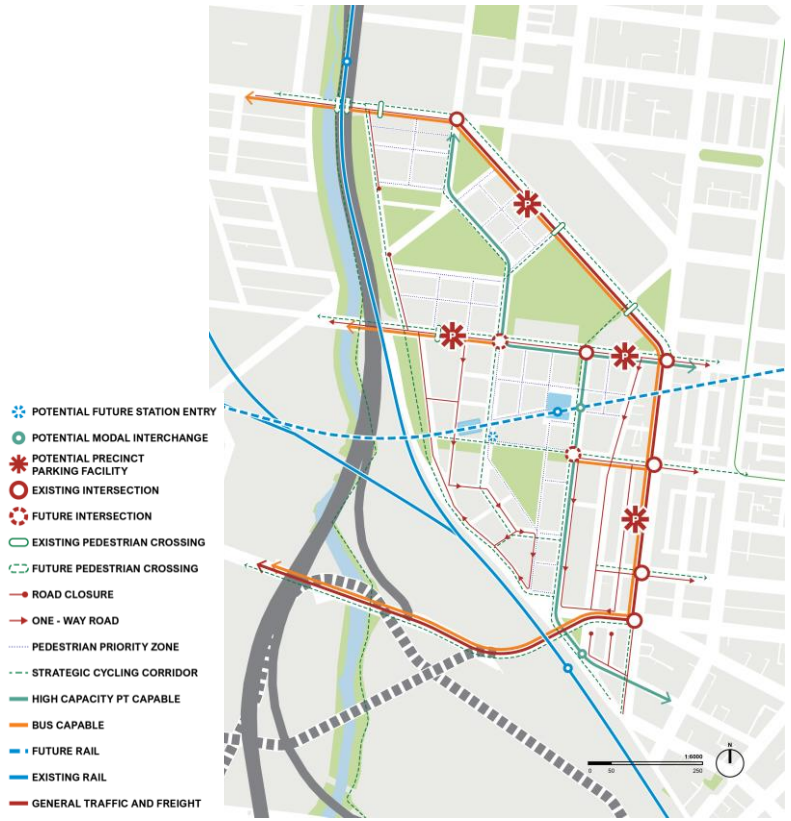
Accordingly, the Arden Vision sets an objective that 90% of travel to Arden will be by sustainable modes, while only 10% will be made by car.

GTA Consultants has been engaged by the Victorian Planning Authority (VPA) to undertake a Movement and Parking study in review of the Draft Structure Plan .The purpose of this engagement is to:

- review if the transport goals and plans set out in the plan are realistic and achievable,
- support best practice and innovation
- realise the growth plans of Arden, including the employment and innovation goals of the Arden Vision
- Prepare a Precinct Parking Plan to underpin a Schedule to the Parking Overlay for Arden

This report also sets out a parking strategy, including rates of parking provision, and how consolidated, unbundled parking can be implemented to maximise the efficiency of car parking provision. This will reduce the need to build lots of car parking, resulting in increased and more affordable habitable space.

Arden Transport Connections – Movement Network Plan



Source: Draft Arden Structure Plan 2020

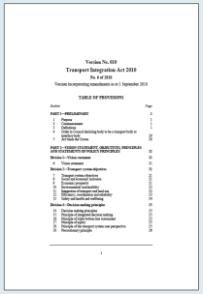
1.2 STATE POLICY CONTEXT

There are a number of key state policy documents which have guided the development of the draft Arden Structure Plan.

Overview

The following state strategic documents were reviewed and the key points relevant to the Arden Precinct Parking Plan have been highlighted.

- The **Transport Integration Act** is the overarching legislative policy for transport planning in Victoria and recognises that transport infrastructure and policy changes influence land use.
- **Plan Melbourne** contains a set of principles and guidelines to shape Melbourne's land use and transport planning into the future. The plan informs the direction taken for strategic planning in the city.
- **Movement and Place in Victoria** recognises the diverse role places play in planning which type of transport mode is most appropriate for any given street or road. It recognises that all streets are places in their own right, and in this context, there are different priorities in a place at any given time.



Transport Integration Act

The Transport Integration Act is Victoria's principal transport Act, bringing together the whole transport portfolio under one statute for the first time.

The Transport Integration Act combines Victoria's transport portfolio under one single legislative act. It serves as a strategic framework a for sustainable transport systems. The legislation guides the main decision-making process for other strategic transport planning documents within Victoria.

The Act also includes six legislated objectives - social and economic inclusion; economic prosperity; environmental sustainability; integration of transport and land use; efficiency, coordination and reliability; safety, health and wellbeing. These are also underpinned by eight principles that further guide this decision making.

Plan Melbourne 2017-2050

Plan Melbourne will guide the growth of the city for the next 35 years. It sets the strategy for supporting jobs, housing and transport, while building on Melbourne's legacy of distinctiveness, liveability and sustainability.

Plan Melbourne is a long-term plan designed to respond to the various challenges and opportunities Victoria faces between now and into the future. This plan revises the 2014 version of Plan Melbourne in order to better reflect current policies and priorities. It is a blueprint for a Melbourne, whose population is forecast to reach 8 million by 2050.

The plan is structured around 9 principles to guide policies and actions, 7 outcomes to state the ambitions of the plan, 32 directions to outline how the outcomes will be achieved and 90 policies to detail how directions will be turned into actions.

Movement and Place in Victoria (2019)

This document provides an overview of movement and place thinking and steps through the four modules in the Movement and Place Framework.

The Movement and Place Framework takes a future-focused, multi-modal approach to network planning. It takes into consideration the diverse role places play in planning the types of transport modes appropriate to a local road or street. In this new language, roads and streets are defined by the context of a local place and assigned various 'movement' and 'place' classifications.

The Framework offers a common language for coordinated transport planning between transport and planning agencies and local governments. It also provides a consistent approach to assessing the performance of the road and transport network, identifying project requirements and assessing project solutions.

The local policy context and planning practice guidance have been reviewed and key points relating to Arden identified.

Overview

The following local planning documents were reviewed and the key points relevant to the Arden Precinct Parking Plan have been highlighted.

- The **Melbourne Transport Strategy 2030** is the overarching transport vision for Melbourne. The Strategy identifies Arden as an urban renewal area to be prioritised for development from a low-intensity land use to a mixed-use precinct.
- The **Melbourne Planning Scheme** sets out the vision and strategic direction for the municipality and through a range of specific objectives and policies, guiding where future land use and development should be located across the city.
- **Planning Practice Note 57 – The Parking Overlay (PPN57)** provides guidance for councils on how to prepare and apply a Parking Overlay. It explains what the Parking Overlay is, what it does, when and how to use it and how to complete a schedule to the overlay.

Melbourne Transport Strategy 2030

"Catering for growth and safeguarding prosperity will require planning for an efficient and sustainable transport network."

The Melbourne Transport Strategy 2030 is an ambitious document that seeks to priorities active and public transport within the City of Melbourne. The Strategy sets out a range of Strategies and actions to improve safety and accessibility of the city for all. A number of actions specifically relate to Arden, including plans to expand public transport and include movement corridors through the precinct.

The Strategy addresses unlocking renewal areas with public transport and sets a long-term plan for Arden to be supported with investment so that it can ultimately function in a similar way to the central city public transport nodes today.

Melbourne Planning Scheme

Planning schemes are legal documents prepared by the local council or the Minister for Planning and approved by the Minister. They contain policies and provisions that control land use and development. The Arden Precinct sits within the Melbourne Planning Scheme. One of the objectives within the Melbourne Strategy 2030 was to review relevant sections of the Melbourne Planning Scheme and, if appropriate, initiate an amendment to ensure that development supports the transport of residents and the broader community.

Planning Practice Note 57 – The Parking Overlay

Prior to preparing and implementing a Parking Overlay, councils need to prepare a Car Parking Plan which identifies the car parking needs and issues across the nominated area and sets out the car parking objectives which council seeks to achieve. The Car Parking Plan provides the strategic justification for the specific requirements (i.e. financial contributions, parking rates, design requirements) within the schedule to the Parking Overlay and will be referred to when the Parking Overlay is exhibited to the public through the planning scheme amendment process, and in this sense, it is a critical document when implementing a Parking Overlay and other parking management tools. A Car Parking Plan will often become a reference document to the Parking Overlay schedule it supports.

1.2 DRAFT ARDEN STRUCTURE PLAN BACKGROUND REVIEW

'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)

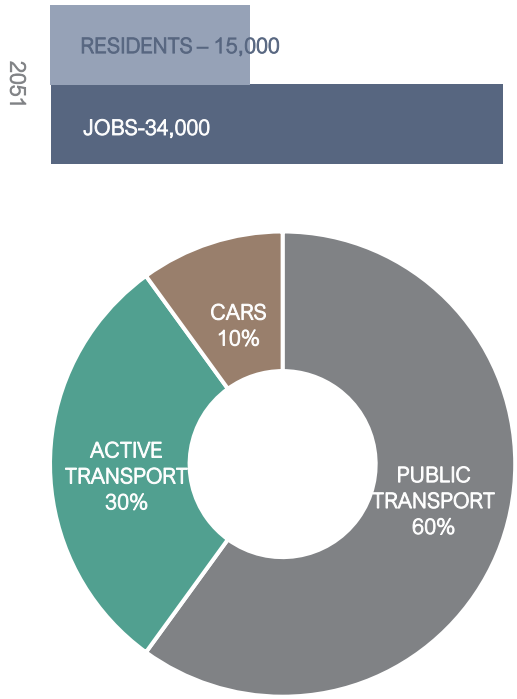
Draft Arden Structure Plan - Victorian Planning Authority, 2020

The Draft Arden Structure Plan builds upon the Arden Vision (2018) and turns the visions set out in the document into objectives and strategies to guide how the precinct should develop in the short, medium and long-term, along economic, physical and social dimensions. This document supersedes the Arden–Macaulay Structure Plan (2012).

The plan is divided into nine (9) key objectives,

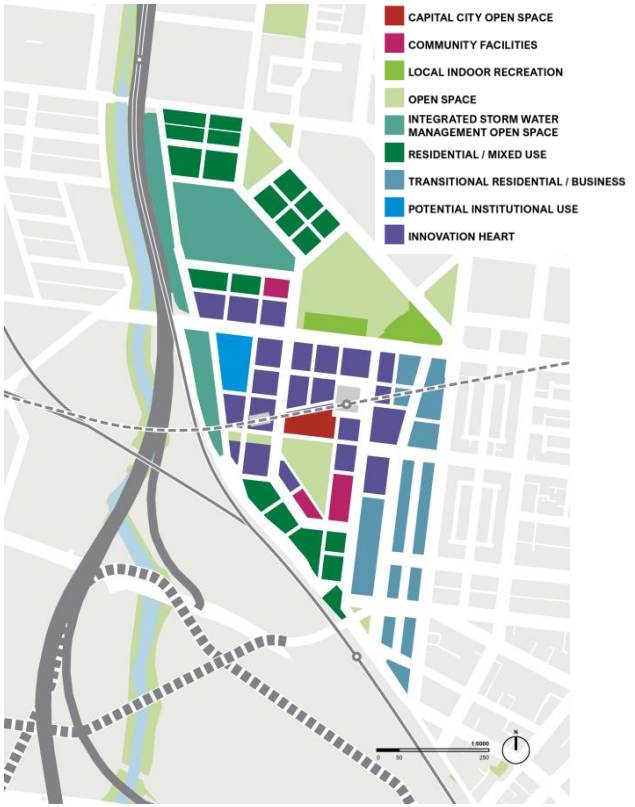
1. Transforming Arden
2. Designing a Distinctive Place
3. Embedding Sustainable Change
4. Prioritising Active Transport
5. Celebrating Water
6. Creating Diverse Open Spaces
7. Accommodating Diverse Communities
8. Investing in Community Infrastructure
9. Delivering Arden

Figure 1.1: Arden Vision Targets



Source: Arden Vision 2018

Figure 1.2: Arden Proposed Land Uses



Source: Draft Arden Structure Plan 2020

1.3 DRAFT ARDEN STRUCTURE PLAN BACKGROUND REVIEW

A substantial amount of work has been done to arrive at the mode share target aspirations for Arden. While ambitious, an active hand in shaping access arrangements will make it an achievable aspiration.

Strategic Overview

The following strategies and documents outlined here are the supporting documents for the Draft Arden Structure Plan. These documents form the evidence base and inform the overall directions of the plan.

As an overall picture of the access strategy for Arden, the Structure Plan recognises that there is limited capacity in the existing road network with further limited scope to increase capacity. Consequently, a 10% car mode share has been adopted by the structure plan.

Whilst a 10% mode share is unprecedented within the context of Melbourne, the projected change in employment and residents through to 2051 suggests that the mode share will naturally shift towards 10%. To serve the remaining gap in trips to, from and around Arden, supply side measures have been outlined, along with sustainable transport improvements.

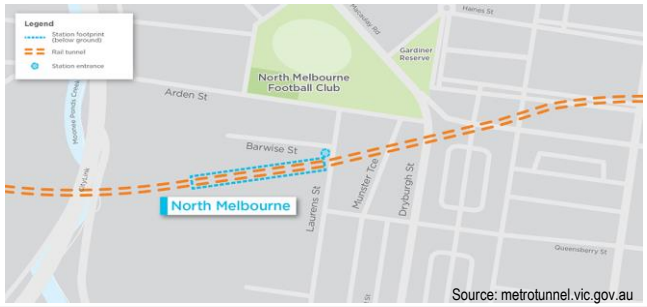
The following key documents set out these improvements and measures in detail, illustrating what is needed for Arden to achieve its aspirational targets.

Key Document	Overview and Relevance
Arden Vision, VPA and COM (Final, 2018)	The Arden Vision sets out the priorities that will guide the next steps in the precinct's development. It is the first step in the implementation of local-level detailed planning for the Arden urban renewal precinct. The document confirms shared state and local government intentions for the precinct and ultimately guides the Arden Structure Plan. **Key conclusion: Car mode share target of 10%, sustainable mode share target of 90%**
Arden Transport Capacity Assessment, GTA (Final, 2019)	The report is 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. The study forms a gap assessment of the potential mode share for trips into Arden and what is needed to reach the aspiration targets set out in the Arden Vision. **Key conclusions: Minimise car parking, reallocate road space from cars to sustainable modes, increase public transport integration across the precinct.**
Tram Option Feasibility Study, AECOM (Final, 2019)	Based on the need to provide transport access beyond the future Arden Station, this study has investigated these limitations in the context of a proposed series of tram extensions to the Precinct to help support public transport networks. **Key conclusions: Tram extensions connecting to and moving within Arden would have significant value for people using the precinct. A full business case should be developed.**
Active Transport Investigation, AECOM (Draft, 2020)	The purpose of this Active Transport Study is to understand the existing conditions and key constraints and opportunities within the study area. This was used to identify the two highest priority walking and cycling corridors, along with the associated infrastructure requirements in order to provide a better active transport experience along these corridors. **Key conclusions: The Arden Street and Canning Street corridors will be critical to delivering walking and cycling connectivity between Arden and adjacent precincts. Upgrades are proposed to improve walking and cycling use of these corridors**
Integrated Transport and Access Review, GTA (Final, 2013)	The purpose of this study is to review the adequacy of transport and access proposals identified in the Arden-Macaulay Structure Plan and other State and local policy to support the anticipated future development. This study outlines the future conditions of Arden as well as the projected minimum transport constraints and requirements for Arden to be viable. **Key conclusions: Improvement to walking and cycling and public transport networks will be needed. Further work is required to refine car parking rates to proceed to a car parking overlay.**

1.4 MAJOR PROJECTS

There are major infrastructure projects affecting the accessibility of Arden. Increased access by car makes it important to adopt a precinct-level response to the potential for local traffic congestion and to capitalise on excellent public transport access.

Table 1.1: 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 a new station within the Arden urban renewal area. The MMRP will alleviate congestion in the existing city loop by creating capacity for 500,000 more rail journeys peer week. 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 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 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.

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

Table 1.2: Fishermans Bend vs. Arden

Characteristic	Fishermans Bend	Arden
Distance to CBD (Old GPO)	4km	3km
Area	4.8km^2	0.54km^2
Proposed Residents	80,000 people	15,000 people
Population density	16,667 residents per km^2	27,800 residents per km^2
Proposed Jobs	80,000 jobs	34,000 jobs
Employment Density	16,667 jobs per km^2	63,000 jobs per km^2
Sustainable mode share target	80%	90%

Delivering Fishermans Bend

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 1.2.

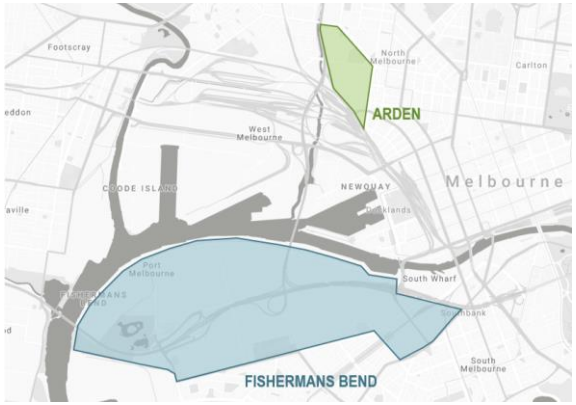
A major component of the Fishermans Bend urban renewal project was to establish new benchmarks for sustainable transport in inner-Melbourne. This would place the precinct among the most sustainable transport cities in the world. A high sustainable transport mode share target reflects an aim to shift 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.

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.

It is worth noting that Arden is a much higher-density precinct than Fishermans Bend, having nearly twice the residential density and nearly four times the employment density. This leads to a more compact urban environment, with shorter walk distances between buildings and comparatively greater access to public transport compared to Fishermans Bend. This indicates that there is potential to adopt lower rates of parking for Arden.

Figure 1.3: Map of Arden and Fishermans Bend precincts



Source: GTA Consultants

Ministerial Advisory Panel Transport Recommendations

- Support the 80% sustainable mode share target by early establishment of key cycling corridors
- Support the implementation of maximum parking rates to limit reliance on private on-site parking
- The first stage of new tram routes should be completed within 5 years of adopting the Fishermans Bend Framework Plan
- Business cases should be prepared for trial precinct parking stations of up to 300 car spaces
- Strictly limit parking to 0.5 spaces per dwelling pending evaluation of the precinct parking station trials.

1.5 CASE STUDIES – BARANGAROO, SYDNEY

Barangaroo in Sydney is an example of an urban renewal site with an even lower car mode share target than Arden. It demonstrates acceptability of this type of development when access by public transport and active modes is prioritised.

Table 1.3: Barangaroo vs. Arden

Characteristic	Barangaroo	Arden
Distance to CBD (Old GPO)	<1km	3km
Area	0.22km^2	0.54km^2
Proposed Residents	c. 2,000 people	15,000 people
Population density	9,100 residents per km^2	27,800 residents per km^2
Proposed Jobs	Up to 26,000 jobs	34,000 jobs
Employment Density	118,200 jobs per km^2	63,000 jobs per km^2
Sustainable mode share target	95%	90%

Delivering Barangaroo

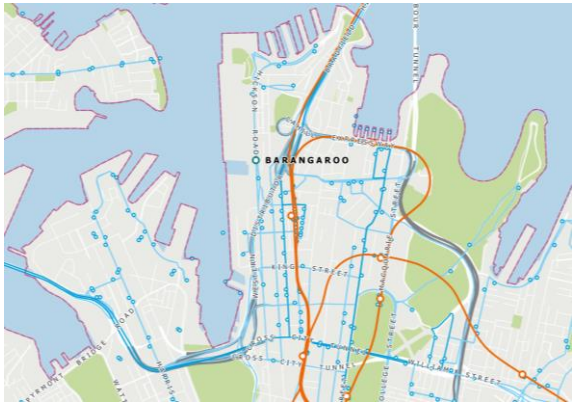
Barangaroo is similar to Arden – both were previously home to an industrial and logistics precinct but are now witnessing a step-change in land use as a result of urban redevelopment, catalysed by the introduction of a new rail corridor. Barangaroo is an extension of the Sydney CBD. The development trajectory of Barangaroo is similar to what is expected of Arden. Table 1.3 provides a comparison of the two sites.

It is important to note that Barangaroo is a much more compact site than Arden, being half the size but with nearly double the expected employment density. The Integrated Transport Plan for Barangaroo identifies that a key component of the sustainable mode share target is conditional on the introduction of Sydney Metro through the site. The use of a new transit corridor as the pretext for aspirational mode share targets indicates the potential as well as feasibility for the mode share targets sought for Arden.

The Barangaroo Integrated Transport Plan articulates that the existing road network is already heavily congested and that there is little scope to accommodate additional private vehicle trips. Consequently, it was identified that Barangaroo would need to be highly accessible by modes other than private vehicles, particularly by high-capacity public transport, to accommodate expected demand.

Given implementation of Sydney Metro is a key component of achieving a high sustainable mode share in Barangaroo, the Metro Tunnel project will be crucial to providing Arden with the capacity step-change needed to reach its own sustainable mode share targets.

Figure 1.4: Barangaroo Transport Network



Source: GTA Consultants

Application to Arden

- Providing high capacity, accessible and efficient forms of public transport within a central location offers a step change in terms of accessibility and convenience in Arden.
- High-density inner-city locations tend to be sited in locations served by congested road networks. Arden is not alone in identifying that there is limited scope to accommodate additional travel demand by private vehicle.
- A diverse mix of sustainable transport options, in addition to mass transit, is critical to covering travel demand to Arden as one mode will not meet the needs of everyone.
- Providing limited car parking provision treats cars as a mode of last resort, creating a supply constraint that makes other modes attractive.

1.5 CASE STUDIES – WEST MELBOURNE STRUCTURE PLAN

West Melbourne and Arden have some comparable features. However, Arden has a much more ambitious population and job density. Evidence was presented to Planning Panel for low car parking rates, down to 0.3 cars per dwelling.

Table 1.4: West Melbourne vs. Arden

Characteristic	West Melbourne	Arden
Distance to CBD (Old GPO)	1.5km	3km
Area	0.85km^2	0.5km^2
Proposed Residents	9,000 people	15,000 people
Population density	10,500 residents per km^2	30,000 residents per km^2
Proposed Jobs	10,000 jobs	34,000 jobs
Employment Density	11,800 jobs per km^2	68,000 jobs per km^2
Sustainable mode share target	N/A	90%

Delivering West Melbourne

West Melbourne is directly adjacent to Arden and shares a similar future vision and investment to support a growing community.

Similar to Fishermans Bend, it is worth noting that Arden is a much higher-density precinct than West Melbourne, leading to a more compact urban environment, with shorter walk distances between buildings and comparatively greater access to public transport. This indicates that there is potential to adopt lower rates of parking for Arden.

Noting that the proposed residential and employment density for West Melbourne is significantly less than Arden, the transport strategies required to support Arden are required to be more ambitious.

The key transport themes of the West Melbourne Structure Plan are:

- Improve walking and cycling routes to connect to major destinations.
- Expand and upgrade the cycling network.
- Advocate for public transport investment.
- Convert some car parking to public open space.
- Update off-street private car parking requirements to support a less car dependent transport system.

Given the vision and aspirations for Arden are more ambitious, it is reasonable to assume that strategies and actions developed for transport to support the redevelopment of Arden will need to be more ambitious.

Figure 1.5: West Melbourne Structure Plan Study Area

Source: Studio Magnified

Planning Panel Transport Recommendations

- Adopt the following car parking rates:
  - 1-bedroom dwelling 0.3 spaces per dwelling
  - 2-bedroom dwelling 0.45 spaces per dwelling
  - 3-bedroom dwelling 0.6 spaces per dwelling
  - Everything else 0.5 spaces per 100sqm
- Implement rates for parking provision and control design outcomes in a Schedule to the Parking Overlay.

EXISTING CONDITIONS & BEST PRACTICE

This section sets out the existing transport conditions for Arden. A review of transport trends has been completed which concludes car use is dropping and is likely to drop further. A review of Movement & Place is also provided in the context of work completed for Arden. Lastly, a review of best practice solutions identifies innovative means of implementing car share, last-km servicing and electric vehicles.

Part 2
02
Evidence Base

2.1 EXISTING CONDITIONS IN THE ARDEN PRECINCT

Arden currently consists of mainly industrial land with some residential development and transport infrastructure provision. The Structure Plan targets a substantial shift in land use over time.

Land Use

The Arden area was historically established as a manufacturing and industrial district, with a provision of housing for working class families. The streets in the area were designed accordingly, generally with wide roads, large street blocks and limited access by foot or bicycle, including across the railway lines and Moonee Ponds Creek.

The residents and workers in the area benefitted from good access to key roads, tram services and railway stations, including at North Melbourne, Macaulay, Kensington, Newmarket and Flemington Bridge.

Since the early 2000's, the areas surrounding Arden have changed in many ways. New housing developments, including public and community housing, have increased the number of people living in the east of Arden as well as in the Macaulay area, and introduced some new community facilities in the area.

Construction of the elevated CityLink freeway has also introduced new complexities to the creek and rail interface, in terms of both amenity (i.e. overshadowing and noise) and the ability to make changes to the way people access the area in the future (i.e. rail).

Other areas including Arden itself remain relatively unchanged, with terrace housing comprising much of the residential area in the east and industrial uses occupying large parts of Arden Central. From a transport perspective, this also means that many physical characteristics remain largely unchanged.

Transport Network

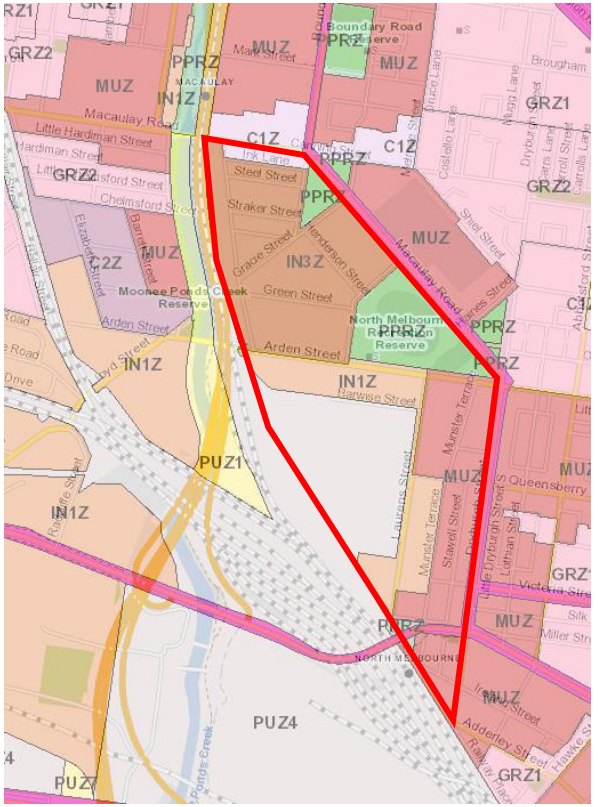
Arden is serviced by three buses – the 403 along Arden Street, the 402 along Macaulay Road and the 401 between Parkville and North Melbourne Station. These services are infrequent and largely operate during the weekdays only.

