

Bass Coast Integrated Transport Strategy

Background Report - Final

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Institute for
Sensible Transport

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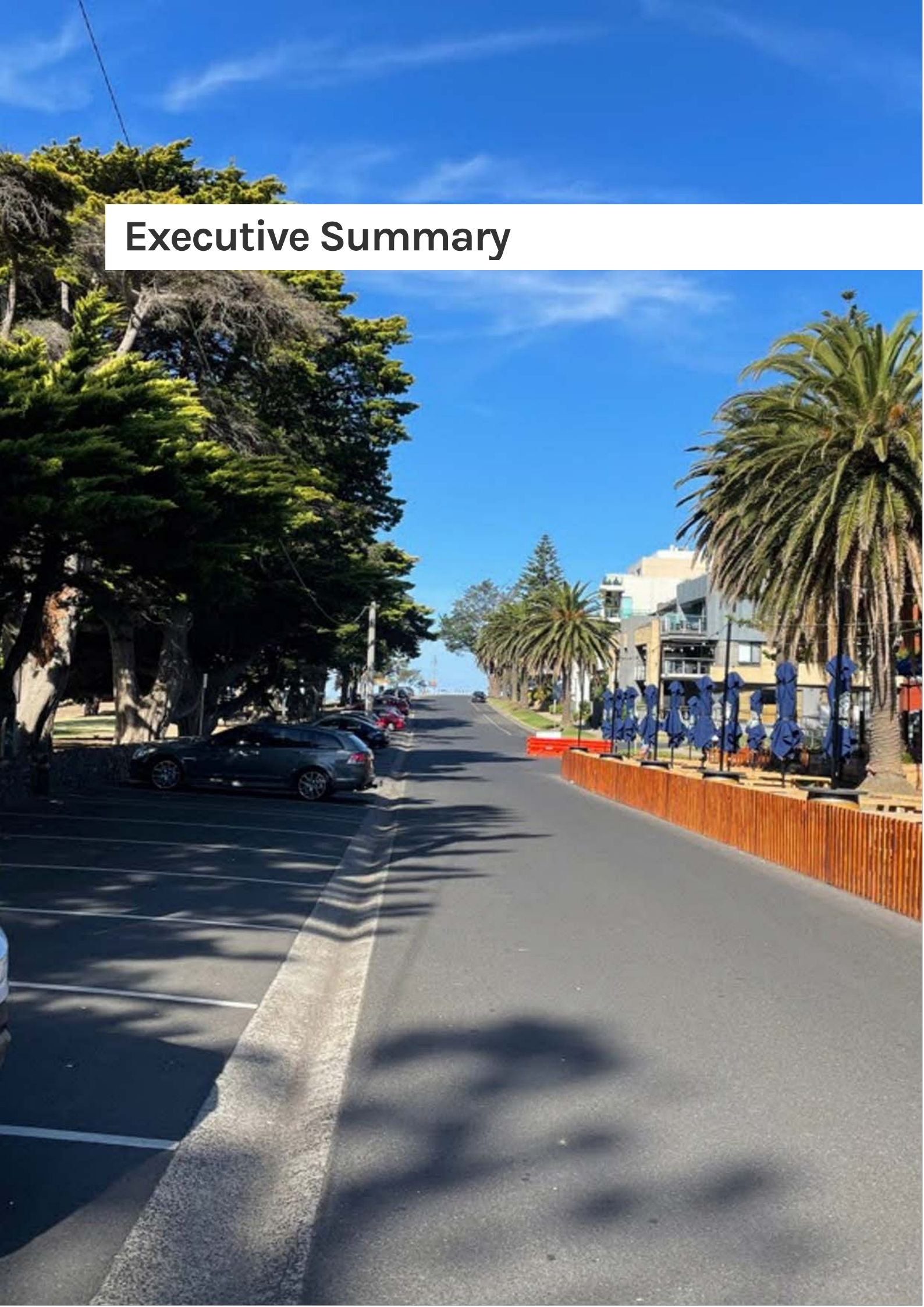
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Executive Summary



Bass Coast has begun the process of developing an Integrated Transport Strategy (ITS), to serve as a high-level guide directing the Council's transport investments, policies, and decision-making. This future focused ITS will have a 20-year horizon and serve to enhance sustainability, accessibility and safety objectives. This report provides important background information to act as a basis for future stages of the project.

Principles underpinning the ITS

The development of the ITS must be guided by the three key principles, summarised in the figure below.



Key principles underpinning the Bass Coast ITS

Key stages in the development of the ITS

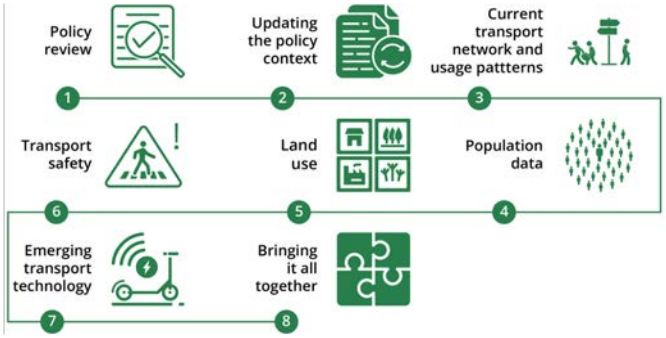
This report represents the first of four stages, as highlighted below.



Stages of the Bass Coast ITS

What does this report cover?

This Background Report includes eight separate areas of focus; these are designed to provide a critical evidence base upon which to develop the ITS.



Key areas of focus for this Background Report

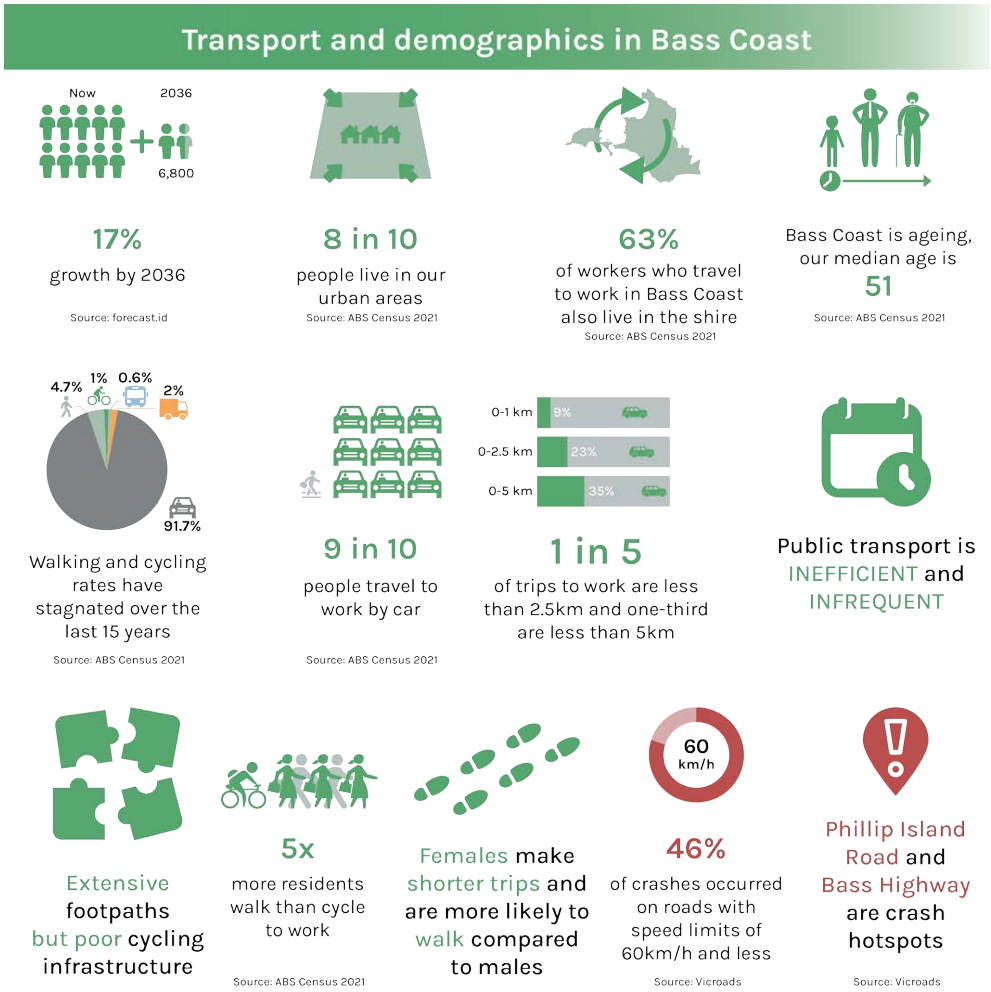
Key findings

There are a number of important findings that have direct relevance to the development of the Bass Coast ITS. These include:

- High levels of car dependence, even for short trips
- Fragmented cycling network, with limited opportunities to ride on paths that connect origin and destination without having to mix with motor vehicles.
- A set of council policies and strategies that consistently highlight a desire for better, sustainable mobility options.
- Strong population growth that may put pressure on the existing transport network.
- Limited options for using public transport in a manner that is time efficient compared to the car.

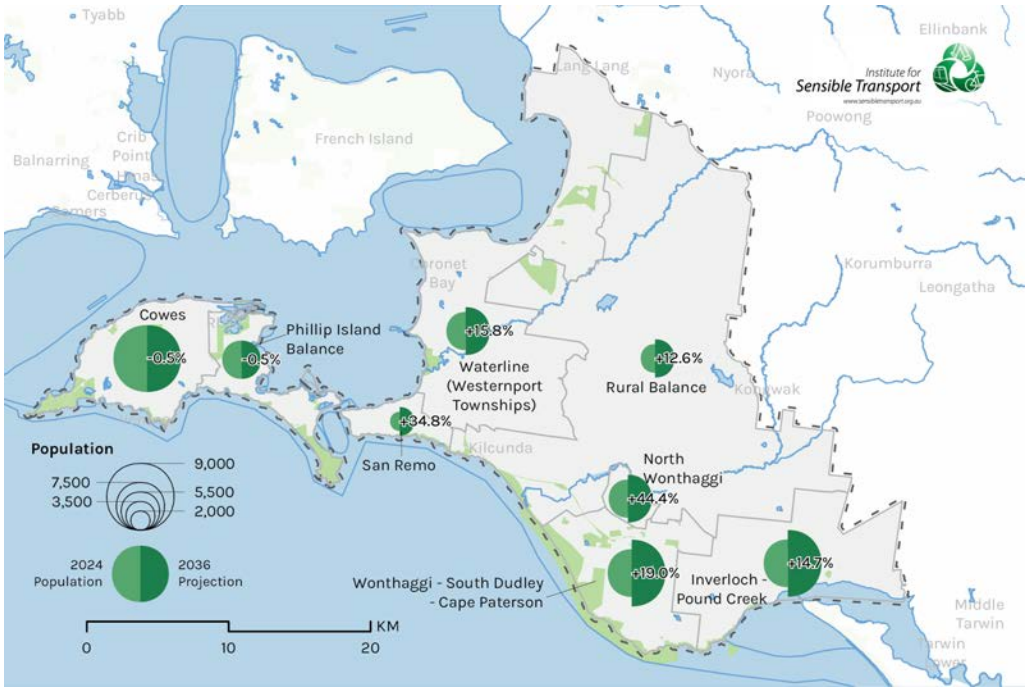
For all trips to work, 34.9% were under 5km. This highlights the potential to increase active travel to work in Bass Coast.

The key findings from this Background Report are summarised in the infographic on the following page.



Transport and demographics in Bass Coast

The growth of the Bass Coast population by 2036 is illustrated in the map below.



Small area population forecast, 2036

1. Introduction



Bass Coast has begun the process of developing an Integrated Transport Strategy (ITS), to serve as a high-level guide directing the Council's transport investments, policies, and decision-making. This future focused ITS will have a 20-year horizon and serve to enhance sustainability, accessibility and safety objectives. This report provides important background information to act as a basis for future stages of the project.

1.1 Key principles in the development of the Integrated Transport Strategy

The development of the ITS must be guided by the three key principles, summarised in Figure 1.



Figure 1 Key principles of the Bass Coast ITS

1.2 Why do we need an Integrated Transport Strategy?

There are a number of challenges Bass Coast face that have a relationship to transport. Population growth, the need to reduce emissions, parking pressure, road safety and accessibility are all important issues that an ITS can help address. Seasonal fluctuations in visitor numbers, shortages in labour and skills, and traffic congestion at key times of the year all require a strategic approach. An ITS helps to ensure Council's actions in transport align with the Shire's wider strategic ambition. An effective ITS can help to widen people's transport options, increase the diversity of transport modes, promote sustainable transport, and increase street vibrancy.

1.3 Current context

Bass Coast Shire is located approximately 130 kilometres southeast of Melbourne and is one of Victoria's fastest growing regional municipalities. It covers an area of just over 800 square kilometres. The area is predominantly coastal, with a landscape that is defined by Bass Strait, the Bunurong Coast, Western Port and Anderson Inlet. The unique coastal areas are complemented by rural hinterland, river flats and the Strzelecki Foothills.

Bass Coast Shire is one of Victoria's fastest growing regional municipalities.

The major townships and populations centres in Bass Coast include Wonthaggi, Cowes, San Remo, Inverloch and Grantville. Alongside these larger townships are both rural communities and smaller coastal communities that experience large population fluctuations during holiday and summer periods.

1.4 Project structure

The four key stages of this project are summarised in Figure 2. This report delivers on the first component of Stage 1, the *Background Report.*



Figure 2 Summary of four key stages

1.5 Historical context

For over 35,000 years, the land of Bass Coast Shire has been occupied by the Bunurong and Boonwurung people, who are the traditional

landowners of the area. The region has several archaeological sites that are known to have belonged to Aboriginal communities, particularly around Western Port and Bass Strait.

For over 35,000 years, the land of Bass Coast Shire has been occupied by the Bunurong and Boonwurung people.

Bass Coast Shire also has a richly layered post-European settlement history that dates to some of the earliest European settlement activity in Victoria. Cultural heritage sites are located both on public and private land throughout the Shire, in towns, settlements, along the coast and in rural landscapes.

1.6 Future projection (population and demand)

The population of Bass Coast Shire is expected to grow by ~17% between 2021 and 2036, which is an increase of 6,769 people. It should be noted that growth is not similar for all small areas across Shire. Detailed information about future population distribution is presented in Chapter 7. The annual growth rate is estimated to be slightly under 1%. This growth is likely to bring economic benefits and increased services. Growth may also present challenges such as a perceived loss of community and the 'small town feel' which may have attracted many residents.

1.7 Report structure

An overview of the report structure is offered in Figure 3.

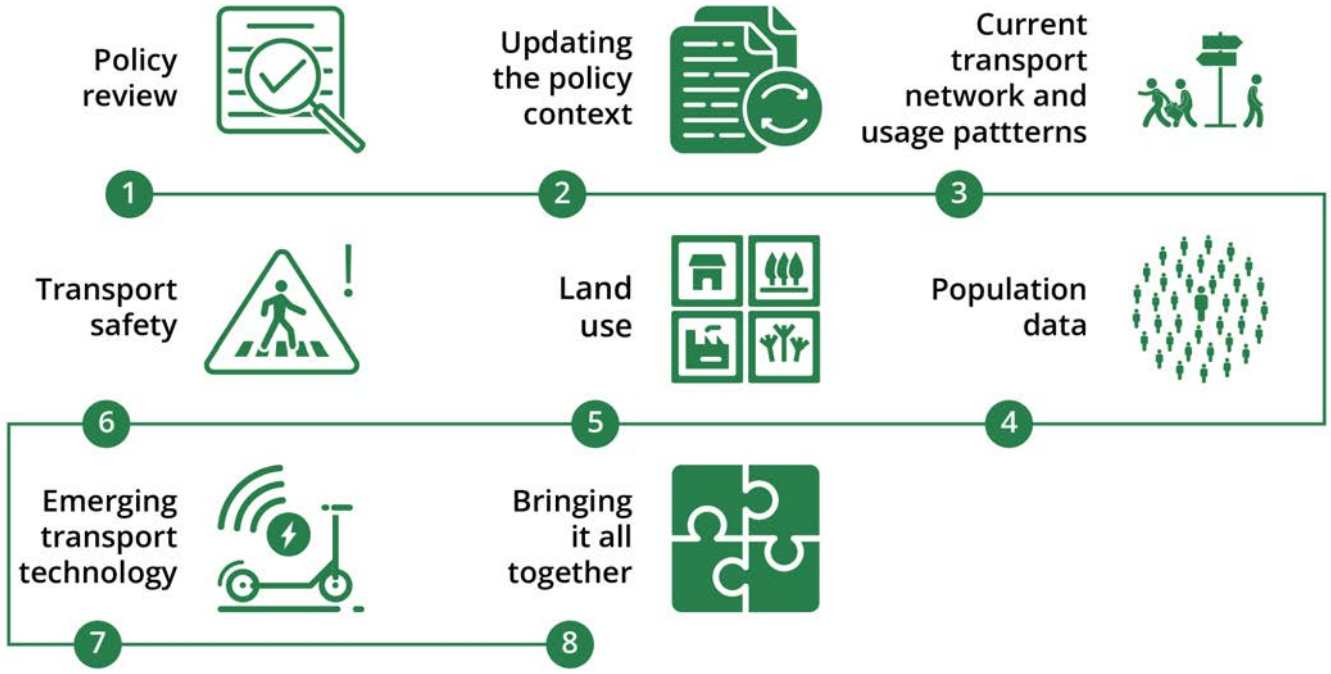


Figure 3 Key report components

2. Review of policies and plans



This chapter provides a succinct review of relevant documents, across local and state government.

2.1 Council policies and plans

This Section provides a summary of policies and plans prepared by Bass Coast Shire Council.

2.1.1 Bass Coast Council Plan 2021-25

This Plan sets out how Council will work with residents to achieve their aspirations. The Plan identifies a number of challenges that the Shire is facing, including:

- Climate change
- Ageing population
- Lack of housing affordability
- Population growth
- Family violence.

The Plan has six strategic objectives based on community aspirations:

- Protect the natural environment
- Healthy community
- Our places - improving the connection between people and public places
- Growing our economy
- Sustainable development
- Leading our community.

Providing more sustainable transport choices helps to support the Shire and the community meet its aspirations. This has clear implications for future stages of the ITS; to create better connections with the natural environment, to boost physical activity within the community, and help to enhance sustainability amid population growth.

2.1.2 Bass Coast Community Vision 2041

The Community Vision articulates the community's long-term aspiration to guide decision-makers over the next 20 years.

The community vision themes are:

- Climate emergency and climate preparedness
- Protect and enhance natural environment
- Healthy and inclusive communities
- Access and movement
- Education, creative economy and industry.

Transport-related priorities within the *'Access and movement'* theme are:

- Advocate for safety and maintain and improve the road network
- Affordable transport options
- Prioritise walking and cycling through well-connected paths
- Supporting infrastructure for the transition to a low or no-emission transport system
- Reduce car use
- Encourage visitors to use eco-friendly transport modes
- Reliable public transport access.

There is significant overlap between the priorities listed above and the future ITS. The ITS will be designed to provide alternatives to motor vehicles, including better options for walking, cycling and public transport, as well as EV charging possibilities.

2.1.3 Bass Coast Tracks and Trails Strategy 2022 - 2032

This Strategy aims to provide a connected and accessible trail network for everyone. The existing trail network in different parts of Bass Coast was identified. Some 36 new trail opportunities have been identified. Those high and medium-priority opportunities are:

2.1.3.1 High priority

- Wonthaggi to Inverloch Trail
- Woolamai to Nyora Rail Trail Extension
- Coghlan Rd to Redwood Drive
- Rhyll Inlet to Cowes-Rhyll Road
- Ozone St to Goroke St
- Cowes to Ventnor Foreshore Trail.

2.1.3.2 Medium priority

- Coronet Bay to Corinella

- Gippsland Odyssey Trail
- Cape Paterson Loop
- Gossard Point to Nobbies
- Bore Beach to Phillip Island Rd
- Screw Creek Loop
- Boys Home Road to Churchill Island Access Road
- The Esplanade Surf Beach
- Baxter Drive to Harmers Haven (Part of Yallock-Bulluk)
- Ryll Headland to Rhyll Harbour
- Berry's Beach to Summerlands
- Phillip Island Rd to George Bass Coastal Walk
- Coal Point to Cape Paterson
- Pier Rd to Dalyston-Glen Forbes Rd
- Dalyston To Rail Trail Connection
- Baxter Wetlands to Neil's Outlook (Part of Yallock-Bulluk)
- Corinella Road Connection
- Pyramid Rock Rd to Thompson Ave
- Cowes to Pyramid Rock
- Wonthaggi to Inverloch Trail to Cape Pater son (Part of Yallock-Bulluk)
- Grossard Point to Cowes
- Rail Trail to W Area Rd
- Ventnor Rd to Smiths Beach Rd.

The construction of the above trails will provide an important foundation for the development of walking and cycling options in Bass Coast Shire. The construction of these trails will substantially enhance the attractiveness of micromobility across Bass Coast Shire and give more transport choices.

2.1.4 Bass Coast Climate Change Action Plan 2020 – 2030

This Plan sets out actions toward net zero emissions by 2030. It is important to consider that transport is the second largest emission source in Bass Coast (29.7%).

Transport is the second largest emission source in Bass Coast (29.7%).

Switching to sustainable transport modes such as walking, cycling, electric vehicles are some of the transport-related actions in the Plan and have a direction connection with the future Bass Coast ITS.

The community vision for Bass Coast in 2030 is:

- Connected and zero-carbon community
- Renewable energy
- Sustainable travel, healthy economy.

Some of the climate change effects on transport are:

- Increase maintenance and its related cost
- Short-term isolation of communities and accessibility issue
- Loss of escape routes from natural disaster.

Since sustainable transport options were introduced as a solution to reduce emissions, it is important to consider this Action Plan in developing the ITS.

2.1.5 Bass Coast Advocacy Strategy 2023-26

This Strategy reflects the needs of the Bass Coast community by setting out the advocacy priorities. Advocacy pillars are:

- Cultivate partnership
- Seek funding.

Advocacy priority projects are mainly based on:

- Council plan and policies
- Council resolutions
- Issues of the day as they arise
- Government budget and policy cycle.

Some of the transport-related advocacy outcomes within the Council plan are:

- Advocate for, and create, connected, sustainable places, support active transport, reliable public transport, and other low-emission transport options.
- Advocate for and leverage technology and digital resources to improve connectivity, service delivery, and experience.

These advocacy outcomes are aligned with this project's goals to widen Bass Coast residents' transport options and promote sustainable transport choices.

2.1.6 Access Equity and Inclusion in Bass Coast Plan 2021-2025

This Plan sets out Council actions to improve access and inclusion in the Shire. The 2016 Census data indicates that approximately 6.6% of the people living in the Bass Coast Shire have a disability, which is above regional Victoria's average of 6%.

Bass Coast Shire Council is committed to improving access and inclusion for people with disability who visit, live in or work in our Shire.

The actions of the Council are grouped into three categories:

- Physical environment
- Service and support
- Community environment.

Physical environment actions include footpaths, streetscape, buildings, and recreational facilities.

The main three goals of this Plan are:

- An accessible and safe physical environment
- Accessible, equitable, and appropriate service and support
- Inclusive and safe community environment.

Some of the transport-related actions are:

- Improve planning, design, and consultation for all new public use infrastructure such as street furniture, and parking spaces
- Advocate for better public transport.

The goals of the ITS are in line with this Plan. Creating accessible transport infrastructure benefits more than disabled people; it makes everything more accessible, for all members of the community.

2.1.7 Active Bass Coast Plan 2018-2028

This Plan sets out the Council's aspirations and vision for recreation and open space. The vision for Active Bass Coast is: '*A healthy and connected community that regularly participates in recreation and social activities in both natural and structured open spaces*.' This vision falls into three key categories:

- Active people
- Active places
- Active partnerships.

Almost two-thirds (59%) of Bass Coast residents do not participate in the levels of physical activity required for healthy living.

Almost two-thirds (59%) of Bass Coast residents do not meet the required activity physical activity guidelines. A high percentage of people are overweight or obese.

Community engagement feedback informed the development of *Active Bass Coast*. Walking and cycling trails was a popular topic, with residents asking for a shared path between Wonthaggi and Inverloch. Walking was ranked as a favourite activity by residents.

A high percentage of Bass Coast residents are overweight or obese.

One of the objectives of the Bass Coast ITS will be to offer sustainable transport options, including active transport. By helping more people see walking and cycling as an attractive choice, physical activity levels will increase, boosting overall population health.

2.1.8 Cowes Streetscape Master Plan 2023

This Plan aims to improve the quality and function of the public realm in Cowes. The Plan also aims to transform the transport hierarchy from car-oriented to pedestrian-oriented design.

Cowes Streetscape Master Plan aims to create a vibrant destination that prioritises safety, comfort, and accessibility for pedestrians and encourages people to walk, ride, and spend time in Cowes.

Objectives of this Plan are to:

- Establish Thompson Avenue as a 'Destination Place'
- Connect the Cowes township to the foreshore
- Prioritise pedestrians in the transport hierarchy
- Encourage sustainable transport options
- Support commercial activity and preserve the unique character of Cowes.

Given how recently this Plan was created, and how closely it aligns with the intention of the Bass Coast ITS, we'd expect there to be a heavily overlap between this Plan and the future ITS.

2.1.9 Wonthaggi Activity Centre Streetscape Master Plan 2023

Bass Coast Shire Council prepared this Plan to enhance the development of Wonthaggi to meet future needs. Some of the Plan's objectives are to:

- Improve connectivity
- Shift transport hierarchy and prioritise pedestrians
- Activate the centre of town.

Figure 4 shows future directions and actions within Wonthaggi Activity Centre extents.

Some of the transport-related actions are to:

- Reclaim nature strip areas for safer pedestrian zones
- Upgrade bus stop and interchange facilities
- Reclassify Graham Street as an "Activity Street"
- Implement traffic calming measures
- Improve pedestrian mobility and connection
- Introduce mobility lanes, a designated pathway for visitors using mobility aids, with a minimum width of 1 metre, to McBride Avenue
- Relocate freight route from Graham Street to Watt Street and Korumburra Road.

Since this document includes detailed transport-related actions, it is important to consider these closely in the development of the Bass Coast ITS.

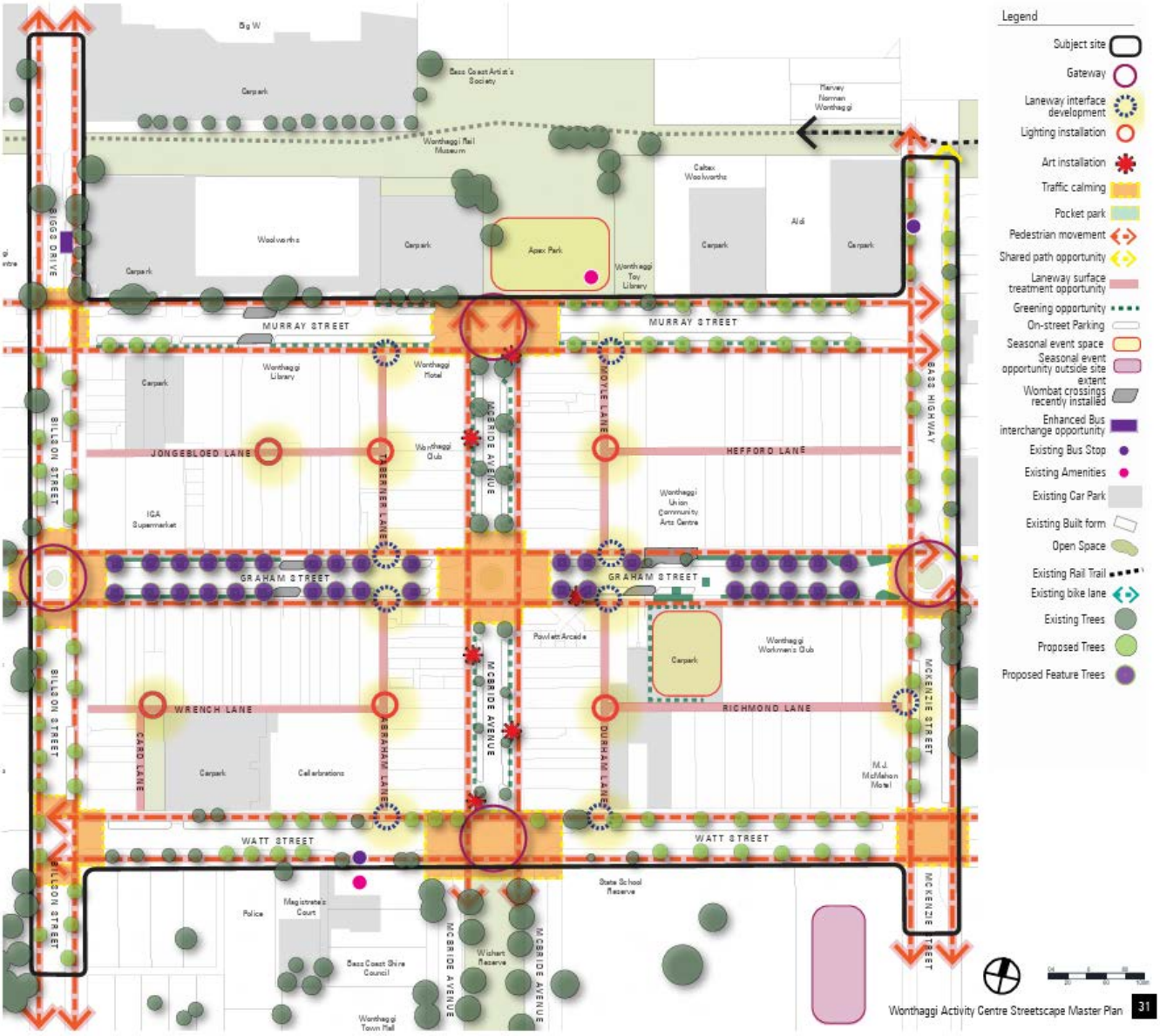


Figure 4 Wonthaggi Streetscape Master Plan

Source: Wonthaggi Activity Centre Streetscape Master Plan 2023

2.1.10 Healthy Communities Plan 2021-25

This Plan was developed in partnership between Bass Coast Shire and South Gippsland Shire, along with other health and community stakeholders. The Plan quotes residents as wanting more opportunities for active transport, while also providing integrated priorities and strategies for the South Coast.

The Plan has four priorities:

- Creating healthy lifestyles
- Improving mental wellbeing
- Supporting affordable housing
- Improving equity.

The *Healthy Communities Plan* prioritises healthy lifestyles opportunities by:

- Supporting community access to the natural and built environment for recreation and active transport.
- Increasing active transport.

Improving accessibility for people with disabilities is also an area of focus. The Plan aims to accomplish this by incorporating accessibility into all new built environments.

The Healthy Communities Plan sets out a precedent for regional partnership between Councils, and this could be investigated when considering connecting the regional transport network.

2.1.11 Living Young Plan 2021-2025

The Living Young Plan was developed to support the current and future needs of young people.

A lack of active transport and public transport access reduces young people's engagement in the community.

Given that 25% of Bass Coast residents are under 25, and 31% of children live in low-income, welfare-dependent households, it is evident that the region faces significant disadvantage. A lack of active transport and public transport access reduces young people's engagement in the community. During the process of preparation of the Plan, the following transport-related major issues that young people (12–25 years old), families, and children (0–11 years old) face are:

- Lack of infrastructure for active transport and public transport options
- Inadequate access to amenities and areas for recreation.

Integrating the priorities and insights from this Plan into the ITS can help ensure Council is responsive to the need of young people, families, and children in the community.

2.1.12 Road Asset Management Plan 2019 - 2023

This Plan sets out the required level of service for road infrastructure including road pavement, footpaths, bridges, street furniture, and kerbs.

The goals of Road Asset Management Plan are for:

- Well-maintained public amenities
- Safe and accessible pedestrian crossing
- Effective advocacy for the community for government investment in road assets
- Ensuring supportive infrastructure for healthy and connected communities.

Safety and accessibility are two main priorities of the Bass Coast community.

Some of the expected changes in the service expectations are:

- An ageing population and more need for safe crossing
- Improve access to bike paths
- Increase freight demand
- Seasonal demand and usage of the road network
- Using rural roads with higher traffic levels than they were designed for can cause accelerated deterioration.

Some methods to manage demand for new services are:

- Enhancing current assets
- Phase out ineffective assets
- Use of appropriate signage
- Implement policies to reduce damage.

Funded upgrade programs are:

- Footpath gap program
- Aspirational pathway program
- Local road safety improvement program
- Urban road and drainage improvement policy
- Road upgrade program.

Safety and accessibility are two main priorities for Bass Coast community and there are some funded upgrade programs. It is important to consider this Plan in developing ITS to be aligned with community expectations and previous programs.

2.1.13 Road Asset Management Plan 2024 – 2034

The draft of this Plan is currently out for community consultation. This Plan introduces principles for asset management and investment for next 10 years by considering level of service.

Strategic objectives of this Plan are:

- Natural environment
- Healthy community
- Growing economy
- Sustainable development
- Connection between people and public places
- Leading for our community.

Some of the risks associated with Council's road are:

- Rapid population growth
- Growth within Wonthaggi North – East precinct
- Lack of planning to develop and renewal program
- Road accidents
- Climate change
- Lack of funding.

Some of performance measures introduced for customer level of Service are:

- Availability and accessibility
- Maintenance
- Safety
- Environment
- Cost effectiveness

Develop an ITS in order to identify modal shift is part of demand management plan introduced in this document.

2.1.14 Road Management Plan 2022

This Plan sets out a management system and relevant standards for the road management functions of Bass Coast Shire.

This document defines the duties of road users, service authorities, and council. Some of the Council's duties are:

- Ensuring that roads are safe
- Provide and maintain a network of roads for all road users.

Additionally, the Road Asset Management Plan provides a road and defect hierarchy, which is used to determine the response time for reported defects.

2.1.15 Phillip Island Integrated Transport Study 2014

The *Phillip Island Transport Strategy (PITS)* was developed to guide future investment in the transport network on Phillip Island by both local and state governments from 2014 through to 2030. Some of the objectives of PITS are:

- Sustainability
- Equity of access
- Healthy future for Phillip Island
- Vibrant transport choices.

The Strategy ultimately aims to develop an integrated transport network that meets the needs of all users during peak season and growth in year-round activities. To achieve this aim, the following principles act as the framework for implementing the PITS:

- Improve the sustainable transport network
- Create a vibrant active transport network
- Create better connections and high levels of integration between modes.

Some of the challenges to implement the actions included in PITS are:

- Alignment of transport and land use objectives
- Congestion and seasonal demand
- Funding
- Stakeholders' support.

Phillip Island residents' priorities are:

- Improved road safety
- Better public transport
- More bike paths
- Better pedestrian connections
- Improved car travel time.

Figure 5 represents current and future pedestrian networks in Phillip Island. Figure 6 represent future public transport in Phillip Island. Figure 7 shows the current and future road network in Phillip Island.

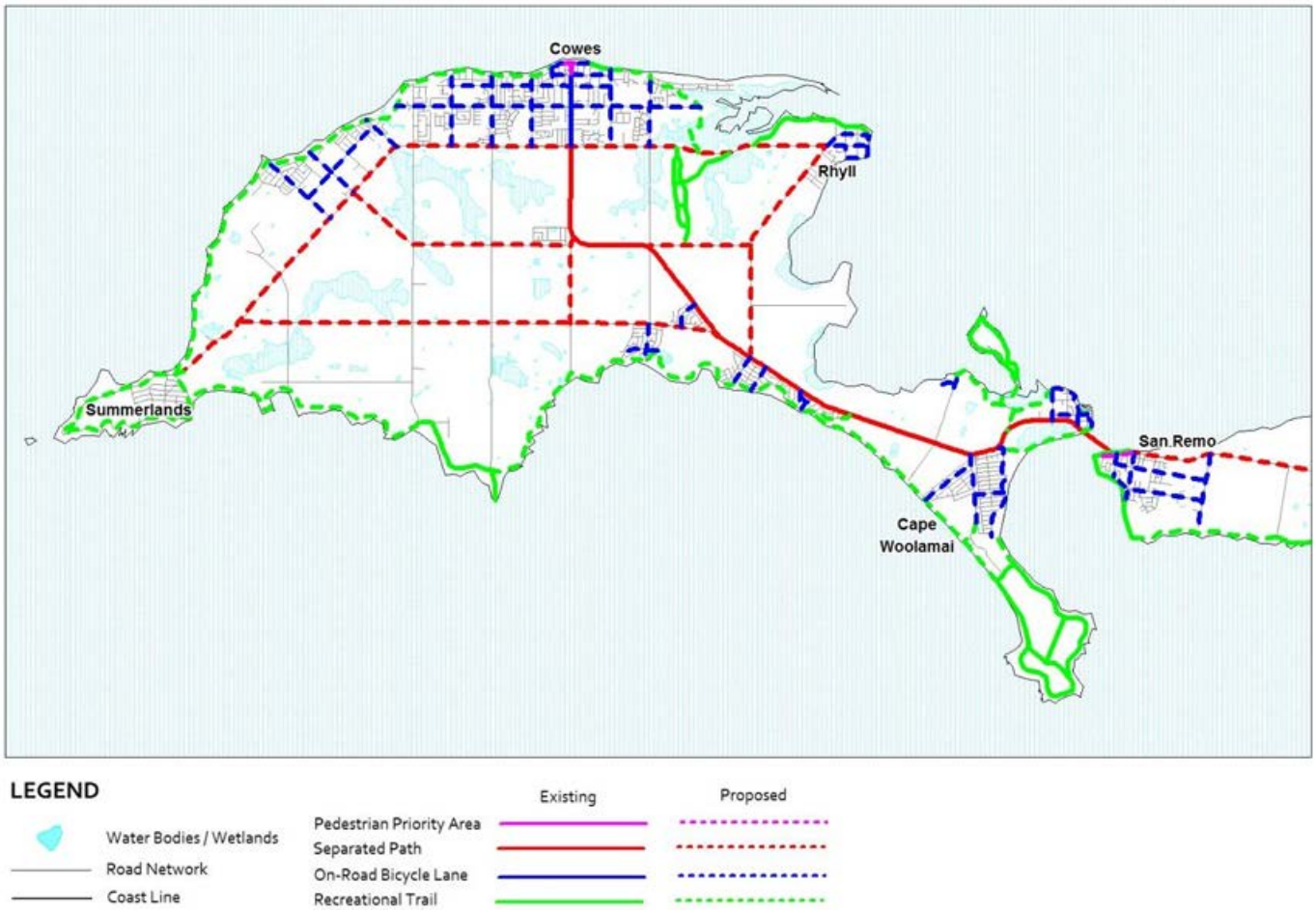


Figure 5 Pedestrian and cycle priority network

Source: Phillip Island Integrated Transport Study 2014

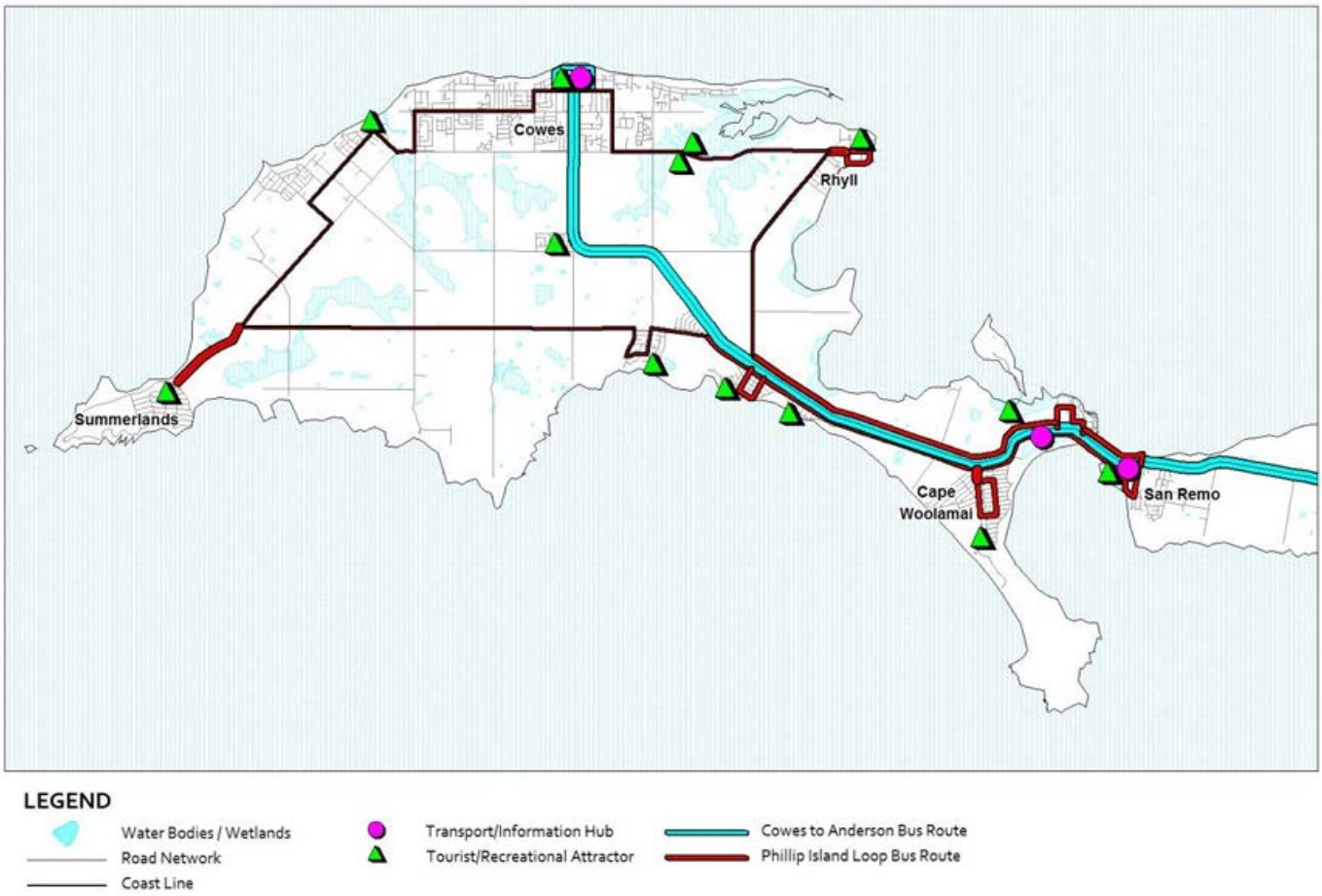


Figure 6 Future public transport network

Source: Phillip Island Integrated Transport Study 2014

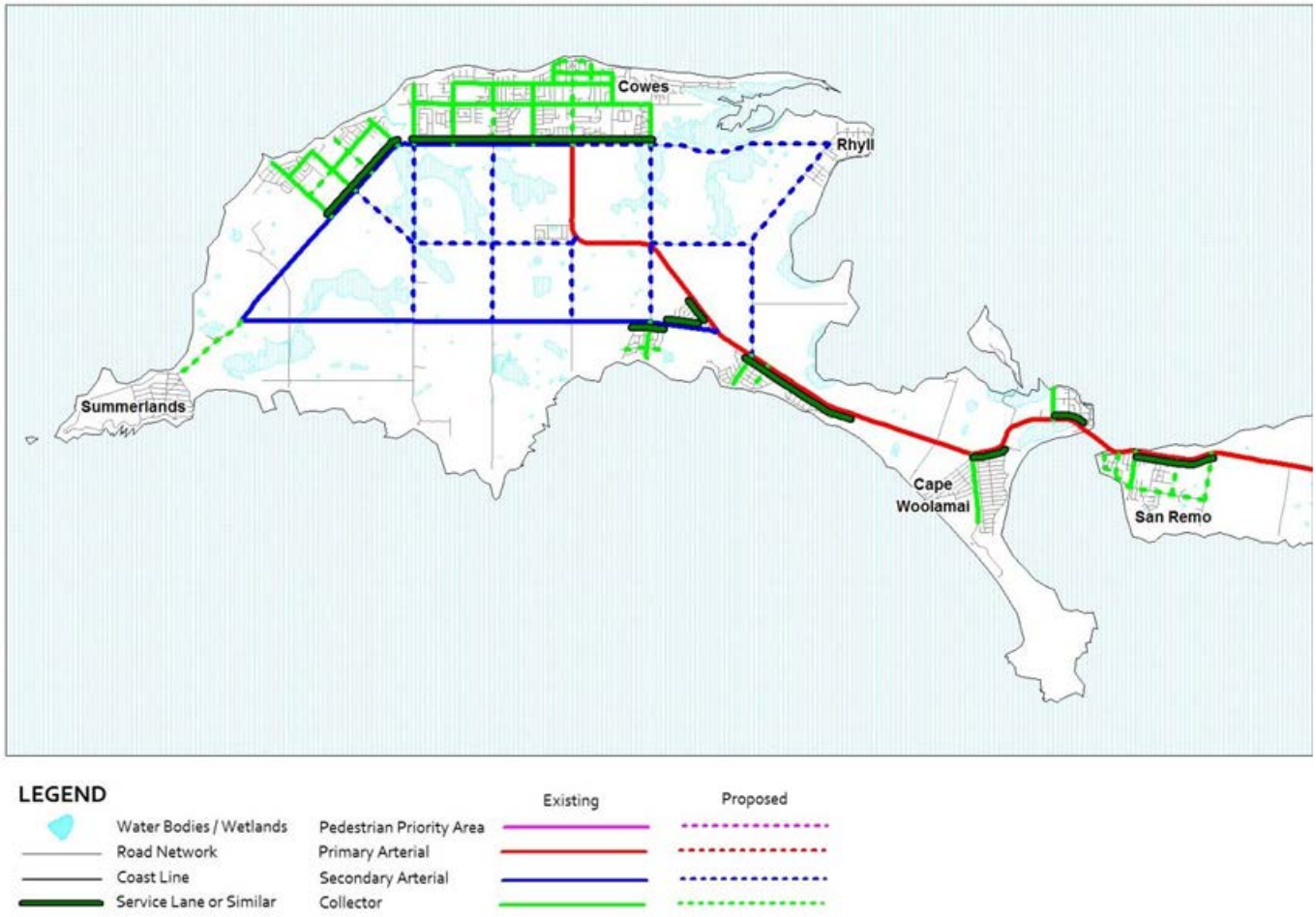


Figure 7 Phillip Island's future road network

Source: Phillip Island Integrated Transport Study 2014

For developing the Bass Coast ITS, it is important to consider the work contained in the PITS.

2.1.16 Pilot On-Demand Transport Service for Phillip Island and San Remo – Service Design and Implementation Plan 2022

This Plan provides a service design and implementation plan for an on-demand transport service for Phillip Island and San Remo. On-demand transport is an agile form of transport that operates based on demand, rather than fixed routes or timetables. The full-service model suggested in this report included electric buses operating from 6 a.m. to 11 p.m. on weekdays and from 7 a.m. to 11 p.m. on weekends and public holidays during peak periods.

The benefits of on-demand transport service for Phillip Island include:

- More transport options for those who cannot or choose not to drive and reduce transport disadvantages
- Faster and more convenient travel
- Customised service for visitors
- Reducing emission.

A flexible, on-demand transport system is not something that always offers an efficient solution in many areas; however for Phillip Island, given its tight geographical boundaries and low population density, is suitable for an on-demand bus system. This will be considered as the Bass Coast ITS progresses.

2.1.17 Urban Forest Strategy 2022-2040

This Strategy is a response to climate change effects by planning to expand and grow urban forests.

Trees can be used as a traffic calming measure as motorists drive slowly along treed streets.

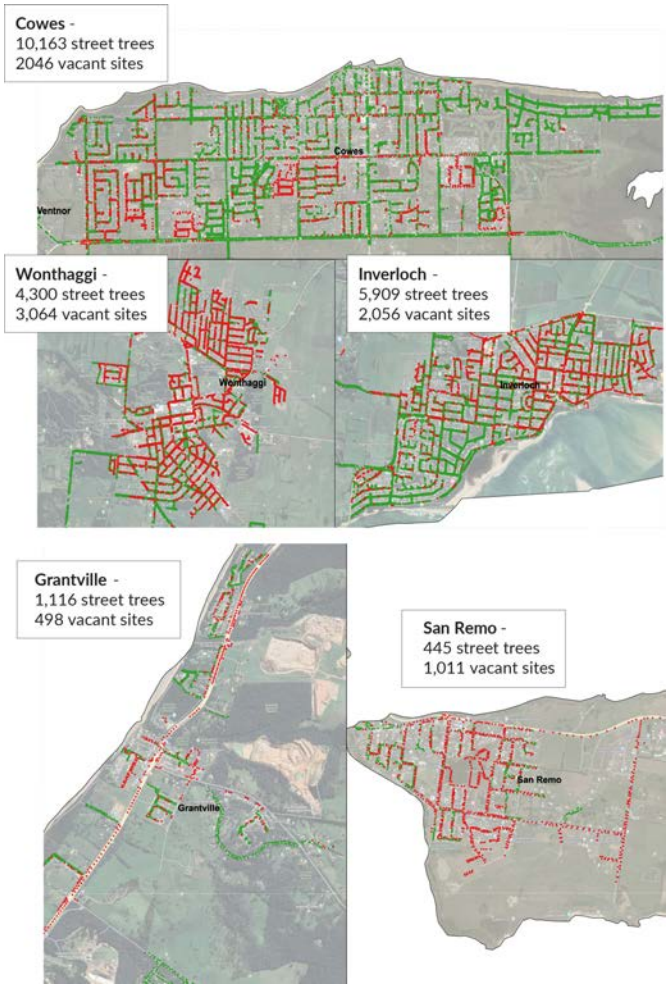


Figure 8 Distribution of street trees across Bass Coast

Source: Urban Forest Strategy 2022-2040

Bass Coast has 25% urban forest cover. It is important to note that trees can be used as a traffic calming measure as motorists drive slowly along treed streets. This plan also recorded the location of street trees and vacant sites. Figure 8 shows the number of street trees and vacant sites at each of the five major towns.

Since the ITS may propose the construction of new infrastructure or the redesign of existing streets, it is crucial to consider how additional greening and enhance liveability outcomes in Bass Coast.

2.1.18 Wonthaggi North East Precinct Structure Plan 2023

This *Precinct Structure Plan* (PSP) guides the planned growth and delivery of infrastructure and services in Wonthaggi North East (Figure 9). The area is expected to grow from 8,000 to 20,000 residents through the construction of 4,500 homes over the next 30 years. One of the objectives of the PSP is to identify a potential alignment for a future Wonthaggi bypass.

The PSP also outlines road projects to be delivered to facilitate the development of the growth area. This includes new and upgraded roads and intersections. Open space, waterways, and community infrastructure are also outlined.

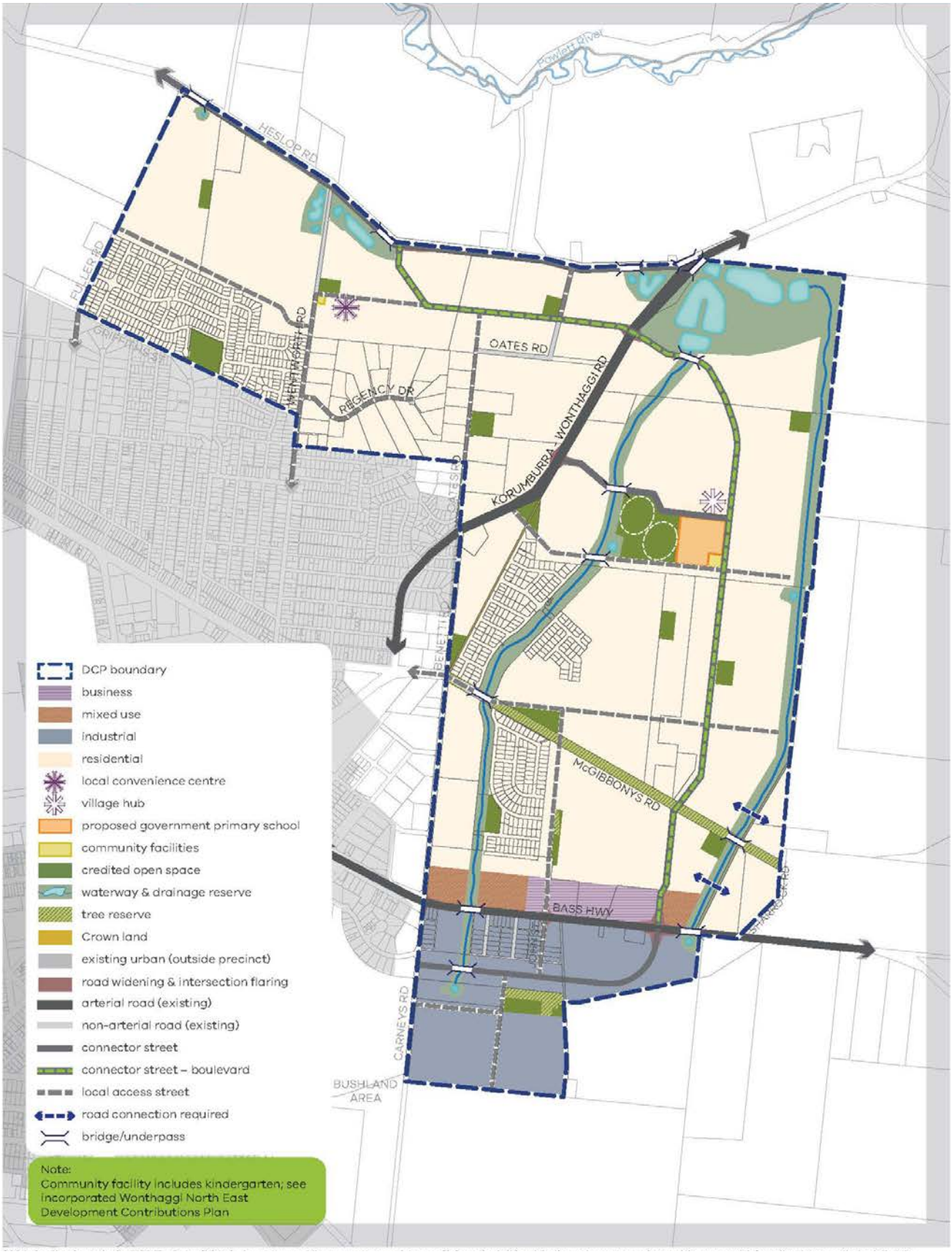


Figure 9 Wonthaggi North East PSP

Source: Wonthaggi North East Precinct Development Contributions Plan

Transport-related objectives in *Wonthaggi North East Precinct Structure Plan* are:

- Create an integrated transport network that encourages sustainable travel behaviour.
- Prioritise community access and safety in the local road network.

There are opportunities to build on the work outlined in the PSP to further improve pedestrian and bike riding access to and through the township. In particular, streets that form part of the future bike riding network could provide separated infrastructure. Additionally, roundabouts and other intersections in the built-up area should have a stronger focus on safe pedestrian access. The proposed waterways also offer opportunities to provide recreational and transport active travel links.

2.1.19 Wonthaggi North East Precinct Development Contributions Plan 2024

The infrastructure included in this document is determined based on the development scenario described in the PSP. The infrastructure projects in the DCP are important for the health, safety, and well-being of the community. There are four types of infrastructure projects:

- Transport
- Community facility
- Active recreation
- Integrated water management.

To support future residential growth, the PSP outlines an expanded urban structure. Transport projects include:

- Controlled intersection construction
- Road constructions.

Intersection projects include:

- Heslop Road and Fuller Road
- Heslop Road and proposed Boulevard Connector Road
- Heslop Road and Korumburra–Wonthaggi Road
- Korumburra–Wonthaggi Road and proposed Boulevard Connector Road
- Bass Highway and Carneys Road
- Bass Highway and proposed Boulevard Connector Road
- McGibbonys Road and Korumburra–Wonthaggi Road
- Bass Highway and John Street
- Korumburra–Wonthaggi Road and Connector Road.

Road projects include:

- Heslop Road (Fuller Road to Korumburra–Wonthaggi Road) 2400m
- McGibbonys Road.

Figure 10 shows details of transport projects. One of the risks of a Plan such as this is that it can offer higher levels of service to car use and therefore make it more difficult to achieve the mode share transition to more sustainable forms of transport.

