

12 June 2024

Attention: Hon Michelle Rowland MP  
Minister for Communications

**RE: Submission Letter – Regional Telecommunications Review**

Dear Minister

On behalf of the Fraser Coast Regional Council, we would like to acknowledge and welcome your Government's Regional Telecommunications Review.

We understand how critical telecommunications services are for regional Australia, allowing our communities to access services and stay connected with the rest of the country and the world.

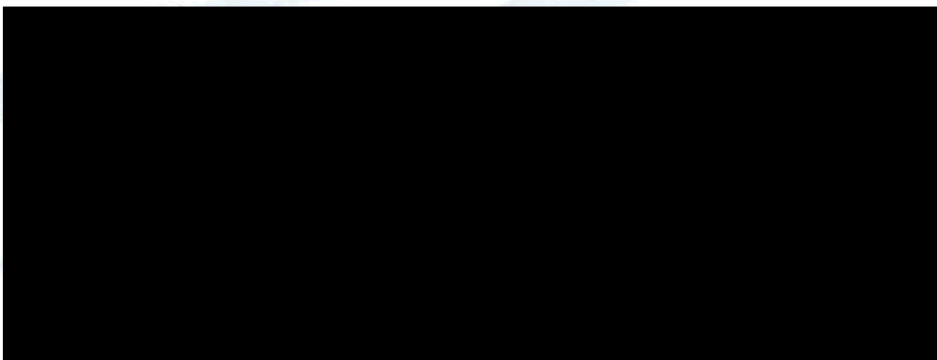
We are currently developing a digital connectivity plan for the Fraser Coast with Telstra, nbn co and other technology providers, and recently commissioned a mobile testing report which is attached.

The Fraser Coast Network Testing Report, outlined the following for the Region:

- Connectivity providers are focussing investment in intensive services closer to city centres like 5G and nbn and this leaves gaps on regional main roads and in fast growth areas, not close to city centres.
- Telstra need to provide better coverage and 4G improvement in growth areas of the Fraser Coast such as Craignish, Dundowran Beach, River Heads, Nikenbah, and St Helens.
- Optus and Vodafone need to provide better coverage and 4G improvement in Urraween, Nikenbah, Walligan, Susan River, Saltwater Creek, Maryborough West, and Aldershot.

The Fraser Coast Region is experiencing significant growth, and we need to reduce the number blackspots on our main roads and in growth areas. We need assurances that there is adequate mobile coverage and connectivity for the region, especially with the impending closure of 3G and while not ideal, at the very least the option for NBN Fixed Line services is critical for high growth regional areas.

Thank you for the opportunity to provide feedback into the telecommunications review and we look forward to hearing of the findings and future improvements to telecommunications infrastructure across the Fraser Coast and other regional communities.





**Fraser Coast**  
REGIONAL COUNCIL

**Hervey Bay & Maryborough  
Mobile Network Testing Report**



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# 1. Executive Summary

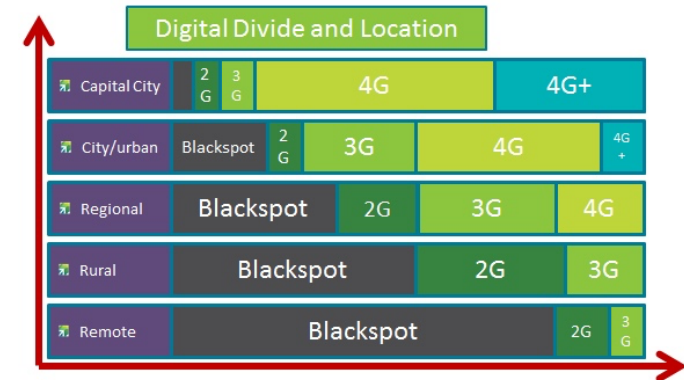
## Executive Summary

Mobile connectivity, for phone calls and broadband, has become a utility expected by business, residents and the community where ever they go. The rapid development of new technologies and faster connection options has resulted in regional and rural areas of Australia being on the wrong side of the 'Digital Divide'. In our capital cities there are virtually no Blackspots for coverage and rapid deployment of the latest generation of connectivity.

In our capital cities there are virtually no Blackspots for coverage and rapid deployment of the latest generation of connectivity. On the other side of the 'Digital Divide' Blackspots form the largest part of the landscape and their townships have technology a generation or two behind.

For regional cities like Hervey Bay and Maryborough, the challenge is to find ways to partner with the three privately owned carriers to reduce the extent of Blackspot coverage. They must seek to drive expanded and advanced deployment of the best generation technology the carriers are prepared to invest in to generate their private company need for profit. Another avenue to improve coverage is to access the Commonwealth Government Mobile Blackspot Program<sup>1</sup> and Peri-Urban Mobile Program<sup>2</sup>.

For local governments in times of disaster or emergency, being able to provide a positive experience for visitors and deliver greater productivity is now an expectation.



Successful regions have used mobile coverage reporting to inform and implement a long-term strategic action plan covering five key areas:

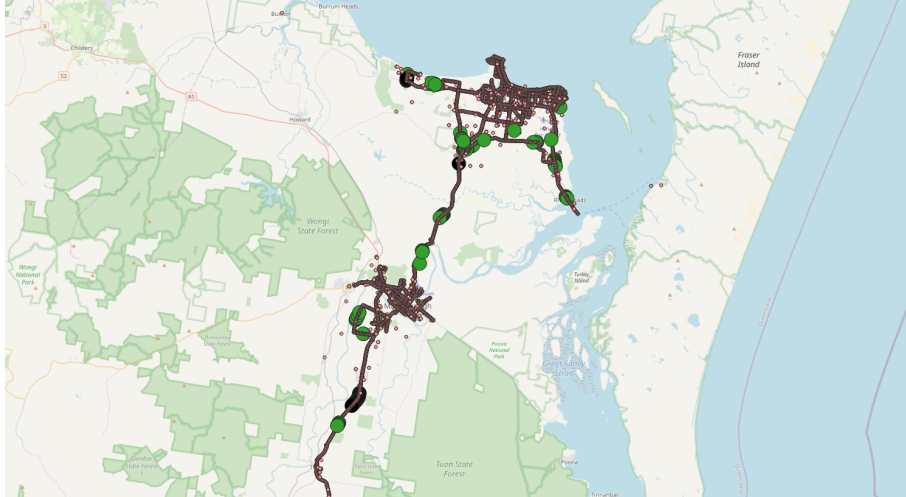
1. Target proportionate Mobile Blackspot Program funding commensurate with the extensive Black Spots in the region. This involves sustained policy prioritisation and active political advocacy with federal and state governments
2. Partner with the three carriers to identify their priorities and Fraser Coast Regional Council needs, focusing on:
  - Mobile Black Spot Program funding locations
  - Local access network upgrades and spectrum development
  - Backhaul and core network upgrades and development to reduce the lag (time distance) to their core
3. Partner with your regional industry and businesses to increase awareness, skilling and demand for digital connectivity.
4. Facilitate digital connectivity via emerging carrier and non-carrier systems that deliver wider coverage for the Internet of things and devices.

<sup>1</sup> <https://www.communications.gov.au/what-we-do/phone/mobile-services-and-coverage/mobile-black-spot-program>

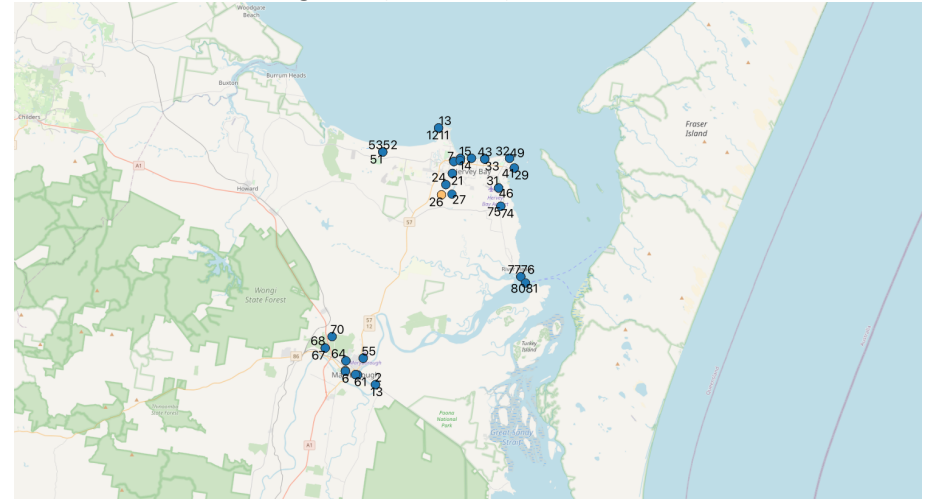
<sup>2</sup> <https://www.communications.gov.au/what-we-do/phone/mobile-services-and-coverage/peri-urban-mobile-program>

- Build and maintain local capability to underpin the strategic action plan. Invest in relevant experienced staff to provide a consistent core officer level and capacity to build relationships and deliver outcomes. Maintain regular updates to the current baseline to inform the evolving priorities. Encourage Councils and industry to undertake localised testing to build out the coverage picture for their own area.