To the north-west of the precinct, Arden is serviced by the Upfield Line at Macaulay Station. Services along this line operate every 20-30 minutes throughout the week. To the south of the precinct, North Melbourne Station functions as a major rail interchange and offers turn-up-and-go services every day.

To the east of the precinct, the route 57 tram runs along Abbotsford Street and operates every 10-30 minutes throughout the week and offers a frequent service to the CBD and parts of the Parkville NEIC.

Bicycle routes exist along Queensberry Street and Macaulay Road as well as the Capital City Trail along the Moonee Ponds Creek. Most road cross-sections are wide enough to cater for high-quality safe bicycle lanes.

Figure 2.1: Existing Land Zoning



Source: VicPlan

The existing walking and cycling experience is compromised by large block sizes, poor pedestrian crossings and high vehicles speeds.

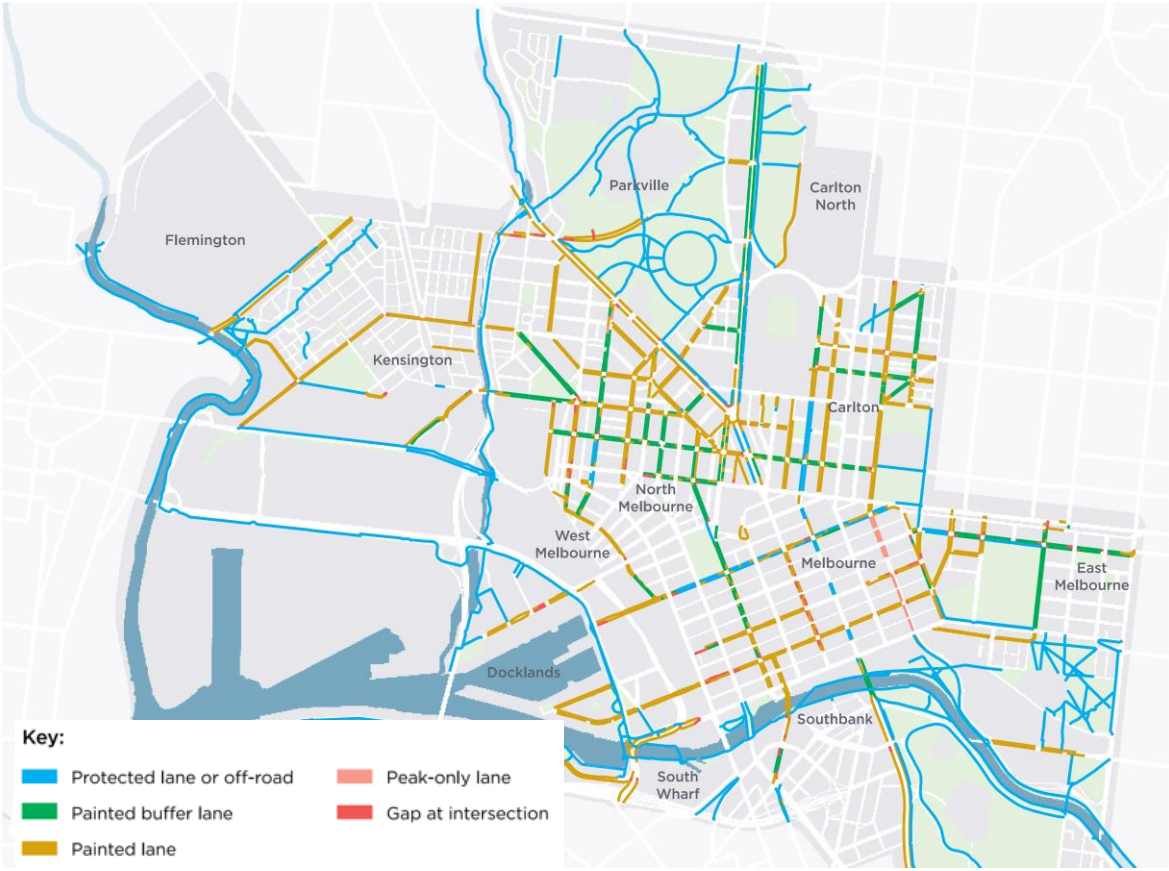
Walking

Due to the urban nature of the study area, the footpath network is dense and interconnected. However, long wait times at some traffic signals can be perceived in some areas as barriers to the convenience of walking. City of Melbourne has classified the intersections within the study by their waiting times, with signal cycles exceeding 75 seconds considered less desirable for pedestrians and cyclists. Research undertaken by the NZ Transport Agency[1], shows that if delays are perceived to be too long (i.e. greater than 30 seconds between walk signals), it may increase non-compliant (risk-taking) behaviour, specifically jaywalking.

Cycling

The study area is well covered by cycle lanes. However, the majority are not fully protected from traffic and car parking, and only a few sections are fully kerb-protected cycle lanes. The Capital City Trail is a strategic cycling ring corridor that connects several areas of metropolitan Melbourne. This corridor connects into North Melbourne via Arden Street. The University of Melbourne can also be accessed from this corridor along an off-road path via Princes Park. Royal Park also provides a mesh of off-road trails and paths which connect directly to the Royal Children's Hospital. The existing most protected on-road corridors are Queensberry Street, Abbotsford Street and Swanston Street between the University of Melbourne and Queen Victoria Market.

Figure 2.2: Existing Cycling Network



Source: City of Melbourne Transport Strategy

[1] Reducing pedestrian delay at traffic signals, NZTA, 2011

2.1 EXISTING TRAM NETWORK CONDITIONS

The existing transport network consists of a railway station at either end of the Arden Precinct, as well as several tram routes that run outside its eastern and northern peripheries.

Train

The existing North Melbourne station and Macaulay station currently serve the study area in close proximity to the Arden Precinct. Macaulay station is on the Upfield Line, whilst North Melbourne is an interchange station for Craigieburn, Sunbury, Upfield, Werribee.

Bus

Route 401 (North Melbourne station - Melbourne University Loop via Royal Melbourne Hospital) is an express bus service between the hospital precinct, Melbourne University and North Melbourne station. It travels along Victoria Street, Dryburgh Street and Arden Street.

Route 402 (Footscray Station – East Melbourne via North Melbourne) runs through North Melbourne along Macaulay Road, Shiel Street, Haines Street, Arden Street and Harcourt Street.

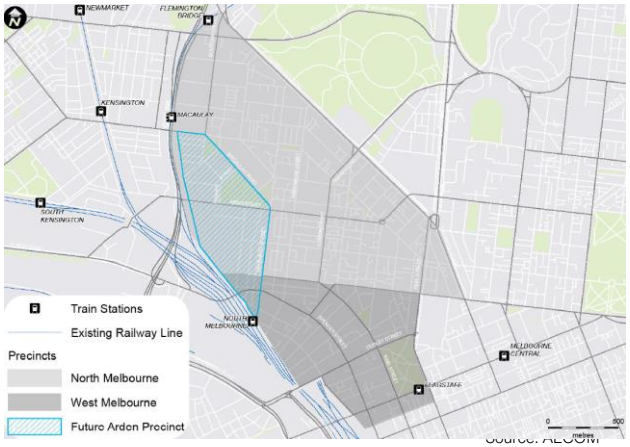
Express Shuttle Route 403 (Footscray Station – Melbourne University via Royal Melbourne Hospital) runs in off -peak periods through North Melbourne along Arden Street, Dryburgh Street and Dynon Road.

Tram

The existing tram network in the study area is shown in the accompanying map. A single existing tram route runs through North Melbourne: Route 57 West Maribyrnong to Flinders Street station. It operates along Victoria Street, Errol Street, Queensberry Street and Abbotsford Street. The route 57 tram is the closest operating tram to the Arden Precinct. There are three tram routes which run along the border of North Melbourne and West Melbourne:

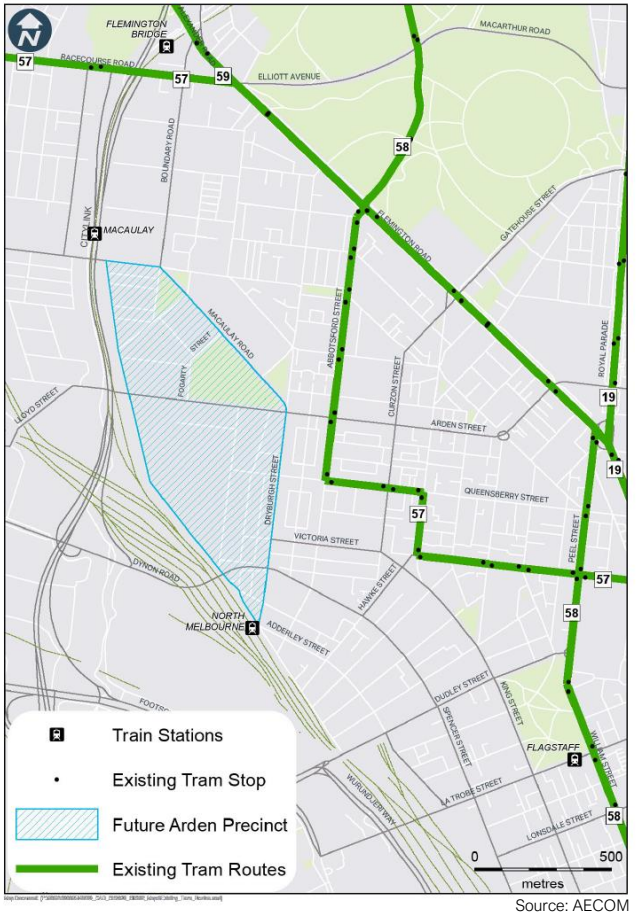
- Route 59 Airport West to Flinders Street station.
- Route 58 West Coburg to Toorak.
- Route 19 North Coburg to Flinders Street station.

Figure 2.3: Existing Train Network



Source: AECOM

Figure 2.4: Existing Tram Network



Source: AECOM

2.1 EXISTING ROAD NETWORK CONDITIONS

The existing road network is well-developed, with access to the freeway and arterial road network located nearby. The road network is currently congested during peak periods, which will make car use less attractive compared to other modes as development densities increase.

Road Network

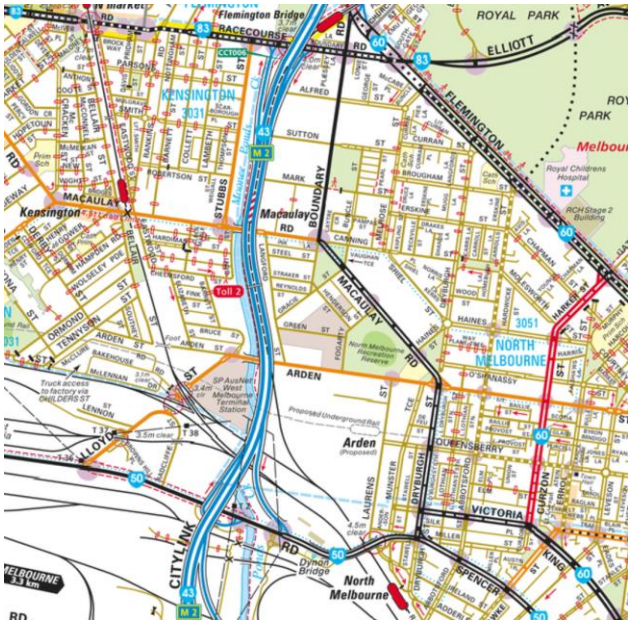
The existing road network in the vicinity of Arden precinct is shown in Figure 2.5. The precinct is in close proximity to Melbourne's arterial road network. CityLink provides access from the study area to the airport in the north, industry to the west and the Port of Melbourne to the south. The precinct has access to CityLink via the Racecourse Road and Dynon Road interchanges.

Racecourse Road is a designated east-west arterial road, while the north-south through route of Macauley Road is an arterial link. City access is provided primarily via Macaulay Road and Dryburgh Street.

Generally, Arden is difficult to access by car during peak hours. Major arterial roads in the surrounding area, such as Macaulay Road, Spencer Street, Flemington Road, Dynon Road and Racecourse Road are congested. This is confirmed by strategic modelling (VITM) shown in Figure 2.6, 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.

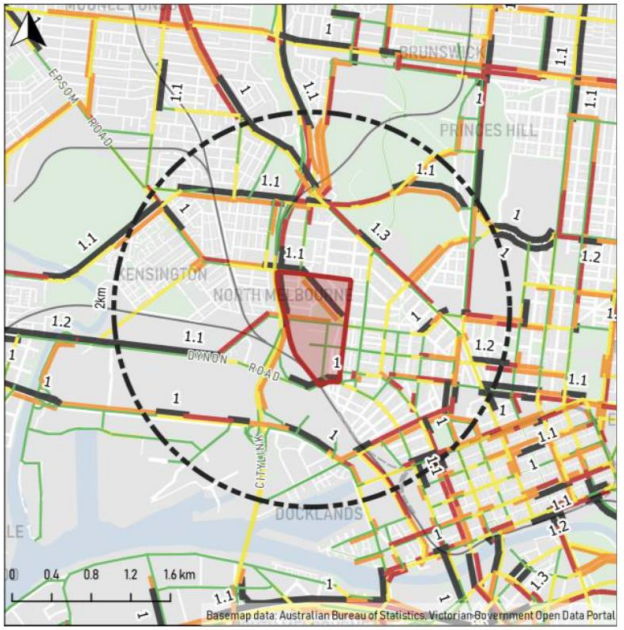
This results in rat-running through local streets within the precinct, as drivers attempt to avoid congested intersections.

Figure 2.5: Existing Road Network



Source: Melway Publishing

Figure 2.6: 2016 AM Peak 2hr Volume / Capacity Plot



Source: VITM

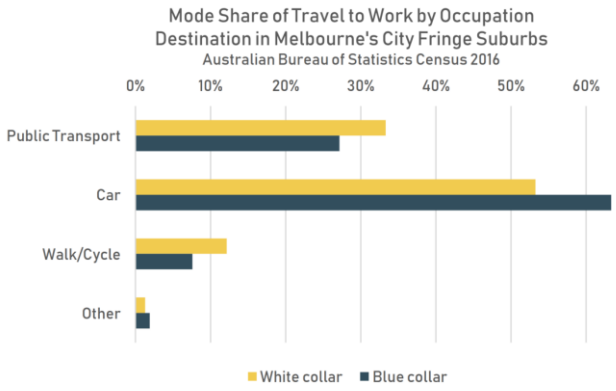
Melbourne as a city is trending towards lower car usage. Changes in employment types, car ownership as well as the current COVID-19 pandemic are driving factors in this change.

Change in Employment Types

The Arden area has historically been associated with manufacturing and industrial employment. A core focus of the Arden Vision is a transition toward white collar employment sectors (Health, Life-sciences, Education and Technology).

To understand this change, analysis was undertaken on how people travel to work to blue-collar and white-collar jobs in inner-city Melbourne suburbs. These trends depend on a number of factors (such as availability of car parking, access to public transport, nature of work, ability to live locally and so on), but broadly speaking, provide an indication of how occupation can influence travel choices in a similar setting to Arden.

Figure 2.7: Mode Share to Work by Occupation with a Destination in Inner City Melbourne



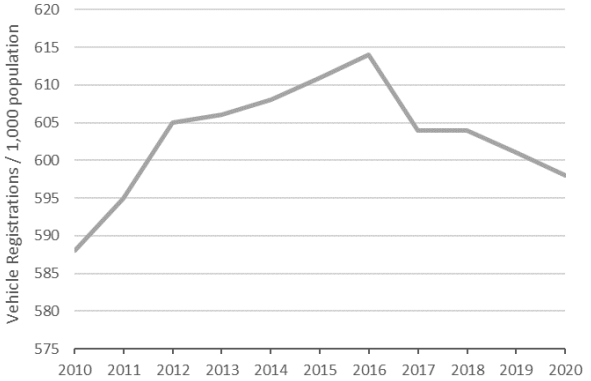
Source: ABS Census 2016
Sample size: White Collar 142,627 people, Blue Collar 29,264 people

Car Ownership Across Victoria is Trending Downward

While there are more cars registered to drive on the road each year in Victoria, the number of car registrations on a per person basis reached a peak in 2016 and has begun to trend downward over the last four years, see Figure 2.8

Car ownership depends on a range of economic factors and there is a low number of sample years from which to project forward. Based on the available information, 2051 car ownership could be 15% less than at 2020 on a per person basis, a level not seen since the early 1990's.

Figure 2.8: Vehicle Registrations in Victoria 2010 to 2020



Source: ABS Motor Vehicle Census, to 31 January 2020 (Passenger Car)

[1] The Work-Life Rebalance, a whitepaper by LVI Associates, October 2020
[2] Queensland Centre for Population Research, Working Paper No 2020/03

Car Ownership in the Melbourne LGA is Trending Downward

Arden is to be the home of 15,000 people by 2051, living in high density residential buildings. Analysis of ABS Census car ownership indicates a drop of 0.1 cars per dwelling between 2011 and 2016 censuses. This includes the historic apartment stock. The new apartments that have been built, which contributed to a fall in the average car ownership, have been provided with much fewer cars per dwelling, as shown below:

- **2011**: 32,500 apartments, 0.75 cars per household
- **2016**: 50,000 apartments, 0.65 cars per household
- **Change**: 17,500 apartments, **0.45 cars per household**

The COVID-19 Pandemic is Likely to Change Movement

One of the "silver linings" of the COVID-19 pandemic is that is likely to change the way people work and, consequently, how much time they devote to travel to and from their place of work. The pandemic has effectively forced businesses to breakdown barriers to enable people to do their job from home. Coupled with this, many businesses have implemented a curtailed working week, which has given employees greater work/life balance that will be difficult to relinquish[1].

In addition, early research[2] is pointing towards a decrease in Victoria's population growth by 2040, compared with earlier forecasts.

Summary

These factors add-up to a reduced need to travel and a reduced likelihood of owning, or needing to own a car, compared to current characteristics.

2.2 TRANSPORT TRENDS - LIVING AND WORKING LOCALLY

A key part of increasing walking and cycling mode shares is to make decisions that support people to live locally. This is supported at the metropolitan-wide policy level through the idea of a 20-minute neighbourhood, as set out in Plan Melbourne.

20-Minute Neighbourhoods

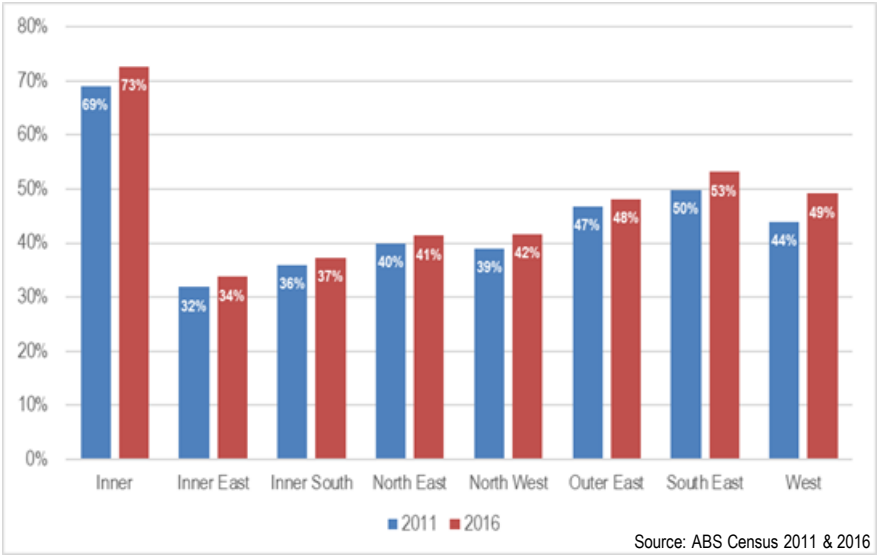
The realisation of 20-minute neighbourhoods, places where people can live and work and meet most of their daily needs, is a key component of Plan Melbourne.

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 2.9 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 2.9: People that live and work in the same suburbs of Melbourne, 2011 - 2016



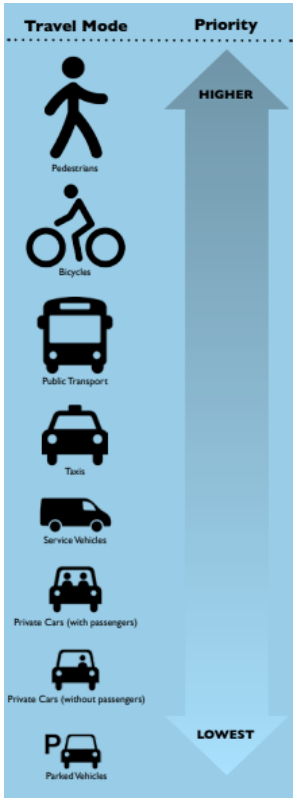
Source: ABS Census 2011 & 2016

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 create 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.

The Movement & Place framework steps away from traditional prescriptive functional road hierarchies, towards a system that considers how people use different parts of the transport network and the benefits they derive.



The Movement & Place Framework

The Movement and Place Framework, developed by Department of Transport (DoT, 2019), provides a balanced approach to allocating road space by mode of transport, having regard to its movement and place function at a network operating level. These 'functions' should be aligning with the community's vision for both transport and land use, rather than just replicating the current conditions.

"Fundamental to movement and place thinking is recognising that streets perform multiple functions. Transport links not only move people from A to B, they also serve as key places and destinations in their own right.

There is also a natural tension between these two functions, As a movement corridor, every link aims to minimise travel time and keep people and goods moving. Contrarily as a destination, it aims to increase visitor dwell time." (DoT, 2019)

A core component of the framework is the identification of modal networks and their relative importance. Each mode would ultimately have its network prioritised on a scale of 1 to 5, M1 being a route of state or national significance, and P5 being a place of local significance.

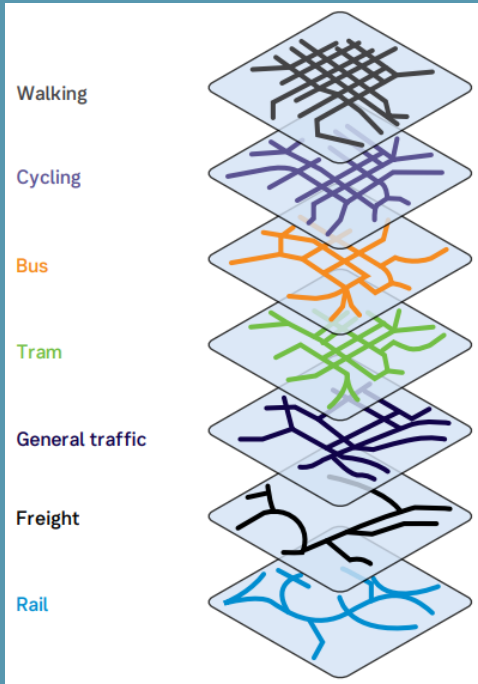
Application of Movement and Place to Arden

A comprehensive Movement and Place framework assessment has been completed by Arup[1] which captures the Arden precinct. Selected aspirational networks are shown overleaf.

This framework has been used by AECOM[2] to develop street typologies for the Arden Street and Canning Street corridors.

[1] North Melbourne, West Melbourne and Docklands Movement and Place Strategic Plan: Strategy and Assessment Framework, Arup, 2019
[2] North Melbourne, West Melbourne and Parkville: Active Transport Investigation, AECOM, 2020

Movement layers in the DoT Movement & Place framework

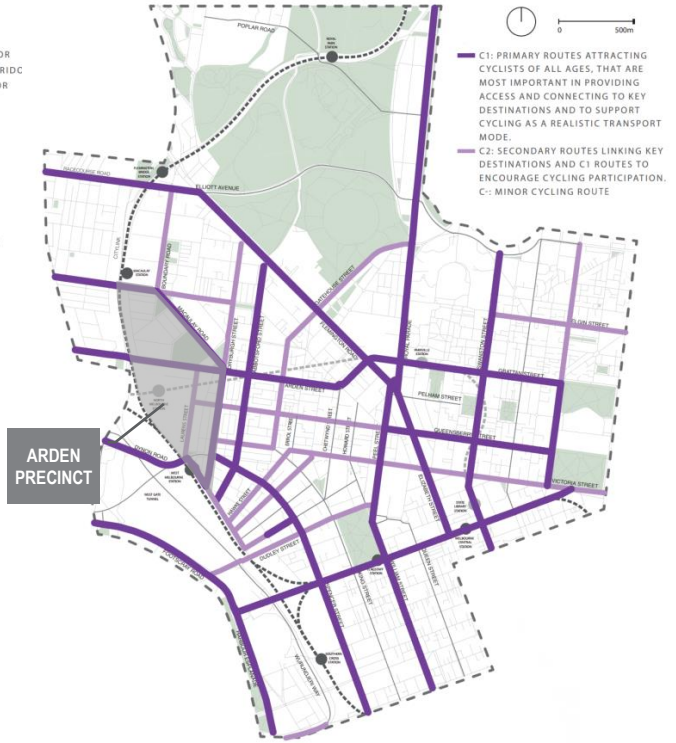


Aspirational movement networks for Arden are set out in the Movement and Place Strategic Plan.[1]

Figure 2.10: Aspirational Street Types

Figure 2.11: Aspirational Walking Classification

Figure 2.12: Aspirational Cycling Classification



[1] North Melbourne, West Melbourne and Docklands Movement and Place Strategic Plan: Strategy and Assessment Framework, Arup, 2019

2.3 BEST PRACTICE SOLUTIONS REVIEW – KERB SPACE REPURPOSING & LOW-IMPACT LAST-KILOMETRE SERVICING

On-street parking should also consider the need to provide for more sustainable travel modes. A flexible approach to kerbside space will ensure parking is provided for the right uses at the right time.