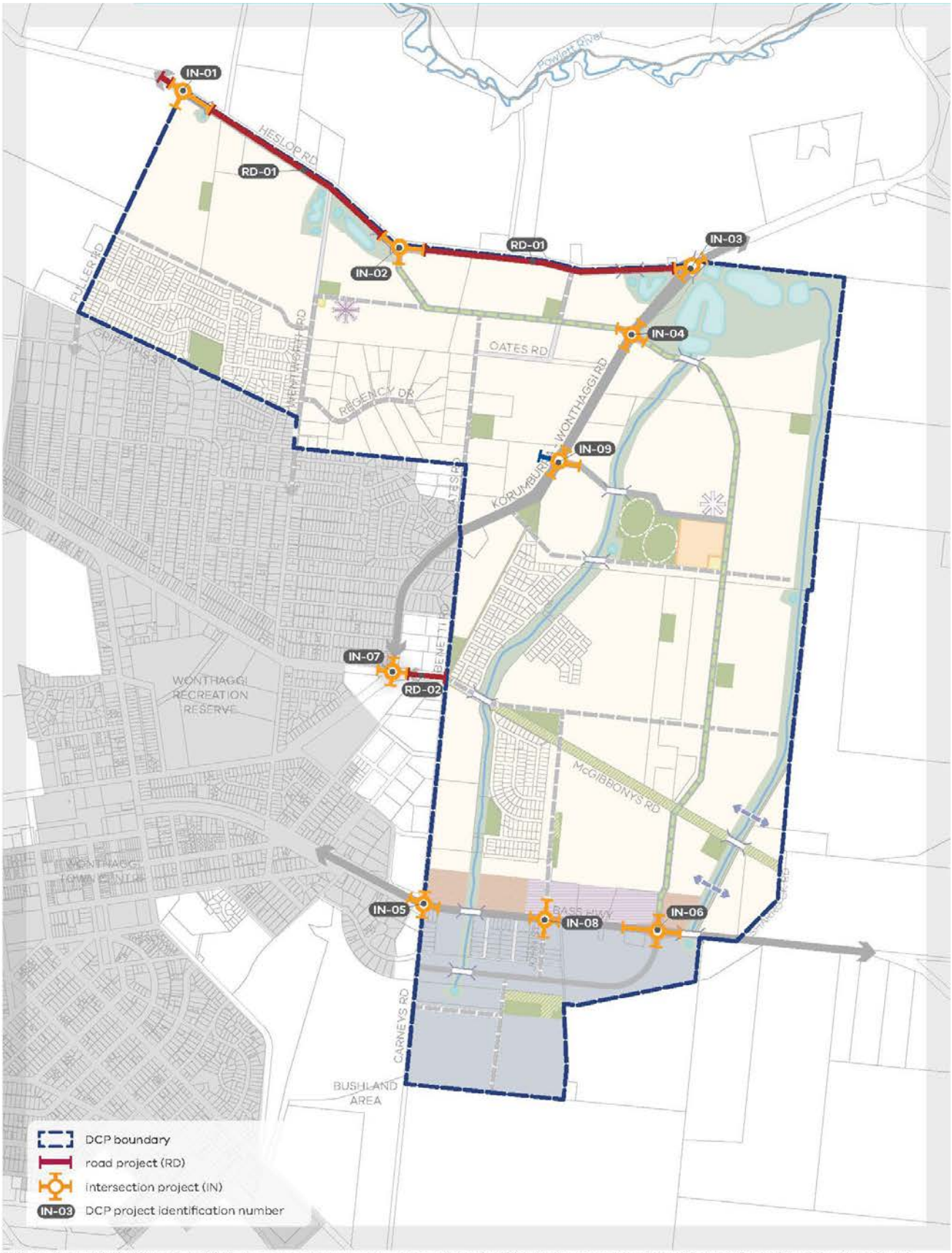


Figure 10 Transport projects

Source: Wonthaggi North East Precinct Development Contributions Plan

2.1.20 Bass Coast Economic Development Framework 2023

This framework outlines Council's plan to improve business activity, investment, employment, and education.

Bass Coast's economy depends on tourism which creates revenue and is not dependent on population growth.

Key focus areas of the framework are:

- Living + Working
- Natural world + Visitor economy
- Industry diversification + Innovation
- Place shaping.

In order to make Bass Coast a desirable destination for residents and visitors, efforts are being made in the areas of "place shaping" and "Living + Working." This involves creating vibrant town centres, implementing sustainable transport options, and making housing more affordable.

Some of the actions in this framework, such as providing sustainable transport options and creating vibrant town centres are directly related to the ITS.

2.1.21 Bass Coast Planning Scheme (Victorian Planning Provisions, Infrastructure Design Manual) 2024

Bass Coast experiences large population fluctuation during the year. Four objectives are considered in Council's vision for land use planning:

- Natural environment
- Sustainable development and growth
- Healthy communities
- Economic development.

Wonthaggi, north-east of the centre of the township, will see most of the urban future growth. San Remo and Grantville will experience significant residential expansion.

Some of the transport relevant themes within the Planning Scheme include:

- Creating walkable neighbourhoods
- Encourage active and sustainable modes of transport.

Some of the design considerations for walking and cycling included in the Planning Scheme are:

- Links to existing infrastructure
- Safe walking access to key destination locations
- Develop interconnected and continuous routes (footpath, shared path, and cycling lane)
- Provision of direct bike lane access to key destinations
- Provide safe crossings
- Natural surveillance
- Accessibility for people with disability.

Some of the public transport design requirements are:

- Connect new routes to existing ones
- Provide public transport access to key destinations
- Place regional buses on arterial roads and local buses on connector streets to enhance journey time efficiency.

Some of the neighbourhood street network design requirements are:

- Integrate with the current mobility network
- Distinguish between arterial roads and neighbourhood streets
- Ensure appropriate speed limit to prioritise pedestrians and cyclists
- Safe and efficient access to key destinations
- Ensure safe movement for all vehicles
- Consider adequate reservation for arterial roads to manage future movement demand
- Encourage safe travel behaviour
- Minimise culs-de-sac style development, as this can reduce pedestrian permeability.

The Planning Scheme provides useful direction as the Bass Coast ITS begins to develop.

2.2 Summary of key themes within Council policies

The review of Bass Coast Shire policies and strategies allows us to extract the consistent themes present across a wide range of policy documents. These are identified below:

- Encouraging and supporting sustainable transport options
- Seasonal population growth
- Ageing population
- A need for greater levels of transport safety
- Prioritising pedestrians in street design
- Reducing climate changing emissions
- Protecting Bass Coast's natural environment.

These themes are important, as a key objective of the ITS will be to ensure the actions included in the ITS support Council in achieving its wider strategic ambition.

2.3 State government policies and plans

This section provides a review of policies and plans prepared by the Victorian government to understand statewide needs and goals.

2.3.1 Movement and Place 2019

The *Movement and Place Framework* has been adopted by the Victorian government and is designed to inform street design and policy decisions for particular streets in the transport network. At the heart of *Movement and Place* is a recognition of the dual role that streets perform in terms of being a *movement* corridor and a *place* in itself. Implicit in the Movement and Place framework is an acknowledgement that in past decades, the role of the motor vehicle and vehicle throughput has been the primary goal underpinning street design, and this can at times be to the detriment of the *place* function that many streets perform, as well as their ability to support walking and cycling.

Movement and Place recognises the disconnect that transport and land use planning pose and offers a method for reconciliation.

The Movement and Place (M&P) Framework, developed jointly by VicRoads and Transport for Victoria enables local government and the community to understand the dual role that streets perform in terms of being a movement corridor and a place in itself. Streets provide for movement of people and goods, and serve as places for people to recreate, socialise, shop etc. There is a natural tension between these two functions, therefore careful consideration is required to determine a street's level of priority, from movement and place perspective.

The *Movement and Place* framework consists of four broad modules, of which the first two modules are on a strategic level and the third and fourth module on a project or local level.

- Module 1: Network classifications matrix
- Module 2: Performance Assessment
- Module 3: Toolbox & Design Guides
- Module 4: Options Assessment.

Figure 11 illustrates the graphic used in Module 2 of Victoria's Movement and Place framework. Many local governments in Victoria have taken an interest in Movement and Place, and seeking to use it to create better outcomes for transport sustainability and place. This is of particular relevance for the main streets in each of the key townships within Bass Coast Shire. Implementing initiatives that enhance the role of *place* and the treatment of sustainable transport is especially relevant to the Integrated Transport Strategy.



Figure 11 Movement and Place matrix for Victoria

Source: Victorian State Government

The core of the *Movement and Place* framework is shown in Figure 12. This highlights that instead of only viewing roads through a prism of movement, we can consider a matrix of, each one with a specific movement designation and a specific place designation. We can use this matrix to compare and contrast the way streets are performing today to how we would like them to perform in the future.

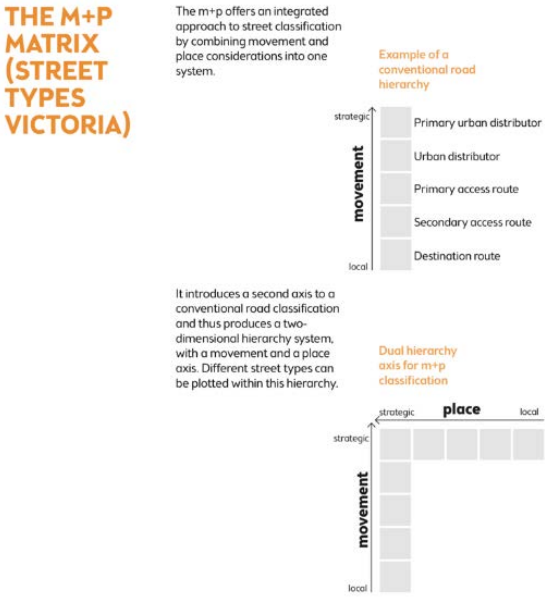


Figure 12 Understanding Movement and Place

Source: Department of Transport

2.3.2 Victorian Principal Freight Network Maps

The Victorian government publishes the Victorian Principal Freight Network (PFN). The PFN plays a crucial role in shaping the future freight network. It is important to protect the PFN to help industries in the area stay competitive and contribute to productivity.

The PFN network in Bass Coast is presented in Figure 13. All townships must have access to PFN to keep their industries and business competitive. Inverloch, Wonthaggi, and Grantville have access to PFN. San Remo, Cowes and Newhaven are connected to PFN by a B-doubled road network.

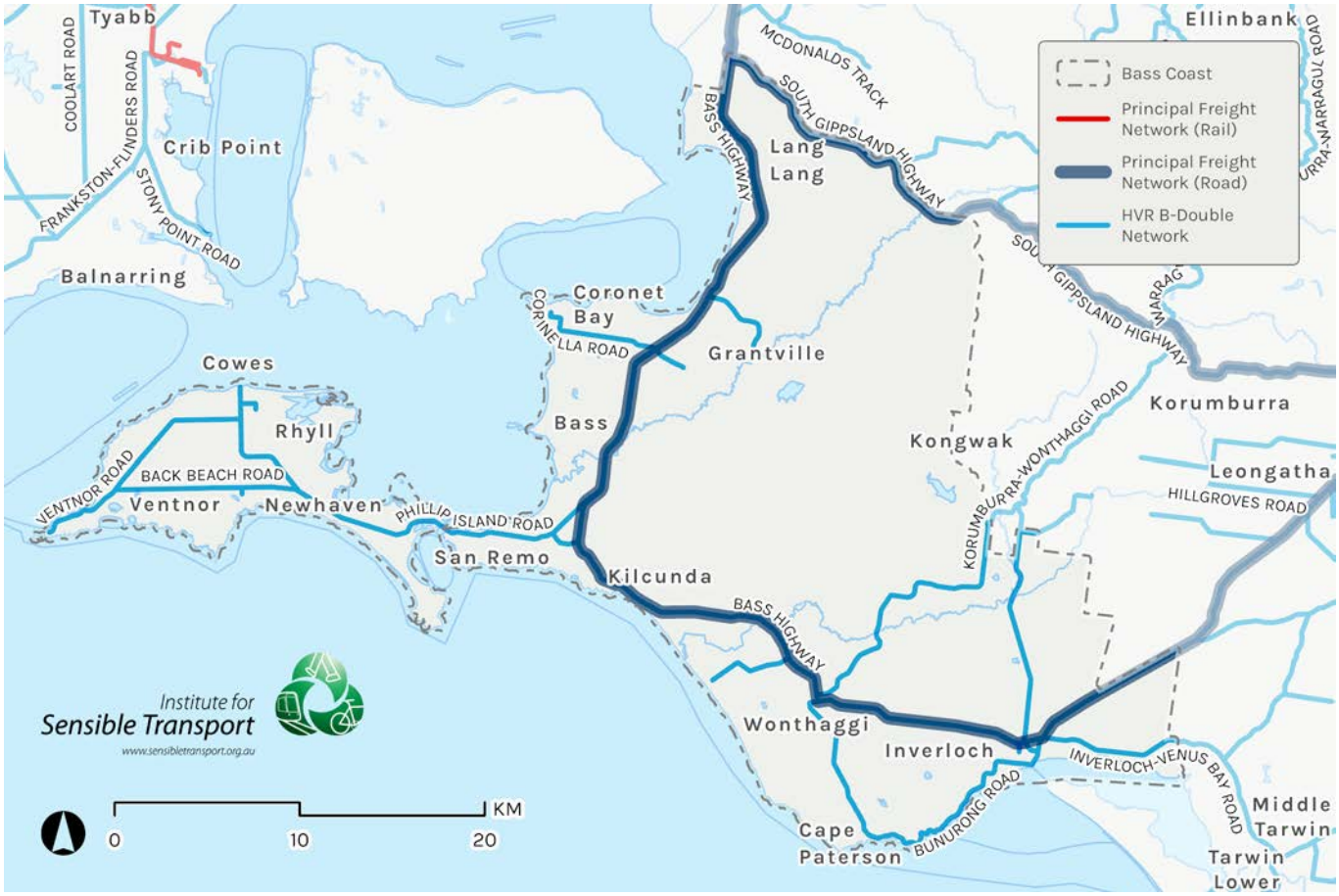


Figure 13 Victorian Principal Freight Network in Bass Coast
Source: Department of Transport and planning

2.3.3 Principal Bicycle Network routes

The PBN is a network of cycle routes that aim to make cycling for transport easier and provide access to key destinations in Victoria. It serves as a planning tool to direct State investment in the development of a transport bicycle network. Figure 14 show Principal Bicycle Network (PBN) routes.

Bicycle network coverage is generally poor, with limited connectivity and access to key destinations. In addition to a lack of coverage in townships, there are few links between townships.

However, the PBN does not accurately represent cycling infrastructure in Bass Coast. The existing cycling network in its entirety is shown in Figure 29.

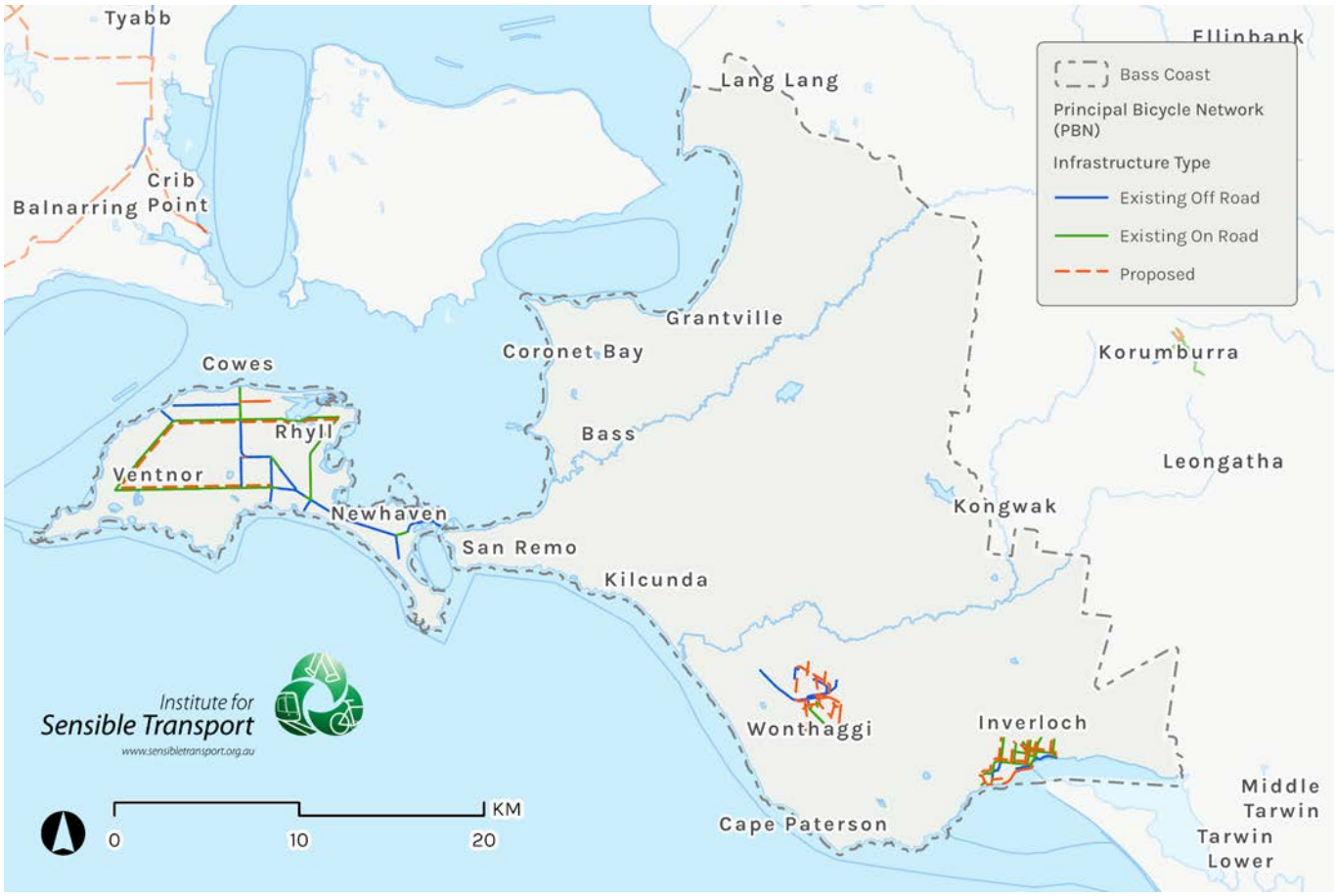


Figure 14 Principal Bicycle Network routes in Bass Coast

Source: Department of Transport and Planning

2.3.4 Victorian Road Safety Strategy 2021-2030

Victoria has a *Road Safety Strategy* aimed at reducing the number of road deaths and serious injuries by 2030. It aims to eliminate road deaths by 2050. An interim target of halving deaths by 2030 is also committed, however it is not clear how this might be achieved using the current set of policies. The Strategy focuses on creating a safe road environment and supporting road users to make safe choices. The Strategy also seeks to embed a culture of road safety within the Victorian community and deliver initiatives that have an immediate impact while also preparing for future changes to road safety technology.

The *Road Safety Strategy* aims to improve the safety of vulnerable road users such as older road users, children, and young drivers, and foster liveable cities that encourage active transport. Initiatives include:

- Safe infrastructure
- Safer road design
- Land-use planning strategies
- Behaviour changes campaigns to protect at-risk communities like pedestrians, cyclists, and motorcyclists.

Victoria has been a global leader in implementing measures such as mandatory seat belts, random breath testing, safety cameras, and public campaigns targeting dangerous driving behaviours like drink and drug driving. As a result of these interventions, there has been a significant reduction in road deaths since 1970 (Figure 15). The number of deaths on Victorian roads decreased from 1,061 deaths in 1970 to 548 in 1990, and further down to 266 in 2019. These statistics demonstrate the effectiveness of the implemented measures in reducing road trauma and saving lives. However, there is a concern that safety performance has stagnated, and it remains an outstanding challenge for Victoria to meet its road safety ambitions.

The Strategy highlights that unprotected and vulnerable road users are at higher risk of death and injury in road crashes.

As safety is one of the important factors in mode choice decisions, this Strategy aligns with the overarching aims of Bass Coast ITS to achieve safer outcomes for road users, especially those considered to be more vulnerable.

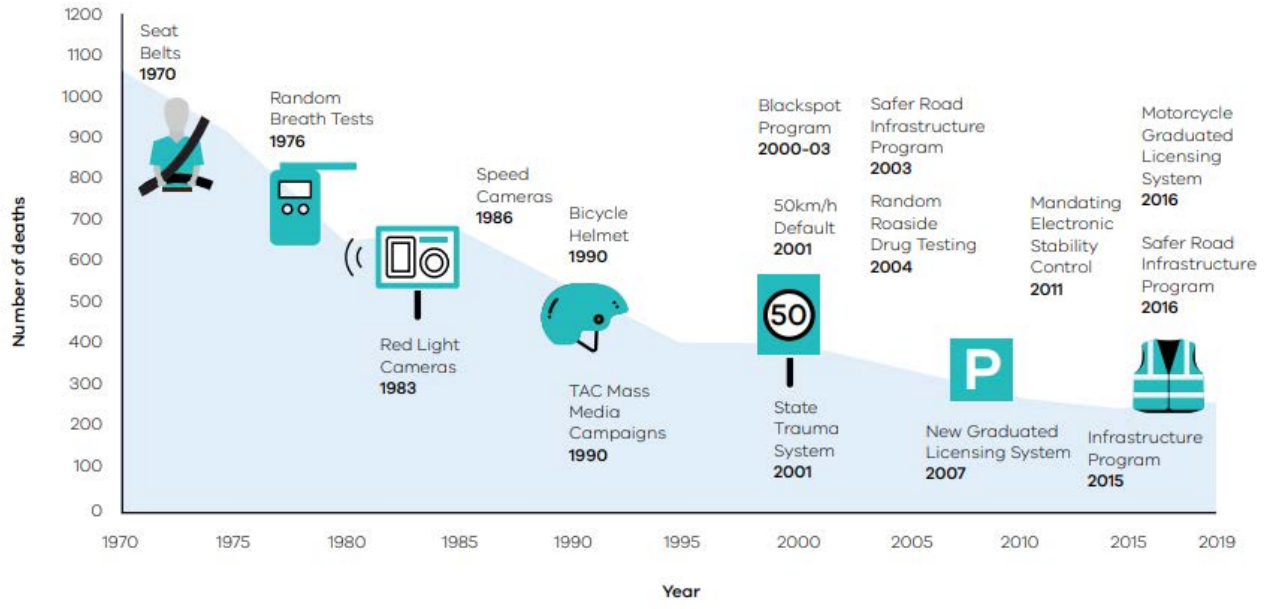


Figure 15 Reduction in road deaths in Victoria
Source: Victorian Road Safety Strategy 2021–2030

2.3.5 Phillip Island Road Corridor Planning (DTP)

Phillip Island Road is facing capacity issues due to a high number of visitors. The Victorian Government has allocated $3.2 million to plan for future infrastructure improvements, including the construction of intersection treatments (Figure 16). The project aims to provide benefits such as:

- Improved road safety
- Better traffic flow
- Enhanced public transport facilities
- Increase active transport
- Improved access to and from Phillip Island
- Encouragement of active transport
- Increase car parking in Newhaven.

While the points above state what the document has said, it is not clear that this is the most effective way of achieving the overall ambition Council and the State have for a safer, more sustainable transport system. There is a risk that investment in this plan will not increase the use of sustainable transport and may help entrench car dependency in the region.



Figure 16 Proposed plans for Phillip Island Road at San Remo
Source: Phillip Island Road Corridor Planning

2.3.6 Victorian Transport Integration Act 2010

The Act established a framework for an integrated and sustainable transport system in Victoria. The system promotes inclusivity, prosperity, and environmental responsibility.

The Act outlines several key objectives for the transport system in Victoria:

- Social and economic inclusion
- Economic prosperity
- Environmental sustainability
- Integration of land use and transport
- Efficiency, coordination, and reliability
- Safety and health and wellbeing.

The Bass Coast ITS should be designed to align with the objectives outlined in the Act, working towards a comprehensive and sustainable transport system that benefits the community.

2.3.7 Road Management Act (2004)

The Road Management Act 2004 defines the powers and responsibilities of relevant authorities managing roads in Victoria. This regulatory document has two major purposes:

- Establish the system for managing road-related functions
- Set the standards for discharging duties related to road management.

Any document that is relevant to the management of roads, and the safety of roads, is subject to the Codes of Practice as directed in the Act.

2.3.8 Phillip Island and San Remo Destination Management Plan Towards 2033 (2023)

This Plan sets out to help create a sustainable and growing visitor economy.

The guiding principles in this document are:

- Improving visitor movements
- Enhancing our visitor experience
- Building a resilient tourism ecosystem
- Caring for our environment and community
- Sharing our story with impact.

Improving infrastructure and transport to support thriving destinations is one of the priorities for tourism.

Focus areas for "improving visitor movement" are closely related to the Bass Coast ITS:

- Short visit vehicle contribution
- Electric vehicle network
- Active and public transport
- Integrated transport planning
- Marine infrastructure.

Tourism is a high greenhouse gas emitting sector and is highly vulnerable to the adverse effects of climate change.

It is important to take this Plan into account as the Bass Coast ITS develops. Many of the overall goals are likely to be shared between this Plan and the future ITS.

2.3.9 Towards 2030 Gippsland Destination Management Plan (2019)

This document sets out a plan for rebuilding the visitor economy in Gippsland after recent disruptions, with a focus on revitalising and strengthening communities. Five experience pillars in this Plan are:

- World-class natural sanctuary
- Lake, rivers, and costal paradise
- Paddock and ocean produce
- Inspired adventure
- Vibrant local community.

One of the strategic priorities in this plan is *"place-making and enabling infrastructure investment"*

which includes investment in place-making and enabler infrastructure such as roads, signage, walking tracks that enhance the visitor economy and visitors' willingness to stay longer.

"Urban renewal" and *"transport"* are two infrastructure priorities related to the ITS. The ultimate goal of these two priorities is to create a more liveable region and improve visitors' experience. Some of the actions include:

- Invest in 'green' transport choice
- Public transport integration
- Create bike-friendly public transport
- Advocate for air transport service
- Improve road access to visitor destinations.

This Plan is closely aligned to the ITS as it is seeking to enhance the quality and diversify of different transport options, including a focus on sustainable and integrated transport.

2.3.10 Gippsland Odyssey Trail 2022

The Gippsland Trail is a proposed long-distance cycling trail network.

The objectives of the Gippsland Odyssey Trail include:

- Providing an attractive cycling experience for both long-distance and short-distance riders
- Delivering economic benefits to the region
- Improving connectivity
- Enhancing infrastructure accessibility
- Improving health and safety outcomes.

To achieve these objectives, the study found:

- A multipurpose trail named 'Gippsland Trail' or 'Great Gippsland Trail' will be created.
- The trail will have contained experiences that can be enjoyed in sections.
- Longer routes for bike-packing experiences will be promoted to enable extended journeys throughout Gippsland.

Some of the issues founded in this report are:

- Safety concerns for those seeking to travel between Inverloch and Venus Bay, as well as the South Gippsland Highway. The report recommends investigating off-road routes as an alternative.
- Public transport accessibility between Morwell and Moe.

Figure 17 provides an illustration of the proposed trail.



Figure 17 Existing and Proposed Trails

Source: Gippsland Odyssey Trail

As connectivity is an important factor in cycling trips, it is important to consider proposed trails in developing the ITS, to ensure a cohesive network and that the level of separation with motor vehicles is sufficient to attract a broad group of users.

2.3.11 Gippsland Freight Strategy 2013

The Gippsland region produces 85% of Victoria's electricity, 90% of Victoria's natural gas and 20% of Australia's oil. The region also supports a strong agriculture and forestry industry. These latter industries together with a large tourism sector generates large volumes of freight and passenger vehicles, particularly along Bass Highway. Wonthaggi houses one of the few export-focussed meat processing plants in the region. The Strategy identifies the need for a bypass of the Bass Highway to take heavy vehicles out of the centre of Wonthaggi. Figure 18 provides a high-level overview of key Gippsland freight routes.

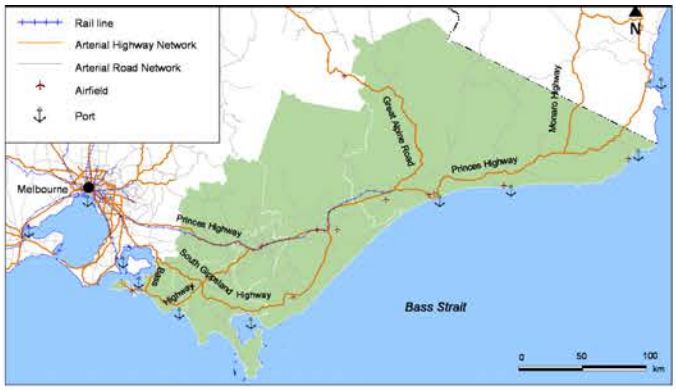


Figure 18 Gippsland Freight Transport Network

Source: Gippsland Freight Strategy

While much of the *Gippsland Freight Strategy* remains pertinent, several areas of the document, including a focus on growing coal demand, may require updated analysis. The potential growth of freight movements, tourism growth, and increased development within Wonthaggi place increasing and conflicting demand on the local transport network.

3. Updating policy context



The transport landscape has changed considerably in the last ten years. The growing need to reduce transport emissions and enhance safety outcomes are two policy areas that require a strong shift towards policies that favour actions that lower emissions and reduce the risk and severity of collision.

The emergence of new transport technology now provides a greater range of options for people. This includes App based ride-sourcing services such as Uber, as well as shared and private micromobility options, such as e-bikes and e-scooters. While App-based ride sourcing services as simply a new way of catching a taxi, the e-micromobility options offer a way of people making short to medium trips without needing a car. These types of devices are already becoming popular in Bass Coast. While these types of services are quickly being adopted, their full potential will not be realised until there is a cohesive network of high-quality protected bike lanes and paths. A more extensive network of shared paths and bicycle lanes will be required in order for these forms of transport to become a more appealing solution to a greater proportion of the population.

The last ten years has also seen a significant growth in electric vehicle (EV) ownership. Indeed almost 9% of new vehicles sold in Victoria in 2023 were EV and this growth is expected to continue over coming decades. The implication for Bass Coast is that the development of the EV charging network can help more people use an EV within Bass Coast. This is especially important for visitors and commercial vehicles. Bass Coast residents will generally find their home is the most convenient place to charge their EV. Charging can be used to encourage visitors to stop in Bass Coast townships, helping to create more vibrant, and economically successful places.

In future stages of this project, our team will assess what Council can do in order to capitalise on the benefits offered by these emerging forms of transport. These opportunities will be developed in a manner that aligns with Council's wider strategic objectives, including the *Climate Emergency Declaration*, and the intention to grow the proportion of trips done by active modes of transport, including e-bike.



4. Existing transport network



This section provides a review of the current transport network in Bass Coast Shire.

4.1 Introduction

The sections below describe different elements of the transport system, as identified in Figure 19. Importantly, *public realm* considerations are also embedded in our analysis, given that key townships in Bass Coast are destinations within themselves, and require enhanced streetscapes and urban vibrancy.



Figure 19 Key modes of interest

4.2 Public transport

This section provides a description of public transport services available in Bass Coast, and their patronage levels. The integration of public transport modes and increasing their frequency will play a crucial role in providing a more diverse set of transport options. For the Bass Coast ITS, developing a coordinated advocacy role to ensure new, high-quality public transport options are provided to existing and new residential growth areas is essential.

Currently, there are limited public transport options to and from Bass Coast, including local town buses, a V/Line rail and coach service, and a ferry located in Cowes (shown in Figure 20 and Figure 21). This section also highlights the limitations of the public transport network in Bass Coast where they exist.

Eastern Victoria train and coach network

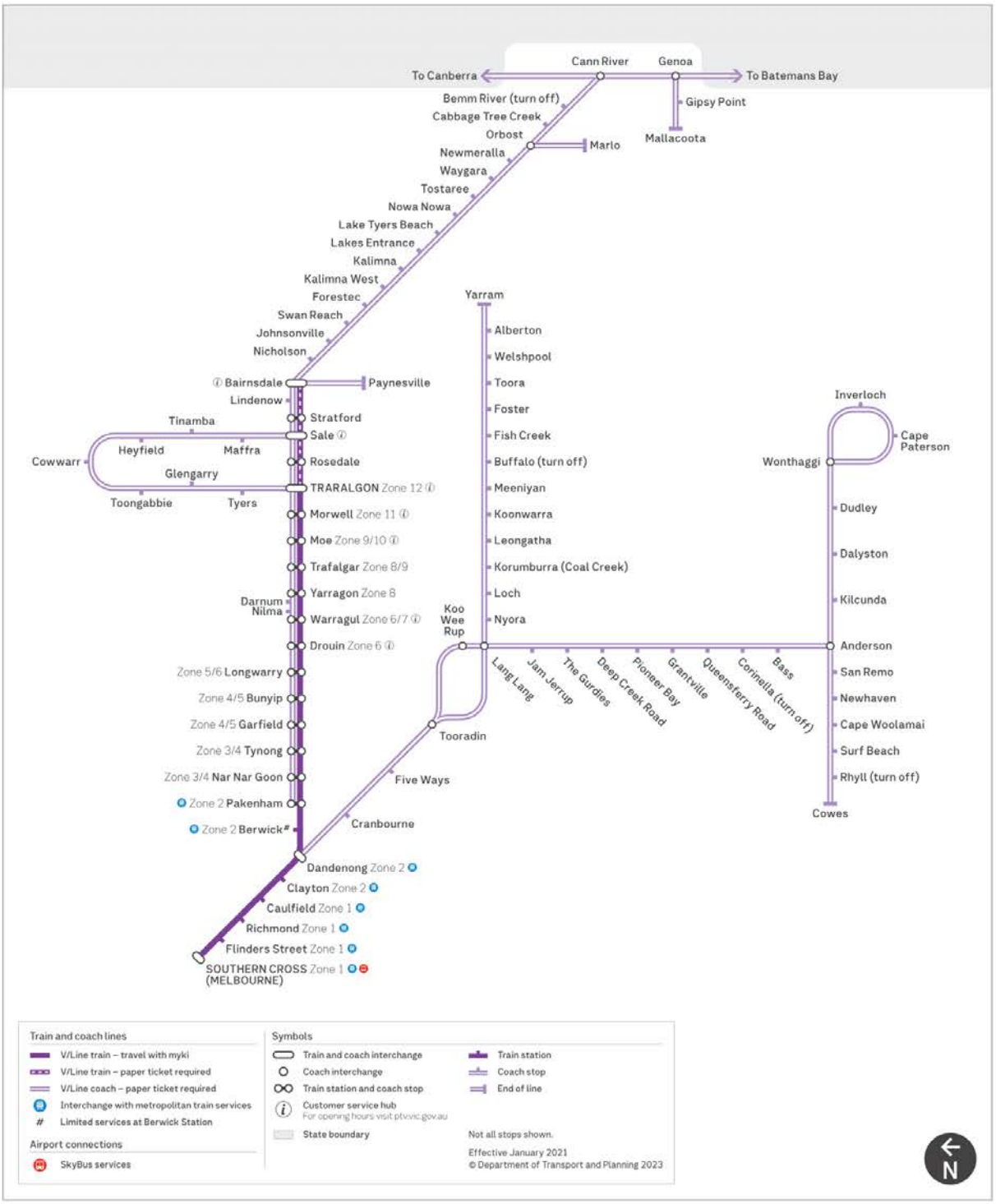


Figure 20 Eastern Victoria train and coach network

Source: Department of Transport and Planning

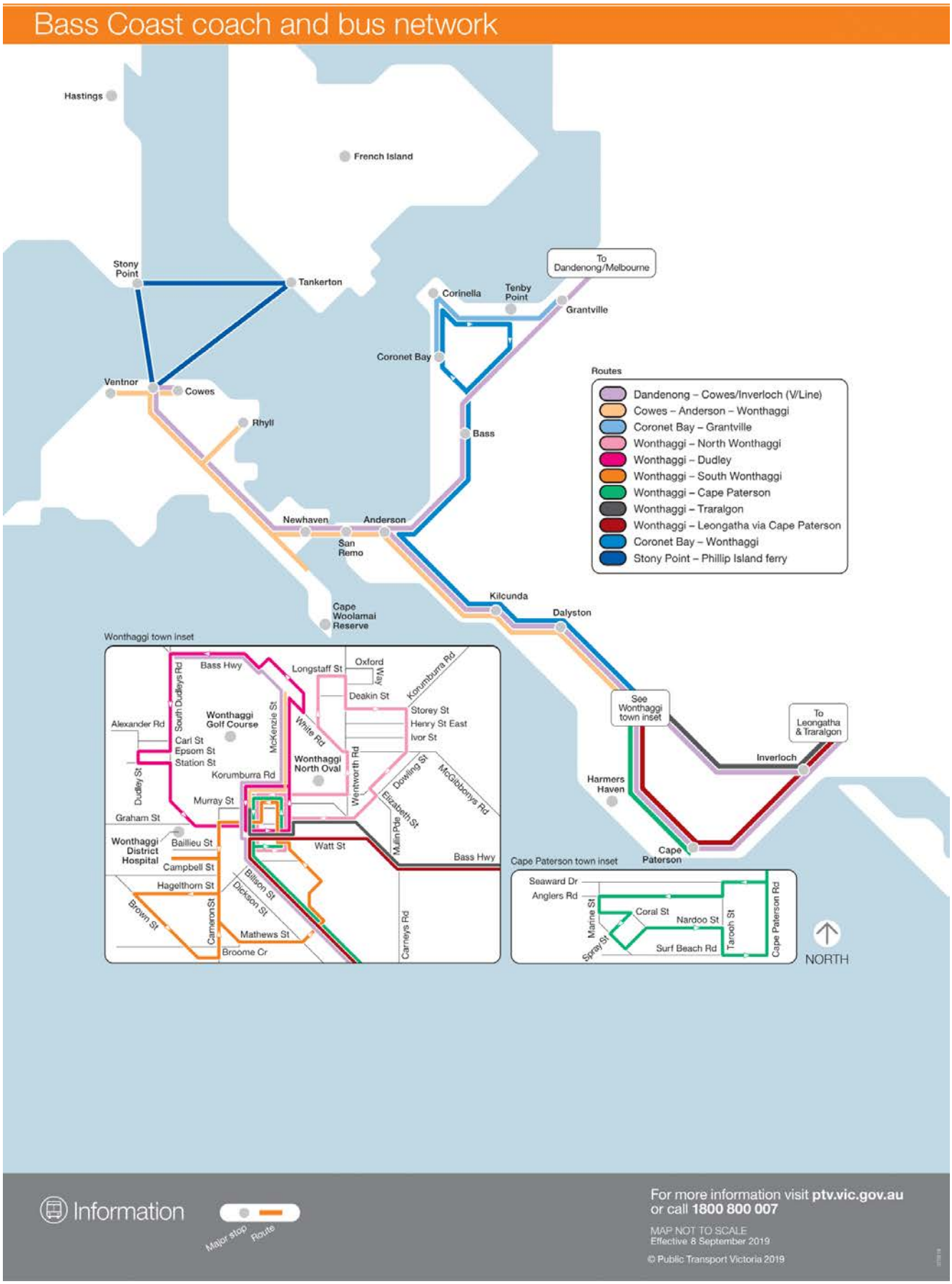


Figure 21 Bass Coast coach and bus network

Source: PTV

4.2.1 Town buses

There are ten town bus routes that run in Bass Coast, as shown in Table 1. It is worth noting that buses in Bass Coast are more focused on travel *between* townships than *within* townships. This potentially explains why bus use as a travel mode to work is less than 1% in Bass Coast.

Table 1 also details the number of weekday services (both directions) each bus route has. Operational frequencies on all local town buses are below what many residents would likely require of a reliable public transport service. These services are therefore unlikely to have broad appeal for those who have other transport choices.

Table 1 Bus routes in Bass Coast, 2024

Route ID	Weekday services (both directions)
Cowes – Anderson – Wonthaggi	14*
Cowes - Fountain Gate via Anderson	2* (only runs on Thursdays)
Wonthaggi Town Service – North Wonthaggi	5 (service runs in one direction as a loop)
Wonthaggi Town Service – Dudley	6 (service runs in one direction as a loop)
Wonthaggi Town Service – South Wonthaggi	6 (service runs in one direction as a loop)
Wonthaggi Town Service – Cape Paterson	10
Wonthaggi – Traralgon via Leongatha	10**
Wonthaggi – Leongatha via Cape Paterson & Inverloch	2 (only runs on school days)
Coronet Bay – Wonthaggi via Corinella	2*** (only runs on Fridays)
Coronet Bay – Grantville	8

Source: PTV

* Some timetabled services require pre-booking. Passengers must contact the operator to book this service.

** Mobility aid users should book 24 hours in advance

*** Service stops at Anderson on request only

Town buses operate between Cowes to Anderson/Wonthaggi, and Cowes to Fountain Gate. The Cowes to Wonthaggi bus runs daily, with several different stopping arrangements. The route is shown in Figure 22. On weekdays, buses run from Cowes to Anderson/Wonthaggi eight times a day, and six times a day in the opposite direction. On Friday, there is an additional bus from Cowes to San Remo, and two additional services in the opposite direction, however, two of these services must be pre-booked by phone.

There is one trip, per direction, which loops round to numerous settlements on Phillip Island and San Remo, as shown by dotted lines on Figure 22. For all other trips, these settlements are skipped. This service pattern adds significant time to the journey, with a bus trip starting in San Remo taking almost an hour and a half to arrive in Ventnor, a journey which would take only 18 minutes to drive. It is unlikely that this route is used by anyone who has any other transport choice, as the time taken is simply too long to be competitive with any mode other than walking.

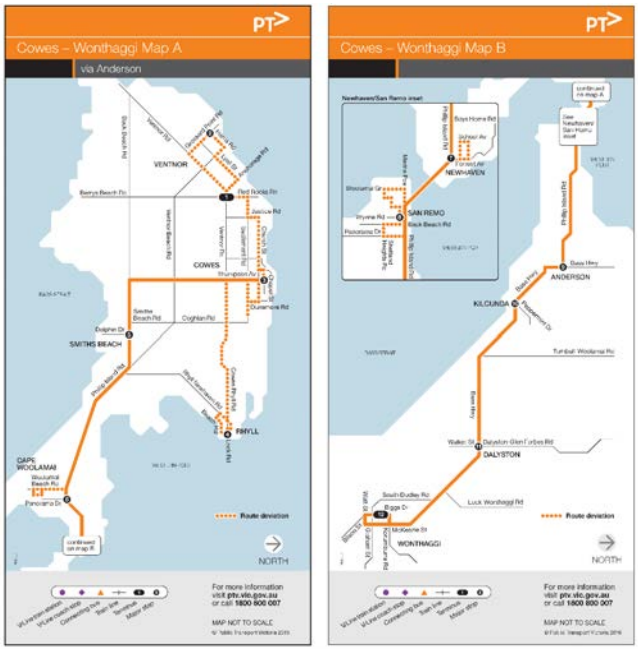


Figure 22 Route map of Cowes to Wonthaggi bus

Source: PTV

a bus trip starting in San Remo taking almost an hour and a half to arrive in Ventnor, a journey which would take only 18 minutes to drive

In Wonthaggi, there are four town bus route services, which are operated by *South Coast Bus*, as shown in Figure 23. Three of these town services are operated as loops, through the north-east, north-west, and southern parts of Wonthaggi and run between 5-6 times a day, while a fourth town service connects Wonthaggi to Cape Paterson that has 10 services a day (5 services in each direction).

South Coast Bus also operate a service between Wonthaggi and Coronet Bay that stops via Corinella. Whilst this service is not a local town service within Wonthaggi like those described above, it does originate/terminate in Wonthaggi. This service only runs once a week on Fridays, stopping at Anderson upon request.

There are two additional routes that originate/terminate in Wonthaggi that have shared responsibilities between multiple operators. The Wonthaggi to Traralgon service via Leongatha is shared between *South Coast Bus* and *Wilson's Bus Lines*. This route runs five times per day in each direction, acting more as a shuttle service that stops at the major townships of Wonthaggi, Inverloch, Leongatha, Mirboo North, Morwell and Traralgon. Finally, *Westernport Roadlines* run a school shuttle service between Wonthaggi and Leongatha via Inverloch. This route only operates on school days, with one service in the morning from Wonthaggi and one service in the afternoon from Leongatha.

Buses in Wonthaggi provide a good level of coverage, with around 61% of properties being within 200 metres of a stop and 90% of properties being within 400 metres of a stop. However, due to the low operational frequencies, this likely reduces the attractiveness of using the bus as a viable transport option. Additionally, there are few stops in the town centre of Wonthaggi (as shown in Figure 23), and the routes operate in a chain. These two factors limit the attractiveness and usability of local buses.

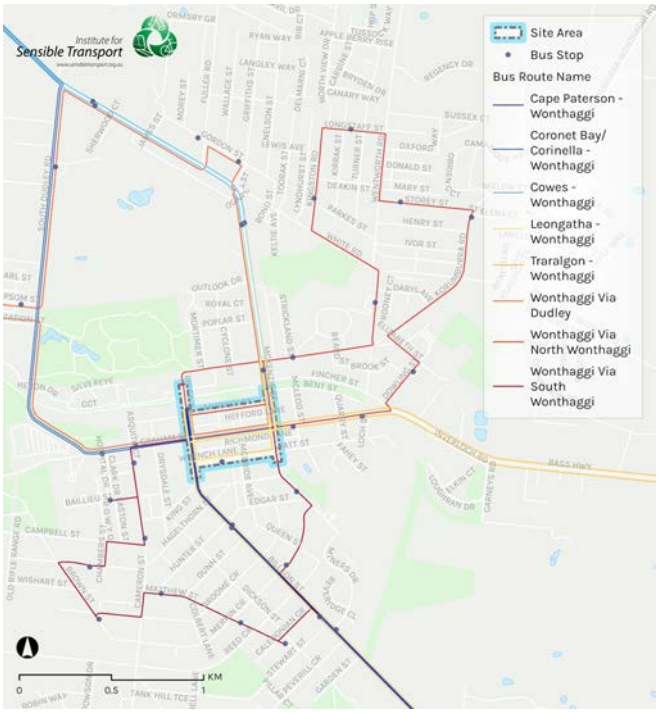


Figure 23 Wonthaggi bus network - routes and stops

Source: PTV

Lastly, Coronet Bay has a local route delivered by *South Coast Bus* that operates four times a day in each direction between Coronet Bay and Grantville via Corinella. Whilst this route has a higher frequency than most services in Bass Coast, it is still below what many residents would require of a reliable public transport service. For this reason, it is unlikely to have broad appeal for those who have other transport choices.

4.2.2 V/Line coach

Bass Coast is connected to Melbourne via a rail and coach service. This service requires passengers to change services along the route. Passengers catch a Metro train from Melbourne CBD to Dandenong, then change to a V/Line coach. Passengers are then required to change to a different coach at either Koo Wee Rup or Anderson. The opposite direction is the inverse. Some services do through connect, meaning that a change may not always be necessary. The timetable shows there are eight V/Line services scheduled from Melbourne to Inverloch/Cowes and twelve from Inverloch/Cowes to Melbourne, per weekday, as shown in Table 2 and Table 3.

Table 2 Weekday V/Line coaches between Inverloch/Cowes and Melbourne

Cowes to Melbourne												
Cowes Transit Centre	5:15	-	6:38	7:33	-	10:21	12:15	-	14:21	16:15	-	18:38
Cowes (2)	-	-	6:41	-	-	10:23	-	-	14:23	-	-	18:40
Wimbledon Heights	-	-	6:44	-	-	10:26	-	-	14:27	-	-	18:43
Smiths Beach	5:27	-	6:48	7:48	-	10:30	12:30	-	14:31	16:30	-	18:47
Sunset Strip	-	-	6:49	-	-	10:31	-	-	14:32	-	-	18:48
Rhyll turnoff	-	-	6:52	-	-	10:35	-	-	14:35	-	-	18:52
Surf Beach	5:30	-	6:55	7:51	-	10:38	12:33	-	14:36	16:33	-	18:53
Cape Woolamai	5:35	-	6:58	7:53	-	10:41	12:34	-	14:38	16:34	-	18:55
Newhaven turnoff	5:38	-	7:01	7:56	-	10:44	12:37	-	14:44	16:37	-	19:01
San Remo	5:41	-	7:08	7:59	-	10:51	12:40	-	14:51	16:40	-	19:08
Inverloch (1)	-	5:11	-	-	7:22	-	-	12:14	-	-	16:14	-
Inverloch (2)	-	5:12	-	-	7:23	-	-	12:15	-	-	16:15	-
Cape Paterson	-	-	-	-	7:38	-	-	-	-	-	-	-
Wonthaggi arr	-	5:26	-	-	7:47	-	-	12:29	-	-	16:29	-
Wonthaggi dep	-	5:31	-	-	7:52	-	-	12:34	-	-	16:34	-
Wonthaggi North	-	5:33	-	-	7:54	-	-	12:36	-	-	16:36	-
Dudley	-	5:37	-	-	7:58	-	-	12:40	-	-	16:40	-
Daylston	-	5:42	-	-	8:03	-	-	12:45	-	-	16:45	-
Kilcunda	-	5:47	-	-	8:08	-	-	12:50	-	-	16:50	-
Anderson arr	5:51	5:51	7:18	8:09	8:12	11:01	12:50	12:54	15:01	16:50	16:54	19:18
Change Service	Coach	-	-	Coach	-	-	Coach	-	-	Coach	-	-
Anderson dep	5:56	5:56	7:18	8:17	8:17	11:06	12:59	12:29	15:06	16:59	16:59	19:18
Bass (2)	6:02	6:02	7:23	8:23	8:23	11:11	13:05	13:05	15:11	17:05	17:05	19:23
Corinella Turn Off	6:09	6:09	7:28	8:30	8:30	11:16	13:12	13:12	15:16	17:12	17:12	19:28
Queensferry Road	6:11	6:11	7:29	8:32	8:32	11:17	13:14	13:14	15:17	17:14	17:14	19:29
Grantville	6:14	6:14	7:30	8:35	8:35	11:18	13:17	13:17	15:18	17:17	17:17	19:30
Deep Creek Street	6:16	6:16	-	8:37	8:37	-	13:19	13:19	-	17:19	17:19	-
Pioneer Bay	6:18	6:18	7:33	8:39	8:39	11:21	13:21	13:21	15:21	17:21	17:21	19:33
The Gurdies	6:19	6:19	7:34	8:40	8:40	11:22	13:22	13:22	15:22	17:22	17:22	19:34
Jam Jerrup	6:23	6:23	7:38	8:44	8:44	11:26	13:26	13:26	15:26	17:26	17:26	19:38

Source: V/Line

Table 3 Weekday V/Line coaches between Melbourne and Inverloch/Cowes

Melbourne to Cowes								
Jam Jerrup	7:35	10:29	12:17	14:29	16:17	18:42	20:27	22:27
The Gurdies	7:39	10:33	12:21	14:33	16:21	18:46	20:31	22:31
Pioneer Bay	7:41	10:35	12:23	14:35	16:23	18:48	20:33	22:33
Deep Creek Street	-	10:37	-	14:37	-	18:50	-	22:35
Grantville	7:47	10:41	12:29	14:41	16:29	18:54	20:39	22:29
Queensferry Road	7:49	10:43	12:31	14:43	16:31	18:56	20:41	22:41
Corinella Turn Off	7:51	10:45	12:33	14:45	16:33	18:58	20:43	22:43
Bass	7:58	10:52	12:40	14:52	16:40	19:05	20:50	22:50
Anderson arr	8:04	10:58	12:46	14:58	16:46	19:11	-	-
Anderson dep	8:09	10:58	12:46	14:58	16:46	19:11	20:56	22:56
Kilcunda	-	11:02	-	15:02	-	19:15	-	23:00
Dalyston	-	11:07	-	15:07	-	19:20	-	23:05
Dudley	-	11:12	-	15:12	-	19:25	-	23:10
Wonthaggi North	-	11:13	-	15:13	-	19:26	-	23:11
Wonthaggi arr	-	11:15	-	15:15	-	19:28	-	23:13
Wonthaggi dep	-	11:17	-	15:17	-	19:30	-	23:15
Cape Paterson	-	-	-	-	-	19:38	-	23:23
Inverloch (2)	-	11:31	-	15:31	-	19:56	-	23:41
Inverloch (1)	-	11:32	-	15:31	-	19:57	-	23:42
San Remo	8:19	-	12:56	-	16:56	-	21:06	-
Newhaven turnoff	8:24	-	12:58	-	16:58	-	21:11	-
Cape Woolamai	8:26	-	13:03	-	17:00	-	21:13	-
Surf Beach	8:29	-	13:06	-	17:03	-	21:16	-
Rhyll turnoff	8:30	-	13:07	-	17:04	-	21:17	-
Sunset Strip	8:33	-	13:10	-	17:08	-	21:20	-
Smiths Beach	8:34	-	13:11	-	17:09	-	21:21	-
Wimbledon Heights	8:38	-	13:15	-	17:13	-	21:25	-
Cowes (2)	8:41	-	13:18	-	17:18	-	21:28	-
Cowes Transit Centre	8:46	-	13:23	-	17:23	-	21:33	-

Source: V/Line

While public transport provides a core service to residents, the connections to and from the public transport stop are equally as important. Box 1 offers an insight into first and last mile segments of a trip.

First and last mile

The 'first mile' and 'last mile' are the short but crucial segments at the start and end of a journey. These segments often present challenges in terms of accessibility, distance, and congestion. Some towns have developed strategies for increasing the efficiency of the first and last mile. These actions can include:

- Improve walking and cycling infrastructure to public transport nodes.
- Introduce micro-mobility options like e-bikes and shared micromobility schemes.
- Ensure seamless integration between different modes of transport and coordination of timetables to reduce interchange delay.
- Bicycle racks on buses.
- Use technology for real-time information.

Addressing first and last mile connectivity enhances accessibility, encourages the use of public transport, and improves overall transport efficiency, contributing to a better quality of life for residents.

Box 1 First and last mile connections

4.2.3 Western Port Ferries

Western Port Ferries operates a passenger ferry service between Stony Point, French Island, and Cowes. Operating 365 days of the year, the ferry service is an important connection to the mainland for French Island residents and is an extremely popular route for visitors to the area. The ferry makes three return trips on weekdays, four trips on Saturdays, and five trips on Sundays, as shown in Table 4. Ticket prices of Western Port Ferries are shown in Table 5.

Table 4 Timetable of Western Port Ferries

Depart Stony Point	Depart French Island	Depart Phillip Island
Monday to Friday		
7:10am	7:30am	8:35am
7:50am	9:00am	-
10:00am	10:20am	-
11:50am	12:10pm	11:10am*
2:35pm	3:35pm	1:00pm**
4:15pm	4:35pm	-
5:15pm	6:30pm	3:20pm
7:20pm	7:30pm	6:00pm
Saturday		
7:40am	9:00am	8:30am
10:00am	11:20am	10:50am
12:00pm	12:20pm	-
2:00pm	3:10pm	2:45pm
3:40pm	4:00pm	-
4:30pm	5:55pm	5:25pm
6:15pm	6:30pm	-
Sunday		
8:15am	9:30am	9:00am
10:15am	11:35am	11:05am
12:00pm	1:05pm	12:40pm
2:20pm	3:35pm	3:05pm
4:05pm	4:25pm	-
4:45pm	6:00pm	5:35pm
6:15pm	6:30pm	-

Source: Western Port Ferries

* Only to Stony Point, not French Island

** Extra service running 27 December - 31 January only

Table 5 Fare structure of Western Port Ferries

	One Way	Return
Adult	$15.50	$31
Pension/Concession	$9.50	$19.00
Child (5-16)	$7.10	$14.20
Child (17-18)	$7.10	$14.20
Bicycles	$7.10	$9.40
Oversized Bicycles (trikes, tandems, bikes with trailers etc.)	$7.50	$15
Infant (Under 5)	Free of charge	
Seniors Card Holders	Free of charge (weekends and public holidays)	

Source: Western Port Ferries

4.2.4 Bus Patronage

Figure 24 shows the bus patronage by SA1 – or where people who catch the bus *live*. It is weighted by area to provide a *bus commuter by square kilometre* figure. Overlaid is the 2024 bus network and bus stops. Note that these figures only show *journeys to work* and do not include education, shopping, or other trip types. This shows that for the majority of Bass Coast, residents do not use a bus to commute to work. There are small pockets located in Sunset Strip, Dalyston, and Inverloch that have higher origin bus patronage than the rest of Bass Coast.

