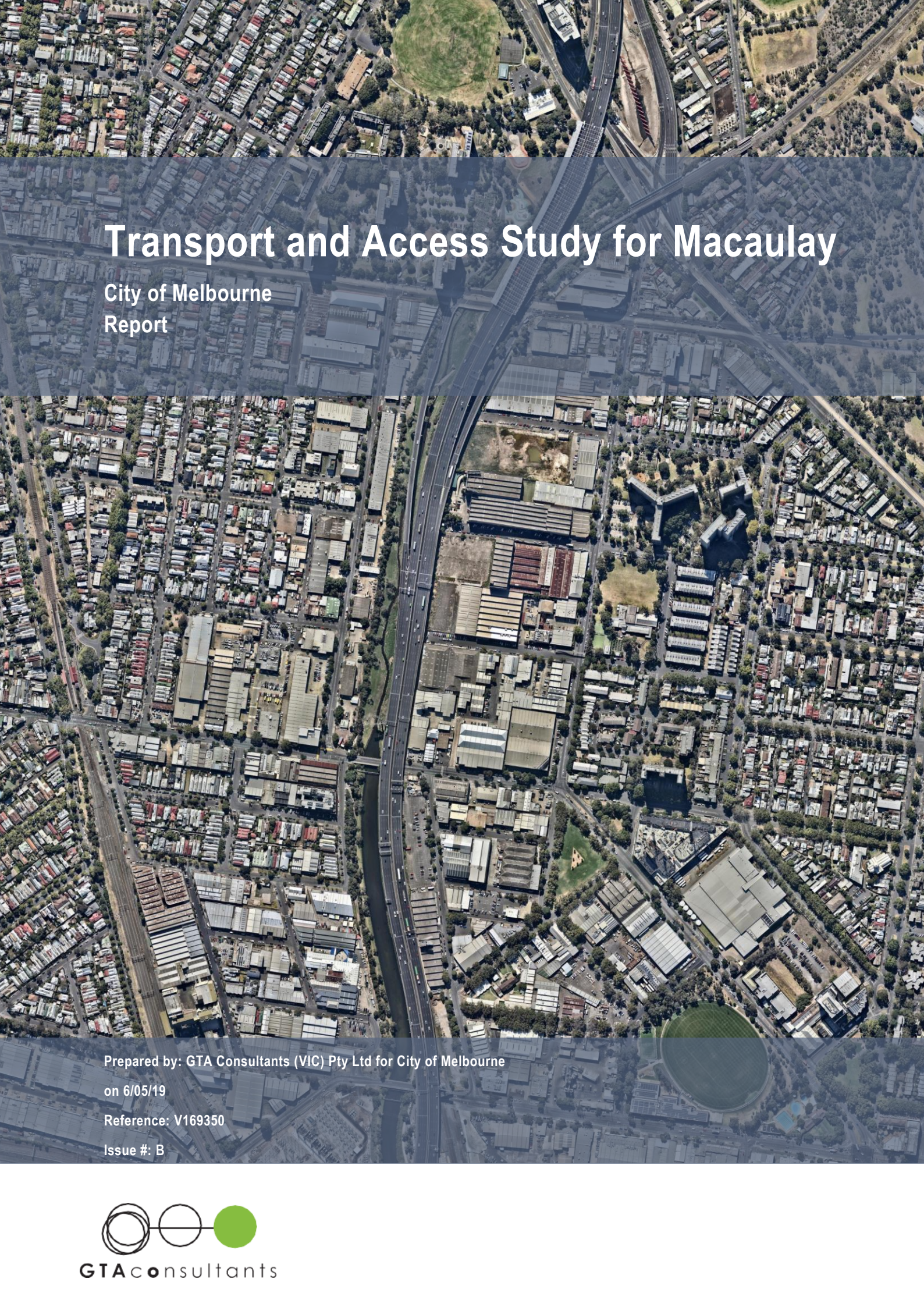




Transport and Access Study for Macaulay

City of Melbourne
Report

Prepared by: GTA Consultants (VIC) Pty Ltd for City of Melbourne

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01

EXECUTIVE SUMMARY

1.1. Context

Melbourne is rapidly transforming to become Australia's most populous city, envisaged to grow to a population of more than eight million people over the coming decades. Accommodating growth of this scale will depend on maximising use of existing infrastructure and underutilised areas which are close to jobs, daily needs and transport services.

Located on the edge of Melbourne's CBD and within close reach of the jobs and education opportunities in Parkville, the Macaulay precinct has been earmarked for transformation into a vibrant, mixed-use neighbourhood and will play an important role in supporting the city's growth, projected to become home to 10,000 residents and 9,500 jobs by 2051.



Planning for Macaulay seeks to increase use of walking, cycling and public transport use. Specifically, the Arden Macaulay Structure Plan seeks to “prioritise the growth of sustainable transport modes and contain vehicular access and parking provision within that context”.

The City of Melbourne provided a preliminary framework to form the basis of testing and refinement through the engagement of consultants. This included early thinking on a new street hierarchy and transport networks in Macaulay, as well as different built form and land use opportunities. This document is referenced throughout this report as the ‘CoM preliminary framework’.

1.2. Planning for Growth

In February 2012, Council adopted the Arden Macaulay Structure Plan 2012, outlining a long-term strategy for the urban renewal of Melbourne's inner north-west. This includes planning for an increase in density to support population growth in the central city, revitalisation of the urban realm and safeguarding the connectivity and accessibility of the precinct. Council also prepared Amendment C190 which sought to introduce land use and built form controls to support the Arden Macaulay Structure Plan.

In September 2017, the Minister for Planning approved the built form controls for Macaulay as interim controls, which apply until September 2019. The Minister also formed the view that the built form provisions could be improved to make better allowance for (amongst other things):

- Housing and employment growth to support the government's investment in public transport infrastructure and opportunities achieved through site consolidation and master planning
- Better management of density through a ‘Floor Area Ratio’ control and potential to maximise development outcomes in exchange for public benefit
- Integration with structure planning for the Arden precinct.

Since this time, Council has undertaken a significant body of work, in collaboration with other consultancies, to address the conditions outlined by the Minister and progress the planning framework for

Macaulay, including the Macaulay Built Form Review Report and the Moonee Ponds Creek Strategic Opportunities Plan.

This report supports these investigations by considering the impact of future development on the way people move and travel in Macaulay. More broadly, this report will also look at the street network proposed for the area and provide some ideas about how various levels of development could be supported by changes to transport.

1.3. Living and Working in Macaulay

Today, Macaulay has three relatively distinct precincts. The area to the west is largely residential housing, often in the form of narrow-frontage terraces. The area to the east is also predominantly residential, with a mix of social housing provision, both high-density and mid-rise walk-up units. Residents living in Macaulay benefit from good access to both the rail and key road networks, with an even mix of people travelling to work by public transport (39.3%) and car (39.4%), with a smaller proportion (18.3%) by foot and bicycle or other modes (2.9%).

Areas central to Macaulay are predominantly industrial or commercial uses, often occupying large sites with limited permeability and with wide streets and inactive frontages. People working in Macaulay travel from both local areas and further afield, generally from Melbourne's central and outer north and west, where car dependence is typically higher. Paired with convenient access from arterial roads and CityLink and a large provision of on-site car spaces, driving is the predominant way Macaulay's workers travel to the area, with 78% travelling by car and 22% by public transport, walking and cycling.

In both cases, availability of abundant, and relatively unrestricted, on-street car parking on most streets further incentivises car use and ownership. A high-level review shows that roughly 40% of residential and 20% of worker vehicles are likely to be parked on-street. Other studies for the City of Melbourne show that off-street car parking is currently oversupplied by 26-41%,¹ and so interventions should be put in place to minimise the risk of oversupply and associated car use in Macaulay, consistent with sustainable transport aspirations for the area.

1.4. Movement and Access in Macaulay

1.4.1. Walking

Many of the existing residential areas are relatively walkable, with tree plantings, wide footpaths and relatively low-traffic streets. Small lots (terrace housing) and shorter block lengths (and so more choice in route) also make the walk more interesting.

However, many areas of Macaulay are relatively disconnected and difficult to access by foot or bicycle. Existing industrial sites are generally large and have limited connections through the site. Likewise, limited crossing points across barriers like the Moonee Ponds Creek and railway lines can also make for a long walk – in some cases, walking around the block is more than three times longer than if a direct link was provided. Some of these detours can be even longer for people with prams, bicycles, wheel chairs, scooters

¹ City of Melbourne Transport Strategy – Car Parking Discussion Paper

or other mobility challenges, where stairs or other impediments limit accessibility. For example, stairs across the Craigieburn rail corridor at Arden Street require a significant detour (additional 15 minute walk) for those that cannot use them. More generally, overpasses and underpasses can also feel unsafe for many, particularly at night, and driveways across footpaths can present accessibility challenges for those in wheelchairs and scooters or with prams, and so should be avoided.

The proposed street network in the CoM preliminary framework proposes a finer-grain grid of pedestrian links, providing greater accessibility and choice and resilience in route (for example, if one street was closed due to construction). However, there are opportunities to increase pedestrian accessibility further by providing more pedestrian links through remaining large blocks (such as Cityside Industrial Estate site, Public Records Office site and Seeing Eye Dogs site). The CoM preliminary framework also proposes a number of new crossings over the Moonee Ponds Creek, however the effectiveness of these crossings are limited unless they also extend across the Upfield rail corridor and link the east and west sides of the corridor.

Other features which make walking safer and more comfortable (such as reducing the width of road crossings, providing crossings at street level and minimising grade changes, wayfinding, tree canopies, increased pedestrian priority, active frontages, seating, lighting and other amenities) should also be provided.

1.4.2. Cycling

The case is similar for people riding bikes, where limited connections and permeability can make routes more circuitous than they need to be, and therefore reduce the convenience and directness of cycling. However, bike riders also face safety challenges in the area, where many of the most direct bicycle routes are provided on major high-speed traffic corridors, generally with minimal facilities (painted bicycle lane) and no separation or protection from vehicles. As a result, more than 30 per cent of crashes in Macaulay in the last five years involved a person on a bicycle.

The proposed cycling network in the CoM preliminary framework includes provision for protected bicycle lanes along key, direct and convenient routes, which will enhance the accessibility and attractiveness of cycling for many as these links become safer and more comfortable. These links should be extended across the broader network to key destinations outside of Macaulay (including Parkville, Arden and the CBD) to make cycling a viable choice for more people.

Other features which make cycling safer and more comfortable (low-stress environments, priority for people on bikes, convenient bicycle parking, wayfinding, direct routes, high-quality surfaces and facilities, reducing adjacent car parking) should also be implemented.

1.4.3. Public Transport

Macaulay is relatively well-serviced by public transport, particularly in comparison to other areas of Melbourne and other urban renewal precincts (such as Fishermans Bend). Services provide access in all directions, including north-south by tram and rail and east-west by tram and bus. Development of Melbourne Metro will provide further opportunities to access other areas of the city (such as Parkville) by

rail and will increase capacity on existing lines. Bus, tram and train services typically run at a high frequency, particularly in the weekday peak periods but even inter-peak and on weekends – for example, most tram services and many train services have a frequency of 10 minutes or less on a Saturday. Some train services and bus services are less frequent, at 20 minute intervals, but still relatively frequent compared to other areas of Melbourne. Most areas of Macaulay are within ten minutes' walk of a railway station, with some locations within walking distance of up to three stations.

However, areas around train stations in Macaulay often have low amenity and poor safety. For example, community responses indicate that Macaulay Station feels 'deserted and dark' and 'unnerving'. Its location beneath the CityLink overpass means that it is overshadowed during the day and is generally isolated from passive surveillance and passers-by. Likewise, community feedback on the area around Flemington Bridge Station indicates that it has limited foot traffic, poor lighting and passive surveillance, poor visibility (due to vegetation) and feels removed from roads and nearby residences.

Improving connections to public transport, particularly by foot, will continue to build public transport as a viable way of travel for people living and working in Macaulay. In particular, safety and amenity should be improved at, to and from Macaulay Station, as well as other nearby stations such as Flemington Bridge, Kensington, Newmarket and North Melbourne (formerly Arden). This includes improved connections which are attractive, activated (more 'eyes on the street') and are better integrated with their surrounds, including for passive surveillance. A potential relocation of Macaulay Station (as proposed in the CoM preliminary framework) would provide space for a new pedestrian plaza, providing a more 'open and inviting' interface and improving integration of the station with the abutting activity centre.

1.4.4. Vehicle Movement and Access

GTA prepared the Macaulay Demand Model (MDM) to understand:

- how the street network could be expected to function at various levels of development, in terms of vehicle traffic
- where, and at what levels of development, the likelihood of vehicle delays and travel unreliability increased
- the potential impacts of interventions which reduce demand for vehicle travel and encourage shifts to other modes.

The MDM was deployed for the existing street network and existing land use ('Existing Conditions'), as well as for three different built form outcomes using the proposed future street network - Floor Area Ratio 3:1 ('Scenario 1'), Floor Area Ratio 4:1 ('Scenario 2') and Floor Area Ratio 5.7:1 ('Scenario 3').

In general, modelling indicates most roads in Macaulay are capable of accommodating demand under existing conditions, with a few pinch points across the network where delays and travel unreliability could be expected - for example, at railway crossings and some parts of Racecourse Road, Macaulay Road and Arden Street. These areas, where demand exceeds capacity, are predominantly due to traffic travelling through the area (rather than travelling to, or from, Macaulay).

Under future scenarios, as the level of development increases, more locations across the network become 'pinch points', particularly on parts of main roads like Racecourse Road, Boundary Road,

Macaulay Street and Arden Street. In Scenario 3, Robertson Street (a neighbourhood connector) also became a pinch point

However, increasing capacity for car travel is not consistent with aspirations for the area, which seeks to prioritise walking, cycling and public transport. Instead of providing new traffic lanes or intersection upgrades ('increasing capacity'), measures should be put in place to reduce demand for car use and promote a shift in the way people travel to walking, cycling and public transport and reducing the need for trips by enabling more local living. At a minimum, the level of intervention should be commensurate to the level of planned development, but Council could also pursue more aspirational levels of sustainable transport use, local living and sense of place to become a 'best practice' inner-city neighbourhood.

1.5. Achieving the Aspirations

1.5.1. Priority Opportunities

These measures should be implemented to reduce demand for car travel and alleviate many of the pinch points which could be expected to arise on the road network as the area unfolds. These measures are also consistent with delivering on the sustainable transport aspirations for the area.

- Managing on-street car parking to reduce use as long-term vehicle storage or unrestricted parking, including through implementing time restrictions, permit systems, paid parking or reduction in supply to make more room for wider footpaths, outdoor dining, new bike paths, flood mitigation measures or dedicated public transport facilities.
- Managing off-street car parking, including introduction of low (or zero) maximum car parking rates (consistent with other city fringe areas such as Carlton, West Melbourne and Fishermans Bend). This does not mean 'no cars in Macaulay' (as can be seen at present in the suburbs outlined above), rather, it allows new development to provide a level of car parking that reflects the good level of transport access, proximity to jobs and opportunities in the CBD and Parkville and sustainable transport aspirations for the area.
- Providing more regular walking and cycling links across the railway corridors, particularly the Upfield corridor to better integrate the east and west sides of the Moonee Ponds Creek and especially if it can be designed as part of a level crossing removal project, noting the constraints imposed by overhead clearances (rail power supply, CityLink) and grades.
- Providing safer and more comfortable walking and cycling facilities, including access to public transport, and improved public transport priority and reliability (such as through dedicated lanes).

1.5.2. Other Opportunities

These measures, in addition to the above, are consistent with 'best practice' and reflect the good level of transport access, proximity to jobs and opportunities in the CBD and Parkville and aspirations for sustainable movement and access in Macaulay.

- Unbundling car parking from titles to provide more choice in meeting the mix of car parking needs for residents, workers and visitors and make better use of space.

- Providing car parking as 'precinct parking structures' located on key traffic routes on the fringe of the area to allow sharing and better utilisation of parking resources and reduce the number of vehicles travelling on local streets in Macaulay. This should be coupled with limiting vehicle access to emergency and service vehicles on local streets in areas serviced by precinct parking stations.
- Encouraging car share to allow sharing and better utilisation of vehicles and reduce levels of car ownership and therefore, space for car parking which could be used to add elements which make the area more liveable (such as open space, playgrounds, areas to walk and cycle or attributes that give a neighbourhood a sense of place).
- Providing improved walking and cycling access over the Craigieburn corridor to improve access to Macaulay from South Kensington.
- Pursuing greater permeability through remaining large sites, including the Seeing Eye Dogs site, Public Records Office site and Cityside Industrial Estate site.

Initiatives from other levels of government, such as level crossing removals, tram extensions and increases in public transport frequency and capacity, will further support these outcomes.

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2. INTRODUCTION

This section outlines a brief overview of the area and the structure and purpose of the report.

02

2.1. Introduction

Melbourne is rapidly transforming to become Australia's most populous city, envisaged to grow to a population of more than eight million people over the coming decades. Accommodating growth of this scale will depend on maximising use of existing infrastructure and underutilised areas which are close to jobs, daily needs and transport services.

Located on the edge of Melbourne's CBD and within close reach of the jobs and education opportunities in Parkville, the Macaulay precinct has been earmarked for transformation into a vibrant, mixed-use neighbourhood and will play an important role in supporting the city's growth, projected to become home to 10,000 residents and 9,500 jobs by 2051.



Past

Like many inner-city suburbs, the Macaulay 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, uninspiring streetscapes and limited access by foot or bicycle, including across the railway lines and Moonee Ponds Creek. Notwithstanding, the residents and workers in the area benefitted from good access to key roads, tram services and railway stations, including at Macaulay, Kensington, Newmarket and Flemington Bridge.

Figure 2.1: Aerial View of North Melbourne – 1950s



Source: C. D. Pratt, via State Library of Victoria

Present

Macaulay has changed in many ways over recent decades. New housing developments, including public and community housing, have increased the number of people living in the east of Macaulay 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 the ability to make changes to the way people access the area in the future (i.e. elevating rail).

Other areas of Macaulay remain relatively unchanged, with terrace housing comprising much of the residential area in the west and industrial uses occupying large central sites, adjacent to the creek and railway line. From a transport perspective, this also means that many physical characteristics remain largely unchanged, with large blocks and wide streets still in place today and limited pedestrian and cycling access, particularly across the creek and around/through the industrial sites.

There is also increased awareness around some of the key challenges the area faces, including flooding, crowding on roads and rail services and the need for more community facilities and open space.

Figure 2.2: Aerial View of North Melbourne – Now



Source: Google Earth

Future

Looking forward, the precinct can expect to see further changes in the way people access the area and service their daily needs. Major committed transport infrastructure projects, including Melbourne Metro,

will be delivered over the coming decade, which will not only change the way that people access different parts of Melbourne by road and rail, but will be a focus point around which new communities and neighbourhoods can develop and unfold. Other transport projects, such as the West Gate Tunnel Project, Level Crossing Removals, Suburban Rail Loop and Airport Rail Link, may also change the way people travel to, from and through the local area. More detail is discussed in later sections.

Locally, many changes have been planned for Macaulay in order to adequately prepare the area for the anticipated growth over the coming decades. This includes recent changes to the types of **land uses** in the area to provide more residential housing and jobs, as well as the shops, services, facilities and transport needed to support them. From a transport perspective, it also means making the most of good access to high-quality public transport to support higher population **densities** and an increased use of 'sustainable' ways of travel, including walking, cycling and taking public transport.

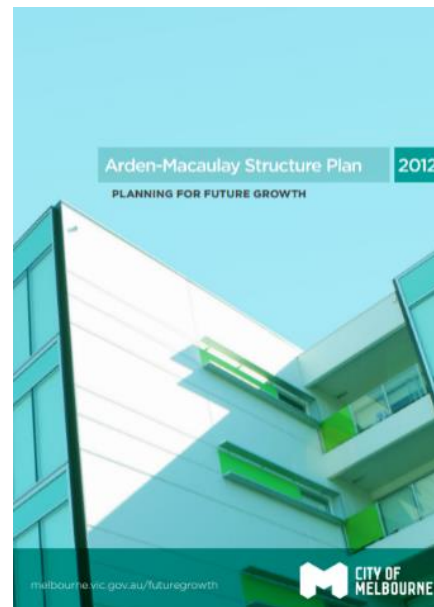
Land uses: Different ways the land in Macaulay can be used. For example, 'housing', 'shops', 'cafés/restaurants' and 'schools' are all different types of land uses.

Density: The amount of people living or working, or the amount of land use (i.e. dwellings) in a given area. 'Higher-density' in the context of this report generally means there are more people living or working, or more dwellings or land use in a given area, and as a result, buildings might be taller to accommodate more people and land use in a smaller space.

2.2. Planning Context

In February 2012, Council adopted the Arden Macaulay Structure Plan 2012, outlining a long-term strategy for the urban renewal of Melbourne's inner north-west. This includes planning for an increase in density to support population growth in the central city, revitalisation of the urban realm and safeguarding the connectivity and accessibility of the precinct.

