Regional Digital Plan

WIMMERA SOUTHERN MALLEE

REGIONAL PARTNERSHIPS
WIMMERA SOUTHERN MALLEE

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Context of the Digital Plan

What is a Digital Plan?

The Digital Plan for each region 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 plans empower 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 Digital Plans complement 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. Digital Plans are also needed to identify and address key place-based unmet digital needs that would limit the region-specific competitive advantages over the next 3-5 years. This 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.

How will the plans be used?

The nine Digital Plans:

- Provide forward-looking guidance to Regional Partnerships, local governments and business, household and community groups in identifying digital priorities and advocating solutions
- Inform Victorian Government regional digital policy and program development.

The plans will be employed in conjunction with companion tools including 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.[1]

How were the Digital Plans prepared?

Digital Plans were prepared through:

- Extensive face-to-face consultation with the Regional Partnerships and Digital Plan Working Groups
- In-depth interrogation of the SLIM database

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[1] Access to the SLIM database is currently limited to the Victorian Government.

- Fieldwork comprising an online survey of all local governments in regional Victoria, and face-to-face interviews in each Region
- Independent expert advice on the fundamental drivers of unmet needs and potential solutions
- Confirmation from each 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 plan?

- A description of the region's geographic, demographic, economic and structural change characteristics
- An overview of current telecommunications services in the region
- Place and sector-based analysis of digital services and skills supply and demand and potential solutions to unmet needs – for cities, towns, localities; primary production areas; tourist sites and transport corridors.

Regional Partnership Foreword

Since the establishment of the Wimmera Southern Mallee Regional Partnership in 2016, we have worked to influence and shape our region to promote prosperous and inclusive communities.

Being one of Victoria's more remote regions, our stakeholders highlighted the importance of improving digital connectivity at our first Regional Assembly. Digital connectivity is now a critical requirement for regions and communities to participate in the digital economy, bringing with it the broad and growing benefits and opportunities these technologies afford.

We have undertaken and supported a number of activities since then to improve the region's digital landscape. This includes supporting the implementation of government funding programs to address mobile blackspots, which has led to 33 new mobile towers being funded.

Our region is also taking part in a pilot project as part of the Victorian Government's Enhanced Broadband program. Our largest population centre in Horsham has been provisioned with very high-capacity fixed wireless services which are a significant improvement to the previous services available. This pilot will support the growth and competitiveness of local businesses in Horsham.

Despite these activities and improvements to date, we know digital connectivity remains a key issue for our stakeholders. As such, we are proud to present our Digital Plan and the accompanying summary brochure. These documents highlight the remaining digital gaps across our region and sets out priority recommendations and actions that can continue to bridge the digital divide for the people living in and visiting our region.

The analysis within our Digital Plan is some of the most in-depth undertaken on digital supply and demand to date. It will serve as a critical tool to enable further advocacy and guide future investments to those areas most in need across our region.

I would like to applaud the efforts of the Wimmera Southern Mallee Working Group for its time and efforts in producing this work, and the Victorian Government for supporting the development of these regional Digital Plans.

I look forward to seeing the impact of our Digital Plan in shaping the digital landscape of our region and call on industry and all levels of government to use these resources to continue investing in improved digital services across our region.

David Jochinke

Wimmera Southern Mallee Regional Partnership Chair

Glossary and Definitions

ABS: Australian Bureau of Statistics

ACCC: Australian Competition and Consumer Commission

Cat-M1: Narrowband IoT technology

CRCP: Victorian Government $45 million Connecting Regional Communities Program

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

DII: RMIT-Swinburne-Telstra Digital Inclusion Index

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

FTTC: Fibre to the curb NBN fixed line technology – 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 equivalents 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

NB-IoT: Narrowband Internet of Things

BB-IoT: Broadband Internet of Things

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

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

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

MBSP: Mobile Black Spot Program (Commonwealth Government)

MNO: Mobile network operator

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

SLA: Service Level Agreement

SLIM: State Level Information Management database

VMP: Victorian Mobile Program

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

Executive Summary

The Wimmera Southern Mallee (WSM) region covers 33,900 square kilometres (15 per cent of Victoria's landmass), is one of Victoria's more remote regions and is characterised by predominantly rural areas. The northern part of the region extends to the Mallee incorporating agricultural towns such as Hopetoun. The south of the region includes the Grampians and Mount Arapiles area, both of which are significant tourist destinations. The western reaches of the region border South Australia and primarily consist of agricultural land and national parks. The region has one major regional centre in Horsham. The region's foremost digital connectivity need is comprehensive mobile coverage – with this need heightened with the advent of 5G technology.

Wimmera Southern Mallee comprises five Local Government Areas (LGAs):

- Horsham
- West Wimmera
- Hindmarsh
- Yarriambiack
- Northern Grampians.

Located in the far central-west of the state, the region does not border metropolitan Melbourne and therefore the region's population and economy are not influenced by the benefits and pressures associated with being adjacent to Melbourne's peri-urban fringe. Agriculture is the dominant sector in the region in terms of number of employees and GRP contribution, followed by health and community care which has displayed strong jobs growth and is forecast to continue to do so. Employment in farming is falling but the sector continues to contribute substantially to GRP. These and other key industries require a significant increase in digital intensity over the next 3-5 years to remain competitive and effective, highlighting the need for access to modern digital infrastructure including in rural and remote areas. Digital development is the Regional Partnership's number one priority, with digital access first, then skills, then affordability:

- connectivity => capability => competition

Like much of regional Victoria, 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:

- Mobile coverage (the region's foremost connectivity need) appears reasonably good for business and households in cities and towns across the region, but is deficient in more remote, less closely settled primary production areas and tourist locations. The public coverage maps underpinning this analysis are unable to show particular places within population centres where the 'lived experience' of mobile services is inadequate to support, for example, basic web-browsing, highlighting the need for better coverage data to guide future mobile infrastructure investment in these areas.
- The fixed broadband needs of businesses across the board, and households in smaller localities (less than 1,500 residents), on the fringe of larger centres and in rural and remote areas, are not always met due to limitations of NBN fixed line, fixed wireless and satellite technologies.
- Public WiFi for visitors and low-income residents is in short supply.
- Tourist attractions in cities and towns are generally well served with broadband (to enable tourist sites to offer WiFi services) and mobile coverage is good; however, this is not the case for remote tourist locations.
- A-class roads have reasonable but non-continuous mobile coverage while B and C-class roads have sporadic mobile coverage.
- North Western Victoria ranks amongst the lowest regions on the RMIT-Swinburne-Roy Morgan-Telstra Digital Inclusion Index (DII) with an index of 55.9 compared to Melbourne at 64.9 and Victoria overall 63.3.

Priority recommendations to address the Wimmera Southern Mallee digital divide and support the region's strengths include the following (noting the limited resources, expertise and capacity for the Regional Partnership and local governments to implement solutions without state and Commonwealth government assistance):

Local Governments are not funded nor equipped to undertake telecommunications research however they are a source of information that may help to identify localised fixed and mobile blackspots and facilitate or support digital literacy training in local digital hubs, including libraries, community learning centres, coworking spaces and Neighbourhood Houses if they have them within the LGA.

The *Victorian Government* has a role to identify IT/telecommunications shortfalls and extend its regional telecommunications advocacy, co-investment and pilot programs. This includes considering subsidies for businesses and households to install mobile and fixed wireless signal boosters which can have a dramatic effect on coverage, and to address unmet needs and capitalise on opportunities from IoT and 5G – recognising the scope for 5G technology to meet next generation mobile, fixed broadband and IoT connectivity needs. In this context, new infrastructure co-funding models need to be explored, including government tower infrastructure that can support multiple services and technologies – mobile data and voice, fixed wireless broadband and IoT. There is also a role for the Victorian Government to facilitate and fund the preparation of business cases where identified investments may be needed and to provide regional stakeholder access to the place-based State Level Information Management (SLIM) database.

The *Commonwealth Government* continues to review and extend its mobile blackspot co-funding program, require NBN Co to maximise deployment of high-performance technologies, mandate industry meets stronger NBN service connection and maintenance requirements and invest in digital skills training programs.

Local, state and Commonwealth Governments work together to support the Regional Partnership's advocacy for Horsham and surrounds to be considered a location for the Federal "Cities Deals" program, building on existing grains innovation precincts and the WSM's tourism potential.

NBN Co restructures its wholesale pricing to allow lower retail prices and encourage greater utilisation of network capacity, quickly bringing to market effective business-grade services with strong service level agreements (SLAs) in the regions.

The *telecommunications industry* works with community and government to find solutions to address current and future unmet demands across the spectrum, particularly in thin markets, and actively consider opportunities to provide competing broadband services to businesses in high demand precincts, particularly if NBN Co fails to restructure its wholesale pricing or does not provide effective business grade services in regional locations.

Regional Partnership Priority Recommendations

The Regional Partnership, in conjunction with the five Wimmera Southern Mallee local governments, has drawn on the evidence base in the Digital Plan and local knowledge to prioritise gaps in digital infrastructure and services and guide upgrade activities to the areas of greatest need. The Regional Partnership seeks the support of the Victorian and Commonwealth Governments and mobile network operators in this process. Addressing remaining mobile blackspots in agricultural areas, tourist locations and on the region's roads is the foremost priority. The outcomes of the Connecting Regional Communities Program (CRCP) Enhanced Broadband, Public WiFi and Agriculture IoT trials will be monitored for their applicability to Wimmera Southern Mallee locations. Ongoing work on identifying placed-based digital needs will be facilitated by regional stakeholder access to the SLIM database – the Wimmera Southern Mallee Regional Partnership would welcome and support trialling wider SLIM access in the region.

Mobile access

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

Mobile access priority recommendations

The Regional Partnership will:

1. Advocate for continued Commonwealth and Victorian Government investment in expanding mobile coverage, coupled with a review of blackspot funding models as investment extends into ever more marginal areas

2. Advocate for mobile network operators to provide comparable coverage information that shows probable coverage and quality (areas where streaming, browsing, voice calls, emergency calls/SMS warnings are reasonably predicted to work) – disclosure of 'real' performance – for public access to the SLIM database

3. Encourage the Victorian Government to support local government agencies to equip their vehicles with coverage monitoring tools to build a strong local evidence base of blackspots in their LGA

4. Advocate the Victorian Government to develop a state-wide schedule of significant visitor events where network capacity problems exist and tender for mobile operators to provide solutions

5. Develop a list of 5G priority locations based on the digital requirements of regional industries, and advocate for early 5G rollout to these locations.

Fixed access ('broadband') – Where population centres are above 300 residents

Significant fixed access 'unmet demand' is prevalent across the region for businesses, and for households in smaller towns and primary production areas.

Fixed access priority recommendations

The Regional Partnership will:

1. Encourage local governments to engage with NBN Co to ensure local priorities are considered in network rollout planning

2. Encourage local government planners to designate business precincts in brownfield and greenfield 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 alternate service providers if the access technology proposed for an area is likely to be inadequate for needs of precinct occupants – facilitated by regional stakeholder access to SLIM

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. Encourage the Commonwealth Government to require NBN Co lift the minimum standard NBN speed beyond 12 Mbps and dimension the network to accommodate this

6. Advocate for the early introduction of high-speed, business-grade NBN services – including symmetric high bandwidth services with strong service level agreements (SLAs)

7. Advocate for stronger service connection and maintenance for NBN services to ensure the interests of residential and business users are adequately served

8. Advocate for a restructuring of NBN wholesale pricing to align retail service provider incentives with unlocking the maximum potential of the NBN

9. Advocate for a lowering of the mandatory threshold above which FTTP must be incorporated in greenfield developments

10. Advocate for competitive fixed broadband for businesses where feasible, particularly if NBN Co fails to offer effective business-grade services and reset its wholesale pricing

11. Where the Victorian Government is co-funding enhanced broadband such as the Spirit Telecom fixed wireless trial in Horsham, ensure the selected service provider has after sales service capacity on the ground in that location and internal governance processes are robust.

Internet of Things Access

The Regional Partnership will support local governments' and business groups' engagement with mobile operators on their plans for mobile-supported broadband IoT (Cat-M1) and narrowband IoT (LP-WAN) network rollout across the WSM. This will draw on data on existing networks and latent user needs, information from the CRCP agricultural IoT trials and the fieldwork conducted to support the Digital Plans.

> ### *Internet of Things priority recommendations*
>
> The Regional Partnership will:
>
> 1. Encourage the Victorian and Commonwealth Governments to include IoT support as a decision criterion in mobile blackspot funding initiatives
> 2. Advocate for mobile network operators to provide comparable coverage maps that include the type of IoT applications supported
> 3. Advocate for mobile network operators to open narrowband services to enable voice communication in high risk and more isolated areas.

Public WiFi

Preliminary identification of locations that would benefit most from further public WiFi deployment is in the Digital Plan. This will be enhanced by insights from survey work undertaken with local governments.

> ### *Public WiFi priority recommendations*
>
> The Regional Partnership will:
>
> 1. Encourage the Victorian and local governments to identify public WiFi locations and Smart City opportunities
> 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

Limited place-based information on the supply of and demand for digital skills and the affordability of digital services has been found for the Wimmera Southern Mallee Digital Plan.

> ### *Digital skills and affordability priority recommendations*
>
> The Regional Partnership will encourage the Victorian and Commonwealth Governments to:
>
> 1. Address the digital skills information gap, including through current digital plan field-work, Digital Economy initiatives and compiling existing skills data for agriculture
> 2. Consider the scope for digital training at digital hubs, including libraries, Community Learning Centres, coworking spaces and Neighbourhood Houses if they have them within the LGA.
> 3. Invest in the preparation and delivery of quality digital education and training, adding relevant focus to general initiatives as detailed information on location and sector unmet skills needs are identified.

Analytical Framework

The digital planning framework has been developed to systematically analyse the significant body of supply, demand and other key information gathered to support the digital planning process, which in turn provides the evidence base to recommend priorities on a place and sector-based level. This approach takes into account the significant diversity within the region. Analysis is conducted to provide a view of the current supply and demand situation and a three to five-year forward view. The framework is designed to be flexible, repeatable, easy to use and at the summary level at a glance, and guide where to focus action to address the digital divide. Further development of this framework is required in subsequent digital plans.

The planning framework takes inputs from multiple information sources including:

- The region's economic, demographic and geographic characteristics
- Place-based digital supply and demand analysis of population centres, the rural hinterland and key primary production areas, tourist locations and transport corridors
- SLIM database
- *The Regional Digital Plans: Common Themes* report
- Regional Assembly feedback
- Local government area surveys and onsite fieldwork
- The Digital Inclusion Index
- Australian Bureau of Statistics information
- Other sources highlighted in this document.

Shortfalls in internet access are identified by comparing supply and demand for public network access services classified by technology type (fixed, mobile, Internet of Things and WiFi) in different locations and for the various user groups (businesses, households, communities, visitors and road and rail travellers). This is done by assigning High, Medium and Low ratings (H, M, L) 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 Victorian 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'

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 recommendations to address unmet needs
- Highlighting the need for good information skills gaps and the affordability of digital services.

The usual focus of the digital divide is on the situation in the regions relative to capital city locations. However, the significant diversity in geographic, demographic, social and economic characteristics within a region means there are also digital divides within regions and localities. Accordingly, effective digital planning needs to be place and sector-specific and able to identify priorities at this detailed level. However, current data limitations mean some of the analysis in this first Wimmera Southern Mallee 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, as shown in the following chart. North-West Victoria which included the Wimmera Southern Mallee region falls below the regional average.
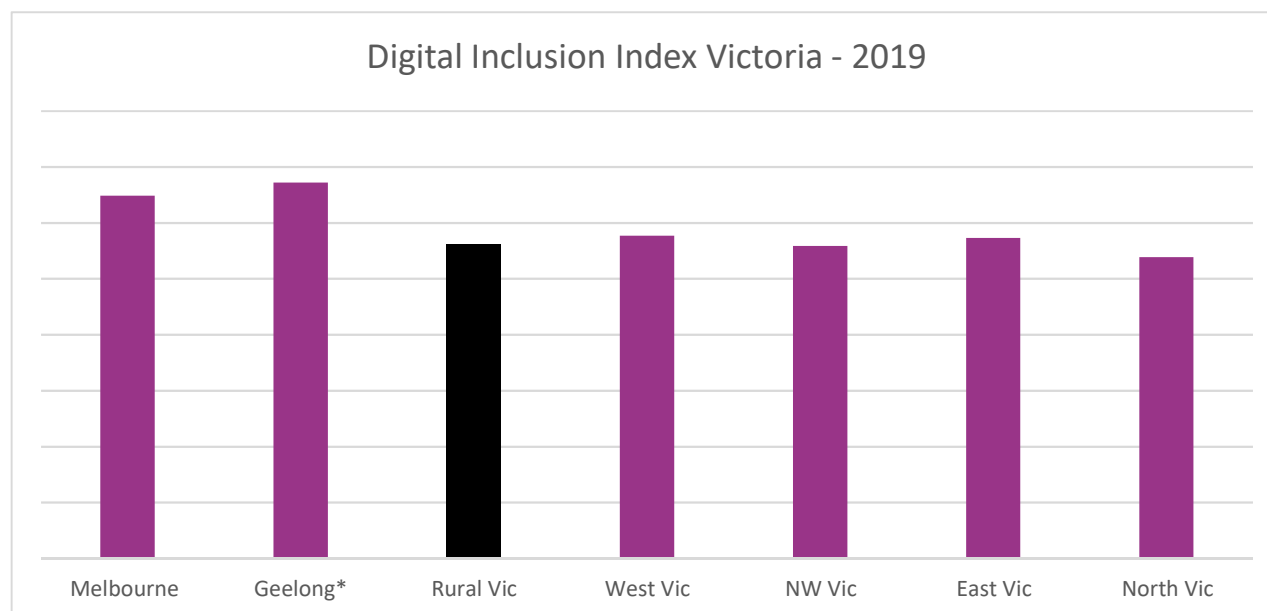

Figure 1 Summary of 2019 RMIT-Swinburne-Roy Morgan-Telstra Digital Inclusion Index (DII) findings across Victorian regions

Digital divides within localities are driven by the intersection of topography, population density, the inherent performance characteristics of key digital technologies and network deployment economics. These factors cause variations in service quality for standard fixed line technologies, local gaps in mobile coverage, and technology boundary issue. This can result in highly localised 'digital have nots' amongst and contiguous to 'digital haves' and technology coverage boundary issues (e.g. on the fringes of towns).

Digital technologies

Mobile networks, the foremost connectivity need in Wimmera Southern Mallee, provide 'untethered – on-the-move' internet access from three major and one nascent network (TPG), with Telstra by far the largest supplier of mobile coverage for the region. 3G and 4G mobile technologies are currently in use. Mass deployment of high-performance 5G service is planned to commence in 2020, with initial rollout likely to be in capital cities and larger regional centres. Coverage (service availability) depends on local topography and the location and aerial orientation of mobile towers, and for these reasons is absent or poor quality in some locations.

The Digital Plan 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 is not yet available for public release. 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 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 can capture 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 (with regional stakeholder access) and the digital plans when this becomes available.

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).[2]

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 TFFN 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 enough data capacity.

Internet of Things networks provide one and two-way communications between sensors and central data storage and analysis facilities. These can be high bandwidth (HB-IoT) for large data volumes in either direction, or low volume low power (LP) IoT (typically one way, from a remote sensor in a paddock, factory of residence). High bandwidth IoT is currently delivered on existing mobile networks (with wider coverage). LP-IoT is currently provided on LP-WAN networks by operators such as Taggle and Sigfox, although the mobile network operators are examining the technology and business case for providing low power IoT applications on their networks.

Public WiFi networks provide a no-cost-to-user link between mobile devices (e.g. smartphones and tablets) and mobile service providers.[3] Free public WiFi is typically provided by local governments for disadvantaged citizens,

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[2] 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.

[3] 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

the wider public and visitors in larger cities and towns.[4] 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, several 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 fixed and mobile network services are more expensive in regional locations, as NBN Co is required to price its wholesale services uniformly Australia-wide, and broadband and mobile service providers price nationally not on a location basis. Nonetheless it is likely many regional users pay more for these services on a quality-adjusted basis – an equally-priced fixed wireless or satellite service does not in general provide the same value-for-money as an equivalent fixed line service. Similarly, an equally priced mobile service will be lower value-for-money for regional users that frequently experience blackspots and degraded service.[5]

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 those in lower-income locations, have less 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 yet been investigated.

Priority recommendations

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

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[4] Free public WiFi is also provided by the operators of some cafes, fast food restaurants, shopping centres, airports, tourist locations and other commercial premises to improve customers' on-site experience.

[5] 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

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.

Options for addressing for 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.[6]

Affordability solutions are not addressed in this first-generation digital plan – data collection and analysis are 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 Victorian Government use only from a variety of public and commercial-in-confidence data. The agreements and protocols necessary for wider use are being developed to support future versions of the Digital Plans and locally-based digital development activities.

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[6] Involving the Department of Education and Training.

Regional Context: Wimmera Southern Mallee

Population density differs across the region – from 4.7 residents per square kilometre for Horsham LGA to 0.4 for West Wimmera. One third of the region's population lives in Horsham, with a further one third in the other cities, towns and localities. The remaining 33 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.

Primary production in the region is primarily grain cropping with grazing and food processing also represented.

Tourist sites include year-round attractions and signature annual festivals and other periodic events.

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.

Road transport corridors need good mobile coverage for continuous mobile connectivity. There are no passenger rail services in the region.

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

Place/sector (typology)	Characteristics (place/user)	Digital 'unmet needs'
Significant places - cities/towns/localities		
Businesses	Concentration of public services (education, health, admin), retail, small business in cities, 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 affordable, high-capacity broadband Improved digital skills
Communities	Varying digital literacy & ability to afford broadband	Access to affordable broadband Increased digital skills
Primary production areas		
Farming	Low population density Variety of farming systems – broadacre cropping & grazing, intensive horticulture & livestock Increasing use of digital farming Varying digital literacy	Mobile coverage Customised solutions (e.g. on-farm WiFi) Broadband & narrowband IoT coverage Digital literacy – farmers, farm service providers
Tourist sites		
Permanent attractions	Both town & remote locations Visitors with high digital literacy & dependence (e.g. TripAdvisor, GPS, Facebook)	Mobile coverage Public WiFi – general and site-specific High bandwidth fixed broadband for WiFi backhaul
Events	Highly seasonal/periodic	Temporary mobile peak capacity requirements High bandwidth fixed broadband for WiFi backhaul
Transport corridors		
Road	Motorists & freight Mix of major (VicRoads) & minor (local council) roads	Continuous mobile coverage

* Based on digital supply-demand analysis documented in the following sections of the Digital Plan

Wimmera Southern Mallee population centres, primary production areas, tourist sites and transport corridors
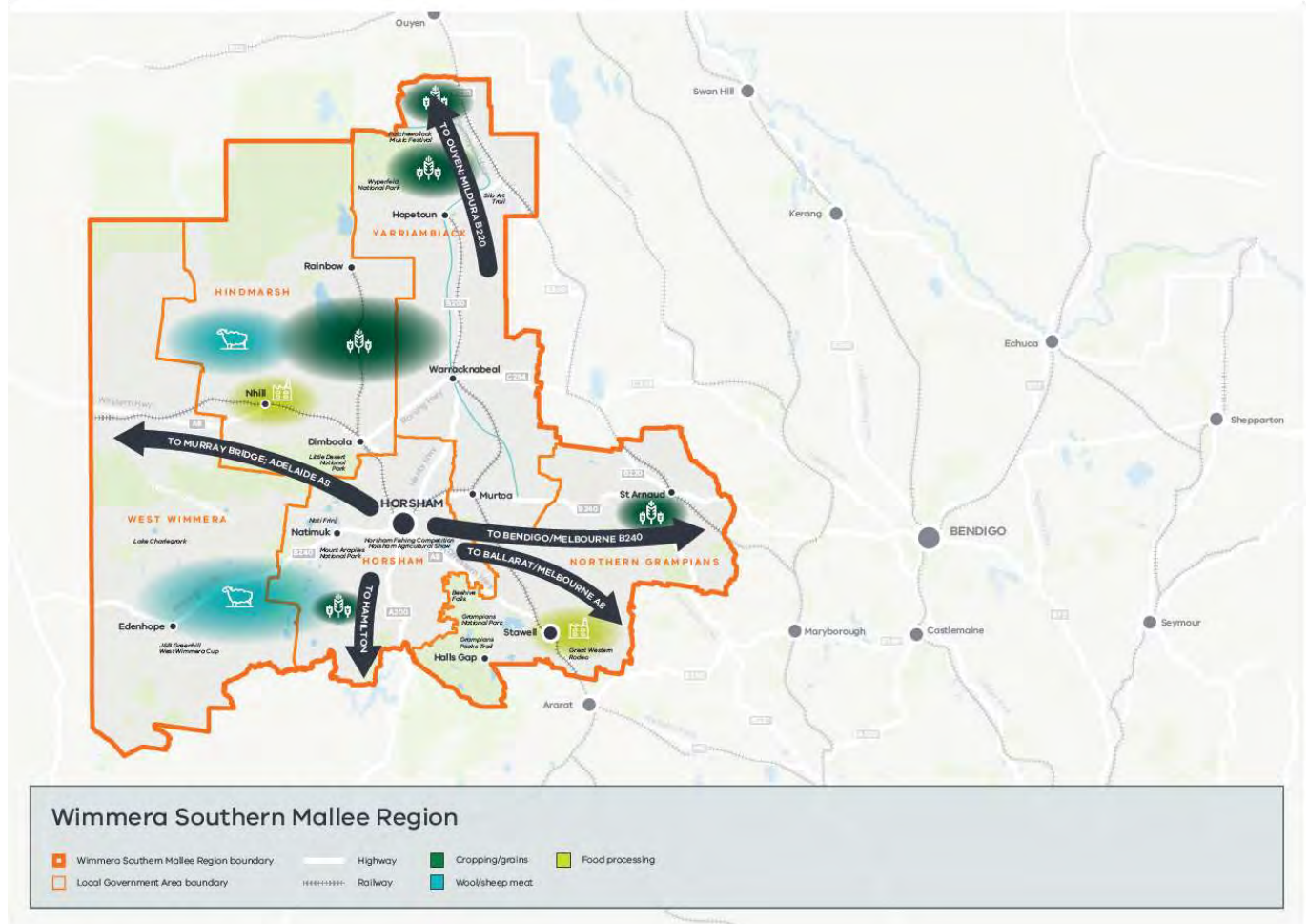

Figure 2 Wimmera Southern Mallee population centres, primary production areas, tourist sites & transport corridors

Key factors considered in the development of the place and sector-based Wimmera Southern Mallee Digital Plan include the following:

Significant regional diversity

- Population density - differs widely across the region, from 4.7 residents per square kilometre for Horsham LGA to 0.4 for West Wimmera
- Median age - differs significantly across the region from 41 in Horsham to more than 50 in Hindmarsh and Yarriambiack
- Industry sectors supporting employment - six industries make up two-thirds of Wimmera Southern Mallee employment with these being dispersed across the region.[7]

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

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[7] Agriculture 17.4%, Construction 6.6%, Retail 9.5%, Public admin & safety 5.9%, Education & training 7.2%, Health care & social assist 16.8% from ABS 2017
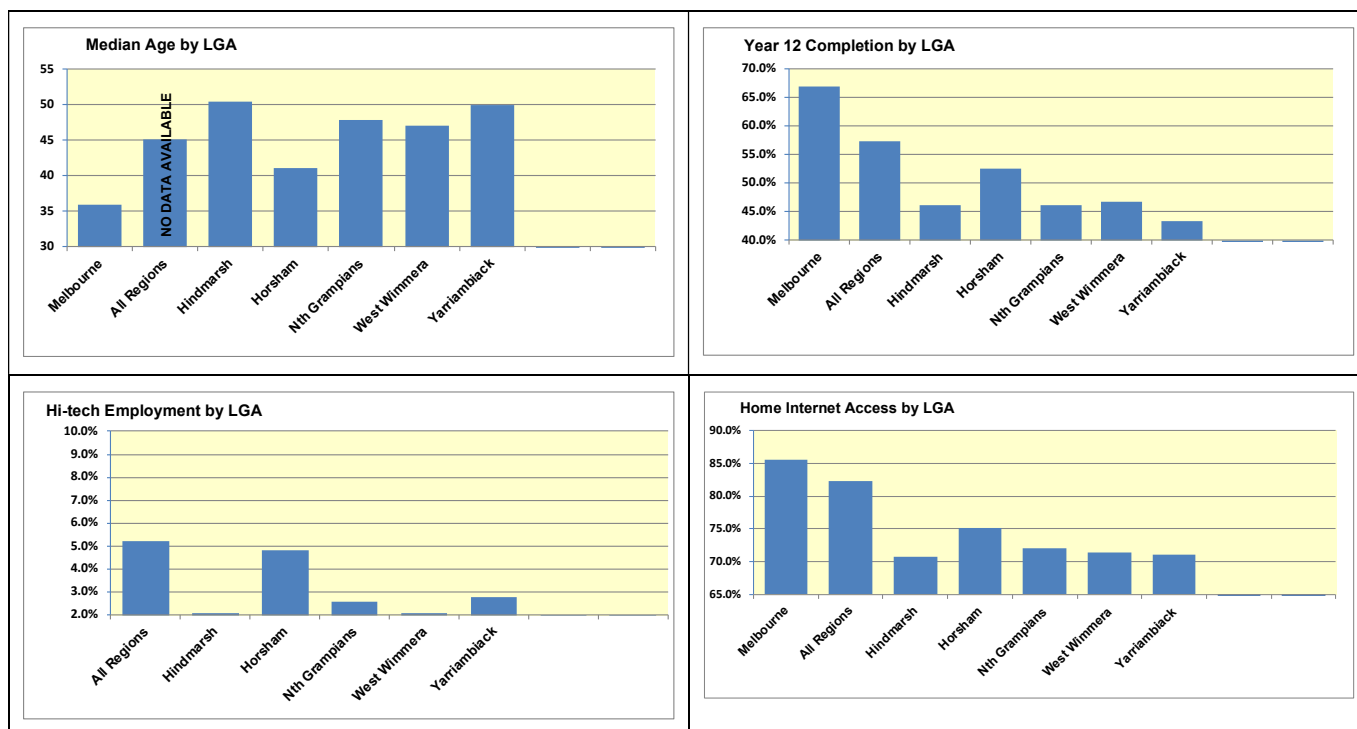
Figure 3 Comparisons of key Wimmera Southern Mallee indicators of digital infrastructure demand

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 three industries making up fewer jobs – retail, manufacturing and agriculture/forestry/fishing – has fallen over the past decade and is forecast to contract or grow only slowly over the next five years
- However, manufacturing and agriculture are major contributors to Wimmera Southern Mallee's Gross Regional Product (GRP) growth, suggesting these industries also warrant particular attention to their digital development.

Digital intensity

- Analysis of the digital intensity requirements of the seven industries representing 70 per cent of the Wimmera Southern Mallee employment reveals that five of the industries will rely more heavily on digital services over the next 3-5 five years. These include health care and community assistance, tourism and agriculture, for which digital intensity needs to rise strongly over the next 3-5 years to retain competitiveness
- Agriculture and tourism in particular need to shift from their current low to high digital intensity over the next 5 years to be competitive in Australia and internationally, and health and community care needs to digitise quickly for leading-edge effectiveness.

Table 2 Comparison of current and future digital intensity requirements of the main Wimmera Southern Mallee industries based on employment

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

Legend:

🟥	*Low*	🟨	*Medium*	🟩	*High*

The Digital Divide

The digital divide between regional Victoria residents and businesses and their capital city counterparts – the gap between them in the availability of digital services, the ability of residents and workers to use digital services (digital skills), and the affordability of digital services and digital expertise – is reflected in the 2019 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 chart below.
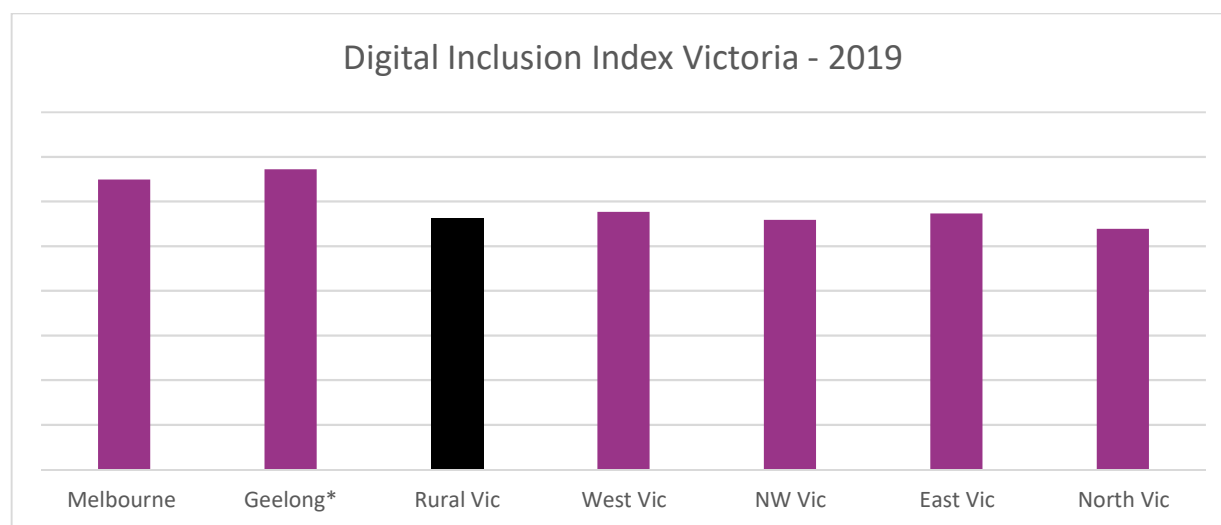

Digital Inclusion Index Victoria - 2019

Melbourne | Geelong* | Rural Vic | West Vic | NW Vic | East Vic | North Vic

Figure 4 Summary of 2019 RMIT-Swinburne-Roy Morgan-Telstra Digital Inclusion Index (DII) findings across Victorian regions

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, 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. From its inception in 2010 the mandated purpose of the NBN has been to provide ubiquitous high-speed 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 business for effective business-grade broadband services – high-speed (100 Mbps+), symmetric and service level agreements on 24/7 information rate performance – for developing its Enterprise Ethernet business grade service that meets these requirements for release Q4 CY 2018.

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

Competing fixed broadband networks

Competing networks exist in capital city CBDs and some more densely settled metropolitan areas that can provide high quality alternatives to the NBN capable of supporting broadband services that meet the needs of digitally-intensive businesses at affordable prices. The 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 service are in general not present and are unlikely to be widely developed without government support.

