Canterbury Mobile Blackspots – Phase 2

Final Report

Prepared for Environment Canterbury (on behalf of the Canterbury Mayoral Forum)

Prepared by Beca Limited

3 December 2021

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Revision History

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on behalf of	Beca Limited		

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Project Purpose

This project was initiated by the Canterbury Mayoral Forum which is made up of the Chair of Environment Canterbury and the Mayors of the 10 territorial authorities in Canterbury and followed on from Phase 1 of the project, which focussed solely on state highways and was delivered March 2021.

In our increasingly connected world, having access to mobile coverage in as many areas as possible is becoming enormously valuable and in some cases even essential for day to day operations. The Mayoral Forum recognises this significance and wanted to better understand the potential economic and social benefits of reducing mobile blackspots on improved productivity and logistics, safety and emergency operations and the tourism sector. Using this information alongside a ground testing process the final task is to advocate targeted investment in mobile telecommunications infrastructure where it is likely to have the greatest impact on economic and social development in the region.

The purpose of this project was to test current voice mobile coverage data by completing on the ground field testing on Canterbury local roads and using this data to gain an understanding of mobile blackspot locations in the Canterbury Region. Once these mobile blackspot locations were identified, they were then defined and prioritised, working with a group of stakeholders. The project also sought to provide some validation of mobile coverage data that already exists to understand how well this data matched the ground tested data to help inform how it can be used to undertake wider analysis in the future.

Methodology

The Canterbury Mayoral Forum reached out to Environment Canterbury and the territorial authorities to gain an understanding of the local roads that they were interested in performing drive testing on as well as to gain their confirmation that they would be prepared to provide field staff to undertake the collection of drive test data to capture mobile signal service levels. This data was used together with other data gathered during the project to identify road segments as mobile blackspots. Stakeholder engagement was then undertaken to confirm and prioritise these locations.

The methodology consists of the following steps:

1. Desktop study and data collation
2. Field data collection using NetMonitor mobile application
3. Identification of mobile blackspots
4. Matrix of social and economic datasets to assist with prioritisation
5. Capture of anecdotal information from stakeholders
6. Stakeholder engagement workshop

1. Desktop Study and Data Collation:

The desktop study explored the datasets that were already available which could help inform early prioritisation of areas, provide a contextual picture of coverage, and be used as a basis for testing the driven data against. As part of the study Crown Infrastructure Partners (CIP), Rural Connectivity Group (RCG) and network providers were contacted to find out what regionally specific mobile coverage data they had, including drive test data, planned tower build locations and the proposed coverage of these towers. Available mobile coverage data was also gathered from telecommunications companies.

2. Mobile Data Collection and Processing

The Mayoral Forum engaged with the regional council and territorial authorities to establish key areas of concern for this project. Environment Canterbury and five of the ten territorial authorities responded to the request, and staff from these councils were engaged to capture mobile signal data. Testers were provided with three mobile phones, one for each mobile network (Vodafone, Spark and 2Degrees). A drive tested dataset was collected and built to support existing evidence of blackspots across Canterbury local roads. An application called “NetMonitor Cell Signal Logging Lite” (NetMonitor) was used to capture signal service levels as received from towers to each mobile device.

Instructions and guidance on how to use the application can be found in Appendix A. Processing of the resulting data captured included converting the text files into a geospatial format, testing each data point for the required service level, and distinguishing data collected on the road network.

The required service levels used on this project were supplied by RCG who are working with CIP to build mobile voice coverage across the country. Where the received signal strength indication (rssi) is greater than or equal to -123 dBm (decibel-milliwatts) as detected inside the vehicle the service level for mobile voice calls is met, as shown in Figure 1.

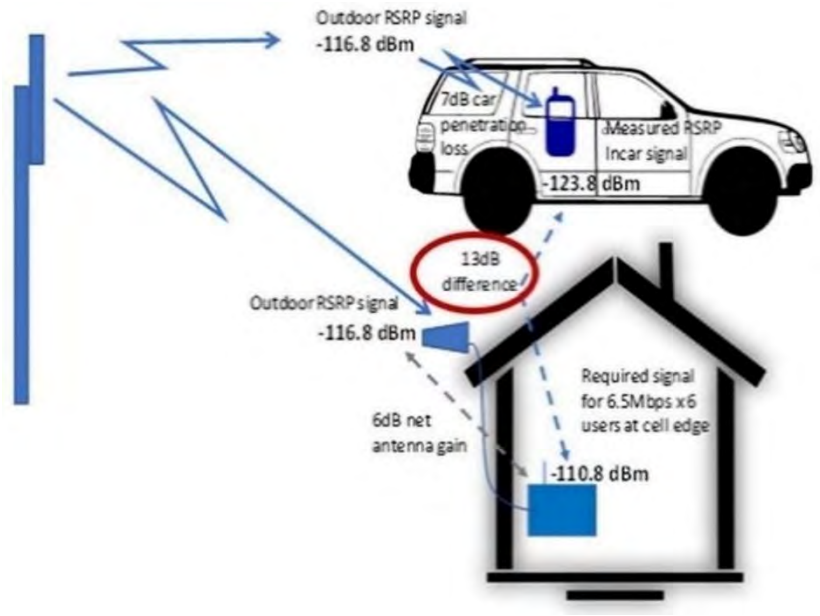

Figure 1 Link diagram showing mobile signal strength levels (dBm) in a vehicle. As provided by the Rural Connectivity Group to Crown Infrastructure Partners.

Figure 2 shows the coverage of NetMonitor data that was received. While this coverage is not complete and exhaustive coverage of local roads in Canterbury, it does provide direct and measurable observation of mobile service levels across the key areas of concern established by the Territorial Authorities. Approximately half of the data points collected were missing latitude and longitude values, which was caused by such factors as satellite coverage/reception or issues with specific phones GPS hardware. Most of these records still had useful data for cell coverage and their signal strength. By joining these records to other network datasets using the ‘sys_time’ field (a date time field with accuracy to the second value) the location proved to be very close as these were collected at the same time. A small number of records joined to other datasets in the incorrect spatial location in error due to duplicated ‘sys_time’ values where another drive tester happened to be collecting data in another location at the same time. When investigated these records showed up as a sparse and dispersed small set of points and were discarded in the mobile blackspot gap analysis.