To support the implementation of the Structure Plan, Council proposed changes to land use and built form controls in the Planning Scheme ('Amendment C190'), including changing the zoning of land in Macaulay to encourage residential development, as well as shops and services. The Amendment was exhibited for public comment at various stages between 2012 and 2015, and subjected to a Panel Hearing in July 2015. Council endorsed the Amendment in August 2016 and submitted the Amendment to the Minister for Planning for approval.



In September 2017, the Minister for Planning split the amendment into two parts, and approved Part 1 (Macaulay) as interim controls, which apply until September 2019. The Minister also formed the view that the built form provisions could be improved to make better allowance for (amongst other things):

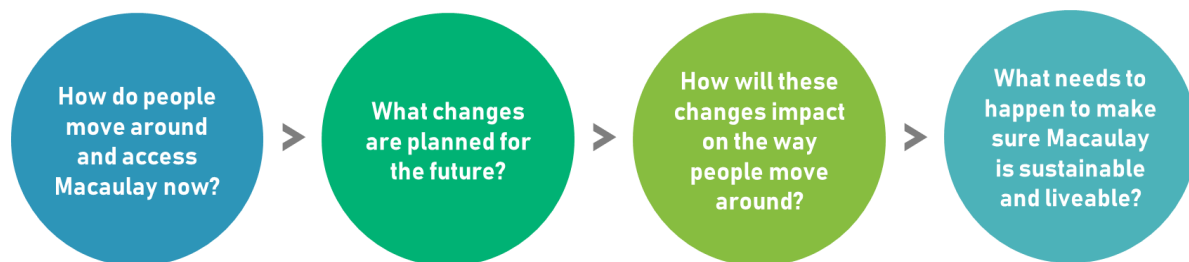
- Housing and employment growth to support the government's investment in public transport infrastructure and opportunities achieved through site consolidation and master planning
- Better management of density through a 'Floor Area Ratio' control and potential to maximise development outcomes in exchange for public benefit
- Integration with structure planning for the Arden precinct.

Since this time, Council has undertaken a significant body of work, in collaboration with other consultancies, to address the conditions outlined by the Minister and progress the planning framework for Macaulay. Further planning exercises (including this study) are also being undertaken to consider the impact of revised population forecasts and recent planning developments (e.g., Arden Structure Plan, strengthened focus on flooding impacts).

This report supports these investigations by considering the impact of future development on the way people move and travel in Macaulay. More broadly, this report will also look at the street network proposed for the area and provide some ideas about how various levels of development could be supported by changes to transport.

2.3. Structure of this Report

This report is structured to understand how people move in Macaulay now, how this is likely to change in the future and what needs to be done to ensure the movement network supports a vibrant, liveable, sustainable community.



This report has a Technical Appendix attached at the rear, which provides further detail around some of the more technical elements.

3. HOW DO PEOPLE MOVE NOW?

This chapter provides a summary of how people currently move around and travel to and from Macaulay, including looking at the different options people have for travel, how these options function and any factors that should be considered in future planning.

03

3.1. Current Travel Patterns in Macaulay

Understanding the way that people travel today is important in recognising how people use the road network and the level of change that is required to achieve the aspirations for Macaulay as an area that prioritises walking, cycling and public transport.²

In Australia, the way that people travel to work is often used as a benchmark for how people travel more generally, as this information is collected as part of the Australian Bureau of Statistics (ABS) Census every five years, so is a good representation of the whole population (compared to a smaller survey) and can be compared over time.

The way that residents living in Macaulay currently travel to work is shown in Figure 3.1, and the way that people working in Macaulay currently travel to work is shown in Figure 3.2.³

Figure 3.1: Mode Share – Macaulay Residents

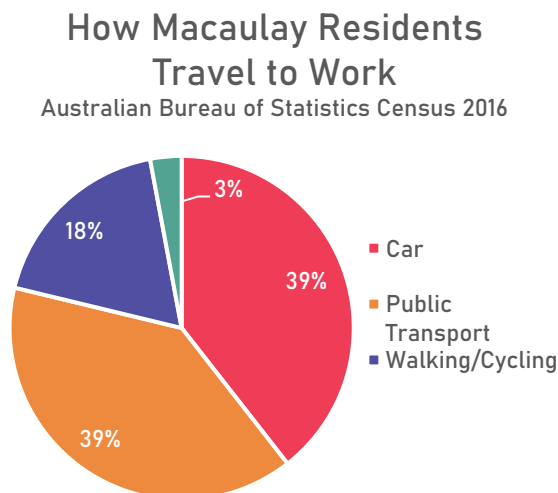
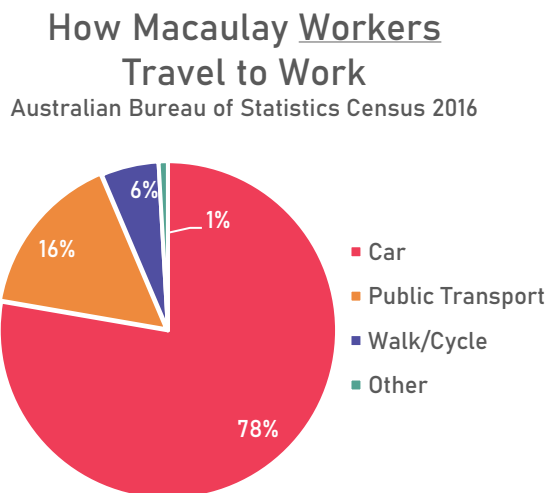


Figure 3.2: Mode Share – Macaulay Workers



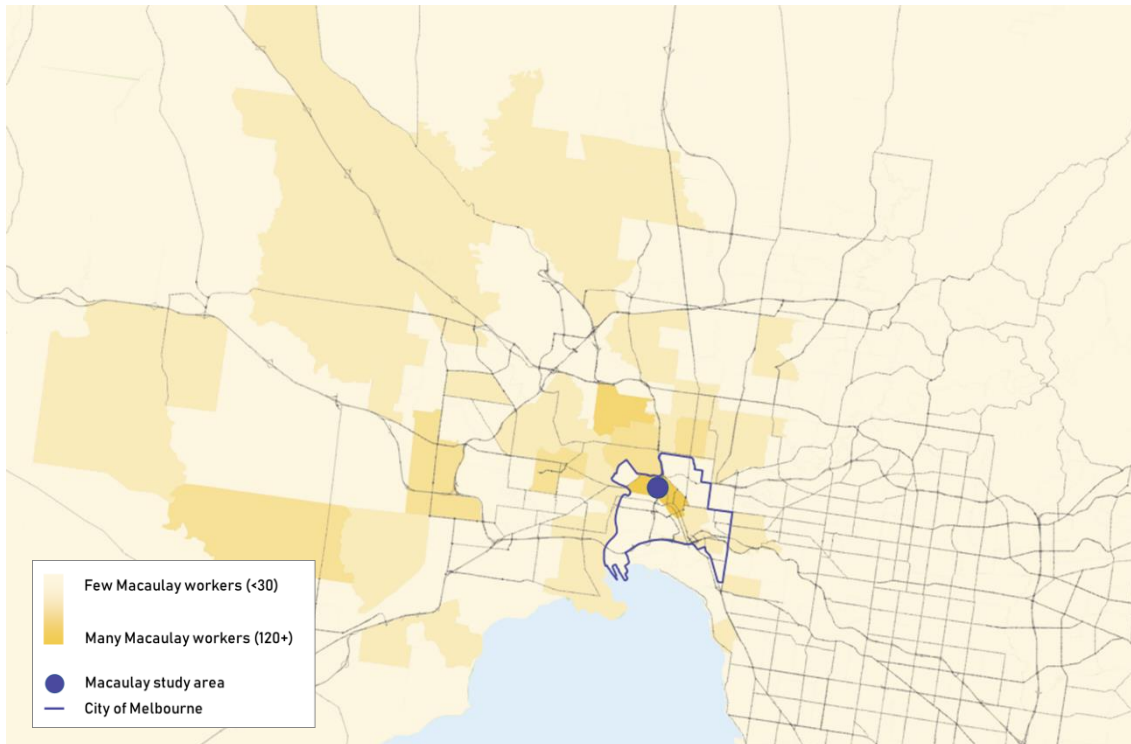
As shown in the figures above, people living in Macaulay travel to work in many different ways, with about two-fifths using public transport, another two-fifths taking the car and the remaining one-fifth travelling by foot or bicycle.

However, people working in Macaulay overwhelmingly travel to the area by private vehicle, with more than three quarters of workers travelling by car or truck. A smaller share also reach the area by public transport, walking and cycling. This may reflect the largely industrial or 'heavy' commercial jobs in Macaulay at present, for which workers might either rely on a car or truck to undertake the work, or attract workers from areas which are highly car-dependent. This may also reflect the amount of car parking available both on-site and on-street in Macaulay. More detail can be found in Section 3.4.

² Arden Macaulay Structure Plan 2012, Principle 8

³ GTA analysis of ABS Census 2016 – SA1 and DZN areas which most closely spatially represent the Macaulay urban renewal precinct. Excludes people who worked from home, did not work or had 'not stated' or 'not applicable' responses.

Figure 3.3: Where Macaulay's Current Workers Live⁴



Indeed, although some workers travel from nearby (Kensington, North Melbourne), most travel from other areas of Melbourne, including areas in the inner north and the outer north and west, where car dependence is high.

As the area transforms, it is envisaged that the industrial and heavy commercial uses will subside over time, transitioning to knowledge, service and retail employment sectors. This shift will likely bring change in the way that people access the area for work, both in terms of propensity to use public transport, walk or cycle⁵ and the areas from which people are attracted to work. There may even be a greater shift towards people living and working locally within the neighbourhood, supporting the shift towards public transport, walking and cycling and away from car use.

3.1.1. How do people in different areas of Macaulay travel?

People living in different areas of Macaulay show different characteristics in the ways they travel to work. In all maps, the darker the colour, the higher the proportion of residents travelling to work by the respective mode.³

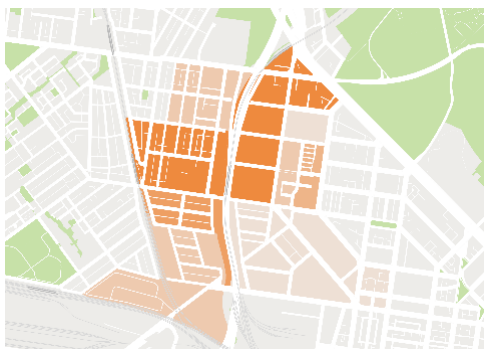
⁴ GTA analysis of ABS Census 2016 – SA2 origins for DZN destinations which most closely spatially represent the Macaulay urban renewal precinct. 'Car' includes car as driver, car as passenger and truck. 'Public transport' includes bus, tram, train and ferry. 'Other' includes taxi, motorbike/scooter and other. Excludes people who worked from home, did not work or had 'not stated' or 'not applicable' responses.

⁵ Refer to Technical Appendix, Section A.1



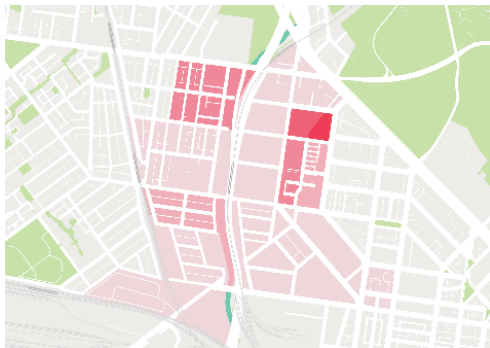
Active Transport

A higher share of people who walk and cycle to work live in the south of Macaulay, where employment opportunities in North Melbourne, Parkville and the CBD are generally closer and within walking distance. For example, the northern fringe of the CBD is about 2.5km or a half-hour walk from these areas of Macaulay. Ensuring good access to key pedestrian networks will support walking in the area.



Public Transport

A higher share of people who travel to work by public transport live in the central areas of Macaulay, which have plentiful access to the rail network, including stations at Macaulay, Flemington Bridge and Kensington and trams on Racecourse and Flemington Roads. Providing good access to rail stations and tram stops, particularly by foot, will continue to support sustainable transport aspirations.



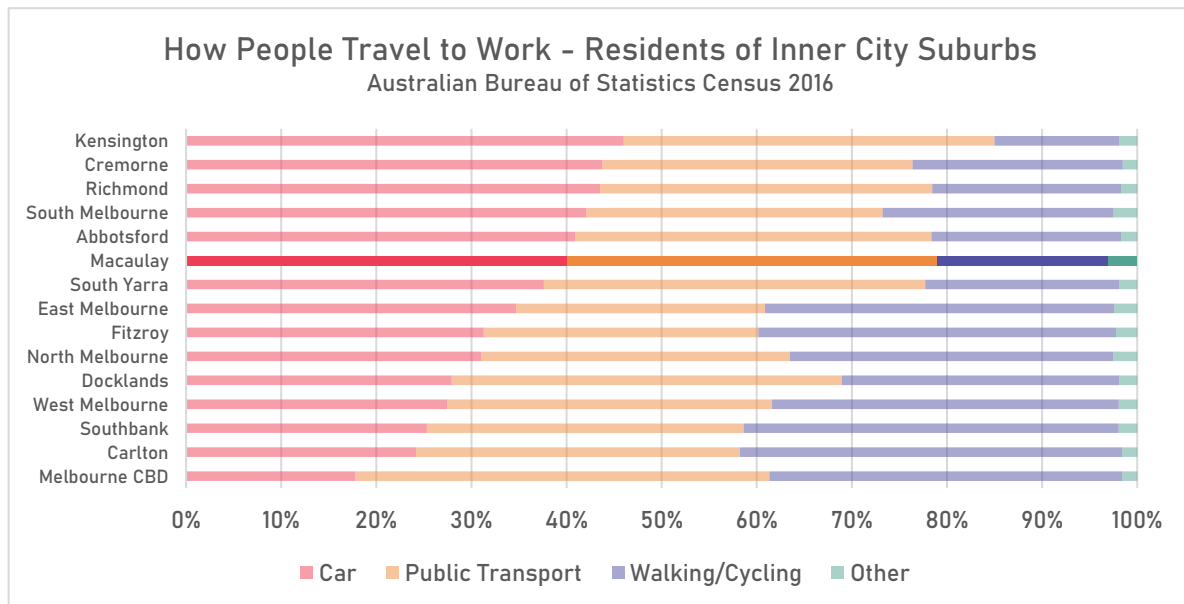
Private Vehicles

A higher share of people who travel to work by private vehicle live in the social housing complexes in the east. These areas should be carefully managed to ensure vulnerable groups in the community retain access to employment opportunities, while encouraging a shift to more sustainable transport modes. Higher car use to work is also evident in the north-west of Macaulay.

3.1.2. How does this compare to similar neighbourhoods?

The way people travel in Macaulay has been compared to a range of other similar suburbs. These suburbs have been chosen as they are broadly similar in distance from the CBD (and its jobs, education and social opportunities), and provide a 'mix' of different levels of housing density, maturity in uses and access to transport networks. Comparison against these suburbs will provide an understanding of where Macaulay is placed now, and the types of areas it could aspire towards in the future in terms of levels of sustainable transport access.

Figure 3.4: Mode Share Comparison – Macaulay vs Other Inner-City Melbourne Suburbs⁶



As shown, people living in Macaulay travel to work in similar ways to people living in South Yarra, South Melbourne and Abbotsford. These areas are all about three kilometres from the CBD and have good access to public transport, particularly the rail network (South Yarra, Abbotsford) and tram network (South Melbourne). Abbotsford and South Melbourne are also similar in that they are rapidly densifying, but still have a mix of ‘heavier’ commercial uses.

By comparison, people living in the CBD or its fringe typically drive to work less, and walk or catch public transport more often. These behaviours are generally reflective of an ability to service daily needs within a short distance, higher living and working densities, measures which constrain car ownership or parking, good public transport access and a safe, comfortable walking and cycling environment.

As another point of comparison, the Fishermans Bend area is also earmarked for a major transformation from an industrial/warehousing background to become a new residential and knowledge-based employment hub. The new suburb has relatively poor existing public transport access and is surrounded on most sides by the Yarra River and Port Phillip Bay. Planning for Fishermans Bend sets a target for 80% of all trips to be by walking, cycling and public transport, with less than 20% of trips to be taken by car.⁷ Given Macaulay’s existing accessibility to high-quality public transport and relatively few barriers to walking and cycling (including to the CBD), there is potential for Macaulay to match or exceed these aspirations, with the right interventions in place.

⁶ GTA analysis of ABS Census 2016. ‘Car’ includes car as driver, car as passenger and truck. ‘Public transport’ includes bus, tram, train and ferry. ‘Other’ includes taxi, motorbike/scooter and other.

⁷ [Fishermans Bend Framework \(2018\)](#)

3.1.3. Summary

- People living in Macaulay travel in a mix of ways which are relatively consistent with similar inner-city suburbs. The area benefits from good access to the rail and road network.
- People working in Macaulay mostly drive to work, but this may shift as the jobs evolve from industrial-based to knowledge, retail and service-based roles (refer to Technical Appendix, Section A.1)
- Given the area's strong transport foundations (public transport, walking, cycling networks) and proximity to Parkville and the CBD, planning for Macaulay should aspire towards being a walking, cycling and public transport-oriented neighbourhood.

3.2. Existing Streets in Macaulay

Every day, people travel from home to shop, eat, work, visit friends and family or spend leisure time. Regardless of the reason for travel, everyone will use the street network in one way or another – whether it is walking to the station or shops, cycling to work, walking the dog or dropping somebody off by car. People also spend time in streets for other reasons – for outdoor dining, to window shop or to sit and watch the world go by.

Streets are part of everyday life for everyone, so designing streets 'well' will benefit everybody's day-to-day experience. Given the area aspires towards prioritising walking, cycling and public transport use, the street network needs to be designed accordingly, with an environment that makes it easy, safe, comfortable and convenient to choose to walk, cycle or catch the tram, train or bus. In particular, walking is "the most important mode" in the City of Melbourne, with almost two-thirds of trips in the municipality undertaken by foot.⁸ Improving connectivity (including by walking) also benefits the economy and increases productivity because jobs effectively become 'closer' and more accessible, allowing more opportunities to collaborate and share knowledge and ideas more quickly.⁹

Some of the elements which contribute to these outcomes are discussed in this section.

3.2.1. Walking Networks

Amongst many other elements, the layout of the street network can contribute to an environment which is safe, attractive and convenient for walking, including by improving **permeability** and **connectivity**.

- **Permeability:** refers to how easy it is to reach a destination in terms of choice and directness. An area with large street blocks, large properties which cannot be crossed (like industrial sites) or physical constraints (like a river or railway line) with limited crossing points makes it more difficult to reach a destination, because of the need to walk around these obstacles. On the contrary, an area with lots of small blocks and opportunities to cut through sites (i.e. walkways, arcades or corridors) can make a walk much more direct and convenient, and provide a range of choices as to how to reach the destination (for example, if one street is closed for construction). In this way a 'highly-

⁸ [City of Melbourne Transport Strategy Refresh – Walking Discussion Paper](#) (based on VISTA 2016)

⁹ [City of Melbourne Walking Plan 2014-17](#)

permeable' street network contributes to making a neighbourhood more interesting and more walkable.

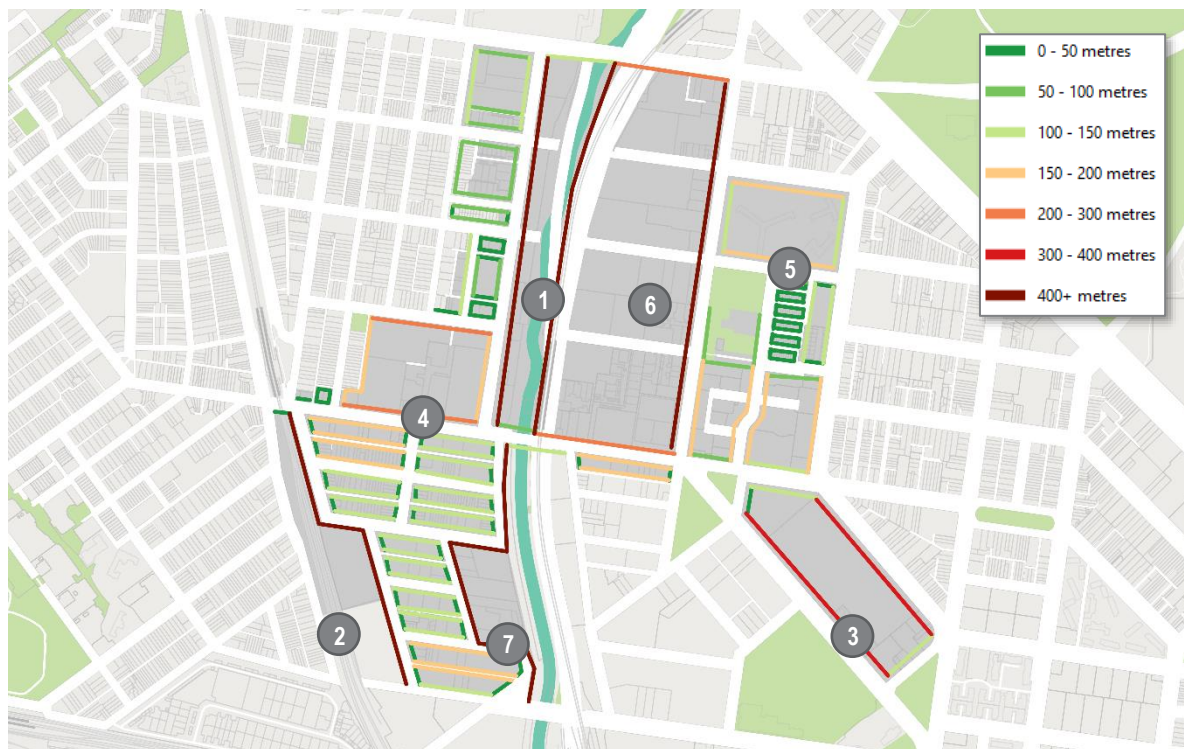
- **Connectivity:** making sure footpaths and walking paths connect to other footpaths and destinations of interest continuously, smoothly and directly will provide people with the option to travel where they need to go on foot or by wheelchair or scooter. Even short distances of discontinuity can make walking challenging or unsafe – this is particularly true for users with higher needs.