Different forms of vehicles require kerbside space

With a need to provide greater space for pedestrians on footpaths, declutter walking environments and introduce more trees and landscaping, there is a need to make use of what have been car parking spaces for other modes and activities.

This covers not only dedicated parking for motorcycles and bicycles but also potential new modes such as e-scooters. Repurposing parking spaces to provide pocket parks and seated landscaping areas is also a means of supporting placemaking and on-street activities.

Flexible kerbside spaces

Having "parking" spaces that can be used in a more dynamic way for different uses is also a way to maximise the turnover and use of potentially valuable space. There are examples of areas set aside for loading or disabled parking that can easily transition at times to use as footpaths or for market stalls. The concept of a space being purely set aside for parking is increasingly being challenged.

Implications for Arden

- Car parking spaces can be repurposed to accommodate street furniture and create wider footways with less clutter.
- Make use of road space to accommodate service vehicles in the street rather than on-site, making better use of developable land.

Case Studies – Repurposing Car Parking Spaces

Haringey London, UK Bike Hanger - bike lockers for six bicycles that occupies less than one parking space. These are oversubscribed

Pop up seating and dining area in Adelaide

Part time loading available footpath other times of day, London

On-street bike parking replacing car park, City of Melbourne

There are many benefits to removing the ability for people to drive cars through a neighbourhood. Active travel is naturally elevated, vehicle speeds decrease, and the streets are returned to the communities they serve.

Increase Active Travel by Restricting Vehicle Access

Limiting or removing vehicle access within a neighbourhood pushes vehicle priority down the modal hierarchy.

This can be achieved by straightforward and cost-effective means:

- Modal filters (restrict cars, permit everything else).
- One-way streets.
- Bus gates.
- Width restrictions to limit heavy vehicle access.
- School streets (to prevent parents getting close for drop-off and pick-up).

A low traffic neighbourhood can be supported by gateway treatments such as

- Raised intersections (continuous footway).
- Parklets.
- Zebra crossings or pedestrian operated signals.

Emergency vehicle access[1]

Examples from the UK indicates that emergency services are generally positive about such schemes. They are statutory consultees and typically see no change in response times, with most common concerns raised being placement of lockable bollards for access during extended incidents, and their GPS systems being updated appropriately. These issues can be managed with planning and coordination with local emergency services managers.

[1] Living Streets, Low Traffic Neighbourhoods, UK 2018.

Case Studies – Streatham Hill Low Traffic Neighbourhood

Source: London Borough of Lambeth

Similarities to Arden

- Limited access from surrounding major roads
- Vehicle access maintained but not wholly prohibited
- Access within the neighbourhood becomes more convenient by active travel

Benefits of Similar Schemes

Walking +32 minutes per week	
Cycling +9 minutes per week	
Life expectancy +7 months	
Economy +30% retail, -17% vacancies	
Vehicles -56% residential, -38% overall	
Community +216% static street use	

2.3 BEST PRACTICE SOLUTIONS REVIEW – CAR SHARING AND ELECTRIC VEHICLES

Car share schemes allow limited space to be shared by multiple users and provide alternative access to car ownership where alternative transport options are unavailable.

How Can it be Made Easier to not Own a Car?

Car share services are established in an effective way across Melbourne. The premise is that shared vehicles are available to rent on an hourly basis, replacing the need to own a vehicle for people who use a car rarely.

Car Share Services Promote Shared Use of Space

Cars spend the majority of the time unused and therefore represent an inefficient use of space and resources. Car share provides an alternative access to transport where alternative options are not available.

Local Trips that Would Otherwise be Made by Active and Public Transport may be replaced by Car Share Use

Easy access to a vehicle can mean, rather than replacing trips made by privately owned cars, they replace trips otherwise made by active or public transport modes, in turn adding to the congestion and parking demand

Strategies or Initiatives

If VPA/City of Melbourne wants to implement and encourage it should be free for companies to set up (or a nominal setup fee to cover the cost of signs and administration). In addition:

- Car share should be encouraged off-street in-lieu of car parking.
- The vehicles should be treated in the same way as resident long-term parking in terms of locating within resident streets.
- Council should develop a policy basing this on future rather than current demand.

Electric Vehicle Ownership is Set to Increase

The traditional idea of a petrol or diesel driven car is changing. The increasing use of hybrid electric vehicles, and pure electric vehicles (EVs) is changing vehicle design and requirements. In Europe, diesel and petrol cars are being progressively banned across various countries. Within the United Kingdom, petrol and diesel cars will be banned from 2035, building upon existing legislation for fuel efficient vehicle standards as well as carbon emissions-based congestion charges in areas such as London.

It is estimated that by 2025, EVs will be of a similar cost to petrol or diesel vehicles[1], reducing the cost barrier to their adoption. Beyond pricing, as a barrier to EV adoption rates, challenges remain on supporting infrastructure for EVs. A higher share of EVs in the local area will pose problems as to how these vehicles will be charged, where will there be charging points, how to retrofit this infrastructure as well as how much charging these vehicles will cost.

Implications for Arden

- Car share could contribute to reduced car parking
- Car share still contributes to vehicle trips
- It is realistic to assume that nearly all vehicles will be electrically powered within the lifetime of the structure plan
- It is therefore realistic to plan for vehicle charging to be supplied at long-term parking locations.
- Advent of AV's and mobility as a service (MaaS) could lead to greater uptake of subscription models currently in place for car share, contributing to lower on-site parking needs.

Case Studies – Share Car Charging Bays (Singapore)

In 2017, the Land Transport Authority (LTA) implemented a nation-wide EV carsharing scheme consisting of 1,000 vehicles and 2,000 charging points. Of these charging points, 400 of them will be open for public use. The charging of private EVs is based on an hourly rate of $1-2/hour or alternatively $20 a year as part of a subscription.

By combining car sharing and EV charging infrastructure, the program encourages both the adoption of EVs for those who want to own their own private vehicle by providing more range and coverage across the island as well as providing a low emissions option those who only need to use a car occasionally.

[1] https://theicct.org/publications/update-US-2030-electric-vehicle-cost

Wayfinding is a simple solution to improving access to car parking along with increasing user comfort and safety.

How can it be made easier to find parking?

Improved wayfinding to parking can assist with reducing frustration and congestion. People spend a large amount of time looking for a parking space, adding to frustration and increasing the number of vehicles on the roads. Improved wayfinding can assist in addressing this issue. Dynamic signing to off-street car parks, and areas of on-street parking has been demonstrated to improve usage of parking spaces whilst reducing circulation trips. Such systems are widespread in Europe, but still have limited uptake in Australia.

Whilst they can be expensive and there are complexities with different ownerships of off-street car parking, these barriers can be overcome. Often basic levels of static signing to off-street parking is limited and even locals can be unaware of provision. Ensuring sufficient informative and consistent signing can improve car park usage. Telling users about the number of spaces, if it is restricted or unrestricted all provide valuable information to users.

Making parking safe

Everyone has the right to feel safe and comfortable within their community. However, pedestrian pathways to access car parking can be an intimidating part of the journey home for many people. Wayfinding must consider the logical principles around what makes an area comfortable space (especially at night). Crime Prevention Through Environmental Design (CPTED) is not an exact science. It must be incorporated into every wayfinding project with interventions prepared on a case-by-case basis.

Case Studies – VMS at South Melbourne Market

Variable Message Signs (VMS) are used at South Melbourne Market to manage the seasonal demand for parking in the precinct. Decision points at key intersections feature signs indicating the number of free spaces available at car parks. These signs are further reinforced with static signage to direct drivers to the corresponding car park.


Source: GTA 2020

Source: GTA 2020

More notably, the wayfinding system incorporates both Council owned and private off-street parking spaces. By taking an integrated precinct-level approach to parking, drivers have a clearer understanding of where to go and where to park, minimising the level of congestion created by vehicles looking to park.

Source: GTA 2020

Implications for Arden

- Car park occupancy monitoring linked to VMS will lead to increased parking efficiency (do more with less).
- Reduced user frustration
- Reduced vehicle congestion on roads and within car parks
- Provides increased user comfort and safety through adoption of CPTED principles

Kerb space can be better utilised with smart technologies.

A Rigid use of On-street Spaces

Currently in Melbourne and across Australia, kerbside spaces are managed by fixed signage that requires updating each time a change is needed. The signage usually indicates the restrictions placed on the space including the duration it applies to. Combining multiple conditions requires combining multiple pieces of information onto a small sign, representing a poor and confusing user experience for drivers.

These fixed conditions may also not be representative of the needs of the local community as this can change over the span of not only a day, but also over the year (e.g. a local event may require more loading or delivery space than what the kerbside space is signposted for).

A Modern Approach for Arden

The case study presented opposite, demonstrates a new way of allocating and managing on-street parking provision for a range of needs. Benefits include

- Efficient, dynamic use of road space that links with the precinct's innovation hub aspirations
- Links with last-km servicing and providing for vulnerable parking user groups, such as people with disabilities
- Reduces enforcement administrative burden.

Case Studies – Grid Smarter Cities (UK)

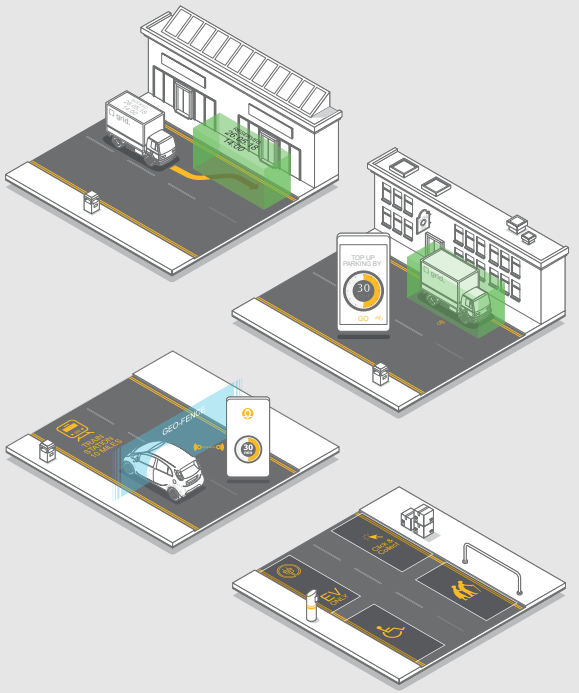
Grid Smarter Cities is a digital approach to managing kerbside spaces in urban areas. By combining geolocation technologies with dynamic resource allocation systems, it is possible to increase the flexibility and efficient usage of on-street space.

Whilst a typical on-street loading bay or parking space has a fixed use as indicated through signage or line marking, Grid Smarter Cities proposes to substitute these with geofenced locations that are updated and communicated real time through smartphone and desktop applications.

A key feature is the use of bookings to allocate resources across a defined range of spaces as well as to aid in wayfinding. By guaranteeing a specific parking/loading space to a user within a certain timeframe, congestion caused by users circling roads for a space is minimised.

At the same time, this system can also be used to reassign spaces as needed both on-street and off-street as needed on a real time basis. Additional parking and loading space can be created as needed if demand or a situation requires it by creating virtual parking or loading spaces demarcated by geofenced areas.

The system also minimises management overhead created by issuing permits and exemptions as these can now be done in a unified system all whilst providing accurate and detailed data to authorities.



Source: Grid Smarter Cities 2020

TRIP ANALYSIS AND MODE SHARES

Building on the Arden Transport Capacity Study (an earlier report by GTA), further supporting evidence is collated here to demonstrate the mode share targets for Arden are achievable. A first principles trip generation exercise is also provided for later use when assessing the movement network.

Part 2

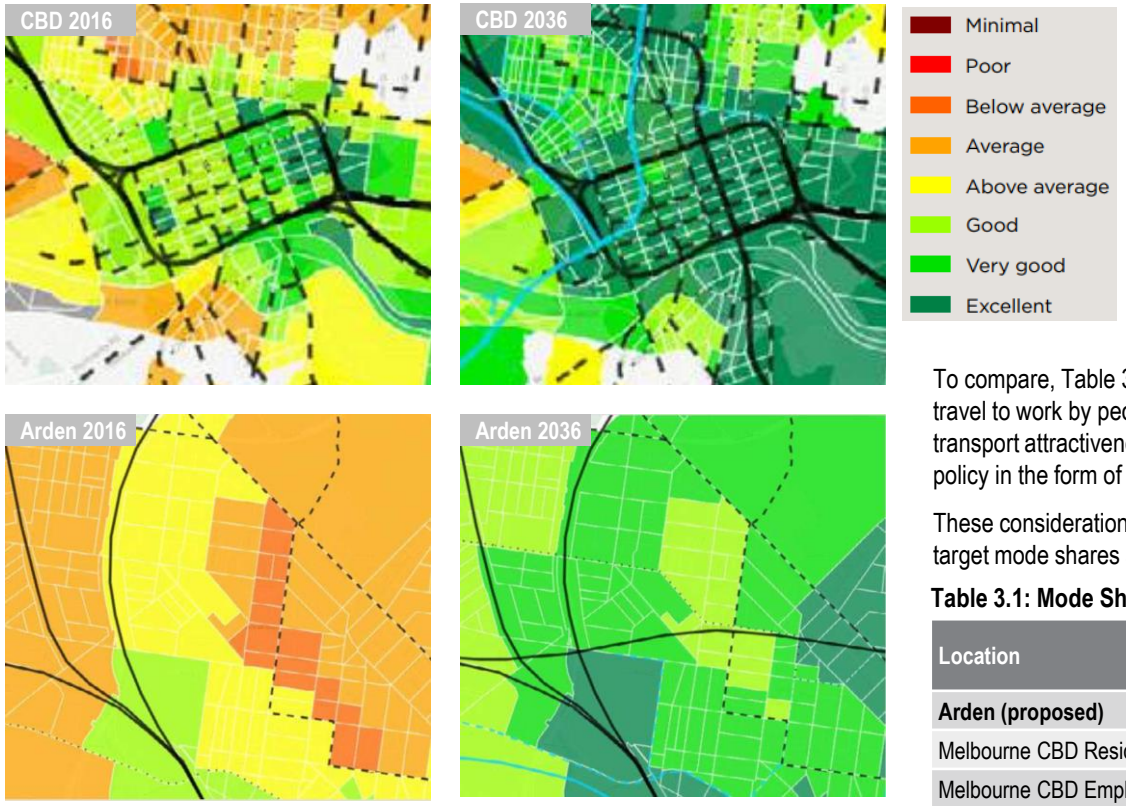
03

Evidence Base

3.1 PLAUSIBILITY OF MODE SHARE TARGETS

Enhancements to the tram and active transport networks have be put forward since the GTA transport capacity study was completed. In addition, transport accessibility mapping by RMIT indicates that Arden will have as good or better public transport access than the Melbourne CBD currently enjoys. These measures will consolidate access to the precinct by sustainable modes.

Figure 3.1: Public Transport Accessibility Comparison (SNAMUTS[1])



RMIT for the City of Melbourne Transport Strategy 2030

[1] SNAMUTS - Spatial Network for Multi Modal Urban Transit Systems
[2] "Melbourne needs two new rail tunnels by 2035, council says". The Age 19 April 2018. Viewed by GTA October 2020. Link

Public transport access is set to increase across inner Melbourne over the next 20 years and beyond. This includes major city-shaping projects, such as Metro Tunnel 1 and Metro Tunnel 2 and Melbourne Airport Rail.

A route for a third rail tunnel, Melbourne Metro 3 has been called for by Council[2], which would have a station at Arden; but this is likely to be overshadowed by the Suburban Rail Loop (SRL). While not directly serving Arden, the SRL encourages people to travel by public transport, making it part of their travel behaviour.

Public transport accessibility mapping by RMIT is shown in Figure 3.1, indicating that by 2036, Arden will enjoy the same or better public transport access than the CBD does currently.

To compare, Table 3.1 shows the Arden mode share target alongside the current mode shares for travel to work by people living in and people travel to the Melbourne CBD. This indicates that public transport attractiveness can push down car mode share, noting that this is assisted by "bottom-up" policy in the form of parking maximums.

These considerations, together with other factors such as reducing car ownership, suggest that the target mode shares are realistic over the planning horizons set out in the draft Arden Structure Plan.

Table 3.1: Mode Share for Melbourne CBD compared to Arden

Location	Sustainable Transport	Car
Arden (proposed)	**90%**	**10%**
Melbourne CBD Resident	88%	12%
Melbourne CBD Employment	80%	20%

Source: ABS Census 2016, Method of Travel to Work by Place of Residence
For the purposes of this analysis, sustainable travel is taken as any trip that is not made as either a car driver or car passenger.

3.2 TRIP GENERATION ASSESSMENT

A first principles assessment has been completed using the target mode shares to understand the number people that are likely to travel to and from Arden. This assessment will be used in the movement network analysis.

Residential and Employment People Trips in Peak Periods

The methodology used to estimate trips for Arden is similar to that used by Transport for London to estimate travel volumes during peak hours, as set out in a City of Melbourne best practice review on pedestrian level of service[1].

This methodology applies to Arden as is it is focused on pedestrian trips that largely originate from a public transport-based movement network. The results can then be used in pedestrian comfort analysis.

For a variety of reasons, not everyone turns up to work every day at their listed place of employment. TfL uses a factor of 85% of employees turning up at work each day (due to working from home, sick leave, working elsewhere, annual leave or for other reasons).

From there, it is assumed these 85% arrive in the peak period, but not necessarily in the peak hour itself (shift workers, early/late starts, off-site meeting etc.). A further factor of 55% is therefore applied to convert peak period trips to a peak 1 hour. 55% has founding in the Victorian Integrated Transport Model (VITM), where this factor is applied to the VITM 2-hr modelled peak. TfL use a factor of 43% for the AM peak and 33% for the PM peak, by way of comparison.

The process is set out below:

- Begin with the number of employees or residents
- Reduce to 85% to account for those not working at their place of employment. This factor can be revisited post-COVID-19 to understand if increased working from home remains higher than historic levels over the long term, which can then be used for planning purposes.
- Assume that 55% of peak period travel (2hrs) occurs in the peak hour (as noted, TfL use 43% in the AM pea and 33% in the PM peak)

Table 3.2: 2051 Arden AM and PM Peak 1-hour Ingress / Egress Mode Shares (based on First Principles Assessment)

Mode	Employment (ingress)		Residents (egress)		Total	
Public Transport	8,550 people	60%	3,150 people	60%	11,700 people	60%
Walking	2,850 people	20%	1,050 people	20%	3,900 people	20%
Cycling	1,425 people	10%	525 people	10%	1,950 people	10%
Private Vehicle	1,425 people	10%	525 people	10%	1,950 people	10%
Total	**14,250 people**		**5,250 people**		**19,500 people**	

A further assumption applies to internal trips, this is based on residents working internally and is then subtracted off both the resident and employment external trips. The resulting peak hour person trips, prior to applying the mode shares, is:

- 14,250 employment trips (ingress)
- 5.250 resident trips (egress)

The number of people trips for both employment and residential land uses is shown in Table 3.2.

[1] Pedestrian Level of Service and Trip Generation, City of Melbourne, 2012

3.2 TRIP GENERATION ASSESSMENT

The assessment of retail trips is based on robust mode share assumptions and floor area-based person trip rates. Overall, it is expected that the Arden Precinct would generate 21,000 to 22,000 person trips during peak hours.

Retail Trips in Peak Periods

For the "Retail" land use, this assessment makes the following assumptions for the relative contributions to the overall retail trip making behaviour:

- 50% walk-in trips from surrounding catchment applied to overall (24,500sqm)
- 5% car trips, consisting of
  - 50% car trips to the supermarket land use (4,000sqm)
  - 8% car trips to other retail (20,500 sqm)
- Cycling and public transport trips apportioned out similar to the proportions of active and public transport mode share in the Arden Structure Plan:
  - 25% Public transport
  - 10% Cycling

A person trip generation rate relative to floor area is used for retail land uses, using the following source data from RMS NSW trip generation surveys and the GTA trip generation database.

Table 3.3: Retail Trips Generated in Arden

Sub-Precinct	Land Use	Size	AM Peak Hour		PM Peak Hour	
			Rate	Trips	Rate	Trips
Arden Central	Supermarket	4,000 sqm	6 trips/100sqm	240	12.6 trips/100sqm	500
	Other Retail	18,250 sqm	4 trips/100sqm	730	8 trips/100sqm	1,460
Laurens Street	-	-	-	-	-	-
North Arden	Other Retail	2,250 sqm	4 trips/00sqm	90	8 trips/100sqm	180
Total		24,500 sqm		1,060		2,140

Source: GTA, RMS NWS

Summary of Trips Generated

The overall trips generated by each of the land uses and by each travel mode is summarised in the table below for the PM peak hour (highest peak volume, due to retail trips).

Table 3.4: PM Peak Hour Trip Generation Summary

Mode	Employment	Residents	Retail	Total
Public Transport	8,550	3,150	540	12,240
Walking	2,850	1,050	1070	4,970
Cycling	1,430	530	210	2,160
Private Vehicle	1,430	530	320	2,270
Total	14,250	5,250	2,140	21,640

3.2 TRIP GENERATION ASSESSMENT

Car occupancy rates of up to 1.15 people per car apply across Melbourne. This can be used to determine the number of actual vehicles within the overall car travel mode share, which can be used to determine traffic impacts and car parking demand.

Car trips in peak periods

The number of people making trips by car includes both drivers and car passengers. The ABS census and VISTA data is used to work out the number of drivers and hence the number of cars expected to travel to car parks in Arden. This analysis is shown in Table 3.5 for Melbourne as a whole, the CBD and North Melbourne. Inner Melbourne is used for retail.

The analysis indicates a car occupancy ratio of up to 1.15 people per car currently occurs for employment trips, in this case to the Melbourne CBD.

Table 3.5: Car Occupancy Ratios

Land Use	Local Area	Car Driver	Car Passenger	Ratio
Employment[2]	Melbourne (c)	29.80%	2.90%	1.10
	Melbourne (s)	17.70%	2.70%	1.15
	North Melbourne (s)	58.20%	3.30%	1.06
	Average	**35.23%**	**2.97%**	**1.08**
Residential[3]	Melbourne (c)	24.70%	2.50%	1.10
	Melbourne (s)	10.20%	1.60%	1.16
	North Melbourne (s)	27.80%	2.80%	1.10
	Average	**20.90%**	**2.30%**	**1.11**
Retail[4]	**Inner Melbourne**	**48.00%**	**18.00%**	**1.375**

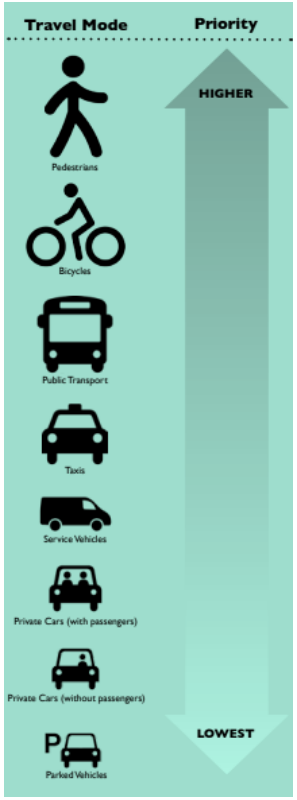
[2] ABS Census 2016, Method of Travel to Work, Place of Employment
[3] ABS Census 2016, Method of Travel to Work, Place of Residence
[4] Victorian Integrated Survey of Travel and Activity (VISTA)
(c) City (LGA)
(s) Suburb (SA2) i.e. CBD

STRUCTURE PLAN MOVEMENT NETWORK ANALYSIS

GTA has conducted a comprehensive review of the movement plan network set out in the draft Structure Plan, together with a general review of alignment between the objectives and strategies set out in relevant parts of the structure plan report.
Some minor recommendations are made for consideration.

Part 2
04
Evidence Base

The movement plan for Arden deploys a range of approaches to elevate the position of sustainable travel over and above vehicle use in the modal hierarchy.



Meeting the Arden Vision

Arden is planned as a transport-oriented development that leverages its position on the Melbourne public transport network to deliver a low-car use precinct, in support of the broader Arden Vision. To reach the sustainability targets, all the transport related proposals should be aimed at reducing car use and maximising use of public transport and active travel.

A travel mode hierarchy has been developed for Arden, based on the principles set out in Part 1 Section 03 of this report and is shown to the left. The road space consumed by various modes of travel is shown to the right, indicating that mixed vehicle traffic moves less people per hour in a city streetscape.

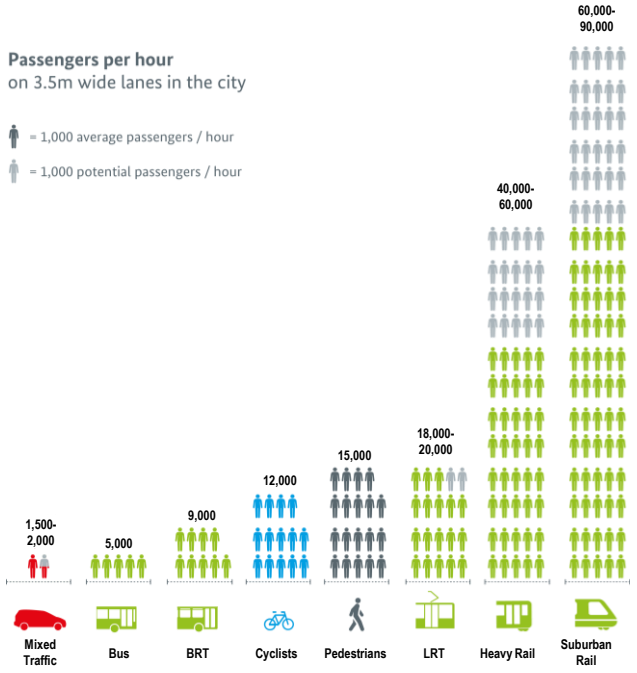
The hierarchy has been used to guide the review of the movement network plan, to ensure the intent of the Arden Vision is being met by the draft Arden Structure Plan.

Review Structure

First, we review the movement network in plan view to confirm that the intent of the background work for specific travel modes is being met and is aligned with the objectives and strategies of the Draft Structure Plan.

Next, key road cross-sections are examined to determine if they are likely to serve their purpose within the movement network.