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, towns, localities		
1. Businesses	Access to high-speed, symmetrical broadband (100Mbps+) services with Service Level Agreements *No NBN business grade services are currently available* Access to near-complete 4G coverage by at 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 Fibre to the premises/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 *Currently relatively well served* Access to near-complete 4G coverage by a least two operators *Currently relatively well served* 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 *Currently relatively well served* Access to near-complete 4G coverage by a least two operators *Currently well served* 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 *Currently not well served* Access to Internet of Things Coverage *Some access currently available* 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* 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
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*	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 coverage

* Based on digital supply-demand analysis documented in the following sections of the Digital Plan

Wimmera Southern Mallee unmet needs hotspots: mobile access and fixed broadband
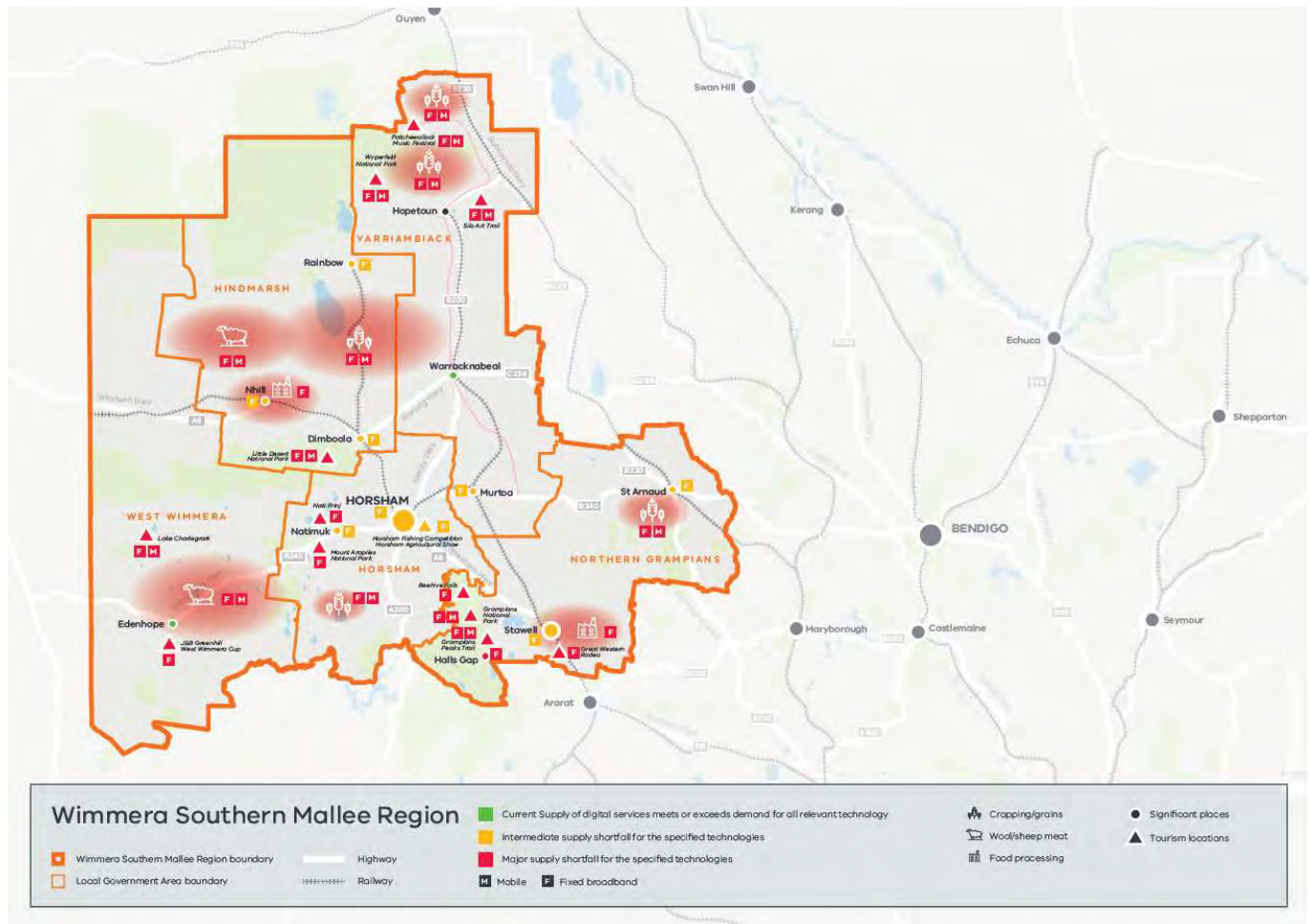

Figure 5 Wimmera Southern Mallee unmet needs hotspots: mobile access and fixed broadband

Businesses in all *population centres* down to 500 residents generally have effective mobile access (4G coverage) but are not uniformly well supplied with fixed access (access that can uniformly support business grade services). Households in population centres down to localities with 1,500 residents are generally well served with effective mobile and fixed access, with smaller places mainly having fixed wireless access. Narrowband IoT coverage is generally good across the region relative to demand, while public WiFi coverage are patchy and warrant careful consideration of how shortfalls in low income towns and localities are best addressed. What is not shown is the important and challenging issue of digital 'have nots' amongst the 'haves'. This 'below the surface' digital divide issue should not be overlooked.

The high-level picture for households and businesses in primary production areas is mixed, with mobile coverage for farms (and at tourist locations) more unpredictable than in cities and towns 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. Access to an LP-WAN network (Taggle) is available for many farms, with future farm competitiveness likely to require wider IoT access in the next 3-5 years.

Mobile coverage on major roads is good, but less so for connecting roads.

Over the following pages the results of detailed supply and demand analysis is documented and discussed for mobile, fixed, narrowband IoT and public WiFi conducted in the body of the plan. Specifically, for these digital services the adequacy of supply relative to demand is considered for a selection of Wimmera Southern Mallee population centres down to 300 residents, selected primary production areas, a range of tourist locations and for significant roads. The supply and demand rating methodology used for this purpose is as follows:

Digital Supply and Demand Rating Methodology

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

Mobile access rating methodology

Local accuracy of mobile coverage analysis is limited by the need to use high-level publicly available mobile coverage maps. Government discussions with mobile network operators to enable 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.[8]

MOBILE ACCESS AVAILABLITY

<u>For both businesses and households</u> (same supply ratings 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

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

MOBILE DEMAND

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

Fixed access rating methodology

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

FIXED ACCESS AVAILABILITY

For businesses

Rated **High** where:

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

Rated **Medium** where:

- Mainly FTTN (as users face uncertainty about the availability of the forthcoming Enterprise Ethernet service at a premise as this service cannot be provided over access long loops), AND

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

Rated **Low** where:

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

For households

Rated **High** where:

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

Rated **Medium** where:

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

Rated **Low** where:

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

FIXED ACCESS 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 as the quality of NBN FTTN performance is expected to improve in line with user needs.[9]

Narrowband (LP-WAN) IoT access rating methodology [10]

NARROWBAND IOT AVAILABILITY

The present supply of LP-IoT is rated:

- **High** for near-complete coverage by at least one LP-WAN network
- **Medium** or **Low** for patchy or no coverage
- At least two networks requirement for High in 3-5 years.[11]

NARROWBAND IOT AVAILABILITY

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

Demand by households is related as **Low** at present.

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[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.

[10] Sigfox, Taggle and Optus IoT network coverage is considered. NNNCo and mobile network operator coverage is not considered in the plan analysis as this information was not publicly available at the time of analysis.

[11] High bandwidth and 2-way IoT are provided by mobile carriers.

Public WiFi

PUBLIC WIFI AVAILABILITY

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.

PUBLIC WIFI 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.[12]

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[12] 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 significant places is shown in Table 4, red shading indicating major supply shortfall relative to demand, orange an intermediate supply shortfall and green where current supply meets or exceeds demand. ***Note the light green shading for mobile access denotes reservations, based on local mobile access experience, about the good coverage indicated by public coverage maps.***

Table 4 Significant places: current unmet digital access needs.

Place	LGA	Name	User Type	Access Mobile * Supply / Demand	Fixed Supply / Demand	LP-WAN IoT Supply / Demand	WiFi Supply / Demand
City	Horsham	**Horsham** (pop. 15,630)	Business	H/H	M/H	H/M	n.a.
			Home	H/H	H/H	H/L	H/L
			Community	H/H	n.a.	n.a.	H/L
Town	Northern Grampians	**Stawell** (pop. 5,521)	Business	H/H	M/H	H/M	n.a.
			Home	H/H	H/H	H/L	H/L
			Community	H/H	n.a.	n.a.	H/L
	Yarriambiack	**Warracknabeal** (pop. 2,314)	Business	H/H	H/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/M
			Community	H/H	n.a.	n.a.	L/M
	Northern Grampians	**St Arnaud** (pop. 2,031)	Business	H/H	M/H	H/M	n.a.
			Home	H/H	H/H	H/L	H/H
			Community	H/H	n.a.	n.a.	H/H
	Hindmarsh	**Nhill** (pop. 1,755)	Business	H/H	M/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/L
			Community	H/H	n.a.	n.a.	L/L
	Hindmarsh	**Dimboola** (pop. 1,426)	Business	H/H	M/H	H/M	n.a.
			Home	H/H	H/H	H/L	L/M
			Community	H/H	n.a.	n.a.	L/M
Local	Yarriambiack	**Murtoa** (pop. 747)	Home	H/H	M/H	H/L	L/L
			Community	H/H	n.a.	n.a.	L/L
	West Wimmera	**Edenhope** (pop. 687)	Home	H/H	H/H	H/L	L/M
			Community	H/H	n.a.	n.a.	L/M
	Hindmarsh	**Rainbow** (pop. 492)	Home	H/H	M/H	H/L	L/H
			Community	H/H	n.a.	n.a.	L/H
	Horsham	**Natimuk** (pop. 396)	Home	H/H	M/H	H/L	L/L
			Community	H/H	n.a.	n.a.	L/L
	Northern Grampians	**Halls Gap** (pop. 316)	Home	H/H	M/H	H/L	L/L
			Community	H/H	n.a.	n.a.	L/L

Legend **Red** - Major supply shortfall | **Orange** - 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

Mobile and fixed access

Mobile coverage in cities, towns and localities across the region is in general currently meeting demand based on publicly available coverage maps which tend to show good 4G coverage from multiple mobile network operators within the significant places analysed. The light green shading for mobile coverage analysis in the heat map tables in these sections reflects the concerns regarding the veracity of these conclusions based on the best-available public data used.

While fixed access will meet the needs of households in larger centres when the NBN is rolled out, the fixed access needs of some businesses will be under-served by the NBN as the planned technology (FTTN) will not support business grade services for all premises, and fixed wireless access will not be on par with household demand for services equivalent to that of their metropolitan peers.

In addition, in locations where user needs are generally well met there will be individual households, businesses and neighbourhoods with under-par mobile and fixed access (including those on the fringes of towns with patchy mobile coverage and fixed wireless broadband). These localised disparities also occur in capital city locations but may be marked in regional population centres and warrant specific attention. Warracknabeal will have a marked divide between fibre to the curb (FTTC) and fibre to the node (FTTN) fixed access premises, with the substantial part of the town which will have FTTC technology juxtaposed with areas not enjoying this 'near gold standard' broadband.

Looking forward 3-5 years, widespread fixed access upgrades will be difficult to achieve as fixed line networks are increasingly costly to deploy for smaller populations (with prospects of mobile access overtaking fixed lines in the future to meet this demand). While government advocacy, demand aggregation and co-funding programs for enhanced broadband may be effective at the margin for smaller population centres (guided by lessons from the CRCP Enhanced Broadband trials in Morwell and Horsham), there are limits to what can be achieved. While business and household mobile needs are currently met in all the Wimmera Southern Mallee cities, towns and localities considered, smaller towns and localities may not enjoy 5G coverage in the next 3-5 years.

Narrowband (LP-WAN) IoT [13]

Coverage of LP-WAN IoT networks across Wimmera Southern Mallee cities, towns and localities is currently good relative to demand (coverage by Taggle of all places considered) – as such there is 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 deploying LP-WAN IoT networks (use of low-cost spectrum and long signal carrying distances). Demand developments in WSM cities, towns and localities are less clear. While there is widespread expectation that IoT use by businesses and households will burgeon soon, it is not apparent whether these premise-specific IoT needs will be met by in-premise WiFi systems or by public IoT networks.

Public WiFi

A key benefit of free public WiFi at present is assisting disadvantaged residents access the internet, and for visitors to the location. At present supply of public WiFi is high in three of the places considered (Horsham, Stawell and St Arnaud), but absent elsewhere with supply deficient relative to demand in four lower income locations (a mix of larger and smaller towns and localities).

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[13] Sigfox and Taggle network coverage is considered, NNNCo network coverage is not considered in the plan analysis as this information was not publicly available at the time of analysis.

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 Victorian Government programs – with the current CRCP free public WiFi trials in Shepparton and Geelong providing useful lessons on the design of such programs. However, falling mobile data prices, and scope for mobile networks to support low power Smart City sensors may mean public WiFi becomes less relevant for social and local government service delivery purposes. Monitoring of trends is required.

Skills and affordability

Primary measures of digital literacy, availability of IT professionals and workforce preparedness for the future digital world, including on a place and sector basis, are extremely limited, existing at best at a high level of aggregation. As a result, further local data collection is required to identify skills gaps and shape necessary 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, including: 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 Wimmera Southern Mallee 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 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 recommendations

Priority recommendations 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 required changes to the Commonwealth Government, NBN Co and other digital service providers. Some actions are high-level in nature such as establishing priorities and action plans, while others are technology specific. They address both broad shortfalls in the supply of digital services and the situation of digital 'have-nots' amongst the 'haves'.

The Wimmera Southern Mallee Region high-level priority recommendations include:

1. Local governments and the Regional Partnership work with the Victorian Government to identify which actions provide the greatest benefit and prioritise actions for each of the access technologies on this basis – including investigating the feasibility of a combined 5G mobile/fixed access service and alternative market stimulation models to bring the service to market

2. The Victorian Government promotes, educates and informs businesses and residents living in small, remote localities of how best to seek the best bespoke solution for those requiring reliable high bandwidth solutions, where it is unlikely to be viable due to cost constraints

3. Local stakeholders use the State Level Information Management (SLIM) database to conduct more detailed analysis of unmet needs and possible solutions, including for proposed development sites – requiring the Victorian Government to expedite third party access to SLIM

Specific priority recommendations 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 and discussions with mobile service providers on more immediate localised solutions through antennae directional tuning, low-cost small cell towers and other bespoke work arounds

2. The Victorian Government advocates 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

3. The Victorian Government commits 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 locations

5. The Victorian Government examines the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G in high demand areas

6. The Victorian Government undertakes cost-benefits analysis (CBA) on the socio-economic benefits to rural areas of mobile services, given this addresses IoT, Public WiFi, economic development, education, welfare and emergency services issues.

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 service.

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, the Victorian Government and industry work 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 encourages 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 advocates for a lowering of the mandatory threshold above which FTTP must be incorporated in new developments

6. The Victorian Government advocates for a restructuring of NBN wholesale pricing to ensure the maximum potential of the NBN is unlocked (including revising CVC pricing)

7. The Victorian Government makes submissions to the current ACCC Domestic Transmission Capacity Services (DTCS) inquiry in relation to backhaul routes where its market insights indicate regional users are adversely impacted by high backhaul pricing

8. The Victorian Government advocates for the immediate introduction of NBN business grade services with symmetric high bandwidth options and robust service level agreements (SLAs)

9. Local governments, businesses and community groups work in partnership to better understand the incidence and impact of fixed technology boundary issues (the 'have nots' next door to the 'haves'), and the feasibility of public network and bespoke solutions that address serious anomalies.

IoT access

1. The Regional Partnership working closely with business, local governments, agencies and the Victorian Government to coordinate with all mobile operators on their plans for mobile-supported Cat-M1 and narrowband IoT deployment across the WSM. This will be supported by the region's 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 working closely with business, local governments, agencies and the Victorian Government to coordinate discussion with LP-WAN network operators on their plans for network deployment across the WSM, including what information they can provide and actions they can take to assist the network operators in their deliberations

3. The Victorian Government to include IoT support as a decision criterion in its mobile blackspot initiatives, and advocate the Commonwealth to do the same in its future blackspot programs

4. The Victorian Government considers 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 coordinates the collection and sharing of information from local governments on the location, footprint, target audience and uses 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-tracks the compilation and distribution of information on its public WiFi trials across the state

3. The Victorian Government investigates 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. An online survey with local government will provide some data with onsite fieldwork tp follow (including pulling together any sector-specific information such as that on agriculture digital skills needs).

2. The WSM Regional Partnership will coordinate and document any potential local solutions arising from the AgTIDE Education and Training project, and other digital literacy opportunities (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 addressed in the plan 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. Funding should be provided to each region or LGA to run an education campaign on digital access options within the region. LGAs do not have resources or the capacity available to do this without external funding.

Options to address Wimmera Southern Mallee 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

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

Table 5 Primary production areas: current unmet digital access needs

Land Use	Location	User Type	Mobile * Supply / Demand	Fixed Supply / Demand	LP-WAN IoT Supply / Demand
			Access		
Cropping	North of Hopetoun	Business	L/H	L/H	H/M
		Home	L/H	L/H	H/L
Cropping	North-east of Nhill	Business	M/H	L/H	H/M
		Home	M/H	L/H	H/L
Cropping	Around Patchewollock	Business	L/H	L/H	H/M
		Home	L/H	L/H	H/L
Cropping	Around Gre Gre and St Arnaud	Business	M/H	L/H	H/M
		Home	M/H	L/H	H/L
Cropping	Around Toolondo	Business	L/H	L/H	H/M
		Home	L/H	L/H	H/L
Grazing (wool/ sheep meat)	North-west of Nhill	Business	L/H	L/H	L/M
		Home	L/H	L/H	L/L
Grazing (wool/ sheep meat)	North of Edenhope	Business	M/H	L/H	H/M
		Home	M/H	L/H	H/L
Food processing	Around Nhill	Business	H/H	L/H	H/M
		Home	H/H	L/H	H/L
Food processing	Around Stawell	Business	H/H	L/H	H/M
		Home	H/H	L/H	H/L

Legend **Red** - Major supply shortfall | **Orange** - 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 within each of these primary production areas with mobile and fixed supply in several areas rated low. While narrowband IoT supply appears to generally meet demand at present, it is recognised that apparent low demand may reflect limited user knowledge and availability of IoT systems – dissemination of findings from the CRCP agriculture IoT trials is critical in this regard to ensure agri-business in the region remains competitive.

Mobile coverage

Mobile coverage for remote area cropping and grazing is generally poor with coverage concentrated around population centres and major highways with clear expanses of poor service in between. With demand for fixed services high, major and intermediate shortfalls are apparent in these areas. Food processing locations are better served.

Looking forward 3-5 years - there is likely to be little market-driven improvement on coverage, and 5G technology may not replace 4G outside large population centres and on major roads. Rising demand in the face of largely static supply would mean a worsening of the unmet demand situation. Redesigned mobile blackspot programs will be needed to ameliorate this growing supply-demand gap.

Fixed access

Current situation - fixed access for Wimmera Southern Mallee primary production areas is predominantly NBN satellite, with some NBN (and carrier) fixed wireless near towns.

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

Narrowband IoT

Current situation - Narrowband IoT coverage is good relative to demand across most Wimmera Southern Mallee primary production areas, with substantial coverage by at least one network operator.

Looking forward 3-5 years - demand for such coverage is expected to grow strongly, as is supply, with the supply-demand balance unclear. There may be a valid role for government market stimulation where more acute supply shortfalls become apparent. Mobile coverage has the potential in primary production areas and small towns to provide all access needs (particularly 5G coverage), contributing significantly to socioeconomic outcomes by providing universal access.

Priority recommendations

The Wimmera Southern Mallee Region high-level priority recommendations for primary production areas include:

1. Local governments and the Regional Partnership works with the Victorian Government to prioritise action for each of the access technologies based on business cases to determine which actions provide the greatest benefits

2. The Victorian Government identifies the best channels to educate those in sparsely populated locations that require high quality, high bandwidth blanket coverage solutions, but for which are unlikely to be viable due to cost constraints and seek to identify and resolve the best served bespoke solutions – including examining the scope for mobile networks to support high and low bandwidth data and voice access in thin markets with appropriate subsidies

3. Local governments and regional businesses consider leveraging available government assets for cost-effective bespoke solutions

4. Use the State Level Information Management (SLIM) database to conduct more detailed analysis of unmet needs and possible solutions

5. Advocate for the implementation of better resourcing in existing hubs and libraries that can address fixed broadband for household and business customers in NBN fixed wireless and satellite areas.

Specific priority recommendations 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 and discussions with mobile service providers on more immediate localised solutions through antennae directional tuning, low-cost small cell towers and other bespoke work-arounds

2. The Victorian Government advocates 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

3. The Victorian Government commits 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 locations

5. The Victorian Government examines the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G in high demand areas.

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 access services

2. The Victorian Government encourages 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 advocates 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 makes submissions to the current ACCC Domestic Transmission Capacity Services (DTCS) inquiry in relation to backhaul routes where its market insights indicate regional users are adversely impacted by high backhaul pricing

5. The Victorian Government advocates for the immediate introduction of NBN business grade services with symmetric high bandwidth options and robust service level agreements (SLAs), including expeditious release of the Sky Muster Plus service announced in November 2018 which will allow speed bursts above 25Mbps and extend unmetered data to a range of standard internet use cases such as web browsing, online banking and software updates.

IoT access

1. The Regional Partnership works closely with business, local governments, agencies and the Victorian Government to coordinate with all mobile operators on their plans for mobile-supported Cat-M1 and narrowband IoT deployment across the WSM. This will be supported by the region's 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 working closely with business, local governments, agencies and the Victorian Government to coordinate discussion with LP-WAN network operators on their plans for network deployment across the WSM, including what information they can provide and actions they can take to assist the network operators in their deliberations

3. The Victorian Government to include IoT support as a decision criterion in its mobile blackspot initiatives, and advocate the Commonwealth to do the same in its future blackspot programs

4. The Victorian Government considers 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, orange an intermediate supply shortfall and green where current supply meets or exceeds demand. ***Note the light green shading for mobile access denotes reservations, based on local mobile access experience, about the good coverage indicated by public coverage maps.***

Table 6 Tourist locations: current unmet needs

Type	Location	LGA	User Type	Access Mobile* Supply / Demand	Fixed Supply / Demand
Permanent	Grampians National Park	Northern Grampians	Operator	L/H	L/H
			Visitor	L/H	n.a.
	Wyperfeld National Park	Hindmarsh	Operator	L/H	L/H
			Visitor	L/H	n.a.
	Little Desert National Park	West Wimmera	Operator	M/H	L/H
			Visitor	M/H	n.a.
	Mount Arapiles National Park	Horsham	Operator	H/H	L/H
			Visitor	H/H	n.a.
	Halls Gap	Northern Grampians	Operator	H/H	L/H
			Visitor	H/H	n.a.
	Mackenzie Falls	Northern Grampians	Operator	L/H	L/H
			Visitor	L/H	n.a.
	Beehive Falls	Northern Grampians	Operator	H/H	L/H
			Visitor	H/H	n.a.
	Lake Charlegrark	West Wimmera	Operator	M/H	L/H
			Visitor	M/H	n.a.
	Grampians Peaks Trail	Northern Grampians	Operator	M/H	L/H
			Visitor	M/H	n.a.
	Silo Art Trail	Yarriambiack	Operator	M/H	L/H
			Visitor	M/H	n.a.
Events	Great Western Rodeo	West Wimmera	Operator	H/H	L/H
			Visitor	H/H	n.a.
	Patchewollock Music Festival	Yarriambiack	Operator	M/H	L/H
			Visitor	M/H	n.a.
	Horsham Fishing Competition	Horsham	Operator	H/H	M/H
			Visitor	H/H	n.a.
	Nati Frinj	Horsham	Operator	H/H	L/H
			Visitor	H/H	n.a.
	Horsham Agricultural Show	Horsham	Operator	H/H	M/H
			Visitor	H/H	n.a.
	The West Wimmera Cup	West Wimmera	Operator	H/H	L/H
			Visitor	H/H	n.a.
	YFest at Warracknabeal	Yarriambiack	Operator	H/H	H/H
			Visitor	H/H	n.a

Legend **Red** - Major supply shortfall | **Orange** - 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 consideration of mobile and fixed access technologies is relevant. Mobile access to support both visitors and local tourism businesses and fixed access to enable tourism businesses to provide WiFi services and support the day-to-day conduct of the business. Two types of tourist locations are considered, permanent tourist attractions and periodic events such as an annual music festival.

Present situation: Mobile coverage and fixed access of the tourist locations considered is generally meeting demand for sites in or near significant population centres, with only the more remote tourist destinations seriously under-served.

In 3-5 years: Mobile coverage demand will grow as ready mobile connectivity becomes the mandatory norm for any event or permanent attraction – including coverage on surrounding roads. Demand for high bandwidth fixed or next generation mobile 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.

Priority recommendations

The Wimmera Southern Mallee region high level priority recommendations supporting tourism include:

1. Local governments and the Regional Partnership prioritise action for each of the access technologies based on business cases to determine which actions provide the greatest benefits

2. The Victorian Government educates, informs and promotes through existing and trusted Regional Tourism Boards to site operators 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 (or possible relocation)

3. Local governments and regional businesses consider leveraging available government assets for cost-effective bespoke solutions

4. Use the State Level Information Management (SLIM) database to conduct more detailed analysis of unmet needs and possible solutions.

Specific priority recommendations include:

Mobile access

1. Local government agencies equip their service vehicles with mobile coverage monitoring tools to build a strong ground-up evidence base on specific gaps in coverage relevant to tourism requirements – to inform future blackspot programs and discussions with mobile service providers on more immediate localised solutions through antennae directional tuning, low-cost small cell towers and other bespoke work-arounds

2. The Victorian Government advocates 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

3. The Victorian Government commits 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 hot-spots

5. The Victorian Government examines the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G in high demand tourist areas
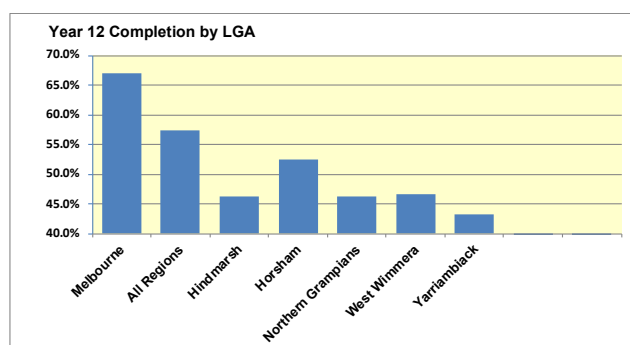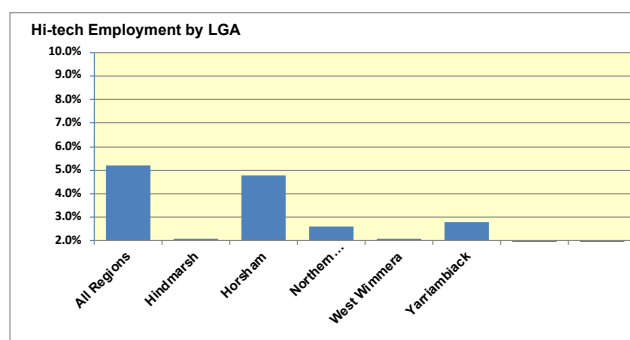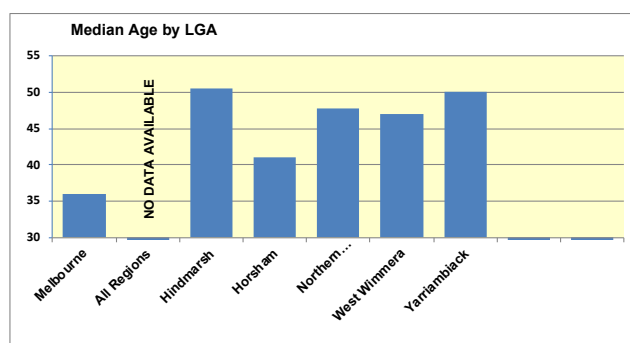
6. Local governments and the Regional Partnership should compile a list of significant regional events where capacity problems exist and tender for one mobile operator to provide a region-wide multi-carrier mobile solution.

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 service

2. The Victorian Government encourages 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.

Transport Corridors Analysis

Digital supply-demand balance for selected transport corridors is shown in Table 7, red shading indicating major supply shortfall relative to demand, orange an intermediate supply shortfall and green where current supply meets or exceeds demand. ***Note the light green shading for mobile access denotes reservations, based on local mobile access experience, about the good coverage indicated by public coverage maps.***

Here only mobile access is relevant.

Table 7 Transport corridors: current unmet needs

Road Class	ID	Name	From near	To near	Commentary	Mobile* Supply / Demand
A/B	A200	Henty Highway	Cherrypool	Horsham	Patchy 4G coverage interspersed with 3G coverage by at least two carriers	L/H
	B200	Henty Highway	Horsham	Lascelles	Patchy 4G coverage interspersed with 3G coverage by at least one carrier	L/H
	B210	Stawell-Warracknabeal Road	Warracknabeal	Stawell	4G coverage by two carriers	L/H
	B220	Sunraysia Highway	Redbank	Cope Cope	3G coverage by two carriers	L/H
	A8	Western Highway	Armstrong	Servicetown	Continuous 4G coverage by at least two carriers	H/H
	B240	Wimmera Highway	Aspley	Logan	Continuous 4G coverage by at least one carrier	M/H
C	All	28 roads			Some 4G coverage, 3G coverage from at least two carriers	L/H
Rail					No passenger rail in the region	n/a

Legend **Red** - Major supply shortfall | **Orange** - 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 limited analysis of mobile coverage supply and demand on major and more minor roads in Wimmera Southern Mallee conducted to demonstrate the place-and-sector approach for transport corridors and note any preliminary patterns.

Commentary

The pattern from the indicative sample of major and minor roads is that there is good mobile coverage on major (class A) thoroughfares, with less robust 4G service on intermediate (class B) roads. Coverage of the numerous minor highways (class C roads) indicates poor coverage along the routes.

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

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

Priority recommendations

The Wimmera Southern Mallee Region priority recommendations for road coverage 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 and discussions with mobile service providers on more immediate localised solutions through antennae directional tuning, low-cost small cell towers and other bespoke work-arounds

2. The Victorian Government advocates 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

3. The Victorian Government commits 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 locations

5. The Victorian Government examine the effectiveness of market enhancement models aimed at stimulating the early rollout of 5G in high demand areas.

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1 Wimmera Southern Mallee General Characteristics

1.1 The land and the people

Key features of Wimmera Southern Mallee region are:

- Located in the north-west of the state, adjoining the Great South Coast, Mallee, Loddon Campaspe and Central Highlands regions
- Remote – Horsham 300 kilometres from Melbourne
- Approximately 34,000 square kilometres (relatively large)
- Population 48,000 (2017) – average population density one resident per square kilometre (very low for regional Victoria)
- Five local government areas (LGAs) – Horsham (population 20,000), Hindmarsh (6,000), Northern Grampians (11,000), West Wimmera (4,000) and Yarriambiack (7,000)
- Main cities and towns: Horsham (16,000, one third of the region's population), Stawell (6,000), Warracknabeal (2,000), St Arnaud (2,000) – typical region structure of major hub and smaller nodes
- Low LGA diversity apart from Horsham – size, population, density and land use – unusual for regional Victoria.

1.2 The community

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

- Age: 28% of population <25 years, 49% 25-64, 24% 65+ – older than average (30:50:20 average)
- Education: 31% of the population have post-secondary qualifications – lower than regional average (34%)
- Income: average income for workers $38,000 – lower than regional Victoria average of $40,000
- Unemployment: 4.9% total, 9.6% youth – lower than regional average (5.9% total, 11.5% youth)
- Overall socio-economic disadvantage: second most disadvantaged region on ABS SEIFA score[14].

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

Median Age by LGA

Hi-tech Employment by LGA

Year 12 Completion by LGA

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

Home Internet Access by LGA
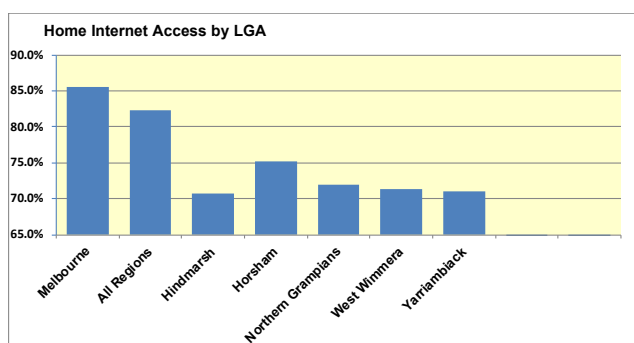
Figure 6 Comparisons of Wimmera Southern Mallee indicators of digital infrastructure demand

Notably, all LGAs are reasonably similar on these characteristics except Horsham which has a younger, more highly educated population with higher home internet access and greater high-tech employment.

1.3 The economy

Gross Regional Product (GRP) (2017) for the region is $2.5 billion (the smallest of the nine regions), with substantial decline over the past 10 years (-20%) compared to 2.6% growth for total regional Victoria. International exports are valued at $0.3 billion (2017), with export-intensity (exports relative to GRP) close to the regional Victoria average.

Eight industries make up three quarters of Wimmera Southern Mallee employment:

- Health/social care (17% of jobs), education & training (7%), construction (7%)
- Tourism (7%), manufacturing (6%), public administration & safety (6%), retail trade (10%)
- Agriculture/forestry (17%).

Employment across occupational categories is as follows:

- Professional (15% of residents), technical & trades (13%), managers (22%)
- Clerical & administration (10%), community & personal services (12%)
- Labourers (14%), Sales (9%), machine operators & drivers (6%).

1.4 Structural change

Employment in three industries of the top eight (health, education and tourism) has grown strongly over the past 10 years and is forecast to continue to do so. Employment in agriculture/forestry and manufacturing has fallen and is forecast (nationally) to continue to contract or grow only slowly over the next 5 years. This suggests the more important industries to embrace digital opportunities are health, education and tourism. It is critical these sectors step up to a higher level of digital intensity over the next five years to ensure best practice efficiency and competitiveness, as indicated in the table below.

However, a somewhat different picture emerges when GRP contribution is considered. From this perspective agriculture and manufacturing are amongst the leading sectors, suggesting these industries also warrant particular attention to their digital enablement – agriculture in particular needs to shift from its current low to high digital intensity over the next five years to be competitive in Australia and internationally.

1.5 Digital intensity – now and in 3-5 years

Table 8 Comparison of current and future digital intensity requirements of the main Wimmera Southern Mallee industries based on employment[15]

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

Legend:

🟥	Low	🟨	Medium	🟩	High

1.6 General characteristics informing digital planning

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

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

2 Regional Supply Overview

2.1 Fixed broadband

Coverage by Land Area

The map following shows NBN coverage of the Wimmera Southern Mallee region, with the LGA boundaries marked.

Areas served with FTTP, FTTC and FTTN represent less than 2 per cent 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.
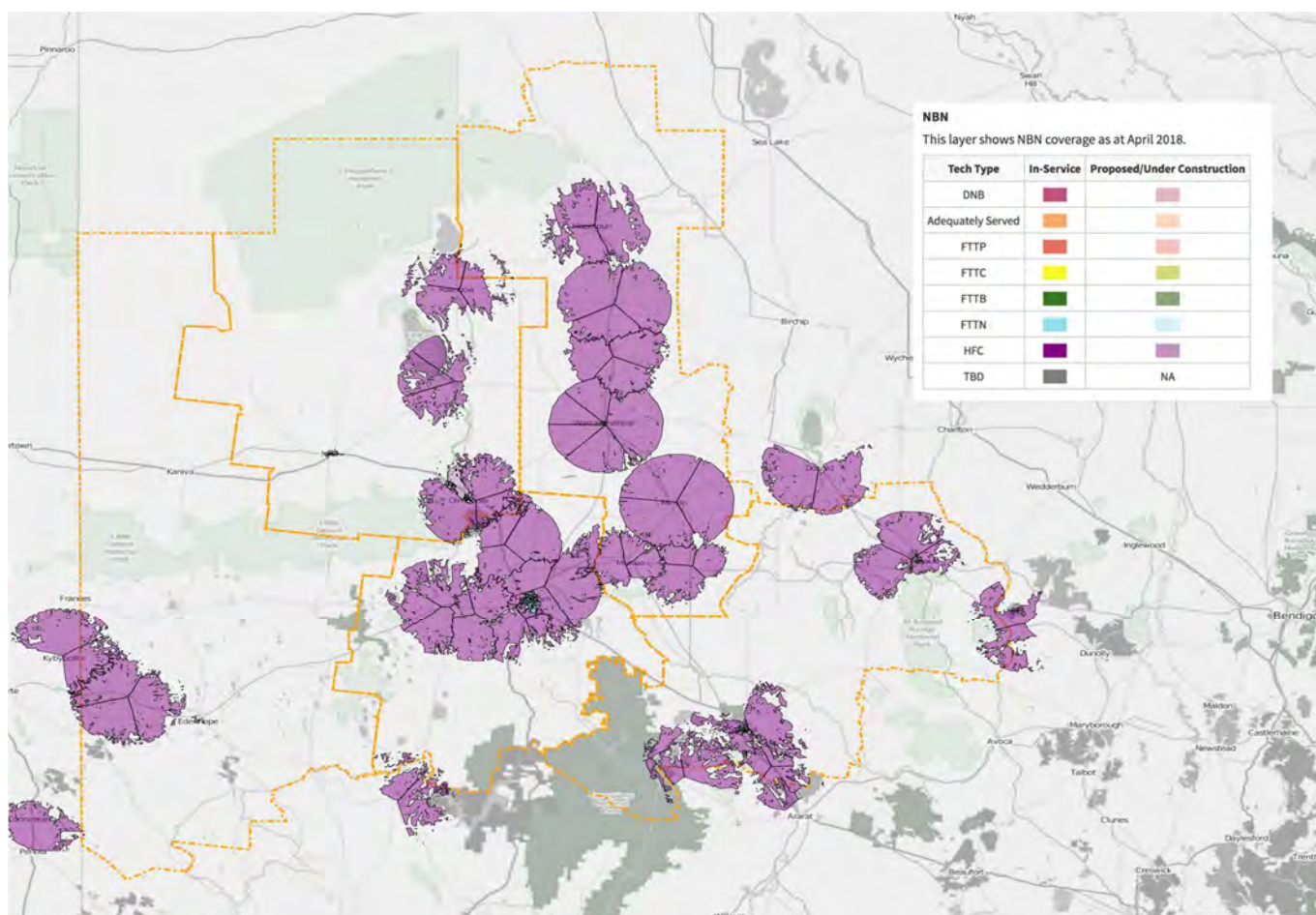
Figure 7 An Overview of NBN Technology Coverage of the Wimmera Southern Mallee Region (SLIM)

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.

