Regional Digital Plan Supporting Document

GIPPSLAND

REGIONAL PARTNERSHIPS GIPPSLAND

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Context of the Supporting Information document

The *Gippsland Regional Digital Plan: Supporting Information* is the companion document to the Gippsland Regional Digital Plan. This Supporting Information has been developed by the Department of Jobs, Precincts and Regions (DJPR) on behalf of the Gippsland Regional Partnership through funding from the Victorian Government's Connecting Regional Communities Program (CRCP). It captures the evidence-base and analysis that has been drawn upon by the Gippsland Digital Plan Working Group in developing our Digital Plan.

The Supporting Information document is an evidence-based, place-based analysis of the supply of and demand for digital services and skills. The research and analysis in this document has been compiled according to the following place and sector perspectives:

- **Significant Places** – a review of digital infrastructure across a selection of the most populated cities, towns and localities of the region
- **Primary Production** – a review of digital infrastructure across the most economically significant primary production industries in the region
- **Tourist Locations** – a review of digital infrastructure across the most important tourist attractions / locations in the region, and
- **Transport Corridors** – a review of digital infrastructure along the region's key transport routes.

The evidence and analysis gathered within this document is representative of the whole rather than a complete review of every facet of the Gippsland digital infrastructure environment. However, this is the most comprehensive evidence-base of digital infrastructure supply and demand compiled to date across the Gippsland region and has been a critical input to the development of the Gippsland Digital Plan.

This evidence document is available to assist Gippsland businesses, households and community groups to better understand the current availability of digital infrastructure across the region and where the evidence currently reveals 'unmet digital needs'.

We expect that our stakeholders will bring more information and evidence to light in response to this document to help complete the picture over time, and continue to improve our understanding of the Gippsland digital infrastructure landscape.

Why is this information important?

This Supporting Information has been compiled to assist the Gippsland Regional Partnership to develop its Digital Plan. The Gippsland Digital Plan identifies the key digital issues affecting our region and the priority actions which can reduce the *digital divide*: where regional users face inferior digital services compared to their metropolitan counterparts.

The digital divide has been a longstanding issue affecting regional Victorians. The lack of comprehensive and comparable data on digital infrastructure supply and demand from place to place has been a critical barrier in the ability to clearly understand, advocate on and better target funding and initiatives towards the most pressing issues across regional Victoria. This Supporting Information has been compiled to address this barrier.

How was this information prepared?

This Supporting Information document and analytic structure was prepared by the Department of Jobs, Precincts and Regions on behalf of the Regional Partnerships through funding provided from the CRCP. Activities undertaken in its development include:

- Extensive face-to-face consultation with the Regional Partnerships and Digital Plan Working Groups
- In-depth interrogation of the State Level Information Management (SLIM) database[1]
- Fieldwork comprising an online survey of all local governments in regional Victoria, and face-to-face interviews in each region aided by the Committee for Gippsland
- Independent expert advice on the fundamental drivers of unmet needs.

Structure of this report

- **Section 1 –** A detailed place- and sector-based analysis of digital services supply and demand according to the categories of Significant Places, Primary Production Areas, Tourist Locations and Transport Corridors. Section 1 also includes a general review of digital technology issues influencing future directions for policy and programs.
- **Section 2** – The supporting evidence base that underpins the analysis presented in Section 1 and in the Gippsland Regional Digital Plan. It includes a description of the region's geographic, demographic, economic and structural change characteristics and a review of the current digital services available across the region.

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[1] The SLIM database is an interactive place-based repository of current information on the availability of digital services and key demand drivers across regional Victoria, developed as part of the Connecting Regional Communities Program to inform the development of Regional Partnership digital plans.

Executive Summary

Gippsland is a large region of 274,000 residents stretching from the edge of Melbourne in the west to the NSW border in the east. It is characterised by numerous towns spread throughout the region, its extensive Bass Straight coastline, substantial grazing areas, alpine terrain in the north and a diversity of industry. Traralgon, the largest city in the region, is within 2 hours drive of the Melbourne CBD and forms a natural road and rail gateway to the region. It is the home of many residents commuting daily to work in Melbourne.

Employment is spread relatively evenly over the larger sectors of the economy, with health and community care making up 13% of jobs (and growing strongly); construction, retail and agriculture/forestry/fishing each 9-10% of employment; and tourism, education/training and manufacturing each 7-8%. The region's economy has faced significant structural adjustment over the past decade as coal mining and power generation has declined. Agriculture and manufacturing both contribute strongly to Gross Regional Product. These sectors need to step up to a higher level of digital intensity over the next 5 years to ensure best practice efficiency and competitiveness.

The various dimensions of the digital divide – city-country, urban-rural, town-fringe and 'technology boundaries' within neighbourhoods – continue to limit attainment of the region's aspirations as a prosperous, enjoyable, secure and equitable place to live, work and do business. These digital divides constrain efforts to promote greater decentralisation to the regions affecting the willingness of businesses and consumers to consider relocating in the absence of digital services that will meet their needs.

Particular issues identified across the Gippsland region include:

- There are issues with fixed broadband access for businesses throughout the region. These issues extend to households in smaller localities as well as those located on the fringe of larger population centres and are caused by the limitations of lower quality NBN infrastructure such as fibre to the node, fixed wireless and satellite technologies. The region stands to benefit in areas such as food and fibre, education, e-health and professional services like engineering if the standard of services available to these organisations can be improved.

- Improving mobile connectivity remains a high priority for regional stakeholders. Infrastructure investment and service quality continues to lag that of metropolitan users, yet user expectations continue to increase for on-demand access to voice and data functionality wherever they are. Major population centres appear to be well served, but coverage and performance is often unsatisfactory when moving beyond population centres and in many rural and remote areas. Coverage is also likely to be inconsistent on trains beyond Traralgon. The public coverage maps underpinning this analysis are limited in their ability to show specific spots within population centres where the 'lived experience' finds mobile services to be too poor to support, for example basic web-browsing. Better coverage data from mobile network operators is needed to help guide future mobile infrastructure investment and provide a more complete picture of the experience of regional users.

- Digital skills are a persistent issue across the region, both in terms of basic digital literacy as well as specialist technical skills to support business growth and competitiveness across the region. Gippsland industry consultations have highlighted the importance of this issue and the ways in which current digital skills training is often not well targeted to regional business needs and government supported courses are too inflexible. Any government support for digital skills training needs to ensure it delivers relevant, place-based digital skills training in the regions and businesses where it is needed. Further research is required to understand where these issues are felt worst and how training can be tailored to address them.

- Low bandwidth Internet-of-Things (IoT) coverage for businesses in population centres and for agriculture is variable. Several agricultural areas have been identified as having a supply shortfall, warranting further attention as demand is expected to grow in the coming years. WiFi for visitors and low-income residents is often in short supply where it is needed most, with regional stakeholders showing strong support for more public WiFi initiatives based on consultations.
- Tourist attractions are inadequately served with fixed broadband for site operators and a number of places, particularly more remote places, face issues with mobile coverage, noting that even places that appear well served based on public coverage data may present issues for reliable and high-quality connectivity for users.
- Major roads generally appear to have good mobile coverage and the Melbourne-Traralgon rail link has good mobile coverage and in-carriage reception, with the standard of services beyond Traralgon less clear but likely to degrade.

SECTION 1 – Technology Issues and Summary of Findings

General Infrastructure and Technology Issues

The following sections provide a general discussion of a number of important and common digital connectivity issues relevant to regional markets. This commentary has been developed by expert consultants and stakeholder consultations that revealed the most pressing concerns of regional stakeholders the various aspects that must be considered in evaluating and rolling out different infrastructures and services.

The Gippsland Digital Plan Working Group has used this information and the 'heat map' analyses which follow it as the basis for developing the Gippsland Digital Plan and the priority actions identified within it.

The range of issues canvassed below demonstrate the current reality that digital infrastructure and services, as well as the skills required to take advantage of these technologies, are a multi-faceted and complex policy and program domain.

Multiple infrastructures and technologies, diverse user groups, various levels of government, and a breadth of industry and community stakeholder groups all combine to ensure that the technological landscape facing regional Victoria today will look significantly differently in five- or ten-years' time. The priority issues and actions identified as warranting immediate attention may be resolved or become less relevant as investment continues, technologies advance, polices change and stakeholder needs and expectations evolve.

The Gippsland Digital Plan Working Group has taken this information into account to develop the Regional Partnership's initial list of priority projects as outlined in the Gippsland Digital Plan. The Working Group acknowledges that as the matters discussed below change over time, so too may the priority actions for the region. The Digital Plan will be amended to reflect these developments and ensure the plan continues to reflect the most important priorities across the Gippsland region.

Mobile network coverage

Mobile coverage (service availability) depends on local topography and the location and aerial orientation of mobile towers. Users closer to the fringe of a mobile tower's coverage will receive weaker signal strength. The lower population and revenue densities of regional markets and the larger areas in which people live, means there is less mobile infrastructure in a given area compared to metropolitan areas. For these reasons mobile coverage is absent or poor quality in some regional locations.

This document has, by necessity, taken the mobile coverage maps publicly provided by the mobile network operators as the starting point for analysis – better data held by the mobile network operators has not yet been made available. What this necessarily-superficial, second-best analysis does not show is the significant variation in the real-world connectivity experience of mobile users, with many gaps in coverage and poor-quality service in areas shown as fully covered.

Mobile users have increasingly higher expectations of the services that they can access on smartphones, ranging from traditional voice and critical emergency communications, through to web browsing data apps and video streaming. The situations in which people want to access mobile services are also changing. Once primarily considered a service for on-the-move outdoor use, mobile services are increasingly substituting for fixed services in the home and at work for a significant share of users. However, the publicly available coverage maps fail to distinguish between traditional voice and other narrowband services on the one hand, and high quality mobile broadband access on the other – that is, they do not provide enough information for regional users in particular to identify locations where higher bandwidth services will (and will not) work well.

As such, while the analysis undertaken in this document has led to many areas being regarded as well covered by existing mobile infrastructure, such conclusions need to be interpreted cautiously taking into account the limitations of the public coverage maps. Mobile coverage conclusions of this document are intentionally high-level and intended to offer the general perspective of a given city, town, primary production area, tourist location or transport corridor, rather than offering the perspective of individual users in these places who may be located on the fringe of coverage or in an area where topography adversely impacts services in their area for example.

It is well understood that even within the apparently well served areas, many people will regularly face issues with access to reliable and high-capacity mobile services such as those available in metropolitan areas. Furthermore, as users move beyond higher density population centres between regional towns and into more remote locations there is inevitably a reduction in mobile coverage and the number of mobile network operators providing good services in any given location. This is experienced by users as a lack of continuous, high-quality mobile services capable of supporting the full range of smart phone functionality users expect.

The Victorian Government understands user disappointment and disillusionment with mobile connectivity in regional areas and has joined industry stakeholders in calling for mobile network operators to publish the richer and more accurate coverage data they possess to accurately identify unmet needs and possible ameliorative actions. The Government in conjunction with the Australian Competition and Consumer Commission (ACCC) and the Commonwealth Government is actively pressing the mobile network operators to publish more useful coverage data and supports the ACCC in its public commitment to take regulatory action if cooperative progress is not made.

The State Level Information Management (SLIM) database is capable of capturing and analysing more detailed location-specific information on the availability and quality of mobile coverage in regional areas, with improved coverage data to be incorporated in future iterations of SLIM and the digital plans when this becomes available to enable mobile coverage analysis more closely aligned with the 'lived experience' of residents and visitors.

The Digital Divide – looking below the surface
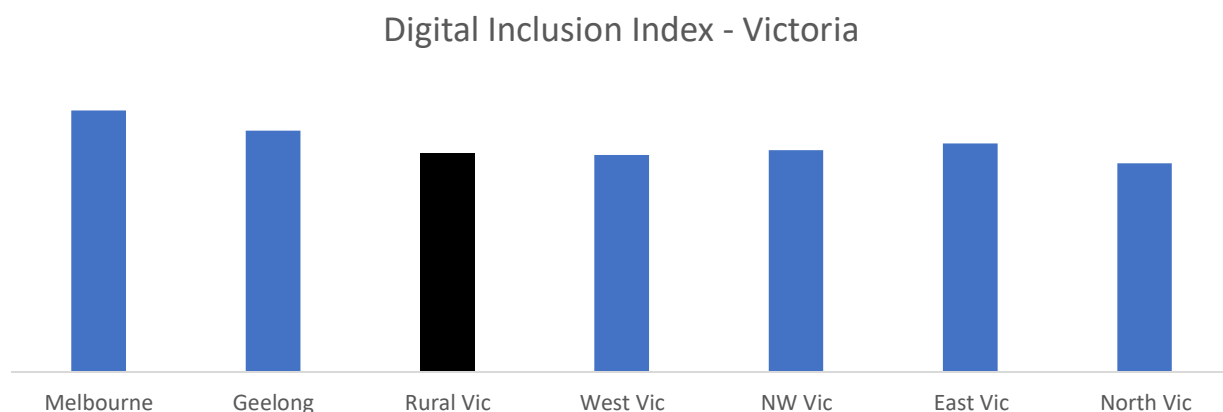
Digital Inclusion Index - Victoria

The significant diversity in geographic, demographic, social and economic characteristics within a region, and network design decisions and consequent technology boundaries, mean there are also digital divides within cities, towns, localities and rural/remote areas – digital 'have nots' amongst the 'haves'.

Where NBN infrastructure cuts over from fixed line to fixed wireless technology, or from fibre to the premise (FTTP) to fibre to the node (FTTN) within fixed line areas, businesses and homes on either side of the technology boundary will experience different service quality. Similarly, local topology and antenna settings can result in substantial quality disparities in and between localities.

Furthermore, mobile users have increasingly higher expectations of the services that they can access on smartphones, ranging from traditional voice and critical emergency communications through to web browsing, data apps and video streaming. The situations in which people want to access mobile services are also changing. Once primarily considered a service for on-the-move outdoor use, mobile services are increasingly substituting for fixed services in the home and at work for a significant share of users.

Digital divides within communities and between businesses will also exist for digital skills and affordability, reflecting differences in individual and company digital proficiencies, age, income levels and experience in high technology environments.

Business grade broadband services - NBN

Some regional businesses have experienced service quality difficulties with NBN fixed line services, in particular substantial variations over the course of the day in information rates achievable from NBN-based broadband services and have called for effective NBN business grade services. The Victorian Government recognises that from its inception in 2010, the mandated purpose of the NBN has been to provide ubiquitous highspeed wholesale broadband coverage to all residential (and very small business) premises at affordable standard national prices rather than larger businesses, and the necessity of NBN Co's technology choices to optimise total network costs. The Victorian Government also recognises and applauds NBN Co for responding to the call from business of effective business grade broadband services – high speed (100 mbps+), symmetric and service level agreements on 24/7 information rate performance – for developing its Enterprise Ethernet business grade service that meets these requirements for release Q4 CY 2018.

Nonetheless some unmet business needs will remain due to the predominance of fibre to the node (FTTN) technology within the NBN network which utilises long copper loops that will not support the Enterprise Ethernet service. There is no NBN business grade service foreshadowed for fixed wireless areas, and there is uncertainty about the veracity of the yet-unspecified satellite-based NBN business grade service due to inherent latency issues and information rate constraints.

Competing fixed broadband networks

Competing networks exist in capital city CBDs and some more densely settled metropolitan areas that can provide high quality alternatives to the NBN capable of supporting broadband services that meet the needs of digitally-intensive businesses at affordable prices. The existence of such competing networks leads to better service offerings for businesses and consumers in these areas.

The rollout of 5G wireless technologies as early as 2019 will enhance the capacity for alternative high-quality broadband services to the NBN to be provided. However, an equivalent situation does not exist in regional Victoria, where competing networks capable of broadly-affordable business grade service are in general not present and are unlikely to be widely developed without government support.

Common technology issues

In developing the Digital Plans, numerous digital technology issues were identified through Regional Partnership and stakeholder consultation and expert analysis. Understanding the nature of these issues and the barriers which must be overcome is the first step towards addressing them and their impact on the digital divide. This section provides deeper insights into these problems arranged under six common themes that are most relevant to Victoria's regions:

1. **Fixed broadband**, in particular, the national broadband network (NBN)
2. **Mobile network coverage** – for both voice and data services. For some, this is an alternative to fixed broadband connectivity. For many, the "untethered" access made possible by the mobile networks is vital to social amenity, safety and productivity.
3. **Public WiFi** availability, particularly in low income locations
4. **Low-powered wide area network (LP-WAN) coverage** and uptake for Internet of Things (IoT) applications. Embracing the application of IoT technologies is important if Australia is to achieve "best practice" in areas such as agriculture, community infrastructure and the like.
5. The potential to enhance outcomes by access to **Government infrastructure** – such as the optical fibre deployed along rail routes, and towers used for radio networks.
6. **Digital skills** – a vital counterpart to the availability of infrastructure and services.

1. <u>Fixed Broadband</u>

NBN Rollout Schedule concerns

With the NBN rollout still underway, some areas are already able to access NBN services while others are still waiting. Where a non-satellite technology is planned but the rollout has not yet been completed, users are generally not able to procure a satellite service in the interim, meaning their fixed broadband connectivity options remain as they were prior to the NBN initiative. These are generally an ADSL service over Telstra's copper, a non-NBN fixed wireless service, or a satellite service from a commercial provider.

For *most* (but not necessarily all) users, an NBN connection will deliver improved performance relative to the options previously available. Further discussion on where this may not be the case is provided in the following sections. While an improvement in fixed broadband services for many will come in the form of an NBN connection, the lengthy duration of the rollout schedule does mean that areas destined to be serviced in the final years of the NBN rollout face a measure of continuing disadvantage relative to those with access. While it is not possible to fast track the remaining rollout to all locations, it may (by negotiation with NBN Co) be possible to fast track the rollout to priority locations as identified by local governments.

Affordability and service quality concerns

The cost and quality of fixed broadband for regional users has been raised by stakeholders. Details (such as whether the complaints relate to NBN or other services, whether some RSPs figure more prominently than others, what retail plans are involved) are not available to support a comprehensive analysis of root causes. Some of the complaints relate to the type of connection available to them (see discussion later under "*Concerns raised around limitations of NBN technologies*") and some relate the performance of services falling short of expectations.

For fixed broadband users, including those already able to access an NBN connection, a common complaint relates to service performance during peak periods – even for those users with the highest performing FTTP connection technology.

In the case of NBN-based services, two key segments in an end-to-end connection where performance may suffer during peak periods are the Connectivity Virtual Circuit (CVC) within the NBN, and the backhaul between an NBN Point of Interconnect (POI) and the RSP's core network. Both of these segments are "shared pipes" where the capacity available is a small fraction of the total demand that

could be generated if all users were simultaneously active at the maximum speed available on their connection.

Towards strengthening the user's protection against poor performance, the Government passed legislation in mid-2018 setting out the user's remedies should the performance of an NBN-based service fall significantly short of nominal specifications advised by the RSP.

CVC Capacity

The under provisioning of CVC capacity is not due to technical limitations, but rather to a pricing model designed to boost NBN Co's wholesale revenues. In the early life of the NBN, RSPs typically acquired an *average* of just over 1 Mbps per customer (supporting users with connection speeds up to 100/40 Mbps). More recently, NBN Co has introduced pricing incentives to promote the purchase of additional CVC capacity, and at the time of this report, the average had risen to a little over 1.5 Mbps. Nevertheless, congestion can still occur during peak periods.

Inadequate CVC capacity issues would typically affect both urban and regional users equally. However, due to lesser economies of scale, smaller Retail Service Providers (RSPs) may face higher costs in being able to provision adequate CVC to support their customers. Investing at the level required could lead to higher prices or inadequate margins – but failing to do so could leave their users more vulnerable to performance degradation during busy periods.

A CVC-based pricing model limiting the ability for smaller RSPs to compete in regional markets may contribute to inferior outcomes for regional businesses and households.

Backhaul Pricing concerns

The cost of backhaul for internet service providers to connect with the NBN points of interconnect (POIs) is higher in regional areas due to both the more limited backhaul infrastructure competition and investment, as well as the larger distances involved in connecting to POIs. The premiums attributable to regional backhaul may motivate RSPs to operate their links to regional POIs at higher congestion levels, with the result that regional users experience poorer performance than their urban cousins.

The cost of backhaul to core networks (almost always located in the major capital cities) is one of the barriers to more active competition for the supply of alternative fixed broadband services in regional locations and limits the growth of alternative business-grade networks.

Concerns raised around limitations of NBN technologies

Fibre-to-the-Premises (FTTP) represents the ultimate access technology, capable of performance limited only by the electronics driving the fibre. Whilst today's technology delivers 1 Gbps, 10 Gbps FTTP technology is on the horizon. Those serviced by the "lesser" technologies may face constraints on the utility of their connection as discussed further below (including access to effective business grade services).

Greenfield housing developments present an area of opportunity for establishing FTTP precincts that can meet the needs of residential users with more demanding requirements. Currently, developers are required to procure a FTTP solution for any development comprising 100 or more dwellings.

As the NBN rollout proceeds and more fibre-based infrastructure becomes available throughout Victoria, the 100-dwelling threshold merits review. Consultation with regions suggests that lowering this threshold could improve the prospects of establishing FTTP enclaves in regional areas.

Satellite concerns

Satellite services are subject to latency issues which significantly affect the utility of these services, particularly for interactive activities requiring inbound and outbound signals. Geostationary satellite services can also be prone to disruption during periods of heavy rainfall and suffer predictable degradation twice a year due to solar interference.

The finite capacity of NBN Co's satellites is being rationed across the 3-4% of Australian premises that will eventually rely on the service. This constrains the ability to access retail high bandwidth broadband plans with as liberal monthly data quotas as are typically available on terrestrial connection technologies. This can be an impediment to utilising these services for more data intensive activities such as large-scale data sharing for farming and mining, online education and streamed entertainment. For large-scale agricultural users it is also not possible to use NBN satellite services out in the field as the service needs to be "anchored" to a fixed location, usually the house.

Fixed Wireless concerns

NBN Co utilises fixed wireless (FW) to a maximum distance of 14 kilometres from the base station. Installations at the limits of this reach may experience some variability in signal quality. The current maximum speed is 50/20 Mbps. NBN Co had signalled its goal of introducing a 100/40 Mbps offering, but no recent announcements have been made as to if and when this will become available.

Fixed wireless technologies share the finite capacity of an antenna beam amongst all of the users in the footprint of that beam. As such, the network is prone to congestion during busy periods. In October 2018 NBN Co acknowledged a problem of congestion on around 4% of FW sites, reducing busy-time performance to below 6 Mbps per user.

Fibre to the Node (FTTN) concerns

The performance of services supported by FTTN technology is heavily influenced by the length and condition of the copper segment from the node to the customer's premises. While distances of up to about 150m support speeds of or close to 100/40 Mbps, a majority of users are located at longer cable distances from the node, leading to progressively slower performance. In August 2017, NBN Co disclosed the percentages of FTTN-connected premises in different download speed bands as follows:

- 6% in the 12-25 Mbps band
- 29% in the 25-50 Mbps band
- 33% in the 50-75 Mbps band
- The remainder (32%) in the 75 -100 Mbps band.

Business and household users connected by FTTN technology that are too far from the node to support the higher speed tiers offered over the NBN may be constrained in their online activities and commercial potential (including access to effective business grade services).

To put this issue in some perspective, NBN Co's 2018 Annual Report indicated that some 52% of NBN FTTN users were selecting plans with download speeds of just 12 or 25 Mbps – achievable on virtually all connections. Affordability (and the adequacy of such speeds for those with modest needs) is undoubtedly a factor for many who choose these plans. However, there are also likely to be some who would opt for higher speed plans if their lines were capable of supporting them.

The individual Digital Plans and supporting information for each Regional Partnership go some way in identifying locations (such as business precincts) where the NBN technology may limit current or future digital progress. Better information on where these demand hotspots exist can support more targeted and efficient investment and upgrades to NBN services.

Early signs from the CRCP Enhanced Broadband program emphasises the reality of these technology boundaries and the impact on regional communities. Several enhanced broadband pilots are being undertaken to ascertain the appetite among regional communities for services beyond those being provided by the NBN, with alternative service providers demonstrating interest in bidding for these projects. The department will be happy to provide feedback and outcomes from these pilot projects as they become available to shed light on the business model feasibility of NBN bypass and assist the Commonwealth and NBN Co in considering where and how upgrades to the NBN rollout can be best applied to meet local community needs.

The situation for "digitally intensive" businesses is somewhat different from that of residential users. Discussions with regional stakeholders exposed several situations where large businesses with demanding connectivity were suffering from the lack of adequate, competitively-priced solutions, ideally over optical fibre. Such businesses and locations could be prioritised for NBN upgrades or policy attention given to procuring competitively-priced fibre access in regional locations.

NBN Connection and Fault Repair Experience

The parliamentary Joint Standing Committee on the NBN released its first report on 29 September 2017. The Committee recommended that appropriate consumer protections be established for broadband services, including service connection and fault repair timeframes, minimum network performance and reliability, and compensation arrangement when required standards were not met.

Strong Service Level Agreements (SLAs) are especially important to businesses, since service disruption and protracted outages have the potential to bring the businesses to its knees.

Alternatives to NBN Connections

The carriers offering fixed broadband alternatives to the NBN tend to be most active in urban areas. Under its agreement with NBN Co, it is understood that Telstra is not permitted to compete with NBN Co for residential connections once a cabled NBN solution (FTTP, FTTN, or FTTC) is established in an area. However, it is able to offer business grade services to organisations needing more specialised connections.

An important consideration is ensuring that the organisations which depend on high-speed connectivity for the conduct of their businesses are able to procure the services they need. This underpins the rationale for Victoria's Enhanced Broadband program as part of the CRCP. Cabled solutions that involve the installation of new cabling over any significant distance will typically be priced at a level that only the very largest of businesses could entertain.

One of the options for moderating costs is to establish precincts that can accommodate a cluster of businesses with high connectivity needs.

2. <u>Mobile blackspots</u>

In the context of mobile connectivity, the overwhelming issue of concern to regional Australians is gaps in coverage.

Real world experience of mobile coverage indicates that the situation is far more complicated than the coverage maps provided by the mobile network operators suggest. Mobile phone users in regional areas frequently report weak signals and call drop-outs in areas that are claimed to have good coverage. It is an unfortunate reality that mobile coverage cannot be accurately summarised in a simple form because of a number of complicating factors:

- Networks are constantly evolving and new sites are periodically commissioned
- Connectivity depends on the quality of antenna in the receiving device
- Device reception can be enhanced by use of an external antenna
- A large number of environmental factors can be at play, including local complex topography blocking or reflecting signals (known as 'multi-path'), vegetation along the path (especially if it is moist) and adverse weather such as rain, fog or dust
- Signal strength can vary widely as users move around closely proximate locations (for example, when moving from open space into or near a building).

Any given tower can support a mix of technology generations (such as 3G, 4G and in the near future, 5G) at different frequencies (various channels from 700MHz to 2600MHz and higher for 5G). Both the phone and the network continually negotiate the connection and need to adapt for changes in real-time, especially for devices that are actively moving during a call or download. All of these factors combine to

deliver an experience that is often well short of what the coverage maps would suggest – and significantly worse than that experienced by metropolitan users.

Connectivity can also fail or degrade due to tower congestion when a large number of users all try to connect at the same time – for example, at an event or a passing bus/train in a remote area.

Blackspots continue to be an issue affecting not only public safety and social amenity, but increasingly business efficiency. Almost every sector of economic activity is evolving to exploit the opportunities that have become available with anywhere, anytime access to information and services via the mobile networks. Without mobile connectivity, individuals and businesses will find themselves at growing disadvantage.

With large geographic areas of Victoria destined to be limited to satellite for fixed broadband services, the mobile networks can provide a valuable adjunct, fallback or alternative to fixed broadband – providing low latency connections and providing a "safety net" when satellite services are affected by solar interference or severe weather conditions.

The Digital Plans and supporting information for individual regions are expected to note conspicuous gaps in mobile coverage that affect:

- Significant places (population centres and tourist locations)
- Road and rail transport routes
- Areas of agriculture or other areas of intensive economic activity.

Whilst accepting that 100% landmass coverage is not a realistic goal, it may be sensible that an appropriate national mobile coverage aspiration should be established reflecting worthwhile socio-economic benefits from extending coverage further in regional Australia, most of which cannot be captured by the MNOs.

A "natural monopoly" may be the most efficient approach for providing coverage in areas of very low population density requiring significant public subsidies. This could take various forms, such as:

- Concentrating future investment in one carrier, but on condition that the carrier offers mobile roaming to other MNOs, or
- Establishing a wholesale-only operator in the areas where no other MNO will go, with that operator providing roaming to all MNOs, e.g. NBN Co or a new special purpose private or government-owned entity.

Rail coverage

A significant community of mobile users travel along the various rail corridors across Victoria, both for commuting and as tourists. The importance of good coverage for train travellers is recognised by the Victorian Government's investment partnership with the main MNOs and V/Line to improve in-carriage coverage along the five main commuter rail corridors out of Melbourne. Similar to the experience of road users, train travellers frequently report poor experiences in areas where the MNOs suggest that they provide good coverage due either to localised mobile blackspots or carriage types that block passenger in-carriage reception.

Disparate coverage

Because the network footprints of the three MNOs differ, there are many locations where users of one mobile network have no coverage, but where coverage is available on one or both of the other two networks. Such situations rarely occur in urban areas.

This is not a problem for emergency calls, since triple-zero (or "112") calls will be accepted on any network. However, for users wanting to maximise network access for more general purposes (both calls and data access), the only option is to maintain multiple network subscriptions – adding to costs and creating ambiguity for callers.

The introduction of mobile roaming between carrier networks is a potential solution to the problems of a disparate patchwork of coverage. While not favoured by the ACCC at present, a change in the approach for blackspot funding towards a natural monopoly could prevent the problems of disparate coverage in very low population density areas from growing.

Major events capacity shortfalls

At significant regional events mobile coverage is not just required to support attendees and their needs for connectivity, but also increasingly for vendors who are reliant on 3G/4G coverage for EFTPOS terminals handling onsite payments. This is particularly important in (for example) swap-meets, markets and field-days where significant amounts of money change hands. A lack of connectivity can be crippling for business.

Potential approaches to alleviate problems with capacity shortfalls include:

- Coverage Augmentation – this may be applicable to venues that are regularly used and which warrant a permanent boost in capacity through the deployment of micro-cells.
- WiFi Coverage – providing a public WiFi zone covering the area in which the event is conducted may allow a proportion of the demand (notably for data) to be offloaded from the mobile networks, freeing more capacity for voice communications.
- Demand Aggregation – compiling a consolidated State-wide schedule of all events where additional mobile capacity is needed could underpin a procurement process from the MNOs to satisfy the requirements.

3. Public WiFi

Virtually all modern smart phones, tablets and notebook computers have the inbuilt capability to connect to WiFi networks. WiFi is therefore a highly accessible connection means supporting faster connection speeds avoiding some of the costs associated with transferring high data volumes over mobile networks. However, the range of WiFi signals is quite limited (indicatively 100m) and therefore multiple base stations are necessary when attempting to provide coverage over a larger area.

Free WiFi zones (open to public use) have been established in various locations throughout regional Victoria. In developing the individual regional plans, interest in Public WiFi zones has been reinforced to address a range of needs:

- As a means of access for under-privileged households in the community who may not be able to afford fixed or mobile connectivity
- For visitors and tourists who want to find out information about their location and/or share experiences with family and friends
- For travellers passing through an area
- For residents living in regions where the only fixed broadband option is a satellite service, or when away from their fixed broadband connection.

4. Low Powered Wide Area Network (LP-WAN) Connectivity (IoT)

IoT investment is forecast to grow dramatically over the coming years. Whilst still in a relatively early stage of development, IoT technology will increasingly underpin "best practice" in many areas of economic activity and presents opportunities that Australians will need to embrace if they are to remain competitive with global markets.

Some IoT applications are well established, such as the remote camera surveillance for security purposes. Many other IoT applications are still in a developmental phase – trialling different approaches and learning what works and what doesn't work.

On the supply side, there are numerous different technologies that can be used to connect devices – including Bluetooth and Zigbee. However, four LP-WAN technologies – NB-IOT, LoRa, Sigfox and Taggle –

are emerging as key pillars of support for emerging IoT needs. These technologies vary in performance characteristics, the distances over which connectivity can be achieved and power requirements. For many applications, batteries are the only viable source of power to sensors and battery life of 10-15 years can be a key requirement.

NB-IOT is an extension of the mobile networks, with coverage being provided by the existing mobile networks. For the other three technologies, coverage is currently being deployed on an "as needed" basis. That is, coverage is not being deployed in advance of commercial opportunities, but rather in response to specific projects that generate revenue to fund the infrastructure.

Given that IoT is a relatively new phenomenon, demand for LP-WAN coverage is emerging but can be expected to grow strongly in the coming years. A key factor will be the extent to which various barriers to adoption are overcome. These barriers may include (but are not limited to):

- Lack of end-to-end solutions that can be implemented without specialised systems integration experience
- Lack of network coverage for the particular connectivity technologies used by available solutions
- Insufficient proof of the benefits on offer through IoT technologies to attract end-user investment
- A shortage of appropriate skills and experience to support the implementation and operation of beneficial applications
- Costs – either capital costs associated with implementation, or ongoing costs associated with connectivity or the operation of solutions.

A range of IoT trials in the agricultural sector are being funded as part of the Victorian Government's CRCP and are expected to yield valuable insights into factors that can accelerate adoption. Suggested approaches to boosting the uptake of IoT technology are expected to be determined in the wake of this work.

5. Alternative infrastructure

Various infrastructure providers have deployed optical fibre or other communications technologies to support their operations. Spare capacity is often available that could be made available for other purposes without compromising the host agency's use. However, the availability and capacity of these alternatives is not well known.

Discussions with stakeholders indicated a low level of awareness of the potential for utilising spare capacity on alternative infrastructure. Notwithstanding the lack of overt demand, there are a number of areas in which such capacity could be used to advantage including (but not limited to):

- Providing additional backhaul capacity between NBN Co's regional POIs in Victoria and the central RSP networks in Melbourne
- providing backhaul capacity for enhanced broadband precincts and carriers offering alternatives to NBN services
- (In the case of towers) supporting microwave links that address critical gaps in high-speed infrastructure.

6. Digital skills

Little systematic place-based information on the supply of and demand for digital skills and the affordability of digital services was available to support development of this supporting information. This is a clear barrier to deeper understanding of where digital skills issues are prevalent and potential remedies to address them. However, some broad findings and conclusions can be drawn about the current state of affairs.

The extent to which digital literacy is a problem across the regions varies considerably. As a broad generalisation, the problem is more intense the further the distance from a major population centre. It is

likely that this relates to the reduced access to education and training resources, potentially setting up a vicious cycle. Gippsland industry consultations has highlighted the importance of this issue and the ways in which current digital skills training is often not well targeted to regional business needs and government supported courses are too inflexible.

The character of needs varies from introductory computer literacy (often the foundation for kick-starting more advanced learning) to sophisticated skills of the kind needed to exploit more specialised opportunities.

A rich array of educational resources is available through the Internet. Many of the most effective are video-based – ranging from video clips explaining how to solve particular problem (such as on YouTube) through to streaming webinars (commonly offered through industry groups) and lectures (both streamed live and stored for consumption at the user's convenience). Many are freely available (for example, the massive online open courses, or "MOOC"s). Some of the more advanced courses culminating in formal accreditation involve enrolment and the payment of fees.

For many regional Victorians, connectivity is still a barrier to taking advantage of these resources – whether due to connectivity costs, low-speed connections or limited data quotas that can be quickly exhausted if video resources are used too liberally. Accordingly, improving the general connectivity landscape via the sort of measures outlined in the earlier sections of this document can help to improve access to learning resources and contribute to higher digital literacy.

Improving connectivity more generally (both fixed and mobile) can also serve to make regional Victoria a more attractive location for businesses and individuals, decentralising the population distribution and improving the market for supporting industries (such as IT equipment supply and maintenance etc.).

Notwithstanding general improvements to the connectivity landscape, it is predictable that a sector of the community risks being left behind in an increasingly digital world. The most digitally vulnerable include those who:

- Cannot afford either fixed or mobile connectivity
- Live outside mobile coverage areas
- Have connectivity that performs poorly or is subject to restrictive data usage quotas (for example, users in the NBN satellite footprint).

For some such individuals, access to public WiFi can provide an alternative, even if it lacks the convenience of anytime access and requires travel to a point of access.

In general, it is anticipated that the future will bring improved local options for raising digital literacy (including tuition in digital hubs), state-wide vocational training solutions for shortages of IT professionals, and state-wide school education solutions (STEM++) for digital age workforce preparedness.

Digital learning needs to start with baseline skills so that people can find and engage with more advanced materials. Access to foundational education needs to be effective and affordable. Beyond basic literacy, the digital access infrastructure and services documented in the regional digital plans potentially alert users to various resources that can be used to remediate skills shortages – for example, using YouTube, MOOCs (massive online, open courses), and interactive training providers. Education is likely to be most effective when embraced at the local level. Multipurpose digital hubs can play an important focal point in this regard, including good online access and venues where, for example, young people can teach older citizens and workers basic digital literacy skills.

In addition to generic educational resources, further detailed work may expose key gaps that could be usefully addressed with tailored training modules, or potentially a "roadshow" of presentations.

The following summarises some key factors relevant to the success of digital hubs identified through consultation with representatives from three regional digital hubs as part of the Digital Plans' case study development. These include for hubs to:

- Have a clear, well-defined purpose
- Feature a multi-function, flexible layout, be aesthetically inviting, safe and adaptable to all sectors of the community
- Be well-managed and well-supported from information technology, communications and specialised equipment perspective
- Provide learning activities and programs that are well-targeted to the needs of the surrounding community
- Establish and maintain a program of support volunteers.

Overview of Findings

The map and table below captures high level findings for the Gippsland region from the place and sector based analysis undertaken to provide the evidence base necessary for effective digital planning.

Gippsland unmet needs hotspots: fixed broadband and mobile access
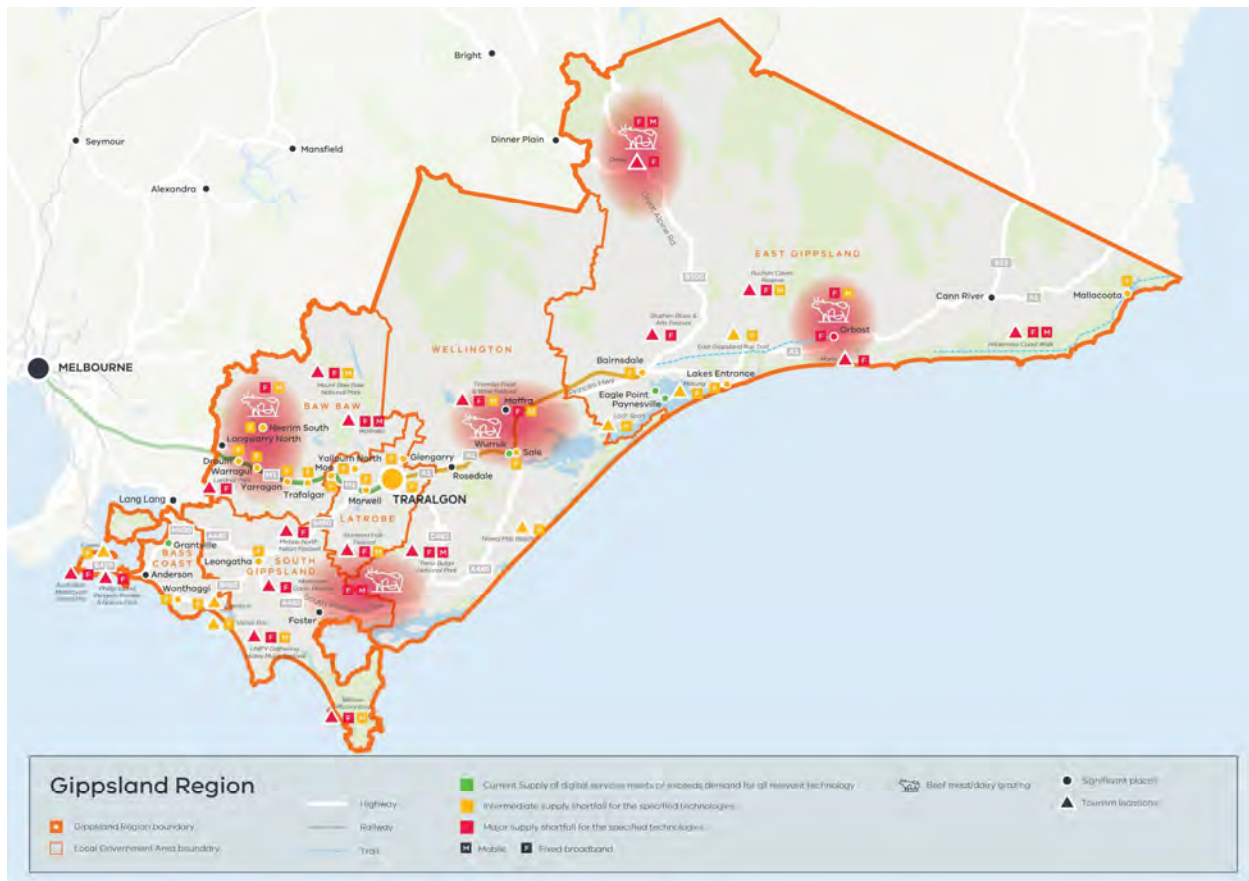
Figure 1 Gippsland unmet needs hotspots: fixed broadband and mobile access

The general demand characteristics of different user groups and the commonly identified 'unmet needs' of regional users are summarised in the table below. These general findings have been revealed through the analysis undertaken in Section **2** of this report and through stakeholder consultations undertaken to understand the common technology issues faced by regional users.

Table 1 Summary of common unmet needs for different regional user groups

Place/Sector (typology)	Demand Characteristics (place/user)	Digital 'Unmet Needs'
Significant Places		
Businesses	Concentration of public services (education, health, admin), retail, small business in cities, larger towns	Access to effective business grade broadband, including on town fringes Improved digital skills
Households	High-medium population densities, suitable for NBN fixed line services	Access to affordable, high-capacity broadband Improved digital skills
Communities	Varying digital literacy & ability to afford broadband	Access to affordable broadband (including public WiFi) Increased digital skills
Primary production areas		
Farming	Low population density Variety of farming systems – broadacre cropping & grazing, intensive horticulture & livestock Increasing use of digital farming Varying digital literacy	Mobile coverage Customised solutions (e.g. on-farm WiFi) Broadband & narrowband IoT coverage Digital literacy – farmers, farm service providers
Tourist sites		
Permanent attractions	Both town & remote locations Visitors with high digital literacy & dependence (e.g. TripAdvisor, GPS, Facebook)	Mobile coverage Public WiFi – general and site-specific High bandwidth fixed broadband for WiFi backhaul
Events	Highly seasonal/periodic	Temporary mobile peak capacity requirements High bandwidth fixed broadband for WiFi backhaul
Transport corridors		
Road	Motorists & freight Mix of major (VicRoads) & minor (local council) roads	Continuous mobile coverage
Rail	Passengers Increased need for high quality mobile 4G (5G) connectivity	In-carriage reception on rail services between Bendigo and Swan Hill

Fixed Connectivity

Available fixed broadband connectivity does not meet the needs of many businesses across the Gippsland region due to technology limitations – the predominance of NBN FTTN in cities and towns will limit uniform access to effective NBN business grade services due to the technical limitations of this service. In smaller localities, on the fringe of larger centres and in rural and remote areas, broadband for **businesses** is further compromised by fixed wireless and satellite technologies.

The fixed broadband needs of **households** in larger population centres are generally met at present, but the needs of households in smaller localities (less than 1,000 residents) on the fringe of larger centres and in rural and remote areas are compromised by having access only to NBN fixed wireless and satellite technologies.

Mobile Connectivity

Mobile coverage generally appears to be good in Gippsland cities, towns and localities down to 650 residents, and on significant roads and rail links based on analysis of publicly available mobile coverage maps. However, consistent feedback from and concerns of regional users indicate that mobile service continuity and quality in many locations remains a real concern.