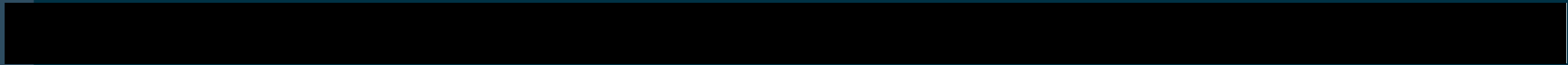
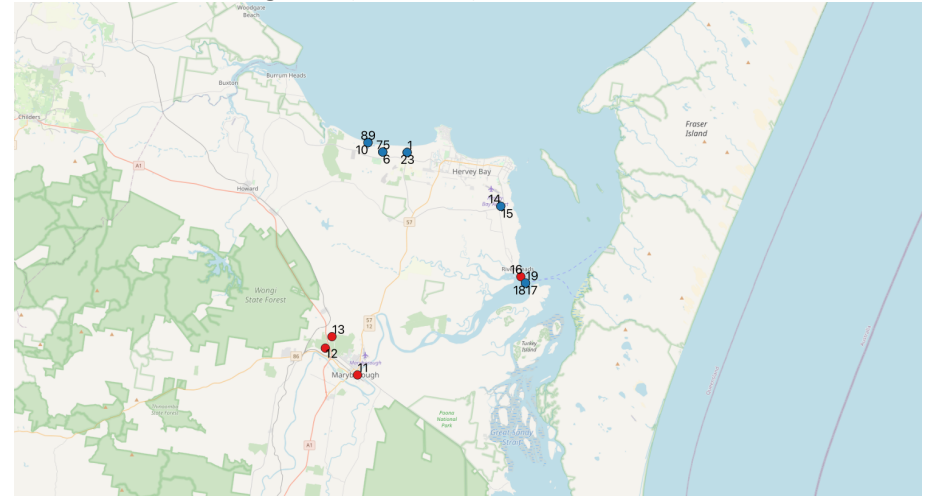
Total Network Signal Testing Data (3 Carriers)



Total Time Series Testing Data (3 Carriers)



Total Network Testing Data (3 Carriers)



## 2. Introduction



## Introduction

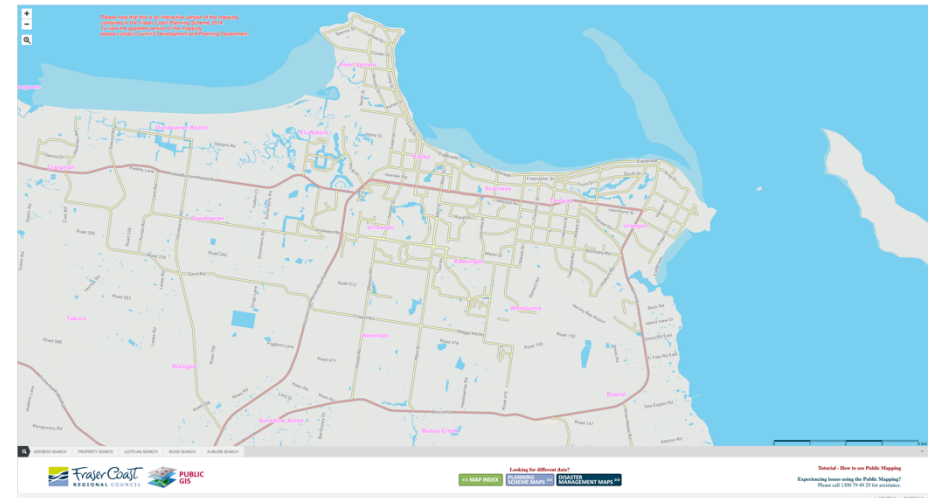
Given its extensive geography and relatively dispersed population outside major cities, Australia has performed well in connecting our citizens and businesses to telecommunications services. However, as the world becomes more digitised, the need for access to competitively available advanced data and digital services is increasing. With COVID-19, we have seen how much we all depend on connectivity, with data volume demand up 80% or more at some points of the crisis.

Why are regional cities at risk? The possibilities enabled by 5G and IoT require significantly more capital than was the case for the moves to 4G from 3G, or 2G to 3G, principally because 5G cell density is much greater than previous mobile generations. With declining capital returns, telecommunications carriers in Australia have redoubled their focus on CBDs and inner-city areas as the target for profitable new network investment. By contrast, many outer metropolitan cities and regions still lack basic coverage, in part because of the reduced economies of scale that apply in regional areas. Federal policy has not been able to sufficiently drive market behaviour to address these challenges, meaning in our view, that expert intervention is often needed by local and state government, to identify connectivity needs, competitive optimisation, actual capital costs and areas where government support is necessary, practical and equitable.

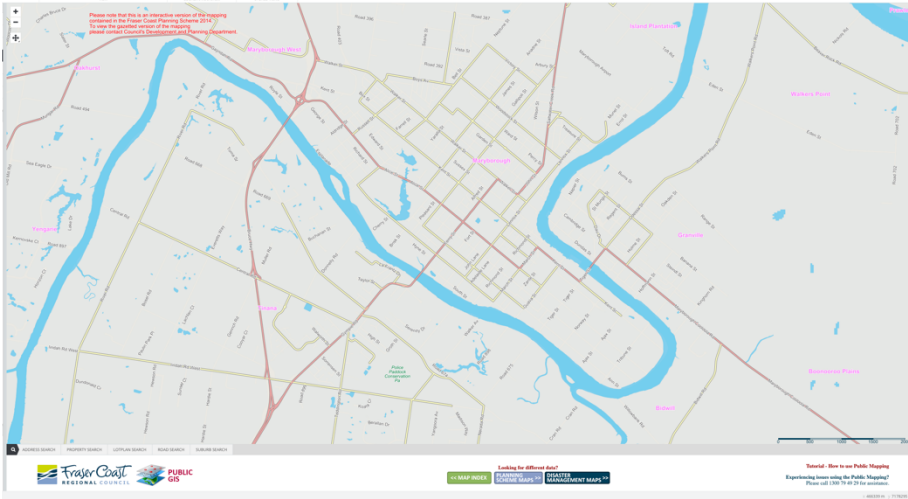
A “digital divide” in outer-metro and regional Australia is a real risk, and would limit connectivity for thousands of households, farms, SMBs and communities, dilute new job creation and hamper “regionalisation” at a time when all CBDs face decline post COVID, and public safety and security services have been recently challenged by natural disasters and pandemics.

We are also seeing the emergence of innovations to connect cities and regions, such as through network sharing and community-led initiatives, including new communication technologies and energy solutions. Traditional large telecommunications operator costs and approaches to investment are a form of legacy thinking that does not support their investment in outer metro and regional areas using their infrastructure competitive constraints for example. This means that new market entrants are finding innovative ways to support improved connectivity, and to use existing infrastructure to keep costs down. As telecommunications experts over decades, we understand the traditional and emerging investment models used in the industry, can argue for change and value third party intervention from the use of shared assets to access to a range of government financial support.

In recognition of these significant trends, Fraser Coast Regional Council has engaged Gravelroad Group to carry out Mobile Network coverage and capacity testing across the Hervey Bay and Maryborough urban areas.







### Looking beyond mobile phone and internet coverage

Mobile connectivity has moved in 25 short years from exclusive access to universal access and is expected. People now use these networks for voice calls through the app economy to a hyper connected future where Smart phones are becoming central devices to our lives. See the evolution of the mobile industry illustration below. The demand for data is doubling each year.



**ACMA RESEARCH\* REPORTS**  
**over 34 million**  
**mobile services**  
 IN OPERATION AT JUNE 2018,  
 IN AN AUSTRALIAN  
 POPULATION OF JUST  
 OVER 25 MILLION.#

\*Communications Report 2017/18 #ABS  
 ACMA, Australian Communications and Media Authority






THE MOBILE SECTOR IS A  
 SIGNIFICANT COMPONENT OF  
 THE CRITICAL INFRASTRUCTURE  
 THAT FACILITATES OUR ABILITY TO  
 CONNECT, WORK AND TRANSACT.

**\$ 22.9 billion**  
 The total value added to the  
 Australia's GDP by the mobile  
 industry in 2017-18.

**116,100**  
 The total number of full-time equivalent jobs  
 supported by the mobile industry.

**\$ 25.2 billion**  
 Revenue generated by the mobile  
 industry in 2017-18.

\*Deloitte Access Economics Mobile Nation 2019 5G: The Future

**THE 2019 DELOITTE ACCESS  
 ECONOMICS REPORT**

MOBILE NATION - THE 5G FUTURE  
 5G will provide new pathways for businesses to  
 create value, support productivity and even help  
 people join the labour force.

"The productivity  
 benefits of mobile  
 telecommunications  
 will be worth  
**\$65 billion**  
 to the Australian  
 economy by 2023.  
 Equivalent to 3.1%  
 of GDP."

EQUIVALENT TO \$2500  
 IN BENEFITS FOR EVERY AUSTRALIAN.

The need to look beyond mobile black spots becomes ever more apparent as the demand for data doubles each year<sup>3</sup> and there are now 18,000 mobile sites around Australia with 3,000 in planning, acquisition or deployment at any one time by Australia's three major Carriers, Telstra, Optus and Vodafone.

<sup>3</sup> <http://www.amta.org.au/>

# 3. Baseline Assessment

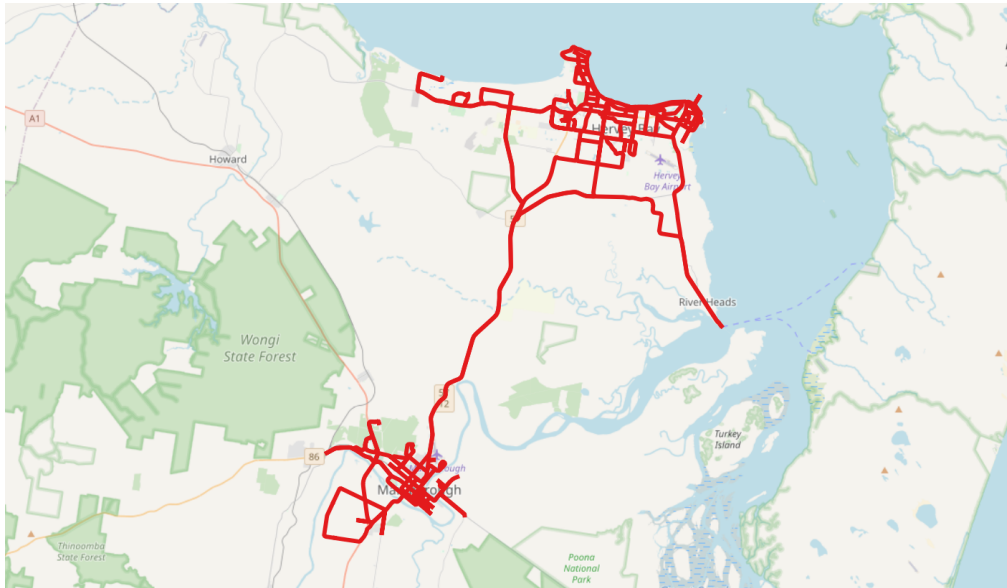
## Baseline Assessment

The baseline assessment involves four components. They are:

