Regional Digital Plan GREAT SOUTH COAST







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Glossary

ABS: Australian Bureau of Statistics ACCC: Australian Competition and Consumer Commission **BB-IoT**: Broadband Internet of Things **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 – 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 connectivity for the public LGA: Local government area M: Mobile services – third, fourth and fifth generation technology (3G, 4G, 5G) **MBSP:** Mobile Black Spot Program (Commonwealth Government) **MNO:** Mobile network operator **NB-IoT**: Narrowband Internet of Things 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 RDAC: Regional Development Advisory Committee – the chairs of the nine Regional partnerships **SLA**: Service Level Agreement SLIM: State Level Information Management database VMP: Victorian Mobile Program WiFi: Wireless mobile access technology for residents and visitors in public places and some neighbourhoods

Context of the Great South Coast Digital Plan

What is a Digital Plan?

The Great South Coast Digital Plan is an evidence-based, place-based analysis of the supply of and demand for digital services and skills. It is aimed at identifying 'unmet needs' and potential solutions, for both the present and in 3-5 years. The establishment of this Plan empowers advocacy and action by local communities, households and businesses – operating individually and through the Regional Partnerships – in bringing about changes needed to reduce the country-city digital divide.

The Great South Coast Digital Plan complements other regional Plans prepared by the Government to strengthen local economies and communities across regional Victoria – including Infrastructure, Transport, Skills and Growth Plans.

While informing the development of digital policies and programs for the regions, the digital plans are not a commitment to any particular course of action by the Victorian Government.

Why are Digital Plans needed?

Region-level digital plans are needed to effectively reduce the persistent country-city **digital divide**: regional shortfalls in **access** to digital services, the **ability** to effectively use these services, and their **affordability** relative to their capital city counterparts. The digital divide matters more than ever as the realities of the increasingly pervasive digital world strike home:

- *Households* around the world rely more and more on digitally-based entertainment, communications and shopping, banking, news and other personal services
- *Communities* increasingly stay connected and safe, and community services are delivered more effectively, through digital platforms
- *Businesses* of all sizes rely on digital advances high bandwidth fixed and mobile communications, data capture and analysis, artificial intelligence and digitally-driven production techniques to increase productivity and remain competitive.

The Great South Coast Digital Plan is also needed to identify and address critical unmet digital needs that stand in the way of the region's national and international competitiveness and attractiveness as a place to live and work.

How will the Digital Plans be used?

The Great South Coast Digital Plan:

- Provides forward-looking guidance to Regional Partnerships, local governments, businesses, households and community groups in identifying digital priorities and advocating solutions (including digital priorities/solutions for students).
- Informs Victorian Government regional digital policy and program development.

The Great South Coast Digital Plan will be employed in conjunction with, and guide the use of, companion reports and tools:

- The State Level Information Management (SLIM) database, an interactive place-based repository of current information on the availability of digital services and key demand drivers across regional Victoria
- Fieldwork comprising an online survey of all local governments in regional Victoria, and face-to-face interviews in each region.

How were the Digital Plans prepared?

The Great South Coast Digital Plan was prepared with Victorian Government support and through:

- Extensive face-to-face consultation with the Regional Partnership and Digital Plan Working Group (listed in Appendix A)
- In-depth interrogation of the SLIM database recognising the limitations of data on the supply of digital services, including the limited accuracy of publicly available mobile coverage maps regarding localised blackspots
- Independent expert advice on the fundamental drivers of unmet needs and potential solutions
- Confirmation from the Regional Partnership that the Digital Plan hits the mark as a tool for them and their stakeholders in driving place-based solutions to unmet digital needs.

What are the key elements of each Digital Plan?

Key elements of the Great South Coast Digital Plan are:

- A description of the region's geographic, demographic, economic and structural change characteristics
- An overview of current telecommunications services in the region, based on best available information at the time subject to the accuracy of publicly available coverage maps (including localised mobile blackspots)
- Place and sector-based analysis of digital services and skills supply and demand and potential solutions to unmet needs for selected cities, towns, localities; primary production areas; tourist sites and transport corridors.

What does Digital Plan success look like?

Success of the Digital Plan is defined by:

- Active and effective use of the Plan by the Regional Partnership and other regional stakeholders in identifying and promoting digital priorities
- Investment in digital priority projects in the region
- Improvement in the region's competitiveness as reflected in business and population attraction and retention.

Regional Partnership Foreword

The Great South Coast region is a diverse area comprising our population centres of greatly varying sizes, a range of industries and primary production areas and a wealth of tourist attractions.

Whether it is a local business owner, a young student, a tourism operator, a visitor or an elderly citizen, digital connectivity is now a fundamental feature of everyone's lives.

So ingrained are digital services in our daily lives that they are now a significant factor contributing to the liveability and growth of regional communities. No matter where we go and what we do, we must be able to connect with the people, services and information we need.

Our regional stakeholders have long suffered the challenges associated with inferior digital services, particularly those located in more remote and less densely populated areas which presents challenges for population retention and attraction.

The lack of clear evidence on where digital infrastructure gaps exist and the demand of users has been a clear barrier to improving services and better targeting investment.

In this regard, the Great South Coast Regional Partnership is pleased to present its Digital Plan.

This plan provides an initial snapshot in time of our digital infrastructure landscape and is the first ever comprehensive digital plan of its kind for our region.

The plan sets out a range of recommendations and priorities for our region which we, and we hope our many stakeholders, will pursue to address our digital divide and underpin economic development and liveability across our region.

This plan is not the final word on digital priorities. It is a starting point to guide immediate and future work and provides a useful framework to consider digital priorities and next steps for our region.

We look forward to hearing from you and continuing our local engagement to build on this important evidence base.

I would like to extend my thanks to the Great South Coast Digital Plan Steering Committee for their time and effort in developing this plan, and to the Victorian Government for their support to make this possible.



Lisa Dwyer Chair, Great South Coast Regional Partnership

Executive Summary

The Great South Coast is one of three more remote regions, with the major population centre, Warrnambool, over 250 kilometres from Melbourne. 30 per cent of the Great South Coast population lives in Warrnambool and another 20 per cent in Portland and Hamilton, with a further 20 per cent in the other cities, towns and localities spread across the region. The remaining 30 per cent live on the fringe of these centres and in rural and remote locations and, reflecting their greater dispersion, experience less favourable digital connectivity than their more urbanised peers.

Agriculture/forestry/fishing (including aquaculture) is a dominant sector in the region in terms of both jobs (over 15 per cent of direct employment) and contribution to Gross Regional Product (GRP) (around 30 per cent of GRP). Other economically important sectors include tourism, health and community care, and education and training (noting there is strong community interest in the digital needs of students in the region). Tourist sites include year-round attractions – some with seasonal population peaks – and signature annual festivals and other periodic events.

The five local government areas in the region exhibit substantial diversity in population size, business activities, age of residents, income levels and home use of the internet. The five local governments recognise the critical importance of city-grade and better digital connectivity and innovation to meet their shared goals of enhanced national and international business competitiveness, an attractive place to live and work and resultant population and business attraction and retention. They provide strong forward-looking digital leadership and look to the Great South Coast Digital Plan to inform their digital road map of priority unmet needs requiring attention.

The various dimensions of the digital divide – city-country, urban-rural, town-fringe and 'technology boundaries' within neighbourhoods – currently limit attainment of the region's aspirations as a prosperous, enjoyable, secure and equitable place to live, work and do business. In particular:

- Broadband needs of businesses across the board, and households in small localities, on the fringe of larger centres and in rural and remote areas, are frequently not met due to limitations of NBN fibre-to-the-node (FTTN), fixed wireless and satellite technologies
- Mobile coverage in and around the region's cities and towns meets the needs of most businesses and households, but is deficient in less closely settled rural and remote primary production areas, remote tourist locations and on the region's road and rail corridors (qualified by the limits to the identification of localised mobile blackspots using public mobile coverage data)
- Low bandwidth Internet-of-Things (IoT) network coverage for agriculture, logistics, delivery of "smart city" public services and other sectors is reasonable, but availability and knowledge of IoT applications and their value-proposition is limited, risking early adoption of next-generation sensor-based business practices
- Public WiFi in towns for visitors and low-income residents is often in short supply, warranting ongoing government attention
- Permanent tourist attractions in cities and towns are in general reasonably well served with broadband (to enable WiFi services for visitors at tourist sites) and mobile services, but remote tourist sites tend to be poorly served
- Major passenger and freight roads have reasonably good mobile coverage, although coverage tends to be overstated in publicly available maps with localised blackspots not identified. The Melbourne-Geelong link of the Warrnambool rail passenger service has good mobile coverage and in-carriage reception, while in-carriage reception on the Geelong-Warrnambool link needs to be verified in relation to digital connectivity needs – including those of students travelling in the region

- Mobile coverage on the Maroona (Ararat)-Hamilton- freight rail line is not relevant for the purposes of this plan. The Portland, Warrnambool and Hamilton airports all have good mobile coverage
- While there is a general perception the city-country digital divide extends to digital skills and affordability, systematic evidence is not available at present making data collection a priority.

Priority actions to address the Great South Coast digital divide include:

Local Governments use their local presence, insights and planning powers to identify and "ground truth" localised fixed and mobile blackspots, influence NBN high performance technology deployment, promote early 5G rollout and facilitate digital literacy training (including in local digital hubs).

The Victorian Government reviews and extends its regional telecommunications advocacy, co-investment funding and pilot programs;¹ works with network operators to improve coverage data; addresses location-specific unmet needs from targeted highspeed broadband deployment; facilitates regional IoT and 5G developments; and expedites access for stakeholders in the region to its infrastructure visualisation tool.

The Commonwealth Government continues, reviews and extends its mobile blackspot co-funding program, requires NBN Co to maximise deployment of high-performance technologies and network architecture that support business-grade digital services, mandates that the telecommunications industry meets stronger NBN service connection and maintenance requirements and invests in digital skills training programs."

NBN Co recognises the need for pricing models that encourage the adoption of services and the realisation of latent digital opportunities in rural and regional areas² and quickly brings to market effective business-grade services with strong service level agreements (SLAs).

The telecommunications industry actively considers opportunities to provide competing broadband services to businesses in high demand precincts (and high speed backhaul links), particularly if NBN Co fails to restructure its wholesale pricing or does not provide effective business-grade services to regional customers.

¹ The Victorian Government has allocated \$12 million to trial IoT connectivity for internet enabled on-farm technologies around Birchip (grains), Maffra (dairy), Tatura (horticulture) and Serpentine (sheep); \$8 million for public WiFi pilots, originally in Ballarat and Bendigo and now extended to Shepparton and Geelong; and \$7 million to pilot new higher-quality broadband networks in Morwell, Geelong and Horsham to address gaps in the NBN.

² The Regional Partnership recognises that NBN Co is making progress on this through its Wholesale Pricing Review 2019.

Regional Partnership Priority Actions

The Regional Partnership, in conjunction with the five Great South Coast local governments, has drawn on the evidence base in the Digital Plan to prioritise gaps in digital infrastructure and services and guide upgrade activities to the areas of greatest need – digital gaps that limit the region's competitiveness and attractiveness as a place to live and work. The Regional Partnership seeks the support of the Victorian and Commonwealth Governments and mobile network operators in this process, noting that some actions and advocacy are most effectively prosecuted by local governments and others are better executed at an aggregated level. The outcomes of the Connecting Regional Communities Program (CRCP) Enhanced Broadband, Public WiFi and Agriculture IoT trials will be monitored for their suitability and applicability to Great South Coast locations, and the desirability of including forestry and its supply chain in future IoT trials.

Fixed Access ('broadband')

There is fixed access unmet demand by businesses across the region, with current technologies unable to consistently support business-grade services. Households in smaller localities (less than 1,500 people) and rural and remote areas are also under-served. Digital hubs in each local government area (LGA) should be explored as a means of providing access to high bandwidth services to a range of users.

Fixed access priority actions

The Regional Partnership will:

- 1. Encourage the Victorian Government to engage with NBN Co on behalf of the region's local governments to ensure their local priorities are considered in network rollout planning
- 2. Encourage local government planners to designate business precincts in greenfield and brownfield locations that will be developed with higher grade connectivity (e.g. fibre optic, high speed wireless) to create preferred locations for businesses with high connectivity needs
- 3. Encourage local governments to obtain a quote under the NBN Technology Choice program, and consider proposals from alternative service providers, if the NBN access technology proposed for an area is likely to be inadequate for the needs of precinct occupants
- 4. Encourage the Commonwealth Government to require NBN Co to maximise the deployment of technologies with the highest performance potential in the remaining rollout areas with assistance from local governments by highlighting areas where demand for high performance is expected to be greatest
- 5. Advocate for the early introduction of high-speed, business-grade NBN services including symmetric high bandwidth services with strong data throughput service level agreements (SLAs)
- 6. Advocate for stronger service connection and maintenance guarantees for NBN services to ensure the interests of residential and business users are adequately served
- 7. Encourage the Victorian Government to advocate for a restructuring of NBN wholesale pricing to align retail service provider incentives with unlocking the maximum potential of the NBN
- 8. Advocate for a lowering of the mandatory threshold above which fire to the premise (FTTP) technology must be deployed in greenfield developments and priority city-centre locations
- 9. Advocate for competitive fixed broadband where economically feasible, particularly if NBN Co fails to expeditiously offer effective business-grade services and reset its wholesale pricing.

Mobile Access

The Regional Partnership will work with the Victorian Government to identify priority mobile blackspots in the region, including in localities with populations below 300 people which have not been analysed in this plan.

Mobile access priority actions

The Regional Partnership will:

- 1. Advocate for continued Commonwealth and State Government investment in expanding mobile coverage, coupled with a review of blackspot funding models as investment extends into ever more commercially marginal areas and high-risk tourist areas
- Advocate for mobile network operators to provide more accurate and comparable coverage information that shows localised blackspots as well as coverage and service quality (areas where streaming, browsing, voice calls, emergency calls/SMS warnings are reasonably predicted to work) – disclosure of 'real' performance
- 3. Encourage local government agencies to equip their vehicles with coverage monitoring tools to build a strong evidence base of blackspots in their LGA, and work with the Victorian Government to include this and other 'ground-truthing' field audit mobile coverage data in SLIM for use in future digital plans
- 4. Advocate for Victorian Government development of a state-wide schedule of significant visitor events where network capacity problems exist and tender for mobile operators to provide solutions
- 5. Advocate for Victorian Government attention to transport corridor mobile blackspots, to address the connectivity needs of the travelling public (including students) and freight operations
- 6. Encourage local governments to develop a list of 5G priority locations based on the digital requirements of regional industries, and advocate for early 5G rollout to these locations.

Internet of Things Access

The Regional Partnership will encourage and coordinate local governments' and business groups' engagement with dedicated IoT network operators and mobile operators on their plans for narrowband IoT (LP-WAN) network rollout across Great South Coast. This will draw on data on existing networks and latent user needs, information from the CRCP agricultural IoT trials, the fieldwork conducted to support the digital plans and business case analysis and use of IoT by local governments to efficiently deliver Smart Cities and other services.

Internet of Things priority actions

The Regional Partnership will:

- 1. Encourage the Victorian and Commonwealth Governments to include IoT support as a decision criterion in mobile blackspot funding initiatives, including for early warnings for emergency services agencies
- 2. Encourage the Commonwealth and State Governments to pilot a low power (LP-WAN) IoT blackspot program
- 3. Advocate for mobile network operators to provide comparable coverage maps that include narrowband and broadband IoT applications supported by the network.

Public WiFi

The locations that would benefit most from further public WiFi deployment have not yet been systematically identified in the Digital Plan.

Public WiFi priority actions

The Regional Partnership will:

- Encourage the Victorian and local governments to identify value-adding opportunities for public WiFi, using results from digital plan fieldwork, analysis of Smart City proposals, the current CRCP WiFi deployment trials and data on the needs of households in disadvantaged localities and students
- 2. Encourage the Victorian Government to examine public WiFi co-investment models e.g. the State or Commonwealth Government meeting capital costs and local governments (or mobile network operators) meeting ongoing costs.

Digital skills and affordability

Systematic place-based information on the supply of and demand for digital skills and the affordability of digital services has not been identified for the Great South Coast Regional Digital Plan.

Digital skills and affordability priority actions

The Regional Partnership will encourage the Victorian and Commonwealth Governments to:

- 1. Address the digital skills information gap, including through current digital plan fieldwork and Digital Economy initiatives
- 2. Consider the scope for digital training via digital hubs
- 3. Invest in the preparation and delivery of quality digital education and training (including infrastructure to support Smart Classroom initiatives), adding relevant focus to general initiatives as detailed information on location and sector unmet skills needs are identified.

Regional Context: Great South Coast

Population density differs widely across the region – from 286 residents per square kilometre for Warrnambool LGA down to 2 for Southern Grampians. 30 per cent of the region's population lives in Warrnambool, with a further 40 per cent in the other cities, towns and localities. The remaining 30 per cent live on the fringe of these centres and in rural remote and locations and, reflecting their greater dispersion, experience less favourable digital connectivity than their more urbanised peers.

The Great South Coast region has a number of competitive advantages. It produces around \$2.3 billion in agricultural output – the highest of any region of Victoria. The region is highly suited to livestock production with productive pastures, fertile soils, access to supplementary feed such as grains and hay and a relatively high and reliable rainfall. The region has a strong forestry and forestry products sector, and an emerging aquaculture industry. Tourist sites include year-round attractions and signature annual festivals and other periodic events, with strong positive flow-on effects to the wider economy from this sector.

The digital connectivity needs of farms and farm households, and tourist site operators and visitors, differ across these locations depending on the nature of the primary production and tourist activities. This requires the overlay of both places and sectors in digital supply-demand analysis to identify priority unmet needs that stand in the way of retaining and expanding the region's competitive advantages.

Road and rail transport corridors need continuous mobile connectivity for passengers (including students), and IoT access on freight routes.

Place/Sector (typology)	Demand characteristics (place/user)	Digital 'Unmet Needs'
Significant places		
Businesses	Concentration of public services (education, health, administration), retail and small business in cities and larger towns	Access to business-grade broadband, including on town fringes Improved digital skills
Households	High-medium population densities, suitable for NBN fixed line services	Access to high-capacity broadband in smaller localities Improved digital skills
Communities	Varying digital literacy & ability to afford broadband Access to vocational & tertiary education limited by digital infrastructure Access to health care limited by digital infrastructure Communications with Emergency Services limited by gaps in mobile coverage	Access to affordable broadband Increased digital skills Increase access via Smart Classroom links between educational institutions and campuses Priority broadband links between health care providers Mobile coverage
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

Table 1 Summary of digital infrastructure demand characteristics and common 'unmet needs'

Forestry	Remote, unpopulated locations Unmanned forest monitoring	Narrowband IoT coverage Mobile coverage
	Occasional human presence for forest management & harvesting	
Tourist sites		
Permanent attractions	Both in towns & remote locations Visitors with high digital literacy and 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 freight	Safety Supply chain efficiency	Continuous mobile coverage IoT coverage
Road	Motorists & freight All major (VicRoads) & minor (local council) roads	Continuous mobile coverage
Rail	Passengers, including students Increased need for high quality mobile 4G (5G) connectivity	Continuous mobile coverage



Great South Coast population centres, primary production areas, tourist sites & transport corridors

Figure 1 Great South Coast population centres, primary production areas, tourist sites & transport corridors

Key factors considered in the development of the Great South Coast Digital Plan include:

- Significant regional diversity
- Structural change and trends
- Digital intensity of industry sectors
- Digital divide and digital inclusion
- Business-grade broadband services
- Competing broadband networks.

Details on the approach to digital planning are given in the Analytical Framework section below

Significant Regional Diversity

- Population Density differs widely across the region, from 286 residents per square kilometre for Warrnambool LGA to 2 for Southern Grampians
- Median Age is relatively consistent across the region from 39.7 in Warrnambool to just below 41 in Glenelg

 Industry sectors supporting employment differ across LGAs. Seven industries make up 70% of Great South Coast employment, ³ led by agriculture/forestry/fishing with 16% of jobs region-wide but between 20% and 30% of total employment in Corangamite, Moyne and Southern Grampians LGAs and less than 5% in City of Warrnambool.

Proposed remedy - Apply a place and industry/sector-based approach to digital planning.

These and other key indicators are shown in the following charts:





Figure 2 Comparisons of key Great South Coast indicators of digital infrastructure demand

Structural Change

- Growth in employment three of the top employment industries have grown strongly over the past 10 years (health care and community assistance, education and training, tourism) and are forecast to continue to do so, warranting priority attention to their digital intensity needs. Employment in agriculture/forestry/fishing is also expected to be strong going forward, as is the sector's contribution to Gross Regional Product (GRP), reflecting in part the region's lower susceptibility to damaging climate change (drought)
- Employment in other significant industries making up fewer jobs including retail trade and manufacturing has fallen over the past decade and is forecast nationally to contract or grow only slowly over the next five years. However, manufacturing (including downstream agribusiness) is a major contributor to GRP, meaning it warrants attention to the sector's digital development.