		NBN Technology (% Area)	
LGA	Area (km²)	FW	SAT
Hindmarsh	7,527	7%	93%
Horsham	4,273	25%	74%
N Grampians	5,734	10%	89%
W Wimmera	9,098	2%	98%
Yarriambiack	7,320	33%	67%
Region (km²)	33,952	4,734	29,180

Coverage of Businesses

Across the region there are 5,882 businesses registered with Workcover. The NBN technology that currently serves (or is destined to serve) these businesses is shown in the chart below.
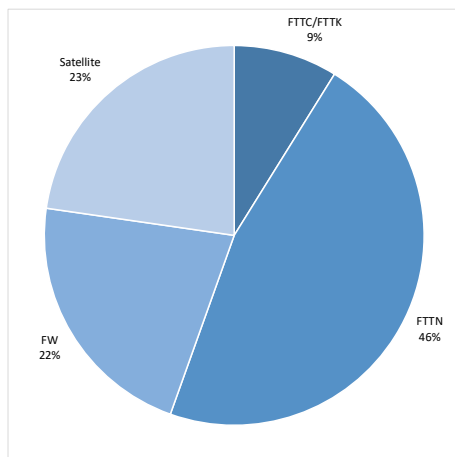
Figure 8 Businesses served by different NBN technologies

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

		Approximate Coverage (%)				
LGA	No. Bus.	FTTP	FTTB FTTC	FTTN	FW	SAT
Hindmarsh	223	0%	13%	38%	17%	32%
Horsham	900	0%	0%	81%	11%	8%
N Grampians	490	0%	21%	30%	27%	22%
W Wimmera	216	0%	4%	18%	3%	76%
Yarriambiack	315	0%	16%	0%	61%	22%
Region (no.)	2,144	-	190	999	468	487

Coverage of Dwellings

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

At an overview level, the following table summarises coverage by technology type for GNAF[16] addresses *(see important qualification in footnote)* that lie within residential-zoned areas.
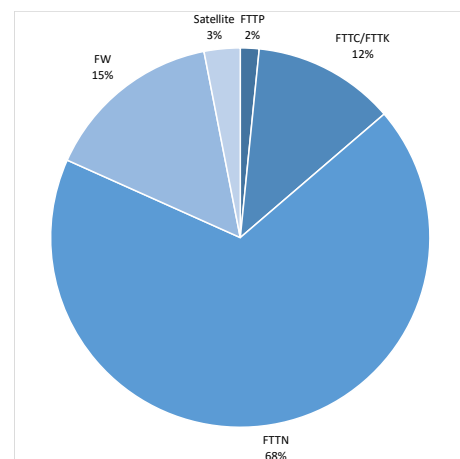
Figure 9 GNAF addresses served by different NBN technologies

		Approximate Coverage (%)				
LGA	No. Res.	FTTP	FTTB FTTC	FTTN	FW	SAT
Hindmarsh	1,957	2%	24%	66%	0%	7%
Horsham	8,996	3%	0%	89%	7%	1%
N Grampians	5,681	0%	21%	50%	23%	6%
W Wimmera	18	0%	0%	0%	0%	100%
Yarriambiack	1,424	0%	36%	9%	55%	0%
Region (no.)	18,076	289	2,190	12,288	2,754	555

Whilst NBN Co's satellite solution is intended to service the most remote 3 per cent of the population, a higher proportion will be reliant on it in Hindmarsh, Northern Grampians and West Wimmera LGAs.

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

2.2 Mobile coverage

Public Coverage Maps

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

In the interim, only very high-level perspectives can be obtained from the public coverage maps provided by each of the three established mobile network operators.
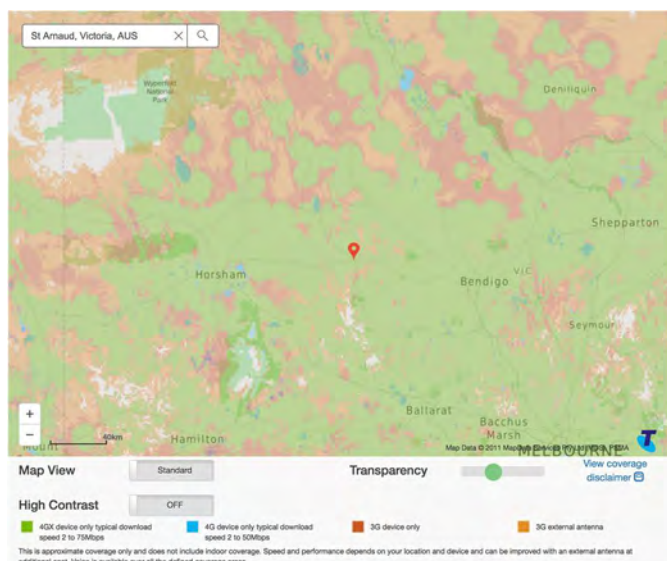
Figure 10 Telstra Public Coverage Map of Wimmera Southern Mallee Region

Telstra's public coverage map indicates good coverage with:

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

By simple visual examination of this map, Telstra appears to support coverage over at least 90 per cent of the region.

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

- purple indicates 4G Plus coverage
- blue indicates 3G coverage
- yellow indicates 3G coverage with an external antenna.

By simple visual examination of this map, Optus appears to offer coverage of at least 90 per cent of the landmass, comparable to Telstra.
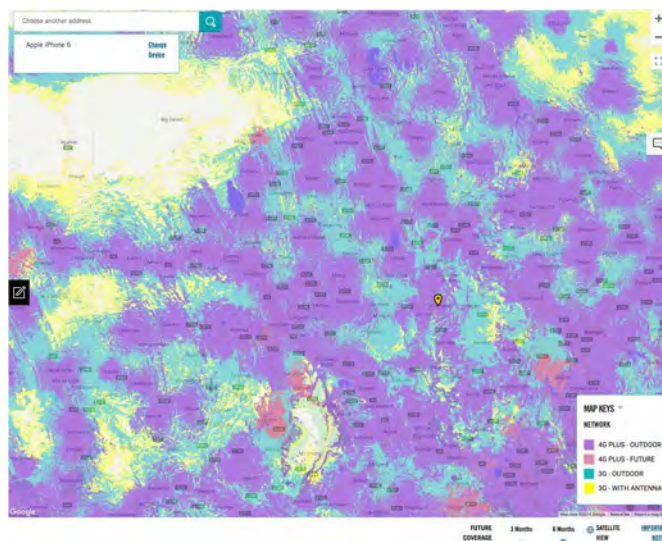
Figure 11 Optus Public Coverage Map of Wimmera Southern Mallee Region

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 with 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.
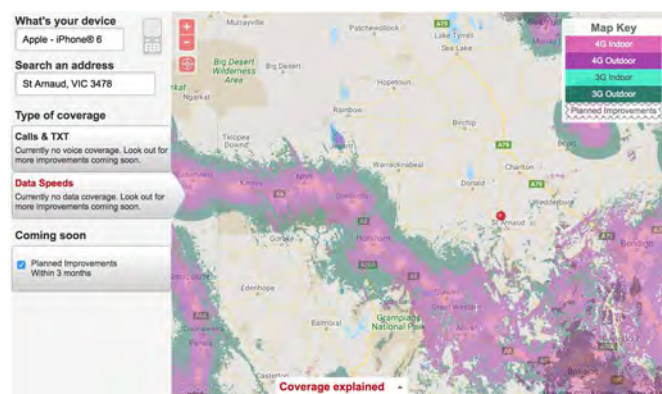
Figure 12 Vodafone Public Coverage Map of Wimmera Southern Mallee Region

In interpreting the map:

- light purple indicates 4G indoor coverage
- dark purple indicates 4G outdoor coverage
- light green indicates indoor 3G coverage
- dark green indicates outdoor 3G coverage

- shaded areas indicate where coverage enhancements are due to take place in the near future.

Based on the maps, Vodafone's coverage is not as extensive as that of Telstra and Optus but appears to include good coverage of the major roads and some population centres.

Crowd-sourced Coverage Information

In practice, the public coverage maps provided by the carriers do not always accord with end-user experience, a fundamental issue being that they are based on outdoor connectivity. A range of applications have been developed to capture users' real-world experiences and integrate these into databases.

An example is the OpenSignal[17] application and database, and a sample of the maps produced from these sources (in this case, in the area of Ararat) is provided below. These applications can provide useful insights into (especially) transport mobile blackspots – but are less useful in assessing wide area coverage because of the difficulties of testing everywhere.
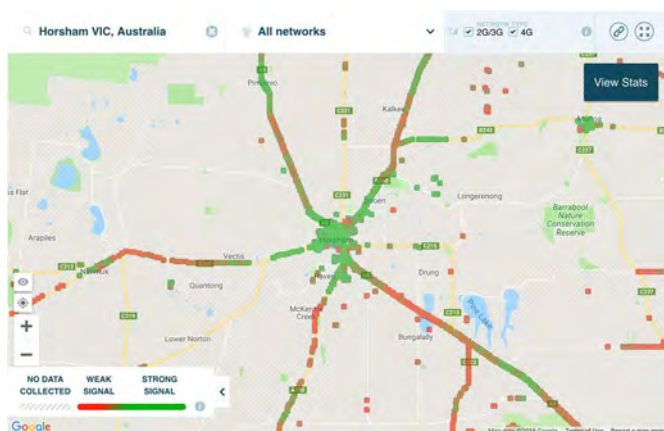
Figure 13 OpenSignal Mapping of Coverage around Horsham

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).

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

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

Mobile coverage is discussed in the analysis that is provided in **Section 3** for cities, towns and smaller localities in the region. *In all cases*, the outlook five 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 off the state and in Gippsland. Coverage that extends to any area 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 carriers access to its copper network.

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 not 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. However, the percentage in Victoria is significantly

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

higher – estimated at around 75 per cent - because of comparatively high population densities.

It is not realistic to expect 100 per cent 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 well-being
- supporting IoT applications
- as a supplement (or alternative) to a fixed broadband service, especially in areas served only by NBN Co's satellite service.

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

The challenges for the MNOs are understandable. If investment in extending coverage to an area does not generate enough 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 operator that they have chosen does not offer coverage relevant to their location and transport patterns.

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

2.3 LP-WAN coverage

General Notes

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

The original providers of LP-WAN technology coverage are:

- NNNCo, with LoRaWAN technology; LoRa is a two-way protocol – at the point of developing this plan, no information about coverage was 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 on 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 applications.

Sigfox

Sigfox publishes a global coverage map[18]. The diagram below shows coverage in the Wimmera Southern Mallee 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.
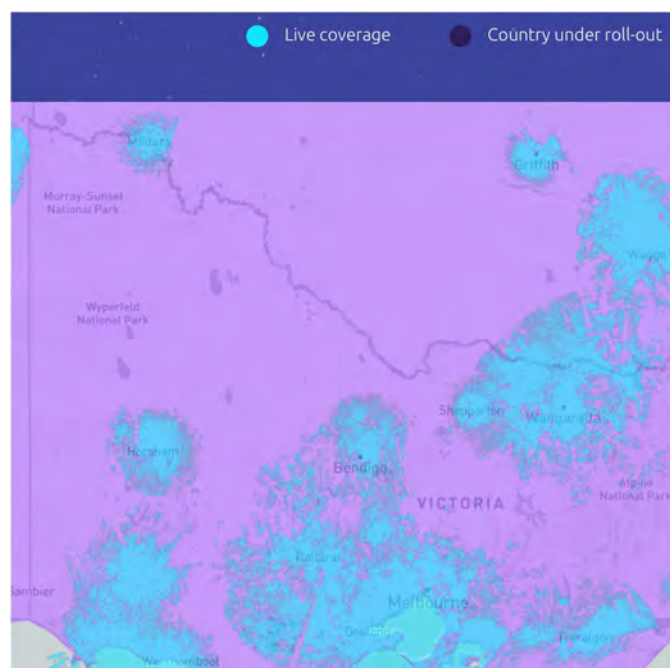
Figure 14 Sigfox Coverage of Wimmera Southern Mallee Region (sigfox.com)

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

Taggle

Taggle has provided indicative coverage maps for inclusion in the SLIM GIS, but they do not reflect any topographic occlusions that may affect communications at the margins. Nominal coverage is as shown in orange in the diagram that follows – field testing to confirm communications towards the fringes of coverage areas would be prudent as additional base stations may need to be deployed to assure good connectivity.
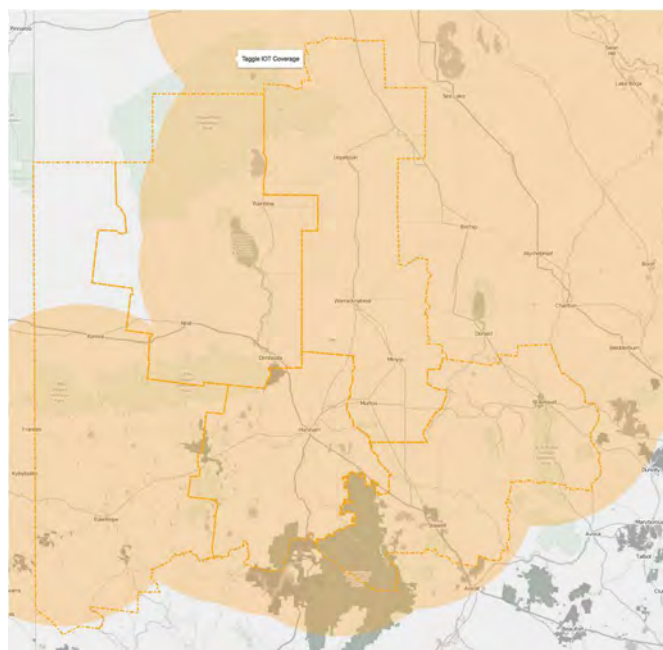
Figure 15 Taggle Coverage of the Wimmera Southern Mallee Region (SLIM)

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.

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

2.5 SLIM analysis

Whilst the broad perspectives offered in this report are based on information from the SLIM data tool, SLIM is at its most powerful for detailed analysis of particular areas. Stakeholders are encouraged to build familiarity with the system if it is made 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 11 places selected for analysis in this section include all cities (population[19] > 10,000), all towns (population > 1,000) and the largest locality (population <1,000) in each LGA that makes up the region.

In combination, the 11 places accommodate 65.9% of the region's total population of 47,548. 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 eight localities with populations of between 185 and 1,000 - in combination representing another 3,005 (6.3%) of the population in the region.

The balance of the region's population (27.8%) 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[20], this equates to an estimated 5,087 households outside of the places considered in the following subsections.

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

3.1 City of Horsham

Horsham is located on a bend of the Wimmera River approximately 300 kilometres north-west of Melbourne. It grew throughout the latter 19th and early 20th centuries as a centre of Western Victoria's wheat and wool industry, becoming the largest city in the Wimmera and Western Victoria by the early 1910s.

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

- The population of Horsham grew by 10.6% over a decade to 15,627 in 2016, the second highest growth rate after Halls Gap for the places analysed

- 7,418 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 54.6% being in full-time employment and 34.2% in part-time employment (the remainder were 'away from work' at the time of the census)
- 12.6% of the labour force classified themselves as managers, 18.6% as professionals and 12.1% as clerical and administrative workers
- 8.0% of the labour force cited their industry of employment as hospitals
- One public hospital is in Horsham
- The city has five primary schools, a special development school, a primary/secondary school, two secondary colleges and a campus of Federation University
- With a median age of 41, Horsham has one of the youngest populations in the region, but older than the Victorian median of 37
- The ABS report a median annual household income of $56.7K for Horsham, one of the highest in the region, well above the median of $45.1K for places analysed in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with WorkCover indicates approximately 736 businesses in the city or its near surrounds
- In 74.2% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 21.3% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 19.0% have completed level III or IV trade certificates
- another 11.5% have completed year 12.

ABS Industry employment data from 2016 indicated that the Horsham LGA had 4.8% employment in the

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[19] All population figures cited in this report are based on the 2016 Population Census, published by the Australian Bureau of Statistics.

[20] Much of the data for locations and larger areas is sourced from the ABS Quickstats site (see

http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/2?opendocument).

industry sectors with strong technology exposure, the highest of the five LGAs in the region.

Fixed Broadband

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

Our analysis reveals that Horsham is largely serviced by NBN FTTN with small pockets of FTTP and fixed wireless in areas surrounding the city.
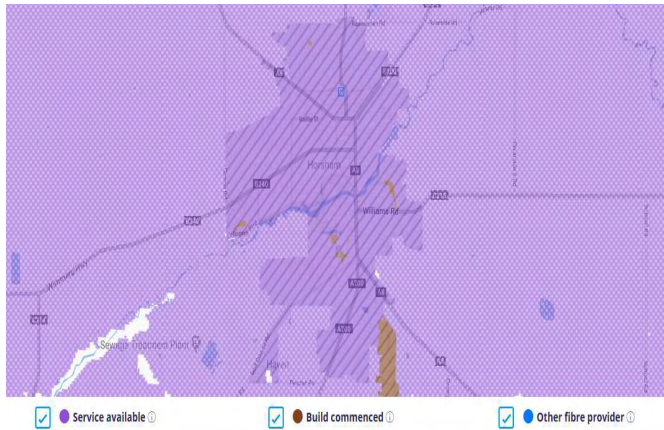
Figure 16 NBN Coverage of Horsham (NBN Co)

Examining a satellite map of the same area shows premises north-east of Horsham (along Peppertree Lane, Pryors Road and Dooen Road) that fall outside the FTTN area being serviced by fixed wireless.
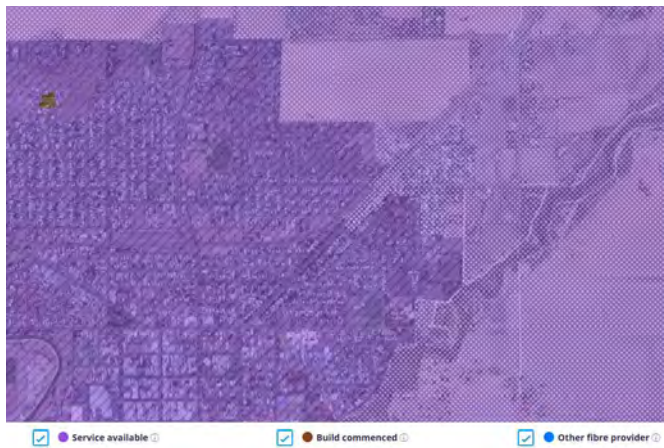
Figure 17 Aerial imagery showing NBN fixed line and fixed wireless areas in north-east Horsham (NBN Co)

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

There is extensive Sigfox and Taggle coverage in Horsham.

Public WiFi Coverage

Horsham Rural City Council installed free public WiFi in the Horsham CBD in 2014, with free availability in Firebrace Street, Roberts Place, Roberts Avenue bus terminal, O'Callaghan Parade Visitor Information Centre and May Park. The council has also stated it intends to extend the roll-out of free WiFi in the CBD as part its CBD Revitalisation Strategy to support tourism, marketing and business growth objectives.

Free WiFi access is available at the Horsham Library during library hours (five-and-a-half days a week).

Other networks

VicTrack does not operate in Horsham.

220kV Power has network in Horsham via the Horsham to Waubra Terminal, the Red Cliffs to Horsham Terminal and the Horsham to Stawell Terminal (see picture below).
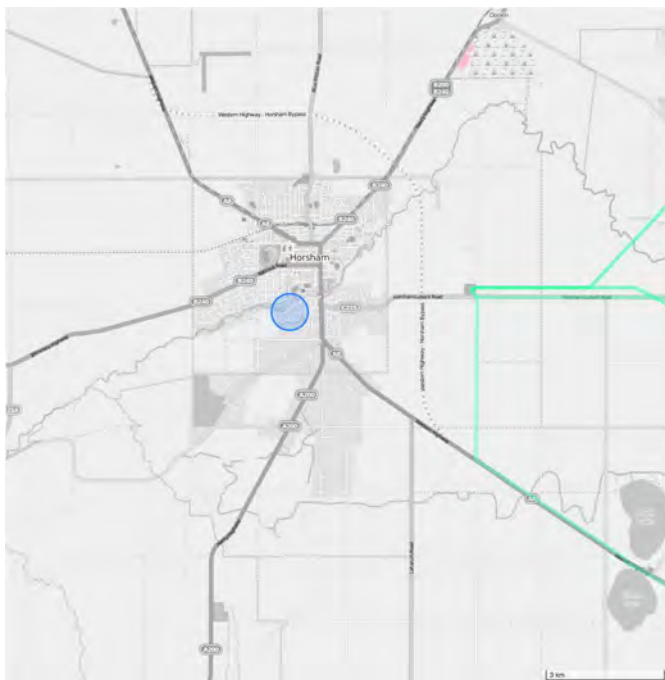
Figure 18 Power transmission network near Horsham

3.2 Town of Stawell

Stawell was founded in 1853 during the Victorian gold rush and is one of few towns in Victoria retaining an active gold mining industry. Stawell is famed for the Stawell Gift sprinting competition.

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

- The population of Stawell declined by 6.1% over a decade to 5,520 in 2016
- 2,315 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 55.2% being in full-time employment and 32.2% in part-time employment
- 10.6% of the labour force classified themselves as managers, 11.7% as professionals and 9.0% as clerical and administrative workers
- 5.7% of the labour force cited their industry of employment as hospitals and 4.1% cited local government administration
- One public hospital is in the town
- The town has three primary schools, a special development school and a secondary college
- With a median age of 47, Stawell is above the Victorian median of 37, and just below the median of 49 for places analysed in the region

- The ABS report a median annual household income of $47.4K for Stawell, around the median of $45.1K for places analysed in the region and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 235 businesses in the town or its near surrounds
- In 70.0% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 14.9% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 17.5% have completed level III or IV trade certificates
- another 11.5% have completed year 12.

ABS Industry employment data from 2016 indicated that the Northern Grampians LGA had 2.6% employment in the industry sectors with strong technology exposure.

Fixed Broadband

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

Premises in Stawell, except those being serviced by fixed wireless, are yet to receive NBN services as FTTN and FTTC are in construction or planned.

Our analysis reveals that Stawell will be largely serviced by NBN FTTN and FTTC, with fixed wireless in areas surrounding the town.
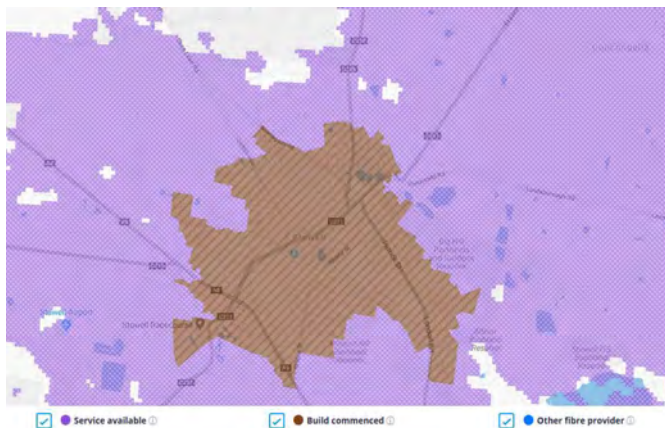
Figure 19 NBN Coverage of Stawell (NBN Co)

Examining a satellite map of the same area shows that most of the premises in the township fall within the proposed FTTN or FTTC area.

Figure 20 Aerial imagery showing NBN fixed line and fixed wireless areas in Stawell (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

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

LP-WAN Coverage

There is extensive Taggle coverage in Stawell.

Sigfox does not have coverage in Stawell.

Public WiFi Coverage

Stawell businesses leverage the Northern Grampians Shire Council's free public WiFi service with free WiFi available in a number of cafes, bakeries and other businesses in the Central Business District.

Launched in 2014, the service is offered by the Northern Grampians Shire Council at no charge to participating businesses and is password protected.

Other networks

VicTrack does not operate in Stawell.

220kV Power has network in Stawell via the Horsham to Waubra Terminal (approximately 11 kilometres north-east from the centre of Stawell) and via the Horsham to Stawell Terminal (see picture below).
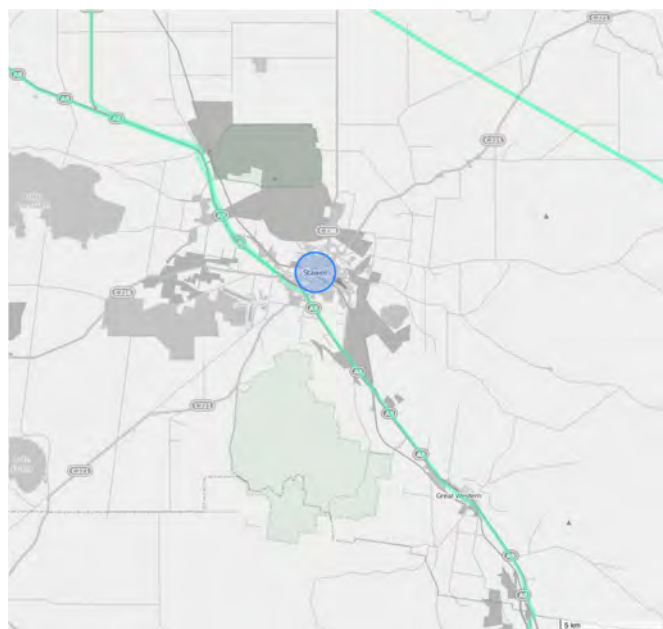
Figure 21 Power transmission network around Stawell

3.3 Town of Warracknabeal

Warracknabeal is situated on the banks of the Yarriambiack Creek, 330 kilometres north-west of Melbourne. It is the business and services centre of the northern Wimmera and southern Mallee districts, and hosts local government offices of the Shire of Yarriambiack.

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

- The population of Warracknabeal declined by 7.0% over a decade to 2,316 in 2016
- 890 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 53.1% being in full-time employment and 34.9% in part-time employment
- 13.9% of the labour force classified themselves as managers, 15.1% as professionals and 10.8% as clerical and administrative workers
- 14.7% of the labour force cited their industry of employment as hospitals and 5.0% cited local government administration
- One public hospital is located in the town
- The town has two primary schools, a special development school and a secondary school
- With a median age of 49, Warracknabeal is older than the Victorian median of 37, but equal to the median of 49 for the places analysed in the region
- The ABS report a median annual household income of $43.8K for Warracknabeal, just below the median of $45.1K for places analysed in the region and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 104 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:

- 14.3% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 18.4% have completed level III or IV trade certificates
- another 10.0% have completed year 12.

ABS Industry employment data from 2016 indicated that the Yarriambiack LGA had 2.8% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Warracknabeal as advised by NBN Co in September 2018. The purple/stripedareas show the locations currently serviced by NBN fixed line services (if any), the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite (if any). The brown/striped

areas show the locations where NBN fixed line services are planned or under construction (if any).

Premises in Warracknabeal, except those being serviced by fixed wireless, are yet to receive NBN services as FTTC and FTTN are in construction or being planned.

Our analysis reveals that Warracknabeal will be largely serviced by NBN FTTC and FTTN (there is a small pocket of FTTN in south east Warracknabeal along Arnold and Milbourne Streets) with fixed wireless in areas surrounding the town. 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 if they are within either the FTTN or fixed wireless areas.
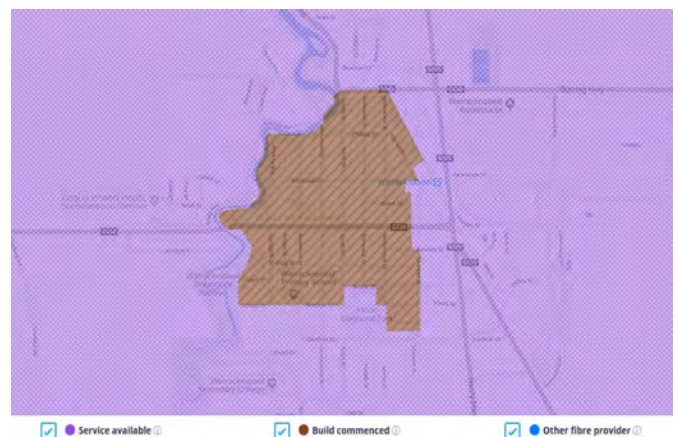
Figure 22 NBN Coverage of Warracknabeal (NBN Co)

Examining a satellite map of the same area shows that a considerable number of premises on the town fringes are to be serviced by fixed wireless as they fall outside of the NBN fixed line areas.

Figure 23 Aerial imagery showing NBN fixed line and fixed wireless areas in Warracknabeal (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

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

LP-WAN Coverage

There is extensive Taggle and Optus agricultural IoT coverage in Warracknabeal.

Sigfox is not currently available in Warracknabeal.

Public WiFi Coverage

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

Other networks

220kV Power has network accessible in Warracknabeal via the Red Cliffs Terminal to Horsham Terminal approximately six kilometres west of the town centre.
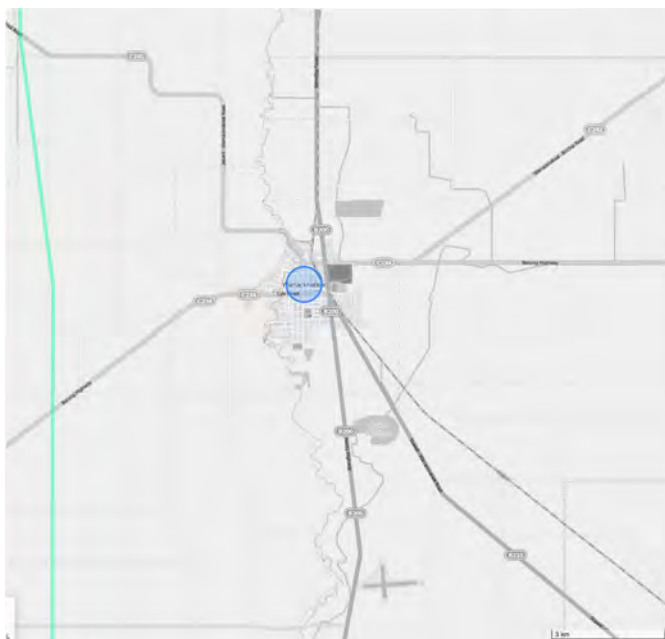
Figure 24 Power transmission network near Warracknabeal

3.4 Town of St Arnaud

St Arnaud is located 244 kilometres north-west of Melbourne in the Shire of Northern Grampians. It is a former gold mining town settled in the 1850s. The town features many well-preserved historic buildings which line the main thoroughfare of Napier Street.

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

- The population of St Arnaud declined by 10.5% over a decade to 2,033 in 2016, one of the highest population declines among the larger towns in the region
- 857 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 50.4% being in full-time employment and 35.4% in part-time employment
- 16.3% of the labour force classified themselves as managers, 12.4% as professionals and 8.4% as clerical and administrative workers
- 8.1% of the labour force cited their industry of employment as hospitals and a further 4.2% cited aged care residential
- One public hospital is located in the town
- The town has two primary schools and one secondary school
- With a median age of 52, St Arnaud is above the Victorian median of 37 and just above the median of 49 for the larger places in the region
- The ABS report a median annual household income of $42.0K for St Arnaud, one of the lowest in the region, below the average of $45.1K for places analysed and almost half Melbourne's $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 97 businesses in the town or its near surrounds
- In 66.2% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 12.8% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 16.8 have completed level III or IV trade certificates
- another 11.5% have completed year 12.

ABS Industry employment data from 2016 indicated that the Northern Grampians LGA had 2.6% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in St Arnaud as advised by NBN Co in September 2018. The purple/stripedareas show the locations currently serviced by NBN fixed line services (if any), the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite (if any). The brown/striped areas show the locations where NBN fixed line services are planned or under construction (if any).

Our analysis reveals that St Arnaud is largely serviced by NBN FTTC and FTTN with fixed wireless in areas surrounding the town.
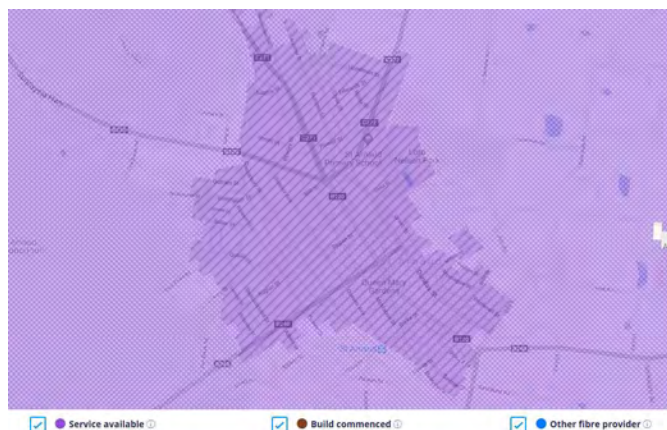
Figure 25 NBN Coverage of St Arnaud (NBN Co)

Examining a satellite map of the same area shows that most of the town's premises will fall within the fixed line area.

Figure 26 Aerial imagery showing NBN fixed line and fixed wireless areas in St Arnaud (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

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

LP-WAN Coverage

There is extensive Taggle coverage in St Arnaud.

There is limited Optus agricultural IoT coverage in St Arnaud. Testing may be needed to confirm coverage.

Sigfox is not currently available in St Arnaud.

Public WiFi Coverage

St Arnaud businesses leverage the Northern Grampians Shire Council's free public WiFi service with free WiFi available in a number of cafes, bakeries and other businesses in the Central Business District.

Launched in 2014, the service is offered by the Northern Grampians Shire Council at no charge to participating businesses and is password protected.

Other networks

St Arnaud is neither on the VicTrack or the power transmission routes.

3.5 Town of Nhill

Nhill is the administrative headquarters for the Shire of Hindmarsh and residents are mainly employed in either farming or food processing, most notably in grain and fowl.

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

- The population of Nhill declined by 8.7% over a decade to 1,749 in 2016, one of the largest population declines for the region

- 748 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 60.3% being in full-time employment and 29.8% in part-time employment
- 12.8% of the labour force classified themselves as managers, 13.4% as professionals and 10.6% as clerical and administrative workers
- 15.6% of the labour force cited their industry of employment as hospitals, and 5.9% cited local government administration
- One public hospital is located in the town
- The town has two primary schools and a primary/secondary school
- With a median age of 48, Nhill is above the Victorian median of 37 and close to the median of 49 for towns analysed in the region
- The ABS report a median annual household income of $50.0K for Nhill, one of the highest in the region, well above the average of $45.1K for places analysed but still well below Melbourne's $80.4K.
- Data in SLIM on businesses registered with WorkCover indicates approximately 83 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:

- 15.6% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 17.4% have completed level III or IV trade certificates
- another 8.9% have completed year 12.

ABS Industry employment data from 2016 indicated that the Hindmarsh LGA had 2.1% employment in the industry sectors with strong technology exposure, the equal lowest of the five LGAs in the region.

Fixed Broadband

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

Our analysis reveals that Nhill is largely serviced by NBN FTTC, FTTN and satellite in areas surrounding the town.
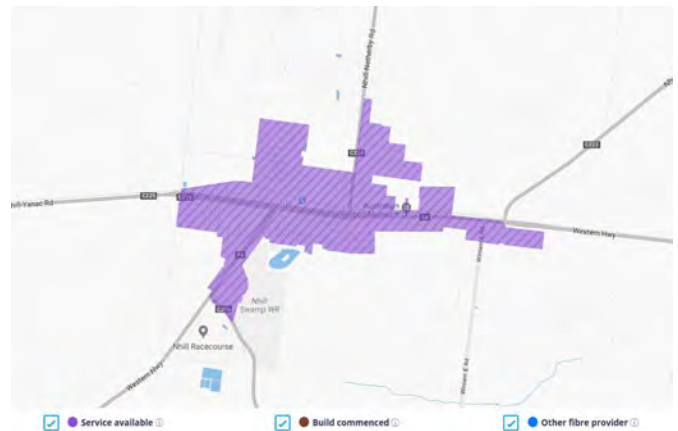
Figure 27 NBN Coverage of Nhill (NBN Co)

Examining a satellite map of the same area shows that most Nhill premises in the township fall within the fixed line areas.
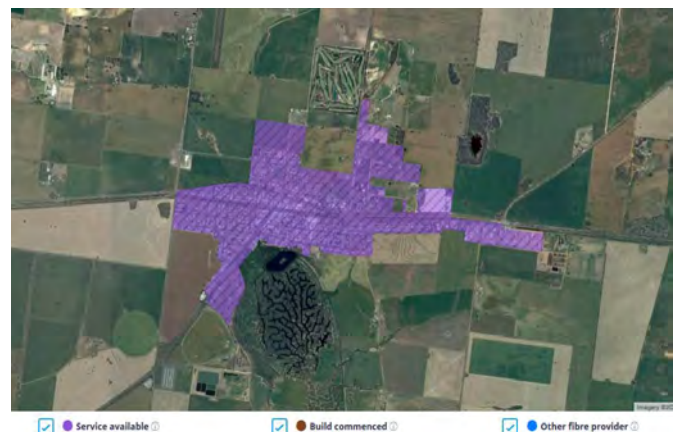
Figure 28 Aerial imagery showing NBN fixed line and satellite areas in Nhill (NBN Co)
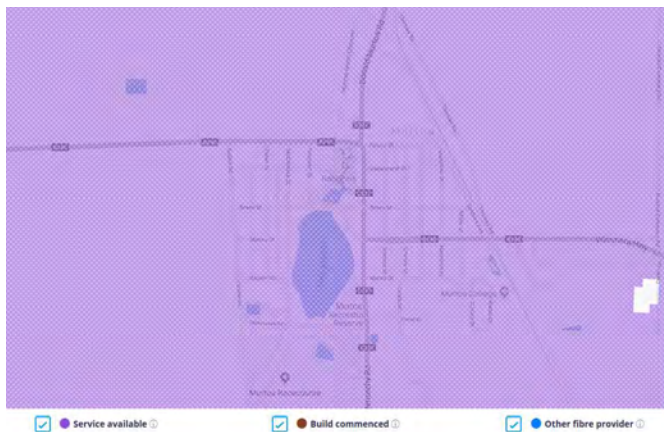
Mobile Coverage

Based on public coverage maps:

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

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

LP-WAN Coverage

There is extensive Taggle coverage in Nhill.