- Client priorities and Study Area
- Review of carrier advertised coverage

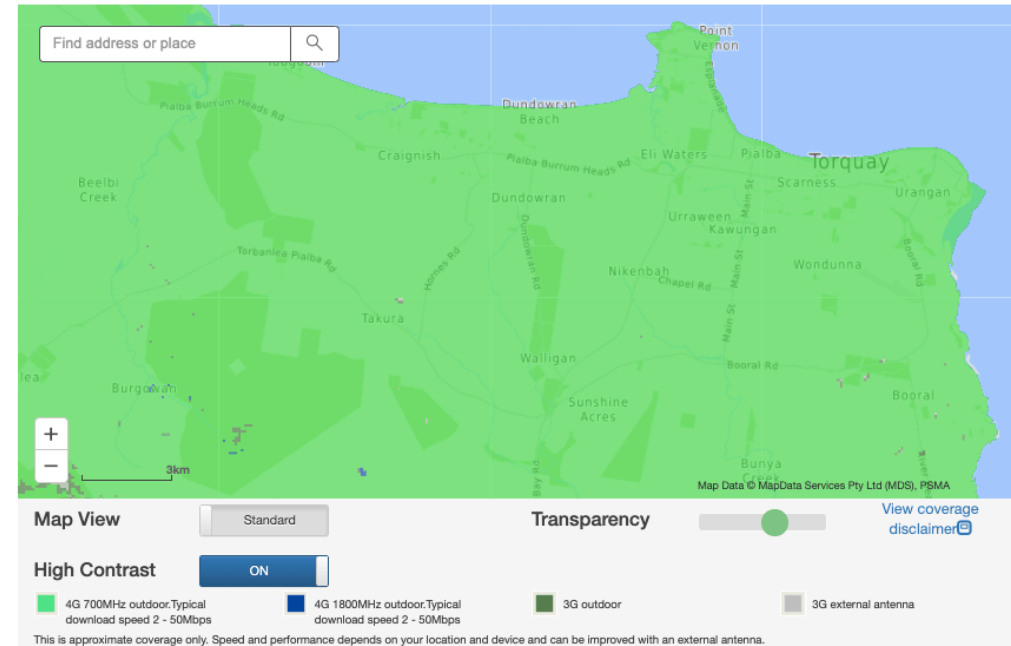
### Client Priorities & Study Area

Fraser Coast Regional Council engaged Gravelroad Group to carry out Mobile Network coverage and capacity testing across the Hervey Bay and Maryborough urban areas focussing on agreed Major Roads, Locations and Points of Interest. Over 420 kms of drive testing has been completed.

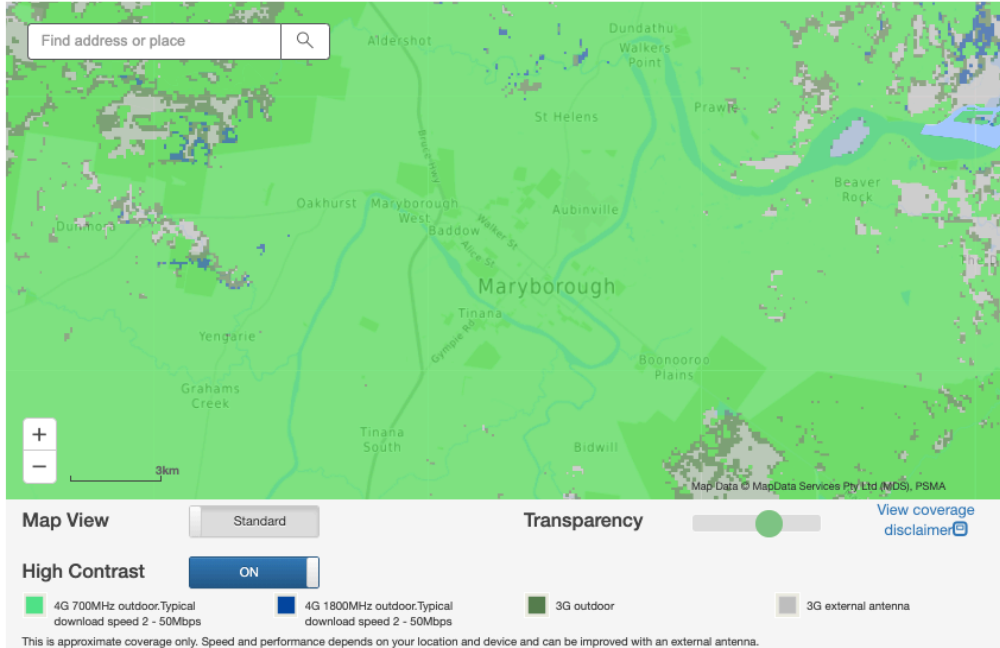


## Carrier Coverage Maps

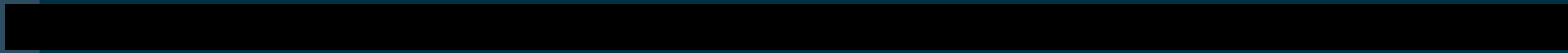
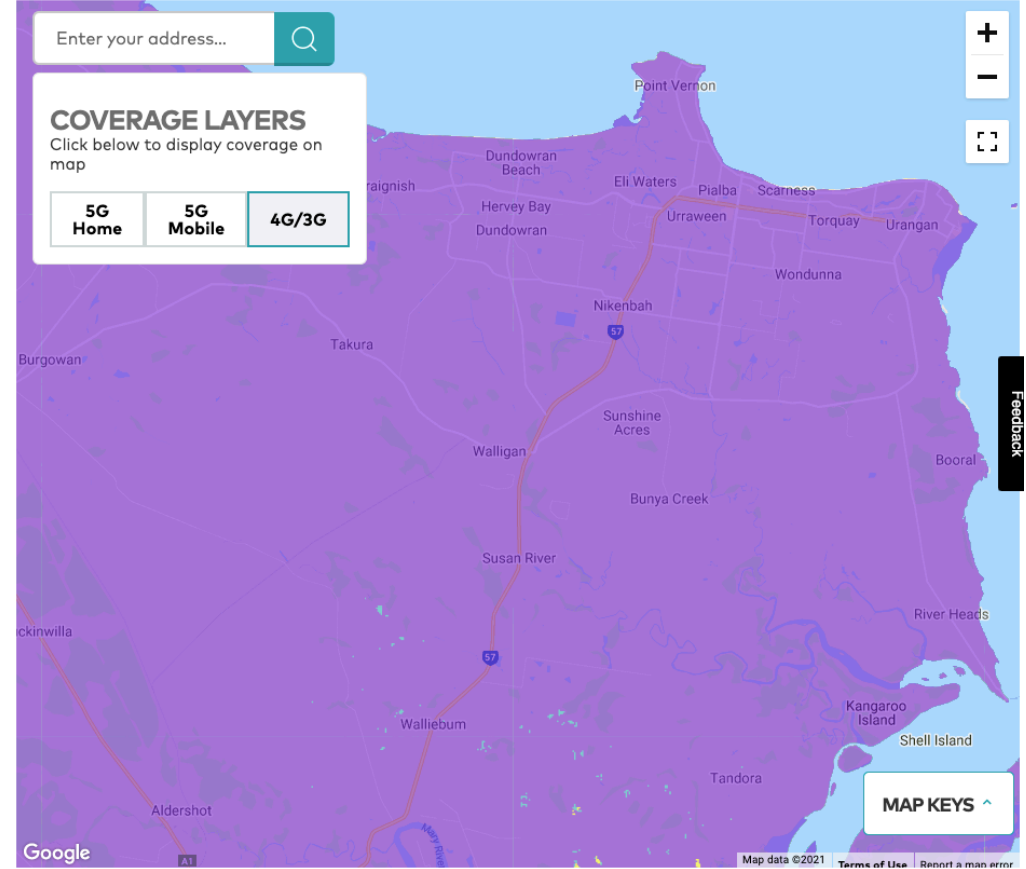
### Telstra – Hervey Bay