Proposed remedy - conduct industry/sector-based technology options analysis and apply the outcomes on a place-based approach. As an initial focal point for supporting greater digitalisation across industries in the region, the Regional Partnership is focussing on two priority areas:

³ Agriculture, Forestry & Fishing 16%, Manufacturing 8%, Construction 7%, Retail Trade 10%, Accommodation & food services 7%, Education & training 8%, Health Care and Social Assistance 14%

Internet of Things (IoT) connectivity and use - Internet of Things is a rapidly growing market that refers to the connection of an ever-increasing array of devices, services and equipment to the internet. Better understanding of this technology will be critical to underpin competitiveness and productivity across Great South Coast regional industries in the future. The Regional Partnership is exploring opportunities around this technology and potential ways to foster network development and usage across the region.

Digital education initiatives – the Regional Partnership will explore opportunities to improve access to and utilisation of digital technologies in the delivery of education and training across the region, with an emphasis on building digital skills in fields relevant to regional priorities, including IoT for agriculture, smart cities, utilities and environment. This work will seek to leverage existing activities around student digital hubs and smart classrooms in the region.

Digital Intensity

- Analysis of the digital intensity requirements of the eight industries representing 76 percent of the Great South Coast employment reveals that five of the industries will rely more heavily on digital services over the next 3-5 years. These include health care/community assistance, tourism and agriculture/forestry/fishing, for which digital intensity needs to rise strongly over the next 3-5 years to retain competitiveness.
- Agriculture/forestry/fishing and tourism in particular need to shift from their current low to high digital intensity over the next five years to be competitive in Australia and internationally, and health and community care needs to digitise quickly for leading-edge effectiveness.

Proposed remedy - Apply an industry/sector-based digital planning approach and apply the outcomes on a place-based approach.

Regional sector	Digital intensity now (current practice)			Digital intensity needed in 3-5 years (best practice) ⁴		
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. Embedded use of 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		

Table 2 Comparison of current and future digital intensity requirements of the main Great South Coast industries based on employment

⁴ Derived from: McKinsey Digital – Digital Australia: Seizing the opportunity from the Fourth Industrial Revolution; OCED – A taxonomy of digital intensive sectors; and discussions with industry sector digital development experts.

Public administration & 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		Medi	um High		

The Digital Divide

The digital divide between regional Victorian residents, businesses and students and their capital city counterparts – the gap between them in the availability of digital services, the ability of residents and workers to use digital services (digital skills), and the affordability of digital services and digital expertise – is reflected in the RMIT-Swinburne-Roy Morgan-Telstra Digital Inclusion Index (DII) which measures these aspects in different locations. This shows a substantial gap between regional Victoria and Melbourne – rural Victoria rated 56 and Melbourne 65. The divide also exists within the region. These digital divides are shown in the charts below.



Figure 3 Summary of 2019 RMIT-Swinburne-Roy Morgan-Telstra Digital Inclusion Index (DII) findings across Victorian regions *Sample size <150, exercise caution in interpretation Source: Roy Morgan, April 2018-March 2019

The Digital Divide – looking below the surface

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 Regional Partnership 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 Regional Partnership also recognises and applauds NBN Co for responding to the call from businesses for effective business-grade broadband services – high speed (100 Mbps+), symmetric and service level agreements on 24/7 information rate performance – for releasing its Enterprise Ethernet business needs will remain due to the predominance of fibre to the node (FTTN) technology where NBN is rolling out its fixed line network as long copper loops will not support the Enterprise Ethernet service. Furthermore, 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 rollout of 5G wireless technologies as early as 2019 will enhance this capacity. However, an equivalent situation does not exist in regional Victoria, where competing networks capable of broadly-affordable business-grade services are in general not present and are unlikely to be widely developed without government support, and rollout of 5G services may lag metro areas.

Regional Digital Analysis and Priorities

Analysis of digital supply and demand is conducted on a place and sector basis across the region to provide the evidence base necessary for effective digital planning. High level findings are given in the following table and map.

Table 3 An overview of digital needs and opportunities on a place and sector perspective

'Place/sector' typology	Digital Needs/Issues	Digital Opportunities/Solutions		
Significant Places - Cities, to	owns, localities			
1. Businesses	 Access to high speed, symmetrical broadband (100Mbps+) services with data throughput Service Level Agreements Such NBN business-grade services are not currently available Access to near-complete 4G coverage by a least two operators. Currently relatively well served Varying Digital Literacy levels 	 Enhanced broadband projects to provide business-grade high speed fixed line access or wireless services. Fast-track the availability of NBN business-grade services to key precincts advised by local government Fibre to the premise/node in business parks/precincts to provide business- grade services. Digital literacy capability building through courses, digital festivals and other initiatives. 		
2. Households	 Access to NBN fixed line services. <i>Currently relatively well served</i> Access to near-complete 4G coverage by a least two operators. <i>Currently relatively well served in town centres</i> WiFi for disadvantaged residents to reliably access the internet in low income areas Varying Digital Literacy levels 	 Enhanced broadband projects to provide high- speed fixed line access or wireless services. Subsidised free WiFi in areas of disadvantage. Digital literacy capability building through courses, digital festivals and other initiatives. 		
3. Communities	 Access to NBN fixed line services. <i>Currently relatively well served</i> Access to near-complete 4G coverage by a least two operators. <i>Currently well served in town centres</i> WiFi for disadvantaged residents to reliably access the internet in low income areas Varying Digital Literacy levels 	 Enhanced broadband projects to provide high speed fixed line access or wireless services. Subsidised free WiFi in areas of disadvantage. Digital literacy capability building through courses, digital festivals and other initiatives. Create Digital Hubs to support people and businesses to access reliable high-speed broadband services and build digital capability and literacy 		

Primary Production		
1. Businesses	 Access to NBN fixed line services. Not well served due to predominance of satellite services Access to near-complete 4G coverage by a least two operators. <i>Currently not well served</i> Access to Internet of Things Coverage Currently not well served Varying Digital Literacy levels 	 Fast-track the availability of NBN fixed wireless services Digital literacy capability building through courses, digital festivals and other initiatives Create Digital Hubs to support people and businesses to access reliable high-speed broadband services and build digital capability and literacy Mobile blackspot projects to provide more complete rural coverage Internet of Things projects to provide more complete coverage, trials and adoption of IoT services
2. Households	 Access to NBN fixed line services. Not well served due to predominance of satellite services Access to near-complete 4G coverage by a least two operators. Currently not well served Access to Internet of Things Coverage Currently not well served Varying Digital Literacy levels 	 Fast-track the availability of NBN fixed wireless services Digital literacy capability building through courses, digital festivals and other initiatives Create Digital Hubs to support people and businesses to access reliable high-speed broadband services (including multiple basic "connectivity hubs" in rural and remote areas) and build digital capability and literacy Mobile blackspot projects to provide more complete rural coverage Internet of Things projects to provide more complete coverage and adoption of IoT services
Tourism (sites and events)		
1. Operators and Visitors	 Access to NBN fixed line services. Not well served in remote locations Access to near-complete 4G coverage by a least two operators. Not well served in remote locations 	 Accelerate mobile black spot programs for high risk tourist areas Subsidised free WiFi for high traffic tourist sites Fast-track the availability of NBN business-grade services Cell on Wheels project to make mobile services available at reasonable pricing to operators and make services available to visitors

Transport Corridors							
1. Roads	 Access to near-complete 4G coverage by a least two operators. Weak coverage on B and C class roads 	 Mobile blackspot projects to provide more complete rural passenger (incl. students) and freight coverage Investigate IoT blackspot programs for freight routes 					
2. Rail	 Access to near-complete 4G coverage by a least two operators. Questionable in-carriage coverage on services beyond Geelong 	 Mobile blackspot projects to provide more complete rail coverage (incl. for students) Projects to provide in-carriage coverage in Vlocity trains beyond Geelong IoT coverage on rail freight links 					

Great South Coast unmet needs hotspots: fixed broadband and mobile access



Figure 4 Great South Coast unmet needs hotspots: fixed broadband and mobile access

Businesses in all population centres are not uniformly well supplied with fixed broadband access (access that can uniformly support business-grade services), although they generally have effective mobile access (4G coverage). Households in population centres down to around 1500 residents are generally well served with

effective fixed and mobile access, with smaller places mainly having fixed wireless access. Narrowband IoT networks and public WiFi coverage are patchy and warrant careful consideration of how shortfalls are best addressed. What is not shown is the important and challenging issue of digital 'have nots' amongst the 'haves'. It is critical these 'below the surface' digital divide issues are not be overlooked.

The high-level picture for households and businesses in primary production areas and at more isolated tourist sites is a concern, with mobile coverage for farms and tourists more unpredictable and fixed connectivity below par for farm offices and homesteads and tourist site operators. However, limits to widespread remediation exist, as the per-user costs of fixed line access and blanket mobile coverage rise exponentially with remoteness. Significantly for farms, connectivity for both one-way and two-way IoT is patchy or non-existent for many broadacre farms, limiting future competitiveness of these businesses in the next 3-5 years unless IoT access improves.

Mobile coverage on major roads is good (subject to localised blackspots not shown on publicly available coverage maps), but less so for connecting roads – particularly where they traverse national park land.

Mobile network coverage of the Warrnambool-Melbourne passenger rail corridor is generally good but incarriage coverage needs to be tested for the Geelong-Warrnambool link. Mobile and IoT coverage for the Portland-Hamilton Maroona (Ararat) freight rail link is not relevant for the purposes of this plan. The three major airports in the region – Warrnambool, Portland and Hamilton – all have good mobile coverage for passenger and operator use.

Digital Supply and Demand Rating Methodology

The following tables describe the rating methodology used for fixed and mobile, public WiFi and IoT access.

Fixed access rating methodology

Supply

For businesses

Rated High where:

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

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 long access 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 services are in the pipeline, fixed wireless services are only available up to 50 Mbps and fixed wireless information rates 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+ services at comparable prices to NBN

Rated Medium where:

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

Rated Low where:

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

Demand

<u>Demand for fixed access</u> by businesses and households is rated **High** as both groups need fixed line network performance to meet their current and emerging digital needs. These rating benchmarks apply for the present and in 3-5 years.

Mobile access rating methodology

Local accuracy of mobile access availability is limited by the need to use high-level publicly available mobile coverage maps. Government discussions with mobile network operators on access to more detailed information are occurring. In addition, local "ground-truthing" of mobile coverage will be considered in future updates of the Digital Plan.⁵

Supply

<u>For both businesses and households</u> (the same supply ratings are used as access to mobile services is very important for both businesses and households and they have similar mobile service performance needs):

Rated High where:

• Two or more 4G networks are available (noting the limited local accuracy of the public coverage maps used)

Rated **Medium** where:

• 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 ⁶

Supply

The present supply of LP-WAN 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 a High rating 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 that current IoT demand is likely to be limited by lack of knowledge and availability of IoT apps, and the anticipated explosion in IoT interest and use in coming years.

⁵ Note that decisions on Victorian government funding for mobile blackspots are not based on the high-level mobile coverage maps it is necessary to use in the digital plans

⁶ Sigfox, Taggle and Optus IoTnetwork coverage is considered, NNNCo and mobile network operator IoT coverage is not considered in the Plan analysis as this information was not publicly available at the time of analysis.

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.⁷

⁷ 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 4, red shading indicating a 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.*

				Access			
Place	LGA	Name	User Type	Fixed Supply / Demand	Mobile* Supply / Demand	LP-WAN IoT Supply / Demand	WiFi Supply / Demand
		Warrnamhool	Business	M/H	H/H	H/M	n.a.
City	Warrnambool	(pop 30.707)	Home	H/H	H/H	H/L	M/L
		(pop. 30,707)	Community	n.a.	H/H	n.a.	M/L
		Dambland	Business	M/H	H/H	H/M	n.a.
	Glenelg		Home	Н/Н	H/H	H/L	M/L
		(pop. 10,039)	Community	n.a.	H/H	n.a.	M/L
	Couthorn	Llensilten	Business	M/H	H/H	H/M	n.a.
	Grampians		Home	H/H	H/H	H/L	L/L
	Grampians	(pop. 8,892)	Community	n.a.	H/H	n.a.	L/L
			Business	M/H	H/H	H/M	n.a.
	Moyne		Home	H/H	H/H	H/L	M/L
		(pop. 3,028)	Community	n.a.	H/H	n.a.	M/L
		C	Business	M/H	H/H	H/L	n.a.
	Corangamite	Camperdown	Home	H/H	H/H	H/L	L/H
		(pop. 2,994)	Community	n.a.	H/H	n.a.	L/H
		Terang (pop. 2,027)	Business	M/H	H/H	L/L	n.a.
	Corangamite		Home	H/H	H/H	L/L	L/H
			Community	n.a.	H/H	n.a.	L/H
		Karait	Business	M/H	H/H	H/L	n.a.
Town	Warrnambool	(pop 1585)	Home	Н/Н	H/H	H/L	L/L
		(pop. 1,585)	Community	n.a.	H/H	n.a.	L/L
		Cabilan	Business	M/H	H/H	M/L	n.a.
	Corangamite	(pop 1 566)	Home	H/H	H/H	M/L	L/L
		(pop. 1,500)	Community	n.a.	H/H	n.a.	L/L
		Casterton	Business	L/H	H/H	M/L	n.a.
	Glenelg		Home	M/H	H/H	M/L	L/H
		(pop. 1,344)	Community	n.a.	H/H	n.a.	L/H
		Horwood	Business	L/H	H/H	H/L	n.a.
	Glenelg	(non 1 261)	Home	M/H	H/H	H/L	L/H
		(pop.1,201)	Community	n.a.	H/H	n.a.	L/H
		Mortlako	Business	L/H	H/H	L/L	n.a.
	Moyne	(pop 1, 109)	Home	M/H	H/H	L/L	L/H
		(pop.1,105)	Community	n.a.	H/H	n.a.	L/H
	Southern	Coleraine	Home	Н/Н	H/H	M/L	L/H
	Grampians	(pop. 849)	Community	n.a.	H/H	n.a.	L/H
	Corangamita	Timboon	Home	M/H	H/H	L/L	L/L
LOCAL	Corangamite	(pop. 796)	Community	n.a.	H/H	n.a.	L/L
	Marrasabaal	Allansford	Home	H/H	H/H	M/L	L/L
	vvarrnambool	(pop. 725)	Community	n.a.	H/H	n.a.	L/L

Table 4 Significant places: current unmet digital access needs

		Саре	Home	M/H	M/H	M/L	L/H
Gl	lenelg	Bridgewater (pop. 326)	Community	n.a.	M/H	n.a.	L/H

Legend Red - Major supply shortfall | Amber - Intermediate supply shortfall | Green - current supply meets or exceeds demand. Based on SLIM interrogation and subject to the local accuracy limitations of the mobile coverage and other data in SLIM.

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

Commentary

Fixed access supply in Great South Coast 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 small towns and localities where NBN fixed wireless predominates. Mobile access is generally good for the 15 Great South Coast places examined according to the publicly-available coverage maps used, recognising the limitations with this data in identifying localised blackspots and the feedback from local people on their mobile access difficulties. Coverage of narrowband IoT networks across Great South Coast places is reasonably good and not constraining relative to limited demand at present. The supply of public WiFi is low across the region and is 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 NBN fixed access upgrades will be difficult to achieve due to network cost constraints. Furthermore, 5G mobile coverage in smaller locations may lag demand. Widespread narrowband IoT access is important for future competitiveness of the region and should be encouraged from dedicated LP-WAN operators and mobile network operators.

Fixed access

Fixed access for cities and towns with population in excess of 1500 residents, and for the smaller places Coleraine and Allansford, 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 NBN Enterprise Ethernet business-grade services due to long loop lengths for some premises. For smaller towns and localities (except Coleraine and Allansford) NBN fixed wireless is the usual 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 fixed wireless network.

Looking forward 3-5 years, while NBN FTTP and FTTC network technology would support future business demand for business-grade services, widespread upgrades will be difficult to achieve. Nonetheless government advocacy, demand aggregation and co-funding programs for enhanced broadband may be effective at the margin for business hot-spots and smaller population centres, guided by lessons from the CRCP enhanced broadband trials in Morwell and Horsham.

Mobile access

Mobile access appears to be good for almost all the Great South Coast cities, towns and localities examined (down to 300 residents) with near-complete 4G coverage by at least two mobile network operators (based on public coverage maps and recognising there will be specific sites which experience unsatisfactory mobile performance not reflected in the public coverage maps used). However, the 3-5 year outlook is not uniformly positive, with the possibility that only the larger population centres will receive 5G coverage (based on mobile network operators targeting large and rapidly growing populations). Importantly, the introduction of 5G services in these cities and towns will at some point create greater competition between

mobile and fixed access providing a potential solution for individual premises and neighbourhoods with poor fixed access.

Narrowband (LP-WAN) IoT⁸

Coverage of narrowband IoT networks across Great South Coast cities, towns and localities is currently reasonably good and adequate for the limited demand by businesses, local governments and households (constrained by lack of IoT knowledge and apps) 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 (due to using low-cost spectrum and the long signal carrying distances of the technology). 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. Further investigation into IoT networks is a priority project of the Regional Partnership undergoing further business case assessment.

Public WiFi

Key benefits of free public WiFi at present are assisting students and disadvantaged residents access the internet, and for visitors to the location. On the limited information available at present the supply of public WiFi is rated low in all places considered (with the exception of Warrnambool), while demand is rated high in the seven locations with below-average household incomes. Accordingly, on the basis of the rating 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 these 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 the 'ability' component of the Digital Inclusion Index. Based on these broad indicators, there appears to be a significant skills shortfall in Great South Coast 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 levels and older populations. The importance accorded digital skills apparent from the digital plan

⁸ Sigfox and Taggle network coverage is considered, NNNCo network coverage is not considered in the Plan analysis as this information is not publicly available.

consultations highlights the need for data collection on skills supply and demand.

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

Priority actions

Priority actions lie primarily with regional stakeholders (local governments, business and community groups and the Regional Partnership), including encouraging and assisting the Victorian Government to make evidence-based representations on needed changes to the Commonwealth Government, NBN Co and other digital service providers. These are listed in the Regional Partnership Priority Actions section above. Some of the actions are high-level and general in nature such as establishing priorities and action plans, while others are technology-specific or focused on skills gaps and affordability. They address both broad shortfalls in the supply of digital services and skills and their affordability, and the situation of digital 'have-nots' amongst the 'haves'. The actions outlined address current and future unmet digital needs.

The Great South Coast Region high level priority actions include:

- Local governments and the Regional Partnership prioritise action for each of the access technologies on the basis of business cases to determine which actions provide the greatest benefits – including investigating the feasibility of a combined 5G fixed access/mobile service and alternative market stimulation models to bring the services to market
- 2. The Regional Partnership educate those in sparsely populated locations that high-quality high bandwidth blanket coverage solutions are unlikely to be viable due to cost constraints and those requiring reliable high bandwidth solutions may be best served by bespoke solutions
- 3. Local governments and regional businesses consider leveraging available government assets for cost-effective bespoke solutions (for example VicTrack fibre for backhaul or joining up access network components)
- 4. Use the State Level Information Management database to conduct more detailed analysis of unmet needs and possible solutions
- 5. Advocate for IoT connectivity in population centres for local government delivery of 'smart city' and other services, along with IoT coverage to support primary production activities.

Specific priority actions include:

Fixed access

- 1. Local governments engage with NBN Co to ensure it understands local priorities to influence NBN Co's technology boundary decisions where the NBN has not yet been rolled out, and where technology upgrades should be focused once rollout is completed. The Victorian Government could assist local governments (and the Regional Partnership) in identifying and prioritising unmet needs by developing a web-based application through which users could register their need for improved fixed (and other) access services
- 2. Local governments obtain quotes under the NBN Technology Choice program for underserved current and planned business precincts, and investigate funding models including contributions by precinct tenants
- 3. Local governments, the Regional Partnership and the Victorian Government work in unison to determine if there are cost effective non-NBN solutions that address current and future fixed access shortfalls (informed by current CRCP Enhanced Broadband demonstration projects)

- 4. The Victorian Government encourage the Commonwealth Government to require NBN Co to deploy technologies with the highest performance potential in the remaining rollout areas, aided by information from local governments on where demand for high performance is expected to be greatest
- 5. The Victorian Government advocate for a lowering of the mandatory threshold above which FTTP must be incorporated into new developments
- 6. The Victorian Government advocate for NBN Co to recognise the need for pricing models that encourage the adoption and realisation of latent digital opportunities in rural and regional areas
- 7. The Victorian Government advocate for the immediate introduction of NBN business-grade services with symmetric high bandwidth options and robust service level agreements (SLAs)
- 8. Local governments, businesses and community groups work in unison to better understand the incidence and impact of fixed technology boundary issues ('have nots' next door to the 'haves'), and the feasibility of public network and bespoke solutions that address serious anomalies.

Mobile access

- 1. The Victorian Government advocate for continued Commonwealth investment in blackspot programs, coupled with a review of funding models to ensure maximum investment efficiency as mobile coverage extends into ever more marginal areas and supports a range of voice, emergency alert, data and IoT needs
- 2. The Victorian Government commit to future funding of blackspot programs, including funding models that support widespread voice, emergency alert, data and IoT coverage in remote areas where service availability from any provider may stand ahead of competition considerations
- 3. Local governments and the Regional Partnership seek to influence 5G rollout by creating a list of high-demand priority locations
- 4. The Victorian Government examine the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G in high demand areas.