There is limited Optus agricultural IoT coverage in Nhill. Testing may be needed to confirm coverage.

Sigfox is not currently available in Nhill.

Public WiFi Coverage

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

Other networks

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

3.6 Town of Dimboola

Situated on the Wimmera River, Dimboola was previously known as 'Nine Creeks'. Dimboola's economy is predominantly rural, with wheat, sheep and timber being traditionally important.

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

- The population of Dimboola declined by 4.7% over a decade to 1,424 in 2016
- 485 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 55.1% being in full-time employment and 31.5% in part-time employment
- 9.7% of the labour force classified themselves as managers, 15.9% as professionals and 9.7% as clerical and administrative workers
- 10.5% of the labour force cited their industry of employment as hospitals, and 5.1% cited local government administration
- One public hospital is located in the town
- The town has two primary schools and a secondary college
- The town has a median age of 52, above the Victorian median of 37
- The ABS report a median annual household income of $44.3K for Dimboola, just below the average of $45.1K for places analysed and well below Melbourne's $80.4K

- Data in SLIM on businesses registered with Workcover indicates approximately 38 businesses in the town or its near surrounds
- In 65.6% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 15.6% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 14.7% have completed level III or IV trade certificates
- another 8.4% have completed year 12.

ABS Industry employment data from 2016 indicated that the Hindmarsh LGA had 2.1% employment in the industry sectors with strong technology exposure, the equal lowest of the five LGAs in the region.

Fixed Broadband

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

Premises in Dimboola, except those being serviced by available fixed wireless services, are yet to receive NBN services.

Our analysis reveals that Dimboola will be largely serviced by NBN FTTN with small pockets of FTTP. NBN fixed wireless services are available in areas surrounding the town.

Figure 29 NBN Coverage of Dimboola (NBN Co)

Examining a satellite map of the same area shows a considerable number of premises south-east of Dimboola (along High Street, Horsham Road and Malvern Road) that fall outside the FTTN and FTTP area being serviced by fixed wireless.

Figure 30 Aerial imagery showing NBN satellite and fixed wireless areas in Dimboola (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 town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Dimboola.

There is limited Optus agricultural IoT coverage in Dimboola. Testing may be needed to confirm coverage.

There is limited Sigfox coverage in Dimboola. Testing may be needed to confirm coverage.

Public WiFi Coverage

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

Other networks

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

3.7 Locality of Murtoa

Murtoa is a wheat district town situated around Lake Marma on the Wimmera Highway, 305 kilometres north-west of Melbourne.

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

- The population of Murtoa declined by 5.3% over a decade to 750 in 2016
- 297 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 48.5% being in full-time employment and 35.7% in part-time employment
- 14.0% of the labour force classified themselves as managers, 15.1% as professionals and 10.3% as clerical and administrative workers
- 10.4% of the labour force cited their industry of employment as hospitals, and 6.1% cited combined primary and secondary education
- The closest hospitals to Murtoa are located in Rupanyup to the east and Horsham to the south-west
- The town has a primary school and a primary/secondary school
- The town has a median age of 49, above the Victorian median of 37 and equal to the median of the places analysed in the region

- The ABS report a median annual household income of $45.3K for Murtoa, very close to the average of $45.1K for places analysed and well below Melbourne's $80.4K
- Data in SLIM on businesses registered with WorkCover indicates approximately 20 businesses in the town or its near surrounds
- In 72.3% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 16.0% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 16.0% have completed level III or IV trade certificates
- another 11.4% have completed year 12.

ABS Industry employment data from 2016 indicated that the Yarriambiack LGA had 2.8% employment in the industry sectors with strong technology exposure.

Fixed Broadband

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

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

Figure 31 NBN Coverage of Murtoa (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

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

LP-WAN Coverage

There is extensive Taggle coverage in Murtoa.

There is good Optus agricultural IoT coverage in Murtoa. Testing may be needed to confirm coverage.

There is good Sigfox coverage in Murtoa. Testing may be needed to confirm coverage.

Public WiFi Coverage

There are no known public WiFi zones in Murtoa. Free WiFi access is available at the Murtoa Library during library hours (five-and-a-half days a week). Fieldwork that is being undertaken may ascertain the availability and extent of publicly accessible WiFi options.

Other

Murtoa is not on a VicTrack route, but a power transmission network runs within 11 kilometres to the west and 12 kilometres to the south of the town.
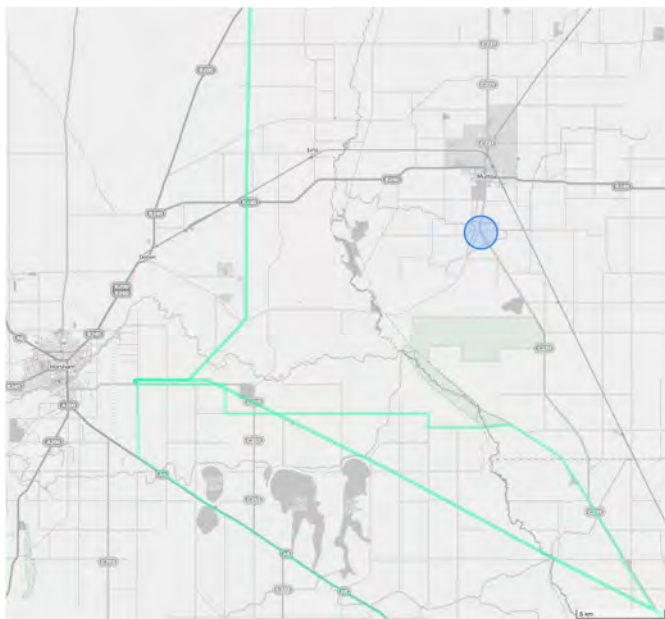
Figure 32 Power transmission network west and south of Murtoa

3.8 Locality of Edenhope

Edenhope is located on the Wimmera Highway, 30 kilometres from the South Australian border, in the Shire of West Wimmera. The town sits on the shores of Lake Wallace, which is home to abundant waterbirds, and is a popular fishing and water sports destination.

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

- The population of Edenhope declined by 11.7% over a decade to 691 in 2016, one of the largest population declines in the region
- 253 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 54.2% being in full-time employment and 29.6% in part-time employment
- 17.9% of the labour force classified themselves as managers, 16.6% as professionals and 12.2% as clerical and administrative workers
- 12.7% of the labour force cited their industry of employment as hospitals, and 11.1% cited local government administration
- One public hospital is located in the town
- The town has one primary school and a primary/secondary school
- With a median age of 57, Edenhope has one of the oldest populations in the region and well above the Victorian median of 37

- The ABS report a median annual household income of $42.7K for Edenhope, below the average of $45.1K for places analysed and well below the Melbourne average of $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 50 businesses in the town or its near surrounds
- In 63.5% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 15.8% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 16.7% have completed level III or IV trade certificates
- another 9.1% have completed year 12.

ABS Industry employment data from 2016 indicated that the West Wimmera LGA had 2.1% employment in the industry sectors with strong technology exposure, the equal lowest of the five LGAs in the region.

Fixed Broadband

The map below shows the status of the NBN rollout in Edenhope Settlement as advised by NBN Co in September 2018. The purple/stripedareas show the locations currently serviced by NBN fixed line services (if any), the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite (if any). The brown/striped areas show the locations where NBN fixed line services are planned or under construction (if any).

Premises in Edenhope, except those being serviced by NBN satellite, are yet to receive NBN services. Our analysis reveals that Edenhope will be largely serviced by NBN FTTC and FTTN in the fixed line footprint (brown striped areas in the map below).

Figure 33 NBN Coverage of Edenhope (NBN Co)

Examining a satellite map of the same area shows that most Edenhope premises in the township fall within the proposed fixed line areas.

Figure 34 Aerial imagery showing NBN fixed line and satellite areas in Edenhope (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

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

LP-WAN Coverage

There is extensive Taggle coverage in Edenhope.

Sigfox is not currently available in Edenhope.

Public WiFi Coverage

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

Other networks

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

3.9 Locality of Rainbow

Rainbow is a town in north-west Victoria around 400 kilometres from Melbourne. Rainbow is a small commercial centre for the surrounding agricultural area. Many of the early settlers were of German descent who came across from South Australia.

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

- The population of Rainbow declined by 1.2% over a decade to 491 in 2016
- 173 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 54.3% being in full-time employment and 37.0% in part-time employment
- 23.7% of the labour force classified themselves as managers, 18.3% as professionals and 7.1% as clerical and administrative workers
- 17.5% of the labour force cited their industry of employment as hospitals, and 8% cited local government administration
- One public hospital is located in the town
- The town has a primary/secondary school
- With a median age of 54, Rainbow is well above the Victorian median of 37
- The ABS report a median annual household income of $38.9K for Rainbow, the lowest of the places analysed in the region and less than half of Melbourne's $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 24 businesses in the town or its near surrounds
- In 67.8% of dwellings, at least one person accessed the internet from home

Skills

ABS Census data indicates:

- 16.1% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 19.5% have completed level III or IV trade certificates
- another 10.3% have completed year 12.

ABS Industry employment data from 2016 indicated that the Hindmarsh LGA had 2.1% employment in the industry sectors with strong technology exposure, the equal lowest of the five LGAs in the region.

Fixed Broadband

The map below shows the status of the NBN rollout in Rainbow Settlement as advised by NBN Co in September 2018. The purple/stripedareas show the locations currently serviced by NBN fixed line services (if any), the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite (if any). The brown/striped areas show the locations where NBN fixed line services are planned or under construction (if any).

The Rainbow township and surrounding areas are serviced by NBN fixed wireless.
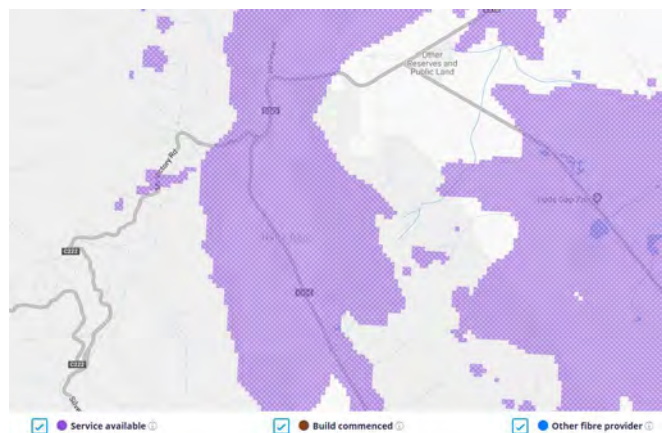

Figure 35 NBN Coverage of Rainbow (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows no mobile coverage in the area.

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

LP-WAN Coverage

There is extensive Taggle coverage in Rainbow.

There is limited Optus agricultural IoT coverage in Rainbow. Testing may be needed to confirm coverage.

There is no Sigfox coverage in Rainbow.

Public WiFi Coverage

There are no known public WiFi zones in Rainbow.

Other networks

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

3.10 Locality of Natimuk

Natimuk is a town in Western Victoria around 300 kilometres from Melbourne. Traditionally the town has served as a rural service centre for the surrounding grain and sheep farming community. More recently it has diversified into tourism as well.

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

- The population of Natimuk declined by 11.6% over a decade to 397 in 2016, one of the largest population declines in the region
- 197 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 49.7% being in full-time employment and 34.5% in part-time employment
- 18.8% of the labour force classified themselves as managers, 16.6% as professionals and 6.6% as clerical and administrative workers
- 14.9% of the labour force cited their industry of employment as hospitals, 10.4% cited local government administration and 7.5% cited aged care residential
- The town does not have a hospital but there is one in the nearby city of Horsham to the east

- The town has one primary school
- Natimuk has a median age of 53, well above the Victorian median of 37
- The ABS report a median annual household income of $51.1K for Natimuk, above the average of $45.1K for places analysed but well below Melbourne's $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 25 businesses in the town or its near surrounds
- In 70.8% of dwellings, at least one person accessed the internet from home.

Skills

ABS Census data indicates:

- 24.4% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 13.0% have completed level III or IV trade certificates
- another 10.2% have completed year 12.

ABS Industry employment data from 2016 indicated that the Horsham LGA had 4.8% employment in the industry sectors with strong technology exposure, the highest of the five LGAs in the region.

Fixed Broadband

The map below shows the status of the NBN rollout in Natimuk Settlement as advised by NBN Co in September 2018. The purple/stripedareas show the locations currently serviced by NBN fixed line services (if any), the purple / spotted areas show locations serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite (if any). The brown/striped areas show the locations where NBN fixed line services are planned or under construction (if any).

The Natimuk township and surrounding areas are serviced by NBN fixed wireless.

Figure 36 NBN Coverage of Natimuk (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 no mobile coverage issues in the town, with the three major mobile network operators all offering service.

LP-WAN Coverage

There is extensive Taggle coverage in Natimuk.

There is no Sigfox or Optus agricultural IoT coverage in Natimuk.

Public WiFi Coverage

There are no known public WiFi zones in Natimuk.

Other

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

3.11 Locality of Halls Gap

Halls Gap is located in the Shire of Northern Grampians and sits adjacent to the Grampians National Park. The town is named after the first settler there, Charles Browning Hall.

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

- The population of Halls Gap grew by 12.5% over a decade to 316 in 2016, one of the highest growth rates for the region
- 163 people aged 15 and over reported being in the labour force in the week preceding the 2016 Census, with 59.5% being in full-time employment and 33.1 % in part-time employment
- 29.0% of the labour force classified themselves as managers, 22.2% as professionals and 3.7% as clerical and administrative workers
- 34.1% of the labour force cited their industry of employment as accommodation
- There is no hospital in Halls Gap, with the closest facility located to the east in Stawell
- The town has one primary school
- Halls Gap has a median age of 44, one of the younger populations in the region but above the Victorian median age of 37
- The ABS report a median annual household income of $62.1K for Halls Gap, one of the highest in the region but still below Melbourne's $80.4K
- Data in SLIM on businesses registered with Workcover indicates approximately 35 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:

- 33.2% of people aged 15 and over have gained a diploma, advanced diploma, bachelors degree or higher educational qualification
- another 14.9% have completed level III or IV trade certificates
- another 13.9% have completed year 12.

ABS Industry employment data from 2016 indicated that the Northern Grampians LGA had 2.6% employment in the industry sectors with strong technology exposure.

Fixed Broadband

The map below shows the status of the NBN rollout in Halls Gap Settlement as advised by NBN Co in September 2018. The purple/stripedareas show the locations currently serviced by NBN fixed line services (if any), the purple / spotted areas show locations

serviced by NBN fixed wireless services and white areas locations serviced by NBN satellite (if any). The brown/striped areas show the locations where NBN fixed line services are planned or under construction (if any).

The Halls Gap township and surrounding areas are serviced by NBN fixed wireless.

Further analysis reveals NBN satellite coverage is servicing a largely unpopulated hilly region from the north of the region to the south including a small number of residences situated in the north of the town.

Figure 37 NBN Coverage of Halls Gap (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 mobile coverage in the surrounding area, but no services in the town.

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

LP-WAN Coverage

There is extensive Taggle coverage in Halls Gap.

There is no Sigfox or Optus agricultural IoT coverage in Halls Gap.

Public WiFi Coverage

There are no known public WiFi zones in Halls Gap.

Other networks

Halls Gap is neither on the VicTrack or the power transmission routes.

4 Primary Production

4.1 Land use classification

The Victorian Land Use Information System sub-classifies primary production land use in the categories shown in the legend for the following map, showing cropping as the predominant primary production category.
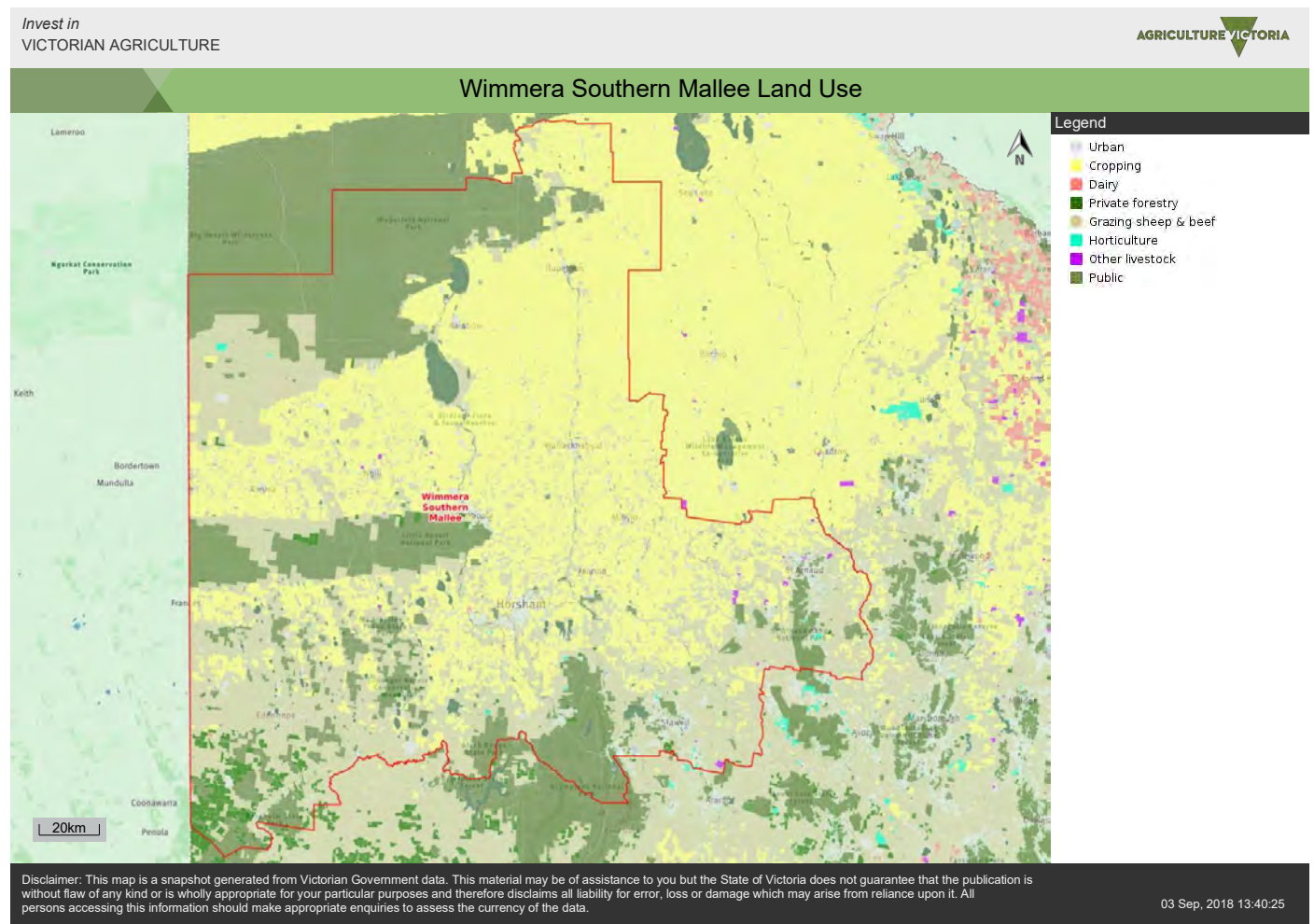
Figure 38 Primary production land in the region (https://invest.agriculture.vic.gov.au)

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

- 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 livestock production areas, detailed animal tracking, identification, biometrics and feed management can optimise yields
- in irrigation areas, soil moisture monitoring and water management are becoming increasingly important to minimise costs and maximise production
- in all areas, general access to information *where* and *when* it is needed can support informed decision-making

- with agriculture posing many occupational health and safety risks, access to communications in emergency situations can make the difference between life and death.

In 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*).

4.2 Fixed broadband supply

NBN Services

The map below shows NBN coverage of the Wimmera Southern Mallee region.
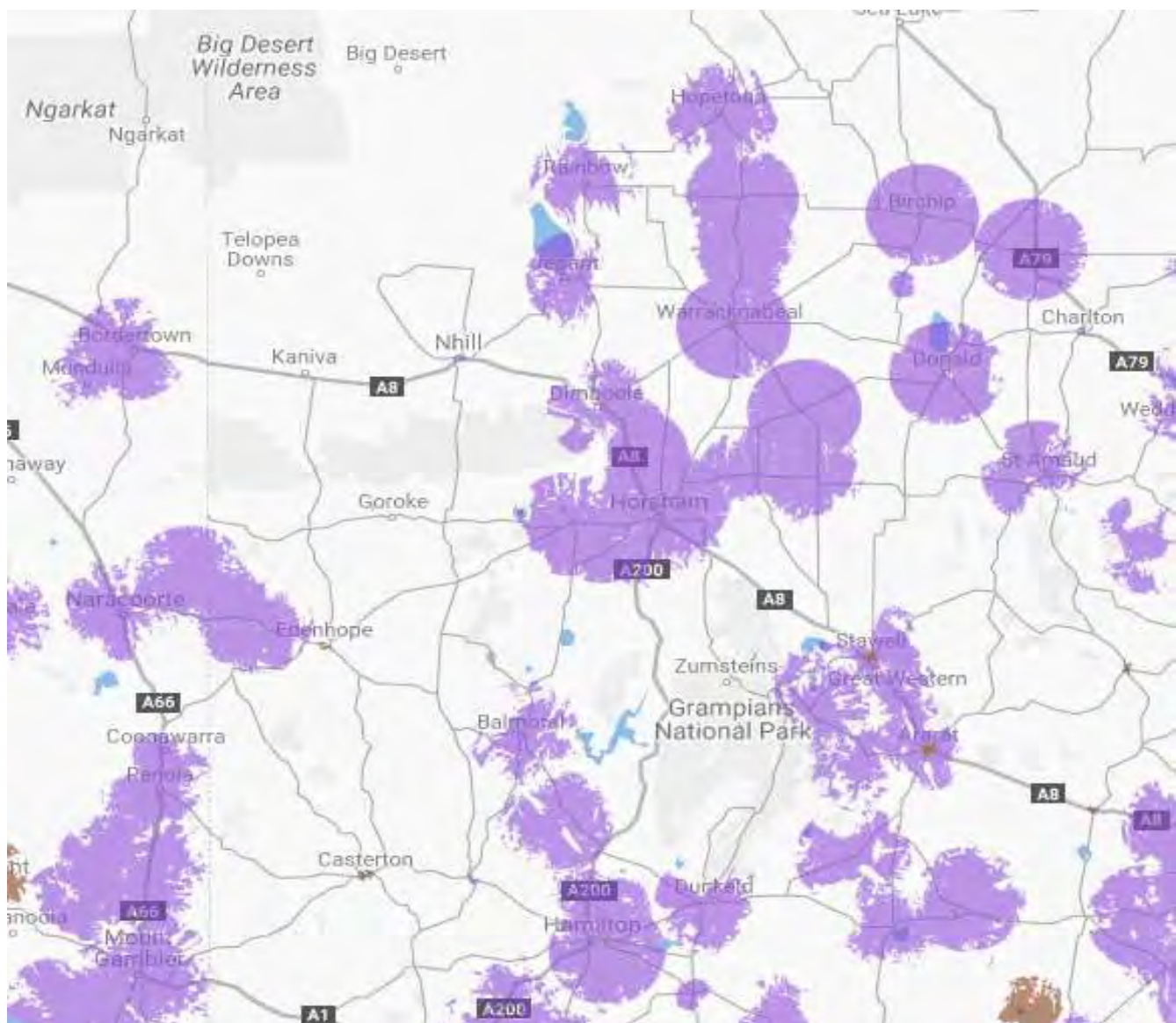
Figure 39 NBN Coverage of the Wimmera Southern Mallee Region (NBN Co)

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 80% of rural land in the Wimmera Southern Mallee has access to NBN Co's satellite solution, and most of the remainder has access to (or is due to receive) the higher-performing fixed wireless solution.

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

LGA	Population in Rural Land[21]	Estimated Area of Satellite Coverage
Hindmarsh	1,657	90%
Horsham	3,807	60%
N Grampians	3,630	90%
W Wimmera	2,341	95%
Yarriambiack	1,793	60%

Cropping

- *Grains*
- *The area north of Hopetoun*

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 Hopetoun have NBN fixed wireless coverage.
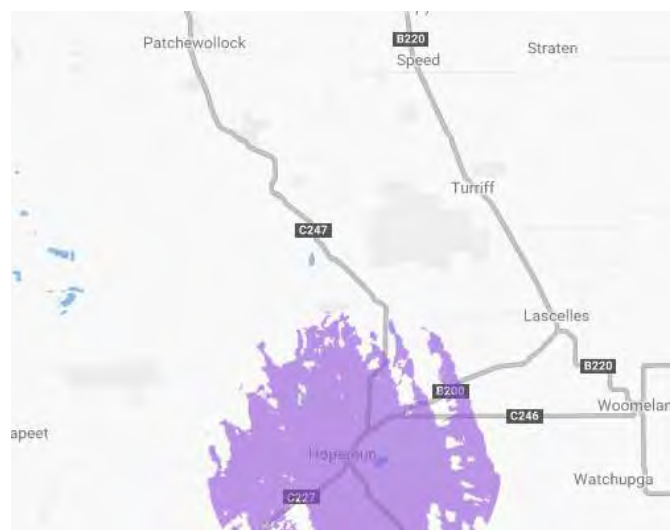
Figure 40 NBN Coverage of the farming area north of Hopetoun (NBN Co)

Cropping

- *Grains*
- *The area north-east of Nhill*

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 Dimboola, Jeparit and Warracknabeal have NBN fixed wireless coverage.
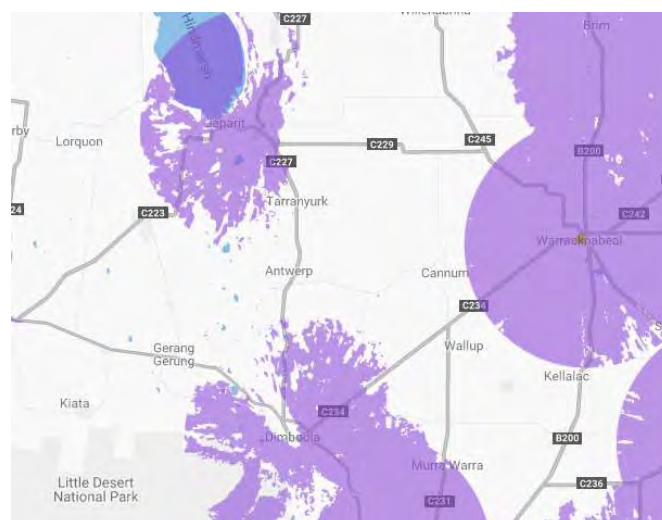
Figure 41 NBN Coverage of the farming area north-east of Nhill (NBN Co)

Cropping

- *Grains*
- *The area around Patchewollock*

The map below shows no NBN fixed wireless coverage in the area, with farms serviced by NBN satellite. There are few towns or concentrations of premises from which fixed wireless or fixed line footprints might extend. There is a small fixed line service under construction in Ouyen, but this will not cover any surrounding farms.

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21 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.

Figure 42 NBN Coverage of the farming area around Patchewollock (NBN Co)

Cropping

- *Grains*
- *The area around Gre Gre and St Arnaud*

The map below shows limited coverage of NBN fixed wireless. Farms serviced by fixed wireless are those within the radiuses of fixed wireless footprints servicing the towns of St Arnaud to the east, Donald to the north, and Rupanyup to the west.
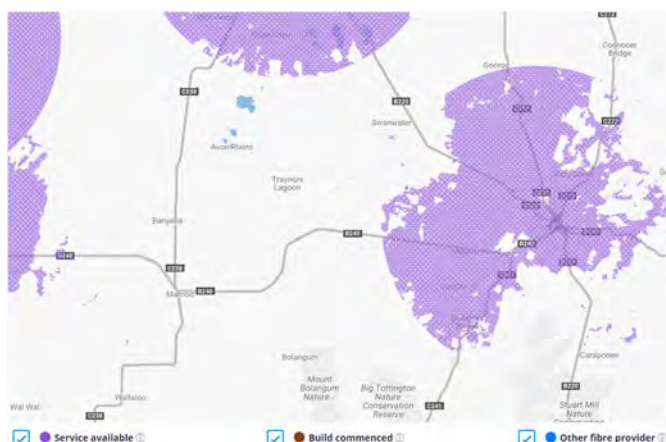
Figure 43 NBN Coverage of the farming area around Gre Gre and St Arnaud (NBN Co)

Cropping

- *Grains*
- *The area around Toolondo*

The map below shows primarily NBN satellite coverage of the farms around Toolondo. The properties that are serviced by NBN fixed wireless are those to the north and south, falling within the Horsham and Balmoral fixed wireless footprints respectively.
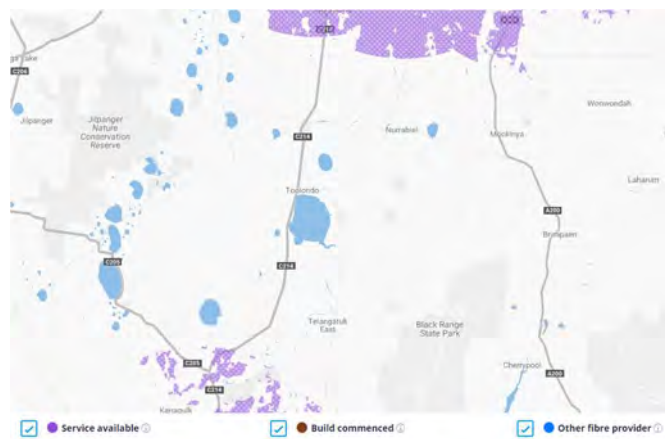
Figure 44 NBN Coverage of the farming area around Toolondo (NBN Co)

Grazing

- *Wool/sheep meat*
- *The area to the north-west of Nhill*

The map below shows that most farms in the area have only NBN satellite coverage.

Figure 45 NBN Coverage of farming area to the north-west of Nhill (NBN Co)

Grazing

- *Wool/sheep meat*
- *The area to the north of Edenhope*

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 Apsley have NBN fixed wireless coverage. Farms located in and around Neuarpurr, Peronne, Karnak, Gymbowen, Gorake, Patyah and Wombelano are serviced by NBN satellite.
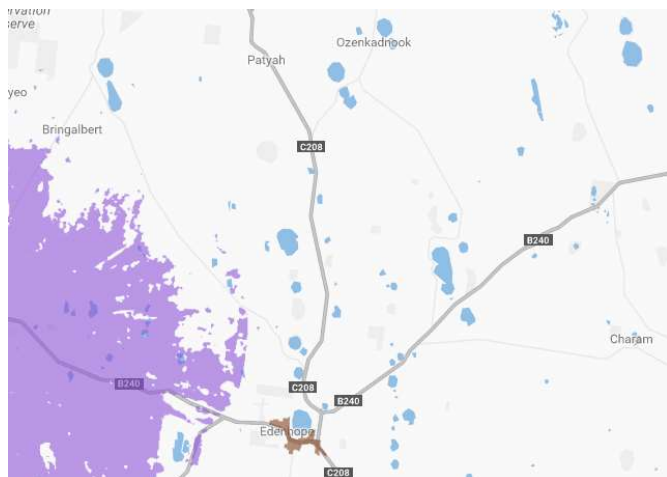
Figure 46 NBN Coverage of the farming area north of Edenhope (NBN Co)

Food processing

- *The area around Nhill*

The map below shows that the food processing farming area around Nhill has NBN satellite coverage.

Figure 47 NBN Coverage of the food processing farming area around Nhill (NBN Co)

Food processing businesses in the Nhill township, except those being serviced by NBN satellite, are yet to receive NBN services as FTTC and FTTN are in construction or being planned.

Nhill will be largely serviced by NBN FTTC, FTTN and satellite in areas surrounding the town – refer to the Significant Places section of this report.

Food processing

- *The area around Stawell*

The map below shows limited NBN fixed wireless coverage in the area, with most food processing farming businesses in the area serviced by NBN satellite.
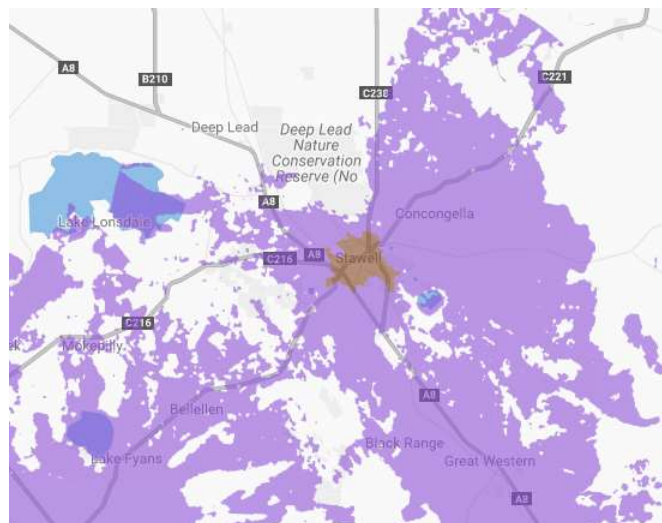
Figure 48 NBN Coverage of the food processing farming area around Stawell (NBN Co)

Food processing businesses in Stawell township, except those being serviced by NBN fixed wireless and satellite, are yet to receive NBN services as FTTC and FTTN are in construction or being planned.

Stawell will be largely serviced by NBN FTTC, FTTN, fixed wireless and satellite in areas surrounding the town – refer to the Significant Places section of this report.

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
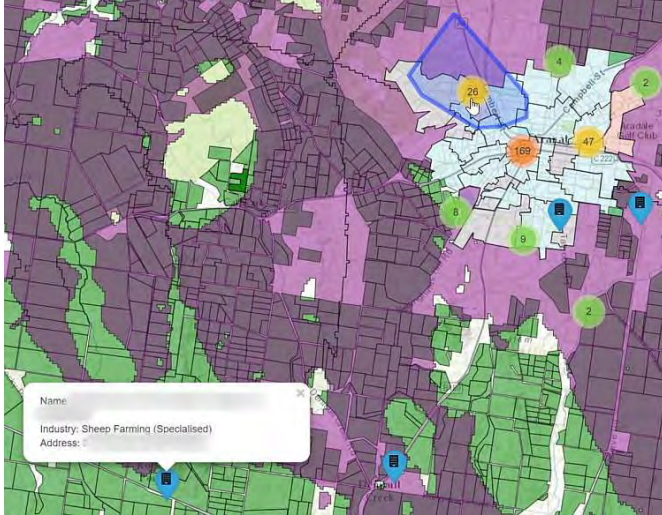
Figure 49 SLIM outputs at a more detailed level (SLIM)

- the "pop-up" 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-shaped 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.

4.3 Mobile coverage

Coverage maps published by 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 Wimmera Southern Mallee 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.

Cropping

- *Grains*
- *The area north of Hopetoun*

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) around the population centres of Hopetoun and Patchewollock, with 3G external antenna only across the region
- Optus shows 4G Plus and 3G outdoor coverage across the area, with little 3G external antenna coverage
- Vodafone shows no coverage.

In summary, except for population centres, there appears to be 3G external antenna coverage only from one carrier across in the area, with no handheld device coverage except for around population centres of Hopetoun and Speed/Tempy.
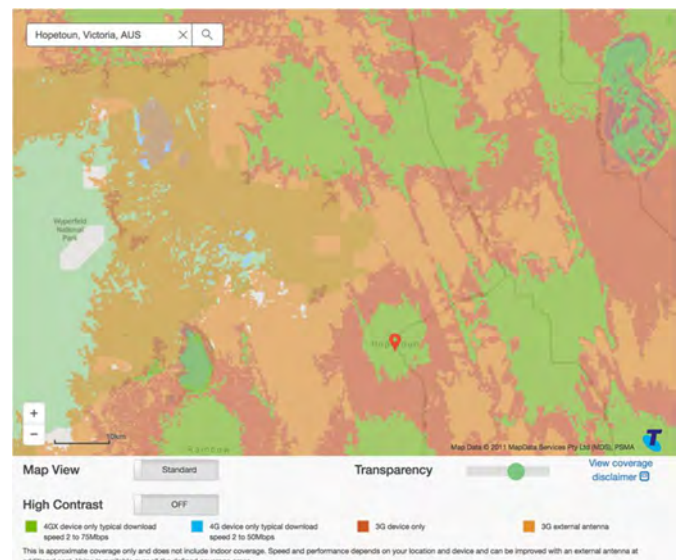
Figure 50 Telstra mobile coverage between Hopetoun and Patchewollock
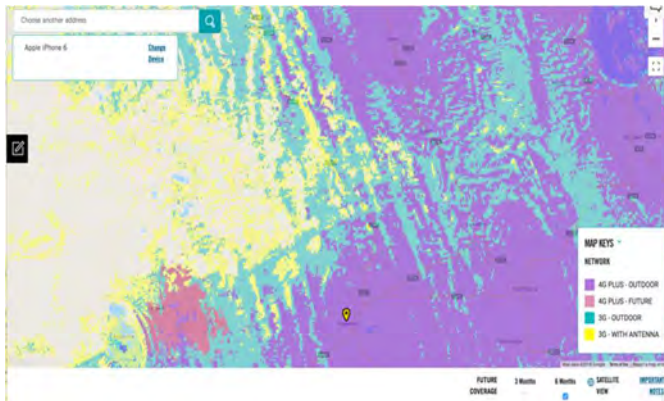
Figure 51 Optus mobile coverage between Hopetoun and Patchewollock
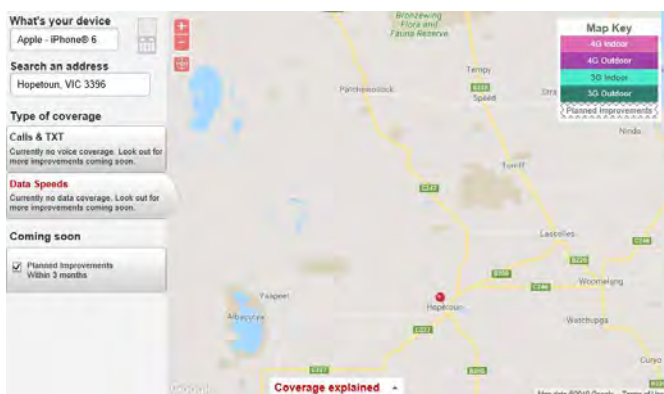
Figure 52 Optus mobile coverage between Hopetoun and Patchewollock

Cropping

- *Grains*
- *The area north-east of Nhill*

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 predominantly 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps), however coverage appears marginal and there are significant patches of 3G device and 3G external antenna coverage across the area with no black spots evident
- Optus shows 4G Plus outdoor, 3G outdoor device and 3G external antenna coverage across the area with no black spots evident
- Vodafone shows 4G and 3G outdoor coverage across parts of the area.