Other factors including safety and comfort are also important, and will be discussed in later sections.

3.2.2. Permeability of Macaulay's Street Network

The figure below presents a summary of how permeable the blocks in Macaulay are today.

Figure 3.5: Permeability of the Street Network in Macaulay¹⁰



Block sizes of about 100 metres in length¹¹ are typically consistent with a good balance between permeability and maintaining viable land sizes, as well as avoiding the perception that walkers are 'always crossing streets'.¹² Beyond this length, a neighbourhood becomes less permeable and less walkable.

¹⁰ GTA spatial analysis of current street network

¹¹ "The most walkable grids... have blocks that average less than four hundred feet [~120 metres] in length" – Walkable City, Jeff Speck

¹² [Why City Blocks Work](#), The Harvard Gazette

As shown in Figure 3.5, many block sizes in Macaulay are around this length (about 50-150 metres in length), with some areas that exceed what would be considered to be a 'walkable' block length. These areas include (with number references matching Figure 3.5):

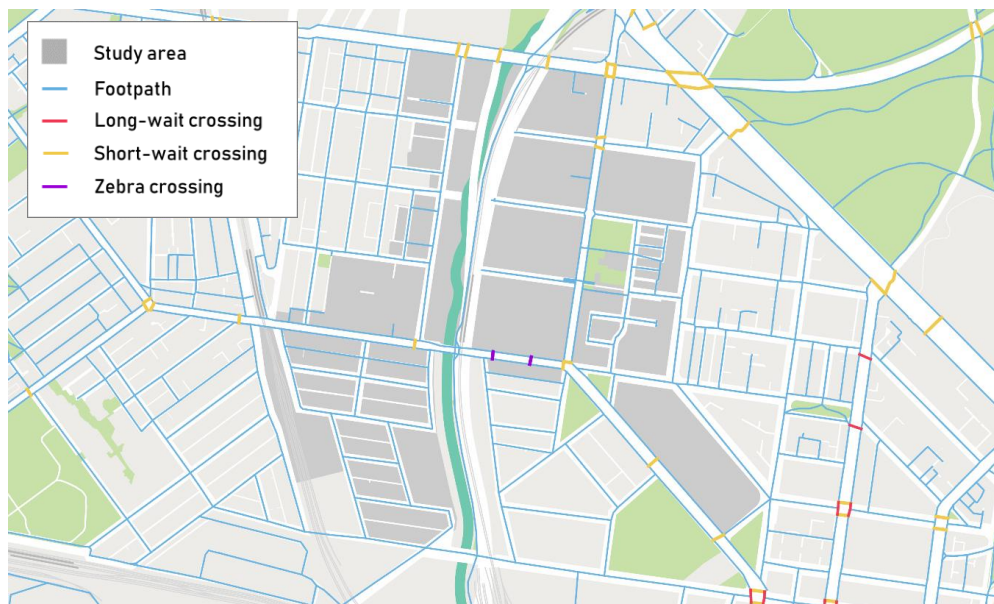
- The Moonee Ponds Creek and Upfield rail corridor between Racecourse Road and Macaulay Road (#1 in Figure 3.5), where the walk is more than one kilometre (12-minute walk) from one side to the other (for example, Smith Street to Sutton Street). By comparison, a new pedestrian connection would reduce the walk to 350 metres.
- Across the Craigieburn rail corridor between Macaulay Road and Arden Street (#2), which is approximately 650 metres (eight-minute walk) from one side to the other. This distance is even longer for wheelchair, mobility-impaired users and people with prams or bikes, as the southern crossing is via a pedestrian overpass with stairs and requires a significant detour to reach the nearest street-level crossing. By comparison, a new walking connection would reduce the walk to 50 metres (for example, Ormond Street to Chelmsford Street).

Permeability should also be improved through the Public Records Office site on Macaulay Road (#3), the Cityside Industrial Estate site on Macaulay Road (#4), the Moonee Ponds Creek interface and Seeing Eye Dogs site south of Macaulay Road (#7), larger sites in the social housing estate precinct (#5) and the large blocks in the centre of the area, between Racecourse Road, Boundary Road, Macaulay Road and CityLink (#6).

3.2.3. Connectivity of the Walking Network

The figure below presents a summary of footpaths within Macaulay and how they connect to other pedestrian footways.

Figure 3.6: Connectivity of the Footpath Network in Macaulay¹³



¹³ City of Melbourne Footpath Network (provided and used as-is)

Most streets have a sealed footpath on both sides of the road. In some locations, these footpaths are narrow or have a gradient as they form part of a driveway or property access. In addition to footpaths, some laneways in the area also informally serve as shared pedestrian and vehicle spaces given their low-speed environments.

Major barriers to pedestrian connectivity are typically in the form of major roads (with high volumes of traffic), natural constraints (such as rivers) and other infrastructure barriers (such as railway lines).

Consistent with the review of permeability, there are clear areas of disconnection across long stretches of both the Upfield and Craigieburn rail lines and the Moonee Ponds Creek. Providing connections across these areas would link different areas of the neighbourhood and contribute to the walkability of the area.

Major roads (Arden Street, Flemington Road, Racecourse Road, Macaulay Road and Boundary Road) can be difficult to cross in some areas, either due to an absence of facilities or a long waiting period at a signalised crossing. Increasing the number and frequency of crossings and increasing priority for pedestrians (for example, by reducing wait times at signals) will increase the walkability of the neighbourhood.

For wheelchair and scooter users, people with mobility impairments and people with prams, barriers can also come in the form of stairs, overpasses, underpasses, high kerbs and an absence of suitable infrastructure (such as raised crossings). A number of these elements are in place across Macaulay (including across Boundary Road), and where possible, alternate crossing arrangements should be provided at surface level which provide a high-level of accessibility for all users.

3.2.4. Cycling Networks

Like walking, cycling is an active mode of transport, which means that in addition to typical decision factors in the way people might choose to travel (time, cost, flexibility, availability of parking etc.) there is the additional consideration of physical effort. Making walking and cycling convenient, providing choice and flexibility in route for all types of users and providing a safe, direct, appealing and comfortable environment will encourage people to choose to walk or cycle.

3.2.5. Permeability of Cycling Networks

Permeability of cycling networks is broadly consistent with the walking network. However, like many types of pedestrians, people with bicycles are also constrained further by their choice in travel options by the availability of infrastructure that accommodates wheeled equipment, including bicycles.

Infrastructure like overpasses, underpasses, stairs, high kerbs can all reduce the connectivity and permeability of the cycling network. For example, stairs limit accessibility to South Kensington from Arden Street. Providing crossings which are consistent with the level of the path, or where this is not possible, providing ramps which do not require a person riding a bike to dismount, increase the continuity of the cycling network.

Permeability of the cycling network can also be improved by maintaining cycling access where roads are closed to vehicles, as has been achieved on Robertson Street.

3.2.6. Connectivity of Cycling Networks

The figure below shows the current cycling network in Macaulay.

Figure 3.7: Connectivity of the Cycling Network in Macaulay¹⁴



As shown, the most direct and convenient cycling routes are typically provided along high-speed, high-volume major roads like Flemington Road, Macaulay Road and Stubbs Street, generally with minimal facilities (painted bicycle lanes) and no separation or protection from vehicles. In some areas (Melrose Street, Macaulay Road, Abbotsford Street) the cycling lanes have a narrow buffer of linemarking, providing a small degree of separation from traffic in the adjacent vehicle lane. In other areas (like Arden Street), cycling facilities are limited to **sharrows**, or sharing local streets with vehicle traffic. In one key example, Boundary Road has no cycling facilities and requires cyclist to mix with high-speed traffic in an environment which is neither comfortable nor safe, despite being a key north-south link through the area.

Sharrows: Painted bicycle symbols on the road without lanes. Typically used to remind drivers of cyclist presence where no facilities are available. Sharrows also show a person cycling where to position themselves on the roadway.

As is the case for walking, there is limited connectivity in cycling networks across the Moonee Ponds Creek or rail corridors, particularly the Craigieburn line south of Macaulay Road.

¹⁴ City of Melbourne Cycling Network (provided and used as-is)

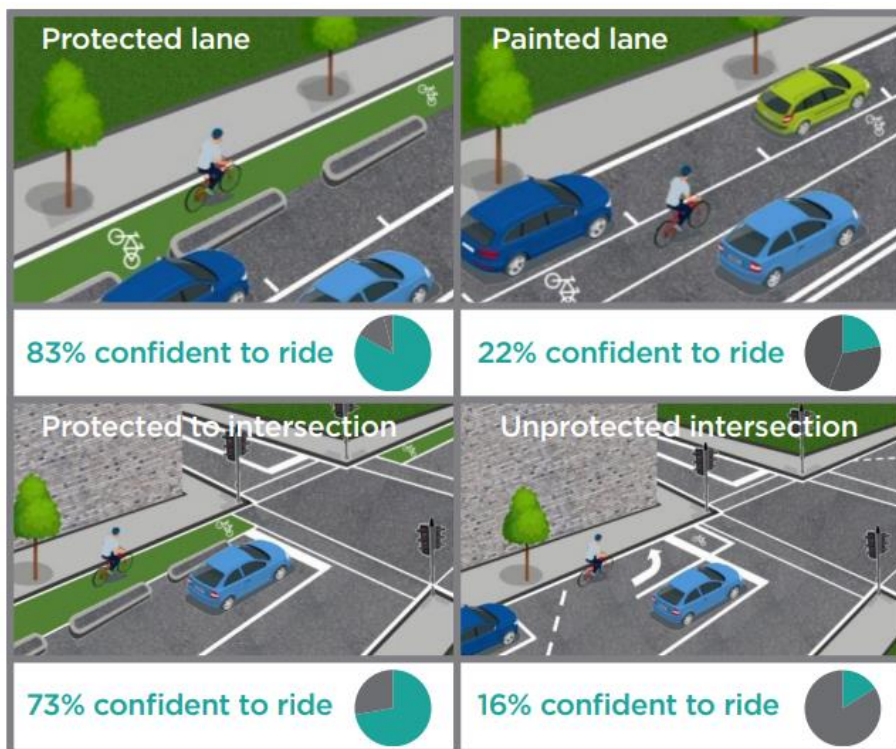
Bicycles are an important mode in the City of Melbourne, carrying more than 12,000 people to work in the municipality every day, enough to fill 57 trams and carrying more than 1.6 times more workers than buses.¹⁵ As such, improving safety and comfort of cycling should be a priority in Macaulay, particularly considering the area is within easy riding distance of jobs and opportunities in Parkville, Arden, the CBD and beyond to Southbank and Fishermans Bend.

Signal jump: A special traffic light which allows cyclists to have a head start before vehicles. This provides time for a person riding a bike to safely begin crossing an intersection before vehicles accelerate from behind or beside.

On key routes where there are high volumes of traffic, suitable separation and protection should be provided (such as physical or marked buffers) between traffic and parked cars and on-road cycling lanes. These have the additional benefit of providing protection from vehicle intrusion in crowded or popular pedestrian areas. According to research conducted by the City of Melbourne, 83% of people feel confident to ride in a protected lane, compared to just 22% in a painted lane.¹⁵

Currently, some routes lack separation (Macaulay Road) or lack any facilities at all (Boundary Road). Innovative treatments should also be considered at intersections, such as physical protection, areas where cyclists can safely wait to turn and cyclist priority measures (such as **signal jumps**). City of Melbourne research indicates 73% of people would feel confident to ride in a protected intersection, compared to 16% in an unprotected intersection.¹⁵

Figure 3.8: Proportion of people confident to ride with various levels of protection¹⁵



¹⁵ [City of Melbourne Transport Strategy Discussion Paper – Bicycles for Everyday Transport](#)

3.2.7. Personal Safety

Personal safety is a critical consideration in designing a walking and cycling network. Even if physical infrastructure is in place, a walking or cycling connection is not useable for many people if it is not safe, or does not feel safe.

In general, many areas of Macaulay (particularly around industrial or commercial sites) do not have **active interfaces** or uses, which means there are fewer people travelling to or through the area and lower levels of passive surveillance or 'eyes on the street'. Other areas are relatively isolated from passers-by or nearby houses, both during the day and at night, particularly near the rail corridors, at stations and along the Moonee Ponds Creek Trail.

Active interface: Buildings at street level which have lots of people activity across the day and night, like shops and restaurants. Even houses with windows provide a level of passive surveillance.

Specifically, community submissions were reviewed from BikeSpot¹⁶, WalkSpot¹⁷ and Free to Be¹⁸ to understand areas in Macaulay which were considered unsafe or problematic. A summary of comments is provided on the following page.¹⁹

¹⁶ The [BikeSpot](#) study was undertaken in 2016 by CrowdSpot, in collaboration with The Squeaky Wheel and the TAC. The study identifies 'safe' and 'unsafe' spots for cycling across Victoria, based on more than 8,000 community submissions.

¹⁷ The [WalkSpot](#) study was undertaken in 2017 by CrowdSpot and Victoria Walks, using funding from the TAC and support from state and local government. The study identifies 'safe' and 'issue' spots for walking across Victoria, based on more than 2,350 community submissions.

¹⁸ The [Free to Be](#) program is a partnership between CrowdSpot, Plan International and Monash University's XYX Lab to provide opportunities for women to provide their experiences in cities and identify public spaces that make them feel 'uneasy and scared' or 'happy and safe'.

¹⁹ This section provides a summary of comments provided by the community. These comments are the opinion of the contributors, and do not necessarily represent the views of GTA, nor have the comments been checked or verified for accuracy.

Figure 3.9: Summary of BikeSpot, WalkSpot and Free to Be Responses

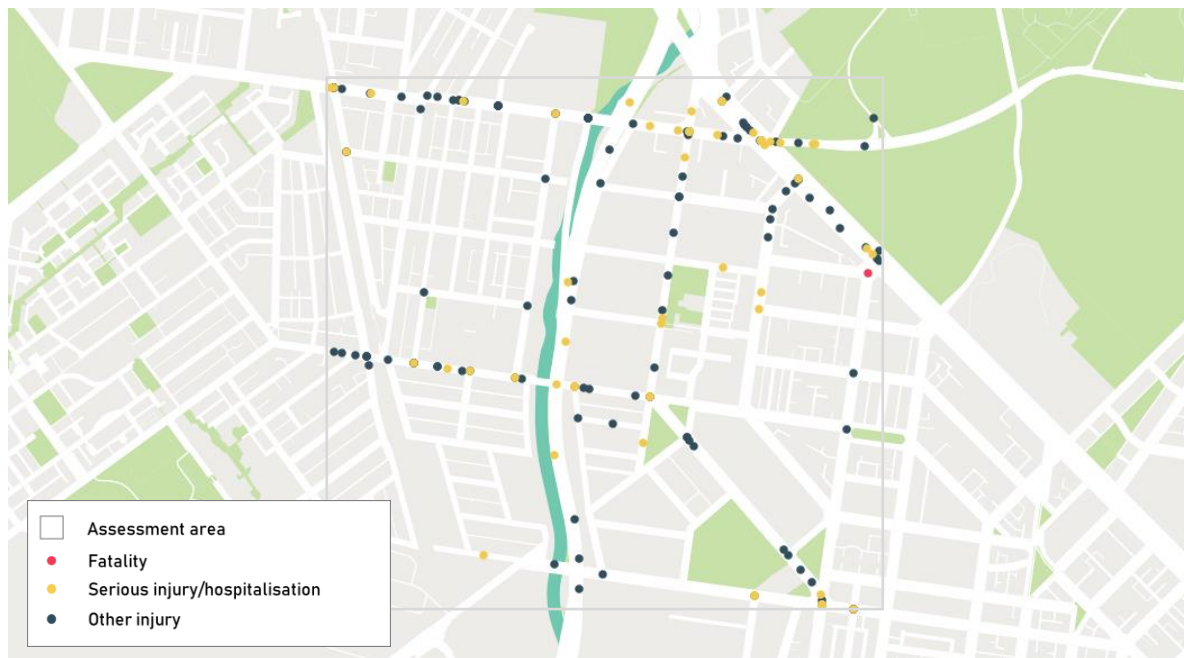


3.2.8. Road Safety

A review of VicRoads Crash Statistics shows there have been 220 crashes in the last five full years (2014-18) in Macaulay and immediate surrounds, of which more than 30 per cent involved a person on a bicycle and 16 per cent involved a pedestrian.²⁰ Crashes typically occurred on major roads, where higher volumes of vehicles and bicycles, as well as higher speeds, are more likely.

²⁰ GTA analysis of VicRoads Crash Statistics

Figure 3.10: Crashes in/near Macaulay in the last five years (2014-18)



The most common crash types were rear end collisions, right-through collisions (where a vehicle turning right collided with a vehicle travelling straight-ahead in the opposite direction) and collisions with pedestrians who were crossing on the near (i.e. left) side.

The most common crash types which involved bicycles were right-through collisions, left-turn side swipe collisions (where a vehicle turning left collided with a bicycle on the vehicle's left) and dooring incidents. Most crashes occur on major roads, including Racecourse Road, Flemington Road and Macaulay Road.

The most common crash types which involved a pedestrian occurred when pedestrians were crossing from either the near or far side of the road. Most crashes occurred on major roads and near (or at) intersections.

These incidents reaffirm the importance of providing facilities which allow for safe and comfortable walking and cycling. Low speeds also contribute to creating a safer environment for all users and can reduce the impact of a crash when it occurs.

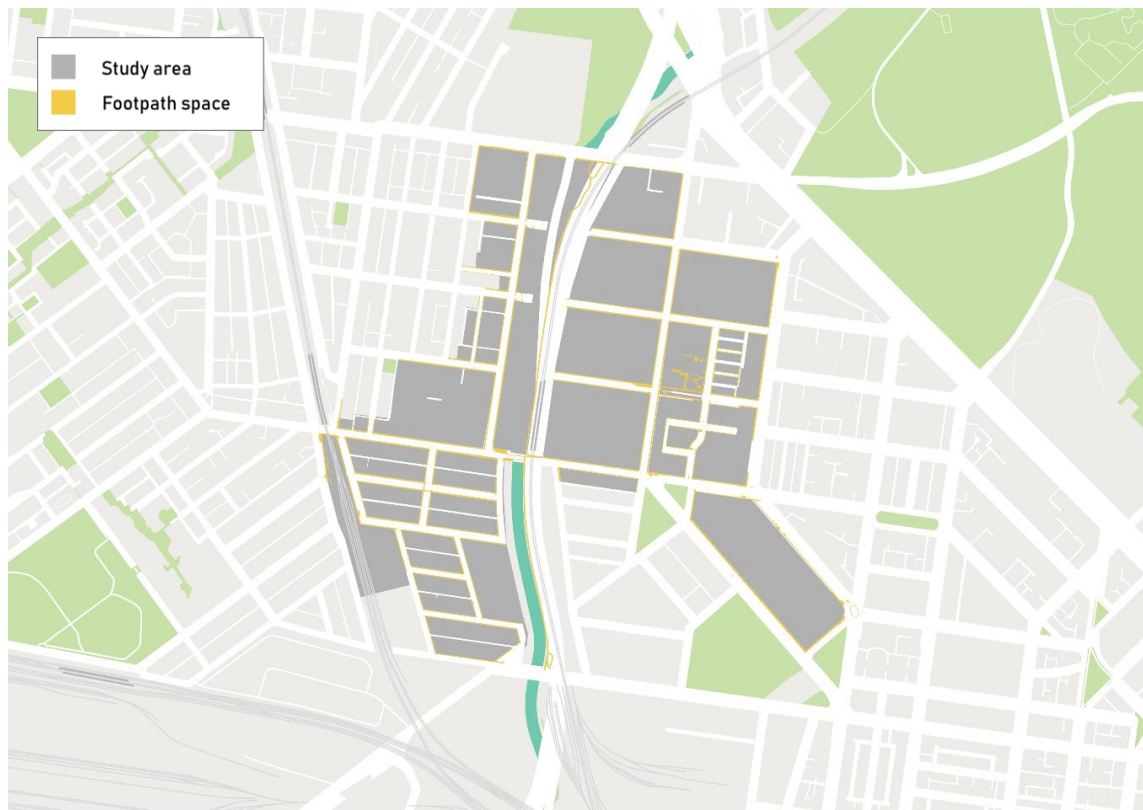
3.2.9. Comfort

Providing enough space for pedestrians is essential in establishing a comfortable and safe walking environment, particularly in high-volume areas, or areas where footpaths are also used for other things (bicycle parking, signage, seating, outdoor dining, trees and landscaping).