Mobile coverage for farms and tourists is lacking, exacerbating digital limitations from below-par fixed connectivity for farm offices and homesteads and tourist site operators. Mobile coverage on major roads appears to be generally good, while coverage and performance is unsatisfactory for more minor roads and in many rural and remote areas. Poor in-carriage mobile reception may occur on trains beyond Traralgon.

Undertaking the mobile coverage analysis as part of this document has highlighted the lack of high-resolution coverage maps from mobile network operators which show real-world performance (i.e. where coverage can support only voice services or more data-intensive activities as well such as web-browsing and mobile applications). This issue is elaborated on below and highlights the need for better data from mobile network operators to enable more informative analysis and identification of priority mobile blackspots in future iterations of this digital plan.

Limits to widespread remediation to these fixed connectivity and mobile coverage issues exist, as the per user costs of improving fixed line access and blanket mobile coverage rise exponentially with remoteness.

IoT Connectivity

A shortage of low bandwidth IoT networks has been identified for several of the primary production areas analysed, but generally speaking issues are not a major concern given the low level, nascent demand for these services currently. This demand pattern is expected to change in the coming 3-5 years and will require improved networks to enable the adoption of next-generation business practices.

Public WiFi

Public WiFi coverage is patchy with a number of places identified as experiencing a major supply shortfall and warrants careful consideration of how shortfalls are best addressed.

Analytic framework

The digital connectivity needs of businesses in towns, households, farms, tourist site operators and visitors differ across regional locations. As such, digital supply and demand analysis throughout this report has been undertaken according to both place and sector perspectives as follows:

- **Significant Places** – looks at the demand and supply of digital infrastructure and services in the most populated cities, towns and localities of the region to identify where existing infrastructure is unable to meet current demand for businesses, households and the community
- **Primary Production** – looks at the most economically significant primary production industries in the region, focusing on the availability of wireless technologies like NBN fixed-wireless, mobile and Low-Powered Wide Area Networks (that support Internet of Things applications like remote sensors) which are most relevant to primary production businesses
- **Tourist Locations** – looks at the supply of and demand for digital services in the most important tourist attractions / locations in the region
- **Transport Corridors** – looks at the availability of mobile services along the region's key transport routes.

The other lens through which digital needs has been assessed is the technology type. The following technologies form the basis of the digital infrastructure analysis of this report:

- **Fixed access** – includes National Broadband Network (NBN) fixed-line broadband services including fibre to the Premises (FTTP), fibre to the Node (FTTN), fibre to the Curb (FTTC), fixed wireless and satellite
- **Mobile** – availability of digital mobile networks capable of supporting voice telephony and data applications through 4G networks (3G coverage is considered sub-standard)
- **WiFi** – the availability of public WiFi services such as through public libraries and buildings, information centres and other local government initiatives
- **LP-WAN IoT** – the availability of Low Powered Wide Area Networks that can support Internet of Things applications like remote sensors and devices which are becoming increasingly relevant to industry applications.

Identified Infrastructure Gaps

Rating Methodologies

The sections below summarise the identified infrastructure gaps across the region according to a 'heat map' table that compares the supply and demand of digital infrastructure for Significant Places, Primary Production, Tourism and Transport Corridors. The colours in the maps should be interpreted as follows:

- Green = the supply of digital infrastructure is suitable to meet its demand
- Amber = there is an intermediate supply shortfall, for example where a place has a medium supply of a technology but a high demand
- Red = there is a major supply shortfall, for example where a place has a low supply of a technology but a high demand.

Section 2 includes the supporting evidence which has been used to undertake this analysis and develop the ratings. It brings together coverage data for digital infrastructure such as public coverage maps from mobile network operators and NBN Co, as well as demographic data for each place provided largely from Australian Bureau of Statistics census data.

Also supporting the analysis is a newly developed data repository and visualisation tool, called the State-Level Information Management (SLIM) database, developed by the Victorian Government that aggregates digital infrastructure data across the state. This tool includes more detailed coverage data in some instances which is not yet publicly available, but which has been used to inform the analysis.

The following tables describe the rating methodology used for Fixed Access, Mobile Access, Public WiFi and IoT.

Fixed access rating methodology

Reflecting the needs of users relative to service quality provided by different fixed and mobile technology types and the situation in metropolitan areas, the following rating standards have been used.

SUPPLY

For businesses

Rated High where:

- Mainly FTTP or FTTC (as these technologies can deliver the forthcoming Enterprise Ethernet business grade service), AND/OR
- There are one or more competing networks providing comparable business grade services at similar prices to NBN business grade service

Rated Medium where:

- Mainly FTTN (as users face uncertainty about the availability of the forthcoming Enterprise Ethernet service at a premise as this service cannot be provided over access long loops), AND
- There are no alternative networks offering comparable business grade services at similar prices

Rated Low where:

- Mainly fixed wireless (as no fixed wireless business grade service in the pipeline, FW service only available up to 50 mbps and FW information rate can be significantly degraded when network use spikes), OR
- Mainly satellite (as there is no specification available for the mooted business grade satellite service, latency issues are inherent and current satellite services are only available up to 25 mbps and there are data limits), AND

- There are no alternative networks offering comparable business grade services at similar prices

For households

Rated High where:

- NBN FTTP, FTTC or FTTN are available (as this is comparable to the metro household situation), AND/OR
- There are one or more competing networks offering 100 mbps+ service at comparable prices to NBN

Rated Medium where:

- NBN fixed wireless is available, AND
- There are no competing networks offering 100 mbps+ service at comparable prices to NBN

Rated Low where:

- Only NBN satellite is available, AND
- There are no competing networks offering 100mbps+ service at comparable prices to NBN

DEMAND

Demand for fixed access by businesses and households is rated High as both groups need fixed line network performance to meet their current and emerging digital needs.

Mobile access rating methodology

For mobile coverage analysis in particular it is important to note that the public coverage maps are not sufficiently detailed to ensure the real-world experience of mobile services in a given location is accurately reflected by the coverage maps. As such, mobile coverage analysis is a best-efforts attempt at reviewing the level of mobile coverage in a location and whether there are multiple mobile network operators operating in a given location. A green rating in a given place does not imply all users are able to achieve good services, just that public coverage data suggests the area is relatively well covered by multiple providers. Technical limitations and the relatively lower levels of infrastructure investment in a given area in regional locations together combine to mean that the experience for regional mobile users is generally inferior to that in metropolitan areas, despite perhaps appearing well served according to public coverage maps.

Government discussions are occurring with mobile network operators to enable access to more detailed information. Local "ground-truthing" of mobile coverage could be included in future updates of the Digital Plan Supporting Information.[2]

SUPPLY

For both businesses and households (as access to quality mobile services is very important for both groups):

Rated High where:

- Two or more 4G networks are available

Rated Medium where:

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[2] Note that decisions on Victorian government funding for mobile blackspots is not based on the high-level mobile coverage maps it is necessary to use in the digital plans

- Only one 4G network is available

Rated Low where:

- There is no coverage by any mobile network, OR
- The only coverage available is predominantly 3G

DEMAND

Demand is rated High for all mobile users now and in 3-5 years, reflecting mobile's importance for all.

Narrowband (LP-WAN) IoT access rating methodology [3]

SUPPLY

The present supply of LP-IoT is rated:

- High for near-complete coverage by at least one LP-WAN network
- Medium or Low for patchy or no coverage
- At least two networks requirement for High in 3-5 years.

DEMAND

Demand by businesses in larger centres and for farms is rated Medium at present and High in 3-5 years; and Low (now) and Medium (3-5 years) for businesses in smaller centres and households, reflecting an explosion in IoT interest and use.

Public WiFi

SUPPLY

Supply of public WiFi is rated:

- High where it is available in relevant public places and disadvantaged localities
- Medium or Low for incomplete or no coverage
- For now, and in 3-5 years.

DEMAND

Demand by residents is rated according to income levels (high where incomes are low), reflecting the importance of mobile access to everybody for everyday life.[4]

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[3] Sigfox and Taggle network coverage is considered, NNNCo network coverage is not considered in the Plan analysis as this information is not publicly available. High bandwidth and 2-way IoT are provided by mobile carriers.

[4] This broad measure could be improved by using more detailed information on disadvantaged locations from the ABS Socio-economic Index (SEIFA) and the Jesuit Social Services study *Dropping of the Edge: 2015* (postcode level)

Significant Places Analysis

Digital supply-demand balance for selected population centres is shown in Table 2, red shading indicating major supply shortfall relative to demand, amber an intermediate supply shortfall and green where current supply meets or exceeds demand. *Note the light green shading for mobile access denotes reservations, based on local mobile access experience, about the good coverage indicated by public coverage maps.*

Table 2 Significant places: current unmet digital access needs.

Place	LGA	Name	User type	Fixed Supply / Demand	Mobile* Supply / Demand	LP-WAN IoT Supply / Demand	WiFi Supply / Demand
City	Latrobe	Traralgon (pop. 25,485)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	H/L
			Community	n.a.	H/H	n.a.	H/L
	Latrobe	Moe-Newborough (pop. 15,059)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	H/H
			Community	n.a.	H/H	n.a.	H/H
	Baw Baw	Warragul (pop. 14,276)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	M/L
			Community	n.a.	H/H	n.a.	M/L
	Latrobe	Morwell (pop. 13,540)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	H/L
			Community	n.a.	H/H	n.a.	H/L
	Wellington	Sale (pop. 13,511)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/L
			Community	n.a.	H/H	n.a.	L/L
	East Gippsland	Bairnsdale (pop. 12,952)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/M
			Community	n.a.	H/H	n.a.	L/M
	Baw Baw	Drouin (pop. 11,887)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/L
			Community	n.a.	H/H	n.a.	L/L
Town	Bass Coast	Wonthaggi (pop. 7,917)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/H
			Community	n.a.	H/H	n.a.	L/H
	East Gippsland	Lakes entrance (pop. 6,071)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/H
			Community	n.a.	H/H	n.a.	L/H
	South Gippsland	Leongatha (pop.5,119)	Business	M/H	H/H	M/M	n.a.
			Home	H/H	H/H	M/L	L/L
			Community	n.a.	H/H	n.a.	L/L
	Baw Baw	Trafalgar (pop. 3,466)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/L
			Community	n.a.	H/H	n.a.	L/L
	East Gippsland	Paynesville (pop.3,376)	Business	H/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	M/H
			Community	n.a.	H/H	n.a.	M/H
	East Gippsland	Orbost (pop. 2,014)	Business	L/H	H/H	L/M	n.a.
			Home	M/H	H/H	L/L	L/H
			Community	n.a.	H/H	n.a.	L/H

	Council	Town	Category				
	Baw Baw	Yarragon (pop. 1,124)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/L
			Community	n.a.	H/H	n.a.	L/L
	Latrobe	Yallourn North (pop. 1,099)	Business	M/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/M
			Community	n.a.	H/H	n.a.	L/M
	East Gippsland	Mallacoota (pop. 1,005)	Business	M/H	H/H	M/M	n.a.
			Home	H/H	H/H	M/L	L/H
			Community	n.a.	H/H	n.a.	L/H
Local	Wellington	Wurruk (pop. 972)	Home	H/H	H/H	H/L	L/L
			Community	n.a.	H/H	n.a.	L/L
	Bass Coast	Grantville (pop. 955)	Home	H/H	H/H	H/L	L/H
			Community	n.a.	H/H	n.a.	L/H
	South Gippsland	Venus Bay (pop. 944)	Home	H/H	H/H	L/L	L/H
			Community	n.a.	H/H	n.a.	L/H
	East Gippsland	Eagle Point (pop. 843)	Home	H/H	H/H	H/L	L/L
			Community	n.a.	H/H	n.a.	L/L
	Baw Baw	Neerim South (pop. 837)	Home	M/H	H/H	H/L	L/L
			Community	n.a.	H/H	n.a.	L/L
	Latrobe	Glengarry (pop. 646)	Home	M/H	H/H	H/L	M/L
			Community	n.a.	H/H	n.a.	M/L

Legend **Red** – Major supply shortfall | **Amber** – Intermediate supply shortfall | **Green** – current supply meets or exceeds demand.

* Mobile coverage taken from public carrier coverage maps which may not reflect detailed coverage at the local level.

Commentary

Fixed access supply in Gippsland cities and larger towns is currently favourable for households, but under par for businesses as the prevailing NBN FTTN technology will not uniformly support effective business grade services and alternative NBN-equivalent broadband services are not available. The situation is less favourable for some small towns and localities where NBN fixed wireless predominates. Mobile access is generally good for the 22 Gippsland places examined (recognizing coverage issues at specific sites). Coverage of narrowband IoT networks across Gippsland places is mixed but not constraining as demand is also low at present. The supply of public WiFi is low across the region, not meeting latent demand in places with below-average household incomes.

Looking forward 3-5 years, while government advocacy, demand aggregation and co-funding programs for fixed network upgrades may be effective at the margin (guided by the CRCP enhanced broadband trials), widespread fixed access upgrades will be difficult to achieve due to network cost constraints. Furthermore, 5G mobile coverage in smaller locations may lag demand.

Fixed access

Fixed access for cities and towns with population in excess of 800 residents, is predominantly provided by NBN FTTN technology. While this satisfactorily meets current household needs (on par with metropolitan households), it represents an intermediate supply shortfall for businesses as FTTN will not uniformly support the pending NBN Enterprise Ethernet business grade service due to long loop lengths for some premises. For some smaller towns and localities NBN fixed wireless is the prevailing network technology, meaning an intermediate supply shortfall for households and major shortfall for businesses as the NBN business grade service will not be offered on its FW network.

Looking forward 3-5 years, while NBN FTTP and fibre to the curb (FTTC) networks would support future business demand for business grade services, widespread upgrades will however be difficult to achieve. Nonetheless government advocacy, demand aggregation and co-funding programs for enhanced

broadband may be effective at the margin for smaller population centres, guided by lessons from the CRCP enhanced broadband trials in Morwell and Horsham.

Mobile access

Mobile access is good for all the Gippsland cities, towns and localities examined (down to 600 residents) with near-complete 4G coverage by at least two mobile network operators (recognising there will be specific sites which experience unsatisfactory mobile performance). However, the 3-5 year outlook is not so uniformly rosy, with only the larger population centres may have 5G coverage (based on mobile network operators targeting large and rapidly growing populations). Importantly, the introduction of 5G services in these cities will at some point create greater competition between mobile fixed access providing a potential solution for individual premises and neighbourhoods with poor fixed access.

Narrowband (LP-WAN) IoT [5]

While coverage of narrowband IoT networks across Gippsland cities, towns and localities is currently mixed, demand by businesses, local governments and households is also low with little apparent unmet need at present.

Looking forward 3-5 years – IoT network coverage is expected to increase substantially, driven by rising demand and the relatively low cost of low bandwidth IoT networks and applications (use of low-cost spectrum and long signal carrying distances). Demand developments are less clear – while there is widespread expectation that IoT use will burgeon in the near future, what is not apparent is whether these largely premise-specific business and household IoT needs will be met by in-premise WiFi systems coupled with fixed backhaul or by public IoT networks.

Public WiFi

A key benefit of free public WiFi at present is assisting disadvantaged residents access the internet, and for visitors to the location. At present supply of public WiFi is low in all places considered (with the exception of Traralgon, Moe-Newborough and Morwell), while demand is rated high in the eight locations with below-average household incomes. Accordingly, on the basis of the methodology and limited data used, there appears to be an unmet need for public WiFi in some mid-sized and smaller locations.

Looking forward 3-5 years – it is expected some local governments will roll out public WiFi in public places and disadvantaged neighbourhoods in response to these and their own "smart city" unmet needs. This suggests a potential role for targeted Commonwealth and State government programs – with the current CRCP free public WiFi trials in Shepperton and Geelong providing useful lessons on the design of such programs. However, falling mobile data prices, and scope for mobile networks to support low power Smart City sensors may mean public WiFi becomes less relevant for social and local government service delivery purposes. Monitoring of trends is required.

Skills and affordability

Primary measures of digital literacy, availability of IT professionals and workforce preparedness for the future digital world, including on a place and sector basis, are extremely limited, existing at best at a high level of aggregation. As a result, further local data collection is required to identify skills gaps and shape needed remedial action. Nonetheless there are a range of secondary indicators that, taken together, give a broad indication of skills availability (supply) at an LGA level – age, education, the proportion of households that access the internet at home, the share of employment in high-technology industries and

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[5] Sigfox and Taggle network coverage is considered, NNNCo network coverage is not considered in the Plan analysis as this information is not publicly available.

the 'ability' component of the Digital Inclusion Index. Based on these broad indicators, there appears to be a significant skills shortfall in Gippsland relative to Melbourne, and substantial differences between LGAs. Furthermore, at any location in the region, there will be individuals and businesses with low digital skills.

Looking forward 3-5 years, workforce preparedness for successful employment in the digital age is important for the whole of Victoria, with shortfalls in regional areas likely to be greater than in Melbourne given lower education level and older populations. The importance accorded digital skills apparent from the digital plan consultations highlights the need for data collection on skill supply and demand.

Affordability of digital services has not yet been considered in the analysis and warrants attention in the next generation Plan.

Primary Production Areas Analysis

Digital supply-demand balance for selected primary production areas is shown in Table 3, red shading indicating major supply shortfall relative to demand, amber an intermediate supply shortfall and green where current supply meets or exceeds demand. ***Note the light green shading for mobile access denotes reservations, based on local mobile access experience, about good coverage indicated by public coverage maps.***

Table 3 Primary production areas: current unmet digital access needs

			Access		
			Fixed Supply / Demand	**Mobile*** Supply / Demand	**LP-WAN IoT** Supply / Demand
Land Use	**Location**	**User type**			
Beef/dairy grazing	Warragul	Business	L/H	M/H	H/M
		Home	M/H	M/H	H/L
Beef/dairy grazing	Foster	Business	L/H	L/H	L/M
		Home	M/H	L/H	L/L
Beef/dairy grazing	Maffra	Business	L/H	M/H	H/M
		Home	M/H	M/H	H/L
Beef/dairy grazing	Orbost	Business	L/H	M/H	L/M
		Home	M/H	M/H	L/L
Beef/dairy grazing	Omeo	Business	L/H	L/H	L/M
		Home	M/H	L/H	L/L

Legend Red – Major supply shortfall | Amber – Intermediate supply shortfall | Green – current supply meets or exceeds demand.

* Mobile coverage taken from public carrier coverage maps which may not reflect detailed coverage at the local level.

Commentary

The primary production areas examined are all beef/dairy grazing locations as this is the predominant agricultural activity in Gippsland (food processing is also important, which is covered in the manufacturing sector). The unmet needs picture is mixed within each of these primary production areas with fixed supply in most of them rated low-to-medium, although mobile demand appears well served mostly by 4G network. Low power IoT supply-demand balance is in transition – supply is generally limited to one network vendor, but demand is only now starting to rise and is generally rated medium.

Fixed access

Current situation – fixed access in the primary production areas across regional Victoria comprises a mix of NBN fixed wireless and satellite technologies.

Looking forward 3-5 years – it is anticipated fixed access supply will change little in the next 3-5 years without policy intervention. With demand inexorably rising, this means the current moderate level of unmet demand for fixed access will become severe. However, policies to materially alleviate this situation are likely to be prohibitively expensive.

Mobile coverage

Current situation – mobile coverage in primary production areas of Gippsland is also relatively high, although with clear expanses of poor service. With demand for fixed services high, at least moderate shortfalls are apparent.

Looking forward 3-5 years – there is likely to be little market driven improvement on coverage and 5G technology is unlikely to replace 4G. Rising demand in the face of largely static supply will mean the unmet demand situation will worsen. Redesigned mobile blackspot programs will be needed to ameliorate this growing supply-demand gap.

Narrowband IoT

Current situation – narrowband IoT coverage is currently mixed across Gippsland primary production areas, with broadacre farmers in particular facing moderate but widespread unmet needs for in-paddock coverage.

Looking forward 3-5 years – demand for such coverage is expected to grow strongly, as is supply with the supply-demand balance unclear. That said, there may be a valid role for government market stimulation where more acute supply shortfalls become apparent.

Tourist Locations Analysis

Digital supply-demand balance for selected tourist locations is shown in Table 4, red shading indicating major supply shortfall relative to demand, amber an intermediate supply shortfall and green where current supply meets or exceeds demand. *Note the light green shading for mobile access denotes reservations, based on local mobile access experience, about the good coverage indicated by public coverage maps.*

Table 4 Tourist locations: current unmet needs

Type	Location	LGA	User type	Access	
				Fixed Supply / Demand	Mobile* Supply / Demand
Permanent	Wilsons Promontory	South Gippsland	Operator	L/H	M/H
			Visitor	n.a.	M/H
	Ninety Mile Beach & Loch Sport	Wellington	Operator	M/H	H/H
			Visitor	n.a.	H/H
	Phillip Island Penguin Parade & Nature Park	Bass Coast	Operator	L/H	H/H
			Visitor	n.a.	H/H
	Mount Baw Baw National Park	Baw Baw	Operator	L/H	M/H
			Visitor	n.a.	M/H
	Walhalla	Baw Baw	Operator	L/H	L/H
			Visitor	n.a.	L/H
	Inverloch	Bass Coast	Operator	M/H	H/H
			Visitor	n.a.	H/H
	Cowes	Bass Coast	Operator	M/H	H/H
			Visitor	n.a.	H/H
	Lakes Entrance	East Gippsland	Operator	M/H	H/H
			Visitor	n.a.	H/H

	Venus Bay	South Gippsland	Operator	M/H	H/H
			Visitor	n.a.	H/H
	Omeo	East Gippsland	Operator	L/H	H/H
			Visitor	n.a.	H/H
	Marlo	East Gippsland	Operator	L/H	H/H
			Visitor	n.a.	H/H
	Metung	East Gippsland	Operator	M/H	H/H
			Visitor	n.a.	H/H
	Mallacoota	East Gippsland	Operator	M/H	H/H
			Visitor	n.a.	H/H
	Buchan Caves Reserve	East Gippsland	Operator	L/H	M/H
			Visitor	n.a.	M/H
	Tarra Bulga National Park	Wellington	Operator	L/H	L/H
			Visitor	n.a.	L/H
Signature Events	Lardner Park (Venue for several events)	Baw Baw	Operator	L/H	H/H
			Visitor	n.a.	H/H
	Australian Motorcycle Grand Prix	Bass Coast	Operator	L/H	H/H
			Visitor	n.a.	H/H
Events and Festivals	Meeniyan Garlic Festival	South Gippsland	Operator	L/H	H/H
			Visitor	n.a.	H/H
	Mirboo North Italian Festa	South Gippsland	Operator	L/H	H/H
			Visitor	n.a.	H/H
	Boolarra Folk Festival	Latrobe	Operator	L/H	M/H
			Visitor	n.a.	M/H
	Tinamba Food and Wine Festival	Wellington	Operator	L/H	M/H
			Visitor	n.a.	M/H
	Bruthen Blues and Arts Festival	East Gippsland	Operator	L/H	H/H
			Visitor	n.a.	H/H
	Unify Gathering Heavy Music Festival	South Gippsland	Operator	L/H	M/H
			Visitor	n.a.	M/H
Trails	Wilderness Coast Walk	East Gippsland	Operator	L/H	L/H
			Visitor	n.a.	L/H
	East Gippsland Rail Trail	East Gippsland	Operator	M/H	H/H
			Visitor	n.a.	H/H

Legend Red – Major supply shortfall | Amber – Intermediate supply shortfall | Green – current supply meets or exceeds demand.

*Mobile coverage taken from public carrier coverage maps which may not reflect detailed coverage at the local level. Outdoor coverage is considered to be generally sufficient for tourist locations.

Commentary

Here only fixed and mobile access technologies are relevant – fixed for site operators for WiFi backhaul and day-to-day conduct of the business, and mobile for both visitors and operators. Two types of tourist locations are considered, permanent tourist attractions and periodic events such as an annual music festival.

Current situation – based on the sample of events and permanent tourist sites examined, the unsurprising finding is that at present both fixed and mobile access are likely to be poor for events and permanent tourist attractions a significant distance from a population centre. Town-based events and sites are better served. In addition, the coastal resorts which experience sharp spikes in population during peak periods (populations rising five- to ten- fold) may face mobile network capacity constraints, e.g. Phillip Island, Inverloch, Venus Bay, Wilsons Promontory, Lakes Entrance and Marlo. Looking forward 3-5 years, this pattern is expected to still prevail without intervention – it is unlikely market forces alone will

sufficiently shift the supply-demand fundamentals in more remote tourist locations. This has two-way implications. For event organisers, they and the visitors will be better served with relevant digital services the closer they are to a town.

For governments, tourism-focused digital enhancement programs for events in more remote locations are likely to be more costly (and warrant a higher return) than events closer to settled areas.

Looking forward 3-5 years – demand for fixed access at tourist sites is expected to rise strongly in coming years as live streaming of events becomes more prevalent and digital access and enhancements to permanent attractions becomes more important to their financial viability. Mobile coverage demand will also grow as ready mobile connectivity becomes the mandatory norm for any event or permanent attraction – including coverage on surrounding roads for map applications.

Transport Corridors Analysis

Digital supply-demand balance for selected transport corridors is shown in Table 5, red shading indicating major supply shortfall relative to demand, amber an intermediate supply shortfall and green where current supply meets or exceeds demand. *Note the light green shading for mobile access denotes reservations, based on local mobile access experience, about the good coverage indicated by public coverage maps.*

Here only mobile access is relevant.

Table 5 Transport corridors: current unmet needs

Road Class	ID	From	To	Comment	Mobile* Supply / Demand
M	M1	Longwarry North	Yarragon	4G cover by 3 carriers	H/H
A/B	A1	Yarragon	Rosedale	4G cover by 3 carriers	H/H
	A1	Rosedale	Lakes Entrance	4G cover by 3 carriers	H/H
	A1	Lakes Entrance	Cann River	3G or little/no coverage	L/H
	A1	Cann River	Victorian Border	3G or little/no coverage	L/H
	A440	Lang Lang	Foster	4G cover by 2+ carriers	H/H
	A440	Foster	Sale	4G cover by 2+ carriers	H/H
	B23	Cann River	Victorian Border	4G or little/no coverage	L/H
	B420	Anderson	Cowes	4G cover by 3 carriers	H/H
	B460	Anderson	Leongatha	4G cover by 3 carriers	H/H
	B460	Leongatha	Morwell	4G/3G or little/no coverage	M/H
	B500	Bairnsdale	Dinner Plain	4G cover by 3 carriers	H/H
	M420	Lang Lang	Anderson	4G cover by 3 carriers	H/H
C	All	113 roads		Little/no cover in alpine regions	L/H
Rail		Melbourne	Traralgon	4G cover by 3 carriers; good in-train reception	H/H
		Traralgon	Bairnsdale	4G cover by 3 carriers; uncertain in-train reception	M/H

Legend Red – Major supply shortfall | Amber – Intermediate supply shortfall | Green – current supply meets or exceeds demand.

* Mobile coverage taken from public carrier coverage maps which may not reflect detailed coverage at the local level.

Table 5 summarises the limited analysis of mobile coverage supply and demand on major and more minor roads and rail links in Gippsland conducted to demonstrate the place-and-sector approach for transport corridors and note any preliminary patterns.

Commentary

The tentative pattern from the very small indicative sample of major and minor roads is that there is good mobile coverage on major (Class M) thoroughfares, mixed coverage on intermediate (Class A and B) roads and poor coverage on minor (Class C) roads. However, examination of more roads and rail links is required to confirm these patterns.

Looking forward 3-5 years, this tentative pattern is expected to continue, with intervention required to lift mobile coverage on more minor roads.

These findings, if substantiated by further analysis, also have two-way implications: drivers will experience better mobile coverage to the extent they can stick to more significant roads, and that mobile blackspot programs aiming to achieve good coverage on more minor roads are likely to be expensive and warrant careful targeting.

Mobile network coverage on the rail links examined appears to be good, although beyond Traralgon the amount of signal attenuation caused by the type of carriage needs to be verified by separate analysis.

Glossary

ABS: Australian Bureau of Statistics

ACCC: Australian Competition and Consumer Commission

Cat-M1: Narrowband IoT technology

CRCP: Victorian Government $45 million Connecting Regional Communities Program

DJPR: Department of Jobs, Precincts and Regions (Victoria)

DII: RMIT-Swinburne-Telstra Digital Inclusion Index

F: Fixed internet access services – NBN fixed line, fixed wireless and satellite connections

FTTC: Fibre to the curb NBN fixed line technology – also capable of providing very fast internet access

FTTN: Fibre to the node NBN fixed line technology – access speed limited by long copper loops for some customers

FTTP: Fibre to the premise NBN fixed line technology – capable of providing extremely fast internet access

GRP: Gross Regional Product (the region equivalent of Gross Domestic Product – GDP)

IoT: Internet of Things

LCCC: Local Community Connectivity Centres - facilities providing high bandwidth connective for the public

LGA: Local government area

NB-IoT: Narrowband Internet of Things

BB-IoT: Broadband Internet of Things

M: Mobile services – third, fourth and fifth generation technology (3G, 4G 5G)

NBN: National broadband network – the government-owned wholesale network covering all premises in Australia

NBN Co: The Commonwealth Government-owned business responsible for building and operating the NBN

MBSP: Mobile black spot program (Commonwealth Government}

MNO: Mobile network operator

RDAC: Regional Development Advisory Committee – the chairs of the nine Regional Partnerships

SLA: Service Level Agreement

SLIM: State Level Information Management database

VMP3: Victoria Mobile Program: Round 3

WiFi: Free public WiFi service – for resident and visitor mobile access in public places and some neighbourhoods

SECTION 2 – Supporting Evidence Base

This section provides the detailed evidence base which has informed the preceding analysis. The section is divided into sections looking at general economic and social characteristics of Gippsland, followed by an infrastructure and skills analysis from each of the perspectives of Significant Places, Primary Production, Tourist Locations and Transport Corridors.

1.   Gippsland General Characteristics

Gippsland population centres, primary production areas, tourist sites & transport corridors

Figure 2 Gippsland population centres, primary production areas, tourist sites & transport corridors

1.1   The land and the people

Population density differs widely across the region – from 52 residents per square kilometre for Latrobe LGA down to 2 for East Gippsland. The region's population is widely dispersed in population centres throughout the region with 7 large urban centres containing over 10,000 residents (38% of the population of the region) and 32% per cent in 69 other towns and localities. The remaining 30 per cent live on the fringe of these centres and in rural remote locations, reflecting their greater dispersion, and experience less favourable digital connectivity than their more urbanised peers.

Primary production in the region revolves around beef and dairy grazing, vegetable cropping and food processing, with some poultry and eggs, sheep meat and wool.

Tourist sites include year-round attractions and signature annual festivals and other periodic events. The digital connectivity needs of farms and farm households, tourist site operators and visitors differ across these locations depending on the nature of the primary production and tourist

activities, requiring the overlay of both places and sectors in digital supply-demand analysis.

Road and rail transport corridors need good mobile coverage for continuous mobile connectivity.

Key features are:

- East of and adjoining Greater Melbourne
- Approximately 41,000 km² (largest region)
- Population 274,000 (2016) – population density 7 residents /km² (medium for regional Victoria)
- Six local government areas (LGAs) – Bass Coast (population 34,000), Baw Baw (50,000), East Gippsland (46,000), Latrobe (75,000), South Gippsland (29,000) and Wellington (44,000)
- Main cities and towns: Traralgon (25,000 - 9% of the region's population), Moe-Newborough (15,000), Warragul (14,000), Morwell (13,000), Sale (13,000), Bairnsdale (13,000, Drouin (12,000), Wonthaggi (8,000), Lakes Entrance (6,000), Leongatha (5,000), Inverloch, (5,000), Cowes (5,000), Churchill (5,000) – not a typical structure of a major hub and smaller nodes
- Substantial LGA diversity – size, population, density and land use – usual for regional Victoria.

1.2   The community

Whilst there are noteworthy variations across the region, the following summarises the overall profile:

- Age: 28% of population <25 years, 49% 25-64, 22% 65+ – relatively old (30:50:20 average)
- Education: 34% of the population have post-secondary qualifications – equivalent to the regional average (34%)
- Unemployment: 6.9% total, 12.6% youth – higher than regional average (5.9% total, 11.5% youth)
- Digital inclusion: mid-ranked on the RMIT-Swinburne-Telstra Digital Inclusion Index[6]

- Overall socio-economic disadvantage: third most disadvantaged region on ABS SEIFA score[7].

Some of the more noteworthy variations across the region are demonstrated in the following charts:

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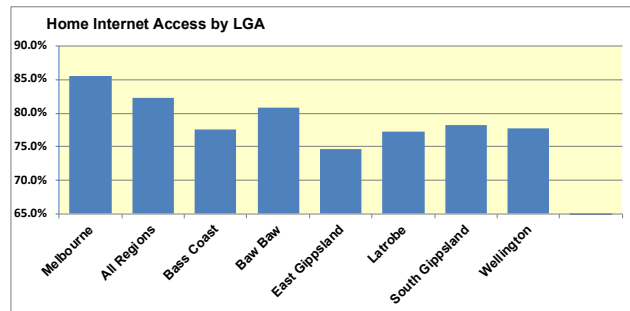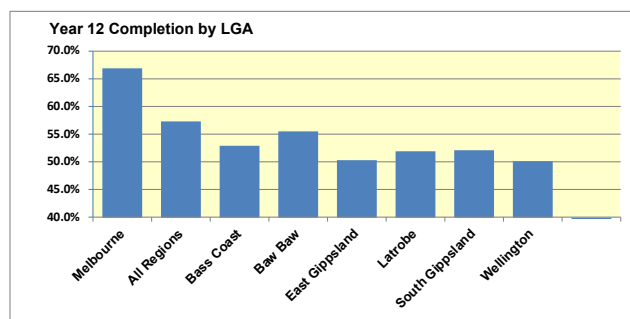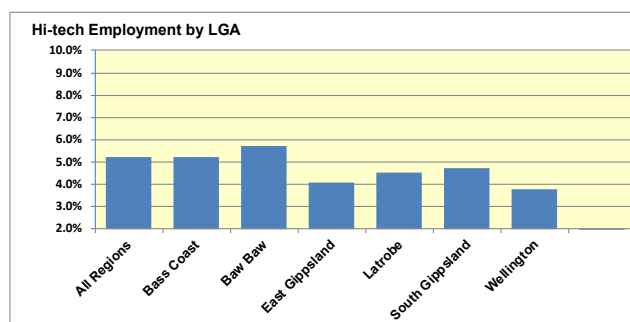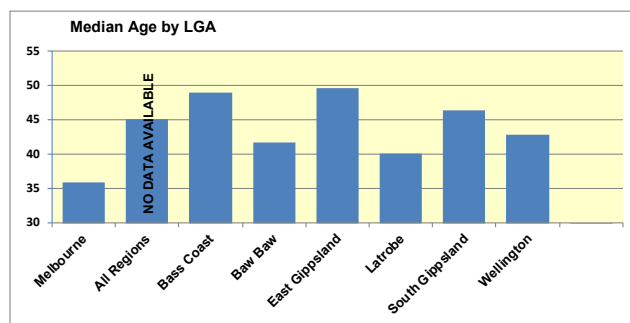
[6] Measuring Australia's Digital Divide – the Australian Digital Inclusion Index 2017

[7] ABS Socio-economic Index for Australia: SEIFA

Notably, the residents of the East Gippsland and South Gippsland LGAs are on average older, are less likely to access the internet from home and less likely to work in a high-technology job than those residing elsewhere in the region – at risk of being left behind on digital development.

1.3   The economy

Gross Regional Product (GRP) $14 billion (second largest of all the regions), with slow decline over the past 10 years (-0.5% p.a., in line with population growth) compared to 0.5% p.a. for total regional Victoria

Eight industries make up almost two-thirds of employment in the region:

Retail Trade	10%
Health care/social assistance	13%
Ag./forestry/fishing	9%
Construction	10%
Manufacturing	7%
Education/training	8%
Tourism	8%
Public/admin/safety	6%
	71.0%

Gippsland residents are employed across occupational categories as follows:

- Professional (16% of residents), technical & trades (17%), managers (15%)
- Clerical & administration (12%), Community & personal services (12%)
- Labourers (13%), sales (10%), machinery operators & drivers (7%)

International exports $1.6 billion (2017), with export-intensity (exports relative to GRP) close to regional average.

1.4   Structural change

Analysis of the digital intensity requirements of the eight industries representing over 71 percent of the Gippsland employment reveals that five of the industries will rely more heavily on digital services over the next 3-5 five years. These include health care and community assistance, tourism and agriculture/forestry, for which digital intensity needs to rise strongly over the next 3-5 years to retain competitiveness.

Two of the top employment industries have grown strongly over the past 10 years and are forecast to continue to do so – health and construction. Conversely, employment in two industries making up fewer jobs has fallen over the past decade and is forecast to contract or grow only slowly over the next 5 years – manufacturing and retail trade. This suggests the more important industries to embrace digital opportunities are health and construction – to step up to a higher level of digital intensity over the next 5 years to ensure best practice efficiency and competitiveness – as indicated in the table below.

However, a somewhat different picture emerges when GRP contribution is considered. From this perspective manufacturing and agriculture are the two leading sectors, suggesting that both also warrant particular attention to their digital enablement. Agriculture, tourism and healthcare and social assistance in particular need to shift from their current low to high digital intensity over the next 5 years to be competitive in Australia and internationally, and health and community care needs to digitise quickly for leading-edge effectiveness.

1.5   Digital Intensity – now and in 3-5 years[8]

Regional sector	Digital intensity now (current practice)		Digital intensity needed in 3-5 years (best practice)	
Healthcare & social assistance		Fixed access for patient records		Patient & GP fixed and mobile connectivity. Digitisation of records, analytics & data transparency. Robot-assisted operations
Education & training		School, home fixed & mobile access		Student fixed & mobile home connectivity, online learning. Augmented & virtual reality in classrooms for enhanced teaching methods
Construction		Fixed and mobile connectivity		Fixed & mobile connectivity, digital models
Tourism		Mobile coverage of tourist hot spots		Mobile road coverage. WiFi & IoT at popular venues. Augmented/virtual reality tours
Manufacturing		Fixed connectivity		Fixed connectivity, industrial IoT, fault prevention & data analytics for logistics
Public admin & safety		Resident fixed & mobile connectivity, connected public infrastructure		Resident fixed & mobile, IoT-for Smart Cities, enhanced security & digital profiles for individuals
Agriculture/forestry		Mobile coverage of farming areas Nascent use of IoT		Wide narrowband and broadband IoT access, apps and skills for intensive and broadacre horticulture, cropping & livestock
Retail trade		Shop and building access		Retail at threat from online shopping. IoT can help retail stores connect to customers through promotions and mobile payment methods

Legend

	Low		Medium		High

1.6   General Characteristics Informing Digital Planning

This summary of the Gippsland characteristics and structural change demonstrates the significant regional diversity and the many factors that need to be considered when developing a regional digital plan. In this Plan, a framework has been developed that attempts to address regional diversity and take into account the current and future needs of people, businesses, places and industry sectors. The framework includes place and sector-based analysis of digital supply and demand necessary for identifying specific unmet digital needs and identifying priorities. Further development of this framework is required in subsequent digital plans.

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[8] McKinsey Digital – Digital Australia: Seizing the opportunity from the Fourth Industrial Revolution; OCED – A taxonomy of digital intensive sectors

2. Regional Supply Overview

2.1 *Fixed Broadband*

Coverage by Land Area

The map following shows NBN coverage of the Gippsland region, with the LGA boundaries marked.

Areas served with FTTP, FTTC and FTTN represent less than 1% of the land area in the region and accordingly are barely visible at the scale of this map. Many of these locations are discussed in Section **3** below.

Of note at the scale of this map is the proportion of the region that is *not* shaded with any colour – representing the areas that are serviced with the lowest performing of NBN Co's access technologies – satellite coverage.

Also visible at this scale are the areas where fixed wireless has been deployed (dark purple) or will be deployed (light purple) and some of the larger population centres where FTTP (brown) or FTTN (blue) has (or is due to be) deployed.
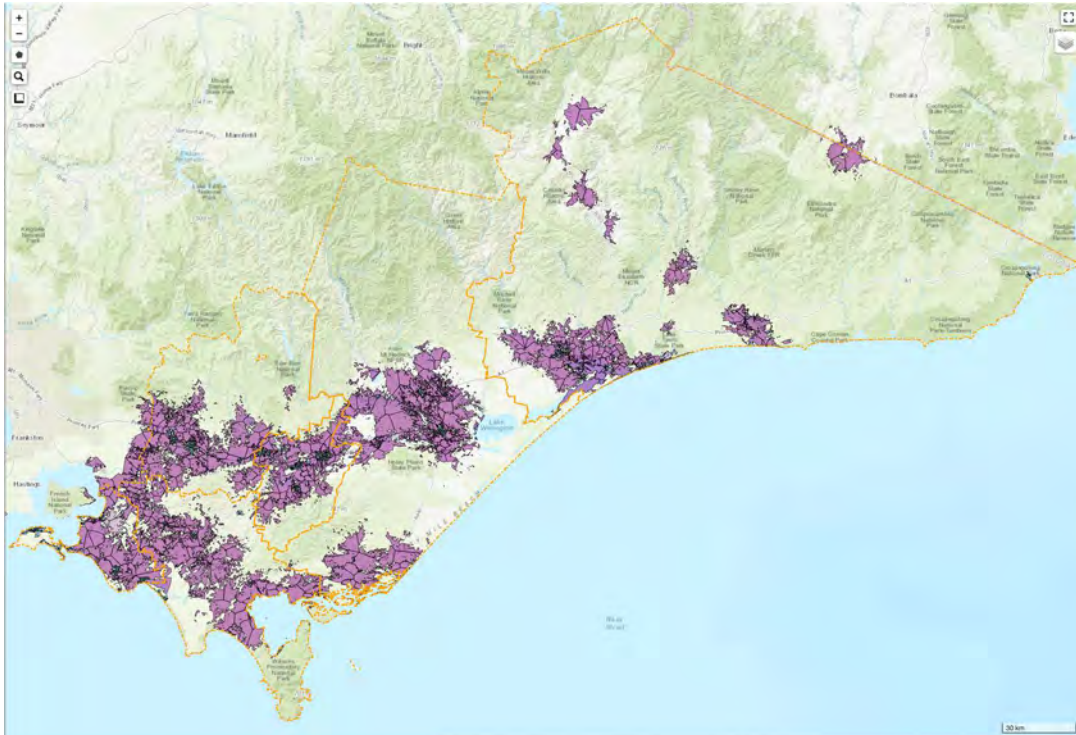
Figure 3 An Overview of NBN Technology Coverage of the Gippsland Region (SLIM)

The split between fixed wireless and satellite coverage is particularly relevant in assessing how well areas of the Region are served. The following table summarises NBN Co's present or planned use of these technologies for each LGA, noting that all LGAs include large expanses of national parkland.

LGA	Area (km²)	NBN Technology (% Area)	
		Fixed Wireless	Satellite
Bass Coast	875	20%	74%
Baw Baw	4,021	18%	81%
E Gippsland	20,966	6%	94%
Latrobe	1,427	28%	68%
S Gippsland	3,300	24%	76%
Wellington	10,807	13%	87%
Region (km²)	41,396	4,662	36,508

Coverage of Businesses

Across the Gippsland region, there are 9,118 businesses registered with Workcover. The NBN technology that either currently serves (or is destined to serve) these businesses are as shown in the chart below.
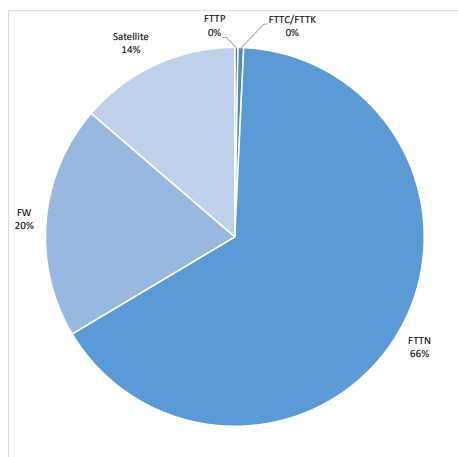
Figure 4 Businesses served by different NBN technologies

Differences across the LGAs that make up the region are quite significant, as summarised in the table below.