In summary, there appears to be continuous 3G and 4G coverage from two of the mobile network operators with limited coverage from the third operator.
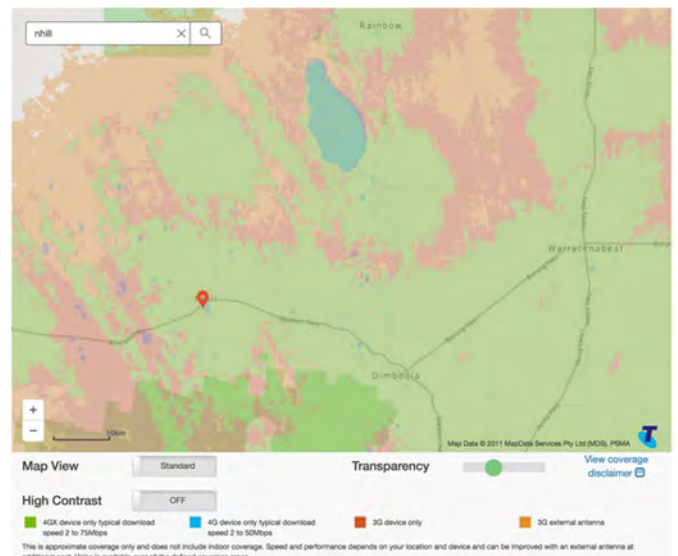
Figure 53 Telstra mobile coverage north-east of Nhill
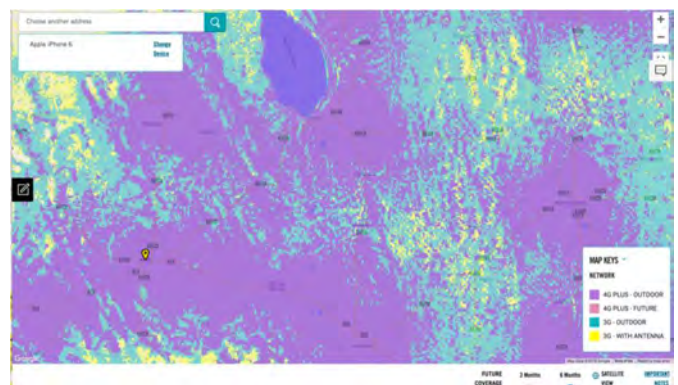
Figure 54 Optus mobile coverage north-east of Nhill
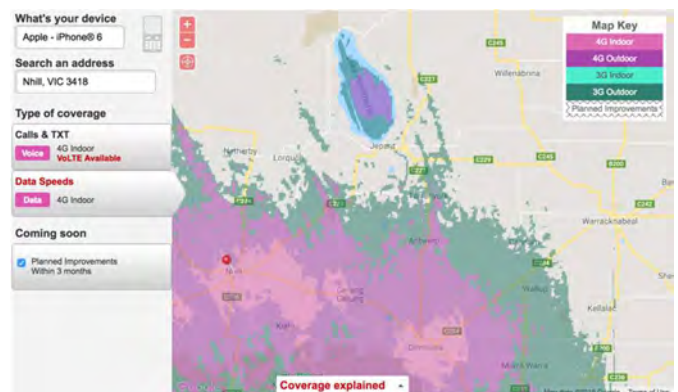
Figure 55 Vodafone mobile coverage north-east of Nhill

Cropping

- *Grains*
- *The area around Patchewollock*

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 predominantly 3G external antenna coverage and 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) with patches of 3G device coverage across the area with no black spots evident
- Optus shows predominantly 3G outdoor and 3G with antenna but with widespread blackspots, including in Patchewollock. 4G coverage becomes available east of Patchewollock, around Tempy and Speed
- Vodafone shows no mobile coverage of the area.

In summary, there appears to be continuous 3G coverage or better from one mobile network operator, partial coverage by another and no coverage from the third operator.
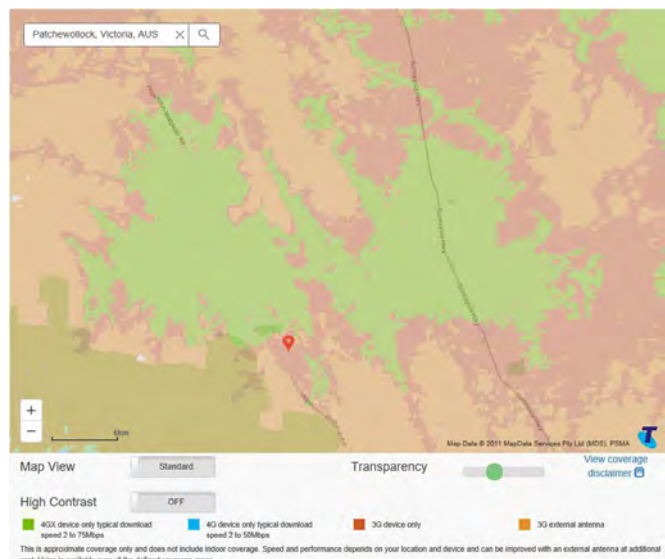
Figure 56 Telstra mobile coverage of area around Patchewollock
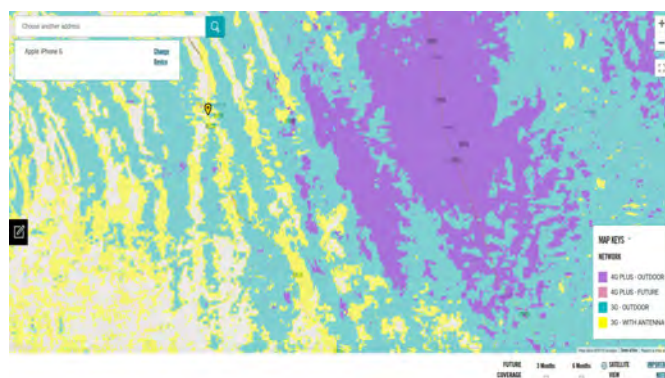
Figure 57 Optus mobile coverage of area around Patchewollock
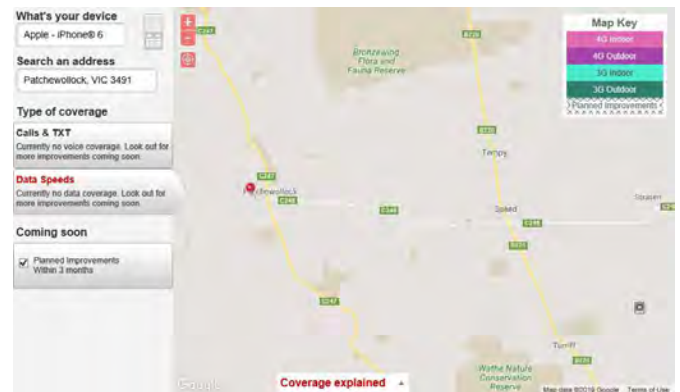
Figure 58 Vodafone mobile coverage area around Patchewollock

Cropping

- *Grains*
- *The area around Gre Gre and St Arnaud*

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 predominately 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the area with no black spots evident
- Optus shows 4G Plus outdoor, 3G outdoor device and 3G external antenna coverage across the area with only some very minor blackspots
- Vodafone shows patchy 3G outdoor coverage and significant areas with no coverage at all.

In summary, there appears to be good coverage from one of the mobile network operators with mostly 3G and 4G coverage from the second operator and limited coverage from the third operator.
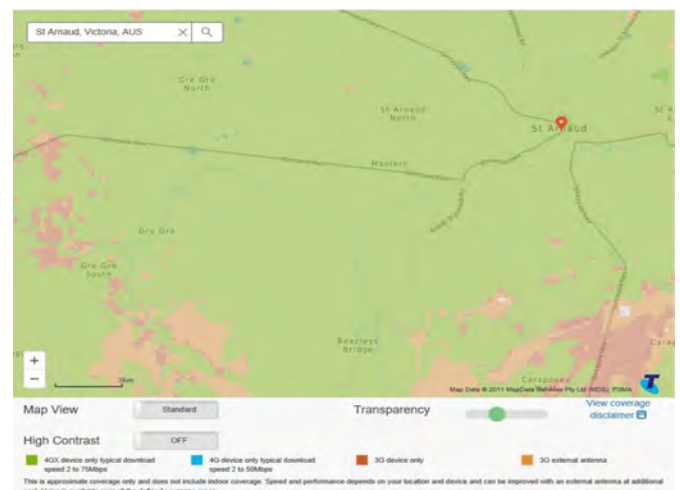
Figure 59 Telstra mobile coverage of area around Gre Gre and St Arnaud
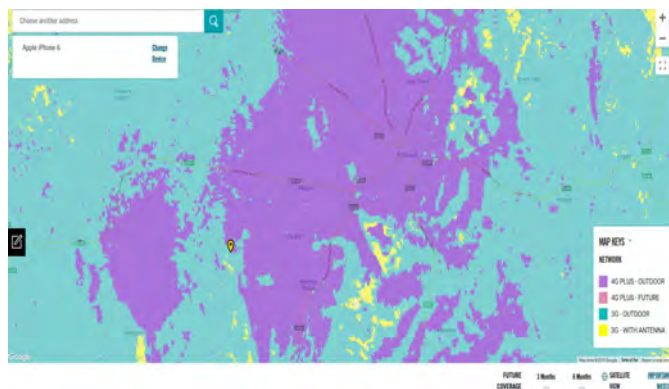
Figure 60 Optus mobile coverage of area around Gre Gre and St Arnaud

Figure 61 Vodafone mobile coverage of area around Gre Gre and St Arnaud

Cropping

- *Grains*
- *The area around Toolondo*

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 predominantly 3G device and 3G external antenna coverage in Toolondo including the immediate surrounding area and 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) in the extended area with no black spots evident
- Optus shows primarily 3G outdoor device and 3G external antenna coverage with large blackspots south of Toolondo
- Vodafone shows patchy 3G outdoor coverage to the north and east of Toolondo with the south and west area of Toolondo showing no coverage at all.

In summary, there appears to be continuous 3G outdoor coverage or better from one mobile network operator, and patchy 3G coverage from two operators.
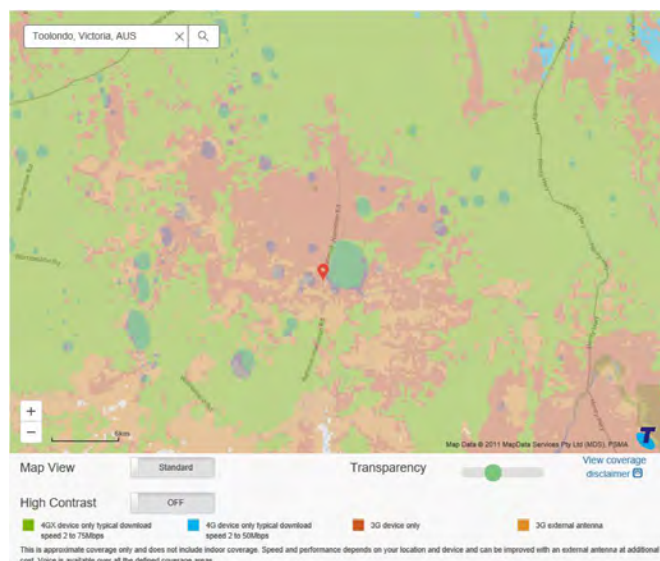
Figure 62 Telstra mobile coverage of area around Toolondo
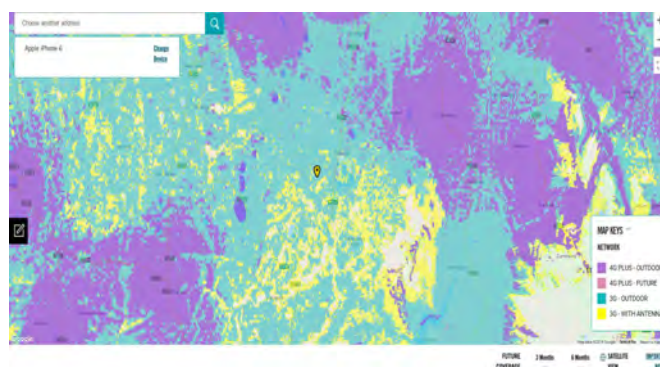
Figure 63 Optus mobile coverage of area around Toolondo
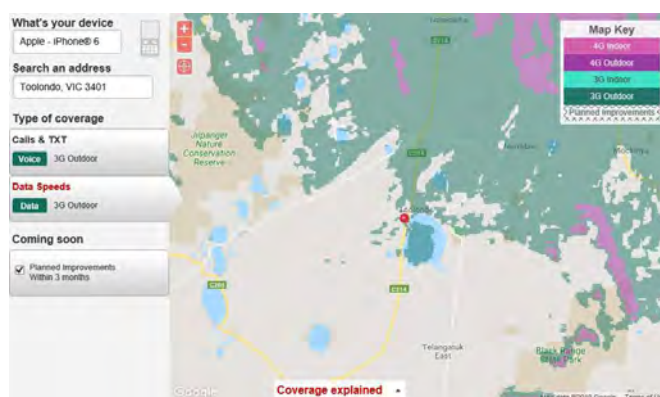
Figure 64 Vodafone mobile coverage of area around Toolondo

Grazing

- *Wool/Sheep Meat*
- *The area to the north-west of Nhill 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, 3G device and 3G external antenna coverage of the area
- Optus shows 4G Plus, 3G outdoor and patchy 3G with antenna coverage of the area
- Vodafone shows 4G outdoor and indoor and 3G outdoor coverage of the area with limited coverage further north towards Netherby and Yanac.

In summary, there appears to be continuous 3G outdoor coverage or better from the three mobile network operators.
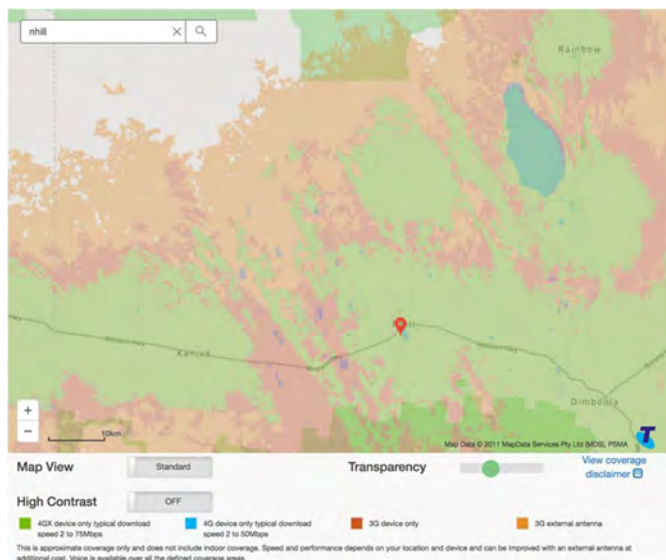
Figure 65 Telstra mobile coverage between north-west of Nhill and the Victorian border
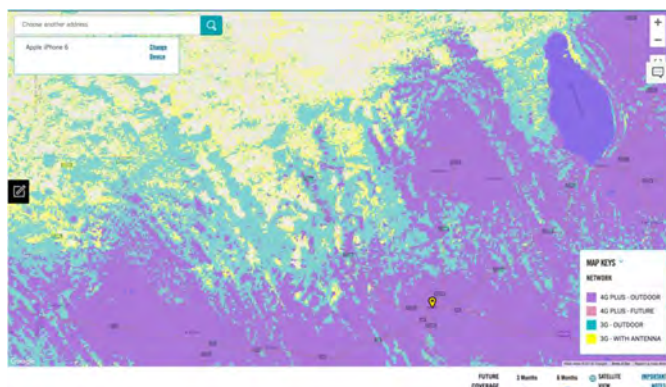
Figure 66 Optus mobile coverage between north-west of Nhill and the Victorian border
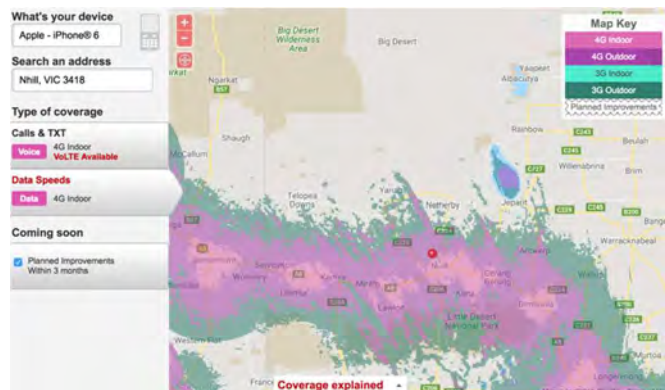
Figure 67 Vodafone mobile coverage between north-west Nhill and the Victorian border

Grazing

- *Wool/Sheep Meat*
- *The area to the north of Edenhope*

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) in the area with continuous 3G external antenna coverage and no black spots evident
- Optus shows 4G Plus and 3G outdoor coverage in the area
- Vodafone shows no coverage.

In summary, there appear to be mobile coverage in the area from at least two of the three mobile network operators.
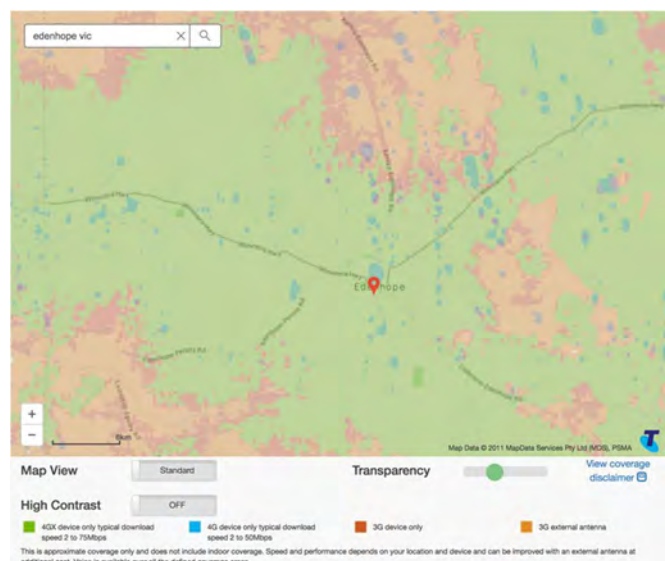
Figure 68 Telstra mobile coverage in the area north of Edenhope
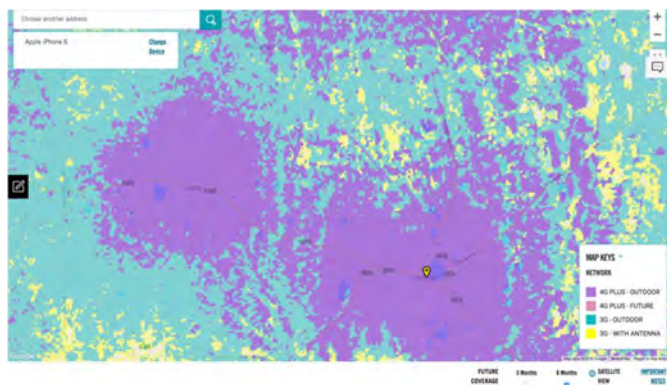
Figure 69 Optus mobile coverage in the area north of Edenhope
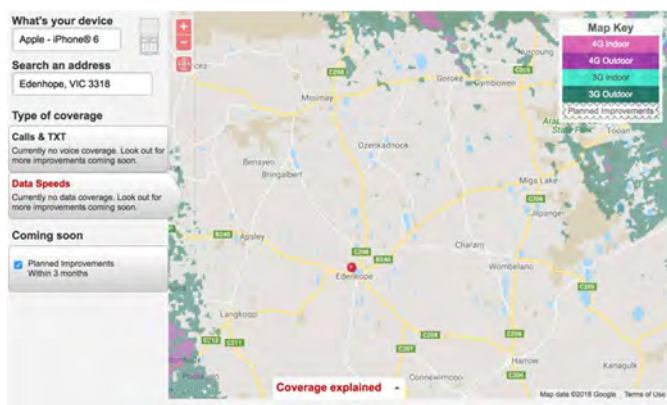
Figure 70 Vodafone mobile coverage in the area north of Edenhope

Food processing

- *The area around Nhill*

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 some 3G outdoor device coverage in the extended area around the town
- Optus shows 4G Plus and 3G outdoor coverage in the extended area around the town
- Vodafone shows 4G indoor and outdoor coverage in extended area around town.

In summary, there appear to be good options for 4G coverage in the region from all three mobile network operators.
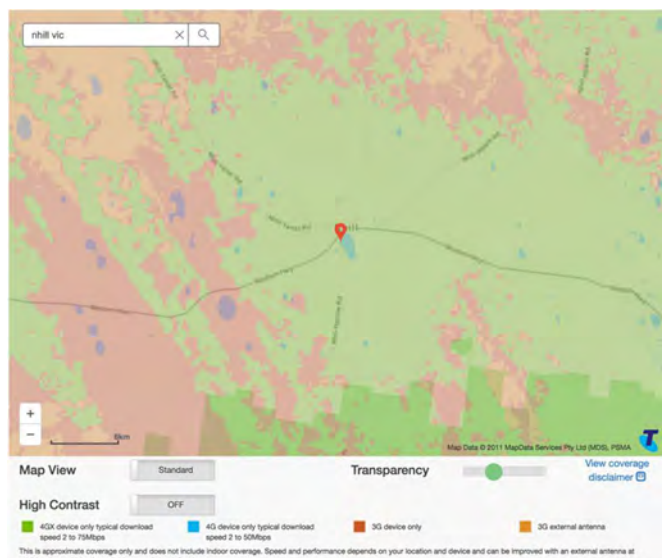
Figure 71 Telstra mobile coverage around Nhill
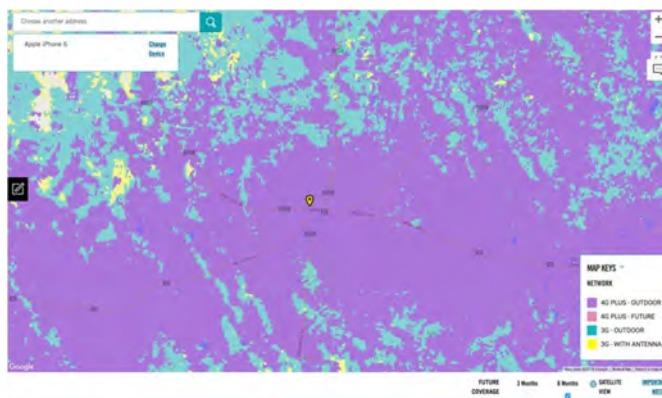
Figure 72 Optus mobile coverage around Nhill
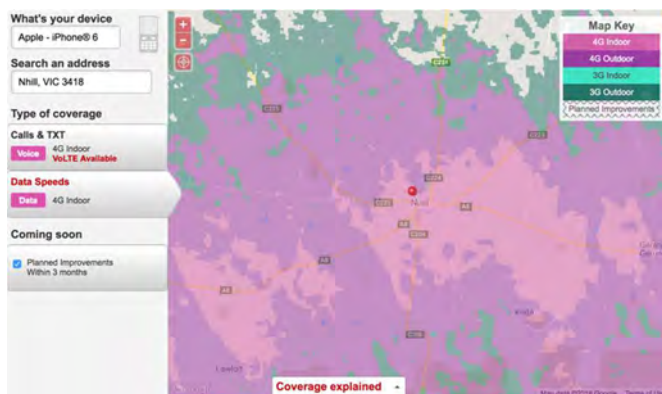
Figure 73 Vodafone mobile coverage around Nhill

Food processing

- *The area around Stawell*

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) in the extended area around the town
- Optus shows 4G Plus outdoor coverage in the extended area around the town
- Vodafone shows 4G indoor and outdoor coverage in the extended area around the town.

In summary, there appear to be good options for 4G coverage in the region from all three mobile network operators.

Figure 76 Vodafone mobile coverage around Stawell

4.4 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:

- Sigfox appears focussed on the northern and western parts of the region with national park areas marked for future rollout
- Taggle coverage appears to cover the entire region.

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.

Cropping

- *Grains*
- *The area north of Hopetoun*

The SLIM database shows extensive Taggle and Optus NB-IoT trials coverage in the area.

Cropping

- *Grains*
- *The area north-east of Nhill*

The SLIM database shows extensive Taggle coverage with limited Optus NB-IoT trials coverage in the area.

Figure 74 Telstra mobile coverage around Stawell

Figure 75 Optus mobile coverage around Stawell

Cropping

- *Grains*
- *The area around Patchewollock*

The SLIM database shows extensive Taggle coverage. Optus NB-IoT coverage and Sigfox do not appear to have coverage in the area.

Cropping

- *Grains*
- *The area around Gre Gre and St Arnaud*

The SLIM database shows extensive Taggle coverage. Optus NB-IoT coverage and Sigfox do not appear to have coverage in the area.

Cropping

- *Grains*
- *The area around Toolondo*

The SLIM database shows extensive Taggle coverage. Sigfox have limited coverage to the north-east of Toolondo. Optus NB-IoT do not appear to have coverage in the area.

Grazing

- *Wool/sheep meat*
- *The area to the north-west of Nhill*

The SLIM database shows Taggle coverage is not available in the area approximately 12 kilometres north of Kaniva and 45 kilometres west of Rainbow. Optus NB-IoT and Sigfox do not appear to have coverage in the area.

Grazing

- *Wool/sheep meat*
- *The area to the north of Edenhope*

The SLIM database shows extensive Taggle IoT coverage in and around Edenhope. Optus NB-IoT and Sigfox do not appear to have coverage in the area.

Food processing

- *The area around Nhill*

The SLIM database shows extensive Taggle coverage with limited Optus NB-IoT trials coverage in the area.

Food processing

- *The area around Stawell*

The SLIM database shows extensive Taggle IoT coverage in and around Edenhope. Optus NB-IoT and Sigfox do not appear to have coverage in the area.

4.5 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 Wimmera Southern Mallee 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+
Hindmarsh	5,677	46.2%
Horsham	19,833	52.5%
N Grampians	11,498	46.2%
W Wimmera	3,867	46.7%
Yarriambiack	6,673	43.3%
Region	**47,548**	**48.5%**

5 Tourist Locations

For tourist locations, the communication demands tend to comprise:

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

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

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

Note the Wimmera Southern Mallee Region features numerous additional tourist attractions and events beyond those covered in this section.

5.1 Grampians National Park

The Grampians National Park is a large nature reserve with the north of the park located in the Wimmera Southern Mallee region. The park is famous for its rugged sandstone mountain ranges, waterfalls, wildlife and walking trails that lead to impressive lookouts.

The Brambuk Aboriginal Cultural Centre, located 2.5 kilometres south of Halls Gap, provides an insightful experience into the Jardwadjali and Djab Wurrung people who have lived in the area for thousands of years. There are the many shelters of the Aboriginal people such as the Manja Shelter, Ngamadhidj Shelter and Billimina Shelter that can also be visited. The park made the Australian National Heritage List in 2006 for its rich Aboriginal culture and natural beauty.

Popular features of the park include Reeds, Boroka and the Balconies lookouts and numerous waterfall displays including the Mackenzie Falls, Fish Falls, Silverband Falls and Splitters Falls. The Grampians provides camping sites where campervans can be parked, or tents can be pitched. The facilities available at each site vary with some having tennis courts, televisions and wireless internet and family friendly

caravan parks providing jumping pillows, pools, camp kitchens and bike hire. There is also the option to experience glamping or stay in self-contained accommodation.
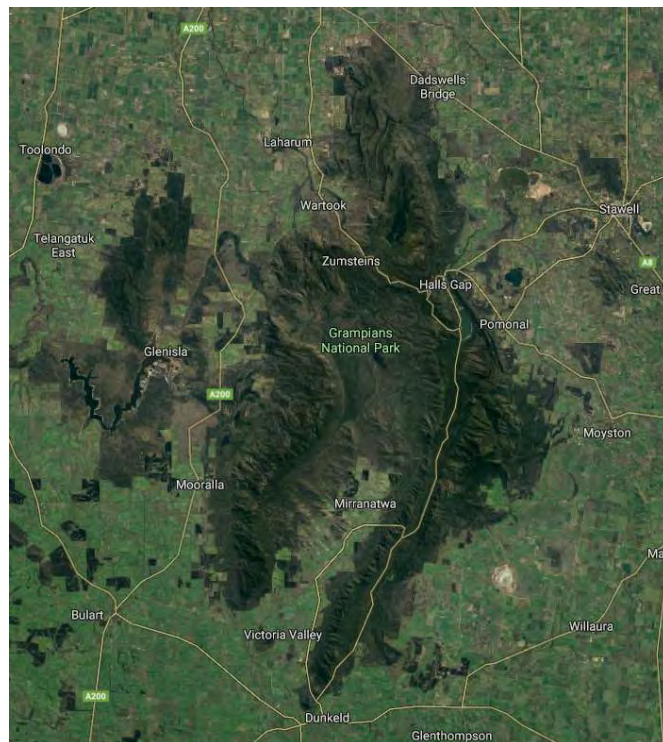
Figure 77 Aerial imagery of the Grampians National Park

Fixed Broadband

Our analysis reveals much of the Grampians National Park falls in the NBN Co's satellite footprint with NBN fixed wireless servicing the area of Halls Gap including the Halls Gap Recreation Reserve, Halls Gap Camping Ground and Halls Gap Visitor Information Centre.
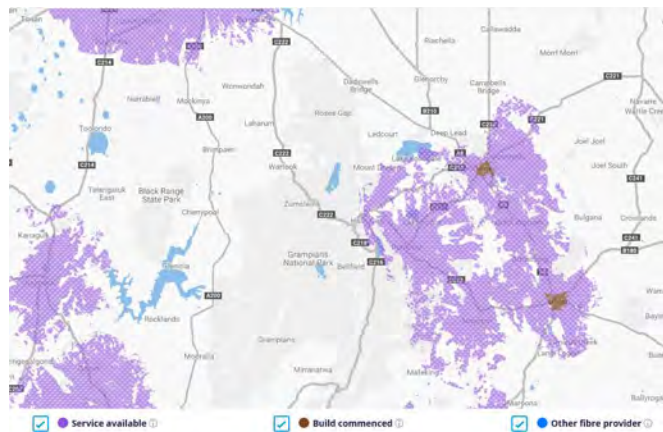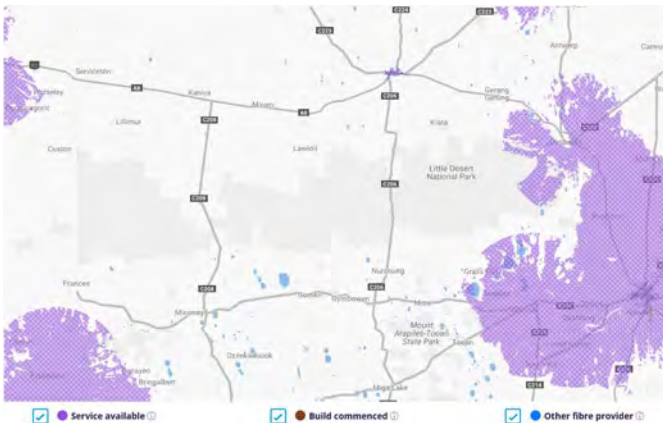

Figure 78 NBN Coverage of the Grampians National Park (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) of the park perimeter and some areas within the park. There are also small patches of 3G device and 3G external antenna coverage within the park
- Optus shows 4G Plus outdoor coverage of the park perimeter however, there are some areas of 3G outdoor and 3G with antenna coverage
- Vodafone shows limited 4G and 3G outdoor coverage including Halls Gap and a number of lookouts with most of the park without coverage. The Brambuck National Park and Cultural Centre has no coverage.

In summary, there appears to be partial coverage in the park from the three mobile network operators.
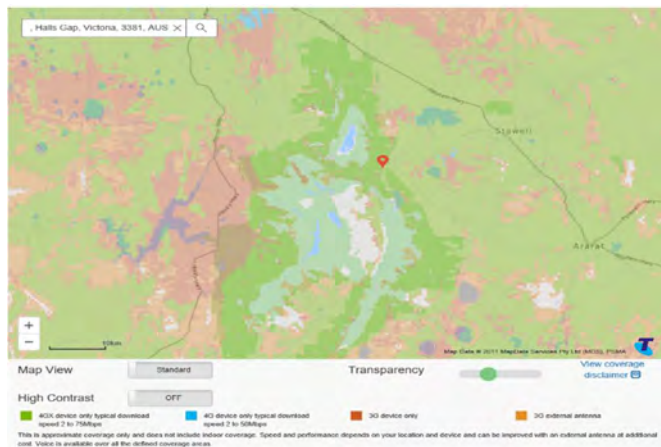
Figure 79 Telstra mobile coverage of the Grampians National Park
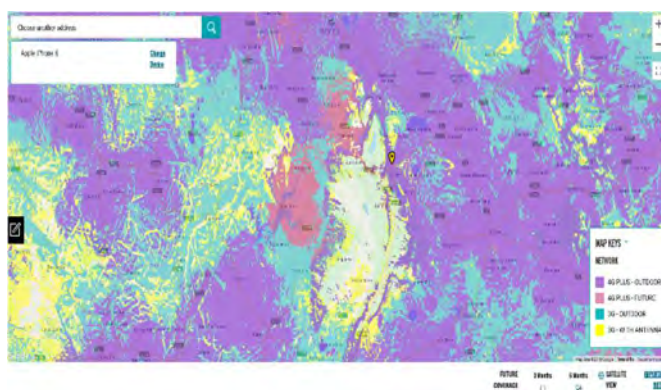
Figure 80 Optus mobile coverage of the Grampians National Park
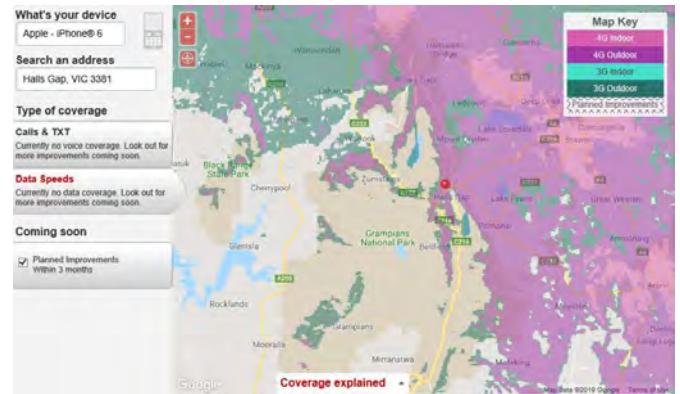
Figure 81 Vodafone mobile coverage of the Grampians National Park

5.2 Wyperfeld National Park

The Wyperfeld National Park is the third largest national park in Victoria covering 357,017 hectares of flat, semi-arid land.

The park appeals to nature lovers and outdoor adventurists with various activities that can be undertaken in the park that include observing the numerous native plants and animals, nature walks, lookout views, 2WD and 4WD driving, and cycling. Wonga, Snowdrift and Casuarina camping areas are available for overnight stays with short, half day, full day and overnight walking trails including the Discovery Walk and Desert Walk accessible from the campsites.

The rugged, sandy desert land attracts 4WD with some tracks leading to large white sand dunes. Another feature of the park is a chain of lake beds connected by Outlet Creek which only fills when the Wimmera River over supplies to Lake Hindmarsh.