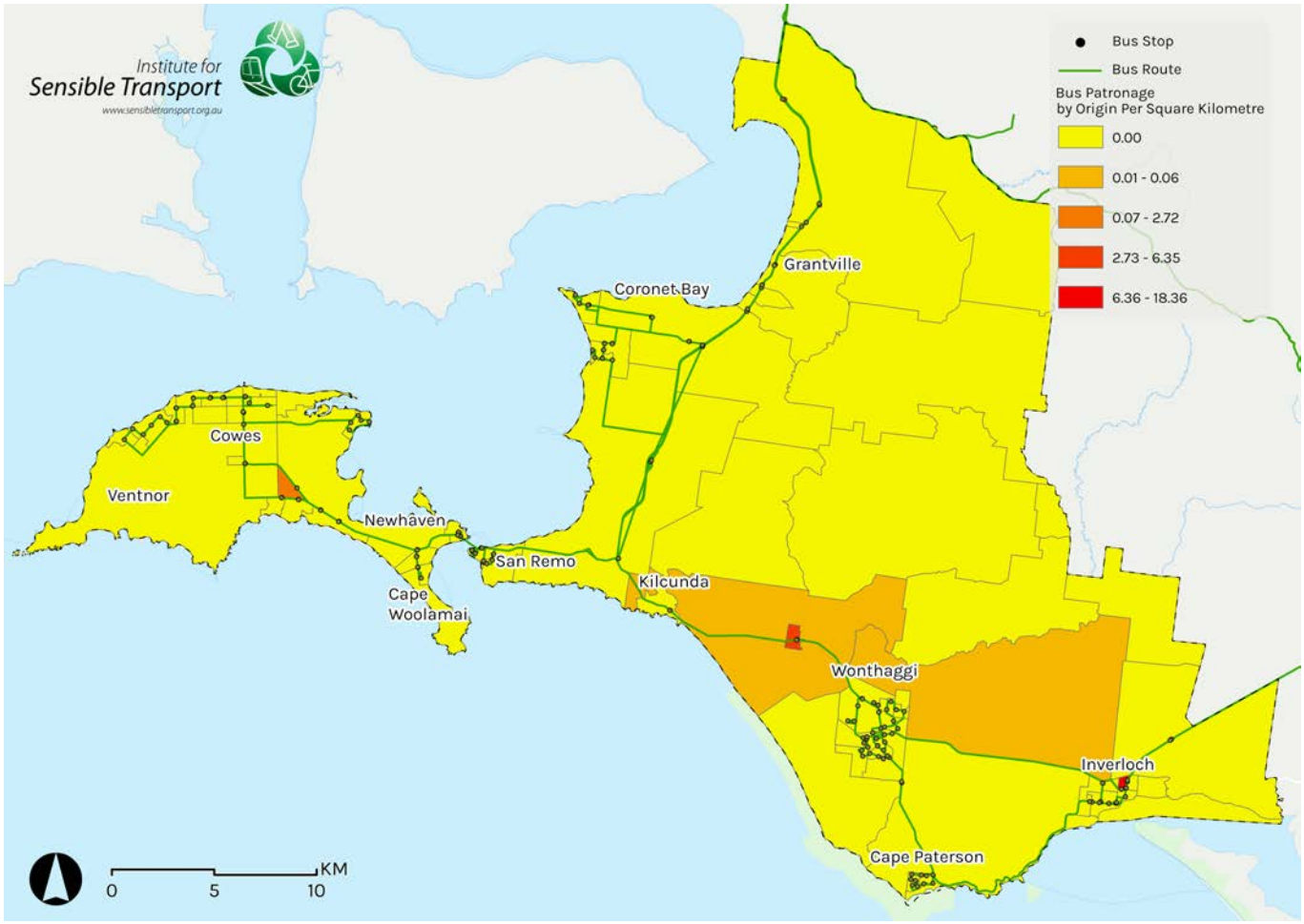


Figure 24 Bus Patronage by Origin

Source: ABS Census

Figure 25 below shows the bus patronage by *destination* – using Destination Zone data from the ABS Census. Again, it is weighted by people per square kilometre and only includes journey to work data. San Remo, Inverloch, Wonthaggi and Cape Woolamai had the highest destination patronage in Bass Coast

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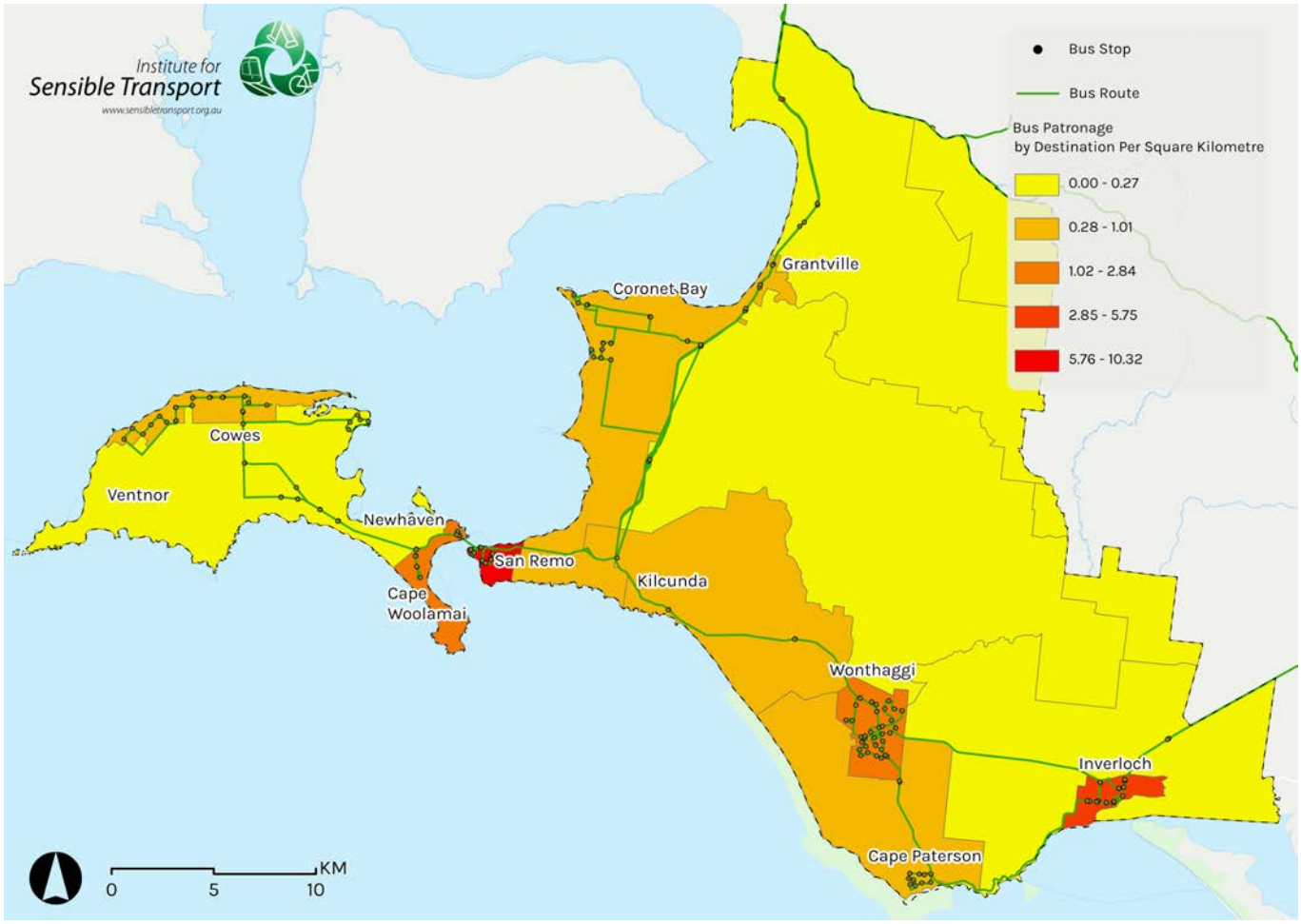


Figure 25 Bus Patronage by Destination

Source: ABS Census

4.2.5 Public Transport Accessibility Index

A *Public Transport Accessibility Index* was produced for Bass Coast, as shown in Figure 26 . Analysing both town bus and V/Line coach access in Bass Coast, it accounts for the number of services and average daily (weekday) frequency at each public transport stop.

To account for ease of access, areas within a closer distance to stops were weighted more favourably. For bus and coach stops, this was done at intervals of 400, 600 and 800 metres distance. The distances are broadly accepted distances that people will generally walk for a bus service.

The accessibility values for town buses and V/Line coaches were combined and Figure 26 shows the resultant Index for the whole municipality. The Index is provided as a decile where the darker colours indicate greater access. In Bass Coast, Wonthaggi along with Cowes and Inverloch were the highest scoring areas in the Index.

The *Public Transport Accessibility Index* results are complementary to the observed patronage data discussed earlier. Whilst buses accounted for less than 1% of work trips in Bass Coast, use of public transport is generally higher in areas which the Index shows higher accessibility. Both sections highlight Inverloch, Wonthaggi and Cowes as having higher *accessibility* to public transport and *use* of public transport. Buses in Cape Paterson, Coronet Bay, and Grantville serve a residential population that could benefit from improved access.

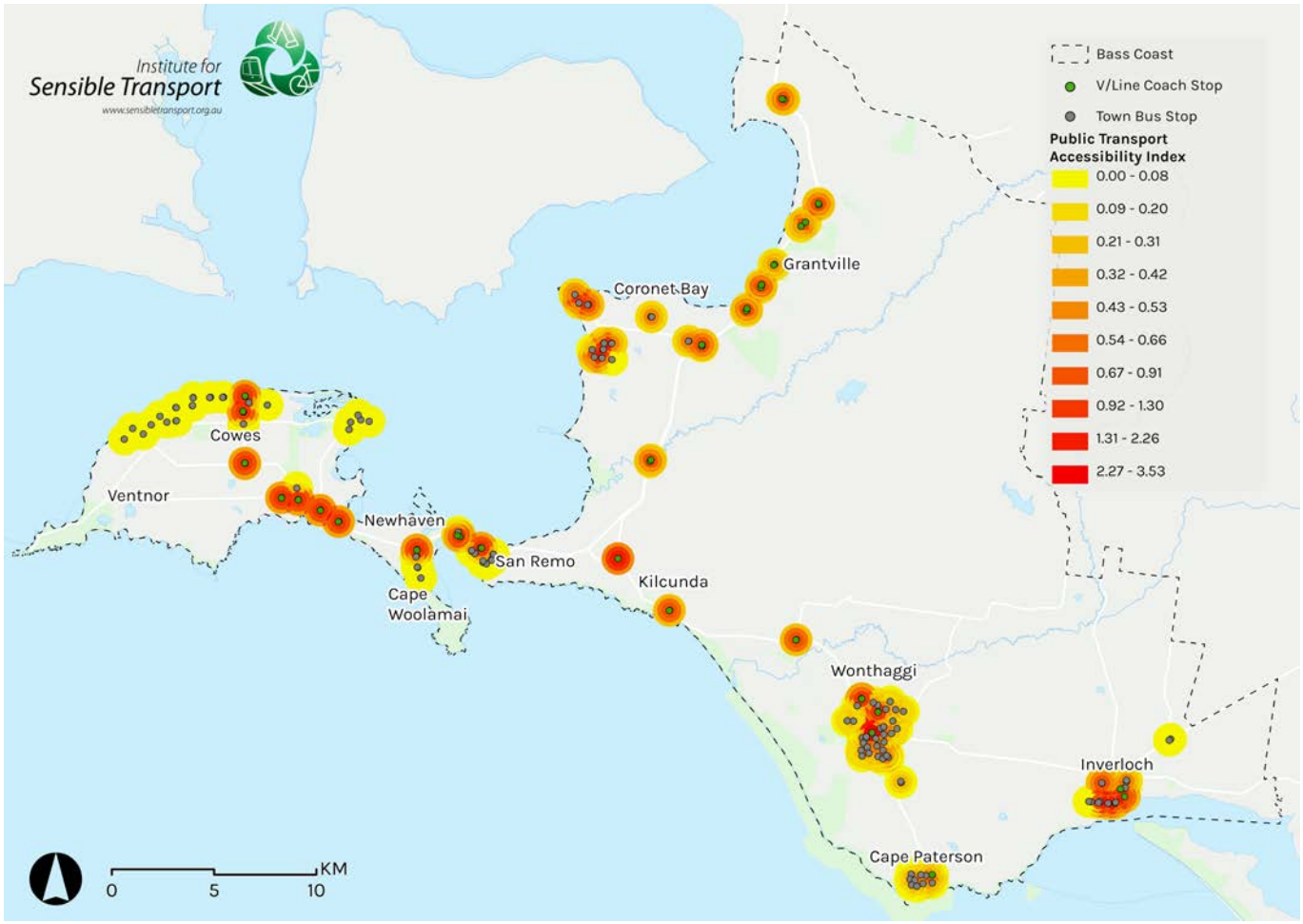


Figure 26 Public Transport Accessibility Index for Bass Coast

Source: GTFS, PTV

4.2.6 Travel time comparison

Figure 27 provides a snapshot of how different modes compare, on a *cost* and *time* basis, for some common trip types originating in Bass Coast. This highlights that the car is generally around twice as quick as public transport, but more expensive. The car cost calculations only including petrol costs, rather than the costs of car ownership. Car trips are likely to be the most attractive due to the much shorter trip duration and the limited frequency of public transport, where trips will have to be planned according to the bus schedule.

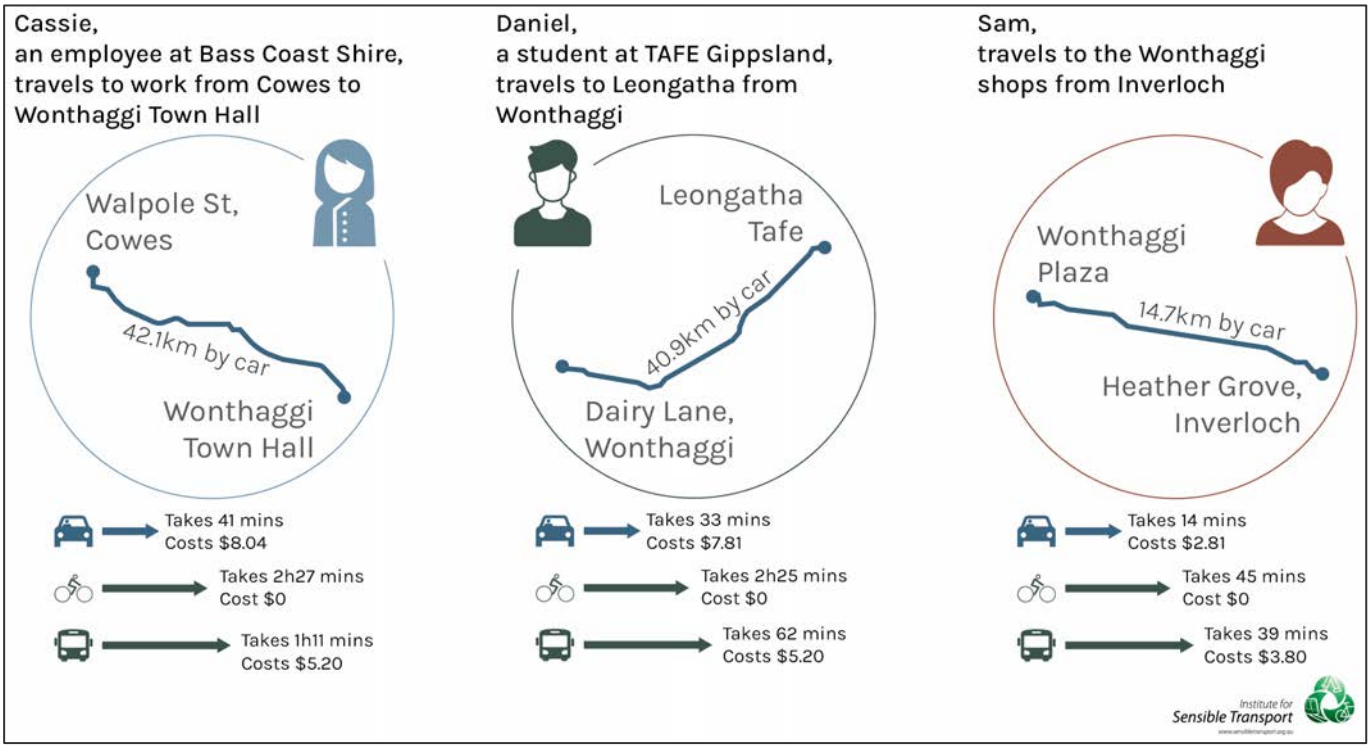


Figure 27 Travel time comparison, multiple modes

Source: Institute for Sensible Transport, based on Google Maps

4.3 Cycling

The cycling network in Bass Coast is made up of on-road touring routes and off-road trails as shown in Figure 29. All the major townships are connected by the touring routes. However, it is important to recognise that the touring routes shown in Figure 29 shows on-road cycle lanes. This infrastructure type is generally dedicated bicycle lanes separated by paint and lack the *vertical protection* required to meet most people's minimum safety standards. Additionally, many of the on-road bike lanes are on rural roads with soft edges, creating additional safety hazards for cyclists. An example of this can be seen in Figure 28, where the painted on-road bicycle lane on Back Beach Road has soft edges on both sides of the road.

Bike infrastructure is fragmented and what does exist often falls short of what most people require before considering cycling as an attractive option.



Figure 28 Back Beach Road, Phillip Island bike lane

Source: Google



Figure 29 Existing cycling infrastructure

Source: Department of Transport and Planning

The type of bicycle infrastructure must be appropriate to the function and design of the road in which it is located. Figure 30 presents work completed for Austroads, indicating the most suitable type of infrastructure based on the *speed* and *volume* of motor vehicles. In later stages of the ITS development, this approach will be used to inform network upgrade recommendations.

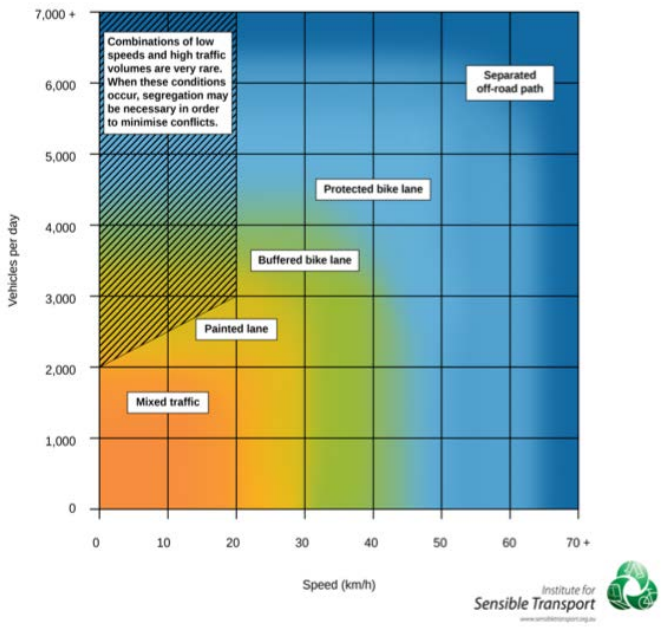


Figure 30 Bicycle infrastructure design based on the speed and volume of motor vehicle traffic

Source: Institute for Sensible Transport

Figure 31 captures confidence levels among adults that *do not ride*, based on the level of separation with motor vehicles. It outlines that adults are only likely to feel confident on fully protected bike lanes at both midblock (83% confidence) and intersections (73% confidence).

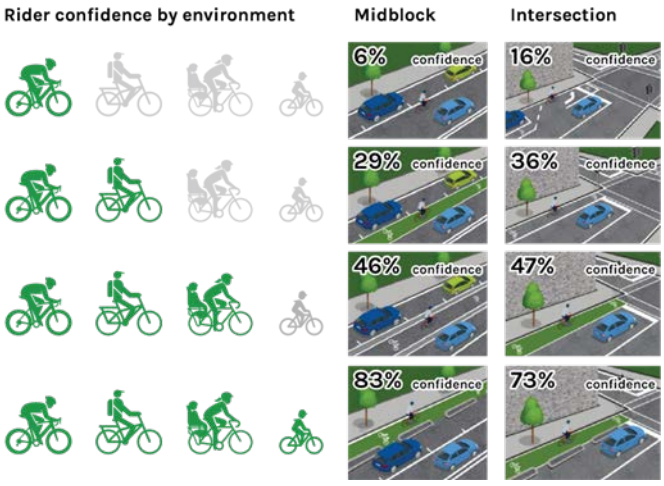


Figure 31 Riding confidence - various infrastructure types

Source: CDM Research and ADSF Research for City of Melbourne (2017)

Finally, there are said to be four main types of cyclists, as highlighted in Figure 32. It is important to recognise that someone might be enthused and confident for some rides (e.g. riding alone) but interested and concerned for others (e.g. riding with young children).

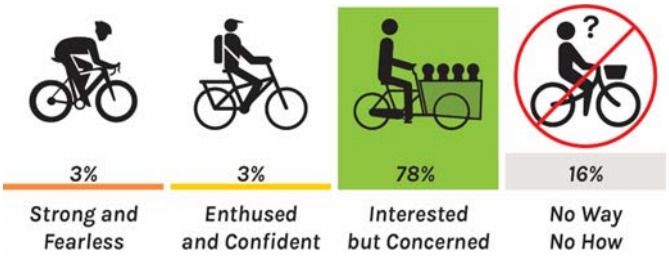


Figure 32 Four types of cyclists

Source: Geller, 1994

4.3.1 Bike Use Propensity Index

High-quality bicycle infrastructure can be expensive and government budgets are limited. It is therefore important to determine the spatial variation in the *latent demand* for cycling. Through peer-reviewed research, a number of Census collected variables have been isolated, in order to provide a heat map of latent demand for cycling, known as the *Bike Use Propensity Index*.

The Index is based on seven Census collected variables that are statistically significant predictors of bike use, as shown in Figure 33. In sum, these maps provide a clear illustration of the spatial variation in latent demand for cycling in Bass Coast.

The Index can help guide areas for future investment in cycling infrastructure by identifying the areas where the greatest uptake in cycling is likely to occur. Actions focusing on high-propensity areas are likely to include infrastructure projects but should also consider behaviour change initiatives and other support programs to encourage greater cycling uptake. This exercise is particularly useful for Bass Coast, which has a very limited collection of high quality bicycle infrastructure.

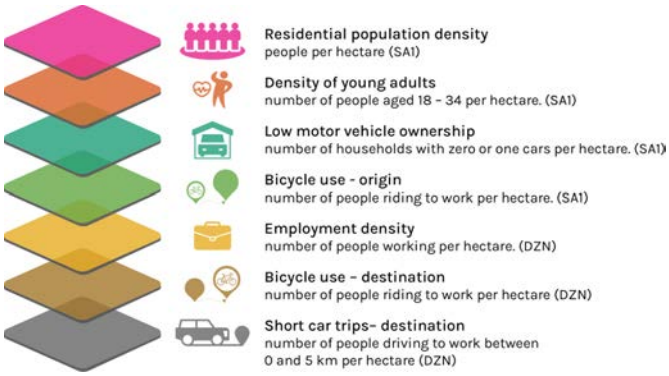


Figure 33 Variables for Bike us Propensity Index

Source: Institute for Sensible Transport using ABS Census data

Methodology

The *Bike Use Propensity Index* combines seven variables, all of which are collected as part of the ABS Census. The statistical basis for the Index was developed through the collection of data on riding behaviour and demographic factors. This data was analysed using binary logistic regression in SPSS and STATA. The results, published in *Transportation Research Part A* revealed that there are some statistically significant factors for propensity to cycle.

The *Bike Use Propensity Index* has been designed to show the variation in the relative propensity to cycle, at the highest possible level of spatial detail.

The Index contains more residential-oriented variables than it does employment, or destination, variables. To ensure that employment-rich areas that have comparatively lower residential populations are not undervalued, the employment variables in the index are weighted the same as residential factors. Doing this helps ensure important bike destinations, such as employment hubs, are adequately considered in the Index.

Geographic areas are given an absolute score, of between 0 and approximately 5 for each of the variables. These scores are then averaged to reveal an overall bike use propensity score of between 0 and approximately 5. A score close to 0 indicates a low propensity to cycle, while a score of 5 indicates a high propensity to cycle. The mapped values are aggregates of the attributes' scores.

SA1s that receive very high Index scores will have scored highly across all the variables included in the Index. In almost all cases, an SA1 that scores above 4.5 will have been highest scoring in most variables. The maps used in this report have been colour-scaled to be comparable within the study area. However, the score is relative to all other areas in Australia (for example, the Melbourne and Sydney CBDs have areas with scores above 4.5).

Results

The *Bike Use Propensity Index*, for all seven factors, for Bass Coast, is shown in Figure 34. The suburbs with the highest propensity for cycling are Wonthaggi, Inverloch, Cowes, and Cape Woolamai.

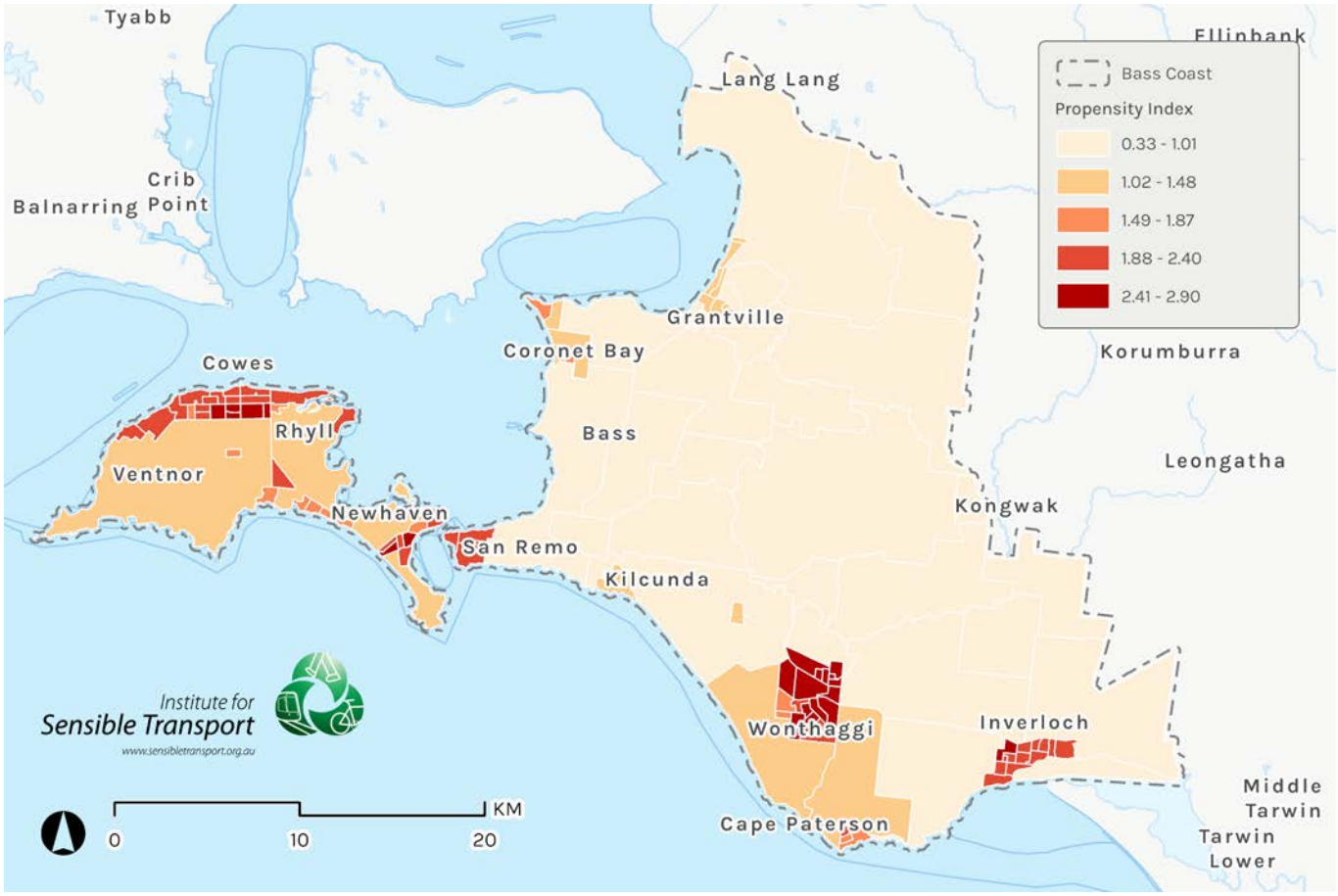


Figure 34 Bike Use Propensity Index – Overall

Source: Institute for Sensible Transport, based on ABS Census Data

Figure 35 shows the *origin score* for the *Index*. The value indicates the potential for people to consider bike riding for transport trips, based on demographic and transport variables. Residential parts of Wonthaggi, Inverloch, Cowes, Cape Woolamai, and Cape Peterson were among the highest scoring areas.

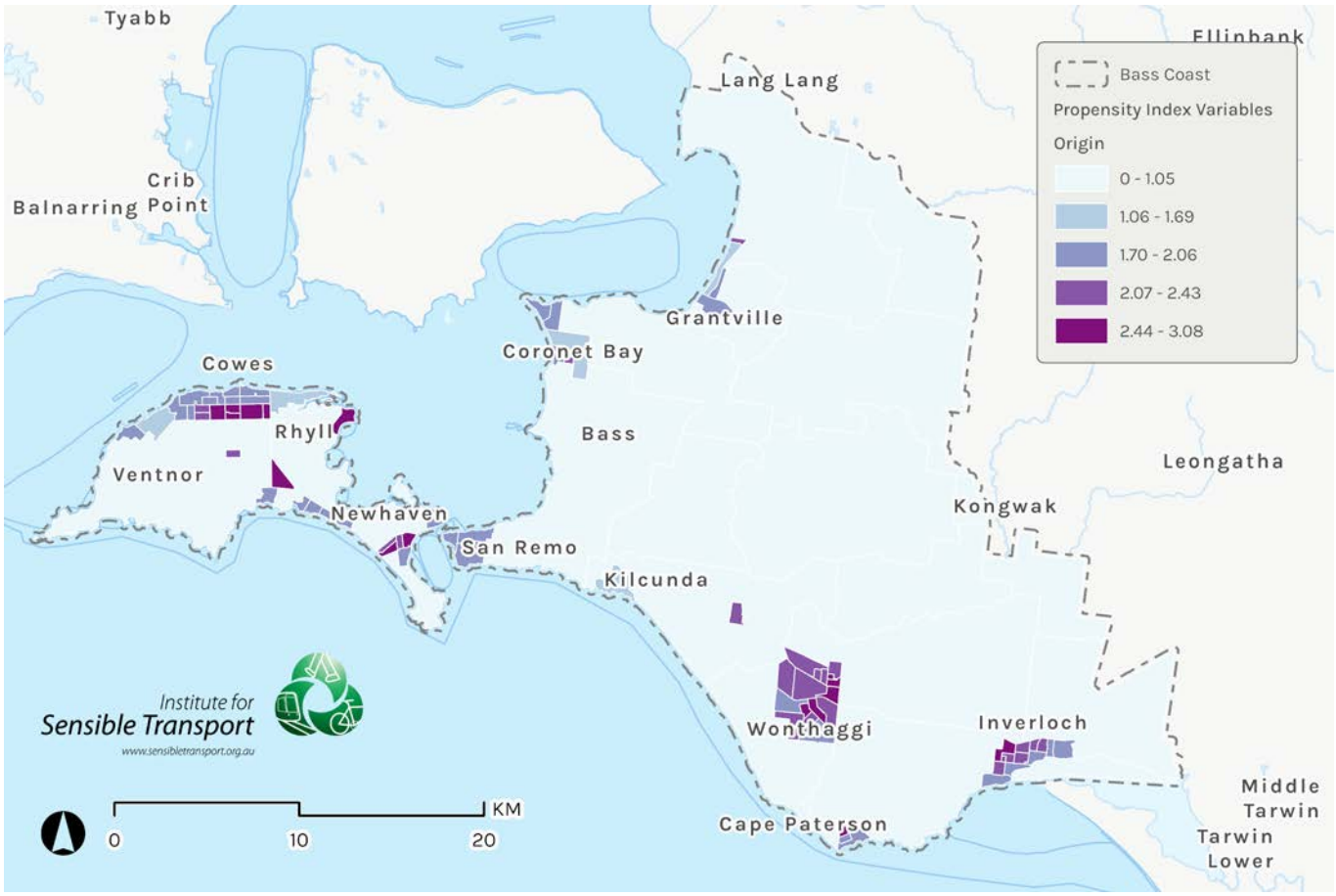


Figure 35 Bike Use Propensity Index – Origin

Source: Based on ABS Census Data

Figure 36 shows the *destination scores* of the *Index*. The value indicates the potential for people to consider bike riding for transport trips, based on demographic and transport variables at the destination location. The highest scoring destinations are in the areas located in the southern and eastern suburbs, including Cowes, Cape Woolamai, San Remo, Wonthaggi and Inverloch.

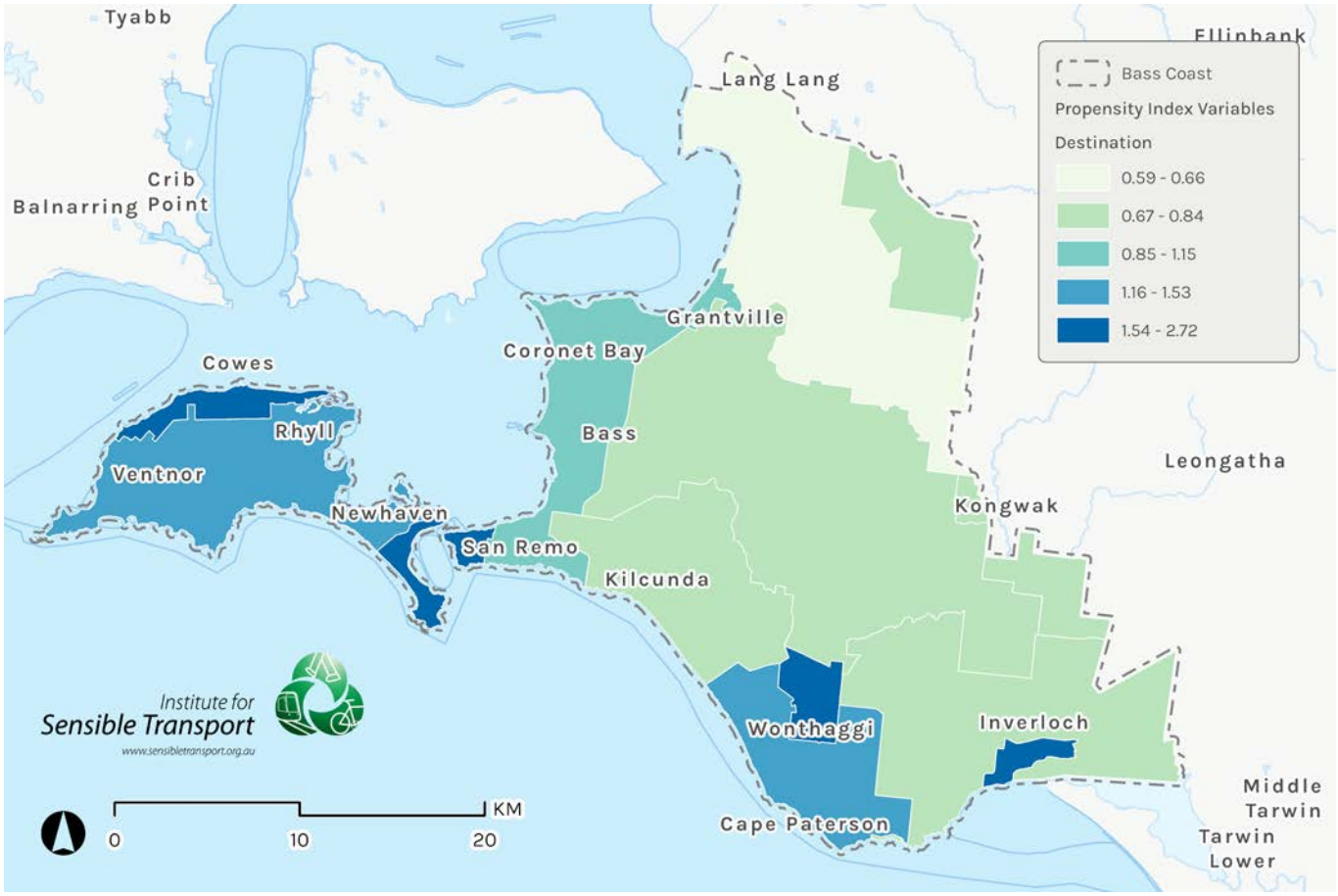


Figure 36 Bike Use Propensity Index - Destination

Source: Based on ABS Census Data

Implications

The *Bike Use Propensity Index* highlights how Bass Coast can make prudent decisions when investing in bicycle infrastructure, focusing on maximising people's opportunity to cycle. The bicycle infrastructure opportunities will include how different bike infrastructure typologies (e.g., painted bike lane, separated bike lane) can be used to maximise the appeal of cycling, especially in areas of Bass Coast with higher latent demand. Figure 37 shows the existing Principal Bicycle Network layered on top of the Index.

Based on the results shown in this section, there are several areas of high latent demand for cycling. These areas should be a focus for future cycling infrastructure investments.

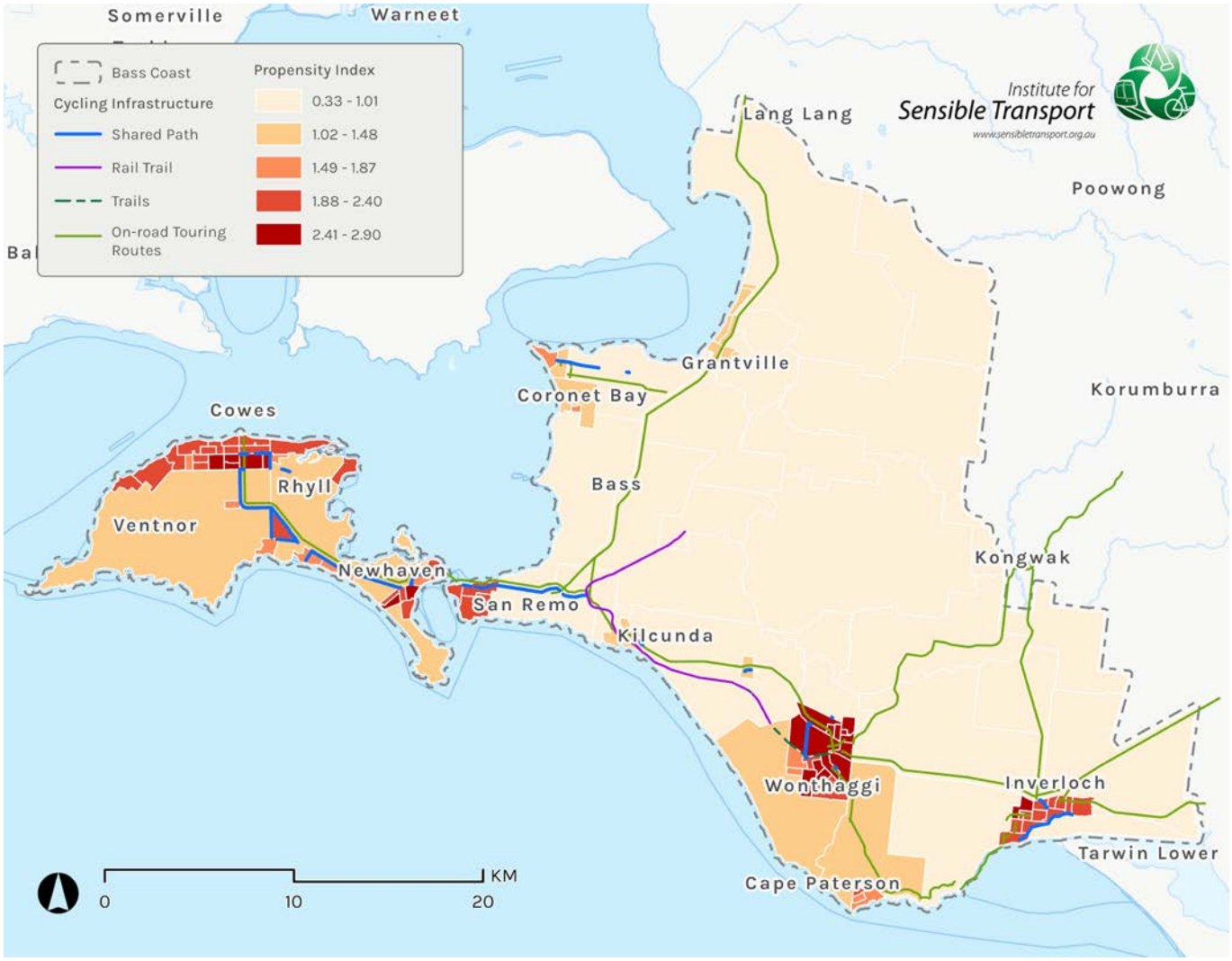


Figure 37 Bike Use Propensity Index and existing infrastructure

Source: Based on ABS Census and Department of Transport and Planning Data

4.4 Walking

Footpaths are an essential component of the transport network and facilitates the most fundamental transport mode. Regardless of people's mode of transport, walking will generally form an important link at the beginning and end of any trip. Figure 38 shows that in Bass Coast, the footpath network is mostly concentrated around the main population and activity centres.

Aside from the main activity centres of each township, most local residential streets in Bass Coast have a footpath on one side of the street, or none at all. This means that most residents in Bass Coast are required to walk on the road or cross the road to access footpath connections. This may deter residents from walking to their destination due to unsafe or unattractive walking environments. This is especially pertinent for vulnerable road users, such as children or those with mobility issues.

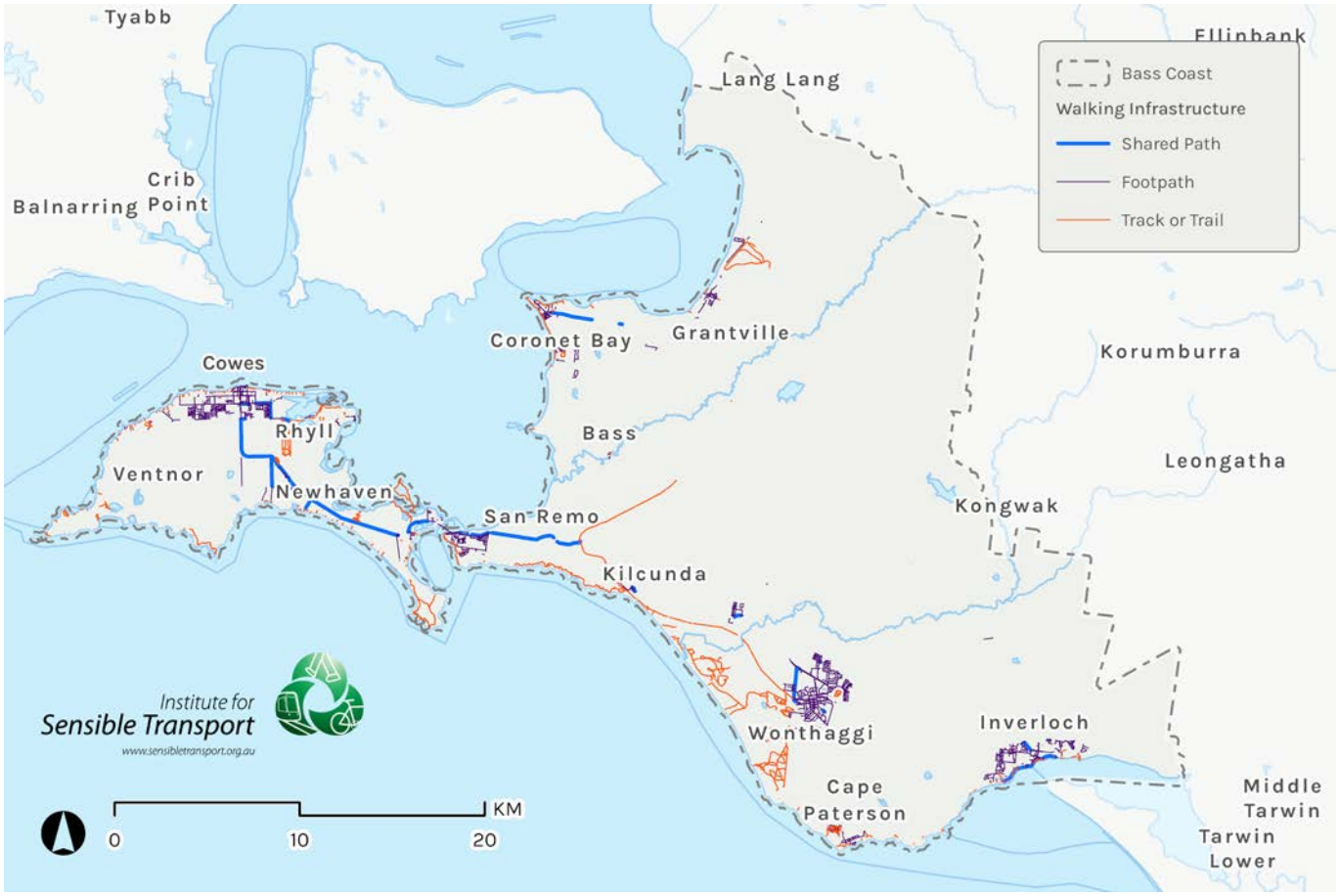


Figure 38 Footpath network in Bass Coast

Source: Bass Coast Shire

In emerging residential areas such as San Remo and Wonthaggi, footpaths are being constructed alongside new developments. Despite typically being present on only one side of the road in these growth areas, considerations have been made regarding modal filtering and facilitating active transport connections. Several instances of modal filtering, raised threshold crossings, and shared path cut-through connections exist between local streets. These connections between cul-de-sacs establish efficient and direct routes for pedestrians and cyclists, facilitating easy navigation without the need for detours. Creating more direct routes for pedestrians and people on bikes will help to increase the competitive advantage of active travel.

At a high level, analysis of the footpath network in Bass Coast reveals a range of opportunities to improve the local walking network. Enhancing connectivity, accessibility, and safety for pedestrians includes opportunities to:

- Implement high-quality, prioritised crossing points located in areas of high pedestrian demand.
- Upgrade existing informal surfaces and desire lines to ensure safe and accessible pedestrian routes.
- Expand the network of cut-through connections and modal filtering measures to create more direct routes for walking and cycling.
- Ensure there are appropriate and high-quality footpath connections to all bus stops within Bass Coast.

For the ITS, this section highlights the need for a comprehensive network of footpaths and shared paths. It is also important to understand that people's ability to walk is not simply a function of the footpath network. The number of *destinations* within a close walk of people's home is also a central determinant of walking frequency. Ensuring population growth occurs in established areas that are already close to shops, services and transport will reduce the dependence people have on motor vehicles. This is one of the most impactful measures a Council can take to increase daily walking.

The following sections offer a more detailed focus on the core townships of Wonthaggi, Cowes, Inverloch, Grantville, and San Remo/Newhaven, as these areas are likely to represent walking hot spots in terms of demand and safety issues. It should be noted that high-level recommendations for each township's connectivity and safety are provided at this stage. Detailed prioritisation and strategies for further investment will be developed in the next stages of this project.

4.4.1 Wonthaggi

The footpath network, pram ramps and the activity centre of Wonthaggi are shown in Figure 39. There are various opportunities to improve the local pedestrian network in Wonthaggi. These opportunities include:

- Install missing north-south footpath links on the eastern side of McKenzie Street between Graham Street and Korumburra Road.
- Install missing east-west footpath links on the northern side of Korumburra Road, between Cyclone Street to Mortimer Street.
- Install missing north-south footpaths links on the eastern side of the Bass Highway, between Bent Street to Baillieu Street East.
- Extend existing footpath on the eastern side of Quarry Street to Bent Street.
- Implement a walking path along the western edge of the Graham Street off-street car park (adjacent to the Wonthaggi Workmen's Club) aligning with the existing wombat crossing.
- Formalise existing east-west cut-through connections with footpaths between Vicars Avenue, Toorak Street, and N View Drive, as some paths currently lack connection to footpaths or roads.
- Ensure appropriate footpath connections to all bus stops – including but not limited to: Hagelthorn Street, Matthew Street, Merrin Crescent and McKenzie Street.

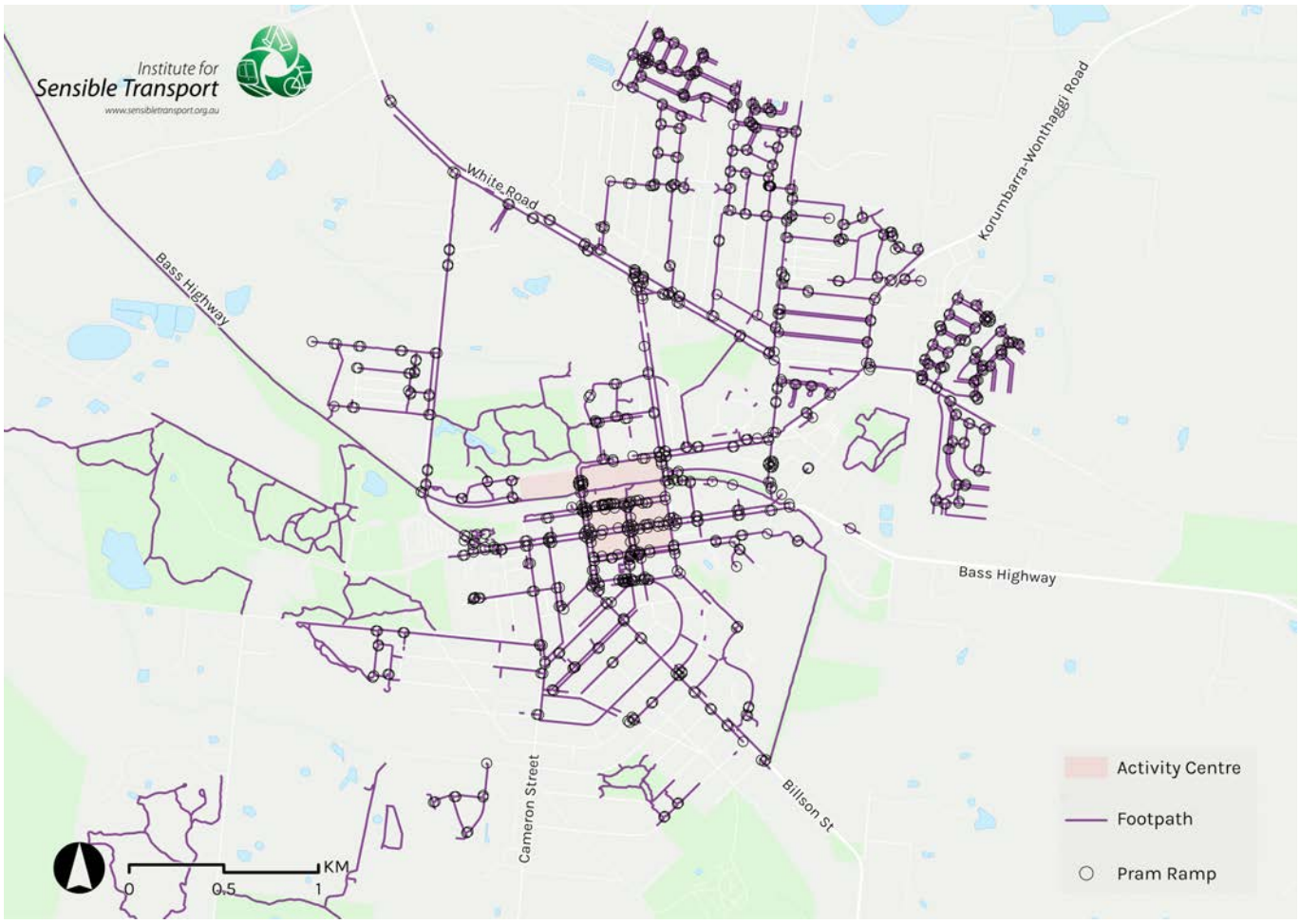


Figure 39 Wonthaggi footpath network

Source: Bass Coast Shire

4.4.2 Cowes

The footpath network, pram ramps and the activity centre of Cowes are shown in Figure 40. There are various opportunities to improve the local pedestrian network in Cowes. These opportunities include but are not limited to:

- Install missing east-west footpath links on Church Street, east of Norman Drive to bridge the gaps and connect tourism locations such as Anchor Belle Holiday Park, The Sea Pavilions, and NRMA Holiday Park to the activity centre of Cowes.
- Install footpaths along St George Road to leverage existing cut-throughs and modal filtering on Roderick Close and Irving Road, ultimately establishing a connection with Thompson Avenue and subsequently the activity centre of Cowes.
- Install a footpath on the eastern side of Bass Avenue, a key street within the activity centre of Cowes.
- Improve the gravel sections of the path along the northern side of the foreshore to connect with the existing path on The Esplanade and meet DDA compliant.
- Investigate missing north-south foot path links from Red Rocks Road from Ventnor Road to Settlement Road. This can improve connectivity for residents in Ventnor by integrating them into the existing footpath network.

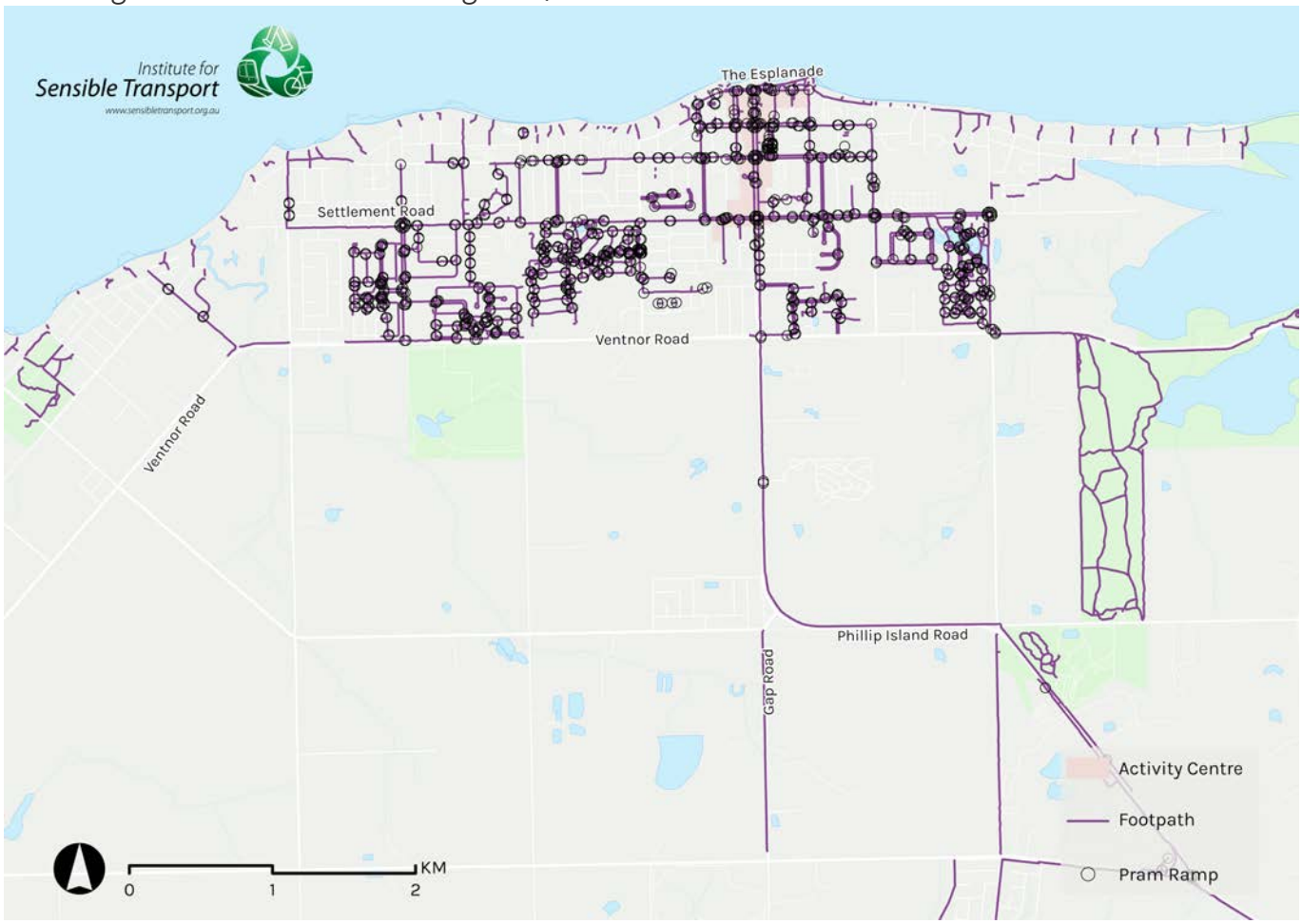


Figure 40 Cowes Footpath network

Source: Bass Coast Shire

4.4.3 Inverloch

The footpath network, pram ramps and the activity centre of Inverloch are shown in Figure 41. There are various opportunities to improve the local pedestrian network in Inverloch. These opportunities include but are not limited to:

- Install missing north-south footpath links on the western side of Reilly Street, a key street within the activity centre of Inverloch.
- Extend the existing east-west footpaths along Wilson Avenue, Stewart Avenue, and Gordon Avenue to connect with Sandy Mount Avenue, as they currently do not run the entire length of each street.
- Install a footpath along Sandy Mount Avenue to facilitate connections to the existing footpath network in the south of Inverloch, including St Kilda Street, Venus Street, and Hillside Avenue.
- Ensure footpath connections to all bus stops – including but not limited to: Sandy Mount Avenue, Venus Street and Williams Street.