LGA	No. Bus.	Approximate Coverage (%)				
		FTTP	FTTB FTTC	FTTN	FW	SAT
Bass Coast	1,072	0%	0%	79%	3%	18%
Baw Baw	1,755	0%	0%	66%	20%	14%
E Gippsland	1,641	0%	3%	58%	27%	12%
Latrobe	2,118	1%	0%	79%	14%	6%
S Gippsland	1,109	0%	0%	46%	28%	26%
Wellington	1,423	0%	0%	60%	26%	14%
Region (no.)	9,118	24	47	5,988	1,811	1,248

Coverage of Dwellings

NBN Co's use of different technologies to service particular residential areas can be examined visually within SLIM by zooming to a detailed (town or street level) view.

At an overview level, the following table summarises coverage by technology type for GNAF[9] addresses *(see important qualification in footnote)* that lie within residential-zoned areas.
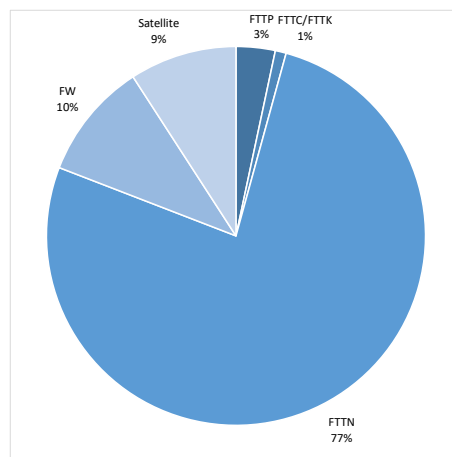
Figure 5 GNAF addresses served by different NBN technologies

LGA	No. Res.	Approximate Coverage (%)				
		FTTP	FTTB FTTC	FTTN	FW	SAT
Bass Coast	30,384	4%	0%	89%	0%	6%
Baw Baw	20,709	7%	0%	76%	7%	9%
East Gippsland	25,682	1%	5%	67%	20%	6%
Latrobe	38,634	3%	0%	83%	9%	5%
South Gippsland	8,655	0%	0%	67%	23%	10%
Wellington	22,100	2%	0%	64%	11%	23%
Region (no.)	146,164	4,880	1,353	111,965	14,607	13,359

Whilst NBN Co's satellite solution is intended to service the most remote 3% of the population, a very much higher proportion will be reliant on it across all LGAs in the region. The overall percentage (9%) is also higher than the national average and could possibly be higher if the additional dwellings in farming areas were to be included.

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9   The GNAF database contains addresses in land that is zoned commercial, industrial and residential. As such, it excludes properties located (for example) within land zoned for farming.

2.2   Mobile Coverage

Public Coverage Maps

Access to mobile coverage data is currently under discussion between the Department and the mobile network operators.

In the interim, only very high-level perspectives can be obtained from the public coverage maps provided by each of the three established mobile network operators.
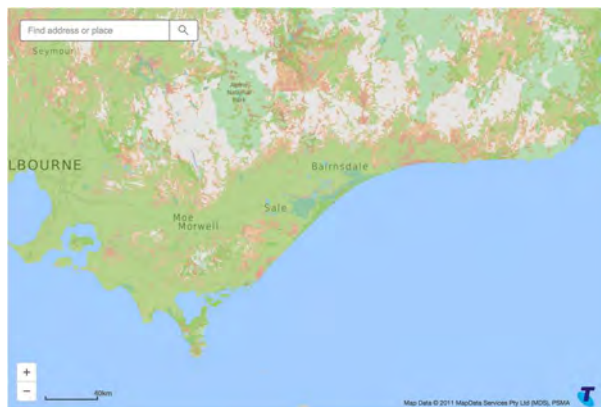
Figure 6 Telstra Public Coverage Map of Gippsland Region

Telstra's public coverage map indicates good coverage with:

- 4GX (typically download speed 2 to 75 Mbps) in green
- 3G in dark brown
- 3G with external antenna in light brown
- No coverage in white.

By simple visual examination of this map, Telstra appears to support coverage approximately 40% of the region.

The Optus public coverage map (see opposite) is based on using a nominated device outdoors. For the purposes of this report, a handheld iPhone 6 has been assumed. In interpreting the map:

- Purple indicates 4G Plus coverage
- Blue indicates 3G coverage
- Yellow indicates 3G coverage with an external antenna.

By simple visual examination of this map, Optus appears to offer coverage of at least 90% of the landmass, comparable to Telstra.
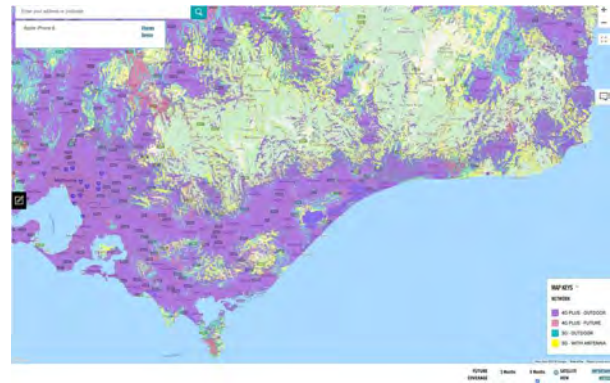
Figure 7 Optus Public Coverage Map of Gippsland Region

The most noteworthy gaps evident in both Telstra and Optus coverage is in mountainous national parklands areas with relatively good coverage in coastal and valley terrain. Smaller coverage gaps are scattered across the region, most commonly in areas of South Gippsland.

As for Optus, Vodafone's public coverage maps are based on using a nominated device, and for comparison with the Optus map, an iPhone6 has been assumed.
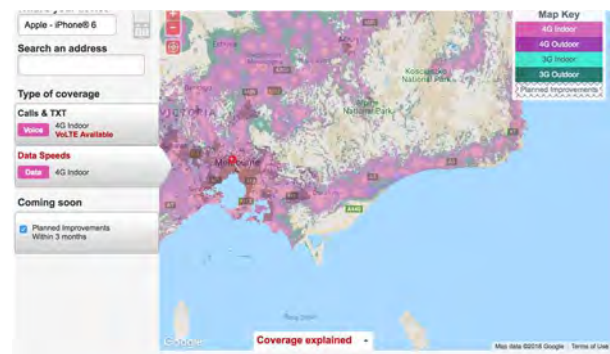
Figure 8 Vodafone Public Coverage Map of Gippsland Region

In interpreting the map:

- Light purple indicates 4G indoor coverage
- Dark purple indicates 4G outdoor coverage
- Light green indicates indoor 3G coverage
- Dark green indicates outdoor 3G coverage
- Shaded areas indicate where coverage enhancements are due to take place in the near future.

Based on the maps, Vodafone's coverage is not as extensive as that of Telstra and Optus, but appears to include good coverage of the major roads including the Princes Highway as far as the Victorian border.

Crowd-sourced Coverage Information

In practice, the public coverage maps provided by the mobile network operators do not always accord with end-user experience. A range of applications have been developed to capture users' real world experiences and integrate these into databases.

An example is the OpenSignal[10] application and database, and a sample of the maps produced from these sources (in this case, in the area of Ararat) is provided below. These applications can provide useful insights into (especially) transport mobile blackspots – but are less useful in assessing wide area coverage because of the difficulties of testing everywhere.
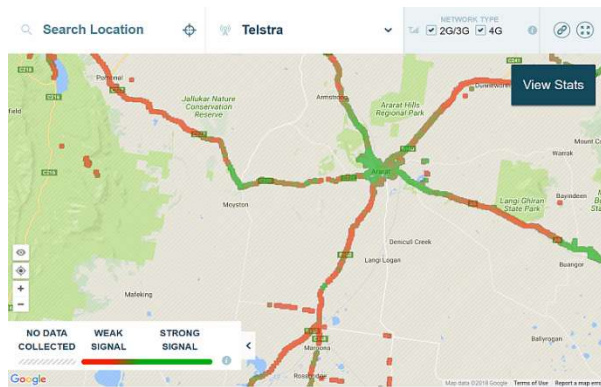
Figure 9 OpenSignal Mapping of Coverage around Ararat

The use of these applications by stakeholders (such as local government staff) may be valuable in building evidence of transport mobile blackspots.

General Notes

Coverage is constantly evolving as a result of ongoing MNO investment in new base stations - including new base stations supported by the Commonwealth Mobile Blackspot Programs (MBSP) and the Victorian Governments Blackspot Programs (VMP3).

In addition, the mobile networks are evolving through successive technology generations.

In particular, fifth generation (5G) mobile technology is expected to commence general deployment in 2020, bringing with it significantly increased capacity, the ability to support a vastly increased number of devices and new features of particular relevance to "Internet of Things" (IoT) applications.

Mobile coverage is discussed in the analysis that is provided in Section 3 for cities, towns and smaller localities in the region. *In all cases*, the outlook 5 years hence depends significantly on the pace and extent to which 5G technology is rolled out in regional areas of Victoria.

The mobile network operators are progressively introducing support for the Cat-M1 and NB-IOT protocols – suited to various IoT purposes. To date, only Optus has provided information for inclusion in SLIM. The Optus coverage relates to agricultural IOT trials being conducted in the north of the State and in Gippsland. Coverage that extends to any areas of this region is noted.

Mobile Coverage Challenges

The market dynamics of the fixed and mobile markets vary considerably in Australia.

In the fixed broadband market, the Australian Government responded with the NBN initiative to a growing divide between urban and rural areas. In urban areas, high population densities and concentrated consumer spending attracted network investment and competition. In addition, Telstra was required to grant other carriers access to its copper network to moderate what would otherwise have been a near-monopoly grip on the market.

There has been no similar intervention in Australia's mobile network - though the challenges are broadly parallel. In particular, investment has flourished in urban areas, but languished in rural areas where there is insufficient revenue-generating traffic to drive commercial returns. As a result, only around one third of Australia's landmass enjoys mobile coverage. The percentage in Victoria is significantly higher – estimated at around 75% - as a consequence of comparatively high population densities.

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10   See https://opensignal.com/networks, accessed on 10 July 2018.

It is not realistic to expect 100% coverage of Australia's vast land-mass. However, with the advent of smart phones and data capabilities, the mobile networks are becoming ever more important all Australians for many different purposes including (but not limited to):

- Social amenity
- Occupational health and safety (noting that in emergency situations, triple-zero calls can be made on *any* available network)
- On-the-spot access to information and services relevant to one's business, lifestyle and/or well-being
- Supporting IoT applications
- As a supplement (or alternative) to a fixed broadband service, especially in areas served only by NBN Co's satellite service.

At the present level of coverage (by any MNO) many of the potential socio-economic benefits remain "out of reach". In this context, pushing the boundaries of mobile network coverage promises social-economic benefits that can be disproportionate to the additional revenue opportunities available to carriers.

The challenges for the MNOs are understandable. If investment in extending coverage to an area does not generate sufficient additional revenue generating traffic to be profitable, it is not a prudent use of shareholder funds.

The structure of the mobile market in Australia leads to the question of what constitutes a mobile blackspot. Most Australians subscribe to one and only one mobile network – and for many such Australians, a blackspot exists if the particular operator that they have chosen does not offer coverage relevant to their location and transport patterns.

However, one of the benefits of the vigorous competition that prevails to attract mobile users in urban areas is a rich array of competitively priced options. As a result, for those users whose preferred MNO does not provide coverage in all the areas that they frequent, the cost of subscribing to a secondary plan is typically not prohibitive. There are also "dual SIM" phones that facilitate management of connectivity in a two-network environment.

2.3 LP-WAN Coverage

General Notes

LP-WAN technologies are designed for low-bandwidth transmission of small packets of information, with the radio technology supporting battery life of several years, making it well-suited for remote IoT sensors. Two-way protocols can be used for both monitoring (for example, meters, alarms etc) and control responses. In contrast, one-way protocols support only monitoring, but typically achieve longer battery life by obviating the need to "listen" for transmissions.

The original providers of LP-WAN technology coverage are:

- NNNCo, with LoRaWAN technology; LoRa is a two-way protocol; at this stage, no information about coverage is available
- Thinxtra, with Sigfox technology – Sigfox is also a two-way protocol
- Taggle, a one-way technology used widely for water meter reading.

Deployment of these LP-WAN technologies (LoRa, Sigfox and Taggle) is driven by project-specific opportunities, rather than by up-front investment in coverage in the hope that applications will follow.

The major mobile network operators are rapidly moving into the provision of LP-WAN services (NB-IoT), with data available for digital plan analysis on Optus NB-IoT coverage.

In addition to utilising LP-WAN technologies, Smart City and Smart Town initiatives can often take advantage of short-range technologies such as WiFi, coupled with backhaul provided by an NBN service, an independently sourced connectivity solution or a mobile network service.

LoRa

An Australian company, NNNCo Pty. Ltd., is a leading proponent of LoRa technology and is known to be working in a range of smart city and rural applications. Details of coverage established in support of these projects are not published. In addition to NNNCo, various other parties are known to have deployed LoRa base stations for trial purposes and/or for particular applications.

Sigfox

Sigfox publishes a global coverage map[11]. The diagram below shows coverage in the Gippsland Region in blue. In contrast to the Taggle map (see following), the Sigfox map appears to take account of topographic occlusions – as evidenced by the irregular patterns of coverage at the fringes of coverage areas.
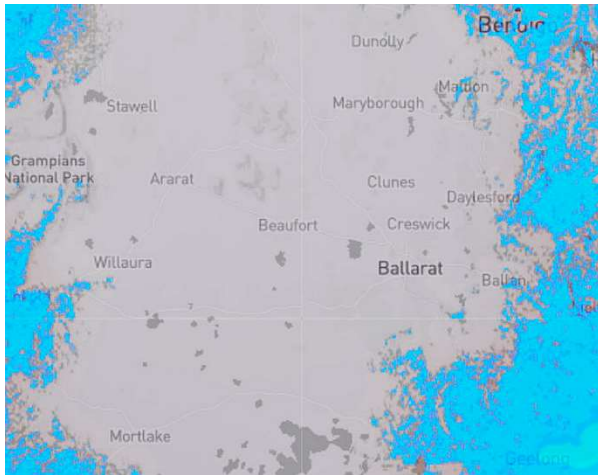
Figure 10 Sigfox Coverage of Gippsland Region

Based on this map, there may be some coverage around the fringes of the Gippsland Region.

Taggle

Taggle has provided indicative coverage maps for inclusion in the SLIM GIS, but they do not reflect any topographic occlusions that may affect communications at the margins. Nominal coverage is as shown in orange in the diagram that follows – field testing to confirm communications towards the fringes of coverage areas would be prudent as additional base stations may need to be deployed to assure good connectivity.
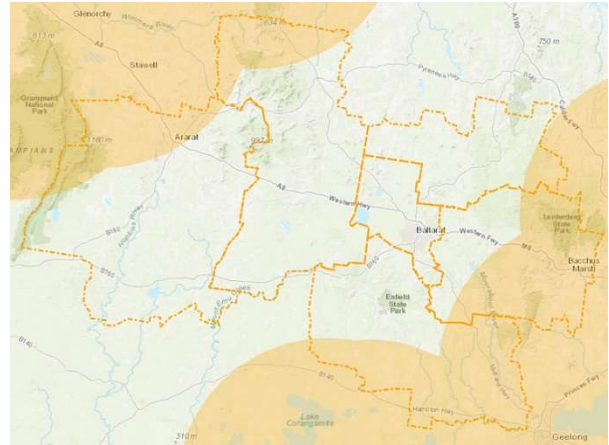
Figure 11 Taggle Coverage of the Gippsland Region (SLIM)

2.4   Other Connectivity Options

The analysis of places notes where VicTrack fibre passes through (or nearby) a population centre. Access to the fibre may be possible subject to commercial arrangements, and the availability of suitable access points.

Also in the context of "other" connectivity options, the power transmission network commonly includes optical fibre in the Overhead Power Ground Wires (OPGWs) that protect the power lines below from lightning strikes. Whilst it is not known if fibre capacity is available and accessible on any particular segment of the power transmission network, the proximity of a location to the power transmission network is noted where applicable.

In various locations, commercial providers such as Telstra, Optus, Nextgen and others may be able to offer connectivity solutions for a wide range of purposes. Details of their infrastructure are currently not available in SLIM.

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[11]   Map derived from Sigfox coverage map published at http://www.Sigfox.com/en/coverage (accessed on 3 July 2018).

2.5 SLIM Analysis

Whilst various of the broad perspectives offered in this report are based on information from the SLIM GIS, SLIM is at its most powerful for detailed analysis of particular areas. Stakeholders are encouraged to build familiarity with the system when it is publicly available in order to be able to investigate particular needs in their jurisdictions, combining the information in SLIM with local knowledge.

3.   Significant Places

The region includes in total 7 cities with population > 10,000, 24 towns (population > 1,000 and 45 localities (population <1,000).

The 22 places selected for analysis in this section include all cities, a random selection of 9 towns (population > 1,000) and the largest locality (population <1000) in each LGA that makes up the region.

In combination, the sample of 22 places accommodates 20.9% of the region's population of 278,030. The proportion included in the analysis would be higher if those living in the immediate surrounds of each named place were to be counted.

The region is home to another 54 localities with populations of between 185 and 1,000 - in combination representing another 50.6% of the population in the region.

The balance of the region's population (28.5%) is living in communities with a population of less than 185, or on isolated properties (farms and the like). Based on an average Victorian household size of 2.6 as reported by the ABS[12], this equates to an estimated 30,795 households outside of the places considered in the following subsections.

The source of data in this section is cited for the first (only) reference of its type.

3.1   City of Traralgon

Traralgon is located in the east of the Latrobe Valley in the Gippsland region. It is the largest and fastest growing city in the greater Latrobe Valley area. The economy is primarily driven by primary industry, natural resources and secondary industry including coal mining, processing and fossil-fuel power generation.

General characteristics of the city that provide an indication of the city's likely telecommunications demand profile include:

- The population of Traralgon grew by 16.1% over a decade to 25,485 in 2016, slightly above the median growth rate of 15.4% for the 22 population centres analysed in the region
- 12,115 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 55.5% being in full-time employment and 31.4% in part-time employment
- 9.9% of the labour force classified themselves as managers, 18.4% as professionals and 14.5% as clerical and administrative workers
- 6.4% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals), and 3.7% cited local government administration
- The city has one public hospital
- The city has 6 primary schools, 3 primary/secondary schools and a TAFE
- With a median age of 38, Traralgon has one of the youngest populations in regional Victoria, and just above the Victorian median of 37
- The ABS report a median annual household income of $66.4K for Traralgon, one of the highest in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 847 businesses in the city or its near surrounds
- In 81.0% of dwellings, at least one person accessed the internet from home.

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[12]   Much of the data for locations and larger areas is sourced from the ABS Quickstats site (see http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/2?opendocument).

Skills

ABS Census data indicates:

- 21.8% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 21.5% have completed level III or IV trade certificates
- Another 12.2% have completed year 12.

ABS Industry employment data from 2016 indicated that the Latrobe LGA had 4.5% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Traralgon as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Traralgon is largely serviced by NBN FTTN, with small pockets of FTTP (in the city's new developments), with fixed wireless and pockets of satellite in areas surrounding the city.


Figure 12 NBN Coverage of Traralgon (NBN Co)

Examining a satellite map shows a large Traralgon business, Valley Ford (west of Traralgon on the Princes Highway), that is being serviced by NBN fixed wireless.

Figure 13 Aerial imagery showing NBN fixed wireless Coverage of Valley Ford west of Traralgon (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire city
- Optus shows 4G Plus outdoor coverage across the entire city
- Vodafone shows 4G indoor coverage across the entire city, with new coverage under construction.

In summary, there appears to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle and Sigfox and Optus NB-IOT coverage in Traralgon.

Public WiFi Coverage

There are a number on free public WiFi zones in the Traralgon region with free WiFi available at the Traralgon Sports Stadium, Traralgon Early Learning Centre, Traralgon Service Centre and Library, the Visitor Centre, Traralgon Recreation Reserve, Traralgon Outdoor Pool, the Cameron Street Preschool and Community Centre and Park Lane Preschool.

Other

A VicTrack fibre loop is available through the centre of town along the rail corridor and south towards the Loy Yang power facilities.

Extensive power is available in Traralgon.

Figure 14 Power transmission network around Traralgon

3.2   City of Moe-Newborough

Moe-Newborough is a population centre in Latrobe Valley in the Gippsland region. It is approximately 130 kilometres east of the central business district of Melbourne. The area is a navigation point and stopover for tourists en route to Erica, the historic goldfields township of Walhalla, the Walhalla Goldfields Railway and Mount Baw Baw. Lake Narracan is nearby, and Moe is home to the annual Moe Cup horse races and the Moe Jazz Festival. Newborough has a higher than average proportion of retirees and aged residents and is home to a vibrant artist community.

General characteristics of the city that provide an indication of the city's likely telecommunications demand profile include:

- The population of Moe-Newborough was 15,059 in 2016. The ABS does not provide an equivalent population estimate for 2006 so a ten-year growth rate cannot be given.

- 6,131 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 47.8% being in full-time employment and 34.0% in part-time employment
- 6.5% of the labour force classified themselves as managers, 11.8% as professionals and 12.5% as clerical and administrative workers
- 4.5% of the labour force cited their industry of employment as aged care residential and 3.5% cited hospitals (except psychiatric hospitals)
- There are no public hospitals in the city, with the nearest one located to the east in Traralgon West
- The city has 6 primary schools, 1 secondary school, a special development school and a TAFE
- With a median age of 44, Moe-Newborough has the median age of the 22 population centres analysed in the region
- The ABS report a median annual household income of $43.1K for Moe-Newborough, below the median of 49.0K for the 22 population centres analysed in the region and below Melbourne's $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 386 businesses in the city or its near surrounds
- In 70.6% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 13.4% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 22.3% have completed level III or IV trade certificates
- Another 11.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Latrobe LGA had 4.5% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Moe-Newborough as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Moe-Newborough is largely serviced by NBN FTTN, with small pockets of FTTP (in the city's new developments), with fixed wireless and pockets of satellite in areas surrounding the city.
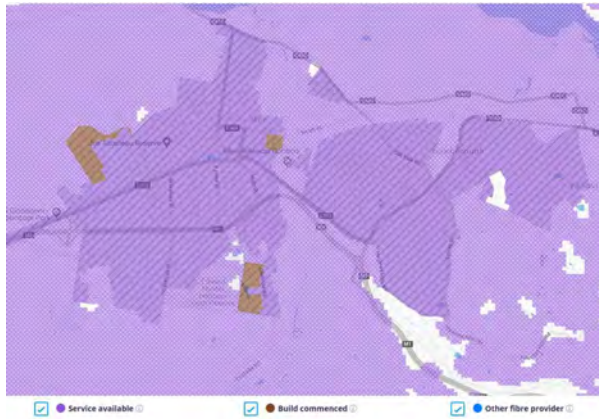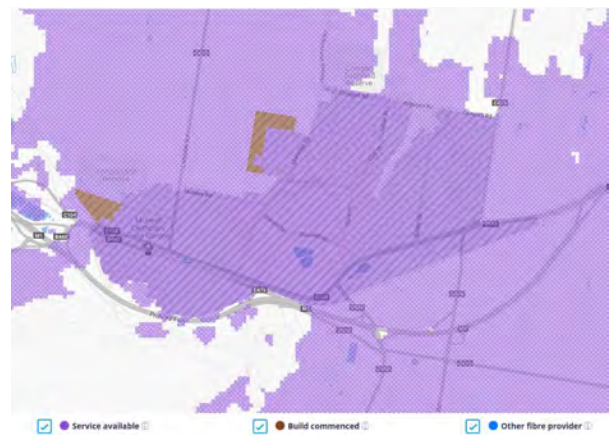

Figure 15 NBN Coverage of Moe-Newborough (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire city
- Optus shows 4G Plus outdoor coverage across the entire city
- Vodafone shows 4G indoor coverage across the entire city, with new coverage under construction.

In summary, there appears to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Moe-Newborough. Coverage maps for Sigfox and Optus NB-IOT show partial coverage in the region. Testing should be completed to confirm exact coverage availability.

Public WiFi Coverage

Free WiFi is available at the Moe Service Centre and Library, Moe Leisure Centre, Moe Town Hall, Moe Place and Moore Street Preschool (Hennessey Street Park).

Other

VicTrack fibre transits the centre of Moe and Newborough, following the route of the train line.

Extensive power options are available in the region.
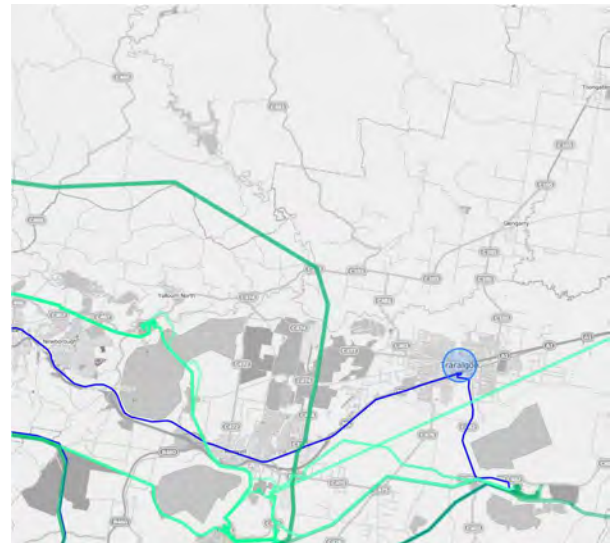
Figure 16 VicTrack fibre and power transmission network around Traralgon

3.3   City of Warragul

Warragul is a city located 102 kilometers south-east of Melbourne. The city lies between the Strzelecki Ranges to the south and the Mount Baw Baw Plateau of the Great Dividing Range to the north. Warragul is the main population and service centre of the West Gippsland region and the Shire of Baw Baw. The surrounding area is noted for dairy farming and other niche agriculture and has long been producing gourmet foods.

General characteristics of the city that provide an indication of the city's likely telecommunications demand profile include:

- The population of Warragul grew by 24.2% over a decade to 14,276 in 2016 above the median of 15.4% for the 22 population centres analysed in the region
- 6,483 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 54.5% being in full-time employment and 34.3% in part-time employment
- 11.4% of the labour force classified themselves as managers, 20.1% as professionals and 12.3% as clerical and administrative workers
- 4.7% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals) and 6.3% cited combined primary and secondary education
- One public hospital is located in the city
- The city has 3 primary schools, a primary/secondary school, a secondary school, a special development school and 2 TAFEs
- With a median age of 43, Warragul is just below the median of 44 for the 22 places analysed in the region
- The ABS report a median annual household income of $60.1K for Warragul, one of the highest in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 767 businesses in the city or its near surrounds
- In 80.4% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 25.8% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 19.4% have completed level III or IV trade certificates
- Another 12.1% have completed year 12.

ABS Industry employment data from 2016 indicated that the Baw Baw LGA had 5.7% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Warragul as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Warragul is largely serviced by NBN FTTN, with small pockets of FTTP (in the city's new developments), with fixed wireless and pockets of satellite in areas surrounding the city.
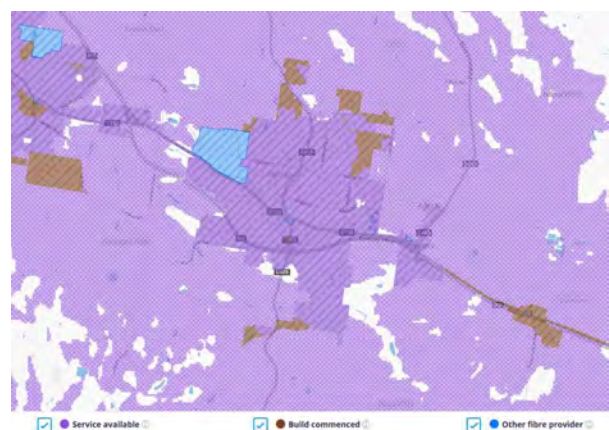
Figure 17 NBN Coverage of Warragul (NBN Co)

Examining a satellite map shows a large Warragul business, Flavorite Hydraponic Tomatoes (east of Warragul), that is being serviced by NBN fixed wireless.

Figure 18 Aerial imagery showing NBN fixed wireless Coverage of Flavorite Hydraponic Tomatoes east of Warragul (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire city
- Optus shows 4G Plus outdoor coverage across the entire city
- Vodafone shows 4G indoor coverage across the entire city, with new coverage under construction.

In summary, there appears to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Warragul. Sigfox and Optus NB-IOT are not currently available in the area.

Public WiFi Coverage

24 hour free public WiFi access is available at the Warragul Leisure Centre and Warragul Library.

Other

VicTrack fibre transits the centre of Warragul, following the route of the train line.

500kV power is available via the Hazelwood to Cranbourne Terminal approximately 3kilometres south of Warragul.
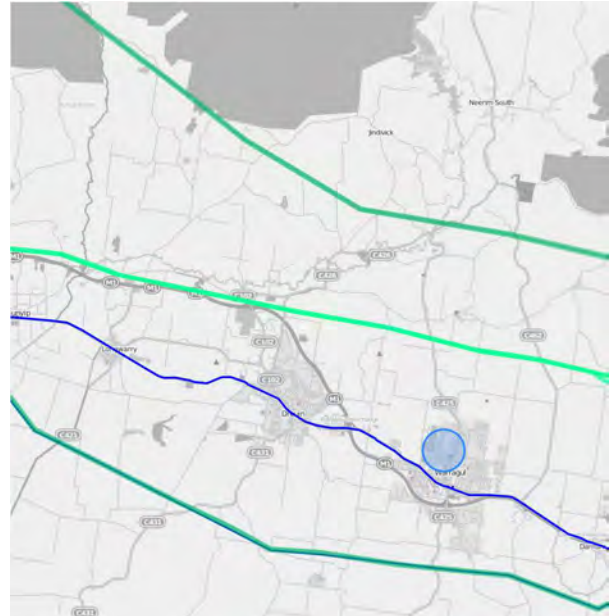
Figure 19 VicTrack fibre and power transmission network around Warragul

3.4   *City of Morwell*

Morwell is a town in the Latrobe Valley area of Gippsland, in South-Eastern Victoria approximately 149 kilometres east of Melbourne. It is both the seat of local government and the administrative centre for the City of Latrobe. The city has been known for its role as a major energy production location for Victoria as the centre of a major coal mining and fossil-fuel power generation industry.

General characteristics of the city that provide an indication of the city's likely telecommunications demand profile include:

- The population of Morwell grew by 1.1% over a decade to 13,540 in 2016, well below the median growth of 15.4% among the 22 places analysed in the region

- 5,077 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 47.0% being in full-time employment and 32.4% in part-time employment
- 7.7% of the labour force classified themselves as managers, 11.4% as professionals and 13.2% as clerical and administrative workers
- 4.2% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals) and 3.2% cited aged care residential
- One private hospital is located in the city, with a public hospital located nearby in Traralgon
- The city has 4 primary schools, a secondary school and a TAFE
- With a median age of 43, Morwell is just below the median of 44 for the 22 places analysed in the region and above the Victorian median of 37
- The ABS report a median annual household income of almost $60K for Morwell, one of the highest in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 545 businesses in the city or its near surrounds
- In 69.3% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 12.8% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 19.7% have completed level III or IV trade certificates
- Another 12.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Latrobe LGA had 4.5% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Morwell as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Morwell is largely serviced by NBN FTTN, with small pockets of FTTP (in the city's new developments), with fixed wireless and pockets of satellite in areas surrounding the city.


Figure 20 NBN Coverage of Morwell (NBN Co)

Examining a satellite map shows businesses to the south-east of Morwell being serviced by NBN fixed wireless.

Figure 21 Aerial imagery showing NBN fixed wireless Coverage of businesses to the south-east of Morwell (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire city
- Optus shows 4G Plus outdoor coverage across the entire city
- Vodafone shows 4G indoor coverage across the entire city, with new coverage under construction.

In summary, there appear to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Morwell with limited Sigfox and Optus NB-IOT available in the area. Testing should be conducted to determine exact coverage of these technologies in Morwell.

Public WiFi Coverage

Free public WiFi access is available at the Morwell Library, Morwell Headquarters, Morwell Leisure Centre, Kernot Hall, Carinya Early Learning Centre, Latrobe Regional Airport and the Latrobe Regional Gallery.

Other

VicTrack fibre transits the centre of Morwell, following the route of the train line.

Extensive power options are available in Morwell.

Figure 22 VicTrack fibre and power transmission network around Morwell

3.5   City of Sale

Sale is a city situated in the Gippsland region of Victoria. The first white settler was Archibald McIntosh who arrived in 1844. Sale has seen much development and redevelopment in the past decade, one example being the multimillion-dollar redevelopment of the city's Port of Sale.

General characteristics of the city that provide an indication of the city's likely telecommunications demand profile include:

- The population of Sale grew by 1.3% over a decade to 13,511 in 2016, below the median growth of 15.4% for the 22 places analysed in the region
- 6,056 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 54.5% being in full-time employment and 32.9% in part-time employment
- 11.4% of the labour force classified themselves as managers, 20.5% as professionals and 10.7% as clerical and administrative workers
- 6.5% of the labour force cited their industry of employment as hospitals (expect psychiatric hospitals)
- One public hospital is located in the city
- The city has 5 primary schools, 2 primary/secondary schools and a TAFE
- With a median age of 40, Sale is older than the Victorian median of 37
- The ABS report a median annual household income of $59.8K for Sale, higher than the median of $52.0K among the 22 places analysed in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 561 businesses in the city or its near surrounds
- In 77.8% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 23.5% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 19.3% have completed level III or IV trade certificates
- Another 11.4% have completed year 12.

ABS Industry employment data from 2016 indicated that the Wellington LGA had 3.8% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Sale as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Sale is largely serviced by NBN FTTN, with small pockets of FTTP (in the city's new developments), with fixed wireless and pockets of satellite in areas surrounding the city.

In a development east of Sale, our analysis reveals that NBN FTTB is planned or under construction to service businesses at the Sale airport.
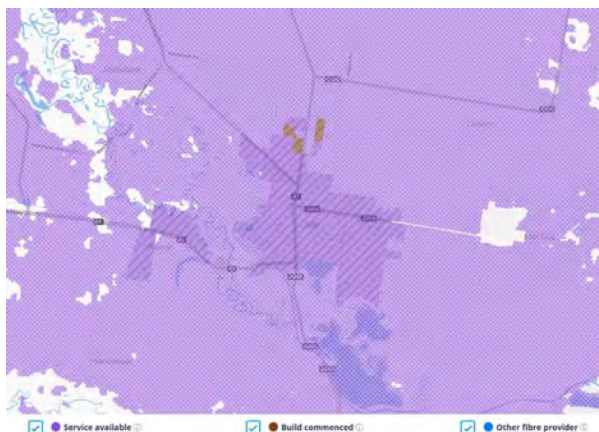
Figure 23 NBN Coverage of Sale (NBN Co)

Examining a satellite map shows a large number of premises, north-east of Sale, being serviced by NBN fixed wireless.

Figure 24 Aerial imagery showing NBN fixed wireless Coverage north-east of Sale (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire city
- Optus shows 4G Plus outdoor coverage across the entire city
- Vodafone shows 4G indoor coverage across the entire city.

In summary, there appears to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle and Optus NB-IOT coverage in Sale with limited Sigfox and available in the area.
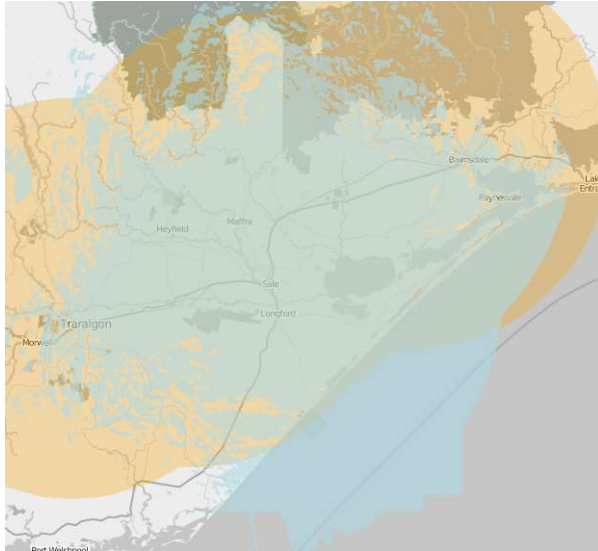
Figure 25 LP-WAN coverage in Sale and surrounding areas

Public WiFi Coverage

24-hour free public WiFi access is available at the Sale Library.

Other

VicTrack fibre is not available in Sale.

66v power is available approximately 7 kilometres north of Sale.

Figure 26 Power transmission network around Sale

3.6 City of Bairnsdale

Bairnsdale is a city in East Gippsland, Victoria. The city is a major regional centre of eastern Victoria along with Traralgon and Sale. It is also the commercial centre for the East Gippsland region and the seat of local government for the Shire of East Gippsland.

General characteristics of the city that provide an indication of the city's likely telecommunications demand profile include:

- The population of Bairnsdale grew by 14.8% over a decade to 12,952 in 2016, just below the median of 15.4% for the 22 places analysed in the region
- 5,178 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 51.3% being in full-time employment and 35.7% in part-time employment
- 10.5% of the labour force classified themselves as managers, 15.4% as professionals and 11.1% as clerical and administrative workers
- 5.7% of the labour force cited their industry of employment as aged care residential and 5.2% cited primary and secondary education
- One public hospital is located in the city
- The city has 6 primary schools, 2 primary/secondary schools and a TAFE
- With a median age of 44, Moe-Newborough has the median age of the 22 population centres analysed in the region
- The ABS report a median annual household income of $49.4K for Bairnsdale, below the median of $52.0K for the 22 places analysed in the region and below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 694 businesses in the city or its near surrounds
- In 72.9% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 18.2% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 18.7% have completed level III or IV trade certificates
- Another 11.1% have completed year 12.

ABS Industry employment data from 2016 indicated that the East Gippsland LGA had 4.1% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Bairnsdale as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Bairnsdale is largely serviced by NBN FTTN, with small pockets of FTTP (in the city's new developments), with fixed wireless and pockets of satellite in areas surrounding the city.
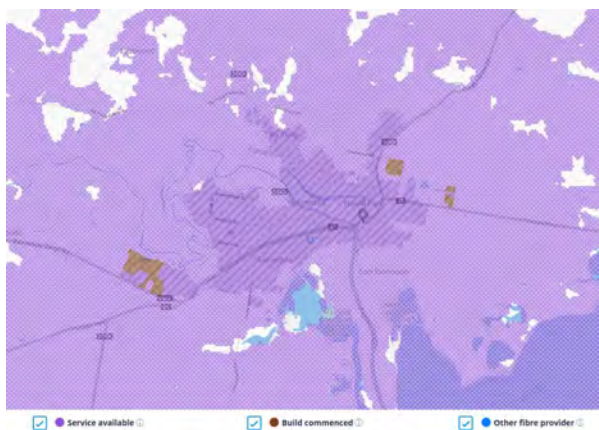
Figure 27 NBN Coverage of Bairnsdale (NBN Co)

Examining a satellite map shows most premises in Bairnsdale to be covered by NBN Fixed Line services.
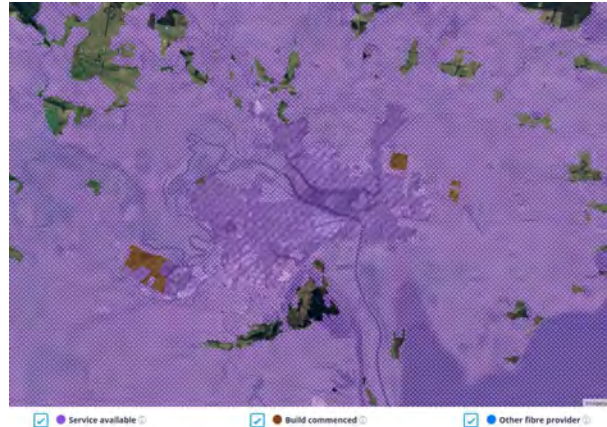
Figure 28 Aerial imagery showing NBN Fixed Line and fixed wireless Coverage in Bairnsdale (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire city
- Optus shows 4G Plus outdoor coverage across the entire city
- Vodafone shows 4G indoor coverage across the entire city.

In summary, there appears to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle and Optus NB-IOT coverage in Bairnsdale with limited Sigfox and available in the area.

Public WiFi Coverage

24-hour free public WiFi access is available at the Bairnsdale Library.

Other

VicTrack fibre is not available in Bairnsdale.

66v power is available in Bairnsdale via the Bairnsdale to Morwell Terminal.

Figure 29 Power transmission network around Bairnsdale

3.7   City of Drouin

Drouin is a town in the West Gippsland region, 90 kilometres east of Melbourne. Its local government area is the Shire of Baw Baw. New housing developments have accelerated the town's residential growth in recent years.

General characteristics of the city that provide an indication of the city's likely telecommunications demand profile include:

- The population of Drouin grew by 73.3% over a decade to 11,887 in 2016, one of the highest growth rates in regional Victoria
- 5,105 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 55.4% being in full-time employment and 32.8% in part-time employment
- 10.7% of the labour force classified themselves as managers, 15.2% as professionals and 10.9% as clerical and administrative workers
- 3.8% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals) and 5.3% cited primary and secondary education
- There is no hospital in the city, but there is one in Warragul located nearby to the south-east
- The city has 3 primary schools, a primary/secondary school and a secondary college

- With a median age of 40, Drouin has one of the youngest populations in the region
- The ABS report a median annual household income of $59.8K for Drouin, above the median of $52.0K among the 22 places analysed in the region and below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 304 businesses in the city or its near surrounds
- In 80.2% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 19.9% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 22.8% have completed level III or IV trade certificates
- Another 11.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Baw Baw LGA had 5.7% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Drouin as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Drouin is largely serviced by NBN FTTN, with small pockets of FTTP (in the city's new developments), with fixed wireless and pockets of satellite in areas surrounding the city. The map below shows there is another fibre provider offering services towards the centre of the town.
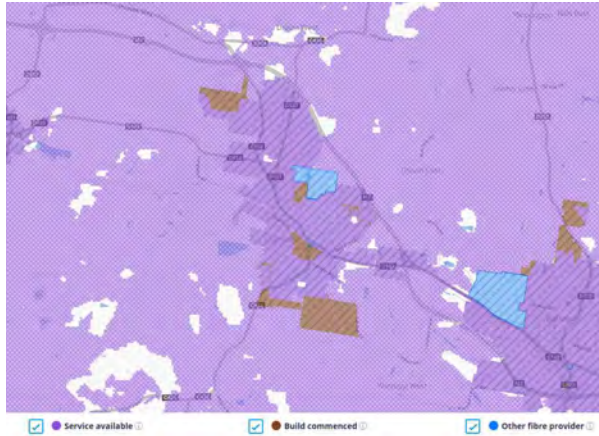
Figure 30 NBN Coverage of Drouin (NBN Co)

Examining a satellite map shows apple and pear growers wholesale businesses west of Drouin being serviced by NBN fixed wireless.

Figure 31 Aerial imagery showing NBN fixed wireless Coverage of Apple and Pear Businesses in Drouin (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire city
- Optus shows 4G Plus outdoor coverage across the entire city
- Vodafone shows 4G indoor and outdoor coverage across the entire city, with new coverage under construction.

In summary, there appears to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Drouin. Sigfox and Optus NB-IOT limited are not currently available in the area.

Public WiFi Coverage

There are no known public WiFi areas in Drouin.

Other

VicTrack fibre transits the centre of Warragul, following the route of the train line.

Extensive power is available in Drouin with 500kV power available via the Hazelwood to Cranbourne Terminal approximately 5 kilometres south of Drouin.

Figure 32 VicTrack fibre and power transmission network around Drouin

3.8   Town of Wonthaggi

Wonthaggi is a seaside town located 132 kilometres south-east of Melbourne, in the Bass Coast Shire of Gippsland. Known originally for its coal mining it is now the largest town in South Gippsland, a regional area with extensive tourism, beef and dairy industries.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Wonthaggi grew by 21.3% over a decade to 7,917 in 2016, above the median growth rate of 15.4% for the 22 places analysed in the region
- 2,967 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 43.5% being in full-time employment and 41.0% in part-time employment
- 8.8% of the labour force classified themselves as managers, 10.5% as professionals and 10.4% as clerical and administrative workers
- 3.9% of the labour force cited their industry of employment as aged care residential and 3.2% cited local government administration
- One public hospital is located in the town
- The town has 3 primary schools, a secondary school, a special development school and a TAFE
- With a median age of 48, Wonthaggi is older than the median of 44 for the 22 places analysed in the region and above the Victorian median of 37
- The ABS report a median annual household income of $41.4K for Wonthaggi, one of the lowest in the region and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 328 businesses in the town or its near surrounds
- In 69.8% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 14.2% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 19.2% have completed level III or IV trade certificates
- Another 10.7% have completed year 12.