Figure 82 Aerial imagery of Wyperfeld National Park

Fixed Broadband

Our analysis reveals that the Wyperfeld National Park including the Visitor Information Centre, fall into the NBN Co's satellite footprint.
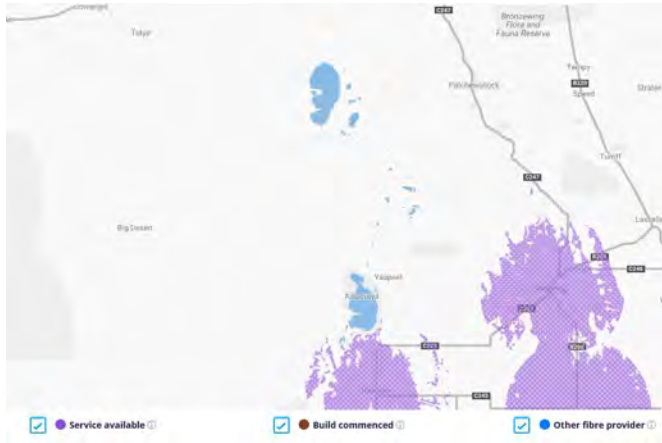
Figure 83 NBN Coverage of the Wyperfeld National Park (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 3G external antenna coverage east of the park with the remaining area having no coverage
- Optus shows 3G outdoor and 3G with antenna coverage however a significant area is without coverage
- Vodafone shows no mobile coverage of the area.

In summary, there appears to be partial coverage in the park from two of the three mobile network operators.
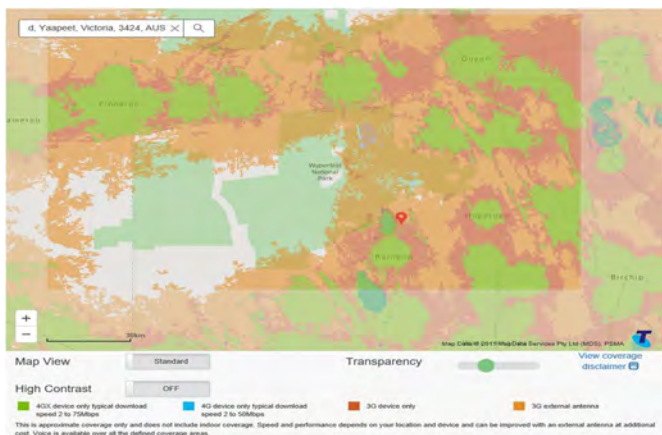
Figure 84 Telstra mobile coverage of the Wyperfeld National Park

Figure 85 Optus mobile coverage of the Wyperfeld National Park
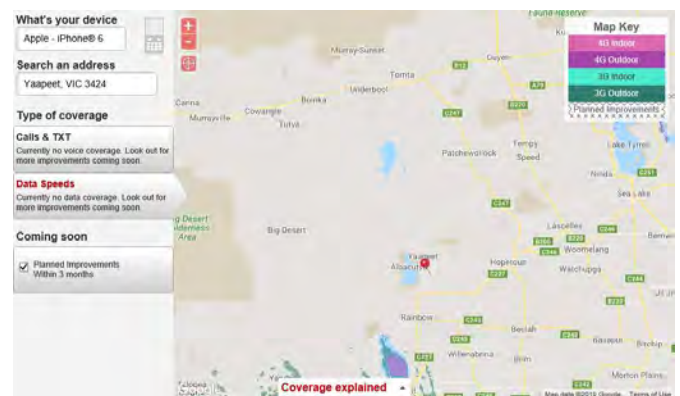
Figure 86 Vodafone mobile coverage of the Wyperfeld National Park

5.3 Little Desert National Park

Little Desert National Park is Victoria's second largest national park spanning 132,647 hectares, located near the town of Dimboola.

Visitors can choose to stay overnight at camping sites including Ackle Bend and Horseshoe Bend which are situated by the Wimmera River fringed with River Red Gums. The camping sites provide basic picnic facilities and communal fireplaces. Various walking trails ranging from short walks, such as the Stringybark Walk, to the Little Desert Discovery Walk which is 74 kilometres long can be explored. A variety of plants can be observed on the walks along with birds, insects and animals.

Other popular activities to partake in the desert are hiking up the rolling sand dunes of the desert and four-wheel driving.

Figure 87 Aerial imagery of Little Desert National Park

Fixed Broadband

Our analysis reveals that much of the Little Desert National Park falls into the NBN Co's satellite footprint with NBN fixed wireless servicing the far east perimeter of the Park including the immediate surrounding area of Dimboola.

Further analysis reveals the nearby town of Dimboola is scheduled to receive NBN FTTN fixed line services.

Figure 88 NBN Coverage of the Little Desert National Park (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps), 3G device and 3G external antenna coverage across the park
- Optus shows 4G Plus outdoor, 3G outdoor and 3G with antenna coverage in the park with small areas of no coverage
- Vodafone shows 4G outdoor and 3G outdoor coverage however, there appears to be no coverage west of the park.

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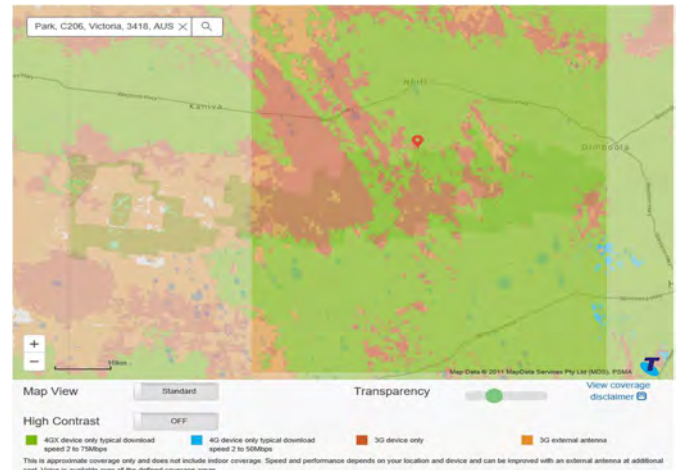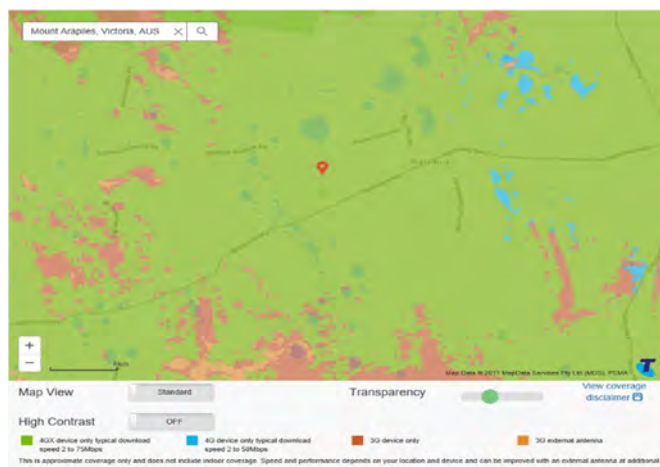

Figure 89 Telstra mobile coverage of the Little Desert National Park
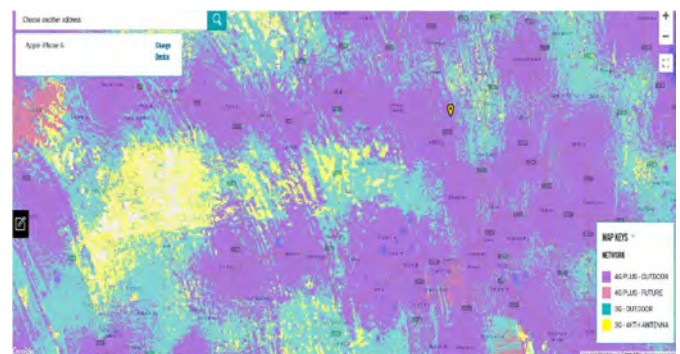
Figure 90 Optus mobile coverage of the Little Desert National Park
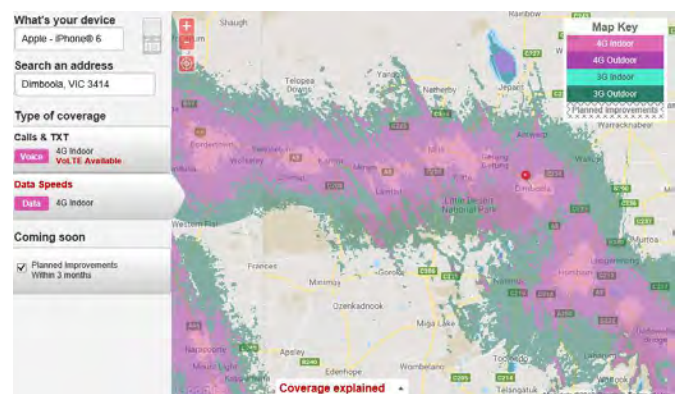
Figure 91 Vodafone mobile coverage of the Little Desert National Park

5.4 Mount Arapiles National Park

Mount Arapiles National Park is located approximately 10 kilometres west of Natimuk and consists of Mount Arapiles, Mitre Rock and Tooan Block. A major

attraction in the park is Mount Arapiles, a sandstone landmark that offers views of the surrounding Wimmera Plains.

Rock climbing, hiking and bouldering are popular activities enjoyed by locals and visitors on the 140m rock formation. Centenary Park campgrounds, located near the base of the cliffs, is available for overnight camping. There are a variety of native plants, animals and bird species also found in the park.
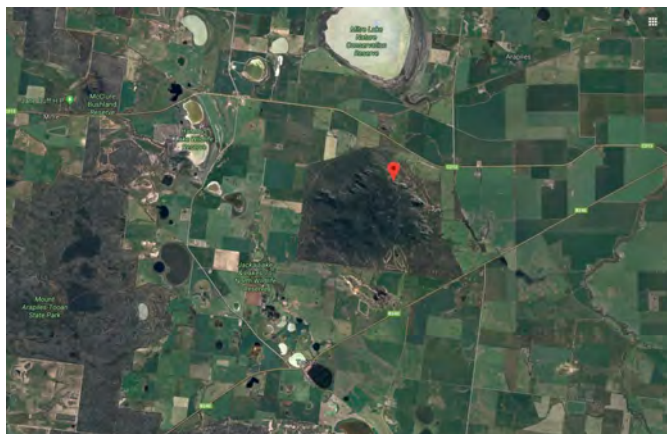
Figure 92 Aerial imagery of Mount Arapiles National Park

Fixed Broadband

Our analysis reveals that much of the Mount Arapiles National Park falls into the NBN Co's satellite footprint.

Mount Arapiles is located on the edge within the NBN satellite footprint with NBN fixed wireless servicing the east of the park which further extends to the town of Natimuk.
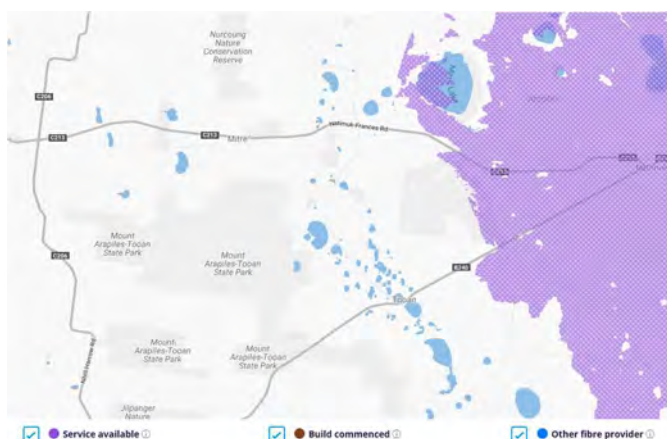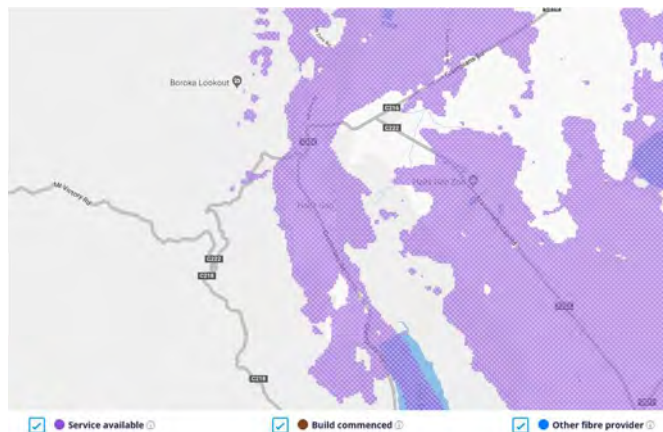

Figure 93 NBN Coverage of the Mount Arapiles National Park (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the park
- Optus shows 4G Plus outdoor coverage for much of the park including Mount Arapiles and the camping grounds
- Vodafone shows non-continuous 4G and 3G outdoor coverage in the park with a significant area having no coverage.

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

Figure 94 Telstra mobile coverage of the Mount Arapiles National Park

Figure 95 Optus mobile coverage of the Mount Arapiles National Park
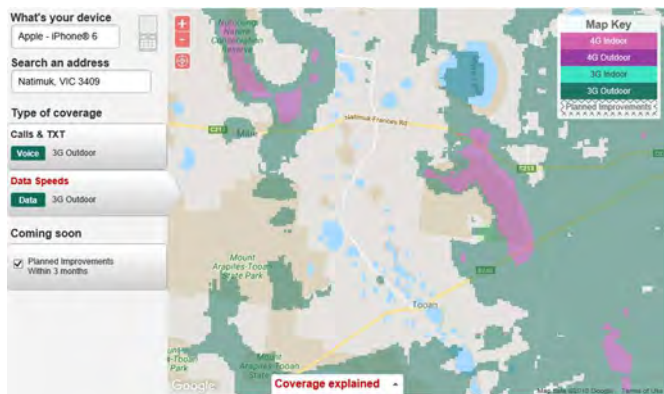
Figure 96 Vodafone mobile coverage of the Mount Arapiles National Park

5.5 Halls Gap

Halls Gap is a picturesque township nestled in the foothills of the Grampians, surrounded by green woodland.

This town offers the opportunity to explore several natural attractions including Mount William, Clematis Falls, Fish Falls, Mackenzie Falls and the Pinnacle. Bushwalking trails for various levels of ability are accessible from the town.

Other attractions include the Halls Gap Zoo, Steve Morvell Wildlife Art Gallery, the Brambuck and The Gap Vineyard.
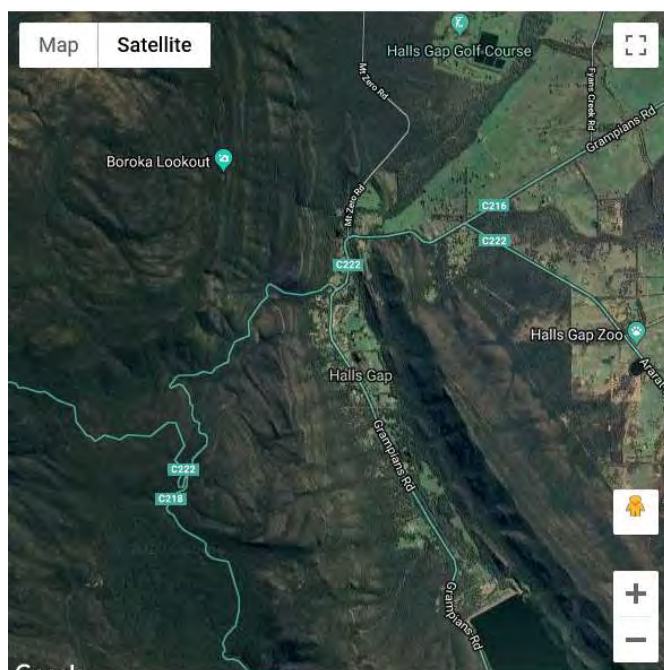
Figure 97 Aerial imagery of Halls Gap

Fixed Broadband

Our analysis reveals that the majority of the Halls Gap township is serviced by NBN fixed wireless including the Halls Gap Visitor Information Centre and Brambuk National Park and Cultural Centre.

Figure 98 NBN Coverage of Halls Gap (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) across the entire town
- Optus shows 4G Plus outdoor coverage across the entire town
- Vodafone shows 4G outdoor and 3G outdoor mobile coverage in the surrounding area, but no services in the town.

In summary, there appears to be good coverage in the town and surrounding area from two of the three major mobile network operators.
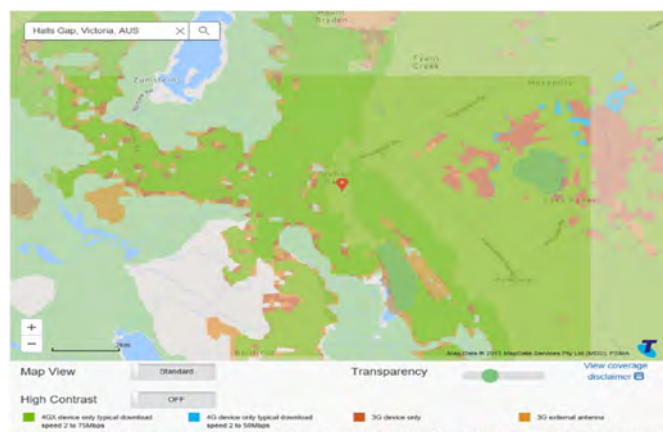
Figure 99 Telstra mobile coverage of Halls Gap
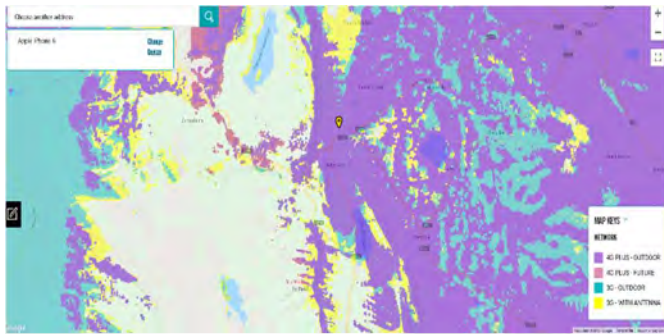
Figure 100 Optus mobile coverage of Halls Gap

Figure 101 Vodafone mobile coverage of Halls Gap

5.6 Mackenzie Falls

Mackenzie Falls is an iconic tourist destination within the Grampians National Park. It is one of the largest waterfalls in Victoria and draws large numbers of visitors year-round to view the spectacular sights.

The waterfall can be accessed via the viewing platform at the Bluff which is wheelchair accessible or viewed from the base by following a steep trail to the bottom.

Figure 102 Aerial imagery of Mackenzie Falls

Fixed Broadband

Our analysis reveals that Mackenzie Falls and the surrounding area falls into NBN Co's satellite footprint.

Figure 103 NBN Coverage of Mackenzie Falls (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows no mobile coverage of the area
- Optus shows no coverage in the area with patchy 3G and 4G device coverage in the surrounding area
- Vodafone shows no mobile coverage of the area.

In summary, there appears to be no coverage at the location by any of the mobile network operators and patchy coverage in the surrounding area by one operator.

Figure 104 Telstra mobile coverage of Mackenzie Falls
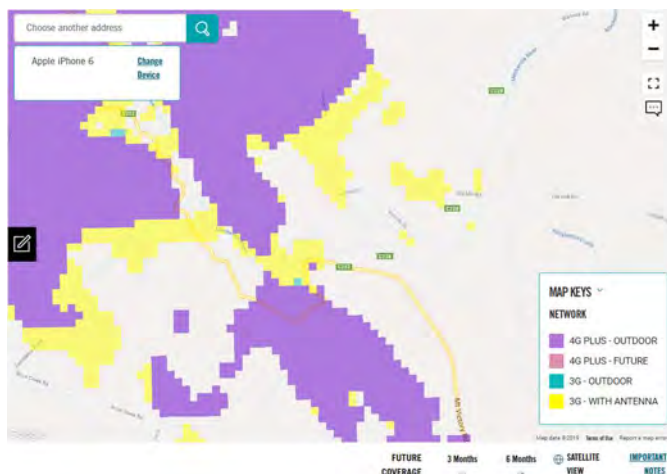
Figure 105 Optus mobile coverage of Mackenzie Falls
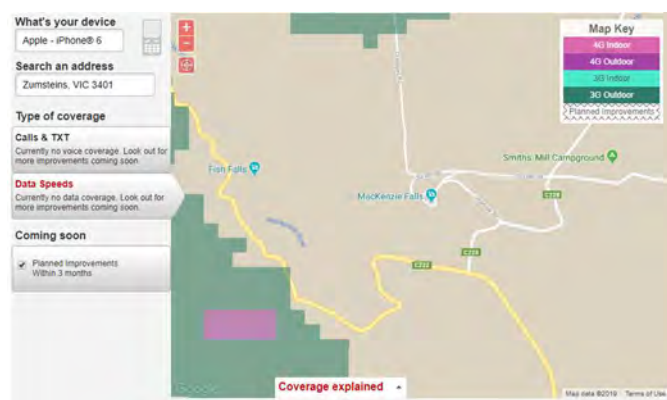
Figure 106 Vodafone mobile coverage of Mackenzie Falls

5.7 Beehive Falls

Beehive Falls is a waterfall display located in the Grampians National Park. This waterfall is accessible from the Beehive Falls car park with a moderate 2.8 kilometres walking track leading to the falls.
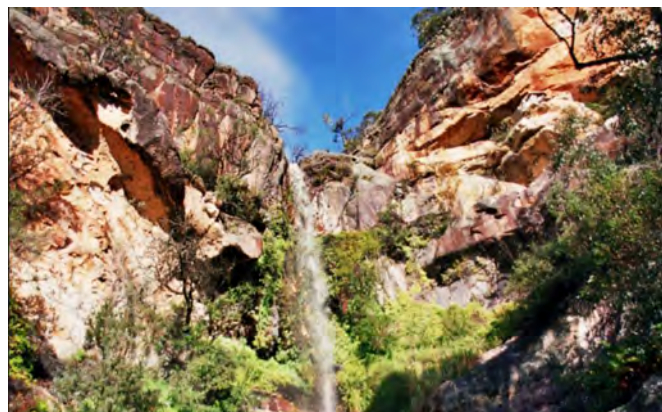

Figure 107 Beehive Falls [22]

Fixed Broadband

Our analysis reveals Beehive Falls and surrounding area falls into the NBN Co's satellite footprint.

Further analysis reveals the nearby town of Horsham is predominately serviced by NBN FTTN fixed line and NBN fixed wireless.
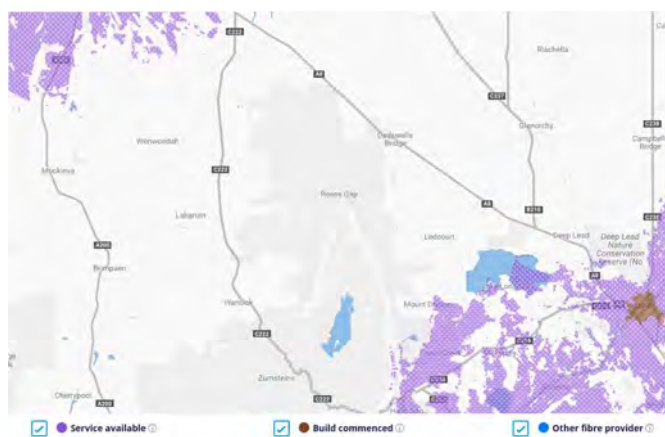
Figure 108 NBN Coverage of Beehive Falls (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

[22] *https://www.visitmelbourne.com/regions/grampians/things-to-do/nature-and-wildlife/lakes-and-waterways/beehive-falls*

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

Figure 109 Telstra mobile coverage of Beehive Falls
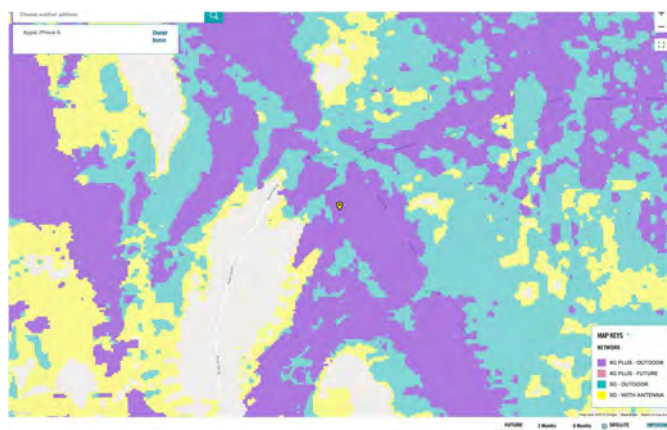
Figure 110 Optus mobile coverage of Beehive Falls

Figure 111 Vodafone mobile coverage of Beehive Falls

5.8 Lake Charlegrark

Lake Charlegrark, located in Minimay, is a popular spot for water skiing in the summer months with a campsite and accommodation provided at the lake. The lake contains fish such as Murray Cod, Yellow Fin fish and Red Fin which makes it a hotspot for fishing.
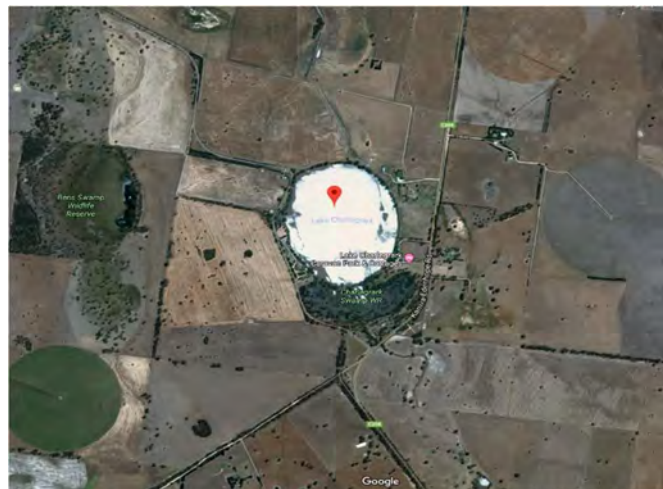
Figure 112 Aerial imagery of Lake Charlegrark

Fixed Broadband

Our analysis reveals that Lake Charlegrark and the surrounding areas fall into the NBN Co's satellite footprint.

Figure 113 NBN Coverage of Lake Charlegrark (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 3G handheld device only coverage in the area with patches of 3G external antenna coverage in the surrounding area
- Optus shows 4G Plus outdoor coverage in the area
- Vodafone shows no mobile coverage in the area.

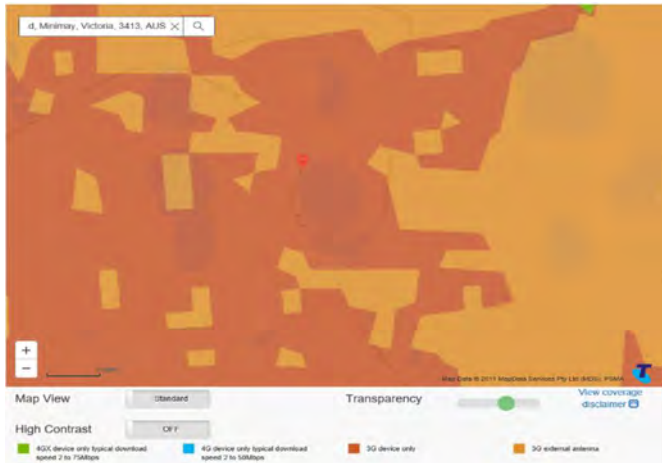In summary, there appears to be good 4G coverage from only one mobile network operator in the area.

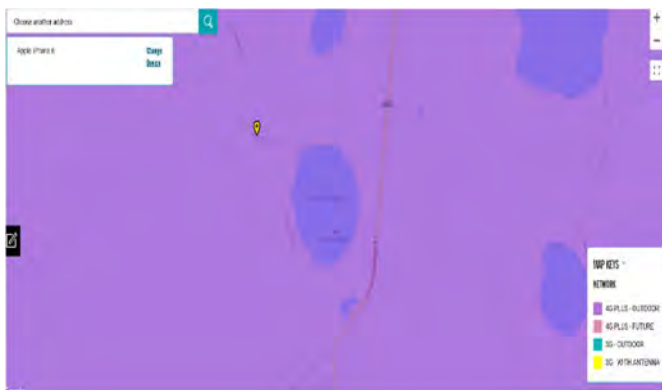Figure 114 Telstra mobile coverage at Lake Charlegrark

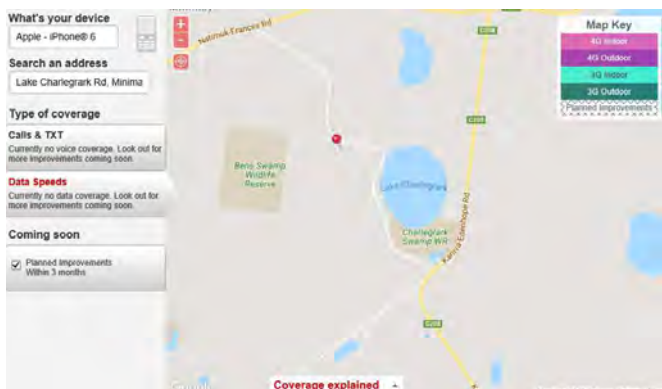Figure 115 Optus mobile coverage at Lake Charlegrark

Figure 116 Vodafone mobile coverage at Lake Charlegrark

5.9 Grampians Peaks Trail

The Grampians Peaks Trail is one of the Walk Victoria's Icons trails that is currently under construction. Once complete, the trail will be a 160 kilometre journey through the Grampians National Park commencing at the peaks around Mt Zero in the north to Mount Abrupt overlooking the Dunkeld township in the south.

The first section of the trail has been completed and is a 36 kilometre, three-day/two-night circuit walk

departing from Halls Gap. The walk offers views from the top of Mount Rosea, Pinnacle Lookout and the rock features of the Grand Canyon. The remaining sections of the trail are scheduled to be completed in late 2020.
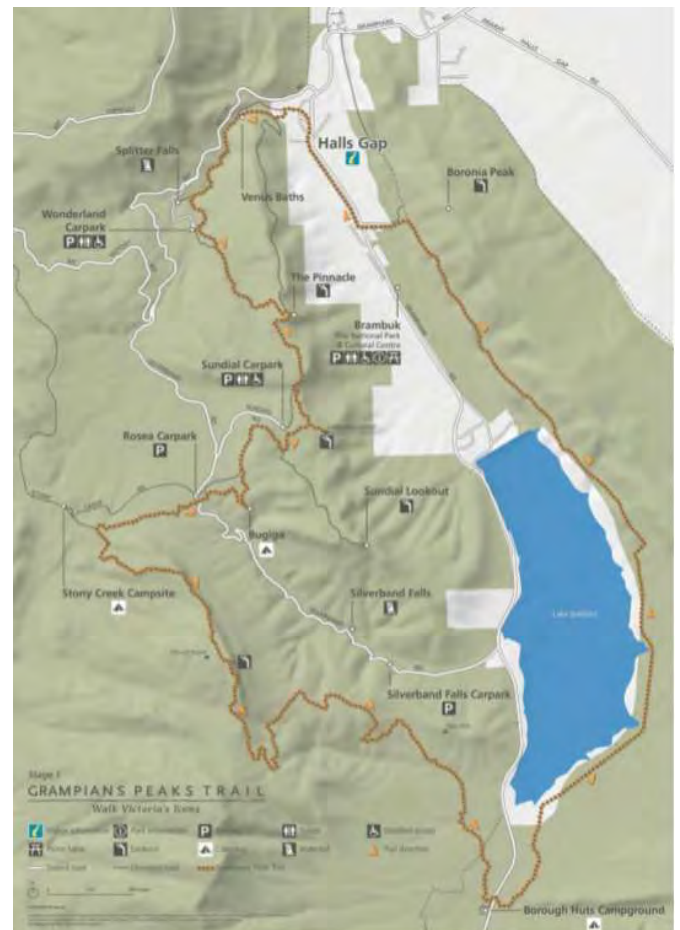

Figure 117 Map of the first section of the Grampians Peaks Trail

Figure 118 Aerial imagery of the first section of the Grampians Peaks Trail

Fixed Broadband

Our analysis reveals that the town of Halls Gap has NBN fixed wireless coverage including the Halls Gap Visitor Information Centre and Brambuk National Park and Cultural Centre.
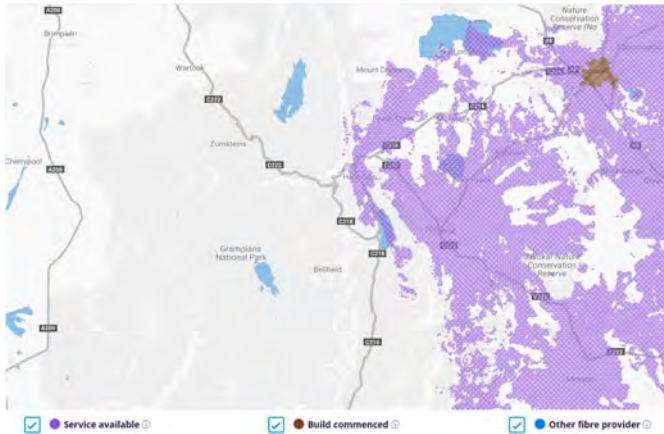

Figure 119 NBN Coverage of the Grampians Peaks Trail (NBN Co)

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 trail with patchy 3G device coverage. The southern section of the trail is without coverage
- Optus shows 4G Plus outdoor coverage across most of the trail however, there are some areas of 3G *outdoor* handheld coverage
- Vodafone shows non-continuous 4G and 3G outdoor coverage of the trail with sections having no coverage.

In summary, there is patchy 4G coverage from multiple operators in the area, but not continuous coverage from multiple operators.
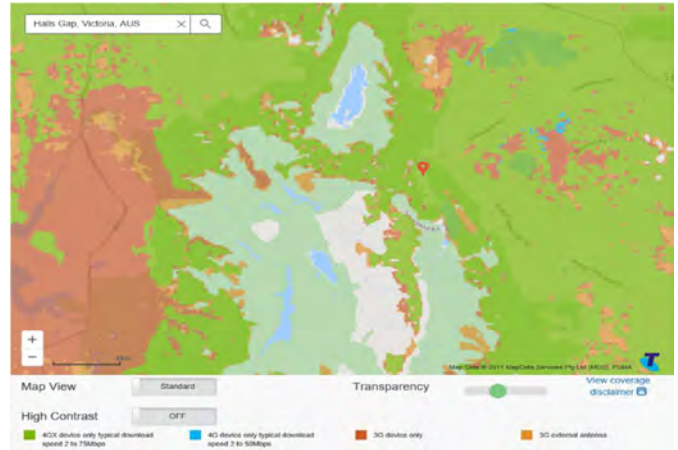

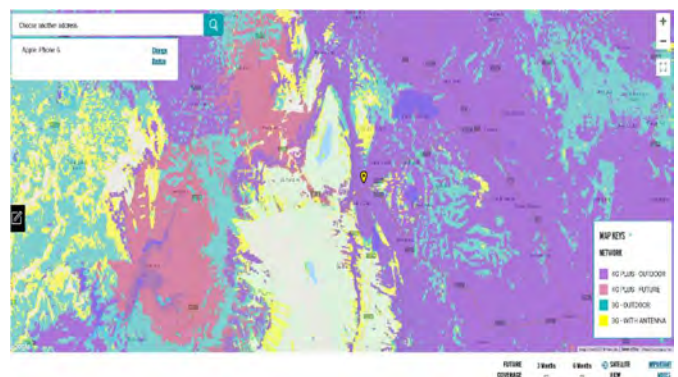Figure 120 Telstra mobile coverage of the Grampians Peaks Trail

Figure 121 Optus mobile coverage of the Grampians Peaks Trail

Figure 122 Vodafone mobile coverage of the Grampians Peaks Trail

5.10 Silo Art Trail

The Silo Art Trail is a 200 kilometre journey that showcases large-scale mural portraits created by local and international street artists on the various grain silos located in Patchewollock, Lascelles, Rosebery, Brim, Sheep Hills and Rupanyup.

Figure 123 Brim Silo Art [23]

Figure 124 Silo Art Trail Area Map [24]

Fixed Broadband

Our analysis reveals that NBN satellite and NBN fixed wireless services the towns on the Silo Art Trail from Rupanyup to Patchewollock.

Further analysis reveals NBN fixed wireless provides coverage for the towns located in the south which

includes Rupanyup, Minyip, Sheep Hills, Brim and Hopetoun (located further north). The towns of Rosebery, Lascelles and Patchewollock are serviced by NBN satellite.
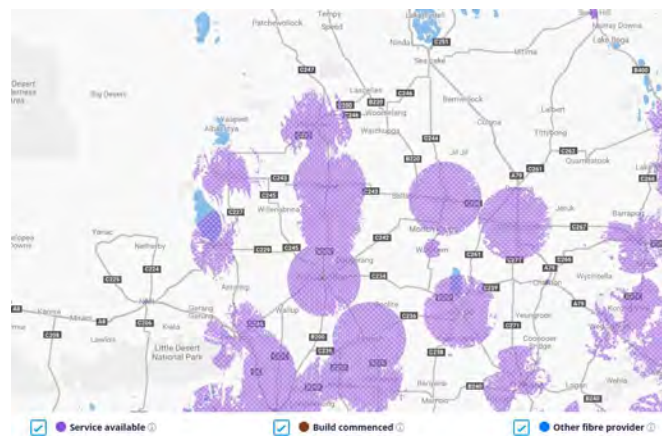

Figure 125 NBN Coverage of the Silo Art Trail (NBN Co)

Mobile Coverage

Based on public coverage maps:

- Telstra shows 4GX outdoor handheld device coverage (with a typical download speed of 2-75 Mbps) in all of the towns except for Rosebery which has 3G device and 3G external antenna coverage. The Sunraysia, Hopetoun-Walpeup and Henty Highways have 4GX outdoor handheld device, 3G device and 3G external antenna coverage down to Rosebery. The remaining route to Rupanyup has 4GX outdoor handheld device coverage
- Optus shows 4G Plus outdoor, 3G outdoor and 3G with antenna coverage in all the towns
- Vodafone shows no mobile coverage of the area.