This brought the number of records with a location to 2/3 of the data gathered. Some additional analysis was undertaken into the missing GPS records to understand if the missing data was dotted throughout the data or large portions in succession. From this we found:

- Of the 203 datasets received 22 datasets were missing GPS on all the data points
- There were only two runs that had data GPS data missing from all three network providers
- On average the percentage of GPS data missing per dataset received was 17% and in most instances was dotted throughout the datasets

If required, further analysis could be undertaken to decrease the number of records missing GPS data, however this would require a deeper inquiry into the data than has been scoped for this project. For the purposes of this project sufficient data was received to undertake the analysis required to identify mobile blackspots on Canterbury local roads.

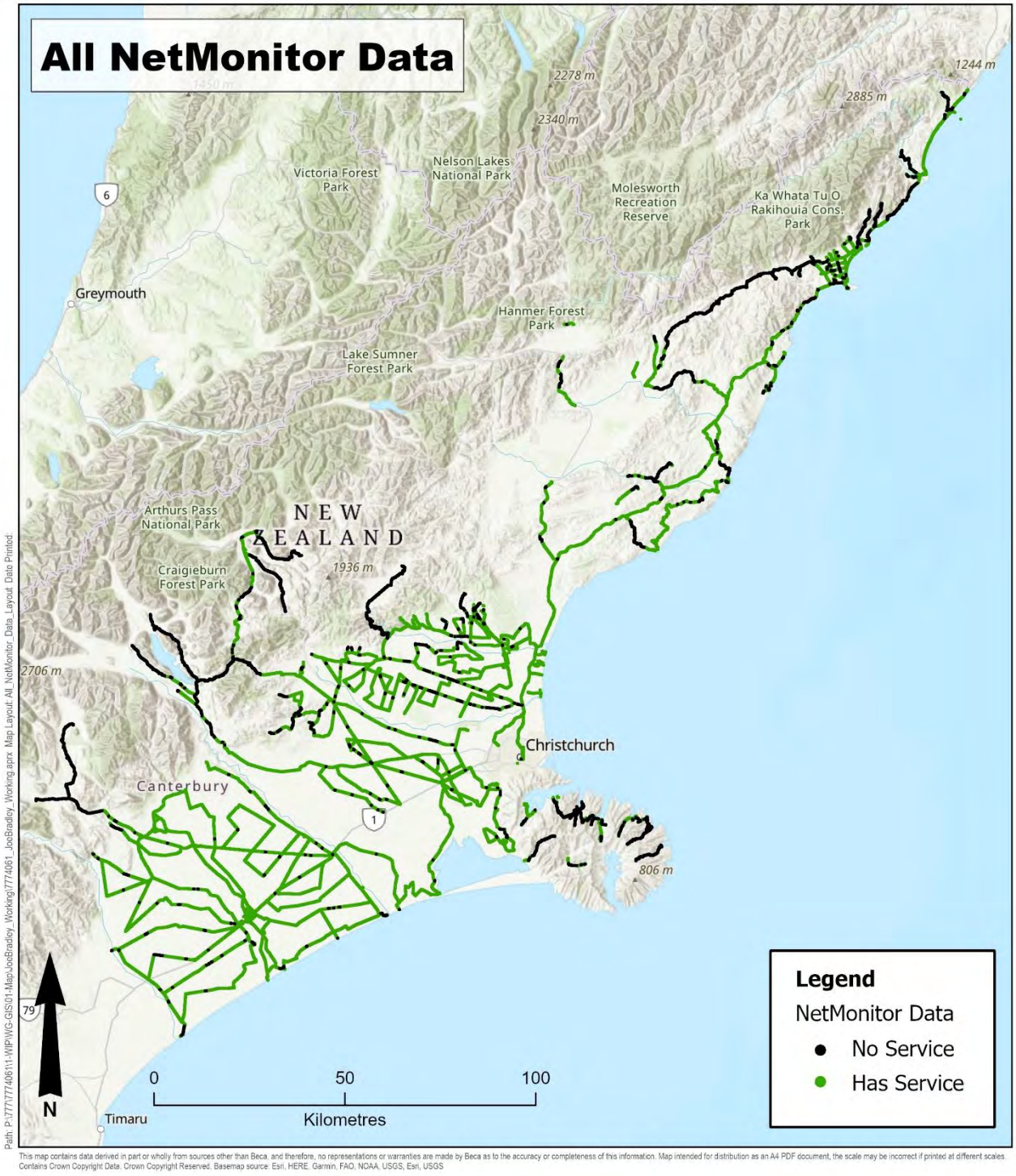

Figure 2 NetMonitor Data received from drive testers

Figure 3 presents the NetMonitor data that has been classed as a mobile blackspot with a rssi value of <-123 dBm as density maps. The blue points show where there is a low number of mobile blackspot points in the same spatial location and the red points show where there is a high concentration of mobile blackspot points in a spatial location. Map 1 shows all three network providers combined and maps 2, 3 and 4 are separate maps for each network provider. This highlights a general correlation of mobile blackspots across the three networks for areas such as the Kaikoura Inland Route, Lees Valley, and the Canterbury Foothills. However, it also shows some differences between networks, for example Vodafone has more areas where the NetMonitor registered a drop in signal strength below the required threshold around Banks Peninsula than both 2Degrees and Spark.