- **Movement and Place -** check alignment of the movement network with the movement and place strategic framework.
- **Public Transport -** check alignment with structure plan objectives and strategies and check precinct coverage from proposed public transport stations and stops.
- **Walking Network** – check alignment with structure plan objectives and strategies.
- **Cycling Network** – check alignment with structure plan objectives and strategies.
- **Local Vehicle Access** – confirm local access only through precinct.
- **Service and Emergency Vehicles** – locations of modal filters.
- **Cross-sections**– check pedestrian volumes and comment on the ability of the cross-section to handle the number of pedestrians likely to use it.



Source: Transformative Urban Mobility Initiative (TUMI)

4.2 MOVEMENT NETWORK PLAN – ALIGNMENT WITH MOVEMENT AND PLACE STRATEGIC FRAMEWORK

Each of the modal networks has been reviewed and there is general alignment between the spatial aspirational movement and place classifications in the strategic plan and the movement network set out in the Structure Plan. Some differences are noted.

An update to the Movement and Place Strategic Framework to fully align with the Arden Structure Plan could be undertaken

Location	Street Type	Place	Walking	Cycling	Bus	Tram	Traffic	Structure Plan Alignment & Comment
Arden Street	Activity Street & Boulevard	Regionally Significant	Major Corridor	Primary Route	No services	High Capacity Public Transport Capable Corridor	Neighbourhood Street	Aligns
Macaulay Road	Activity Street & Boulevard	Municipally Significant	Moderate Corridor	Primary Route	Services, no priority	No services	Municipal Road	Generally aligns, noting Macaulay Road is a local cycling route in the structure plan. A parallel N-S connection is proposed via Langford Street. Macaulay Road not proposed as a High Capacity Public Transport Capable Corridor within the Structure Plan.
Canning Street	Activity Street & Boulevard	Neighbourhood Significant	Moderate Corridor	Primary Route	Services, no priority	No services	Neighbourhood Street	Generally aligns noting Canning Street along with Macaulay Road are local cycling routes in the structure plan, not primary routes. A parallel N-S connection is proposed via Langford Street, to complete the N-S primary route connectivity.
Laurens Street	City Street	Regionally Significant	Major Corridor	Secondary Route	No services	No services	Local Traffic Only	Generally aligns, noting Laurens Street is now proposed as a High Capacity Public Transport Capable Corridor within the Structure Plan.
Queensberry St	Local Street	Neighbourhood Significant	Major Corridor	Secondary Route	No services	No services	Neighbourhood Street / Local Traffic Only	Generally aligns, noting Queensberry Street is identified as a strategic cycling corridor in the Structure Plan, with bus capability.
Dryburgh Street	Activity Street & Boulevard	Regionally Significant	Moderate Corridor	Primary Route	Services, no priority	No services	Municipal Road	Aligns
Dynon Road	Connector	Regionally Significant	Minor Corridor	Minor Route	Services, no priority	No services	Municipal Road	Generally aligns noting Dynon Road is identified as a strategic cycling corridor in the Structure Plan.
Fogarty St / Henderson St	N/A not in strategic framework							Fogarty Street and Henderson Street are proposed High Capacity Public Transport Capable Corridors in the Structure Plan.

[1] North Melbourne, West Melbourne and Docklands Movement and Place Strategic Plan: Strategy and Assessment Framework, Arup, 2019

4.2 MOVEMENT NETWORK PLAN – RELEVANT KEY DIRECTIONS

The draft Arden Structure Plan contains a range of objectives and supporting strategies which have been developed to guide the development of the precinct.

Overview

The aim of this section is to broadly determine whether or not the Strategies outlined in the draft Structure Plan support and allow for the Objectives for the precinct to be achieved.

A strategy is defined as a plan or action that is designed to achieve a set objective.

The draft Structure Plan is organised by chapters that reflect the key directions for Arden's renewal established by the Arden Vision. Within the draft Arden Structure Plan, the following chapters are considered to be the most relevant to the movement network, and have been assessed:

Chapter 5: Prioritising Active Transport

Chapter 10: Delivering Arden

Appendix 1: Conceptual Street Cross Sections

Overview of Chapter Five: Prioritising Active Transport

The Arden Vision includes targets for all trips to Arden to be 60 per cent public transport, 30 per cent walking and cycling and 10 per cent private vehicles.

Figure 4.1 illustrates the proposed transport network which has been designed with the intention to support the mode share targets presented in the vision.

To support the proposed transport network a range of objectives and supporting strategies have been developed.

Overview of Chapter Ten: Delivering Arden

The delivery of Arden requires ambitious investment to support major infrastructure works. Chapter 10 of the draft Structure Plan provides objectives and supporting strategies for developing a governance structure and a delivery model for Arden.

The following pages assess the transport related strategies and their appropriateness to support the relevant objectives.

Figure 4.1: Arden Movement Network Plan

Source: Draft Arden Structure Plan

4.2 MOVEMENT NETWORK PLAN – PUBLIC TRANSPORT

Arden enjoys access to world class public transport, making it the mode of choice for most day-to-day activities. The public transport network will be connected to its neighbourhood by a network of streets that reposition active travel above car use.

The Public Transport Network

Arden is planned as a transit-oriented development. The precinct will benefit from access to a wealth of public transport opportunities:

- High-capacity Metro trains on the Metro Tunnel train line with a station in the heart of the Arden precinct.
- Tram and bus services delivered via high-capacity routes and bus capable streets.
- Public transport modal interchange outside Arden Station at Laurens Street.
- Train services at Macaulay and North Melbourne stations combine to offer access to 6 train lines, covering a wider catchment across metropolitan Melbourne and quick links to adjacent precincts such as Parkville.

It is standard to plan for a train station to be accessible to the population within an 800m walk. A 400m walk distance is typically applied for trams and buses.

Figures 4.2 to 4.4 overleaf demonstrate that by **halving these walk times**, much of Arden will be within easy reach of transit stops and stations. The precinct will have excellent access to train and tram services, particularly after the initial phase of Stage 2 tram line extensions. This will bring tram services to the model interchange at Arden Station.

Aside from trains, the public transport network in the area is tram-focused and any upgrades need to be integrated with the existing public transport network.

Relevant Structure Plan Objective
15: Provide space for high-capacity public transport capable options connecting Arden into the expanding central city.

Strategies to Achieve Objective	Alignment	Commentary
Strategy 15.1 Provide space to allow for the potential future delivery of high capacity public transport capable corridors along Laurens Street, Fogarty Street, Henderson Street and Boundary Road (south of Macaulay Road)	Yes	Generally appropriate to prioritise for high capacity transit in these locations. However, further detailed analysis required to investigate options, staging and deliverable frequencies
Strategy 15.2 Implement improvements to local bus services to improve connections between Arden and surrounding suburbs in the short term.	Yes	Improvements to existing services are an appropriate way to cater for demand and encourage the use of public transport prior to the provision of new public transport infrastructure.
Strategy 15.3 Explore opportunities to reopen the northern entrance to North Melbourne Station for a more convenient and direct link to Arden.	Yes	Investigations to be considered against risks and alternative options.

Recommendations

- Implement Green Travel Plans for all residential and employment land uses to capture the full benefit of the public transport investment and provide a structured means to conduct ongoing monitoring of travel choices and potential barriers.
- Aim for a walk-on service frequency to encourage public transport use
- Deliver public transport improvements early, noting Fishermans Bend has a requirement for the first trams service extensions to be delivered within 5 years of adopting the Framework Plan.
- Consider options to deliver high-frequency, high-capacity public transport to Arden. This includes bus rapid transit or trackless tram, noting the importance of integration with the wider network.

Figure 4.2: Public transport lines and stops

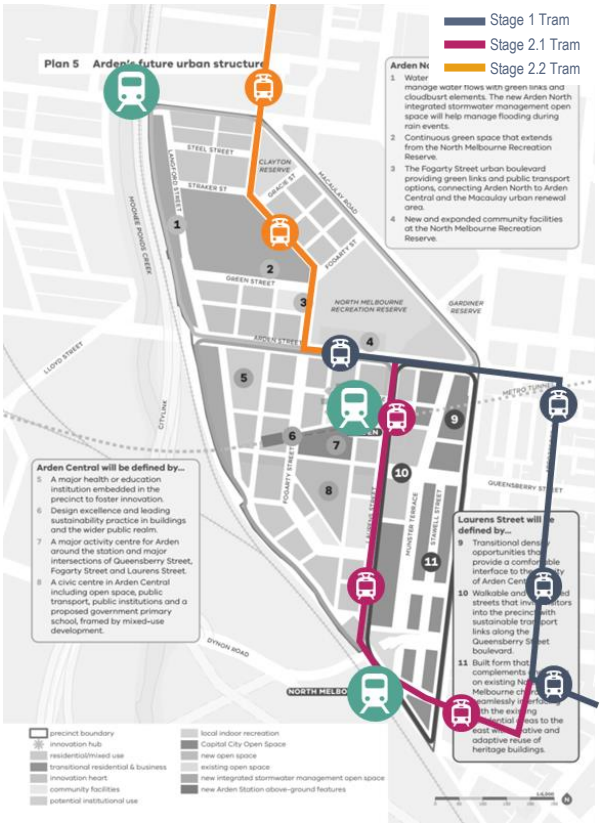


Figure 4.3: Accessibility 400m for train | 200m for tram

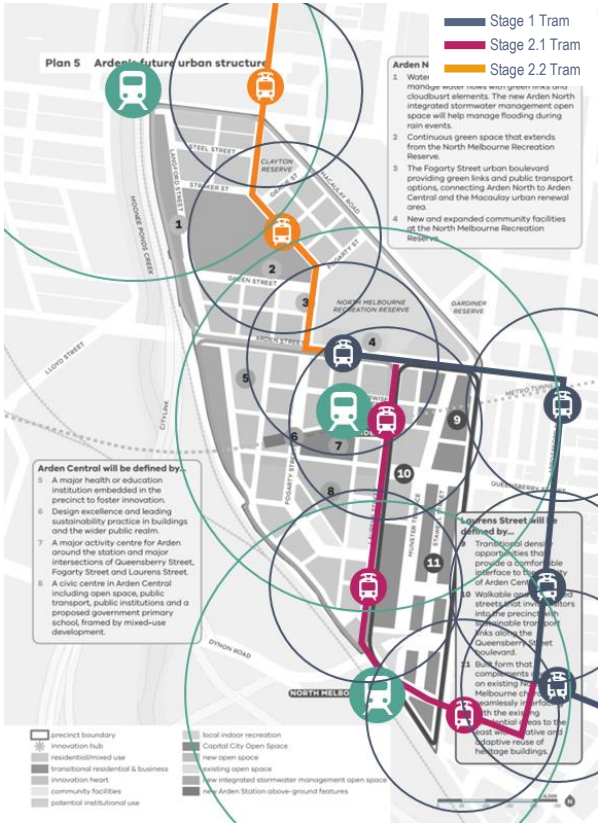
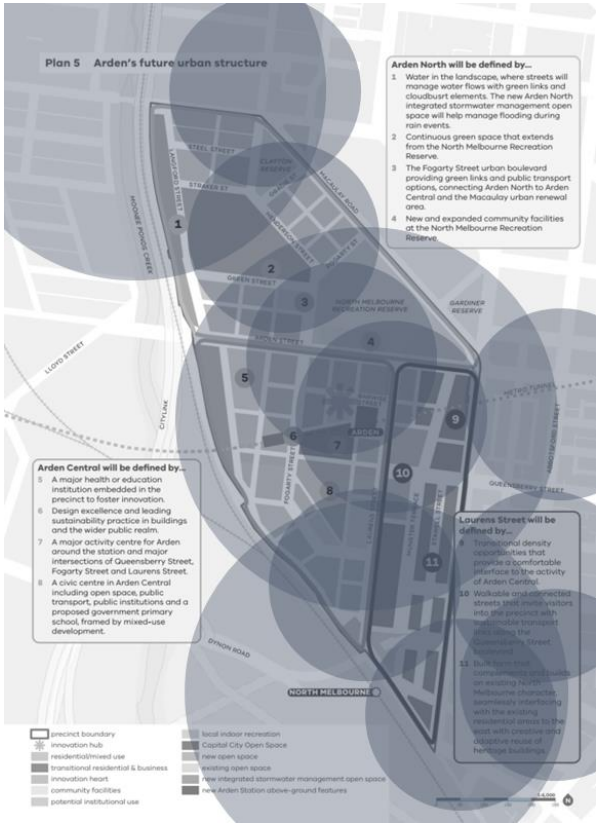


Figure 4.4: Full coverage at better than average walk times



4.2 MOVEMENT NETWORK PLAN - CYCLING

The proposed cycling network will deliver on the intent of the movement and place strategic framework for the area, enabling people to cycle within the precinct and travel to and from Arden from further afield.

Cycling Network

The proposed cycling network within Arden has been developed to cater for mix of cycling abilities and purposes.

The structure plan will create a network of four Strategic Cycling Corridors aimed at creating protected routes that will cater for the majority of cycling trips through and within the precinct.

The structure plan also proposes to create a network of bike lanes that feed into the Strategic Cycling Corridor and connect to major destinations.

The table to the right shows the strategies that support the objective of encouraging people to cycling to and within the precinct.

Recommendations

The following recommendations are made as a result of this review:

- End of trip facilities to provided in locations that are convenient and designed using Crime Prevention through Environmental Design principles.
- Ensure appropriate wayfinding for cyclists is provided.
- Ensure cycling aligns with City of Melbourne cycling design standards

Relevant Structure Plan Objective
16: Provide Safe, direct and connected protected cycling routes through and to the precinct

Strategies to Achieve Objective	Alignment	Commentary
Strategy 16.1 Deliver Strategic Cycling Corridors along Arden Street, Queensberry Street, Langford Street and Laurens Street.	Yes	New Strategic Cycling Corridors will directly support cycling through and to the precinct.
Strategy 16.2 Deliver a dense network of local feeder bike lanes to complement the Strategic Cycling Corridors and provide access for bicycles to destinations within the precinct, including the proposed government primary school, community hubs and innovation hub.	Yes	New dense cycling network will encourage people to cycle and assist in reaching sustainable travel targets.
Strategy 16.3 Deliver safer intersections for bike riding by adopting designs which continue bicycle lanes up to and through intersections and provide physical separation for cyclists.	Yes	Intersection improvements for cycling will connect cycling routes.

4.2 MOVEMENT NETWORK PLAN - WALKING

The proposed walking network will deliver substantial change to the ability to walk safely, comfortably and conveniently within the Arden precinct.

Walking Network

The walking network proposed within the structure plan is clearly different to the current street block network.

The structure plan will create a network of fine-grained streets that are permeable for active travel modes but restrict access by car. A low-speed environment is proposed, generally at 30km/h along streets within the precinct. Footways are generally separated from vehicle traffic by bicycle lanes or parked cars, adding to the pedestrian level of comfort provided by generous footway widths.

Away from vehicle movement streets, a network of pedestrian priority streets is proposed to provide access to buildings, public open spaces and Arden Station.

Crossing points are provided on all major roads within or around the precinct at zebra crossings, dedicated pedestrian operated crossings or at signalised intersections

The table to the right shows the strategies that support the objective of encouraging people to walk within the precinct.

Recommendations

The following relatively minor recommendations are made as a result of this review:

- Ensure signalised crossings are timed to give priority to and minimise delay for people walking and not people driving
- Ensure detailed design adopts wayfinding principles as per *Wayfound Victoria, 2020*
- Develop street cross-sections for
  - Queensberry Street
  - A typical local street
  - A typical pedestrian priority street

Relevant Structure Plan Objective
17: New and existing streets will be pedestrian friendly and provide comfortable, green links between open spaces and public transport routes and enhance the quality of the public realm.

Strategies to Achieve Objective	Alignment	Commentary
Strategy 17.1 Create walkable streets in Arden with many routes, crossings and through-block links that improve permeability and draw people into new spaces, consistent with block sizes outlined in the Central Melbourne Design Guide.	Yes	Finer-grain networks contribute to better access to a range of facilities.
Strategy 17.2 Create activated pedestrian-priority zones that provide shared space for pedestrians and slow-moving cyclists and service and emergency vehicles.	Yes	Walking and cycling is encouraged by having space allocated to these modes.
Strategy 17.3 Deliver streetscape improvements to Queensberry Street and Fogarty Street to support their role as urban boulevards	Yes	Walking and cycling encouraged by creating places for people to stop and spend time.
Strategy 17.4 Deliver public realm and urban greening improvements along the western edge of the Arden precinct to connect North Melbourne Station and Macaulay Station via a new green link.	Yes	Given Australian summers, urban greening is important for creating a more habitable environment to encourage walking.
Strategy 17.6 Explore opportunities to deliver consolidated freight distribution and waste collection hubs to reduce the number of service vehicles entering the precinct.	Yes	Consolidating and controlling movement of freight and waste vehicles will support the prioritisation of active and public transport and create a more efficient network for these modes.
Strategy 17.7 Maximise personal safety and security through activation of ground floors around open spaces and key pedestrian routes and the use of Crime Prevention Through Environmental Design (CPTED) principles.	Yes	New safe connections enable walking trips and create community spaces that support diverse community needs.

4.2 MOVEMENT NETWORK PLAN – LOCAL VEHICLE ACCESS

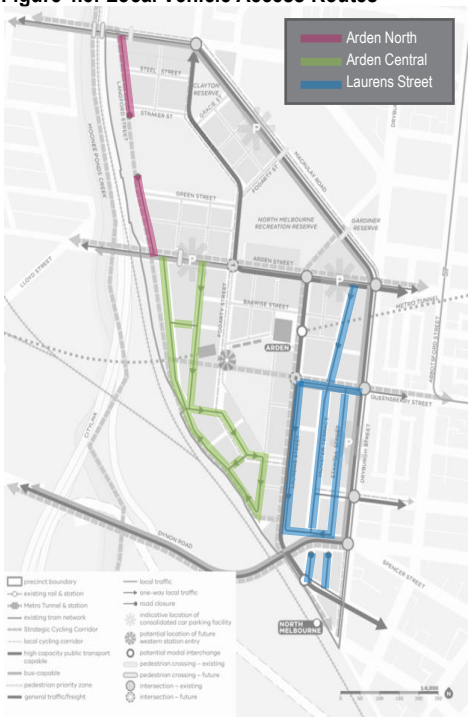
The principles of a high accessibility / low traffic neighbourhood have been applied to Arden. Local vehicle movement is permitted, while general traffic access through the precinct is managed.

Local Vehicle Access

Selected roads within the Arden precinct allow local vehicle access, using a combination of one and two-way streets, while restricting cross-precinct movement as generally shown in Figure 4.5 below.

The table to the right shows the strategies that support the objective of restricting vehicle movement within the precinct.

Figure 4.5: Local Vehicle Access Routes



Relevant Structure Plan Objective
18: Minimise the impact of car parking and associated vehicular movements through Arden.

Strategies to Achieve Objective	Alignment	Commentary
Strategy 18.1 Prepare a Vehicle Circulation and Precinct Parking Plan which caps the supply of parking and directs parking into dedicated off-street parking hubs.	Yes	A movement network that restricts general vehicle access to all but necessary areas while preventing cross-precinct through movement will result in less contact between cars and people walking or cycling.

Changes to the Vehicle Movement Network

It is realistic to expect that some changes to the movement network may be required to respond to a range of matters that may occur at later stages of planning.

Any changes to the vehicle movement network should be assessed for alignment with the structure plan objectives and the movement and parking principles set out in Part 1 Section 03 of this report.

Recommendations

The following relatively minor recommendations are made as a result of this review:

- Consider gateway intersection treatments where local streets meet external roads, see Figure 4.6.
- Consider building a detailed model of the area to enable future governance and informed decision making.

Figure 4.6: Gateway Intersection Treatment

Source: NACTO, Global Designing Cities Initiative

4.2 MOVEMENT NETWORK PLAN – DESIGN OF LOCAL STREETS

A range of design treatments can be applied to the layout of local streets. These measures permit traffic but aim to reduce vehicle speed, reduce road space dedicated to car use and prioritise active travel. These guidelines are provided as a starting point for local requirements to be developed.

Narrow Lanes
Narrow lanes reduce vehicle right of way and reprioritise road space for non-vehicle modes
- 3.0m maximum width for a single lane on local streets, less width where possible.

Pinchpoints
Midblock road narrowing with priority to oncoming vehicles.
- Combine with a pedestrian crossing to shorten crossing distances.
- Alternate vehicle directional priority over successive locations.

Tight Corner Radii
By tightening corner radii, we can reduce vehicle speeds, reduce pedestrian crossing distances and create compact intersections
- 4.0m radius or less at intersections.
- Make intersections safer for pedestrians

Chicanes and Lane Shifts
Target lower vehicle speeds by introducing lateral shift and remove the tunnel effect of straight roads.
- Use kerb build outs and alternate the parking lane.

Buildings and Trees
Trees and continuous activated facades create the sense of an urban environment for people and not a highway for cars.
- Adopt a default position of no crossovers on activated streets unless otherwise essential.
- Plant appropriate trees

Signal Progression
Reduce motorists expectation that they can speed through signals in succession.
- Retime signals to prioritise non-car travel.
- Reduce signal cycle times to assist pedestrian movement at crossings.

Gateway Treatments
Alert drivers that they are entering a changed speed zone and should lower their speed.
- A variety of measures can be used such as those listed on this page.
- Use gateway intersection treatments where local streets meet external roads.

Diverters and Modal Filters
Reduce overall traffic volume and cut speeds by eliminating through traffic.
- Use modal filters to wholly prohibit all but essential vehicle movement through pedestrian priority areas.

Images Source: NACTO, Global Designing Cities Initiative

4.2 MOVEMENT NETWORK PLAN – CAR PARKING

A parking strategy for Arden has been prepared which explores options for a precinct-level approach to parking management, including a review of parking locations and the possible outcomes for parking supply and management.

Car Parking Locations and Access

The location of car parking and car park access depends on the amount of car parking provided and walk distances to land use. These considerations are investigated in Part 2 Section 6 of this report.

Findings and Recommendations

- **Consolidated parking** that is unbundled from land use is an efficient but untested solution in Victoria. It will require early delivery by the public sector to prove its value. Following this, transfer to the private sector is possible. Locations of car parking are suitable for consolidated parking in a general sense.
- **A mix of consolidated and on-site parking is also viable**. This has drawbacks in terms of more vehicles on local streets and additional vehicle access points, but these are considered minor issues. It is also the scenario that is likely to have more immediate appeal to developers as the car parks are nearer to the buildings they serve
- A consolidated, fully shared parking system could generate the need for an estimated **3,500 car spaces**. There is less need for car parking as people share the same space.
- A mixed or fully on-site parking system is likely to generate the need for an estimated **4,500 car space.** More car parks are needed as a single car park is less well utilised as a shared facility.
- Provide wayfinding for pedestrians and cyclists and car parking, using CPTED principles to ensure safety, convenience and comfort.

Relevant Structure Plan Objective
18: Minimise the impact of car parking and associated vehicular movements through Arden.

Strategies to Achieve Objective	Alignment	Commentary
Strategy 18.1 Prepare a Vehicle Circulation and Precinct Parking Plan which caps the supply of parking and directs parking into dedicated off-street parking hubs.	Yes	Limiting parking supply and providing clear wayfinding to available spaces will control the number of vehicles circulating the precinct.

4.2 MOVEMENT NETWORK PLAN – LAST KILOMETRE SERVICING AND EMERGENCY VEHICLE ACCESS

Key vehicles access for servicing, emergency vehicles and people with disabilities needs to be carefully planned to ensure the needs of these user groups can be met while protecting the streetscape amenity.

Loading Spaces

Guidance from RMS in NSW indicates that commercial buildings need a loading space from every 8,000sqm of floor area, while residential buildings need a loading space for every 200 dwellings. In either instance, 50% of the spaces are for truck use.

Consolidated servicing is proposed to accommodate most of the truck movements, meaning 100 loading spaces will be needed to serve development of 790,000sqm of commercial area and 6,800 dwellings.

Most of these spaces can be accommodated by on-street parking on local roads within the precinct; however, loading zones will also be needed to accommodate trucks not part of the consolidated system.

Loading zones should be located at the end of an on-street parking lane, with suitable length for trucks to manoeuvre in and out.

Access for Key Vehicles

In transport engineering terms, as long as there is adequate road width and a pavement of suitable bearing strength, a low amount of vehicle movements through a pedestrianised precinct is a safety risk that can be managed effectively.

As an example of how this could work, GTA is familiar the operation of Murray Street Mall in the Perth CBD - a scaled-down Bourke Street Mall, but without trams – it is closed at both ends. Vehicles normally enter the pedestrian zone at one end and depart at the other, reducing the need to reverse to turn around. This arrangement is shown in the **case study.**

Recommendations for Precinct Access

- Place modal filters in key locations, as shown in Figure 4.7.
- Eliminate heavy vehicle reversing, using one-way lanes where possible.
- Control access to pedestrian priority areas to outside of peak times.
- Coordinate response in partnership with emergency services

As long as these factors are met, there is unlikely to be an issue with larger vehicles or trucks entering the precinct on a infrequent basis.

Figure 4.7: Locations of potential modal filters with key vehicle access (highlighted green)

Case Studies – Modal Filters at Murray Street Mall, Perth

A waste truck enters Murray Street Mall via drop bollards operated by precinct management, called via intercom.

Source: Google (top), The West Australian (bottom)

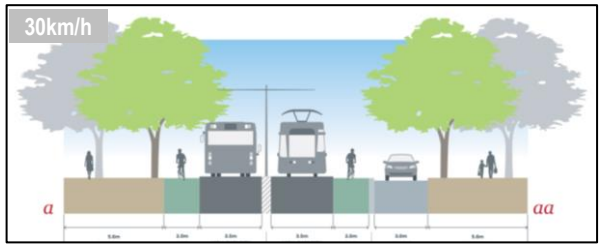
4.2 OTHER MOVEMENT NETWORK STRATEGIES

This section assesses how the transport related strategies within Chapter Ten: Delivering Arden align with the objectives within the draft Arden Structure Plan.