ABS Industry employment data from 2016 indicated that the Bass Coast LGA had 5.2% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Wonthaggi as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Wonthaggi is largely serviced by NBN FTTN, with small pockets of FTTP (in the towns new developments), with fixed wireless and pockets of satellite in areas surrounding the town.
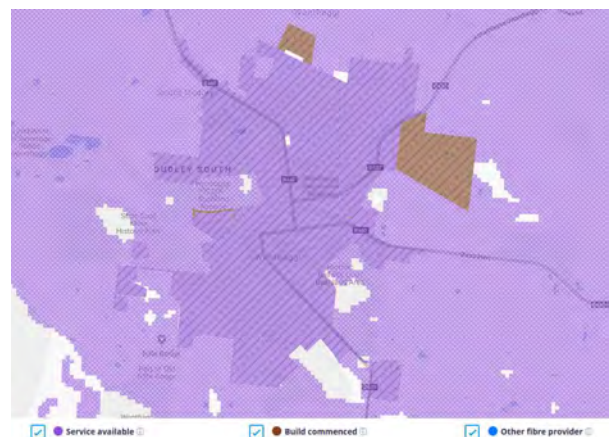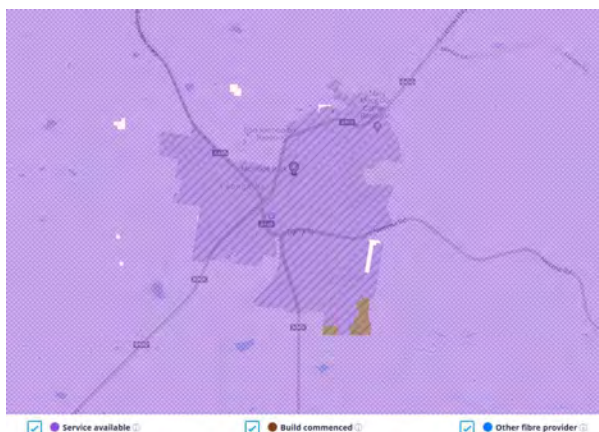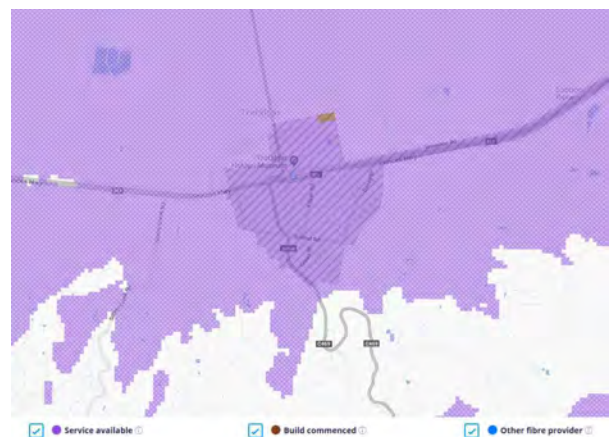

Figure 33 NBN Coverage of Wonthaggi (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor coverage across the entire town.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Wonthaggi. Sigfox and Optus NB-IOT limited are not currently available in the area.

Public WiFi Coverage

24-hour free public WiFi is available at the Wonthaggi Library.

Other

Neither VicTrack fibre or power transmission network is available in Wonthaggi.

3.9 *Town of Lakes Entrance*

Lakes Entrance is a seaside resort and fishing port in eastern Victoria. It is situated approximately 320 kilometres east of Melbourne, near a managed, artificial channel connecting the Gippsland Lakes to the Bass Strait.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Lakes Entrance grew by 9.4% over a decade to 6,071 in 2016, below the median of 15.4% among the 22 places analysed in the region
- 2,131 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 45.0% being in full-time employment and 37.7% in part-time employment

- 13.0% of the labour force classified themselves as managers, 12.6% as professionals and 10.7% as clerical and administrative workers
- 7.9% of the labour force cited their industry of employment as accommodation and 4.2% cited aged care residential
- There is no hospital in the town. The nearest one is located to the west in Bairnsdale
- The town has 2 primary schools a secondary school and a TAFE
- With a median age of 53, Lakes Entrance has one of the older populations in the region, above the median of 44 for the 22 places analysed
- The ABS report a median annual household income of $42.4K for Lakes Entrance, one of the lowest in the region and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 201 businesses in the town or its near surrounds
- In 70.2% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 15.1% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 20.3% have completed level III or IV trade certificates
- Another 10.2% have completed year 12.

ABS Industry employment data from 2016 indicated that the East Gippsland LGA had 4.1% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Lakes Entrance as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Lakes Entrance is largely serviced by NBN FTTN, with fixed wireless and pockets of satellite in areas surrounding the town.
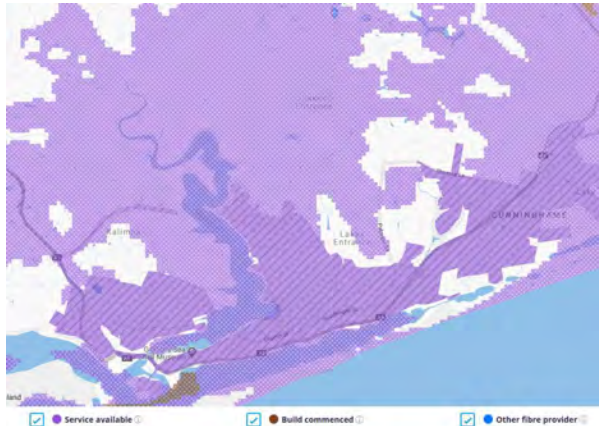
Figure 34 NBN Coverage of Lakes Entrance (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor coverage across the entire town.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Lakes Entrance. Sigfox and Optus NB-IOT limited are not currently available in the area.

Public WiFi Coverage

There are no known public WiFi areas in Lakes Entrance.

Other

Neither VicTrack fibre or power transmission network is available in Lakes Entrance.

3.10 Town of Leongatha

Leongatha is a town in the foothills of the Strzelecki Ranges, South Gippsland Shire located 135 kilometres south-east of Melbourne. First settlement of the area by Europeans occurred in 1845. Leongatha is a major educational hub for South Gippsland.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Leongatha grew by 13.7% over a decade to 5,119 in 2016, below the median growth of 15.4% for the 22 places analysed in the region
- 2,151 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 52.1% being in full-time employment and 36.6% in part-time employment
- 11.5% of the labour force classified themselves as managers, 15.4% as professionals and 11.5% as clerical and administrative workers
- 5.0% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals) ad 3.3% cited local government administration
- One public hospital is located in the town
- The town has 2 primary schools, a primary/secondary school, 2 secondary schools, a special development school and a TAFE
- With a median age of 43, Leongatha is just below the median of 44 for the 22 places analysed in the region
- The ABS report a median annual household income of $54.5K for Leongatha, above the media of $52.0K among the 22 places in the region analysed but below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 330 businesses in the town or its near surrounds
- In 75.8% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 19.9% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 19.7% have completed level III or IV trade certificates
- Another 10.5% have completed year 12.

ABS Industry employment data from 2016 indicated that the South Gippsland LGA had 4.7% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Leongatha as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Leongatha is largely serviced by NBN FTTN, with small pockets of FTTP (in the towns new developments), with fixed wireless and pockets of satellite in areas surrounding the town.

Figure 35 NBN Coverage of Leongatha (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows no mobile coverage in the area.

In summary, residents have options for good coverage in the town and surrounding area from two of the three mobile network operators.

LP-WAN Coverage

There is limited Taggle coverage in Leongatha. Testing should be conducted to determine exact coverage available.

Public WiFi Coverage

24-hour free public WiFi is available at the Leongatha Library.

Other

Neither VicTrack fibre or power transmission network is available in Leongatha.

3.11 Town of Trafalgar

Trafalgar is a town in the West Gippsland region of Victoria. The town lies on the Princes Highway and main Gippsland railway line about 10 kilometres west of Moe. The town backs onto the foothills of the Strzelecki Ranges to the south.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Trafalgar grew by 50.6% over a decade to 3,466 in 2016 one of the highest growth rates in regional Victoria
- 1,549 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 53.1% being in full-time employment and 34.5% in part-time employment
- 10.5% of the labour force classified themselves as managers, 17.4% as professionals and 12.4% as clerical and administrative workers
- 6.5% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals) and 7.0% cited primary and secondary education
- There are no hospitals in the town, but there is a public hospital located to the west in Warragul or the east in Traralgon
- The town has 2 primary schools and a secondary school
- With a median age of 40, Trafalgar has one of the youngest populations in the region, but above the Victorian median of 37
- The ABS report a median annual household income of $63.0K for Trafalgar, one of the highest in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 88 businesses in the town or its near surrounds
- In 80.0% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 22.0% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 22.4% have completed level III or IV trade certificates
- Another 10.4% have completed year 12.

ABS Industry employment data from 2016 indicated that the Baw Baw LGA had 5.7% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Trafalgar as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that Trafalgar is largely serviced by NBN FTTN, with small pockets of FTTP (in the towns new developments), with fixed wireless surrounding the town and satellite in areas south of the town.
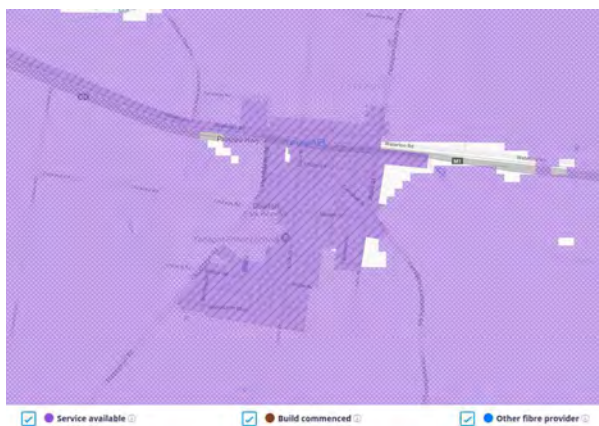

Figure 36 NBN Coverage of Trafalgar (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G outdoor coverage across the entire town, with new coverage under construction.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle and Sigfox coverage in Trafalgar.

Public WiFi Coverage

There are no known public WiFi areas in Trafalgar.

Other

VicTrack fibre transits the centre of Trafalgar, following the route of the train line.

Extensive power is available in Trafalgar with 500kV power available via the Hazelwood to Cranbourne Terminal approximately 2 kilometres north of the town.

Figure 37 VicTrack fibre and power transmission network transiting Trafalgar

3.12   Town of Paynesville

Paynesville is a tourist/holiday resort town in the Gippsland region of Victoria. It is known as the boating capital of Victoria. Paynesville was originally called Toonalook, which is an aboriginal name for "place of many fish". Much of the town's recent growth has stemmed from the development of a network of canals and prestige homes which have created two artificial islands within the town.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Paynesville declined by 2.4% over a decade to 3,376 in 2016, one of the lowest growth rates in the region
- 1,082 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 49.1% being in full-time employment and 37.2% in part-time employment
- 12.3% of the labour force classified themselves as managers, 16.8% as professionals and 11.0% as clerical and administrative workers
- 8.0% of the labour force cited their industry of employment as aged care residential and 6.6% cited primary and secondary education
- There is no hospital in the town, but there is one located to the north-west in Bairnsdale
- The town has 1 primary school
- With a median age of 61, Paynesville has one of the oldest populations in the region and well above the Victorian median of 37
- The ABS report a median annual household income of $43.9K for Paynesville, below the median of $52.0K for the 22 places analysed in the region
- Data in SLIM on businesses registered with workcover indicates approximately 74 businesses in the town or its near surrounds
- In 78.7% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 21.2% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 20.2% have completed level III or IV trade certificates
- Another 10.5% have completed year 12.

ABS Industry employment data from 2016 indicated that the East Gippsland LGA had 4.1% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Paynesville as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Premises in the east of Paynesville are yet to receive NBN services (brown striped areas in the map below) but construction has commenced.

Our analysis reveals that Paynesville will be largely serviced by NBN FTTC and FTTN with small pockets of FTTP and fixed wireless in areas surrounding the town.
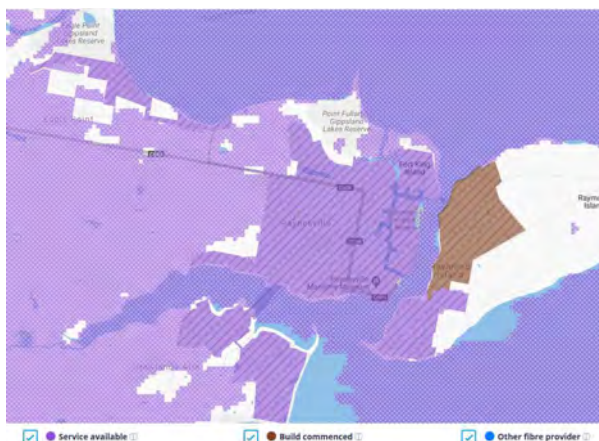
Figure 38 NBN Coverage of Paynesville (NBN Co)

Examining a satellite map shows premises that will eventually be serviced by NBN FTTP, FTTC, FTTN and fixed wireless as services are in construction or being planned.

Figure 39 Aerial imagery showing NBN Fixed Line and fixed wireless Coverage in Paynesville (NBN Co)
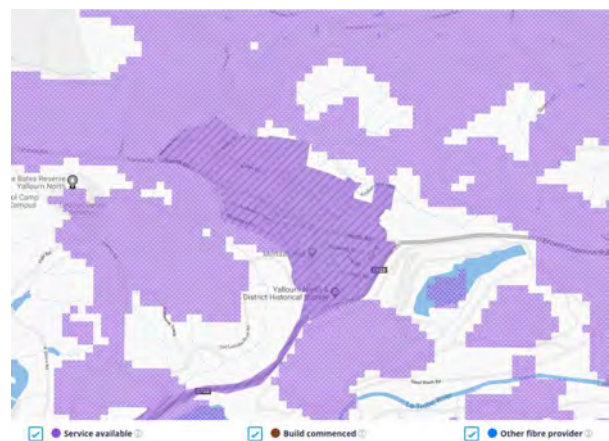
Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G outdoor coverage across the entire town.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle, NB-IOT and Sigfox coverage in available in Paynesville.

Public WiFi Coverage

24-hour free public WiFi is available at the Paynesville Service Centre and Paynesville Library.

Other

Neither VicTrack fibre or power transmission network is available in Paynesville.

3.13 Town of Orbost

Orbost is a tourist town in the Shire of East Gippsland, Victoria, 375 kilometres east of Melbourne. Orbost is the service centre for the primary industries of beef, dairy cattle and sawmilling. More recently, tourism has become an important and thriving industry, being the major town close to several national parks that are between the east access to either the surf or the snow.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Orbost declined by 4.0% over a decade to 2,014 in 2016, one of the lowest growth rates in the region
- 642 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 41.6% being in full-time employment and 39.1% in part-time employment
- 9.8% of the labour force classified themselves as managers, 10.5% as professionals and 10.7% as clerical and administrative workers
- 11.0% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals
- One public hospital is located in the town
- The town has 3 primary schools and a secondary school
- With a median age of 52, Orbost has an older population than the median of 44 for the 22 places analysed in the region
- The ABS report a median annual household income of $36.9K for Orbost, one of the lowest in the region and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 99 businesses in the town or its near surrounds
- In 62.0% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 13.0% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 16.3% have completed level III or IV trade certificates
- Another 8.9% have completed year 12.

ABS Industry employment data from 2016 indicated that the East Gippsland LGA had 4.1% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Orbost as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that premises in Orbost are serviced by NBN FTTN and fixed wireless with pockets of satellite in areas surrounding the town.

Figure 40 NBN Coverage of Orbost (NBN Co)

Examining a satellite map shows that close to half the premises in Orbost are being serviced by NBN fixed wireless.

Figure 41 Aerial imagery showing NBN Fixed Line and fixed wireless Coverage in Orbost (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor and outdoor coverage across the entire town.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

The SLIM database shows there are no known LP-WAN coverage providers in available in Orbost.

Public WiFi Coverage

There are no known free public WiFi areas in Orbost.

Other

Neither VicTrack fibre or power transmission network is available in Orbost.

3.14   Town of Yarragon

Yarragon is a small town in the Baw Baw Shire in the West Gippsland region of Victoria. The town lies on the Princes Highway and the main Gippsland Railway line approximately halfway between the major towns of Warragul and Moe. Significant expansion of facilities and businesses along Yarragon's main Princes Highway streetscape since the 1990s aimed at capitalizing on the passing tourist traffic has resulted in the town being informally dubbed 'Yarragon Village'.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Yarragon grew by 55.5% over a decade to 1,124 in 2016, one of the highest growth rates in regional Victoria
- 518 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 53.9% being in full-time employment and 33.6% in part-time employment
- 7.2% of the labour force classified themselves as managers, 13.8% as professionals and 14.0% as clerical and administrative workers
- 4.9% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals) and 2.9% cited local government administration
- The nearest public hospital is located to the west in Warragul
- The town has 1 primary school
- With a median age of 41, Yarragon has one of the younger populations in region and below the median of 44 for the 22 places analysed in the region
- The ABS report a median annual household income of $56.2K for Yarragon, above the median of $52.0K for the places analysed in the region but below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 42 businesses in the town or its near surrounds
- In 77.4% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 18.8% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 23.0% have completed level III or IV trade certificates
- Another 13.4% have completed year 12.

ABS Industry employment data from 2016 indicated that the Baw Baw LGA had 5.7% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Yarragon as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that premises in Yarragon are serviced by NBN FTTN and fixed wireless with pockets of satellite in areas surrounding the town.
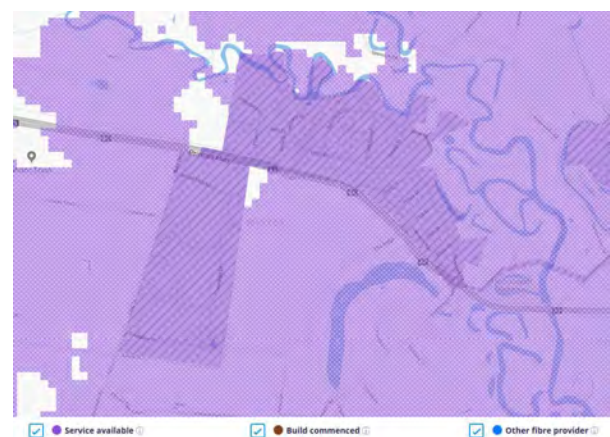

Figure 42 NBN Coverage of Yarragon (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor and outdoor coverage across the entire town, with new coverage under construction.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle and Sigfox coverage in Yarragon.

Public WiFi Coverage

There are no known free public WiFi areas available in Yarragon.

Other

VicTrack fibre transits the centre of Yarragon, following the route of the train line.

Extensive power is available in Yarragon with 500kV power available via the Hazelwood to Cranbourne Terminal approximately 2 kilometres north of the town.

Figure 43 VicTrack fibre and power transmission network transiting Yarragon

3.15 Town of Yallourn North

Yallourn North is a country town in the City of Latrobe. It is approximately eight kilometres north-east of Moe, and 146 kilometres south-east of Melbourne. Yallourn North owes its origins to the discovery of brown coal in the Morwell area of Gippsland.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Yallourn North declined by 5.2% over a decade to 1,099 in 2016, one of the largest declines in the region over this period
- 461 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 46.2% being in full-time employment and 33.2% in part-time employment
- 7.5% of the labour force classified themselves as managers, 7.7% as professionals and 7.7% as clerical and administrative workers
- 4.8% of the labour force cited their industry of employment as aged care residential and 3.9% cited hospitals (except psychiatric hospitals)
- There is no hospital in the town but there are hospitals in nearby Morwell and Traralgon
- The town has 1 primary school
- With a median age of 43, Yallourn North is just below the median of 44 for the 22 places analysed in the region
- The ABS report a median annual household income of $48.4K for Yallourn North, below the median of $52.0K for the 22 places analysed and below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 9 businesses in the town or its near surrounds
- In 73.3% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 12.4% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 25.7% have completed level III or IV trade certificates
- Another 9.7% have completed year 12.

ABS Industry employment data from 2016 indicated that the Latrobe LGA had 4.5% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Yallourn North as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that premises in Yallourn North are serviced by NBN FTTN and fixed wireless with pockets of satellite in areas surrounding the town.

Figure 44 NBN Coverage of Yallourn North (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G outdoor coverage across the entire town, with new coverage under construction.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service (albeit at the edges of coverage).

LP-WAN Coverage

Taggle coverage is available in Yallourn North. Coverage maps show partial availability of Sigfox and Optus NB-IOT in the region. Testing should be conducted to confirm exact coverage in the area.

Public WiFi Coverage

24-hour free public WiFi is available at the Yallourn North Library.

Other

VicTrack fibre is available approximately 6 kilometres south of Yallourn North.

There is power transmission network transiting Yallourn North.

Figure 45 VicTrack fibre and power transmission network around Yallourn North

3.16 Town of Mallacoota

Mallacoota is a small town in the East Gippsland region of Victoria. At holiday times, particularly Easter and Christmas, the population increases around eight-fold. It is one of the most isolated towns in the state of Victoria, 25 kilometres off the Princes Highway and 523 kilometres from Melbourne. It is the last official township on Victoria's east coast before the border with New South Wales.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Mallacoota grew by 3.4% over a decade to 1,005 in 2016, below the median growth rate of 15.4% among the 22 places analysed in the region
- 371 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 35.0% being in full-time employment and 46.4% in part-time employment
- 15.4% of the labour force classified themselves as managers, 13.0% as professionals and 8.6% as clerical and administrative workers
- 12.9% of the labour force cited their industry of employment as accommodation and 9.3% cited primary and secondary education
- There is no hospital in the town, with the nearest one located to the west in Orbost
- The town has 1 primary/secondary school
- With a median age of 58, Mallacoota has one of the oldest populations in the region
- The ABS report a median annual household income of $39.6K for Mallacoota, one of the lowest in the region and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 48 businesses in the town or its near surrounds
- In 74.3% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 27.3% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 17.5% have completed level III or IV trade certificates
- Another 12.6% have completed year 12.

ABS Industry employment data from 2016 indicated that the East Gippsland LGA had 4.1% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Mallacoota as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Premises in Mallacoota are yet to receive NBN services. Our analysis reveals that premises in Mallacoota will receive NBN FTTN services.
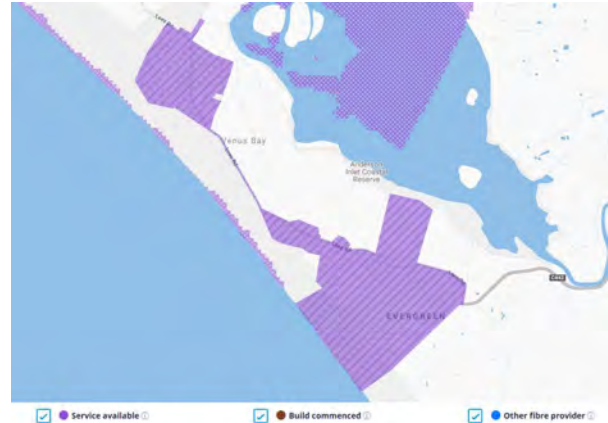

Figure 46 NBN Coverage of Mallacoota (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 3G outdoor coverage across portions of the town.

In summary, residents have options for good coverage in the town and surrounding area from two of the three mobile network operators, with partial (marginal) coverage from the third operator.

LP-WAN Coverage

There is limited Taggle coverage in Mallacoota. Testing should be conducted to determine exact coverage available.

Public WiFi Coverage

There are no known free public WiFi areas in Mallacoota.

Other

Neither VicTrack fibre or power transmission network is available in Mallacoota.

3.17 Locality of Wurruk

Wurruk is a town near Sale in Victoria. It is only minutes from the western shores of Lake Wellington which, along with Lakes Victoria and Reeve, the Sale wetlands and Ninety Mile Beach make up the core of the Gippsland Lakes Coastal Park.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Wurruk was 972 in 2016, but did not have a comparable population figure from ABS in 2006 to allow a growth rate to be given
- 450 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 54.9% being in full-time employment and 33.6% in part-time employment
- 9.5% of the labour force classified themselves as managers, 16.5% as professionals and 10.9% as clerical and administrative workers
- 7.8% of the labour force cited their industry of employment as hospitals (except psychiatric hospitals)
- There is no hospital in Wurruk but there is a public hospital located in Sale adjacent
- The town has 1 primary school
- With a median age of 39, Wurruk has one of the youngest populations in the region and just above the Victorian median of 37
- The ABS report a median annual household income of $69.7K for Wurruk, one of the highest in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 28 businesses in the town or its near surrounds
- In 84.7% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 20.5% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 20.9% have completed level III or IV trade certificates
- Another 13.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Wellington LGA had 3.8% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Wurruk as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that premises in Wurruk are serviced by NBN FTTN and fixed wireless with pockets of satellite in areas surrounding the town.
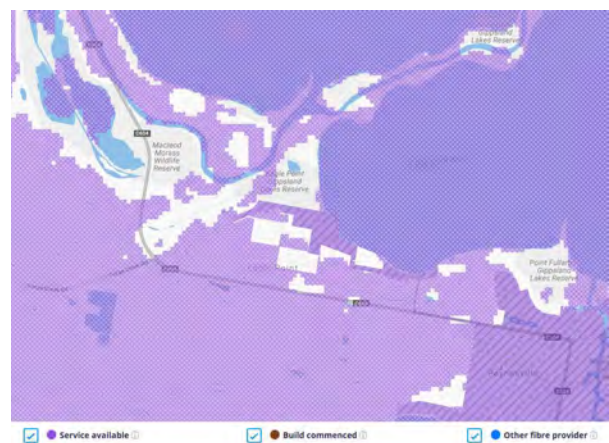

Figure 47 NBN Coverage of Wurruk (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor and outdoor coverage across the entire town.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

Taggle and Optus NB-IOT coverage is available in Wurruk.

Public WiFi Coverage

There are no known free public WiFi areas available in Wurruk.

Other

Neither VicTrack fibre or power transmission network is available near Wurruk.

3.18 Locality of Grantville (including Pioneer Bay)

Grantville is a small town located 103 kilometres south-east of Melbourne, on the eastern shore of Westernport. Grantville was once a supply port for the settlers in the adjacent hill country and a timber town with four sawmills. The town was named after Lieutenant James Grant who surveyed the area in 1801.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Grantville grew by 15.9% over a decade to 955 in 2016, just above the median growth of 15.4% for the 22 places analysed in the region

- 343 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 53.4% being in full-time employment and 34.4% in part-time employment
- 13.4% of the labour force classified themselves as managers, 8.5% as professionals and 13.1% as clerical and administrative workers
- 3.9% of the labour force cited their industry of employment as local government administration, 3.9% cited primary education and 3.9% cited aged care residential
- The nearest public hospital is located in Wonthaggi to the south or Korumburra to the east
- The town has no schools but there is a primary school located nearby to the south-east in Corinella
- With a median age of 52, Grantville has an older population than the median of 44 for the 22 places analysed in the region and Victoria's median of 37
- The ABS report a median annual household income of $39.1K for Grantville, one of the lowest in the region and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 38 businesses in the town or its near surrounds
- In 71.9% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 13.5% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 21.0% have completed level III or IV trade certificates
- Another 10.3% have completed year 12.

ABS Industry employment data from 2016 indicated that the Bass Coast LGA had 5.2% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Grantville as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that premises in Grantville are serviced by NBN FTTN and fixed wireless with pockets of satellite in areas surrounding the town. Most premises in Grantville are serviced by NBN FTTN.

Figure 48 NBN Coverage of Grantville (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor coverage across the entire town, with new coverage under construction.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

Taggle and Sigfox IOT coverage is available in Grantville.

Public WiFi Coverage

There are no known free public WiFi areas in Grantville.

Other

Neither VicTrack fibre or power transmission network is available in Paynesville.

3.19   Locality of Venus Bay

Venus Bay is a small town situated on a narrow peninsula of land located 180 kilometres south-east of Melbourne. Venus Bay has become a popular holiday retreat for people from Melbourne and is close to other popular South Gippsland tourist spots such as Phillip Island and Wilsons Promontory.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Venus Bay grew by 85.5% over a decade to 944 in 2016, one of the highest growth rates in regional Victoria
- 251 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 42.6% being in full-time employment and 39.8% in part-time employment
- 11.2% of the labour force classified themselves as managers, 18.1% as professionals and 10.7% as clerical and administrative workers
- 5.3% of the labour force cited their industry of employment as accommodation and 5.4% cited hospitals (except psychiatric hospitals)
- The nearest public hospitals are located in Wonthaggi to the north-west or Leongatha to the north-east
- There are no schools in the town, but there is a primary school nearby in Tarwin Lower
- With a median age of 58, Venus Bay has one of the oldest populations in the region

- The ABS report a median annual household income of $35.3K for Venus Bay, one of the lowest in the region
- Data in SLIM on businesses registered with workcover indicates approximately 11 businesses in the town or its near surrounds
- In 77.9% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 18.4% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 14.4% have completed level III or IV trade certificates
- Another 8.1% have completed year 12.

ABS Industry employment data from 2016 indicated that the South Gippsland LGA had 4.7% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Venus Bay as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that premises in Venus Bay are serviced by NBN FTTN with satellite in areas surrounding the town.

Figure 49 NBN Coverage of Venus Bay (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G outdoor coverage across the entire town.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

Taggle, Sigfox and Optus NB-IOT coverage is not available in Venus Bay.

Public WiFi Coverage

There are no known free public WiFi areas in Venus Bay.

Other

Neither VicTrack fibre or power transmission network is available in Paynesville.

3.20 Locality of Eagle Point

Eagle Point is a small town within the Shire of East Gippsland on the Gippsland lakes, mostly on Lake King. It is known for its bushland and tourism.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Eagle Point grew by 106.6% over a decade to 843 in 2016, one of the highest growth rates in regional Victoria
- 335 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 49.3% being in full-time employment and 36.1% in part-time employment
- 12.6% of the labour force classified themselves as managers, 17.0% as professionals and 12.3% as clerical and administrative workers
- 6.6% of the labour force cited their industry of employment as aged care residential and 11.6% cited primary and secondary education
- The nearest public hospital is located in nearby Bairnsdale
- The town has 1 primary school
- With a median age of 56, Eagle Point is older than the median of 44 for the 22 places analysed in the region
- The ABS report a median annual household income of $55.4K for Eagle Point, above the median of $52.0K for the places analysed in the region but below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 15 businesses in the town or its near surrounds
- In 80.1% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 21.5% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 21.0% have completed level III or IV trade certificates
- Another 11.6% have completed year 12.

ABS Industry employment data from 2016 indicated that the East Gippsland LGA had 4.1% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Eagle Point as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

Our analysis reveals that most premises in Eagle Point are serviced by NBN FTTN with areas of fixed wireless services and some pockets of satellite services surrounding the Fixed Line footprint.

Figure 50 NBN Coverage of Eagle Point (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G outdoor coverage across the entire town.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There are extensive LP-WAN options in Eagle Point with Taggle, Sigfox and Optus NB-IOT coverage all available in the area.

Public WiFi Coverage

There are no known free public WiFi areas in Eagle Point.

Other

VicTrack fibre is not available in Eagle Point.

3.21 Locality of Neerim South

Neerim South is a town in West Gippsland, located in the Shire of Baw Baw, 109 kilometres east of Melbourne and 19 kilometres north of Warragul. The town's main industry is service to the local farming community.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Neerim South grew by 37.7% over a decade to 837 in 2016
- 354 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 55.1% being in full-time employment and 34.5% in part-time employment
- 11.5% of the labour force classified themselves as managers, 19.6% as professionals and 11.2% as clerical and administrative workers
- 10.1% of the labour force cited their industry of employment as primary or secondary education and 4.3% cited hospitals (except psychiatric hospitals)
- The nearest public hospital is located to the south in Warragul
- The town has 1 primary school and a secondary college
- With a median age of 46, Neerim South is above the median of 44 for the 22 places analysed in the region
- The ABS report a median annual household income of $63.5K for Neerim South, above the median of $52.0K for the places analysed in the region but still below Melbourne's $80.4K

- Data in SLIM on businesses registered with workcover indicates approximately 32 businesses in the town or its near surrounds
- In 83.2% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 25.0% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 18.8% have completed level III or IV trade certificates
- Another 8.8% have completed year 12.

ABS Industry employment data from 2016 indicated that the Baw Baw LGA had 5.7% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Neerim South as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

The Neerim South township and surrounding areas is serviced by NBN fixed wireless and satellite.
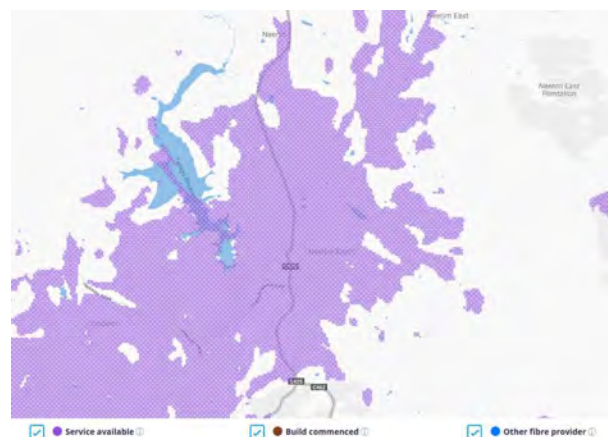
Figure 51 NBN Coverage of Neerim South (NBN Co)

Examining a satellite map of the same area shows that most of the premises in Neerim South fall within the NBN fixed wireless area.

Figure 52 Aerial imagery showing NBN fixed wireless and satellite Coverage in Neerim South (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town, with new coverage under construction
- Vodafone shows 4G indoor coverage across the entire town, with new coverage under construction.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle IOT coverage in Neerim South.

Public WiFi Coverage

There are no known free public WiFi areas in Neerim South.

Other

VicTrack fibre is not available in Neerim South.

3.22   Locality of Glengarry

Glengarry is a town in the Gippsland region of Victoria, located in the City of Latrobe, 165 kilometres south-east of Melbourne. Gengarry was established after the railway arrived from Traralgon in 1883.

General characteristics of the town that provide an indication of the town's likely telecommunications demand profile include:

- The population of Glengarry declined by 4.6% over a decade to 646 in 2016
- 352 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 56.5% being in full-time employment and 31.8% in part-time employment
- 9.3% of the labour force classified themselves as managers, 14.6% as professionals and 13.4% as clerical and administrative workers
- 6.3% of the labour force cited their industry of employment as local government administration, 6.3% cited hospitals (except psychiatric hospitals) and 4.9% cited local government administration
- The nearest public hospital is located in Traralgon to the south-east
- The town has 1 primary school
- With a median age of 37, Glengarry has one of the youngest populations in regional Victoria
- The ABS report a median annual household income of $80.2K for Glengarry, one of the highest in the region and just below Melbourne's $80.4K
- Data in SLIM on businesses registered with workcover indicates approximately 16 businesses in the town or its near surrounds
- In 87.4% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 18.7% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 27.6% have completed level III or IV trade certificates
- Another 12.6% have completed year 12.

ABS Industry employment data from 2016 indicated that the Latrobe LGA had 4.5% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Glengarry as advised by NBN Co in September 2018. The purple / striped areas show the locations currently serviced by NBN Fixed Line services, the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite. The brown / striped areas show the locations where NBN Fixed Line services are planned or under construction.

The Glengarry township and surrounding areas is serviced by NBN fixed wireless and satellite.

Figure 53 NBN Coverage of Glengarry (NBN Co)

Examining a satellite map of the same area shows that most of the premises in Glengarry fall within the NBN fixed wireless area.

Figure 54 Aerial imagery showing NBN fixed wireless and satellite Coverage in Glengarry (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor coverage across the entire town, with new coverage under construction.

In summary, there appear to be no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There are extensive LP-WAN options in Glengarry with Taggle, Sigfox and Optus NB-IOT coverage all available in the area.

Public WiFi Coverage

24-hour free public WiFi is available in Main St and the Glengarry Library.

Other

Neither VicTrack fibre or power transmission network is available near Glengarry.

4.   Primary Production

4.1   Land Use Classification

The Victorian Land Use Information System sub-classifies primary production land use in the following categories shown in the map legend.

As is evident from the land use map following, the overwhelming categorisation of primary production land across the Gippsland region is classified as Grazing – both Dairy and Grazing (sheep and beef). The regional partnership boundary is shown in red.

The character of digital needs and opportunities will inevitably vary for different types of agriculture. By way of just a few examples:

- In livestock production areas, detailed animal tracking, identification, biometrics and feed management can optimise yields
- In cropping areas, technology for real-time machinery monitoring and guidance is becoming more common, and satellite imagery can provide valuable insights into crop development and health

- In irrigation areas, soil moisture monitoring and water management are becoming increasingly important to minimise costs and maximise production
- In all areas, general access to information *where* and *when* it is needed can support informed decision-making
- With agriculture posing many occupational health and safety risks, access to communications in emergency situations can make the difference between life and death.

In the light of this, all forms of agriculture will need to exploit information technology and communications more actively in the future if they are to remain globally competitive.

Accordingly, it is relevant to consider the supply of fixed broadband (*important at homesteads and business locations in rural land*), mobile coverage (*for both voice and data communications*) and LP-WAN coverage (*for emerging IoT applications*).
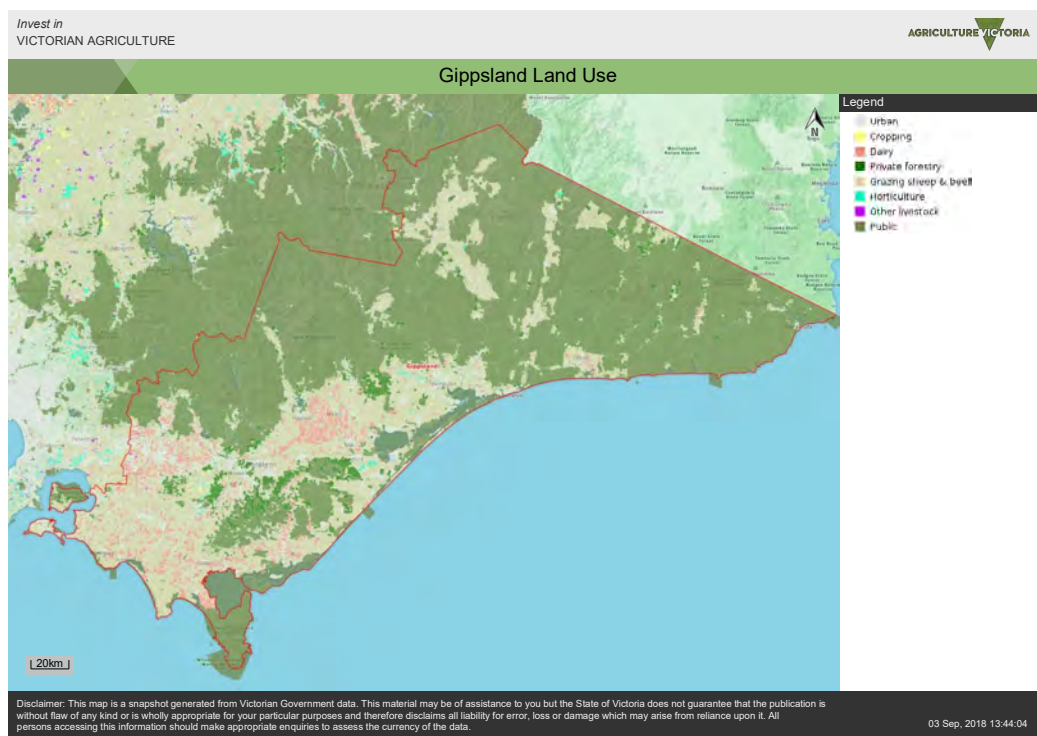
Figure 55 Primary production land in the region (https://invest.agriculture.vic.gov.au)

4.2   *Fixed Broadband Supply*

NBN Services

The map below shows NBN coverage of the Gippsland region.
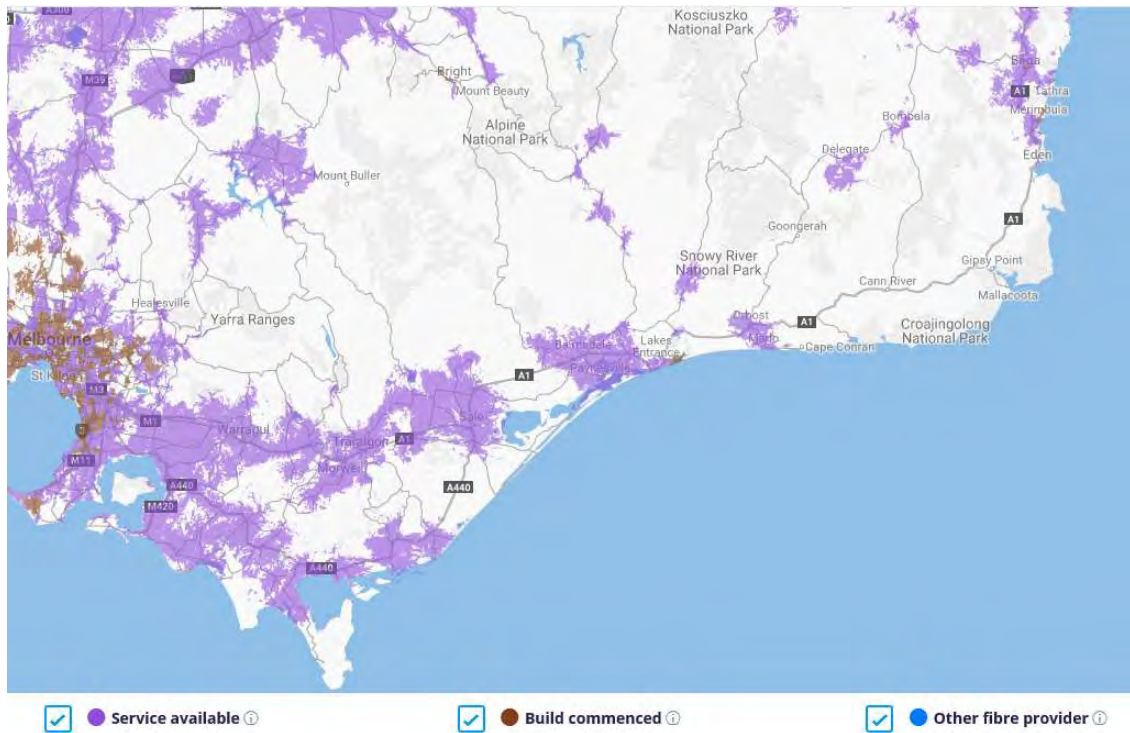
Figure 56 NBN Co Coverage of the Gippsland Region (NBN Co)

The most significant feature is the split between fixed wireless coverage (in purple) and the areas with satellite coverage (no colour). Technologies such as FTTP, FTTC and FTTN are barely visible at the scale of this map – but since these technologies are limited to population centres, they are only marginally relevant to an analysis of primary production land).

Overall, by simple visual estimation, it appears that around 30% of rural land in Gippsland has access to NBN Co's satellite solution, and most of the remainder has access to (or is due to receive) the higher-performing fixed wireless solution.

By Local Government Area, the indicative percentage of the area of rural land with satellite coverage shown in the table following.

LGA	Population in Rural Land[13]	Estimated Area of satellite Coverage
Bass Coast	6,217	40%
Baw Baw	15,698	30%
East Gippsland	14,812	10%
Latrobe	11,843	80%
Sth Gippsland	14,193	40%
Wellington	16,541	20%

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[13]   The number of individuals living in rural areas is estimated by subtracting the number in cities, towns and localities with a population greater than 185 from the total population in the LGA.

Note that the rural population is not necessarily evenly distributed across the rural land, and therefore the number of homes and businesses in NBN Co's satellite footprint does not necessarily correlate with the proportion of satellite coverage by land area.

Grazing

- *Beef meat / dairy*
- *The area around Warragul*

The map below shows most farms in the area are serviced by NBN fixed wireless.