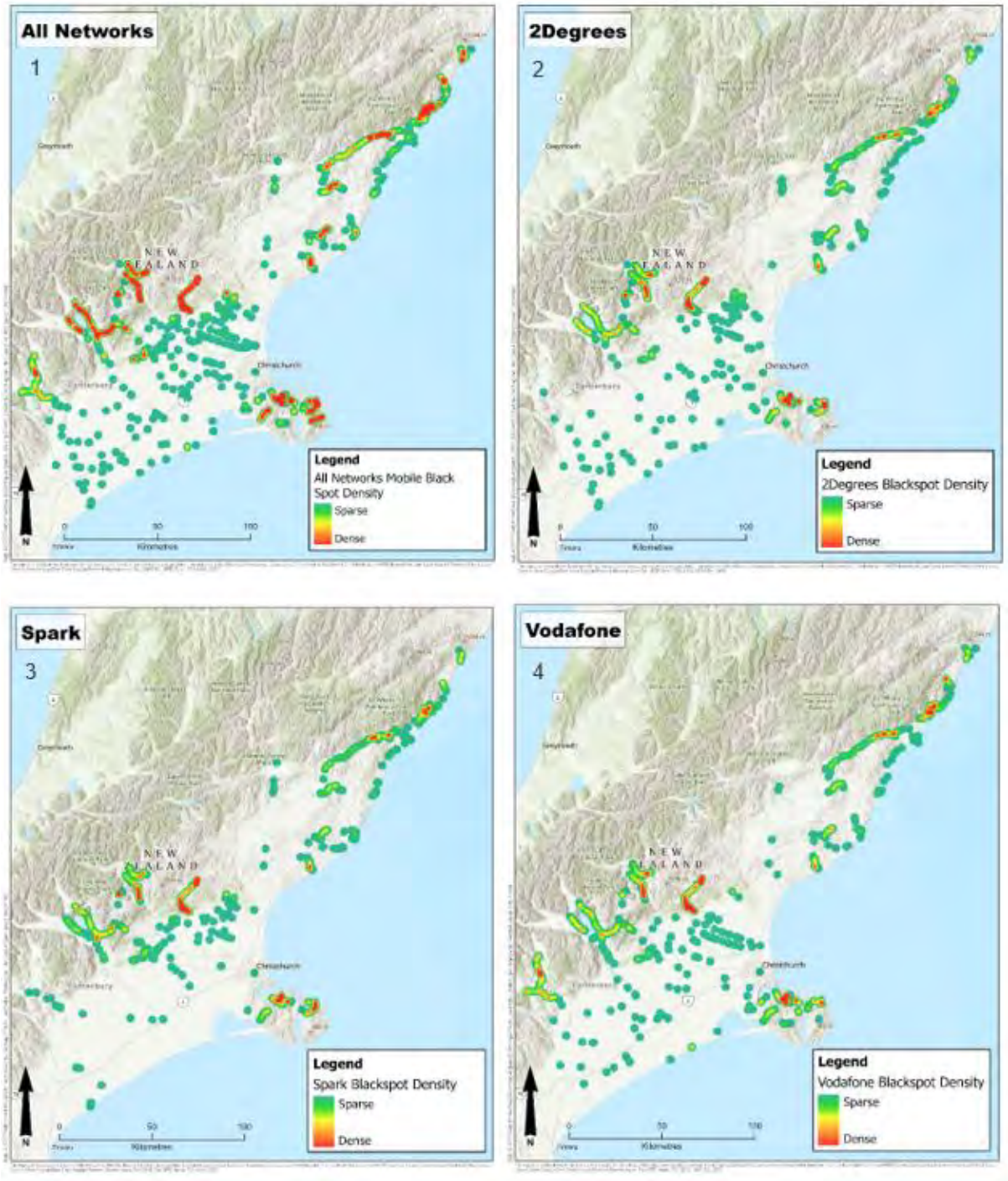

Figure 3 Density heat map of NetMonitor data received that has been categorised as No Service for all networks combined and for each of the network providers

3. Mobile Blackspot Identification

For this project a mobile blackspot has been defined as any section of road that does not meet the required service level for voice calls, as recorded by NetMonitor, along a section of road at least 400m long. This is in keeping with the commonly used 400m distance in transport accessibility studies on walking and cycling services and assumes that in an emergency most people should be able to walk that 400m in a reasonable time to call for help (see note below). In areas where mobile blackspots were patchy, we have grouped blackspots together where the areas of mobile coverage are less than 400m. An example of this can be found in Figure 4.

Note: a 400m distance is commonly used in transport accessibility studies for cycling and walking services. See NZTA report (https://www.nzta.govt.nz/assets/consultation/guidelines-for-public-transport-infrastructure/docs/guidelines-pt-infrastructure-draft.pdf).

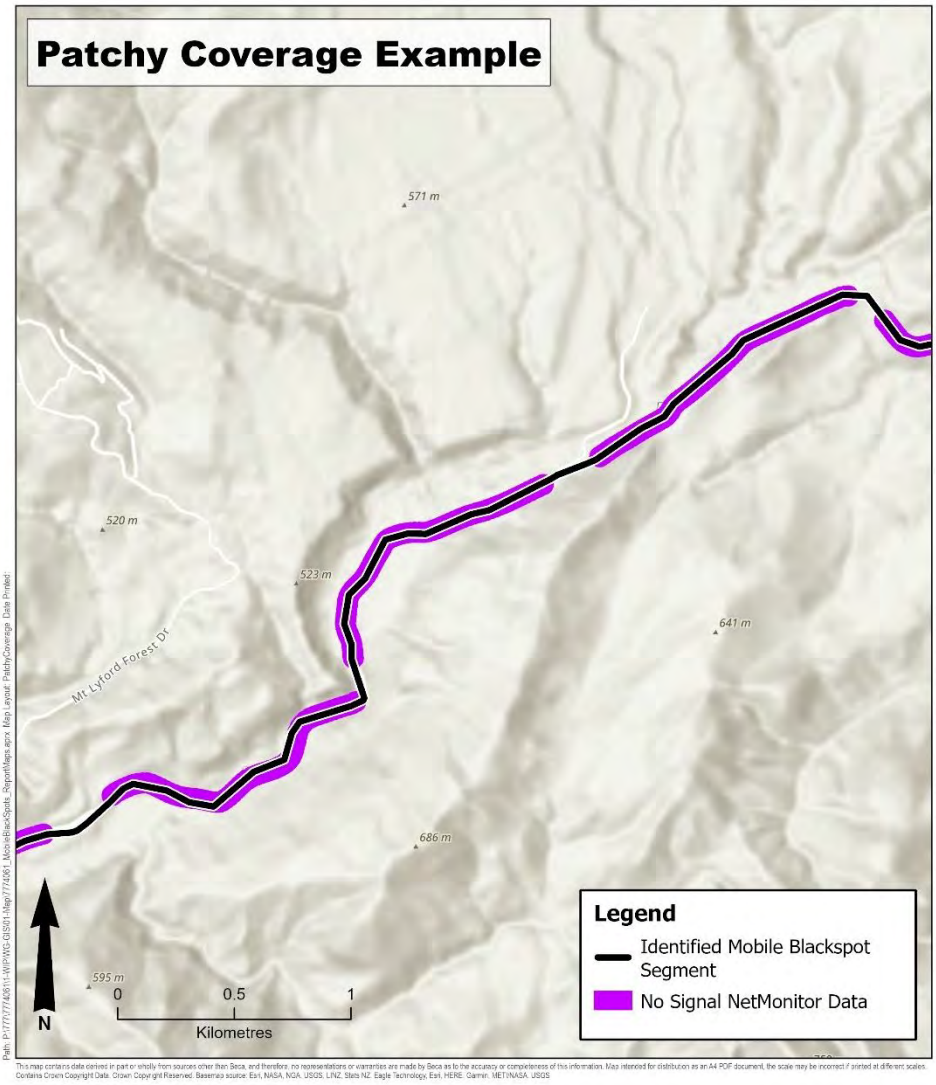

Figure 4 Example of patchy mobile coverage where areas of coverage are less than 400m so the whole segment has been identified as a mobile blackspot

Most road segments were driven in both directions and in some instances there was a stronger signal when the vehicle was driving in one direction. This was often patchy mobile coverage so when identifying mobile blackspot segments we have taken a conservative approach and have not differentiated between a complete or one directional mobile blackspot.