IoT access

- 1. The Regional Partnership coordinate local governments' and business groups' active engagement with dedicated LP-WAN network operators and the mobile operators on their plans for mobile-supported narrowband IoT deployment across Great South Coast armed with their own intelligence on existing deployments and latent user needs, information provided by the Victorian Government from its agricultural IoT trials and the fieldwork conducted to support the digital plans
- 2. The Regional Partnership coordinate local governments' and business groups' discussion with LP-WAN network operators on their plans for network deployment across Great South Coast, including what information they can provide and actions they can take to assist the network operators in their deliberations
- 3. The Victorian Government include IoT support as a decision criterion in its mobile blackspot initiatives, and advocate the Commonwealth do the same in its future blackspot programs
- 4. The Victorian Government consider an LP-WAN network rollout market facilitation model, including the feasibility and net benefits of state-wide blanket deployment of LP-WAN access.

Public WiFi access

- 1. The Regional Partnership coordinate the collection and sharing of information from local governments on the location, footprint, target audience and use trends of their public WiFi networks, and their ambitions for wider WiFi coverage in their LGAs to inform local government decision-makers and Victorian Government policy considerations
- 2. The Victorian Government fast-track the compilation and distribution of information on its public WiFi trials currently being conducted in Shepperton and Geelong
- 3. The Victorian Government investigate the feasibility, net benefits and possible market facilitation models for deployment of public WiFi networks in smaller regional towns and localities, to meet local social needs and attract visitors.

Skills

- 1. As the supply of and demand situation for digital skills is not well understood at present, a key action needed is purpose-specific data collection. A start on this has been made with questions in the local government online currently being conducted at present, and in the onsite fieldwork to follow.
- 2. Looking forward, as a general point, it is anticipated there will be local solutions for 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.
- 3. At the local level, digital access infrastructure and services potentially provides an array of tools to remediate skills shortages for example, using YouTube, MOOCs (massive online, open courses), and interactive training providers. However, learning needs to start with baseline skills in the region so that people can find and engage with those materials. Access to this foundational education also needs to be effective and affordable. This is likely to be most effective when initiated at the local level, Multipurpose digital hubs can play an important focal point in this regard, including good online access where for example young people can teach older citizens and workers basic digital literacy skills.

Options to address Great South Coast digital services affordability issues have not been considered in this initial digital plan, pending better information on the nature and importance of any affordability gaps. Data collection is the immediate need.

Primary Production Areas Analysis – selected locations

Digital supply-demand balance for selected primary production areas 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 good coverage indicated by public coverage maps.*

			Access			
Land Use	Location	User Type	Fixed Supply / Demand	Mobile* Supply / Demand	LP-WAN IoT Supply / Demand	
Shoop & boof grazing	South of Palmoral	Business	L/H	L/H	H/M	
Sheep & beer grazing	South of Baimoral	Home	L/H	L/H	H/L	
Shoop & boof grazing	Between Macarthur and	Business	L/H	L/H	L/M	
Sheep & beer grazing	Mortlake	Home	L/H	L/H	L/L	
Shoop & hoof Crazing	West of Dartmoor	Business	L/H	M/H	L/M	
Sheep & beer Grazing	West of Dartmoor	Home	L/H	M/H	L/L	
Doinggrooting	Between Camperdown and	Business	L/H	H/H	H/M	
Dairy grazing	Warrnambool	Home	L/H	H/H	H/L	
Deimerene	A new red Lieuware ed	Business	L/H	H/H	H/M	
Dairy grazing	Around Heywood	Home	L/H	Н/Н	H/L	
Hortioulture	North Fact Dortland	Business	L/H	H/H	H/M	
Horticulture	North-East Portland	Home	M/H	H/H	H/L	
Lleutieultune	Foot of Llowsitton	Business	L/H	H/H	H/M	
Horticulture		Home	L/H	Н/Н	H/L	
Forestry	Fast of Nalson	Business	L/H	L/H	L/M	
Forestry	East of Nelson	Home	L/H	L/H	L/L	
Annenitien	2891 Princes Highway Port	Business	L/H	H/H	H/M	
Aquaculture	Fairy	Home	M/H	H/H	H/L	
Aguagultura	Snapper Point Road	Business	L/H	H/H	H/M	
Ациасиците	Narrawong	Home	M/H	H/H	H/L	

 Table 5 Primary production areas: current unmet digital access needs (sampled areas only)

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 unmet needs picture is mixed with fixed supply mainly rated low (due to dominance of satellite services) and mobile supply rated low in some extensive grazing areas. Low power IoT supply-demand balance is in transition – supply is not strong for some extensive grazing areas but demand is only now starting to rise and is generally rated medium.

Fixed access

Current situation - fixed access in the Great South Coast primary production areas is predominantly NBN satellite technology, with the proportion of farming areas served by fixed wireless is low relative to regional Victoria as a whole. Business and household demand is, however, uniformly high, meaning major unmet demand in the primary production areas considered.

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 level of unmet demand for fixed access will become more severe. However, policies to materially alleviate this situation are likely to be prohibitively

expensive.

Mobile coverage

Current situation - Mobile coverage in the primary production areas examined across Great South Coast is mixed, with more closely-settled places competitively served by more than one 4G network (with undocumented localised gaps) but supply less satisfactory elsewhere. With demand for mobile services uniformly high, major supply shortfalls for some grazing areas 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 in these areas. 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 medium across Great South Coast primary production areas, but with farms facing unmet needs in some areas.

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.

Priority actions

High level priority actions for primary production areas are as follows:

- 1. Local governments and the Regional Partnership prioritise action for each of the access technologies on the basis of business cases to determine which actions provide the greatest benefits
- 2. The Regional Partnership educate those in sparsely populated locations that high quality high bandwidth blanket coverage solutions are unlikely to be viable due to cost constraints and those requiring reliable high bandwidth solutions may be best served by bespoke solutions (or possible relocation)
- 3. Use the State Level Information Management database to conduct more detailed analysis of unmet needs and possible solutions
- 4. Advocate for the implementation of multipurpose digital hubs that can address a range of access, skills and affordability needs (including providing access to reliable high-speed broadband access for those in NBN fixed wireless and satellite footprints).

Specific priority actions include:

Fixed access

1. Local governments engage with NBN Co to ensure it understands primary production areas' priorities – to influence NBN Co's technology boundary decisions where the NBN has not yet been rolled out, and where technology upgrades should be focused once rollout is completed. The Victorian Government could assist local governments (and the Regional Partnership) in identifying and prioritising unmet needs by developing a web-based application through which users could register their need for improved access services

- 2. The Victorian Government encourage the Commonwealth Government to require NBN Co to deploy technologies with the highest performance potential in the remaining rollout areas, aided by information from local governments on where demand for high performance is expected to be greatest
- 3. The Victorian Government advocate for a restructuring of NBN wholesale pricing to ensure the maximum potential of the NBN is unlocked (including revising CVC pricing)
- 4. The Victorian Government advocate for the immediate introduction of effective NBN businessgrade services on the prevailing NBN technologies in primary production areas.

Mobile access

- 1. Local government agencies equip their service vehicles with mobile coverage monitoring tools to build a strong evidence base on specific gaps in coverage to inform future blackspot programs, discussions with mobile service providers on more immediate localised solutions through antennae directional tuning, low-cost small cell towers and other bespoke work-arounds, and SLIM enhancement
- 2. The Victorian Government advocate for continued Commonwealth investment in blackspot programs, coupled with a review of funding models to ensure maximum investment efficiency as mobile coverage extends into ever more commercially marginal areas and supports a range of voice, emergency alert, data and IoT needs
- 3. The Victorian Government commit to future funding of blackspot programs, including funding models that support widespread voice, emergency alert, data and IoT coverage in remote areas where service availability from any provider may stand ahead of competition considerations
- 4. Local governments and the Regional Partnership seek to influence 5G rollout by creating a list of high-demand priority rural and remote locations
- 5. The Victorian Government examine the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G in high demand areas.

IoT access

- 1. The Regional Partnership coordinate local governments' and business groups' active engagement with all mobile operators on their plans for narrowband IoT deployment across Great South Coast armed with their own intelligence on existing deployments and latent user needs, information provided by the Victorian Government from its agricultural IoT trials and the fieldwork conducted to support the digital plans
- 2. The Regional Partnership coordinate local governments' and business groups' discussion with LP-WAN network operators on their plans for network deployment across Great South Coast, including what information they can provide and actions they can take to assist the network operators in their deliberations
- 3. The Victorian Government include IoT support as a decision criterion in its mobile blackspot initiatives, and advocate the Commonwealth do the same in its future blackspot programs
- 4. The Victorian Government consider an LP-WAN network rollout market facilitation model, including the feasibility and net benefits of state-wide blanket deployment of LP-WAN access
Tourist Locations Analysis

Digital supply-demand balance for selected tourist locations is shown in Table 6, 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.*

				Access		
Туре	Location	LGA	User Type	Fixed Supply / Demand	Mobile* Supply / Demand	
	Twelve Apostles	Comencensite	Operator	L/H	H/H	
	(5 million+ visitors p.a.)	Corangamile	Visitor	n.a.	H/H	
	Noorat, Glenormiston and	Concercito	Operator	L/H	H/H	
	Terang	Corangamite	Visitor	n.a.	H/H	
	Budj Bim National Heritage		Operator	L/H	H/H	
	Landscape (110,000 visitors forecast p.a.)	Glenelg	Visitor	n.a.	H/H	
	Portland Whale Watching		Operator	L/H	H/H	
	Platform (18,000 visitors p.a.)	Glenelg	Visitor	n.a.	H/H	
	Cape Bridgewater Whale		Operator	L/H	H/H	
	Watching and Seal Tour (5,000 visitors p.a.)	Glenelg	Visitor	n.a.	Н/Н	
Permanent	Wannon and Nigretta Falls	Southern	Operator	L/H	H/H	
	(30,000 visitors p.a.)	Grampians	Visitor	n.a.	H/H	
	Tower Hill Wildlife Reserve		Operator	L/H	H/H	
	(260,000 visitors p.a.)	Ivioyne	Visitor	n.a.	H/H	
	Dont Foim / Tournahin	Moyne	Operator	M/H	H/H	
	Port Fairy Township		Visitor	n.a.	H/H	
	Port Comphell Township	Correspondito	Operator	L/H	H/H	
	Port Campbell Township	Corangamite	Visitor	n.a.	H/H	
	Logans Beach Whale Viewing		Operator	L/H	H/H	
	Platform, Warrnambool (270,000 visitors p.a.)	Warrnambool	Visitor	n.a.	Н/Н	
	Kennedy's Creek Music		Operator	L/H	H/H	
	Festival (1,000 visitors)	Corangamite	Visitor	n.a.	Н/Н	
	Port Fairy Folk Festival	Mayna	Operator	M/H	H/H	
	(40,000 visitors p.a.)	ivioyne	Visitor	n.a.	H/H	
	SheepVention	Southern	Operator	M/H	H/H	
Events	(20,000 visitors p.a.)	Grampians	Visitor	n.a.	H/H	
	May Race Carnival		Operator	M/H	H/H	
	Warrnambool (32,000 visitors p.a.)	Warrnambool	Visitor	n.a.	н/н	
	Twelve Apostles Gourmet Trail	Corangamite	Operator	L/H	H/H	
Trails	(40,000 visitors p.a.)		Visitor	n.a.	H/H	
	Great South West Walk	Clanala	Operator	L/H	L/H	
	(80,000 visitors p.a.)	Gleneig	Visitor	n.a.	L/H	

Table 6 Tourist locations: current unmet needs

Cremeriana Dealta Trail	Southern	Operator	L/H	L/H
Grampians Peaks Trail	Grampians	Visitor	n.a.	L/H
Great Ocean Walk	Corongomito	Operator	L/H	M/H
(16,000 visitors p.a.)	Corangamile	Visitor	n.a.	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. Outdoor coverage is considered to be generally sufficient for tourist locations

Commentary

Here only fixed and mobile access technologies are relevant – fixed access for site operators to provide backhaul for site-specific WiFi provided by the site operator and day-to-day conduct of the business; and mobile for both visitors and operators. Mobile coverage on feeder roads is also relevant, as covered in Table 6 above. Three types of tourist locations are considered: permanent tourist attractions; periodic events such as an annual music festival; and trails.

Present situation: Fixed access supply is generally poor, limiting the scope of site operators to provide high quality WiFi for visitors. Mobile coverage for a number of the Great South Coast tourist locations considered is generally meeting demand (subject to the local accuracy of publicly available coverage maps), the exceptions being the Cape Bridgewater area and the more remote Great South West Walk which are seriously under-served.

In 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.

Priority actions

The Great South Coast Region high level priority actions supporting tourism include:

- 1. Local governments and the Regional Partnership prioritise action for each of the access technologies in tourist locations on the basis of business cases to determine which actions provide the greatest benefits
- 2. The Regional Partnership educate site operators at or considering more remote locations that high quality high bandwidth blanket coverage solutions are unlikely to be viable due to cost constraints and those requiring reliable high bandwidth solutions may be best served by bespoke solutions
- 3. Local governments and regional businesses consider leveraging available government assets for cost-effective bespoke solutions
- 4. Use the State Level Information Management database to conduct more detailed analysis of unmet needs and possible solutions.

Specific priority actions include:

Fixed access

- 1. Local governments engage with NBN Co to ensure it understands local priorities for tourist sites to influence NBN Co's technology boundary decisions where the NBN has not yet been rolled out, and where technology upgrades should be focused. The Victorian Government could assist local governments (and the Regional Partnership) in identifying and prioritising unmet needs by developing a web-based application through which users could register their need for improved access services
- 2. The Victorian Government encourage the Commonwealth Government to require NBN Co to deploy technologies with the highest performance potential in the remaining rollout areas, aided by information from local governments on where demand for high performance is expected to be greatest
- 3. The Victorian Government advocate for a restructuring of NBN wholesale pricing to ensure the maximum potential of the NBN is unlocked (including revising CVC pricing)
- 4. The Victorian Government advocate for the immediate introduction of NBN business-grade services with symmetric high bandwidth options and robust service level agreements (SLAs), including business-grade services operational on NBN technologies in more remote tourist locations.

Mobile access

- 1. Local government agencies equip their service vehicles with mobile coverage monitoring tools to build a strong evidence base on specific gaps in coverage relevant to tourism requirements to inform: future blackspot programs; discussions with mobile service providers on more immediate localised solutions through antennae directional tuning, low-cost small cell towers and other bespoke work-arounds; and SLIM data enhancements
- 2. The Victorian Government advocate for continued Commonwealth investment in blackspot programs, coupled with a review of funding models to ensure maximum investment efficiency as mobile coverage extends into ever more commercially marginal areas and supports a range of voice, emergency alert, data and IoT needs
- 3. The Victorian Government commit to future funding of blackspot programs, including funding models that support widespread voice, emergency alert, data and IoT coverage in remote areas where service availability from any provider may stand ahead of competition considerations
- 4. Local governments and the Regional Partnership seek to influence 5G rollout by creating a list of high-demand tourism hot-spots
- 5. The Victorian Government examine the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G in high demand tourist areas
- 6. Local governments and the Regional Partnership compile a list of significant regional events where capacity problems exist and tender for one mobile operator to provide a region-wide, multi-carrier mobile solution.

Transport Corridors Analysis

Digital supply-demand balance for selected transport corridors and airports is shown in Table 7, 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.*

Road Class	ID	From	То	Comment	Mobile* Supply / Demand
	A1	Colac	Mt Gambier	Coverage by all 3 carriers	H/H
A	A200	Horsham	Heywood	Coverage by at least 2 carriers	Н/Н
	B100	Wattle Hill	Allansford	Coverage by all 3 carriers	H/H
D	B120	Warrnambool	Mortlake	Coverage by all 3 carriers	H/H
В	B140	Cressy	Hamilton	Coverage by at least 2 carriers	H/H
	B160	Hamilton	Glenthompson	Coverage by at least 2 carriers	H/H
	C192	Portland	Nelson	Partial coverage by all carriers only	L/H
	C195	Portland	Casterton	Coverage by all 3 carriers	H/H
(sumple only)	C176	Woolsthorpe	Heywood	Coverage by all 3 carriers	H/H
Dail		Geelong	Melbourne	Coverage by 3 carriers	H/H
(passenger)		Warrnambool	Geelong	Coverage by 3 carriers, in-carriage coverage needs to be verified	Н/Н
Rail		Maroona (Ararat)	Hamilton	Not relevant for passenger use	n.a.
(ireight)		Hamilton	Portland	Not relevant for passenger use	n.a.
		Portland		Coverage by 3 carriers	H/H
Airports		Warrnambool		Coverage by 3 carriers	Н/Н
		Hamilton		Coverage by 1 carrier	M/H

Table 7 Transport corridors: current unmet needs

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 7 summarises the analysis of mobile coverage supply and demand on major and more minor roads and the passenger and freight rail links in Great South Coast conducted to demonstrate the place-and-sector approach for transport corridors and note any preliminary patterns.

Commentary

Only mobile coverage is relevant to the analysis of transport corridors. The pattern from the indicative sample of major and minor roads is that there appears to be good mobile coverage on major (Class A) thoroughfares and intermediate (Class B) roads but weaker coverage on smaller (Class C) roads with substantial freight traffic. However, examination of more roads is required to confirm these unsurprising patterns.

Looking forward 3-5 years, mobile connectivity demand is expected to continue, with intervention required to lift mobile coverage on transport corridors, including for 5G services.

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.

External mobile coverage on the passenger rail links appears to be good. In-carriage mobile connectivity is or shortly will be good on the Melbourne-Geelong link, while the extent of signal attenuation caused by the type of carriage on the Geelong link needs to be verified by separate analysis. The mobile connectivity needs of students and the travelling public generally will grow over the next 3-5 years, including for 5G services.

Mobile coverage on the Portland-Hamilton-Maroona freight link is not relevant for the purposes of this plan.

Priority actions

The Great South Coast Region transport-related priority actions include:

Mobile access

- 1. Local government agencies equip their service vehicles with mobile coverage monitoring tools to build a strong evidence base on specific gaps in coverage to inform future blackspot programs, discussions with mobile service providers on more immediate localised solutions through antennae directional tuning, low-cost small cell towers and other bespoke work-arounds and SLIM enhancement
- 2. The Victorian Government advocate for continued Commonwealth investment in blackspot programs, coupled with a review of funding models to ensure maximum investment efficiency as mobile coverage extends into ever more commercially marginal road and rail corridors and supports a range of voice, emergency alert, data and IoT needs
- 3. The Victorian Government commit to future funding of blackspot programs, including funding models that support widespread voice, emergency alert, data and IoT coverage on passenger and freight transport corridors
- 4. Local governments and the Regional Partnership seek to influence 5G rollout by creating a list of high-demand priority transport corridors
- 5. The Victorian Government examine the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G for high demand corridors.

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-basis. 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 corridors
- SLIM database
- Expert analysis of digital technology limitations and common issues
- 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 potential solutions canvassed give a range of options for reducing the digital divide for consideration by the Regional Partnership, local, State and Commonwealth governments and local business and community leaders.

The 'digital divide'

In essence, the Digital Plan 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 actions to address unmet needs
- Highlighting the need for good information on 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 of this first Great South Coast Digital Plan relates to the high-level city-country digital divide and simply acknowledges and discusses the locally-based digital divide issue.

The digital divide between regional Victorian residents and businesses and their capital city counterparts – the gap between them in the *availability* of digital services, the *ability* of residents and workers to use digital services (digital skills), and the *affordability* of digital services and digital expertise – is reflected in the RMIT-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 56 and Melbourne 65.

The DII also shows substantial variation between and within regions, shown in the following chart.





*Sample size <150, exercise caution in interpretation Source: Roy Morgan, April 2018-March 2019

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 issues (e.g. on the fringes of towns). This can result in highly localised 'digital have nots' amongst and contiguous to 'digital haves'.

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).⁹

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.

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. 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 (often not captured in public high-level coverage maps).

The Digital Plan 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.

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 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

⁹ 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.

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 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.

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, Sigfox and Optus-IoT.

Public WiFi networks provide a no-cost-to-user link between mobile devices (e.g. smartphones and tablets) and mobile service providers.¹⁰ Free public WiFi is typically provided by local governments for disadvantaged citizens, the wider public and visitors in larger cities and towns.¹¹ 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

¹⁰ 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

¹¹ Free 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.

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-priced mobile service will be lower value-for-money for regional users that frequently experience blackspots and degraded service.¹²

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 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.

Priority actions

The options for action lie with both regional stakeholders (local governments, business and community groups and the Regional Partnership), the Victorian Government, the Commonwealth Government, mobile network operators – including evidence-based representations by the Regional Partnership to the various layers of government. Some of the options are high-level and general in nature such as establishing priorities and action plans, while others are technology-specific or focused in a general way on skills gaps. They address the broad shortfalls in the supply of digital services and skills and acknowledge and comment on the frequent boundary and 'Swiss cheese' situation of 'have-nots' amongst the 'haves'. The options outlined address current and future unmet digital needs. The options for action listed draw on separate expert analysis undertaken around digital technology limitations and common issues.

Options for addressing skills shortfalls are not developed in detail in this version of the Digital Plan due to our limited understanding of this issue on a place and sector basis. Rather, data collection is the key immediate imperative. However, it is anticipated that local solutions will be important in addressing digital literacy gaps (including training at digital hubs), state-wide vocational training solutions for shortages of IT professionals, and state-wide school education solutions (STEM++) for digital age workforce preparedness.¹³

Affordability solutions are not addressed in this first-generation digital plan – collection and analysis of primary data the key immediate action.

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, noting expeditious access to SLIM by regional stakeholders is a

¹² 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

¹³ Involving the Department of Education and Training.