Further analysis reveals farms in the south of Warragul are serviced by NBN satellite with farms in the north due to receive NBN FTTP Fixed Line (highlighted in brown).
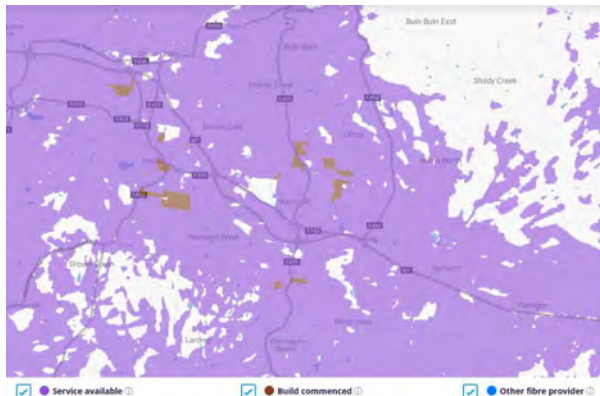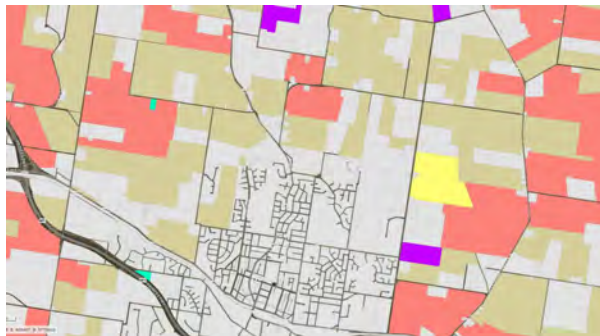
Figure 57 NBN Coverage of the farming area around Warragul (NBN Co)

Grazing

- *Beef meat / dairy*
- *The area around Foster*

The map below shows that the majority of farms are serviced by NBN fixed wireless with the remaining farms located to the west of Foster, serviced by NBN satellite.
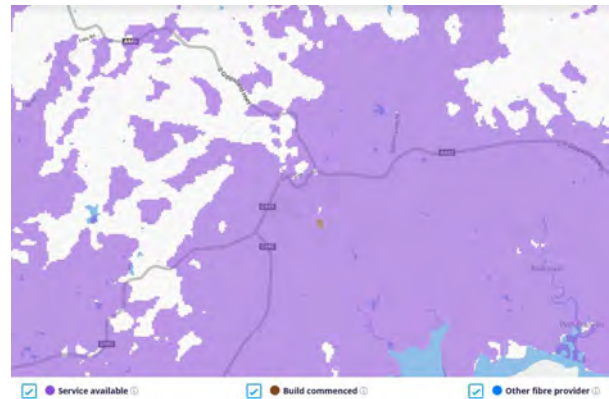
Figure 58 NBN Coverage of the farming area around Foster (NBN Co)

Grazing

- *Beef meat / dairy*
- *The area around Maffra*

The map below shows NBN fixed wireless coverage in the area with small patches in the south-east providing NBN satellite coverage to farms.
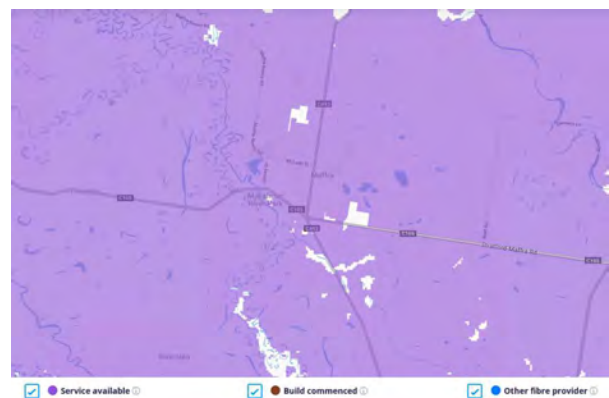
Figure 59 NBN Coverage of the farming area around Maffra (NBN Co)

Grazing

- *Beef meat / dairy*
- *The area around Orbost*

The map below shows most of the farms are serviced by NBN fixed wireless, however the outskirts of the area are serviced by NBN satellite.
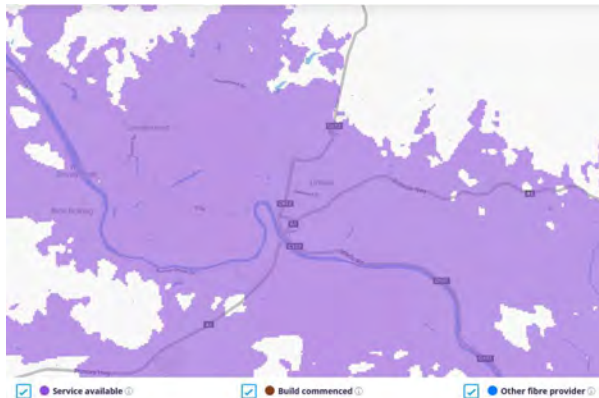
Figure 60 NBN Coverage of the farming area around Orbost (NBN Co)

Grazing

- *Beef meat / dairy*
- *The area around Omeo*

The map below shows NBN fixed wireless coverage to the farms in the immediate surrounding area of the town.

Farms located in the extended area outside the NBN fixed wireless footprint, are serviced by NBN satellite.
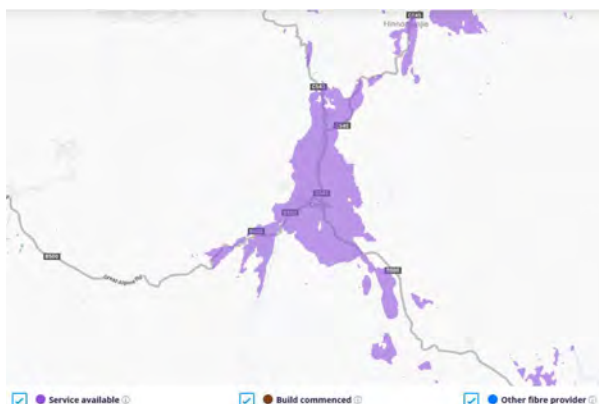
Figure 61 NBN Coverage of the farming area around Omeo (NBN Co)

Other Fixed Connectivity Options

For those living in rural areas where satellite is the only technology supported by NBN Co, there are several noteworthy technology alternatives:

- Wireless technologies (microwave and enhanced WiFi configured for long-reach) can be used to extend capacity from an area with better service
- The mobile network operators are starting to introduce plans with high data allowances that may substitute or augment a satellite service
- Other providers (notably Telstra) may be able to provide a service.

More Detailed Supply-Demand Analysis

More detailed information on local areas – down to the level of individual businesses can be obtained using SLIM – as illustrated in the map following showing the area around Ararat.

In this map:

- Green areas show individual agricultural land parcels
- Purple areas show NBN fixed wireless coverage
- The "popup" at the bottom left shows details of an individual sheep farming business at the location marked with the blue marker
- The coloured circles indicate the number of businesses in an area
- The hand-shape pointer touching on the circle with the number "26" is lighting up (with blue boundary and shading) the area within which those 26 businesses are located.
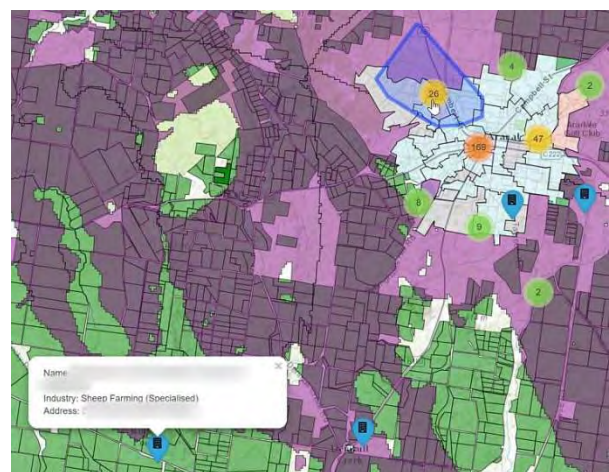
Figure 62 SLIM outputs at a more detailed level (SLIM)

4.3   Mobile Coverage

Coverage maps published by each of the three major mobile network operators are provided in Section **2.2**.

Simple visual examination of these maps of Telstra and Optus suggest extensive coverage across the Gippsland region, with most coverage gaps confined to areas of hilly terrain and national or state parks.

In contrast, Vodafone's coverage is more limited, concentrating on significant population centres and major national roads.

Looking to the future, the ability of the mobile networks to support agricultural IoT applications will be enhanced by the activation of the NB-IoT and Cat-M1 protocols, and by the advent of 5G. The mobile network operators' plans for regional areas are not known.

Grazing

- *Beef meat / dairy*
- *The area around Warragul*

Due to the size of the area under consideration, public coverage maps do not provide sufficient resolution to conduct detailed analysis, so comments are general in nature. Based on public coverage maps:

- Telstra shows 4GX and 3G outdoor handheld device coverage across most of the region. It is clear that the hilly terrain has impact on Telstra's coverage quality
- Optus shows 4G Plus and 3G outdoor coverage across the entire region
- Vodafone shows 4G indoor and outdoor coverage across the entire region, with significant areas of new coverage under construction.

In summary, there appears to be little or no mobile coverage issues in the area, with the three major mobile network operators all offering service.
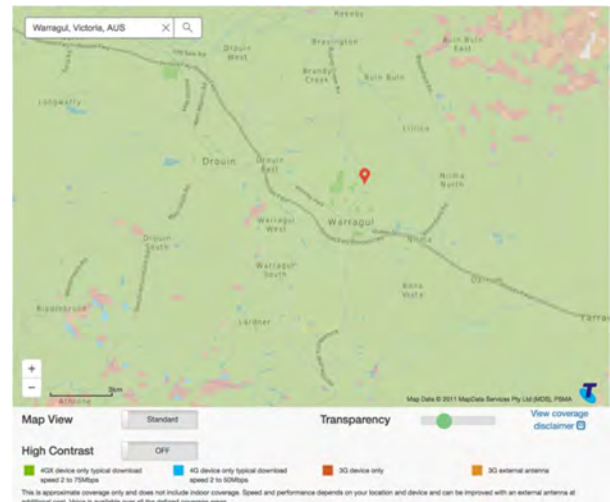
Figure 63 Telstra mobile coverage in grazing land around Warragul
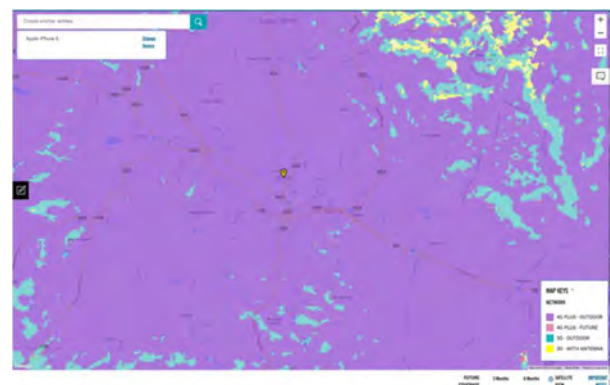
Figure 64 Optus mobile coverage in grazing land around Warragul
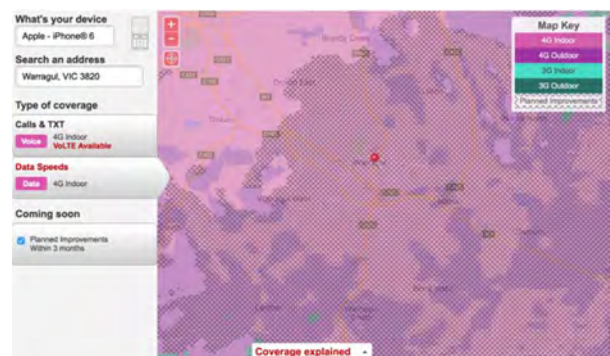
Figure 65 Vodafone mobile coverage in grazing land around Warragul

Grazing

- *Beef meat / dairy*
- *The area around Foster*

Due to the size of the area under consideration, public coverage maps do not provide sufficient resolution to conduct detailed analysis, so comments are general in nature. Based on public coverage maps:

- Telstra shows 4GX and 3G outdoor handheld device coverage across the majority of the region.
- Optus shows 4G Plus and 3G outdoor coverage across the majority of the region.
- Vodafone shows poor to no coverage across the region.

In summary, there are options for good coverage in the area from two of the three mobile network operators, with poor to no coverage from the third operator.
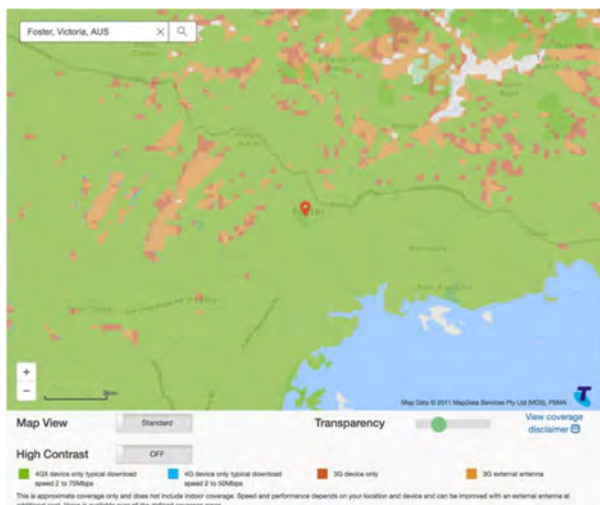
Figure 66 Telstra mobile coverage in grazing land around Foster

Figure 67 Optus mobile coverage in grazing land around Foster

Figure 68 Vodafone mobile coverage in grazing land around Foster

Grazing

- *Beef meat / dairy*
- *The area around Maffra*

Due to the size of the area under consideration, public coverage maps do not provide sufficient resolution to conduct detailed analysis, so comments are general in nature. Based on public coverage maps:

- Telstra shows 4GX and 3G outdoor handheld device coverage across the area
- Optus shows 4G Plus and 3G outdoor coverage across the area
- Vodafone shows 4G and 3G outdoor coverage across the area.

In summary, there are options for good coverage in the area from the three mobile network operators.
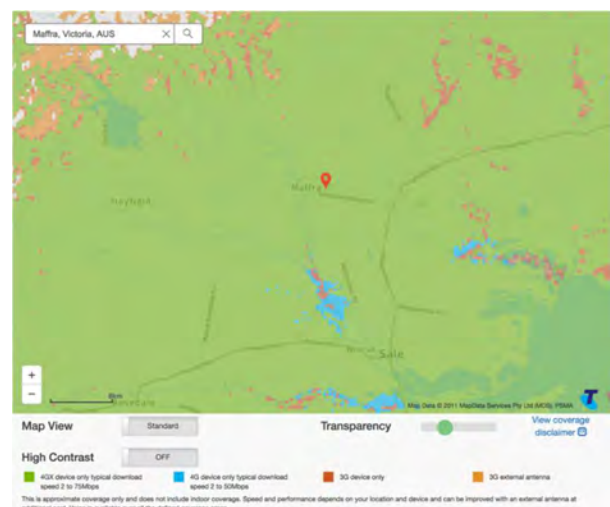
Figure 69 Telstra mobile coverage in grazing land around Maffra
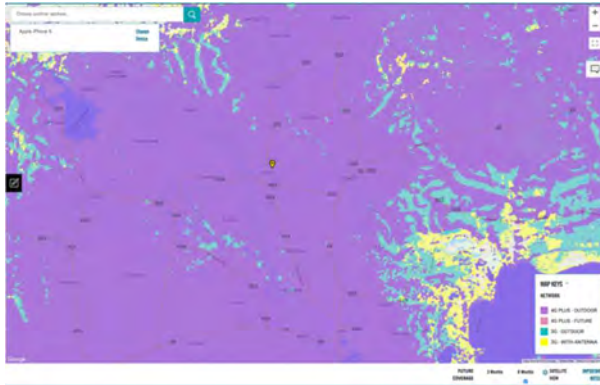
Figure 70 Optus mobile coverage in grazing land around Maffra
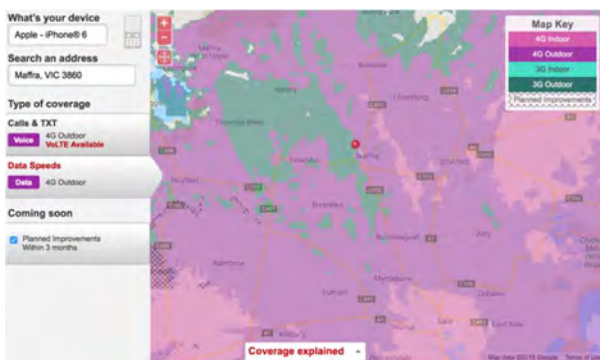
Figure 71 Vodafone mobile coverage in grazing land around Maffra

Grazing

- *Beef meat / dairy*
- *The area around Orbost*

Due to the size of the area under consideration, public coverage maps do not provide sufficient resolution to conduct detailed analysis, so comments are general in nature. Based on public coverage maps:

- Telstra shows 4GX and 3G outdoor handheld device coverage across the area
- Optus shows 4G Plus and 3G outdoor coverage across the area
- Vodafone shows 4G and 3G outdoor coverage across the area.

In summary, there are options for good coverage in the area from all three mobile network operators.
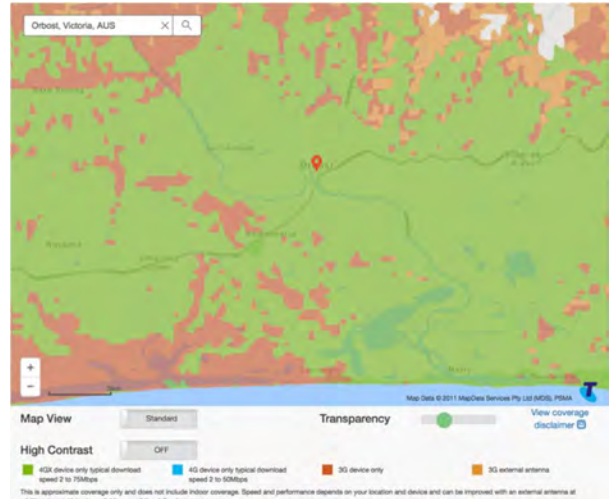
Figure 72 Telstra mobile coverage in grazing land around Orbost
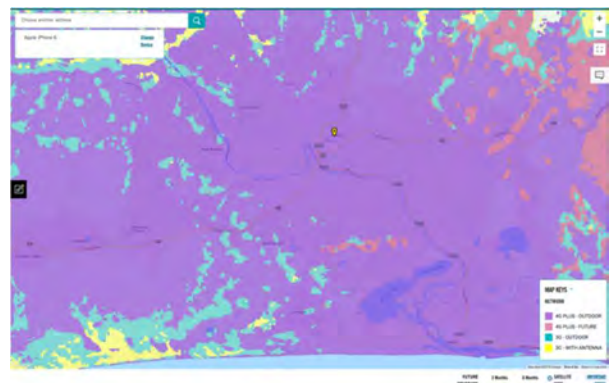
Figure 73 Optus mobile coverage in grazing land around Orbost
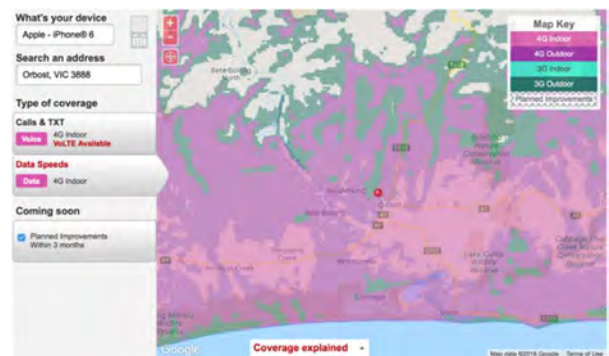
Figure 74 Vodafone mobile coverage in grazing land around Orbost

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Grazing

- *Beef meat / dairy*
- *The area around Omeo*

Due to the size of the area under consideration, public coverage maps do not provide sufficient resolution to conduct detailed analysis, so comments are general in nature. Based on public coverage maps:

- Telstra shows 4GX and 3G outdoor handheld device coverage across the area
- Optus shows 4G Plus and 3G outdoor coverage across the area
- Vodafone shows no coverage across the area.

In summary, there are options for good coverage in the area and surrounding area from two of the three mobile network operators, with no coverage from the third operator.
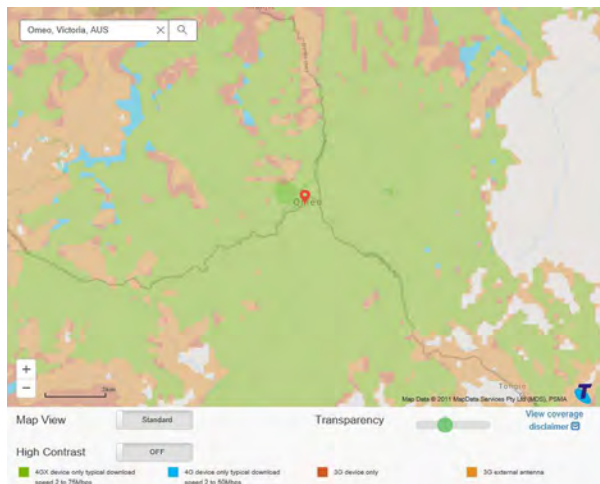
Figure 75 Telstra mobile coverage in grazing land around Omeo
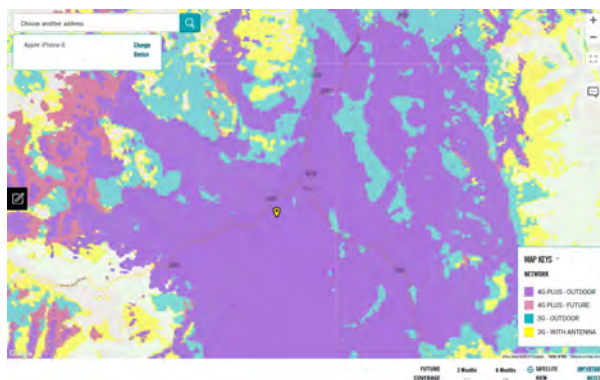
Figure 76 Optus mobile coverage in grazing land around Omeo
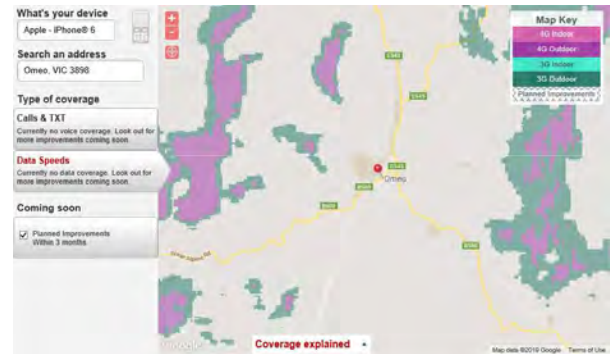
Figure 77 Vodafone mobile coverage in grazing land around Omeo

4.4   LP-WAN Coverage

Coverage maps for LP-WAN technologies Sigfox, Optus NB-IOT and Taggle are provided in Section **2.3**. Coverage of the LoRa LP-WAN technology is unknown.

Based on these maps:

- Sigfox coverage is available around Warragul, Traralgon and Bairnsdale
- Extensive Taggle coverage appears to be available in the region except towards the north-eastern region from Lakes Entrance and below Foster towards Wilsons Promontory
- Optus NB-IOT coverage is available in the areas between Lakes Entrance, Traralgon and Maffra.

In areas towards the fringes of coverage footprints, testing is necessary to confirm the viability of communications connectivity. If it is marginal, better antennas and antenna positioning may help, or the installation of additional base stations may be necessary to get reliable communications.

Agricultural IoT trials currently being undertaken may yield further insight into needs, opportunities and barriers in the adoption of IoT technologies.
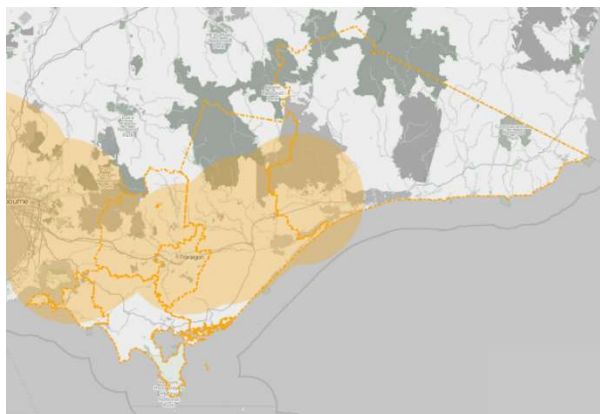
Figure 78 Taggle coverage in Gippsland
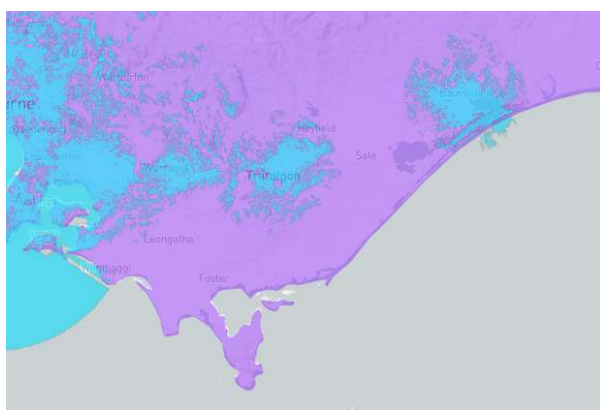
Figure 79 Sigfox coverage in Gippsland
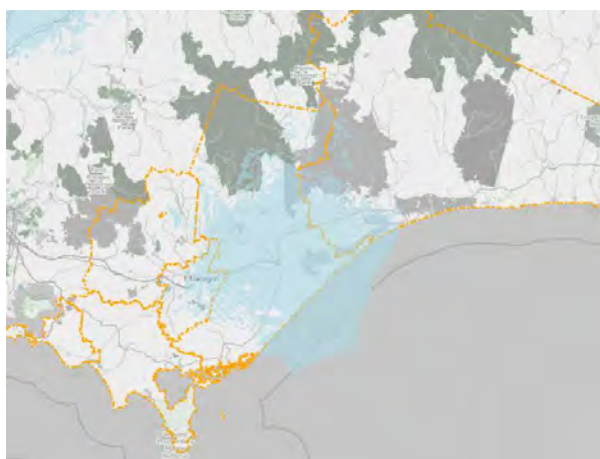
Figure 80 Optus NB-IOT coverage in Gippsland

Grazing

- *Beef meat / dairy*
- *The area around Warragul*

Extensive Taggle coverage is available in and around the area.

Sigfox maps show good to excellent coverage in and around Warragul.

Maps of the Optus NB-IOT trials show no coverage in the area.

Grazing

- *Beef meat / dairy*
- *The area around Foster*

The SLIM database and public maps for Sigfox, Taggle IOT and the Optus NB-IOT trials show no coverage in the area.

Grazing

- *Beef meat / dairy*
- *The area around Maffra*

Extensive Taggle and Optus NB-IOT coverage is available in and around the area.

The Sigfox maps show show no coverage in the area.

Grazing

- *Beef meat / dairy*
- *The area around Orbost*

The SLIM database and public maps for Sigfox, Taggle IOT and the Optus NB-IOT trials show no coverage in the area.

Grazing

- *Beef meat / dairy*
- *The area around Omeo*

The SLIM database and public maps for Sigfox, Taggle IOT and the Optus NB-IOT trials show no coverage in the area.

4.5 Skills

No specific information regarding the skill level of those operating businesses or living in agricultural areas is currently available.

An *indirect* indicator of skillsets useful in taking advantage of digital technologies *may* be found in general education levels.

Across the Gippsland region, ABS Quickstats data indicates the proportions of the population with an educational attainment of Year 12 or higher (Level III or IV certificate, Diploma or Advanced Diploma, Bachelors degree or above) as shown in the table following.

LGA	Population	% Year 12+
Bass Coast	32,804	52.9%
Baw Baw	48,479	55.6%
East Gippsland	45,040	50.3%
Latrobe City	73,257	51.9%
South Gippsland	28,703	52.1%
Wellington	42,983	50.2%
Region	271,266	52.1%

5. Tourist Locations

For tourist locations, the communication demands tend to comprise:

- The needs of the host, predominantly comprising fixed broadband connectivity
- The needs of tourists visiting the region, predominantly comprising mobile connectivity and potentially WiFi connectivity in the surrounding towns or at accommodation venues.

The communications options for population centres across the region are discussed in Section **3**, and an overview of mobile coverage outside these centres is provided in Section **2.2**.

For major events, mobile coverage is a primary concern, not just for the event venue itself, but also for the surrounding area. Visitors increasingly rely on network access for purposes such as navigation.

Note the Gippsland region features numerous additional tourist attractions and events beyond those covered in this Section.

5.1 Wilsons Promontory

Wilsons Promontory is Victoria's largest coastal wilderness area. The southernmost point of mainland Australia possesses large granite mountains, forests, rainforests, flora and fauna and beaches including the iconic Squeaky Beach named for its white 'squeaky' sounding sand.

The coastlines and forests can be explored on the numerous long and short bushwalks and beach walks including the 'Great Prom Walk' covering a distance of 35.5 to 52.8 kilometres. The marine national park surrounding the land provides great diving spots to explore marine life.

Wilderness retreats and campgrounds are available to book with Tidal River the main location for camping and accommodation. Within the vicinity is the Tidal River Visitor Centre and the Tidal River General Store which supplies several supermarket items, gifts and souvenirs and take away food.

Another feature of the Wilsons Promontory is the lighthouse, completed in 1859. It is situated in a remote coastal location south of the Prom, that can only be accessed by foot through the Telegraph Track or the Oberan Bay Walking Track. Cottages surrounding the lighthouse are available to book for a maximum of two nights.

Figure 81 The lighthouse and cottages at Wilsons Promontory[14]

Figure 82 Aerial imagery of the Wilsons Promontory

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[14] https://parkweb.vic.gov.au/explore/parks/wilsons-promontory-national-park/things-to-do/wilsons-promontory-lightstation

Fixed Broadband

Our analysis reveals that the Tidal River Visitor Centre falls into NBN Co's satellite footprint.

Figure 83 NBN Coverage of the Wilsons Promontory (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the Tidal River area. The entry road (Wilsons Promontory Road) has 4GX and 3G device coverage however, blackspots are evident. The lighthouse has no handheld coverage with the Telegraph Track and Oberon Bay Walking Track having partial 4GX, 4G device, 3G device coverage however, black spots are evident particularly closer to the lighthouse.
- Optus shows 4G Plus outdoor coverage is scheduled for Tidal River location. Currently, 3G outdoor coverage is provided in the area. The entry road (Wilsons Promontory Road) has 4G Plus outdoor, 3G outdoor with 4G Plus scheduled for minor sections of the road however, blackspots are evident. The lighthouse has no handheld coverage with 4G Plus outdoor and 3G outdoor coverage on the Telegraph Track and Oberon Bay Walking Track however, blackspots are evident closer to the lighthouse.
- Vodafone shows no coverage of the Tidal River area, Wilsons Promontory Road or the lighthouse including the walking tracks leading to the lighthouse.

In summary, there appears to be coverage of the key locations, road and walking tracks in the Wilsons Promontory from two of the three mobile network operators however, the coverage signal and speeds may be affected by the increase in tourist numbers.
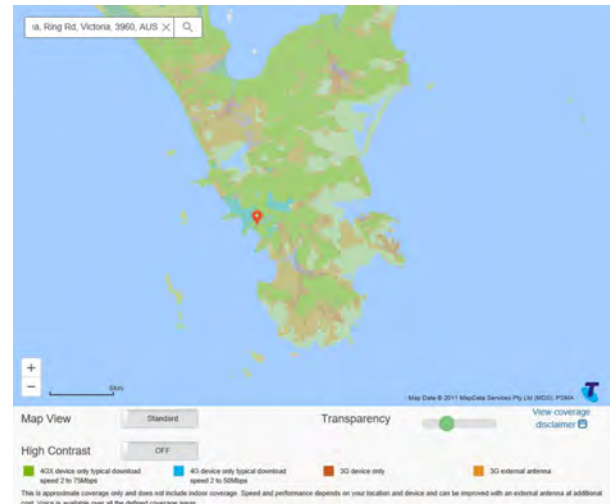
Figure 84 Telstra mobile coverage of Wilsons Promontory

Figure 85 Optus mobile coverage of Wilsons Promontory
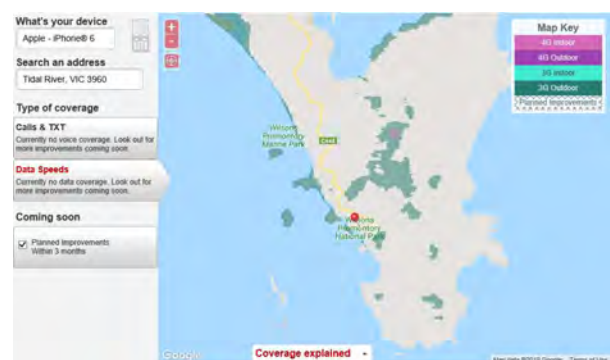
Figure 86 Vodafone mobile coverage of Wilsons Promontory

5.2 Ninety Mile Beach & Loch Sport

The Ninety Mile beach is a beautiful natural unspoilt beach facing the Bass Strait. The pristine beach stretches along the south-eastern coastline of the East Gippsland region. Located nearby is the coastal town of Loch Sport.

Water-based activities such as swimming, fishing, surfing, whale and dolphin watching attract many visitors every year to the shores of Ninety Mile Beach and Loch Sport. The appealing location and easy going lifestyle of Loch Sport has initiated a substantial increase in the permanent location. The population numbers increase into the thousands during the holiday periods.

Figure 87 Ninety-Mile Beach[15]
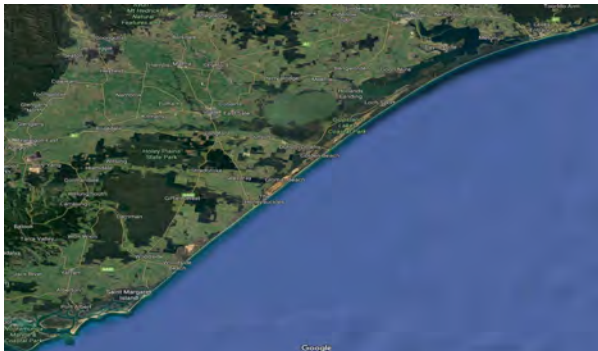
Figure 88 Aerial imagery of Ninety-Mile Beach

Figure 89 Aerial imagery of Loch Sport town

Fixed Broadband

Our analysis reveals the town of Loch Sport is serviced by NBN FTTN within the Fixed Line footprint. The immediate surrounding area is serviced by NBN satellite.
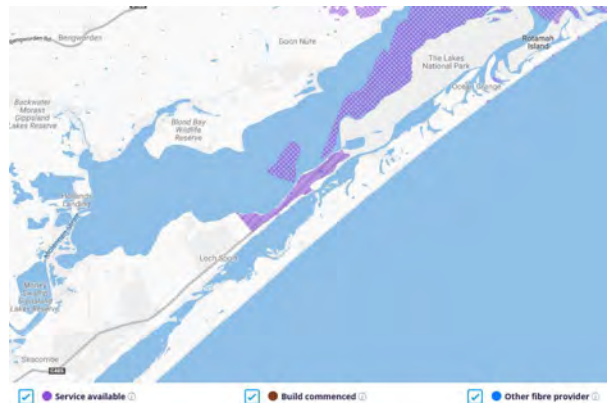
Figure 90 NBN Coverage of Loch Sport (NBN Co)

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[15] https://www.visitmelbourne.com/regions/Gippsland/Things-to-do/Nature-and-wildlife/National-parks-and-reserves/Ninety-Mile-Beach-Marine-National-Park.aspx

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of Loch Sport. The length of the beach has predominately 4GX outdoor handheld device coverage with patchy 3G device coverage.
- Optus shows 4G Plus outdoor coverage of Loch Sport. The length of the beach has patchy 3G outdoor coverage however, 4G Plus is scheduled for sections of the coastline.
- Vodafone shows the majority of Loch Sport town having 4G indoor and 3G outdoor coverage. Patchy 4G outdoor coverage and 3G outdoor is evident along the Ninety Mile beach with no coverage between Port Albert and in the Gippsland Lakes Coastal Park area.

In summary, there appears to be coverage of the beach and Loch Sport from two of the three mobile network operators, with partial (marginal) coverage from the third operator.

Figure 92 Optus mobile coverage of Ninety Mile Beach and Loch Sport

Figure 93 Vodafone mobile coverage of Ninety Mile Beach and Loch Sport
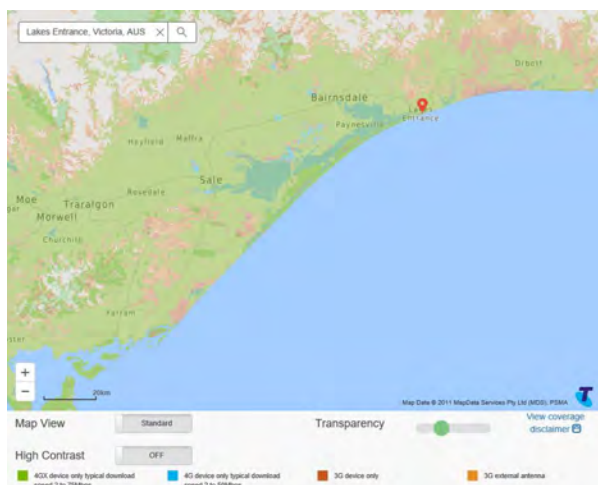
Figure 91 Telstra mobile coverage of Ninety Mile Beach and Loch Sport

5.3 Phillip Island Penguin Parade & Nature Park

The Phillip Island Nature Park is home to the hugely popular penguin parade and only 90 minutes from Melbourne. Visitors can view other wildlife in their natural habitat in the conservation park.

Every night of the year, the world's smallest penguins make their way from the waters of Summerland Beach to their sand dune burrows. The waddling penguins can be viewed at sunset from an elevated viewing platform, limited to a maximum of 300 people. The Penguin Parade Visitor Centre contains interactive displays, gift shops, toilets, café and a theatre.

Figure 94 The penguins travelling to their burrows at the penguin parade[16]
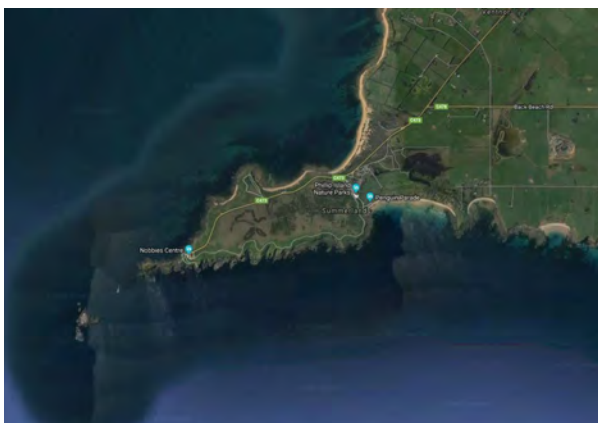
Figure 95 Aerial imagery of the Penguin Parade location

Fixed Broadband

Our analysis reveals the Penguin Parade Visitor Centre falls into the NBN Co's satellite footprint. New technologies do not appear to be scheduled for this area.

Figure 96 NBN Coverage of the Phillip Island Nature Park (NBN Co)
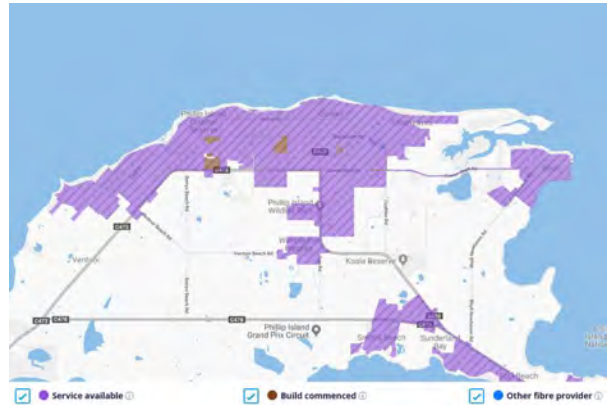
Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) and 3G device coverage of the nature park
- Optus shows 4G Plus outdoor coverage of the nature park
- Vodafone shows 4G indoor coverage of the nature park.

In summary, there appears to be no mobile coverage issues in the area, with the three major mobile network operators all offering service.

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[16] https://www.visitmelbourne.com/regions/phillip-island/things-to-do/nature-and-wildlife/wildlife-and-zoos/phillip-island-nature-parks#
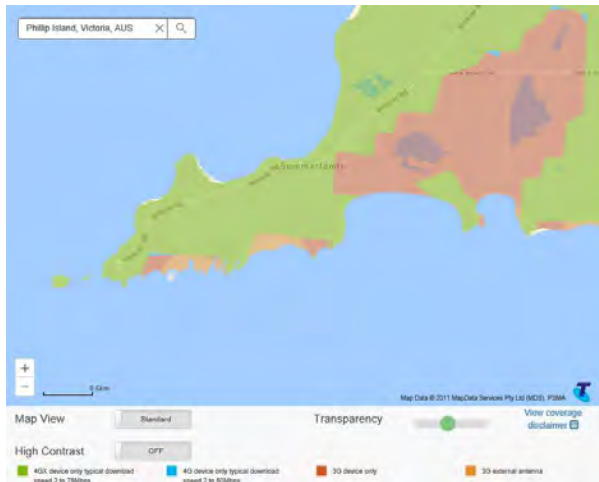
Figure 97 Telstra mobile coverage of the Phillip Island Nature Park

Figure 98 Optus mobile coverage of the Phillip Island Nature Park
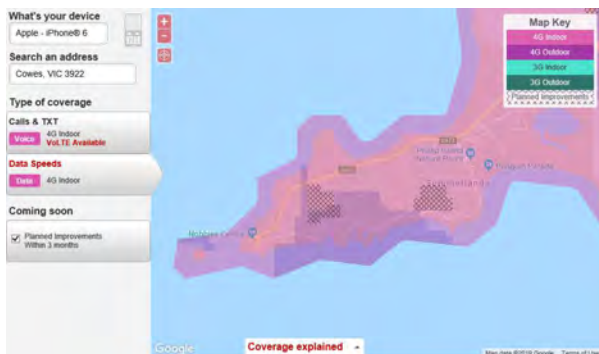
Figure 99 Vodafone mobile coverage of the Phillip Island Nature Park

5.4   *Mount Baw Baw National Park*

The Mount Baw Baw National Park is a playfield for all seasons, approximately 120 kilometres east of Melbourne.

Due to its close proximity to Melbourne, the Mount Baw Baw Alpine Village is a popular destination for snow activities in the winter for day trippers and also for those planning to extend their stay. With over 30 hectares of snowy terrain, the activities to experience include skiing, snowboarding, tobogganing, snowshoeing and dog sledding. Overnight accommodation options range from budget dorms to luxurious lodges.

The summer offers the ideal location for bushwalking and mountain biking with open grassy plains scattered with wildflowers.

Figure 100 Skier in the Mount Baw Baw Village[17]

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[17] https://www.visitmelbourne.com/things-to-do/outdoor-activities/skiing/mt-baw-baw
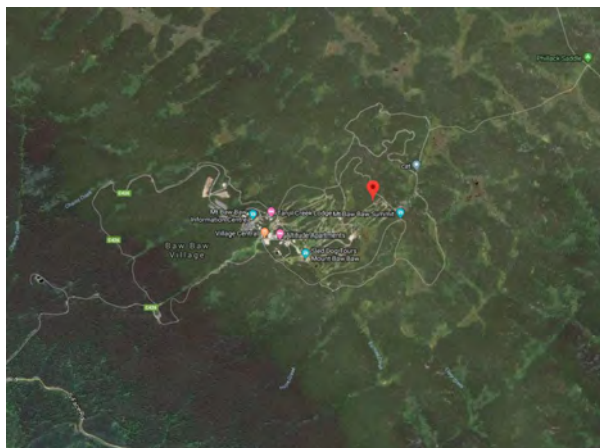
Figure 101 Aerial imagery of Mount Baw Baw Village

Fixed Broadband

Our analysis reveals the village, including the Mt Baw Baw Information Centre, falls into the NBN Co's satellite footprint.