Spacious footpath facilities can also provide some offset from the road and make a walk along a high-traffic street more comfortable, as well as ensure better access for users with wheelchairs or scooters. This is particularly important at intersections, where pedestrians might congregate to wait for a crossing and where exposure to vehicles is highest.

To give an indication of the amount of space allocated for walking, the overall street network and all of its components (footpaths, roads, tramways, nature strips) makes up about one quarter (25%) of the available land in Macaulay. Of this, about 70% of the street space is taken up by roads, on-road bicycle lanes and on-street car parking, 22% is taken up by footpaths and shared (walking and cycling) trails and the remainder for other uses (kerbs, median and a small amount of tramway).²¹ Considering the aspirations for the neighbourhood to prioritise walking, cycling and public transport, the existing use of space reflects an environment which favours car travel and car parking.

Figure 3.11: Space budget of the footpath network in Macaulay²¹



Other features which make walking more comfortable and which should be provided in Macaulay include:²²

- reducing the width of crossings - pedestrian refuges, widening footpaths or building out kerbs at intersections
- easy wayfinding – signage and street features which reaffirm that people are ‘on the right track’
- consistent experience – avoiding the need to use ramps or stairs or navigate street obstacles
- protection – tree canopies to protect from the sun and awnings to protect from sun and rain
- priority – shorter waits at intersections, raised crossings, paving and frequent crossing opportunities

²¹ Data source: City of Melbourne Open Data – Road Segment with Surface Type

²² Global Street Design Guide

- activation – land uses which attract people, features which capture the unique identity, history and culture of the local area, outdoor dining and shops at street level
- other features – lighting, seating, water fountains and landscaping.

Other features which make cycling more comfortable and which should be provided in Macaulay include:²³

- protection – facilities/routes which make the ride low-stress and minimise conflicts with traffic and pedestrians
- priority – shorter waits at intersections, advance waiting boxes at intersections, signal jumps
- convenient parking – close to key destinations, easily accessible and with good passive surveillance
- consistent experience – avoiding need to dismount, street-level crossings strongly preferred
- easy wayfinding – signage and distance indicators to key destinations, including over longer distances
- direct – avoiding unnecessary detours or physical impediments (speed humps), particularly travelling uphill
- surface – quality of surface, including suitable anti-slip treatments (incl. line marking) for wet weather.

3.2.10. Summary

- Planning for Macaulay seeks to prioritise walking, cycling and public transport and a compact, walkable environment which supports local living, consistent with the direction established in Plan Melbourne and best practice approach to urban renewal.
- Amongst other factors, a street network which encourages these sustainable modes should provide good permeability, connectivity, safety, comfort and public realm.
 - **Permeability:** many blocks in Macaulay are small (particularly around residential areas) and so provide good walkability. However large industrial sites and physical barriers (railway lines, Moonee Ponds Creek) can make walking or cycling access difficult or circuitous in some areas and connectivity should be improved as the area unfolds.
 - **Connectivity:** most areas have a sealed footpath and pedestrian crossings at key intersections across major roads. However, some areas have an absence of pedestrian crossing facilities, or a long wait at traffic lights. Some areas also cater poorly to users with wheelchairs, scooters or prams (i.e. overpasses, underpasses, sloped footpaths at driveways, stairs, high kerbs, ramps instead of raised crossings).
 - **Safety and comfort:** features should be included which support safe and comfortable outcomes, including activation of street frontages across the day and night to put more 'eyes

²³ Global Street Design Guide

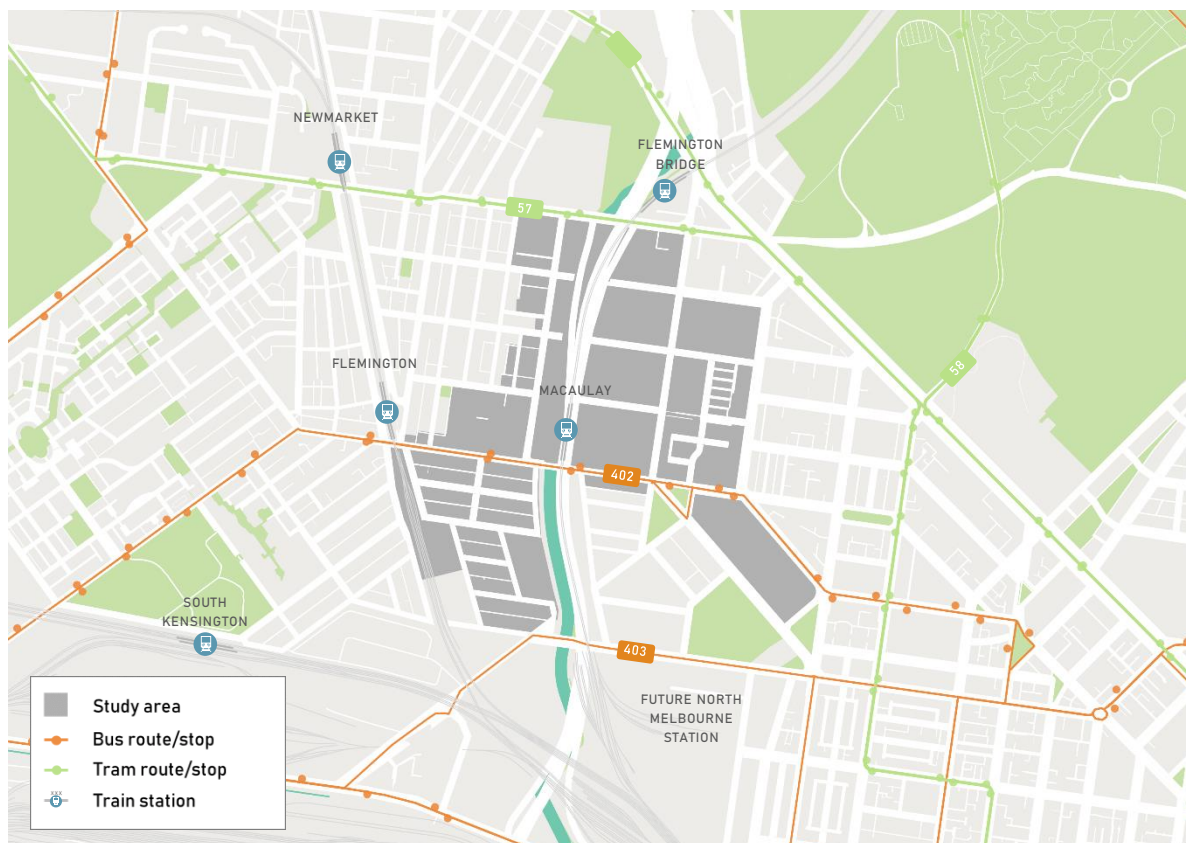
on the street', improved visibility and pleasant streetscapes with landscaping and seating. Current bicycle facilities are limited and generally feature no protection or separation from vehicles, even on high-speed, high-volume roads shared with traffic. Facilities should be provided which support safe cycling, including good levels of separation and protection on key routes to activity centres or neighbouring areas and along major roads.

3.3. Current Public Transport Conditions

3.3.1. Public Transport Networks

The public transport networks in and near Macaulay are shown in Figure 3.12. The available services are summarised below.

Figure 3.12: Public Transport Network in/near Macaulay²⁴



²⁴ Datasets sources from Data.Vic and provided by Public Transport Victoria. Route 402 added manually from Google Maps.

HOW DO PEOPLE MOVE NOW?

Service	Stops in/near Macaulay	Approx. Frequency ²⁵
BUS ROUTES		
Route 402 – East Melbourne to Footscray	Stops along Macaulay Road	Peak: 10 minutes Inter-Peak: 10 minutes Saturday: 20 minutes
TRAIN SERVICES		
Upfield Line	Macaulay Station, Flemington Bridge Station	Peak: 15-20 minutes Inter-Peak: 20 minutes Saturday: 20 minutes
Craigieburn Line	Kensington Station, Newmarket Station	Peak: 5-10 minutes Inter-Peak: 20 minutes Saturday: 20 minutes
Sunbury, Werribee & Williamstown Lines	South Kensington Station	Peak: 5-10 minutes Inter-Peak: 5-10 minutes Saturday: 5-10 minutes
TRAM SERVICES		
Route 57 – West Maribyrnong to City	Stops along Racecourse Road	Peak: 5-10 minutes Inter-Peak: 5-10 mins Saturday: 10-15 mins
Route 58 – West Coburg to Toorak	Stops along Flemington Road	Peak: 5-10 minutes Inter-Peak: 10 minutes Saturday: 10 minutes
Route 59 – Airport West to City	Stops along Flemington Road	Peak: 5-10 minutes Inter-Peak: 8 minutes Saturday: 8 minutes

The Route 403 Express Bus also runs along Arden Street, but does not stop in Macaulay.

Current public transport services provides access in all directions, with north-south access afforded by tram (Flemington Road and via Royal Park) and train (Upfield and Craigieburn lines). East-west access is also provided by tram (Racecourse Road) and bus (Macaulay Road), and also by train to the western suburbs a bit further afield (South Kensington). SNAMUTS analysis indicates that accessibility is 'above average' in most areas of Macaulay.²⁶

Public transport is also of a good frequency in the weekday peak hours, with most services being of a 5-10 minute frequency in the morning peak hour (i.e. an average wait of 3-5 minutes), and overlap of services in some areas means the wait for a service might actually be shorter.

²⁵ Review of Public Transport Victoria (PTV) timetables for a typical weekday morning peak hour.

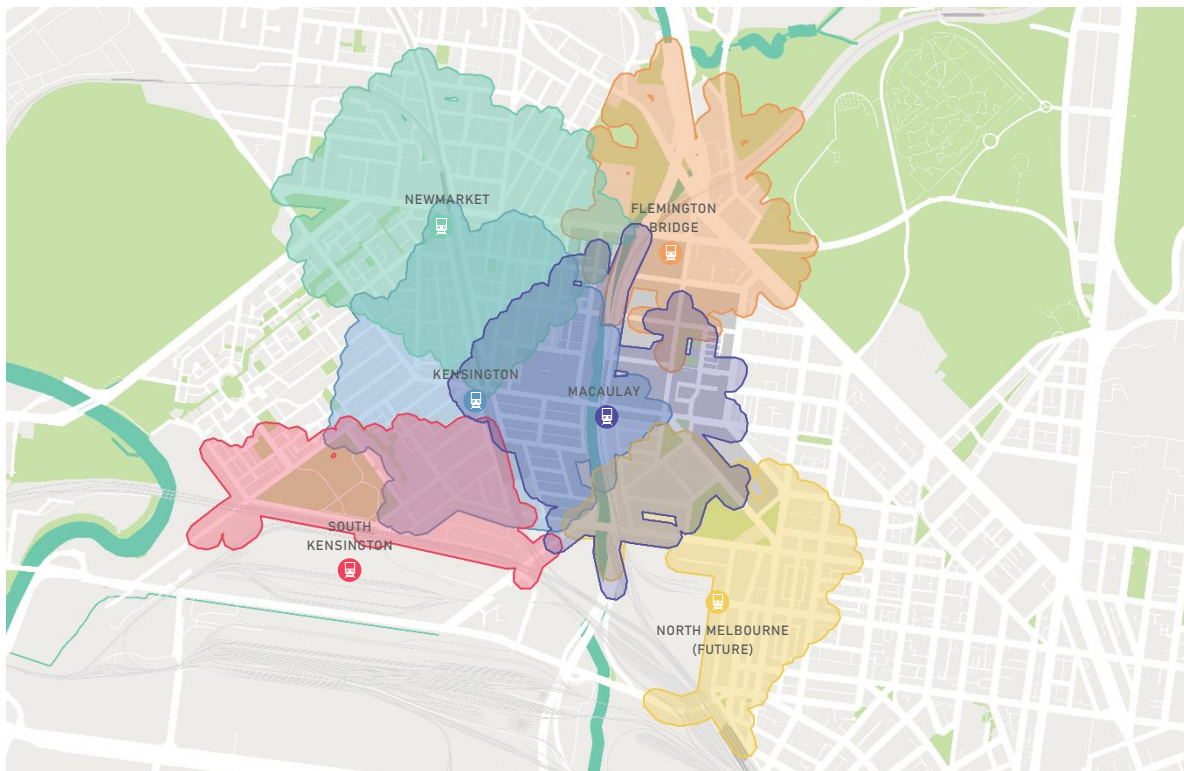
²⁶ Spatial Network Analysis for Multi-Modal Urban Transport Systems (SNAMUTS) – [Melbourne 2016](#)

3.3.2. Catchments

A distance of about 800m (a ten-minute walk) is typically considered 'walking distance' from a train station. Almost all of Macaulay is located within a ten-minute walk of at least one train station, with some areas within reach of up to three stations. The exceptions are areas which have large block sizes and lower levels of pedestrian permeability and so take a longer time (and distance) to and from the station.

The future North Melbourne station has been included in the figure below to show the new catchments once Melbourne Metro is delivered in 2026.

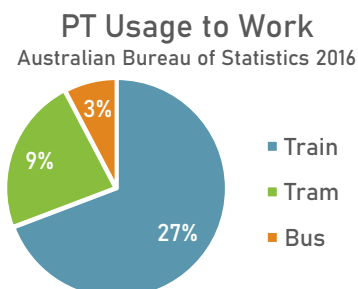
Figure 3.13: Walking Catchments for stations in/near Macaulay (10-minute walk from station)²⁷



3.3.3. Use

According to the Australian Bureau of Statistics, 39% of people living in Macaulay travel to work by public transport (refer Figure 3.1).²⁸

Of these, most people (27% of all trips to work) are by train. Some people (9% of all trips to work) are by tram and a smaller number (3% of all trips to work) are by bus.



²⁷ Catchment Analysis undertaken by GTA using Targomo & Open Street Map data

²⁸ GTA analysis of Australian Bureau of Statistics Census 2016 data. Excludes people who did not travel to work.

These results reflect the number and coverage of train stations in the vicinity of Macaulay, including access to several rail lines.

3.3.4. Capacity

Train

Data from the Department of Transport indicate that 19% of services in the morning peak hour and 8% of services in the evening peak hour on the Craigieburn line were over **capacity**. No services on the Upfield line were over capacity in the morning or afternoon peak hours.²⁹

People living in Macaulay and surrounding areas may have difficulty accessing some peak hour trains on the Craigieburn line, particularly as it is close to the CBD. As such, given proximity to the Upfield line and future Melbourne Metro, good pedestrian connections should be provided between rail stations and surrounding communities to ensure a range of choices in accessing the rail network, and in turn, provide access to a greater range of destinations by rail. The Melbourne Metro project is also anticipated to increase capacity in the peak hours by 27% (an additional 54,000 passengers every week) on the Craigieburn line, as well as 71% more peak hour capacity on the Upfield line.³⁰

Capacity: Every year, the Department of Transport surveys passenger loads on train and tram services and compares them against benchmark standards for capacity. At present, a train service is considered to be 'over capacity' when the service carries more than 900 passengers. For tram passengers, the capacity varies by location (CBD vs non-CBD) and type of vehicle.^{29,31}

Tram

Tram services near Macaulay are assessed for their overcrowding at Peel Street/Victoria Street and Haymarket roundabout. At both of these locations, surveys indicate that no services were overcrowded in either the morning or afternoon peak hours.³¹

3.3.5. Summary

- Macaulay is well-served by public transport in all directions, with tram, train and bus services operating at a high-frequency, at least in the peak hours
- Areas which have least accessibility to train services are where block sizes are large and permeability is poor
- Future planning should continue to provide good pedestrian connections and accessibility to public transport services.

²⁹ Department of Transport Metropolitan Train Load Standard Survey – May 2018

³⁰ Melbourne Metro – [Benefits for Your Train Line](#)

³¹ Department of Transport Metropolitan Tram Load Standard Survey - May 2018

3.4. Car Parking

Existing car ownership and parking data provides an understanding of current car ownership and parking in Macaulay. On-street car parking data is limited for the area, so can only be discussed in general terms. The key findings are outlined below.

Residential

It should be noted that despite Macaulay's low existing residential stock and large proportion of social housing, results are broadly consistent with nearby Kensington and North Melbourne.

- The study area has 2,275 residents living in 1,270 dwellings – an average of 2.15 persons per household.³² This is lower than the average household size for Greater Melbourne of 2.7 persons per household but similar to Kensington (2.2 persons/dwelling) and North Melbourne (2.1 persons/dwelling).³³
- The average household owns 0.88 vehicles, that is, less than one vehicle per household, and about one third of households do not own a car. This is consistent with data for Kensington and North Melbourne (0.9 vehicles/dwelling combined and 32% dwellings without a car).³⁴
- There are currently 636 off-street car parking spaces within residential properties, which equates to approximately 0.5 spaces per dwelling. About half of these are provided in the social housing precinct, with the balance in the existing residential areas in the west and south-west.³⁵
- Given off-street parking provision (0.5 spaces/dwelling) is lower than car ownership (0.88 vehicles/dwelling), approximately 40% of cars are being stored on-street, assuming off-street spaces are fully utilised. Note that this number may be lower depending on alternate garaging arrangements (i.e. commercial car park, storing car at workplace or alternate location), or higher if cars are parked on-street despite having an off-street space (i.e. garage) available.

Workers

Note that employment data is not available to as fine-grain level of detail as population data. As such, this analysis covers a larger area than the study area, including near Flemington Bridge and down to Arden Street in the south.

- There are approximately 5,000 workers in the analysed area broadly representing Macaulay and immediate surrounds.³²
- There are currently 2,718 private off-street spaces in this same area, which equates to 0.54 spaces/worker. Theoretically, this means that more than half of people working in Macaulay can

³² GTA review of ABS Census 2016 data. Data for population and dwellings was reviewed to a mesh block (MB) level which most closely aligned with the Macaulay study area, noting that the analysed area is slightly larger than the study area. Data for workers was reviewed to a destination zone (DZN) level, noting that the analysed area is larger than the study area.

³³ [ABS QuickStats – Greater Melbourne, North Melbourne, Kensington](#)

³⁴ GTA review of ABS Census 2016 data. Note this analysis excluded 'not stated' or 'not applicable' responses, so the data covers a smaller number of households. This proportion has been extrapolated over the 1,270 dwellings.

³⁵ City of Melbourne CLUE Data – Off-Street Car Parking

drive to work and have a car park available on-site.³⁵ As private on-site car parking (as distinct from commercial car parking) is often free,³⁶ this incentivises car travel to work.

- Indeed, journey to work data indicates that 3,428 people drove to work by car (excluding passengers and taxis) in this same area, which exceeds the number of off-street car spaces.³² This means that about 20% of cars are being stored on-street, assuming off-street spaces are fully utilised. Again, note that this number may be lower depending on alternate garaging arrangements (i.e. commercial car park or alternate location), or higher if cars are parked on-street despite having an off-street space available.

3.4.1. Summary

- Availability of off-street car parking, as well as unrestricted on-street car parking, means that people are incentivised to travel by car.
- Managing both on-street and off-street car parking will be essential in reducing car dependence, improving sustainable transport use and making better use of street space, particularly as it is a lever which is largely within Council's control. More detail on potential interventions is provided in Section 5.

3.5. Traffic Volumes and Movement

GTA prepared the Macaulay Demand Model (MDM) to understand:

- how the street network could be expected to function at various levels of development, in terms of vehicle traffic
- where, and at what levels of development, the likelihood of vehicle delays and travel unreliability increased
- the potential impacts of interventions which reduce demand for vehicle travel and encourage shifts to other modes.

Details of the model and how it was compiled are discussed in the Technical Appendix.

The figures below show how the **capacity** of the road network could be expected to handle the anticipated **demand** for the road network under existing conditions.

Capacity: refers to the theoretical maximum number of vehicles a given section of road can carry in a period of time – in this case, a peak hour. The capacity will depend on things like how many lanes are available and other things that might reduce how many vehicles that can travel along that section, like railway boom gates.

Demand: refers to how many vehicles are estimated to use a given section of road in a period of time – again in this case, a peak hour. The demand for roads in Macaulay will be a combination of people starting or finishing their trips in the local area, or other trips which are travelling through, but not stopping in, Macaulay ('through trips').