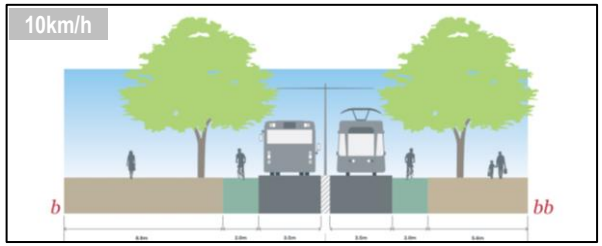
Objective	Strategies	Alignment	Commentary
Objective 26 Ensure coordinated and collaborative staging of development on government owned land around the new Arden Station to effectively respond to existing conditions and ongoing business requirements and create a safe and vibrant place upon opening of the station.	**Strategy 26.4** Collaborate with the Metro Tunnel Project and project partners to deliver construction phase and legacy phase projects as outlined in the Metro Tunnel Creative Strategy.	Yes	Collaborating with relevant projects will create efficiencies.
Objective 31 Provide for the timely and coordinated funding and delivery of public open space, transport upgrades and community and social infrastructure to meet the needs of the new community.	**Strategy 31.1** Prepare a state infrastructure investment plan outlining the role of government in investing in and facilitating the delivery of key infrastructure and the infrastructure that will be delivered through this plan.	Yes	An appropriate investment plan will ensure funding is appropriately timed.
	Strategy 31.2 Prepare a development contributions plan (or equivalent) to contribute funds towards the costs of new infrastructure required as a result of new development in Arden.	Yes	As above.

4.3 STREET CROSS-SECTIONS

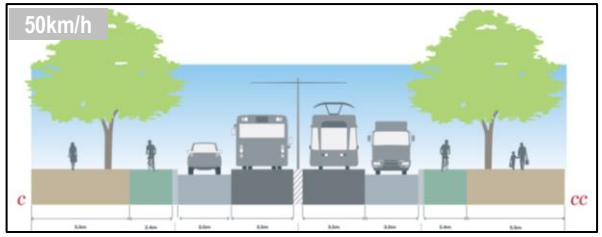
The street cross-sections have been reviewed to check they align with their place in the road network plan, meet contemporary design criteria, and can accommodate the amount of pedestrians in key areas.



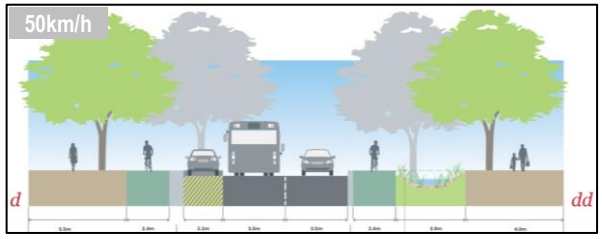
Cross-Section A : Laurens Street, south of Fogarty Street extension	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards, consider physical buffer between bike lane and transit corridor
Travel volumes [1]	1,800 peds/hr is no issue for a 5.6m wide footway (min. 2.5m width needed)
Supply/Demand Change	Significant change and move away from vehicle travel toward sustainable modes



Cross-Section B : Laurens Street, at Arden Station	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards, consider physical buffer between bike lane and transit corridor
Travel volumes [1]	1,900 peds/hr is no issue for a 5.6m wide footway, station forecourt can accommodate 7,000 people per hour.
Supply/Demand Change	Complete change from vehicle travel to public transport focus



Cross-Section C : Arden Street, west of Laurens Street	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards, consider 40km/h speed limit (or less)
Travel volumes [1]	1,000 peds/hr is no issue for a 5.5m wide footway (min. 2.5m width needed)
Supply/Demand Change	Significant change and move away from 4-lane road toward sustainable modes

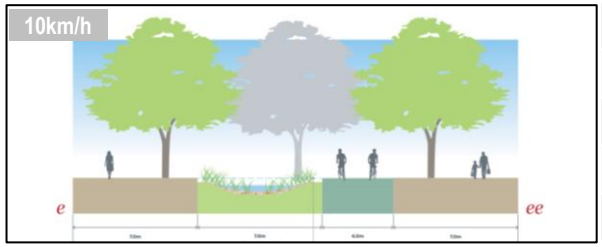


Cross-Section D : Arden Street, west of Fogarty Street	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards, consider 40km/h (or less)
Travel volumes [1]	1,000 peds/hr is no issue for a 4.0m wide footway (min. 2.5m width needed)
Supply/Demand Change	Significant change and move away from 4-lane road toward sustainable modes

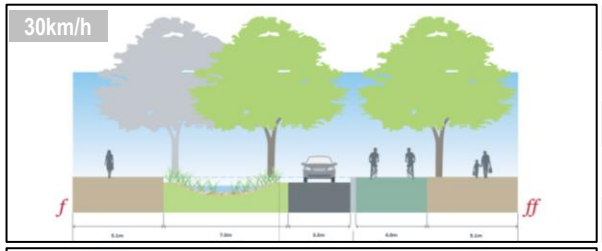
[1] Pedestrian volumes based on a broad assignment of public transport people trips as set out in Section 3. Comfort factor is based on work by Gehl which indicates that 13 people per minute per metre of footway width is a general empirical limit after which people start forming lines while walking along a street. GTA has applied this factor assuming all pedestrians use only one side of the street, to be conservative.

4.3 STREET CROSS-SECTIONS

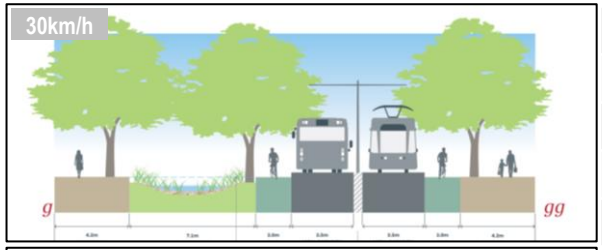
The street cross-sections have been reviewed to check they align with their place in the road network plan, meet contemporary design criteria, and can accommodate the amount of pedestrians in key areas.



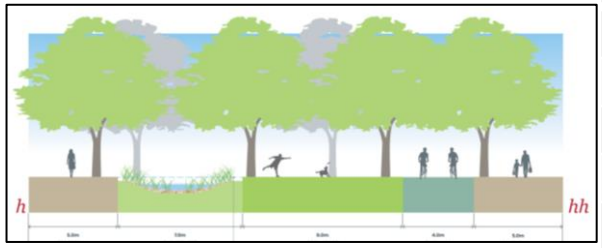
Cross-Section E : Fogarty Street extension, west of Laurens Street (pedestrian priority)	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards
Travel volumes [1]	No issues. Relatively low pedestrian volumes expected.
Supply/Demand Change	Adds to permeability of the street network and is focused on sustainable access



Cross-Section F : Fogarty Street extension, west of Laurens Street (local traffic)	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards
Travel volumes [1]	No issues. Relatively low pedestrian volumes expected.
Supply/Demand Change	Adds to permeability of the street network and is focused on sustainable access



Cross-Section G : Fogarty Street, north of Arden Street	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards
Travel volumes [1]	No issue. Footway accommodates up to 3,250 people per hour (min. 4.0m width needed)
Supply/Demand Change	Complete change from vehicle travel to public transport focus

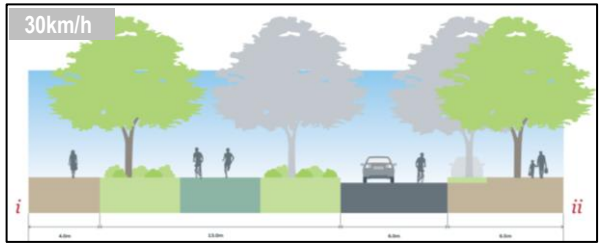


Cross-Section H : Queensberry Street, west of Laurens Street	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards
Travel volumes [1]	No issue. Footway accommodates up to 3,900 people per hour
Supply/Demand Change	Adds to permeability of the street network and is focused on sustainable access

[1] Pedestrian volumes based on a broad assignment of public transport people trips as set out in Section 3. Comfort factor is based on work by Gehl which indicates that 13 people per minute per metre of footway width is a general empirical limit after which people start forming lines while walking along a street. GTA has applied this factor assuming all pedestrians use only one side of the street, to be conservative.

4.3 STREET CROSS-SECTIONS

The street cross-sections have been reviewed to check they align with their place in the road network plan, meet contemporary design criteria, and can accommodate the amount of pedestrians in key areas.



Cross-Section I : Munster Terrace between Victoria and Queensberry Streets	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards
Travel volumes [1]	No issue. Footway accommodates up to 3,100 people per hour
Supply/Demand Change	Significant change and move away from vehicle travel toward sustainable modes

Cross-Section J : Munster Terrace between Arden and Queensberry Streets	
Movement Plan	Aligns with movement plan
Dimensions	Complies with contemporary design standards
Travel volumes [1]	No issue. Footway accommodates up to 2,700 people per hour
Supply/Demand Change	Significant change and move away from vehicle travel toward sustainable modes

Accommodating Street Furniture

The pedestrian comfort analysis[1] uses one side of the street only (the side with the narrowest footway), but applies the full pedestrian volume to that single side. This results in a conservative estimate of pedestrian comfort, although street furniture still needs to be considered and accommodated.

The Gehl comfort factor is quite low at 13 people per metre width per minute (ppmm), some guidance[2] goes to 20 ppmm, or more, before movement is considered too restrictive.

This isn't necessarily a problem as people expect streets to be busy during peak periods, particularly around transit hubs. Also, there needs to be a degree of balance between street width and people movement during peak hours, which represent a relatively limited portion of the day.

Given the high-level and conservative nature of the analysis, street furniture could occupy 25-50% of the footway while still maintaining the streets ability to move pedestrians at an acceptable level of comfort during peak hours, albeit a bit more restricted compared to the rest of the day.

As an absolute minimum, footways should provide no less than 2.0m clear width over localised narrowing, such as at signs or trees. Ideally, this clear width would be 2.5-3.0m, or more.

Summary and Recommendations

All street cross-sections align with the movement plan and generally comply with contemporary design standards and practices. Vehicle volumes on these streets are expected to be low, particularly on local roads, with manageable traffic volumes on through roads within the precinct.

The following minor recommendations are made based on this review:

- Consider providing a physical buffer where a transit lane is directly alongside a bicycle lane.
- Consider reducing Arden Street to 40km/h (or less), similar to other activity centre streets in Metropolitan Melbourne.

[1] Pedestrian volumes based on a broad assignment of public transport people trips as set out in Section 3. Comfort factor is based on work by Gehl which indicates that 13 people per minute per metre of footway width is a general empirical limit after which people start forming lines while walking along a street. GTA has applied this factor assuming all pedestrians use only one side of the street, to be conservative.

[2] Pedestrian Comfort Guidance for London, Transport for London, 2019 (Link)

ARDEN PARKING DEMANDS

Car parking is a travel demand management tool. This section shows that low car parking provision has a wide market basis and is therefore viable.

Part 2
05
Evidence Base

5.1 ARDEN STRATEGY CONTEXT

At its essence, car parking provides a means of accessing places where we live, work and play.

Strategy Walkthrough

Part 1 – Arden Strategy Context
Part 2 – Parking Provision
Part 3 – Car Parking Supply Scenarios
Part 4 – Case Studies
Part 5 – Precinct Parking Locations
Part 6 – Precinct Parking Management and Implementation
Part 7 - Inclusions in a Schedule to the Parking Overlay
Part 8 – Alignment with Movement and Parking Principles

Summary of Findings and Recommendations:

- Remove the parking cap; replace it with parking rates that can flexibly respond to changes in land use.
- Implement the following maximum car parking rates to constrain residential and destination (non-residential) parking to realise the 10% car mode share target
  - 1-bedroom dwelling: 0.2 spaces per dwelling
  - 2-bedroom dwelling: 0.3 spaces per dwelling
  - 3-bedroom dwelling: 0.5 spaces per dwelling
  - Everything else: 0.32 spaces per 100sqm GFA
- Unbundle parking from land use and individual owners and locate parking in a manner which efficiently serves the defined user groups. This should primarily be located in residential buildings to solve the adjacency problem.
- The public sector will need to fund the first parking hubs as the acceptability of this parking and land use model has not been established on this scale in Victoria.

Parking as a planning policy tool

Car parking is an 'end of trip facility'. Car parking policies will effect overall attractiveness and performance of Arden. There are a range of attributes within a place that affect how they respond to car parking policy. These include:

- The availability of viable alternative modes of travel and following from this, the ability to use car parking as an effective travel demand management tool.
- The economic role of car parking to support employment, retail and services.
- The diversity of land uses in the precinct, and the ability to share car parking resources between uses.

While private vehicles will remain a necessary transport mode for accessing places around Arden in the future, the negative aspects of car use need to be addressed to support the growth, vibrancy and prosperity of the precinct.

It is also important to recognise roads and streets as aspects of "place" in Arden. This means taking into consideration both the diverse role places play in planning the types of transport modes and balancing the community's various priorities in regard to parking.

The needs and role of parking will also vary between commercial and residential streets with different outcomes being sought in each case.

As part of this, car parking management will play a key role towards mode shift in the longer term. This will also be in conjunction with ongoing investment in public transport and active travel, along with creating a vibrant and attractive public realm for differing street types.

Parking as a demand management tool

Car parking is a transport demand management tool and influences urban form, transport patterns and Plan Melbourne outcomes.

The management of car parking can occur at many levels to ensure car parking is allocated to its intended users. It should take into account and balance a variety of factors which influence the demand for parking including:

- key user groups
- road safety
- amenity and public realm
- property access and servicing, including delivery and waste collection vehicles
- desired modes of transport including car, walk, cycle and public transport.

There are a variety of parking management methods to balance these factors such as:

- uncontrolled (unrestricted) parking
- time restricted parking
- allocated parking spaces using a permit zone (or a permit holder exempt) scheme
- access / security-controlled off-street car parking areas
- prohibited parking and paid parking.

Different land uses and place functions each have their own unique ways in which parking is, and should be, managed. As each land use brings a different type of user, the management of parking needs to be altered accordingly to ensure a suitable balance for all users.

Relevant Terminology

Precinct Parking Stations (PPS)

This is defined as:

- *Consolidated parking that is provided in lieu of parking within nearby developments.*

"Nearby" means that PPS are within easy walking distance (up to 400m[1]).

The PPS model does not exclude the use of unbundling parking from residential developments; however, PPS could be on-site if the carpark is serving surrounding land uses.

Unbundled Parking

Car parking that is unbundled or "decoupled" from the land use.

Unbundling parking compels developers to sell or lease parking independently of residences or commercial leases. People may re-evaluate their need to own a car as unbundling exposes the cost of car parking from the cost of owning or renting the property.

Unbundling parking from sales and leases may naturally lead to the market delivering parking precinct stations.

Unbundling can be done in several ways:

- Parking can be bought or rented separately when the apartment or office space is bought or leased.
- Renters can be offered a discount on their rent for not using parking spaces.
- Parking costs can be listed as a separate line item in lease agreements to show tenants the cost and enable them to negotiate reductions.
- Unbundling can be encouraged informally by creating a market for available parking spaces – building managers can keep a list of tenants or owners with excess spaces available for rent.

Allocated Parking versus the Right to Park

With unbundled parking, people that drive can still have access to a single car parking space that is "theirs" alone. The parking space is allocated to them.

This creates an inefficiency that can be addressed simply by introducing a "right to park" – paying for a permit to enter a particular parking garage or a particular part of a parking garage.

Shared Parking

Different land uses have different parking demands at different times of the day. Residential parking demands, peak in the early morning and the late evening, while employment parking reaches a peak in the hours prior to midday.

The differences in parking demand can be leveraged to serve more cars from fewer parking spaces.

Supply / Demand Efficiency

Parking supply and demand are two different considerations. As a car park fills, drivers search time for the last empty spaces increases to the point were the car park presents as full, even if it not 100% occupied.

There is an efficiency gap between the parking demand and the number of car spaces that should be supplied to maintain an efficient system.

This level of efficiency varies across different types of parking.

- 85% On-street
- 90% Off-street (small or poorly connected)
- 95% Off-street (large or well-connected)

Even with fully guided parking, it is not entirely practical to rely on 100% efficiency.

In a PPS scenario, the car park operates in a similar manner to a public car park, meaning that an efficiency gap exists where drivers need to circulate long distances or where parking supply is dispersed over several locations.

Providing some parking supply headroom also allows for times when the land use parking profiles don't quite match up. To not do so, would risk undermining the purpose of the system, noting that the actual number of users can be controlled by permits.

[1] Victorian Transport Policy Institute (Canada) paper, Shared Parking, Sept 2007

5.1 ARDEN STRATEGY CONTEXT

In addition to a residential population of 15,000 people, Arden will provide a range of employment land uses, including health, life-sciences, education and digital technology.

Strategy Context

Future Land Use Configuration

The 2051 resident and employee population forecast for Arden, together with the number of homes is set out in Table 5.1.

Table 5.1: Land use and population by precinct[1]

Precinct	Resident	Dwellings	Jobs
Arden Central	4,300	1,950	24,000
Laurens Street	4,700	2,140	4,800
North Arden	6,000	2,730	5,200
Total	**15,000**	**6,820**	**34,000**

Source: VPA

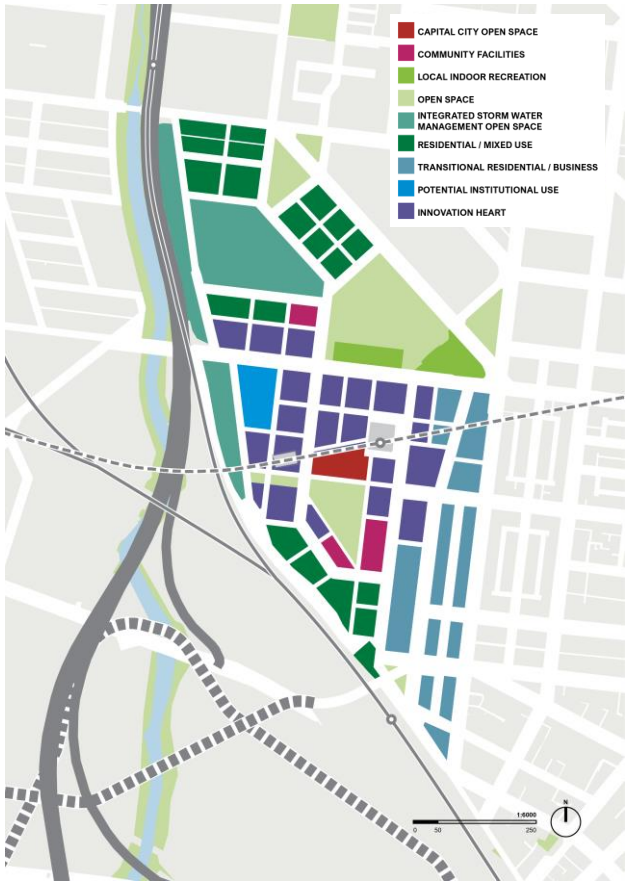
Land Use Mix

Arden will accommodate a range of land uses, which will include all those commonly found in major activity centres, together with others specifically curated for this precinct.

It is important to understand these land uses and the mix of parking user groups and their various needs. The land uses and user groups are set out in in Table 5.2.

[1] This development yield is used for the purposes of this assessment only and may be subject to future modification.

Figure 5.1: Arden Structure Plan Land Uses



Source: Draft Arden Structure Plan 2020

Table 5.2: Land Use and User Types

Land Use	User Types
Residential	Couples, families, lone households, group households, retirement, aged care, visitors
Retail	Retail staff, retail customers and loading
Commercial	Curated land uses (life sciences, digital technology) and other commercial staff, visitors and loading
Education	Staff, students and drop-off / pick-up
Services Economy	Staff and visitors for hospital, other healthcare, child care and professional services

5.2 PARKING DEMAND & RATES OF PROVISION

Efficient parking, at a quantity that matches the objectives of low car use, will be key to delivering the Arden Vision.

Current Parking Controls

Statutory parking requirements for developments in Arden are set out in Table 1 to Clause 52.06 of the Melbourne Planning Scheme. The precinct is located within the Principal Public Transport Network area, meaning the parking rates in Column B of Clause 52.06 apply.

Clause 52.06 rates are minimum parking rates. Example land use parking rates are shown in Table 5.3. It is worth noting that Column B rates will result in abundant parking, which is not aligned with Arden's sustainability goals.

Previous Structure Planning

Parking controls were recommended as part of the Arden-Macaulay Structure Plan[1]. These were reduced from those in Clause 52.06 and are maximum instead of minimum rates, similar to the parking controls for the Capital City Zone. Example land use parking rates are shown in Table 5.3.

Table 5.3: Clause 52.06 Col. B and Previous Structure Plan Parking Rates

Land Use	Clause 52.06 Column B[2]	Arden Macaulay Structure Plan
Dwelling	1 space per 1 or 2 bedroom dwelling 2 spaces per 3 bedroom dwelling	1.5 spaces per dwelling
Office	3 spaces per 100sqm	1 space per 100sqm
Retail	3 spaces per 100sqm	1 space per 100sqm

[1] GTA Integrated Transport and Access Review for Arden Macaulay (Amendment C190), June 2013.
[2] Melbourne Planning Scheme

Other Relevant Parking Controls

There are a number of parking controls set out in Schedules to the Parking Overlay in various locations. These are shown Table 5.4, the most relevant of which are West Melbourne (the suburb adjacent to Arden) and Fishermans Bend, due to similar renewal precinct planning considerations and sustainable travel mode share target.

It is worth noting that Arden is a far higher-density precinct than Fishermans Bend, having nearly twice the residential density and nearly four times the employment density. This leads to a more compact urban environment, with shorter walk distances between buildings and comparatively greater access to public transport compared to Fishermans Bend. This indicates that there is potential to adopt lower rates of parking for Arden.

Table 5.4: Parking Overlay Rates of Provision

Overlay	Date	Planning Scheme	Residential	Employment	Retail
PO 14 (West Melbourne)[1]	2018	Melbourne	1-bed 0.3 spaces 2-bed 0.45 spaces 3-bed 0.6 spaces	0.5 spaces per 100sqm NFA	
PO 13 (Fishermans Bend)	2018	Port Phillip	1/2-bed 0.5 spaces 3-bed 1 space	1 per 100sqm GFA	2 per 100sqm GFA
PO 1 (Fishermans Bend)	2018	Port Phillip	1/2-bed 0.5 spaces 3-bed 1 space	1 per 100sqm GFA	2 per 100sqm GFA
PO 11 (Yarra's Edge)	2013	Melbourne	2 per dwelling	2 per 100sqm GFA	4 per 100sqm GFA
PO 12 (Inner City Residential)	2013	Melbourne	1 per dwelling	-	-
PO 1 (CCZ)	2013	Melbourne	1 per dwelling	0.5 spaces per 100sqm NFA	
PO 10 (Docklands Business Park)	2013	Melbourne	1.5 spaces per DU	3 per 100sqm	4 per 100sqm
PO 6 (Docklands Victoria Harbour)	2013	Melbourne	2 per dwelling	2.5 per 100sqm GFA	2-4 per 100sqm GFA
PO 7 (Docklands Batman's Hill)	2013	Melbourne	2 per dwelling	1.5 per 100sqm GFA	1 per 100sqm GFA
PO 8 (Docklands Stadium Precinct)	2013	Melbourne	1.5 per dwelling	1 per 100sqm GFA	

[1] Before the Minister for approval

Arden provides an opportunity to realise a true transit-oriented development. The level of access to public transport and active travel will attract people away from car use. This aim should be supported by policy that restricts car parking to a viable minimum.

Overview

The target of 10% car and 90% sustainable transport, are realistic but policy needs to be aligned to ensure that sustainable transport investments, which runs to hundreds of millions of dollars, are not undermined by a business as usual approach to parking.

Car Parking Provision Rates

Destination (Employment) Parking Demand and Rate

The employment projections for Arden show that up to 34,000 jobs could be created in the precinct by 2051, including:

Table 5.5 Jobs and Employment GFA by Year

	2031	2036	2041	2046	2051
Jobs	7,400	14,050	20,700	27,350	34,000

Source: SGS Economics at 2031 and 2051, GTA assume a straight-line interpolation for other years.

The number of people turning up to work each day can be determined by the same method used in Part 2 Section 3 of this report, i.e. that 85% of employees use their place of work each day. This equates to about 29,000 employees. The 10% mode share implies that up to 2,900 people are likely to arrive by car.

The number of people arriving by car includes the person driving and any passengers. Analysis of the ABS census travel to work data in Part 2 Section 3 of this report, shows that people are willing to carpool at a rate of 1.15 people per car.

On this basis, approximately **2,500 car spaces** will be needed to accommodate people driving to Arden for work. This is a rate of 0.32 car spaces per 100sqm[1].

Residential Parking Demand

Residential car parking rates are somewhat more difficult to work out. To give a reasonably confident answer in terms of hitting a 10% mode share, you need to not only know how many residents own cars, but also how likely they are to use them.

ABS data shows that significant proportion of people live in an apartment but don't own a car.

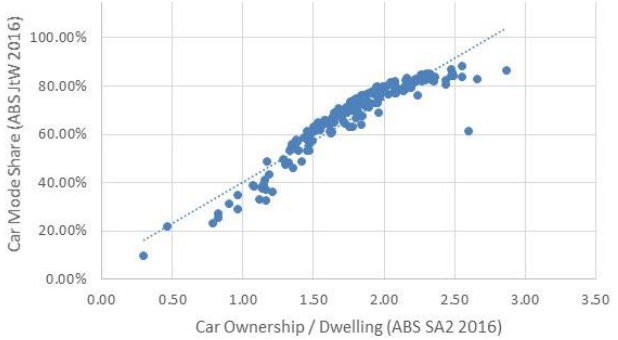
ABS data suggests that car use is related to car ownership. At lower car ownership levels, the rate is approximately 10% car mode share for every 0.3 cars owned. This analysis is shown in Figure 5.2.

Review of car ownership rates for apartments in Melbourne indicates that for the increase in apartments between 2011 and 2016, car ownership dropped for these dwellings, to an average of 0.45 across the LGA. The rate in the Melbourne CBD is 0.29 per dwelling over the same period. This analysis is shown in Table 5.6.

[1] 2,500 car space for 790,888sqm of floor area

It is worth noting that at 2016, the Melbourne LGA had a car ownership rate of 0.65 cars per dwelling, while the CBD had a rate of 0.45 cars per dwelling.

Figure 5.2: Metropolitan Melbourne Car Ownership by Dwelling vs Car Mode Shares for Work



Source: ABS Census 2016, GTA Analysis

Table 5.6 Melbourne LGA and CBD Car Ownership

Location	Cars/Dwelling	No Cars
Melbourne LGA 2011	0.75	25%
Melbourne LGA 2016	0.65	35%
LGA difference 2011-16	**0.45**	**55%**
Melbourne CBD 2011	0.56	44%
Melbourne CBD 2016	0.45	55%
CBD difference 2011-16	**0.29**	**71%**

Source: ABS Census.