Great South Coast Regional Partnership priority.

1 Great South Coast General Characteristics

1.1 The land and the people

Key features are:

- South-west of the State adjoining Barwon region and the Victorian-South Australian border
- Approximately 23,000 square kilometres
- Population 103,000 (2016) population density 5 residents per square kilometre (low for regional Victoria)
- Five local government areas (LGAs) Warrnambool (population 35,000), Corangamite (16,000), Glenelg (19,000), Moyne (17,000) and Southern Grampians (16,000)
- Main cities and towns: Warrnambool (31,000, 30% of the region's population), Portland (10,000), Hamilton (9,000) reflecting the historical importance of transport hubs / ports to the region's agricultural produce
- Minimal LGA diversity size, population, age, density and land use unusual for regional Victoria.

1.2 The community

Whilst there are noteworthy variations across the region i.e. Warrnambool, there is remarkable consistency across the LGAs in the region:

- Age: 30% of population <25 years, 50% 25-64, 20%
 65+ relatively young (30:50:20 average)
- Education: 21% of the population have postsecondary qualifications – similar to regional average (22%)
- Unemployment: 4.8% total, 9.4% youth lower than regional average (5.9% total, 11.5% youth)
- Digital inclusion: highest ranked region on the RMIT-Swinburne-Telstra Digital Inclusion Index¹⁴
- Overall socio-economic disadvantage: mid-ranked region on ABS SEIFA score¹⁵.

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









Figure 6 Comparisons of key Great South Coast indicators of digital infrastructure demand

¹⁵ ABS Socio-economic Index for Australia: SEIFA

¹⁴ Measuring Australia's Digital Divide – the Australian Digital Inclusion Index 2017

1.3 The economy

Gross Regional Product (GRP) \$5.9 billion (mid-sized), with little growth over the past 10 years.

Eight industries make up more than three-quarters of employment in the region:

Agriculture/forestry/fishing	16%
Construction	7%
Education/training	8%
Health care/social assistance	14%
Manufacturing	8%
Public/admin/safety	5%
Retail trade	10%
Tourism	8%
Total	76.0%

Great South Coast residents are employed across occupational categories as follows:

Professional	16%
Technical & trades	14%
Managers	19%
Clerical & administration	10%

Community & personal services	11%
Labourers	14%
Sales	10%
Machinery operators & drivers	7%

Note. Totals in table may exceed 100% due to rounding

International exports \$1.4 billion (2017), with exportintensity (exports relative to GRP) highest in regional Victoria.

1.4 Structural change

Agriculture/forestry/fishing is the dominant sector in the region both in terms of number of employees (16% of jobs) and GRP contribution (almost 30%). This suggests that digitalisation should be focused on this industry sector, along with the strong emerging industries such as health and tourism.

Manufacturing is the second largest major industry in terms of GRP contribution, but has shown a substantial 10 year decline in number of employees. Increased digital enablement in manufacturing may not halt this decline but will strengthen the prospects of manufacturing remaining a substantial employment and GRP contributing industry.

1.5 Digital Intensity – now and in 3-5 years

Table 8 Comparison of current and future digital intensity requirements of the main Great South Coast industries based on employment ¹⁶

Regional sector	Digital intensity now (current practice)			Digital intensity needed in 3-5 years (best practice) ¹⁷		
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. Embedded use of augmented & virtual reality in classrooms for enhanced teaching methods		
Construction		Fixed & 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 administration & 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 retail stores connect to customers through p and mobile payment methods			

Legend:

Low	

Medium

High

¹⁶ Derived from: McKinsey Digital – Digital Australia: Seizing the opportunity from the Fourth Industrial Revolution; OCED – A taxonomy of digital intensive sectors; and discussions with industry sector digital development experts.

¹⁷ Derived from: McKinsey Digital – Digital Australia: Seizing the opportunity from the Fourth Industrial Revolution; OCED – A taxonomy of digital intensive sectors; and discussions with industry sector digital development experts.

1.6 General Characteristics Informing Digital Planning

The Great South Coast region has limited LGA diversity – apart from Warrnambool – in size, population, population density, age and industry sectors supporting employment:

- LGA region and population Warrnambool LGA has a population of 35,000, approximately one third the region's population although it is the smallest LGA in the region covering 121 square kilometres. In contrast, the Southern Grampians LGA has a population of 16,000 and is one of the largest LGAs in the region covering 6,654 square kilometre.
- Population density differs widely between Warrnambool LGA (286 residents per square kilometre) and the rest of the region at 2-4 residents per square kilometre.
- Median Age is notably consistent across the LGAs at 40 with the exception of Warrnambool at 41.
- Industry sectors supporting employment seven industries make up two thirds of Great South Coast employment with these being dispersed across the region.

Analysis of the digital intensity requirements of the eight industries supporting 76 percent of the Great South Coast workforce reveals that five of the industries will rely heavily on digital services over the next three to five years. Three of the industries will move from having a low reliance on digital services to relying heavily on digital services. These include health and social assistance, tourism and agriculture/forestry/fishing. To ensure service improvements and productivity gains are achieved for these industries, addressing the increasing digital needs of these and other industries is important.

In this Plan, a framework has been developed that attempts to address these regional characteristics 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.

2 Regional Supply Overview

2.1 Fixed Broadband

Coverage by Land Area

The map following shows NBN coverage of the Great South Coast region, with the LGA boundaries marked.

Areas served with FTTP, FTTC and FTTN represent a small part 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.

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 7 An Overview of NBN Technology Coverage of the Great South Coast 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 the figures for Warrnambool are distorted (favourably) by the comparatively small size of the LGA, and the Glenelg LGA has very little fixed wireless coverage.

		NBN Technology (% Area)	
LGA	Area (km²)	Fixed Wireless	Satellite
Corangamite	4,405	25%	75%
Glenelg	6,237	6%	93%
Moyne	5,495	27%	73%
S Grampians	6,648	22%	78%
Warrnambool	120	7%	69%
Region (km ²)	22,905	4,487	18,341

Coverage of Businesses

Across the Great South Coast region, there are 4,205 businesses registered with Workcover. The NBN technology that either currently serves (or is destined to serve) these businesses is as shown in the chart below.



Figure 8 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	Number of business	Approximate Coverage (%)					
		FTTP	FTTB FTTC	FTTN	FW	SAT	
Corangamite	637	0%	0%	37%	31%	32%	
Glenelg	755	0%	1%	64%	10%	26%	
Moyne	664	0%	5%	23%	24%	48%	
S Grampians	766	0%	0%	57%	19%	24%	
Warrnambool	1,383	0%	0%	91%	1%	8%	
Region (no.)	4,205	0	40	2575	582	1008	

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 GNAF¹⁸ addresses (*see important qualification in footnote*) that lie within residential-zoned areas.



Figure 9 GNAF addresses served by different NBN technologies

	Approximate Coverage (%)					
LGA	No. Res.	FTTP	FTTB FTTC	FTTN	FW	SAT
Corangamite	4,868	0%	0%	62%	21%	18%
Glenelg	8,017	0%	2%	84%	5%	8%
Moyne	4,624	0%	12%	55%	9%	25%
S Grampians	6,314	0%	0%	92%	6%	2%
Warrnambool	17,883	3%	1%	92%	1%	4%
Region (no.)	41,706	483	901	34,485	2,401	3,436

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 in the Corangamite, Glenelg and Moyne LGAs. The overall percentage (8%) is also higher than the national average and could possibly be higher if the additional dwellings in farming areas were to be included.

¹⁸ 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.

General Notes

An important "companion" to this document is an overarching *Unmet Digital Needs: Common Themes* report that discusses common problems and common solutions observed across regional Victoria.

The overarching report outlines the strengths and weaknesses of all NBN Co's various delivery technologies. In summary:

- Users in satellite areas suffer the greatest performance limitations and are most likely to find their digital future constrained by performance limitations. For such users, access to higher performing connectivity in nearby population centres may be particularly valuable.
- Some users in both fixed wireless and FTTN areas may be limited by their connection technology, especially as needs grow into the future.

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, which often do not capture localised blackspots due to topography etc.



Figure 10 Telstra Public Coverage Map of Great South Coast Region

Telstra's public coverage map indicates good coverage with:

- 4GX (typically download speed 2 to 75 Mbps) in green
- 3G handheld device in dark brown
- 3G with external antenna in light brown.

By simple visual examination of this map, Telstra appears to support coverage over at least 95% of the region.

The Optus public coverage map (Figure 11 below) 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 95% of the region, comparable to Telstra.



Figure 11 Optus Public Coverage Map of Great South Coast Region

The most noteworthy gap evident in both Telstra and Optus coverage is in the area of the Grampians. Smaller coverage gaps are scattered across the region, most commonly in areas of hilly terrain.

As for Optus, Vodafone's public coverage maps are based on using a nominated device, and for comparison with the Optus map, an iPhone 6 has been assumed.



Figure 12 Vodafone Public Coverage Map of Great South Coast Region

In interpreting the map:

- Light pink indicates 4G indoor coverage
- Dark pink indicates 4G outdoor coverage
- Light green indicates indoor 3G coverage
- Dark green indicates outdoor 3G coverage
- Hatched 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, particularly along the coastal areas.

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 OpenSignal¹⁹ application and database, and a sample of the maps produced from these sources (in this case, in the area of Ararat in the Central Highlands) 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 13 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 (VMP).

¹⁹ See https://opensignal.com/networks, accessed on 10 July 2018.

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. These capabilities are discussed more fully in the overarching report.

Mobile coverage is discussed in the analysis that is provided in Section 3 for cities, towns and smaller localities in the region. <u>In all cases</u>, 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 address a growing divide between urban and rural areas. In urban areas, high population densities and concentrated consumer spending attract network investment and competition. In addition, Telstra was required to grant other mobile network operators 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 has 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.

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 to 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 wellbeing
- 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 MNOs.

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 twoway 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 follows.

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. Telstra's LTE-M (LTE Cat-M1) public coverage map shows full coverage for Victoria except for some alpine areas.

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 map²⁰. The diagram below shows coverage in the Great South Coast 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 14 Sigfox Coverage of Great South Coast Region

Based on this map, there may be significant areas of coverage throughout the Great South Coast Region.

²⁰ Map derived from Sigfox coverage map published at

http://www.sigfox.com/en/coverage (accessed on 3 July 2018).

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 15 Taggle Coverage of the Great South Coast Region (SLIM)

2.4 Other Connectivity Options

The Victorian Government agency VicTrack has fibre links running along regional rail corridors.

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.

2.5 SLIM Analysis

Whilst various of the broad perspectives offered in this report are based on information from the SLIM geographic information system (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 15 places selected for analysis in this section include all cities (population > 10,000), all towns (population > 1,000) and the largest locality (population <1000) in each LGA that makes up the region.

In combination, the 15 places accommodate 65.5% of the region's population of 103,077. 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 11 localities with populations of between 185 and 1,000 - in combination representing another 3,629 of the population in the region.

The balance of the region's population (31%) 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, this equates to an estimated 12,280 households outside of the places considered in the following subsections.

3.1 City of Warrnambool

Warrnambool is a regional centre and former port city on the south-western coast of Victoria which was established in 1846.

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

- The population of Warrnambool grew by 9.1% over a decade to 30,709 in 2016, one of the highest growth rates for the region over the period
- 14,910 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 52.5% being in full-time employment and 36.5% in part-time employment
- 10.0% of the labour force classified themselves as managers, 19.1% as professionals and 11.2% as clerical and administrative workers
- 6.3% of the labour force cited their industry of employment as hospitals (other than psychiatric hospitals), with a further 2.9% citing residential aged care
- A public and a private hospital are located in Warrnambool

- Warrnambool has a total of four Government and three Catholic/independent primary schools, two Government secondary schools, two Catholic/independent secondary schools (one also catering for primary school education), a special developmental school, a campus of Deakin University and the South West TAFE
- With a median age of 41, Warrnambool is one of the youngest population centres in the Great South Coast region and close to the Victorian median age of 37
- The ABS report a median annual household income of \$60.1K for Warrnambool, above the median of the major towns in the region but still below Melbourne's \$80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 1,240 businesses in the city or its near surrounds
- In 77.4% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 23.8% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 17.9% have completed level III or IV trade certificates
- Another 13% have completed year 12.

ABS Industry employment data from 2016 indicated that the Warrnambool LGA had 4.8% employment in the industry sectors with strong technology exposure.

Fixed Broadband

Figure 16 below shows the status of the NBN rollout in Warrnambool 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 outside of the lined areas show locations serviced by NBN fixed wireless services and white areas show 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 Warrnambool is largely serviced by NBN FTTN with small pockets of FTTP built or under construction (brown striped areas) and fixed wireless in areas surrounding the city.



Figure 16 NBN fixed line coverage of Warrnambool (NBN Co)

Our analysis shows that the small number of premises being serviced by NBN FTTP are mainly in the new development areas on the out-skirts of the city.

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 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 Sigfox coverage in Warrnambool.

Taggle does not have coverage in Warrnambool.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are a number of free public WiFi zones in Warrnambool, with 30 minutes of free WiFi access available at public phones on Gilles, Lava, Henna and Koroit streets and at the tourist information centre on the Great Ocean Road. Warrnambool Library has free WiFi during library hours (five and a half days a week).

Other

VicTrack fibre transits the southern fringe of the city, following the route of the train line (see map following). Utilising spare capacity on this fibre could enable highspeed connectivity to Melbourne via Geelong.

No details are available of optical fibre connectivity provided by other mobile network operators.



Figure 17 VicTrack and power transmission networks for Great South Coast

3.2 City of Portland

Portland is a small city in Victoria, Australia, and is the oldest European settlement in the state. It is also the main urban centre in the Shire of Glenelg.

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

- The population of Portland grew by 2.5% over a decade to 10,061 in 2016, close to the median growth rate of 2.0% for major towns in the region
- 4,340 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 50.6% being in full-time employment and 34.6% in part-time employment
- 9.3% of the labour force classified themselves as managers, 14.8% as professionals and 10.1% as clerical and administrative workers
- 5.9% of the labour force cited their industry of employment as Hospitals and 3.4% cited Local Government Administration
- One public hospital is located in Portland
- Portland has seven primary schools, two secondary schools and a TAFE

- With a median age of 44, Portland has one of the younger populations in the region
- The ABS report a median annual household income of \$53.1K for Portland, just above the median of \$51.5K for major towns in the region but well below Melbourne's \$80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 450 businesses in the city or its near surrounds
- In 75.1% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 15.6% 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 10.4% have completed year 12.

ABS Industry employment data from 2016 indicated that the Glenelg LGA had 3.3% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Portland 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 outside the striped 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 Portland is largely serviced by NBN FTTN with a couple of small pockets of FTTP. NBN fixed wireless and satellite service areas surround the city.



Figure 18 NBN fixed line, fixed wireless and satellite coverage of Portland (NBN Co)

An aerial image of the same area shows a number of premises (mainly farms) in the south and west of Portland in the NBN satellite footprint (see next map).



Figure 19 Aerial imagery showing NBN fixed line, fixed wireless and satellite areas in Portland (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 appear to be no mobile coverage issues in the city, with the three major mobile network operators all offering service.

LP-WAN Coverage

Extensive Sigfox coverage exists in Portland.

Taggle does not have coverage in Portland.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are limited free public WiFi zones in Portland, with free WiFi access available in the Portland Tourist Information Centre.

Access to free WiFi services may be valuable for those living just a short distance from the city for whom NBN satellite connectivity is the only fixed broadband option.

Other

Portland is not on the VicTrack fibre route.

3.3 Town of Hamilton

The town of Hamilton is a large town in the south-west of Victoria formally declared in 1851. It has a long history of grazing and agriculture and is a significant producer of Australia's wool clip.

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

- The population of Hamilton declined by 5.2% over a decade to 8,888 in 2016, the fourth lowest level of the 14 biggest towns of the region
- 4,033 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 52.5% being in full-time employment and 35.8% in part-time employment
- 12.6% of the labour force classified themselves as managers, 17.4% as professionals and 11.9% as clerical and administrative workers
- 8.3% of the labour force cited their industry of employment as Hospitals, 3.5% as Local Government, and 2.6% in Aged Care Residential
- One public hospital is located in Hamilton
- Hamilton has four primary schools, two secondary schools, four primary/secondary schools, a university and a TAFE
- With a median age of 46, Hamilton is close to the median age of 48 across major towns in the region

- The ABS report a median annual household income of \$52.6K for Hamilton, just above the median of \$51.5K for major towns in the region but well below Melbourne's \$80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 450 businesses in the town or its near surrounds
- In 73.9% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 20.2% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 19.0% have completed level III or IV trade certificates
- Another 11.1% have completed year 12.

ABS Industry employment data from 2016 indicated that the Southern Grampians 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 Hamilton 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.



Figure 20 NBN fixed line coverage of Hamilton (NBN Co)

Our analysis reveals that Hamilton is largely serviced by NBN FTTN with fixed wireless in areas surrounding the town.

Our analysis shows that most of the town's premises fall within the fixed fixed line FTTN area. However, there are a substantial number of premises yet to receive a service as NBN FTTN services are in construction or being planned (brown striped areas in the map above).

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

Extensive Sigfox coverage exists in and around Hamilton.

Taggle does not have coverage in Hamilton.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Hamilton. Free WiFi access is available at the Hamilton Library during library hours (five and a half days a week).

Other

Hamilton is neither on the VicTrack or the power transmission routes.

3.4 Town of Port Fairy

Port Fairy is a coastal town in south-western Victoria, named after a whaling ship *The Fairy* back in 1828. Its main industries are tourism and fishing, and it is the home port for one of Victoria's largest fishing fleets.

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

- The population of Port Fairy grew by 16.5% over a decade to 3,029 in 2016, the highest growth rate for the largest towns in the region
- 1,250 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 51.5% being in full-time employment and 36.4% in part-time employment
- 18.1% of the labour force classified themselves as managers, 23.8% as professionals and 9.4% as clerical and administrative workers
- 5.2% of the labour force cited their industry of employment as Local Government Administration and 4.8% as Aged Care Residential
- One public hospital is located in Port Fairy
- Port Fairy has two primary schools
- With a median age of 51, Port Fairy is slightly older than the median age of 48 for the largest towns in the region, and considerably older than the median age of 37 for Victoria
- The ABS report a median annual household income of \$57.5K for Port Fairy, the fourth highest for the region but still below Melbourne's \$80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 134 businesses in the town or its near surrounds
- In 77.7% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 32.3% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 15.6% have completed level III or IV trade certificates
- Another 10.8% have completed year 12.

ABS Industry employment data from 2016 indicated that the Moyne LGA had 3.5% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Port Fairy 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 Port Fairy is largely serviced by NBN FTTN and fixed wireless in areas surrounding the town.



Figure 21 NBN fixed line and fixed wireless coverage in Port Fairy (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

Sigfox coverage extends across Port Fairy.

Port Fairy does not fall within the coverage footprint for Taggle.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are two free public WiFi zones in Port Fairy, with 30 minutes of free WiFi access available at public phones on Griffiths and Sackville streets. Port Fairy Library has free WiFi during library hours (five and a half days a week). Fieldwork that is being undertaken may ascertain the availability and extent of other publicly accessible free WiFi options.

Access to WiFi services may be valuable for those living just a short distance from the town for whom NBN satellite connectivity is the only fixed broadband option.

Other

Port Fairy is neither on the VicTrack or the power transmission routes.

3.5 Town of Camperdown

Camperdown is a historically significant rural town in southwestern Victoria renowned for its classic historical buildings.

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

- The population of Camperdown declined by 5.4% over a decade to 2,995 in 2016, below the median growth rate of 2.0% for the largest towns in the region
- 1,218 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 50.7% being in full-time employment and 37.8% in part-time employment
- 11.2% of the labour force classified themselves as managers, 16.9% as professionals and 9.8% as clerical and administrative workers
- 7.4% of the labour force cited their industry of employment as Hospitals, and 5.5% as Local Government Administration
- One public hospital is located in the town
- The town has a primary school, a secondary school and a primary/secondary school with two campuses
- With a median age of 49, Camperdown is close to the median age of 48 for the largest towns of the region
- The ABS report a median annual household income of \$46.7K for Camperdown, below the median of towns in the region of \$50.5K and below Melbourne's \$80.4K

- Data in SLIM on businesses registered with Workcover indicates approximately 145 businesses in the town or its near surrounds
- In 69.9% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 17.1% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 17.8% have completed level III or IV trade certificates
- Another 11.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Corangamite LGA had 3.2% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Camperdown 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.

Our analysis reveals that Camperdown is largely serviced by NBN FTTN, with surrounding areas to the north, east and west receiving fixed wireless and areas to the south receiving satellite services.



Figure 22 NBN fixed line, fixed wireless and satellite coverage of Camperdown (NBN Co)

Examining aerial imagery of the same area shows most Camperdown premises falling within the existing or planned fixed line FTTN coverage. Some premises (mainly farms) in the south-east of Camperdown are in the NBN satellite footprint (see sample in map following).



Figure 23 Aerial imagery showing NBN fixed line, fixed wireless and satellite areas in Camperdown (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

Camperdown falls within the coverage footprint for Taggle.

Sigfox coverage is not currently available in Camperdown.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Camperdown but, free WiFi access is available at the Camperdown Library during library hours (five and a half days a week).

Access to WiFi services may be valuable for those living just a short distance from the town for whom NBN satellite connectivity is the only fixed broadband option.