4. Mobile Blackspot Priority Analysis

Each mobile blackspot has been analysed against the datasets listed in Table 1 to capture the attributes of the layer against the blackspot. These metrics were used to understand some of the criteria regarding the social and economic effects of mobile blackspots including crash counts on the mobile blackspot, population numbers affected and number of emergency call outs along the segment.

Table 1 Priority Matrix Inputs

Dataset Name	Description	Source	Open data (if available)
Segment Length	The distance of each blackspot segment	Mobile blackspot identification output	
Estimated Resident Population (2018)	Intersect on Statistical Area 2 boundary. Where more than one area intersects a segment the population with largest area is selected.	Stats NZ 2018 Census by Statistical Area 2 for the Canterbury Region	Weblink
Crash Data	Selected within 50m radius of continuous blackspot. Sum of each crash type - Fatal - Serious - Minor - Non-injury	Waka Kotahi NZ Transport Agency	Weblink
Fire and Emergency NZ Incident Data	This incident record contains point locations for call out incidents, including a time and date alongside a categorised incident type. Provided by Chris Munro, the Operations Manager for the Southern Communications Centre.	Fire and Emergency NZ 2020	Private dataset
Townships	Townships that a mobile blackspot goes through.	Land information New Zealand	Weblink

5. Capture of Anecdotal Mobile Blackspot Information:

A list of stakeholders was provided by the Mayoral Forum for Phase 1 of the project including contacts from each of the territorial authorities, rural post, milk companies, emergency management teams and the NZ Trucking association. For Phase 2 we used this list and some additional stakeholders that were recommended at the conclusion of Phase 1, a full list of stakeholders can be found in Appendix B. Stakeholders were provided with a crowdsourcing web map (see Figure 5) which allowed them to identify locations within the region that they understood to be mobile blackspots. It also offered the opportunity for the stakeholders to provide feedback on how their business was impacted by the lack of coverage.

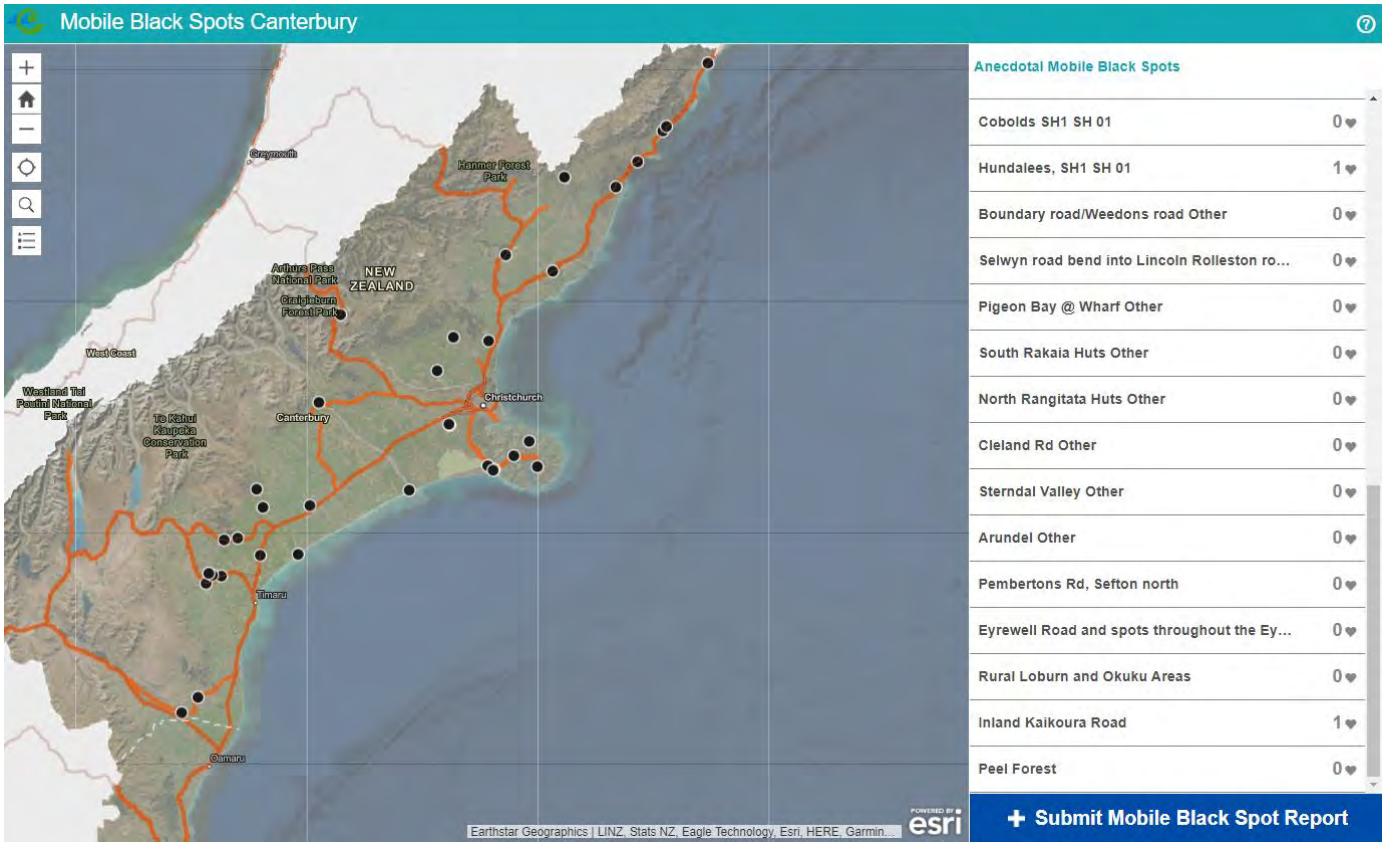

Figure 5 Stakeholder identified mobile blackspots from Phase 1 and Phase 2

6. Stakeholder Engagement Workshop:

A stakeholder engagement workshop was held to engage with nominated staff from territorial authorities, regional council, emergency services and stakeholders from the farming private sector. The purpose of this workshop was to understand the key drivers for mitigating mobile blackspots and the impacts of mobile blackspots on their businesses. This process is explained in more detail below.