³⁶ Research for Infrastructure Victoria shows that only 17% of survey respondents (weekday peak hour car drivers) pay for car parking at their destination – [Managing Transport Demand Community Research – Part 2, Quantum Research](#)

Comparing demand to capacity on different sections of road allows an understanding of where the performance of the road network might start to deteriorate and where delays and travel unreliability are more likely. A common measure for this is a **volume/capacity (V/C) ratio**, which is used for this study, and is consistent with the approach used for testing the road network for Amendment C190 in 2012.

The volume/capacity ratios for roads in the study area under existing population and worker numbers and the current street network are shown below. It is stressed that these plots should not be misinterpreted as showing the length of queues. Rather, they should be used to understand which sections of road are likely to represent 'pinch points' in the network, from which queues could extend.

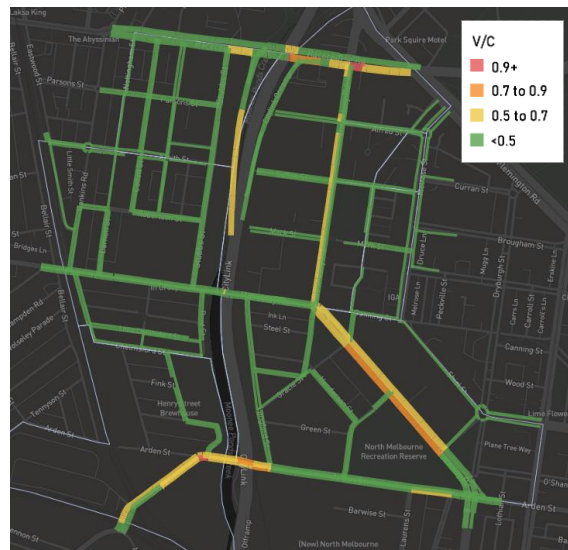
It should also be noted that the transport network should inform, but not dictate, the level of development and that increasing capacity for car travel is not consistent with aspirations for the area, which seeks to prioritise walking, cycling and public transport.

Volume/capacity ratio: a ratio of the expected traffic volumes (demand) compared to the capacity of a given section of road. A V/C ratio approaching, or exceeding, one means that the amount of vehicles that could be expected to use this section of road is close to its capacity and delays and unreliability are more likely. A V/C ratio significantly below one means that there is enough capacity in the road to carry the anticipated amount of vehicles and the road could be expected to function adequately, unless impacted by external factors (such as pinch points in areas outside the study area).

Figure 3.14: V/C Existing – AM Peak



Figure 3.15: V/C Existing – PM Peak



As shown, the analysis indicates that the capacity of most roads in the area is sufficient to accommodate the anticipated demand under existing conditions. This means that most of the road network in Macaulay is not envisaged to be the cause of significant delays or travel unreliability.

There are some exceptions, where the model indicates there is more demand for vehicle travel than the capacity of the roads:³⁷

- Macaulay Road (inbound) between Canning Street and Haines Street (AM Peak)
- Arden Street (inbound), at the railway crossing (AM Peak)
- Racecourse Road (outbound) at Boundary Road (PM Peak)
- Racecourse Road (outbound) at the railway crossing (PM Peak)
- Arden Street (outbound) at Lloyd Street (PM Peak).

Discussion on the implications of this, combined with the impacts of future development, is covered in Section 4.

It is also noted that because this model shows 'pinch points', rather than queue lengths, there may be other locations outside of Macaulay which cause delays and travel unreliability in Macaulay, such as intersections or railway crossings outside the study area. Intensity of demand and capacity constraints also needs to be considered – for example, a boom gate closure may cause short periods with long queues, but across the hour, it is still possible for a road to have sufficient capacity to accommodate demand (example shown below). These are outside of the scope of this study, but should be considered when comparing the modelling results to real-life conditions.

Figure 3.16: Queuing on Arden Street at Langford Street, during a boom gate closure³⁸



Figure 3.17: 'Normal' flow at the same location, a few minutes after boom gate opens



3.5.1. Summary

- Modelling indicates that the capacity of most roads have enough capacity to accommodate the number of cars that are anticipated to use them under existing conditions. This means most of the road network in Macaulay is not envisaged to be the cause of significant delays or unreliability.
- However, modelling indicates there are a few pinch points in the current road network, where demand for car travel exceeds the capacity available in the road network. These areas include parts of Macaulay Road, Racecourse Road, Arden Street and some level crossings.

³⁷ **Inbound:** in the direction of travel generally towards Melbourne CBD, **Outbound:** in the direction of travel generally away from Melbourne CBD

³⁸ Images captured in 2016.

4. WHAT IS PLANNED FOR THE FUTURE?

This section provides a summary of planning for Macaulay, as well as broader projects which may impact on movement and access to Macaulay.

04

4.1. Future Land Use Planning

Macaulay is envisaged to play a role in accommodating growth in Melbourne and the broader State. The area is envisaged to be home to 10,000 residents and 9,500 jobs by 2051.³⁹

The Arden Macaulay Structure Plan was prepared in 2012 and provided the overarching planning framework for Macaulay (and adjacent urban renewal precinct Arden to the immediate south).

In September 2017, the Minister for Planning approved interim controls for the Macaulay area with a two-year expiry. In this time, Council is to review the planning framework for Macaulay and revise the proposed permanent planning controls to make better allowance for (amongst other things):

- Housing and employment growth to support the government's investment in public transport infrastructure and opportunities achieved through site consolidation and master planning
- Better management of density through a 'Floor Area Ratio' control and potential to maximise development outcomes in exchange for public benefit
- Integration with structure planning for the Arden precinct.

Since this time, Council has undertaken a significant body of work, in collaboration with other consultancies, to address the conditions outlined by the Minister and progress the planning framework for Macaulay, including the development of the Macaulay Built Form Review Report and the Moonee Ponds Creek Strategic Opportunities Plan.

Further planning exercises (including this study) are also being undertaken to consider the impact of revised population forecasts and test the impact of various built form scenarios. A summary of key current planning and projects are below.

4.1.1. Arden Macaulay Structure Plan⁴⁰

- Transition to a mixed use area which provides a diversity of activities such as residential, commercial, retail, educational, entertainment and cultural activities.
- Accommodating these uses in a compact, walkable environment to allow residents, workers and visitors to undertake a number of activities in short, linked trips and provide a safer, more vibrant environment.
- Establishing three new local activity centres, including in Macaulay (Macaulay Road and Canning Street).
- Increased provision of affordable housing, open space and community infrastructure.
- Creating liveable, local neighbourhoods.
- Regenerating the area's public realm to design 'great streets' for people.
- Growing a city that prospers within the earth's ecological limit.

³⁹ Victoria in Future 2014: Population and Household Projections to 2051 (2014)

⁴⁰ [Arden Macaulay Structure Plan \(2012\)](#)

WHAT IS PLANNED FOR THE FUTURE?

- Creating a connected and accessible place which maximises pedestrian movement.

4.2. Future Transport & Place Planning

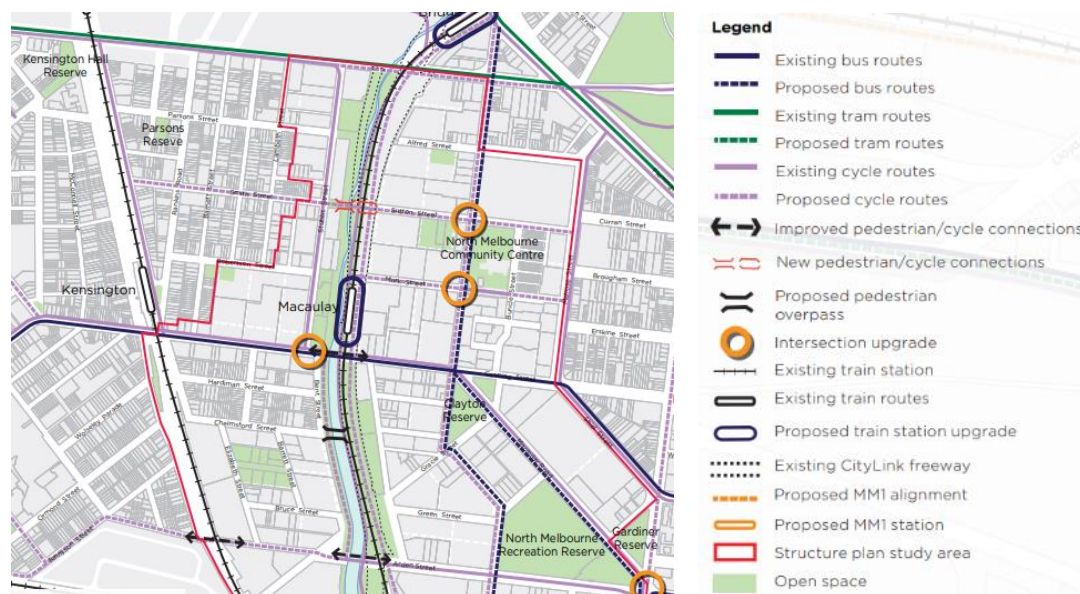
4.2.1. Arden Macaulay Structure Plan (2012)

The Arden Macaulay Structure Plan outlines the following transport directions:

- Prioritise the growth of sustainable transport modes and contain vehicular access and parking provision within that context.
- Prioritise public transport, walking and cycling in existing and new road infrastructure through design treatments, links and facilities.
- Create a permeable street network that is attractive, well-designed and legible with a high-level of amenity.
- Provide safe, direct and attractive pedestrian, cycle and local vehicular links to key activity centres.
- Upgrade Moonee Ponds Creek Corridor to provide improved pedestrian and cycle connections.

Some key projects include reviewing parking requirements and preparing a precinct parking plan, encouraging car sharing and bike sharing as well as new cycle routes and new bus routes.

Figure 4.1: Transport Networks – Arden Macaulay Structure Plan 2012⁴¹



⁴¹ Arden Macaulay Structure Plan 2012

WHAT IS PLANNED FOR THE FUTURE?

4.2.2. City of Melbourne preliminary framework (2018)

The City of Melbourne provided a preliminary framework to form the basis of testing and refinement through the engagement of consultants. This included early thinking on a new street hierarchy and transport networks in Macaulay, as well as different built form scenarios. This document is referenced throughout this report as the 'CoM preliminary framework'.

Figure 4.2: CoM preliminary framework for the future street network – diagram only

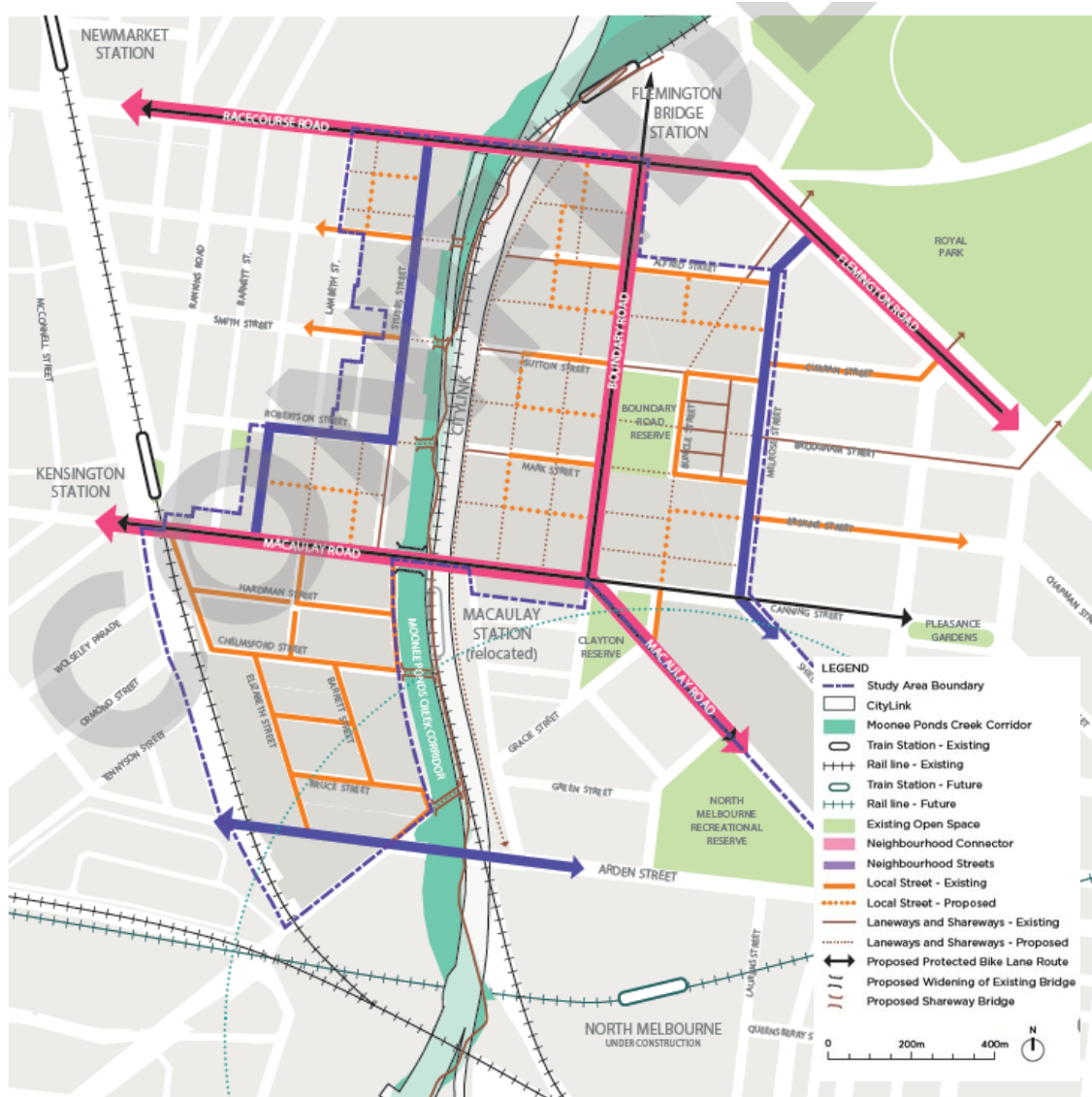


Table 4.1: Access & movement actions based on the CoM preliminary framework

No	Action	Potential Impact
1	Provide additional through-block links through the larger blocks, including local streets and pedestrian/cycle laneways.	New block links will increase permeability and enhance the walkability of Macaulay, reducing walking distances and making more areas accessible. Creating new block links can also help break up large, imposing sites. Where vehicle access is afforded, it is proposed to be provided in a circuitous manner to discourage use of local streets for through-trips.
2	Investigate opportunities for new pedestrian/cycle bridges over and access to the Moonee Ponds Creek.	The Moonee Ponds Creek and freeway corridor presents a significant obstacle which divides Macaulay into distinct precincts through its centre. Providing new bridges will help stitch communities on either side of the Creek together and increase accessibility and connectivity between the two areas. For these links to be effective, they should connect across both the Creek and railway line to link streets on both sides of the corridor. These bridges could also be leveraged to provide increased connectivity to South Kensington via additional crossings over the Craigieburn rail corridor (for example, at Chelmsford Street).
3	Deliver protected bike lanes along neighbourhood connectors, Macaulay Road and Boundary Road	In general, safety often arises as a key reason people feel they cannot choose to cycle. Providing protected cycling lanes which are separated from car traffic and parked vehicles will make cycling more accessible to more people and demonstrates a commitment to safety and prioritising people who cycle.
4	Investigate opportunities for a dedicated cycle route along Canning Street, connecting Macaulay with City North	City North will continue to build as an area of strategic importance as new residential and employment opportunities develop around Melbourne Metro stations. Providing back-street, lower-traffic alternatives (compared to Flemington Road or Macaulay Road) and direct routes will enhance cycle connectivity to this area.
5	Investigate potential redesign or closure of existing low-volume traffic streets to deliver open space and blue/green infrastructure opportunities	The road surface makes up almost three-quarters of all public street space in Macaulay. ⁴² In a space-constrained inner-city environment, strategically closing some local streets to cars (and car parking) will provide new space for parks, flooding infrastructure and other elements which make a neighbourhood a great place to live.
6	Advocate for the relocation of Macaulay Station and integration of a new station forecourt	Macaulay Station is in a constrained location, bounded on the west by the Moonee Ponds Creek and on the east by existing properties. The station is also overshadowed by CityLink and has limited access points and open aspect. Providing a new station forecourt would improve amenity, safety and accessibility of the station and create a more welcoming environment, integrated with the surrounding activity centre. The site could benefit further from improved walking accessibility in all directions, including across Macaulay Road.

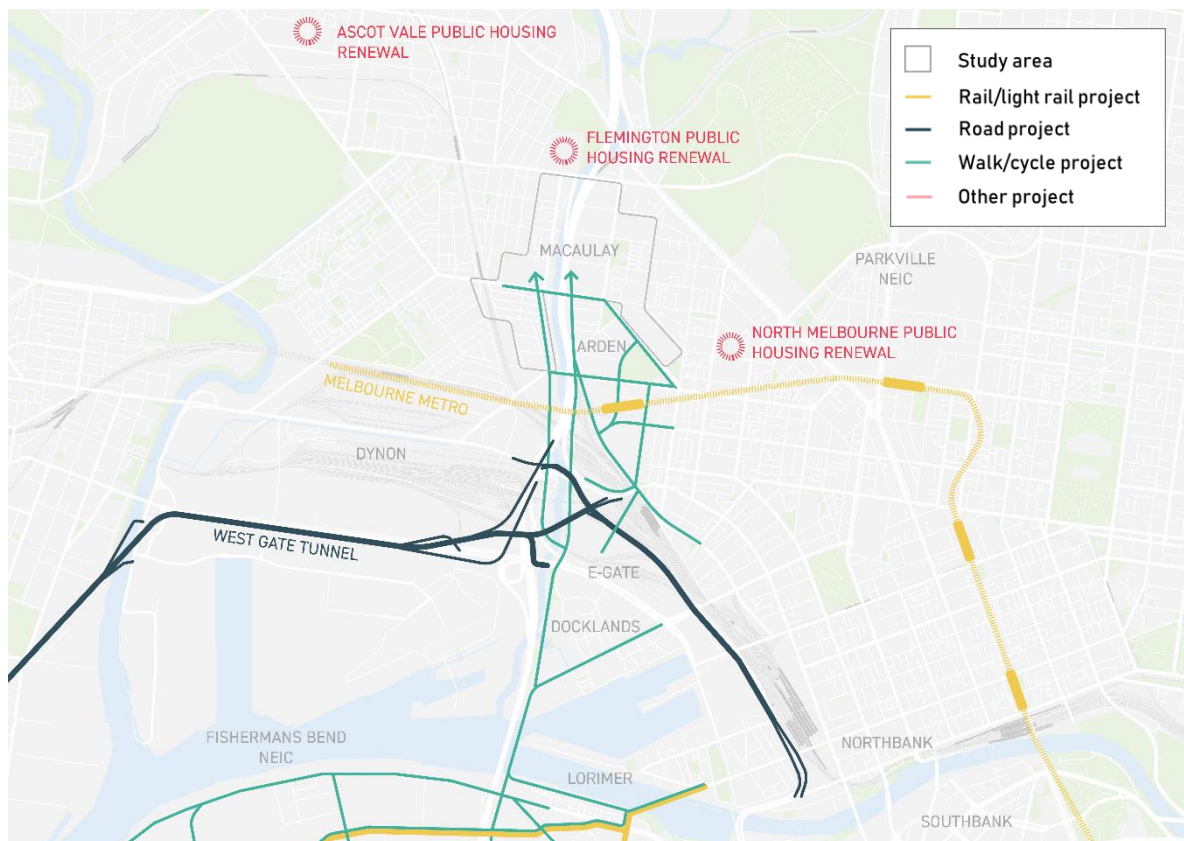
⁴² City of Melbourne Open Data – Road Segment with Surface Type

WHAT IS PLANNED FOR THE FUTURE?

7	Deliver a high-quality public realm outcome to support an economically thriving local activity corridor along Macaulay Road and Canning Street, closing the section of Canning Street adjacent to Clayton Reserve to support an intensity of activity.	In the future, Macaulay Road (extending to Canning Street) is envisaged as a local activity centre. The corridor would require significant improvements to pedestrian amenity and urban realm to achieve this – including improvements to the intersection of Macaulay and Boundary Roads, which ‘severs’ the local activity centre in its current form. Removal of car parking and local vehicle access to Canning Street at Clayton Reserve will provide more room for pedestrian-scale activities. However, this section of street currently provides for a dedicated bus ‘shortcut’ and protected bike lane – maintaining cycling access and good public transport priority in the area (particularly for buses, which share the road with car traffic) will be important in supporting local access and sustainable transport aspirations.
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A summary of planned transport and place planning projects from local and state government policies is outlined in the map below.

Figure 4.3: Projects and Urban Renewal Precincts in the vicinity of Macaulay



WHAT IS PLANNED FOR THE FUTURE?