Viability of a low residential car parking rate is an important consideration. ABS data indicates that the market is shifting towards low car ownership with a significant market in the c. 50% of people living in apartments in Melbourne not owning a car.

Average Residential Car Parking Rate

Based on the analysis on the previous page, car parking provision has to be low to reach a car mode share of 10%.

An average parking provision of 0.3 cars per dwelling aligns with both the trend in car ownership versus the resulting tendency to travel by car, and the observable rate of recent uptake of car ownership by apartment residents in the Melbourne CBD. Arden will have a similar level of public transport accessibility in 2036 as the Melbourne CBD does now.

On this basis, **2,050 car spaces are needed for 6,820 apartments**.

Car Parking Rates for 1, 2 and 3-bedroom Apartments

The car parking plan prepared in support of the West Melbourne Structure Plan recommended a flat rate of 0.3 car parking spaces per apartment. In evidence, the Planning Panel accepted that a mix of apartments requires a proportional mix of parking spaces. The resulting car parking rates were based on a 25% suppression rate of current car ownership levels across the apartment tenure:

- 1-bedroom 0.3 spaces per dwelling
- 2-bedroom 0.45 spaces per dwelling
- 3-bedroom 0.6 spaces per dwelling

To gauge demand for apartment types and how this effects parking rates, a weighted average of 1, 2 and 3-bedroom apartments across the City of Melbourne has been applied to the average parking rate of 0.3 car spaces per dwelling.

The results of this analysis are:

- 1-bedroom 0.2 spaces per dwelling
- 2-bedroom 0.3 spaces per dwelling
- 3-bedroom 0.5 spaces per dwelling

A rate of 0.3 parking spaces per dwelling should remain the average as it is tied to the 10% car mode share target.

In Support of Lower Residential Parking Rates

Viability of Low Car Parking Rates

A significant amount of people who don't own a car (55%) bought an apartment in recent years in the Melbourne LGA.

Looking at a current comparator for the target mode share, the Melbourne CBD has apartment car ownership rate of 55%, including the historic apartment stock.

This indicates that the current market sits at about 0.45 car spaces per apartment, noting that the current maximum is 1 space per dwelling (45% car ownership).

Arden will provide parking for up to 30% of all dwellings. Adding this to the 55% that don't own cars, means there is only a 15% gap to full market exposure.

On current trends, as set out in Part 2 Section 3, this gap is set to narrow in the coming years. Vehicle registrations could drop by 15% on a per person basis by 2051, based on the recent trend. Applying this to the current car ownership of 0.45 cars per dwelling, indicates a drop to 0.38 cars per dwelling by 2051. The narrows the full market gap to 8%

It is also worth noting that drop in vehicle registrations is a state-wide average, there will be areas above and below that average. It stands to reason that people living in the most accessible areas have the greater incentive to not own a car; therefore, the rate of reduction in vehicle registration or ownership could result in much lower car ownership in the most accessible areas, compared to the state-wide average. This points to the market gap ultimately being less than the 8% noted.

Seldom-used cars result in a lot of wasted space that could be put to better use

An opportunity exists to create a sustainable, low car use precinct. This goal risks being undermined if car parking is not matched to the level of public transport and active travel utility.

It could be argued that the public transport measures alone should be enough to attract people away from cars, so they can still own a car, but not use it.

But if people are attracted away from cars, why would they need a space to park a car in?

People who own a car but don't use it that often would be better served by car share, which is shown to replace 7-10 privately-owned cars.

Still, at Arden, the choice to own a car will remain, just at lower levels than the historic apartment stock.

This assessment is based on current travel behaviour

Car ownership data was last collected at the 2016 census. While it is reasonable to compare Arden in future with how people in similarly accessible centres travel, it is still current travel behaviour. Yet, it can be shown that low car parking provision is viable.

Car parking makes housing less affordable

At $30,000 to $40,000 a space in an above-ground parking structure in Melbourne[1], a parking space is often more expensive than the car parked in it. Basement parking is more expensive per space.

This harms housing affordability, disproportionately affecting lower income households by averaging the cost of parking over all dwellings in a building.

Unbundling the parking space from the dwelling solves this issue by implementing a "user pays" approach. Not providing parking for all housing will naturally make housing more affordable.

[1] RLB Intelligence Construction Cost Indicator (link) accessed by GTA in October 2020.

Maximum parking rates can be implemented within a Schedule to the Parking Overlay, controlled by application requirements, decision guidelines, financial contributions and design standards.

Summary and Implementation of Parking Rates

The recommended parking rates for the proposed land uses are:

- **1-bedroom dwelling**: 0.2 spaces per dwelling
- **2-bedroom dwelling**: 0.3 spaces per dwelling
- **3-bedroom dwelling**: 0.5 spaces per dwelling
- **Everything else**: 0.32 spaces per 100sqm GFA

There is little risk in the dwelling mix resulting in the average of 0.3 spaces per dwelling being greatly exceeded.

In any event, the amenity of the precinct should be protected by implementing these as maximum parking rates within a Schedule to the Parking Overlay. This removes the need for a parking cap.

Maximum parking rates provide a de facto parking cap, but allow flexibility for development yields to respond to changing market conditions. Maximum parking rates are tied to a mode share percentage target rather than a firm cap that does not have regard for whether development is more or less intense than forecast. To support this, all on-street parking in the area should be controlled.

A Schedule to the Parking Overlay should include permit application requirements and decision guidelines for circumstances wherein exceeding the maximum parking rates is warranted due to having wider benefits for the precinct.

A Schedule to the Parking Overlay should include any financial measures to control funding of consolidated car parking hubs, if necessary.

Supermarket and hospital parking requirements should be determined on their own merits at the time a permit application is made. However, controls can be implemented to limit the impact of additional car parking on the streetscape and urban form.

Supermarket Parking

Approximately 20,000sqm of the total land use budget for the Arden Precinct is likely to be taken up by retail floor area[1] in a neighbourhood centre in Arden Central. This includes a 4,000sqm full-line supermarket.

A further 2,250sqm of retail floor area could be taken up in Arden North, part of the Macaulay Neighbourhood Centre.

Much of the retail trade for these centres is likely to be based on the walkable catchment provided by Arden, noted to be the primary catchment in the retail demand assessment.

The recommended parking rate of 0.32 car spaces per 100sqm is likely to be sufficient for most of the retail use, particularly as parking spaces in consolidated car parks become available into the afternoon and evening.

However, supermarket operators tend to provide a discrete amount of car parking for the convenience of their customers. This happens in activity centre settings, even those with good access to transit. That said, as Arden develops it is more likely that supermarket operators will move to 'metro' walk-up model.

Though a survey hasn't been undertaken, the supermarket at Southern Cross is extremely busy however the car park is underutilised as nearly all customers walk to the store from nearby apartments. Similar observations have been made at Coles in Swan Street, Richmond.

Hospital Parking

It is understood a hospital in this Arden Central would require 300 parking spaces. It is preferred that this sits within the parking budget for the precinct, rather than in addition. Some reserved parking may be required for emergency use or key staff, but this is likely to be small in view of overall precinct parking requirements.

Some adjacent parking may be needed to accommodate shift workers that arrive or leave the hospital late at night or in the early morning. Again, this is likely to be small in view of overall precinct parking requirements and can be managed as necessary. Crucially, this does not contribute to peak hour travel movement.

Use the Schedule to the Parking Overlay to control when maximum parking rates can be exceeded

Rather than attempting to prescribe a parking rate for anchor land uses, decision guidelines and design standards can be specified within a Schedule to the Parking Overlay to control instances whereby it is possible for a development to provide parking in excess of the maximum parking rate.

In evidence for the West Melbourne Structure Plan, a supermarket was used as an example of when it may be appropriate to exceed the maximum parking rate. To ensure:

- There is no available parking within 400m of the site.
- The extent to which the development provides for bicycle or motorbike parking.
- The extent to which the sustainable travel is incentivised
- Whether any parking that is built can later be adapted to lettable floor area.
- The development is otherwise unviable without the extra car parking.

The ability to exceed the maximum parking rates is a standard inclusion in a Schedule of this nature. It is in the CCZ parking overlay, for example. It provides a level of flexibility to seize an opportunity that is otherwise not permitted, acknowledging that those opportunities should be the exception.

On this basis, land use parking needs within the precinct can be adequately served by the proposed maximum parking rate, or managed through decision guidelines in a Schedule to the Parking Overlay.

[1] Arden Retail Demand - Deep End Services, Dec 2018

5.2 ON-STREET PARKING, PARKING FOR PEOPLE WITH DISABILITIES AND VISITOR PARKING

In addition to off-street parking, Arden will be supported by on-street parking that will allow for pick-up and drop-off, deliveries, other loading needs and access for vulnerable user groups.

On-Street Parking

Existing On-Street Parking

Road projects to accommodate tram services and increased provision for active travel, will result in a reduction in parking on several roads within the precinct.

Existing on-street parking spaces within the three sub-precincts is currently as follows:

- **Arden Central**: 93 spaces
- **Arden North**: 176 spaces
- **Laurens Street**: 288 spaces

Review of typical road cross-sections indicates the following outcome is possible, but is subject to further design:

- **Arden Central**: negligible on-street parking reduction
- **Arden North**: reduction of 50% on-street parking
- **Laurens Street**: reduction of 50% on-street parking

Given Arden Central and Arden North are to be entirely redeveloped, the reduction in on-street parking in these areas is unlikely to be problematic. However, the current mix of land uses currently at Laurens Street means it will likely rely on the current parking levels for longer. The road improvements within the Laurens Street precinct could result in the reduction of half the on-street parking (150 parking spaces).

Removal of these spaces should result in at least the number of current parking permitholders being able to park either on-street or within the a hub car park.

Loading Vehicles

As set out in Part 2 Section 4.2, there will be a need for approximately 100 loading vehicle spaces across the precinct. These should be located on the basis of land use intensity, using the rates noted in Part 2 Section 4.2.

General Vehicles

Local streets within Arden are planned to give priority to active modes and public transport.

A level of on-street parking supply will be required to gain close access to buildings, particularly residents carrying heavier items; however, on-street parking should be minimised throughout the precinct.

This aim can be achieved through a design basis for no on-street parking unless there are compelling reasons why it should be provided.

On-Street Parking Controls

All on-street parking used by general vehicles should be time-restricted paid parking, with limits generally no more than 30-minutes.

Parking for People with Disabilities

Parking for people with disabilities should be provided in accordance with the National Construction Code / Building Code of Australia.

This parking should be designed in accordance with AS2890.6, Clause 52.06 of the Melbourne Planning Scheme and relevant overlays.

Consideration should be given to providing on-street parking for people with disabilities close to building entrance doors to minimise walk distance and parking stay time.

Visitor Parking

The subject site largely falls within the Principal Public Transport Network area, meaning the parking rates in Column B of Table 1 to Clause 52.06 of the Melbourne Planning Scheme apply.

For residential visitor parking, the “Column B” rate is zero car spaces per dwelling. This is on the basis that “Column B” rates represent the typical peak demand of an activity centre, not individual land uses.

Consequently, it is difficult to mandate a particular parking rate for visitor parking when the state-wide policy is that none should be provided in an activity centre setting.

Nonetheless, with the peak parking demand for the land uses in Arden occurring at 10am on a weekday morning, there is likely to be significant visitor parking availability by 12pm, with availability increasing throughout the afternoon.

Visitors can therefore be permitted to use available parking in the consolidated car parks, but it is likely that visitor access will need to be restricted to outside of peak demand periods, likely weekday mornings.

5.2 BICYCLE PARKING, ELECTRIC VEHICLE PARKING, CAR SHARE AND RIDE HAILING SERVICES

The success of Arden will depend on residents and employees having access to bicycle parking for journeys. The planning of the precinct should also allow for established as well as emerging forms of vehicle transport.

Bicycle Parking

Statutory Assessment

Current statutory rates for bicycle parking are set out in Clause 52.34 of the Melbourne Planning Scheme. Example rates that could apply to the proposed land uses are:

- 1 space to each 5 dwellings for residents
- 1 space to each 10 dwellings for visitors
- 1 space per 300sqm for office employees
- 1 space per 1,000sqm to office visitors

These rates result in:

- 2,050 spaces for 6,820 residential dwellings
- 3,450 spaces for 790,888sqm of other land use.

Recommended Bicycle Parking Provision Rates

Clause 52.34 rates are low by contemporary standards. It is recommended that bicycle parking is provided in accordance with detailed demand studies completed for City of Melbourne. This will align bicycle parking with projected growth and the sustainable transport aims of the precinct. The recommended rates are:

Table 5.5 Bicycle Parking Rates

Land Uses	Employee/Resident	Visitor/Customer
Residential	1 per bedroom	2 per 5 dwellings
Commercial	1 to each 100sqm NFA	4 minimum, plus 1 to each 100sqm NFA

Source: Phillip Boyle & Associates, Off-street Bicycle & Motorcycle Parking Review, March 2016.

End of Trip Facilities

End of trip facilities are to be provided in accordance with Planning Scheme Clause 52.34, or as otherwise recommended by and ESD consultant. Such facilities should be provided at locations that are convenient and designed using CPTED principles.

Implementation

The bicycle parking rates could be implemented within the Parking Precinct Plan.

Car Share

While it is known that a car share car can replace 7-10 individually owned cars, it is difficult to gauge demand for this service in a precinct parking scenario; however, it is noted that proposed Amendment C376 requires 4% of total parking to be car share spaces.

While car share services enable people who don't own a car to use one from time-to-time, the maximum parking rates in this assessment assume a 10% mode share. If car share is provided in addition to the maximum car parking provision, it risks undermining the mode share goals.

Car share should therefore be provided within the overall maximum supply of car parking.

Amount of Car Share Parking

This is difficult to forecast - specific car share studies and others carried out for City of Melbourne are silent on a rates of provision.

Currently, Melbourne's target of 2,000 car share spaces is about 1% of the total parking supply in the City (over 200,000 spaces).

Research in San Francisco, which has quite progressive parking policies and management systems such as SF Park, require car shares spaces be provided as follows:

- a rate of 2% of all dwellings
- around 3% of parking supply for all other uses.

For the proposed land uses in Arden, this works out at:

- 6.5% of resident parking demand (resident parking demand being 2,050 spaces, and 2% of c. 6,800 dwellings being 136 spaces)
- 75 car spaces for all other uses (3% of parking demand)

For Arden overall, these rates work out at around 5% of the overall parking demand (211 spaces out of an overall demand of 4,550 spaces)

A rate of 5% is a reasonable and progressive starting point. More can be allocated within the on and off-street public parking supply, noting car share companies are market-driven and will want to access more supply if there is latent demand.

Implementation

Provision of car share vehicles could either be:

- Developer led and funded
- Initiated by a car share operator, if there is a surplus of parking spaces to the maximum allowable for the land use.

Locations

- Close to intersections to maximise catchment
- Away from commercial/residential frontage where possible
- Place at the end of parking lanes
- Do not co-locate unless warranted by demand.

Electric Vehicles

The sustainability target for Arden is to be a net zero greenhouse gas emissions precinct. The date for meeting this target in Arden has not been set; however the City of Melbourne has set a target date of 2040 for the whole municipality to be net zero. It is reasonable to assume that Arden will be similarly aligned.

The price of an electric vehicle is expected to be comparable to a petrol / diesel car by 2025, due to advances in battery and powertrain technology.

The success of Arden will depend on residents and employees having access to bicycle parking for journeys. The planning of the precinct should also allow for established as well as emerging forms of vehicle transport.

Given these two considerations, it is reasonable to plan to eventually fit 3-phase power to enable fast charging, requiring:

- car parks to include means to supply the wiring and outlets to all parking spaces
- at least 20% of on-street car spaces, and all on-street car share space to be provided with charging capability, similar to requirements set out in Amendment C376.

Ride Hailing Services (Uber, Lyft, DiDi, public hire taxi's etc.)

There is a temptation to try to accommodate these vehicles as a separate user group and provide parking for them. It is not necessary to do this, at least not to the extent where all demand for these vehicles would be served by providing enough parking for them.

A simple solution is offered by Jeff Speck in his book *Walkable City Rules*: designate the length of kerb between the last parking space on the block and the street corner as a ride hailing zone. Individual pick-up / drop-off's take a short length of time, so the waiting car does not present an impediment to traffic flow for very long. This is unlikely to be a problem on low-traffic streets in Arden and it saves having to provide dedicated parking spaces for these vehicles.

PRECINCT PARKING STRATEGIES

This section shows that consolidated car parking, while efficient, will need public sector delivery and management, at least until the value of the model is accepted by the private sector.

Part 2

06

Evidence Base

6.1 PARKING SUPPLY SCENARIOS

There are numerous options for the location, construction, management and operation of car parking supply, each of which has its own advantages and disadvantages. These factors are considered here and in the pages that follow.

Parking Provision Characteristics

Car parking can be provided:

- on-street
- off-street (either on or off-site).

On-street parking often the most convenient and attractive parking for visitors to developments. It can be shared between multiple land uses, particularly if land uses have peak parking demands at different times of the day.

On-street parking takes up street space that could be put to better use and is therefore likely to be limited in Arden. New residents will not be given on-street parking permits. Thus it is likely to play a more critical role in respect to pick-up / drop-off, loading and servicing.

Off-street (on-site) car parks provide parking for the land uses they support. Historically, planning conditions have been imposed that requires parking to be available in perpetuity for that land use. This creates an inefficiency by "partitioning" the parking supply, making parking spaces available only for a subset of people seeking a space.

This inefficiency can be addressed by unbundling car parking from the land use as described on Page 55, and making parking spaces available to the market, irrespective of the destination of the end user.

Fully decoupling the user from the "ownership" or "allocation" of individual spaces, further extends this efficiency by initiating a "right to park" only.

Off-street (off-site) parking operates similar to public car parks, and opens-up the full efficiency gains of shared and unbundled parking.

These facilities are costly and should be planned carefully to ensure they best serve their intended purpose and do not undermine the highest and best use of the land.

Off-street, off-site spaces can be leased on a monthly or yearly basis from the parking operator, or strata titled and sold or leased via long term multi-year leases (5-50 years) or charged on a per use per day basis.

Should a new public off-street car parking facility be required, consideration must be given to the following:

- Can such facilities be appropriately located?
- How would such facilities be funded?
- Can such facilities be located in a way to serve the areas where developments are to be located?

User Group Parking Provisions

The type of parking best suited to each user groups needs is set out in Table 6.7 overleaf.

The analysis in Table 6.7 indicates that while demand for on-site parking is likely to be strong, as this is how most parking is currently provided, there is an opportunity to accommodate parking for many user groups in off-site parking.

It is noted that on-street parking could be used to satisfy a number of user groups needs, but in the context of Arden, on-street parking is planned to serve short-term drop-off, pick-up and loading activities.

The management of on-street parking should be considered when preparing the Parking Precinct Plan.

Other Parking Management Approaches

Parking management approaches will need to be considered in addition to the supply of parking in Arden:

- A **smart parking** management system allocates and prioritises parking by time restriction and to higher-priority user groups
- **Paid parking** will be needed to achieve the targeted mode splits by managing parking demand.
- **Wayfinding signage** can minimise vehicle circulation and road network congestion, which can be up to 30% of vehicle movement in an activity centre.

6.1 PARKING SUPPLY SCENARIOS

A good precinct parking strategy considers the intended outcomes, beginning with objectives in the form of end-user preferences and requirements, and the type of parking that can best meet these objectives.

Table 6.7: Arden User Group Parking Characteristics

User Group	User Type	Length of Stay	Walk Distance [1]	Parking Type Able to Serve User		
				On-Street	On-Site	Off-Site (Off-Street)
Residential	Families	Long	Adjacent		✓	✓
	Group households		Medium		✓	✓
	Lone households		Medium		✓	✓
	Couples		Medium		✓	✓
	Visitor	Various	Short	✓	✓	✓
Retail	Staff	Long	Long		✓	✓
	Customer	Short	Short [2]	✓	✓	✓
	Loading	Short	Adjacent	✓	✓	
Commercial	Staff	Long	Long		✓	✓
	Customer	Various	Short		✓	✓
	Loading[3]	Short	Adjacent	✓	✓	
Education	Staff	Long	Long		✓	✓
	Students	Long	Long		✓	✓
	Drop Off – Pick Up	Short	Adjacent	✓	✓	
Services Economy	Staff	Long	Long		✓	✓
	Visitors	Various	Adjacent – Short (typically)	✓	✓	✓
	Loading[3]	Short	Adjacent	✓	✓	
People with disabilities	N/A	Long	Adjacent		✓	

[1] Adjacent = Less than 50m, Short = Less than 250m, Medium = less than 400m, Long = less than 500m
[2] Depending on customer type
[3] Loading could also be consolidated for these uses, with deliveries made by smaller vehicles, by bike or on foot

6.1 PARKING SUPPLY SCENARIOS

Parking can be provided separately for each land use, in common facilities but with individually allocated spaces, or in a fully shared facilities in which people pay for a "right to park" in the facility only.

Car Parking Supply

Parking Demands

In summary of the previous sections, the required parking supply based on the recommend parking rates for individual land uses is:

- 2,500 car spaces for employees
- 2,050 car spaces for residents.

In a business as usual scenario where parking is separated by land use and individual ownership of spaces, the parking requirement is **4,550 car spaces in total**.

Parking Supply Considerations

Parking can be provided in the following ways:

- **Ownership**:
  - Allocated (bundled or unbundled)
  - Unallocated (unbundled)
- **Location**:
  - Individual buildings
  - Consolidated facilities
- **Construction**:
  - Above-ground parking (surface or multi-level)
  - Basement parking
- **Management**:
  - Private sector (parking operator, body corporate)
  - Public sector (public parking stations)

Each of these aspects is explored in the follow sub-sections.

Parking Ownership

Allocated Parking

A fully allocated parking system provides users with their own parking space, or pool of parking in the case of typical employee parking provision.

Allocated parking can result from bundling or unbundling of parking from the land use.

The allocation of parking by land use does not permit sharing of parking. This is important for Arden as the residential and employment land uses have different parking usage profiles throughout the day, but the allocation doesn't permit shared use of the empty spaces.

This is a business as usual scenario, therefore requiring **4,550 car spaces in total**. This is the case whether the car parking is provided in consolidated facilities or individual buildings.

Unallocated Parking

The inefficiency created by allocated parking can be overcome by separating the land use from the "right to park" in a particular space or group of spaces.

This effectively involves unbundling the parking from the land use, as car park users cannot own individual spaces.

Exploring Unallocated Parking

Temporal Profile

The temporal profiles of parking demand can be used to accommodate parking on a first-come, first-served basis. For the proposed land uses, GTA research indicates the peak parking demand occurs at 10-11am on weekdays:

- 55% of maximum residential demand
- 100% of maximum employment demand

Accounting for Dwelling Vacancies

In an unallocated parking scenario, the actual expected number of cars can also include the dwelling vacancy rate.

ID data[1] indicates that around 10-15% of dwellings in City of Melbourne and in the Melbourne CBD are vacant. This trend is expected to continue out to 2041, where the ID forecast ends.

6,150 apartments would be occupied out of 6,820 in Arden, if the vacancy rate is 10%, consistent with City of Melbourne averages.

Total Precinct Parking Requirement

The full efficiency gain across the precinct is only realised if all parking is unallocated. A mixed approach could be adopted but this will result in more car parking being required.

If all parking is unallocated across the precinct, the total peak parking requirement at a precinct level is:

- 2,500 employee car spaces (100% at 10am weekdays)
- 1,015 resident car spaces (6,820 x 0.3 x 55% x 90%)
- **3,515 total car spaces**

Unallocated parking could **save approximately 1,000 car spaces** across Arden.

[1] https://forecast.id.com.au/melbourne/population-households-dwellings?WebID=140&Year2=2026&Year3=2041

6.1 PARKING SUPPLY SCENARIOS

The location of where parking is provided can have influence on the likelihood to share parking within the precinct. The type of parking structure has cost and urban realm trade-offs which should be further investigated.

Location

Individual buildings

This is a business a usual scenario.

Developers secure typically parking for residents or tenants by directly providing parking in individual locations as they are built.

Sharing of parking is possible, but developers will try to match the amount of parking provided to the likely demand of the building occupants.

This results in:

- less likelihood of the benefits of shared parking being realised,
- greater likelihood of more vehicle crossovers at footways
- use of prime land for car parking
- reduced housing and floor area rental affordability (due to greater likelihood to provide more parking)

Consolidated facilities

To understand the benefits and drawbacks of consolidated parking, GTA has reviewed three case studies themes, which are explored in detail on the pages that follow, these include:

1. Urban renewal precincts
   - Battersea, London, UK
   - Vauban, Freiburg, Germany
2. City-wide car parking management
   - Barcelona, Spain
3. Victorian model
   - Edward Street Car Park, Bendigo

Across the three case studies the key themes are:

- Parking precinct stations can be effectively used to support a shift to more sustainable travel.
- Parking precinct stations appear to be an effective tool to improve urban realm outcomes, such as reduced use of prime land, fewer vehicle access points.
- Parking precinct stations are do not often operate a full cost recovery model, emphasising the need for Government leadership in current models.

Additional detail on potential locations of precinct car parks for Arden is discussed later in this section of the report.

Construction

Above-Ground Parking

Surface-level or multi-deck structures can be a cost effective way to provide large amounts of car parking. Above-ground parking structures cost around $30-40,000 per space[1]. It can also be a solution in response to adverse ground conditions or flooding that makes basement parking unviable.

There are some drawbacks to providing above-ground parking in a general sense, including:

- Imposition of parking structure on the streetscape
- In a height-constrained precinct, using building levels for parking without the ability to build additional levels to compensate results in the suboptimal use of land.

It is noted that surface car parks on undeveloped land could serve an interim role in provided cost-effective early parking supply for the precinct. This must be carefully planned to ensure the objectives of sustainable travel are not undermined by releasing too much available land for surface car parking.

Basement Parking

While more costly on a per space basis than above-ground parking ($45-75,000 per space[1]), basement car parking overcomes the disadvantages noted for above-ground parking. The result is a car park that, but for its accessway, is hidden from view, and does not impose limitations on the floor area that can be delivered above ground.

Which option is better suited to Arden?