Other

VicTrack fibre transits the centre of the town through the train station, following the route of the train line

3.6 Town of Terang

Terang is a town in the Western district of Victoria in the Shire of Corangamite. The town was developed in the late 1850s and its attractions include a historic post office with clock tower, a war memorial, rose gardens and the town's first church.

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

- The population of Terang grew by 11.2% over a decade to 2,029 in 2016, one of the highest for the region
- 805 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 55.8% being in full-time employment and 32.8% in part-time employment
- 10.5% of the labour force classified themselves as managers, 12.3% as professionals and 10.8% as clerical and administrative workers
- 6.2% of the labour force cited their industry of employment as Hospitals, and 4.3% cited Local Government Administration
- One public hospital is located in the town
- The town has a primary school and a primary/secondary school with two campuses, along with a TAFE
- With a median age of 48, Terang has the same median age as the median of towns in the region
- The ABS report a median annual household income of \$49.9K for Terang, just below the median of \$50.5K for towns in the region
- Data in SLIM on businesses registered with Workcover indicates approximately 98 businesses in the town or its near surrounds

• In 70.3% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 14.3% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 17.4% have completed level III or IV trade certificates
- Another 10.7% have completed year 12.

ABS Industry employment data from 2016 indicated that the Corangamite LGA had 3.2% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Terang 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.

Our analysis reveals that Terang is largely serviced by NBN FTTN, with fixed wireless in areas surrounding the town.



Figure 24 NBN fixed line and fixed wireless coverage of Terang (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

Terang does not fall within Taggle's coverage footprint.

Sigfox coverage is not currently available in Terang, but spans much of the Great South Coast region.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Terang but, free WiFi access is available at the Koroit Library during library hours (five and a half days a week).

Some of the accommodation venues offer free WiFi connectivity.

Other

VicTrack fibre transits the centre of the town through the train station, following the route of the train line (see following map).

The power transmission network passes the town to the North as shown in the map below.



Figure 25 Power Transmission Network passing Terang (SLIM)

3.7 Town of Koroit

Koroit is a small rural town in western Victoria in the Shire of Moyne. The town borrows its name from the Koroitch Gundidjpeople who occupied the area prior to European settlement.

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

- The population of Koroit grew by 5.9% over a decade to 1,585 in 2016, above the 2.0% median growth rate of the largest towns in the region
- 768 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 50.3% being in full-time employment and 37.2% in part-time employment
- 11.9% of the labour force classified themselves as managers, 15.0% as professionals and 10.0% as clerical and administrative workers
- 5.3% of the labour force cited their industry of employment as Hospitals
- There are no hospitals within Koroit, with the closest ones located in Warrnambool and Port Fairy to the southeast and southwest of the town respectively
- The town has two primary schools
- With a median age of 39, Koroit has one of the youngest populations in the region and only just above the median age for Victoria of 37
- The ABS report a median annual household income of \$61.1K for Koroit, the second highest of the places analysed in the region but still below Melbourne's median of \$80.4K

- Data in SLIM on businesses registered with Workcover indicates approximately 44 businesses in the town or its near surrounds
- In 80.4% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 21.1% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 23.4% have completed level III or IV trade certificates
- Another 12.3% have completed year 12.

ABS Industry employment data from 2016 indicated that the Warrnambool LGA had 4.8% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Koroit 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 Koroit will be largely serviced by NBN FTTN and FTTC, with fixed wireless in areas surrounding the town. The fixed line rollout in Koroit has not yet been completed as shown by the brown areas in the map below.



Figure 26 NBN fixed line under construction and fixed wireless coverage of Koroit (NBN Co)

The Koroit town centre (around Commercial Road) will receive NBN FTTC along with a residential area to the south-east of the town centre. These FTTC areas offer those with demanding connectivity requirements the option of a high-speed broadband service, albeit at the (potential) cost of moving locations.

Examining a satellite map of the same area shows a large industrial site on the town fringe in Eastern Koroit (on Midgley Street) falling partly in the FTTN service area and partly in the fixed wireless footprint. It is not known whether this site is serviced by FTTN (from Midgely Road).



Figure 27 Industrial site located partly in NBN fixed wireless footprint (NBN Co)

The overarching report contains a discussion of the limitations associated with the different NBN Co access network technologies.

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

Sigfox coverage is available in Koroit.

Koroit does not fall within the coverage footprint for Taggle.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Koroit but, free WiFi access is available at the Koroit Library during library hours (five and a half days a week).

Free WiFi access is available in some of the accommodation venues in Koroit.

Other

The power transmission network passes around 2 kilometres to the North of the town.



Figure 28 Power Transmission Network passing to the North of Koroit (SLIM)

3.8 Town of Cobden

Cobden is a town located 200 kilometres South-West of Melbourne. The town was established in the 1860s, and early on attracted logging companies and settlers to the Heytesbury Forest.

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

- The population of Cobden grew by 2.0% over a decade to 1,564 in 2016, which is the median growth rate for towns analysed in the region
- 675 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 56.7% being in full-time employment and 32.3% in part-time employment

- 10.4% of the labour force classified themselves as managers, 10.4% as professionals and 6.7% as clerical and administrative workers
- 7.1% of the labour force cited their industry of employment as Hospitals and 3.9% cited Aged Care Residential
- There are no hospitals in Cobden. The closest one is located in Camperdown, to the northeast of town
- The town has one primary school and a technical school
- Cobden has a median age of 48, which is also the median of the largest towns in the region, and above the median age of 37 for Victoria
- The ABS report a median annual household income of \$53.6K for Cobden, above the median for towns in the region of \$50.5K but below Melbourne's \$80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 63 businesses in the town or its near surrounds
- In 67.5% 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 18.2% have completed level III or IV trade certificates
- Another 10.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Corangamite LGA had 3.2% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Cobden 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 Cobden is due to be serviced by NBN FTTN in the fixed line footprint, with fixed wireless coverage in most of the surrounding area. Around 50% of the town is yet to have active NBN

services as they are still under construction but are planned for NBN FTTN services.



Figure 29 NBN fixed line and fixed wireless coverage of Cobden (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

Cobden falls towards the edge of Taggle's coverage footprint. Signal testing may confirm the need for additional base stations to assure reliable connectivity.

Sigfox coverage is not currently available in Cobden but spans much of the Great South Coast region.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Cobden. Free WiFi access is available at the Cobden Library during library hours (five and a half days a week).

Other

The power transmission network passes about 3 kilometres to the North of the town (largely obscured

by cloud in this aerial image).



Figure 30 Power Transmission Network to the North of Cobden (SLIM)

3.9 Town of Casterton

Casterton is a town located on the Glenelg Highway, 42 kilometres east of the South Australian border. The town of Casterton began on site of a crossing of the Glenelg River and was regarded by early settlers as an ideal farming location.

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

- The population of Casterton declined by 18.8% over a decade to 1,345 in 2016, the most significant decline for the towns analysed in the region
- 464 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 50.0% being in full-time employment and 38.8% in part-time employment
- 11.3% of the labour force classified themselves as managers, 12.6% as professionals and 9.2% as clerical and administrative workers
- 11.6% of the labour force cited their industry of employment as Hospitals, and 5.8% as Aged Care Residential
- One public hospital is located in the town
- The town has two primary schools and a secondary school
- With a median age of 56, Casterton is above the median of 48 for the biggest towns in the region, and well above Victoria's median age of 37

- The ABS report a median annual household income of \$38.0K for Casterton, the lowest of the towns analysed in the region
- Data in SLIM on businesses registered with Workcover indicates approximately 72 businesses in the town or its near surrounds
- In 61.5% 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 16.1% have completed level III or IV trade certificates
- another 9.8% have completed year 12.

ABS Industry employment data from 2016 indicated that the Glenelg LGA had 3.3% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Casterton as advised by NBN Co in September 2018. The brown / striped areas show the locations where NBN fixed line services are planned or under construction. The white areas are serviced by NBN satellite.



Figure 31 NBN fixed line under construction in Casterton (NBN Co)

Our analysis reveals that Casterton is set to receive a predominantly NBN FTTN rollout, with a small area in the centre of town to receive FTTC.

Examining aerial imagery of the same area shows a nontrivial number of premises that fall outside of the NBN fixed line footprint and will receive satellite services, especially in the west between the fixed line footprint and the golf course.



Figure 32 Aerial imagery showing NBN Fixed Wireless and Satellite

Mobile Coverage

areas in Casterton (NBN Co)

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

Casterton is at the fringe of a Sigfox coverage area, and testing may be required to ascertain if additional base stations are needed to assure reliable connectivity.

Casterton does not fall within the coverage footprint for Taggle.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Casterton. Free WiFi access is available at the Casterton Visitor Information Centre, and at least one accommodation venue offers free WiFi.

Access to WiFi services may be valuable for those living just a short distance from the town for whom NBN satellite connectivity is the only fixed broadband option.

Other

Casterton is neither on the VicTrack or the power transmission routes.

3.10 Town of Heywood

Heywood is a town on the Fitzroy River in the Shire of Glenelg to the southwest of Victoria. The township was surveyed in 1852 by Lindsay Clarke who named it after Heywood, Wiltshire in England.

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

- The population of Heywood declined by 1.8% over a decade to 1,264 in 2016, below the median growth rate of 2.0% for towns analysed in the region
- 518 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 52.7% being in full-time employment and 34.4% in part-time employment
- 10.5% of the labour force classified themselves as managers, 7.2% as professionals and 9.7% as clerical and administrative workers
- 7.6% of the labour force cited their industry of employment as Hospitals, and 5.5% cited Local Government Administration
- One public hospital is located in the town
- The town has one primary and one secondary school
- With a median age of 50, Heywood is just above the median of 48 for towns analysed in the region
- The ABS report a median annual household income of \$44.6K for Heywood, below the median of \$50.5K for towns analysed in the region
- Data in SLIM on businesses registered with Workcover indicates approximately 58 businesses in the town or its near surrounds
- In 63.8% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

• 10.6% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification

- Another 19.6% have completed level III or IV trade certificates
- Another 9.4% have completed year 12.

ABS Industry employment data from 2016 indicated that the Glenelg LGA had 3.3% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Heywood 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.

Our analysis reveals that Heywood is serviced by NBN FTTN services within the fixed line footprint, with surrounding areas receiving NBN fixed wireless services.



Figure 33 NBN fixed line and fixed wireless coverage of Heywood (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

Heywood falls within the Sigfox coverage footprint.

There is no Taggle coverage in the area.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Heywood but, free WiFi access is available at the Heywood Library during library hours (five and a half days a week). A number of accommodation venues also offer free WiFi to guests.

Other

Heywood is not on a VicTrack route, but the power transmission network runs within 10 kilometres to the south-east and south-west of the town.

3.11 Town of Mortlake

Mortlake is a town in the Western District of Victoria, 50 kilometres north-east of Warrnambool in the Shire of Moyne. The town is situated at the foot of a dormant volcano, Mount Shadwell, formed 25,000 years ago and is also known for its bluestone buildings, with several dating back to the 1850s.

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

- The population of Mortlake grew by 11.7% over a decade to 1,113 in 2016
- 412 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 51.9% being in full-time employment and 36.2% in part-time employment
- 12.1% of the labour force classified themselves as managers, 10.3% as professionals and 11.3% as clerical and administrative workers
- 10.4% of the labour force cited their industry of employment as Local Government Administration, 7.4% cited Aged Care Residential and 5.7% cited Hospitals
- There are no hospitals in Mortlake, the closest one being located to the southeast in Terang
- The town has one primary school and a primary/secondary school
- With a median age of 50, Mortlake is just above the median of 48 for the towns analysed in this region

- The ABS report a median annual household income of \$40.5K for Mortlake, below the median of \$50.5K for the largest towns in the region
- Data in SLIM on businesses registered with Workcover indicates approximately 62 businesses in the town or its near surrounds
- In 63.8% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 17.0% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 18.6% have completed level III or IV trade certificates
- Another 10.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Moyne LGA had 3.5% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Mortlake 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.

Our analysis reveals that Mortlake is serviced by NBN FTTN within the NBN fixed line footprint, with the surrounding areas receiving NBN fixed wireless services.



Figure 34 NBN fixed line and fixed wireless coverage of Mortlake (NBN Co)

An aerial map shows the large number of premises on the eastern side of the town that fall outside the fixed line area and are being serviced by fixed wireless (see map below). This creates the potential for a significant "digital divide" within the town.



Figure 35 Aerial imagery showing the large number of premises outside of NBN fixed line footprint (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 3G outdoor coverage across the entire town as well as some 4G Plus outdoor coverage over portions of the town
- Vodafone shows 4G indoor coverage across the entire town.

In summary, there appears to be good mobile coverage of the town.

LP-WAN Coverage

Mortlake does not fall within Taggle's current coverage footprint.

Sigfox coverage is not currently available in Mortlake, but spans much of the Great South Coast region.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Mortlake but free WiFi access is available at the Mortlake Library during library hours (five and a half days a week).

Other

The power transmission network passes within

10 kilometres to the north and east of Mortlake.



Figure 36 Power Transmission Network near Mortlake (SLIM)

3.12 Locality of Coleraine

Coleraine is a town on the Glenelg Highway, 350 kilometres west of Melbourne. The area was first settled by Europeans in 1838 for pastoral grazing. Today, Coleraine's primary industries are beef and wool.

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

- The population of Coleraine declined by 14.1% over a decade to 851 in 2016, the third highest population decline of the 15 places analysed in the region
- 322 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 47.2% being in full-time employment and 38.8% in part-time employment
- 11.6% of the labour force classified themselves as managers, 9.9% as professionals and 8.8% as clerical and administrative workers
- 13.1% of the labour force cited their industry of employment as Hospitals, and 6.4% cited Local Government Administration
- One public hospital is located in the town
- The town has two primary schools
- With a median age of 56, Coleraine has one of the oldest populations in the region
- The ABS report a median annual household income of \$40.2K for Coleraine, one of the lowest in the region
- Data in SLIM on businesses registered with Workcover indicates approximately 47 businesses in the town or its near surrounds

• In 64.1% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 10.4% 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 7.2% have completed year 12.

ABS Industry employment data from 2016 indicated that the Southern Grampians 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 Coleraine 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. The white areas are serviced by NBN satellite.

Our analysis reveals that Coleraine is served by NBN FTTN within the NBN fixed line footprint, with the surrounding areas only able to access NBN satellite services.



Figure 37 NBN fixed line coverage of Coleraine (NBN Co)

Examining satellite imagery of the area reveals a scattering of dwellings located outside the town limits.

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 of any kind.

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

Coleraine appears to be on the fringe of a Sigfox coverage area. Testing may be needed to confirm connectivity, and additional base stations may be needed to assure reliable communications.

Coleraine does not fall within the Taggle's coverage footprint.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Coleraine, and no accommodation venues offering WiFi to guests were identified.

Access to WiFi services may be valuable for those living just a short distance from the town for whom NBN satellite connectivity is the only fixed broadband option.

Other

Coleraine is neither on the VicTrack or the power transmission routes.

3.13 Locality of Timboon

Timboon is a town in the Western District of Victoria, in the Shire of Corangamite. The main industries are dairy, forestry, and the production of lime.

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

• The population of Timboon declined by 8.6% over a decade to 796 in 2016, below the median growth of 2.0% for the 15 towns analysed in the region

- 340 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 39.4% in part-time employment
- 7.7% of the labour force classified themselves as managers, 16.0% as professionals and 9.2% as clerical and administrative workers
- 5.6% of the labour force cited their industry of employment as Hospitals
- One public hospital is located in the town
- The town has a primary/secondary school
- Timboon has a median age of 48, the same as the median for the 15 towns analysed in the region
- The ABS report a median annual household income of \$50.5 K for Timboon, the same as the median for the towns analysed in the region, but below the Melbourne median of \$80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 50 businesses in the town or its near surrounds
- In 74.4% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 17.8% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 17.2% have completed level III or IV trade certificates
- Another 10.8% have completed year 12.

ABS Industry employment data from 2016 indicated that the Corangamite LGA had 3.2% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Timboon as advised by NBN Co in September 2018. The purple / spotted areas show locations serviced by NBN fixed wireless services.

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



Figure 38 NBN fixed wireless coverage of Timboon (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 the entire town.

In summary, there appear to be good mobile coverage of the town.

LP-WAN Coverage

Timboon falls just outside of Taggle's coverage footprint.

Sigfox coverage is not currently available in Timboon, but spans much of the Great South Coast region.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Timboon but, free WiFi access is available at the Timboon Library during library hours (five and a half days a week) and some accommodation venues offer free WiFi.

Other

Timboon is neither on the VicTrack or the power transmission routes.

3.14 Locality of Allansford

Allansford is a town in the City of Warrnambool Local Government Area. The Hopkins River flows through the town, and it is also home to Warrnambool Cheese and Butter.

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

- The population of Allansford grew by 15.4% over a decade to 727 in 2016, one of the highest growth rates for towns in the region
- 402 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 56.2% being in full-time employment and 33.6% in part-time employment
- 9.3% of the labour force classified themselves as managers, 11.3% as professionals and 11.8% as clerical and administrative workers
- 8.5% of the labour force cited their industry of employment as Hospitals
- There is no hospital in Allansford, but there are two located nearby to the west in the city of Warrnambool
- The town has one primary school
- With a median age of 35, Allansford has one of the youngest populations in regional Victoria, and below the Victorian median age of 37
- The ABS report a median annual household income of \$79.5K for Allansford, the highest of towns analysed in the region and just below Melbourne's median of \$80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 35 businesses in the town or its near surrounds
- In 82.4% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 16.7% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 25.1% have completed level III or IV trade certificates
- Another 10.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Warrnambool LGA had 4.8% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Allansford 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. The white areas are serviced by NBN satellite.

Our analysis reveals that Allansford is served by NBN FTTN services, with fixed wireless services available outside the fixed line footprint. There is a small area to the north-west of the town where only NBN satellite services appear to be available. Examining satellite imagery of this area does not reveal any premises located here.



Figure 39 NBN fixed line coverage of Allansford (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, mobile coverage in the town is limited to outdoor coverage by two of the major mobile network operators.

LP-WAN Coverage

Allansford falls within a Sigfox coverage area.

Taggle coverage is not available in Allansford.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Allansford, but some accommodation venues offer guests free WiFi.

Other

VicTrack fibre transits near Allansford, following the route of the train line. It is unknown whether spare capacity is available on this fibre to enable high-speed connectivity to Melbourne. The power transmission network passes well to the north.

3.15 Locality of Cape Bridgewater

Cape Bridgewater is a locality on the western shore of Bridgewater Bay about 21 kilometres south-west of Portland which was settled in the 1860s. Cape Bridgewater is home to a colony of around 650 fur seals and has the highest coastal cliff in Victoria.

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

- The population of Bridgewater declined by 16.6% over a decade to 326 in 2016
- 402 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 56.2% being in full-time employment and 33.6% in part-time employment
- 9.3% of the labour force classified themselves as managers, 11.3% as professionals and 11.8% as clerical and administrative workers
- 8.5% of the labour force cited their industry of employment as Hospitals
- Cape Bridgewater does not have a hospital, but there is one located nearby in Portland to the east
- There are no schools in the town, but there are multiple primary and secondary schools nearby in Portland
- The median age of 53 in Cape Bridgewater puts it above the median of 48 for the 15 towns analysed in the region
- The ABS report a median annual household income of \$44.7K for Cape Bridgewater, below the median of \$50.5K for the largest towns in the region
- Data in SLIM on businesses registered with Workcover indicates approximately 14 businesses in the town or its near surrounds
- In 63.6% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data:

- 12.3% of people aged 15 and over having gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- Another 20.7% have completed level III or IV trade certificates
- Another 8.3% have completed year 12.

ABS Industry employment data from 2016 indicated that the Glenelg LGA had 3.3% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Cape Bridgewater 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. The white areas are serviced by NBN satellite.



Figure 40 NBN fixed line, fixed wireless and satellite coverage of Cape Bridgewater (NBN Co)

Examining aerial imagery of the area shows that many premises in the township fall within the fixed wireless area (see Figure 41 below).



Figure 41 Aerial imagery showing NBN fixed wireless areas in Cape Bridgewater (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 most of the town, but with poor coverage (3G) of much of the surrounding area
- Optus shows 4G Plus outdoor coverage across the town, but with similarly poor coverage in the surrounding area
- Vodafone shows 3G outdoor coverage across the town and partial 4G outdoor coverage.

In summary, there appear to be some mobile coverage issues in the town, with the three major mobile network operators all offering service but at the edge of coverage.

LP-WAN Coverage

Cape Bridgewater falls within a Sigfox coverage area.

Taggle coverage does not extend to Cape Bridgewater.

Telstra Cat-M1 coverage.

Public WiFi Coverage

There are no known public WiFi zones in Cape Bridgewater.

Access to WiFi services may be valuable for those living just a short distance from the town for whom NBN satellite connectivity is the only fixed broadband option.

Other

Power transmission lines appear to run in the near vicinity of the town, but it is not known whether they are of the type that would normally utilise OPGW (which may incorporate optical fibre).



Figure 42 Power Transmission Lines Network near Cape Bridgewater (SLIM)

4 Primary Production

4.1 Land Use Classification

The Victorian Land Use Information System subclassifies primary production land use in the following categories shown in the map legend. As is evident from the land use map following, the overwhelming categorization of primary production land across the Great South Coast region is classified as Grazing – both Dairy and Grazing (sheep and beef). The regional partnership boundary is shown in red.