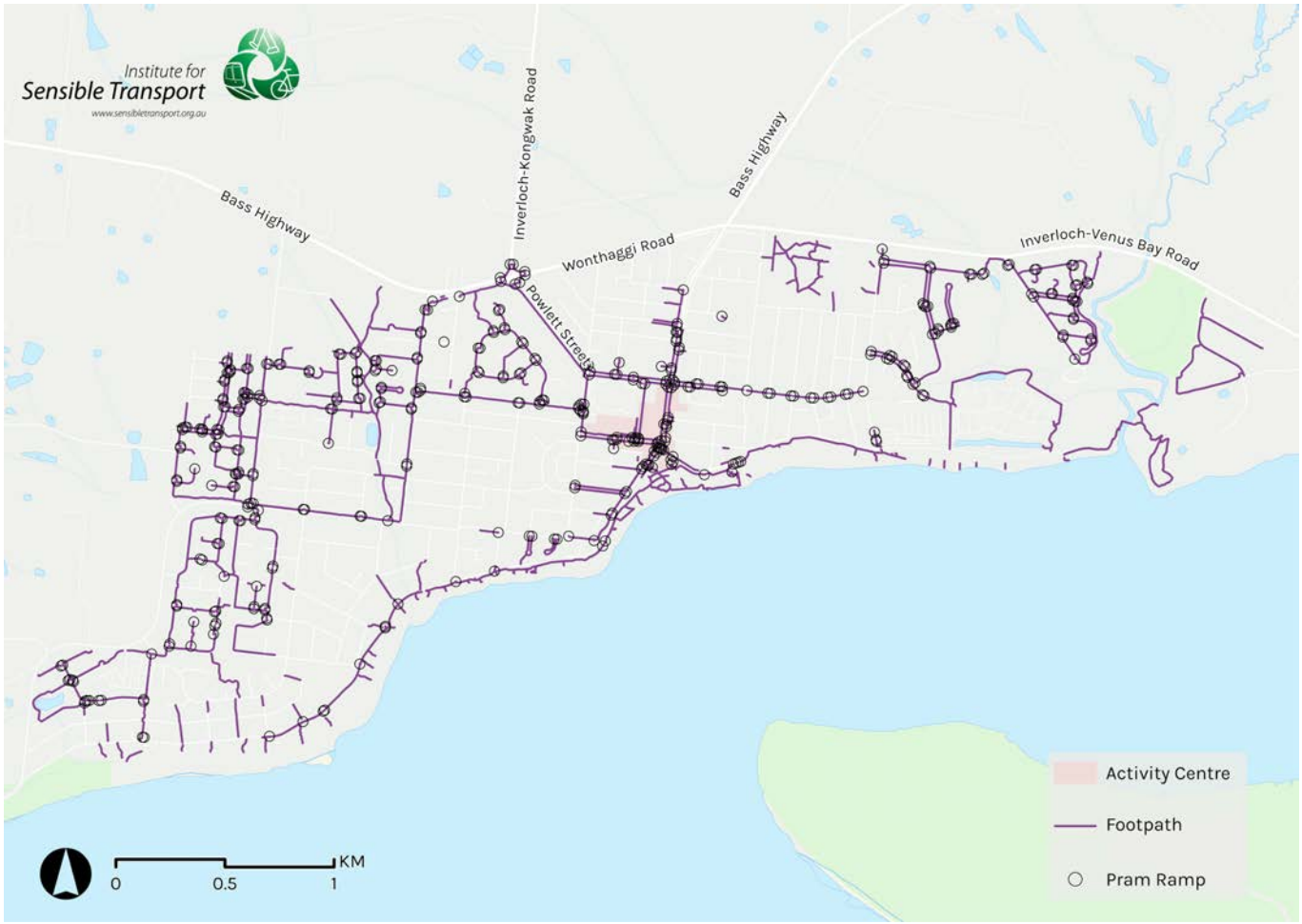


Figure 41 Inverloch Footpath network

Source: Bass Coast Shire

4.4.4 Grantville

The footpath network, pram ramps and the activity centre of Grantville is shown in Figure 42. There are various opportunities to improve the local pedestrian network in Grantville. These opportunities include but are not limited to:

- Install missing east-west footpath connection on the eastern end of Pier Road to the Grantville Foreshore Reserve, public toilets and pier.
- Install missing footpath links on the northern side of Grantville-Glen Alvie Road to provide east-west connections to the activity centre of Grantville via Portview Avenue, Sunset Court and Cairo Place.
- Install a footpath on the eastern side of the Bass Highway to establish a connection between the existing footpath and the residential areas leading to the town centre via Brazier Street.
- Formalise and extend the foreshore footpath northward along the Grantville foreshore, connecting it to the Grantville Hall and Recreation Reserve.
- Investigate an additional mid-block crossing on the Bass Highway near Portview Avenue, to provide safe east-west connections between the activity centre and the foreshore.



Figure 42 Grantville Footpath network

Source: Bass Coast Shire

4.4.5 San Remo/Newhaven

The footpath network, pram ramps and the activity centre of San Remo are shown in Figure 43. There are various opportunities to improve the local pedestrian network in San Remo and Newhaven. These opportunities include but are not limited to:

- Formalise shared footpath along San Remo Foreshore to Phillip Island Road.
- Install missing north-south footpath links from Shetland Heights Road to Phillip Island Road, via The Broadway and San Remo Parade, and Panorama Drive.
- Install missing east-west links from Panorama Drive to Elsa Terrace, via Bonwick Avenue and Anderson Street.
- Investigate missing connections from Marine Parade to Lions Park via Woolamai Grove, Bergin Avenue, and Davis Point Road.
- Investigate missing connections to Newhaven Primary School/Kindergarten on School Avenue, Cleeland Street and Macliff Road.
- Ensure appropriate footpath connections to all bus stops – including but not limited to: Cape Woolamai Grove, Park Road, Back Beach Road, Shetland Heights Road, and Panorama Drive.
- Improve sections of footpath between the Westernport Hotel on the corner of Marine Parade and Woolamai Grove which has been impacted by tree roots.
- Install raised wombat crossings and pedestrian islands at key destinations along Marine Parade.



Figure 43 San Remo Footpath network

Source: Bass Coast Shire

4.5 Road network

The hierarchy of the road network in Bass Coast is shown in Figure 44. According to the *Road Management Plan 2022*, Council manages a public road network of 925km and a pathways network of 276km. The Bass Highway serves as the main connection to and from Bass Coast. There are also several rural arterial roads that provide connections to key townships. Some of these roads include Korumburra-Wonthaggi Road, Inverloch-Kongwak Road, Corinella Road and Back Beach Road. Additionally, there is a bridge that connects Phillip Island to the mainland via Phillip Island Road.

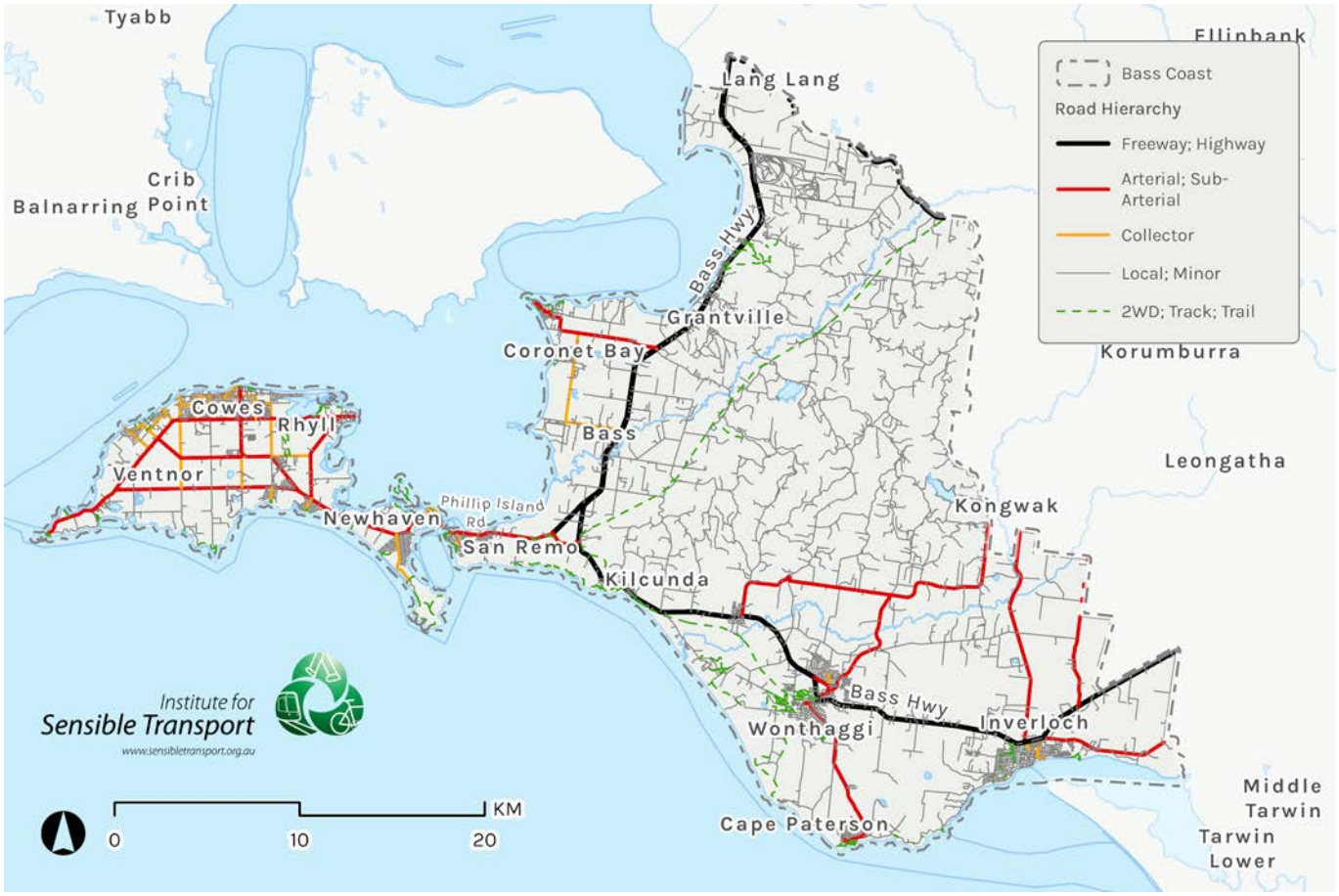


Figure 44 Road network of Bass Coast, by classification

Source: Department of Transport and Planning

4.5.1 Speed

The posted speed limit for every street in the Bass Coast Shire, based on Department of Transport and Planning data, is shown in Figure 45. Of note, more than half of roads in Bass Coast are signed between 90-100km/h, with pockets of 50km/h around the urban localities. It should be noted there is an opportunity to reduce the speed limit to 80 km/h on rural roads based on the condition of the roads and crashes. There are small sections of local roads near the main townships with a speed limit of 40km/h or under. Some schools do not have lowered speed zones or safe crossings on adjoining roads.

The new Bass Coast ITS represents an opportunity to align speed limits with the *Safe Systems* approach to road safety and minimise the potential and severity of injury from crashes. In the last decade many local governments have begun to lower their default speed limit to 40km/h in residential streets and create shared zones with even safer speeds.

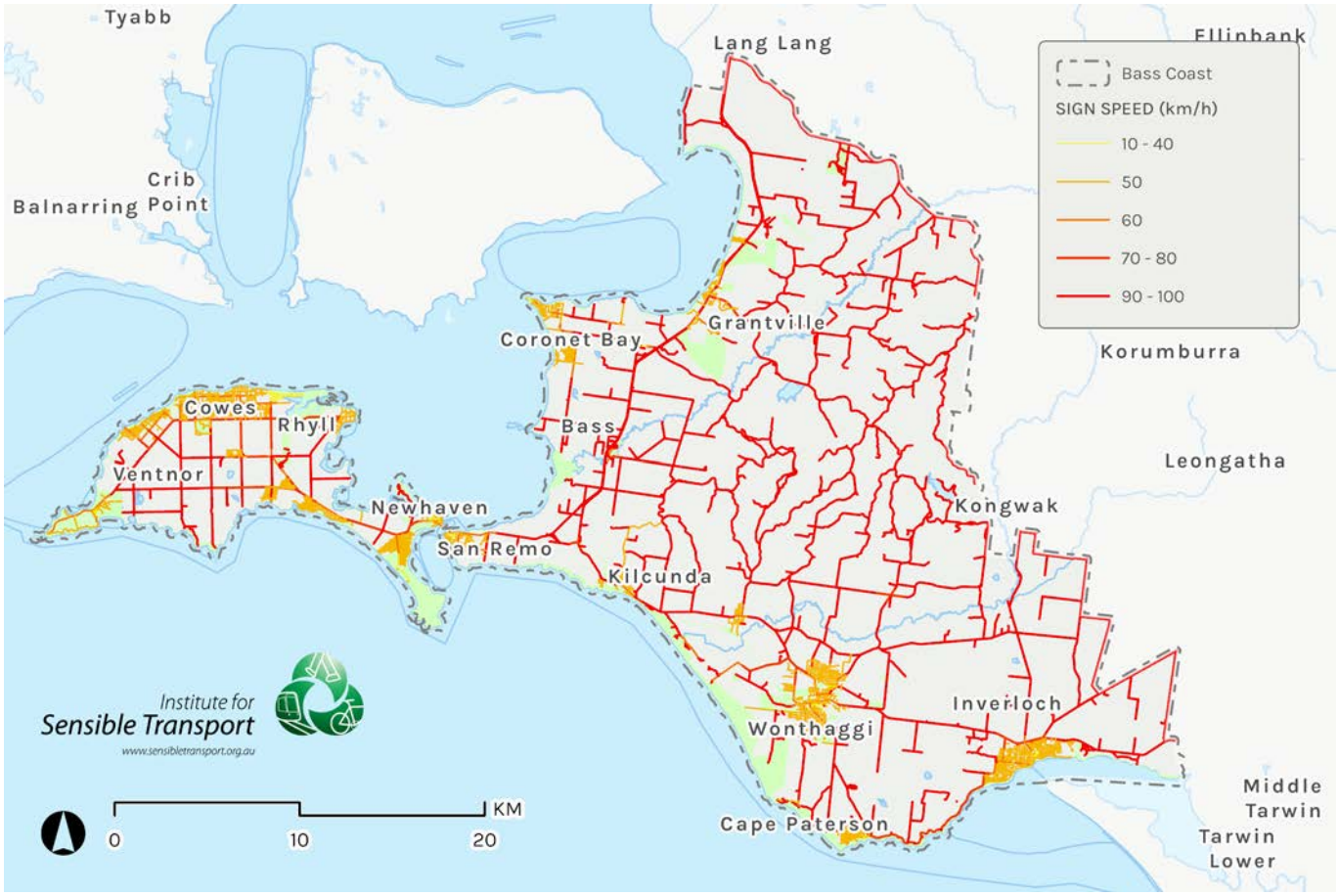


Figure 45 Sign speeds in Bass Coast Shire, LGA

Source: Department of Transport and Planning

4.5.2 Traffic Volume

Traffic volume data is collected for declared roads in Victoria by VicRoads. The recorded two-way yearly volume is divided by 365 and represented by a single line to show average daily volume for all vehicles. The results of this exercise is shown in Figure 46.

As expected, the highest road volumes are on the major highways and arterials such as the Bass Highway and Phillip Island Road. Sections of the South Gippsland Highway and Wonthaggi Road intersecting with the Bass Highway also have high volumes. Being one of Victoria's fasted growing rural municipalities, there may be discrepancies in certain areas due to the fast pace of development.

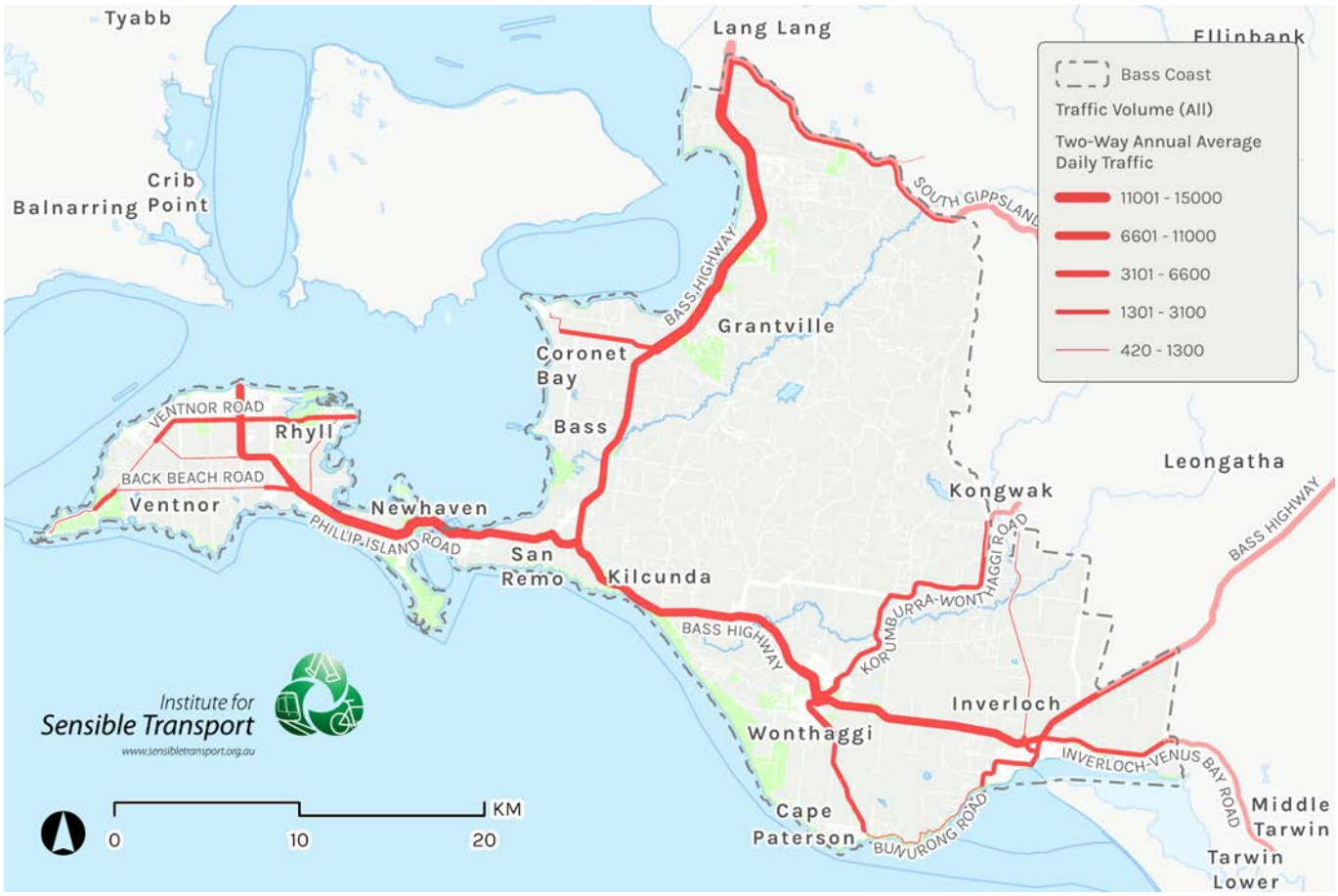


Figure 46 Average daily traffic volume for all vehicles

Source: Department of Transport and Planning

4.5.3 Freight

The principal freight network in Bass Coast comprises of the South Gippsland Highway and Bass Highway. HVR B-doubles are allowed on other roads in the municipality to facilitate the movement of goods. Figure 47 shows the freight networks along with the two-way average traffic volume for freight. The Principal Freight Network, shown in blue-grey, lies on top of the larger HVR B-Double Network. The two-way average truck volume is noticeably highest on South Gippsland Highway along the northern boundary of Bass Coast, reaching up to 1,800 trips daily. Phillip Island Road between Newhaven and Sunset Strip see greater freight movement of between 1,400 to 1,600 trips per day, compared to the 1,300 trips along the busiest part of the Bass Highway.

While freight traffic is generally moving along highways and arterial roads, many businesses rely on deliveries via heavy vehicles. Access to loading docks will need to be carefully managed, particularly in streets with competing uses. Some of the considerations in managing loading docks are:

- Council bins collection services
- Delivery during business hours.

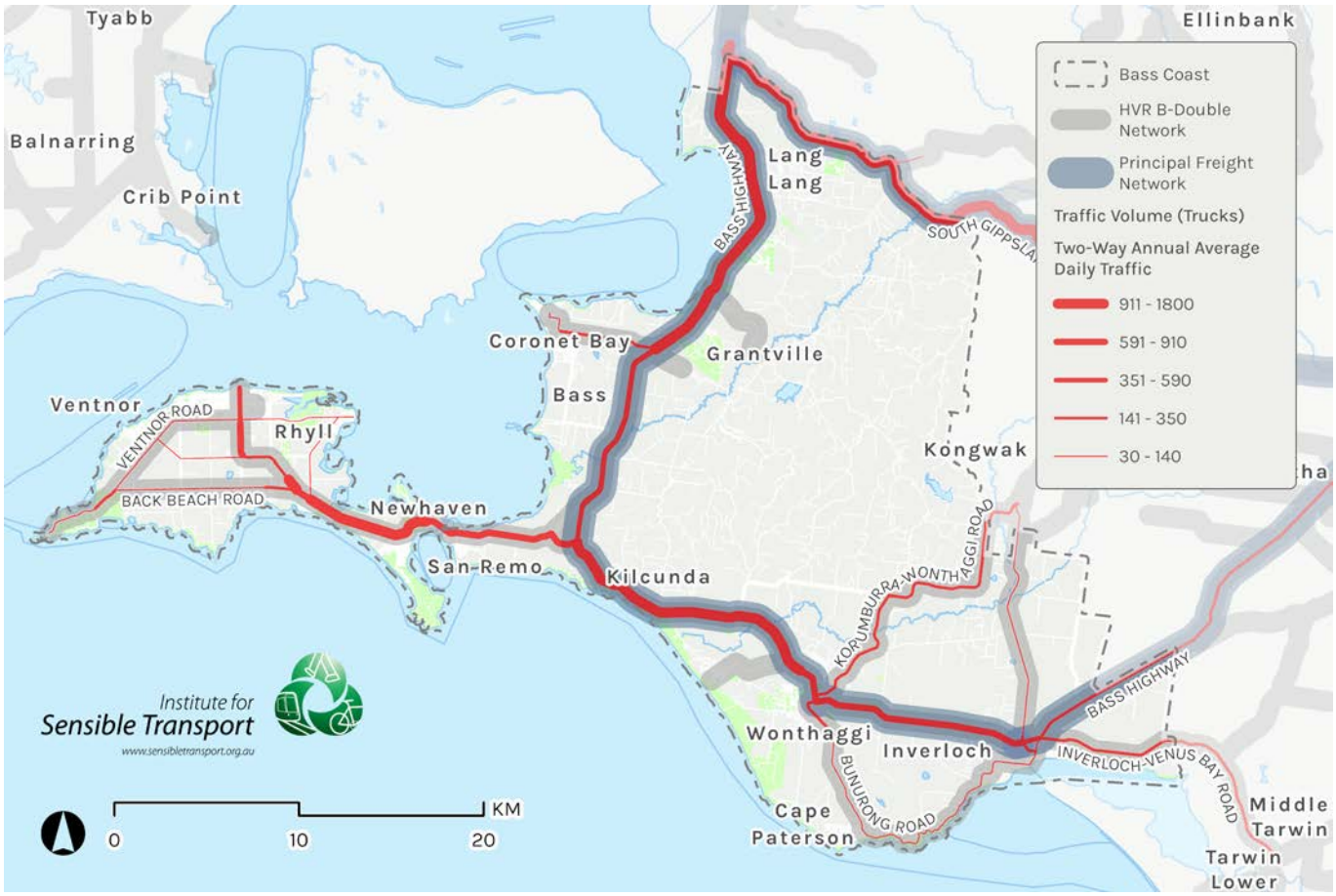


Figure 47 Average daily truck volume

Source: Department of Transport and Planning

5. Car parking



Car parking supply has a profound influence over transport mode choice, housing and development costs, as well as the quality of public space. In Bass Coast, there is a high level of car parking, on a per capita/per job basis.

Improved car parking management in Bass Coast will play a crucial role in providing access to destinations for all, whilst enhancing the local amenity of Bass Coast streets.

This section introduces parking technologies that may assist Council in better managing existing parking infrastructure in Bass Coast. In addition, this section provides findings from a car parking occupancy study in the CBD areas and key destinations in the key townships of:

- Wonthaggi
- Cowes
- Inverloch
- Grantville
- San Remo
- Newhaven.

5.1 Technology to better manage car parking

5.1.1 Parking Overstay Detection System (PODS)

PODS are small in-ground sensors linked to a central computer system that provides Council with precise data on the length of time spent by each car in a PODS parking space. It is used to increase parking enforcement and improve parking compliance. It is also useful for providing Council with detailed occupancy data for high-demand areas. In recent years, Bass Coast has begun to install these devices at key car parks in Wonthaggi and Cowes.

5.1.2 Real time parking availability information

PODS can be integrated with real-time parking information. This can improve the efficiency of existing parking supply by directing drivers to available parking spaces. This reduces congestion caused by cars cruising for a free space and provides the community with an accurate and up-to-date understanding of car occupancy in the area. Other cities have integrated real-time parking information into apps and websites, improving the parking experience.

Figure 48 provides an illustration of PODS, which have become a popular method for local government to monitor occupancy and vehicle overstay.

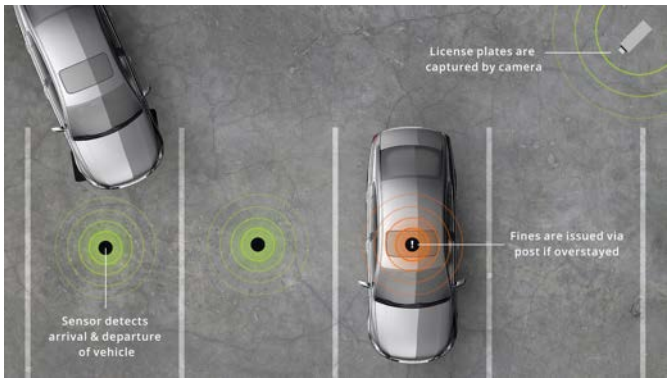


Figure 48 Better management of parking with technology

Source: ESmart 21

Figure 49 illustrates the use of real time parking displays. These require the installation of parking sensors in individual bays.



Figure 49 Real time information displays

Source: Northern Beaches Council

As Bass Coast continues to grow, it is likely there will be increasing competition for parking spaces. Rather than increase supply in the first instances, expanding the use of these technologies can help

to better utilise existing parking assets. This will help preserve land for other uses, and reduce frustration associated with finding a car park in commercial areas.

5.2 Car parking occupancy levels

This section provides an analysis of car parking occupancy in the CBD areas of key townships in Bass Coast. Some key destinations beyond the CBD area perimeters such as recreation reserves and hospital precincts have been included.

The townships covered in this car parking occupancy study include:

- Wonthaggi
- Cowes
- Inverloch
- Grantville
- San Remo
- Newhaven.

Findings from this study reveals how existing car parking infrastructure is currently utilised at peak times. This will support Council to determine how car parking in Bass Coast can be better managed and planned for future use as the townships grow. This study uses high resolution aerial imagery maps provided by Council. With the exception of San Remo, the aerial images used for this study was taken on Tuesday 27th of February, 2024 at around midday (max. temperature 27 degrees Celsius). The aerial images used for San Remo were taken from *Metromap* on Sunday 23rd of January, 2022, around midday (max. temperature 25 degrees Celsius). These dates and times were selected based on instruction from Council, in an effort to be as representative as possible of peak demand and is also restricted by the available aerial imagery.

The catchment of the car parking network for each township includes all on-street and off-street parking bays that are within a short walking distance to key destinations in each township. This includes on-street and off-street parking bays within a walking distance of 100 to 150 metres. These distances were chosen as people who drive prefer to park within a short walking distance to their destination.

5.2.1 Wonthaggi

There is a total of 4,075 parking bays within walking distance of the Wonthaggi town centre, the Bass Coast Health precinct, and Wonthaggi Recreation Reserve. Of these, 1,340 parking bays are located on street, and the remaining 2,735 located in off-street car parks.

Figure 50 provides a breakdown of the existing car parking supply and parking occupancy rates within the catchment. Parking bays classified as *restricted* include parking restricted to buses, taxis, loading zones, disabled parking, motorcycles, caravans/trailers, and staff parking. Across the township, only 53% of parking bays were occupied at a peak time.

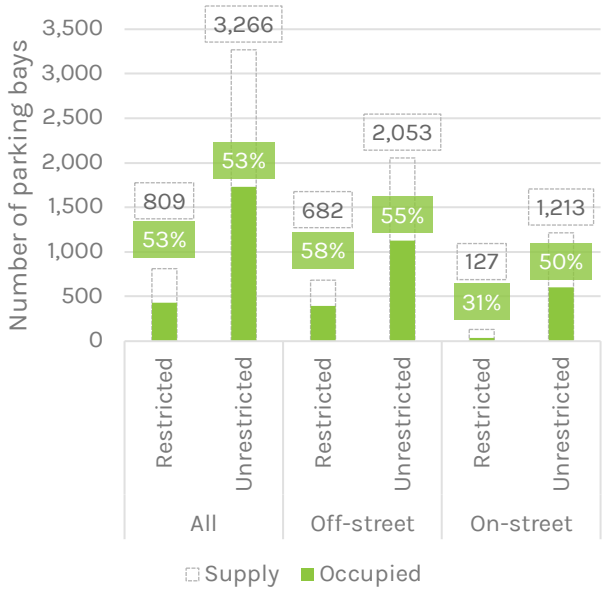


Figure 50 Car parking supply and occupancy, Wonthaggi

Source: Bass Coast Shire Council

Almost half of existing parking bays in Wonthaggi are unoccupied at peak times.

Figure 51 shows the geographical variation in car parking occupancy in the Wonthaggi CBD area. Where car parking occupancy is high (greater than 75%), motorists can find more available parking on the next street, particularly east of McBride Avenue. Parking occupancy around the Town Hall on McBride Avenue, Watt Street and Baillieu Street

(east of McBride Avenue) is especially low, where parking occupancy ranges from being completely vacant to 22%. Further, only 32% of parking at Bass Coast Plaza was occupied at a peak time. It should be noted the off-street car park at the intersection of Mckenzie Street and Korrumburra Road was not open at the time the aerial image was taken.



Figure 51 Car parking occupancy at a peak time, Wonthaggi CBD

Note: Restricted Parking Areas include parking bays restricted to buses, taxis, loading vehicles, motorcycles, disabled parking, staff, and other authorised vehicles. Car parking occupancy labels for these sites are not shown.
Source: Bass Coast Shire Council

Figure 52 shows car parking occupancy in the Bass Coast Health precinct. Parking occupancy is high around Wonthaggi Hospital, where 92% of the primary public car park was occupied at a peak time.



Figure 52 Car parking occupancy at a peak time, Bass Coast Health

Note: Restricted Parking Areas include parking bays restricted to buses, loading vehicles, staff, and other authorised vehicles.

Source: Bass Coast Shire Council

Figure 53 shows car parking occupancy is very low at Wonthaggi Recreation Reserve, where the majority of on-street parking is unoccupied. Further, on-site parking at the reserve is also low, with more than half of available parking unoccupied.

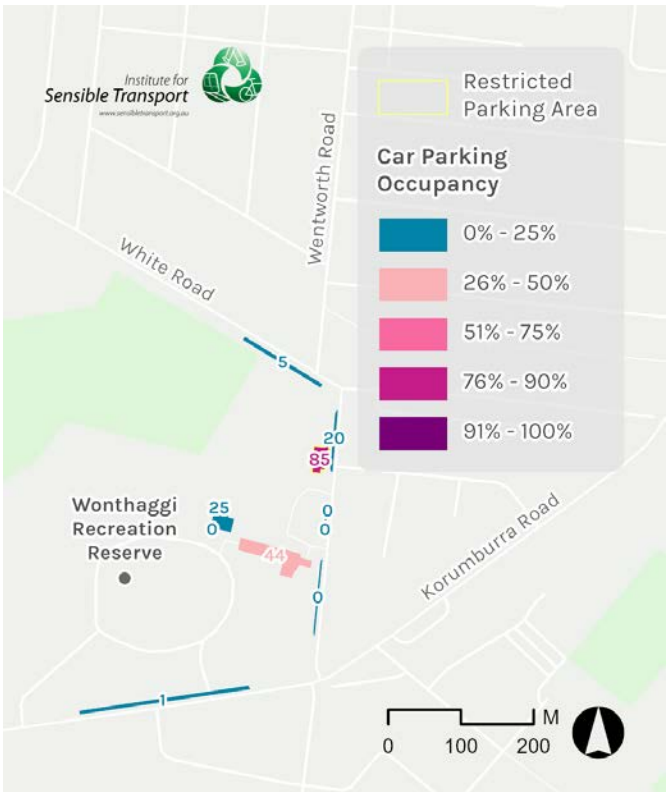


Figure 53 Car parking occupancy at a peak time, Wonthaggi Recreation Reserve

Source: Bass Coast Shire Council

5.2.2 Cowes

The catchment of car parking in Cowes includes the CBD area, and the Cowes Recreation Reserve. In total, there are 2,689 parking bays, where 890 are on-street parking bays and 1,799 are located in off-street car parks.

Figure 54 provides a breakdown of the existing car parking supply and parking occupancy within the catchment. Parking bays classified as *restricted* include parking restricted to buses, taxis, loading zones, disabled parking, motorcycles, caravans/trailers, and staff parking. Across the township, only 48% of parking bays were occupied at a peak time.

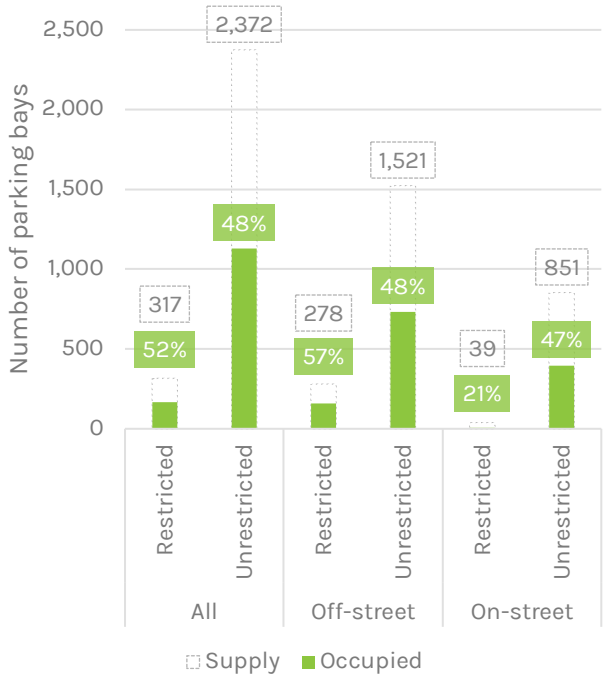


Figure 54 Car parking supply and occupancy, Cowes

Source: Bass Coast Shire Council

More than 50% of existing parking bays in Cowes are unoccupied at peak times.

Figure 55 shows car parking occupancy near the Cowes Recreation Reserve is higher in off-street car parks, at 66% to 81%. However, parking is easily accessible on Chapel Street and Dunsmore Road, where over two in three parking bays are unoccupied. Overall, parking demand is moderate, with approximately 51% of parking bays occupied at a peak time.

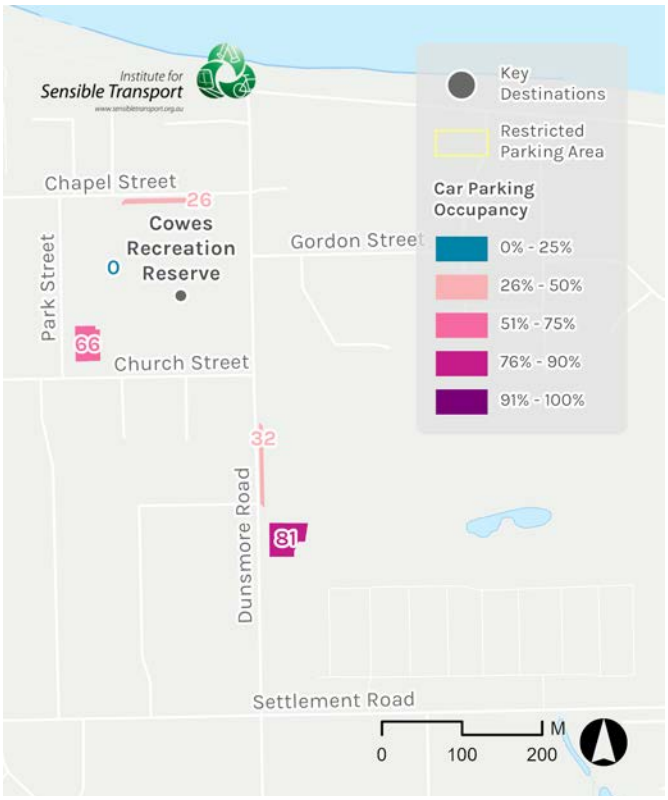


Figure 55 Car parking occupancy at a peak time, Cowes Recreation Reserve

Note: Restricted Parking Areas include parking bays restricted to disabled parking.

Source: Bass Coast Shire Council

Figure 56 shows the geographical variation in car parking occupancy in the Cowes CBD area. Car parking occupancy is generally evenly distributed across the town centre, with the majority of parking areas ranging between 40% to 60%. There is high demand for parking on The Esplanade west of Thompson Avenue, with all parking bays occupied at peak times. In contrast, a high proportion of unoccupied car park bays can be within 150-metres towards the west end of The Esplanade.

Notably, only 39% of car parking at the bus interchange was occupied. Car parking occupancy at the Phillip Island RSL Club (not shown on map) is low, where only 22% of off-street car park is occupied.

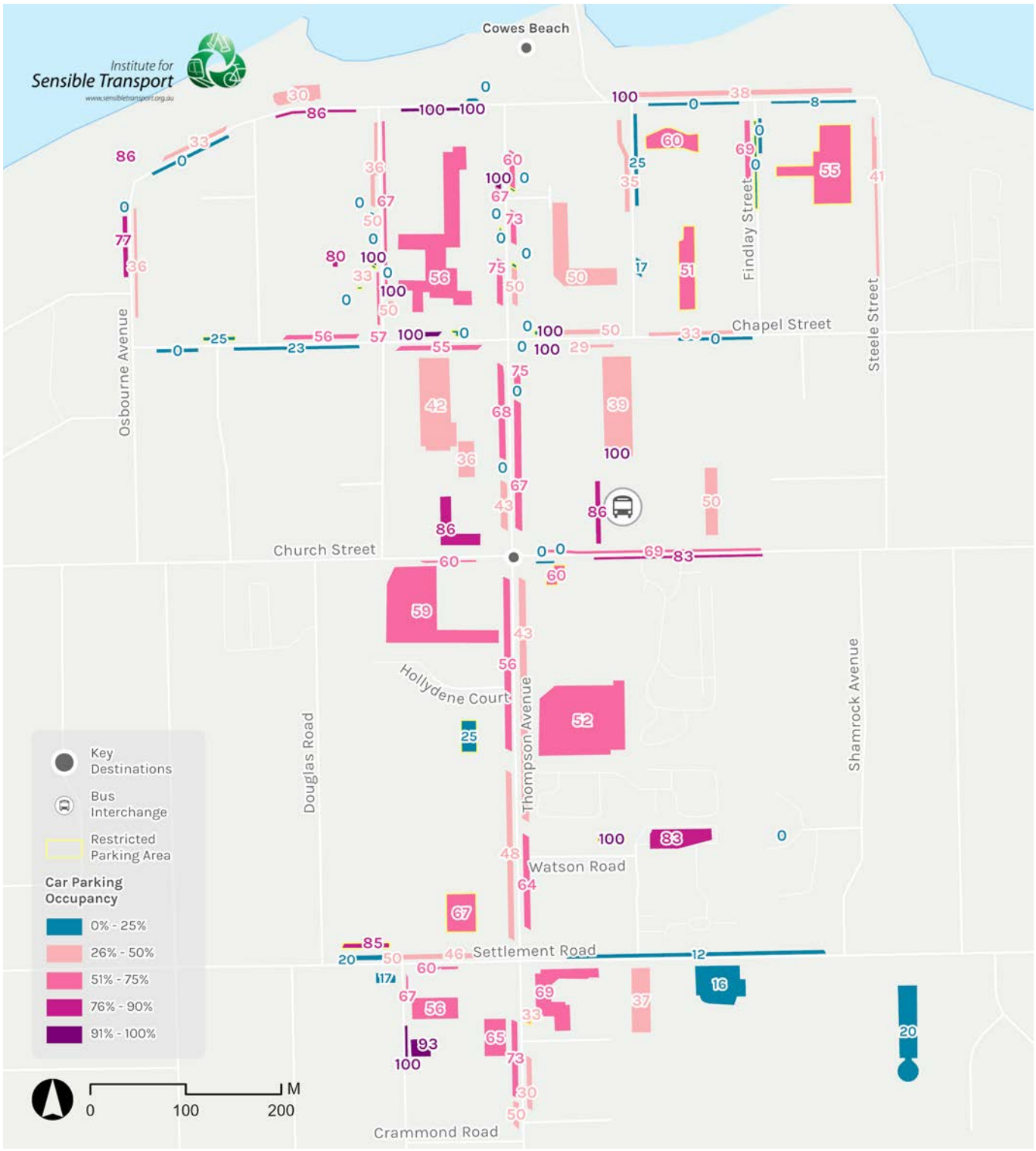


Figure 56 Car parking occupancy at a peak time, Cowes Town Centre

Note: Restricted Parking Areas include parking bays restricted to buses, taxis, loading vehicles, motorcycles, disabled parking, staff, and other authorised vehicles.

Source: Bass Coast Shire Council

5.2.3 Inverloch

The catchment of car parking in Inverloch includes the CBD area, Inverloch Recreation Reserve, Inverloch Beach and the boat ramp. In total, there are 981 parking bays, where 571 are on-street parking bays and 410 are located in off-street car parks.

Figure 57 provides a breakdown of the existing car parking supply and parking occupancy within the catchment. Parking bays classified as *restricted* include parking restricted to buses, taxis, loading zones, motorcycles, caravans/trailers, and staff parking. Across the township, only 43.6% of parking bays were occupied at a peak time.

More than 56% of existing car parking supply in Inverloch is unoccupied at a peak time.

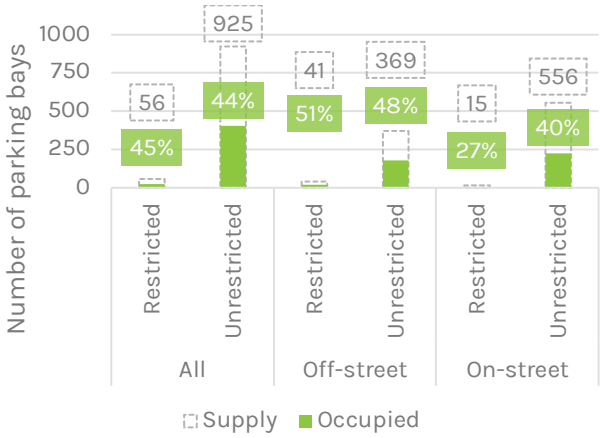


Figure 57 Car parking supply and demand, Inverloch

Source: Bass Coast Shire Council

Unsurprisingly, Figure 58 shows car parking demand is concentrated in the town centre. Unrestricted parking occupancy is greatest at the Beaton Place car park (93%), followed by parking on A'Beckett Street between Alma Street and Ramsey Boulevard (77%). Notably, almost all unrestricted parking bays were unoccupied on A'Beckett Street west of Alma Road. In contrast, parking occupancy at Inverloch Recreation Reserve and Inverloch Beach record lower demand, with approximately half of existing parking bays unoccupied. Around 54% of trailer and caravan parking at the jetty was unoccupied at a peak time.

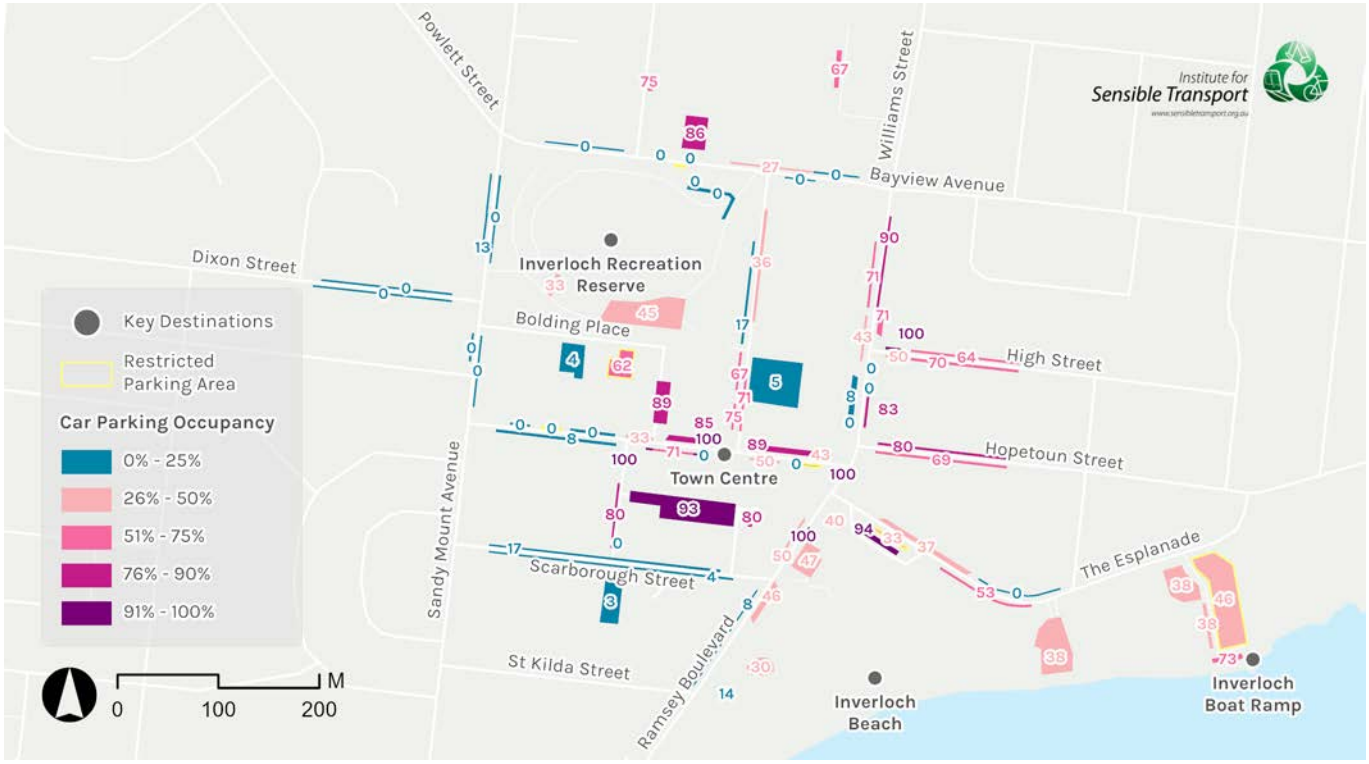


Figure 58 Car parking occupancy at a peak time, Inverloch

Source: Bass Coast Shire Council

5.2.4 Grantville

There is a total of 218 parking bays within walking distance of Grantville's town centre, the Foreshore Reserve, and the Recreation Reserve. Of these, 76 parking bays are located on street, and the remaining 142 car park pays are located in off-street car parks.

Figure 59 provides a breakdown of the existing car parking supply and parking occupancy rates within the catchment. Parking bays classified as *restricted* include parking restricted to disabled parking. Across the township, only 13.6% of parking bays were occupied at a peak time.

Grantville has the lowest car parking occupancy across the Shire, where more than 86% of the network is unoccupied.

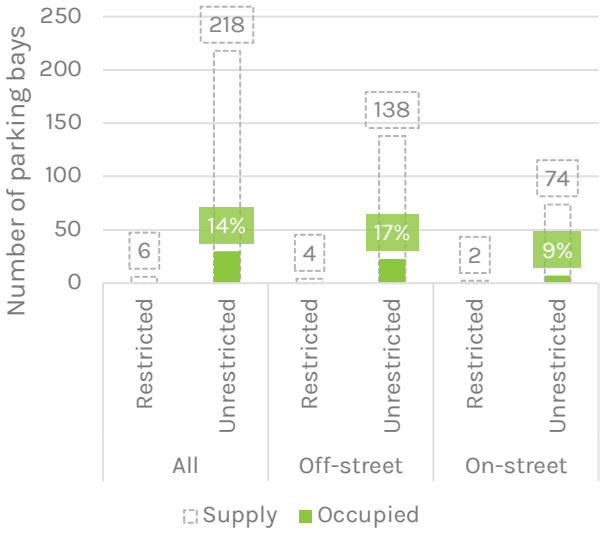


Figure 59 Car parking supply and occupancy, Grantville

Source: Bass Coast Shire Council

Figure 60 shows the geographic distribution of parking occupancy in Grantville at a peak time. The majority of parking demand is currently concentrated in the town centre, which runs along the Bass Highway service road. Car parking areas at Grantville Recreation Reserve and the Foreshore Reserve record very low utilisation. Only two car parking bays were occupied near the Foreshore Reserve, at the west end of Pier Road. No car park bays were occupied at the Recreation Reserve.



Figure 60 Car parking occupancy at a peak time, Grantville

Source: Bass Coast Shire Council

5.2.5 San Remo

The catchment of car parking in San Remo includes the CBD area along Marine Parade, the San Remo Recreation Centre, and Lions Park. In total, there are 884 parking bays, where 625 are on-street parking bays and 259 are located in off-street car parks.

Figure 61 provides a breakdown of the existing car parking supply and parking occupancy within the catchment. Parking bays classified as *restricted* include parking restricted to buses, taxis, loading zones, disabled parking, caravans/trailers, and staff parking. Across the township, only 44% of parking bays were occupied at a peak time.

More than 55% of existing parking supply is unoccupied at a peak time in San Remo.

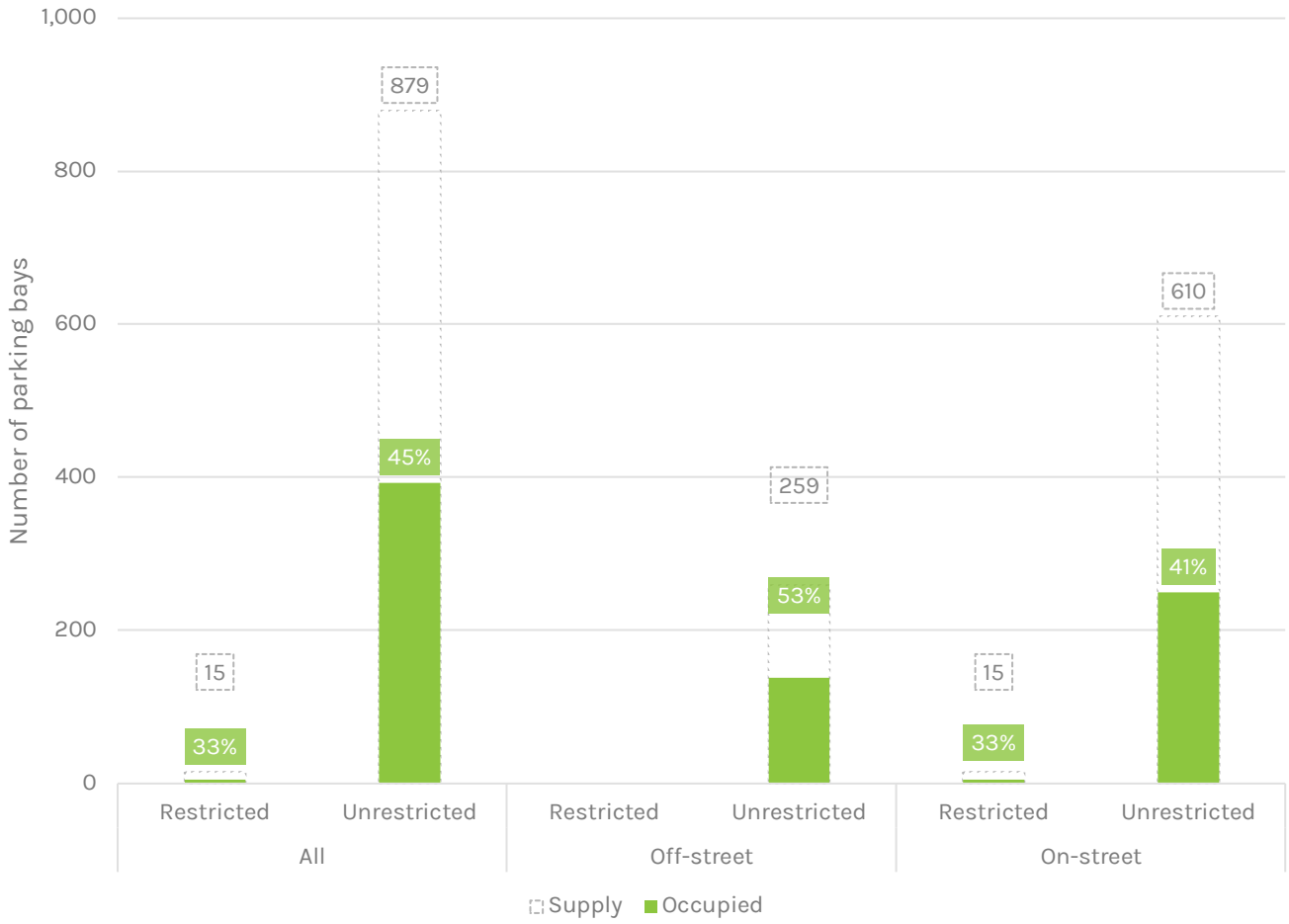


Figure 61 Car parking supply and occupancy, San Remo

Source: Metromap

Figure 62 shows car parking occupancy is very high on Marine Parade west of Bergin Grove, with almost all car park bays occupied. Parking on Woolamai Grove is next highest, likely due to its proximity to Marine Parade, and the caravan park. Car parking occupancy drops off on Marine Parade immediately east of Bergin Grove, with less than half of existing parking bays unoccupied. Parking occupancy near San Remo Recreation Centre is very low, where only 6% of parking bays were occupied. Around 50% to 70% of parking on Davis Point Road with direct access to Lions Park was unoccupied.



Figure 62 Car parking occupancy at a peak time, San Remo

Source: Metromap

5.2.6 Newhaven

There is a total of 910 parking bays within walking distance of the Newhaven town centre, Newhaven Recreation Reserve, and along Phillip Island Road (near the Phillip Island Visitor Centre). Of these, 325 parking bays are located on street, while 585 parking bays are located in off-street car parks.

Figure 63 provides a breakdown of the existing car parking supply and parking occupancy rates within the catchment. Parking bays classified as *restricted* include parking restricted to buses, taxis, loading zones, disabled parking, motorcycles, caravans/trailers, and staff/member parking. Across the township, only 21.8% of parking bays were occupied at a peak time. Further, only 8% of on-street parking was utilised.

Almost 4 in 5 car park bays in Newhaven are unoccupied, at a peak time.

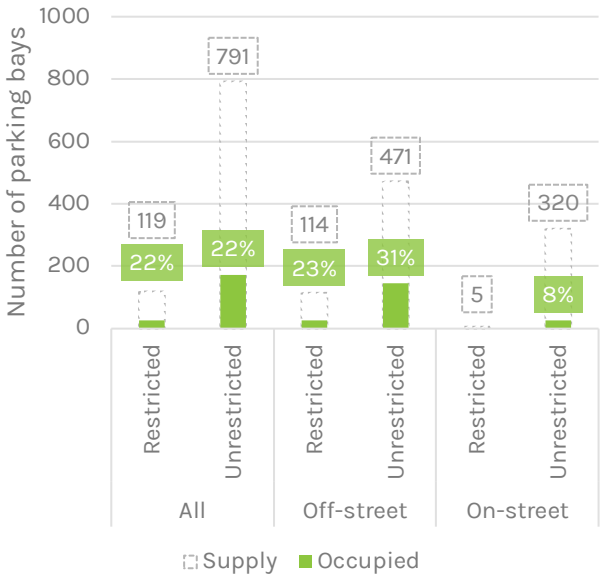


Figure 63 Car parking supply and occupancy, Newhaven

Source: Bass Coast Shire Council

Figure 64 shows parking demand is low even at key destinations including the marina and jetty, where more than half of available parking is unoccupied. Parking occupancy is most concentrated at the intersection of Phillip Island Road and Bluebird Court where cafes and holiday accommodation are located, and at the intersection of Anderson Street and Forrest Avenue.