Stakeholder Engagement Workshop Feedback Summary

Phase 2 of this project was introduced to key stakeholders identified by the Mayoral Forum via an email on 29 October 2021. Once the drive test data was collected, a workshop was held with the stakeholders to interrogate mobile blackspot data identified in the process described above. The workshop was held on Tuesday 23 November 2021 and was attended by staff from the below organisations. This was a subset of the original list of stakeholders as identified in Appendix B.

- Waimakariri District Council
- Selwyn District Council
- Hurunui District Council
- Kaikōura District Council
- Christchurch City Council
- Environment Canterbury
- Timaru District Council
- Ashburton District Council
- Mackenzie District Council
- St Johns

- Fire and Emergency NZ (FENZ)
- Fonterra
- Federated Farmers
- Enterprise North Canterbury

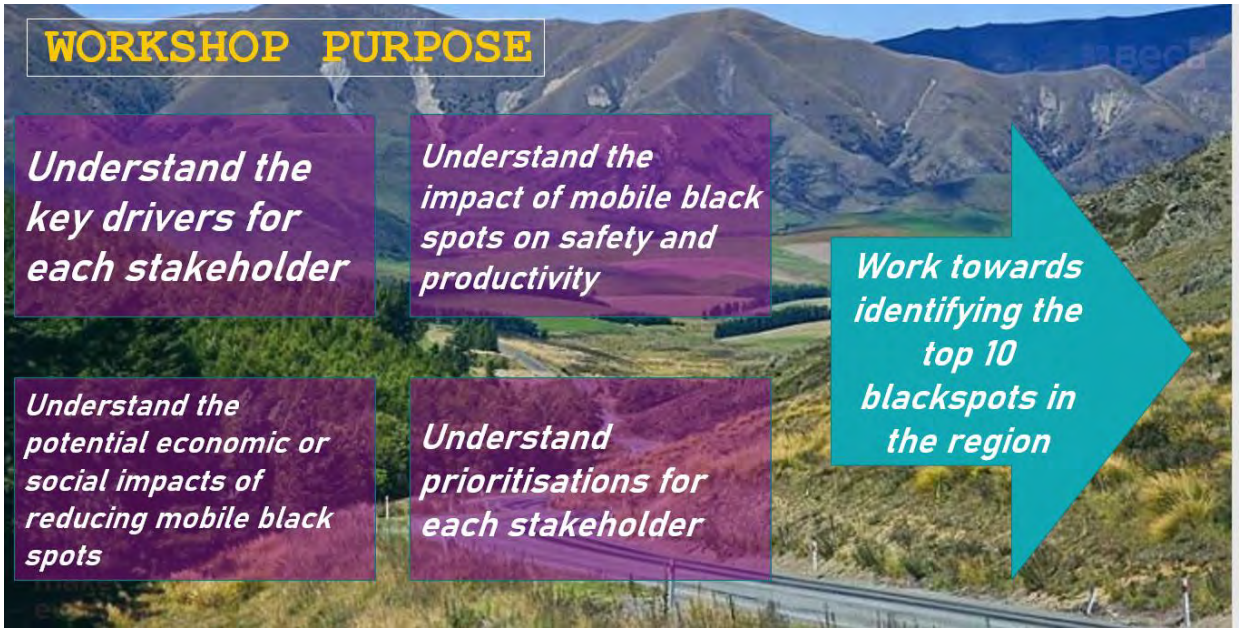

Figure 6 Workshop questions put to stakeholders

After a general introduction to the project, attendees were given the opportunity to outline their key drivers and the impacts of mobile blackspots as shown in Figure 6. A Miro Board was used to capture post-it notes from each stakeholder and these were discussed and categorised into themes. The key drivers and impacts as identified by the workshop attendees are described below. It is important to understand that the information captured below is anecdotal in nature and only includes information provided by the stakeholders that attended the workshop and is a record of what was discussed rather than a full assessment of the impacts.

Key Drivers

St John and FENZ were principally concerned with reducing response time to incidents, either through improving the speed that callers could connect to emergency services or improved accuracy of Enhanced Caller Location technology. This technology pinpoints the location of an emergency call by providing coordinates (therefore, if an incident occurs in a mobile blackspot and someone must travel away from the incident to get signal or call from a landline, time is added to the response while the incident site is located). They were also concerned about improving the safety of their staff, particularly where they have only one paramedic in a crew. Further to this, advice on how to respond to a situation is provided from the call centre to paramedics and this cannot be undertaken within a blackspot, therefore improved coverage improves standard of care.

Fonterra and Federated Farmers were principally concerned with improving on-farm safety and safety in transit to farms, increasing access to and managing costs for mobile connections, improving ability to use latest technology and to use technology to improve environmental compliance, reducing the need to travel for meetings by using online tools, improving social connectivity of farmers and their families, and improving work planning.

Federated Farmers provided us with the results from the Rural Connectivity Survey for 2019, 2020 and 2021.

The territorial authorities were concerned with community safety including:

- Improved coverage of Civil Defence Tools (bulk messaging regarding natural disasters and events such as Covid19 outbreaks, boil water notices)
- Safety of their staff and contractors when out on site or travelling around their district
- Supporting better access to *555 calls and decreasing police response times
- Community connectivity and the flow-on effects on wellbeing and health

Furthermore, territorial authorities were also concerned with improving the ability to gather information about assets and incidents across the region (i.e., water quality data collection and integration, reporting of maintenance / general complaints, wandering stock) and providing more consistent and reliable access to the internet to support tourism and leisure activities.

Impact on Productivity:

The workshop attendees discussed several impacts on productivity. Councils currently rely on telemetry equipment that uses radio technology for communication. This equipment comes at a significant cost so being able to explore and use alternative methods with improved cell phone coverage could save the councils' money.

The emergency call centre now uses Enhanced Caller Location technology that locates where a call has been made from via GPS. This improves the ability of emergency staff to get to an incident quickly as 80% of calls come from cell phones.

Civil Defence relies on bulk emergency messaging services to distribute key urgent communications i.e., emergency event evacuations.

There are efficiencies to be gained for farmers and councils to be able to do work planning live and update instantly, rather than having an additional uploading task when staff are back in service. This also reduces drive time with staff having to drive in and out of service to complete tasks and move to the next. The ability to connect to organisational networks reduces the need to print documents and improves ability of staff to work in the field.