Figure 43 Primary production land use in the region²¹

The character of digital needs and opportunities will inevitably vary for different types of agriculture. A few examples are:

- 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

²¹ https://invest.agriculture.vic.gov.au

- 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*).

Fixed Broadband Supply

NBN Services

The map below shows NBN coverage of the Great South Coast region.



Figure 44 NBN coverage of the 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 70% of rural land in the Great South Coast 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 is shown in the following table.

LGA	Population in Rural Land ²²	Estimated Area of Satellite Coverage
Corangamite	7,278	40%
Glenelg	6,385	85%
Moyne	11,943	50%
Sth Grampians	5,364	70%
Warrnambool	963	<1%

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 / Sheep Meat / Wool combined
- The area south of Balmoral

The map below shows limited NBN fixed wireless coverage in the area, with most farms in the area serviced by NBN satellite.

Farms located closer in proximity to Balmoral, Englefield and Gatum have NBN fixed wireless coverage.



Figure 45 NBN coverage of the farming area south of Balmoral (NBN Co)

Grazing

- Beef / Sheep Meat / Wool combined
- The area between Macarthur and Mortlake

The map below shows limited NBN fixed wireless coverage in the area, with most farms in the area serviced by NBN satellite.

Farms located closer in proximity to Caramat, Hawkesdale, Mortlake and Winslow have NBN fixed wireless coverage.



Figure 46 NBN coverage of the farming area between Macarthur and Mortlake (NBN Co)

²² 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.

- Beef / Sheep Meat / Wool combined
- The area west of Dartmoor

The map below shows that most farms in the area are serviced by NBN satellite.

Note that the NBN analysis above also applies to feedlots that exist in the area.



Figure 47 NBN coverage of the farming area west of Dartmoor (NBN Co)

Grazing

- Dairy
- The area between Camperdown and Warrnambool

The map below shows most farms in the area have NBN fixed wireless coverage.

Farms located closer in proximity to Terang, Noorat, Boorcan, Dixie and Cobden have NBN fixed wireless coverage. There is a large patch of NBN satellite covering farms near Laang, being outside the footprints of the above-mentioned towns.



Figure 48 NBN coverage of the farming area between Camperdown and Warrnambool (NBN Co)

Grazing

- Dairy
- The area around Heywood

The map below shows limited NBN fixed wireless coverage in the area, with most farms serviced by NBN satellite.

Farms located closer in proximity to Heywood and Heathmere have NBN fixed wireless coverage. Farms located around Drumborg and Milltown are covered by NBN satellite.



Figure 49 NBN coverage of the farming area around Heywood (NBN Co)

Horticulture

• Area to the north-east of Portland

The map below shows that there is one horticultural farm in this region located near the intersection of the Princes and Henty Highways near Portland. The map below shows NBN fixed wireless service covering the area.



Figure 50 NBN coverage of the area to the north-east of Portland (NBN Co)

Horticulture

• Area to the east of Hamilton

The map below shows that Waltanna Farms (8596 Glenelg Highway, Hamilton) is serviced by NBN fixed wireless. The Grange Farm Food (238 Petschells Lane, Croxton East) falls into the NBN satellite footprint.



Figure 51 NBN coverage of the area east of Hamilton (NBN Co)

Forestry

• The area east of Nelson

The map below shows NBN satellite coverage of the plantations east of Nelson. West of the Heywood and Portland fixed wireless footprints, there is no NBN fixed wireless or fixed line service.



Figure 52 NBN Coverage of the forestry areas east of Nelson (NBN Co)

Aquaculture

• The coastal area west of Port Fairy (2891 Princes Highway Port Fairy)

The map below shows NBN fixed wireless coverage of the coastal area around Port Fairy. The Southern Ocean Mariculture abalone farm is located at 2891 Princes Highway Port Fairy and falls within the NBN fixed wireless footprint.



Figure 53 NBN Coverage of the coastal area west of Port Fairy (NBN Co)

Aquaculture

• The coastal area north-east of Portland (Snapper Point Road Narrawong)

The map below shows NBN fixed wireless coverage of the coastal area near Narrawong. The Yumbah Aquaculture abalone farm is located at Snapper Point Road Narrawong and falls within the NBN fixed wireless footprint.



Figure 54 NBN Coverage of the coastal area north-east of Portland (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 55 SLIM outputs at a more detailed level (SLIM)

4.2 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 Great South Coast 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 / Sheep Meat / Wool combined
- The area south of Balmoral

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 inconsistent 4GX and 3G outdoor handheld device coverage across most of the region, with some 3G external antenna coverage and areas of no coverage
- Optus shows inconsistent 4G Plus and 3G outdoor coverage across the entire region
- Vodafone shows no coverage.

In summary, there is very inconsistent mobile coverage in the area, with no single mobile network operator providing comprehensive coverage. This is considered to be a result of the low density of premises and major roads.



Figure 56 Telstra mobile coverage south of Balmoral



Figure 57 Optus mobile coverage south of Balmoral



Figure 58 Vodafone mobile coverage south of Balmoral

- Beef / Sheep Meat / Wool combined
- The area between Macarthur and Mortlake

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 outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) and 3G external antenna coverage across the region. No black spots are evident
- Optus shows 4G Plus and 3G outdoor coverage across the entire region with small patches of 3G external antenna coverage across the region. No black spots are evident
- Vodafone shows no coverage.

In summary, there is mobile coverage in the area from at least two mobile network operators, however this is only achieved through use of devices with external antenna.



Figure 59 Telstra mobile coverage between Macarthur and Mortlake



Figure 60 Optus mobile coverage between Macarthur and Mortlake



Figure 61 Vodafone mobile coverage between Macarthur and Mortlake

- Beef / Sheep Meat / Wool combined
- The area west of Dartmoor to the Victorian border

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 outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) near Dartmoor, with 3G handheld device coverage in the remainder of the area, and some small patches of 3G antenna only at the border
- Optus shows 4G Plus and 3G outdoor coverage across the entire region as far as the Victorian border as a result of investment in coverage along the Princes Highway
- Vodafone shows continuous 4G indoor and outdoor coverage as far as the Victorian border.

In summary, there appears to be continuous handheld device coverage along the highway from three mobile network operators, but coverage becomes highly localised on either side of the corridor.

Note that the detailed mobile coverage also applies to feedlots that exist in this area.



Figure 62 Telstra mobile coverage west of Dartmoor



Figure 63 Optus mobile coverage west of Dartmoor



Figure 64 Vodafone mobile coverage west of Dartmoor

- Dairy
- The area between Camperdown and Warrnambool

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 continuous 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) in the area
- Optus shows continuous 4G Plus outdoor coverage in the area
- Vodafone shows 4G indoor and outdoor coverage in the area.

In summary, there appears to be good options for coverage in the region with the three major mobile network operators all offering service.



Figure 65 Telstra mobile coverage between Camperdown and Warrnambool



Figure 66 Optus mobile coverage between Camperdown and Warrnambool



Figure 67 Vodafone mobile coverage between Camperdown and Warrnambool

Grazing

- Dairy
- The area around Heywood

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 continuous 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) in the area
- Optus shows continuous 4G Plus outdoor coverage in the area
- Vodafone shows 4G indoor and outdoor coverage in the area.

In summary, there appears to be good options for coverage in the region with the three major mobile network operators all offering service.



Figure 68 Telstra mobile coverage around Heywood



Figure 69 Optus mobile coverage around Heywood



Figure 70 Vodafone mobile coverage around Heywood

Horticulture

• Area to the north-east of Portland

Our analysis shows that there is one horticultural farm in this region located near the intersection of the Princes and Henty Highways near Portland. Based on public coverage maps:

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

In summary, there appear to be good options for coverage in the area with the three major mobile network operators all offering service.



Figure 71 Telstra mobile coverage north-east of Portland



Figure 72 Optus mobile coverage north-east of Portland



Figure 73 Vodafone mobile coverage north-east of Portland

Horticulture

• Area to the east of Hamilton

Our analysis shows that there are two farms in the area, Waltanna Farms (8596 Glenelg Highway, Hamilton) and The Grange Farm Food (238 Petschells Lane, Croxton East). Based on public coverage maps:

- Telstra shows continuous 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) in the area
- Optus shows continuous 4G Plus outdoor coverage in the area
- Vodafone shows 4G indoor and outdoor coverage of Waltanna Farms and 3G outdoor coverage of The Grange Farm Food.

In summary, there appears to be good options for coverage in the area with the three major mobile network operators all offering service.



Figure 74 Telstra mobile coverage east of Hamilton



Figure 75 Optus mobile coverage east of Hamilton



Figure 76 Vodafone mobile coverage east of Hamilton

Forestry

• The area east of Nelson

Based on public coverage maps:

- Telstra shows poor handheld coverage across the area with only patchy 4GX and 3G device coverage and large stretches of no handheld coverage
- Optus shows similarly poor handheld coverage across most of the area
- Vodafone shows no coverage over the majority of the area.

In summary, there is very inconsistent mobile coverage in the area, with no single mobile network operator providing comprehensive coverage.



Figure 77 Telstra mobile coverage in the planation areas east of Nelson



Figure 78 Optus mobile coverage in the plantation areas east of Nelson



Figure 79 Vodafone mobile coverage in the plantation areas east of Nelson

Aquaculture

• The coastal area west of Port Fairy (2891 Princes Highway Port Fairy)

Based on public coverage maps:

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

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



Figure 80 Telstra mobile coverage along the coast west of Port Fairy







Figure 82 Vodafone mobile coverage along the coast west of Port Fairy

Aquaculture

• The coastal area north-east of Portland (Snapper Point Road Narrawong)

Based on public coverage maps:

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

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





Figure 83 Telstra mobile coverage of the coast north-east of Portland

Figure 84 Optus mobile coverage of the coast north-east of Portland



Figure 85 Vodafone mobile coverage of the coast north-east of Portland

4.3 LP-WAN Coverage

Coverage maps for two of three major LP-WAN technologies (Sigfox and Taggle) are provided in Section 2.3. Coverage of the third major LP-WAN technology (LoRa) is unknown.

Based on these maps:

- Extensive Sigfox coverage is available towards the eastern and western fringes of the region
- Taggle coverage appears to be available towards the north-western including Balmoral and southeastern fringes of the area including Cobden and Camperdown.

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 the needs, opportunities and barriers in the adoption of IoT technologies.

- Beef / Sheep Meat / Wool combined
- The area south of Balmoral

Taggle coverage appears to be available in and around the area including up to 11 kilometres south of Balmoral.

Sigfox maps show limited coverage is available south of Balmoral.

The Optus NB-IoT trials show no coverage in the area.

Grazing

- Beef / Sheep Meat / Wool combined
- The area between Macarthur and Mortlake

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

Grazing

- Beef / Sheep Meat / Wool combined
- The area west of Dartmoor

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

Note that the analysis above applies to the feedlots that exist in the same area.

Grazing

- Dairy
- The area between Camperdown and Warrnambool

The SLIM database shows good Taggle IoT coverage in Camperdown including up to 17 kilometres east towards Terang, approximately 3 kilometres east of Terang. Optus NB-IoT and SigFox do not appear to have coverage in the area.

Grazing

- Dairy
- The area around Heywood

Sigfox coverage appears to be available in and around Heywood. The SLIM database shows no coverage for Taggle and the Optus NB-IoT trials in the area.

Horticulture

• North-east of Portland

Sigfox coverage appears to be available in and around Portland. The SLIM database shows no coverage for Taggle or Optus NB-IoT.

Horticulture

• East of Hamilton

Sigfox coverage appears to be available in and around Hamilton. The SLIM database shows no coverage for Taggle or Optus NB-IoT.

Forestry

• East of Nelson

There is no Sigfox, Taggle or Optus NB-IoT coverage in the area.

Aquaculture

• Near Port Fairy

Sigfox coverage appears to be available in and around Port Fairy. The SLIM database shows no coverage for Taggle or Optus NB-IoT.

Aquaculture

Near Narrawong

Sigfox coverage appears to be available in and around Narrawong. The SLIM database shows no coverage for Taggle or Optus NB-IoT.

4.4 Skills

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

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

Across the Great South Coast 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+
Corangamite	16,086	46.5%
Glenelg	19,644	46.6%
Moyne	16,741	53.6%
Sth Grampians	16,051	51.3%
Warrnambool	34,555	58.0%
Region	189,360	51.2%

5 Tourist Locations

For tourist locations, the communications demands tend to comprise of:

- 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.

The Great South Coast Region features numerous additional tourist attractions and events beyond those covered in this section.

5.1 Twelve Apostles

- Booringa Rd, Princetown
- Major tourist attraction for international visitors

The Twelve Apostles is a collection of limestone stacks off the shore of the Port Campbell National Park, by the Great Ocean Road in Victoria, Australia. Their proximity to one another has made the site a popular tourist attraction. There are eight Apostles left, the ninth having collapsed dramatically in July 2005. The name remains significant and spectacular, especially in the Australian tourism industry.

A visitor facility offers safe car parking, toilet amenity, food and gift shops and an entrance to a network of boardwalks which provides visitors with safe and clean viewing of the coastline in both directions. The venue is a popular stopping point for tourist coaches on the Great Ocean Road. A charter operator offers sightseeing flights from an adjoining heliport.



Figure 86 Twelve Apostles visitor facility



Figure 87 Visitor boardwalks offer sightseers clean and safe access to the fragile cliff edges

Fixed Broadband

The Twelve Apostles Visitor Facility falls within the NBN Co's satellite footprint. It is not known whether NBN competitors provide alternative services at this location.



Figure 88 NBN Coverage of the Twelve Apostles (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) at the venue
- Optus shows 4G Plus outdoor coverage at the venue
- Vodafone shows 4G indoor and outdoor coverage at the venue.

In summary, there appears to be no mobile outdoor coverage issues at the venue. It is expected that 000 safety coverage is available across the precinct.

WiFi

Free public WiFi services are not currently available at the Twelve Apostles Visitors Centre or boardwalks. This may be due to the difficulty in obtaining suitable backhaul connectivity.

An option may exist to establish a high-speed microwave link from the Twelve Apostles to the Parks Victoria site in the area, but this would need to be supported by high-speed backhaul from that point.

LP-WAN Coverage

The Twelve Apostles does not fall within Taggle's coverage footprint.

Sigfox coverage is not currently available in the area, but spans much of the Great South Coast region.

5.2 Noorat, Glenormiston and Terang

Terang is a community located approximately 200 kilometres west of Melbourne and 40 minutes drive from Warrnambool with a population of 2,288 at the 2016 census. The area offers a number of walking tours including a Heritage Walk of well-preserved turn-of-thecentury architecture and the Terang Walking Track which includes a circuit of the dry lake. Noorat is a small township located approximately 6 kilometres north of Terang at the base of Mount Noorat, a dormant volcano which is considered to have Australia's largest dry crater. Noorat had a population of 333 according to the 2016 census. The area holds a strong indigenous history and the area attracts hikers using the Mt Noorat Volcano Walk and cyclists using the Terang-Noorat bike trail.

Glenormiston (North and South) is a small community located 5 kilometres north-east of Noorat with a population of 160 as at the 2016 census. The area hosts both an agricultural campus of South West TAFE as well as the Gnurad-Gundidj campus of the School for Student Leadership, operated by the Victorian Department of Education and Training and offers residential education experiences for year nine students focusing on personal development and team learning projects.



Figure 89 Aerial imagery of the Terang-Noorat-Glenormiston area

Fixed Broadband

The Terang, Noorat and Glenormiston areas are serviced by a mixture of technologies.

The town of Terang is mostly serviced by NBN FTTN with the surrounding areas, including Noorat and Glenormiston South, serviced by NBN fixed wireless. Glenormiston North falls within the NBN satellite footprint.



Figure 90 NBN Coverage of the Terang-Noorat-Glenormiston area (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 area
- Optus shows 4G Plus outdoor coverage across the area
- Vodafone shows continuous 4G outdoor coverage.

In summary, there appear to be no mobile coverage issues in the area, with all three mobile network operators offering continuous service. It is expected that 000 safety coverage is available across the area.

WiFi

Free public WiFi services are not currently available in Terang, Noorat and Glenormiston. This may be due to the difficulty in obtaining suitable backhaul connectivity.

LP-WAN Coverage

The Terang, Noorat and Glenormiston do not fall within Taggle's coverage footprint.

Sigfox coverage is not currently available in the area, but spans much of the Great South Coast region.

5.3 Budj Bim National Heritage Landscape

Near Macarthur

Budj Bim National Park (formerly Mount Eccles National Park) is Victoria's first co-managed national park. The park is managed by Gunditjmara Traditional Owners and Parks Victoria. It has been named a tentative UNESCO World Heritage site with the remains of aboriginal eel traps dating back 6,600 years making it one of the oldest aquaculture sites in the world.

The park's tranquil crater lake and pleasant bushland surrounds make it a pleasant place for picnicking, four wheel driving and bushwalking with a camp ground accessible from Mount Eccles Road. The area attracts approximately 15,000 visitors per annum and is expected to grow up to 110,000 visitors per annum following UNESCO recognition.



Figure 91 Aerial imagery of Budj Bim National Park

Fixed Broadband

The Budj Bim National Park has both NBN fixed wireless and satellite coverage.

The Budj Bim campground is serviced by NBN fixed wireless with the remaining areas of the park receiving NBN satellite and fixed wireless coverage.



Figure 92 NBN Coverage of the Budj Bim National Park (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows consistent 3G outdoor handheld device coverage across the area
- Optus shows continuous 4G Plus outdoor coverage across the area
- Vodafone shows continuous 4G outdoor coverage, although there is no coverage shown between MacArthur and the edges of the park.

In summary, there appears to be no mobile coverage issues in the national park, with at least two mobile network operators offering service. It is expected that 000 safety coverage is available across the park.



Figure 93 Telstra coverage of Budj Bim National Park



Figure 94 Optus coverage of Budj Bim National Park



Figure 95 Vodafone coverage of Budj Bim National Park

WiFi

Free public WiFi services are not currently available at the Budj Bim National Park. This may be due to the difficulty in obtaining suitable backhaul connectivity.

An option may exist to establish a high-speed microwave link to a Parks Victoria site in the area, but this would need to be supported by high-speed backhaul from that point.

LP-WAN Coverage

The Budj Bim National Park does not fall within Taggle's coverage footprint.

Sigfox is currently available in the area.



Figure 96 Sigfox coverage of Budj Bim National Park

5.4 Portland Whale Watching Platform

• Wade Street Portland

Constructed in 2015 as part of the \$2 million National Whale Trail, the Portland platform offers whale viewing over Portland Bay which includes seating, binoculars and information boards on whale identification and local flora and fauna. The venue attracts 18,000 visitors per annum.



Figure 97 Portland Whale Watching Platform

Fixed Broadband

The Portland Whale Watching Platform falls on the edge of the NBN fixed line footprint, enabling premises nearby to access higher quality broadband services. Our analysis reveals that it is serviced by NBN FTTN with NBN satellite coverage east of the platform.



Figure 98 NBN coverage of the Portland Whale Watching Platform (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 area
- Optus shows 4G Plus outdoor coverage across the area
- Vodafone shows continuous 4G outdoor coverage.

In summary, there appears to be no mobile coverage issues in the area, with all three mobile network operators offering continuous 4G service.

WiFi

Free public WiFi services are available at the Portland Tourist Information Centre.

LP-WAN Coverage

The Portland Whale Watching Platform and surrounding waters have extensive Sigfox coverage.

Taggle coverage is not currently available in the area.

5.5 Cape Bridgewater Whale Watching and Seal Tour

• Cape Bridgewater

Cape Bridgewater is a popular viewing location for whale and seal watching. It is accessible via the Cape Bridgewater Wilderness Trail that links Cape Bridgewater to the carpark at Blowholes Road via the sea cliffs. The venue attracts 5,000 visitors per annum.



Figure 99 Aerial imagery of Portland Whale Watching Platform

Fixed Broadband

Our analysis reveals that the viewing location for whales and seals in Cape Bridgewater has NBN satellite coverage.

The viewing location, including the car parking area and cafe, is located east of the NBN fixed wireless footprint which provides coverage to several premises.



Figure 100 NBN Coverage of Cape Bridgewater Whale Watching and Seal Tour (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows inconsistent and generally poor coverage across the cape with areas of 4GX outdoor coverage and (ignoring 3G external antenna coverage) significant areas of no handheld coverage
- Optus shows 4G Plus and 3G outdoor coverage across the entire area
- Vodafone shows continuous 4G and 3G outdoor coverage across the entire area.

In summary, there appears to be no mobile network operator with consistent mobile coverage in the area, although all three provide partial coverage of some kind. It is expected that 000 safety coverage is available across the cape.



Figure 101 Telstra mobile coverage of Cape Bridgewater



Figure 102 Optus mobile coverage of Cape Bridgewater



Figure 103 Vodafone mobile coverage of Cape Bridgewater

WiFi

Free public WiFi services are not currently in Cape Bridgewater.

LP-WAN Coverage

There is limited Sigfox coverage in Cape Bridgewater and the surrounding waters.

Taggle coverage is not currently available in the area.



Figure 104 Sigfox coverage of Cape Bridgewater and surrounding waters

5.6 Wannon and Nigretta Falls

• Located north-west of Hamilton

The Wannon and Nigretta Falls, located in the Southern Grampians, are both fed by the Wannon River. Both falls are accessible from the Glenelg Highway with Nigretta Falls requiring a small detour.