In summary, visitors have options for good coverage on the journey from two of the three mobile network operators.

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[23] https://www.visitmelbourne.com/regions/grampians/things-to-do/art-theatre-and-culture/public-art/brim-silo

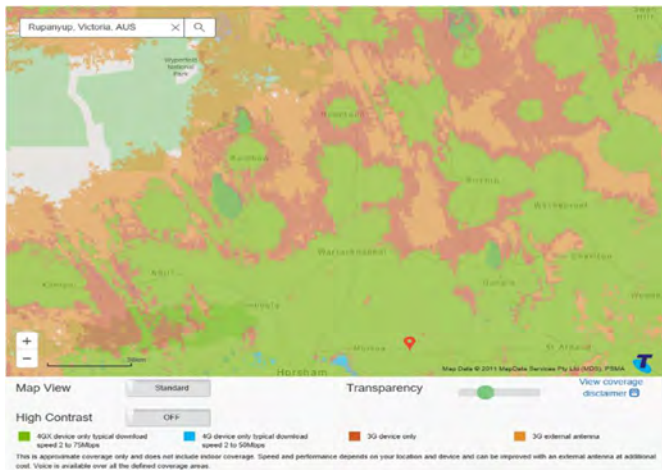[24] http://siloarttrail.com/home/#area-map

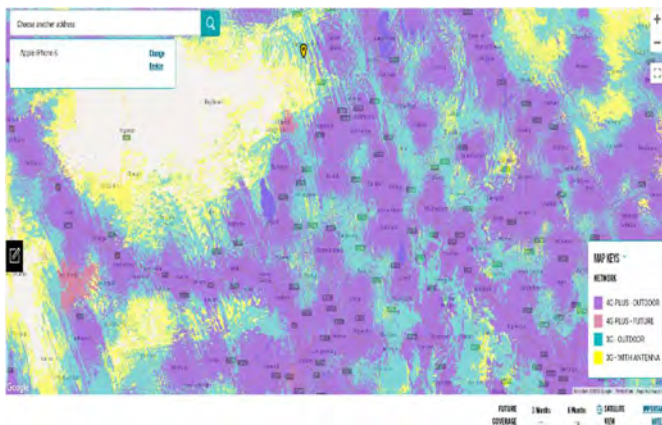Figure 126 Telstra mobile coverage of the Silo Art Trail

Figure 127 Optus mobile coverage of the Silo Art Trail

Figure 128 Vodafone mobile coverage of the Silo Art Trail

5.11 Great Western Rodeo

The Great Western Rodeo is a popular family friendly event held annually attracting local and international visitors at the Great Western Racecourse Reserve in Great Western.

The event is run by the Great Western Football and Netball Club and is held over the Easter Weekend giving visitors time to experience the rodeo shows, live music and other forms of entertainment. The rodeo show is scheduled for the Good Friday with live entertainment ending the night. Free camping is available on the Friday night with a recovery breakfast offered on the Saturday morning.

Figure 129 Rodeo show at the Great Western Rodeo[25]

Figure 130 Aerial imagery of Great Western Racecourse Reserve

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[25] http://www.greatwesternrodeo.com.au

Fixed Broadband

Our analysis reveals that the Great Western Rodeo venue falls into the NBN fixed wireless footprint.
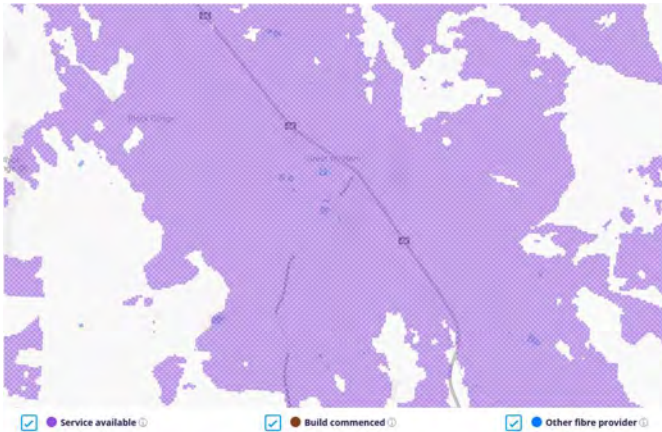

Figure 131 NBN Coverage of the Great Western Racecourse Reserve (NBN Co)

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

Figure 132 Telstra mobile coverage of the venue

Figure 133 Optus mobile coverage of the venue

Figure 134 Vodafone mobile coverage of the venue

5.12 Patchewollock Music Festival

This unique free three-day bush music festival in Patchewollock is run annually and organised by volunteers. It was initially planned as a one-off event back in 2012 but proved so successful, it became an annual event.

Various forms of entertainment are organised for all ages such as theatre, bush poetry, workshops and music to suit different tastes.

Figure 135 A performance at the Patchewollock Music Festival [26]

Fixed Broadband

Our analysis reveals that the venue of the Patchewollock Music Festival (38 Federation St) falls in the NBN Co's satellite footprint.

Figure 136 NBN Coverage at the venue of the Patchewollock Music Festival (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

In summary, visitors have options for good coverage at the venue from two of the three mobile network operators.
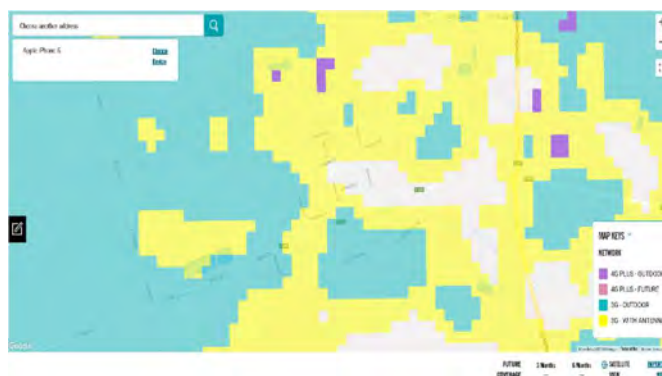

Figure 137 Telstra mobile coverage of the venue
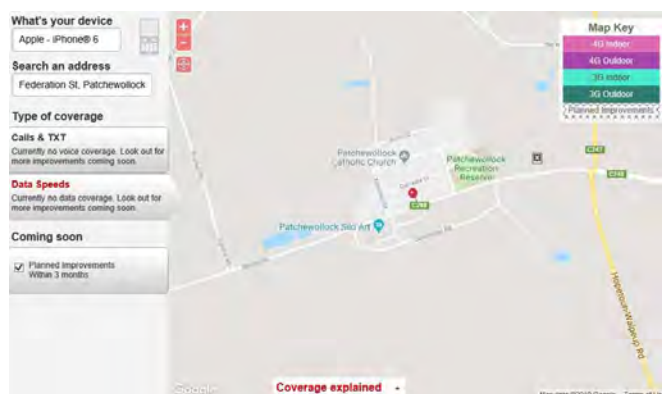

Figure 138 Optus mobile coverage of the venue

Figure 139 Vodafone mobile coverage of the venue

5.13 Horsham Fishing Competition

Horsham Fishing Competition is a fishing contest held annually on the Sunday of the Labour Day Weekend in March on the banks of the Wimmera River.

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[26] https://www.patchewollockmusicfestival.com.au/gallery.html

This is a family friendly event with competitions for all ages from toddlers through to seniors with fish such as Red Fin, Murray Cod and Silver Birch available to be caught. Free and paid camping sites are available along the banks of the river for those planning to stay for the whole competition.

Figure 140 Horsham Fishing Competition Map

Fixed Broadband

Our analysis reveals that the location of the Horsham Fishing competition falls into the NBN FTTN fixed line footprint.
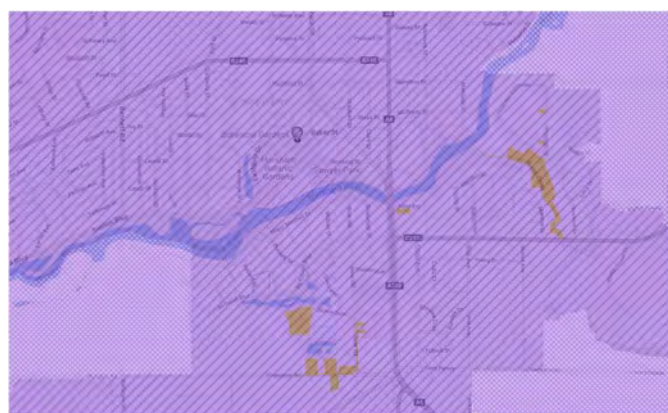

Figure 141 NBN Coverage of the Horsham Fishing Competition (NBN Co)

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 area
- Optus shows 4G Plus outdoor coverage of the area
- Vodafone 4G indoor coverage of the area.

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

Figure 142 Telstra mobile coverage of the venue

Figure 143 Optus mobile coverage of the venue

Figure 144 Vodafone mobile coverage of the venue

5.14 Nati Frinj

The Nati Frinj is a three-day biennial community arts festival that has been run since 2000 in the township of Natimuk.

Scheduled for the three-day event is a mix of performing and visual arts, live music, exhibitions, markets and workshops to entertain locals and visitors.

Figure 145 Aerial performance show at Nati Frinj [27]

Fixed Broadband

Our analysis reveals that the township of Natimuk falls into the NBN fixed wireless footprint.

Figure 146 NBN Coverage of the town of Natimuk (NBN Co)

Mobile Coverage

Based on public coverage maps:

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

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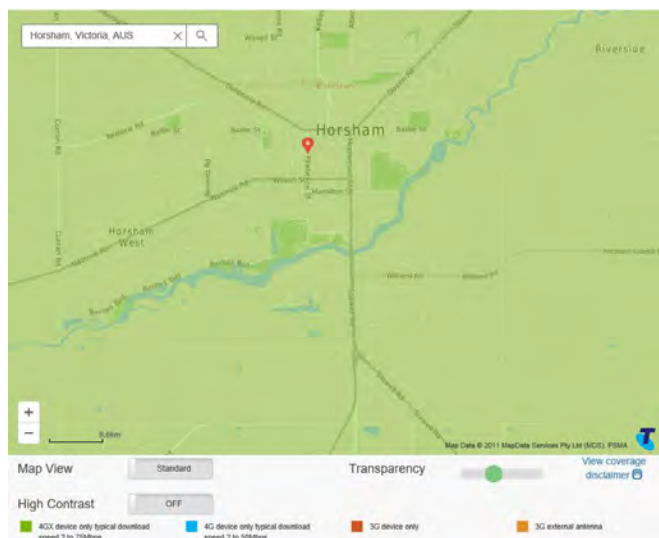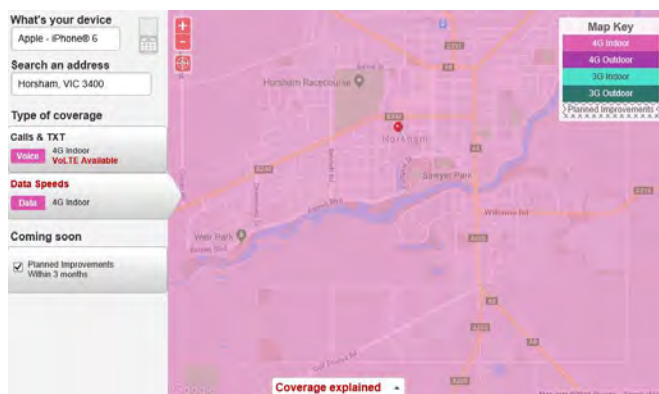

Figure 147 Telstra mobile coverage of the town of Natimuk

Figure 148 Optus mobile coverage of the town of Natimuk

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[27] https://natifrinj.com
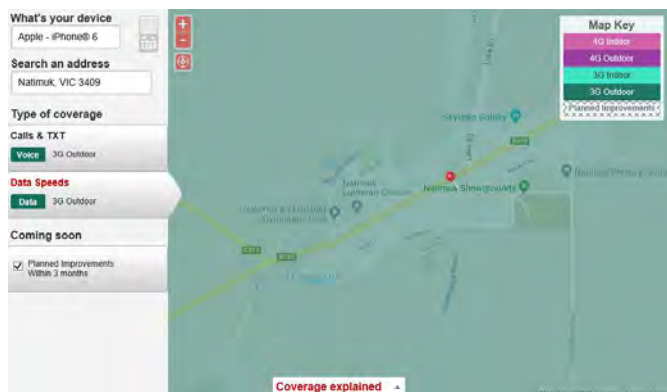
Figure 149 Vodafone mobile coverage of the town of Natimuk

5.15 Horsham Agricultural Show

The Horsham Agricultural Show is a family friendly event run every year on the middle Sunday of the September/October school holidays at the Maydale Reserve.

The show is an opportunity for visitors to be informed on how food is sourced and processed. Numerous competitions are held throughout the show including the Beaut Ute competition, Fleece Competition and Legacy Wool Show, Johnson Asahi Hay & Grain Competition, Sheep Show, Lapidary, Wimmera Aquatrail Scarecrow Competition and the Stockman's Challenge.

Children can engage in a range of activities such as kids cooking, craft and decorating exhibition and playing with animals as well as enter competitions Baby Showtime, Miss Showgirl and Rural Ambassador.

Figure 150 Sheep on show at the Horsham Agriculture Show [28]

Fixed Broadband

Our analysis reveals that the venue for the Horsham Agriculture Show has NBN FTTN fixed line coverage.

Figure 151 NBN Coverage of the 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 of the venue.

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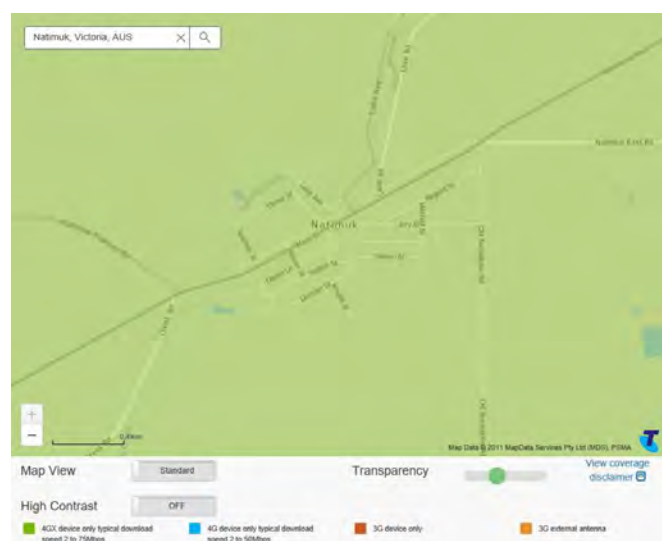

Figure 152 Telstra mobile coverage of the venue

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[28] https://www.facebook.com/pg/horshamshow/posts
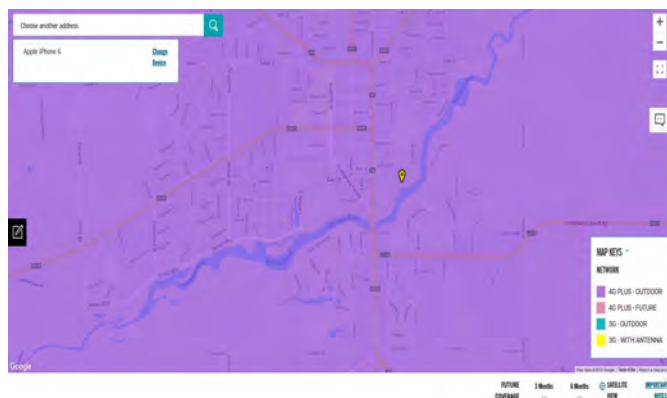
Figure 153 Optus mobile coverage of the venue
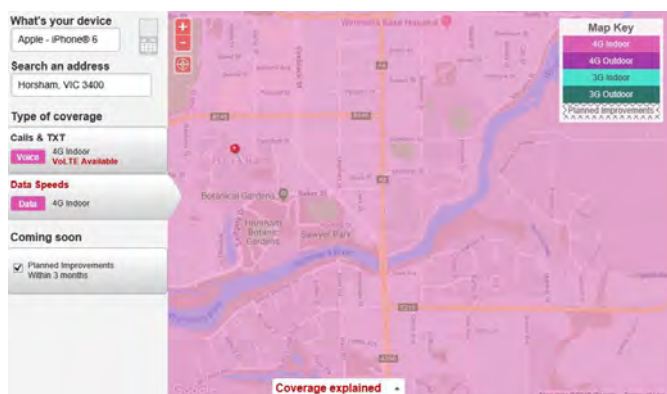
Figure 154 Vodafone mobile coverage of the venue

5.16 The West Wimmera Cup

The West Wimmera Cup is held annually at the Edenhope Racecourse on the Saturday of the Labour Day long weekend.

This popular family friendly event attracts over 1000 patrons every year promising the country cup racing experience. Also featured at the event are free kids' activities, Fashions on the Field and live entertainment.

Figure 155 The Edenhope Cup Race [29]

Fixed Broadband

Our analysis reveals that the venue for the Edenhope Cup falls into the NBN Co's satellite footprint.
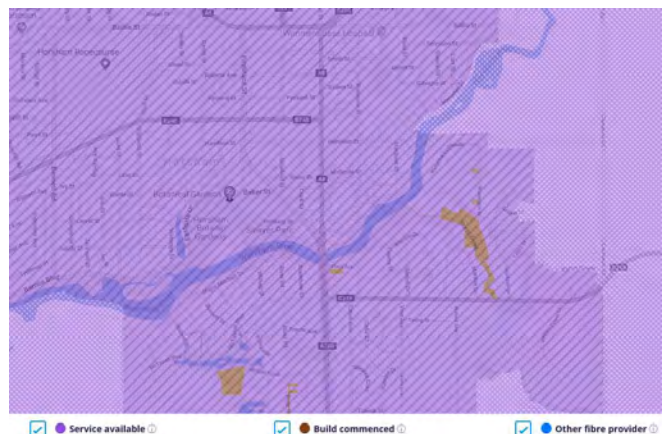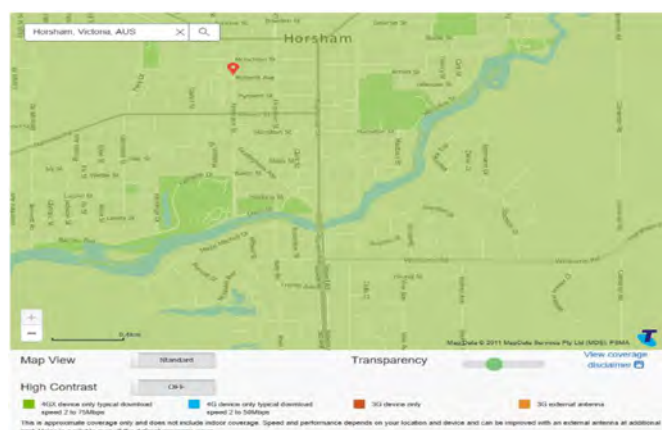

Figure 156 NBN Coverage of the venue (NBN Co)

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 no mobile coverage of the venue.

In summary, there appears to be good coverage at the venue and surrounding area from two of the three mobile network operators.

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[29] https://country.racing.com/edenhope

Figure 157 Telstra mobile coverage of the venue

Figure 158 Optus mobile coverage of the venue
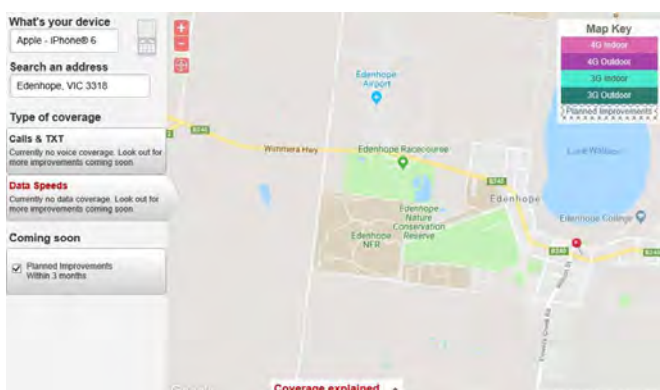
Figure 159 Vodafone mobile coverage of the venue

5.17 YFest at Warracknabeal

YFest is an annual Easter Festival held in the town of Warracknabeal within the Yarriambiack Shire. The festival runs over the Easter weekend and incorporates a number of events, including an Easter Saturday Street Parade, a vintage machinery rally at Wheatlands Museum, a golf tournament, an art show, the Easter Saturday race meeting, and Busking in the Park Competition.

The event attracts approximately 3,000 people into the township during the festival.

Fixed Broadband

Refer to Significant Places for fixed broadband analysis of Warracknabeal.

Mobile Coverage

Refer to Significant Places for mobile coverage analysis of Warracknabeal.

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

6 Transport Corridors

6.1 Introduction

For transport purposes, 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 firmly "on the radar" at this stage. In the case of road transport, the main indicator of demand is the road classification (designated M/A, B or C-grade roads)[30]. It is recognised that there may be other local roads that carry high traffic volumes or that have a poor accident history and where there is poor coverage. Local knowledge is the most effective means of identifying such locations.

Discussions with the MNOs are underway to explore incorporation of the public coverage information into SLIM. If and when such information becomes available, it will become more practical to identify and characterise transport mobile blackspots more easily and efficiently. Fieldwork commencing at the time of preparation of this report may also yield more accurate insights into significant transport mobile blackspots.
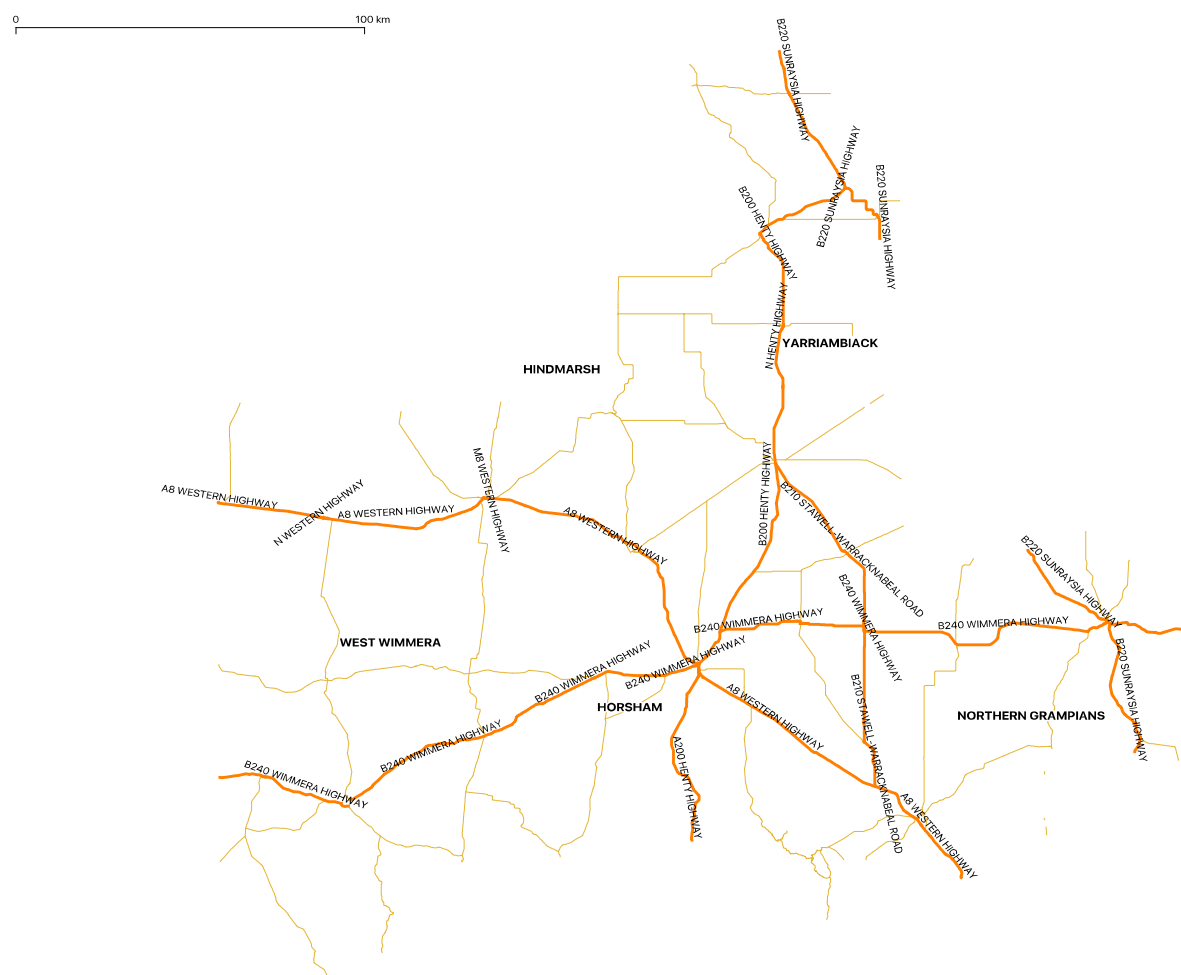
Figure 160 Declared roadways in Wimmera Southern Mallee showing all arterial highways and roads

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[30] "M" routes are primary traffic routes or motor ways. "A" routes are other primary highways and interstate or inter-regional single carriageways. "B" routes are less significant, typically linking smaller population centres to larger regional centres, but without being a major through-route in the region. "C" routes link smaller settlements and towns to the rest of the major road network.

6.2 A/B-class roads

There are no motorways in the region but there are a number of A and B highways in the region that have been reviewed by a visual scan of public carrier maps.

Highway Name	Approximate Start	Approximate End	Dist (km)
A200 HENTY HIGHWAY	Cherrypool	Horsham	46
B200 HENTY HIGHWAY	Horsham	Lascelles	142
B210 STAWELL-WARRACKNABEAL ROAD	Stawell	Warracknabeal	91
B220 SUNRAYSIA HIGHWAY	Redbank	Cope Cope	70
A8 WESTERN HIGHWAY	Armstrong	Serviceton	223
B240 WIMMERA HIGHWAY	Aspley	Logan	253

Practical experience of call dropouts and coverage blackspots when driving some of the roads suggests that the carrier coverage maps tend to overstate the quality of coverage.

A200 Henty Highway (~46 kms)

- Between Cherrypool and Horsham

This highway connects Horsham to Heywood via Hamilton in the south. The Henty Highway continues onwards after Horsham as Highway B200. The section of highway falling within the region starts near Cherrypool.
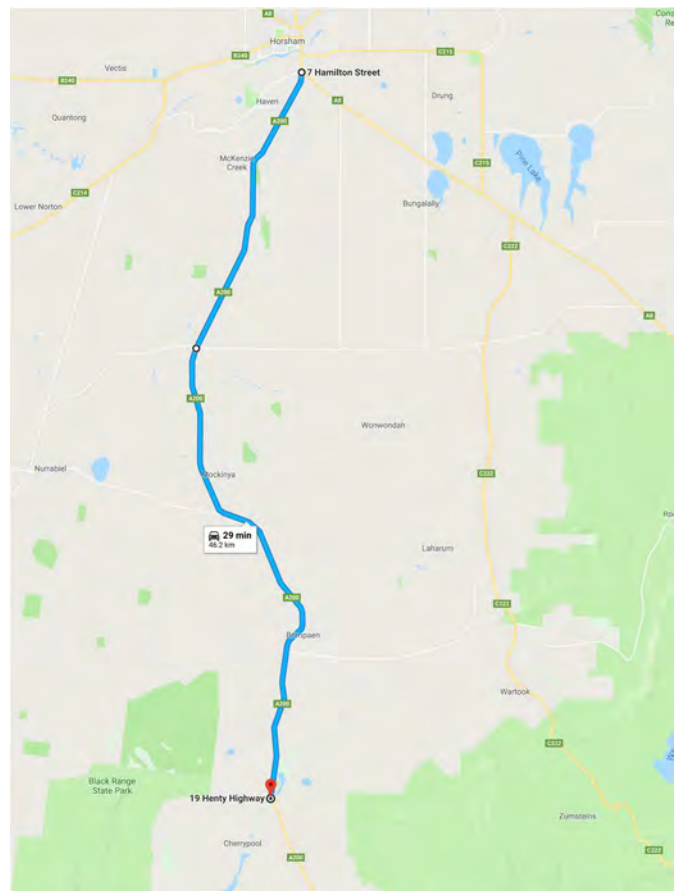
Figure 161 A200 Henty Highway between Cherrypool and Horsham (Google Maps)

- Telstra shows non-continuous 4G outdoor coverage reverting to 3G outdoor coverage around Brimpaen and between Wonwondah and McKenzie Creek
- Optus shows continuous 4G outdoor coverage but reverts to 3G outdoor coverage from Brimpaen to Cherrypool
- Vodafone shows no coverage between Cherrypool and Brimpaen then marginal 3G outdoor coverage as far as Mockinya with 4G coverage only around Horsham.

Based on public coverage maps, there appears to be patchy 4G outdoor coverage interspersed with 3G coverage by at least two mobile network operators across the entire route.
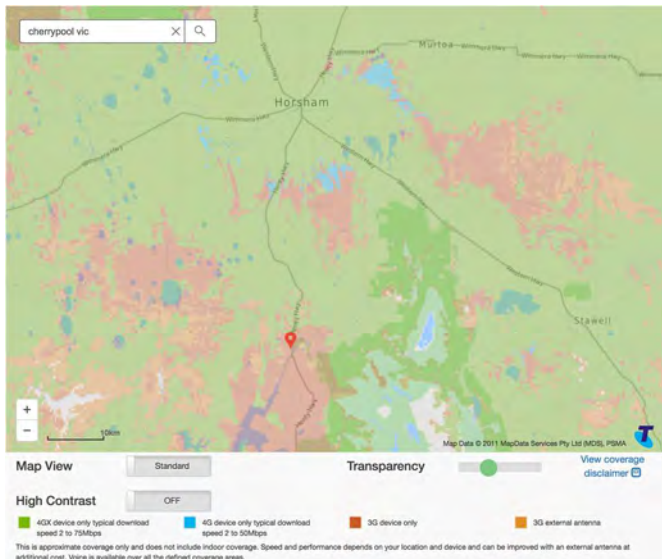
Figure 162 Telstra mobile coverage on A200 Henty Highway between Cherrypool and Horsham
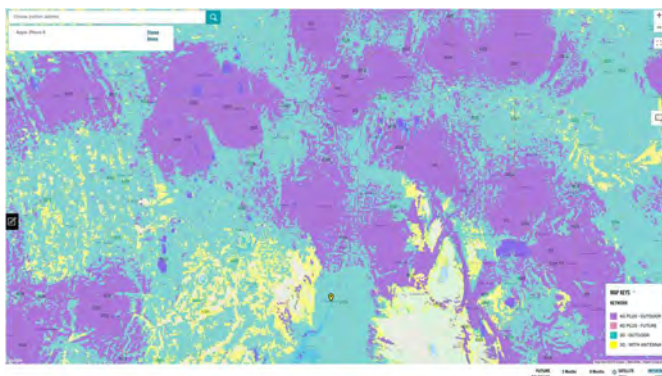
Figure 163 Optus mobile coverage on A200 Henty Highway between Cherrypool and Horsham
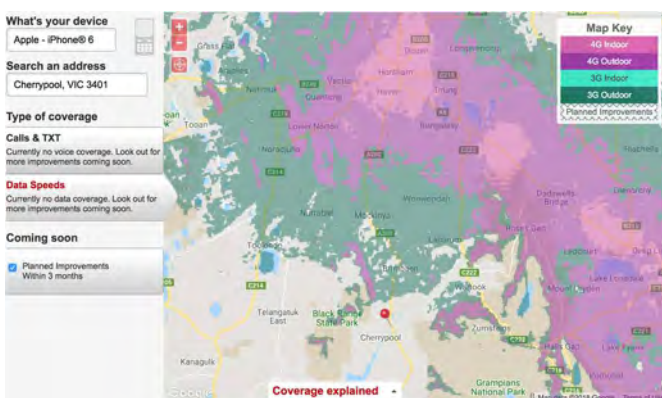
Figure 164 Vodafone mobile coverage on A200 Henty Highway between Cherrypool and Horsham

B200 Henty Highway (~142 km)

- Horsham and Lascelles

This highway traverses the region north-south from Horsham and joins the Sunraysia Highway near Lascelles in the north via Warracknabeal, Beulah and Hopetoun.

- Heading north, Telstra shows continuous 4G outdoor coverage only as far as Beulah and thereafter reverts to a mix of 4G, 3G outdoor and 3G external antenna coverage
- Optus shows continuous 3G outdoor coverage with 4G as the highway traverses the population centres of Hopetoun, Beulah, Warracknabeal and Horsham
- Vodafone shows no coverage at all north of Kewell (approximately 30 kilometres north of Horsham).

In summary, based on public coverage maps, there does not appear to be continuous 4G coverage from multiple mobile network operators.
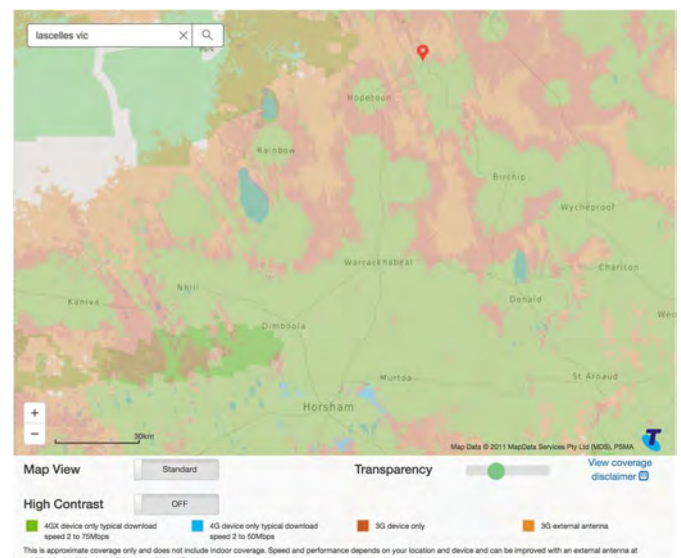
Figure 165 Telstra mobile highway coverage of B200 Henty Highway
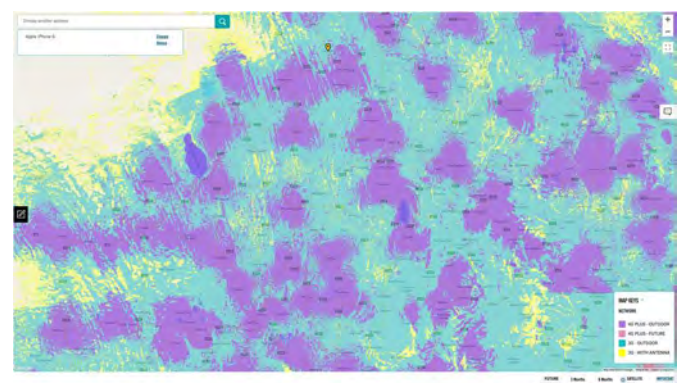
Figure 166 Optus mobile highway coverage of B200 Henty Highway

Page 106
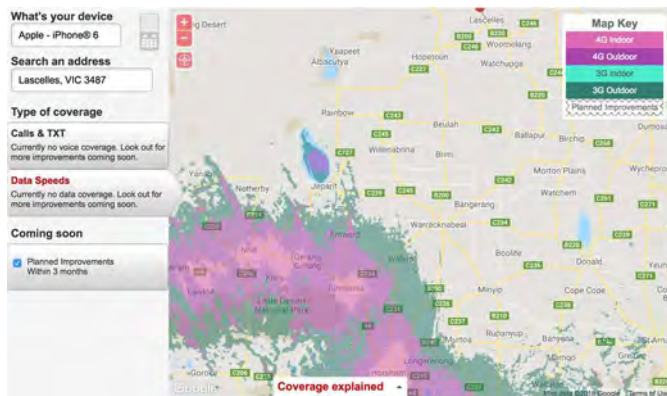
Figure 167 Vodafone mobile highway coverage of B200 Henty Highway

B210 Stawell-Warracknabeal Road (~91 km)

- Stawell to Warracknabeal

This highway connects Warracknabeal to the Western Highway near Stawell.
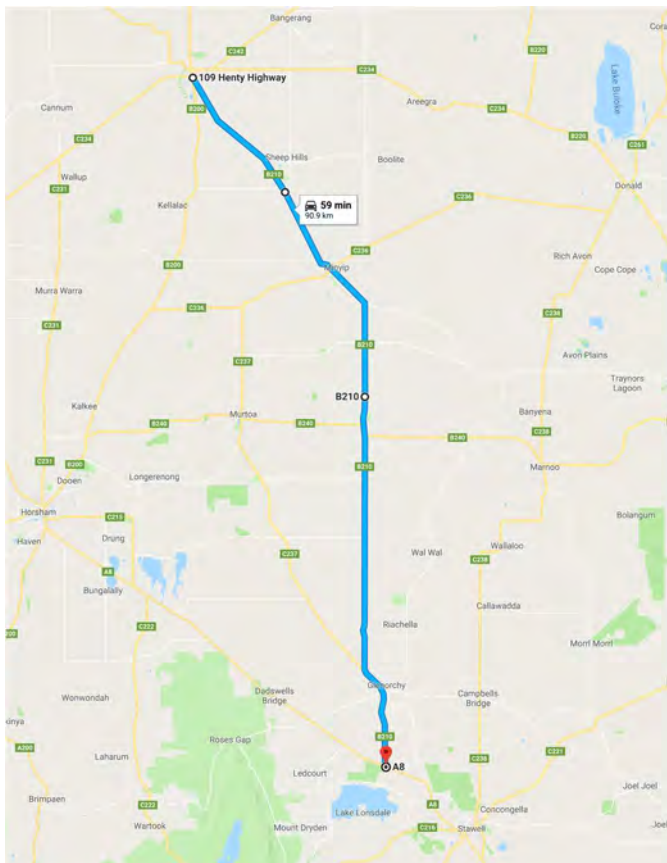
Figure 168 B210 Stawell-Warracknabeal Road between Stawell and Warracknabeal (Google Maps)

- Telstra shows 4G outdoor coverage but reverts to 3G outdoor and patchy external antenna coverage around Glenorchy

- Optus shows continuous 4G outdoor coverage for most of the route but reverts to 3G outdoor coverage around Glenorchy and Sheep Hills
- Vodafone shows no coverage north of Rupanyup near Glenorchy.