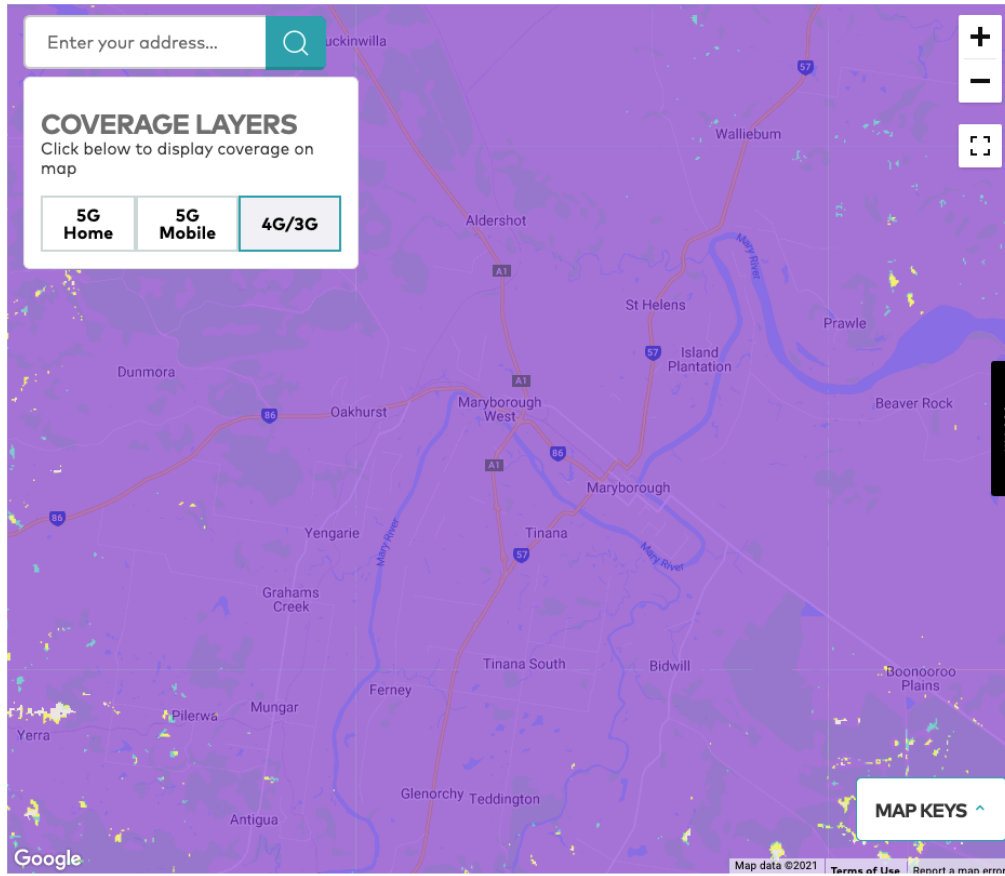
Telstra - Maryborough



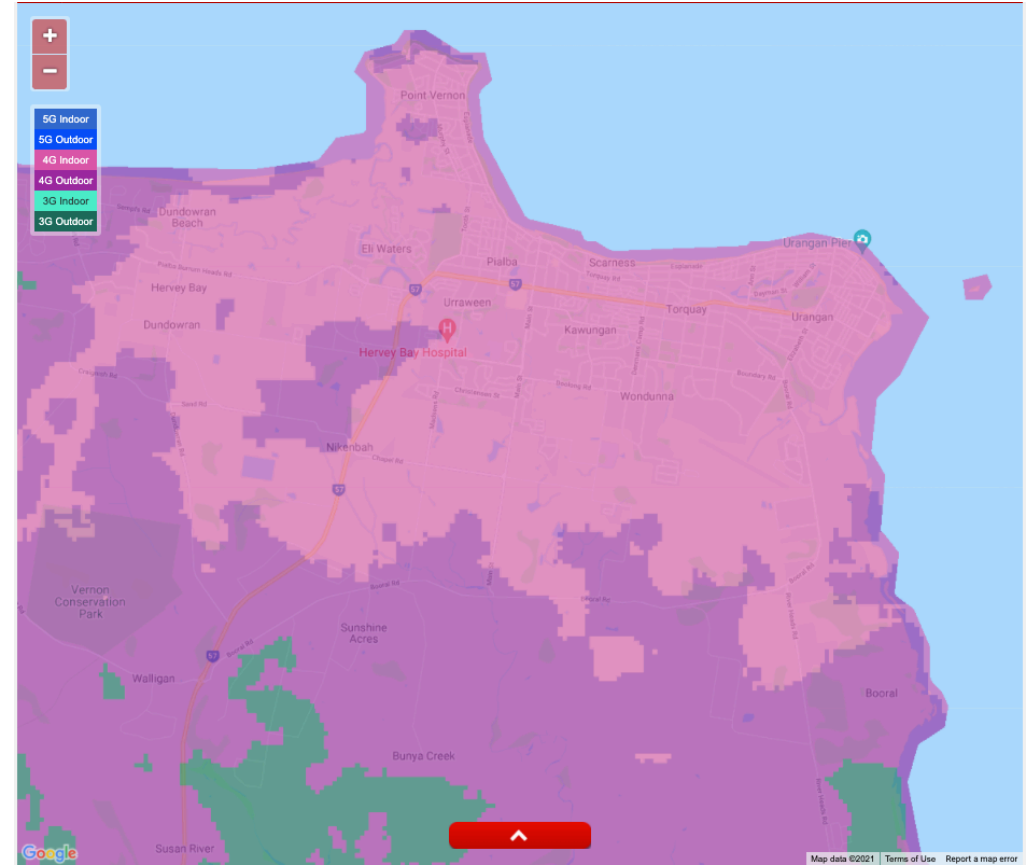
Optus - Hervey Bay



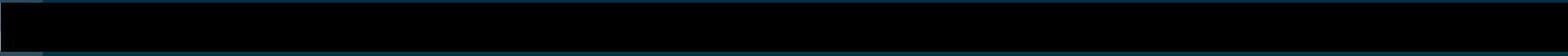
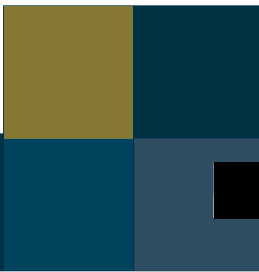
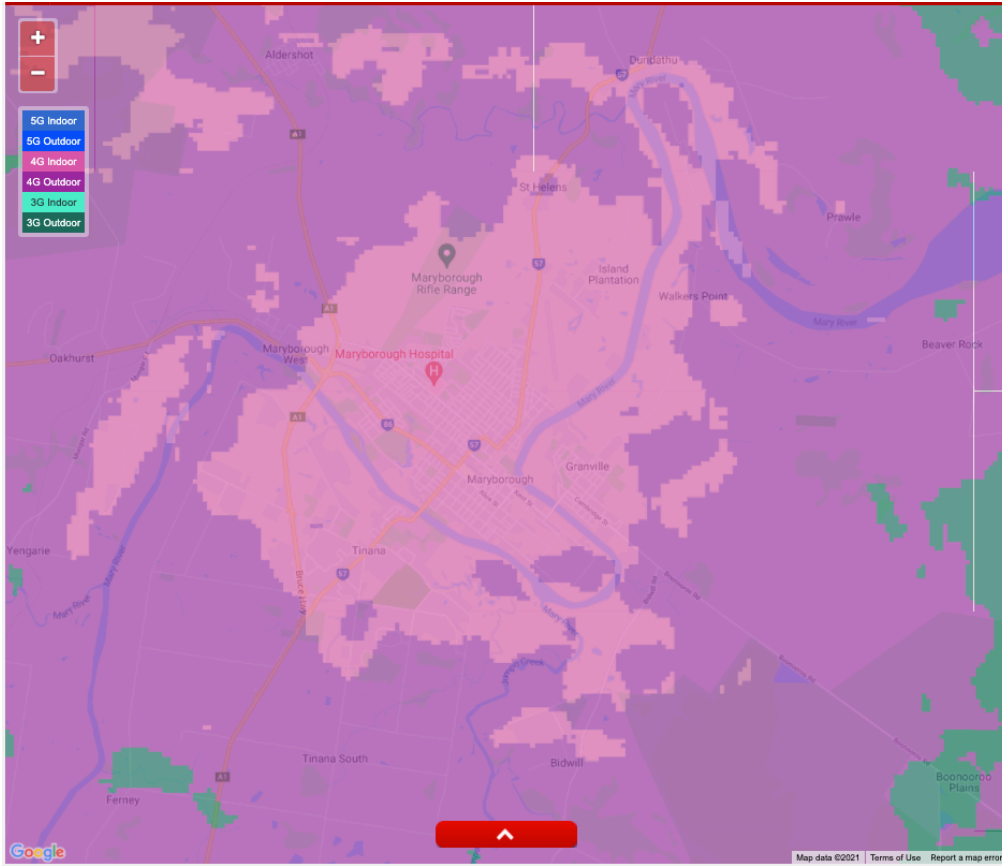
Optus - Maryborough



Vodafone – Hervey Bay



### Vodafone - Maryborough



# 4. Test Results

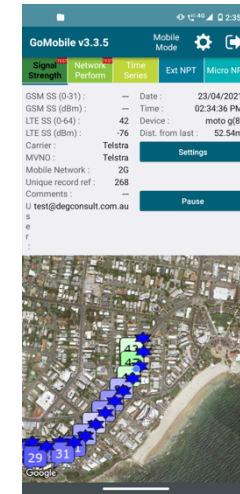
## Test Results

By using independent mobile testing technology, Gravelroad Group provides impartial user experience-based reports and recommendations. The methodology used by us to independently test mobile network performance and identify carrier blackspots has been developed over the last 10 years to provide results that describe the 'user experience'.

We used three Motorola Moto G8 handsets, as commonly used by members of the public, to capture information about signal strength and network performance for each of the national carriers - Telstra, Optus & Vodafone. This benchmarking process provides a rich methodology that has been acknowledged and respected by all major wireless service providers.

Other local governments have typically used the report and specific recommendations to advocate for increased funding by Federal, State governments together with each of the three national carriers – often through the Mobile Black Spot Program.

We tested with an app we have developed specifically for this purpose – GoMobile Network Test (GoMobile) to capture all the information we can about the mobile network and the test device itself. An example of the GoMobile app screen can be seen below.



By providing the GPS location and current results in real time, testers can monitor and authenticate the testing accuracy in real time.

Our testing is now completed using Android handsets with the results available in near real-time from an online portal.

There are six simple principles used to inform our testing methodology:

- User experience based – we use handsets commonly owned by users rather than other more technical and theoretical approaches.
- Same handset, same settings – this provides an equitable basis for benchmarking network performance.
- Simultaneous testing – all tests are carried out in the same vehicle – spaced to remove interference and completed at the same time in that location.
- Signal Strength – for 3G and/or 4G
- Network Performance Test – download, upload and latency
- Time Series Testing - Download and upload of data to the internet over a specified time series.



## Signal Strength

We have tested mobile signal strength for each of the three mobile network operators (Telstra, Optus and Vodafone) in both 3G and 4G modes at approx. every 100m for the 420 kms across the designated routes. This has generated approx. 8,000 markers for each of the three carriers and 24,000 in aggregate. This methodology will comprehensively demonstrate the quality of coverage by carriers in each area tested.

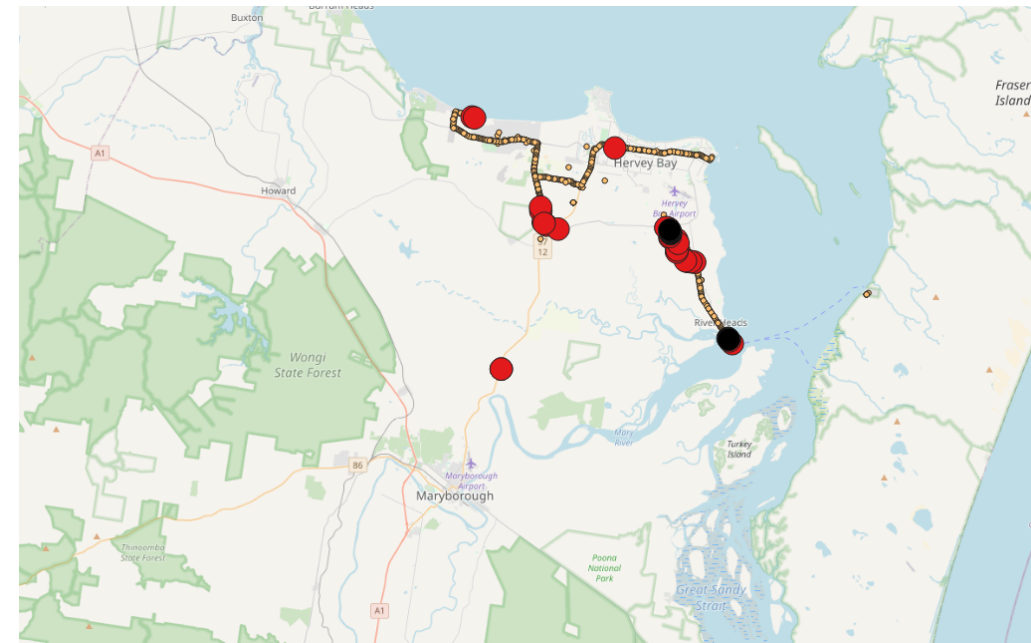
The contrast between Black Spots and hotspots of coverage is clearly shown in both the 3G and 4G tables and maps below.