Wannon Falls provides a display of cascading water over hardened basalt lava into a deep plunge pool below. Along with waterfall displays, Nigretta Falls also offers swimming and fishing in the water pool as well as picnic and barbeque facilities. The falls are best viewed after heavy rainfall. Approximately 30,000 visitors visit the attraction annually.



Figure 105 Nigretta Falls ²³

²³ https://www.visitgrampians.com.au/products/nigretta-falls



Figure 106 Wannon Falls ²⁴

Fixed Broadband

Our analysis reveals that NBN fixed wireless is providing coverage to the Nigretta Falls Scenic Reserve which is situated close by to Nigretta Falls. This area is equipped with toilets, BBQs and picnic tables.

Further analysis reveals the town of Hamilton is predominately serviced by NBN FTTN fixed line and NBN fixed wireless in the surrounding area leading to the falls.



Figure 107 NBN Coverage of Wannon Falls and Nigretta Falls (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 both Falls
- Optus shows 3G outdoor coverage of Nigretta Falls and 4G Plus outdoor of Wannon Falls
- Vodafone shows 3G outdoor coverage of Wannon Falls and 4G outdoor coverage of Nigretta Falls.

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



Figure 108 Telstra mobile coverage of Wannon and Nigretta Falls



Figure 109 Optus mobile coverage of Wannon and Nigretta Falls

²⁴ https://www.visitgrampians.com.au/products/wannon-falls



Figure 110 Vodafone mobile coverage of Wannon and Nigretta Falls

5.7 Tower Hill Wildlife Reserve

• Victoria's First National Park

The Tower Hill Wildlife Reserve was declared Victoria's First National Park back in 1892. This reserve attracts approximately 260,000 visitors annually.

Nestled between Port Fairy and Warrnambool, this extinct volcano was formed some 30,000 years ago and is home to a plethora of wildlife including koalas, emus, seasonal reptiles, kangaroos and waterbirds. Guided tours by Worn Gundidj are available which provides an opportunity to learn about the Aboriginal cultural heritage and further explore the reserve.

A picnic area with toilet facilities, electric BBQs and picnic tables is available for visitors. The visitor centre is located in the picnic area and provides light refreshments, environmental cultural displays and has Aboriginal arts and crafts for sale. Camping overnight is not permitted in the reserve.



Figure 111 The Tower Hill Wildlife Reserve ²⁵



Figure 112 Aerial imagery of Tower Hill Wildlife Reserve

Fixed Broadband

Our analysis reveals the Tower Hill Wildlife Reserve, including the visitor centre, has NBN fixed wireless coverage.

Further analysis reveals that to the north of the reserve, NBN FTTN and FTTC fixed line services within the fixed line footprint are under construction for much of the residents in the town of Koroit.

²⁵ https://www.visitvictoria.com/regions/Great-Ocean-Road/Things-to do/Nature-and-wildlife/National-parks-and-reserves/VV-Tower-Hill-Wildlife-Reserve



Figure 113 NBN Coverage of Tower Hill Wildlife Reserve (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 reserve
- Optus shows 4G Plus outdoor coverage of the reserve
- Vodafone shows 4G indoor coverage quality of the reserve.

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



Figure 114 Telstra mobile coverage of the Tower Hill Wildlife Reserve



Figure 115 Optus mobile coverage of the Tower Hill Wildlife Reserve



Figure 116 Vodafone mobile coverage of the Tower Hill Wildlife Reserve

5.8 Port Fairy Township

• Historical coastal fishing village

Port Fairy Township is a coastal town found on the Princes Highway in the Shire of Moyne. Named after a small boat, 'The Fairy', the busy fishing village is rich in history. The town has more than 50 buildings classified by the National Trust on display, including fully restored white-washed cottages and old stone churches.

The arts are a focal part of the town with various boutique, antique and art and craft stores to be found. The annual Port Fairy Folk Festival is one of the largest music festivals in Australia.



Figure 117 Boats and houses in the Port Fairy Township ²⁶

Fixed Broadband

The coverage map below shows that Port Fairy is predominately serviced by NBN FTTN fixed line.

Our analysis reveals that much of the town is serviced by NBN FTTN with a small area west of the fixed line footprint due to receive NBN FTTP. The surrounding areas outside the fixed line footprint are serviced by NBN fixed wireless.



Figure 118 NBN Coverage of Port Fairy Township (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) in the town with two narrow stretches of beach with no coverage
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G indoor and outdoor 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 4G services.



Figure 119 Telstra mobile coverage of Port Fairy Township

²⁶ https://www.visitvictoria.com/Regions/Great-Ocean-Road/Destinations/Port-Fairy



Figure 120 Optus mobile coverage of Port Fairy Township



Figure 121 Vodafone mobile coverage of Port Fairy Township

5.9 Port Campbell Township

• Township located on the Great Ocean Road

The colourful seaside town of Port Campbell is a popular stop along the Great Ocean Road journey with various restaurants, cafes, shops and galleries to visit.

The Port Campbell National Park spans from Peterborough to Princetown and includes the Twelve Apostles which is located east of Port Campbell. Other historic sites in the park are the Loch Ard Gorge, London Bridge, The Arch and the Grotto. These sites and lookouts can be reached from the coastal trails.

A few other attractions in the town include the Port Campbell Jetty, Kanawinka Geotrail and Two Mile Bay – a popular destination for surfers. Port Campbell is also one of the stops on the Twelve Apostles Gourmet Trail.



Figure 122 Coast of Port Campbell Township ²⁷

Fixed Broadband

The coverage map below shows that the Port Campbell township falls into the NBN fixed wireless footprint.



Figure 123 NBN Coverage of Port Campbell Township (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.

²⁷ https://www.visitvictoria.com/Regions/Great-Ocean-Road/Destinations/Port-Campbell

In summary, there appears to be no mobile coverage issues in the town, with the three major mobile network operators all offering 4G services.



Figure 124 Telstra mobile coverage of Port Campbell Township



Figure 125 Optus mobile coverage of Port Campbell Township



Figure 126 Vodafone mobile coverage of Port Campbell Township

5.10 Logans Beach Whale Viewing Platform

• Located in Warrnambool

The Logans Beach Whale Viewing Platform was constructed in the sand dunes to improve viewing of the Southern Right Whales that migrate to the waters of Warrnambool between the months of June and September.

The whales migrate from the Antarctic waters to the Victorian bays to give birth and raise their calves. The platform provides an unobstructed view of the whales as they frolic within a hundred metres of the shore. The venue attracts approximately 270,000 visitors annually.



Figure 127 The Logans Beach Whale Viewing Platform ²⁸

²⁸ https://visitwarrnambool.com.au/natures-drama/whale-watching-inwinter

Fixed Broadband

The coverage map below shows that the Logan's Beach Whale Watching Platform falls within the NBN satellite footprint.

Our analysis reveals that the viewing platform and the residences to the north are serviced by NBN satellite, with NBN fixed wireless services further north of the platform. Further analysis reveals that NBN FTTN is servicing the western area of the town and NBN FTTP is currently servicing sections of the east within the fixed line footprint. Furthermore, the remaining area in the fixed line footprint in the east is due to receive FTTP (highlighted in brown).



Figure 128 NBN Coverage of Logans Beach Whale Viewing Platform (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 platform
- Optus shows 4G Plus outdoor coverage of the platform
- Vodafone shows 4G indoor coverage quality of the platform.

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



Figure 129 Telstra mobile coverage of the Logan's Beach Whale Viewing Platform



Figure 130 Optus mobile coverage of the Logan's Beach Whale Viewing Platform



Figure 131 Vodafone mobile coverage of the Logan's Beach Whale Viewing Platform
5.11 Kennedy's Creek Music Festival

• Kennedy's Creek Public Hall, Kennedy's Creek

Located in the foothills of the Otway Ranges, Kennedys Creek Music Festival is a three-day boutique camping festival that runs in late October and is capped at 1,000 patrons.



Figure 132 Photo of Kennedy's Creek Music Festival



Figure 133 Aerial imagery of Kennedy's Creek location

Fixed Broadband

The festival venue falls within the NBN satellite footprint. Areas to the east and north of the venue are serviced by NBN fixed wireless.



Figure 134 NBN Coverage of the Kennedy's Creek Music Festival (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows no handheld coverage at the venue with 3G external antenna coverage only
- Optus shows 4G Plus and 3G outdoor coverage at the venue
- Vodafone shows 4G outdoor coverage at the venue.



Figure 135 Telstra mobile coverage at the festival venue



Figure 136 Optus mobile coverage at the festival venue



Figure 137 Vodafone mobile coverage at the festival venue

In summary, there appears to be reasonable mobile coverage at the venue, although how well the existing coverage would support up to 1,000 mobile devices in the confined space should be confirmed. It is expected that 000 safety coverage is available across the precinct.

WiFi

To support the provision of a WiFi service at the festival venue, an appropriate backhaul arrangement would be needed. Options may include a high-speed microwave link, where interconnectivity with optical fibre or other backhaul capacity may be possible via a Telstra phone exchange.

LP-WAN Coverage

Kennedy's Creek falls within the coverage footprint for Taggle.

Sigfox coverage is not currently available around the festival venue region but spans much of the Great South Coast.



Figure 138 Taggle IoT coverage of festival venue

5.12 Port Fairy Folk Festival

- Southcombe Park Sporting Complex, Campbell St, Port Fairy
- World Famous four-day Music and Arts Festival

The town of Port Fairy hosts the Port Fairy Folk Festival, a four-day festival of music, arts and culture held annually in March on the long weekend. Local and international artists perform, attracting approximately 40,000 patrons annually.

The wide variety of music genres from folk to bluegrass appeals to different music tastes with free performances, as well as ticketed performances, available. In addition to impressive music performances, the festival program includes comedy shows, family friendly activities, street performances, workshops, theme concerts, festival choir and an exhibition of Australian handcrafted musical instruments. Sackville Street, Railway Place and Fisherman's Walk are three market areas containing boutique craft stalls.



Figure 139 A performance at the Port Fairy Folk Festival ²⁹

Fixed Broadband

The coverage map below shows that the Port Fairy Folk Festival venue falls on the edge of the NBN FTTN fixed line footprint.

Our analysis also reveals that NBN FTTN fixed line services in the accommodation sites Gardens Camping and Big 4 Accommodation however, NBN fixed wireless is providing coverage to Tent City and Southcombe Park camping.



Figure 140 NBN Coverage of Port Fairy 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 festival
- Optus shows 4G Plus outdoor coverage of the festival
- Vodafone shows 4G indoor coverage quality of the festival.

In summary, there appears to be no mobile coverage issues in the town, with the three major mobile network operators all offering 4G service.





Figure 141 Telstra mobile coverage of the Port Fairy Folk Festival

Figure 142 Optus mobile coverage of the Port Fairy Folk Festival

²⁹ https://www.visitmelbourne.com/regions/great-ocean-road/events/music/festivals/port-fairy-folk-music-festival



Figure 143 Vodafone mobile coverage of the Port Fairy Folk Festival

5.13 Sheep Vention

• Hamilton Showgrounds, Hamilton

Every year, the Hamilton Pastoral and Agricultural Society run SheepVention, the biggest farming event in Victoria. This event attracts over 20,000 visitors annually.

This two-day event held in August each year, combines farming, competition, fashion, entertainment and celebrates local produce. The features of the show include the Ram Sale, Sheep Show, Inventions Competition, Victorian Farm Dogs Competition, Alpaca Show and Wool Fashion Parade. The Ram Sale is a highlight of the event which involves selling five rams to buyers and vendors that attend the show from all over Australia.



Figure 144 The Ram Sale at SheepVention ³⁰

Fixed Broadband

The coverage map below shows that the SheepVention venue falls into the NBN FTTN fixed line footprint enabling access to higher quality broadband services.



Figure 145 NBN Coverage of SheepVention venue (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 quality 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.

³⁰ https://www.weeklytimesnow.com.au/agribusiness/sheep/sheepv ention



Figure 146 Telstra mobile coverage of the venue



Figure 147 Optus mobile coverage of the venue



Figure 148 Vodafone mobile coverage of the venue

³¹ https://www.standard.net.au/story/5366156/2018-warrnambool-

may-racing-carnival-live-coverage

5.14 May Race Carnival Warrnambool

Warrnambool Racing Club, Grafton Road, • Warrnambool

The May Race Carnival is held in Warrnambool over three consecutive days. This unique country racing carnival attracts approximately 32,000 local, national and international patrons over the three days, annually.

The highlights of the carnival include the Grand Annual Steeplechase, consisting of off-track racing and 33 jumps, the 'Wangoom Handicap', the 'Galleywood Hurdle' and the 'Warrnambool Cup'.



Figure 149 The May Race Carnival ³¹

Fixed Broadband

The coverage map below shows that the venue of the May Race Carnival falls into the NBN FTTN fixed line footprint, enabling access to higher quality broadband services.



Figure 150 NBN Coverage of the May Race Carnival (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 and 4G outdoor coverage 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 4G service.



Figure 151 Telstra mobile coverage of the venue



Figure 152 Optus mobile coverage of the venue



Figure 153 Vodafone mobile coverage of the venue

5.15 Twelve Apostles Gourmet Trail

• Area bounded by Port Campbell, Timboon, Cobden, Simpson, Princetown and return to Port Campbell



Figure 154 Twelve Apostles Gourmet Trail Map³²

Most of the businesses on the trail can be visited as part of a 140 kilometre loop. You can savour the flavours of locally produced whisky, beer, cheese, berries, chocolate, fudge, olives and snails, as well as cafes and restaurants along the route. The trail attracts approximately 40,000 visitors per annum.

Many of the towns on the route have been covered within the Significant Places section and major highways area addressed in the Transport section.

Fixed Broadband

The towns on the Twelve Apostles Gourmet Trail are serviced by a mixture of technologies.

Port Campbell, Timboon and Simpson fall in the NBN fixed wireless footprint whereas Princetown is serviced by NBN satellite. The town of Cobden will predominately receive NBN FTTN with approximately half of this fixed line network currently under construction. NBN fixed wireless services the north of Cobden and the immediate surrounding area.



Figure 155 NBN Coverage of Twelve Apostles Gourmet Trail (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 most of the area, however there are some areas of 3G device and 3G external antenna coverage along the Timboon-Colac Rd near Scotts Creek
- Optus shows 4G Plus outdoor coverage across most of the area with similar coverage weaknesses on the roadways near Scotts Creek
- Vodafone shows poor road coverage with noncontinuous 4G and 3G outdoor coverage although there are significant areas of no coverage.

In summary, there appears to be no mobile coverage issues in the area, with at least two mobile network operators offering 4G service throughout the trail. It is expected that 000 safety coverage is available across the trail.

³² https://schulzorganicdairy.com.au/news/2017/12/13/taste-timboon-food-artisans-tour-tips



Figure 156 Telstra mobile coverage of the area covered by the Gourmet Trail



Figure 157 Optus mobile coverage of the area covered by the Gourmet Trail



Figure 158 Vodafone mobile coverage of the area covered by the Gourmet Trail

WiFi

The provision of a public WiFi service at locations in the Gourmet Trail can be facilitated by the availability of NBN access for the area.

LP-WAN Coverage

The Twelve Apostles Gourmet Trail does not fall within Taggle's coverage footprint.

Sigfox coverage is not currently available in the area, but spans much of the Great South Coast region.

5.16 Great South West Walk

• 250 kilometres hiking circuit west of Portland

The Great South West Walk has been developed as a bushwalking trail suitable for most ages and abilities, comprising of short two hour loop walks, full day walks, or the whole 250 kilometre loop from Portland to the Victoria border via Cape Bridgewater and Discovery Bay and returning inland via the Lower Glenelg National Park and Cobboboonee Forest.

This walk includes three National Parks, hardwood forests, the pristine Glenelg River, the picturesque township of Nelson, aboriginal heritage sites, the Southern Ocean and sand dunes, sandy bays and beaches, rugged cliffs, freshwater lakes, the Cape Nelson Lighthouse, and the stunning Bridgewater Bay amongst a diversity of natural fauna and flora including Blue and Southern Right Whales, a mainland Fur Seal colony and Australia's only mainland Australasian Gannet rookery. Much of the walk is contained within the recently declared 66th Australian RAMSAR site.

Camp sites are limited to 20 per night and must be prebooked, however there are no controls over people entering and leaving the walk at locations along the route. Personal safety in the event of bushfire or injury is the responsibility of individual walkers. The walk attracts approximately 80,000 visitors per annum.



Figure 159 Map of the Great South West Walk ³³

Fixed Broadband

The coverage map below shows that the Great South West Walk has NBN fixed line, fixed wireless and satellite services covering the various walks.

Our analysis reveals that Portland has NBN FTTN fixed line so businesses in this area could provide visitors with higher quality WiFi services from their fixed line connection. West of Portland is serviced by fixed wireless and then satellite outside the fixed wireless footprint.



Figure 160 NBN Coverage of the Great South West Walk (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows very poor handheld coverage across the majority of the walk with only patchy 4GX and 3G device coverage and large stretches of no handheld coverage
- Optus shows similarly poor handheld coverage across the majority of the walk
- Vodafone shows good handheld coverage across the inland sections of the walk, but no coverage across the coastal sections between Cape Bridgewater and Donovans in South Australia.

Due to the size of the area under consideration and the predominantly unpopulated areas included in the walk, mobile coverage is unsurprisingly very poor. Walkers are advised not to rely on mobile coverage for safety.



Figure 161 Telstra mobile coverage of the area covered by the Great South West Walk. 3G external antenna coverage in light brown should be ignored.

³³ http://www.greatsouthwestwalk.com



Figure 162 Optus mobile coverage of the area covered by the Great South West Walk. 3G external antenna coverage in yellow should be ignored.



Figure 163 Vodafone mobile coverage of the area covered by the Great South West Walk

WiFi

Free public WiFi services are not currently available on the Great South West Walk. This may be a function of the difficulty in obtaining suitable backhaul connectivity.

An option may exist to establish a high-speed microwave link from appropriate locations along the walk to a Parks Victoria site in the area, but this would need to be supported by high-speed backhaul from that point.

LP-WAN Coverage

There is limited Sigfox coverage along the Great South West Walk.

Taggle coverage is not currently available in the area.

5.17 Grampians Peaks Trail

• One of Walk Victoria's Icons Trails

The Grampians Peaks Trail is one of Walk Victoria's lconic long distance trails currently under construction. The natural beauty of the Grampians National Park will be displayed whilst walking on the trail, with options to experience sections of the walk that will suit different hiking styles.

The first section of the walk has been completed and is a three day/two-night circuit walk departing from Halls Gap. Guided tours are also available. On completion in late 2020, the long-distance trail will be 160 kilometres long and will showcase the peaks of Mt Zero in the north of the Grampians to the Dunkeld township in the south. The entire trail will be able to be experienced as one 13 day/12-night journey with overnight campsites available to book.



Figure 164 Map of the Grampians Peaks Trail³⁴

³⁴ https://grampianstourism.com.au/wpcontent/uploads/sites/4/2016/09/GPT-Master-Plan-Map.pdf

Fixed Broadband

The coverage map below shows that the final destination of the trail, the town of Dunkeld including the immediate surrounding area, is serviced by NBN fixed wireless.

Further analysis reveals the town of Halls Gap has NBN fixed wireless coverage.



Figure 165 NBN Coverage of the Grampians Peak Trail (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 majority of the future walk trail
- Optus shows 4G Plus outdoor and 3G outdoor handheld coverage across the trail with 4G Plus planned in the northern section of the trail. Minor blackspots are evident along the trail.
- Vodafone shows patchy 4G and 3G outdoor coverage across the future walk trail and significant sections with no handheld coverage.

In summary, there appears to be good 4G coverage on the trail from two of the three mobile network operators, with partial (marginal) coverage from the third operator.



Figure 166 Telstra mobile coverage of the Grampians Peaks Trail



Figure 167 Optus mobile coverage of the Grampians Peaks Trail



Figure 168 Vodafone mobile coverage of the Grampians Peaks Trail

5.18 Great Ocean Walk

• 100 kilometre walk from Apollo Bay to Twelve Apostles

The entire Great Ocean Walk is an eight day/seven night coastal walk from Apollo Bay to the Twelve Apostles. This walk attracts approximately 16,000 visitors annually. Walking tours and basic to luxury accommodation is available along the walk, with picnic tables and toilet facilities available at campsites.

Only the section of the walk between Castle Cove and the conclusion at the Twelve Apostles Visitor Information Centre falls within the Great South Coast region (approximately 26 kilometres), with the majority of the walk falling within the adjoining Barwon region.

Note that the entire walk from Apollo Bay to Twelve Apostles has been analysed in the sections below.



Figure 169 The view from a section of the Great Ocean Walk ³⁵



Figure 170 Map of the Great Ocean Walk ³⁶

Fixed Broadband

The coverage map below shows that the starting location of the walk, Apollo Bay, has NBN FTTN fixed line Services so businesses in this area could provide visitors with higher quality WiFi services from their fixed line connection. NBN satellite services the final destination, the Twelve Apostles.



Figure 171 NBN Coverage of the Great Ocean Walk (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld coverage across the majority of the walk with patchy 3G device coverage
- Optus shows 4G Plus outdoor coverage and 3G outdoor handheld coverage across majority of the walk with a small section having no coverage
- Vodafone shows 4G outdoor and indoor and 3G outdoor handheld coverage, however coverage is not provided on a lengthy stretch from the coastal section of Cape Otway to Wattle Hill.