Project	Description	Implications for Macaulay
Melbourne Metro Rail Project (MMRP)	The project will see the installation of five additional stations, including the new North Melbourne station to be located within the Arden urban renewal area.	A new station will be delivered at North Melbourne (formerly 'Arden') about one kilometre south of Macaulay, which will provide access to the metropolitan rail network. A total of approximately 880 entry and exit movements are expected in the morning and evening peak hours, which will increase the number of people seeking to access the station on the surrounding footpath network, but is not likely to have a material impact on the network in Macaulay.⁴³ Strategically, the new station in North Melbourne and existing station in South Kensington will provide improved access to Parkville and suburbs in Melbourne's south-east and north-west. The new station will also provide improved access from Arden and Macaulay to Sunshine Station Super Hub and its future connections, including Airport Rail Link, Suburban Rail Loop, new electrified rail lines to Wyndham Vale and Melton and new Fast Rail to Ballarat and Geelong.⁴⁴
West Gate Tunnel Project	The West Gate Tunnel will provide a second freeway river crossing and connection between the Tullamarine Freeway and Geelong. The project's key aims are to build network redundancy, divert freight traffic from local roads in the inner west and improve access to the Port of Melbourne.	Modelling undertaken for the West Gate Tunnel Project shows a decrease in traffic volumes on Flemington Road of 100vpd and increase in volumes along Macaulay Road of 300vpd as a result of the West Gate Tunnel Project, compared to the future scenario (2031) without the project. Given Macaulay Road is expected to carry 19,000-24,000 vehicles in 2031, this represents a small change and is unlikely to have a material impact on the street network in the area. The project will, however, have a more substantial impact on nearby links including Arden Street and Dryburgh Street. ⁴⁵
Arden and Fishermans Bend Urban Renewal Precincts	The State Government has recently released planning frameworks for both Arden and Fishermans Bend – two urban renewal precincts within reach and a similar context to Macaulay. Projects in both of these areas are likely to interact with the way people move in Macaulay, and planning should consider their implications.	Arden Vision:⁴⁶ • New off-road shared path connection linking Macaulay Station to the new North Melbourne Station and existing West Melbourne Station (and connecting beyond to the CBD), as well as new connections to Docklands (via E-Gate) and Dynon Road. • New or upgraded on-road cycling links along Arden Street, Queensberry Street, Fogarty Street and Laurens Street, Macaulay Road and Langford Street • Upgraded pedestrian and cyclist crossings along Macaulay Road, Arden Street and other streets in Arden precinct. Fishermans Bend Framework:⁴⁷ • New cycling links, including a new bridge across the Yarra River connecting Fishermans Bend to Docklands and new direct cycling links to the Moonee Ponds Creek. • High quality end-of-trip facilities in new developments and good bicycle parking provision. • Supporting precinct car parking stations and car share • Low maximum car parking rates in new developments.

⁴³ Melbourne Metro Environmental Effects Statement – [Chapter 8 - Transport](#)

⁴⁴ [Western Rail Plan](#)

⁴⁵ [West Gate Tunnel Transport Impact Assessment, May 2017, Figure 160](#)

⁴⁶ [Arden Vision 2018](#)

⁴⁷ [Fishermans Bend Framework](#)

WHAT IS PLANNED FOR THE FUTURE?

Project	Description	Implications for Macaulay
		In both cases, there are opportunities to connect active travel links from Macaulay to these nearby urban growth precincts and the residences and employment opportunities they will deliver.
Broader freeway network upgrades	Monash Freeway, CityLink Tulla Widening and the North East Link are major state infrastructure projects that are underway.	These recent and ongoing major road-based infrastructure improvements will continue to support high levels of car travel in many parts of Melbourne. Given the area's proximity to freeway access, if roads in Macaulay are designed to accommodate vehicle traffic (by providing upgraded roads and car parking) people will respond by driving to Macaulay, which contradicts the aspirations for sustainable travel.
Draft Moonee Ponds Creek Strategic Opportunities Plan (2019)	The City of Melbourne released a draft plan for the Moonee Ponds Interface for community consultation.	In the Macaulay area, the draft plan proposes:⁴⁸ • New pedestrian bridges east-west across the creek • Creation of new open space destinations and green links • Creation of a separated commuter path for cyclists. Further south, the plan proposes a new bridge connection between Docklands, North Wharf and Fishermans Bend, consistent with the Fishermans Bend Framework. This link would provide improved connectivity to jobs and education opportunities in Fishermans Bend, as well as providing a comfortable, separated cycling path to Docklands and beyond.

4.3. Summary

Broadly, the street network and actions based on the CoM preliminary framework (see Figure 4.2 and Table 4.1) are consistent with prioritising walking, cycling and public transport, with a few opportunities for further improvement:

- New Creek crossings should also cross the rail corridor to link neighbourhoods together and improve connectivity and accessibility.
- Opportunity to make the most of Moonee Ponds Creek crossings by creating additional crossings over the Craigieburn rail corridor. This would connect Macaulay to South Kensington.
- Macaulay Road will need to be considered particularly carefully in terms of how limited space is used to accommodate different people travelling and visiting the activity centre – pedestrian and bus movements should be prioritised, with safe access by bicycle. Through-vehicle trips and on-street car parking should be discouraged.
- Maintaining public transport priority, as well as good walking and cycling access (including to the activity centre and railway stations), is important in supporting local access and sustainable transport aspirations.

⁴⁸ [Draft Moonee Ponds Creek Strategic Opportunities Plan](#), City of Melbourne

5. WILL CURRENT PLANNING ACHIEVE THIS?

This section considers the existing movement patterns and planned projects for the area and tests whether the proposed movement and access networks are likely to support the aspirations for Macaulay.

05

5.1. Overview

With the context from earlier sections in mind, this section provides further discussion and analysis to identify whether planning is likely to deliver on the aspirations for the area as a liveable and sustainable neighbourhood, from a transport perspective.

Specifically, this study sought to understand the potential impacts of three different development scenarios in Macaulay, defined by different levels of **Floor Area Ratio (FAR)**.

Floor Area Ratio (FAR): Floor space of building divided by overall site area. A higher FAR means that more floor area is delivered on a given site (higher-density).

Figure 5.1: FAR Scenarios and their populations and employment outcomes for 2036⁴⁹

Scenario 1	3:1 FAR	Scenario 2	4:1 FAR	Scenario 3	5.7:1 FAR
	15,100 residents		18,900 residents		25,300 residents
	6,700 jobs		8,400 jobs		11,300 jobs

It is noted that all tested future scenarios exceed the state government's forecast population of 10,000 residents in 2051, and Scenario 3 tests higher employment levels than the forecast 9,500 workers in 2051.

Analysis and findings are presented in the sections below.

5.2. Impacts of Planning on Car Travel

As discussed for existing conditions in Section 3.5, GTA prepared the Macaulay Demand Model (MDM) to understand:

- how the street network could be expected to function at various levels of development, in terms of vehicle traffic
- where, and at what levels of development, the likelihood of vehicle delays and travel unreliability increased
- the potential impacts of interventions which reduce demand for vehicle travel and encourage shifts to other modes.

This is consistent with the approach adopted to test the road network in the Arden Macaulay Integrated Transport and Access Review for Amendment C190 (2012), however has been enhanced to provide a finer-grain of detail as to where the pinch points are likely to occur. The results of the modelling are shown below, with more detail on how the model was compiled in the Technical Appendix.

5.2.1. Scenario 1 – 3:1 FAR

The figures below show how the capacity of the road network could be expected to handle the vehicles using these roads under Scenario 1 in 2036, with existing conditions reproduced for reference.

⁴⁹ Provided by City of Melbourne, rounded to nearest 100

WILL CURRENT PLANNING ACHIEVE THIS?

Figure 5.2: V/C Existing – AM Peak

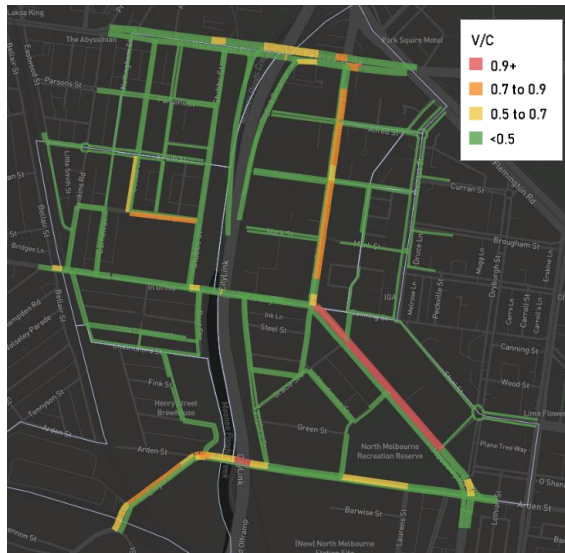


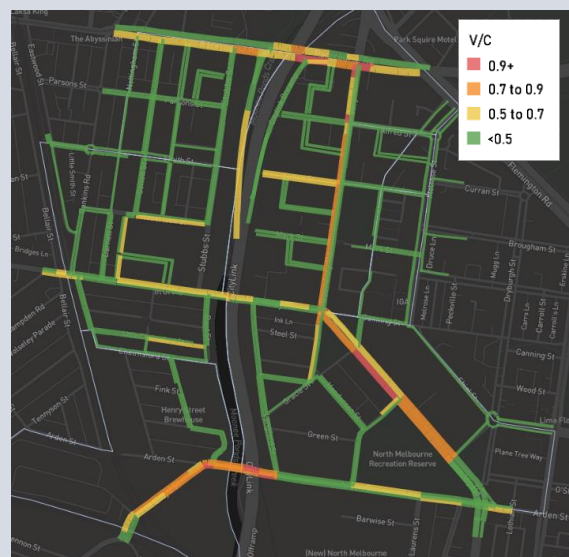
Figure 5.3: V/C Existing – PM Peak



Figure 5.4: V/C Scenario 1 – AM Peak



Figure 5.5: V/C Scenario 1 – PM Peak



The modelling shows most of the roads could be expected to adequately accommodate vehicle demand in Scenario 1. Beyond those identified in existing conditions, the modelling shows new pinch points may arise on:

- Racecourse Road (inbound) at Boundary Road (AM Peak)
- Racecourse Road (outbound) at Boundary Road (AM Peak)
- Boundary Road (inbound) near Alfred Street (AM Peak)
- Boundary Road (inbound) near Mark Street (AM Peak)
- Boundary Road (outbound) near Alfred Street (PM Peak)

WILL CURRENT PLANNING ACHIEVE THIS?

- Boundary Road (outbound) near Racecourse Road (PM Peak)
- Arden Street (inbound) at the railway crossing (PM Peak)
- Arden Street (outbound) at the railway crossing (PM Peak)
- Macaulay Road (outbound) between Gracie Street and Fogarty Street (PM Peak).

5.2.2. Scenario 2 – 4:1 FAR

The figures below show how the capacity of the road network could be expected to handle the vehicles using these roads under Scenario 2 in 2036, with existing conditions reproduced for reference.

Figure 5.6: V/C Existing – AM Peak

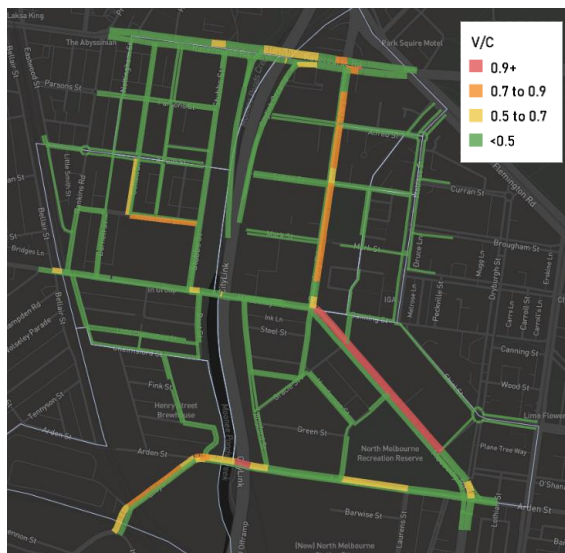


Figure 5.7: V/C Existing – PM Peak



Figure 5.8: V/C Scenario 2 – AM Peak

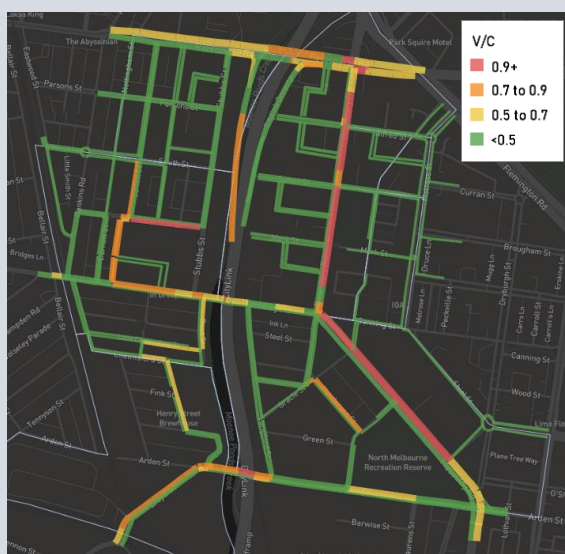
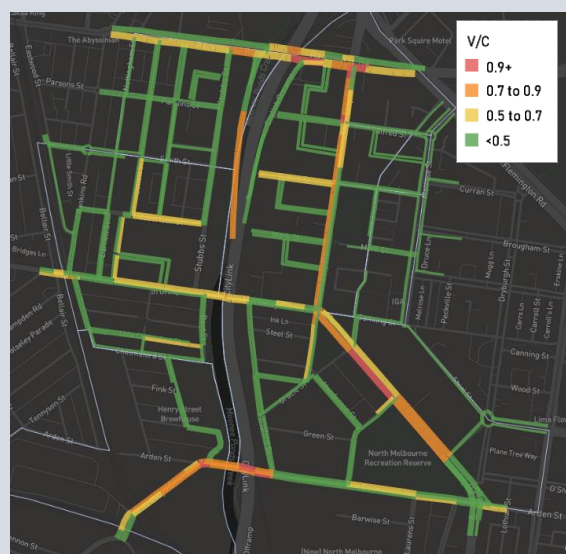


Figure 5.9: V/C Scenario 2 – PM Peak



WILL CURRENT PLANNING ACHIEVE THIS?

Again, the modelling shows most of the roads could be expected to adequately accommodate vehicle demand in Scenario 2. Modelling shows that pinch points arising in Scenario 1 will intensify and new pinch points may arise on:

- Robertson Street (inbound) between Stubbs Street and the new link to Macaulay Road (AM Peak)
- Macaulay Road (inbound) at the railway crossing (AM Peak).

5.2.3. Scenario 3 – 5.7:1 FAR

The figures below show how the capacity of the road network could be expected to handle the vehicles using these roads under Scenario 3 in 2036, with existing conditions reproduced for reference.

Figure 5.10: V/C Existing – AM Peak



Figure 5.11: V/C Existing – PM Peak



Figure 5.12: V/C Scenario 3 – AM Peak



Figure 5.13: V/C Scenario 3 – PM Peak



WILL CURRENT PLANNING ACHIEVE THIS?

Again, the modelling shows most local streets and most parts of major roads could be expected to adequately accommodate vehicle demand in Scenario 3, with modelled demand below capacity (V/C ratio of 0.9 or less). Modelling shows that pinch points arising under Scenario 1 and 2 will intensify and new pinch points may arise on:

- Racecourse Road (inbound) at the railway crossing (AM Peak)
- Racecourse Road (outbound) at the CityLink on-ramp (AM Peak)
- The new road link (inbound) between Robertson Street and Macaulay Road (AM Peak)
- Boundary Road (outbound) north of Macaulay Road (PM Peak)
- Macaulay Road (inbound) at the railway crossing (PM Peak).

A summary of these pinch points is provided in the Technical Appendix in Section A.3.

5.2.4. Potential Projects

Two additional potential projects have been identified by Council, but have not been directly modelled in this study. The anticipated impact of these projects is outlined below.

- **Public transport extension along Macaulay/Boundary Roads:** a new north-south public transport link (tram extension or bus link) has been proposed along Macaulay and Boundary Roads, connecting to the future North Melbourne station in the south. This is shown as a bus route in the Arden Macaulay Structure Plan. If dedicated infrastructure is provided, capacity for car travel may be reduced along these links. However, provision of good quality public transport may attract a shift in trips away from car use to public transport.
- **Level Crossing Removals:** the level crossings on Arden Street, Macaulay Road and Racecourse Road represent pinch points at various peak hours. Removing the level crossings (by grade-separation) would increase the road capacity at these locations and so potentially reduce or remove the pinch points in these areas and improve reliability of the road network.

5.2.5. Summary & Implications

- In general, modelling indicates most roads in Macaulay will be capable of carrying the anticipated vehicle demand.
- As the level of development increases, more locations across the network become 'pinch points' where delays and travel unreliability could be expected. In some cases, the level of demand is not dictated by development in Macaulay, but traffic travelling through Macaulay from other areas.
- However, increasing capacity for car travel is not consistent with aspirations for the area, which seeks to prioritise walking, cycling and public transport. The transport network should inform, but not dictate the level of land development.
- Instead of providing new traffic lanes or intersection upgrades ('increasing capacity'), measures should be put in place to reduce demand for car use and shift travel to walking, cycling and public transport and create a good sense of place. The level of intervention should be commensurate to

the level of development which is planned to be delivered. More on the level and types of intervention is discussed in Section 5.

5.3. Impacts of Planning on the Street Network

5.3.1. Permeability

As discussed in Section 3.2, walking is “the most important mode” in the City of Melbourne and creating a highly walkable network which is connected and permeable, amongst other factors, will be pivotal in achieving aspirations for a sustainable neighbourhood.

Smaller blocks mean that a pedestrian has greater choice and resilience in route, for example, if one street was closed due to construction. Smaller blocks also provide greater variety and interest and reduce distance to destination,⁵⁰ all factors which make walking more comfortable and enjoyable.

“Generally speaking, the cities with the smallest blocks are the ones best known for walkability, while those with the largest blocks are known as places without street life – if they are known at all” – Jeff Speck⁵⁰

Figure 5.14 shows the proposed block sizes, adopting the street network proposed in the CoM preliminary framework. The existing block sizes are also reproduced for comparison.

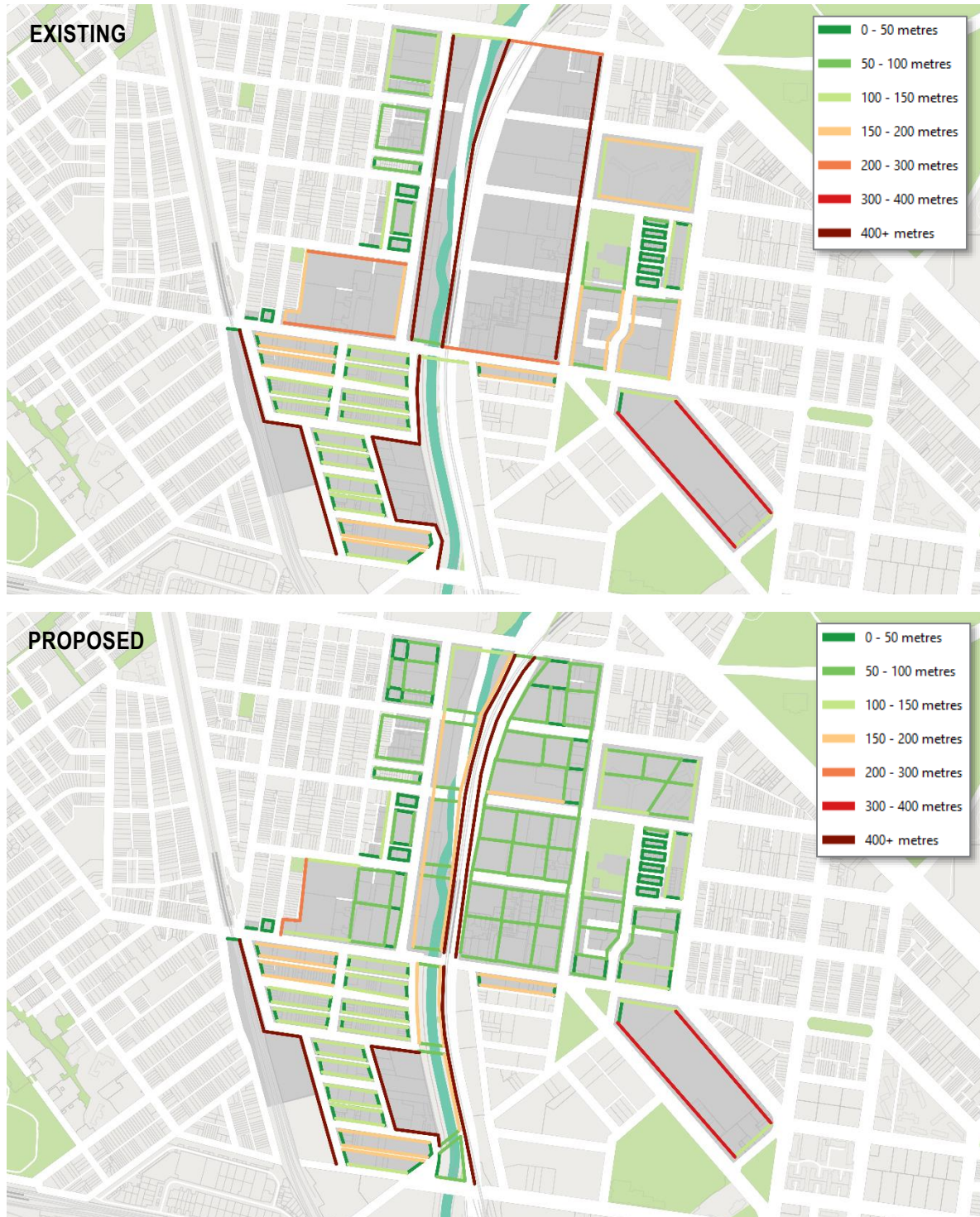
As shown, permeability of the street network significantly improves as new connections are added through large blocks, particularly around the centre of Macaulay where there are several large existing industrial/heavy commercial sites.