Signal strength by itself is not the best indicator of a network performance as it only shows where local access is possible. The signal strength information combined with the network performance testing provides a clear assessment on the networks in the region of study.

### Summary of 3G mobile coverage

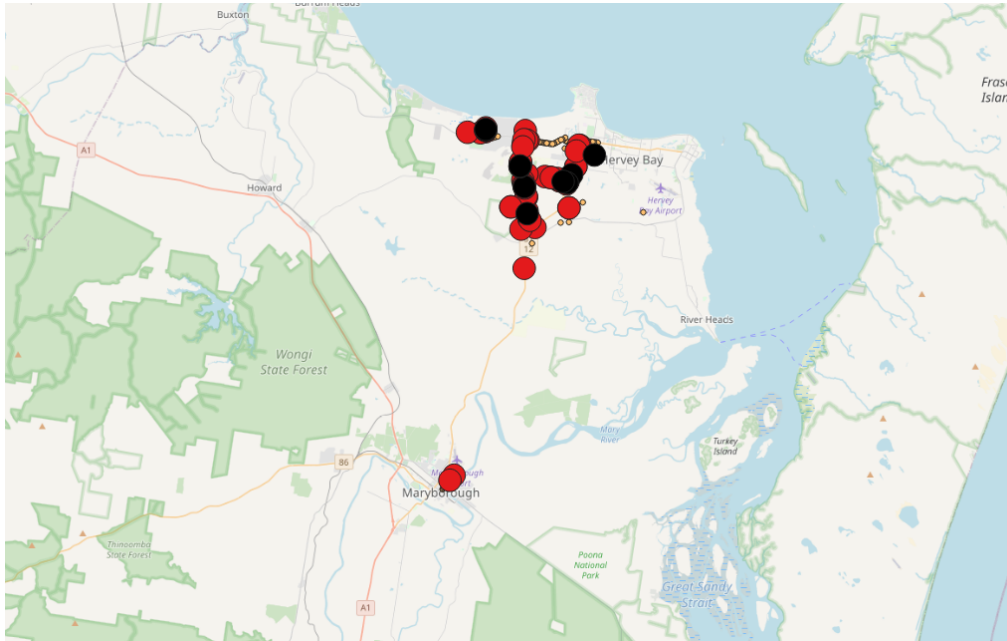
#### Telstra

3G Signal Strength	Kilometres	Percent
Blackspot – no signal	2.4	2%
Very poor signal	6.8	6%
Adequate signal	103.8	92%



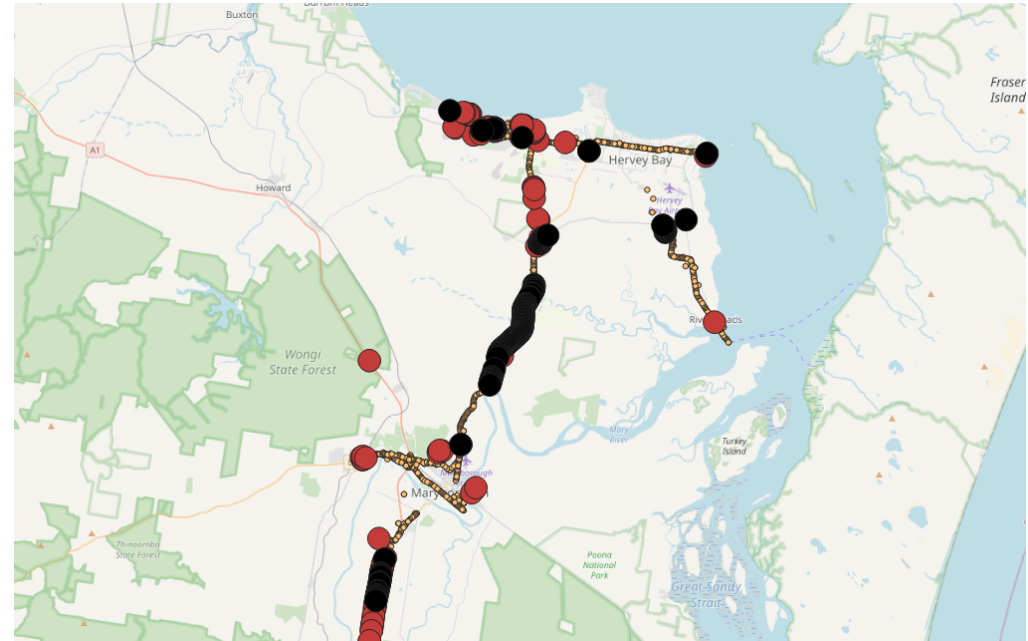
### Optus

3G Signal Strength	Kilometres	Percent
Blackspot – no signal	3.6	8%
Very poor signal	10.2	21%
Adequate signal	33.8	71%



### Vodafone

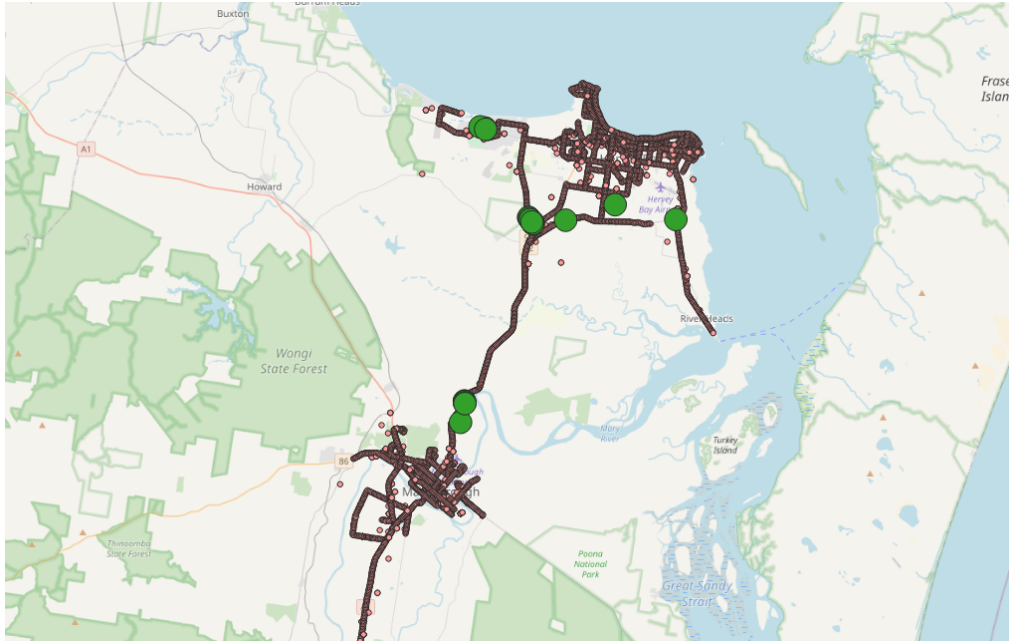
3G Signal Strength	Kilometres	Percent
Blackspot – no signal	23.7	10%
Very poor signal	31.4	13%
Adequate signal	184.9	77%



## Summary of 4G mobile coverage

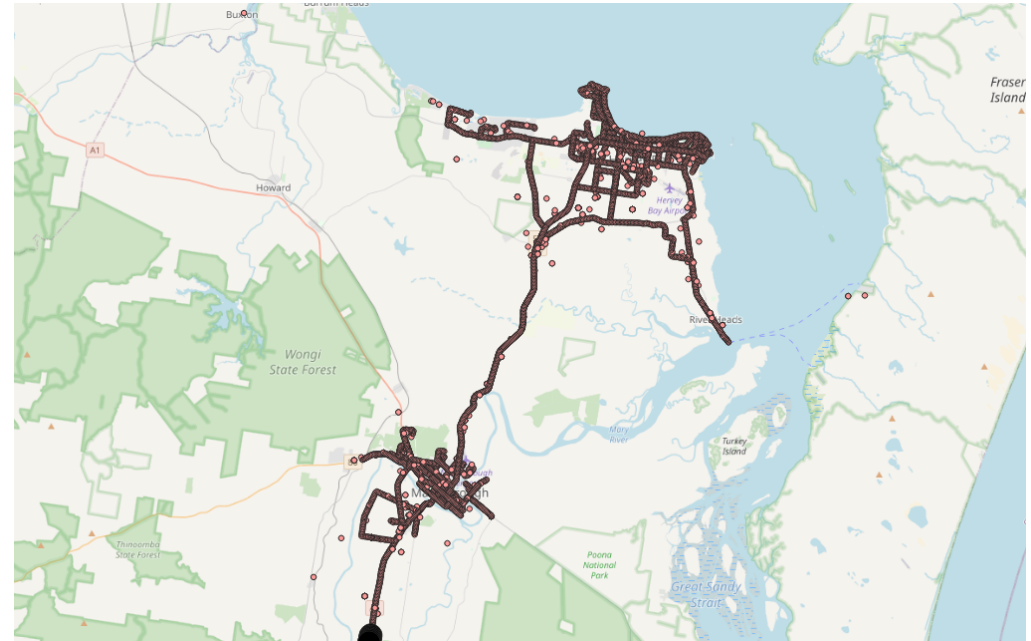
### Telstra

4G Signal Strength	Kilometres	Percent
Blackspot – no signal		
Very poor signal	4.6	0.9
Adequate signal	491.5	99.1