Figure 64 Car parking occupancy at a peak time, Newhaven

Source: Bass Coast Shire Council

5.2.7 Bass Coast Shire townships

Figure 65 summarises car parking occupancy at a peak time for each of the townships included in this study. Parking occupancy across the six key townships range between 44% to 53%, with the exception of Newhaven where parking occupancy is considerably lower at 22%.

As Bass Coast Shire grows, improved car parking management will play a pivotal role in future proofing the vibrancy of the township. This analysis has found that while there are pockets of very high car parking occupancy, it is rare for the majority of the township to have consistently high occupancy levels.

A better utilisation of low occupancy car parks can help balance supply and demand across the six townships in Bass Coast. One solution that emerges from this study is the potential for parking technology to provide better guidance as to where available parking is located. Static or dynamic signage that provides real time information on parking availability can help reduce the frustration of finding a car park at peak times in Bass Coast. This, and other car parking solutions is detailed in Section 5.1.

Some options to enhance the management of car parking and reduce the frustration associated with finding a car park can include:

- Improved wayfinding, directing drivers to nearby parking locations.
- Assess the potential to implement changes to times parking restrictions in areas of high demand (e.g., proximity to shops and services on Marine Parade).
- Direct longer-term parking (e.g., staff), to the perimeters of the town centre.

An effective car parking management plan that utilises the existing car parking infrastructure across the six townships will best position Bass Coast in connecting people to places, whilst achieving its sustainability goals.

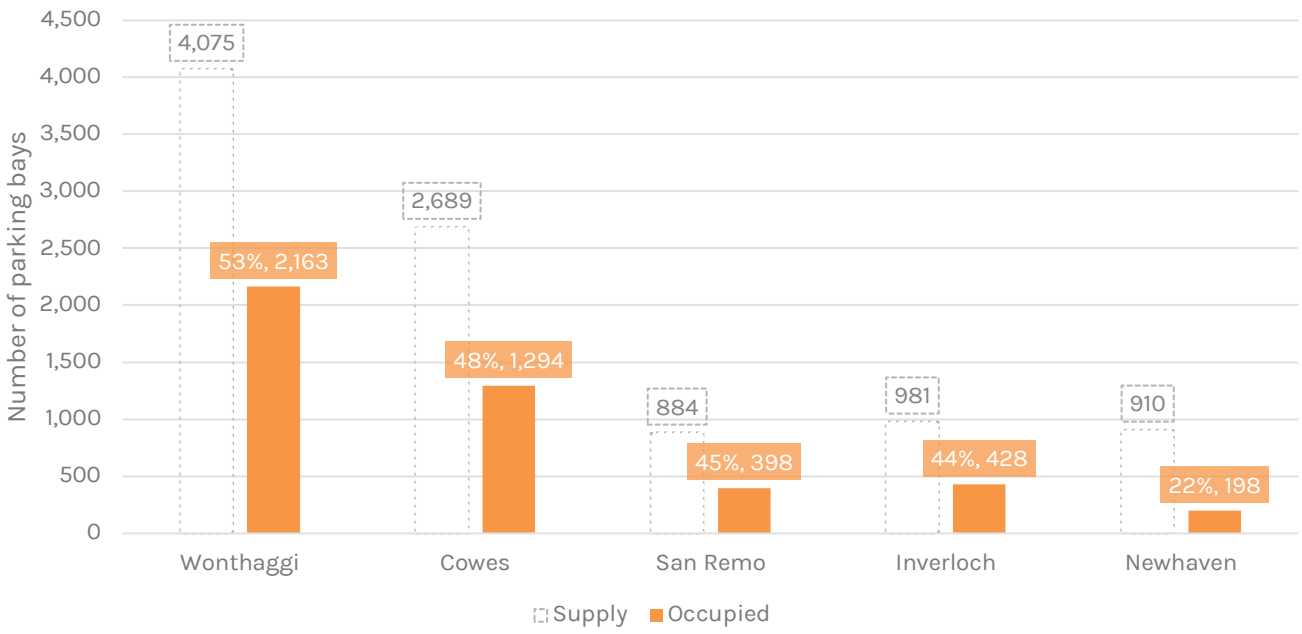


Figure 65 Car parking supply and occupancy at a peak time, Bass Coast townships

Source: Bass Coast Shire Council source map, Metromap



6. Transport patterns

A strong understanding of existing travel patterns in Bass Coast Shire is critical for the development of the ITS. By providing a clear description of existing transport patterns and a review of the current transport network, a baseline is created that can be used to inform future stages of the ITS.

6.1 Census Journey to Work

The only available dataset for transport patterns in Bass Coast is journey to work data. Travel to work data is captured at every Census. The most recently available Census was conducted in 2021. The 2021 Census was conducted while Victoria was subject to health orders which restricted the movement to halt the spread of COVID-19.

Although the COVID-19 pandemic restrictions had an impact on the responses, the mode share of those who *did* travel to work are similar to pre-pandemic patterns. The largest change was in *working from home*, which increased from 8% in 2016 to 20% in 2021, and in the number of workers who did not go to work.

6.1.1 Mode share

Mode share is a term used to describe the proportion of trips by various modes. Understanding mode share is essential for planning and improving transport networks.

6.1.1.1 Bass Coast and other LGAs

The change in the journey to work mode share for Bass Coast and Greater Melbourne over the last decade represented in Figure 66. Like Greater Melbourne, the car is the dominant mode of transport in Bass Coast. Despite policies described in Section 2 that commit to achieving a more sustainable transport system, Census data indicates limited growth in active transport participation. Car use has remained high, with no significant reductions over the past decade. Since 2011, the car accounted for 90% to 92% of all journeys to work for Bass Coast residents. This is similar to the rest of regional Victoria (89% - 91%) but is significantly higher than Greater Melbourne. Before the impacts of the pandemic, the Greater Melbourne car mode share for journey to work in 2016 was around 20% lower than Bass Coast.

Car use is the dominant travel mode in Bass Coast, accounting for 92% of trips to work in 2021. The proportion of people who use the car to travel to work has increased slightly in the last fifteen years.

Public transport patronage is significantly low in Bass Coast. This is partly attributed to the limited train and bus network in Bass Coast, where the closest railway station is on the Pakenham Railway Line and Traralgon Railway Line, approximately 25 to 65 kilometres north. There were only 0.2% of trips to work completed by train in 2011 and 2021, and only 1% in 2016. Only 0.5 - 1% of Bass Coast residents rode the bus to get to work in the last fifteen years. In 2021, bus patronage in the rest of Regional Victoria was double the proportion of trips to work completed by bus in Bass Coast, at 1%.

Public transport is among the least used mode of transport to work for Bass Coast residents, at less than 1%. This is lower than the rest of regional Victoria, where public transport patronage is more than double that of Bass Coast.

Bass Coast residents used different modes of active travel. After car, *Walking* is the next most reported mode of travel to work in Bass Coast, at 5 – 6%. In comparison, only 1% of trips to work were completed by bike in Bass Coast.

A comparison of journey to work mode shares between Bass Coast and nearby LGAs is shown in Figure 67. This shows that the journey to work mode share in Bass Coast are similar to other regional

Councils in the outer perimeter of metropolitan Melbourne. Bass Coast is among the Councils, both regional and metropolitan, with a greater proportion of walked trips to work.



Figure 66 Journey to work mode share, Bass Coast and Greater Melbourne

Source: ABS Census Data

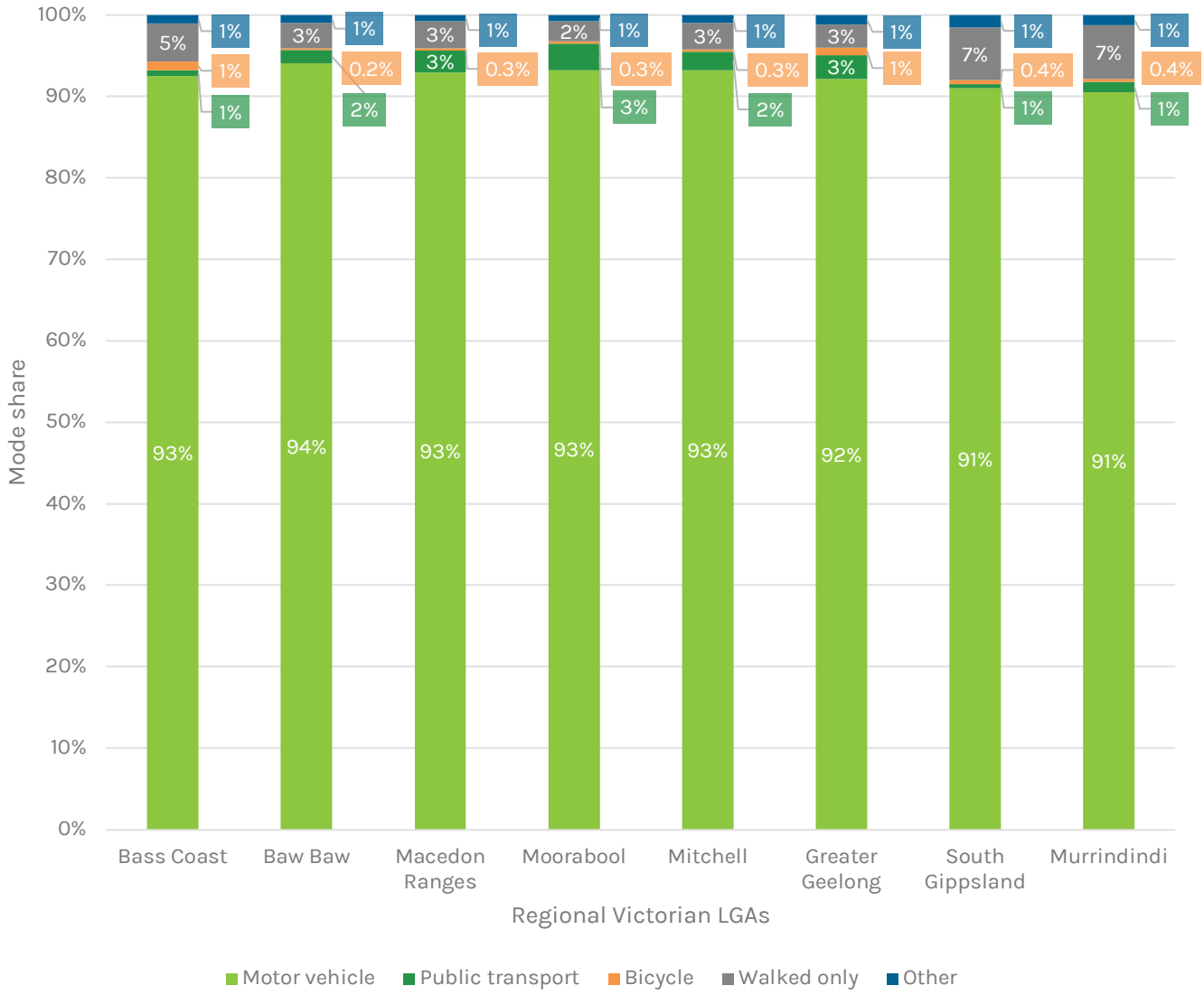


Figure 67 Mode share of Bass Coast compared to other regional LGAs

Source: ABS Census 2021

6.1.1.2 Gender analysis

Gender analysis of mode share is presented in Figure 68. It is noteworthy that the car remains the primary mode of transport for both female and male individuals. Both genders participate in active travel equally at around 5.7%. Noticeably, male residents in Bass Coast are more than twice as likely to ride a bike to work than women, at 1.4% and 0.6%, respectively. This trend is similar to that found across Greater Melbourne.

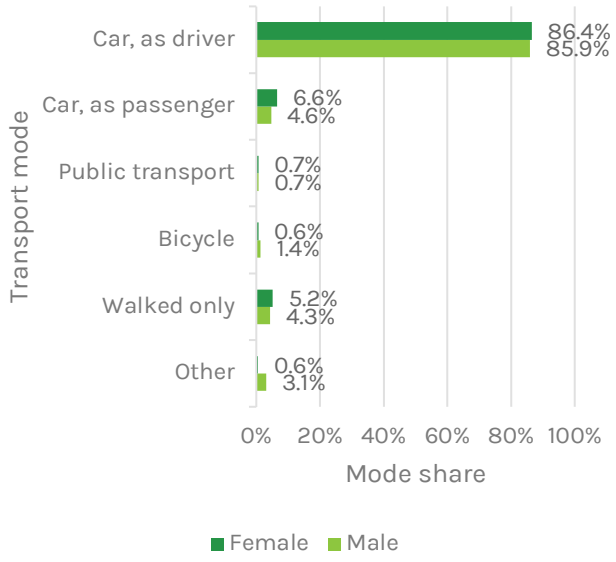


Figure 68 Mode share by sex, Bass Coast

Source: ABS Census 2021

Male residents in Bass Coast are more than twice as likely to ride a bike to work than women, at 1.4% and 0.6%, respectively.

Women demonstrate a slightly greater prevalence of 'walked only' trips.

6.1.1.3 Work from home impact on mode share

Unsurprisingly, there have been significant changes to the *work from home* population in Bass Coast. Figure 69 shows that the *work from home* population in Bass Coast *prior* to the COVID-19 pandemic was almost double that of Greater Melbourne, at around 8% and 4.5%, respectively. While Greater Melbourne saw more significant growth in the work from home population, Bass Coast saw the proportion of residents working from home increase by 2.5 times that of pre-pandemic levels. It can be expected this figure will reduce somewhat by the 2026 Census but remain higher than 2016.

Bass Coast saw the proportion of residents working from home increase by 2.5 times that of pre-pandemic levels.

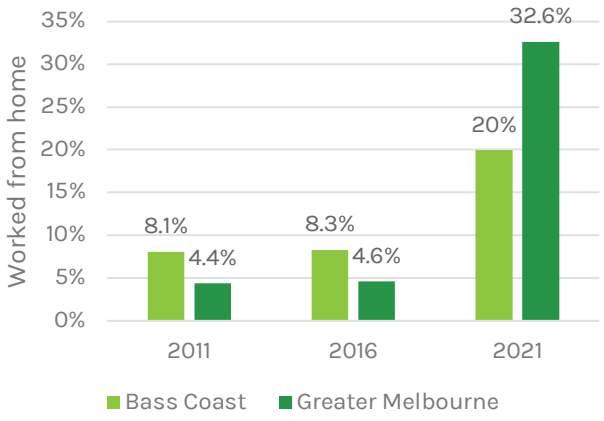


Figure 69 Work from home population

Source: ABS Census Data

Figure 70 shows the changes in the work from home population in Bass Coast by sex. A greater proportion of females work from home in Bass Coast. The number of people working from home increased in 2021 due to the changed working conditions from COVID-19 lockdowns. The percentage of people working from home increased by more than twofold to 16.4% for males, and 23.9% for females.

Of those who worked from home, 115 were lone parents (4%). Lone parents who worked from home in Bass Coast were largely made up of females, at 84%. This has implications for the gender gap, as more women are disproportionately impacted by greater responsibilities involving housework, and childcare.

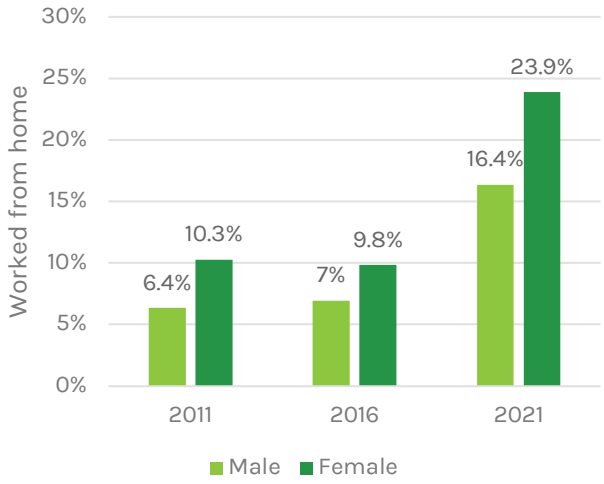


Figure 70 Work from home population by sex

Source: ABS Census Data

6.1.1.4 Bass Coast commuter transport mode share - origin

The mode share of transport used by commuters from points of origin in Bass Coast is shown in Figure 71. The SA1 level is the smallest statistical area provided by that ABS depicting journey to work. *Each dot represents two commuters.* Dots are randomly distributed within the SA1 area. The intended use of this map is to show the variety of modes within the SA1 area and does not accurately provide trip origins spatially.

The car is the most common mode of transport used by residents living in the Shire. For all trips completed by car, 32% were short trips (less than 5km). Most walked trips to work occurred in the main centres of Wonthaggi (8%), Cowes (7%), San Remo (7%), and Inverloch (4%).

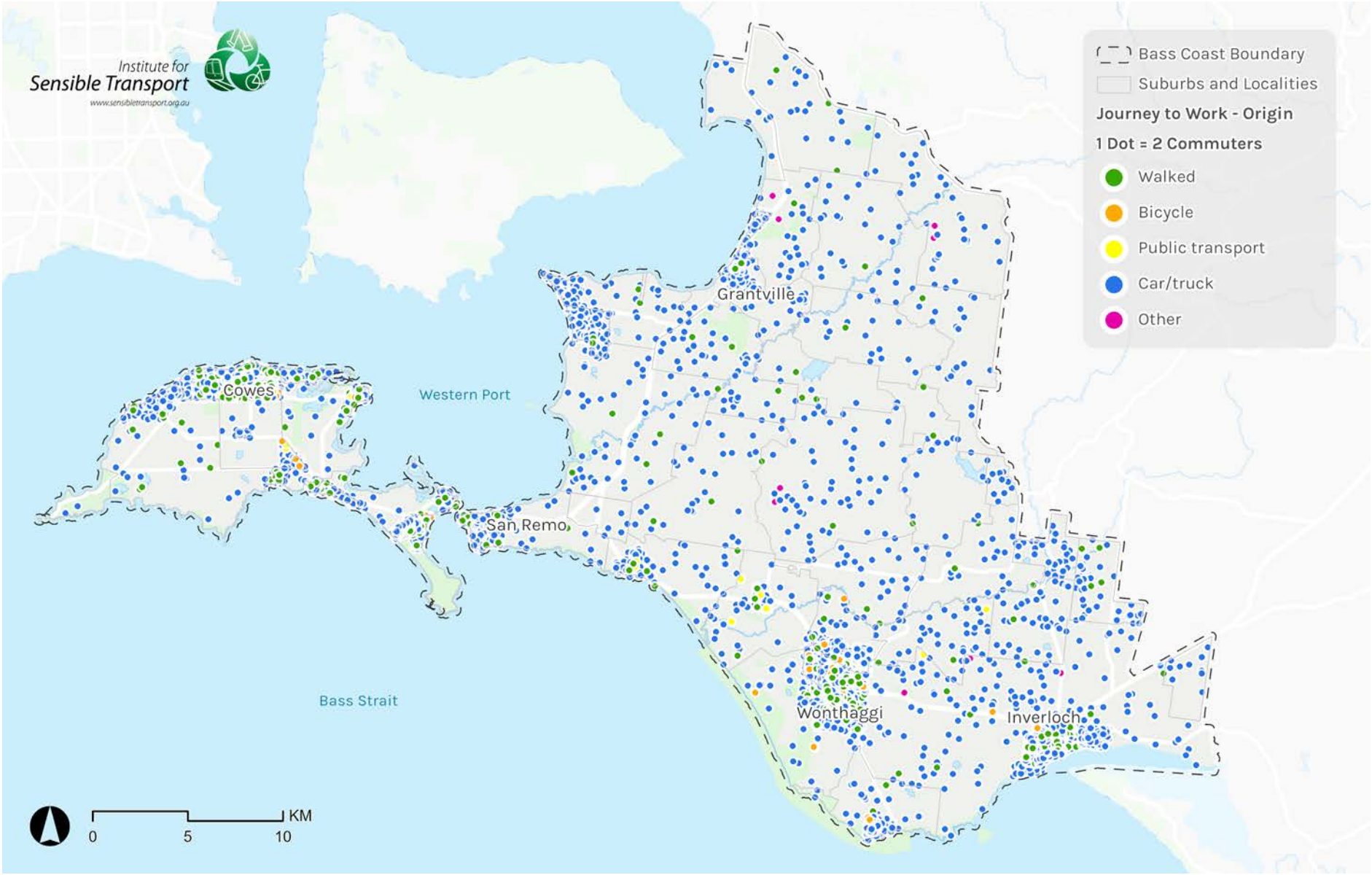


Figure 71 Journey to work, from Bass Coast

Source: ABS Census 2021

The following maps show journeys to work *from* the main centres within Bass Coast. Each dot represents five commuters randomly distributed within the SA1 area. The main centres include Wonthaggi, Inverloch, San Remo, Cowes, and Grantville.

Key findings across the main centres include:

- Wonthaggi has the highest active travel to work participation, at 9.5%. Conversely, zero trips were completed by public transport by residents in the township.
- Inverloch reports the highest public transport patronage to work across the Shire, at 0.5%. Over 93% of residents use the car to go to work.
- In San Remo, 7% of residents walked to work. There were no trips to work completed by bike.
- Cowes reports the second highest active travel mode share among Bass Coast townships, with 7% of trips to work walked, and 2% cycled. It has the lowest car mode share amongst the main centres at 89%.
- Grantville has highest car mode share across the main centres at 95%. Only 3% of residents used active modes to get to work, all of which were walked trips. Residents in this township report the lowest participation in active travel between the main centres.

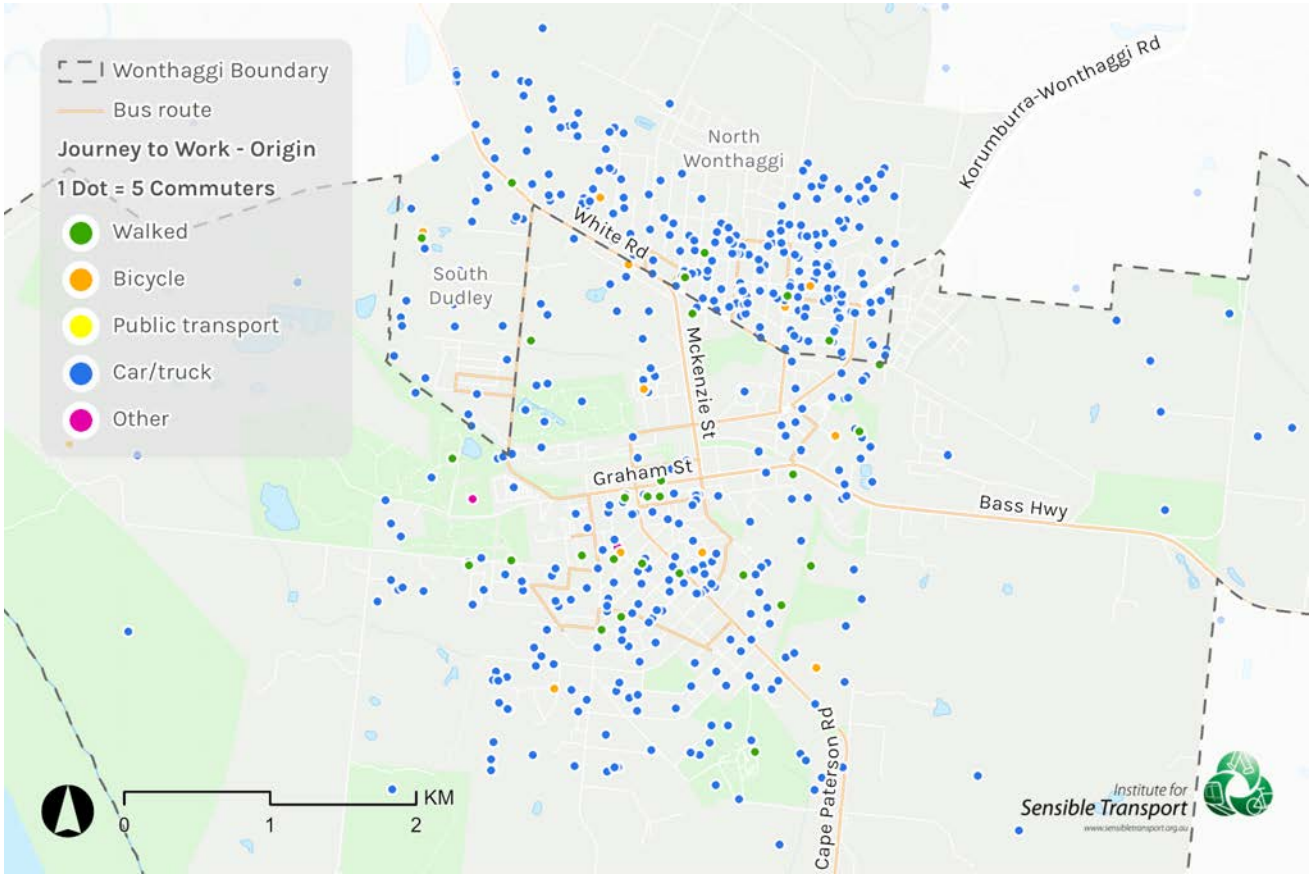


Figure 72 Journey to work from Wonthaggi – Wonthaggi

Source: ABS Census 2021

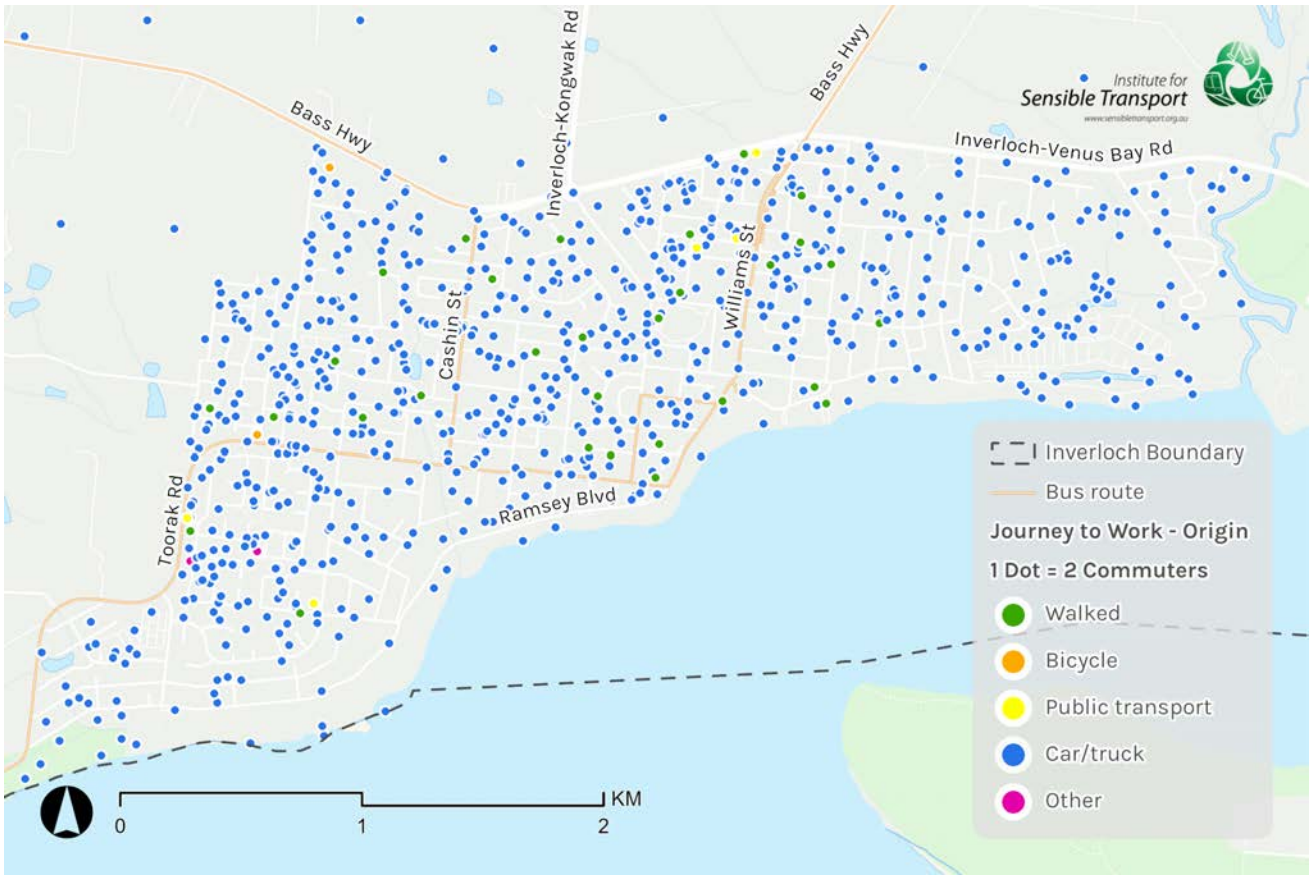


Figure 73 Journey to work from Inverloch

Source: ABS Census 2021

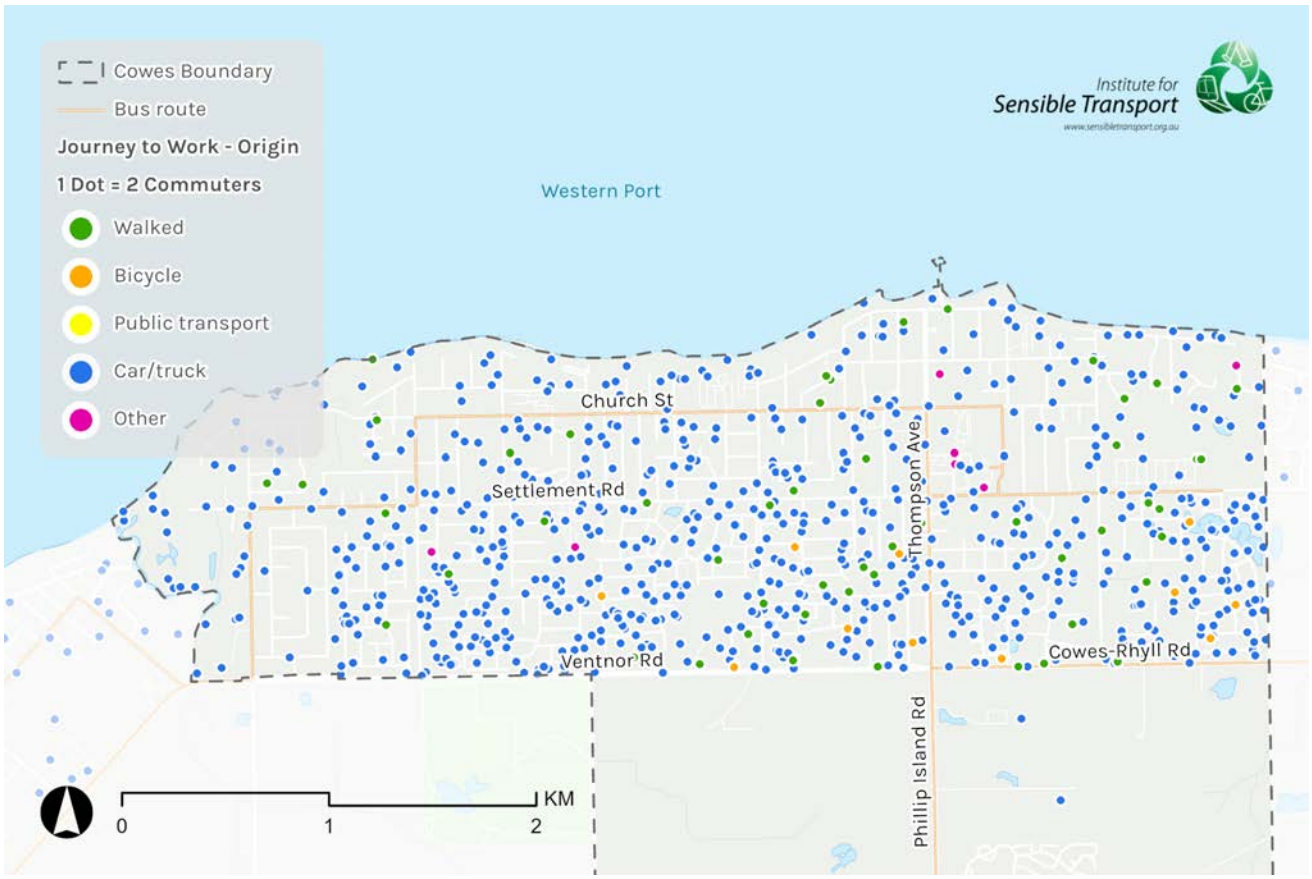


Figure 74 Journey to work from Cowes

Source: ABS Census 2021

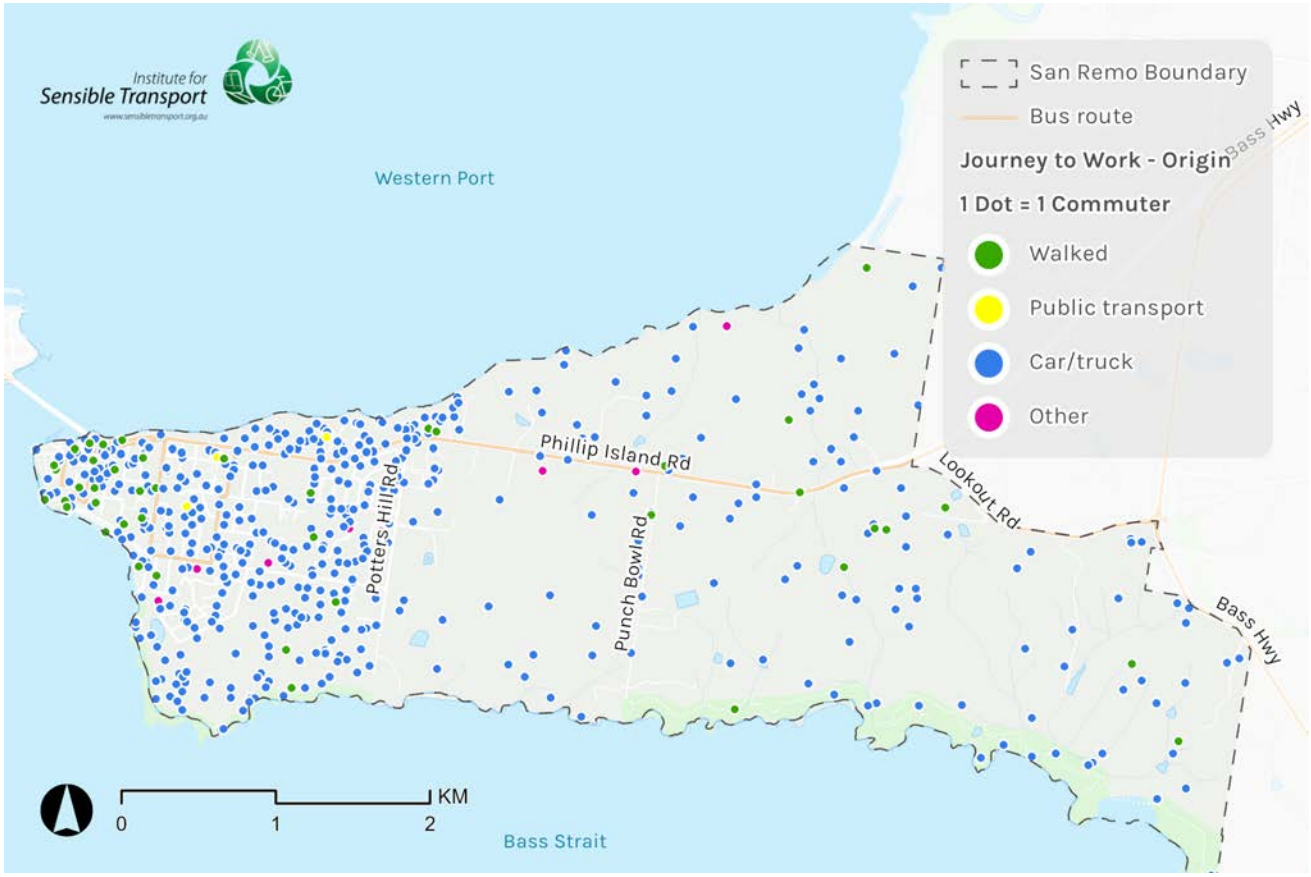


Figure 75 Journey to work from San Remo

Source: ABS Census 2021

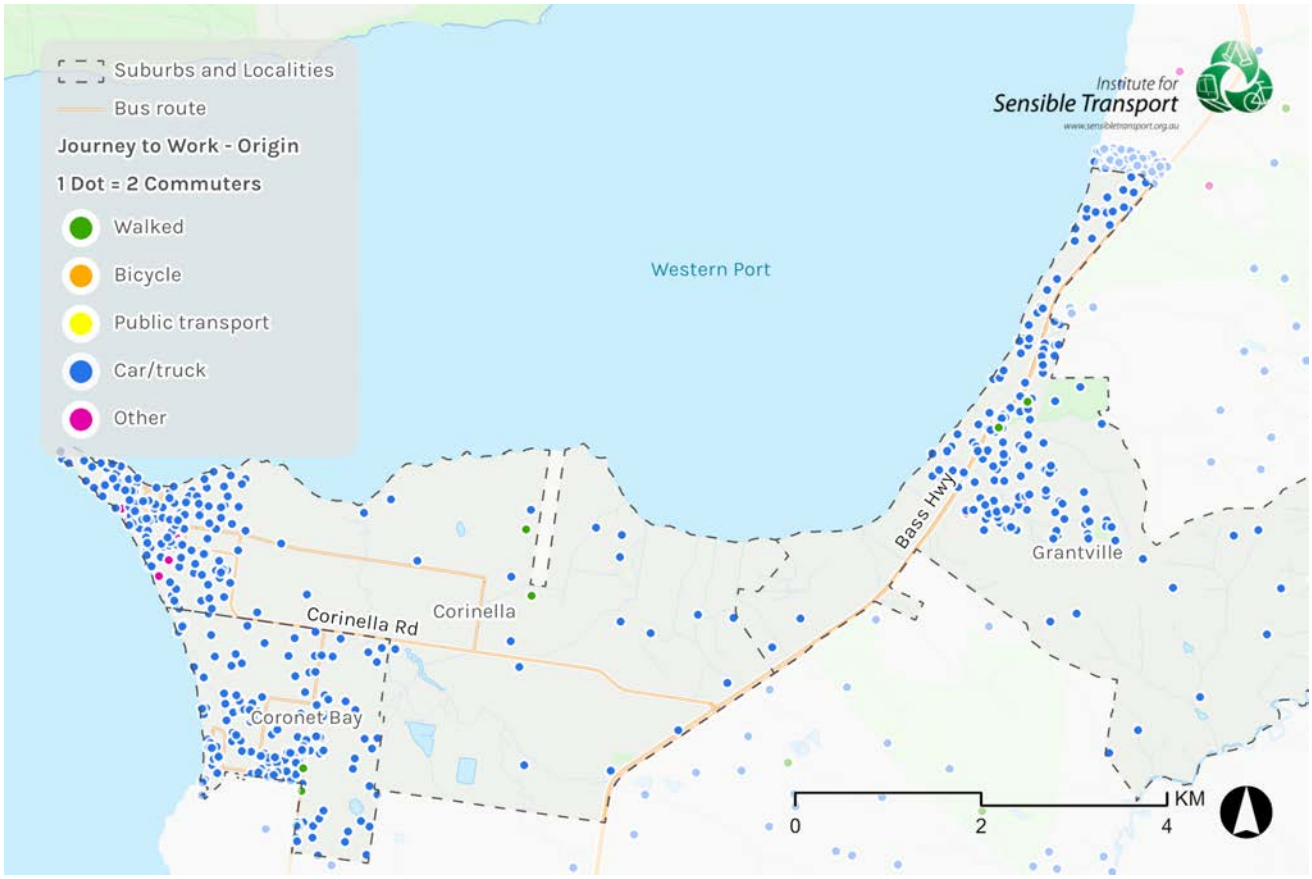


Figure 76 Journey to work from Grantville – Coronet Bay - Corinella

Source: ABS Census 2021

6.1.1.5 Bass Coast commuter transport mode share - destination

The mode of transport used by commuters to *work destinations* within Bass Coast is shown in Figure 77. Each dot represents two commuters randomly distributed within the Destination Zone (DZN) area. DZNs are the smallest statistical area provided by the ABS reporting mode share at the place of work. While the dots do not reflect the place of work, they graphically represent the proportion of different transport modes taken to work in the DZN area.

This shows that for most destinations within Bass Coast, the car is the dominant mode of travel. For all trips completed by car, 38% were short trips (less than 5km).

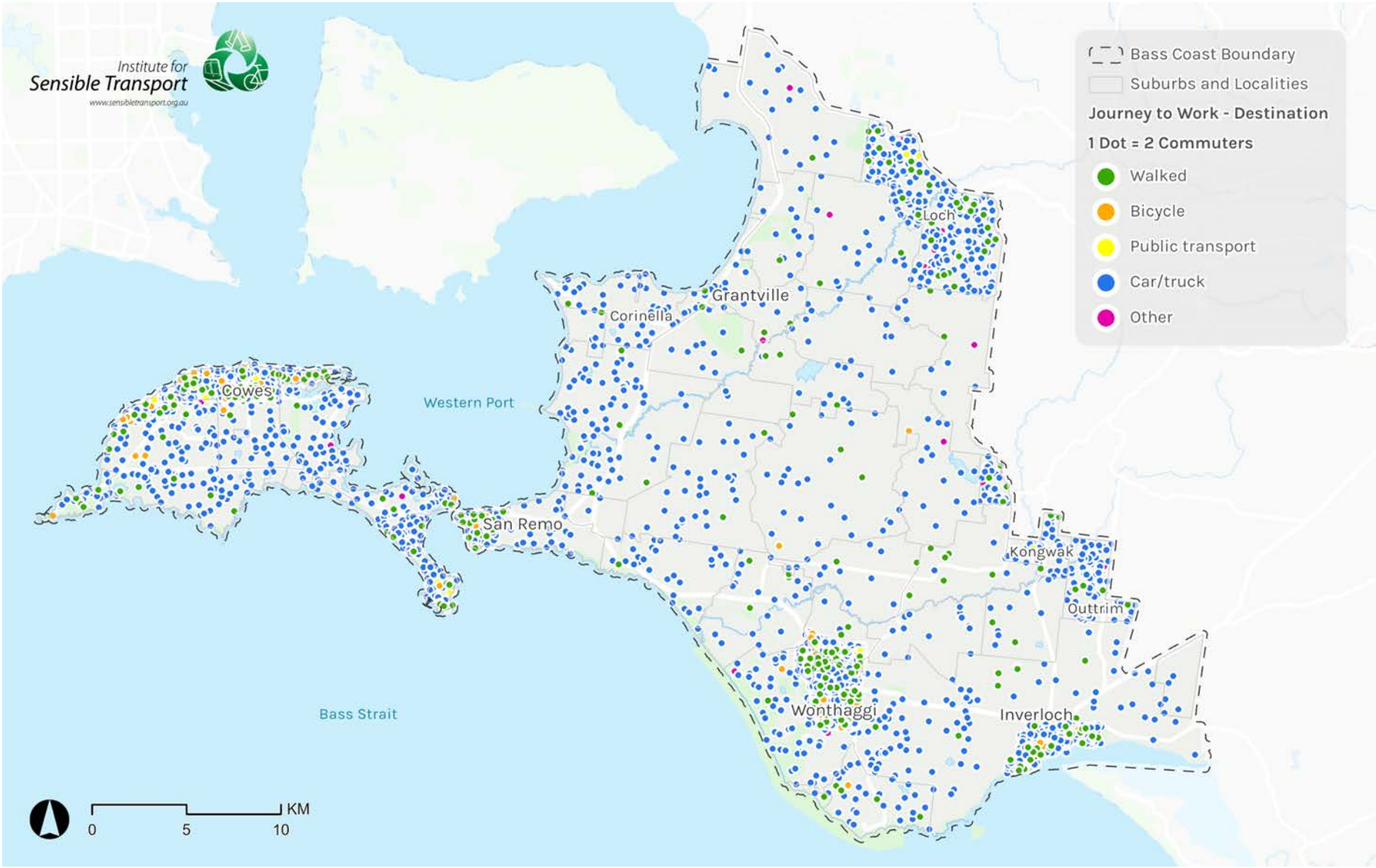


Figure 77 Journey to work, to Bass Coast

Source: ABS Census 2021

The following maps show journeys to work *to* the main centres in Bass Coast. Each dot represents five commuters, and is randomly distributed within the DZN area.

Key findings amongst workers in the Bass Coast main centres include:

- Car mode share is highest for journeys to work to Wonthaggi at 94%. The reliance on cars to get to work in Wonthaggi is compounded by low cycling participation and public transport patronage, at 1% and 0.5%, respectively. This is important as Wonthaggi captures a significant proportion of the Shire's workforce. Approximately 36% of Bass Coast's workforce works in the Wonthaggi-North Wonthaggi townships.

Approximately 36% of Bass Coast's workforce works in the Wonthaggi-North Wonthaggi townships.

- Similar to Wonthaggi, Inverloch workers rely heavily on the car to get to work at 93%. There were no trips made by public transport. Inverloch captures 9.7% of work destinations in Bass Coast.
- Cowes workers exhibit greater diversity in travel modes to work, with car mode share slightly lower than the two main townships at 90%. It has the highest proportion of workers who ride a bike to work, across all townships in Bass Coast, at 2%.
- San Remo workers reported the greatest proportion of walked trips amongst the main centres, at 6.5%. This is higher than the rest of regional Victoria (5%) and Greater Melbourne (3%).
- The population of people who work in Grantville is substantially smaller than other main centres in Bass Coast. All journeys to work in Grantville were by car or walked.
- It should be noted that many people who drive to work in town centres will be making trips on foot once there to get lunch, go for a coffee etc. This highlights the crucial role of footpath in movement and accessibility in town centres.

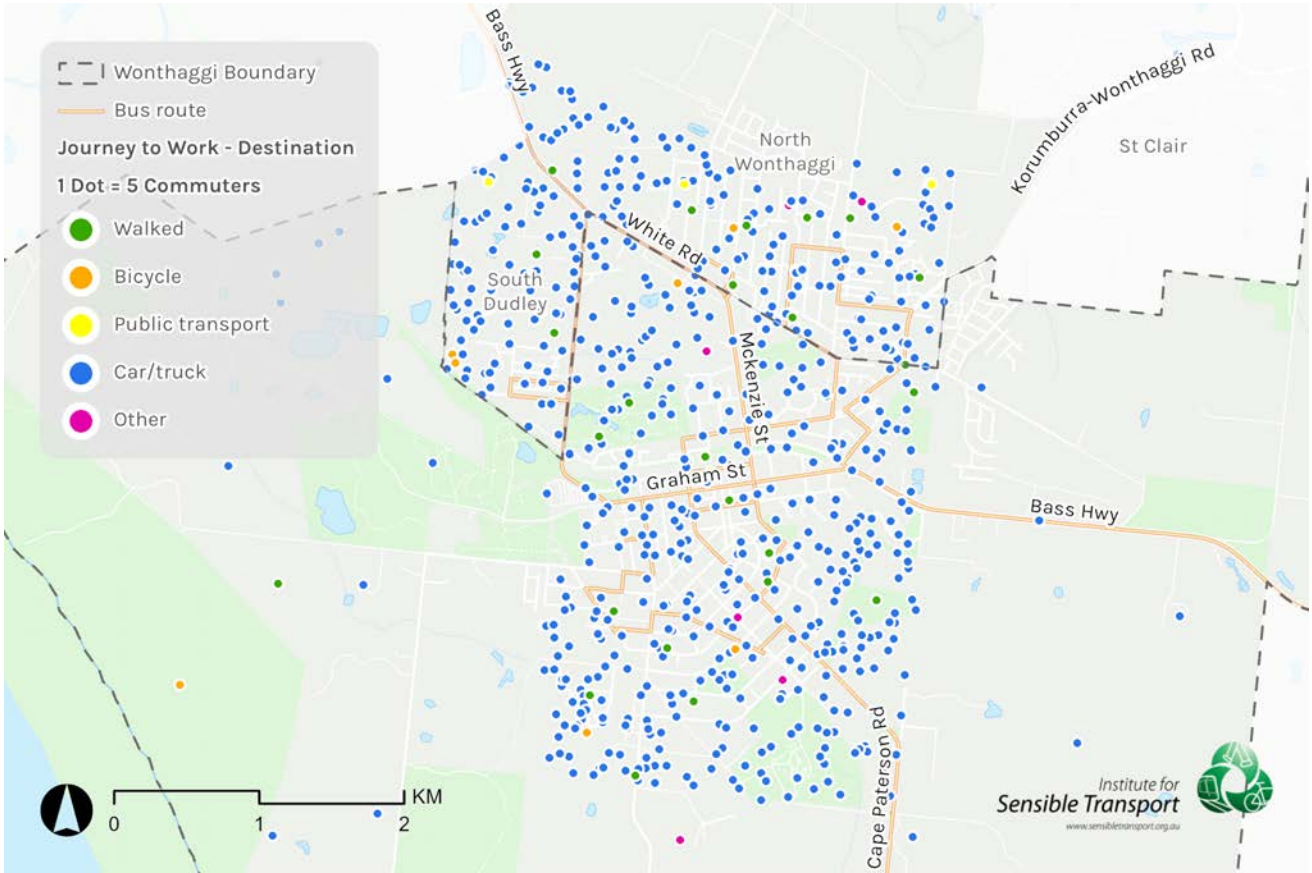


Figure 78 Journey to work, to Wonthaggi

Source: ABS Census 2021

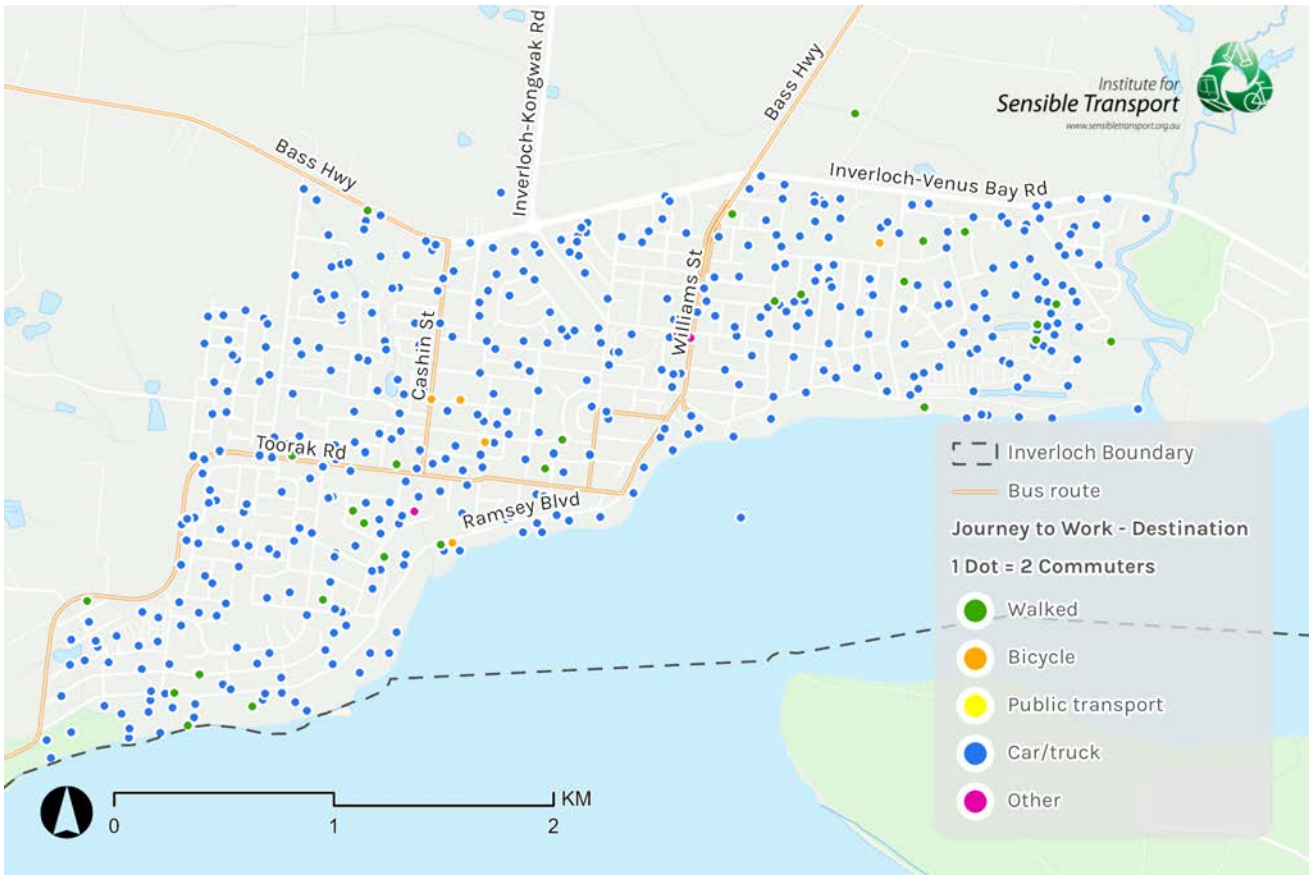


Figure 79 Journey to work, to Inverloch

Source: ABS Census 2021

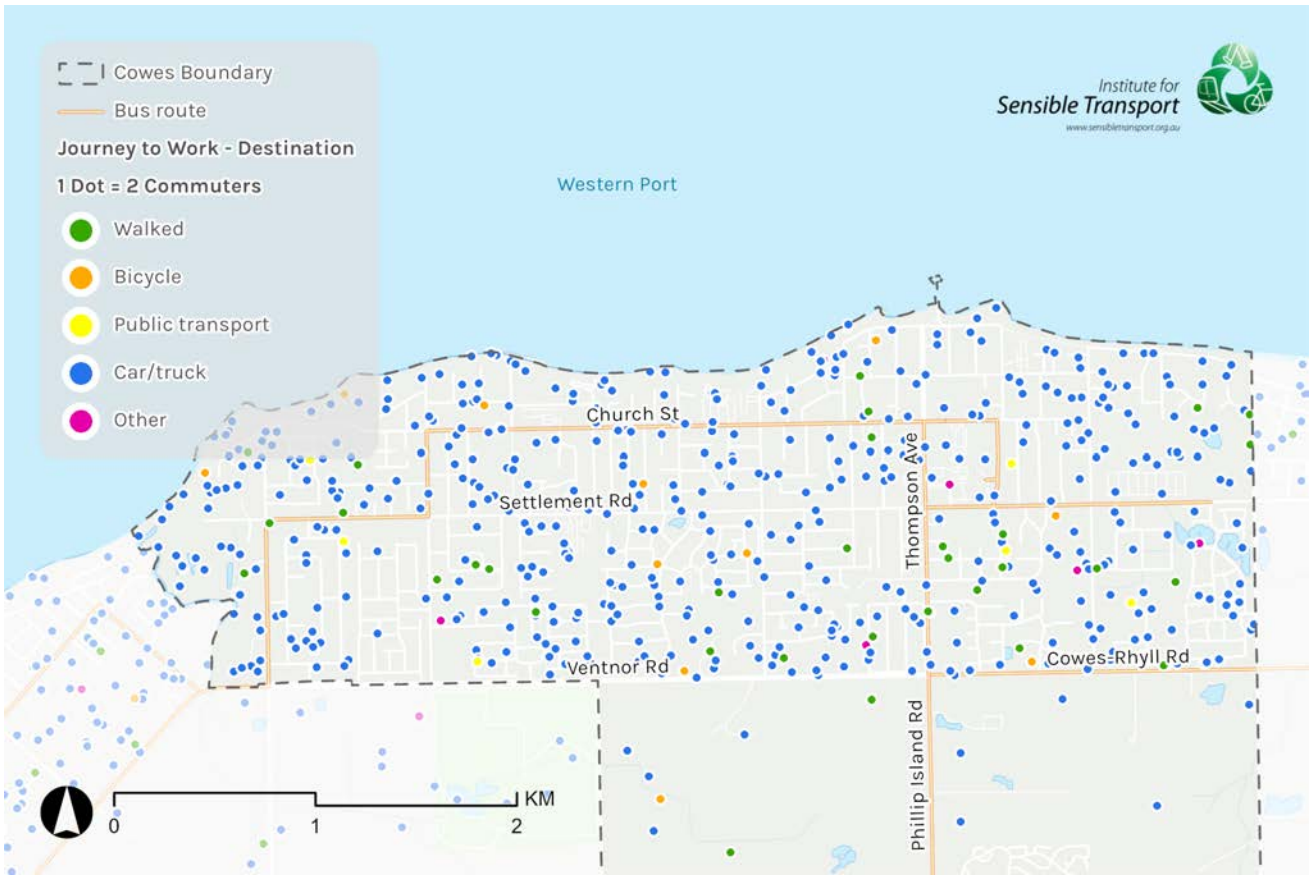


Figure 80 Journey to work, to Cowes

Source: ABS Census 2021

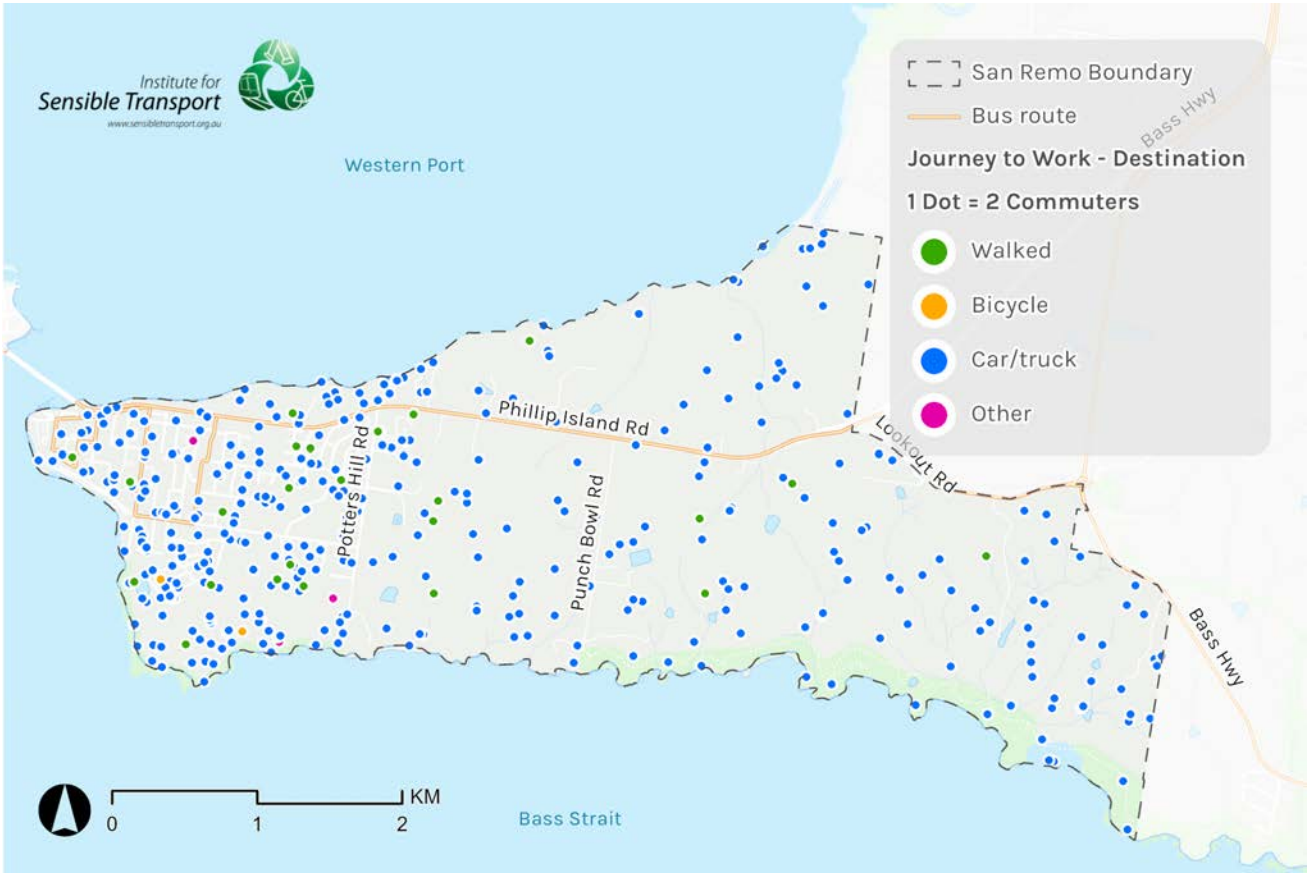


Figure 81 Journey to work, to San Remo

Source: ABS Census 2021

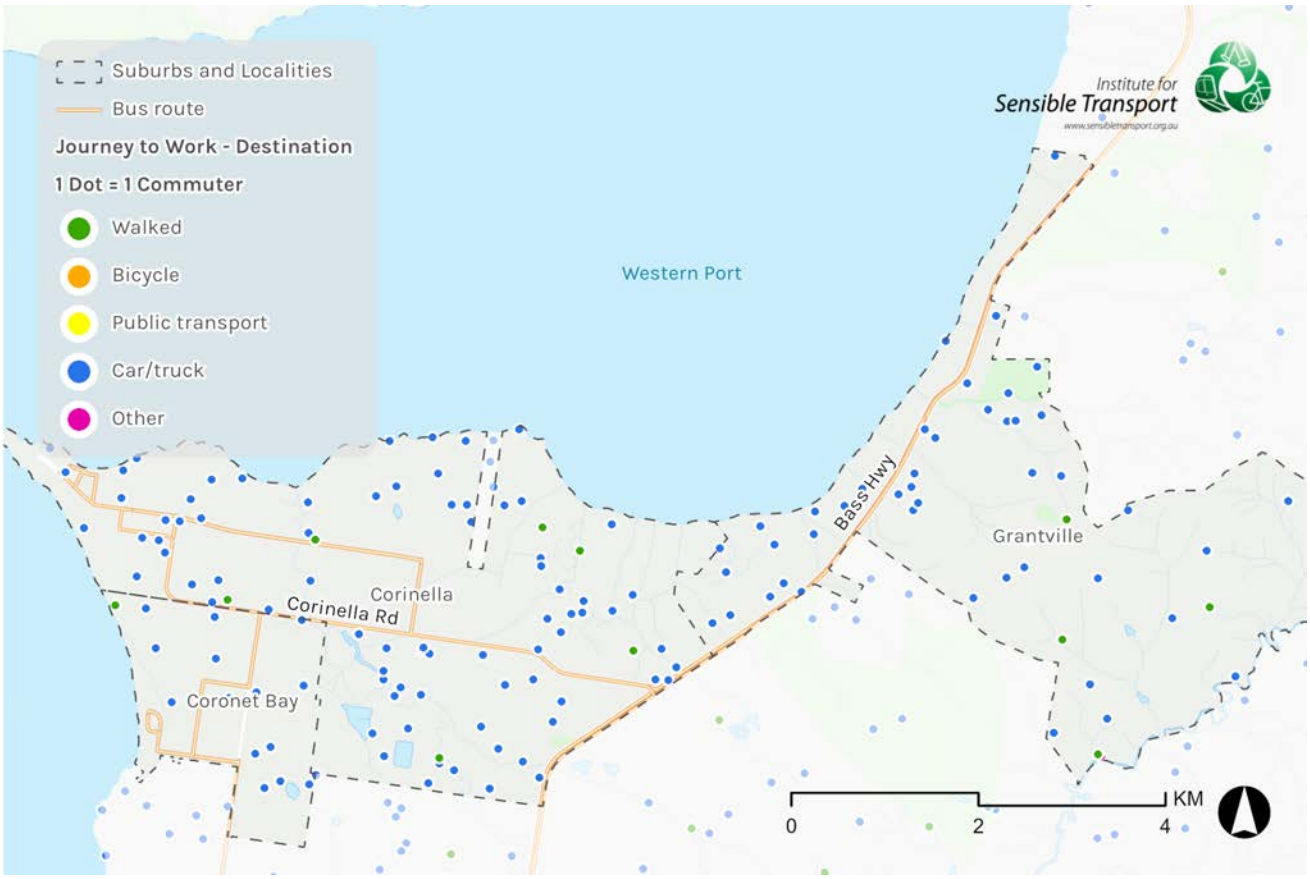


Figure 82 Journey to work, to Grantville-Coronet Bay - Corinella

Source: ABS Census 2021

6.2 Trip distance

An understanding of trip distance is critical for making strategic change to the transport system and providing people with better mobility choices. ABS Census data helps us to develop a picture of how far people travel to work. A significant proportion of Bass Coast residents travelled to work with a distance of more than 5km (65.1%). Trip distances between 1km to 2.5km were the next most reported, at 13.8%. Moreover, 9.1% of Bass Coast residents travelled less than 1km to go to work.