A full appraisal of the relative merits and full-life costs of each type of parking would be needed to make an informed choice on the type of parking structure preferred for Arden.

There is theoretically no difference in the amount of parking that can be provided in either case; therefore, the decision comes down to a balance of other factors.

Inputs to this type of study may include (but are not limited to):

- Cost of parking structure
- Differences in developable area yield
- Development values
- Architectural appraisal
- Environmental and ground constraints

These activities are outside the scope of this study but could be explored through a Parking Precinct Plan.

Given the amount of parking involved, a full business case is likely to be needed, with regard to triple-bottom-line outcomes.

[1] RLB Intelligence Construction Cost Indicator (link) accessed by GTA in October 2020.

Private sector management of parking covers a range of operational models. Public sector management, in the Arden context, is likely to be limited to provision and operation of public parking stations – lending itself to driving a shared parking approach.

Management

Private Sector

Car parks that are managed by the private sector can be broadly classified into two forms:

- **Open to the public**, such as a city centre parking station, operated by a specialist car parking management company
- **Fully private**, such as an apartment building or office car park – managed by a body corporate or building management company.

Public Sector

Car parks operated by the public sector, as applicable to Arden, are typically consolidated parking stations, providing public parking for an activity centre along with allocated parking for businesses and residents.

The Edward Street Car Park, Bendigo case study provides an example of publicly operated parking at a precinct level. It is noted that while a fully direct cost-recovery model is unlikely, the public sector can act to extract wider benefit for a precinct, such as:

- urban realm improvement; or
- use of land that is less attractive to private development

Which option is better suited to Arden?

The preferred management mechanism for Arden will depend on whether consolidated parking is chosen as the overarching parking strategy. It is possible for either the private sector or public sector to manage a consolidated parking facility, but the public sector is likely limited to only this approach. Public sector involvement therefore lends itself to driving a shared approach to parking.

Possible scenarios for either public or private sector management are discussed in further detail in separate part of this section.

Summary of Parking Supply Scenarios

The amount of parking required for Arden depends on

- Ownership
- Location
- Construction
- Management

Of these factors, location and management factors have some influence on supply, but their influence is borne out of a broader choice to implement precinct-level parking and the degree to which parking can be shared in the precinct.

The construction of either above ground or basement car parks, merits further investigation beyond this study.

Chiefly, it is the ownership of parking that has the greatest influence on parking supply. Without breaking the link between allocated individual residential parking spaces and employee pooled parking, there cannot an efficiency gain beyond simply reducing the car parking supply to match the mode share target.

Possible car parking supply outcomes are therefore:

- **Fully allocated:** 4,550 car spaces
- **Unallocated**: 3,515 car space

A combined scenario would deliver between the above noted levels of parking supply.

6.2 CASE STUDIES – URBAN RENEWAL AREAS

The case studies show that car parking management can be an effective tool in controlling vehicle demands and extracting planning gain for urban areas, similar to the benefits sought for Arden. Four examples are provided, across three key themes.

Battersea Power Station, London, UK

Battersea Power Station is located on the Thames just outside of central London. Relative to CBD, its location is similar to Arden. Parking is consolidated with retail in basement level 1 and 2, and private, residential and hotel parking in basement level 3.

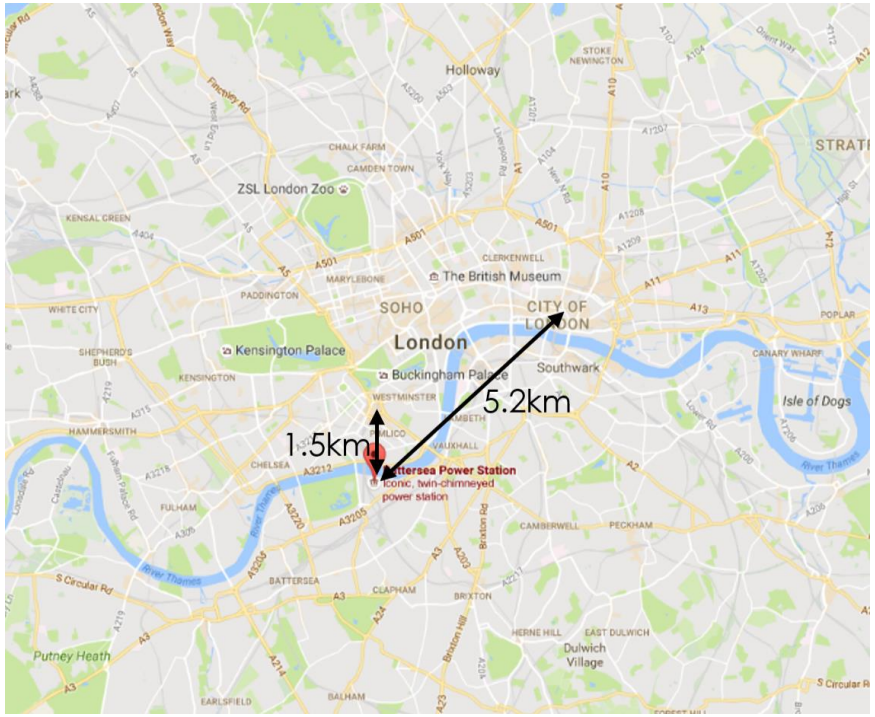


Table 6.8: Battersea Power Station, London, UK

Scale of development	Parking policy	Outcomes for transport and urban development
• 3,444 units across the whole Battersea Power Station site • Expensive apartments in an upmarket area that are targeting the wealthy • Single-owner large complex site, which has been under redevelopment for 10years • Sits between London's most wealthy and most deprived areas • Served by rail into central London, but no connection to the Underground system.	• 1,500 parking spaces • 6,519 cycle parking spaces **London Plan policy:** • all developments in areas of good public transport accessibility should aim for significantly less than 1 space per unit • Like all planning applications in London, Public transport accessibility is based on a London wide modelling tool. • 20 per cent of all spaces must be for electric vehicles	• Council approved increases in retail parking. Transport for London were satisfied that it is acceptable given the wider role it plays in supporting the viability of the development • An application for an increase in residential parking was not supported as: • the development is linked to the delivery of the London underground extension and this needed to be the priority. • impact on surrounding road network.

Managed car parks are common, but there are fewer examples of consolidated car parks that are used to offset the requirements of a development. The most common PPS are in eco-residential developments where parking restrictions are an element of the wider eco-philosophy applied to the whole development.

Vauban, Freiburg, Germany

Vauban is a neighbourhood to the south of the town centre in Freiburg, Southern Germany.

Figure 6.3: Vauban, Freiburg, Germany

Source: Google

Table 6.9: Vauban, Freiburg, Germany

Scale of development	Parking policy	Outcomes for transport and urban development
• 5,500 inhabitants, of which 2,000 are students • Approx. 825 car spaces • Vauban is a planned suburb that has complete consideration of eco values	• Vauban prohibits the building of parking space on private property. Cars are parked at the periphery of the residential area ("parking-free" living). Cars are allowed into the residential area for pick-up and delivery. Low speeds are mandatory (walking speed) • Residents pay ~$30,000 AUD for a space in an underground carpark on the edge of the development, or those that choose to live car -free pay ~$6,000 to preserve open space on the edge of the development	• Vauban residents own 150 cars per 1,000 inhabitants, which is low compared to 420 per 1,000 for the City of Freiburg (Melbourne is 600 per 1,000) • City of Freiburg divided land into small lots and to allocate it in preference to private builders and co-housing groups.

Barcelona is widely acknowledged as an example of best practice in achieving transport policy gains through city-wide management of parking.

Barcelona, Spain

Barcelona, Spain's second largest city is home to 1.6 million people within the city limits. The city is known for its innovative transport policy and has a high proportion of active travel and 20% car mode share.

Figure 6.4: Barcelona, Spain

Barcelona is particularly relevant for Arden as the parking management scheme is closely controlled by Government (or quasi-public statutory authority).
Car parking is managed to achieve holistic outcomes. The parking policy aims to reduce the amount of on-street parking and then reallocate this space to sustainable modes.

Table 6.10: Barcelona, Spain

Scale of development	Parking policy	Outcomes for transport and urban development
• Parking is managed by B:SM, the city-owned Barcelona Municipal Services company. • B:SM construct and manage all spaces the average cost to construct an off-street parking space is ~$40,000 to the construction company. Commuters buy season tickets for about $200 a month. • Approximately 13,000 spaces in 39 different car parks.	The agency constructs off-street facilities who lease spaces exclusively for residents. Most residents lease a space for 50 years. • Management focused on: • decreased traffic looking for free parking and is acting as a deterrent for the use of car too. • On-street parking consumed too much space so D:SM reduced spaces in lieu of off-street spaces • City design forces traffic to move along the periphery of super-blocks and parking inside the zone is prohibited	• Barcelona has 20% private car use. • The streets of Barcelona have been transformed and now prioritise walking, cycling and place functions. • All the revenue generated by parking fees pay for operation and maintenance of a bike-sharing scheme. • The price depends on the location of facility. A monthly space is $150-200[1]

[1] http://www.aparcamentsbsm.cat/aparcar-al-millor-preu/aparcar-al-millor-preu/cercador/

6.2 CASE STUDIES – VICTORIAN EXAMPLE

There are several examples in Victoria where cash-in-lieu of parking is implemented within a local planning scheme to fund consolidated car parking. Council then becomes responsible for providing and managing the car parking associated with the cash-in-lieu agreements.

Edward Street Car Park, Bendigo

A number of cash in lieu schemes exist within various Victorian Municipal Planning Schemes, allowing developers to contribute to the construction of public car parking in lieu of on-site provisions. These typically relate to customer and staff parking, and do not result in specifically allocated parking provisions. They rely on Council being responsible for the provision of car parking.

In order to make it attractive for developers to contribute to such facilities, the contribution value is very rarely set to achieve full cost recovery, resulting in Council's requiring to input significant contributions to these facilities.

Figure 6.5: Edward Street Car Park, Bendigo

Table 6.11: Edward Street Car Park, Bendigo

Scale of development	Parking policy	Outcomes for transport and urban development
420 space public car park primarily serving casual customers. A retail and commercial consolidated parking scheme.	A parking overlay is applied through Clause 45.09 of the Planning Scheme, 'Promotes a vibrant and efficient use of urban space, encourages sustainable transport options and reflects the conditions, opportunities and needs of the area'. The car park was constructed by Council to serve future development and allow for on-site parking reductions in lieu of cash contributions. A cash contribution of $10,600 per space is required which equates to in the order of one third of the overall construction cost per space. The City of Bendigo paid the remaining cost of the car park.	The parking station appears to have limited benefit to transport outcomes at this time. Its key benefit is the ability for smaller sites to be redeveloped with limited on-site parking, to enhance site value capture. It provides council with the potential to redevelop surrounding at grade parking assets for highest and best use. The repayment of the asset will primarily come from the ground level commercial and retail tenancies as compared with parking charge.

[5] http://www.aparcamentsbsm.cat/aparcar-al-millor-preu/aparcar-al-millor-preu/cercador/

6.3 PRECINCT PARKING

This section explores options for a precinct-level approach to parking management, including a review of parking locations and the possible outcomes for parking supply and management.

Objectives of Car Parking Management

Precinct parking approaches can be developed to achieve a range of outcomes. It is important to understand the problem at the outset and to develop a set of objectives by which to assess different approaches and outcomes.

User Group Preferences

The car parking users identified in Table 6.2 each have differing user preferences, and in some cases requirements, which govern the way in which car parking will be required to be provided.

Table 6.12: Identifying Problems and Objectives

Problems	Objectives
Transport demand – the target for Arden for 90% of journeys are to be made by public transport or active travel.	• Use car parking management as a means to reduce vehicle kilometres to improve the local environment. • Use car parking management as a way to promote walking, cycling and public transport, making Arden easy to get around.
Urban design – number of vehicle accesses points/footway crossovers, and the size and imposition of large parking structures on the urban fabric.	• Ensure site frontages are not dominated by car parking. • Ensure car parking does not dominate the landscape. • Provide greater flexibility in road and street design to cater for active modes and urban activation.
Development efficiency – small sites that can be developed are not always large enough to house even a small amount of parking, resulting in inefficient parking solutions such as car lifts and stackers, which are unattractive to end-users and can harm viability.	• Ensure that a parking opportunity is available for sites that would be otherwise unable to accommodate parking. • Generally ensure development is not constrained by the need to provide car parking.
Resilience – the system should not build-in obsolescence, it must be able to respond to changing transport and technological trends.	• Provide flexibility to accommodate changing demands over time.
Right-sizing supply – determining the correct number of spaces to provide and aligning developer and end user expectations on the "ownership" of car parking spaces and how this can lead to greater efficiency and a fairer "user pays" system.	• Ensure that all those who have paid for the right to park can find a parking space in the precinct at all times. • Provide fallback solutions for periods of high demand. • Minimise car parking overspill into the surrounding on-street network.

These preferences are dictated by a number of variables, including, but not limited to:

- Walking distance tolerances between parking location and destination.
- Willingness / ability to own a car and purchase a parking space.
- Price sensitivities.
- Ability to interact with technology.

Among these factors, it is the walk distances that can generally held constant. An acceptable walk distance depends on:

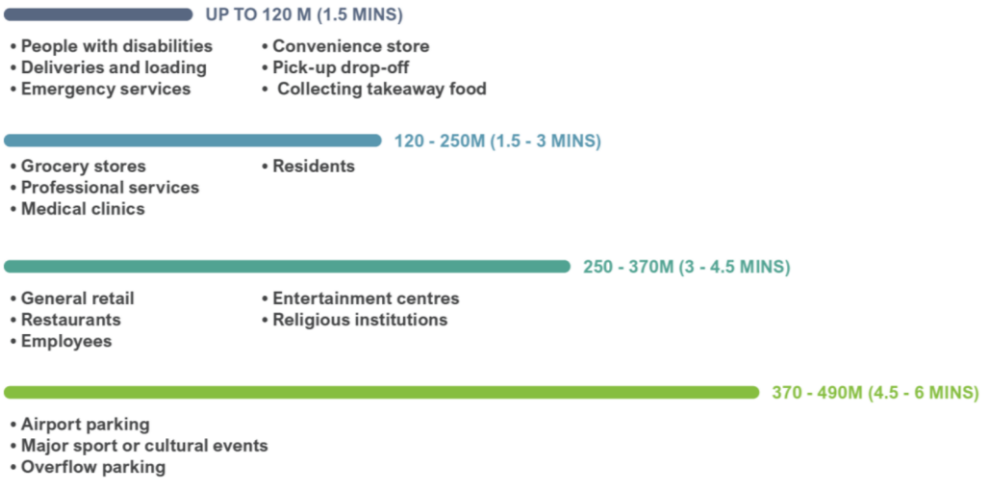
- the length of time that will be spent at a destination,
- the length of car trip car trip
- the quality of the pedestrian environment, climate, gradient, line of site (can the destination be seen?)
- Friction and barriers, such as crossing busy roads.

Figure 6.6 shows walking distances for various activities.

6.3 PRECINCT PARKING

A good precinct parking strategy considers the intended outcomes, beginning with objectives in the form of end-user preferences and requirements, and the type of parking that can best meet these objectives.

Figure 6.6: Willingness to Walk for Parking



Source: Victorian Transport Policy Institute (Canada) paper, Shared Parking, Sept 2007

These walking distance tolerances have been applied by GTA to the user types previously identified, to provide a basis to consider the type of parking facility that will be required to serve each user group. This is shown in Table 6.13.

The current Victorian convention is that resident parking is provided adjacent to housing, but as densities increase, the position of parking relative to dwelling is likely to be reconceptualised.

It is worth noting that these user groups expect or require adjacent parking:

- Residential, e.g. Families and Disabled.
- Drop-off and pick-up
- Loading, e.g. Retail, Commercial.
- Visitors and customers related to the service economy.

Table 6.13: User Group Parking Characteristics

User Group	User Type	Length of Stay	Walk Distance [1]
Residential	Families	Long	Adjacent
	Group households		Medium
	Lone households		Medium
	Couples		Medium
	Visitor	Various	Short
Retail	Staff	Long	Long
	Customer	Short	Short [2]
	Loading	Short	Adjacent
Commercial	Staff	Long	Long
	Customer	Various	Short
	Loading[3]	Short	Adjacent
Education	Staff	Long	Long
	Students	Long	Long
	Drop Off – Pick Up	Short	Adjacent
Services Economy	Staff	Long	Long
	Visitors	Various	Adjacent – Short (typically)
	Loading[3]	Short	Adjacent
People with disabilities	N/A	Long	Adjacent

[1] Adjacent = Less than 50m, Short = Less than 250m, Medium = less than 400m, Long = less than 500m
[2] Depending on customer type
[3] Loading could also be consolidated for these uses, with deliveries made by smaller vehicles, by bike or on foot

6.3 PRECINCT PARKING – SCENARIO 1

Access to car parks should not undermine the pedestrian priority street network. Placing all off-street parking in hub car parks accessed from peripheral roads, reduces the number of access points, keeping most cars outside the pedestrian priority zone.

Precinct Parking Locations

Overview

The locations of potential consolidated car parks are shown on the draft structure plan movement network.

The most efficient scenario that produces the lowest number of parking spaces is if all off-street parking is provided in consolidated car parks and owners have a right to park but do not have an allocated space (Scenario 1).

A second scenario wherein a mix of consolidated and on-site parking is also tested later in this section of the study (Scenario 2).

A **hybrid scenario** is then investigated, noting this forms the basis of the draft parking overlay schedules for the precinct.

Land Use and User Groups

It is important to consider the location of land use and user group walking distance tolerances when determining if the location of a car park is suitable, per earlier discussion.

Figure 6.7 overleaf shows the land use distribution across the precinct, while Figure 6.8 and Figure 6.9 show approximate walk distances at 250m (short) and 400m (medium) respectively.

The following is noted:

- The majority of development is located in Arden Central while the majority of car parking is likely to be located in other sub-precincts. This is not a particular issue as walk distance coverage to car parking is suitable.
- There is a relatively isolated area of residential land use in the southwest corner of Arden Central. This is not a particular issue either, it is within suitable walking distance of a car park. It could also be **a candidate for car-free living**, concentrating these units in the most accessible location next to two train stations and tram routes. This could be supported by car share hubs located in off-street car parks.
- For residents, adjacency issues can be solved by providing on-street parking nearby (for short-term use by families) or by locating particular dwelling units in apartment buildings that contain car parking (for people with disabilities, accessible units for elderly residents etc.).
- Similarly, for non-residential land uses, suitable on-street parking next to the land use solves the adjacency issue for people with disabilities and other necessities, such as deliveries.

The locations of car parks are generally acceptable on this basis.

Parking Supply at each Location

Advice from the VPA is that a hospital is likely to be located on the lot marked for institutional use (Arden Central, northwest parcel, see Figure 6.7 overleaf). It is understood a hospital would require up to. 1,100 parking spaces. This should come from the parking budget for the precinct. Some reserved parking may be required for emergency use or key staff, but this is likely to be small in view of overall precinct parking.

The recommended amount of parking at each location is based on the above hospital requirement and the location of the car parking within the precinct, relative to land use:

- **Arden Street (w)**: 1,250 spaces
- **Arden Street (e)**: 1,000 spaces
- **Dryburgh Street**: 750 spaces[1]
- **Macaulay Road**: 500 spaces

This should act as a general guide to parking in these locations, not as a hard-and-fast requirement.

[1] This car park may need to additionally accommodate displaced car parking from street improvements in the Laurens Street sub-precinct, to maintain commitments to current permitholders.

Vehicle Access at each Location

Based on the above considerations, together with the proposed road layout at each car park access point, the following is noted with regard to the likely form of vehicle access:

- **Arden Street (w)**: Full movements possible, but it is the largest car park and may require a small signalised intersection to accommodate the conflicting traffic streams. This could run a short signal cycle and provide the necessary pedestrian crossing in this location, as per the movement plan.
- **Arden Street (e)**: left-in/left-out due to presence of tram reserve, bike lanes and vehicle traffic. Could optionally be signalised to deliver a pedestrian crossing location and improve safety and connectivity.
- **Dryburgh Street**: Full movements are possible at this location, with suitable design and management.
- **Macaulay Road**: Full movements are possible at this location, with suitable design and management.

To minimise crossover locations, vehicle access could be combined with a nearby minor road intersection, with access to the car park from the minor road. This would also remove access to car parks from the active façade along prime street frontages.

Any signalised intersection operations should be coordinated to ensure delays for pedestrians, cyclists and public transport users are minimised. The operation of intersections should be confirmed as part of a future stage of planning.

Importantly, vehicle access points should be designed to prioritise public transport and active travel modes.

The proposed car park locations are generally acceptable in view of the walking distances to the land uses they serve within the precinct.

Figure 6.7: Proposed Land Uses

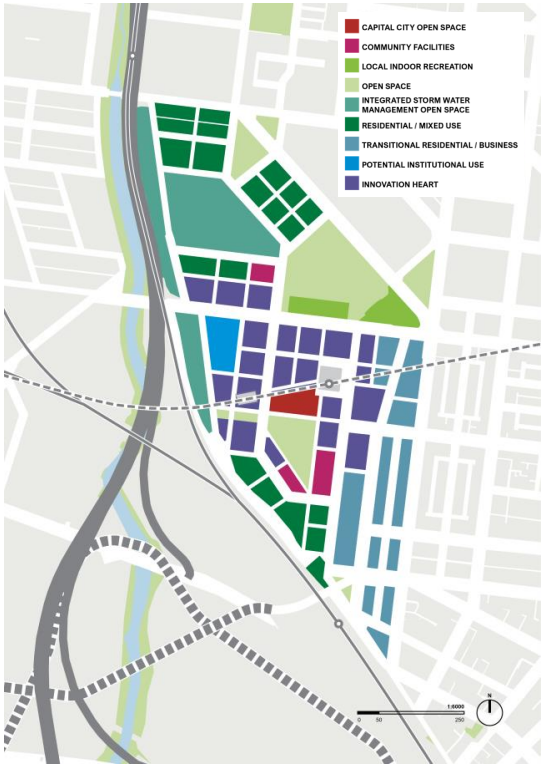


Figure 6.8: Car parking coverage at 250m walk distance

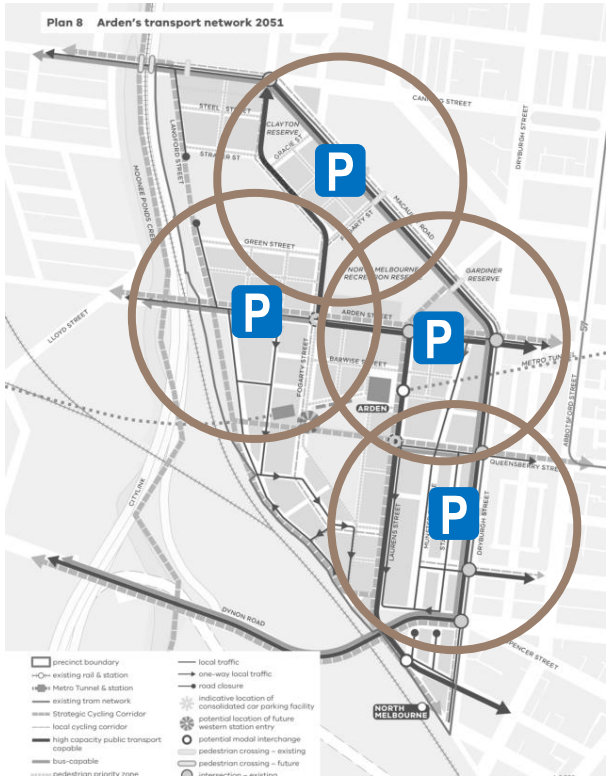
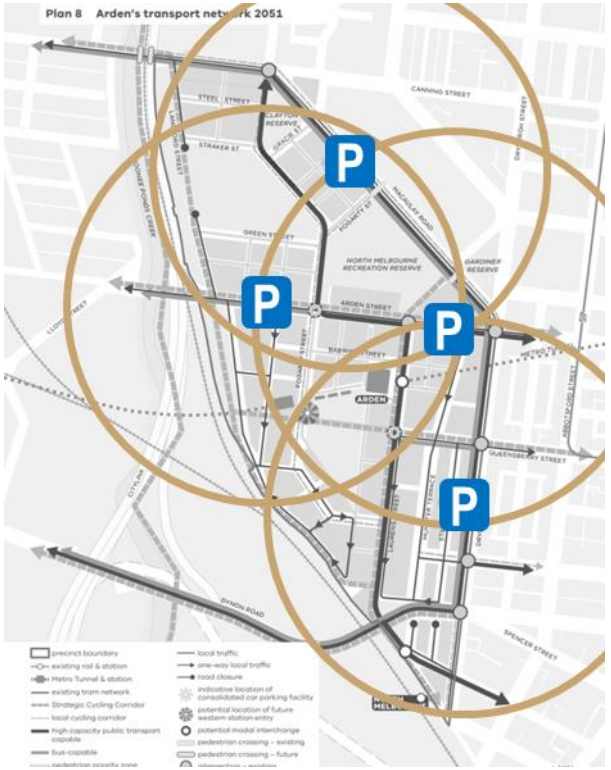


Figure 6.9: Car parking coverage at 400m walk distance



6.3 PRECINCT PARKING – SCENARIO 2

The locations of consolidated car parks on the movement plan presents some issues, that while technically feasible, are further explored in this scenario, demonstrating this type of outcome is viable and generally meets the principles of this study.

Scenario 2 Definition

This section has, at a high-level, presented a range of possible outcomes for the supply, location, construction and management of car parking.

The car park locations shown on the movement network in the draft Arden Structure plan have been assessed (forming Scenario 1); the following alternative outcomes are noted and form part of this second scenario:

- **Arden Central**
  - Locate additional parking beneath the residential buildings in the southwest of the precinct.
  - Provide access to this location through the local road network.
- **Arden North**
  - The location of the north and northeast residential blocks are relatively isolated from the rest of the precinct.
  - This lends them towards providing parking solely for those buildings.
- **Laurens Street**
  - This sub-precinct is likely to see slower development on a more incremental basis.
  - Lends itself toward providing on-site parking, allocated to individual buildings and land uses.