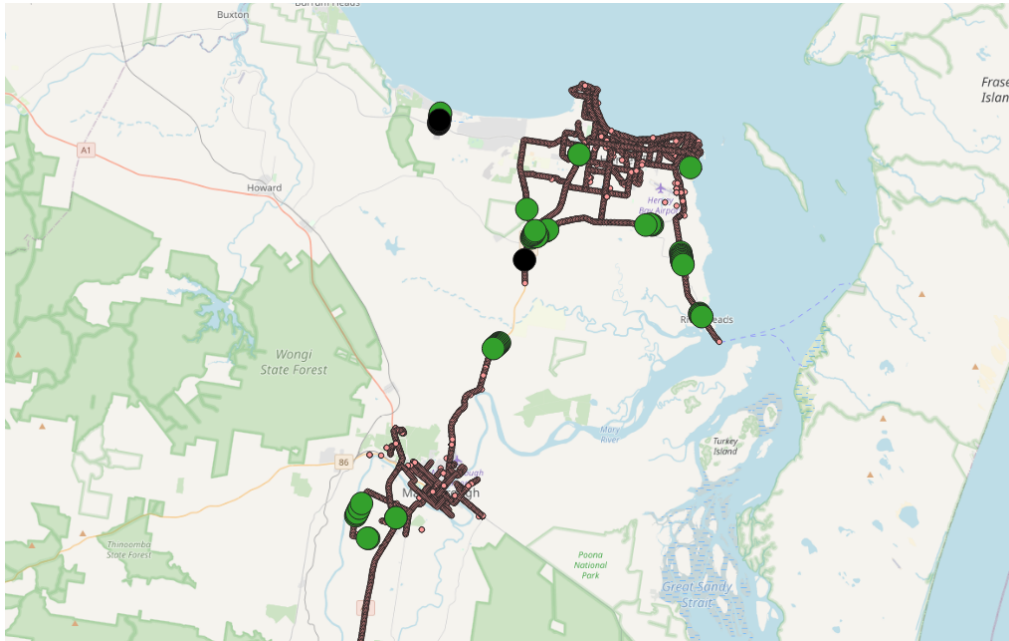
### Optus

4G Signal Strength	Kilometres	Percent
Blackspot – no signal	1.9	0.4
Very poor signal		
Adequate signal	458.5	99.6



### Vodafone

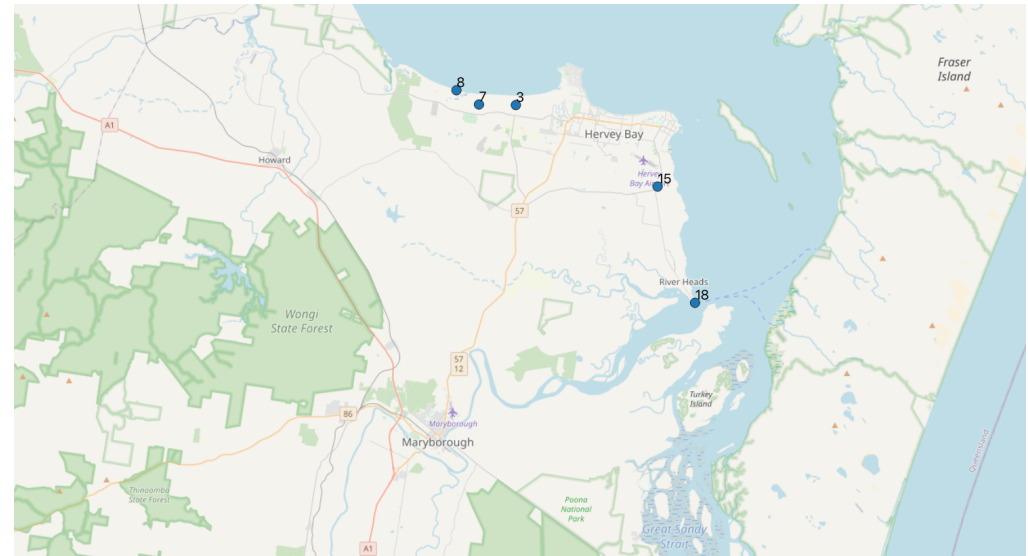
4G Signal Strength	Kilometres	Percent
Blackspot – no signal	1.2	0.3
Very poor signal	7.6	2
Adequate signal	349.6	97.7



## Network Performance Test Results

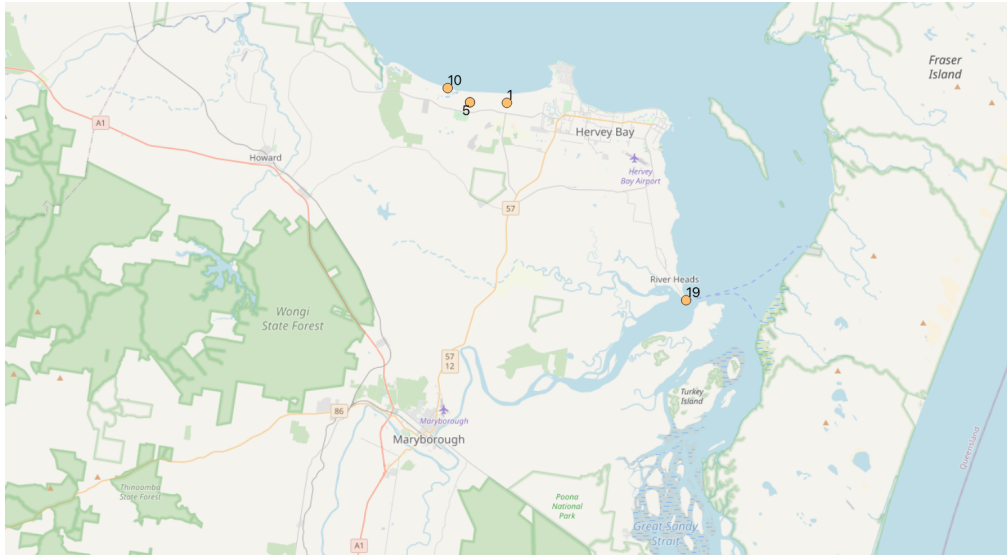
The Network Performance Test (NPT) assesses the quality of mobile internet connection at a location by highlighting the download speed, upload speed and ping/latency (time taken to reach the internet and back). A total of 9 locations are represented in the results below.

### Telstra Network Performance Test locations



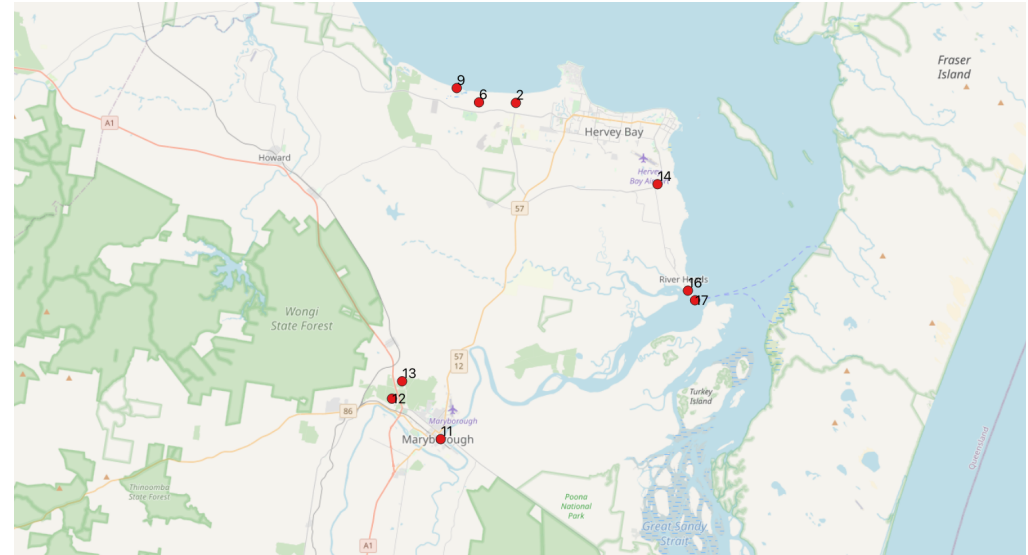
Identifier	Latency (ms)	Download (Mbps)	Upload (Mbps)	Assessment
8	151	3.16	0.85	Poor
7	0	0	0	Blackspot
3	52	9.33	26.73	Adequate
15	124	3.29	14.28	Poor
18	188	1.5	1.09	Poor

### Optus Network Performance Test locations



Identifier	Latency (ms)	Download (Mbps)	Upload (Mbps)	Assessment
10	73	9.74	21.55	High
5	134	3.54	2.97	Poor
1	104	0.57	0.44	Very Poor
19	77	11.03	25.87	High

### Vodafone Network Performance Test locations



Point No	Latency (ms)	Download (Mbps)	Upload (Mbps)	Assessment
9	138	2.94	0.21	Poor
6	818	0.6	0	Blackspot
2	115	0.28	0.23	Very Poor
14	0	0	0	Blackspot
16	743	0.66	0.97	Very Poor
17	100	2.21	0.21	Poor
13	728	4.33	5.29	Moderate
12	1793	0.57	0	Blackspot
11	1490	3.13	0.73	Poor

The overall performance of each of the three carriers is highlighted in seven colour bands to inform the assessment and proposed priorities as follows:

- Exceptional – Exceptional results. Typically, nearby 5G LTE cell in a major capital city with short distance to the Carrier core network.
- Very High: Typically, within range of 5G in an inner urban metro location. Highlights locations with results that stand out for the location.
- High: results - matched expectations set by coverage maps and current technologies used to service that location. Typically, 4G or 3G close to cell and core networks.
- Moderate: Acceptable results, largely consistent with coverage map expectations. 3G and 4G able to connect with a good experience for streaming and cloud based services. Poor: Connecting but occasional network drop out or longer waiting times for internet web pages and content to load.
- Very poor: Calls drop out or fade. Cloud business connections are unreliable and require repeated connections to complete tasks. Typical of the edge of coverage and impacted by vegetation, buildings and building materials.
- Black Spot: - where internet connectivity is not achievable. Also where the latency test may work but the download or upload is unable to be completed.

The final three are considered to be a priority for improved coverage/capacity to deliver the economic and community objectives of the local government and regional organisations.

The Network Performance Tests are sited to evaluate the performance of specific carrier sites and, where possible, also test spectrum performance. The Network Performance Tests (NPTs) are completed to validate the Signal Strength results and to challenge the carrier network with download, upload and network response time.

This test methodology reflects a real world scenario for a user, downloading a 7.5Mb item and uploading a 5Mb item.