Figure 102 NBN Coverage of Mount Baw Baw Village (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of Mt Baw Baw Village and Mt Baw Baw Tourist Road. The remaining park area has 4GX and 3G handheld device coverage with areas of no coverage evident.
- Optus shows 4G Plus outdoor coverage of Mt Baw Baw Village however, a blackspot is evident on Mt Baw Baw Tourist Road. The remaining park area has 4G Plus outdoor and 3G outdoor coverage with patchy areas without coverage.

- Vodafone shows 4G outdoor coverage of Mt Baw Baw Village and Mt Baw Baw Tourist Road. The remaining park area has 4G outdoor and 3G outdoor coverage with significant areas without coverage.

In summary, there appears to be no mobile coverage issues in the Mount Baw Baw Village, with the three major mobile network operators all offering service, however partial coverage is provided for the remainder of the park.
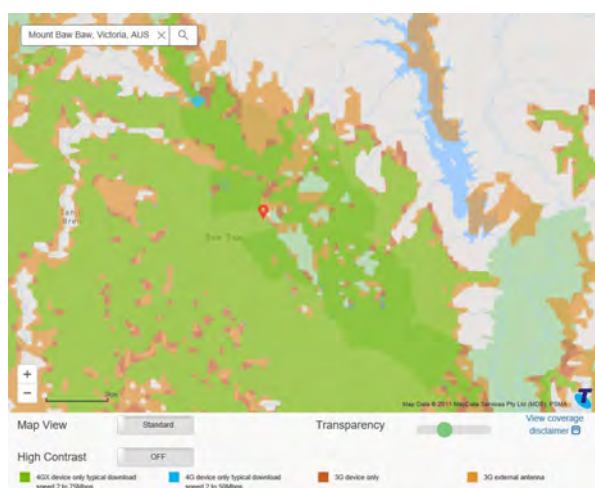
Figure 103 Telstra mobile coverage of Mount Baw Baw National Park
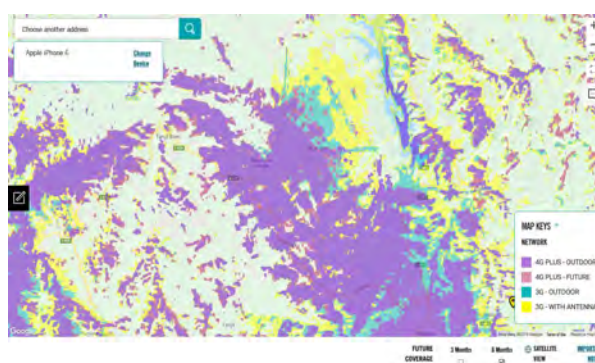
Figure 104 Optus mobile coverage of Mount Baw Baw National Park

Figure 105 Vodafone mobile coverage of Mount Baw Baw National Park

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5.5   *Walhalla*

The town of Walhalla was one of the richest towns in Australia due to the influx of gold seekers into the area in the 1860's. The gold rush eventually diminished and so did its residents from approximately 4000 to 20 however, the town has maintained and restored its heritage buildings, attracting numerous visitors every year.

Take a step back in time with a tour of the Long Tunnel Extended Gold Mine accessing Cohens Reef, a three kilometre vein of gold running through Walhalla, or pan for gold. Experience the Walhalla Goldfields Railway running from Walhalla to Thomson Station which operates three days a week. There are a range of accommodation options available from basic rooms to hotels and B&Bs.

Figure 106 The Walhalla Goldfields Railway[18]
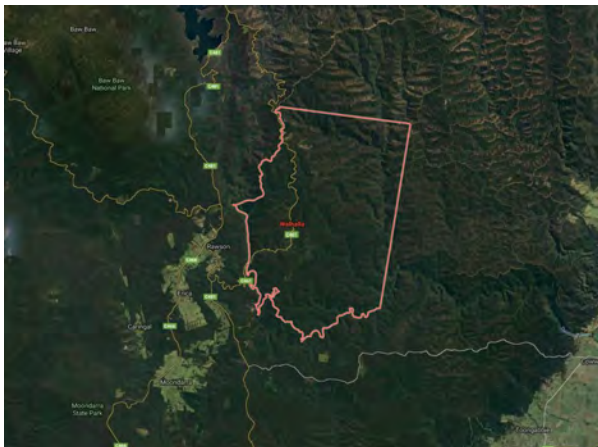
Figure 107 Aerial imagery of Walhalla

Fixed Broadband

Our analysis reveals that the town of Walhalla falls into NBN Co's satellite footprint. New technologies do not appear to be scheduled for the area.
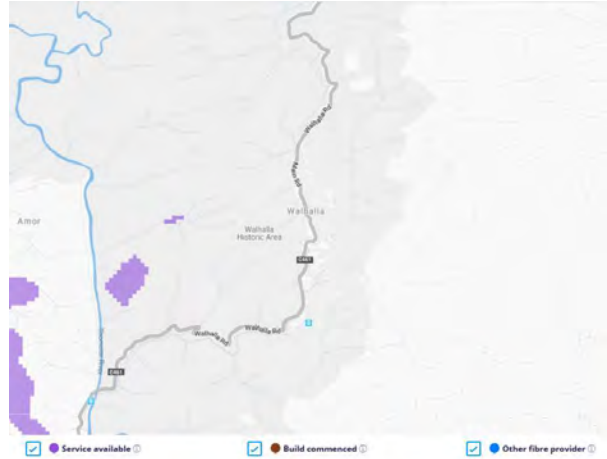
Figure 108 NBN Coverage of the town of Walhalla (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows no mobile coverage in the town however, 4GX device coverage is expected to be rolled out in the first half of 2019
- Optus shows patchy 3G outdoor coverage in the town
- Vodafone shows no mobile coverage in the town.

In summary, new coverage will be completed by one carrier shortly.

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[18] https://www.visitmelbourne.com/regions/gippsland/things-to-do/history-and-heritage/gold-rush-history/walhalla-goldfields-railway
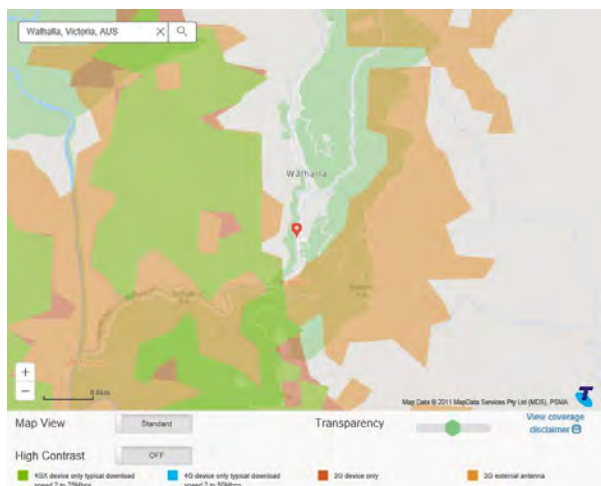
Figure 109 Telstra mobile coverage of the town of Walhalla
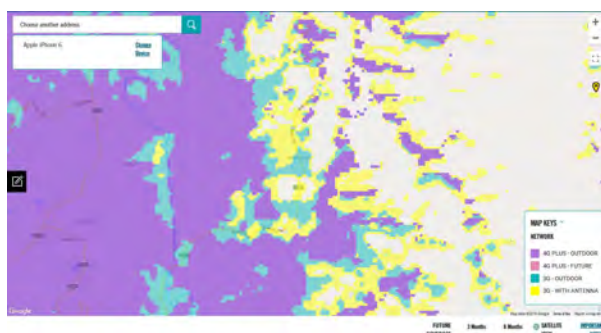
Figure 110 Optus mobile coverage of the town of Walhalla

Figure 111 Vodafone mobile coverage of the town of Walhalla

5.6   *Inverloch*

The coastal town of Inverloch, located 143 kilometres south-east of Melbourne, is a popular holiday destination, famous for its pristine beaches.

The calm waters of Anderson Inlet are perfect for wakeboarding or windsurfing while the surf beach and Eagles Nest attracts beginner and experienced surfers. The walking and cycling trails such as the George Bass Coastal Walk, Screw Creek Nature Walk or The Bass Coast Rail Trail is a chance to discover the beautiful natural surrounds of Inverloch. The Inverloch Jazz Festival is an eventful music experience held on the Labour Day Long Weekend, along with the Sounds of Summer festival event in December.
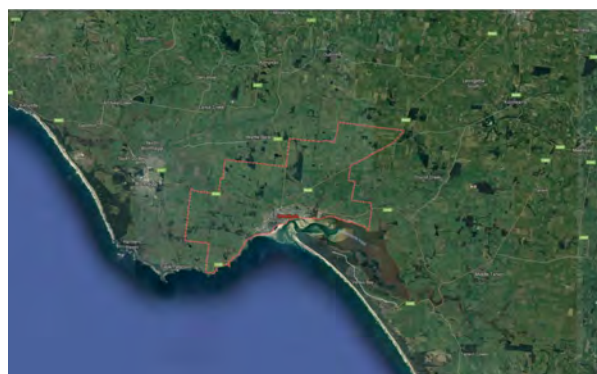
Figure 112 Aerial imagery of Inverloch town

Figure 113 Sunset over Inverloch beach[19]

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[19]https://www.visitvictoria.com/Regions/Gippsland/Destinations/Inverloch

Fixed Broadband

Our analysis reveals the town of Inverloch is predominately serviced by NBN FTTN within the Fixed Line footprint. NBN fixed wireless services the immediate surrounding area.
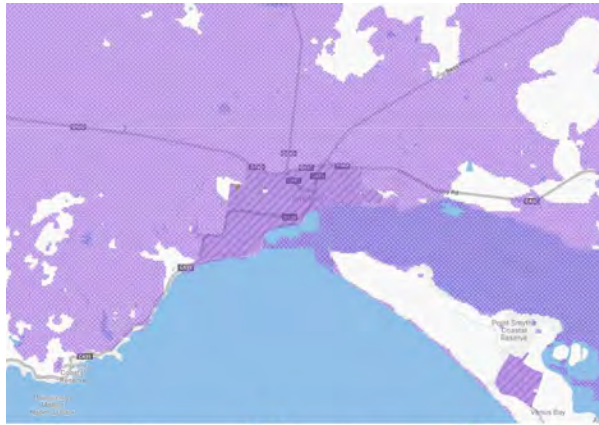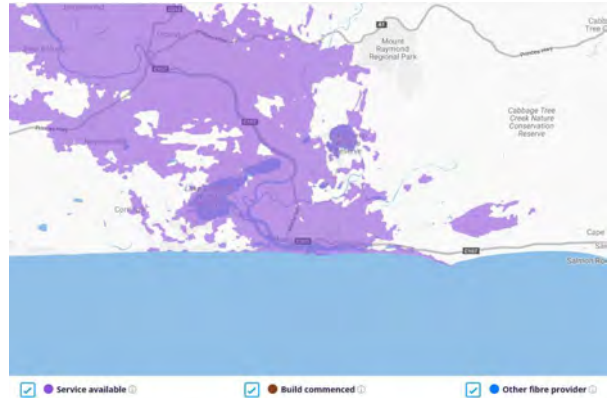

Figure 114 NBN Coverage of Inverloch (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor coverage across the entire town.

In summary, there appears to be no mobile coverage issues in the town, with the three major mobile network operators all offering service however, the coverage signal and speeds may be affected by the increase in tourist numbers during peak holiday seasons.

Figure 115 Telstra mobile coverage of the town of Inverloch

Figure 116 Optus mobile coverage of the town of Inverloch
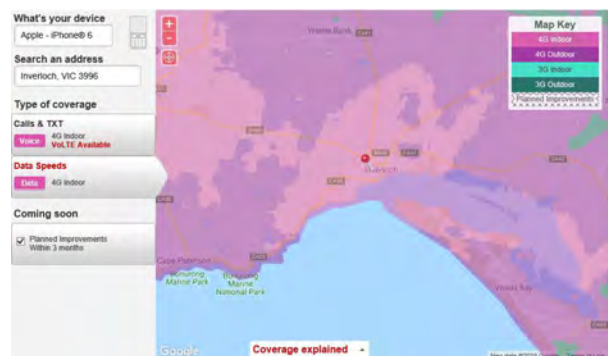
Figure 117 Vodafone mobile coverage of the town of Inverloch

5.7   Cowes

The relaxed seaside town of Cowes, situated in Phillip Island, is a popular holiday destination during the holiday season with many activities to engage in.

The range of activities includes beach activities, dining out in seaside restaurants, viewing Indigenous artworks, attending relaxing day spas and shopping for unique gifts and souvenirs. The town offers a variety of accommodations options which benefits those planning to visit the popular Phillip Island attractions during their stay due to its close proximity.

Figure 118 The beach at Cowes[20]

Figure 119 Aerial imagery of the town of Cowes

Fixed Broadband

Our analysis reveals the town of Cowes is predominately serviced by NBN FTTN within the Fixed Line footprint. The Cowes Visitor Information Centre falls in the NBN FTTN Fixed Line footprint, enabling visitors to access free Wifi services.
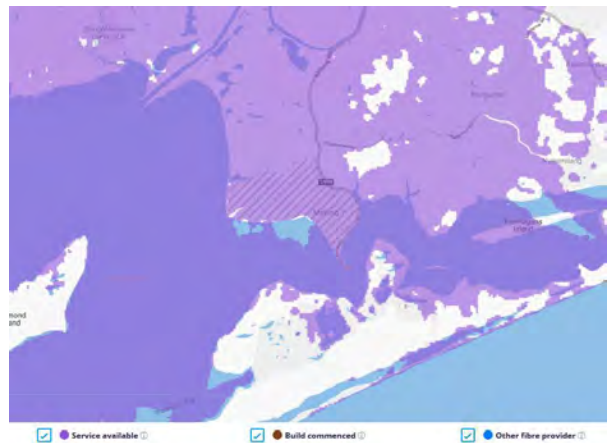

Figure 120 NBN Coverage of Cowes (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor and 4G outdoor coverage across the town.

In summary, there appears to be no mobile coverage issues in the town, with the three major mobile network operators all offering service however, the coverage signal and speeds may be affected by the increase in tourist numbers during peak holiday seasons.

[20] https://www.visitmelbourne.com/Regions/Phillip-Island/Destinations/Cowes
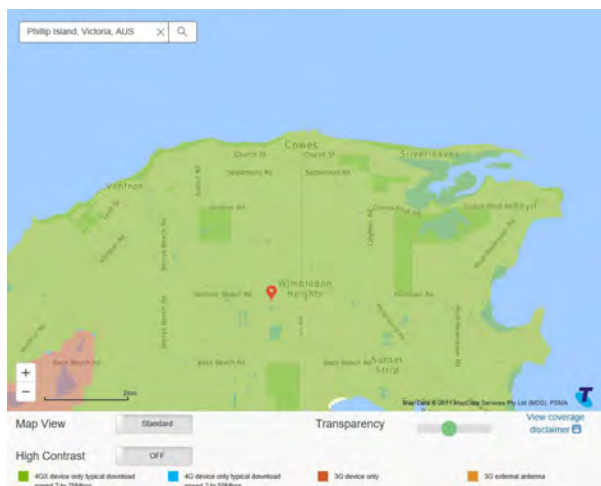
Figure 121 Telstra mobile coverage of the town of Cowes
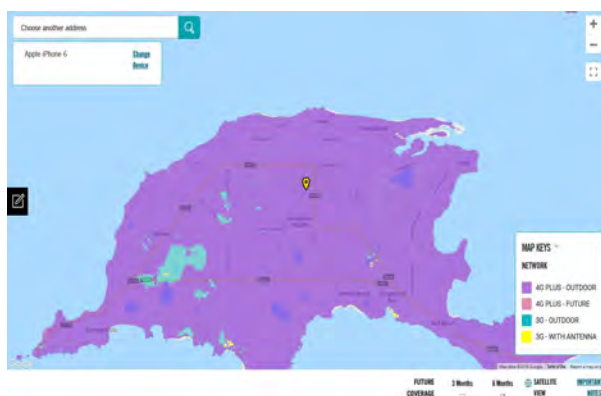
Figure 122 Optus mobile coverage of the town of Cowes
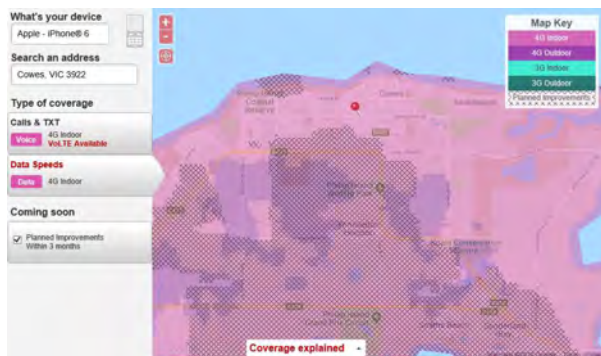
Figure 123 Vodafone mobile coverage of the town of Cowes

5.8   *Lakes Entrance*

Lakes Entrance is a popular year-round coastal holiday destination, known for the Gippsland Lakes. A footbridge connects to Ninety Mile Beach from Lakes Entrance, another popular destination for tourists and locals.

A range of accommodation options, services and facilities are available in the town. The waters attract a number of activities including hiring a paddleboat, cruising on a boat and kayaking. The town is known for its fresh local seafood which can be savoured from the several seafood eateries.
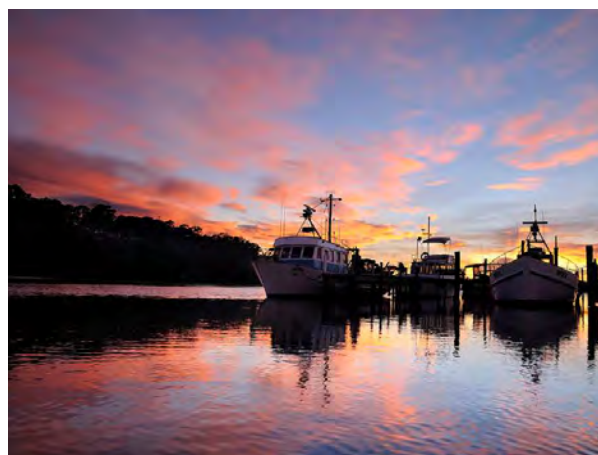
Figure 124 Sunset over Lakes Entrance[21]
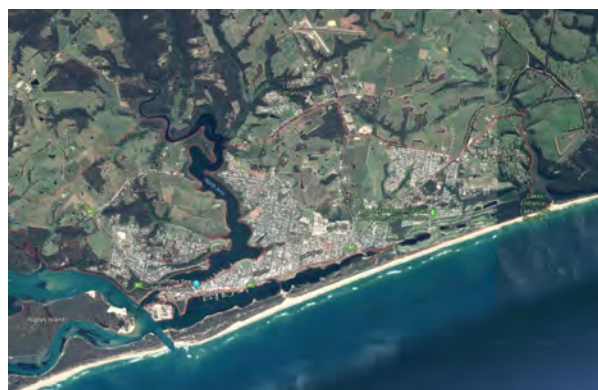
Figure 125 Aerial imagery of Lakes Entrance

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[21]https://www.visitvictoria.com/Regions/gippsland/Destinations/lakes-entrance.aspx

Fixed Broadband

Refer to Significant Places for fixed broadband analysis of Lakes Entrance.

Mobile Coverage

Refer to Significant Places for mobile coverage analysis of Lakes Entrance.

The coverage signal and speeds may be affected by the increase in tourist numbers during peak holiday seasons.

5.9   Venus Bay

Venus Bay is a small coastal town, surrounded by the Bass Strait and Anderson Inlet. The location attracts thousands of visitors in the holiday season, keen to participate in various water activities including swimming, boating and fishing.

Figure 126 Beach at Venus Bay[22]
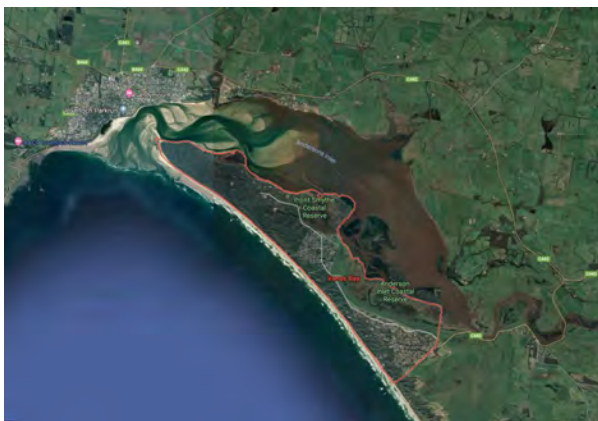
Figure 127 Aerial imagery of Venus Bay

Fixed Broadband

Refer to Significant Places for fixed broadband analysis of Venus Bay.

Mobile Coverage

Refer to Significant Places for mobile coverage analysis of Venus Bay.

The coverage signal and speeds may be affected by the increase in tourist numbers during peak holiday seasons.

5.10   Omeo

The town of Omeo, surrounded by high mountain ranges, is situated on the Great Alpine Road. Once a prosperous gold mining town, its main industry today is cattle and sheep grazing.

A glimpse of the history can be seen in the heritage buildings in the town and at the Oriental Claims Historic Area, south-west of Omeo.

Figure 128 Town of Omeo including the Omeo Region Visitor Information Centre[23]

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[22] https://www.travelvictoria.com.au/venusbay/

[23] https://www.visitmelbourne.com/regions/gippsland/travel-information/visitor-information-centres/omeo-region-visitor-information-centre

Figure 129 Aerial imagery of Omeo

Fixed Broadband

Our analysis reveals the town of Omeo is serviced by NBN fixed wireless with NBN satellite servicing the surrounding region outside the Fixed Line footprint.
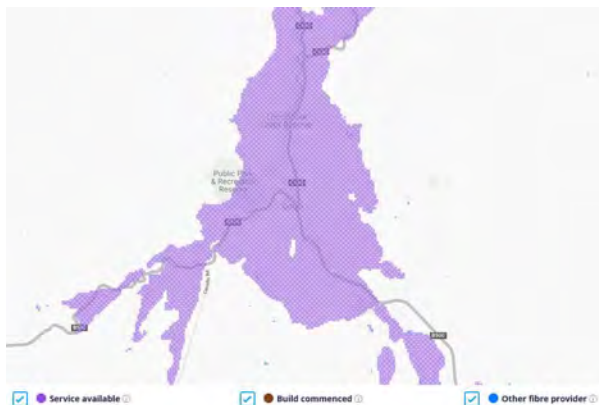
Figure 130 NBN Coverage of Omeo (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows no coverage of the town.

In summary, there appears to be no mobile coverage issues in the town and surrounding area from two of the three mobile network operators.
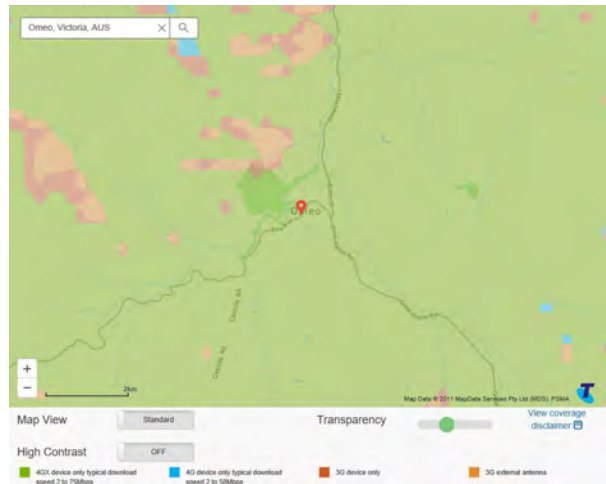
Figure 131 Telstra mobile coverage of the town of Omeo
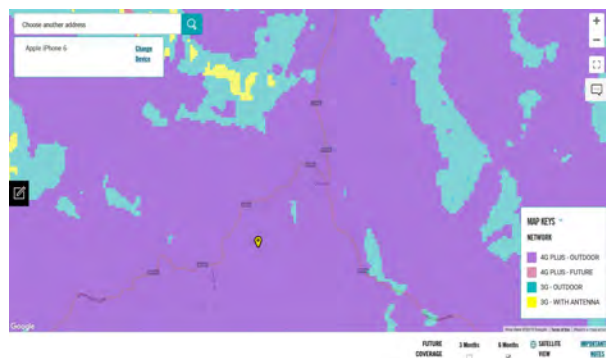
Figure 132 Optus mobile coverage of the town of Omeo
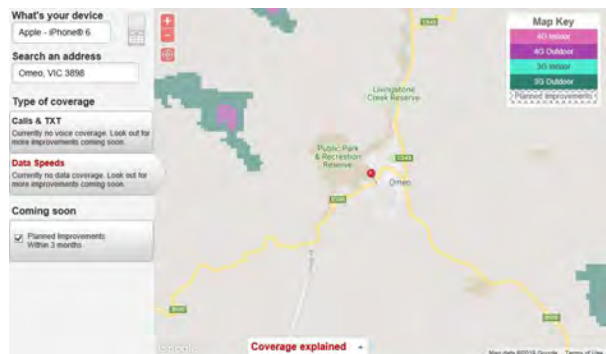
Figure 133 Vodafone mobile coverage of the town of Omeo

5.11 Marlo

Marlo is a coastal town located at the mouth of the Snowy River. The remote and unspolit beaches, including the snowy inlet, attracts a number of visitors especially in the warmer months. Various activities are possible in the seaside town such as fishing for perch and bream fish, surfing, birdwatching and bushwalking.

Figure 134 The coastal section of Marlo[24]

Figure 135 Aerial imagery of Marlo

Fixed Broadband

Our analysis reveals the town of Marlo falls into the NBN fixed wireless footprint.

Figure 136 NBN Coverage of the town of Marlo (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the town
- Optus shows 4G Plus outdoor coverage across the town with 3G outdoor along the coastline however, 4G Plus is scheduled for parts of the coastline
- Vodafone shows 4G outdoor coverage of the town with 3G outdoor along the coastline.

In summary, there appears to be no mobile coverage issues in the town and surrounding area from the three mobile operators however, the coverage signal and speeds may be affected by the increase in tourist numbers during peak holiday seasons.

Figure 137 Telstra mobile coverage of Marlo

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[24] http://marlo.vic.au/oldsite/

Figure 138 Optus mobile coverage of Marlo

Figure 141 Residences and boats in the town of Metung [25]

Fixed Broadband

Our analysis reveals the town of Metung is predominately serviced by NBN FTTN Fixed Line with NBN fixed wireless and NBN satellite services provided in the immediate surrounding area.
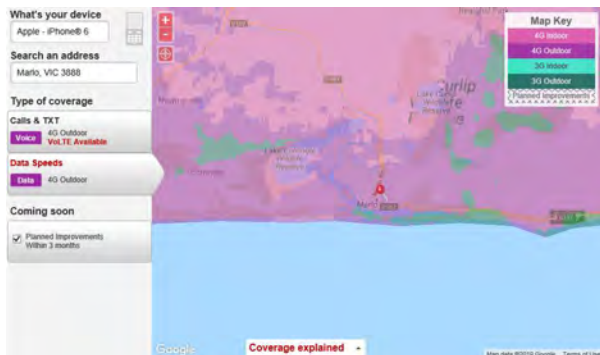
Figure 139 Vodafone mobile coverage of Marlo

5.12   Metung

Metung is a small peaceful village located at the end of Great Alpine Road on the shores of the Gippsland Lakes.

The tranquil waters of the town invite activities such as boating, yachting, waterskiing and fishing. The local fishing provides fresh seafood to a variety of waterfront restaurants and cafes.

Figure 142 NBN Coverage of Metung (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor and 4G outdoor coverage of the town.

Figure 140 Aerial imagery of Metung

[25]https://www.visitmelbourne.com/regions/gippsland/destinations/metung

In summary, there appears to be mobile coverage in the town, with the three major mobile network operators all offering service.
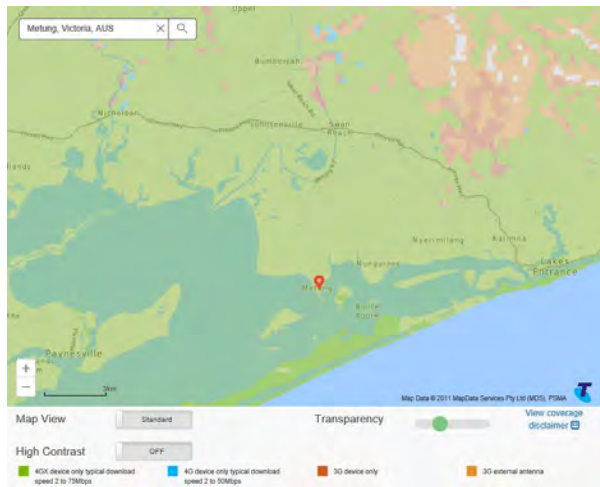
Figure 143 Telstra mobile coverage of the town of Metung


Figure 144 Optus mobile coverage of the town of Metung

Figure 145 Vodafone mobile coverage of the town of Metung

5.13 Mallacoota

Mallacoota is a coastal town in between the border of New South Wales and Croajingolong National Park, particularly popular during holiday seasons where the population size can increase into the tens of thousands.

The coastal element attracts activities such as boating, fishing, swimming and surfing. The town is a popular access point to the Croajingolong National Park.
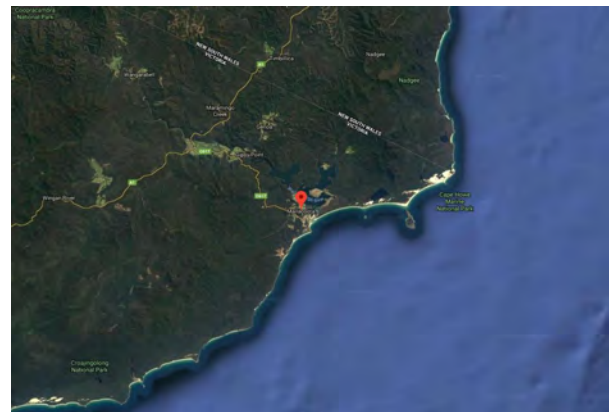
Figure 146 Aerial imagery of Mallacoota
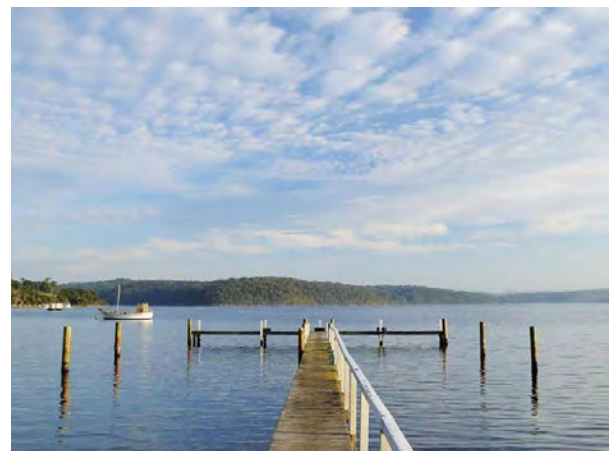
Figure 147 Mallacoota Pier[26]

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[26]https://www.visitmelbourne.com/regions/gippsland/destinations/mallacoota

Fixed Broadband

Refer to Significant Places for fixed broadband analysis of Mallacoota..

Mobile Coverage

Refer to Significant Places for mobile coverage analysis of Mallacoota.

The coverage signal and speeds may be affected by the increase in tourist numbers during peak holiday seasons.

Figure 149 Aerial imagery of the Buchan Caves

5.14 Buchan Caves Reserve

The Buchan Caves Reserve is home to the Fairy Cave and Royal Cave, open to explore through guided tours operating daily.

The caves were formed some 400 million years ago from underground rivers carving through limestone rock. The caves have lit walkways to view the calcium-rimmed pools unique to the Royal Cave and elaborate stalactites and stalagmites formed in Fairy Cave.

Short and long bushwalking trails in the surrounding bushland is an opportunity to observe the abundant wildlife including kangaroos, wombats and birds. Campsites and cabins are available complete with picnic grounds, playground and an information centre. Wilderness retreats are another accommodation option.

Fixed Broadband

Our analysis reveals the reserve including the Buchan Caves Reserve Visitor Centre, falls into the NBN fixed wireless footprint.
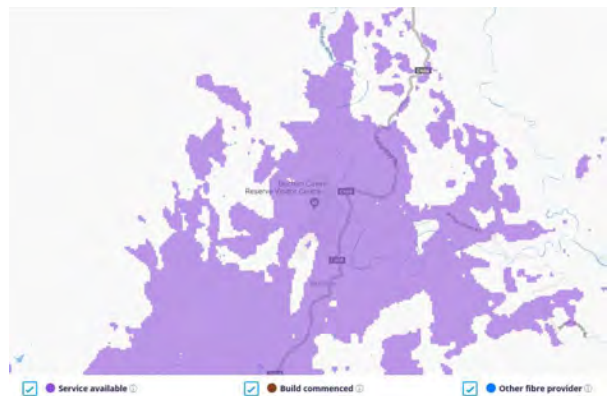
Figure 150 NBN Coverage of the Buchan Caves Reserve (NBN Co)

Figure 148 Tour operating in the Buchan Caves[27]

[27] https://www.visitvictoria.com/regions/gippsland/things-to-do/nature-and-wildlife/national-parks-and-reserves/vv-buchan-caves

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the reserve
- Optus shows limited 3G outdoor device coverage of the reserve and surrounding area
- Vodafone shows no mobile coverage of the reserve.

In summary, there appears to be 4G coverage of the reserve and surrounding area from one of the three mobile operators with little or no coverage from the other two operators.
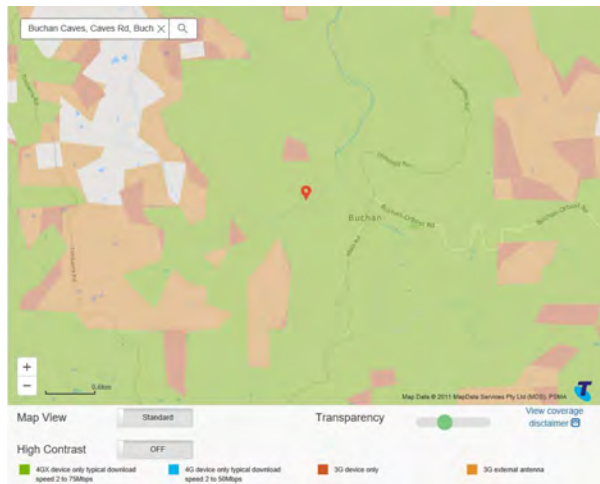
Figure 151 Telstra mobile coverage of the Buchan Caves Reserve
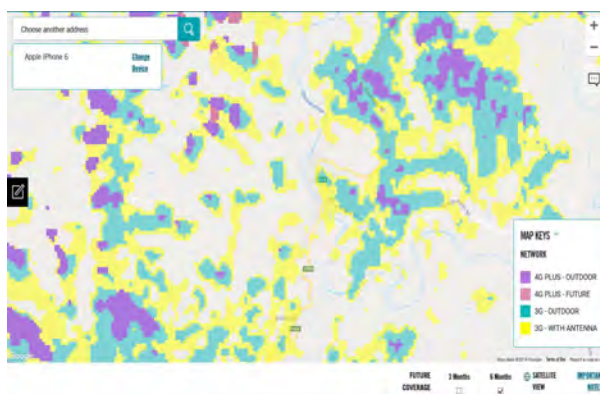
Figure 152 Optus mobile coverage of the Buchan Caves Reserve
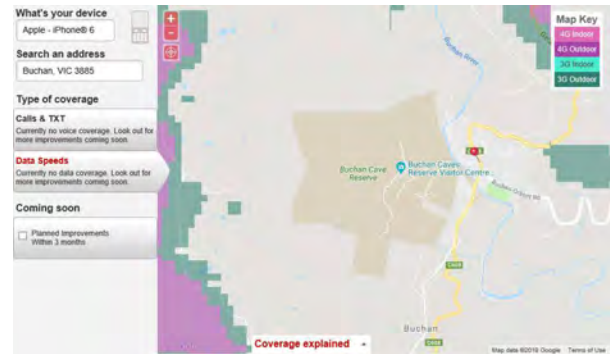
Figure 153 Vodafone mobile coverage of the Buchan Caves Reserve

5.15   Tarra Bulga National Park

Tarra Bulga National Park is a 1522-hectare national park situated south of Traralgon and is one of the only major areas of cool temperate rainforest in the state.

The Tarra Bulga picnic and Tarra Valley Picnic areas complete with toilet facilities, provide a gateway to numerous walking tracks such as the Fern Gully Nature Walk which includes the famous suspension bridge. A wide variety of flora and fauna exist in the rainforest including lyrebirds, wombats, platypuses and yellow tailed black cockatoo. Camping is not permitted in the national park however, the nearby town of Tarra Valley offers a range of accommodation options.
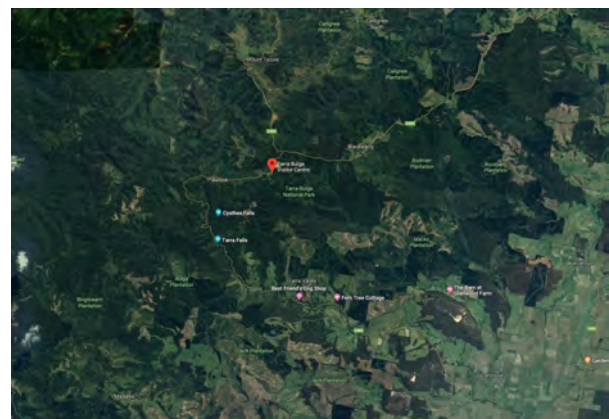
Figure 154 Aerial imagery of Tarra Bulga National Park

Figure 155 The Tarra Bulga National Park[28]

Fixed Broadband

Our analysis reveals the Tarra Bulga Visitor Centre, located north-west of the park, falls into the NBN Co's satellite footprint.
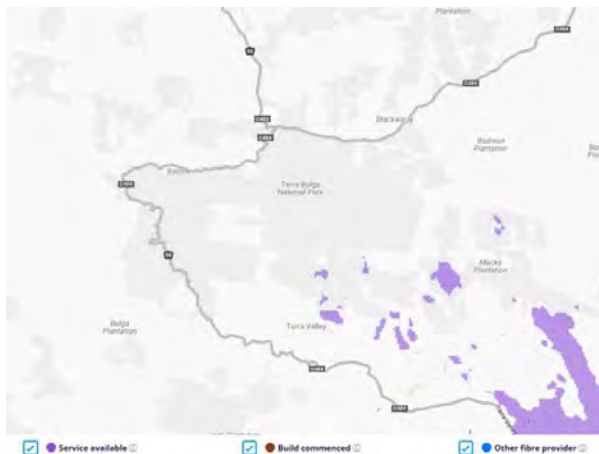
Figure 156 NBN Coverage of Tarra Bulga National Park (NBN Co)

Mobile Coverage
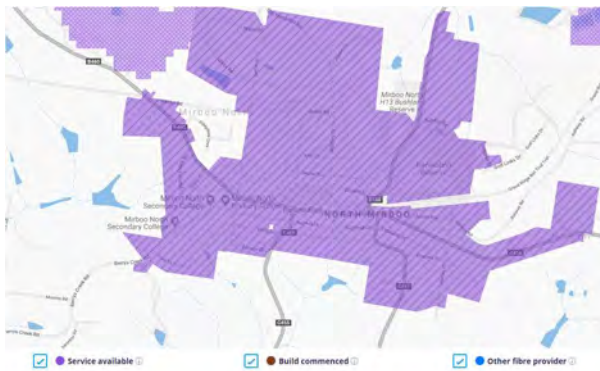
Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the visitor centre with 3G device covering the two picnic areas. The remaining park area has 4GX and 3G device coverage.
- Optus shows patchy 4G Plus outdoor and 3G outdoor device coverage of the park and picnic areas however, the visitor centre has no coverage.

- Vodafone shows no coverage of the park including the visitor centre and picnic areas.

In summary, there appears to be coverage from one operator and partial coverage from the other two mobile network operators.
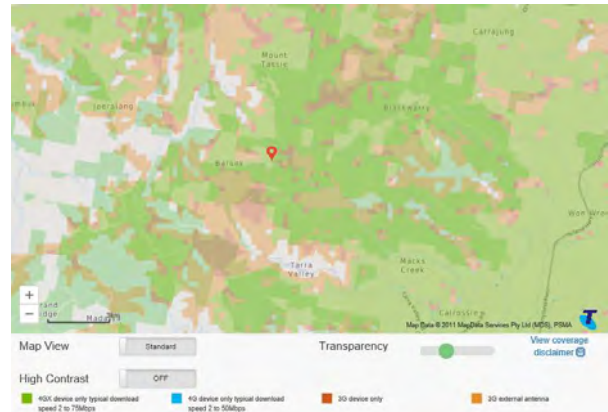
Figure 157 Telstra mobile coverage of the Tarra Bulga National Park
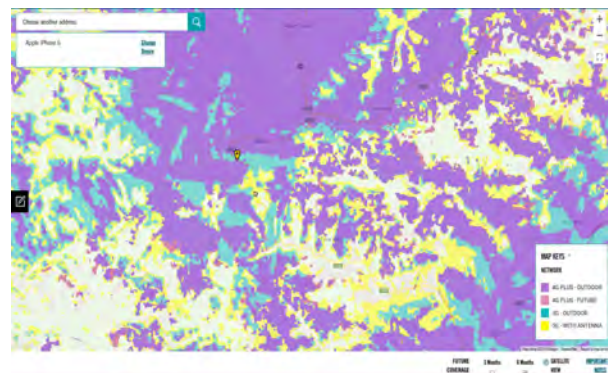
Figure 158 Optus mobile coverage of the Tarra Bulga National Park

Figure 159 Vodafone mobile coverage of the Tarra Bulga National Park

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[28] https://www.visitmelbourne.com/regions/gippsland/things-to-do/nature-and-wildlife/national-parks-and-reserves/vv-tarra-bulga-national-park

5.16 Lardner Park

Established in 1963, Lardner Park is a versatile event venue that has grown to host well in excess of 120 events annually on its expansive 300 acreage.

Lardner Park is home to a variety of signature Gippsland events such as Farm World, Harvest Festival and Beyond the Valley Music Festival.

Figure 160 Lardner Park[29]

Fixed Broadband

Our analysis reveals Lardner Park is serviced primarily by NBN satellite, falling in a patchy NBN fixed wireless Footprint.
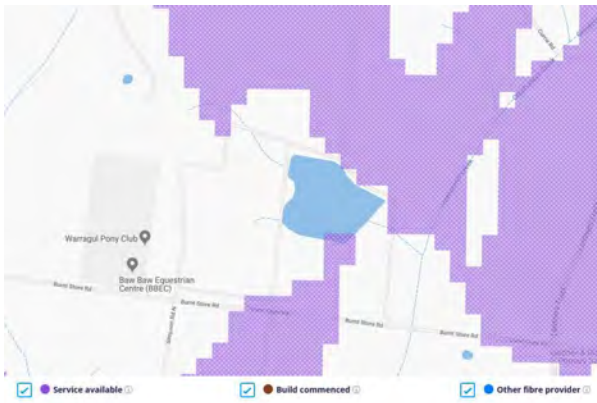
Figure 161 NBN coverage of Lardner Park (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venue

- Optus shows 4G Plus outdoor coverage of the venue
- Vodafone shows 4G outdoor coverage or better of the venue.