For all trips to work, 34.9% were under 5km. This highlights the potential to increase active travel to work in Bass Coast.

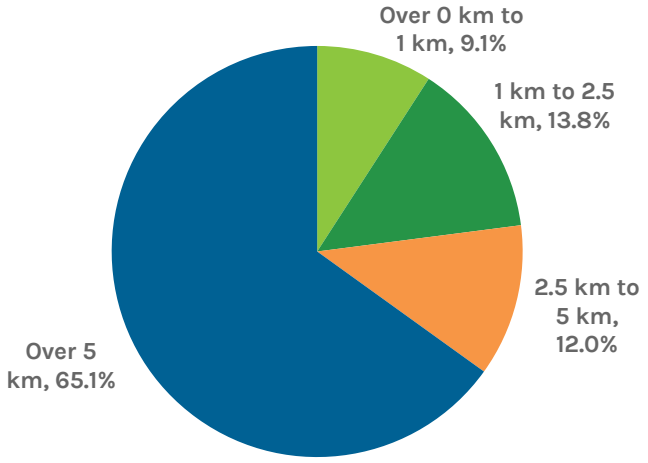


Figure 83 Trip distance for those who travelled to work, Bass Coast

Source: ABS Census 2021

The data shown in Figure 83 highlights the potential for achieving a shift towards more sustainable modes of transport. Most walking trips will be around 1km, while people will use a bike for trips up to around 5 to 6km. Some 35% of trips to work in Bass Coast are short enough that people could walk or cycle, providing the conditions were safe, attractive, and convenient.

The mode share for all trips to work under 5km in Bass Coast is shown in Figure 84. Even for these shorter trips, the car is dominant, with over 84% of people using a car, either as a driver or passenger. Walking is the next highest mode share (11.5%).

Even for trips under 5km, some 84% of people used a car, either as a driver or passenger.

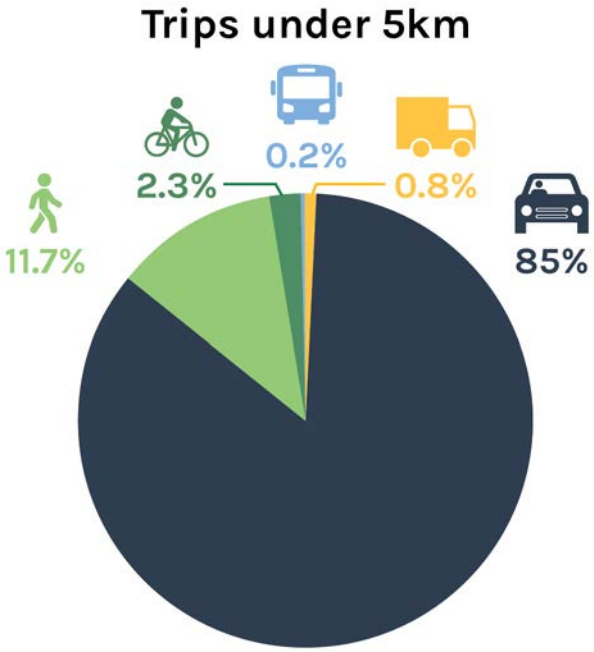


Figure 84 Mode share of trips under 5km to work

Source: ABS Census 2021

6.2.1.1 Gender analysis

It is important to consider gender variations around transport mode for journey to work. Figure 84 shows the mode share of trips under 5km to work, for males and females, respectively. Overall, females are more likely to use the car for short trips to work than males. Public transport patronage and walking participation are quite similar for females and males.

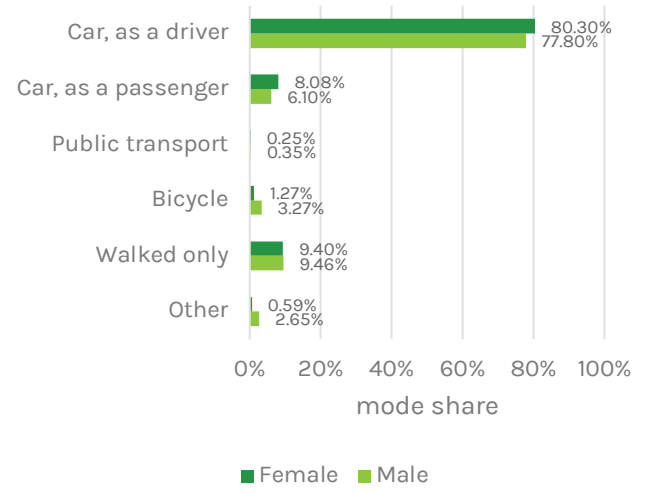


Figure 85 Mode share of trips under 5km to work by sex

Source: ABS Census 2021

Cycling participation for females, at around 1.3%, is significantly less than male participation. This may be attributed to the perception of safety associated with cycling, and for females to be more sensitive to the rider environment. It may also be the case that women undertake a large proportion of trips to get children to/from school etc, which reduces their chances of using the bicycle.

6.3 Origin Destination Analysis

The relationship between origin and destination for commuters travelling to and from Bass Coast Shire is visualised in Figure 86. The volume of people travelling to Bass Coast Shire for work, and residents travelling elsewhere for work is represented by line thickness. The thicker the line, the more commuters. The ring indicates the volume of work trips which start and end in the municipality.

A total of 16,968 commuter trips were recorded to and from Bass Coast. The majority (76.6%) of residents travelled within Victoria's Gippsland region to go to work. Around two-thirds (62.8%) of people travelling to or from Bass Coast work locally within the Shire. Outside of Bass Coast. Approximately 22.4% of trips to work were between Bass Coast and metropolitan Melbourne. South Gippsland has the highest commuter volumes between the LGAs (11.3%), followed by Cardinia (3.6%), Casey (3.4%), the City of Melbourne (2.6%), Greater Dandenong (2.2%), and Mornington Peninsula (1.3%).



Figure 86 Journey to work total commuter volumes

Source: ABS Census 2021

6.3.1 Short commute trips

Short commute trips under 5km were analysed and shown in Table 6. As the SA2 geographical boundary is the lowest common denominator for Usual Residents and Place of Work data, areas in and around Bass Coast were examined.

There were 7,620 short commute trips, up to 5km, in Bass Coast. Almost *all* (98.6%) of short commutes are by residents who both *live* and *work* in the same SA2 area. Foster had the highest local workforce (60.9%), followed by Leongatha (57%), and Phillip Island (53.1%). Wonthaggi – Inverloch had the smallest local workforce in the Shire at 43.8%. This is important because it highlights where better transport options should be prioritised.

The Wonthaggi-Inverloch path, which is about to start construction, has the potential to reduce car trips between the two towns. Providing a safe, scenic, and convenient alternative, can encourage more people to walk, cycle, or even scoot for their regular commutes and errands.

Table 6 Residents who work locally

Area	Total residents in work force*	Work locally	Work elsewhere
Foster	3,107	2,430	677
Leongatha	4,004	3,232	772
Phillip Island	3,968	3,129	839
Korumburra	3,037	1,908	1,129
Koo Wee Rup	1,459	1,296	163
Wonthaggi - Inverloch	7,869	6,255	1,614

*This only include those who travelled for work.

Source: ABS Census 2021

To further understand travel pattern for short commute trips, an Origin-Destination analysis was conducted at the *Destination Zones (DZN)* level[1]. Figure 87 shows the graphical distribution of car trips to work between *Destination Zones* (DZNs) in Bass Coast Shire. The circles shown in Figure 87 indicate trips that begin and end within the same DZN. This map shows there are strong commuter volumes between townships in the south of the Shire, extending to Cowes on Phillip Island. Internal car trips to work in Cowes and Wonthaggi area especially high, at 1,000 trips by car recorded each. This data can be used to inform the planning and development of public transport routes to best service the Shire and support the transition towards more sustainable modes.

[1] As DZNs are only available as *Place of Work* (destination) data, the corresponding origin data was created from intersecting SA1 areas to align with DZNs.

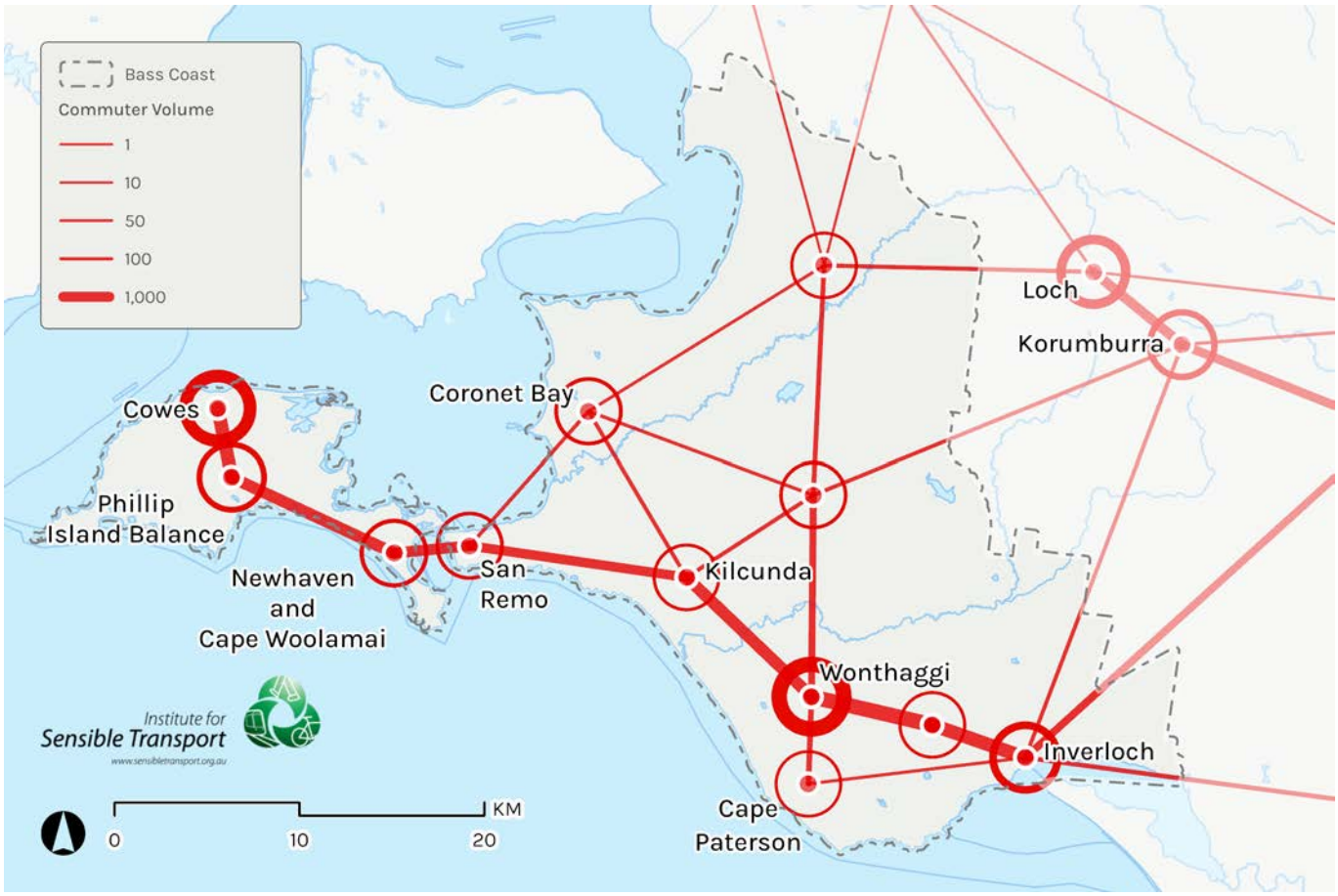


Figure 87 Origin – destination matrix map at DZN

Source: ABS Census 2021



7. Population data

This section describes current population and demographic patterns of relevance to transport and access in Bass Coast Shire.

Figure 88 provides a snapshot of the sociodemographic characteristics in Bass Coast.

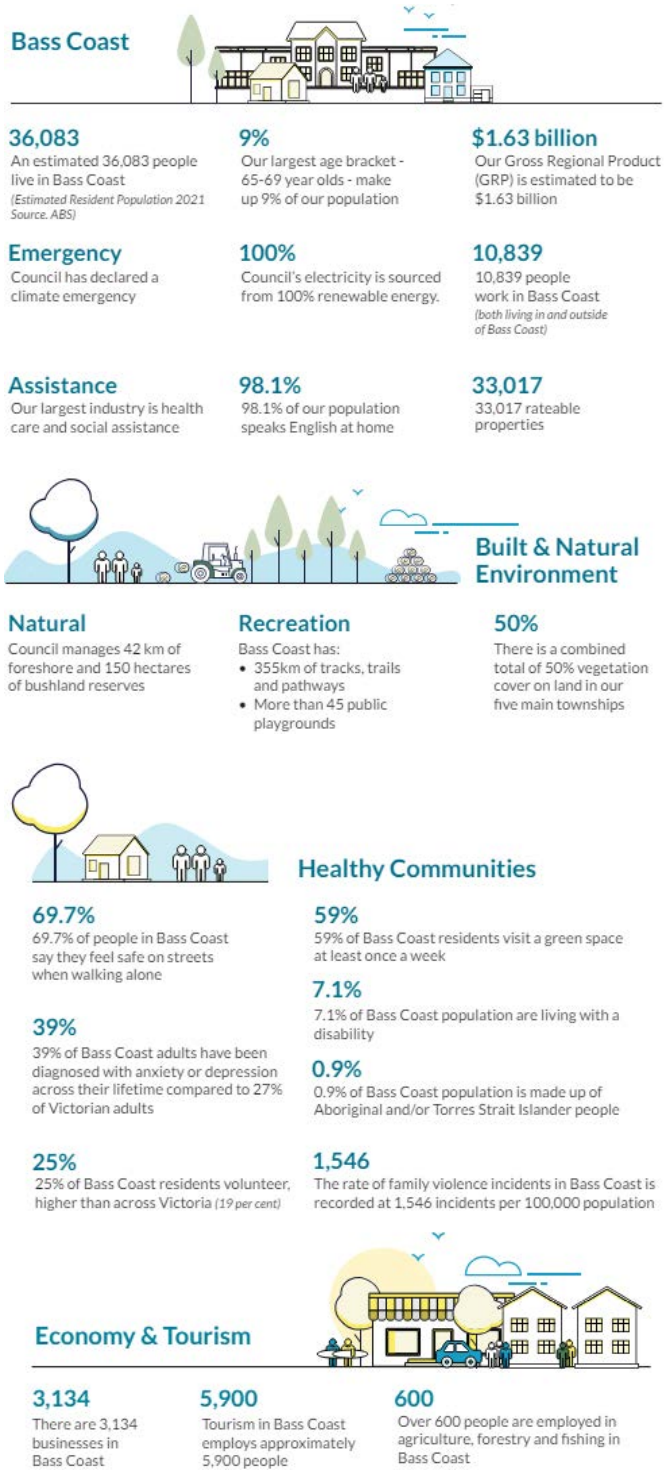


Figure 88 Sociodemographic characteristics

Source: Community Plan 2021 – 2025

7.1 Distribution

Understanding the current population distribution and demographic patterns is crucial for the development of an effective ITS for Bass Coast. At the most recent Census data, Bass Coast's total population was 40,789. However as mentioned in the *Council Plan 2021-2025,* that number increases significantly during holiday periods with large numbers of tourists.

One fact to emerge from the examination of population densities is that while Bass Coast Shire occupies a vast land area, most the population actually lives in a small proportion of the total land mass. Approximately 86% of the population resides within the defined urban centres. This translates to approximately 35,108 individuals living in these areas. The urban centres cover a combined land area of 58.9 sq km, which represents a relatively small portion of the Shire's total 865.8 sq km area. Specifically, the urban centres account for approximately 7% of the total land area but house 86% of the population.

Around 86% of the Bass Coast Shire population live within just 7% of the land.

Figure 89 provides a visual representation of the population density at the MeshBlock level. This visualisation further illustrates the concentration of residents in select areas within the municipality. It highlights the relatively compact urban environment of Bass Coast. This makes the task of providing an effective, sustainable transport system easier than if the population was evenly distributed across the LGA.

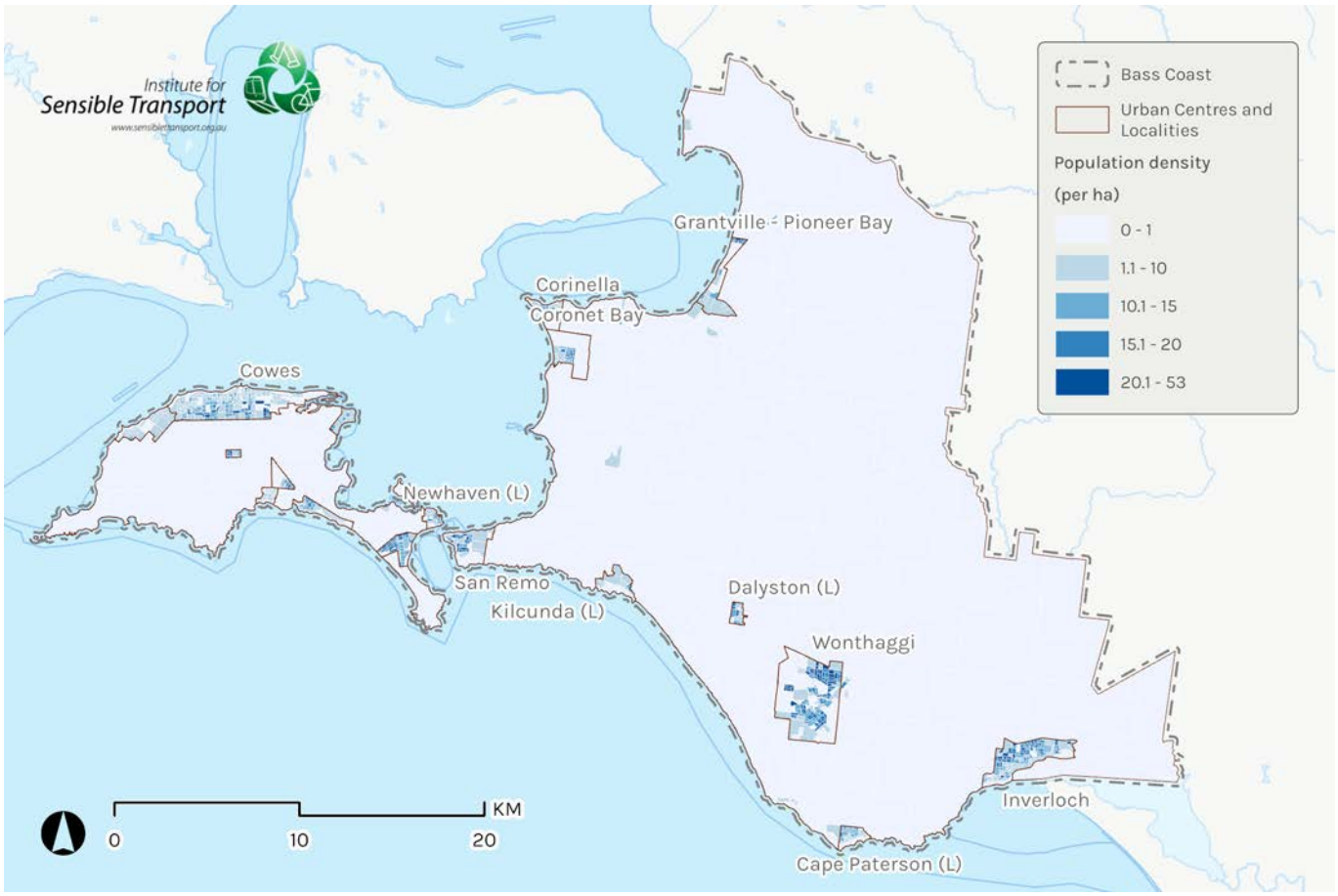


Figure 89 Population density at the MeshBlock level

Source: ABS Census 2021

7.2 Age of population

Figure 90 shows the age profile of Bass Coast Shire compared to the Greater Melbourne average. It indicates that there is a larger proportion of people aged over 60 and a lower proportion of younger people in Bass Coast in comparison to greater Melbourne. Within the six local government areas that make up the Gippsland Region[2], Bass Coast has the second highest median age of 51 after East Gippsland.

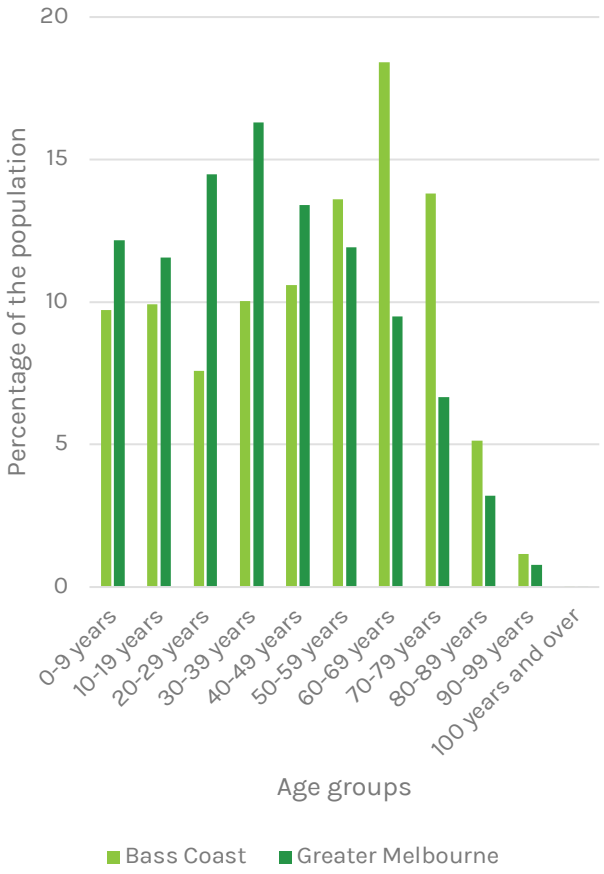


Figure 90 Age group in 2021
Source: ABS 2021

Figure 91 shows gender distribution within each age group among Bass Coast Shire residents. There is a higher proportion of female residents after the age of 30 and there is a longer life expectancy for female residents.

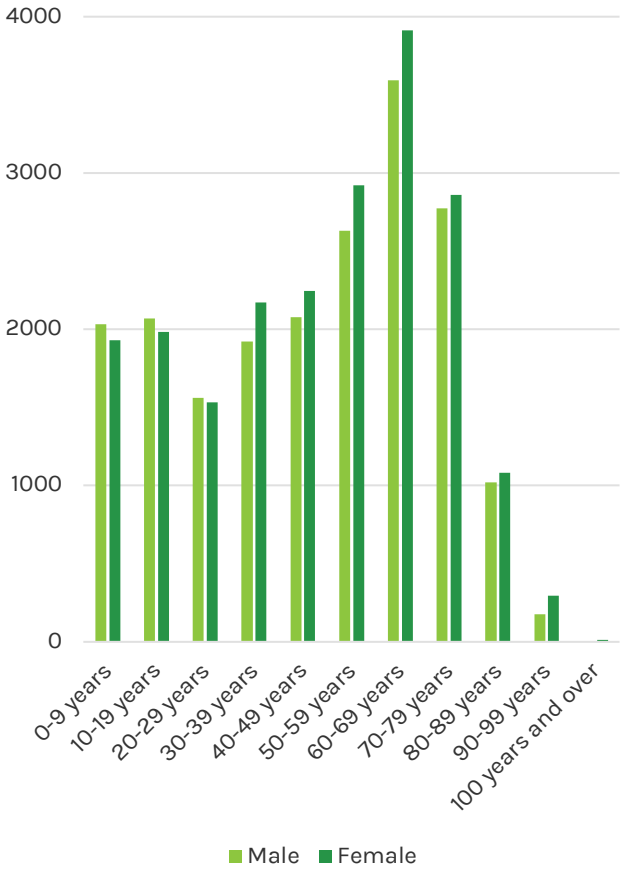


Figure 91 Gender distribution of age groups
Source: ABS 2021

As the population ages, some people will need to consider whether they continue to be fit to drive. This will present a significant problem for social connectedness in car-dependent areas. Women are more likely to recognise they are no longer fit to drive than males.[3] An ageing population is also associated with increased disability prevalence and increased need for assistance, care, programs, and health services.

7.3 Future population

As mentioned in the *Council Plan 2021-2025*, Bass Coast is one of Victoria's fastest-growing regional municipalities. This growth is likely to bring economic benefits and increased services, however, it may also present challenges such as a perceived loss of community and a 'small town feel' which may have attracted many residents. Table 7 shows the population forecast for townships in Bass

[2] The Gippsland Region is made up of Bass Coast, Baw Baw, East Gippsland, Latrobe, South Gippsland and Wellington.

[3] Gwyther, H., & Holland, C. (2012). The effect of age, gender and attitudes on self-regulation in driving. Accident Analysis & Prevention, 45, 19–28. https://doi.org/10.1016/j.aap.2011.11.022

Coast Shire. The population of Bass Coast Shire is expected to grow by 17% between 2021 and 2036, which is an increase of 6,769 people. The annual growth rate is estimated to be 0.77%.

The population of Bass Coast Shire is expected to grow by 16.66% between 2021 and 2036.

Figure 92 shows small areas population forecast. This map indicates the spatial distribution of population growth. It outlines that most of the municipality is expected to undergo population growth, indicating areas where there may be increasing demands on transport infrastructure and services. However, it is notable that Cowes and Phillip Island more generally are projected to see relatively stable populations over the forecast period.

Table 7 Bass Coast Shire population forecast

	Pop 2024	Pop 2036
Waterline (Westernport Townships)	5,178	5,997
Rural Balance	3,339	3,760
Wonthaggi - South Dudley - Cape Paterson	7,151	8,513
Phillip Island Balance	5,269	5,243
Cowes	8,257	8,345
Inverloch - Pound Creek	6,625	7,600
North Wonthaggi	3,839	5,544
San Remo	1,786	2,407

Source: i.d., forecast.id

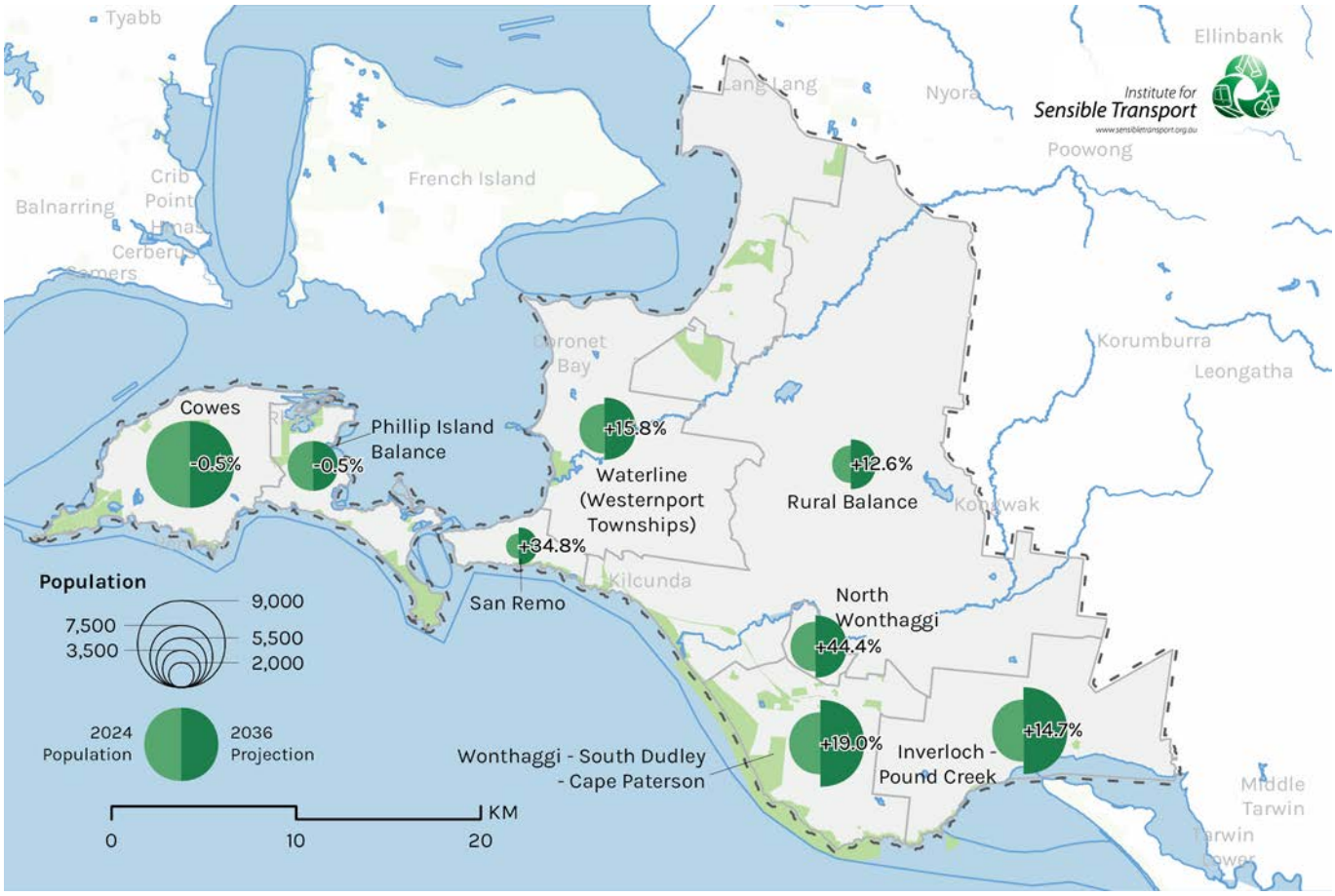


Figure 92 Small area population forecast 2036

Source: .id, forecast.id

Understanding the spatial distribution of population growth is important when anticipating where transport services may need to be expanded or improved to accommodate the evolving needs of residents. A graphic representation of the population forecast available from forecast.id is shown in Figure 93. While the spatial distribution of where new residents will reside is not accurate at a macro scale, the map indicates that North Wonthaggi will see the most intense growth.

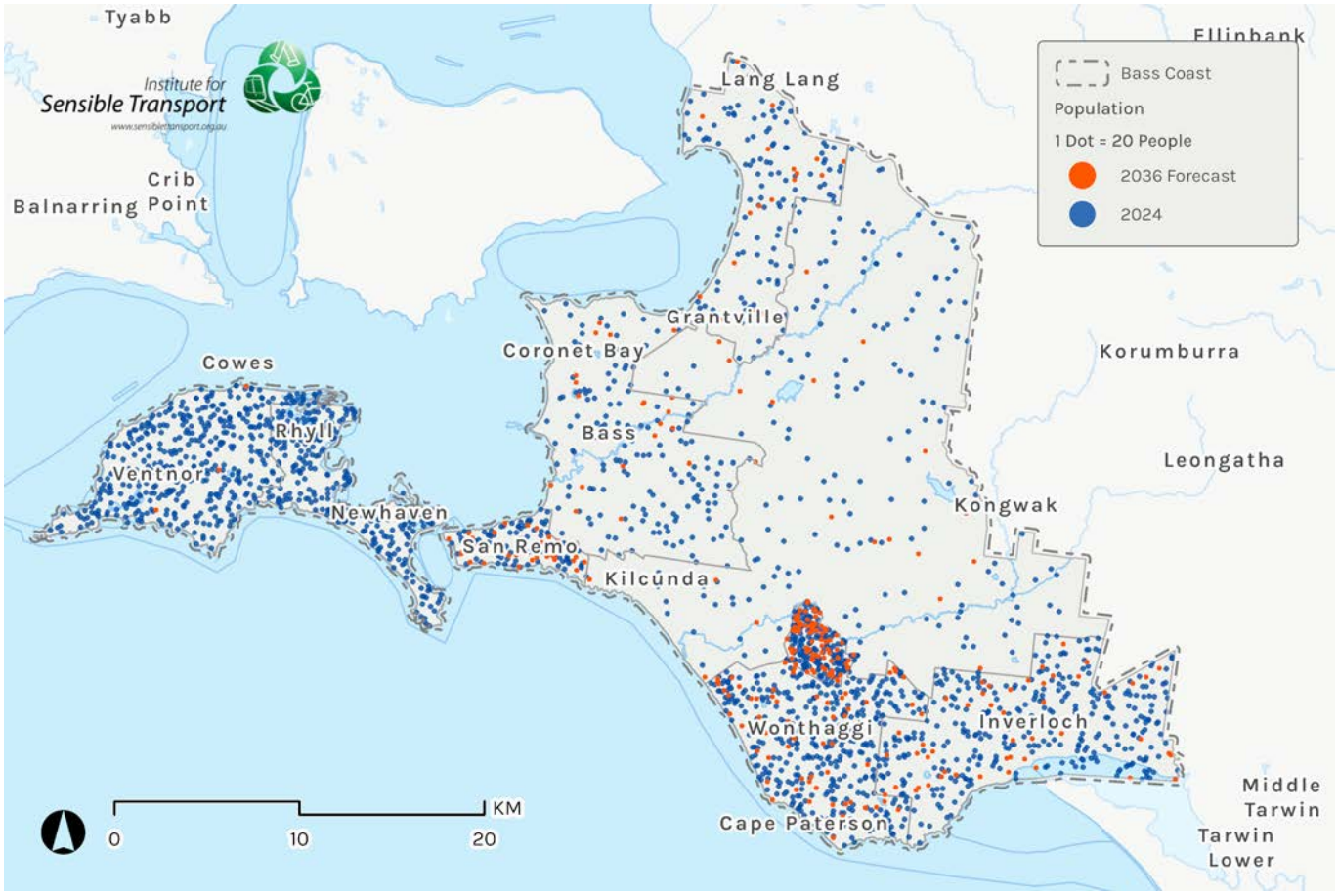


Figure 93 Population in 2036

Source: .id, forecast i.d

7.4 Socio-economic profile

The ABS measures socio-economic status through a series of indexes called Socio-Economic Indexes For Areas (SEIFA). The Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD) summarises the average level of advantage or disadvantage within an area. IRSAD scores for statistical areas across Australia are ranked and divided into equal groups of ten, known as deciles. Areas with decile numbers of 1 have the highest average level of disadvantage, and areas with decile numbers of 10 have the highest average advantage.

The SEIFA Index by IRSAD for Bass Coast (LGA) is shown in Figure 94. The IRSAD Index reveals that the range of advantages and disadvantages is between one and eight. Cowes and Coronet Bay[4] have pockets where the most disadvantaged reside. The largest concentration of disadvantage lies in Wonthaggi and North Wonthaggi, where the highest IRSAD score is four. The large areas of advantage on Phillip Island as well as the south-east of the Shire, are likely a reflection of the low-density country-style living, attracting people with greater socio-economic advantage.

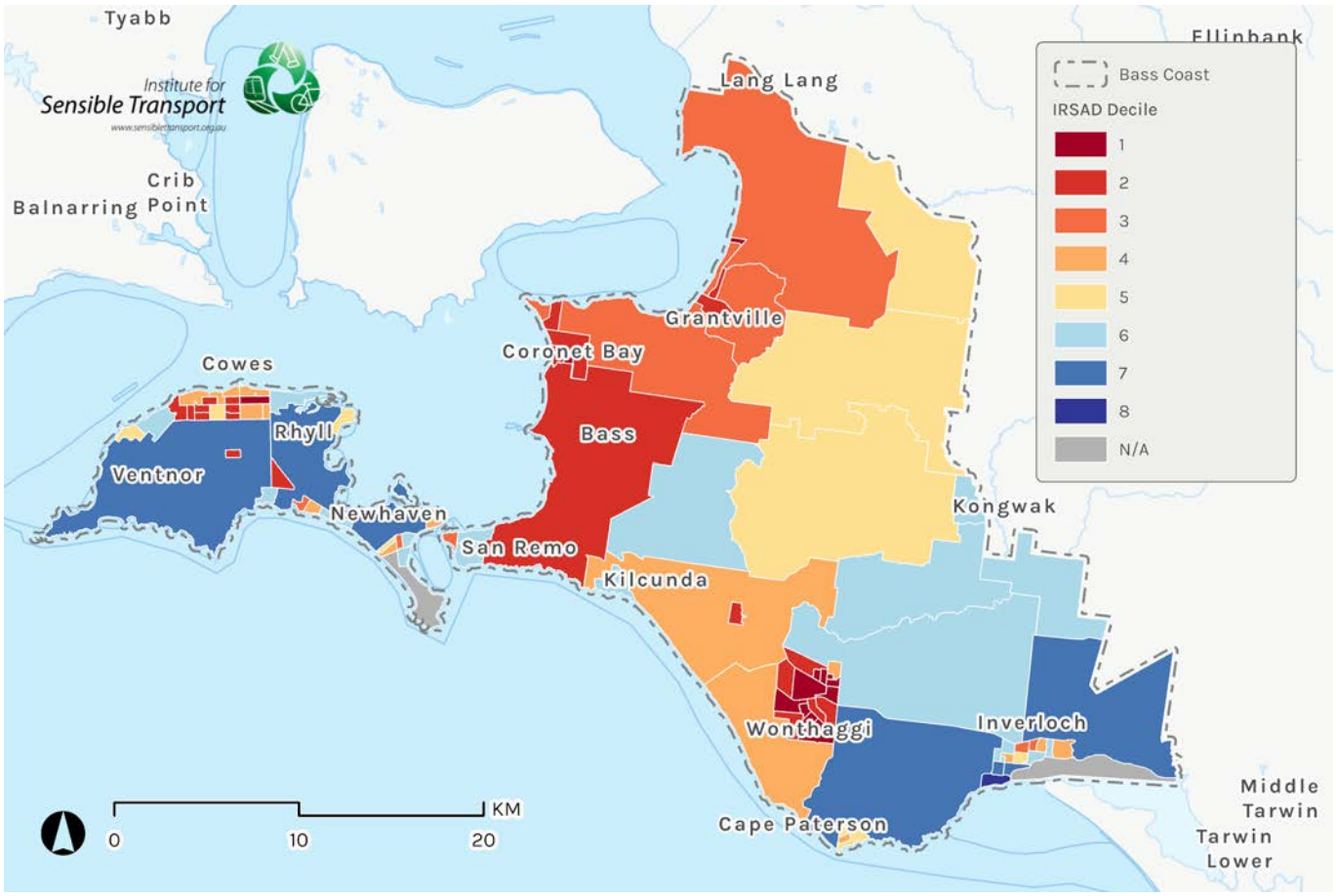


Figure 94 SA1s by IRSAD Decile

Source: ABS Census 2021

[4] Coronet Bay includes Corinella

8. Land Use



This section describes the land use policies and legislation that influence transport behaviour. Land use has a powerful impact on travel patterns. Low-density, single-use zoning is associated with high levels of car use. Conversely, medium-density, mixed-use development, especially when coupled with high-quality public transport, has been shown to diversify transport opportunities.

Bass Coast is part of the Gippsland Region, a state-significant region in Victoria. Wonthaggi is identified in the Gippsland Regional Growth Plan, as well as Plan Melbourne, as a regional centre designated for population growth.

Figure 95 shows Wonthaggi and Inverloch sit along a key corridor between Melbourne to the west, and the rest of East Gippsland to the north-east. Wonthaggi, along with Inverloch and Cape Paterson, form a sub-regional network where transport networks should be strengthened.

The *Bass Coast 2041 Community Vision* outlines the community's vision for the future of the municipality. It envisions a future characterised by inclusivity, accessibility, economic growth, connected places and spaces, a focus on health and wellbeing, as well as sustainable living.

Bass Coast faces population growth, with its population expected to grow by more than 16% by 2036. Most of the municipality is expected to undergo population growth as Wonthaggi, North Wonthaggi, and San Remo. Managing this rapid expansion is a primary challenge, with a focus on protecting natural areas, addressing bushfire hazards, and planning for required infrastructure effectively.

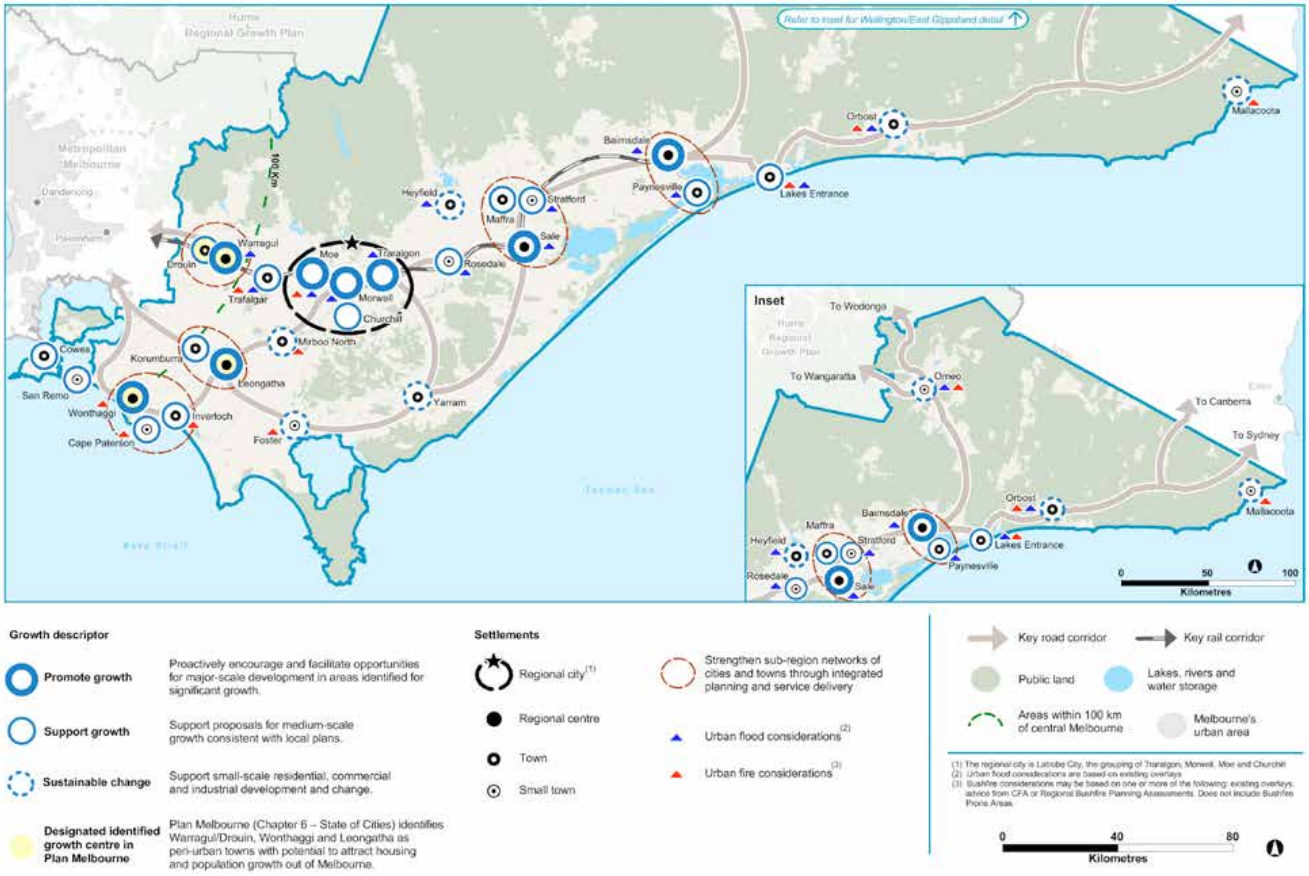


Figure 95 Future directions for settlement

Source: Gippsland Regional Growth Plan

The linkage between land use and transport/mobility patterns is a foundational concept in urban planning. It is based on the intricate relationship between the way land is developed and the transport choices individuals make. Some of the contributing factors are:

- Location of activities,
- Land-use mix,
- Access to different transport modes.

Sustainable land use planning can actively encourage sustainable, efficient, and environmentally responsible transport choices, leading to tangible benefits, including reduced traffic congestion, improved air quality, and an enhanced quality of life for residents.

8.1 Planning Zones

Bass Coast has areas planned and undergoing intensified development in and around Cape Patterson, Cowes, and Wonthaggi. The most intense development is planned around Wonthaggi, one of five planned Regional Centres of State significance. It should be noted that lack of available industrial areas around Wonthaggi causes issues with trucks in residential areas. Therefore, more industrial zoned areas would benefit with freight routes. Table 8 shows the number of different land uses applied for urban centres and localities. This is a non-statistical geographical area provided by the Australian Bureau of Statistics. Wonthaggi, Inverloch, and Cowes have the highest diversity of land use in Bass Coast. San Remo and Cape Paterson have a modest level of diversity in land use despite future directions for moderate population growth.

Table 8 Land use diversity at Urban Centres and Localities

Urban Centre and Locality (excluding Remainder of State)	No. of different land use zones
Wonthaggi	83
Inverloch	56
Cowes	46
Grantville - Pioneer Bay	30
Ventnor (L)	21
San Remo	21
Corinella	16
Kilcunda (L)	15
Newhaven (L)	14
Coronet Bay	11
Smiths Beach (L)	9
Dalyston (L)	9
Cape Paterson (L)	9
Surf Beach - Sunderland Bay (L)	9
Rhyll (L)	8
Sunset Strip (L)	7
Wimbledon Heights (L)	5
Cape Woolamai	5

Source: DELWP 2023

Figure 96 shows a simplified representation of land use zones in Bass Coast. Most notable are the Residential Growth Zones near the waterfront in Cowes, and the Urban Growth Zones to the north and east of Wonthaggi. Most of the land in the Shire remains as Farming Zones.

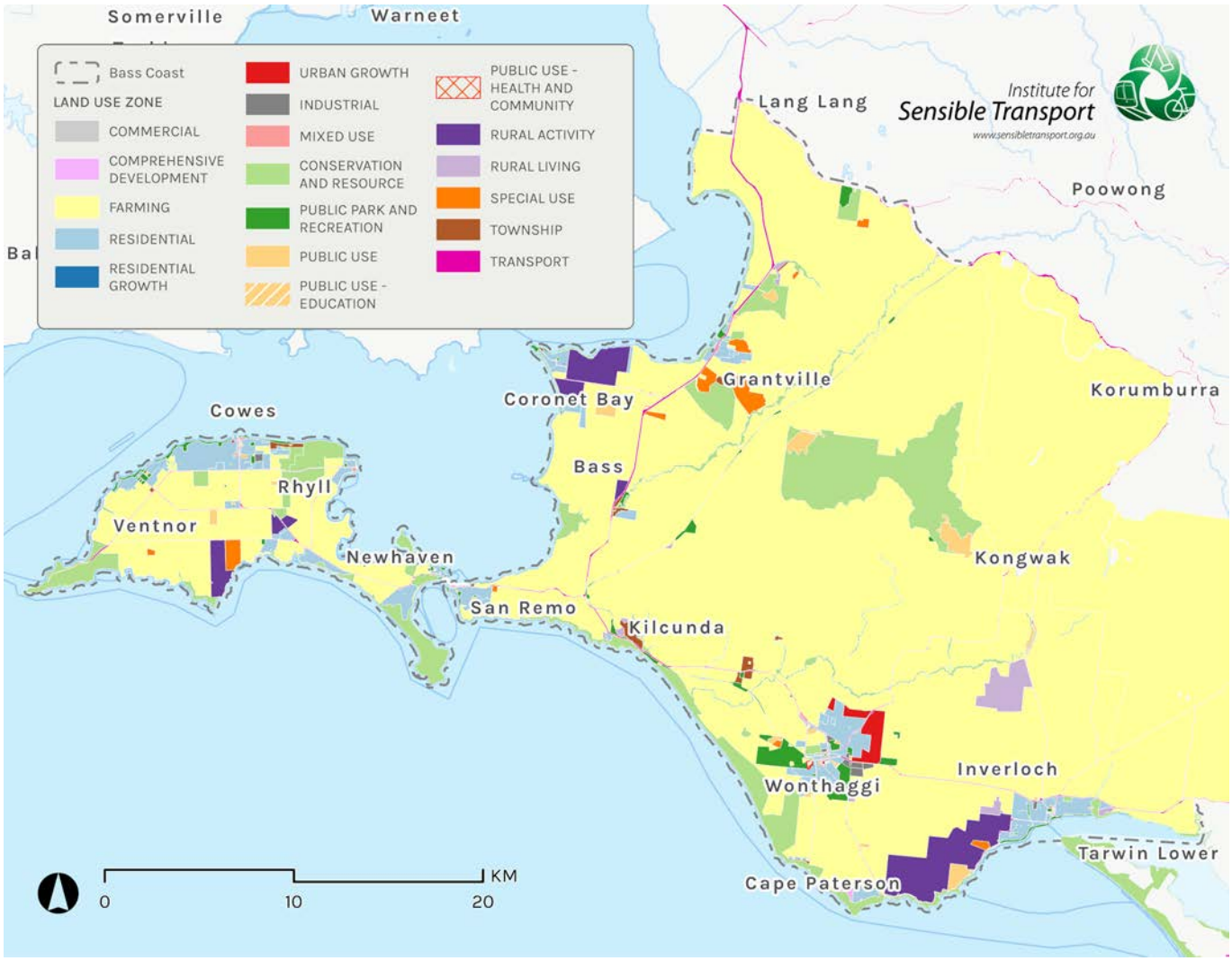


Figure 96 Land use zones

Source: DELWP 2023

8.3 Planning Overlays

There are 12 schedules for the Design and Development Overlay (DDO) in the Bass Coast Planning Scheme. The objectives of DDO1, DDO9, DDO10, DDO12, and DDO13 are to control development and providing better amenity. The controls include strengthening the interface between residential areas and the coastline. The Phillip Island airfield is protected by DDO2, while emergency flight paths are protected by DDO5, DDO6, DDO7, and DDO8. DDO4. DDO11 facilitates diversity and density of housing and accommodation in the Cowes Activity Centre.