Lack of mobile coverage or patchy mobile coverage acts as a lid to how big a company can grow before they need to relocate.

Connectivity improves resilience of organisations because staff can still contribute while working from home. Connectivity also improves the ability of farmers to multitask and undertake tasks without constraints. Inability to access mobile connectivity reduces innovation.

There could be improved environmental compliance and outcomes if farmers could use the technology available to them while they are on the farm.

Impact on Social and Safety

The workshop attendees discussed that improved connectivity has the potential to reduce isolation, loneliness and improve people's sense of wellbeing. It also improves access to community service organisations and allows for working from home opportunities. Furthermore, it improves the ability of rural

schoolchildren to participate in education opportunities remotely as well as enabling adults to upskill and further their education remotely.

Socially connected and supported families create connected and supported communities.

There are long term psychological impacts on callers who have had trouble connecting with emergency services.

Organisations need to be able to ensure the safety of staff using rural roads.

Stress can be caused by a variable connection and inability to plan mobile-reliant work. This was exacerbated by COVID-19 lockdowns with multiple household members at home and reliant on connecting. Poor connectivity can prevent people carrying out routine tasks (e.g., emails, accounting, compliance administration). Given many tasks are time-sensitive, and the demands on people's time, this causes frustration and stress.

Impacts on Economic Activities

The workshop attendees discussed a number of possible impacts on economic activities. These included that it is common for farmers to employ monitoring technology that uses cell phone coverage to manage farms. Proving more uniform cell phone coverage levels the supports the levelling of the playing field for farmers across the region.

Improved cell phone coverage allows people to access the internet and data without having a monthly plan and via a range of devices. This enables and improves social connectivity without the same financial outlay.

Increased integration between agencies and businesses and increasing technology in all sectors and industries will require better connectivity. Improved cell phone coverage will support this.

Improved connectivity has the potential to improve the ability of rural or remote industries to attract and retain staff.

Prioritisation

Following the exploration of the key drivers and impacts, a prioritised list of mobile blackspots was discussed with the workshop attendees in further detail and input from each attendee was gathered to further understand the impact of that specific blackspot. The blackspot prioritisation provided a number of insights, including some specific additional blackspots provided by Federated Farmers. This discussion is captured below in Table 2.

Table 2 summarises the highest priority mobile blackspots by geographic area and provides summaries of the prioritisation matrix criteria for that was outlined in Table 1. The mobile blackspots for each network provider are not always on the same road segment hence the differences in length and summarised prioritisation criteria between the network providers. The mobile blackspots for each geographic area have been mapped and can be found in Appendix C.

Additional Stakeholder Data

Following the stakeholder engagement workshop Federated Farmers provided access to their rural connectivity survey data from 2019 – 2021. This included information regarding the strongest phone signal on each farm and the percentage of the farm that has mobile coverage. This data was passed on to the Mayoral Forum.

Table 2: Top priority mobile blackspot following workshop and prioritisation exercise.
Please note that the mobile blackspots for each network are not necessarily in the same geographic position at each blackspot location area, therefore there may be some significant differences in the prioritisation indicators between networks.

Blackspot Location	Network	Sum Length (km)	Sum FENZ Incidents (All)	Average Resident Population 2018	Total Crash Count	Discussion	Built and planned coverage	Priority
Canterbury Plains - Charing Cross	2Degrees	1.06	2	1875	1	A lot of lifestylers live in the vicinity. Proximity to Christchurch and flat so lack of connectivity is not understood		Low
	Spark	0.65	8	920	21			
	Vodafone	0.66	8	920	21			
Canterbury Plains - Eyrewell	2Degrees	4.04	4	1160	18	A lot of lifestylers live in the vicinity. Proximity to Christchurch and flat so lack of connectivity is not understood		Medium
	Spark	2.21	4	1500	9			
	Vodafone	9.63	17	1628	47			
Canterbury Plains - Loburn	2Degrees	13.09	8	1500	7	A lot of lifestylers live in the vicinity. Proximity to Christchurch and flat so lack of connectivity is not understood		Medium
	Spark	7.54	2	1658	2			
	Vodafone	3.81	0	1257	0			
Kaikōura Alternative Route	2Degrees	60.49	22	2100	53	The backup state highway so can be heavily used. Long sections with no connectivity	Lyford and Inland Roads towers planned for 2022	High
	Spark	58.27	23	2070	52			
	Vodafone	58.27	22	2061	70			

Blackspot Location	Network	Sum Length (km)	Sum FENZ Incidents (All)	Average Resident Population 2018	Total Crash Count	Discussion	Built and planned coverage	Priority
Leader Road, Waiau	2Degrees	13.56	10	2310	17	Long, continuous stretch of mobile blackspot, with relatively high population in the area		Low
	Spark	15.22	10	2310	17			
	Vodafone	13.67	10	2310	17			
Lees Valley	2Degrees	31.95	2	955	15	During emergencies, this community is isolated. During the last slip event, there was no mode of comms available. RTs even cut out. Challenging terrain		Medium
	Spark	32.16	2	1027	15			
	Vodafone	35.12	2	955	18			
Okains Bay Campground	2Degrees	17.38	10	640	13	A lot of concern about this blackspot highlighting that there is a school and camping ground in the vicinity	Lavericks Tower planned for January 2023	High
	Spark	16.48	10	640	13			
	Vodafone	19.06	10	640	13			
Purau - Port Levy	2Degrees	19.53	31	640	11	Long distance to travel to get coverage. A lot of tourists use this route. Concern for roading contractors, DoC staff, a lot of sole operators, small scale farms, stock moved via the road	Port Levy Tower planned for October 2022	High
	Spark	18.41	19	640	11			
	Vodafone	25.96	40	714	24			
Rangitata River Mouth Camping Ground	2Degrees	0.79	0	1630	0	Community vulnerable to coastal hazards and patchy coverage means ability to receive alerts is not certain		Low
	Spark	2.15	1	1630	0			
South Rakaia Huts	Vodafone	1.07	0	2590	0	Community vulnerable to coastal hazards and patchy coverage means ability to receive alerts is not certain		Low

Priority Mobile Blackspots

Prioritisation of mobile blackspots on local roads in Phase 2 was harder to define than the state highways in Phase 1. The local roads tested and discussed were in areas of lower population numbers and on roads that are driven less which was reflected in the lower crash and FENZ incident numbers. We also found that blackspots needed to be grouped together over larger geographic areas as there were clusters of patchy mobile blackspots. The workshop attendees discussed their priorities and based on the data collected and that discussion, the following top 10 priority areas have been selected and shown in alphabetical order:

1. Canterbury Plains - Charing Cross
2. Canterbury Plains - Eyrewell
3. Canterbury Plains - Loburn
4. Kaikōura Alternative Route
5. Leader Road, Waiau
6. Lees Valley
7. Okains Bay Campground
8. Purau – Port Levy
9. Rangitata River Mouth Camping Ground
10. South Rakaia Huts

These prioritised mobile blackspots were allocated a low, medium, or high priority rating based on the prioritisation criteria of population, road crashes and overall length as well as a reflection of the discussion within the workshop. For example, it was unanimous across most workshop attendees that the Kaikōura Alternative Route was a high priority, whereas areas such as the Rangaitata River Mouth Camping Ground and South Rakaia Huts primarily concerned localised workshop attendees.
We do also acknowledge that from our understanding of RCG's forward works programme that over the next 12 months the installation of towers along the Kaikōura Inland Route and areas of Banks Peninsula will make a significant difference to the mobile coverage in these areas. This has not affected the prioritisation but should be considered in the planning of action the next steps undertaken by the Mayoral Forum in this project.

Conclusion

Mobile signal data was collected by engaging field staff from the regional council and five territorial authorities using an app called NetMonitor. Although the drive test data collected within this project has not produced a complete dataset of drive testing on all Canterbury local roads, the coverage area of collected data covers roads highlighted as areas of interest by the participating territorial authorities and provided sufficient data to undertake analysis for this project. The drive test data has been used in conjunction with other data collected during the project such as anecdotal information from stakeholders and mobile coverage maps available from telecommunications companies to provide segments of local roads where significant mobile blackspots can be found.
Some key inferences can be drawn from the data collected:

- The existing and planned mobile coverage data already available from telecommunications companies and CIP can be used generally at the macro level to determine the worst mobile blackspot areas.
- Using a combination of the data output from drive testing, anecdotal evidence and the telecommunications mobile coverage data can provide an understanding of the worst mobile blackspot areas and highlight areas for discussion or further testing if required. Additional analysis could be undertaken to decrease the number of data records that are missing GPS data if required.
- The data collected has provided suitable information for stakeholder engagement to take place allowing interpretation and prioritisation based on the contribution of the workshop attendees.

- The data collected using phones connected to all three network providers allows the comparison between the companies and also highlights areas that have a correlation of mobile blackspots.

The stakeholder engagement workshop allowed us to identify ten high priority mobile blackspot areas to be put forward for advocation to central government, CIP, and telecommunications companies.

1. Canterbury Plains - Charing Cross
2. Canterbury Plains - Eyrewell
3. Canterbury Plains - Loburn
4. Kaikōura Alternative Route
5. Leader Road, Waiau
6. Lees Valley
7. Okains Bay Campground
8. Purau – Port Levy
9. Rangitata River Mouth Camping Ground
10. South Rakaia Huts

The most common driver from stakeholders that aided the prioritisation of these mobile blackspots was safety. Safety of council field staff, communities, emergency services staff working alone, tourists, on farm safety and all road users. Other drivers included community connectivity, information gathering regarding incidents and assets, more consistent and reliable access to the internet to support farming, telemetry technology and tourism and leisure activities.

A

Appendix A – NetMonitor Instruction Guide

Canterbury Mobile Black Spots Data Capture Guide

NetMonitor Cell Signal Logging

Prepared for Environment Canterbury (on behalf of the Canterbury Mayoral Forum)

Prepared by Beca Limited

22 September 2021

Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
1.0	Marc Graham	Draft for client review	08/06/2020
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Approved by	Orlando Kootstra		24/09/2021
on behalf of	Beca Limited		

Executive Summary

Environment Canterbury has commissioned Beca to design and conduct a data gathering exercise with the intent to determine black spots in cellular coverage on roads chosen by the councils in the Canterbury Region. This document is intended to provide a guide to anyone who will be participating in the data gathering exercise.

It covers:

- The mobile application and hardware to be used
- How to configure the app for data gathering
- Safe operation while driving
- How to export data
- Where to send the exported data

1 The Mobile Phones and Networks

Data collectors will be provided with three mobile phones for capturing data, one on each mobile network:

1. Spark
2. Vodafone
3. 2Degrees

The three mobile phones should be kept together and used to collect data simultaneously. Each phone will be equipped with the NetMonitor App for collecting data. Instructions on how to use the app can be found in Section 2.

NetMonitor is designed to run on the Android operating system. It requires access to the cellular hardware that is not possible on iOS devices. Phones are required rather than tablets, even if a tablet has a sim card for cellular data. The phone should run Android 4.3 or later. **Please use the mobile phones supplied by the Mayoral Forum**.

2 Operating NetMonitor & Safety Recommendations

Do not interact with the phone or application while driving. Any time you need to interact with the phone application the vehicle should be stationary and parked in a safe location.

Steps to capture Cell Signal data (set up in stationary vehicle)

1. Ensure mobile phones are fully charged as regular use of the GPS can deplete the battery quickly.

2. Open the app on each phone.

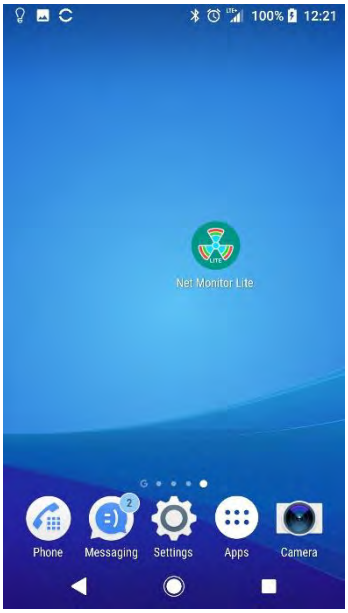


Figure 1 App Icon

3. Begin capturing data in a new session. To start a session, press on the Red circle in the Top Right corner (indicated with the yellow arrow). Ensure this is done on all three phones.

Figure 2 Begin recording options

4. Ensure phones are in clear view of the sky and mounted in a car device holder or properly secured to limit movement in a location that is not distracting to the driver.

5. Where possible ensure the phones are plugged in to genuine tested charging cable as regular use of the GPS can deplete the battery quickly.