#### Network Performance Tests

Latency / Ping (ms)	Download Speed (Mbps)	Upload Speed (Mbps)	Performance
0	0	0	Blackspot
2000+	0.01 – 0.25	0.01-0.249	
1500-1999	0.26-0.50	0.250-0.500	Very poor
1200-1499	0.51- 0.99	0.500-0.749	
1000-1199	1.00 -1.99	0.750-0.99	Poor
800-999	2.00 -2.99	1.00-1.99	
600-799	3.00 – 3.99	2.00-2.49	
500-599	4.00 – 4.99	2.50-4.99	Moderate
300-499	5.00 – 9.99	5.00-7.49	
200-299	10.00 – 19.99	7.50-9.99	High
100-199	20.00 – 49.99	10.00-14.99	
75-99	50.00-74.99	15.00-19.99	
50-74	75.00-99.99	20.00-29.99	Very High
30-49	100-124.99	30.00-39.99	
20-29	125-149.99	40.00-49.99	Exceptional
Less than 20	150 +	50+	

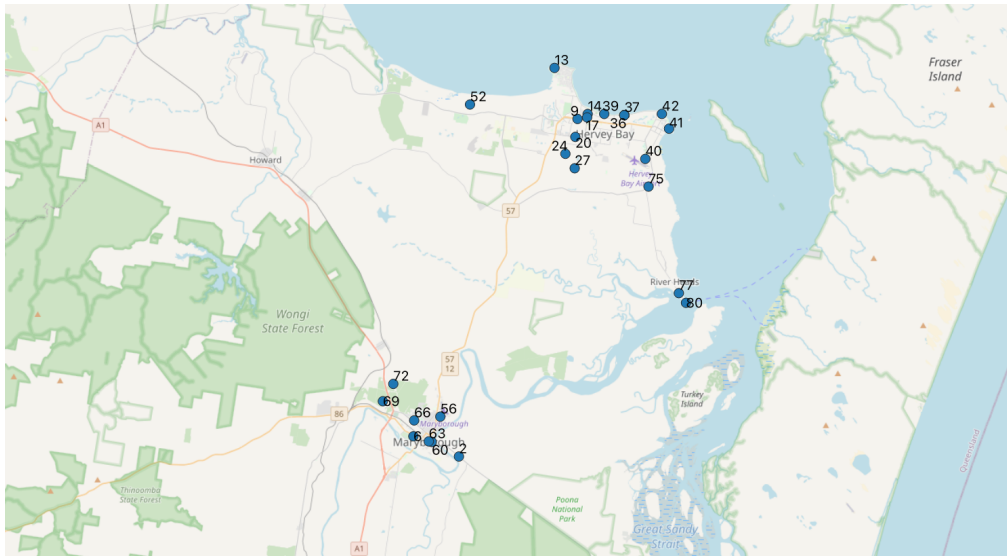
Overall the Network Performance Tests reinforce the message illustrated by the Signal Strength results as discussed above.

# Time Series Test Results

Carriers will seek to challenge the Network Performance Test (NPTs) results as examples of a point in time when the network was under extreme pressure and therefore not a true representation of day to day experience. The Time Series Test, where we complete 10 NPTs in a row, is done validating the individual results and give insight into the network under pressure. For Fraser Coast Regional Council, 25 individual locations were tested for both 3G and 4G and each carrier generating a total of 750 data points.

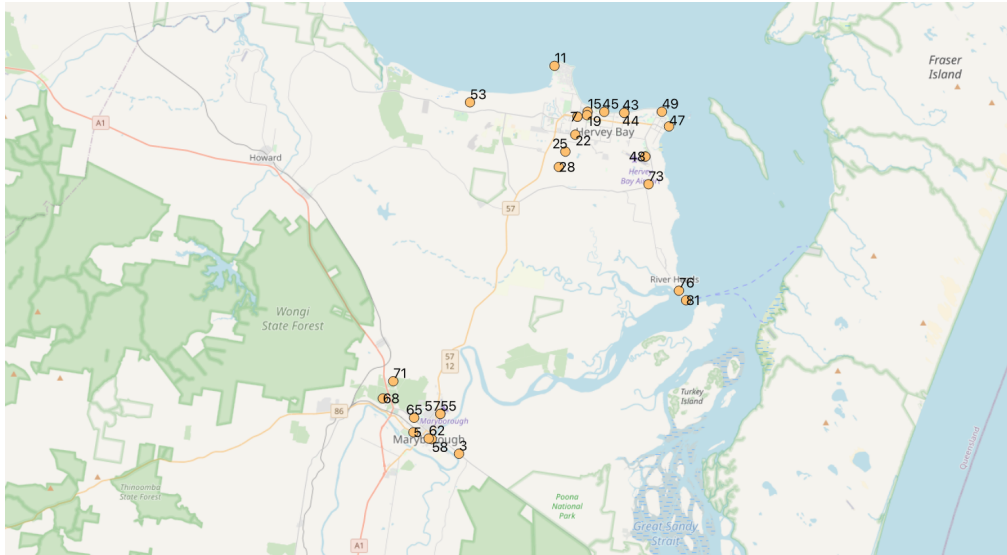
Latency is a key determinant of the network performance. You can have a strong signal from the local tower to your device but still have a poor user experience due to the time to connect the internet for calls or data.

Telstra Time Series Test locations



Identifier	Average Latency (ms)	Average Download (Mbps)	Average Upload (Mbps)	Assessment
52	0	0	0	Blackspot
13	93	11.07	44.31	High
9	153	4.22	36.98	Moderate
14	156	5.9	41.01	Moderate
17	153	4.35	39.77	Moderate
39	113	1.66	33.34	Poor
36	0	0	0	Blackspot
37	52	6.71	63	Moderate
42	61	3.13	31.34	Poor
41	54	2.85	54.56	Poor
20	99	7.85	18.08	Moderate
24	98	8.16	17.73	Moderate
27	91	9.4	53.83	Moderate
40	51	6.22	61.2	Moderate
75	100	6.5	18.69	Moderate
77	99	6.62	29.27	Moderate
80	162	1.01	0.92	Poor
72	90	9.48	43.98	Moderate
69	93	10.16	62.72	High
66	96	9.74	66.63	Moderate
56	96	9.25	42.23	Moderate
6	91	9.74	39.34	Moderate
60	95	10.8	63.49	High
63	93	10.13	53.56	High
2	106	8.69	9.14	Moderate

### Optus Time Series Test locations

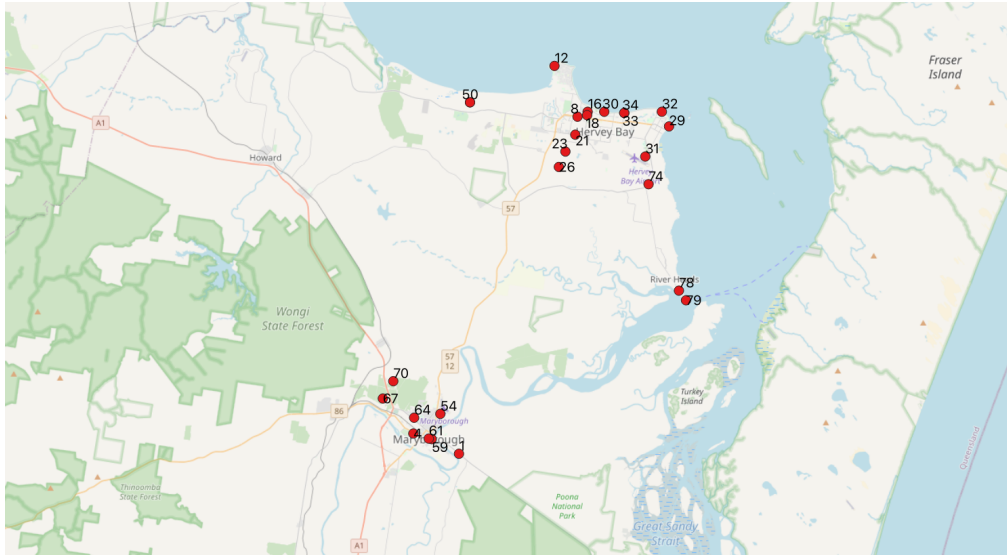


22	95	10.92	36.42	High
25	89	13.05	23.31	High
28	90	11.24	41.28	High
48	52	7.11	46.74	Moderate
73	91	4.82	9.95	Moderate
76	100	11.15	9.76	High
81	96	6.11	28.52	Moderate
71	91	7.61	46.99	Moderate
68	97	10.66	12.51	High
65	105	10.1	6.08	High
57	0	0	0	Blackspot
55	94	9.59	47.45	Moderate
5	98	7.88	40.83	Moderate
62	133	3.2	26.25	Poor
58	95	2.02	38.18	Poor
3	98	10.25	34.15	High

Identifier	Average Latency (ms)	Average Download (Mbps)	Average Upload (Mbps)	Assessment
53	0	0	0	Blackspot
11	88	10.47	28.11	High
7	75	2.95	23.03	Poor
10	0	0	0	Blackspot
15	106	8.04	53.64	Moderate
19	95	10.37	65.67	High
45	58	6.01	43.47	Moderate
43	51	7.18	57.86	Moderate
44	0	0	0	Blackspot
49	51	5.29	40.75	Moderate
47	53	6.95	27.68	Moderate



### Vodafone Time Series Test locations



26	31	4.75	24.51	Moderate
31	31	3.27	14.89	Poor
74	71	1.73	2.01	Poor
78	0	0	0	Blackspot
79	476	1.14	0.17	Poor
70	0	0	0	Blackspot
67	0	0	0	Blackspot
64	31	1.36	22.1	Poor
54	26	4.85	25.49	Moderate
4	30	3.14	26.52	Poor
59	0	0	0	Blackspot
61	32	1.5	13.58	Poor
1	45	1.28	4.29	Poor

Identifier	Average Latency (ms)	Average Download (Mbps)	Average Upload (Mbps)	Assessment
51	0	0	0	Blackspot
12	0	0	0	Blackspot
8	32	1.07	20.21	Poor
16	0	0	0	Blackspot
18	0	0	0	Blackspot
30	31	0.79	8.33	Poor
33	27	19.32	31.62	High
32	27	18.13	29.16	High
29	26	18.45	65.78	High
21	0	0	0	Blackspot
23	32	4.6	15.99	Moderate

# 5. Priority locations & Recommended Actions

## Priority locations and Recommended Actions

Having the mobile broadband black spots independently tested and mapped is the first step towards improving the mobile broadband basis for a strong digital economy. In the same way that local governments know understand and seek funding for priority infrastructure in their area, carrier network infrastructure is also critical.

The difference with mobile digital infrastructure to traditional council infrastructure is that it is privately owned. The primary tactic for facilitating increased investment is knowledge of the network, its performance and choosing priority locations (in partnership with the carriers.)

Carriers look to councils for two key types of support:

- The first and most important is facilitation through the approvals process. Councils need to see the investment in new mobile sites (upwards of \$800,000 per site) in the same way that a development application delivering new employment or business growth gets support.
- The second is the support where access arrangements (including access agreements and leases) for use of council owned or controlled land and assets. Each protracted completion or delay creates a reputation profile for the local government.