Notwithstanding, pedestrian permeability should be improved further by providing extending links across the creek across the railway line and introducing new links through the Public Records Office site, Seeing Eye Dogs site and other remaining large industrial blocks.

⁵⁰ Walkable Cities, Jeff Speck, p. 164-65

WILL CURRENT PLANNING ACHIEVE THIS?

Figure 5.14: Permeability of the Planned Street Network in Macaulay⁵¹



⁵¹ GTA block size analysis based on street network proposed in the CoM preliminary framework

5.3.2. Connectivity

The network proposed in the CoM preliminary framework provides an improved level of connectivity throughout Macaulay. Notwithstanding, connectivity should be improved in some areas of Macaulay:

- Continuing creek crossings to also cross over the Upfield railway line and connect streets in the east of Macaulay to the west of Macaulay in a number of locations. Without these additional links, crossing of the railway line will still be limited to Macaulay and Racecourse Roads, which are 700 metres apart.
- Providing connections over the Craigieburn railway line to connect Macaulay with South Kensington.

Crossing the railway corridors will present some challenges, particularly along the Upfield corridor where the rail tracks and Moonee Ponds Creek and Trail are at different grades. Providing a grade-separated pedestrian crossing (such as an overpass) can limit use for many groups, such as people with prams, bikes or mobility challenges and the location is constrained by the elevated CityLink tollway and overhead rail clearance (including power supply) impose vertical constraints. Providing an underpass, similarly, can reduce the usefulness of the link to certain groups, such as people with bikes, and can be unsafe, with lower levels of passive surveillance. Ideally, crossings would be provided at-grade, particularly where this can be designed-in as part of a broader level crossing removal project.

There are also challenges crossing the Craigieburn line corridor, where the rail corridor is wide (30-40 metres in parts) and the grade on the west side of the tracks is higher than the east side. Crossing treatments should raise people walking and cycling comfortably, such as through the provision of DDA-compliant ramps, as well as stairs for more direct access. Improvements to pedestrian connectivity, such as additional links across this corridor, should also be sought as part of any level crossing removal solution.

More generally, the impact of other features which can disconnect people from places (large intersections, major roads, overpasses and underpasses) should be designed out or overcome as the area evolves. Access to key destinations around the study area should also be improved in terms of convenience, safety and amenity, such as Flemington Bridge Station.

5.4. Summary

- The proposed street network will improve the connectivity and permeability of the street network, which will improve walkability and access, as well as connectivity between neighbourhoods.
- Further connections should be provided through other large sites, such as the Public Records Office site and the Seeing Eye Dogs site.
- Crossings of the Moonee Ponds Creek should also extend across the Upfield railway line to connect the two sides of the creek corridor, otherwise these crossings will have limited impact.
- Further connections across the Craigieburn line would provide better links from South Kensington to Macaulay.
- Across the precinct, providing regular opportunities to cross major roads and rail corridors where there is likely to be pedestrian and cyclist demand and seeking opportunities to replace over/underpasses with at-grade alternatives will support a broader range of users in walking and cycling.
- New links should include good design principles which make them safe, comfortable and attractive.

6. WHAT NEEDS TO HAPPEN TO ACHIEVE THE VISION?

Given the findings of the previous chapter, this section presents a summary of initiatives which will support the aspirations for Macaulay.

06

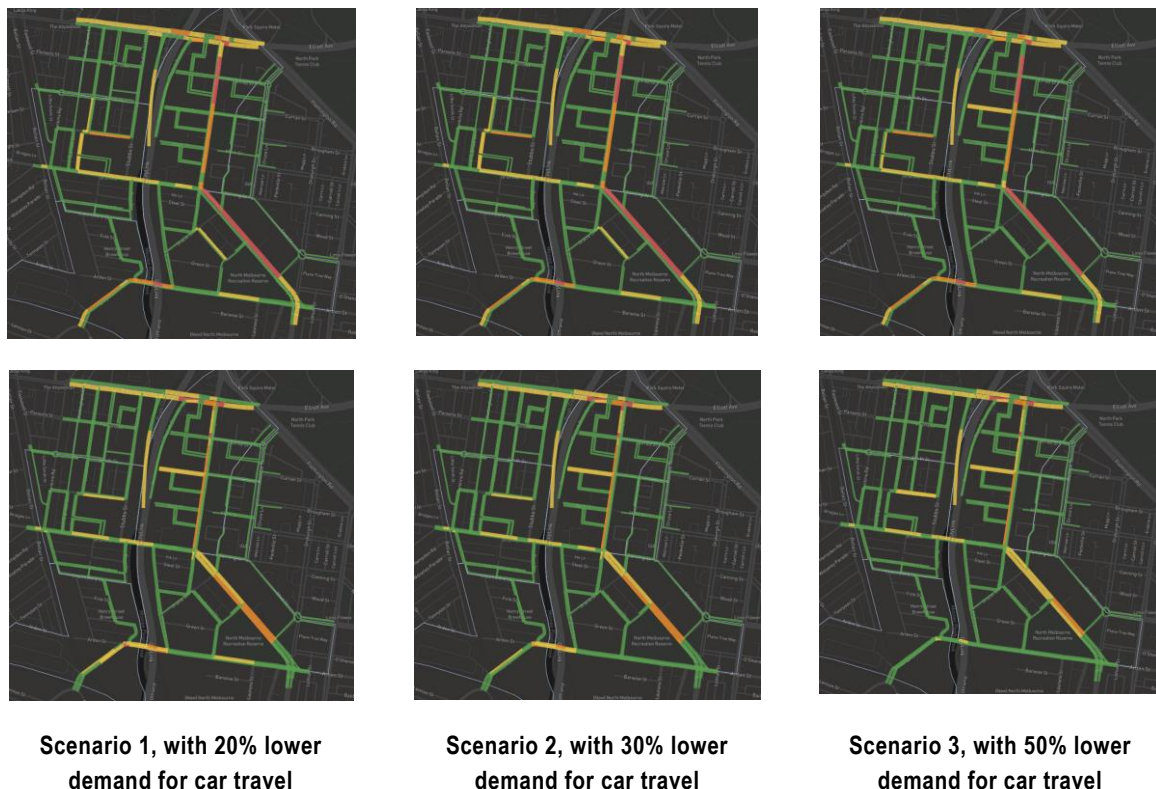
6.1. Mode Shift

Sensitivity testing was undertaken using the model to understand the broad level reduction in car demand which would be required to reduce the number of ‘pinch points’ in Macaulay (i.e. where delays or unreliability become more likely). More detail on this review can be found in the Technical Appendix.

It is stressed that higher aspirations for sustainable transport mode shift can, and should, be sought for other reasons, including to improve safety, liveability and sustainability, particularly in this inner-city context. However, removing some of the pinch points means that people who need to drive, and public transport which shares the roadway, is more likely to be able to travel more reliably and with fewer delays.

Notwithstanding, having some pinch points in the road network is not fatal to the function of the local area – delays and unreliability can be key drivers for people to shift the way they travel (mode, time of day, destination) and it is often not possible to continue to build capacity to alleviate pinch points due to cost and location constraints, as well as the influence of induced demand. Generally speaking, many streets perform well most of the day and night, even if they have pinch points during the peak hours. In these instances, adding capacity may not reflect the best use of limited space or funds. Instead, the focus should be on providing reliability in travel for modes that the area seeks to prioritise – walking, cycling and public transport - so that people who need to drive are able to do so.

Figure 6.1: Volume vs Capacity under each scenario with mode shift (AM = top, PM = bottom)



Broadly speaking, the higher the level of development, the greater the reduction in vehicle demand which should be sought to improve reliability on the road network. As shown in Figure 6.1, the model shows that a reduction in demand for car trips to and from Macaulay (i.e. excluding through trips) of about 10 to 20 per cent would remove many of the pinch points under a low-FAR buildout. Larger reductions in Macaulay car demand of about 20 to 30 per cent for Scenario 2 and 30 to 50 per cent for a high-FAR would remove many of the pinch points at higher levels of development.

In some cases, the level of demand is not dictated by development in Macaulay, but traffic travelling through Macaulay from other areas. This is the case along parts of Macaulay Road and Arden Street in the morning peak hour, and parts of Racecourse Road in the evening peak hour. In these instances, reducing demand below capacity would require broader changes to the way people travel beyond the bounds of Macaulay.

For trips generated in Macaulay (i.e. starting or finishing in Macaulay), reduction in car demand could be achieved by providing means for people to shift from their car to other ways of travel, encouraging shift in the time of day that people travel, or destinations they travel to – for example, encouraging more trips to be taken locally (i.e. by foot or bicycle).

The following sections outlines some ways that mode shift for trips to and from Macaulay could be achieved.

6.2. Potential Interventions

This section explores some of the initiatives which could be implemented to support shift away from car travel and build on prioritising walking, cycling and public transport in Macaulay.

The initiatives in this section focus on measures which are within Council control and jurisdiction, particularly car parking as a significant lever which Council has full control in implementing. As another inner-city urban renewal area which has recently undergone extensive planning and approval by state government, initiatives which have been adopted in the Fishermans Bend Framework are also referenced throughout. Other initiatives (such as public transport, future technology) are guided by relevant authorities and facilitated by Council where it supports aspirations for the precinct as outlined in relevant planning documents.

Because mode shift is a 'holistic' measure which takes account of the impact of many different actions, it is difficult to say what the exact impact of each initiative below would be, however some of the benefits are outlined below for guidance.

6.2.1. On-Street Car Parking

What is the lever?

Public space is limited in an inner-city context, and street space is even more limited. As an area grows, there is a need to use this limited space as effectively as possible for movement or as a positive place for the community.

Providing on-street car parking benefits only the small number of users who are parked in these spaces. Instead, this space could be used for other purposes with a wider benefit, such as wider footpaths, bus priority lanes, cycling lanes, outdoor dining, green space or flood management infrastructure.

Case for Change

- **Space:** Limited public space needs to be used effectively, particularly in a constrained inner-city environment such as Macaulay. The role of street space should focus on the safe and efficient movement of people and goods, as well as establishing environments which are attractive and vibrant places to spend time. In the case of Macaulay, it should also be used to reduce the impact of potential flooding in the future. Providing car parking on-street means that a large amount of space is used to the benefit of a small number of people who are occupying the car parks.
- **Amenity:** On-street car parking can detract from the visual appeal of a street. The noise and emissions from vehicles circulating for a space and making parking manoeuvres can also make the street a less desirable place to spend time, which in turn can discourage people from choosing to walk, dine or shop in a local area.
- **Traffic:** Providing car parking in 'premium' on-street locations encourages people to travel by car to meet their local needs and can increase traffic volumes as vehicles circulate to search for a space. These outcomes can reduce safety, amenity and reliability for other road users, impact on the environment through emissions and pollution and are contrary to the aspirations for Macaulay and inner-city Melbourne.
- **Prosperity:** Many local and international studies⁵² have found that people who walk and cycle to the shops often have a similar, or greater, retail spend than car drivers. One study in Carlton found that converting car parking to bicycle parking returned four times as much retail spend in the local area.⁵³
- **Flooding:** Modelling has indicated that in a major flooding event, much of Macaulay could be subject to water inundation. Innovative measures will be required, including clever use of street space for trees, water sensitive urban design, drainage and flood storage, to reduce the impact of stormwater in the future.

Response

Planning for Macaulay should seek to significantly reduce on-street car parking in favour of improved streetscapes, flood mitigation measures, wider footpaths, new bike paths, dining areas or dedicated public transport facilities that make travel quicker and more reliable. Remaining car parking should prioritise those that need to drive by improving accessible parking.

⁵² Some case studies can be found at the following: '[Good for Business: The benefits of making streets more walking and cycling friendly](#)', Heart Foundation, 2011, '[The Complete Business Case for Converting Street Parking into Bike Lanes](#)', CityLab, 2015, '[The Economic Benefits of Sustainable Streets](#)', New York City Department of Transportation.

⁵³ In 2008, the City of Melbourne removed two on-street car parking spaces in Lygon Street, Carlton to provide parking for 24 bicycles. Evaluation of the project found that providing bicycle parking generated four times more spending at local businesses (\$4,042/day) compared to previous use as car parking (\$994/day). '[Bike racks in car bays lift shop trade](#)', The West Australian, 11 December 2014

6.2.2. Off-Street Car Parking

What is the lever?

At present, new developments are required to provide a certain minimum level of car parking ('**minimum rate**') for every dwelling constructed, or based on the size and type of land uses delivered. To provide a lower level of car parking than this minimum level requires a permit from Council.

Instead, modern urban areas are removing this minimum requirement, so that new developments can provide a more appropriate mix of car parking for the local context and to provide people with greater choice as to whether or not they need a car park where they live or work, and the commensurate cost and space savings associated with this.

Minimum rate: The minimum amount of car parking which must be provided per unit of land use. For example, a minimum rate of 1 space/one-bedroom dwelling means that a minimum of one car space must be built on-site for every one-bedroom dwelling constructed. A developer must apply for a permit to provide a lower level of car parking. 'Rate' refers to the amount of car parking, not the price of paid parking.

Case for Change

- **Space:** The City of Melbourne Transport Discussion Paper notes that the number of residential car parking spaces exceeds the number of vehicles owned by 40 per cent. Data from Southbank and West Melbourne also found that 26-41% of private car parking spaces are empty.⁵⁴ This represents an inefficient use of space which could be used for other purposes, such as more housing or open space.⁵⁵
- **Affordability:** The Real Estate Institute of Victoria estimates that a car space can add more than \$100,000 to the price of a one-bedroom apartment in central Melbourne, compared to an apartment with no parking. Other studies have found that land and construction costs per car parking space are between \$50,000 and \$80,000.⁵⁶ Estimates indicate \$700 million has been wasted by home owners and renters paying for empty off-street car parks in the occupancy of their property.⁵⁶ Removing the need for a minimum level of car parking can provide increased options for cheaper housing where a car (or second car) are not needed.
- **Traffic:** Research for Infrastructure Victoria found that of surveyed people who drive during the weekday peak hour, 94% own the car that they drive and 61% of people use the car 'without thinking about it'. The same research found that 72% of people that drive in the peak hour have free parking at their destination, and that the primary reason trips are undertaken by other modes is that 'parking is a problem at the destination'.⁵⁷ Limiting car parking can encourage reduced car ownership and shift travel to sustainable modes.

⁵⁴ [City of Melbourne Transport Strategy Car Parking Discussion Paper](#)

⁵⁵ [Empty Car Parks Everywhere, But Nowhere to Park. How Cities Can Do Better](#), The Conversation

⁵⁶ [Car Parking Reforms Ahead for Melbourne](#), Bicycle Network

⁵⁷ Infrastructure Victoria – [Managing Transport Demand Community Research – Part 2, Quantum Research](#)

- **Amenity:** Car parks are visually unappealing and often result in poor urban design and public realm outcomes, such as inactive frontages (i.e. surface parking), blank facades (i.e. podium parking) and cross overs for car park entrances, as well as local noise and pollution.

Response

Maximum Car Parking Rates

The City of Melbourne has been limiting car parking in the CBD since 1981,⁵⁸ an approach which has been extended to other central city areas and surrounds, including Southbank, Docklands, Fishermans Bend and parts of Footscray, Carlton, East Melbourne and West Melbourne. Introducing maximum car parking is rapidly becoming 'the norm' for creating liveable, sustainable communities, particularly in inner-city areas where there is good public transport, walking and cycling access, close proximity to daily needs and higher propensity to live, learn and work locally.

Removing minimum car parking rates and instead introducing maximum car parking rates means that there is greater flexibility in the amount of car parking that can be provided, particularly where sustainable (low-car) outcomes are being pursued. By introducing maximum car parking rates, the onus is placed on developers to demonstrate (through the permit process) why they need to provide higher levels of car parking when there is good public transport, walking and cycling access nearby.

A study in London found that planning regulations forcing developers to provide a minimum level of car parking resulted in an oversupply of car parking, which was underutilised. When this requirement was removed, parking continued to be provided, but at a rate approximately 40 per cent lower.⁵⁹ Another study found that residential parking supply reduced by 49 per cent when minimum rates were replaced with maximum rates.⁶⁰ As above, the case is similar in Melbourne, with 26-41% of private car parking spaces unused.⁶¹ Introducing maximum car parking rates does not mean 'no car parking', as is evident from current circumstances in Melbourne CBD, Southbank, Docklands, Carlton, East Melbourne, West Melbourne where maximum rates apply and car parking still exists and is still constructed. Rather, it means that more appropriate levels are provided and risk of oversupply can be reduced.

What is a suitable rate?

Removing minimum car parking rates is the critical part of this initiative. Introducing the maximum car parking rate then sets the benchmark for the level of car parking provision that is supported before a permit needs to be sought.

The table below shows a summary of current maximum car parking rates for residential uses in Melbourne.

⁵⁸ [The Elephant in the Planning Scheme: How Cities Still Work Around the Dominance of Parking Space](#), The Conversation

⁵⁹ Guo, Z & Ren, S. (2012), [From Minimum to Maximum: Impact of the London Parking Reform on Residential Parking Supply from 2004 to 2010](#)

⁶⁰ Guo, Z & Li, F. (2014), [Do Parking Standards Matter? Evaluating the London Parking Reform with a Matched Pair Approach](#)

⁶¹ [City of Melbourne Transport Strategy Car Parking Discussion Paper](#)

Table 6.1: Current Maximum Car Parking Rates for Similar Areas – Residential Uses

Location	Planning Scheme	Schedule to Pk Overlay in Planning Scheme	Maximum Rate for Dwellings	Introduced
Docklands - Yarra's Edge & Victoria Harbour, Batman's Hill	Melbourne	Schedules 6, 7 & 11 (PO6, PO7, PO11)	2 spaces/dwelling	2013
Docklands – Business Park & Stadium Precinct, Comtech Port	Melbourne	Schedules 8, 9 & 10 (PO8, PO9, PO10)	1.5 spaces/dwelling	2013
Southbank, CBD & CBD North (CCZ - Outside Retail Core)	Melbourne	Schedule 1 (PO1)	1 space/dwelling	2013
Residential Development in Specific Inner City Areas (i.e. Carlton, East Melbourne, West Melbourne, St Kilda Road)	Melbourne	Schedule 12 (PO12)	1 space/dwelling	2013
Footscray MAC – Inner & Outer Parking Precincts*	Maribyrnong	Schedules 1 & 2 (PO1, PO2)	1 space/dwelling (1- or 2-br) 1.5 spaces/dwelling (3-br+)	2015
Fishermans Bend Urban Renewal Area	Melbourne & Port Phillip	Schedule 13 (PO13) – Melb. Schedule 1 (PO1) – Port Phillip	0.5 space/dwelling (1- or 2-br) 1 space/dwelling (3-br+)	2018
Moreland - Major Activity Centres**	Moreland	Subject to Planning Scheme Amendment	1 space/dwelling (1- or 2-br) 2 spaces/dwelling (3-br+)	2019**

*Minimum rates also apply

** Subject to Planning Scheme Amendment mid-2019

*** Note suburban context

As shown, areas on the city fringe have implemented low maximum car parking rates, as low as 0.5 spaces/dwelling (or a maximum of one space for every two dwellings) in Fishermans Bend.⁶² A rate of 0.5 spaces/dwelling is consistent with the existing level of off-street car parking provision in Macaulay.⁶³ Macaulay has a well-established and frequent public transport network and many existing walking and cycling links. Arguably, Macaulay is as-suited, if not more-suited, to adopting low maximum car parking rates compared to Fishermans Bend.

On the basis of the above, a maximum rate of 0 to 0.5 spaces per dwelling is likely to be suitable to achieve the sustainable transport aspirations for the area, with a lower rate reflective of a more sustainable outcome.

While this response focuses on residential parking (where maximum rates are broadly accepted in a central city area), maximum car parking rates should also be considered for commercial uses to safeguard the sustainable access aspirations for the area.