There are 24 schedules for the Development Plan Overlay (DPO). DPO1 specifies the construction of roads in the development plan. Besides providing road access, DPO2, DPO4, DPO5, DPO8, DPO9, DPO11, DPO14, DPO18 also requires pedestrian and bicycle paths to be included. Carparking, loading bays, bicycle parking along with pedestrian access are requirements in DPO3. DPO6 requires road and car parking to be provided in Cowes South-East industrial and low-density residential area. DPO12, DPO13, DPO15, DPO16, DPO19, DPO20, DPO22, DPO23, DPO24, and DPO25 require a traffic management plan to be included as a condition of the planning permit. The objective for DPO21 is to promote housing diversity and affordability in the Wonthaggi North East Growth Area but does not articulate improving access to existing urban areas or the provision of transport choices. DPO7 and DPO10 concern developments in hamlets and other land uses with no focus on transport issues.

There is one schedule to the Public Acquisition Overlay (PAO) which specifies acquiring land for road widening along the Bass Highway for road widening, and along Marine Parade in San Remo for right of way.

There is one schedule for the Developer Contributions Plan Overlay (DCPO) which covers areas in North Wonthaggi and implements the Wonthaggi North East Development Contributions Plan. This overlay allows Council to collect contributions to build transport infrastructure as specified in Clause 45.06.

Sections of arterial roads such as White Road, Loch-Wonthaggi Road, and Korumburra–Wonthaggi Road as subjected to flooding as indicated by the Land Subject to Inundation Overlay (LSIO).

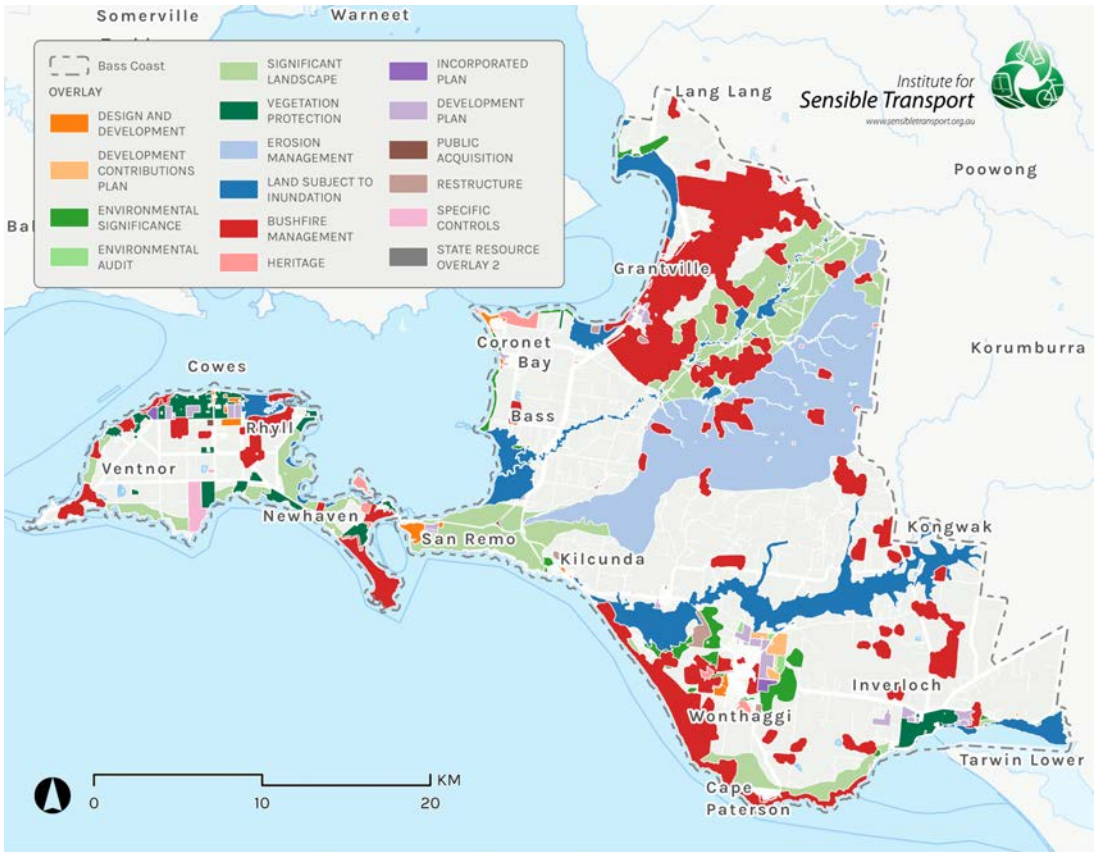


Figure 97 Planning overlays

Source: DELWP 2023

8.4 Structure Plans

This Section provides a summary of structure plans in Bass Coast. Structure plans illustrate where planned growth and developments are set to occur. These plans guide land allocation for different purposes. Within the context of Bass Coast ITS, these plans can facilitate the integration of various transport modes and promote accessibility and connectivity.

8.4.1 Cowes Silverleaves Ventnor Wimbledon Heights Structure Plan, 2010

This Structure Plan identifies key strategic influences:

- Population growth and demographic changes,
- Land supply and demand,
- Climate change,
- Movement, parking, and access,
- Infrastructure.
- Some of the preferred locations for residential density and movement and access improvement are represented in Figure 98

Movement network and car parking strategies are:

- Strengthen links between Cowes and the mainland,
- Provide more sustainable transport options, public and active transport,
- Create an effective and efficient road network considering seasonal changes,
- Provide enough parking.



Figure 98 Local Structure Plan

Source: Cowes Silverleaves Ventnor Wimbledon Heights Structure Plan, 2010

8.4.2 San Remo Newhaven Cape Woolamai Structure Plan, 2010

This Structure Plan identifies the strategic planning issues facing the towns considering future growth. Some of the transport and movement issues mentioned in this plan are:

- Parking and circulation issues in San Remo
- Traffic management measures in Newhaven may be needed at the Phillip Island Road entrance into the town.
- Local area traffic management measures in Cape Woolamai may be required although most of the nearest services are in Newhaven and San Remo.
- Travel between communities for shopping, recreation, and work has been observed.
- San Remo and Newhaven were identified as 'moderate growth capacity' and Cape Woolamai was identified as 'low growth capacity' under the State Government's policy – Costal Spaces.

The strategic directions of this plan are:

- Maintain unique town character
- Offer good retail, commercial, and employment options
- Provide eco-friendly tourist activities and accommodations
- Have varied housing with energy and water conservation principles
- Consistent coastal town design
- Vibrant town centres with ample parking
- Appropriate community services and infrastructure
- Protect coastal environment
- Quality tourism development
- Safe and attractive environment with pedestrian and bicycle access

The main aim of this Plan is to form a sustainable community.

New developments in San Remo, Newhaven, and Cape Woolamai are shown in Figure 99, Figure 100, and Figure 101 respectively. The light red colour shows future residential areas. Other notable areas are in yellow and purple which denote tourist commercial and the commercial core respectively, as well as the light brown which shows where large lot residential will be situated.

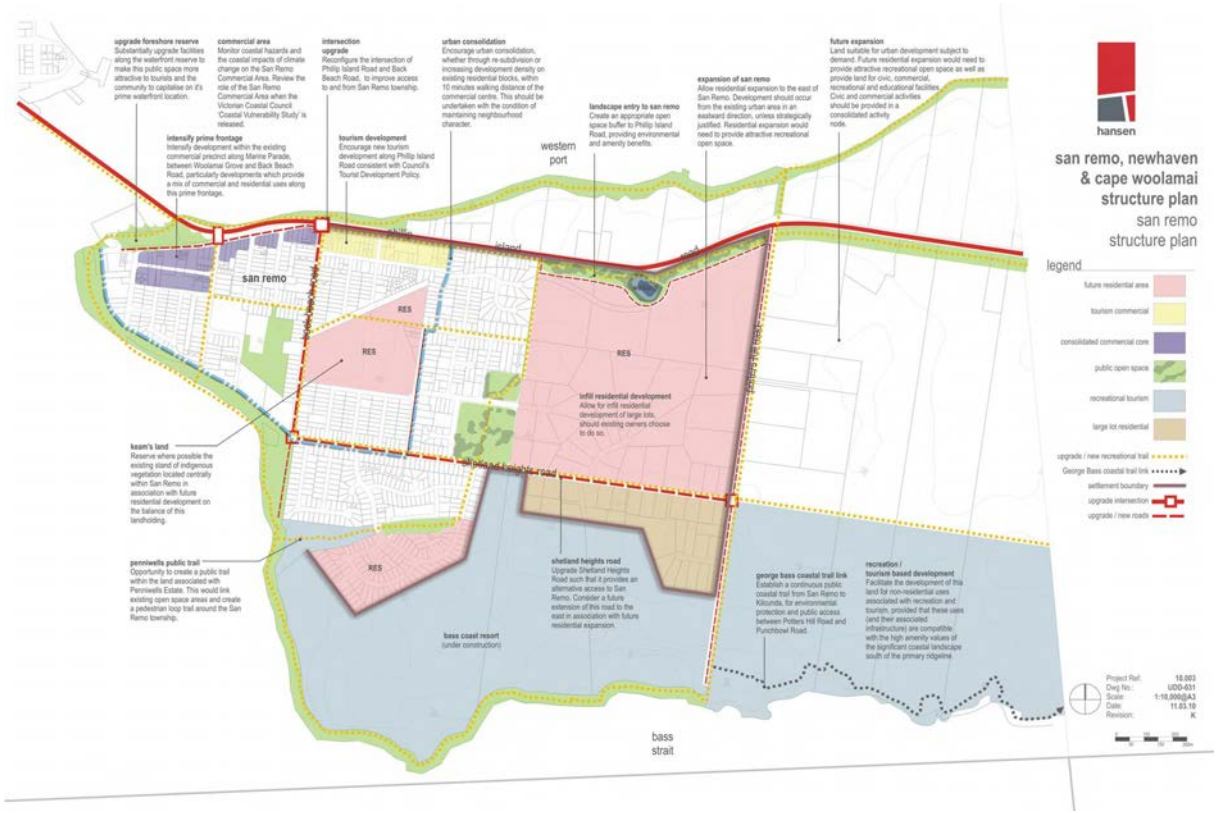


Figure 99 San Remo Structure Plan

Source: San Remo, Newhaven and Cape Woolamai Structure Plan, 2010

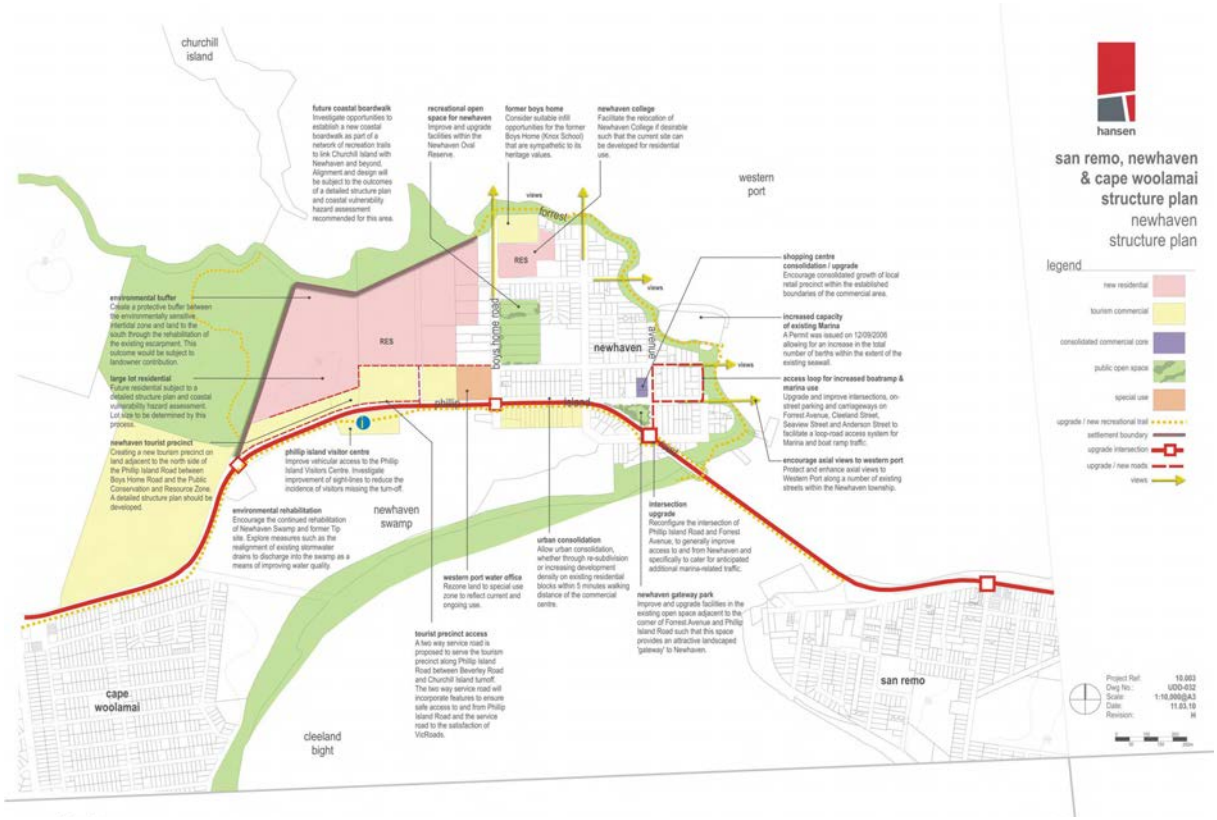


Figure 100 Newhaven Structure Plan

Source: San Remo, Newhaven and Cape Woolamai Structure Plan, 2010



Figure 101 Cape Woolamai Structure plan

Source: San Remo, Newhaven and Cape Woolamai Structure Plan, 2010

8.4.3 Dalyston Structure Plan, 2018

This Structure defines Council's preferred direction to manage future population and land use. Key directions for this Plan are:

- Settlement and housing
- Land for employment
- Built environment and character
- Landscape and natural environment
- Public open space and recreation
- Connectivity
- Community infrastructure
- Physical infrastructure.

The vision for this Plan is to facilitate land use development in a way that:

- Encourages Physical Activity
- Facilitates Community Interaction
- Respects the Environment

Some of the objectives of this Plan are:

- Development of sustainable urban areas
- Development of walkable neighbourhoods

Some of the actions to improve connectivity are:

- Safe pedestrian crossing across the Bass Highway
- Appropriate links between popular destinations
- End-of-trip facilities for public and active transport users.

8.4.4 Wonthaggi Structure Plan, 2018

This Plan identifies strategic directions for land use to manage population growth. Key themes in this document are:

- Settlement and housing
- Economic development
- Built environment and character
- Public open space, recreation and environment
- Connectivity
- Community infrastructure
- Physical infrastructure.

Vision for this Plan has four major elements:

- Support the on-going development of Wonthaggi as the regional centre for south west Gippsland
- Encourage physical activity
- Facilitate community interaction
- Respect the environment.

Some of the objectives of this plan are:

- Walkable and cycle-able town
- Diverse, accessible, and quality public open space
- Respect the character of Wonthaggi
- Maximise employment opportunity.

Figure 102 shows future land use planning, cycling corridors, and pedestrian priority areas. Some of the actions under the connectivity theme are:

- Advocating VicRoads to upgrade Graham Street/ McKenzie intersection and other problem intersections
- Implementing a priority pedestrian network
- Link between Wonthaggi North East Growth Area and Wonthaggi
- Support implementation of proposed Principle Bicycle Network (PBN)
- Investigate car parking options in the CBD
- Improve safety in pedestrian crossings.

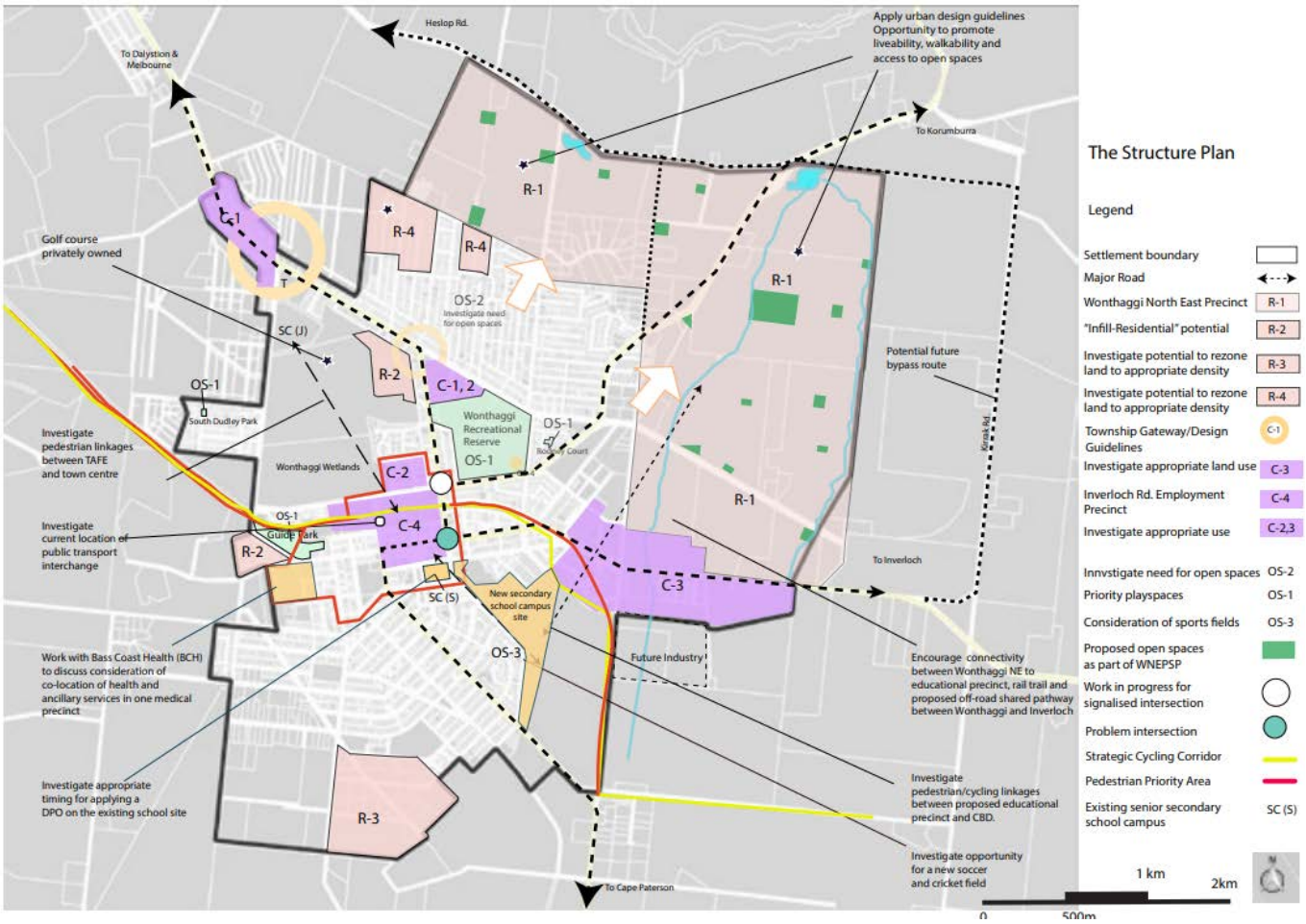


Figure 102 Wonthaggi Structure Plan

Source: Wonthaggi Structure Plan, 2018

8.4.5 Bass Coast Residential Land Supply and Demand Assessment, 2018

This report provides an assessment of residential land supply and demand assessment across Bass Coast Shire. Estimated land supply in July 2018 was 8,059 in Bass Coast Shire. This includes 4,050 existing vacant lots and 4,009 in broad hectare lot capacity. The estimation of future residential land demand is dependent on two demand scenarios:

- Victoria in Future 2016 dwelling projections
- The average number of Dwelling Permits from the past five years.

The possible future dwelling requirements can vary between 462 to 509 dwellings per annum, which would be equivalent to building around 6,930 to 7,635 new dwellings from 2016 to 2031.

Figure 103 shows changes in residential land supply since 2013, there is a declining trend in terms of number of lots.

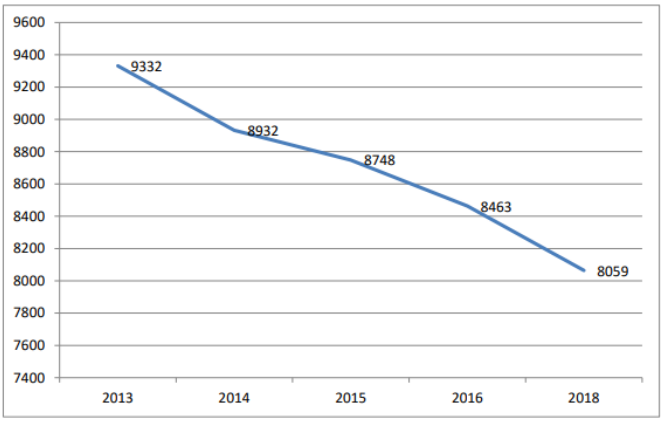


Figure 103 Land supply trends

The growth in residential population will require an additional 5,416 occupied dwellings and 2,220 unoccupied dwellings, resulting in a total of 7,636 new dwellings between 2016 and 2031.

Over last five years, there has been an increase in new dwelling permits issued in Bass Coast Shire. It is worth noting that a reduction in land supply and an increase in building approvals led to a decrease in the number of years of residential land supply.

8.5 Retirement Living

With a median age of 51, Bass Coast has a significant ageing population. Figure 104 (people aged 65 years and above) per hectare, at the SA1 level across the municipality. The densest areas with older adults are in Cowes, Wonthaggi, North Wonthaggi, and Inverloch. Coronet Bay[5], Cape Paterson Pioneer Bay, and Rhyll also have areas where moderately high densities of older adults are gathered.

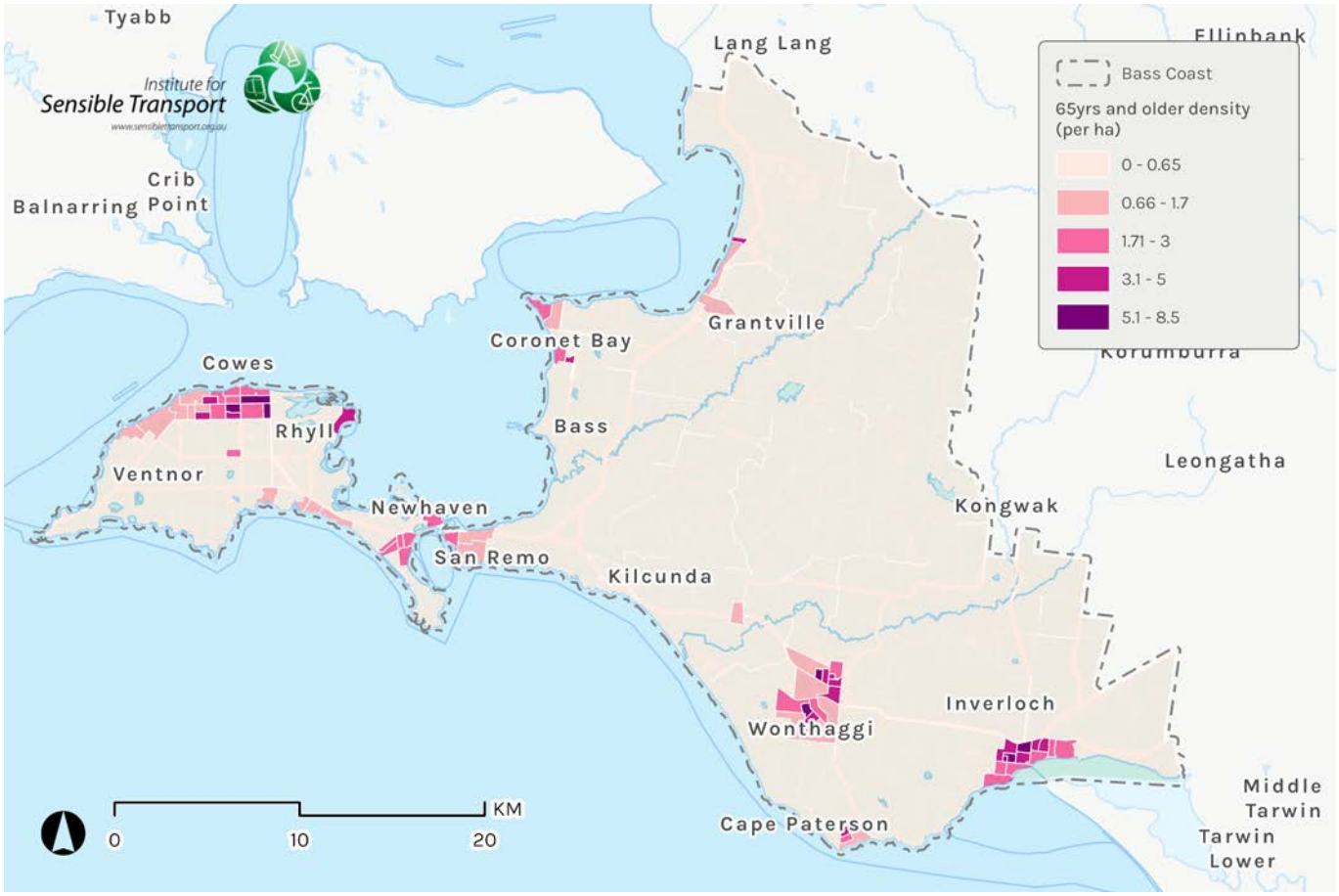


Figure 104 Density of older adults per hectare

Source: ABS Census 2021

[5] Coronet Bay includes Corinella

Hospitals and aged care facilities in Bass Coast include one public hospital in Wonthaggi, one health hub in Cowes, seven residential aged care facilities, and four retirement villages. With health services largely based in Cowes and Wonthaggi, older adults are dependent on the regional bus network to travel to these services. Despite the majority of aged care facilities and retirement villages located within 400m of a regional bus stop, residents are let down by the poor service levels highlighted in Section 4.2.

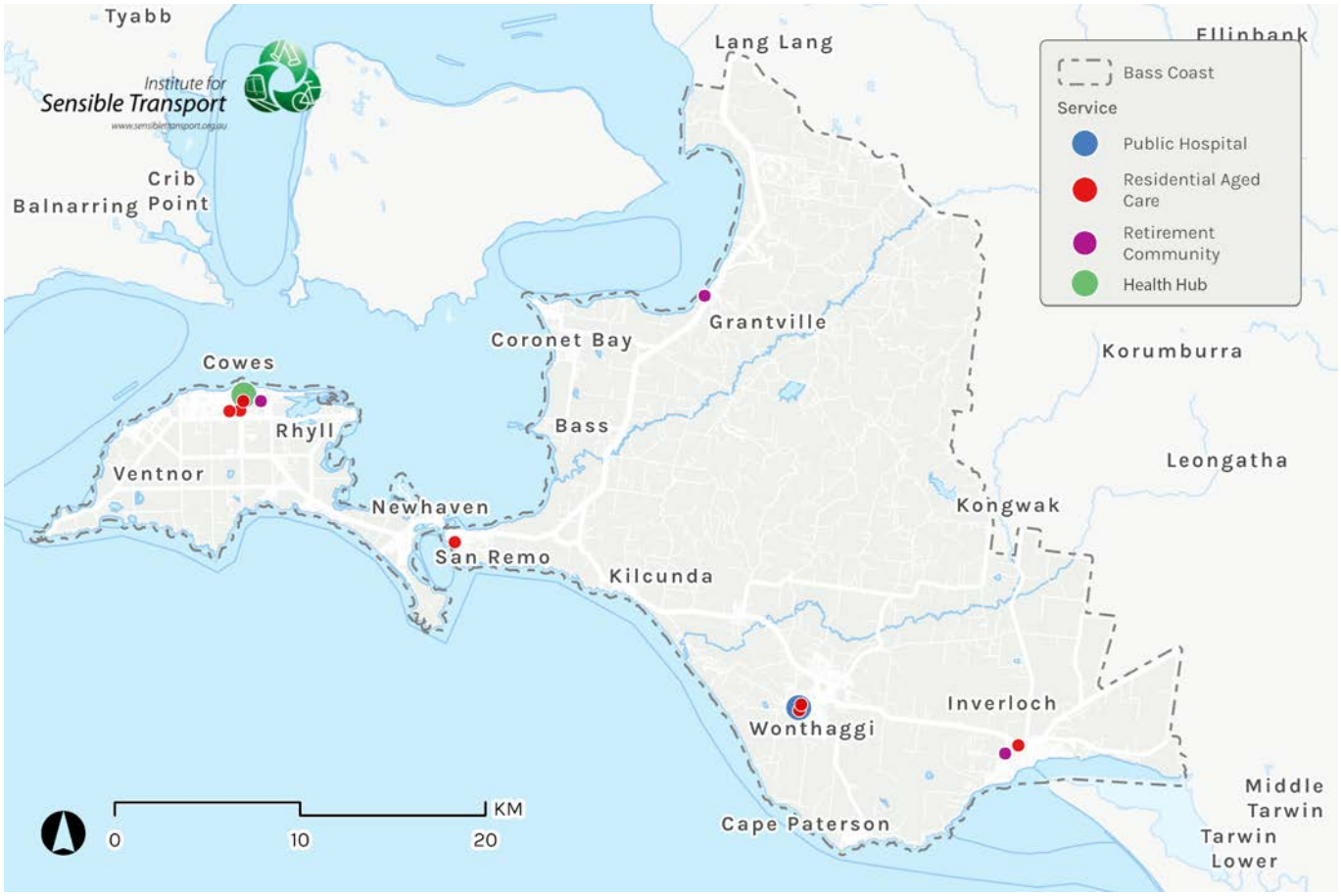


Figure 105 Hospital and aged care facilities

Source: Australian Department of Health and Aged Care. Google Maps

9. Transport safety



The Victorian government has adopted the Safe Systems approach to road safety. This emphasises the fallibility of the road user and seeks to provide a forgiving transport system in which mistakes do not result in death or serious injury. This section examines the Victorian government crash data between January 2019 and August 2023. Using GIS, we pinpoint crash clusters and hotspots, categorising data by mode and severity. Where possible, data has been disaggregated by gender.

9.1 Crash analysis

In the last five years, 877 people were involved in 372 crashes recorded in Bass Coast. Figure 106 shows the crash trend in Bass Coast between 2019 and 2023. The number of crashes recorded in the Shire initially declined in 2020, likely due to travel restrictions enforced during the COVID-19 lockdowns, before increasing again to around 80 crashes annually in 2021 and 2022. In the last year, Bass Coast saw a 31% reduction in crashes, with 60 crashes reported in the Shire.

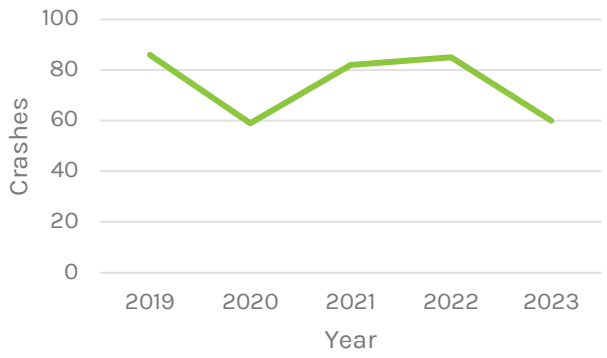


Figure 106 Number of crashes per year, Bass Coast
Source: VicRoads

The Victorian government's Road Safety Strategy seeks to halve road fatalities by 2030 and eliminate death from Victorian roads by 2050. These commitments cannot be met without Bass Coast Shire making further improvements to the safety of the transport network. Introducing measures beyond those tried in the past will be required in order for Bass Coast Shire to achieve state government targets. This has direct implications for the actions that will need to form part of this study. The identification of crash clusters and opportunities to enhance road safety outcomes will contribute to making roads safer for all users.

9.1.1 Crash by location and vulnerable modes

Table 9 shows the number of crashes by their location within road network. It shows that the majority (63%) of crashes across Bass Coast Shire occurred mid-block, while 36% occurred at an intersection. Speed zone analysis revealed that 37.4% of crashes occurred in 50 – 60 km/h speed zones, while 54% were reported in 80 km/h or higher speed zones. In contrast, only 2.2% of all crashes occurred in 40 km/h speed zones. This highlights the relationship between increased risk of crash on Bass Coast roads and higher speeds.

Table 9 Crashes by location

Crash location	Number of crashes
Intersection	133
Mid-block	236
Off-road	3

Only 2% of crashes occurred in 40km/h speed zones.

This highlights the relationship between increased crash risk and high-speed roads.

Figure 107 illustrates that the majority of crashes occurred on key arterial and freight routes, including Phillip Island Road (46) and Bass Highway (74). Crashes are concentrated in:

- the main centre townships of Wonthaggi, Inverloch, and Cowes
- Phillip Island Road on Phillip Island
- Bass Highway exits near town centres (e.g., Dalyston – Wonthaggi).

The majority of these crashes occurred in 80km/h or higher speed zones with no traffic control measures in place. This trend is similarly observed for crash clusters within town centres, where most crashes occurred in 50-60km/h speed zones.

Phillip Island Road and Bass Highway are major crash hotspots in Bass Coast Shire. There were no traffic controls at the majority of these crash sites.

Cowes and Wonthaggi reported the highest number of crashes involving a pedestrian or cyclist, at 14 and 12 crashes, respectively. This is followed by Inverloch, at 7 crashes. Road conditions at these sites generally lack pedestrian crossings or crossing opportunities nearby, bicycle infrastructure, and traffic calming measures. Moreover, roads are particularly wide, with widths spanning up to 22 metres. Notably, 75% of crashes involving active modes occurred in 50-60km/h speed zones on local streets and sub-arterial roads. Incidents involving transport modes have been referred to as crashes. Box 2 provides a meaningful explanation of the difference between crashes and accidents.

Crash sites involving active modes lack safe crossing opportunities and cycling infrastructure.

Reported vs Unreported Crashes and Crashes vs Accidents

In Victoria, section 61 of the Road Safety Act 1986 requires those involved in a traffic '*accident*', under certain circumstances must report it to the police. These circumstances include:

- if a person or animal is injured or has died
- if anyone's property has been damaged as a consequence of the 'accident', or
- if the other party involved in the 'accident' does not stop or refuses to provide you with their particulars (name, address, name and address of vehicle owner, vehicle registration and vehicle details such as colour and make).

Therefore, it is important to note that the data presented in this report refers to the *reported crashes* and does not account for *near misses* or crashes that went *unreported* to police. The distinction between *reported* and *unreported* crashes is crucial in recognising that not all incidents will appear in government crash data, and therefore may not tell the full story of road safety.

We believe it is also important to refer to traffic *incidents* as *crashes* or *incidents* rather than *accidents*. The term *accident* implies that the event was unavoidable or occurred by chance. Using the term *crash* or *incident* instead recognises that traffic *incidents* are preventable and often the result of human error, poor road design or other factors that can be addressed to improve road safety.

Box 2 What do crashes mean

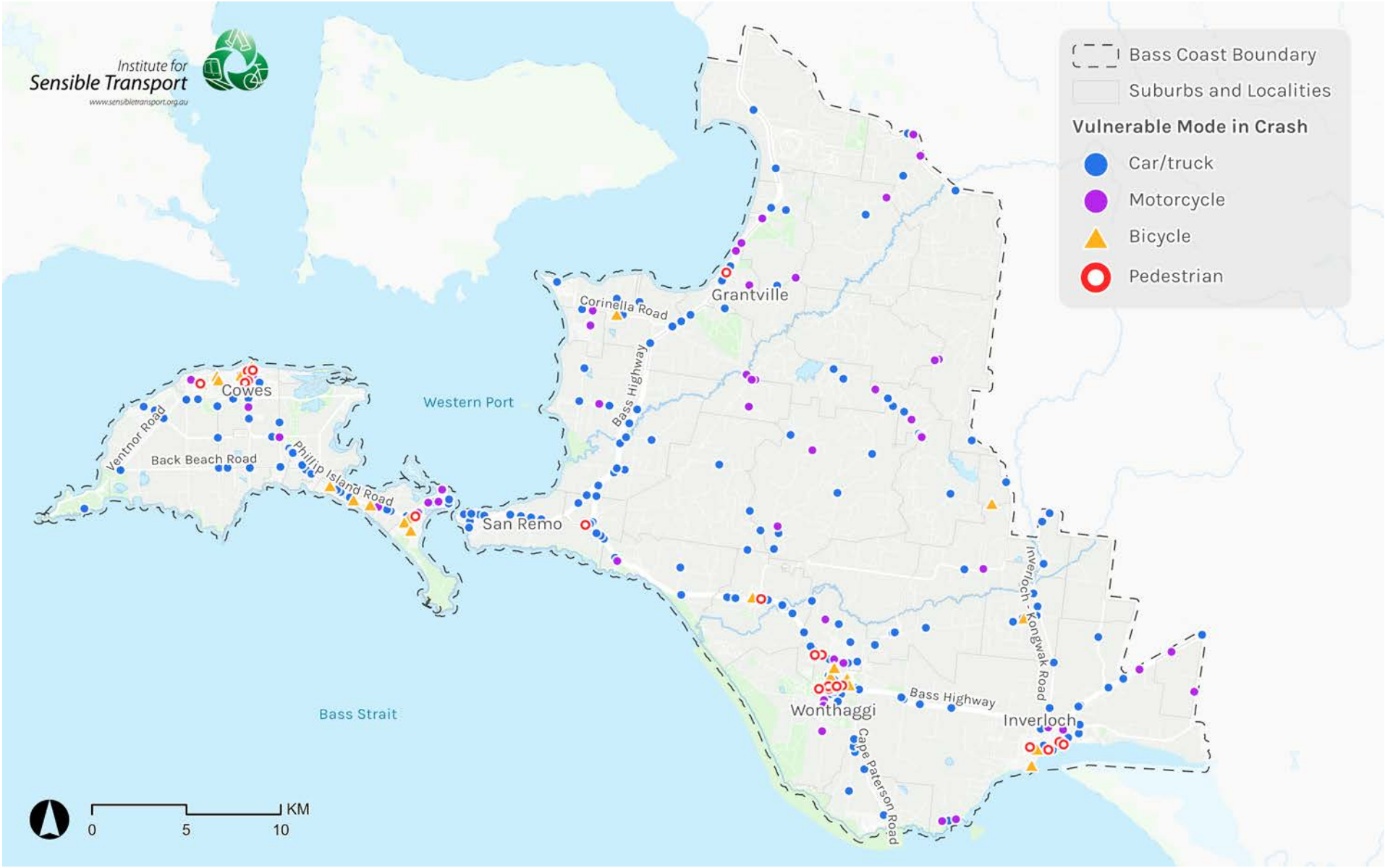


Figure 107 Crashes by most vulnerable mode, 2019 - 2023

Source: VicRoads

9.1.2 Crash by severity

Table 10 shows the severity of recorded crashes in Bass Coast Shire between 2019 and 2023. The data reveals that during this period, one crash involving a pedestrian resulted in a fatality, while 7 crashes caused serious injuries and 8 resulted in other injuries. Furthermore, 6 cyclists were involved in serious injury crashes and 8 were involved in other injury crashes. These findings highlight the need for continued efforts to improve road safety in the area.

Table 10 Crashes by severity

Crash severity	Crash involving active modes	Total crashes
Fatal	1	7
Serious injury	13	94
Other injury	16	169
Not injured	0	102
Total	30	372

Figure 108 shows the severity of crash injuries across Bass Coast in the last five years. Of the crashes across the Shire, an overwhelming proportion of crashes reporting injuries that are serious or greater, occurred on Phillip Island. This is despite the island accounting for only 12% of the total area of the Shire. Of all crashes in Bass Coast resulting in a serious injury, almost 30% occurred on Phillip Island. Half of crash fatalities were recorded on Phillip Island.

Of all crashes in Bass Coast, 30% of serious crash injuries and 50% of crash fatalities were reported in Phillip Island alone.

Moreover, approximately 22% of crashes resulting in a serious injury or fatality occurred on Bass Highway. The Wonthaggi and Inverloch townships reports a strong concentration of 'other injuries.

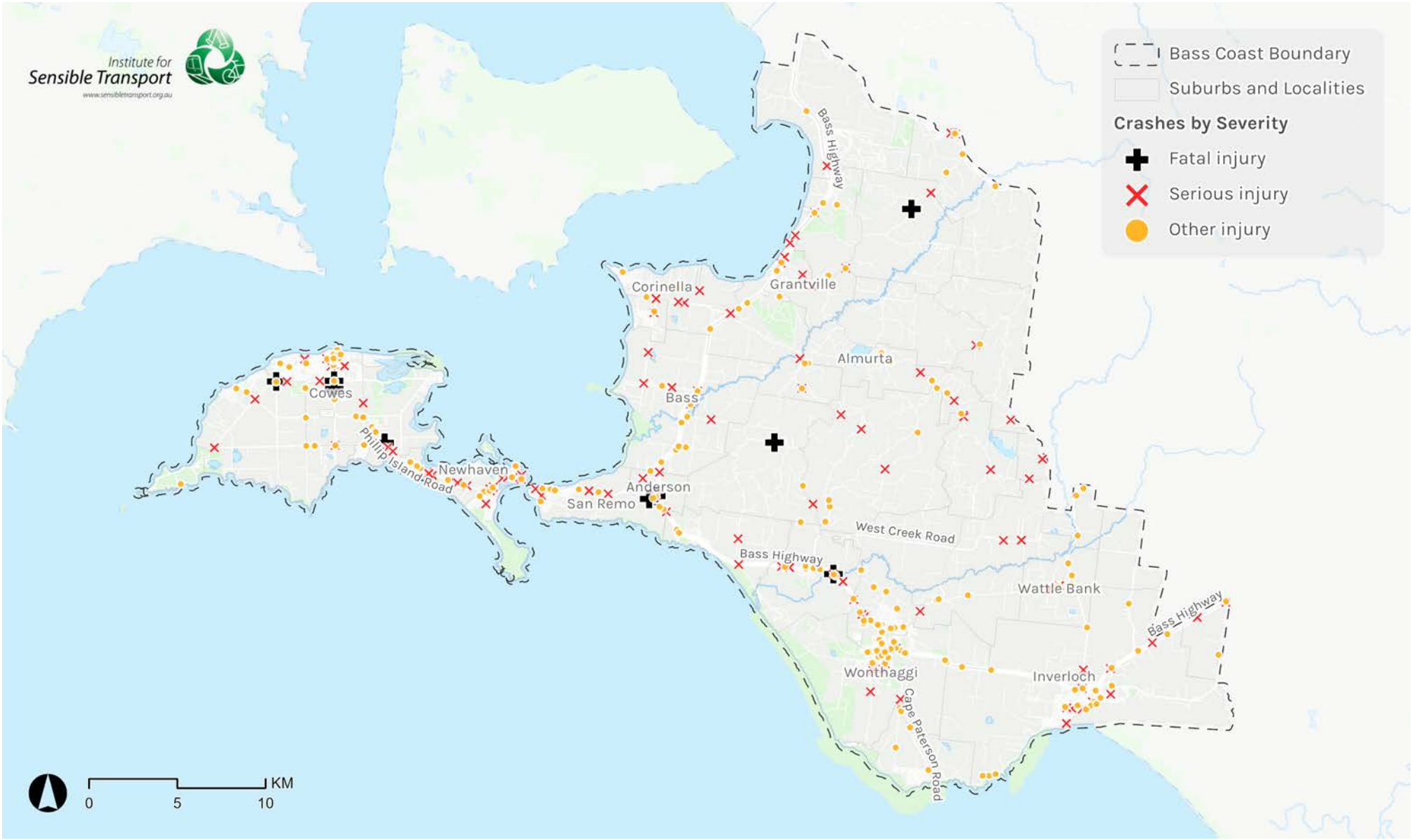


Figure 108 Crashes by severity, Bass Coast Shire

Source: VicRoads

9.1.3 Crash by sex and age

Crash data provides insight into disparities between the sex and age of crash victims. Analysis of this data helps to identify vulnerable groups with increased risk of crash, and increased risks of fatalities or serious injuries, in Bass Coast Shire.

This analysis is based on crash data that categorises individuals into two gender categories: male and female. We recognise that these binary gender identities and acknowledge this limitation may not capture the full scope of gender related factors. Further, while this data looks only at the direct impacts on crash victims, women often bear the burden of crashes following a crash, regardless of their involvement in a crash (e.g., taking up additional housework and caregiver duties). These factors should be taken into consideration in addition to the following findings.

In these five years, Figure 66 shows 57.8% of crash victims in Bass Coast were men and 42.2% of them were women.

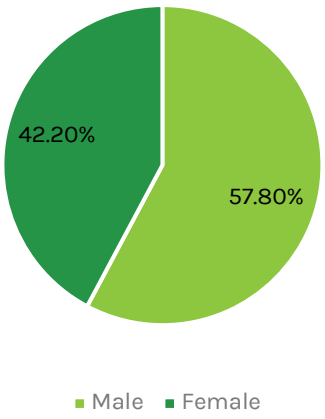


Figure 109 Sex of crash victims in Bass Coast Shire, 2019-2023

Source: VicRoads

Figure 110 shows the severity of crash injuries by sex in Bass Coast Shire. Serious injuries are a bit higher for males (29.5%) in comparison to females (19.7%) while females reported higher levels of other injury (51.7%) than males (41.8%).

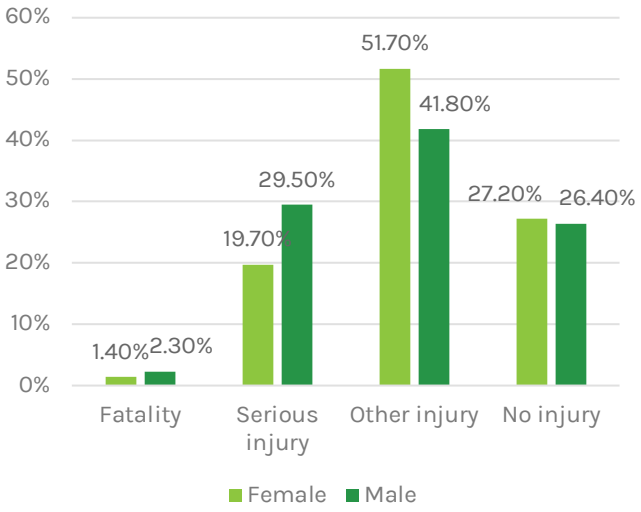


Figure 110 Crash severity by sex

Source: VicRoads

The implications of road crashes for different age groups are varied, as shown in Figure 111, Except for children, all age groups have been affected similarly by these crashes in Bass Coast Shire.

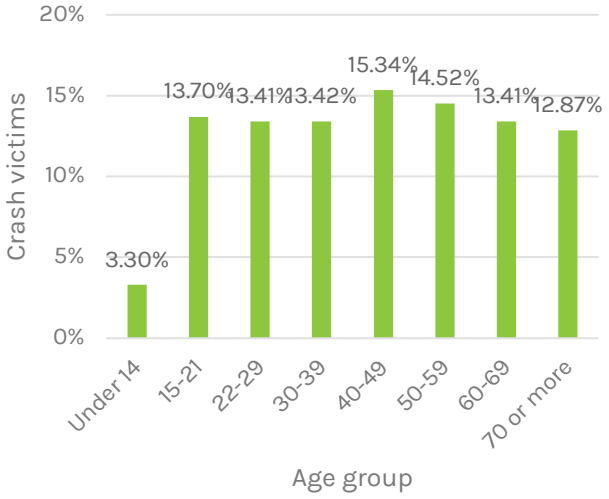


Figure 111 Age of crash victims in Bass Coast Shire, 2019-2023

Source: VicRoads

9.1.4 Crash clusters

This section identifies crash clusters in the Main Centres and assesses the road environment and traffic controls at these sites. Identifying the conditions under which these crashes occurred highlights opportunities to improve road safety at crash hotspots and across the Shire.

9.1.4.1 Wonthaggi

Wonthaggi reported the highest number of crashes across the Shire, with 55 crashes recorded. Almost half occurred within the CBD area. The majority of crashes reported in Wonthaggi were recorded on Graham St and Billson Street, as shown in Figure 112 and Figure 113. It is important to note these crashes occurred *before* road safety works were completed in September 2023 as part of the Australian Government's $3 billion Road Safety Program, where the following works were completed:

- Reduced speed limits along Graham St, Murray St, Bilson St, and McBride Ave, from 50km/h to 40km/h
- Three raised pedestrian crossings with flashing lights connecting pedestrians between Graham St and Murray St.

The assessment of these upgrades' impact on road safety in Wonthaggi CBD will be important once crash data becomes available. The Department of Transport and Planning is currently reviewing a proposal to reduce speed limits along Graham St, west of Bilson St, from 60km/h to 50km/h.

Other crash clusters on the perimeter of the CBD area include intersections at McKenzie St/Graham St, Fincher St/Bass Hwy, and Wentworth Road/Korumburra Road. Crashes at these sites resulted in serious or 'other' injuries to a pedestrian and cyclists. Notably, the painted bike lane ends at the intersection of Fincher St/Bass Hwy where a crash involving a cyclist was recorded. Moreover, there is no cycling infrastructure at the intersection of Korumburra Road and Wentworth Road.

Broadly, there is a lack of safe pedestrian crossings and cycling infrastructure at crash locations across the township. The majority of crashes occurred at an intersection in 50-60km/h speed zones.

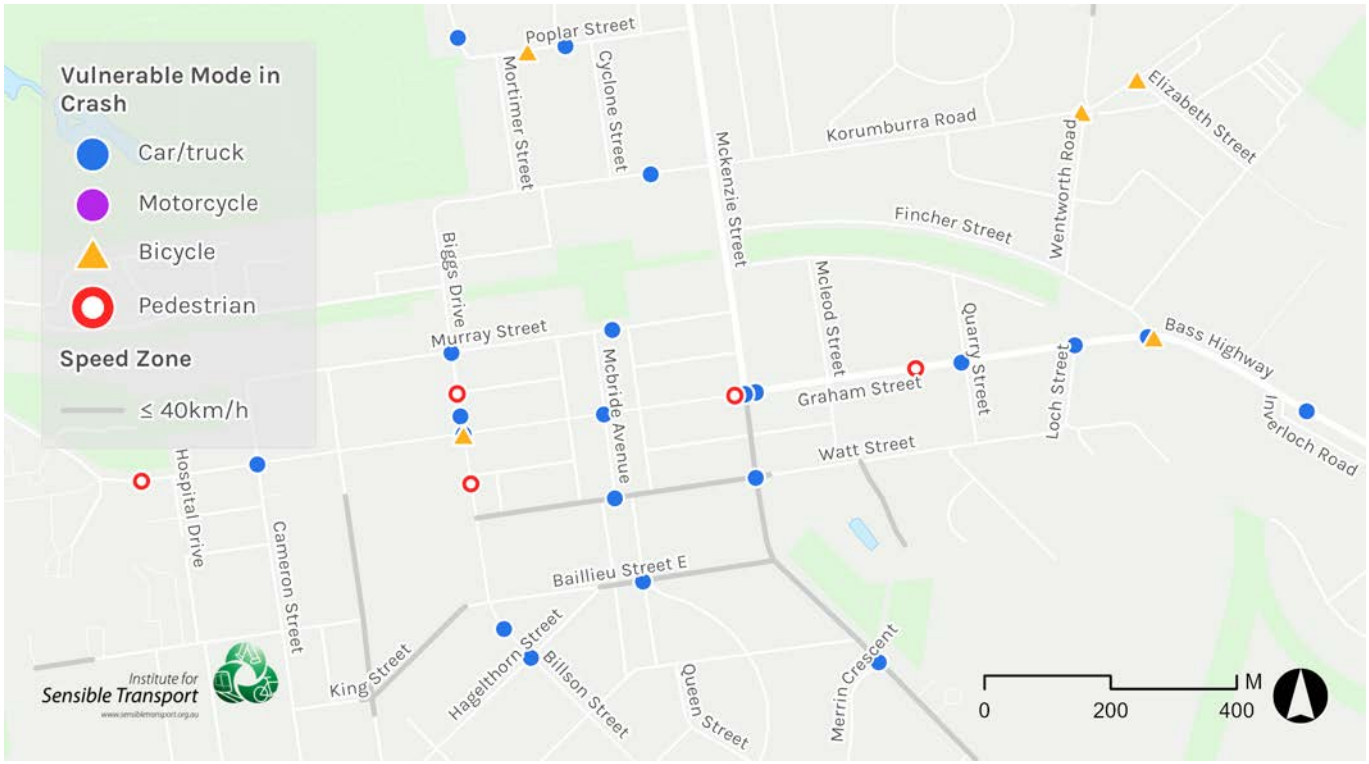


Figure 112 Crashes by vulnerable modes, Wonthaggi

Source: VicRoads

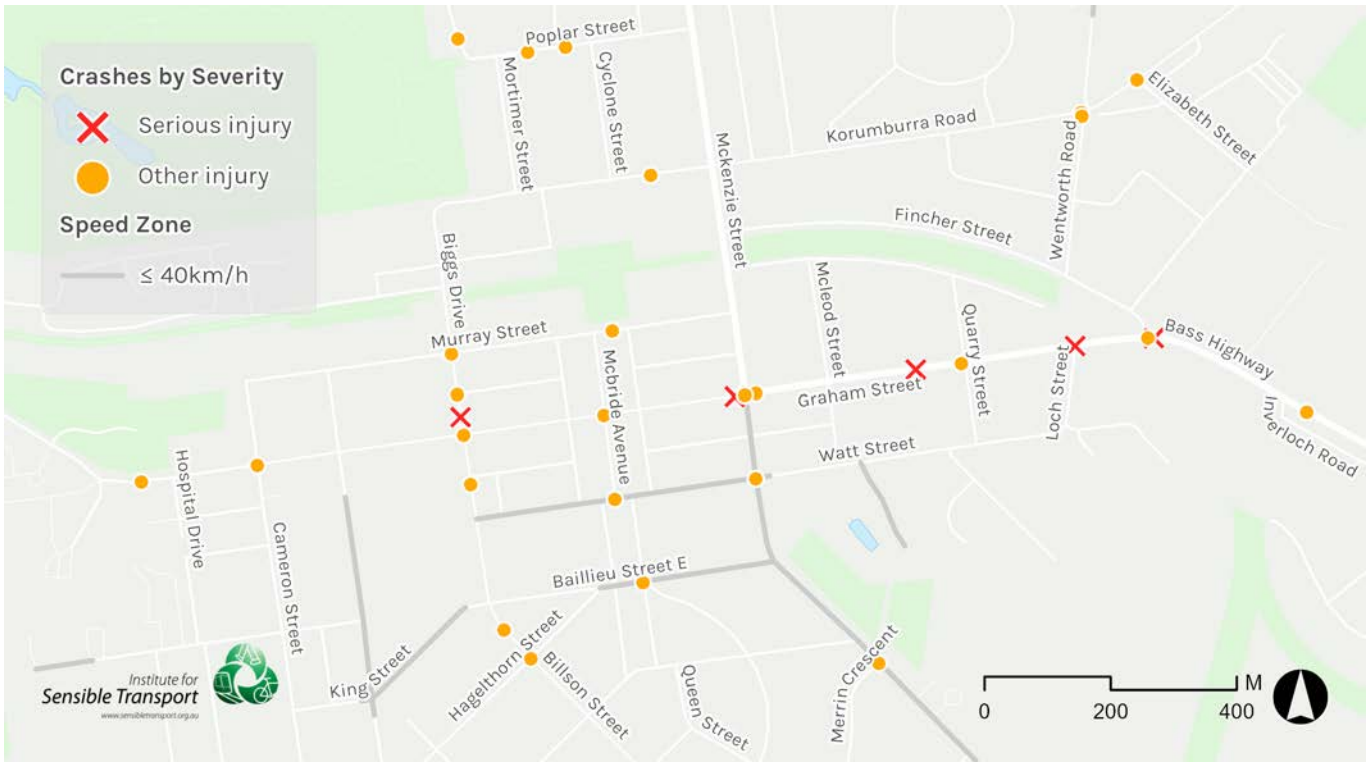


Figure 113 Crashes by severity, Wonthaggi

Source: VicRoads

9.1.4.2 Inverloch

The most vulnerable mode and severity of crashes in Inverloch is shown in Figure 114 and Figure 115, respectively. There were 33 crashes recorded in the Inverloch township. Of all crashes in Inverloch, 93% occurred in 50km/h or higher speed zones. Key crash locations include along Toorak Road, and at the Powlett St and Inverloch-Kongwak Road roundabout. The speed limit at both sites is 60km/h. The higher speed zone is likely a contributor to the increased severity of injuries, where 4 of the 6 crashes at these sites resulted in serious injuries. There is also a lack of footpaths and cycling infrastructure on Toorak Road. As this street provides access to bus services and runs through a residential area, there is cause to reduce the speed limit and implement traffic calming measures to improve road safety conditions.