In summary, there appears to be good coverage on the majority of the walk from two of the three mobile network operators with partial (marginal) coverage from the third operator.

³⁵ https://www.visitvictoria.com/greatoceanwalk

³⁶ https://www.greatoceanwalk.com.au



Figure 172 Telstra mobile coverage of the area covered by the Great Ocean Walk



Figure 173 Optus mobile coverage of the area covered by the Ocean Walk



Figure 174 Vodafone mobile coverage of the area covered by the Great Ocean Walk

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)³⁷. 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.

³⁷ "A" and "B" routes are arterial highways (classification AH). "C" routes typically link smaller population centres to larger regional centres, or roads (classification AO).





Figure 175 Declared roadways in Great South Coast showing all declared highways and rail routes

6.2 A/B Grade Roads

Highway Name	Approx. Start	Approx. End	Dist (km)
A1 Princes Highway West	Colac	Victorian border near Mount Gambier	265
A200 Henty Highway	Horsham	Heywood	190
B100 Great Ocean Road	Wattle hill	Allansford	80
B120 Hopkins Highway	Warrnambool	Mortlake	50
B140 Hamilton Highway	Cressy	Hamilton	170
B160 Glenelg Highway	Hamilton	Glenthompson	50

Practical experience of call dropouts and coverage blackspots when driving some of the roads suggests

that the mobile network operator coverage maps tend to overstate the quality of coverage, however cars fitted with external antennae will receive more consistent coverage.

A visual scan of the public mobile network operator maps for all A and B roads in the region is shown below.

A1 Princes Highway West (~265 kilometres)

This highway connects the region east-west from near Colac in the east to the Victorian border near Mount Gambier.



Figure 176 A1 Princes Highway West

Maps show continuous 3G outdoor coverage or better by all three mobile network operators (local on-road experience suggests otherwise).



Figure 177 Telstra mobile coverage of the A1 Princes Highway West



Figure 178 Optus mobile coverage of A1 Princes Highway West



Figure 179 Vodafone mobile coverage of the A1 Princes Highway West

A200 Henty Highway (~190 kilometres)

This highway connects the region north-south from Horsham in the north to Heywood via Hamilton.



Figure 180 A200 Henty Highway (Google Maps, 2019)

Maps show continuous 3G outdoor coverage or better for Telstra and Optus (local on-road experience suggests otherwise) but with a black spot for Vodafone coverage between Myamyn and Branxholme (approximately 20 kilometres).







Figure 182 Optus mobile coverage on A200 between Hamilton and Heywood



Figure 183 Vodafone mobile coverage on A200 between Hamilton and Heywood

B100 Great Ocean Road (~80 kilometres)

The B100 is a stretch of the Great Ocean Road, following the coastline travelling east-west from Wattle Hill to near Allansford. West of Allansford, the A1 Highway assumes the Great Ocean Road route.



Figure 184 B100 Great Ocean Road (Google Maps, 2019)

There is coverage by three mobile network operators over the majority of the route, however there are localised blackspots near Gellibrand Lower and beyond, with Optus and Vodafone constructing new coverage in the area.



Figure 185 Telstra mobile coverage along the Great Ocean Road



Figure 186 Optus mobile coverage along the Great Ocean Road



Figure 187 Vodafone mobile coverage along the Great Ocean Road

B120 Hopkins Highway (~50 kilometres)

The Hopkins Highway travels north-east from Warrnambool on the coast to the inland town of Mortlake.



Figure 188 B120 Hopkins Highway (Google Maps, 2019)

There is continuous 3G outdoor coverage or better by three mobile network operators between Warrnambool and Mortlake.



Figure 189 Telstra mobile coverage of the Hopkins Highway



Figure 190 Optus mobile coverage of the Hopkins Highway



Figure 191 Vodafone mobile coverage of the Hopkins Highway

B140 Hamilton Highway (~170 kilometres)

The Hamilton Highway bisects the region east-west, linking the inland regional towns of Cressy, Mortlake and Hamilton.



Figure 192 B140 Hamilton Highway (Google Maps, 2019)

There is continuous 3G outdoor coverage or better by two mobile network operators between Cressy and Hamilton via Mortlake, with Optus constructing new coverage near Mortlake. Vodafone coverage is very poor.



Figure 193 Telstra mobile coverage of the Hamilton Highway



Figure 194 Optus mobile coverage of the Hamilton Highway



Figure 195 Vodafone mobile coverage of the Hamilton Highway

B160 Glenelg Highway (~50 kilometres)

The Glenelg Highway travels east-west, linking the regional towns of Glenthompson and Hamilton.



Figure 196 B160 Glenelg Highway between Hamilton and Glenthompson (Google Maps, 2019)

There is continuous 3G outdoor coverage or better by two mobile network operators between Hamilton and Glenthompson, with Optus constructing new coverage near Mortlake. Vodafone shows no coverage between Hamilton and the Victorian border.



Figure 197 Telstra mobile coverage along the Glenelg Highway



Figure 198 Optus mobile coverage along the Glenelg Highway



Figure 199 Vodafone mobile coverage along the Glenelg Highway

6.3 C-Grade Roads

There are 54 declared C roads in the region forming a mesh between major and small communities. In general, the region's roads are well covered by 3G mobile coverage from at least two mobile network operators. However, 4G coverage tends to be patchy and inconsistent, and Vodafone's highway coverage is most concentrated along the coastal areas and surrounding Hamilton.

The following sample C roads have been selected for analysis:

Highway Name	Approx. Start	Approx. End	Dist. (km)
C192 Portland-Nelson Road	Portland	Nelson	70
C195 Portland-Casterton Road	Portland	Casterton	105
C176 Woolsthorpe- Heywood Road	Woolsthorpe	Heywood	80

C192 Portland-Nelson Road (~70 kilometres)

Nelson-Portland Road travels east-west, connecting Nelson near the border to Portland on the coast.



Figure 200 C192 Portland-Nelson Road (Google Maps, 2019)

Between Nelson and Portland Telstra shows large patches of 3G external antenna coverage along the route through forestry and national park areas near Kentbruck Plantation, east of Nelson. In the same section Optus shows patchy 3G antenna only and Vodafone shows patchy 3G outdoor, with large blackspots. East and west of this section, at least two mobile network operators provide 3G outdoor coverage or better.



Figure 201 Telstra mobile coverage of Nelson-Portland Road



Figure 202 Optus mobile coverage of Nelson-Portland Road



Figure 203 Vodafone mobile coverage of Nelson-Portland Road

C195 Portland-Casterton Road (~105 kilometres)

Portland-Casterton Road bisects the region east-west, joining Portland on the coast to the inland town of Casterton.



Figure 204 C195 Portland-Casterton Road (Google Maps, 2019)

Between Portland and Heywood there is continuous 4G coverage from all three mobile network operators. Between Heywood and Casterton, Telstra shows patches of 3G external antenna coverage throughout the section. In the same section, Optus shows primarily 3G outdoor and patches of 3G with antenna. Vodafone shows some patches of 3G outdoor but otherwise this is largely a blackspot area, with a notably large blackspot stretching from around Hotspur through to Casterton.





Figure 205 Telstra mobile coverage along Portland-Casterton Road

Figure 206 Optus mobile coverage along Portland-Casterton Road



Figure 207 Vodafone mobile coverage along Portland-Casterton Road

C176 Woolsthorpe-Heywood Road (~80 kilometres)

Woolsthorpe-Heywood Road runs east-west, connecting the regional inland towns of Heywood and Woolsthorpe.



Figure 208 C176 Woolsthorpe-Heywood Road (Google Maps, 2019)

Between Woolsthorpe and Heywood, Telstra shows continuous 3G outdoor coverage or better. Optus shows primarily 3G outdoor coverage or better, with some small patches of 3G with antenna. Vodafone shows patchy 3G outdoor for approximately 30 kilometres leaving Woolsthorpe, with large blackspots. West of this section, it shows continuous 4G outdoor or better through to Heywood.



Figure 209 Telstra mobile coverage of Woolsthorpe-Heywood Road



Figure 210 Optus mobile coverage of Woolsthorpe-Heywood Road



Figure 211 Vodafone mobile coverage of Woolsthorpe-Heywood Road

6.4 Rail

Melbourne – Geelong

The Victorian Government is undertaking a program to improve mobile services on 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, coverage from all three MNOs is available for passengers on the Melbourne-Geelong route.

Geelong – Warrnambool

The route length of approximately 190 kilometres carries up to four return services per weekday between Warrnambool and Melbourne. The route is served by older V/Line rolling stock which does not suffer from the severe radio frequency shielding as the newer VLocity rail cars. Consequently, mobile network operator public coverage maps can be used as a guide to in-train mobile coverage:

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

In summary, there appears to be no mobile coverage issues on the route with the three major mobile network operators all offering 4G 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 is required for more precise coverage and signal level analysis.

Portland – Hamilton – Maroona

The route is a freight-only line for transporting logs, woodchips and grains between Portland, Hamilton and Maroona.

This route does not carry passengers and has not been analysed.

6.5 Airports

Portland Airport

Flights to Portland Airport from Melbourne Airport occur once daily. The distance is 294 kilometres between Melbourne Airport and Portland Airport.

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

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



Figure 212 Telstra mobile coverage of Portland Airport



Figure 213 Optus mobile coverage of Portland Airport



Figure 214 Vodafone mobile coverage of Portland Airport

Warrnambool Airport

There are 11 flights per week departing from Essendon Airport to Warrnambool Airport. The airport is also home to Ambulance Victoria and Helicopter Emergency Medical Services.

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

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



Figure 215 Telstra mobile coverage of Warrnambool Airport



Figure 216 Optus mobile coverage of Warrnambool Airport



Figure 217 Vodafone mobile coverage of Warrnambool Airport

Hamilton Airport

The airport is located approximately 12 kilometres north of Hamilton. Passenger flight services were discontinued in 2014 however, a flying school remains and is also home to the Hamilton Aero club. Hamilton Council are keen to re-instate a regular passenger air service.

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

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



Figure 218 Telstra mobile coverage of Hamilton Airport



Figure 219 Optus mobile coverage of Hamilton Airport



Figure 220 Vodafone mobile coverage of Hamilton Airport

A. Acknowledgements, Qualifications and Consultations

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 December 2018 during which this report was prepared.
- Data by Region³⁸ providing statistics at the level of Local Government Area (LGA)
- Quickstats³⁹ 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.
- 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"
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- For satellite imagery backgrounds: "Leaflet | Tiles
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- 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".
- 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".
- 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".

Qualifications

 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.

³⁸ See http://stat.abs.gov.au/itt/r.jsp?databyregion

³⁹ See for example

 $http://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/UCL211002?opendocument$

- 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" iPhone 6.
- 4. A fourth Mobile Network Operator (MNO) TPG is in the process of entering the Australian market. Its coverage intentions are not currently known.

Data sources – Digital Inclusion Index

Digital Inclusion Index data at the region level is purchased from Roy Morgan.

Consultations

Great South Coast Digital Plan Working Group:

- Anita Rank, Member of GSC Regional Partnership, and Mayor of Glenelg Shire Council
- Georgina Gubbins, Chair, GSC Food and Fibre Council
- Sandy Burgoyne, University of Sydney, and Glenelg Shire community member
- Grant Sutherland, Deakin University, Warrnambool
- Hugh Koch, Manager, Economic Development and Tourism, Southern Grampians Shire Council.

Great South Coast Regional Partnership:

- Emily Lee-Ack (Chair), independent Partnership member
- David Pope (Acting Deputy Chair), independent Partnership member
- Lisa Dwyer, independent Partnership member
- Wayne Kayler-Thomson, independent Partnership member
- Allan Miller, independent Partnership member
- Sarah Schmidt, independent Partnership member;
- Stephen Lucas, independent Partnership member
- Anita Rank, Regional Development Australia representative;
- Carolyn Gale (Victorian Government representative);
- Bruce Anson, CEO, City Council;
- Bill Millard, CEO, Shire Council;
- Michael Tudball, CEO, Southern Grampians Shire Council;
- Greg Burgoyne, CEO, Glenelg Shire Council;
- Andrew Mason, CEO, Corangamite Shire Council;
- Unni Menon, Regional Director BSW Region, RDV.

Great South Coast local government CEOs and officers (online survey):

- Rory Neeson, Shire Council
- Liz McKinnon, Glenelg Shire Council
- Adam Boyle, Shire Council
- Hugh Koch, Southern Grampians Shire Council
- Shaun Miller, Warrnambool City Council.

B. Great South Coast priority projects – Business case analysis and other priorities

Priority projects are those identified by the Great South Coast Regional Partnership and the Digital Plan Working Group as needed investments and initiatives to strengthen the region's competitiveness and attractiveness as a place to live and work. The top priority projects currently identified are:

IoT for Great South Coast

IoT is a rapidly growing market that refers to the connection of an ever-increasing array of devices, services and equipment to the internet. Better understanding of this technology will be critical to underpin competitiveness and productivity across Great South Coast regional industries in the future. The Regional Partnership is exploring opportunities around this technology and potential ways to foster network development and usage across the region.

Further business case analysis work will:

- Examine the options for expeditious roll-out of narrowband & broadband IoT connectivity across the whole Great South Coast region, and the uptake of IoT for key industry sectors, local government operations and service delivery, and enhancement of emergency services
- Estimate the costs and revenues for these options, and the government/third party contributions necessary for commercial viability
- Calculate the economic and social benefits of these options
- Recommend a preferred option and strategy for implementation.

Digital education initiatives

The Regional Partnership will explore opportunities to improve access to and utilisation of digital technologies in the delivery of education and training across the region, with an emphasis on building digital skills in fields relevant to regional priorities, including IoT for agriculture, smart cities, utilities and environment. This work will seek to leverage existing activities around student digital hubs and smart classrooms in the region.

Other priority projects are:

- Improved fixed broadband (NBN) service quality across the Great South Coast Region
- Sustained focus on knowledge and use of new/emerging technologies entrepreneurship
- More affordable fixed and mobile connectivity services (vis-a-vis Melbourne) for Great South Coast users
- Digital connectivity for e-health and e-education services.

C. Fieldwork

Two streams of fieldwork tap into the practical experience of the five local governments in the Great South Coast region and gather information for the business case feasibility analysis of the top priority project (IoT connectivity and use across the region):

- A detailed online survey of local governments (results attached below)
- Face-to-face onsite interviews by expert market research field staff.

Results from the fieldwork will be provided to the Regional Partnership when available.

Online survey of local governments

The survey was sent to the senior economic development officer (or equivalent) in each local government in late 2018. It sought local government information and views on:

- The importance in their LGA of common unmet digital needs including digitals skills, mobile coverage, NBN service quality, public WiFi, Internet-of-things knowledge and uptake, and access to government infrastructure
- The locations and industries in which these unmet needs impact most severely
- Digital proficiency training needs and more IT professionals
- The location of residential and business developments, and tourist sites, in their LGA
- Details on any digital hubs in their LGA
- The relative importance of the priority digital projects identified by the Regional Partnership and the Digital Plan Working Group.

Onsite interviews

Onsite interviews are used to gather detailed information required for business case analysis. The online survey also requested reports relevant to the survey topics be provided.

D. Common Themes: Needs & Opportunities

Six common themes on priority unmet needs have emerged from discussions with Regional Partnerships and Digital Plan Working Groups:

- Fixed broadband NBN service quality
- Mobile coverage the prevalence of blackspots
- IoT uptake and use
- Public WiFi the benefits
- Access to government assets
- Digital skills digital literacy, supply of IT professionals, workforce preparedness for the future.

A summary of issues in these areas follows.

Fixed broadband

Fixed broadband is still the most common means of accessing the Internet from homes, businesses and service providers, including in the health and education sectors.

Fixed broadband access to the Internet is typically delivered over a mix of fibre/copper cables (providing potentially the best performance), terrestrial wireless (with medium performance), or over satellite (the last resort, often with the lowest performance and the highest cost).

In Australia the National Broadband Network Company (NBN Co) and the Retail Service Providers (RSPs) providing service to end users on the NBN are playing an increasingly important role. As the National Broadband Network (NBN) is constructed, they are becoming the major providers for fixed broadband across Australia. In most, but crucially not all, cases the NBN can deliver an improvement over the current fixed broadband providers.

Performance and costs are driven partly by technology, and partly by commercial choices of the RSPs. The latter in turn are significantly driven by a complex NBN wholesale model. The NBN itself has been designed and is being operated first and foremost as a residential/consumer/micro business broadband network. As such, it often does not provide adequate support for the more complex needs of businesses and community service providers – yet in regional locations it is frequently called on to do in the absence of costequivalent connectivity options.

The planned terrestrial NBN coverage is limited, with reliance on satellite to fill many gaps outside of the major population centres. Today the NBN is still only partially deployed, with another two years until completion. As NBN Co does not offer interim solutions, many regional areas will be waiting some time to be connected. The roll-out has also highlighted procedural failures that are only now getting appropriate attention. All of these factors combine to further entrench the digital disadvantage of regional and rural areas.

On a more positive note, the NBN is looking to provide technology upgrade paths in the years ahead, pushing fibre deeper into the community and enhancing their fixed-wireless capabilities. Moreover, alternatives to the NBN do exist, from small-scale community-led efforts, through various NBN/RSP competitors deploying their own infrastructure, up to futuristic, multi-national companies potentially offering entirely new platforms over the next decade.

Mobile connectivity

Mobile connectivity provides untethered coverage over a wide area. With increasingly more powerful and portable devices and a rich application eco-system, it offers huge socio-economic utility.

Significant applications include voice and video communications, data access, and support for the emerging Internet-of-Things (IoT).

Coverage blackspots affect not only 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 a growing disadvantage.

Blackspots in mobile coverage can limit the delivery of emergency and other community support services. In many regional areas not all Mobile Network Operators (MNOs) offer coverage, with investment decisions driven by commercial considerations. This means consumers and businesses have to estimate their coverage needs and subscribe to the most appropriate service(s) and deal with shortcomings.

The reasons for coverage blackspots are diverse and complex. Even where the MNO maps indicate coverage should be available, practical experience often falls far short of MNO representations. Local environmental factors, largely unavoidable, play a key role and some manageable infrastructural factors, such as transmitter technologies, locations, and congestion, have significant impact. Even older-style rail carriages can disrupt mobile services dramatically for passengers despite proximity to transmitters.

Public WiFi

With appropriate hardware, WiFi can provide highcapacity bandwidth throughout a building, across a site or event venue, and even across a rural property – all at a relatively low cost. It can support internet applications ranging from high-bandwidth video communication down to broad-area monitoring and control of various devices and sensors in IoT contexts. Virtually all modern smart phones, tablets and notebook computers have built-in WiFi capabilities.

Establishing WiFi coverage is not sufficient on its own. It depends on other high-speed links to connect devices with the wider Internet. This 'backhaul' is usually the major cost constraint on large-scale deployments. It is also more vulnerable to security intrusions compared with commercial mobile/fixed wireless services.

Various businesses and government agencies offer WiFi, often for free, to attract and support casual use by locals, tourists, business travellers and in some cases to support disadvantaged members of the community who may not be able to afford fixed or mobile connectivity.

Support for Internet of Things

The concept behind the IoT is the use of multiple sensors, control devices, communications and analytics to streamline processes traditionally involving manual intervention. Application areas range from smart homes to smart cities, smart grids, smart transport, smart farms and smart industries.

IoT brings numerous technical challenges, especially when dealing with many, widely distributed (sometimes moving) sensors – often with severe power limitations. Industry is actively trialling a vast number of alternative approaches, from leveraging mobile phone networks, to WiFi and whole new technology approaches for lowpowered local and wide area wireless transmissions.

Standards are still emerging, and widespread adoption will take significant analysis and planning. However, the opportunities are vast and investment is accelerating. Several trials of low-power wide-area networks (LPWAN) are underway in parts of Victoria, predominantly in agricultural contexts and some infrastructure-monitoring and meter-reading services.

Government infrastructure

The Victorian Government has a number of significant infrastructure assets to support communications across Victoria, including optical fibre links along some rail routes, and a range of wireless communications towers to support emergency and other services. While mainly dedicated to their respective primary purposes, there is often spare capacity that could be made available to address shortcomings in commercial supply.

While many of these assets are available for commercial use, little of this has occurred. The Connecting Regional Communities Program (CRCP) Telecommunications Infrastructure Leverage (TIL) initiative is addressing a number of these issues.

Digital literacy

Building a rich, highly-capable and far-reaching infrastructure is only effective if the community has the skills to properly take advantage of it and if the community and infrastructure are properly supported.

Statistics on the skills and support needs across the state are either almost non-existent, or available only at a very high level of aggregation. As a result, further local data collection is needed to shape remedial plans.

Various indicators strongly suggest that many regional and rural communities are less likely than those in urban centres to have the people with the necessary skills to drive digital progress. At the same time, these communities stand to gain the same or possibly greater benefits from leveraging digital technologies.

The digital infrastructure at the core of this report potentially provides a vast array of opportunities to remediate that situation with online learning – for example, using YouTube, MOOCs (massive online, open courses), and interactive training providers. However, the learning journey needs to start with some baseline skills in the region so that people can find and engage with those materials. Access to this foundational education also needs to be effective and affordable. Much of the investigation undertaken suggests this is not yet the case. There are some opportunities to provide local support frameworks through existing and proposed community centres. These deserve further consideration, possibly within a broader state-wide strategy to boost digital literacy across all age groups.