⁶² Fishermans Bend Framework

⁶³ ABS Census 2016 household data and City of Melbourne CLUE data for Off-Street Car Parking

Unbundling Car Parking

At present, car parking is often titled and sold (i.e. 'bundled') with a dwelling, particularly in the case of apartment complexes. This means that the car park is typically useable only by the owner of the corresponding apartment (unless private arrangements are made) and there is no choice as to whether or not that dwelling comes with a car space. Like minimum car parking rates, bundling car parking represents an inefficient use of resources because more car parks need to be provided so that dwelling owners have a designated car parking space, whether they need it or not.

Unbundling car parking compels developers to sell or lease parking independently of residences or commercial leases. This makes more efficient use of parking resources by providing people with a choice as to whether they need car parking with their dwelling or not – not only as an upfront decision when the property is purchased or rented, but throughout their tenure in the property. That is, unbundled car parking allows people to choose to rent a car space separately to an apartment, which means that one can be discontinued without the other, and also provides ongoing decision-points where people can choose whether they still need to occupy a car park. Unbundled car parking can be provided either within an apartment building (where the car parking pool is generally accessible to building tenants, but may also be available to broader users), or in the form of a 'precinct parking station' (where the car parking pool is accessible to the public).

The Fishermans Bend Framework stipulates that car parks will be subdivided as common property (not individually titled), managed by owners' corporation and leased to property owners. The Fishermans Bend Framework also supports off-site delivery of precinct car parking stations to provide dedicated car parking in the short term to support long-term sustainable transport patterns.⁶²

Unbundling car parking in Macaulay will likely make better use of space and provide more choice in meeting the mix of car parking needs for residents, workers and visitors. Similar provisions as Fishermans Bend could be implemented in Macaulay to continue the commitment to sustainable modes of travel.

Precinct Parking Structures

Precinct parking structures (typically publicly-available off-street car park facilities) represent an efficient car parking solution in that they provide the ability to share car parking between different uses that have peak parking times that do not coincide. Such facilities can also cater for both long term (staff/resident) and short term (customer/visitor) demands. Off-street, off-site spaces could be leased from the parking operator, individually strata-titled and sold or leased or charged on a per use per day basis (like typical commercial paid parking structures).

The provision of new public off-street car parking facilities are, however, costly, and as such, must be carefully planned to ensure that the facility will be effectively used to justify the construction cost and the value of the land which it uses, which, like any car parking, could be potentially used for other, more productive purposes.

In planning for precinct parking structures, consideration needs to be given to how the facilities are funded, and where the facilities can be best located to serve the local area. In Macaulay, suitable

funding arrangements would need to be investigated separately.⁶⁴ Precinct parking stations are best delivered on the edge of precincts, with access from preferred/major traffic routes to provide easy visibility/access for approaching vehicles (less time circulating for a space) and to protect walking and cycling priority on the local street network. For Macaulay, parking stations would be best located on Racecourse Road or nearby Flemington Road (i.e. arterial roads), with the next-best options being along Boundary Road and Macaulay Road, outside of the local activity centre.

While parking stations should remain on the fringe of the precinct, they should be positioned such that they provide sufficient coverage and be within walking distance of intended destinations and uses (approximately 400m), with safe, attractive and well-connected walking networks linking the car park to the destinations.

6.2.3. Car Share

What is the lever?

Under the typical car ownership model, where households, companies or individuals own their own vehicle, cars are used 5% of the time and remain parked 95% of the time.⁶⁵

Car share provides a more efficient model whereby many people can share the use of a vehicle, reducing the need for each user to own their own vehicle. This can result in substantial space savings through reduced car parking provision and support broader sustainable transport aspirations whilst still providing access to a car for those types of trip that need one.

A study for the City of Melbourne estimated that each new car share vehicle could remove ten privately-owned vehicles and that resident vehicle fleet is approximately 6% smaller than it would have been without existing car share services.⁶⁶

Case for Change

- **Space:** As outlined above, providing for car storage is an inefficient use of space which could be used to provide more housing, open space or elements that make the area a great place to live.
- **Cost:** A study in support of Council's car share policy found that car share can reduce a household's transport costs and reinvest these savings in the local economy.⁶⁶
- **Current Policy:** The City of Melbourne approved a policy which supports car share and seeks to deliver 2,000 car share spaces across the municipality by 2021.⁶⁷ Providing car share instead of car storage is also consistent with the City of Melbourne Car Parking Discussion Paper.⁶⁵
- **Traffic:** A study in support of Council's car share policy found that car share members in the City of Melbourne drive half the distance of non-members (2,000km per year vs 4,000km per year).⁶⁶ Shifting the ownership model can encourage people to travel in other ways for trips that do not require a vehicle.

⁶⁴ Some key issues and opportunities of Precinct Parking Stations are presented in [GTA's Precinct Car Parking Opportunities Paper](#).

⁶⁵ City of Melbourne Transport Strategy – [Car Parking Discussion Paper](#)

⁶⁶ [City of Melbourne Car Share Policy Committee Report to Council](#), July 2015

⁶⁷ [Car Sharing](#), City of Melbourne

Response

Car share could be provided as a measure to support a sustainable community, whilst still supporting access to a car when required. It is important to note that provision of car share should complement, not undermine, the priority for walking, cycling and public transport.

Car share should be provided in areas which are accessible to a wide range of the community (i.e. publicly-available car parks, or within private buildings which are accessible to the public) to maximise the utility and accessibility of each car and therefore avoid overprovision.

Car share should also be located off-street where possible (refer 'on-street parking' section above), such as in precinct parking stations, and located adjacent to traffic routes to avoid intrusion into local streets which prioritise walking and cycling.

Car share should be delivered by the private sector and managed by Council in a way that achieves the aspirations for the area.

6.2.4. Walking, Cycling and Public Transport Improvements

Measures which improve the safety, comfort, attractiveness and convenience of walking, cycling or taking public transport (as discussed throughout this report) will encourage more people to organically choose to walk and cycle to serve their daily needs.

6.3. What is an appropriate level of intervention?

Overall, the level of intervention depends on the level of sustainability Council seeks to achieve. If there is anywhere in Melbourne where sustainable transport outcomes should be pursued, areas such as Macaulay are particularly well-suited, considering:

- The area's existing proximity to a range of high-quality, high-frequency public transport which provides access to a range in all directions (see section 3.3.1)
- The impending development of further access to the rail network (at North Melbourne) and increased capacity on abutting rail networks through Melbourne Metro (see section 4.2)
- Plans for new walking and cycling infrastructure, and proximity to jobs and education opportunities in Parkville, Arden, Docklands, the CBD and further afield, Fishermans Bend, which are within reach by foot and/or bicycle (see section 4.2)
- Speculative improvements to the transport network, such as level crossing removals and potential extensions of tram routes (see section 5.2.4)
- Aspirations for medium-density local living, which will reduce the need for car travel as many daily needs can be serviced locally (see section 4.1).

Considering this, the area could seek to deliver a level of intervention which alleviates demand on the road network or pursue more aspirational levels of sustainable transport use and sense of place.

Low-FAR Scenario

Alleviating some of the pinch points on the road network under a low-build scenario would likely require limitations to on-street and off-street car parking (i.e. removal of minimum and introduction of low maximum car parking rates) in new developments, as well as improvements to the walking and cycling networks and access to public transport envisaged in the CoM preliminary framework. A low-build scenario could still pursue higher levels of priority for public transport, walking and cycling by delivering further initiatives, like precinct parking structures and car share instead of on-site parking.

Medium/High-FAR Scenarios

Alleviating some of the pinch points on the road network under a medium- or high-build scenario, or supporting more aspirational levels of walking, cycling and public transport priority, would likely require low (or zero) maximum car parking rates, as well as more intensive interventions like car-free developments (which could be facilitated through developer incentives), unbundled car parking, removal of local street access for private vehicles, excellent provision of walking and cycling facilities which are safe, comfortable, direct and attractive and good mixes of land use to support local living.

Initiatives from other levels of government and other agencies (level crossing removals, tram extensions, increases in public transport frequency) would further support these outcomes.

A. TECHNICAL APPENDIX

The preceding report is accompanied by a greater level of technical detail within the various sections of this Appendix.



A.1. Mode Share by Occupation

Analysis was undertaken to understand 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 Macaulay.

For this analysis, inner-city comparator suburbs were taken as Kensington, Carlton, Parkville, East Melbourne, North Melbourne, West Melbourne, Fitzroy, Abbotsford, Richmond, Collingwood, South Yarra and South Melbourne.

Definition of white collar and blue collar occupations was taken from Australian Bureau of Statistics.⁶⁸ White collar workers includes managers, professionals, community and personal service workers, clerical and administrative workers and sales workers. Blue collar workers includes technicians and trade workers, machinery operators and drivers and labourers.

Figure 6.2: Mode Share to Work by Occupation – Destination in Inner City Melbourne⁶⁹



As shown, a higher proportion of people who work in white collar occupations travel to work by public transport, walking and cycling than blue collar workers. Likewise, a higher proportion of blue collar workers travel to work by car (either as a driver or passenger) than white collar workers.

The suburbs of Docklands, Southbank and Melbourne CBD were excluded from the above analysis as these areas have different characteristics (very high levels of transport access and density) which may

⁶⁸ Australian Bureau of Statistics – [Australian Social Trends](#)

⁶⁹ GTA analysis of ABS Census 2016 – Method of Travel to Work. Excludes 'not stated', 'not applicable', 'did not go to work' and 'worked from home' responses. 'Car' includes car as driver, car as passenger and truck. 'Public transport' includes bus, tram, train and ferry. 'Other' includes taxi, motorbike/scooter or other.

skew results, particularly given the magnitude of workers in these areas. For example, car use for destinations in Southbank and Docklands is much lower and public transport use much higher than the results presented in Figure 6.2 for city-fringe suburbs. Notwithstanding, the results show similar trends – car use is higher for blue collar workers in Southbank and Docklands (43% of all work trips) than white collar workers (32% of all work trips). Similarly, public transport, walk and cycle use is higher for white collar workers in Southbank and Docklands (67% of all work trips) than blue collar workers (56% of work trips).

A.2. Vehicle Demand Modelling

As discussed in the main report, GTA prepared a ‘vehicle demand and capacity’ model to understand:

- how the street network could be expected to function at various levels of development, in terms of vehicle traffic
- where, and at what levels of development, the likelihood of vehicle delays and travel unreliability increased
- the potential impacts of interventions which reduce demand for vehicle travel and encourage shifts to other modes

The modelling process involved the following:

- **Modelling area:** Establishing a study area for the model, including breaking this study area down into smaller zones for inputs and outputs.
- **Baseline inputs:** Identifying the existing levels of population and employment, number of car trips expected to be generated by this level of population and employment, number of trips travelling through Macaulay and the current road network and its capacity.
- **Future scenario inputs:** Determining the growth in population and employment (both in Macaulay and beyond) and changes to the road network.
- **Comparing demand to capacity:** Identify how anticipated car demand for the road network compares to capacity to determine where, and at what level of development, delays and travel unreliability are more likely.
- **Mode shift:** Understanding the level of change required to reduce demand for car travel to improve delays and travel unreliability for each level of future development, and what that looks like in terms of interventions. These interventions are explored in Section 5.

This approach is more refined than typical spreadsheet modelling approaches as it considers demand and capacities of smaller street segments, rather than a whole road. It also provides a more refined approach to traffic distribution and is informed by, but does not base the assessment on, use of the strategic model, which is not suitable in isolation for a local area study.

A.2.1. Modelling Area

The Macaulay urban renewal precinct was taken from the CoM preliminary framework. To allow for a finer-grain level of inputs and outputs, the model study area ('model area') was developed comprising the ten SA1 areas (ABS Statistical Areas – Level 1) that most closely match the Macaulay urban renewal precinct.

These areas were used because they are a common geographic area for data and allow consistency in inputs and outputs across the different data sources used in the model. These zones are shown in the figure below and have been given shorthand names for ease of reference throughout the report. It is noted that these zones (and therefore the model area) are larger than the overall urban renewal precinct area.

ABS SA1 Code (7-digit)	Shorthand (this report)	ABS SA1 Code (7-digit)	Shorthand (this report)
2112104	1	2112324	6
2112103	2	2112321	7
2112102	3	2112326	8
2112101	4	2112322	9
2112320	5	2112337	10

Figure 6.3: Macaulay 'model area' compared to urban renewal precinct area



A.2.2. Baseline Modelling Inputs

Traffic Volumes

Existing traffic volumes were sourced from VicRoads traffic signal data (SCATS), as this provides good coverage of the main roads in the network. SCATS volumes were cross-checked with the traffic volume data provided by the City of Melbourne for 2017, 2018 and 2019. Traffic was distributed across the broader network using HERE data.

Adjustments were made as needed to correct for the way the zones connected to the road network and to reflect actual conditions on the road network (i.e. street closures).

Road Network Capacities

As a starting point, the capacities of the road network were based on road types.

These capacities were then refined manually to reflect constraints on the network, such as level crossings, based on assumptions. The capacities were also adjusted to reflect known capacities based on traffic volumes from SCATS.

Volume (Demand) vs Capacity

Current traffic volumes for the road network were then compared to the capacity to identify areas where demand nears, or exceeds, capacity. In these areas, performance of the road network is likely to deteriorate and delays and travel unreliability become more likely. The results of this assessment are presented in Section 4.

A.2.3. Future (2036) Modelling Inputs

Generally speaking, there are two types of car trips which could be expected to use the road network in Macaulay:

- **Macaulay trips** – trips which start or end in Macaulay
- **Through trips** – trips which do not start or end in Macaulay, but use roads which travel through Macaulay.

These two types of trips are combined to understand likely demand for the road network in Macaulay in the peak hours.

Macaulay Trips

For Macaulay trips, existing population and employment numbers were sourced from Australian Bureau of Statistics Census for 2016 for each SA1 zone in the model area ('ABS baseline'), as Census data is comprehensive and known.

This study sought to understand the potential impacts of three different development scenarios in Macaulay.

Scenario 1	3:1 FAR	Scenario 2	4:1 FAR	Scenario 3	5.7:1 FAR
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The City of Melbourne divided the Macaulay urban renewal precinct area into a number of smaller sub-areas. These sub-areas are smaller than the ABS SA1 areas and are shown below.



These sub-areas were further divided into sites which were **likely to develop** or are undergoing development (assume will grow in the future) or **unlikely to develop** (assume will not grow in the future).

Based on these assumptions, the City of Melbourne provided estimates for expected population and employment numbers in 2036 for each of the three future build-out scenarios for each sub-area within the Macaulay urban renewal precinct area ('CoM future scenarios').

Data was also provided by the City of Melbourne for the existing conditions for these same sub-areas ('CoM Baseline'). The CoM baseline was checked against the ABS baseline for consistency.

In areas where there were material differences, these were checked – for example, blocks A & B showed a low resident population in the CoM baseline but high resident population in the ABS baseline. In this case, Blocks A and B comprised the small existing industrial area along Racecourse Road (with low resident population), whereas the ABS baseline captured this area and surrounds to the northwest – this additional area included mostly residential housing and so a difference between the two different sized areas is consistent with expectations. Similar findings apply for Block C and Block H, which also had smaller resident populations in the CoM baseline than the ABS baseline, but larger ABS zones which contained more residential housing. Block J (existing social housing complex) was excluded from the CoM baseline and assumed to remain unchanged from current ABS baseline conditions.

In order to translate the CoM sub-area data to the SA1 zones used in the model, the difference between each CoM future scenario and the CoM baseline was taken as the 'growth' and added to ABS baseline to determine the 2036 population and employment numbers for each SA1 zone.

The additional population and workers in the area will generate additional vehicle movements. These were calculated by multiplying the growth in population and workers by a 'traffic generation rate', which was determined from ABS Journey to Work and Victorian Integrated Survey of Travel and Activity (VISTA) data.

This additional traffic was mapped to the road network using HERE data.

Through Trips

The volume of through trips using each road link in Macaulay was sourced from the Victorian Integrated Transport Model for 2036 and were added to the locally-generated trips.

Future Road Network

The future network was drawn from the CoM preliminary framework. The key changes included adding a series of new local road links (generally in existing large block sites) and downgrading the southern end of Stubbs Street and creating a new neighbourhood street link to the east of Barnett Street. Other adjustments were made as needed.

Because these new links are not reflected in HERE data or VITM, traffic volumes on these links were distributed manually based on traffic generated and attracted by each zone and divided across the new links. Traffic was also reassigned away from Stubbs Street (to represent its closure to vehicles) to the new road link.

Volume (Demand) vs Capacity

Like current volumes, the future volumes were compared to capacity of the road network. The results of this assessment are presented in Section 4.

A.2.4. Limitations of Modelling

- Spreadsheet (or 'sketch') modelling is a method of estimating traffic demand for strategic planning purposes. This spreadsheet model is refined and robust in its use of a range of data sources and tools and is consistent (or more refined) with other spreadsheet modelling exercises (including the previous Amendment C190 study), however interpretation of the outputs should be treated as strategic or 'order of magnitude' in nature, rather than relying on specific volumes. Likewise, the use of VITM is intended to inform strategic planning and outputs should be treated as such.
- Inputs and outputs from VITM are based on land use and transport network inputs for 2036 as-is and have not been adjusted for this project (outside of scope). Should planned or future land use (including population or demographic forecasts) or transport networks (including new projects) differ from the scenario modelled then results of this report will necessarily change. Inclusion of projects in the future scenario model does not imply commitment from the Government or DOT that these projects will be delivered. If land use or transport network differs from what has been modelled, results will necessarily differ.
- Input data (for population and employment, traffic volumes etc.) has been provided from City of Melbourne and other data sources (VicRoads, HERE) and has not been independently verified. Checks and adjustments have been made where necessary, but no warranty can be made as to the completeness or accuracy of external data.
- The scope of the study does not consider volumes or capacity (and therefore areas which cause delays or unreliability) which are outside of Macaulay.

A.3. Approximate Mode Shift for Macaulay Trips

The table below tests the level of reduction in demand for vehicle trips to or from Macaulay which would reduce anticipated demand below the capacity of the road. It is noted that 'through' traffic (i.e. traffic which uses the road network in Macaulay, but does not start or end the trip in Macaulay), has not been reduced in this exercise.

It should be noted that the nature of modelling means that these figures should not be taken to be 'exact' – rather, they are used to determine an approximate 'order of magnitude' level of change which would be pursued to reduce areas in Macaulay which might cause delays or travel unreliability.

Pinch Point	Scenario 1		Scenario 2		Scenario 3	
	AM	PM	AM	PM	AM	PM
EXISTING CONSTRAINTS						
Macaulay Road (i/b) – Canning Street (AM)	Through	✓	Through	✓	Through	✓
Arden Street (i/b) – Level Crossing (AM)	Through	✓	Through	✓	Through	✓
Racecourse Road (o/b) – Boundary Road (PM)	✓	Through	✓	Through	✓	Through
Racecourse Road (o/b) – Level Crossing (PM)	✓	Through	✓	Through	✓	Through
Arden Street (o/b) – Lloyd Street (PM)	✓	25%	✓	25%	✓	30%
FUTURE CONSTRAINTS						
Racecourse Road (i/b) – Boundary Road (AM)	10%	✓	25%	✓	40%	✓
Racecourse Road (o/b) – Boundary Road (AM)	75%	✓	80%	✓	85%	✓
Boundary Road (i/b) – Alfred Street (AM)	45%	✓	55%	✓	65%	✓
Boundary Road (i/b) – Mark Street (AM)	10%	✓	20%	✓	35%	✓
Boundary Road (o/b) – Alfred Street (PM)	✓	45%	✓	55%	✓	65%
Boundary Road (o/b) – Racecourse Road (PM)	✓	20%	✓	35%	✓	50%
Arden Street (i/b) – Level Crossing (PM)	✓	15%	✓	20%	✓	25%
Arden Street (o/b) – Level Crossing (PM)	✓	10%	✓	10%	✓	10%
Macaulay Road (o/b) – Gracie Street (PM)	✓	5%	✓	10%	✓	15%
Robertson Street (i/b) – Stubbs Street (AM)	✓	✓	15%	✓	40%	✓
Macaulay Road (i/b) – Level Crossing (AM)	✓	✓	5%	✓	20%	✓
Racecourse Road (i/b) – Level Crossing (AM)	✓	✓	✓	✓	5%	✓
Racecourse Road (o/b) – CityLink On-Ramp (AM)	✓	✓	✓	✓	15%	✓
New Road Link (i/b) – Robertson Street (AM)	✓	✓	✓	✓	15%	✓
Boundary Road (o/b) – nth Macaulay Road (PM)	✓	✓	✓	✓	✓	20%
Macaulay Road (i/b) – Level Crossing (PM)	✓	✓	✓	✓	✓	20%

Through = demand for through-trips exceeds the capacity of the road network at this location. Even if no additional car demand was generated by Macaulay precinct (i.e. '100% mode shift' away from car use), these links would be over-capacity. ✓ = link is expected to function adequately in this scenario.