Parking Supply at each Location

Approximate individual land use parking demands for each area are shown on Figure 6.10. These are then translated into car parking supply in the individual locations shown on Figure 6.11 and Figure 6.12. This is based on the following:

- The supply in the southwest residential car park is constrained to the demand of those buildings, to minimise vehicle travel through the precinct.
- Residential parking in the Laurens Street sub-precinct is assumed to spread over individual development sites, rather than in a consolidated car park.
- A consolidated car park in the Laurens Street sub-precinct could be constructed to accommodate demand from employment parking demand from Laurens Street and Arden Central.
- Two sub-scenarios can be developed depending on the employment parking supply for Arden North being located either at Arden Street (w) or at Macaulay Road.

Parking Outcome

- The result is that there is more parking overall (around 4,500 car spaces, compared to around 3,500 in Scenario 1),
- The larger amount of parking is due to there being practically no opportunity to share parking as the car parks sit separate from one another but together with their land uses, for the most part.
- The walk distances become less relevant as parking is located either within or broadly adjacent to the buildings they serve.
- There is a spread of parking across the precinct rather than focusing parking on a smaller number of locations
- The car parks themselves are smaller.
- Smaller car parks can have urban realm benefits in terms of size of structure.
- There are more car parks in Scenario 2 (6 instead of 4 in Scenario 1), meaning 2 more access points, but this is not of critical significance in a precinct of this size.
- Parking on individual sites in the Laurens Street sub-precinct will create more vehicle crossovers; however, depending on development uptake, a consolidated car park could be provided in this location.
- In Arden Central, the 550-space car park would generate traffic on the local street network, perhaps 150-200 vehicles per hour – a vehicle every 20 seconds or so. This is not considered detrimental, particularly considering these local streets are not part of the pedestrian priority area and can carry low volumes of traffic quite safely.

6.3 PRECINCT PARKING – SCENARIO 2

A dispersion of parking across the precinct creates less opportunity for shared parking efficiency, resulting in slightly more, but smaller car parks compared to the fully consolidated parking scenario.

Figure 6.10: Individual Land Use Parking Demands

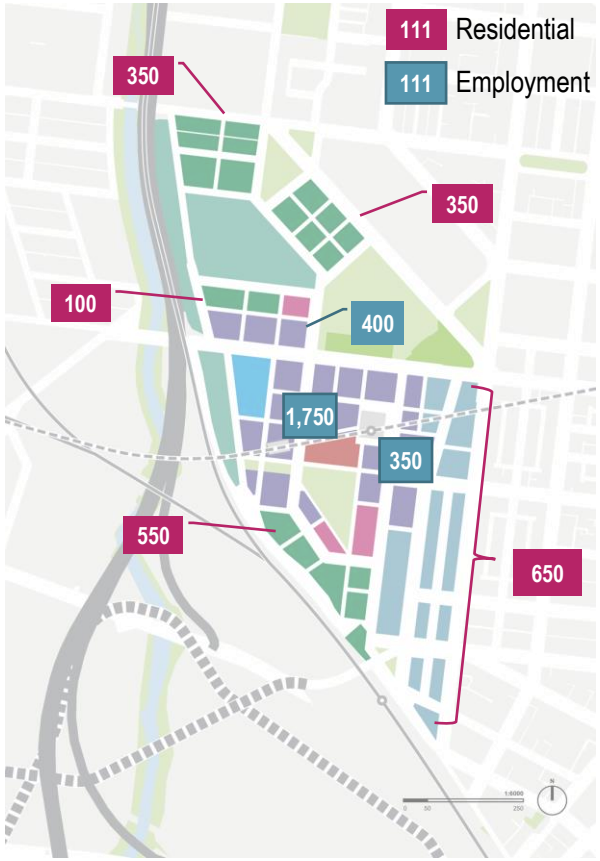


Figure 6.11: Potential Car Park Sizes (Scenario 2a)

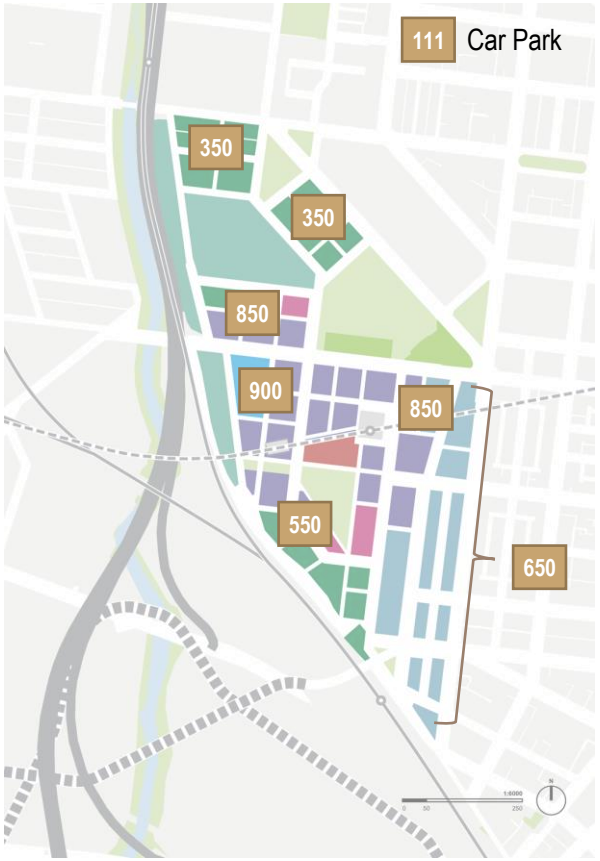
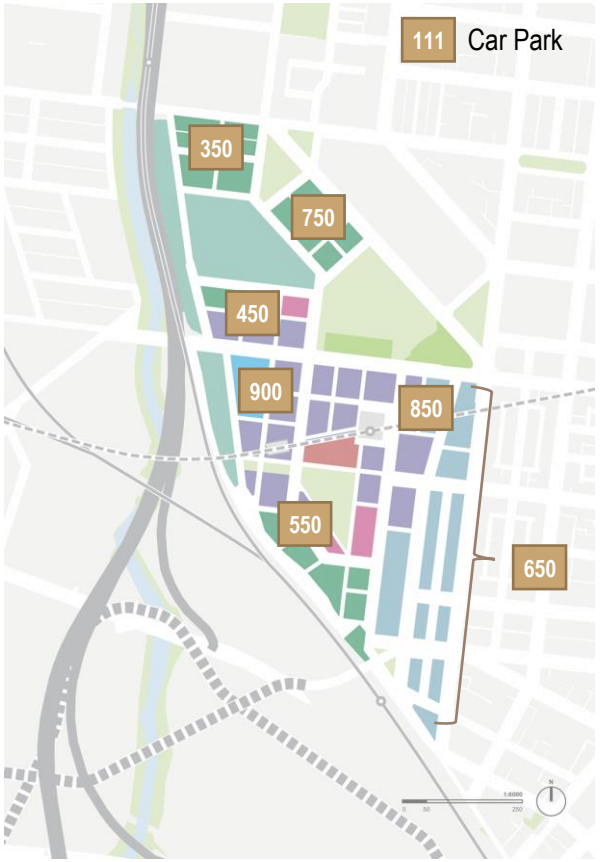


Figure 6.12: Potential Car Park Sizes (Scenario 2b)



6.3 PRECINCT PARKING – SCENARIO 3 (HYBRID)

This scenario sets the objective of consolidated parking being broadly realised within the Arden Precinct, while acknowledging that periphery development sites may need on-site parking, due to the timing and location of consolidated parking facilities.

Definition of the Problem

While consolidated car parking in some form is the preferred approach, it has two key challenges, which present a "who goes first" paradox:

- The first sites to be developed will require consolidated parking to be in place upon opening, meaning the car parks need to be built at the front-end.
- If consolidated car parks are not built upfront, but instead in response to development, then there will be a tendency to provide parking on-site for these early developments, which threatens the ultimate consolidated parking objective.

In terms of being responsible for managing parking, government agencies are reluctant to get involved in a non-funded consolidated parking facility – which raises a question of certainty. The private sector will not get involved in parking without the prospect of a return.

Further, as maximum parking rates are proposed for Arden, this would remove the ability to require developers to pay for parking in a consolidated facility (the minimum requirement is zero). Conversely, minimum parking rates would enable funding of consolidated parking but would potentially lead to the overprovision of parking, undermining the Arden Vision

Scenario 3 – A Hybrid of Scenarios 1 and 2

Technological and attitudinal change is outpacing the ability to reliably predict what will happen in the next 10, 20, 30 years or beyond. It turns out that the transport planning industry has been consistently poor at predicting the effects of what has been a historically sedate pace of change. Consensus has therefore formed around resilience as a way to handle a variety of outcomes.

Combining the best parts of a consolidated or decentralised approach to parking in hybrid scenario will ingrain resilience. This enables flexibility to respond to a wider range of eventualities as the future unfolds rather than locking-in an either/or outcome.

The hybrid scenario has the follow features:

- A preference for zero parking
- using maximum parking rates to control the amount of parking
- protecting the primacy of consolidated parking

By placing consolidated parking at the heart of the parking strategy and supporting policies, this ensures development sites within the influence of a consolidated car park will not be permitted to have parking for their sole use unless it can be demonstrated that:

- The development is otherwise not viable without providing on-site car parking
- On-site car parking can later be refurbished to provided development floor area, returning the parking into a consolidated parking facility.
- The proposed parking will itself be shared or unbundled from the attached land use in some way, to contribute to a pool of parking within the Arden Precinct.

Primarily it would be a requirement of any application to exceed zero parking to be accompanied by a viability assessment that draws in transport and commercial market analysis.to prove that parking is required, and the amount proposed is the minimum viable.

A series of application requirements and decision guidelines can be implemented to support the above outcome that a founded in the principles of this study.

It is noted that there will be instances where the maximum parking rates are exceeded, including:

- Land uses that are intentionally ringfenced for strategic purposes (such as a hospital or car park)
- Land uses that come with parking that can demonstrate parking is needed in accordance with the application requirements and decision guidelines.

Parking Supply Outcome

The intent would be to contain overall supply of parking within the bounds of the consolidated and on-site car parking outcomes set out in Scenarios 1 & 2 set out earlier in this report i.e.:

- **Consolidated (shared):** 4,550 car spaces
- **On-site (partitioned):** 3,515 car spaces

It is expected that a hybrid scenario could deliver approximately 4,000 car spaces with the Arden Precinct in the area covered by the parking overlay.

6.4 PRECINCT PARKING MANAGEMENT AND IMPLEMENTATION

Implementing PPS in Arden will need to be both directed and encouraged. Mandating PPS will slow or stifle development. Subsidising its early development, to the extent necessary to shift behaviour, places short-term responsibility on the public sector.

Management Models

For Fishermans Bend, GTA conducted an extensive evaluation of management models for the roll-out of consolidated parking.

This assessment was based on a number of factors that are difficult to analyse separately, but can be combined into scenarios that allows appreciation of how precinct parking could be managed. The factors are:

- Whether consolidated parking is mandated or not
- Policy levers, (parking rates, financial contributions etc.)
- Urban design factors
- Public/private sector mix
- Likely outcomes

These factors can be simply represented in two delivery model scenarios:

A. Private sector-led
B. Public sector-led

A SWOT analysis of each model is set our in Table 6.14 and Table 6.15 overleaf.

Recommended Model

Scenario B *Public Sector-Led* is aligned with the model of PPS being investigated for Arden. It does not preclude later transfer to private sector management.

Early involvement and investment by the public sector could be used to secure the facilities, provide certainty to the private sector, and unlock an opportunity to deliver a landmark architecture aligned to a precinct. This approach is illustrated in the Bendigo case study.

This model can also use policy incentives (i.e. increased parking allowance, reduced cost via cash-in-lieu) to promote consolidated parking. In this manner, developers are not mandated to deliver consolidated parking however, incentives are provided to encourage developers to locate parking in consolidated locations within the precinct.

Parking precinct stations may be an attractive alternative to providing car parking on site if:

- it is delivered in advance of or in parallel to development
- it is convenient to the development
- and it is available at significantly discounted cost than developing on lot.

Interim Delivery and Parking Supply Release

If this approach is adopted and the car parking is built in advance or in parallel to land use development, an interim situation could arise whereby there is more parking than is actually needed.

This could be controlled by limiting parking access permits or otherwise providing access to only the amount of parking required to support the development, having regard to parking rates set out in a Schedule to the Parking Overlay.

Management Considerations

The following considerations should be further explored in a Parking Precinct Plan as part of the future planning for Arden.

- The preferred delivery method and operational management system for the consolidated off-street parking system.
- The cost of providing the parking solution and how this can be implemented within the financial contribution controls in a Schedule to the Parking Overlay.
- Further consideration of management measures to be applied to individual streets to control overspill of parking into neighbouring precincts.
- The uptake versus current demand for permitholder parking in the sub-precincts of the structure plan area and how the reduction in some on-street parking can be managed.
- Management and control of on-street parking spaces within the precinct and how these can be used to supplement the consolidated car parks (such as during periods of high demand).

Implementation

This model could be implemented through a Schedule to the Parking Overlay, with provisions including:

- Mandating maximum parking rates outside the consolidated system
- Incentives to locate parking in the consolidated system, such as increased floor area ratios
- Financial incentives to locate parking in the consolidated system, such as reduced cost per parking space (a form of cash-in-lieu, where a developer wants parking but can save some cost if located centrally).
- Seeking design excellence as a means to gain parking credits within the consolidated system for a development site.

6.4 PRECINCT PARKING MANAGEMENT AND IMPLEMENTATION

Implementing PPS in Arden will need to be both directed and encouraged. Mandating PPS will slow or stifle development. Subsidising its early development, to the extent necessary to shift behaviour, places short-term responsibility on the public sector.

Table 6.14: Strengths, Weaknesses, Opportunities and Threats: Market-Led Management

Strengths	Weaknesses
Likely to reduce parking and manage demand.	It is an untested model in the Victorian market.
Promotes efficiency and innovation through the private sector.	No existing planning precedent.
Potential for economies of scale.	Likely to result in resistance from the development sector.
Urban realm outcomes.	No certainty for future residents or employees of spaces being delivered
Reduces public sector investment	Hard to work in fragmented land ownership models
Opportunities	**Threats**
May result in parking providers delivering PPS in response to market.	A new approach that will need planning, political and community support.

Table 6.15: Strengths, Weaknesses, Opportunities and Threats: Public Sector-Led Management

Strengths	Weaknesses
Able to construct parking centre in design that matches precincts.	Requires public investment (cost of construction and land does not equal parking dispensation).
Potential for economies of scale if multiple centres exist.	Potentially increases parking in the precinct (relative to goals), therefore, does not wholly support transport aims, but may have wider precinct benefits of enabling development.
Long-term return (via developer contributions) guarantees return on investment.	
The model is known to supply parking as it is proven.	Tested model for non-residential uses only.
Provides certainty on parking supply for surrounding community.	Potential for busines-as-usual outcomes, of which increased number of vehicle accesses (and crossovers) is a critical one.
Opportunities	**Threats**
Potential for a network of parking precinct stations.	In this scenario, the delivery of the parking stations, due to the certainty of investment, could be by the public or private sector. In both models, up-front investment by the public sector is likely required, which carries the risks associated with market take-up.
Potential to align PPS with certain clusters of uses.	
Able to supply less on-street parking.	
Able to provide parking to support certain users/uses (e.g. family access).	
Able to help deliver local policy (e.g. improved cycling facilities)	
Opportunity for future conversion to 'higher' uses, including change in use and as new technology is adopted.	

6.6 ALIGNMENT WITH PRINCIPLES FOR MOVEMENT AND PARKING

The scenarios considered in the parking strategy align with the principles for movement and parking.

Principle	Objectives / Strategies	Alignment	Comment / Recommendations
1. Design a movement network to prioritise active transport over private vehicle movements	• Create a pedestrian-oriented public realm around Arden station in the heart of Arden Central, maximising patronage from the Metro Tunnel project. • Facilitate more walking from the existing stations at Macaulay and North Melbourne into Arden. • Ensure the transport network in the precinct maximises place outcomes, resulting in high levels of amenity and liveability. • Promote cycling in Arden by connecting to regional cycle paths and trail networks and providing a safe network that encourages cyclists of all ages and abilities. • Reduce rat running through the precinct and mitigate increases in traffic volumes arising from the West Gate Tunnel. • Manage vehicle circulation, calm local traffic speeds and control supply and location of car parking within the three sub-precincts. • Maximise connectivity between Arden, West Melbourne, North Melbourne, Parkville, the Melbourne CBD and Kensington, prioritising accessibility for local trips by walking, cycling and public transport.	Yes	• These policies will encourage sustainable travel choices • Bicycle parking for residents should be provided at a rate of at least 1 per bedroom and in accordance with mode share targets for non-residential land use. • Deliver public transport early, noting Fishermans Bend plans to deliver tram extensions within the first 5 years of adopting the Fishermans Bend Framework Plan. • Deliver active transport improvements early to support the access to public transport services.
2. Minimise the impact of car parking and associated vehicular movements in Arden	• Manage the limited amount of on street parking as a shared resource, focussing on short term users • Minimise and centralise off-street parking to selected site locations to create a market with limited supply • Minimise overall car parking in Arden to reduce private vehicle travel • Access to car parks should not undermine the pedestrian priority street network • Car parking stations must be located with direct access to the main vehicle routes passing through Arden.	Yes	• These measure will result in the efficient use of car parking, meaning that less car parking can be provided. • Vehicle access should be designed to prioritise sustainable travel modes.
3. Use car and bicycle parking to rebalance modal priorities in favour of active travel	• Provide bicycle parking in excess of statutory minimums and industry standards • Provide high-quality end-of-journey facilities • Require all developments to have a green travel plan for residents and employees • Exclude on-street parking from pedestrian priority zones • Encourage car share services	Yes	• These objectives and strategies are supported through the parking strategy • Bicycle parking for residents should be provided at a rate of at least 1 per bedroom and in accordance with mode share targets for non-residential land use. • Car parking rates have been recommended that will put downward pressure on the car mode share. • Car park access points are on peripheral roads, not the local streets

continued overleaf

6.6 ALIGNMENT WITH PRINCIPLES FOR MOVEMENT AND PARKING

The scenarios considered in the parking strategy align with the principles for movement and parking.

Principle	Objectives / Strategies	Alignment	Comment / Recommendations
4. People using cars should pay for parking	• Expose the direct cost of parking to the user • Separate the cost of car parking space from the land use cost • Charge for on-street parking, but make exceptions for loading vehicles and people with disabilities	Yes	• Unbundling car parking from land use will expose its true cost • This strategy assumes on-street parking will be paid parking and that on-street parking will generally be for short-term use
5. Prioritise the parking needs of different land uses	• Establish a parking user hierarchy for land uses in the precinct that has full appreciation of how expectations and tolerances differ when it comes why and where people park. • Reflect this hierarchy in the parking rates proposed for the precinct • Identify methods for sharing of off-street parking spaces between different land uses	Yes	• The locations of car parks in terms of walk distances for various user groups has informed this parking strategy • The strategy has considered how parking can be shared between land uses to reduce overall parking supply.
6. Protecting amenity and the environment	• Protect streets around the precinct from parking overspill • Minimise on-street parking to reduce its impact on the streetscape • Minimise driveway access points to parking stations to reduce conflict with pedestrians and other users	Yes	• A system of permits and on-street controls will be necessary to manage overspill into neighbouring precincts • On-street parking will be minimised in Arden as a result of developing the 3 sub-precincts. • Vehicle access should be designed to prioritise sustainable travel modes.
7. Support the Arden economy	• Encourage low-impact last-kilometre servicing • Enable close-proximity access for vulnerable user groups • Provide for loading zones and identify appropriate principles for the management of commercial deliveries, both spatially and temporally	Yes	• Getting people and services to where they are needed will assist productivity within the precinct. • Access for emergency vehicles, service vehicle, those with disabilities or other needs has been considered in this strategy
8. Plan for the future	• Support a transition to electric vehicles • Plan for parking structures to be converted into other more productive land uses over time	Yes	• Off-street car parks in Arden should be constructed to ensure all spaces can in future be supplied with electric vehicle charging. • Urban design provisions can be made within design standards and decision guidelines in a Schedule to the Parking Overlay.

6.7 SUMMARY OF PARKING STRATEGY AND NEXT STEPS

This parking strategy has identified parking rates, parking supply scenarios and a suitable management model for consolidated car parking in Arden. Further work is needed to prepare a Parking Precinct Plan and a Schedule to the Parking Overlay.

This study concludes that consolidated precinct parking is possible for Arden. The detailed management of how this will roll-out should be part of a further investigation at a later stage of planning.

The key points are:

- **Consolidated parking** that is unbundled from land use is an efficient but untested solution in Victoria. It is recommended for early delivery by the public sector to prove its value. Following this, transfer to the private sector is possible.
- **A mix of consolidated and on-site parking is also viable**. This results in more parking being provided in the precinct, but the car parks tend to be smaller and located nearer to the buildings they serve. This has drawbacks in terms of more vehicles on local streets and additional vehicle access points, but these are considered minor issues. It is also the scenario that is likely to more immediately appeal to developers.
- A consolidated, fully shared parking system could generate the need for **3,500 car spaces**.
- A mixed or fully on-site parking system is likely to generate the need for **4,500 car space.**
- A concerted effort to push parking toward a consolidation model through policy levers, is likely to lead to a scenario where around **4,000 car parking spaces** are delivered in the Arden Precinct.
- Provide **wayfinding** for pedestrians and cyclists and car parking, using CPTED principles to ensure safety, convenience and comfort.
- **A parking cap is not needed**, as a zero parking rate, combined with a permit to exceed this and provide parking within a set of maximum parking rates, can control parking provision in an effective manner. A Schedule to the Parking Overlay can incentivise use of the central parking system instead of providing parking on-site. Permit applications to provide any parking will be based on a set of decision guidelines within the Schedule to control when this may be appropriate.
- **Parking Permits:** Current on-street parking permitholders, particularly in the Laurens Street sub-precinct, will potentially need to be accommodated in the consolidated parking system, due to removal of on-street parking associated with the proposed streetscape improvements. A system of parking permits and controls is needed in neighbouring precincts to manage potential parking overspill from Arden
- A **Parking Precinct Plan** has been prepared to further articulate the parking strategy outlined in this report. This is set out in Part 1 of this report.
- A **Schedule to the Parking Overlay** will then need to be adopted within the Melbourne Planning Scheme by amendment. The Schedule will be based on the outcomes of the Parking Precinct Plan, as set out in Part 1 of this report.

This parking strategy aligns with the principles for movement and parking set out in Part 1 Section 3 of this report, and can be implemented to the benefit of Arden, having regard for the recommendations made herein.

Part 2
07
Evidence Base

7.1 RECOMMENDATIONS

This study shows that the movement network proposed in the Arden Structure Plan and supporting background material will be fit-for-purpose. The parking strategy outlined in this report, shows that low parking rates and a consolidated, precinct-based approach to car park management are each realistic.

Recommendations

Movement Plan

- Implement **Green Travel Plans** for all residential and employment land uses to capture the full benefit of the public transport investment and provide a structure means to conduct ongoing monitoring of travel choices and potential barriers.
- **Deliver surface public transport improvements early**, noting Fishermans Bend has a requirement for the first trams services to be delivered within 5 years of adopting the Framework Plan.
- **Deliver walking and cycling improvements early** to support the access to public transport services.
- **Update the Movement and Place Strategic Framework** to reflect the Arden Structure Plan movement network.
- **End of trip facilities** to be provided at locations that are convenient and designed using Crime Prevention through Environmental Design Principles.
- Provide **quality outcomes for** pedestrians and cyclists
- Provide gateway treatments that limit car access
- Consider providing **vehicle access to car parks off minor roads** to protect the active façade on the main activity centre streets.
- Use **modal filters** to control access to the pedestrian priority zones for servicing and emergency vehicles.
- **Coordinate the operation of the modal filters** with emergency services and other stakeholders.

Street Cross-Sections

- Consider providing a **physical buffer** where a transit lane is directly alongside a bicycle lane.
- Consider making **Arden Street 40km/h (or less)**

Parking Provision

- Implement the following **maximum car parking rates** to constrain residential and non-residential parking to realise the 10% car mode share target.
  - 1-bedroom dwelling: 0.2 spaces per dwelling
  - 2-bedroom dwelling: 0.3 spaces per dwelling
  - 3-bedroom dwelling: 0.5 spaces per dwelling
  - Everything else: 0.32 spaces per 100sqm GFA
- **Bicycle parking** for residents should be provided at a rate of 1 per bedroom and at a rate of 1 space per 100sqm for non-residential land use.
- **All off-street parking should be capable of enabling electric vehicle charging;** the same for 20% of on-street car parking spaces.
- **Electric bicycle charging** should be provided in secure bicycle stores for residents and employees.

Parking Management

- **Consolidated parking** that is unbundled from land use is an efficient but untested solution in Victoria. It will require early delivery by the public sector to prove its value. Following this, transfer to the private sector is possible. Structure plan car parking locations are suitable for consolidated parking in a general sense.
- **A mix of consolidated and on-site parking is also viable**. This has drawbacks in terms of more vehicles on local streets and additional vehicle access points, but these are considered minor issues. It is also the scenario that is likely to have more immediate appeal to developers as the car parks are nearer to the buildings they serve.
- **A parking cap is not needed**, as a parking overlay that requires a permit to provide parking, together with a set of maximum parking rates, can control parking provision in an effective manner.
- A Schedule to the Parking Overlay can incentivise use of the central parking system instead of providing parking on-site. Permit application to provide any parking with based on a set of decision guidelines within the Schedule to control when this may be appropriate.
- A consolidated, fully shared parking system could generate the need for **3,500 car spaces**.
- A mixed or fully on-site parking system is likely to generate the need for **4,500 car spaces.**
- A concerted effort to push parking toward a consolidation model through policy levers, is likely to lead to a scenario where around **4,000 car parking spaces** are delivered in the Arden Precinct.
- **Parking Permits:** Current on-street parking permitholders, particularly in the Laurens Street sub-precinct, will potentially need to be accommodated in the consolidated parking system, due to removal of on-street parking associated with the proposed streetscape improvements. A system of parking permits and controls will be needed in neighbouring precincts to manage potential parking overspill from Arden.
- A **Parking Precinct Plan** has been prepared to further articulate the parking strategy outlined in this study. This is set out in Part 1 of this report.
- A **Schedule to the Parking Overlay** will then need to be adopted within the Melbourne Planning Scheme by amendment. The Schedule will be based on the outcomes of the Parking Precinct Plan, as set out in Part 1 of this report.