In summary, there appears to be no mobile coverage issues at the venue, with the three major mobile network operators all offering service however, the coverage signal and speeds may be affected by the increase in tourist numbers during the events.
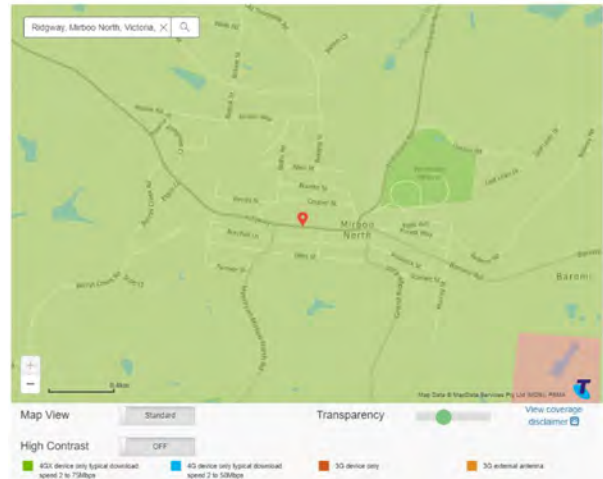

Figure 162 Telstra mobile coverage of Lardner Park
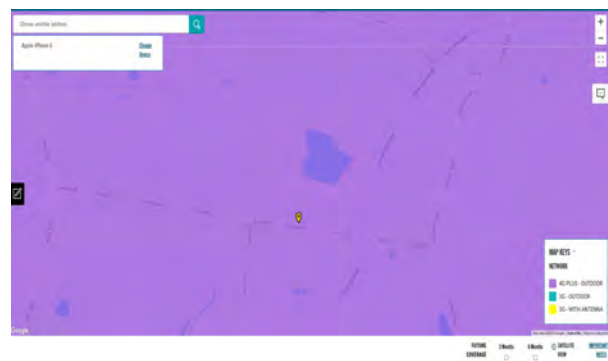

Figure 163 Optus mobile coverage of Lardner Park
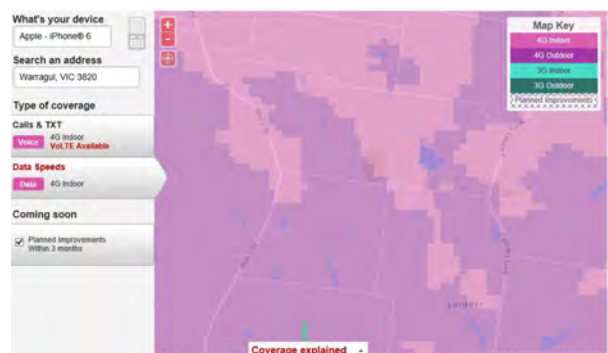
Figure 164 Vodafone mobile coverage of Lardner Park

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[29]https://www.visitmelbourne.com/regions/gippsland/things-to-do/entertainment/lardner-park

5.17 Australian Motorcycle Grand Prix

The Australian Grand Prix is Australia's premier motorcycle competition attracting local and international participants and spectators.

The springtime race takes place against a coastal backdrop at the Phillip Island Grand Prix Circuit, in Phillip Island every year.

Fixed Broadband

Our analysis reveals the event location falls into NBN Co's satellite Footprint.
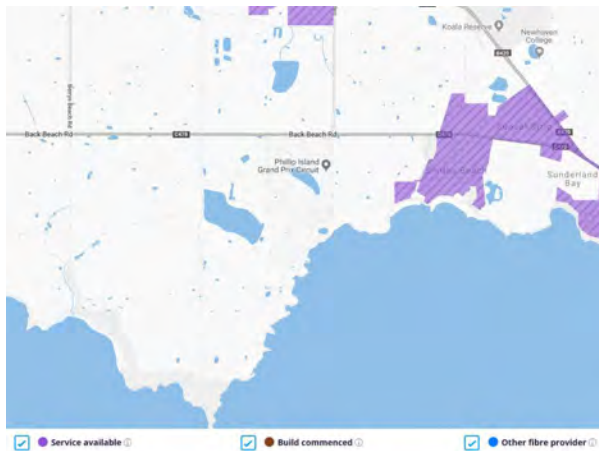
Figure 165 NBN coverage of the Grand Prix Circuit (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venue
- Optus shows 4G Plus outdoor coverage of the venue
- Vodafone shows 4G indoor coverage of the venue, with improvements planned for the location.

In summary, there appears to be no mobile coverage issues at the venue, with the three major mobile network operators all offering service however, the coverage signal and speeds may be affected by the increase in tourist numbers during the event.
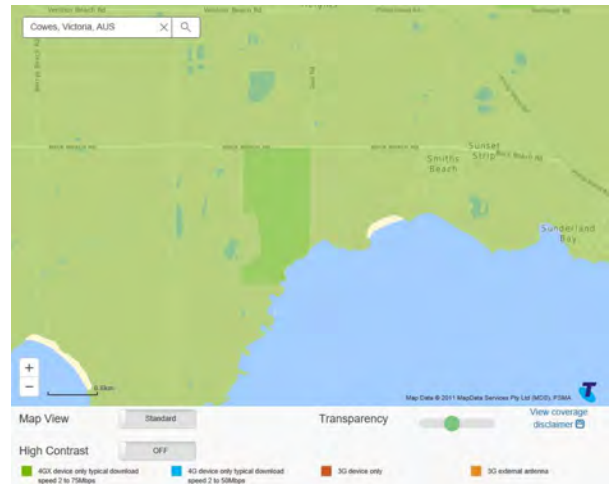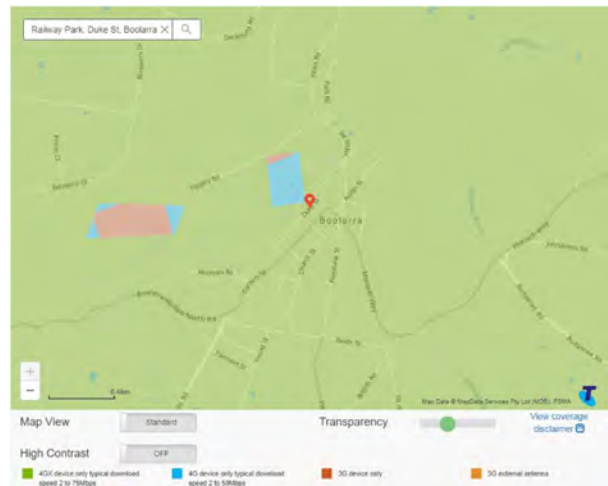

Figure 166 Telstra mobile coverage of the Phillip Island Grand Prix Circuit
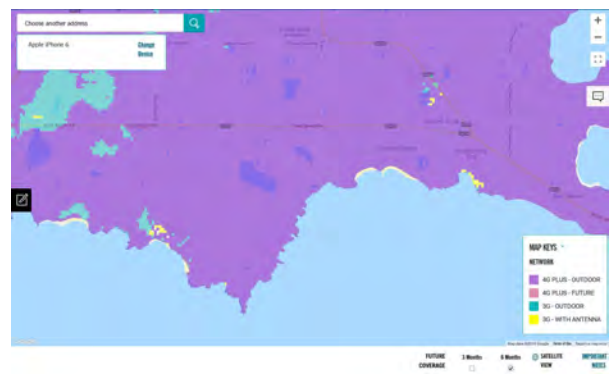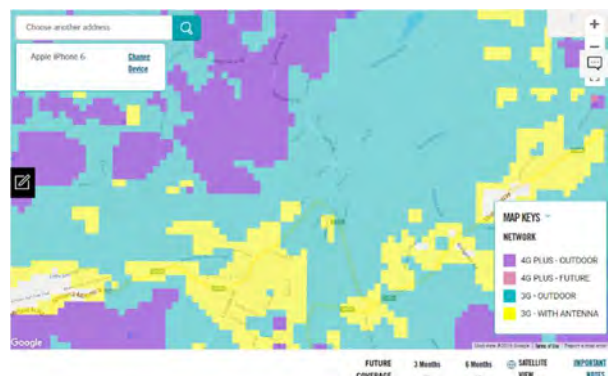

Figure 167 Optus mobile coverage of the Phillip Island Grand Prix Circuit
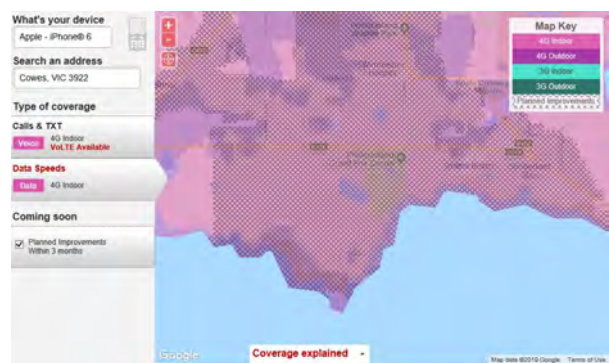
Figure 168 Vodafone mobile coverage of the Phillip Island Grand Prix Circuit

5.18 Meeniyan Garlic Festival

The Meeniyan Garlic Festival is an annual festival that celebrates all things garlic in the regional town of Meeniyan, South Gippsland. The festival ran for its third year in February 2019 and provides visitors with a day of fun, food and entertainment.
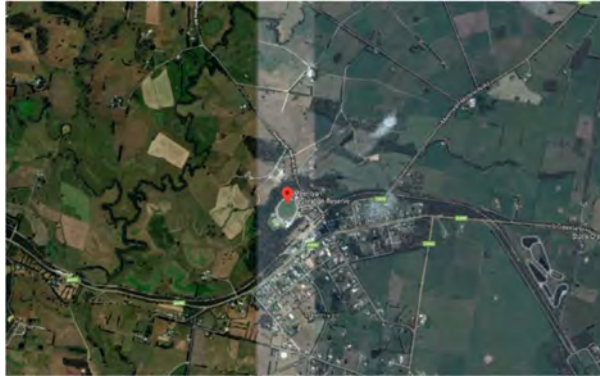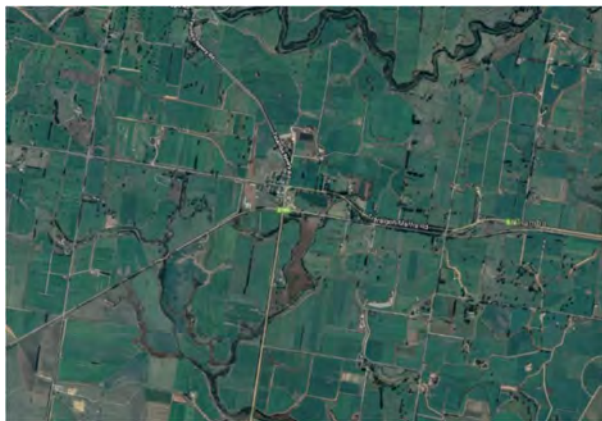

Figure 169 Aerial imagery of the Meeniyan Garlic Festival

Fixed Broadband

Our analysis reveals the event location falls into NBN Co's fixed wireless Footprint.

Figure 170 NBN coverage of the Meeniyan Garlic Festival (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venue
- Optus shows 4G Plus outdoor coverage of the venue
- Vodafone shows no mobile coverage at the venue.

In summary, there are options for coverage at the venue and surrounding area from two of the three mobile network operators however, the coverage signal and speeds may be affected by the increase in tourist numbers during the event.

Figure 171 Telstra mobile coverage of the Meeniyan Garlic Festival

Figure 172 Optus mobile coverage of the Meeniyan Garlic Festival
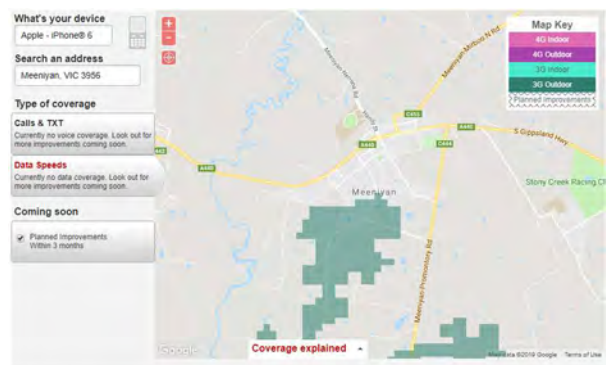
Figure 173 Vodafone mobile coverage of the Meeniyan Garlic Festival

5.19 Mirboo North Italian Festa

The Mirboo North Italian Festa is a festival that celebrates Italy, as well as the Feast of St Paul. The festival is held at Baromi Park at Mirboo North and features authentic Italian food stalls, demonstrations, singing, dancing, and a wide range of free entertainment for the whole family.

Figure 174 Aerial imagery of the Mirboo North Italian Festa

Fixed Broadband

Our analysis reveals the event location falls into NBN Co's Fixed Line footprint.

Figure 175 NBN coverage of the Mirboo North Italian Festa (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venue
- Optus shows 4G Plus outdoor coverage of the venue
- Vodafone shows no mobile coverage at the venue.

In summary, there are options for coverage at the venue and surrounding area from two of the three mobile network operators however, the coverage signal and speeds may be affected by the increase in tourist numbers during the event.

Figure 176 Telstra mobile coverage of the Mirboo North Italian Festa

Figure 177 Optus mobile coverage of the Mirboo North Italian Festa
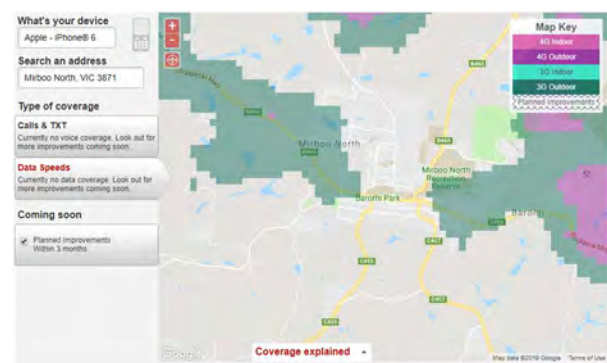
Figure 178 Vodafone mobile coverage of the Mirboo North Italian Festa

5.20 Boolarra Folk Festival

The Boolarra Folk Festival is a free outdoor folk music festival set in Railway Park in the centre of Boolarra. It is an annual community event and features live music, market stalls and performances throughout the day.

Figure 179 Aerial imagery of the Boolarra Folk Festival

Fixed Broadband

Our analysis reveals the event location falls into NBN Co's fixed wireless footprint.
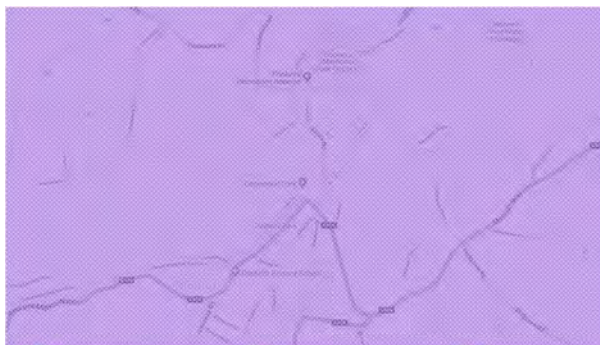
Figure 180 NBN coverage of the Boolarra Folk Festival (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venue. There is a small patch of 4G handheld device (with a typical download speed 2 to 50Mbps) and 3G device coverage in an area surrounding the venue.
- Optus shows partial 3G outdoor coverage of the venue.

- Vodafone shows 4G indoor coverage of the venue, with 3G indoor coverage in the wider surrounding area.

In summary, there are options for coverage at the venue and surrounding area from two of the three mobile network operators however, the coverage signal and speeds may be affected by the increase in tourist numbers during the event.

Figure 181 Telstra mobile coverage of the Boolarra Folk Festival

Figure 182 Optus mobile coverage of the Boolarra Folk Festival
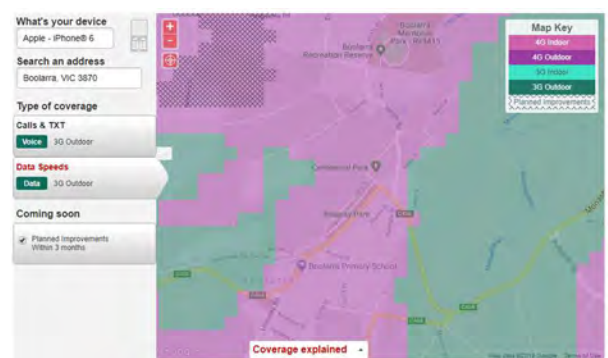
Figure 183 Vodafone mobile coverage of the Boolarra Folk Festival

5.21 Tinamba Food and Wine Festival

The Tinamba Food and Wine Festival is one of Gippsland's most anticipated food and wine festivals located in the small dairy farming town of Tinamba.

The festival began as a locally organised event by surrounding wineries to showcase their newly released wines. It eventually grew to include local food producers, bringing together the best local produce, food and wine together in the region.

Figure 184 Aerial imagery of the Tinamba Food and Wine Festival

Fixed Broadband

Our analysis reveals the event location falls into NBN Co's fixed wireless footprint.

Figure 185 NBN coverage of the Tinamba Food and Wine Festival (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venue

- Optus shows 4G Plus outdoor coverage of the venue with patches of 3G outdoor coverage
- Vodafone shows 4G indoor coverage of the venue, with 3G indoor coverage in the wider surrounding area.

In summary, there are options for coverage at the venue and surrounding area from three of the major mobile network operators however, the coverage signal and speeds may be affected by the increase in tourist numbers during the event.

Figure 186 Telstra mobile coverage of the Tinamba Food and Wine Festival

Figure 187 Optus mobile coverage of the Tinamba Food and Wine Festival
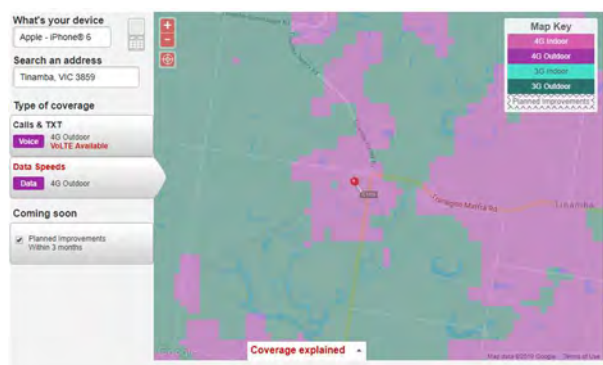
Figure 188 Vodafone mobile coverage of the Tinamba Food and Wine Festival

5.22 Bruthen Blues and Arts Festival

An annual, volunteer-run, family-friendly music festival held on the third weekend of February. It was established in 1995 and is held in several venues over three days, with a free all-day event on the main street of Bruthen both Saturday and Sunday. The town puts on a showcase of stalls, music in the street, workshops, garage sales and music at the Bruthen Inn Hotel.

Figure 189 Aerial imagery of Bruthen

Fixed Broadband

Our analysis reveals the venues are serviced by NBN fixed wireless.
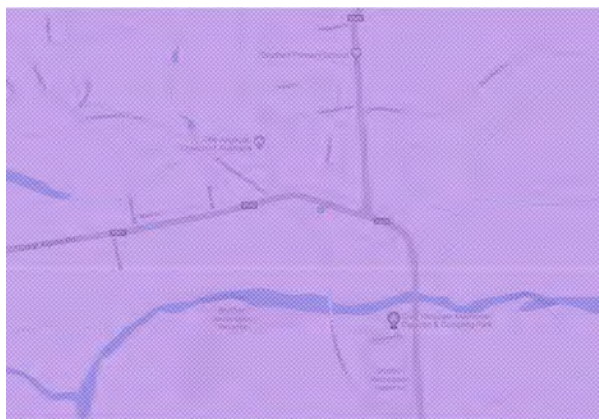
Figure 190 NBN coverage of the Bruthen Blues and Arts Festival (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venues

- Optus shows 4G Plus outdoor coverage of the venues
- Vodafone shows primarily 3G outdoor coverage, with blackspots on the outskirts of the town, outside the Main Street festivities, but bordering on the Bruthen Inn Hotel, one of the festival's music venues.

In summary, there appears to be 4G coverage from two of the three major mobile network operators offering service.
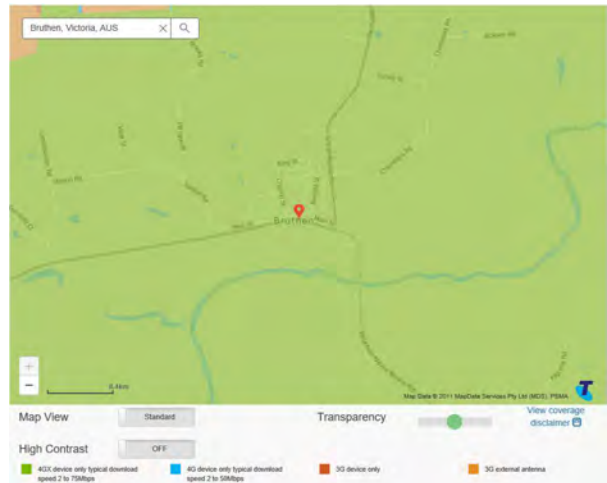
Figure 191 Telstra mobile coverage of the Bruthen Blues and Arts Festival
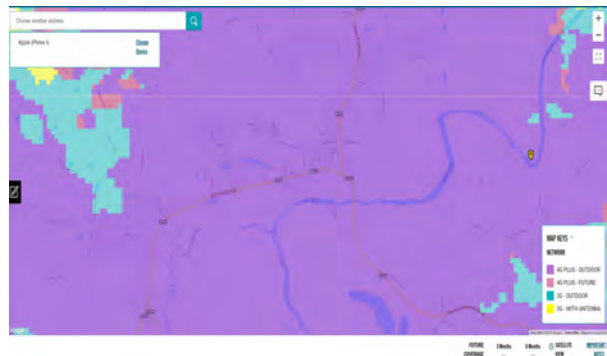
Figure 192 Optus mobile coverage of the Bruthen Blues and Arts Festival
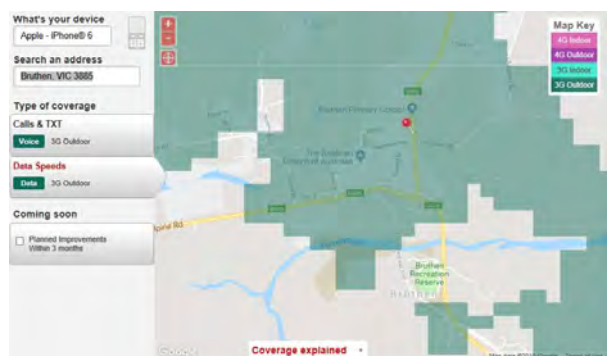
Figure 193 Vodafone mobile coverage of the Bruthen Blues and Arts Festival

5.23 UNIFY Gathering Heavy Music Festival

The UNIFY Gathering Heavy Music Festival is an annual music festival held in the town of Tarwin Lower in South Gippsland. It features various artists with music from the rock, metal and punk genres.

The festival draws crowds of over 7,500 and is held over three days in mid-January with free camping available for festival goers. The festival venue is currently Tarwin Meadows.

Figure 194 Aerial imagery of the UNIFY Gathering Heavy Music Festival

Fixed Broadband

Our analysis reveals the event location falls into NBN Co's satellite footprint.
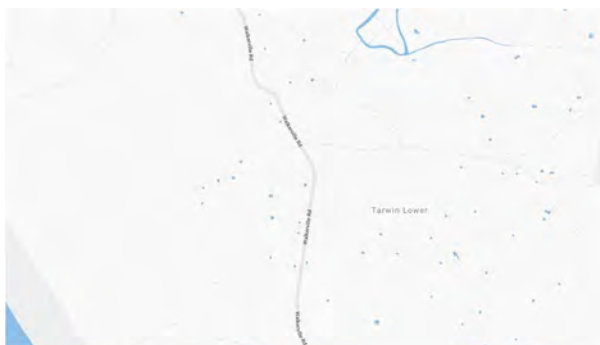
Figure 195 NBN coverage of the UNIFY Gathering Heavy Music Festival (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the venue

- Optus shows a mixture of 4G Plus outdoor, 4G Plus *future* and 3G outdoor coverage of the venue
- Vodafone shows 3G indoor coverage of the venue, with 4G indoor coverage nearby.

In summary, there appears to be mobile coverage from one network operator at the venue, with the other two mobile network operators showing patchy 3G and 4G coverage of the area.

Figure 196 Telstra mobile coverage of the UNIFY Gathering Heavy Music Festival
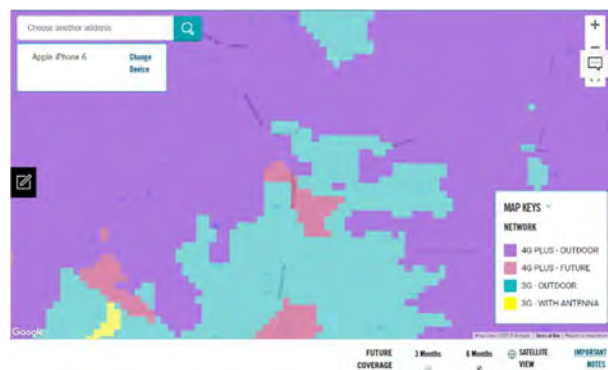
Figure 197 Optus mobile coverage of the UNIFY Gathering Heavy Music Festival
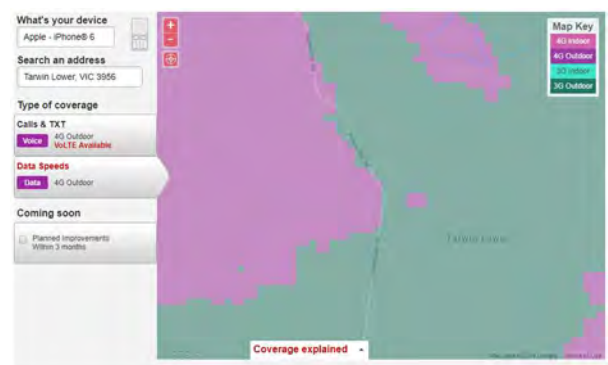
Figure 198 Vodafone mobile coverage of the UNIFY Gathering Heavy Music Festival

5.24 Wilderness Coast Walk

The Wilderness Coast Walk is a 100 kilometre discovery of wide open beaches, rocky headlands, river estuaries and coastal heathlands from Sydenham Inlet, Croajingolong to Wonboyn, New South Wales. Bemm River is the nearest town to the starting location of the walk with a number of accommodation options.

Permits are required to be obtained prior to commencement of the walk. This requirement was introduced to minimize the impact and preserve the remote areas of the walk. A two-night limit applies to the remote campsites and requires booking in advance. Extensive bushwalking experience is highly recommended for the walk and sufficient preparation including appropriate clothing and adequate water supply is essential.

Note that the entire walk from Sydenham Inlet to Wonboyn, New South Wales has been analysed in the sections below.

Figure 199 Walkers trekking the Wilderness Coast Walk[30]
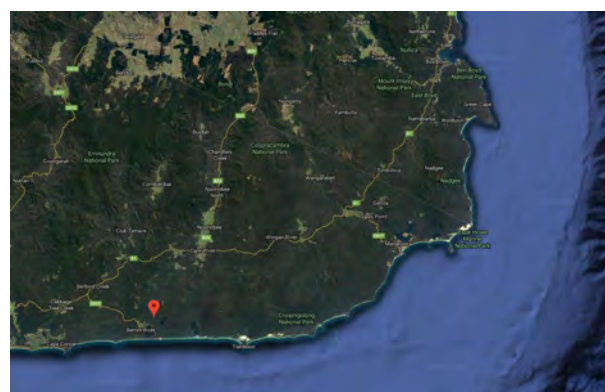
Figure 200 Aerial imagery of the Wilderness Coast Walk

Fixed Broadband

Our analysis reveals the town of Bemm River falls into the NBN Co's satellite footprint.

Refer to Significant Places for fixed broadband analysis of Mallacoota.

Figure 201 NBN Coverage of Bemm River (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows no mobile coverage across majority of the walk including Wingan Inlet campground and boat ramp however, 4GX device outdoor handheld coverage is evident along the coastal section of Wonboyn and Bemm River.
- Optus shows 4G Plus outdoor coverage of Wonboyn area with limited 4G plus outdoor and 3G outdoor coverage on the remaining sections of the walk. Bemm River, Wingan Inlet campground and boat ramp are without handheld coverage.
- Vodafone shows limited mobile coverage of the walk however, patches of 3G outdoor coverage is evident with 4G indoor and 4G outdoor coverage in the Wonboyn area. Bemm River has 3G outdoor and 4G outdoor coverage. Wingan Inlet campground and boat ramp are without coverage.

Refer to Significant Places for mobile coverage analysis of Mallacoota.

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[30] https://www.visitmelbourne.com/regions/Gippsland/Things-to-do/Outdoor-activities/Walking-and-hiking/VV-Wilderness-Coast-Walk

In summary, there appears to be poor coverage of the walk from the three mobile network operators. Walkers are encouraged to carry a personal EPIRB as recommended by Parks Victoria.
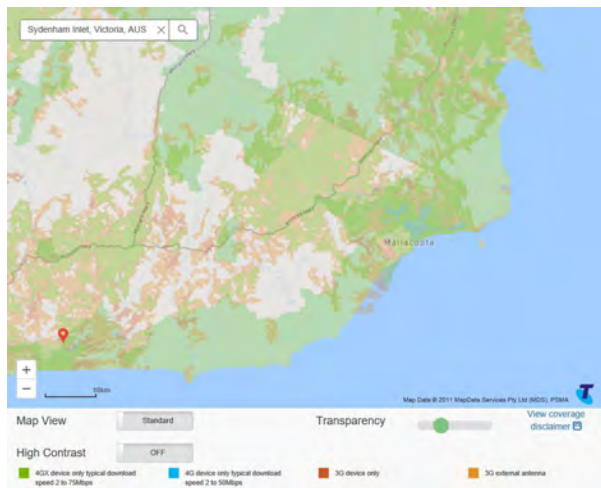
Figure 202 Telstra mobile coverage of the Wilderness Coast Walk

Figure 203 Optus mobile coverage of the Wilderness Coast Walk

Figure 204 Vodafone mobile coverage of the Wilderness Coast Walk

5.25   East Gippsland Rail Trail

The East Gippsland Rail Trail follows the route of the former Orbost railway line, commencing in Bairnsdale travelling through the towns Nicholson, Bruthen, Nowa Nowa and concluding in Orbost.

The trail is 96 kilometres in length and provides an opportunity to explore the farmland, forests, rivers and flood plains throughout East Gippsland. Cycling, walking and horseriding are the popular modes of transport on the trail however, motorised vehicles are prohibited. There is the option to detour to Lakes Entrance from the Colquhuon Forest by connecting to the Gippsland Lakes Discovery Trail, suitable only for mountain bikes.

Figure 205 Map of the East Gippsland Rail Trail[31]

Figure 206 The East Gippsland Rail Trail[32]

Fixed Broadband

Refer to Significant Places for fixed broadband analyses of towns Bairnsdale and Orbost.

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[31] http://www.bikepaths.com.au/map/show/15

[32] https://www.visiteastgippsland.com.au/east-gippsland-rail-trail

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX device outdoor handheld coverage across majority of the trail with patches of 3G device coverage
- Optus shows 4G Plus outdoor, 3G outdoor and 4G Plus (scheduled for the future) coverage on the trail
- Vodafone shows 4G indoor, 4G outdoor and 3G outdoor coverage. Blackspots are evident in the Bruthen area.

In summary, there appears to be no mobile coverage issues on the trail, with the three major mobile network operators all offering service.

Figure 208 Optus mobile coverage of the East Gippsland Rail Trail

Figure 209 Vodafone mobile coverage of the East Gippsland Rail Trail

Figure 207 Telstra mobile coverage of the East Gippsland Rail Trail

6. Transport Corridors

6.1 Introduction

For the purposes of transport, only cellular network coverage is considered in this report. Fixed broadband is, by its nature, inapplicable to mobile users. IoT applications utilising LP-WAN technologies may emerge in the future, but are not "on the radar" at this stage.

In terms of meeting the needs of mobile users, this report considers both road and rail. In the case of rail services, mobile reception depends not only on the availability of coverage along the route, but also on the design of carriages (which can block signals) and the provision of any internal repeaters (to boost internal reception). Since the carriages serving a route can vary from day to day, this report can only consider the level of mobile coverage along the route.

In the case of road transport, the main indicator of demand is the road classification (designated M/A, B or C-grade roads)[33]. It is recognised that there may be other local roads that carry high traffic volumes or that have a poor accident history and where there is poor coverage. Local knowledge is the most effective means of identifying such locations.

Discussions with the MNOs are underway to explore incorporation of the public coverage information into SLIM. If and when such information becomes available, it will become more practical to identify and characterise transport mobile blackspots more easily and efficiently.

Fieldwork commencing at the time of preparation of this report may also yield more accurate insights into significant transport mobile blackspots.

Figure 210 Gippsland region declared roads and rail routes

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[33] "A" and "B" routes are arterial highways (classification AH). "C" routes typically link smaller population centres to larger regional centres, or roads (classification AO).

6.2 Freeways/Motorways

Practical experience of call dropouts and coverage blackspots when driving some of the roads suggests that the carrier coverage maps tend to overstate the quality of coverage, however cars fitted with external antennae will receive more consistent coverage.

There is one motorway in the region with a visual scan of public carrier maps shown below.

6.3 A/B Grade Roads

There are a number of A and B roads in the region. Those listed in the table below are the most significant ones that have been reviewed by a visual scan of public carrier maps.

Highway Name	Approx Start	Approx End	Dist (km)
M1 PRINCES FREEWAY EAST	Longwarry North	Yarragon	34
A1 PRINCES HIGHWAY EAST (1)	Yarragon	Rosedale	70
A1 PRINCES HIGHWAY EAST (2)	Rosedale	Lakes Entrance	131
A1 PRINCES HIGHWAY EAST (3)	Lakes Entrance	Cann River	133
A1 PRINCES HIGHWAY EAST (4)	Cann River	Victorian border	61
A440 SOUTH GIPPSLAND HIGHWAY (1)	Lang Lang	Foster	84
A440 SOUTH GIPPSLAND HIGHWAY (2)	Foster	Sale	122
B23 MONARO HIGHWAY	Cann River	Victorian border	44
B420 PHILLIP ISLAND ROAD	Anderson	Cowes	25
B460 BASS HIGHWAY	Anderson	Leongatha	58
B460 STRZELECKI HIGHWAY	Leongatha	Morwell	55
B500 GREAT ALPINE ROAD	Bairnsdale	Dinner Plain	145
M420 BASS HIGHWAY	Lang Lang	Anderson	29

M1 Princes Freeway East (~34 kilometres)

- From near Longwarry North
- To Yarragon

Maps show continuous 4G outdoor coverage or better by all three mobile network operators. Vodafone appears to be constructing significant new coverage in the area.

A1 Princes Highway West (~275 kilometres)

This highway connects metropolitan Melbourne to the eastern Victorian border extending approximately 275 kilometres through the region. The route has been split into three sections so as to view a reasonable resolution on mobile carrier public coverage maps.

Section 1 – Yarragon to Rosedale (~70 kilometres)
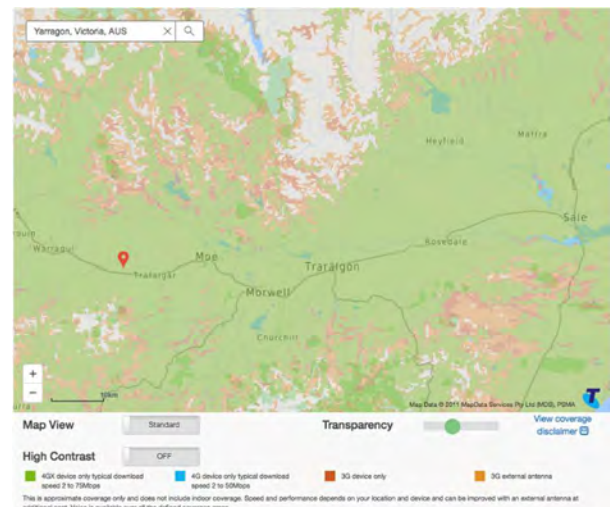
Figure 211 Telstra mobile coverage between Yarragon and Rosedale
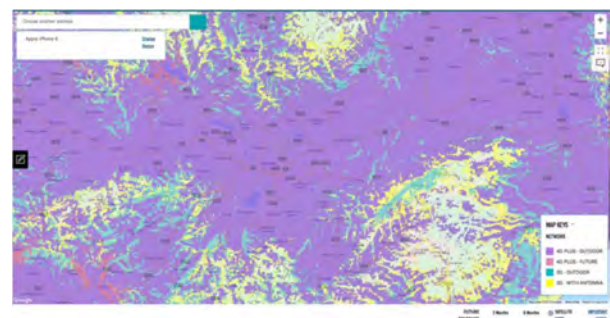
Figure 212 Optus mobile coverage between Yarragon and Rosedale
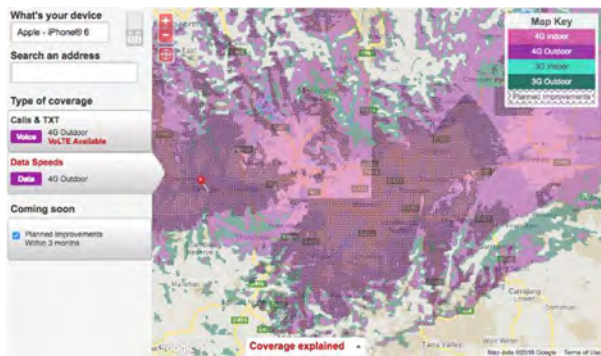
Figure 213 Vodafone mobile coverage between Yarragon and Rosedale

Based on public coverage maps, there appears to be continuous 4G outdoor coverage by all three mobile network operators, with Vodafone constructing significant new coverage along the route.

Section 2 – Rosedale to Lakes Entrance (~131 kilometres)
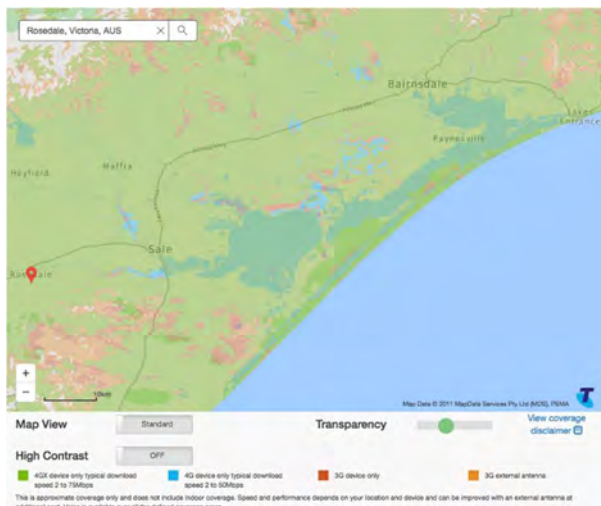
Figure 214 Telstra mobile coverage between Rosedale and Lakes Entrance
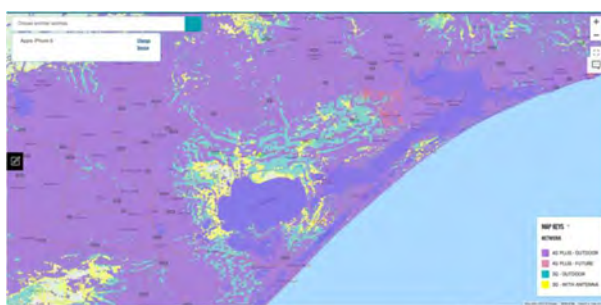
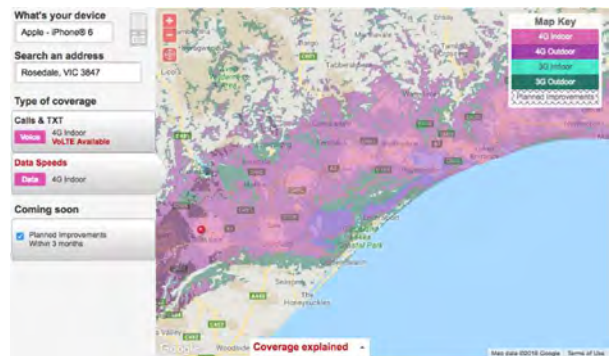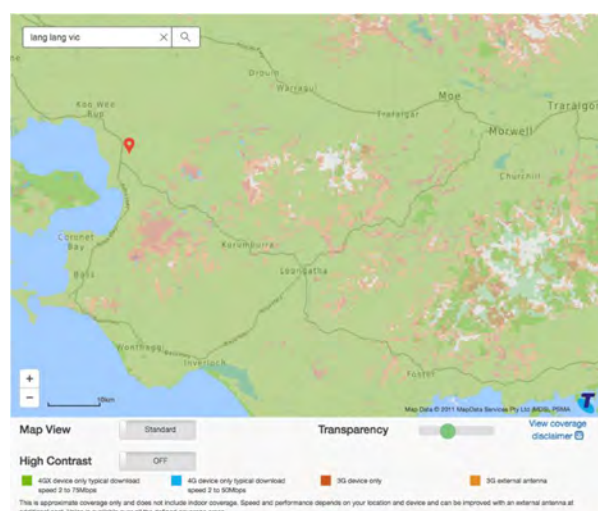*Figure 215 Optus mobile coverage between Rosedale and Lakes Entrance*

Figure 216 Vodafone mobile coverage between Rosedale and Lakes Entrance

Based on public coverage maps, there appears to be continuous 4G outdoor coverage by all three mobile network operators.

Section 3 –Lakes Entrance to Cann River (~133 kilometres)
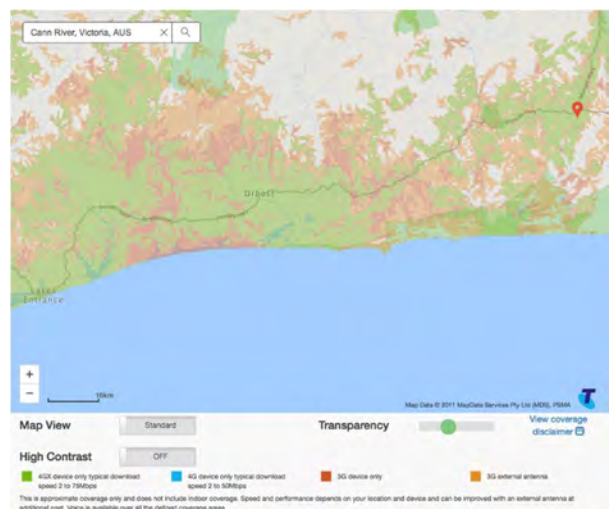
Figure 217 Telstra mobile coverage between Lakes Entrance and Cann River
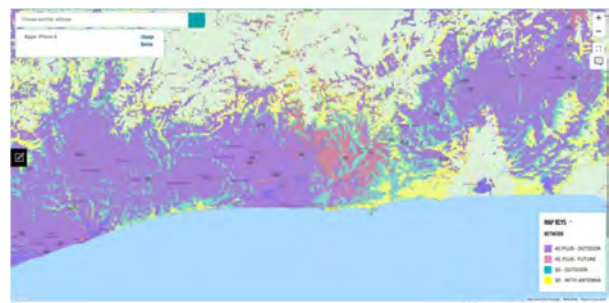
Figure 218 Optus mobile coverage between Lakes Entrance and Cann River

Figure 219 Vodafone mobile coverage between Lakes Entrance and Cann River

Figure 222 Vodafone mobile coverage between Cann River and Victorian Border

Based on public coverage maps, there appears to be 3G outdoor coverage (or better) by all three mobile network operators on the route, with Telstra's coverage appearing the poorest and Optus constructing new coverage near Cabbage Tree Creek.

Based on public coverage maps, there appears to be 3G outdoor coverage (or better) by at least one mobile carrier on the route, with poor or no cover on Telstra for most of the route and Optus providing slightly better coverage.

Section 4 –Cann River to Victorian border (~61 kilometres)

A440 Gippsland Highway (~206 kilometres)

This highway connects the Bass Highway to the Princes Highway West at Sale via the South Gippsland towns of Korumburra, Leongatha, Foster and Yarram. Within the region boundaries, the approximate distance is 206 kilometres and the route has been split into two sections so as to view a reasonable resolution on mobile carrier public coverage maps.