There were three crashes reported in the town centre on Abeckett St (2) and on The Esplanade (1). All three crashes involved a pedestrian. Pedestrian infrastructure currently consists of zebra crossings on Abeckett St and pedestrian refuges (not a zebra crossing) at the intersection of Abeckett St/Williams St. The crash at Abeckett St/William St also occurs at a bend in the road where pedestrian visibility is likely reduced. It is recommended raised pedestrian crossings, additional signage or flashing lights to alert motorists to slow down be installed.

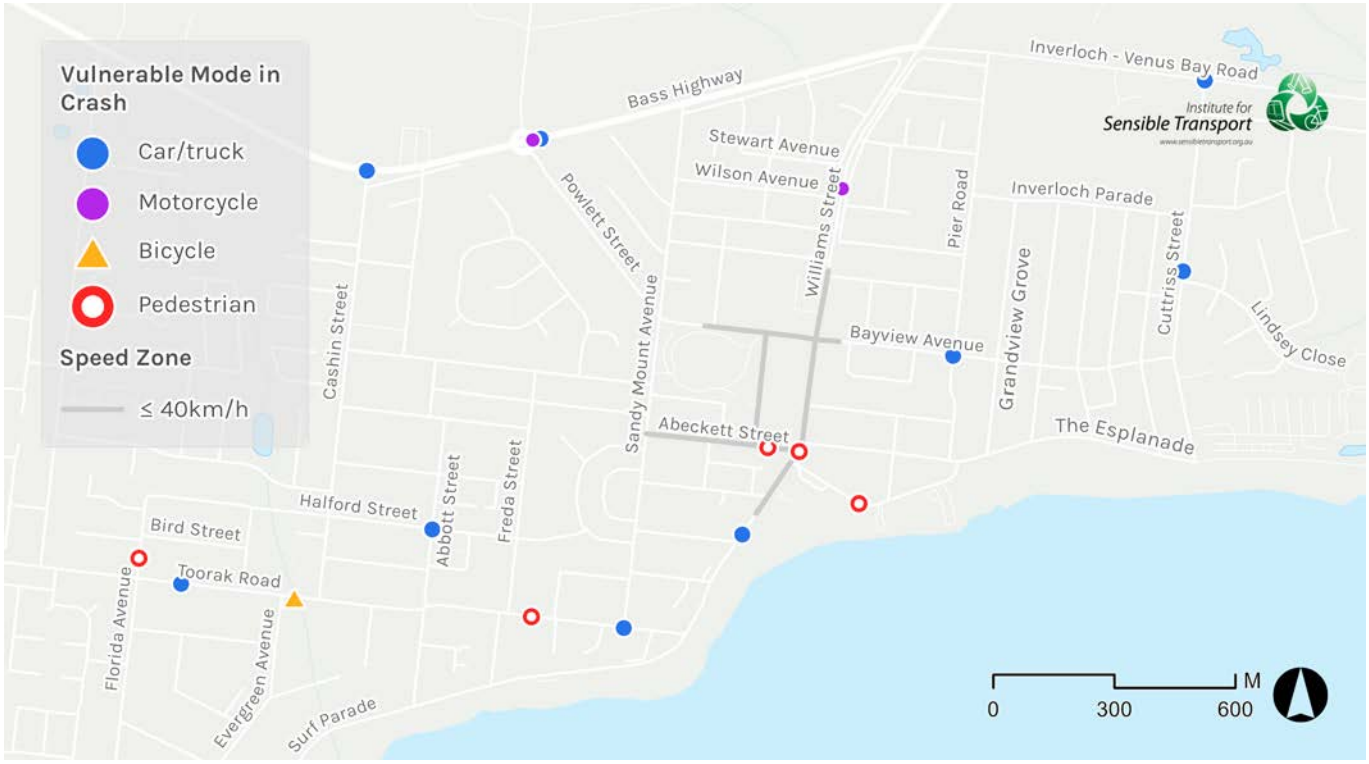


Figure 114 Crashes by vulnerable modes, Inverloch

Source: VicRoads

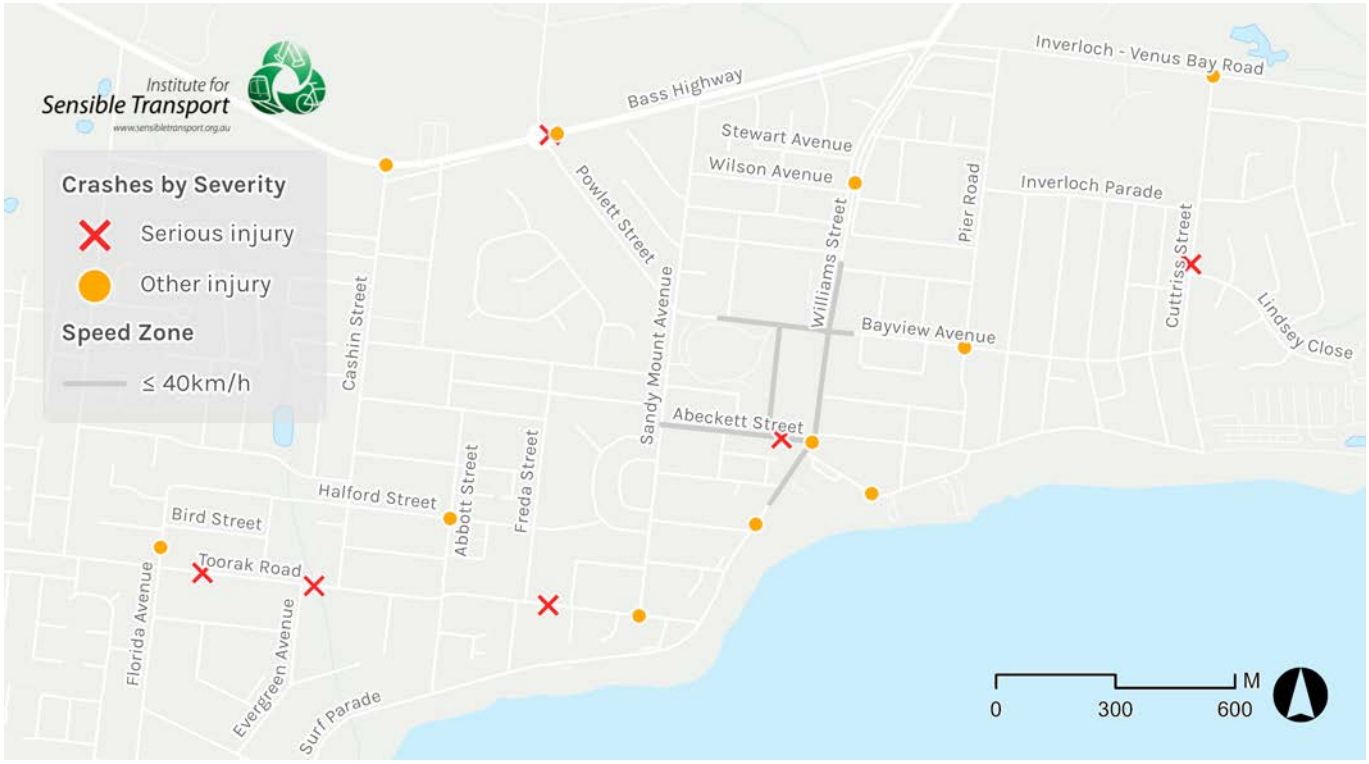


Figure 115 Crashes by severity, Inverloch

Source: VicRoads

9.1.4.3 Cowes

There were 47 crashes recorded in Cowes in the last five years. Almost 40% of all crashes in Cowes occurred in the CBD area. Figure 116 and Figure 117 shows the location of these crashes, the most vulnerable mode in the crash, and the crash severity. The majority of roads in Cowes have speed zones of 50km/h or higher.

Thompson Ave is a major crash hotspot in Bass Coast, with 10 crashes recorded in the last five years alone. The speed zone on Thompson Ave reduced from 50km/h south of Church St to 40km/h from Church Street to The Esplanade. There is a cluster of crashes involving active modes on Thompson Ave near Settlement Road. Pedestrian crossings along the length of Thompson Ave, except for the signalised crossing at near Woolworths and the petrol station, are sparse and unmarked, with only pedestrian refuge islands at roundabout intersections.

Currently there is angled parking and a painted bike lane on both sides of the street. Encouraging motorists to slow down through reduced speed limits and traffic calming measures will play an important role in improving road safety and the local amenity within the town centre. In addition, there is scope to install raised wombat crossings and bulb-outs at intersections and mid-block, to prioritise pedestrian movement in Cowes.

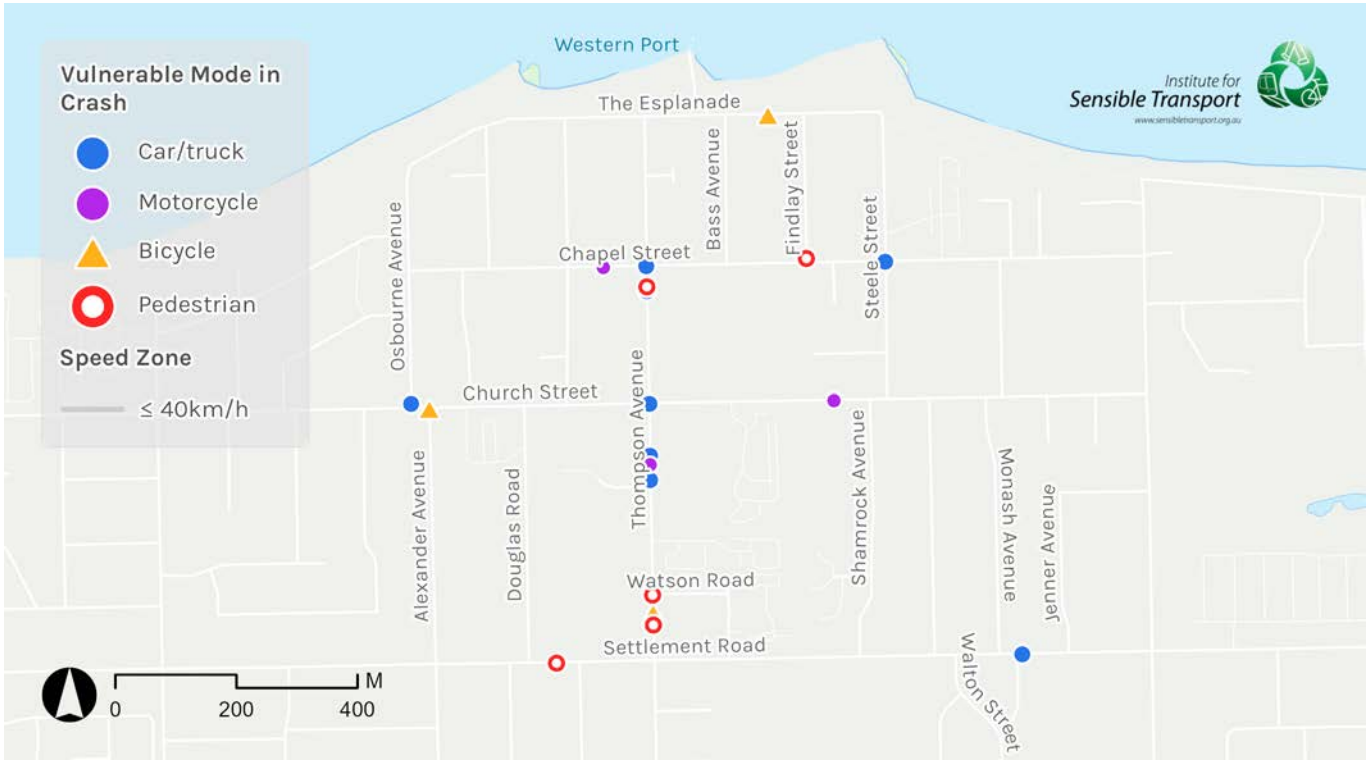


Figure 116 Crashes by vulnerable modes, Cowes

Source: VicRoads

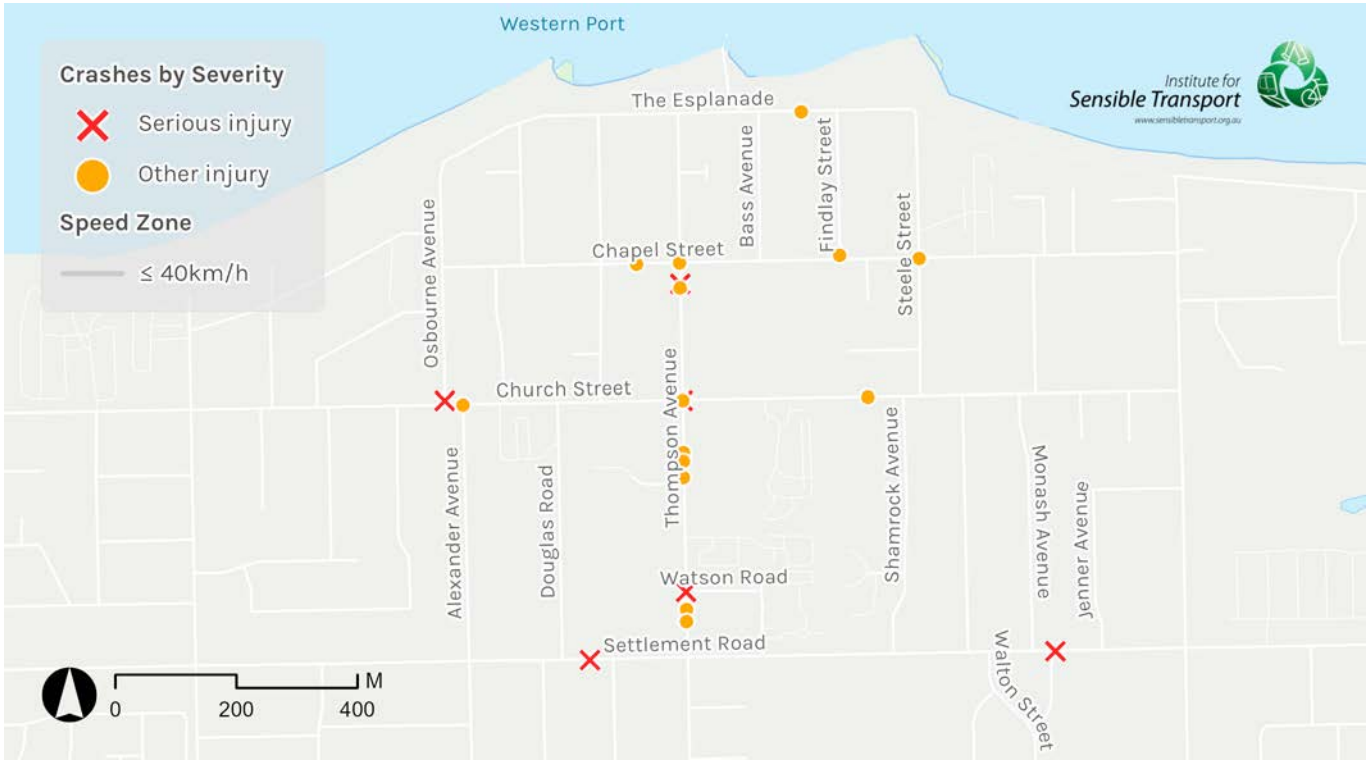


Figure 117 Crashes by severity, Cowes

Source: VicRoads

9.1.4.4 San Remo

A total of 10 crashes were recorded in San Remo in the five-year period. Figure 118 shows all crashes near the town centre occurred on Phillip Island Road and Back Beach Road. All crashes involved only cars or trucks and were located in 60km/h speed zones. Most crashes in San Remo were at intersections where traffic controls consist only of give way signs from side streets. Figure 119 represent severity of crashes in San Remo. A crash occurred near San Remo Primary School at the intersection of Back Beach Road and Flathead Court. This crash resulted in serious injury to a motorist. There is another serious injury crash that occurred near to the intersection of Bergin Grove and Marine Parade. This intersection has no traffic control measures except the give way sign.



Figure 118 Crashes by vulnerable modes, San Remo

Source: VicRoads



Figure 119 Crashes by severity, San Remo

Source: VicRoads

9.1.4.5 Grantville

A total number of 12 crashes were recorded in Grantville. Figure 120 represented crash distribution and involved modes in Grantville. The majority of crashes happened along Bass Highway with a speed limit of 80 km/h. At the signalised intersection of Bass Highway and Grantville – Glen Alvie Road, a serious injury crash involving a pedestrian took place. There are two serious injury crashes on Grantville – Glen Alvie Road involved by cars and motorcycle as shown in Figure 121. Grantville – Glen Alvie Road has a narrow layout with an 80 km/h speed limit without any speed control intervention.

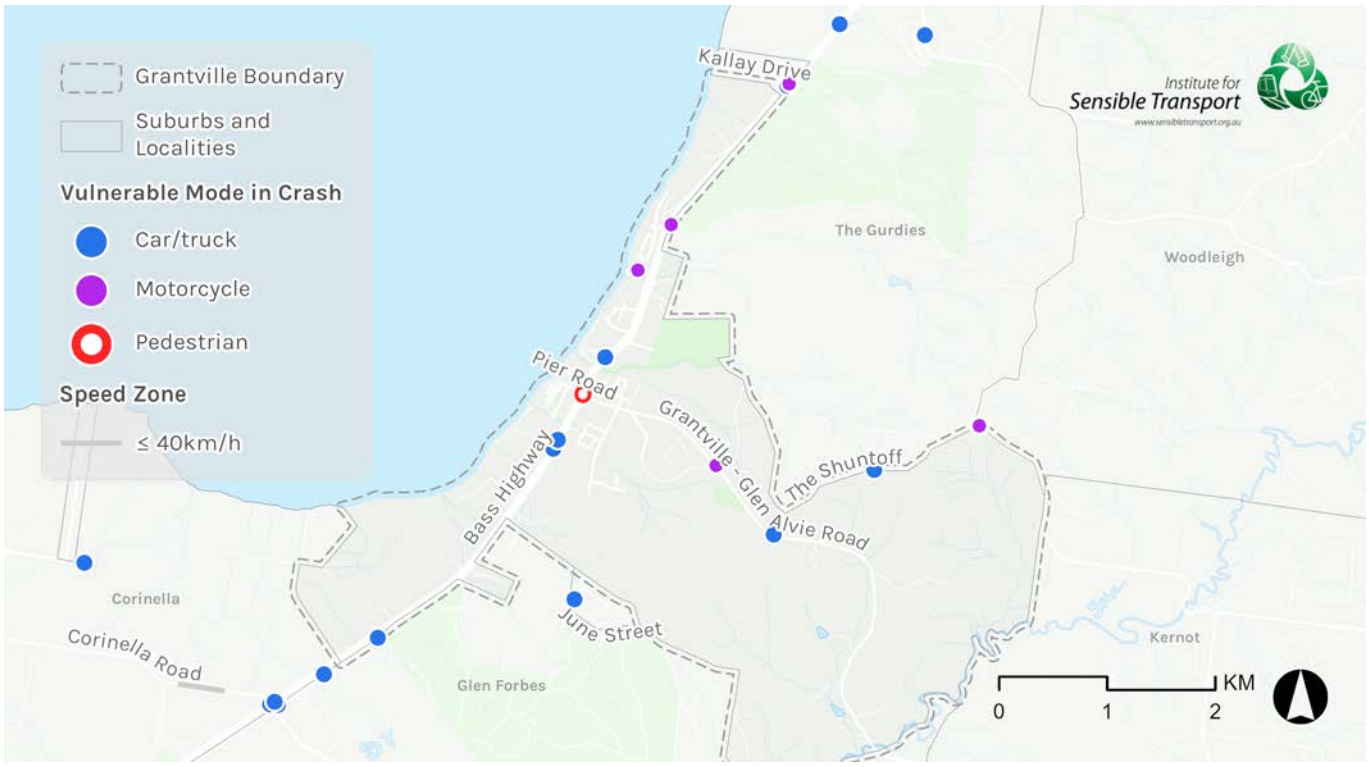


Figure 120 Crashes by vulnerable mode, Grantville

Source: VicRoads



Figure 121 Crashes by severity, Grantville

Source: VicRoads

9.1.4.6 Phillip Island Road

Figure 122 shows crashes in Phillip Island and involved modes. Analysis of crash data reveals that many crashes on Phillip Island occur on Phillip Island Road, with many serious injury crashes involving cars as shown in Figure 123. Intersections along Phillip Island Road emerge as key crash hotspots, managed only by give way signs. Notably, the speed limit for this road is 60 km/h, and there is a lack of dedicated cycling infrastructure and traffic calming measures near residential areas.

There are some crashes on Pinedale Avenue involved pedestrians and cyclists. This low-residential density street lacks dedicated footpaths and bike lanes, potentially contributing to these crashes.



Figure 122 Crash cluster by vulnerable modes, Phillip Island Road

Source: VicRoads

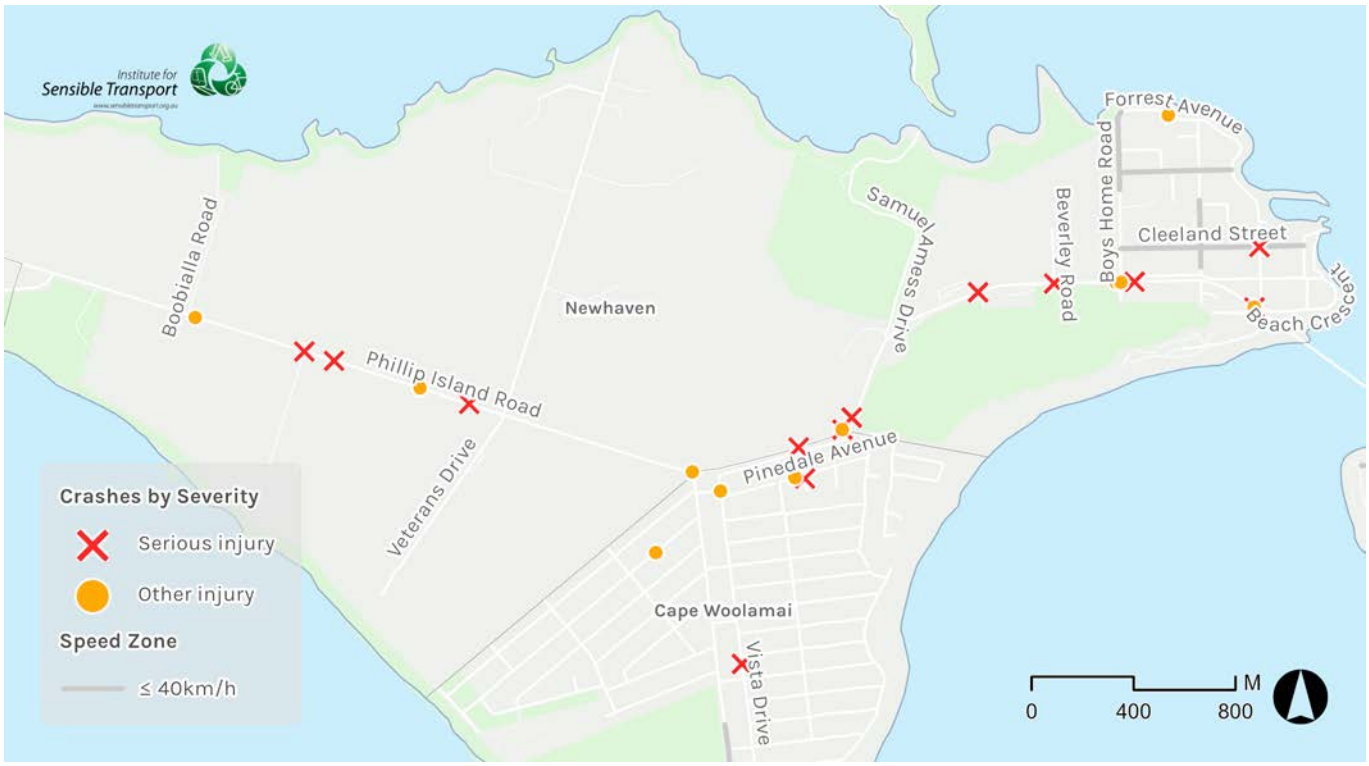


Figure 123 Crashes by severity, Newhaven

Source: VicRoads

10. Emerging transport technologies and implications for Bass Coast



Emerging transport technology offers the potential for improved efficiency relating to the use of road space and resources. The development of connected, cloud-based technology has enabled the provision of real time information on car parking availability, helped to better manage the balance of supply and demand without the need for additional parking. Electric vehicles and micro mobility are beginning to revolutionise mobility options. While e-micro mobility (such as e-scooters and e-bikes) offers considerable potential to enhance liveability and sustainable outcomes for Bass Coast, investment in pedestrianised areas and connected, protected bicycle networks will be required for these new opportunities to flourish.

This section details existing and emerging transport technology that has the potential to assist Bass Coast in achieving its long-term vision.

The transport sector is currently undergoing its most rapid transformation in decades. Disruptive transport technologies, such as App based ride sourcing platforms, innovations in car sharing, real time public transport information and possibly also autonomous vehicles are set to change travel behaviour in our cities over the next 5 – 20 years.

This sharp increase in technologically driven transport innovation comes during a period in which decades-long transport trends are beginning to change. Vehicle ownership rates and even the proportion of young people with a driver's license, once considered among young Australians a rite of passage, are beginning to decline. Since 2004, per capita vehicle kilometres in many OECD countries have begun to decline (Goodwin and Van Dender, 2013).

10.1 Driverless vehicles

Once the stuff of science fiction, driverless cars have made considerable advances over the last two decades. Their operation in cities still face considerable hurdles, and it is plausible that driverless cars never become a mainstream option in built up areas. Google is perhaps the most advanced of the companies involved in driverless cars. They have created the company *Waymo*, which has begun live testing with members of the public. These fleets have travelled millions of kilometres and are already showing impressive safety records. While driverless technology is yet to have an impact on the transport patterns of people living and working in Bass Coast, bodies such as Infrastructure Victoria and the National Transport Commission are preparing the legislative framework for their operation on public roads.

The next 10 – 30 years is widely acknowledged to be a period of profound disruption in the transport sector. Creating the right set of policy tools to ensure these technological changes serve to reduce our emissions and respond to climate change, whilst accommodating Bass Coast's growth will be the key challenge. It is difficult to overstate the magnitude of this task. Meeting this challenge will require bold innovations, unconstrained by conventional traffic engineering practices alone.

The move towards autonomous vehicles is widely predicted to be a central feature of what has become known as mobility-as-a-service (MaaS), in which the benefits of the automobile can be enjoyed without the need for ownership. Cars are the second most expensive item most people will ever buy, yet the typical car sits unused for 96% of its lifetime. An asset utilisation of 4% is very poor for an item as expensive as a car, and for this reason, many companies are seeking to disrupt the established auto industry by offering cars on demand, without a driver.

Box 3 identifies some of the unintended consequences of driverless vehicles.

Autonomous vehicles and congestion

Autonomous vehicles have been hailed as a potential solution to traffic congestion. Some scholars (e.g. see Fagnant and Kockelman, 2015) have suggested that congestion may *increase* due to the availability of autonomous vehicles, for the following reasons:

- People too young or old to drive themselves will be able to summon a ride. Some of these people may have been chauffeured previously, but some will be either making a trip they would not otherwise have made, or do so by autonomous vehicle rather than use another mode (e.g., public transport, bicycle).
- Pooled autonomous vehicles may be able to compete on price with public transport. Even if the cost is slightly higher than public transport, many non-CBD based trips may be substantially quicker than the same trip by public transport and this may result in declining public transport use.
- By not having to focus on driving, the rider avoids the 'time cost' of driving, which may increase their willingness to travel further or spend more time in congested traffic (Adams, 2015)
- Cars may be able to drive without any occupants. Whilst this may reduce demand for car parking, it is likely to exacerbate congestion by increasing vehicle kilometres travelled. This is especially the case with those who choose to own their autonomous vehicle (as opposed to those accessing a fleet of vehicles). For instance, an owner may choose to travel in their autonomous vehicle from their home in Bass Coast to central Melbourne for work and rather than paying for parking, send their car back to park at home (empty), until it is time for them to travel home again, at which time it is summoned again, travelling into central Melbourne (empty) to pick up their owner.

Box 3 Unintended congestion consequences of driverless vehicles

10.2 Mobility as a Service

While the sharing of transport resources is not new (e.g., taxi services, borrowing friend's/neighbour's cars, and of course public transport), the ubiquity of the Internet has spawned a dramatic growth in the diversity of shared mobility options.

10.2.1 Car Share

Car share can be seen as consisting of three distinct offerings, each of which hold characteristics of *disruptive technology.* The first has been around for just about as long as the car itself, rental *by-the-day* (e.g., Hertz, Budget, and Avis). This category has now evolved, such that rather than just accessing a car in full day increments, they can be accessed *by-the-hour*, and this is becoming a very dynamic part of the market. At first these "clubs" operated distinct from traditional car rental companies, and although many still do, there is an industry shift (e.g., Hertz) to enter the *by-the-hour* market.

Some car manufacturers are also entering the *by-the-hour* market due to an appreciation that changing consumer preferences are valuing *access* over *ownership*. *Share Now*, owned jointly by BMW and Daimler AG, offers premium end vehicles in cities across Germany, and other European countries. An offshoot of the *by-the-hour* car share offer is *one-way* usage, in which the user is no longer required to return the car to its original pick-up location. The Institute for Sensible Transport understand that some Australian based car share companies are exploring opportunities to offer *one-way* to its members. The benefits to the user are significant when one considers that the typical *by-the-hour* car share rental lasts six hours, but involves less than an hour of actual driving (City of Melbourne, 2015).

Access to commercial car share providers is currently not available in Bass Coast Shire as no commercial operators offer a service in the area. Alternatively, residents and visitors have the option to utilise private car share services like Uber Carshare. At the current point in time, it is unclear whether there is a sufficient market to support expansion of the car share network, without subsidy.

10.2.2 Ride sourcing

Routinely described in the media as "ride sharing", services such as Uber are in fact not technically "shared transport", as the driver is making a trip purely to transport the passenger. A more accurate term for these sort of services is ride sourcing (Rayle et al., 2014) and use an App to connect a driver with a paying passenger. Uber has been

operating in Australia since 2012. Uber drivers must show they have comprehensive car insurance, pass a police check and have a good driving record. Some evidence has emerged to suggest that Uber and Uber like services can increase rather than decrease congestion, by acting as a placement for trips formally done by public transport.

10.3 Smart parking technology

To ensure Bass Coast is able to manage growth in a manner that protects and enhances its liveability, vibrancy and productivity, best practice parking management principles are essential. Best practice parking management considers how best to allocate scarce space to deliver the greatest public benefit. Box 4 provides a snapshot of some key facts related to car parking.

Summary of facts related to car parking

- Cars sit idle for 95% of the time
- Historically, car parking policies have shaped cities into car dominated landscapes
- On average, 40% of off-street, residential parking is vacant
- On- and off-street parking can account for 50% of all land use in a city
- Car parking adds $30,000 - $122,500 to the price of a residential dwelling in multi dwelling developments
- Up to 30% of all traffic is caused by people seeking no-fee kerbside parking space.

Box 4 Key parking facts

Section 5 provides some information on various car parking technologies and the remainder of this section provides additional information on this rapidly evolving area.

10.3.1 License Plate Recognition

License Plate Recognition (LPR) is a technology that uses cameras and recognition software to convert images of vehicle license plates into text data. LPR systems are widely used in enforcement and parking management scenarios across the world. In parking enforcement scenarios, mobile cameras are used to read license plates and compare the data against known plates for validation. In parking management scenarios, static mounted cameras monitor larger areas for compliance.

For on-street parking, LPR technology is mounted on a vehicle and used to detect the length of time vehicles have stayed in a particular parking space. An example of a mounted LPR camera is shown in Figure 124. A Video Processing Unit (VPU) processes the mobile LPR results and displays these on an inboard, web-enabled tablet device. Officers monitor the device and are alerted to any vehicle detected as having parked for too long in a time restricted zone. The roof mounted LPR cameras can capture parallel, 45°, 60° and 90° angle parking, and simultaneously cover cars parked on both sides of the street.



Figure 124 Mounted Licence Plate Recognition camera example

Source: Duncan Solutions

As shown in Figure 125, for larger, off-street parking complexes, LPR cameras are placed strategically at the facility's entry and departure points. LPR systems are often used to automate the process of recognising license plates and granting or denying access to a parking lot. These can allow users to enter without the need to obtain a ticket and pay at exit (or at a pay station) for their parking stay. This feature is useful in large parking lots, activity centres and apartment buildings. Additionally, LPR systems can offer real-time information on parking availability.



Figure 125 Licence Plate Recognition camera at entry point example

Source: Becas

In many cities including Bass Coast, there are parking patrols officers that are checking parked cars manually, instead of using LPR technology. LPR can significantly reduce the workload on council officers by continuously scanning plates and eliminating the need for human intervention until an event of interest occurs. There are many private Australian and international companies that offer LPR and the associated services.

10.3.2 Paid parking technologies

Paid parking is one strategy that can be used to help moderate demand and increase turn over. This occurs predominantly in retail/commercial areas in which demand for parking is higher than supply. Prior to embarking on a paid parking program, it is important for council to think careful about what is the objective for charging for parking. If it is about reducing car use, it can be more effective to remove the parking. If it is revenue generation, then paid parking can be a useful strategy, in certain high demand areas.

Paid parking can be implemented using multiple different technologies ranging from physical meters to mobile apps that allow users to pay for parking through their smartphones. Physical meters can be configured in a range of different uses, depending on how the parking arrangement is setup. For instance, some councils choose to have one meter for every row of car parking in a larger complex, while others may opt for one meter per 1-2 on-street car parks. Technology improvements have also made parking meters easier to install, less power hungry and have improved quality of life features. This includes using a vehicle's number plate as the identifier, meaning printed tickets will no longer be required to be displayed on vehicles.



Figure 126 Smart parking meter example, Townsville

Source: City of Townsville

10.4 Electric vehicles

Electric vehicles (EVs) are experiencing a surge in growth globally, and while Australia is behind most OECD countries in terms of sales, the trend is rising sharply. In the last few years, the number of EVs owned in the Bass Coast LGA has risen and this is expected to continue. In 2023, almost 9% of new vehicles sold were EV in Australia.

10.4.1 What is an electric vehicle?

There are several different categories of EVs, and it is important to identify the main types, as shown in Figure 127.

The following provides a brief description of each of the vehicle categories listed in Figure 127.

- *Conventional vehicle* – also referred to as an Internal Combustion Engine (ICE) vehicle, is the standard vehicle type widely known and used since the invention of the motor vehicle. The fuel source for most ICE vehicles is petrol, diesel or

gas, with some able to utilise renewable fuels such as ethanol. It is not an EV.

- *Hybrid vehicle* – a vehicle that uses petrol/diesel as its only fuel source, but also has an electric motor and battery that can store energy from regenerative breaking. A Toyota Prius is a common example of a hybrid vehicle.
- *Plug-in Hybrid Electric Vehicles* (PHEV) - combines a mixture of fuel combustion and electricity. It is similar to the hybrid vehicle described above; however, it has the ability to take electricity from a socket and can store this in a battery. A Mitsubishi Outlander is an example of a model available as a PHEV.
- *Battery Electric Vehicles* (BEV), or All-Electric, take electricity from a socket and rely entirely on the electricity stored in an on-board battery for propulsion. A Tesla Model 3 and BYD ATTO 3 are two popular models of BEV.

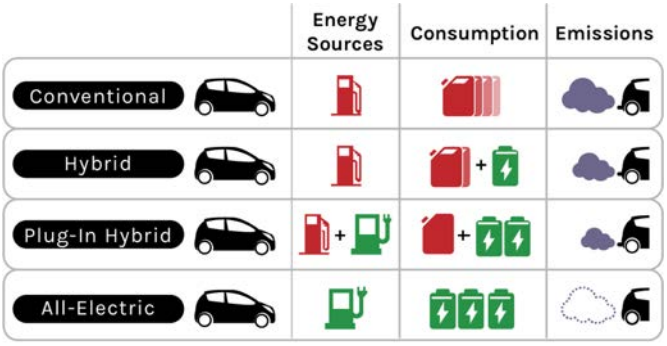


Figure 127 Different types of consumption and electric vehicles

10.4.2 Electric vehicle sales in Australia

While Australia has among the lowest levels of EV adoption in the OECD, it has begun to increase rapidly, from around 2% of new vehicle sales a couple years ago, to ~8.5% for 2023. Figure 128 captures recent EV sales in Australia, both in total and as a percentage of light vehicle sales.

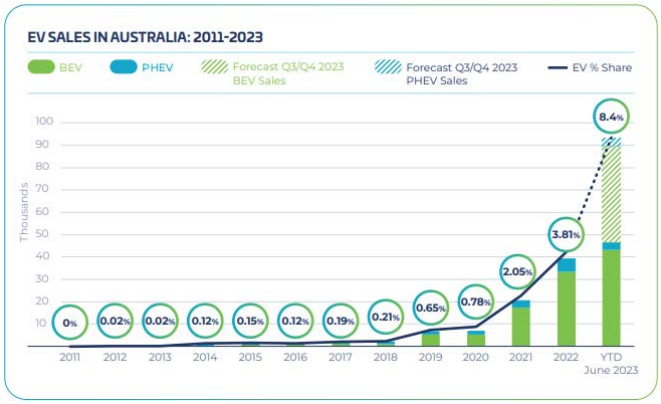


Figure 128 EV sales in Australia
Source: Electric Vehicle Council, 2023

Several surveys have found around 50% of consumers are considering an EV for their next vehicle purchase.

Around half of consumers are considering an EV for their next vehicle purchase.

10.4.3 Electric vehicle advancements

Electric vehicle technology has advanced rapidly in recent years. Electric vehicles avoid the tailpipe emissions of ICE vehicles, have lower running and servicing costs, and last longer. Compared to just five years ago, EVs:

- Have become cheaper
- Offer longer battery range, and
- Are available in a wider variety of vehicle types.

Electric vehicles also now have access to more chargers, including publicly available fast chargers, in more locations around Australia and this is set to grow further in coming years. Range anxiety is still a key stated barrier to the greater uptake of EVs and more chargers will reduce this barrier.

The next 12 months are set to see the introduction of several lower cost models that, while still more expensive to purchase than their ICE equivalents, will compete strongly in terms of *whole of life* costs.

Electric vehicles are important because they:

- Improve local air quality
- Eliminate tailpipe GHG emissions

- Reduce noise pollution
- Reduce vehicle running costs.

10.4.4 EV Chargers

The three main EV charging equipment characteristics that differentiate chargers from one another include (International Energy Agency, 2018):

1. Level: the power output range of the EV charging outlet. The maximum is lower for Alternating Current (AC) for most cars.
2. Type: the socket and connector used for charging.
3. Mode: the communication protocol between the vehicle and the charger.

The number of chargers and the speed with which a battery can be changed has improved significantly over recent years. Victoria is building networks of fast chargers to facilitate long distance travel. Table 1 provides a snapshot of different charging types.

One critically important observation from EV owners regarding their charging habits is that *over 90% of charging happens at home, or work*. This has implications for the selection of appropriate sites for charging infrastructure, and the speed of charger selected. It also has particularly important implications for the Bass Coast Shire, with large numbers of dwellings having easy access to on-site (at home) charging.

Table 11 EV Charging types[6]

	Power	Range added per hour	Charging Time	Typical Application
Level 1 - single phase (domestic)	2.4 - 3.7kW	10 - 20km range / hour	5 - 6 hours	Home
Level 2 - slow single phase (domestic or public)	7kW	30 - 45km range / hour	2 - 5 hours	Home, work, shopping centres, car parks
Level 2 - fast three phase (public)	11 - 22kW	50 - 150km range / hour	30mins - 2 hours	Urban roadside
Level 3 - fast charge (public)	50kW	250 - 300km range / hour	20 - 60 mins	Activity centres, and near highways, motorways and key routes
Level 4 - super-fast charge (public)	120kW	400 - 500km range / hour	20 - 40 mins	Highways, motorways and key routes
Ultra fast charge (public)	350kW	1,000+ km range / hour	10 - 15 mins	Major highways and motorways

Vehicle manufacturers are continuing to upgrade their cars to accept high-capacity chargers. What this means from a usability perspective is that an EV can be fully charged in as little as 15 minutes. It is important to recognise that this will be rare (few vehicles will be able to) and expensive (it is based on a battery optimised for high-speed charging with other downsides). The reality is that most fast-charging sessions, even now, are only ~30 minutes – enough to get you to where you are going.

Over 90% of EV charging occurs at home or work.

10.4.5 Brief introduction in electric vehicle charging for Bass Coast

The last *Integrated Transport Study* was produced in 2014 for Phillip Island, when EVs were in their infancy. There were very few chargers, and little demand for them. In the subsequent nine years, considerable growth in EVs and charging opportunities have occurred. These trends are expected to continue, and the future ITS will need to

[6] Relatively few cars can use full capacity of three phase AC chargers.

identify how Bass Coast will support the transition to zero emission motoring.

It can be helpful to categorise how EV users differ in terms of their charging needs. Figure 129 segments the market into three main categories, based on their circumstance and the charge time they are likely to consider acceptable. At the base of each of the three categories is a suggested charger speed.

A *passing through motorist* will generally not want to spend a long time waiting for their battery to charge and their priority is to continue their journey with minimal delay. Fast chargers are preferred in these situations and are most suitable close to high volume arterial roads and motorways, as these locations have a much larger catchment of potential users. These are often co-located at, or within close proximity to petrol stations, fast food outlets or other roadside amenities. This enables users go to the toilet, buy a coffee etc., while their vehicle is charging. Typical duration of stay is around 15 – 30 minutes. There are some suitable locations within Bass Coast for these type of chargers (e.g. Phillip Island Road, Bass Highway, White Road). These ultra-fast chargers are expensive and require funding from the state or Commonwealth.

Opportunistic charging describes the charging that takes place when someone was going to that particular location anyway, and takes the opportunity to top up, because of the availability of a charger. This can be thought of as analogous to charging a phone not because you are low on charge, but because it is convenient for you to top up the battery. It is common for batteries to have more than 20% charge when entering a charging location in these contexts.

A *local resident* without the ability to charge in an off-street car park will generally find a slow, 7kW public charger suitable for their needs, as overnight charging is possible. These chargers need to be close to where users would have parked anyway and are intended to provide a charging opportunity for those that lack an off-street parking bay in which a charger can be easily installed. Given the type of housing stock in Bass Coast, it is unlikely these type of chargers will be required. Indeed, for houses built from 2024, the new National Building Codes will require parking bays to be EV ready.

Finally, it is important to recognise that an EV owner is likely to move between these different charging categories at different times. A family on a road trip may be a passing through charger at one time, and later the same week an opportunistic charger.

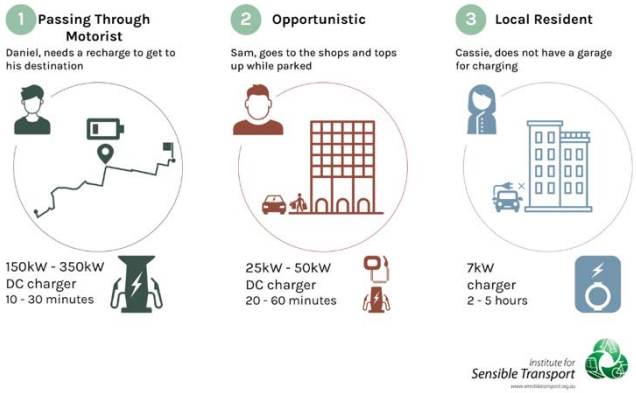


Figure 129 Differentiating the charging market

Figure 130 provides a conceptual illustration of how different types of chargers integrate with different land use types, based on the typical duration of stay.



Figure 130 EV charging eco-system

10.4.6 Bass Coast Electric Vehicle Charging Stations Project

Council is embarking on a project to install four fast-charging stations across strategic locations in the Shire. These charging stations, situated at the Grantville Transaction Centre, Newhaven Visitor Centre, Wonthaggi Art Space, and Inverloch Bunurong Environment Centre, will establish a network of fast chargers for residents and visitors. While some of these sites make sense, it is not clear that all of them do and it is recommended more work is undertaken to ensure they are the right types of chargers, in the right locations. It is

also important that the actions taken by Council offer the best charging network at least cost to Council.

Funding for this project, estimated at $430,000, is a joint effort between Council and the Victorian State Government. The state is contributing $290,000 through a grant managed by the Department of Environment, Energy, and Climate Action (DEECA). The four EV charging stations planned for installation are 4 x 50-60 kW with 3-phase CCS2 and CHAdeMO charge points. Charging rates for EVs will be $0.40/kWh, consistent with other Victorian local governments. The project is expected to be completed in June 2024, subject to availability of contractors and materials.

The content in the paragraph immediately above is out of step with best practice and should be amended if possible. There is little need to provide CHAdeMO plugs, the cost is too low and the outlay from Council too high.

10.5 Micro mobility

Micromobility, such as e-scooters, and other forms of 'small footprint' transport is rapidly evolving. Everything from children scooting to school through to food delivery riders are captured within the term micromobility.

Micromobility does not have a strict, universally accepted definition. For the purposes of this document, micromobility can be thought of as 'small footprint transport' that:

- Travel at less than 45km/h. Laws in Victoria require e-scooters to travel no more than 20km/h and motors on e-bikes to cut out at 25km/h.
- Typically weigh less than 350kg. In most cases, the devices weigh closer to 15 – 35kg.

Figure 131 provides an example of a rapidly growing form of shared e-cargo bike. This is useful primarily by families with young children, as well as those moving items unable to be easily carried on standard bicycles. Users pay an hourly fee. This type of micromobility service only operates in cities that have a well-developed network of connected bicycle infrastructure. These vehicles essentially act as a replacement for a family's motor vehicle, or avoids the need for a second household car.



Figure 131 e-cargo bike share, The Netherlands
Source: Institute for Sensible Transport

10.5.1 Bike share and other forms of micromobility

Shared transport is not solely focused on four wheeled vehicles. The burgeoning two wheeled shared transport sector has been especially active and innovative over the last five years. The number of shared use bicycles has ballooned to over 4.5 million, and many of these bikes are dockless systems that rely on GPS and other technologies to track bikes and integrate with user smartphone to unlock and pay for the bikes (Fishman, 2019).

One of the most exciting innovations in bike share has been the development of electric assist bikes, which are used more than 3 times as frequently as non-electric bike share bikes. Figure 132 provides an image of one of the LIME e-bikes in use in Melbourne.

Given that a significant number of trips that take place in Bass Coast are short, shared e-bikes could be well placed to form an additional transport offering. However, as highlighted earlier, the infrastructure network for cycling must improve considerably if such a system is expected to be successful.



Figure 132 LIME e-Bike share, Melbourne

10.5.2 E-bikes

The global electric bicycle (e-bike) market has grown substantially in the last decade. E-bikes represent the largest, most rapid uptake of alternative fuelled vehicles in the history of motorisation (Fishman and Cherry, 2015). E-bike owners ride more often, and further than other cyclists and are able to better maintain speed with less effort. E-bike ownership reduces car use to an even greater extent than regular bicycles. Figure 133 provides an image of a modern e-bike. Such bikes are general capable of travelling ~80km between charges. These bicycles are particularly relevant to enhancing sustainable mobility options in Bass Coast, primarily due to *distances* being longer in Bass Coast than in more inner city areas.

Research suggests that the main barriers to a greater take up of e-bikes relate to a higher purchase price, and the concerns of riding on inadequate infrastructure.



Figure 133 Modern e-bike

Australia's harmonisation of e-bike regulation, which broadly equates to European standards, coupled with growing market interest, has resulted in a flourishing local e-bike sector.

Importantly however, people do not make transport decisions in isolation; they weigh the pros and cons of the different modes and choose the one that makes sense to them, often from a safety, cost and time perspective.

People do not make transport decisions in isolation; they weigh the pros and cons of the different modes and choose the one that makes sense to them, often from a safety, cost and time perspective.

Unless bike share offers a compelling value proposition, it is unlikely to be a popular choice in Bass Coast. This means a growth in high quality bike lanes, places to park and bikes that meet people's needs.

Benefits of e-bikes

E-bikes offer the user quicker travel time, with less effort. E-bikes have been found to lessen some of the common barriers to conventional bikes, including the ability to overcome topographical challenges, physical limitations of the rider and arriving at work without perspiring. Moreover, e-bike owners report that being able to ride with greater loads (e.g. children or groceries) opens up

greater possibilities for cycling, including replacing some car use. E-bikes are generally more expensive than conventional bikes (~$2,000 – 4,000), and this acts as a barrier to increased adoption.

Figure 134 presents a snapshot of the benefits of e-bikes.

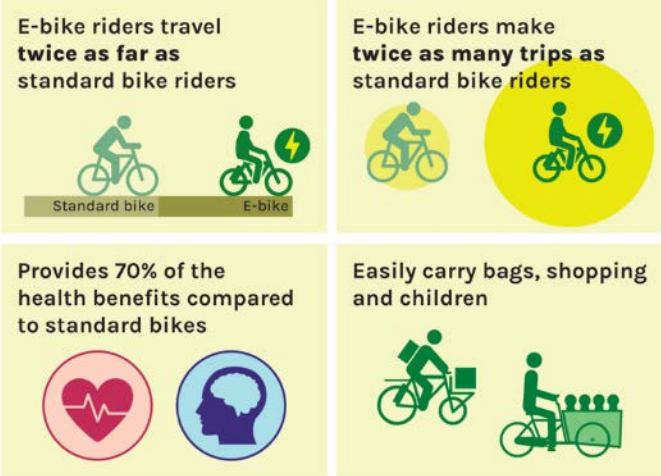


Figure 134 Benefits of e-bikes

A brief summary of the benefits of e-bikes is provided below:

- Replace car trips. E-bikes have been shown to replace car trips more readily, compared to conventional bicycles. One US study of 1,800 e-bike owners found 76% of e-bike trips would have otherwise been made by car. Reducing car use helps:
  - Reduce congestion
  - Reduce transport emissions
  - Lower car parking demand
  - Reduce transport costs.
- Ride further with less effort. Studies have found that people who own an e-bike use them 50% more often than people with regular bikes, and each trip is on average 50% longer.
- Physical activity. Physiological studies have found that people riding e-bikes gain about 60 – 70% of the physical activity benefits of those riding regular bikes. This, combined with the extra cycling associated with e-bikes means e-bikes still provide the necessary level of physical activity to protect from sedentary lifestyle disease.1
- Increase female participation: Females are under-represented in cycling participation in Australia and e-bikes have been shown to reduce the gender imbalance.

As Bass Coast continues to grow and move towards a zero-emission economy, e-bikes have the potential to lower emissions and transport costs, while reducing congestion.

Although there are many benefits for e-bikes, they can cause safety concerns for vulnerable users on shared paths.

10.5.3 Barriers and facilitators to micromobility uptake

The role local government plays in micromobility is crucial to achieving their long-term sustainability vision and strategic objectives. The role that council can play is captured in Figure 135.

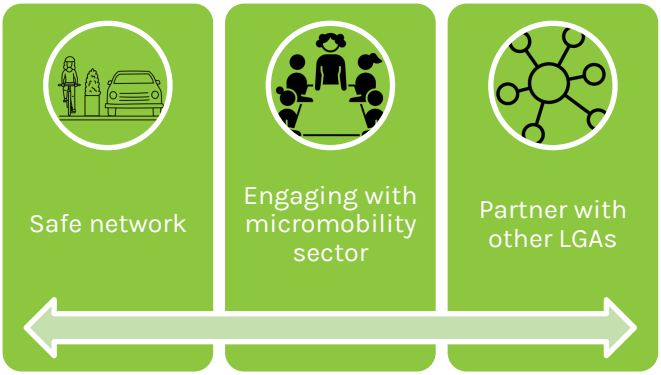


Figure 135 Council's role in growing micromobility in Bass Coast

The single most important responsibility Council has for enabling micromobility to flourish is to create a safe network. Creating a connected, high quality network of protected bicycle lanes, shared paths and quiet streets are key to enabling micromobility to flourish.

While Council will be dependent on cooperation with the state government for protected lanes on declared roads, the majority of the street network in Bass Coast is managed by Council.

The single most important responsibility Council has for enabling micromobility to flourish is to create a safe network.

11. Bringing it all together



The infographic in Figure 136 captures a snapshot of the key findings from this background report.

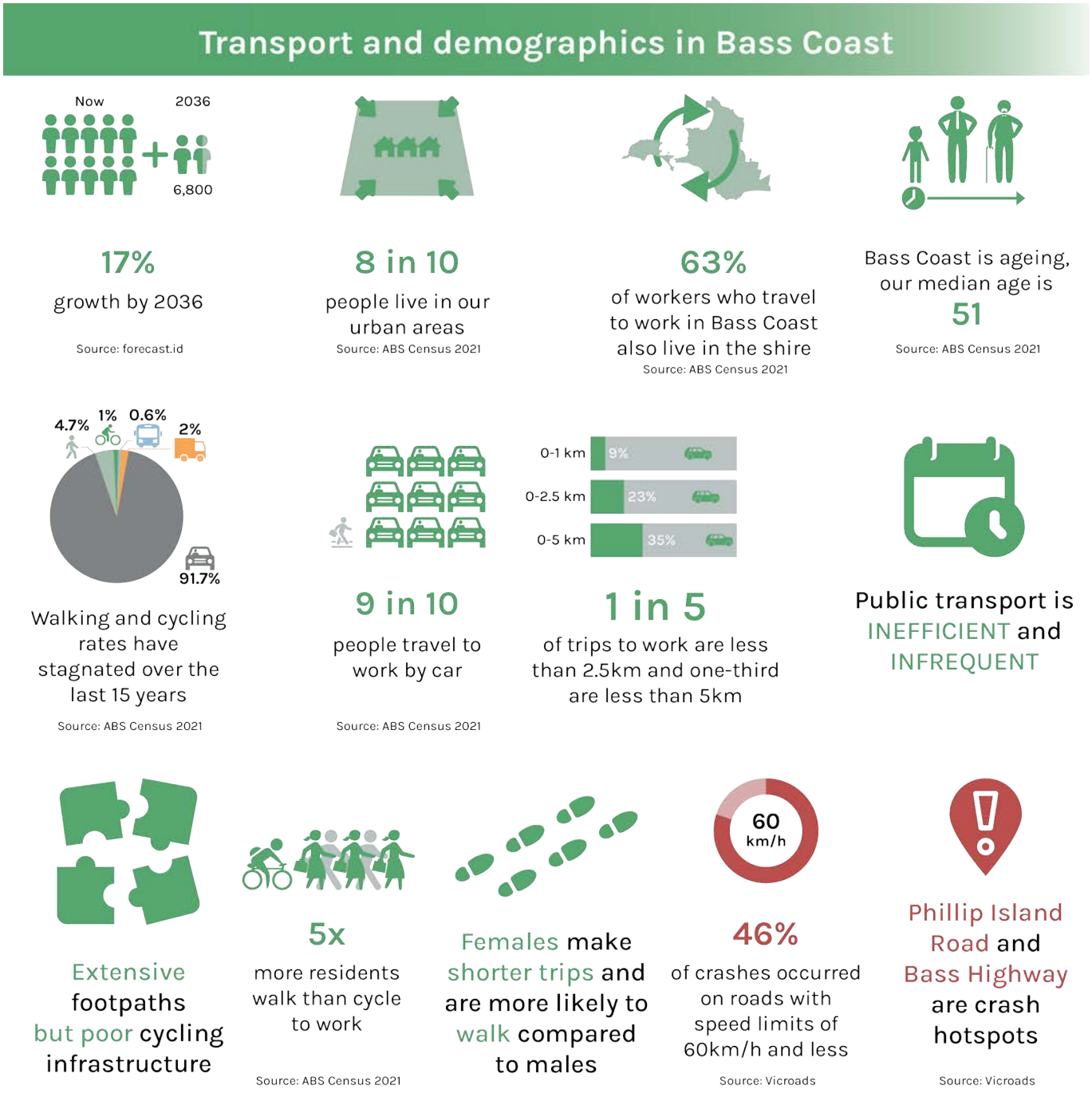


Figure 136 Transport and demographics in Bass Coast

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