Carriers enter into a more productive dialogue when a local government or Regional Organisation of Councils has independently tested black spot mapping and a strong knowledge of the digital infrastructure of the area. Carriers ultimately have a large number of sites in various locations and jurisdictions. In locations where approvals and leases are completed easily will have networks established faster and sooner.

The following are the recommended priorities for Fraser Coast Regional Council in relation to Hervey Bay and Maryborough:

### Telstra, Optus & Vodafone

#### Coverage

- Craginish
- Dundowran Beach
- River Heads
- Nikenbah
- St Helens

#### Capacity

##### 5G Uplift (from 4G)

- Pialba
- Scarness
- Urangan
- Point Vernon
- Maryborough CBD

#### 4G Improvements

- Craginish
- Dundowran Beach
- River Heads
- Nikenbah
- St Helens

### Optus & Vodafone

#### Coverage & Capacity (4G Uplift)

- Urraween
- Nikkenbah
- Walligan
- Susan River
- Saltwater Creek
- Maryborough West
- Aldershot

Having the mobile broadband black spots independently tested and mapped is the first step towards improving the mobile broadband basis for a strong digital economy. In the same way that local governments know, understand, and seek funding for priority infrastructure in their area, carrier network infrastructure is also critical.

By actively pursuing the existing funding programs and working in partnership with the carriers, industry and other levels of government, Fraser Coast Regional Council will be in a good position to improve coverage and mobile network capacity and close the digital divide.

# 6. GIS Data Export

## GIS Data Export

The GIS data and mapping created for this project utilised the QGIS software (<https://www.qgis.org/en/site/>).

All GIS data has been exported into a self-contained DXF file and is available for download at [https://www.dropbox.com/s/c1vv84j7ssi72x0/FraserCoast\\_MobileTesting.dxf?dl=0](https://www.dropbox.com/s/c1vv84j7ssi72x0/FraserCoast_MobileTesting.dxf?dl=0)

# 7. Glossary

Glossary of Terms	
<b>Backhaul</b>	Backhaul typically refers to the mid to long-distance transport of data from a series of disparate locations back to a more centralised location. The backhaul portion of the network comprises the intermediate links between the core, or backbone, of the network and the small sub-networks at the 'edge' of the entire hierarchical network. In the context of the NBN, backhaul services are the data carriage services provided over highspeed, high-capacity fibre lines, which carry aggregated network traffic between a Point of Interconnect (PoI) and a centralised or 'core' part of the network, for example an Internet Service Provider's data centre.
<b>Bandwidth</b>	Refers to the capacity and rate of data transfer over a network, usually measured in kilobits, megabits or gigabits per second.
<b>Blackspot</b>	An under-served premises, or area, usually in remote or rural locations and sometimes on the edges of cities, which is unable to obtain adequate, metro-comparable broadband or other communications services. Reasons for blackspots are normally related to the limitations of technologies, geography or a lack of investment.
<b>Broadband</b>	Broadband is a term used to refer to 'always on' high speed Internet or other network access. In the past, broadband services and technologies were defined in terms of a capability to transfer information at higher rates than traditional dial-up services.
<b>Cloud Computing</b>	Cloud computing is an Internet-based technology which stores information in servers and provides that information as an on demand service. Under cloud computing consumers can access all of their documents and data from any device with internet access such as a home or work PC, a mobile phone or other mobile internet enabled device.
<b>Dark Fibre</b>	It is the equipment at either end that dictates what capacity can be delivered over an optical fibre— ranging upwards from about 100 Mbit/s (at the low end). The term 'dark fibre' simply refers to optical fibre that is available for use and is provided without any equipment at either end. The term was originally used when talking about the potential network capacity of telecommunication infrastructure, but now also refers to the increasingly common practice of leasing fibre optic cables from a network service provider.
<b>Digital Divide</b>	The gap between people with effective access to digital and information technology and services, and those with very limited or no access at all. It refers both to a person's physical access to technology and the resources and skills available to effectively use the technology. Often used in Australia to describe the different levels of communications service available between metropolitan and regional areas.



<b>Fibre Optic</b>	Also known as optical fibre, fibre-optic cable is made up of thin threads of glass that carry beams of light. In telecommunications, data is translated into pulses of laser light that can be transmitted along the fibre cables. Fibre-optic technology is less susceptible to ‘noise’ and ‘interference’ than other data-transfer mediums such as standard copper telephone lines and can be used more reliably over longer distances without loss of speed or quality. Fibre is used extensively in backbone and international submarine networks, and to connect the base stations of mobile and wireless networks. It is increasingly being used for the last mile connection to home and business premises in FTTX networks.
<b>Fibre to the Curb (FttC)</b>	Refers to networks in which fibre connections are provided to a kerb-side equipment cabinet, in which the fibre’s optical signal is converted to an electrical signal and delivered to premises over copper wires— typically over a maximum distance of 100 metres or less.
<b>Fibre to the Node (FttN)</b>	Similar to FTTC but using a neighbourhood node that serves more premises rather than a kerb-side node. Copper distances are typically up to around 1 km.
<b>Fibre to the Premise (FttP)</b>	Similar to Fibre to the Home, but a more neutral term that includes non-residential premises, such as schools, hospitals, and workplaces, as well as households. Fibre connections are provided all the way to premises, including individual units in multi-dwelling buildings
<b>Fixed Line</b>	Fixed line refers to technologies that use physical infrastructure, such as copper wires, rather than wireless infrastructure to deliver data connections. Traditional voice services, dial-up internet, xDSL, HFC cable and FTTP are all forms of fixed line services
<b>Fixed Wireless Broadband</b>	A family of wireless technologies that, as opposed to mobile wireless, delivers broadband services to a particular premises or fixed location. These services are sometimes called ‘point-to point’ or ‘point-to-multi-point’ and require an antenna that is generally permanently attached to the user’s building. Fixed wireless can be used for backhauling in certain cases but also as an access technology, particularly in rugged or remote terrain and areas with low population densities that may make a fixed line alternative impossible or uneconomic. Wireless technologies are limited by the availability of wireless spectrum, the number of concurrent users, distance from the cell antenna and physical impediments such as hills and valleys interrupting signals.
<b>Gigabit per second (Gbit/s)</b>	A measure of communications speed equal to 1 000 000 000 bits per second. Also expressed as Gbps and Gb/s.
<b>Greenfield</b>	A term used to describe a piece of undeveloped land, either currently used for agriculture or completely unused.

<b>Internet</b>	A worldwide, publicly accessible series of interconnected computer networks that transmit data using the standard Internet Protocol (IP). It is a 'network of networks' that consists of millions of smaller domestic, academic, business, and government networks, which together carry various information and services, such as electronic mail, online chat, file transfer, and the interlinked web pages and other resources of the World Wide Web (www).
<b>Internet Service Provider (ISP)</b>	Also known as a Retail Service Provider (RSP), an organisation that offers access to the Internet to its customers. ISPs generally also provide other services such as electronic mail accounts, data storage and web hosting to their customers. ISPs may employ a combination of their own and third party infrastructure, or simply resell services provided by a wholesale carrier.
<b>Last mile infrastructure</b>	Infrastructure used to provide the link from a customer's premises to the provider's nearest point of aggregation. For example, a provider offering a wireless broadband service to the customer would be providing last-mile infrastructure using wireless broadband technology. The "digital divide" is attributed to the lack of suitable "Last mile infrastructure" in lower population density areas.
<b>Latency</b>	The delay in data transmission caused by the time it takes for data to get from one designated point to another.
<b>Megabits per second (Mbit/s)</b>	A measure of communications speed equal to 1 000 000 bits per second. Also expressed as Mbps, mbps, Mb/s and mb/s.
<b>Mobile Wireless and Mobile Broadband</b>	Broadband services supported by mobile networks, such as '3G' and '4G' networks, offering mobility and flexibility for users of handheld and laptop devices. Wireless technologies are limited by the availability of wireless spectrum, the number of concurrent users, distance from the cell antenna and physical impediments such as hills and valleys interrupting signals.
<b>Point of Interconnect (PoI)</b>	The connection point that allows Retail Service Providers (RSPs) and Wholesale Service Providers (WSPs) to connect to NBN Co network infrastructure.

<b>Quality of Service (QoS)</b>	<p>The use of a range of networking technologies and techniques to provide guarantees on the ability of a network to deliver predictable results. Network performance within the scope of QoS can include availability, bandwidth, latency and error rate.</p>
<b>Satellite Broadband</b>	<p>Satellite broadband uses a radio dish to bounce a signal off a satellite and down to an earth station. It is common in rural and remote areas with low population densities, where fixed line alternatives are uneconomic. One-way satellite connections utilise a satellite link to download data to the broadband user and a standard telephone connection for uploading data back to the Internet. Two-way satellite connections use the satellite link to both upload and download information. The suitability of satellite broadband for some applications is impacted by the large physical distances between satellites and the earth's surface, which results in latency (delay) in the sending and receipt of data. Quality may also be affected by the number of simultaneous users and adverse weather conditions.</p>
<b>Smart Infrastructure</b>	<p>The application of communications technologies to infrastructure to make better, more efficient use of resources. Smart infrastructure can be used within the transport, energy, communications and water sectors.</p>
<b>Wholesale Service Provider (WSP)</b>	<p>A provider of infrastructure and services that deals only with other providers and does not have a commercial relationship with end-users or consumers. In telecommunications, a wholesale service provider allows other companies to lease access to equipment and services and avoid the expense of building their own infrastructure.</p>
<b>Wireless Broadband</b>	<p>Wireless broadband uses radio frequencies to transmit and receive data between customers and a local transmission point. Normally, this requires a number of base stations, similar to mobile phone towers, which transmit to customers who have a small transmitter/receiver connected to their computers or other digital devices. Wireless technologies are limited by the availability of wireless spectrum, the number of concurrent users, distance from the cell antenna and physical impediments such as hills and valleys interrupting signals.</p>
<b>Wireless Spectrum</b>	<p>Often referred to as the Radio-Frequency Spectrum, this is the array of electromagnetic radio frequencies used for communications, including mobile broadband, television, AM and FM radio, defence and any other service employing a wireless technology. The spectrum is divided into many frequency ranges, or bands, and usually allocated for a specific technology, device, use or service. Wireless Spectrum is a finite and regulated public asset, and in Australia is administered by the Australian Communications and Media Authority (ACMA), often through a licensing regime.</p>