Section 1 – Lang Lang to Foster (~84 kilometres)

Figure 220 Telstra mobile coverage between Cann River and Victorian Border

Figure 223 Telstra mobile coverage between Lang Lang and Foster

Figure 221 Optus mobile coverage between Cann River and Victorian Border
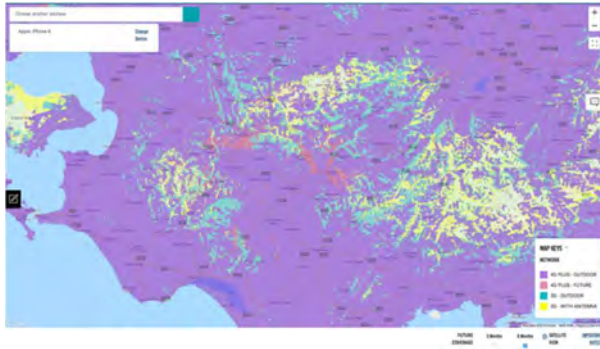
Figure 224 Optus mobile coverage between Lang Lang and Foster
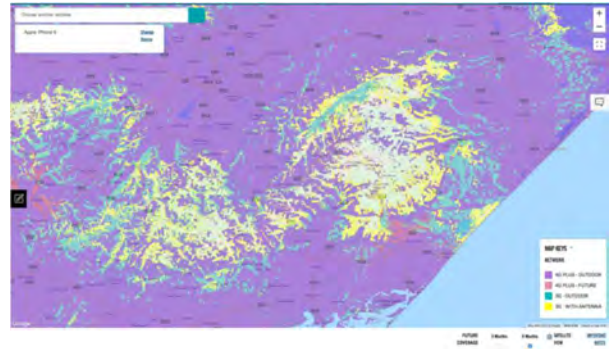
Figure 227 Optus mobile coverage between Foster and Sale

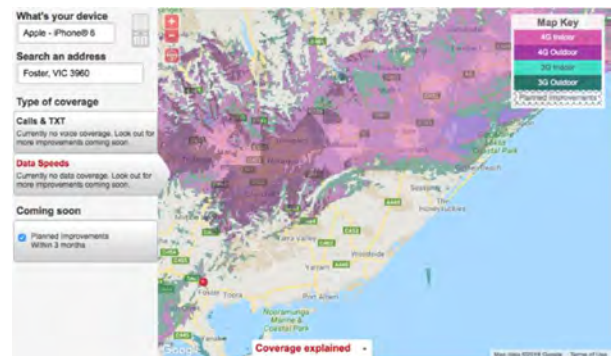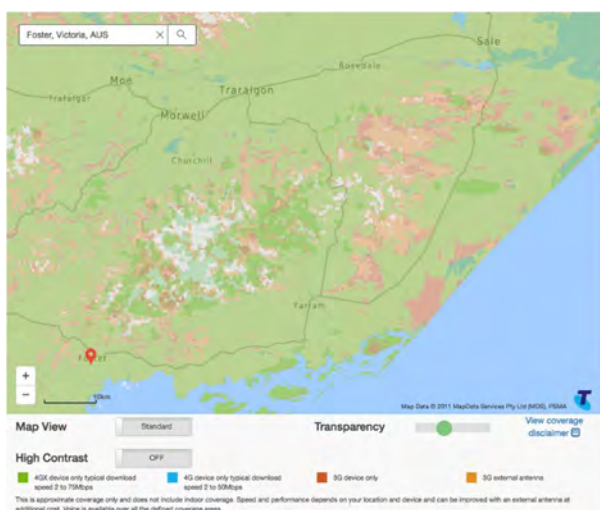*Figure 225 Vodafone mobile coverage between Lang Lang and Foster*

Figure 228 Vodafone mobile coverage between Foster and Sale

Based on public coverage maps, there appears to be 4G outdoor coverage (or better) by at least two mobile network operators on the route, with Vodafone having no coverage at all between near Korumburra and Foster.

Based on public coverage maps, there appears to be 4G outdoor coverage (or better) by at least two mobile network operators on the route, with both Optus and Telstra having small areas of poor coverage in the mountainous national parklands near Gifford West and Stradbroke and Vodafone having no coverage at all between Foster and near Longford.

Section 2 – Foster to Sale (~122 kilometres)

Figure 226 Telstra mobile coverage between Foster and Sale

B23 Monaro Highway (~44 kilometres)

- From Cann River
- To Chandlers Creek (Victorian border)

This highway connects the A1 Princes Highway East at Cann River with Bombala in NSW. The section of the highway that falls within the Region is illustrated below.
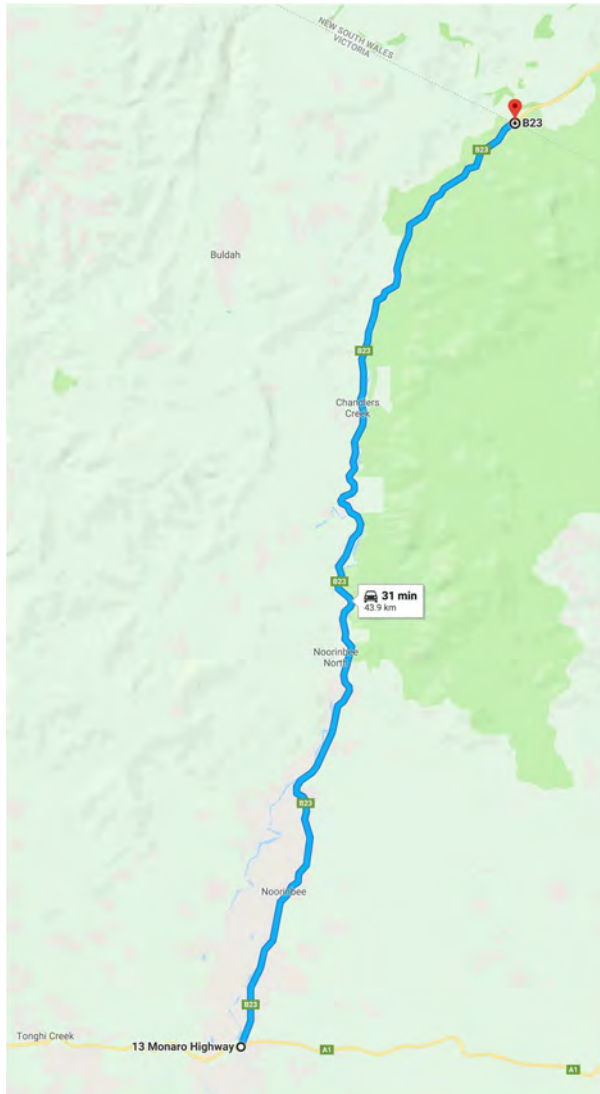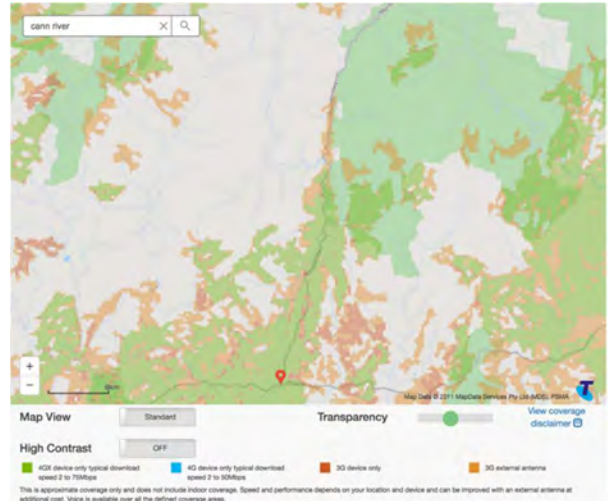

Figure 229 Monaro Highway

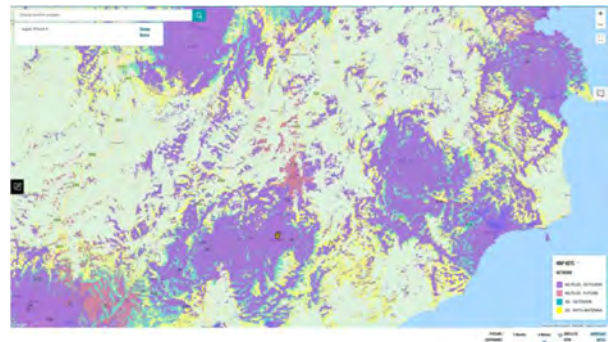*Figure 230 Telstra mobile coverage between Cann River and NSW border*

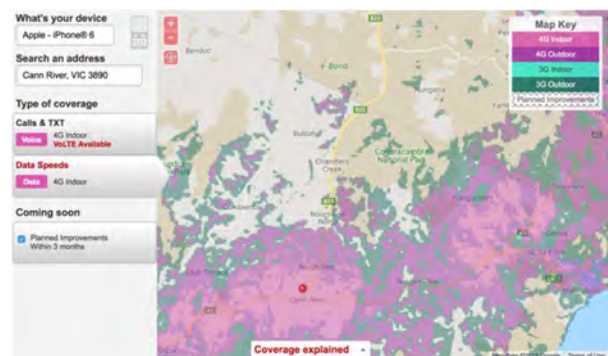*Figure 231 Optus mobile coverage between Cann River and NSW border*

Figure 232 Vodafone mobile coverage between Cann River and NSW border

Based on public coverage maps, there appears to be 4G outdoor coverage (or better) by all three mobile network operators on the route between Cann River and near Chandlers Creek and then no coverage for any carrier.

B420 Phillip Island Road (~25 kilometres)

- From Anderson
- To Cowes

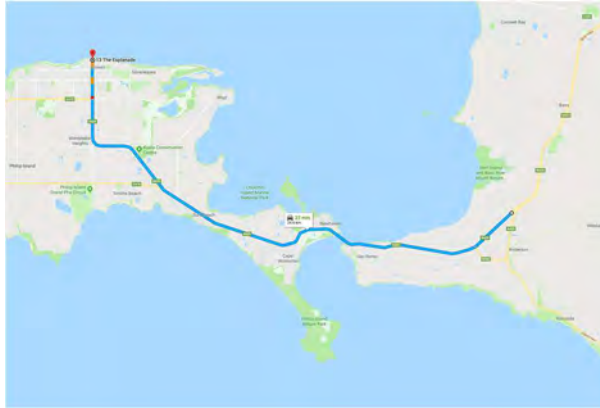This highway connects the M420 Bass Highway with Phillip Island as illustrated below.

Figure 233 Phillip Island Road

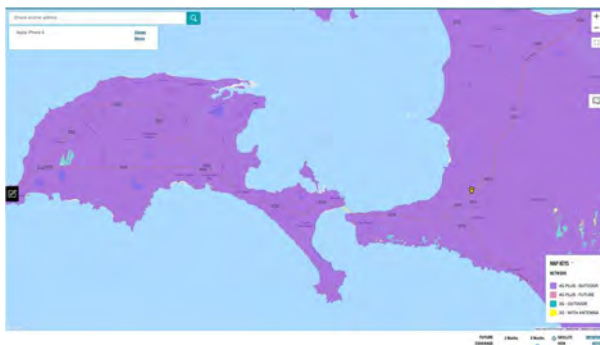*Figure 234 Telstra mobile coverage between Anderson and Cowes*

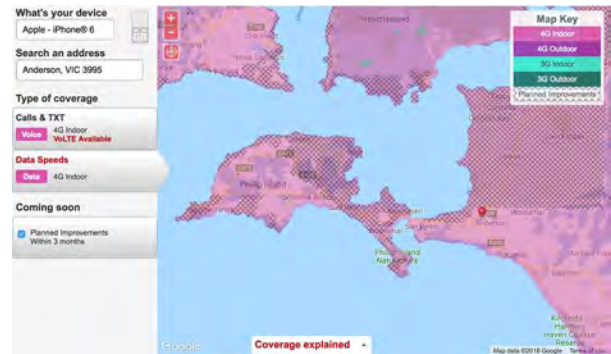*Figure 235 Optus mobile coverage between Anderson and Cowes*

Figure 236 Vodafone mobile coverage between Anderson and Cowes

Based on public coverage maps, there appears to be 4G outdoor coverage (or better) by all three mobile network operators on the route.

B460 Bass Highway (~58 kilometres)

- From Anderson
- To Leongatha

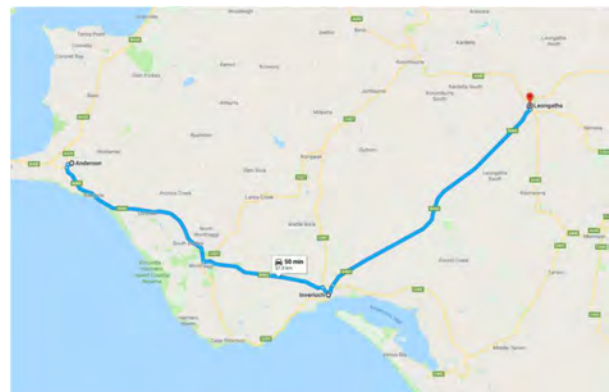This highway connects Phillip Island Road to Leongatha via Wonthaggi and Inverloch as illustrated below.
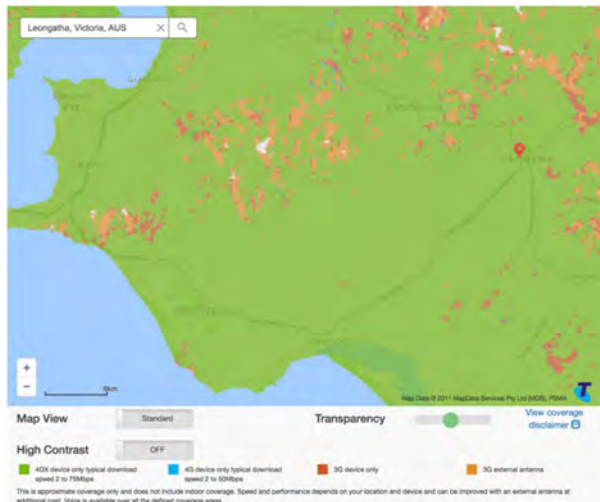

Figure 237 Bass Highway

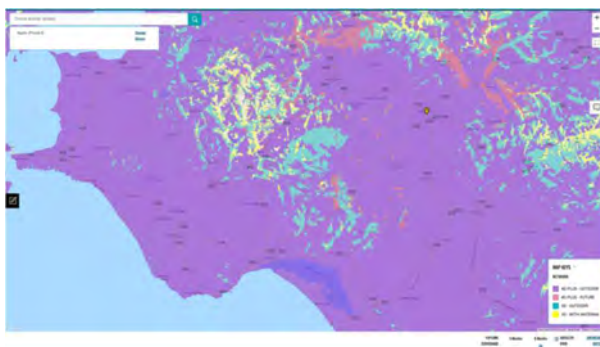*Figure 238 Telstra mobile coverage between Anderson and Leongatha*

Figure 239 Optus mobile coverage between Anderson and Leongatha
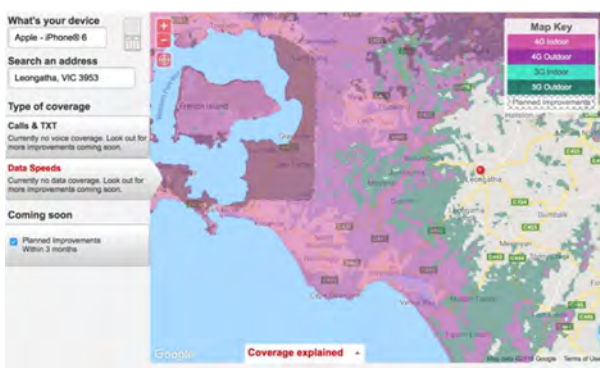

Figure 240 Vodafone mobile coverage between Anderson and Leongatha

Based on public coverage maps, there appears to be continuous 4G outdoor coverage (or better) by at least two mobile network operators with Vodafone showing no coverage at all between Leongatha South and Leongatha.

B460 Strzelecki Highway (~55 kilometres)

- From Leongatha
- To Morwell

This highway extends the Bass Highway from Leongatha to the M1 Princes Freeway East at Morwell as shown below.
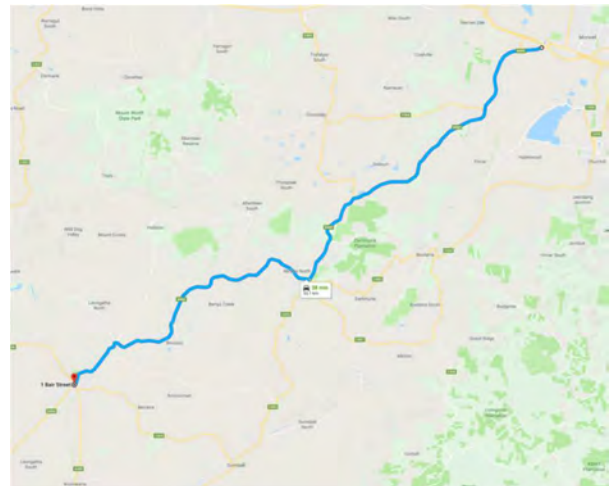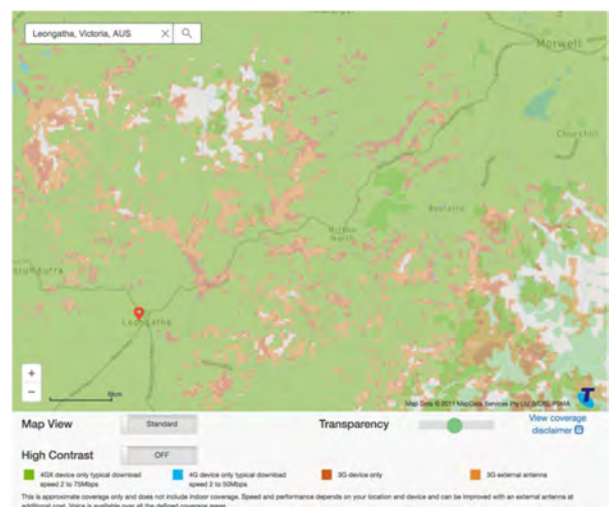

Figure 241 Strzelecki Highway

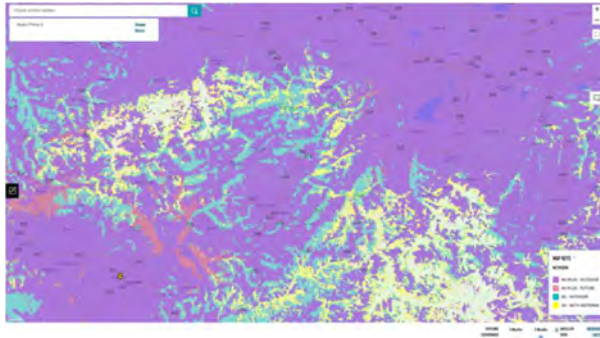*Figure 242 Telstra mobile coverage between Leongatha and Morwell*

Figure 243 Optus mobile coverage between Leongatha and Morwell

Figure 244 Vodafone mobile coverage between Leongatha and Morwell

Based on public coverage maps, there appears to be 3G outdoor coverage (or better) by at least two mobile network operators over the entire route, with Vodafone showing no coverage at all between Leongatha and Delburn.

B500 Great Alpine Road (~145 kilometres)

- From Bairnsdale
- To near Dinner Plain

This tourist highway connects Wangaratta (and the Hume Freeway) to Bairnsdale passing through the townships of Myrtleford, Bright and Mount Hotham and providing year-round access to the Victorian Alps. The section of the highway within the region is illustrated below.
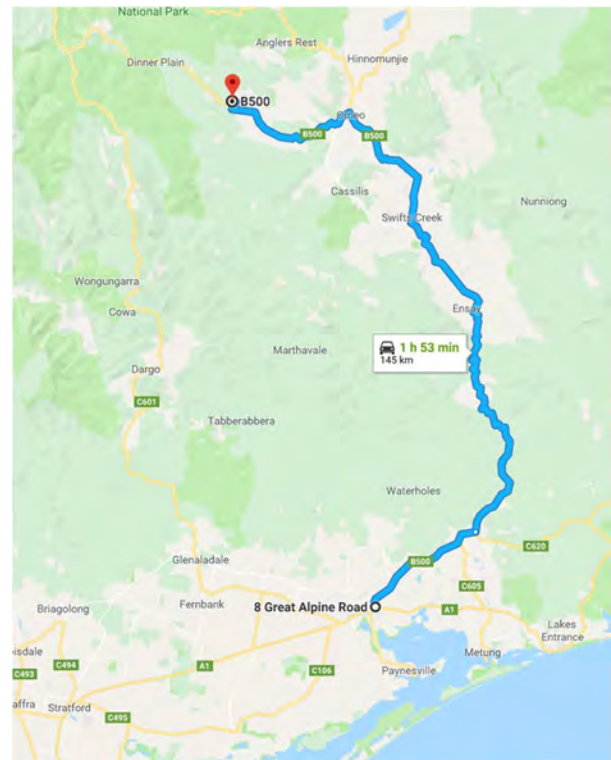

Figure 245 B500 Great Alpine Road within the Gippsland regional partnership

Based on public coverage maps, there appears to be continuous 4G outdoor coverage by all three mobile network operators.

M420 Bass Highway (~29 kilometres)

- From Lang Lang
- To Anderson

The highway is illustrated below.
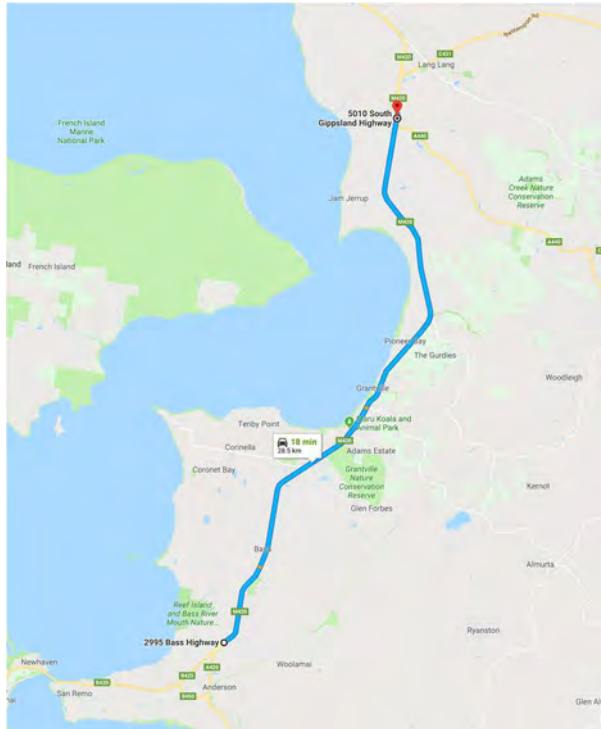
Figure 246 Bass Highway
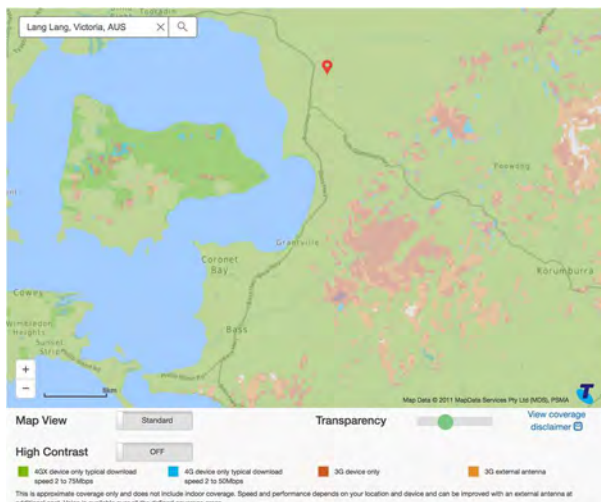
Figure 247 Telstra mobile coverage between Lang Lang and Anderson
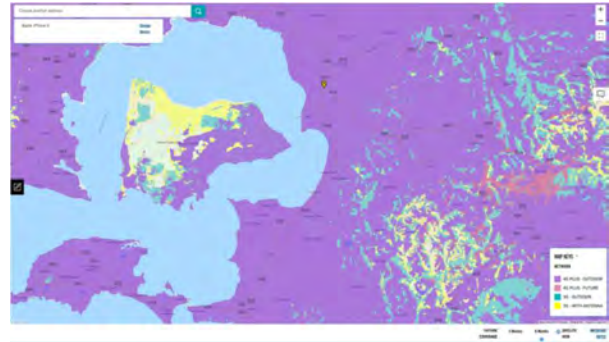
Figure 248 Optus mobile coverage between Lang Lang and Anderson
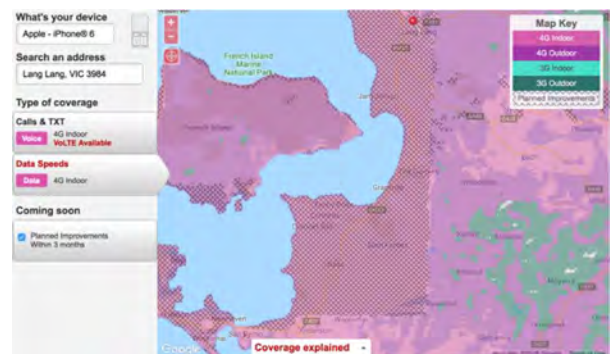
Figure 249 Vodafone mobile coverage between Lang Lang and Anderson

Based on public coverage maps, there appears to be continuous 4G outdoor coverage by all three mobile network operators across the route.

6.4   C-Grade Roads

There are 113 declared C roads in the region forming a mesh between major and small communities. In general, the is good highway coverage across the Latrobe Valley region and in South Gippsland, however the majority of the region consists of mountainous national park land which, combined with very low population density presents challenges for all mobile network operators and unreliable service for 000 emergency calls in those areas.

6.5   Rail

Melbourne – Traralgon

The Victorian Government is undertaking a program to improve mobile services on regional rail routes. This project includes installation of in-train mobile repeaters in all VLocity rail cars as well as improved track-side mobile coverage in certain areas.

As a result of this program, all passengers travelling on the Melbourne-Traralgon route have continuous mobile coverage from all three MNOs by the end of the 2018 calendar year.

Traralgon – Bairnsdale

For passengers travelling onwards towards Bairnsdale, the route carries up to 6 services per weekday between Melbourne and Bairnsdale. Annual patronage for 2017-18 was 130,000 - a 5% increase on 2016-17.

The route is not served by VLocity rolling stock and therefore there are no in-train repeaters in the trains which V/Line uses to service this route. However these cars also do not suffer from the severe radio frequency shielding as the VLocity rail cars. Consequently, mobile carrier public coverage maps can be used as a guide to in-train mobile coverage.

As the rail primarily basically follows the Princes Highway West, trackside coverage for all three mobile network operators is typically continuous and of good quality.
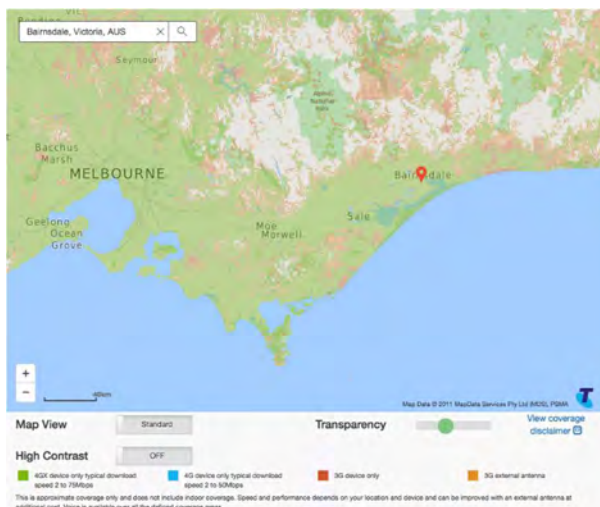
Figure 250 Telstra rail coverage between Melbourne and Bairnsdale
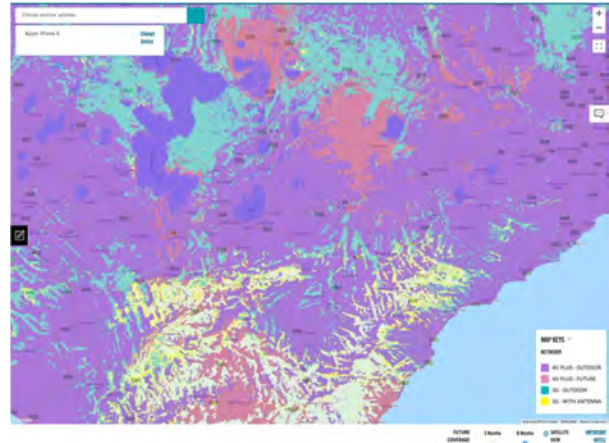
Figure 251 Optus rail coverage between Melbourne and Bairnsdale
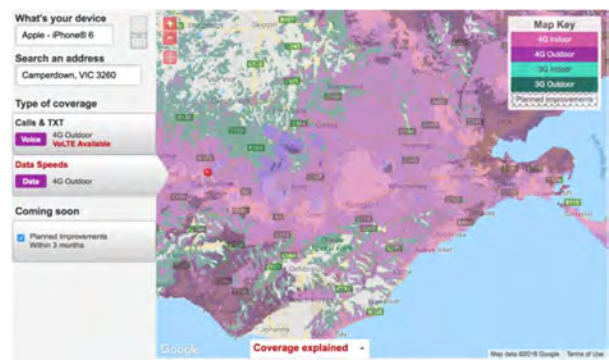
Figure 252 Vodafone rail coverage between Melbourne and Bairnsdale

In summary, there appear to be no mobile coverage issues on the route, with the three major mobile network operators all offering near-continuous service, noting that localised conditions such as cuttings and overpasses may temporarily disrupt continuous coverage as the train passes through. Further measurement of in-train mobile coverage may be required.

A. Acknowledgements & Qualifications

Acknowledgements

Acknowledgements

This report includes numerous images and cites many details about locations that have been obtained from a range of sources. Citing a reference for commonly accessed data sources would clutter the document and undermine the flow of relevant information. Accordingly, this section sets out some important acknowledgements regarding data sources.

1. The **Australian Bureau of Statistics** (ABS) provides a rich repository of information at varying levels of aggregation. Two sources in particular have been used extensively over the period from May 2018 to October 2018 during which this report was prepared.

- Data by Region[34] – providing statistics at the level of Local Government Area (LGA).
- Quickstats[35] - providing statistics at varying levels of aggregation, but in particular, at the level of urban centre/locality (UCL) and slightly higher levels of aggregation as appropriate.
- These data are primarily drawn from the June 2016 Population Census.

2. Screen images generated by the **State Level Information Management** (SLIM) **Graphical Information System** (GIS) are compiled from various sources, and typically include an acknowledgement of the relevant sources in the bottom right corner of the image. Such acknowledgements have often been clipped from the images presented in this report, but are acknowledged (based on the type of background) as follows:

- For grey street map backgrounds: "Leaflet | © OpenStreetMap"

- For coloured street map backgrounds: "Leaflet | Tiles © Esri – Source: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012"
- For satellite imagery backgrounds: "Leaflet | Tiles © Esri – Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community"
- For plain grey background: "Leaflet | Tiles © Esri – Esri, DeLorme, NAVTEQ"
- For topographic backgrounds, "Leaflet | Tiles © Esri – Source: Esri, De Lorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, Geobase, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esi China (Hong Kong), and the GIS User Community"

3. For any screen capture of **Telstra**'s public coverage map that does not show an acknowledgement of the data sources, the following acknowledgement applies: "Map Data © 2011 MapData Services Pty Ltd (MDS), PSMA".

4. For any screen capture of **Optus**'s public coverage that does not show an acknowledgement of the data sources, the following acknowledgement applies: "Map data ©2018 Google".

5. For any screen capture of **Vodafone**'s public coverage that does not show an acknowledgement of the data sources, the following acknowledgement applies: "Map data ©2018 GBRMPA, Google".

6. For any screen capture of **Sigfox** coverage that does not show an acknowledgement of the data source, the following acknowledgement applies: "Leaflet".

7. Region-level Digital Inclusion Index data has been purchased from Roy Morgan.

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[34]   See http://stat.abs.gov.au/itt/r.jsp?databyregion

[35]   See for example http://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/UCL211002?opendocument

Qualifications

1. The ABS periodically makes corrections to its data (including the 2016 Census data utilised widely in this report), so minor discrepancies may be noted between figures cited in this report and data obtained from the ABS website.

2. Coverage by different network technologies reflects the situation at a point in time. Network operators regularly expand and reconfigure the networks with resulting changes to coverage. Before placing reliance on any information presented in this report, it is prudent to obtain the latest available information.

3. Mobile reception depends on many factors including the type of device, whether the device has an external antenna and the like. Both the Optus and Vodafone public coverage maps require nominating a device. For consistency, the coverage maps shown are based on a "middle of the range" iPhone6.

4. A fourth Mobile Network Operator (MNO) – TPG – is in the process of entering the Australian market. Its coverage intentions are not currently known.

B. Analytical Framework

The digital planning framework has been developed to systematically analyse the significant body of supply, demand and other key information gathered to support the digital planning process, which in turn provides the evidence base to recommend priorities on a place and sector-based level. This approach takes into account the significant diversity within the region. Analysis is conducted to provide a view of the current supply and demand situation and a three to five-year forward view. The framework is designed to be flexible, repeatable, easy to use and at the summary level at a glance, and guide where to focus action to address the digital divide. Further development of this framework is required in subsequent digital plans.

The planning framework takes inputs from multiple information sources including:

- General regional characteristics
- Supply characteristics at a regional level
- Place-based analysis of population centres, the rural hinterland and key primary production areas, tourist locations and transport mobile blackspots
- SLIM database
- The Regional Digital Plans: Common Themes report
- Regional Assembly feedback
- Local government area surveys and onsite fieldwork
- The Digital Inclusion Index
- Australian Bureau of Statistics information
- Other sources highlighted in this document.

Shortfalls in internet access are identified by comparing supply and demand for public network access services classified by technology type (fixed, mobile, Internet of Things and WiFi) in different locations and for the various user groups (businesses, households, communities, visitors and road and rail travelers). This is done by assigning High, Medium and Low ratings (H, M, L) ratings for the supply of, and demand for, these services.

Analysis is first conducted for the present, to understand what needs fixing to catch up to capital city and international standards. It is also done looking forward 3-5 years – where supply is expected to be without further state government intervention relative to where the region needs to be in 3-5 years to be a competitive business location and an attractive place to live and work.

The 'digital divide'

In essence, the Digital Plan and supporting information addresses the country-capital city digital divide (access, ability and affordability) by:

- Examining the geographic, demographic, social, economic characteristics of the region and the important structural changes occurring
- Identifying shortfalls in the availability and performance of internet access technologies, in a place and sectoral frame that reflects the region's characteristics and structural change challenges
- Canvassing priority action to address unmet needs
- Highlighting the need for good information skills gaps and the affordability of digital services.

The usual focus of the digital divide is on the situation in the regions relative to capital city locations. However, the significant diversity in geographic, demographic, social and economic characteristics within a region means there are also digital divides within regions and localities. Accordingly, effective digital planning needs to be place- and sector-specific and able to identify priorities at this detailed level. However, current data limitations mean some of the analysis the this first Gippsland Digital Plan:

Supporting Information relates to the high-level city-country digital divide and simply acknowledges and discussing the locally-based digital divide issue.

The digital divide between regional Victoria residents and businesses and their capital city counterparts – the gap between them in the *availability* of digital services, the *ability* residents and workers to use digital services (digital skills), and the *affordability* of digital services and digital expertise – is reflected in the 2018 Royal Melbourne Institute of Technology-Swinburne-Telstra Digital Inclusion Index (DII) which measured these aspects in different locations. This shows a substantial gap between regional Victoria and Melbourne – regional Victoria rated 53 and Melbourne 64.

The DII also shows substantial variation between and within regions, shown in the following chart.

Digital Inclusion Index - Victoria

| Melbourne | Geelong | Rural Vic | West Vic | NW Vic | East Vic | North Vic |
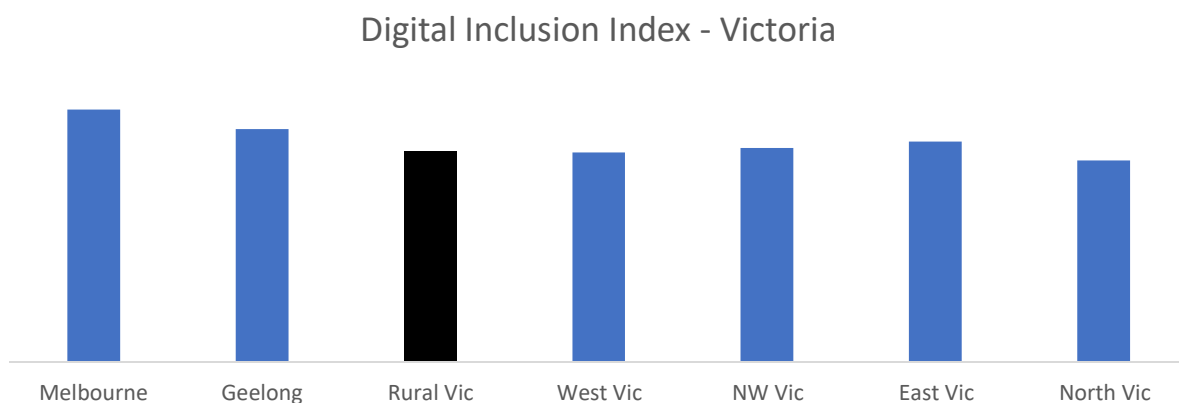
Digital divides within localities are driven by the intersection of topography, population density, the inherent performance characteristics of key digital technologies and network deployment economics. These factors cause variations in service quality for standard fixed line technologies, local gaps in mobile coverage, and technology boundary issue. This can result in highly localised 'digital have nots' amongst and contiguous to 'digital haves'. and technology coverage boundary issues (e.g. on the fringes of towns).

Digital technologies

Fixed networks provide high speed internet access at a set location (for example an office, factory or residence), currently at a relatively low price compared to mobile access. The NBN, an Australia-wide ubiquitous wholesale public access network will, in conjunction with retail service providers, be the main fixed access means for most Australian households and smaller businesses when completed in 2020. It comprises three core technology types – fixed line (cable-based), fixed wireless and satellite (Sky Muster). NBN fixed line technology in turn comprises fibre to the premise (FTTP – the 'gold standard'), fibre to the curb (FTTC – short copper loops to premises with effective performance close to that of FTTP) and fibre to the node (FTTN – longer copper loops which can degrade service quality and exclude delivery of the pending NBN Enhanced Ethernet business grade service).[36]

What this high-level analysis does not show are technology boundary effects that can determine broadband haves and have nots at the local level – that some people in a given location are supplied with different technology and accordingly experience different service quality to their neighbours. For example, where NBN infrastructure cuts over from fixed line to fixed wireless technology (or FTTP to FTTN within fixed line technology), businesses on either side of the boundary will experience different service quality. This will often occur on the fringes of, and sometimes within cities, towns and localities.

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[36] It is anticipated NBN Co will commence a program of shortening the length of copper loops in FTTN areas once rollout is completed in 2020.

The analysis also does not show critical service quality issues that are not due to the NBN infrastructure connecting the users' premises. This includes retail service providers not purchasing enough NBN and backhaul data throughput capacity to meet the speed and reliability needs of users (and advertised service performance).

Awareness of these important issues is essential to understanding the user experience and addressing the various dimensions of the digital divide. The SLIM database provides the means to capture and analyse the locations affected by the above limitations, which will help build the evidence base around these issues. However, this will take time beyond this first iteration of the Digital Plan: Supporting Information. In the meantime, fieldwork and case study analysis will be used to build the evidence necessary for effective advocacy for measures which address such service quality anomalies, for example through NBN Co extending its technology boundaries and retail service providers purchasing sufficient data capacity.

Mobile networks provide 'untethered – on-the-move' internet access from three major and one nascent networks (TPG). 3G and 4G mobile technologies are currently in use. Mass deployment of high-performance 5G service is planned to commence in capital cities and larger regional centres in 2020. Coverage (service availability) depends on local topography and the location and aerial orientation of mobile towers, and for these reasons is absent or poor quality in some locations.

The Digital Plan: Supporting Information has, by necessity, taken the mobile coverage maps publicly provided by the carriers as the starting point for analysis – better data held by the carriers has not yet been made available. What this necessarily-superficial, second-best analysis does not show is the significant variation in the real-world connectivity experience of mobile users, with many gaps in coverage, and poor-quality service, in areas shown as fully covered.

Furthermore, mobile users have increasingly higher expectations of the services that they can access on smartphones, ranging from traditional voice and critical emergency communications through to web browsing data apps and video streaming. The situations in which people want to access mobile services are also changing. Once primarily considered a service for on-the-move outdoor use, mobile services are increasingly substituting for fixed services in the home and at work for a significant share of users. However, the publicly available coverage maps fail to distinguish between traditional voice and other narrowband services on the one hand, and high quality mobile broadband access on the other – that is, they do not provide enough information for regional users in particular to identify locations where higher bandwidth services will (and will not) work well.

The Victorian Government understands user disappointment and disillusionment with mobile connectivity in regional areas and has joined industry stakeholders in calling for mobile carriers to publish the richer and more accurate coverage data they possess to accurately identify unmet needs and possible ameliorative actions. The Government in conjunction with the Australian Competition and Consumer Commission (ACCC) and the Commonwealth Government is actively pressing the mobile carriers to publish more useful coverage data and supports the ACCC in its public commitment to take regulatory action if cooperative progress is not made.

The SLIM database is capable of capturing and analysing more detailed location-specific information on the availability and quality mobile coverage in regional areas, with improved coverage data to be incorporated in future iterations of SLIM and the digital plans when this becomes available.

Internet of Things networks provide one- and two-way communications between sensors and central data storage and analysis facilities. These can be high bandwidth (HB-IoT) for large data volumes in either direction, or low volume low power (LP) IoT (typically one way, from a remote sensor in a paddock, factory of residence). High bandwidth IoT is currently delivered on existing mobile networks (with wider coverage). LP-IoT is currently provided on LP-WAN networks by operators such as Taggle and Sigfox, although the mobile network operators are examining the technology and business case for providing low power IoT applications on their networks.

Public WiFi networks provide a no-cost-to-user link between mobile devices (e.g. smartphones and tablets) and mobile service providers.[37] Free public WiFi is typically provided by local governments for, disadvantaged citizens, the wider public and visitors in larger cities and towns.[38] Local government WiFi networks also support Smart City applications.

Digital skills

Ensuring wide access to digital technologies can only be effective if consumers and the workforce have the skills to properly take advantage of these developments. Necessary digital skills fall into three broad groups: the general digital literacy of consumers and the workforce (familiarity and competence with every-day digital services), the availability of IT professionals for recruitment and provision of advisory services, and workforce preparedness for successful employment in an age of ongoing digital disruption – the capacity of individuals for independent learning, flexibility, knowledge management, design thinking and innovation and risk-taking.

There are few (if any) direct measures of skills supply and demand (particularly at a place and sector level), requiring local data collection to accurately identify skills gaps and shape needed remedial action.

There are, however, a number of secondary indicators that, taken together, can give a broad indication of skills availability at an LGA and region level – age, education, the proportion of households that access the internet at home, the share of employment in high-technology industries and the 'ability' component of the Digital Inclusion Index.

Matching these supply-side indicators with demand metrics to identify unmet skills is not possible at present – collection of data for this purpose is urgently required.

Digital services affordability

The affordability of digital services (and skills) relative to other regions and Melbourne is a function of both their price and the ability of businesses, local governments and consumers to pay.

There is no clear evidence that public network fixed and mobile access services are more expensive in regional locations, as NBN Co is required to price its wholesale services uniformly Australia-wide, and broadband and mobile service providers price nationally not on a location basis. Nonetheless it is likely many regional users pay more for these services on a quality-adjusted basis – an equally-priced fixed wireless or satellite service does not in general provide the same value-for-money as an equivalent fixed line service. Similarly, an equally-prices mobile service will be lower value-for-money for regional users that frequently experience blackspots and service degraded service.[39]

In addition, unconfirmed anecdotal evidence indicates regional users are not offered the same range of specials and one-off customer retention incentives as their capital city counterparts. Anecdotal evidence also suggests the cost of bespoke connectivity solutions (such as a dedicated fibre connection) is higher in the regions as there are fewer competing suppliers.

Regarding ability to pay, it is well known that annual household incomes in the regions are on average substantially lower than in Melbourne: around $50,000 compared to $80,000. This means regional consumers in general, and these in lower-income regions and LGAs in particular, have a lower ability to pay than their capital city peers. Evidence on the ability to pay of regional businesses compared to this in

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[37] The provider of the free public WIFI service – typically a local government (which may in turn commission a mobile operator to provide the service) meets the cost of the link

[38] Free public WiFi is also provided by the operators of some cafes, fast food restaurants, shopping centres, airports, tourist locations and other commercial premises to improve customers' on-site experience.

[39] The price of IoT services in the regions relative to capital city locations has not yet been conducted, but is expected to be higher on a quality-adjusted basis

capital city locations has not been yet been investigated. Finally, a local government IT manager has indicated IT costs are a substantially higher share of the budget in the regions than for local governments in Melbourne.

State Level Information Management (SLIM) database

The State Level Information Management (SLIM) database is an interactive place-based repository of current information on the availability of digital services, key demand drivers and place-based data on the characteristics of each region. The development of the SLIM database is a CRCP initiative funded by the Victorian Government. SLIM has initially been prepared for state government use only from a variety of public and commercial-in-confidence data. The protocols necessary for wide use are being developed to support future versions of the Digital Plans.