Based on public coverage maps, there appears to be 4G outdoor coverage by at least two mobile network operators for much of the route, reverting to 3G coverage over some sections of the route.
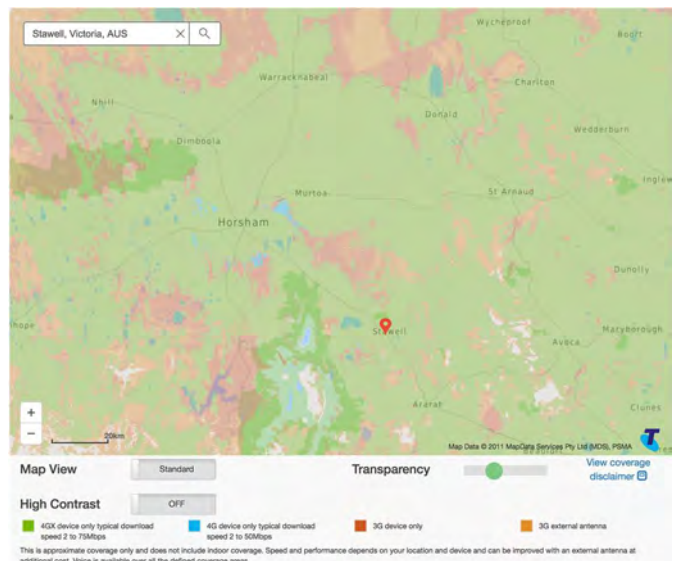
Figure 169 Telstra mobile coverage on B210 Stawell-Warracknabeal Road
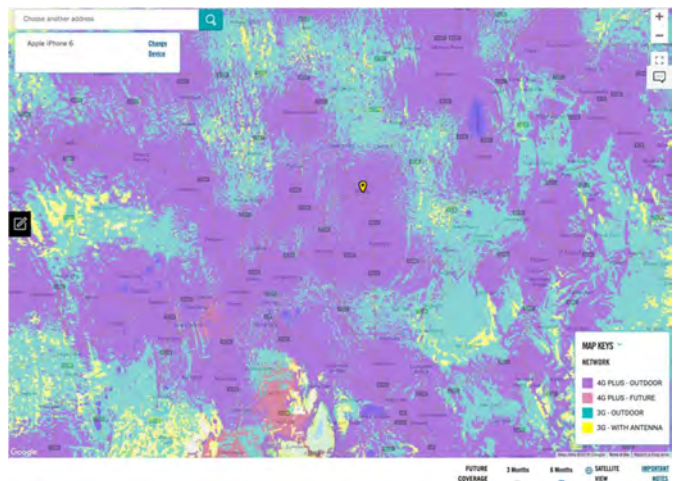
Figure 170 Optus mobile coverage on B210 Stawell-Warracknabeal Road

Figure 171 Vodafone mobile coverage on B210 Stawell-Warracknabeal Road

B220 Sunraysia Highway (~70 km)

- From Redbank to Cope Cope

The full Sunraysia Highway connects Ballarat to Ouyen in the north, traversing Avoca, St Arnaud, Donald and Birchip. However, only a small section of this highway falls within the region, from Redbank to Cope Cope via St Arnaud.

Figure 172 Portion of B220 Sunraysia Highway within the region (Google Maps)

- Telstra shows continuous 3G outdoor coverage or better over the entire route
- Optus shows continuous 3G outdoor coverage or better over the entire route
- Vodafone shows no coverage.

Based on public coverage maps, there appears to be continuous mobile coverage by at least two mobile carriers, although some sections revert to 3G coverage.
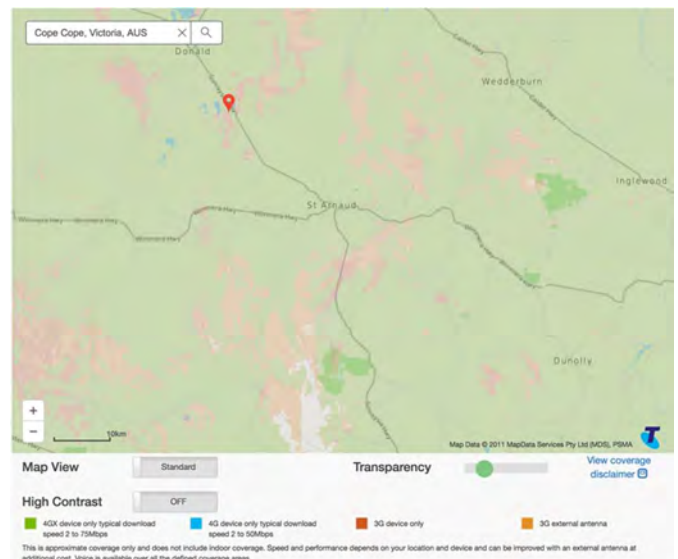
Figure 173 Telstra mobile coverage over the section of Sunraysia Highway
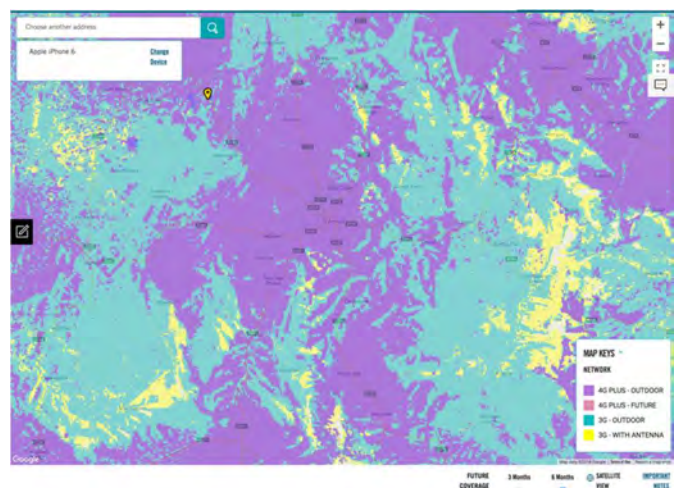
Figure 174 Optus mobile coverage over the section of Sunraysia Highway
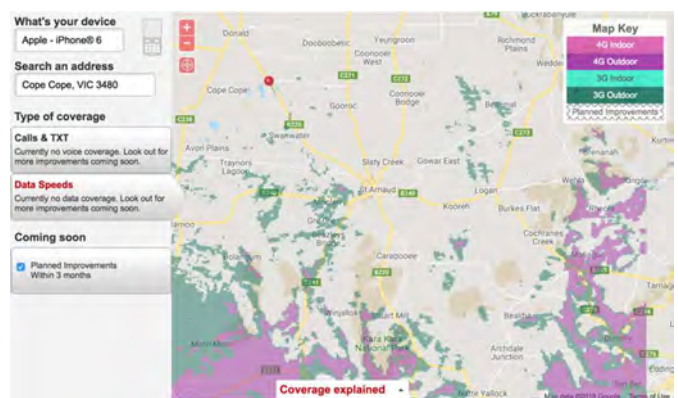
Figure 175 Vodafone mobile coverage over the section of Sunraysia Highway

A8 Western Highway (~223 km)

- From Armstrong to Serviceton

The Western Highway connects the M8 motorway near Ballarat to Adelaide. The section of the highway within the region runs from near Ararat to the Victoria-South Australia border near Bordertown via Horsham.
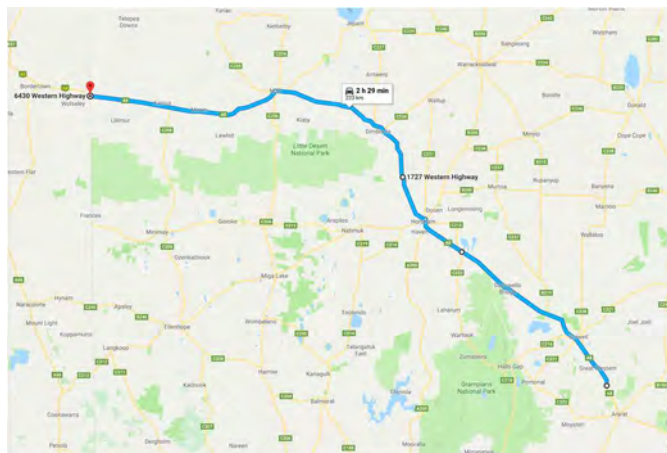
Figure 176 Section of A8 Western Highway within the region (Google Maps)

- Telstra shows 4G outdoor coverage over the majority of the route, except for an area of 3G device coverage between Kaniva and Nhill
- Optus shows continuous 4G outdoor coverage over the entire route
- Vodafone shows continuous 4G outdoor coverage over the entire route.

Based on public coverage maps, there appears to be 4G outdoor coverage by at least two mobile network operators over the entire route, with near-continuous 4G coverage by the third.
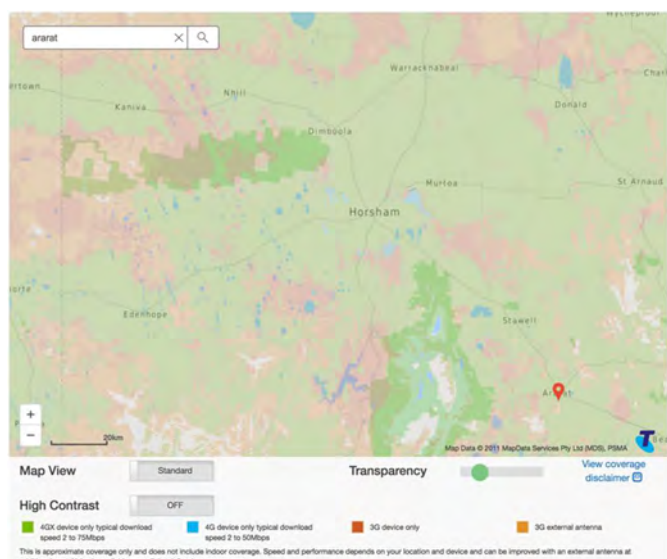
Figure 177 Telstra mobile coverage of A8 Western Highway
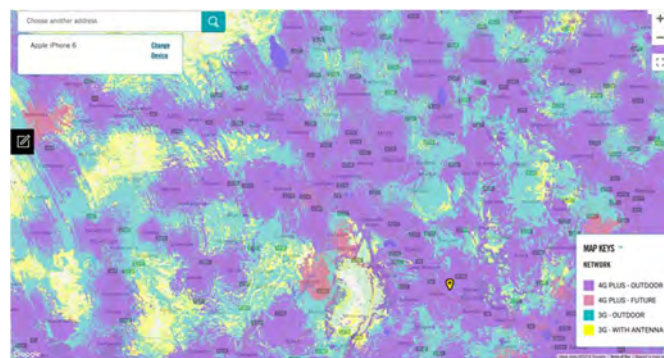
Figure 178 Optus mobile coverage of A8 Western Highway
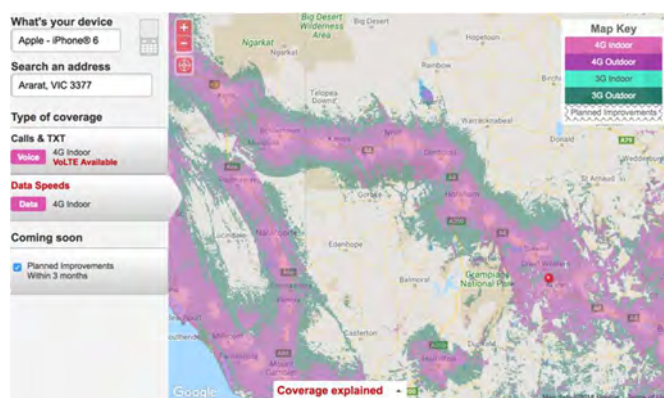
Figure 179 Vodafone mobile coverage of A8 Western Highway

B240 Wimmera Highway (~253 km)

- From Aspley to Logan

This highway runs from near Bendigo to Naracoorte in South Australia and thereafter to Adelaide. The section of the highway within the region runs from Logan to the Victoria-South Australia border near Aspley via Horsham and Edenhope.
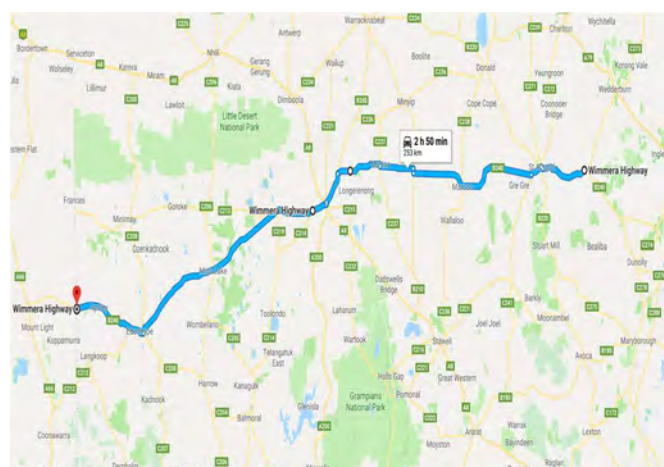
Figure 180 Section of B240 Wimmera Highway within the region (Google Maps)

- Telstra shows continuous 4G outdoor coverage over the route, although coverage appears marginal in some areas around Edenhope
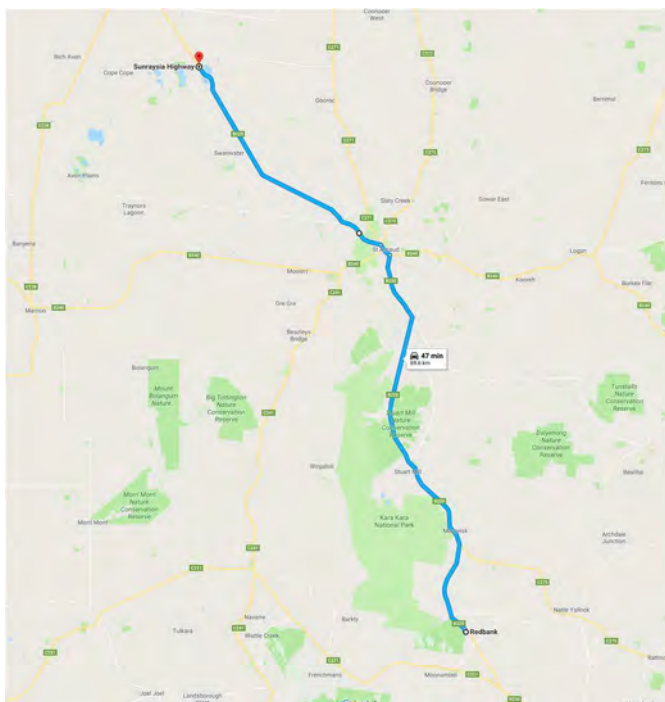- Optus shows continuous 4G outdoor, 3G outdoor and 3G with antenna coverage over the entire route
- Vodafone shows no coverage over the entire route with the exception of around Horsham.

Based on public coverage maps, there appears to be 4G outdoor coverage by at least two mobile network operators, with limited coverage by the third operator.

Figure 183 Vodafone mobile coverage of B240 Wimmera Highway

6.3 C-class roads

There are 28 declared C-class roads in the region forming a mesh between major and small communities. In general, the region's C-grade roads are served by 3G mobile outdoor coverage from at least two mobile network operators, with some 4G coverage. However, Vodafone's highway coverage is concentrated along the Western Highway only.

6.4 Rail

There are no passenger rail services in the region with V/Line servicing communities by coach (see highway mobile coverage analysis above).

Figure 181 Telstra mobile coverage of B240 Wimmera Highway
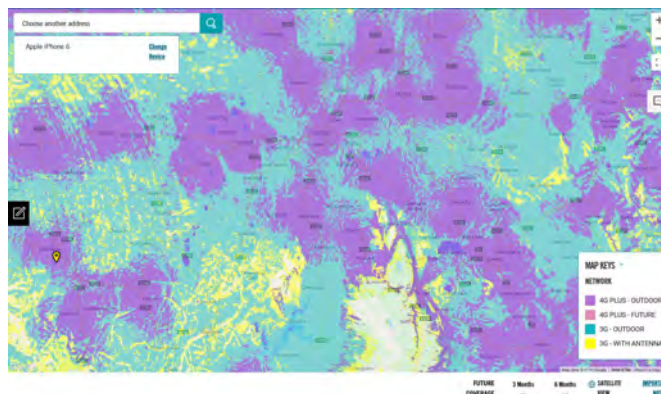
Figure 182 Optus mobile coverage of B240 Wimmera Highway

A. Acknowledgements & Qualifications

Acknowledgements

This report includes numerous images and cites many details about locations that have been obtained from a range of sources. Citing a reference for commonly accessed data sources would clutter the document and undermine the flow of relevant information. Accordingly, this section sets out some important acknowledgements regarding data sources.

1. The **Australian Bureau of Statistics** (ABS) provides a rich repository of information at varying levels of aggregation. Two sources in particular have been used extensively over the period from May 2018 to October 2018 during which time this report was prepared.

- Data by Region[31] – providing statistics at the level of Local Government Area (LGA).
- Quickstats[32] - providing statistics at varying levels of aggregation, but in particular, at the level of urban centre/locality (UCL) and slightly higher levels of aggregation as appropriate.
- These data are primarily drawn from the June 2016 Population Census.

2. Screen images generated by the **State Level Information Management** (SLIM) **Graphical Information System** (GIS) are compiled from various sources, and typically include an acknowledgement of the relevant sources in the bottom right corner of the image. Such acknowledgements have often been clipped from the images presented in this report, but are acknowledged (based on the type of background) as follows:

- For grey street map backgrounds: "Leaflet | © OpenStreetMap"
- For coloured street map backgrounds: "Leaflet | Tiles © Esri – Source: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012"

- For satellite imagery backgrounds: "Leaflet | Tiles © Esri – Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community"
- For plain grey background: "Leaflet | Tiles © Esri – Esri, DeLorme, NAVTEQ"
- For topographic backgrounds, "Leaflet | Tiles © Esri – Source: Esri, De Lorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, Geobase, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esi China (Hong Kong), and the GIS User Community"

3. For any screen capture of **Telstra**'s public coverage map that does not show an acknowledgement of the data sources, the following acknowledgement applies: "Map Data © 2011 MapData Services Pty Ltd (MDS), PSMA".

4. For any screen capture of **Optus**'s public coverage that does not show an acknowledgement of the data sources, the following acknowledgement applies: "Map data ©2018 Google".
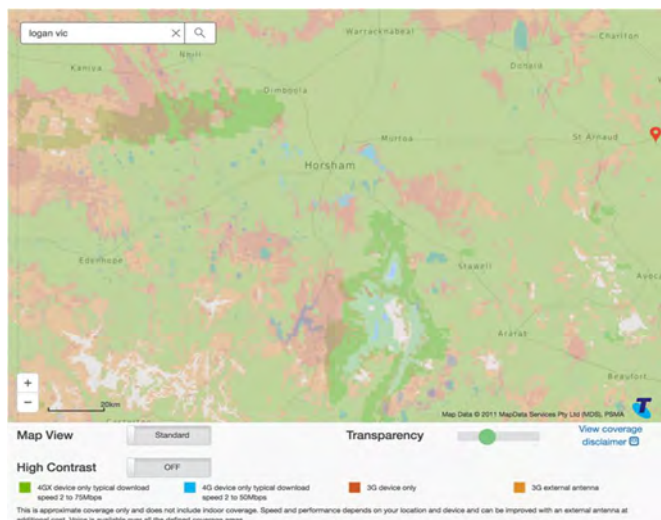
5. For any screen capture of **Vodafone**'s public coverage that does not show an acknowledgement of the data sources, the following acknowledgement applies: "Map data ©2018 GBRMPA, Google".

6. For any screen capture of **Sigfox** coverage that does not show an acknowledgement of the data source, the following acknowledgement applies: "Leaflet".

7. Region-level Digital Inclusion Index data has been purchased from Roy Morgan.

Qualifications

1. The ABS periodically makes corrections to its data (including the 2016 Census data utilised widely in this report), so minor discrepancies may be noted between figures cited in this report and data obtained from the ABS website.

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[31] See http://stat.abs.gov.au/itt/r.jsp?databyregion

[32] See for example http://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/UCL211002?opendocument

2. Coverage by different network technologies reflects the situation at a point in time. Network operators regularly expand and reconfigure the networks with resulting changes to coverage. Before placing reliance on any information presented in this report, it is prudent to obtain the latest available information.

3. Mobile reception depends on many factors including the type of device, whether the device has an external antenna and the like. Both the Optus and Vodafone public coverage maps require nominating a device. For consistency, the coverage maps shown are based on a "middle of the range" iPhone6.

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

B. Fieldwork

Two streams of fieldwork tap into the practical experience of the five local governments in Wimmera Southern Mallee and gather information for the business case feasibility analysis of the top priority project (socio-economic benefits of comprehensive digital connectivity across the region):

- A detailed online survey of local governments
- Face-to-face onsite interviews by expert market research field staff
- Analysis of existing studies provided by respondents

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 August 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 the business case analysis. The online survey also requested reports relevant to the survey topics be provided.

C. 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.

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.

The planned terrestrial NBN coverage is very patchy, 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 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, 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 high-capacity 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 low-powered 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 (LP-WAN) 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 CRCP Telecommunications Infrastructure Leveraging 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, perhaps within a broader state-wide strategy to boost digital literacy across all age-groups.

D. WSM List of Priority Projects

The table below reflects the suite of priority projects the WSM Regional Partnership has identified which would significantly contribute to addressing the digital divide across the region. Our priorities reflect the perspectives offered by WSM businesses, local government and community stakeholders, and the evidence and analysis contained in the accompanying WSM Digital Plan.

Our priorities reflect a point in time perspective on what should be done to address the digital divide across the WSM. As technology advances, infrastructure investment continues, the economy develops, and community expectations change, we will review these priorities to ensure they remain an accurate representation of the region's most pressing needs.

Prioritisation of scores has been generated by seeking ranking and feedback from councils, telecoms experts, business/industry leaders and members of the WSM Digital Plan Working Group. The higher the rating the lesser the priority. The top three priorities are highlighted below.

Theme	Project	Description	Ave
Fixed Broadband & access to fibre networks	Enhanced broadband projects	Transition towns beyond Horsham, to higher capacity fixed broadband networks i.e. Stawell, Nhill, Warracknabeal, Edenhope (Also see 3.2)	1.6
	Enable 5G rollout*	Create a 'regional demand map' to present to carriers to encourage greater coverage of 4G over the wider WSM regional area	1.5
	Better service standards	Advocate for the establishment of a national independent telecommunications advisory service for consumers regarding technology options, programs and pricing	2.6
		Advocate for the implementation of stronger NBN service level agreements and an independent Monitor to uphold these standards, with strict penalties for the NBN for poor service levels and speed	1.8
		Promote awareness of availability of business-grade NBN to commercial entities in the WSM	1.8
	Land Planning	Legislate digital connectivity in land planning laws for commercial and industrial developments	2.2
	Business / Industrial Digital Clusters and Shared Services	Develop co-working digital spaces to activate and enable business to undertake digital innovations (Wimmera Business Centre) and become support resources for early adopters, encouraging business diversification and collaboration	2.1
		Advocate for better use of the vast infrastructure of fibre services (Powercor / Ausnet / Victrack) being integrated into the Internet backbone, so that services and businesses in rural and remote locations have access to highspeed, reliable telecoms services	2.4

Mobile Coverage & Connectivity	Mobile blackspots#	Continue to provide priority mobile black spot tower (MBST) locations into rounds five and six of the Federal Government's MBST funding program, via submission through the Wimmera Development Association and communications with local representatives of carriers	1.1
	Enable 5G roll out*	Track and collate 5G demand in high demand/high-tech business, research and education precincts such as Grains Innovation Park (GIP), Stawell Underground Physics Lab (SUPL), Longerenong Agricultural College, Birchip Cropping Group, WIFT, Regional Stock Exchange and provide reports of demand back to carriers	1.5
	Improved connectivity for tourists and visitors	Encourage and advocate for service carriers to develop the best connectivity fit with Parks Victoria to improve connectivity into Grampians National Park and other key tourism assets across the region, (outlined in the Digital Plan)	2
		Educate event organisers to consider communication costs and build costs into their events more effectively	2.2

Theme	Project	Description	
IOT Networks	IoT enhancement program^	Identify farming areas and towns that will benefit from IoT network coverage through the Ag IoT trails and ensure there is suitable broadband or mobile services to match	1.6
		Support education and knowledge of landowners of Low Power Low Bandwidth Networks (LoRaWAN and NB-IoT) as ways to enable innovation and productivity gains, at relatively low cost. Focus on supporting landowners where significant productivity gains can be made from these applications, but where uptake is currently low.	1.6
		Draw on the interest and investment of government partners to enable education and training to take effect (IoT Trial and AGTIDE Ed and Training project)	1.6
		Support and encourage collaboration between Ag Vic's Smart Farm and the applied Longerenong DATA Farm initiatives to support greater take up of Ag-tech in the region	1.6
Public WIFI	Regional rail connectivity expansion	Advocate for uninterrupted mobile services on V/Line trains along the Ballarat line between Ararat and Melbourne	2.5
	Free WiFi projects	Continue to offer free public WiFi into key community gathering areas where access is important, such as Libraries and Neighbourhood Houses.	2.7

Theme	Project	Description	
Access to Govt Assets enabling better equity	Health Service technology needs analysis	Expand telehealth trials to increase services and carrier systems in partnership with the Wimmera Health Alliance	1.6
		Advocate for a three-year trial of the WSM Mobile Health Service (Bus) providing physical and telehealth access to allied health services working through schools and community hubs	1.4
	Implement digital hubs service centres	Commission research to determine demand from start-ups and small business's access to leading edge digital technologies to maximise business support, development and sustainability. Determine how such technologies could be linked to existing incubators such as the Wimmera Business Centre	2.5
Digital Skills	Digital skills and literacy training	Drive initiatives that remove financial barriers for young students and adult learners to access technology to enhance their learning and employment opportunities	1.7
		Facilitate digital literacy, including funding to educate business and service providers of how to use 4G to its' fullest effect and maximise enhanced broadband through the Horsham enhanced broadband trial	1.7
		Increase availability of locally delivered post-secondary Information Communications and Telecommunications (ITC) skills to support the region's current and future ITC needs	2
		Develop and deliver a digital capability assessment or strategy for WSM businesses that will assist in economic growth and access to export markets	2
Theme	Project	Description	
Future needs & Planning	Digital Plan Engagement	WSM Regional Partnership continue business and community engagement to showcase the Digital Plan and continue to seek local input and advocacy	2.1
		Launch the State Level Information Management (SLIM) database making it widely accessible for use as an investment tool for regional Victoria	1.9
		Advocate for periodical funding to update the digital plans and SLIM database	2.2
		Undertake a process to identify and document key regional businesses and/or key precinct's technology needs for the next 5 years.	1.3

	"Smart Precinct' digital & technology needs audit	Document limitations and infrastructure needs i.e. Livestock exchanges, Industrial estates, WIFT, GIP, Longy, Business incubators including the Wimmera Business Centre, as these locations move to 'smarter' more integrated technologies	1.5
	'Smart City' Planning for key towns	Start to plan for future needs of regional centres in the WSM to be able to address future Smart City needs, including infrastructure, connectivity, security and data management	1.9
	High-speed connectivity & new infrastructure	Standardise and prioritise enhanced digital connections and hardware into ALL new infrastructure developments (i.e. Dimboola Library)	1.5

Notes:

Note on Roaming services: The ACCC has ruled that telecommunication providers do not have to allow roaming on their towers for other carriers, therefore advocacy may be limited. Carriers would require compensation for shared use of new and existing towers.

* Note on 5G roll out. Coverage is determined by the long-term investment plans of carriers. To change plans would require subsidy to carriers. There also needs to be enough devices available to support 5G before it can be widely adopted.

^ Note on IoT enhancement program: The type of network coverage provided through the IoT trial, is applicable only to the transmission of sensor data, small packets of data. Coverage is already in place for networks such as NB-IOT, but unlicensed networks such as LoRaWAN require expansion to cater to farmers' needs. Some farmers will require sufficient broadband connectivity to see the results of the sensing data.

E. WSM Funded Black Spot Towers
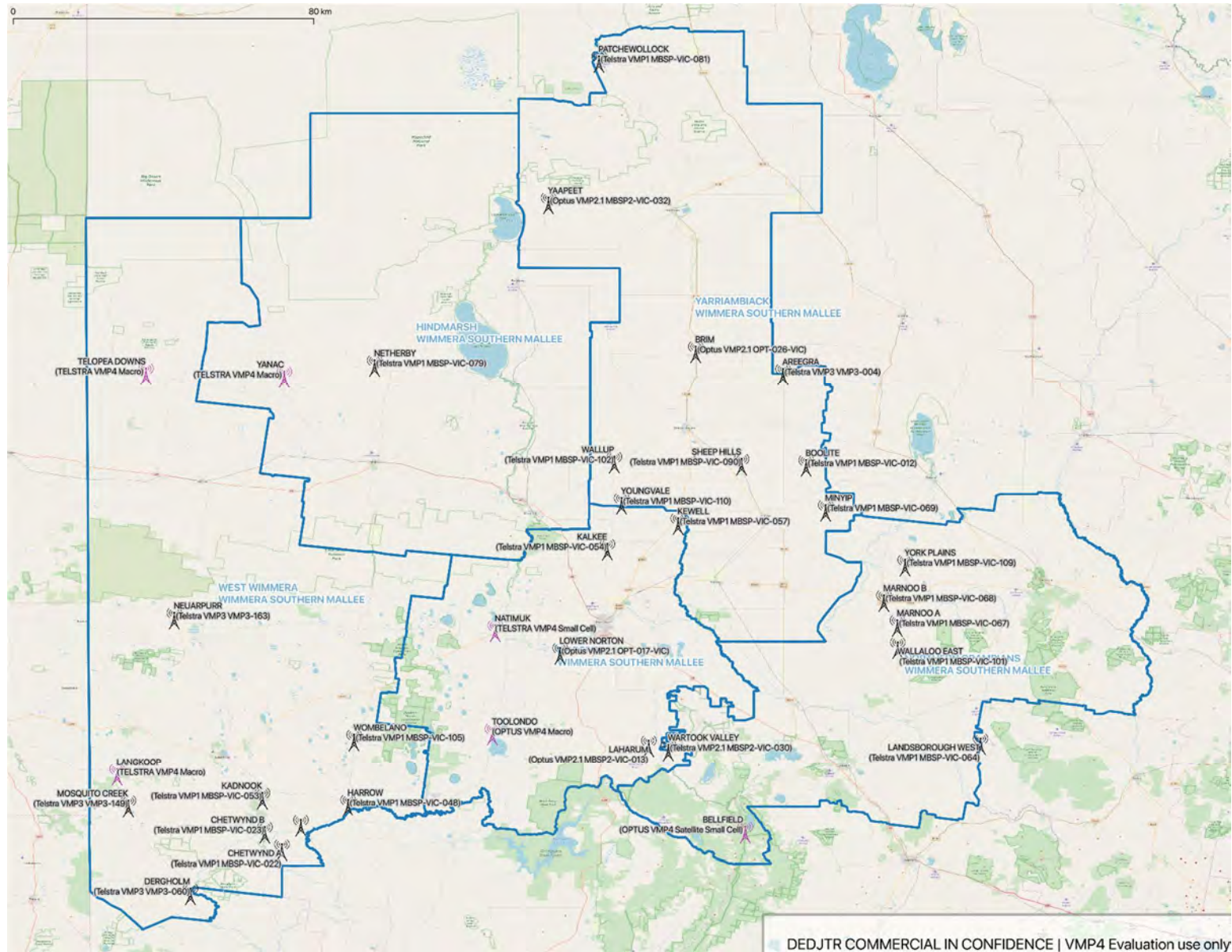
F. WSM Mobile Blackspot Priority Locations

The table below captures priority mobile blackspot locations as identified by each local government area. It indicates which locations to date have been funded and which are the remaining local government priorities.

							Information prepared by Wimnmera Southern Mallee Regional Partnership- Priority Blackspots locations as of July 2019									
LGA	Locality	Carrier	BST Round 1	BST Round 2	BST Round 3	BST Round 4	Remaining Priorities	Population	Tourism	Ag	transport route	Emergency Services	Other Eco Dev	LGA ranking by CEO	BST Regional Priority	Status
Yarriambiack Shire	Boolite	Telstra														Complete
	Minyip	Telstra														Complete
	Patchewollock	Telstra														Complete
	Sheep Hills	Telstra														Complete
	Wallup	Telstra														Complete
	Youngvale	Telstra														Complete
	Yaapeet	Optus														Complete
	Brim	Optus		2.1												Planned completion
	Areegra	Telstra														Planned completion
	Lubeck (Hshm Lubeck & Lubeck tip Intersection)							y		y	y	y		1	1	
	Rosebery							y	y	y	y	y		2		
	Near Lascelle							y	y	y	y	y		3		
	Brim West (Willenabringa) on the Warracknabeal Rainbow Jeparit Rd							y		y	y	y		4		
	West of Rosebury							y		y		y		5		

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Shire	Location	Provider												Status
	Reedy Dam -East of beluah						red			y			6		
Hindmarsh Shire	Netherby	Telstra	green											Complete
	Yanac	Telstra				blue								Planned completion
	Outlet Creek (covers Loquon)								y	y		y	1	1	
	Antwerp Telephone Exchange									y		y	2		
	Glenlee Telephone Exchange									y		y	3		
West Wimmera	Chetwynd A	Telstra	green											Complete
	Chetwynd B	Telstra	green											Complete
	Connewirricoo	Telstra	green											Complete
	Harrow	Telstra	green											Complete
	Kadnook	Telstra	green											Complete
	Wombelano	Telstra	green											Complete
	Dergholm	Telstra			yellow									Complete
	Mosquito Creek	Telstra			yellow									Complete
	Neuarpurr	Telstra			yellow									Complete
	Langkoop	Telstra				blue								Planned completion
	Telopea Downs	Telstra				blue								Planned completion
	Douglas (sth east part of shire)						red	y		y	y	y	1	1	
	Patyah/ Ozenkadnook-						red	y		y	y	y	2		

Region	Location	Provider													Status
	Kaniva-Edenhope Rd Patyah VIC 3318						🟥								
Horsham	Kalkee	Telstra	🟩												Complete
	Kewell	Telstra	🟩												Complete
	Laharum	Optus		🟧											Complete
	Wartook Valley	Telstra		🟧											Complete
	Lower Norton	Optus		2.1											Complete
	Toolondo	Optus				🟦									Planned completion
	Clear Lake						🟥	y		y	y	y		1	1	
	Laharum/ Mount Zero						🟥	y	y	y	y	y	y	2		
	Wartook Valley						🟥	y	y	y	y	y	y	3		
	Brimpaen						🟥	y	y	y	y	y	y	4		
	Telangutuk East						🟥			y	y	y		5		
Northern Grampians Shire															
	Marnoo A	Telstra	🟩												Complete
	Marnoo B	Telstra	🟩												Complete
	Wallaloo East	Telstra	🟩												Complete
	York Plains	Telstra	🟩												Complete
	Bellfield	Optus				🟦									Planned completion
	Swanwater						🟥	y		y	y	y		1	1	
	Halls Gap-Dunkeld Road (Burrough Hut location)						🟥	y	y		y	y	y	2		

	Black Range						🟥	y	y		y	y		3		
	Wartook						🟥	y	y	y	y	y	y	4		
	Callawadda						🟥	y			y	y		5		
	Mount Dryden									y						
	Tottington- Kanya (Between locations)								y	y						
	Winjallok									y						
	Joel									y						
	Slaty Creek									y						
	Carapooee									y						
	Rostron									y						
	Gowar East									y						