6. Follow NZ Legislation requirements outlined in 7.3A Ban on use of mobile phones while driving.

7. Once the user has driven their route, they should pull over to a safe location ensuring the vehicle is stationary before stopping data recording.
   To stop data recording press on the White square in the Top Right corner (indicated with the yellow arrow).

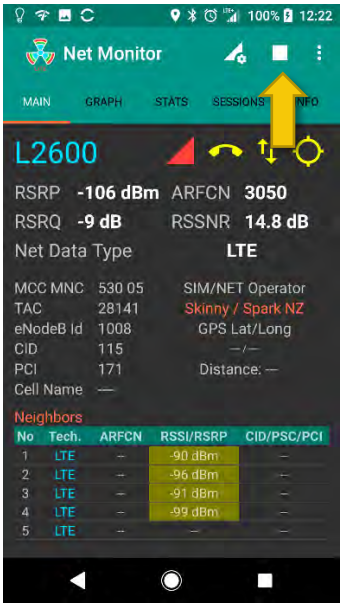


Figure 3 Stop data recording

Users can start and stop recording as many times as they like. Each session will be recorded and stored as separate sessions in the application. **Each session must be exported and emailed separately**.

3 Exporting and emailing NetMonitor data

Each session should be exported from the application as a CSV file and emailed to project-48116@workspace.beca.com.

The user should press on the “Sessions” Tab (Indicated with a yellow arrow).

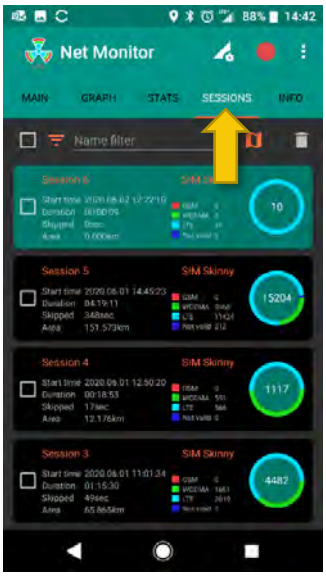


Figure 4 Sessions tab

1. The User should long press on each session to export and will be asked to choose an action. Choose “Export Session to CSV File” (Indicated with a yellow arrow).
   Choose the “Email” option (Indicated with a yellow arrow) and select Gmail. The app will launch; email the file to project-48116@workspace.beca.com.

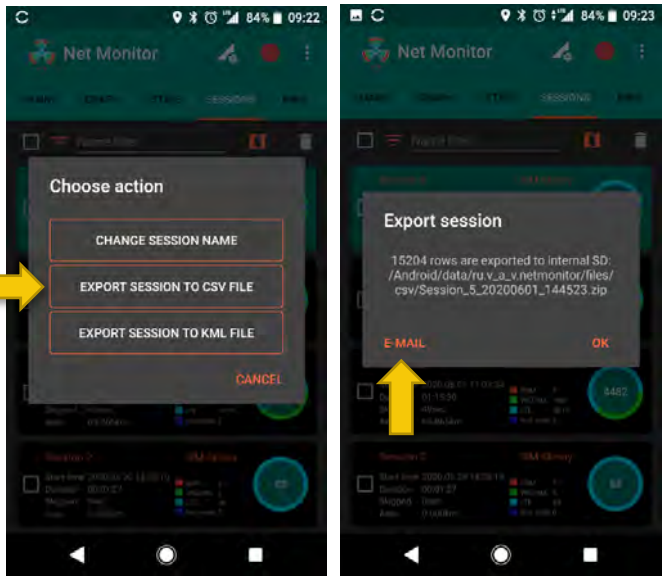


Figure 5 Export session to CSV file via email

Once the sessions are emailed the users can delete the data from their phones. Select all sessions to delete using the check boxes on the left-hand side and pressing the delete icon (Indicated with a yellow arrow) in the top right of the session list.

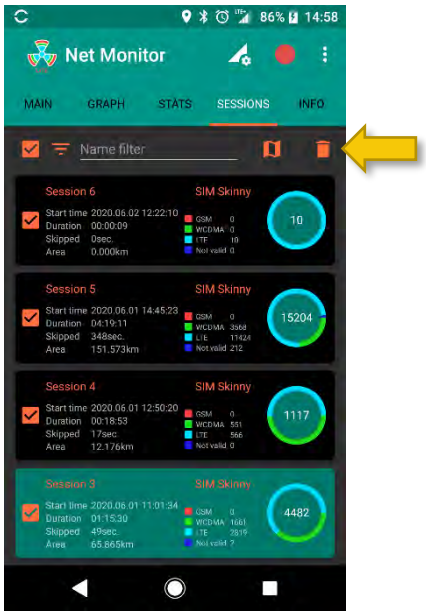


Figure 6 Selected sessions

4 Help

If you have any issues using the app or the phones, please email bianca.clark@beca.com.

B

Appendix B – Communication and Engagement Plan

Communication and Engagement Plan – Phase 2

Prepared for Environment Canterbury (on behalf of the Canterbury Mayoral Forum)

Prepared by Beca Limited

27 October 2021

Creative people together transforming our world

Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
	Genevieve Doube	Draft	27 October 2021
	Genevieve Doube	Final	7 December 2021

Document Acceptance

Action	Name	Signed	Date
Prepared by	Genevieve Doube		7 December 2021
Reviewed by	Heather Law		14 December 2021
Approved by			
on behalf of	Beca Limited		

1 Purpose

The purpose of this plan is to outline the communication and stakeholder engagement approach for the Canterbury Mayoral Forum Mobile Blackspots Project Phase 2.

2 Project Outline and Background

Good mobile coverage is an enabler for productivity and logistics, safety and emergency services, the tourism sector, relationships and connectivity, and communication in our rural communities.

Following on from Canterbury Mayoral Forum Mobile Blackspots Project Phase 1, which investigated mobile phone black spots on state highway routes, the Canterbury Mayoral Forum have engaged Beca to ground truth existing mapped mobile coverage data. Further work with key stakeholders will also be undertaken to understand the impact of mobile black spots within a number of territorial authorities, being -

- Waimakariri District Council
- Selwyn District Council
- Hurunui District Council
- Ashburton District Council
- Kaikōura District Council
- Christchurch City Council
- Environment Canterbury (covering roads in Timaru, Ashburton, Waitaki, Waimate, Mackenzie)

The territorial authorities involved in Phase 1 have each provided a list of roads that they identify as having poor mobile coverage. A desktop study will explore the datasets that are already existing to provide a contextual picture of coverage, and can be used as a basis for testing the driven data against.

There is government funding available through the Mobile Black Spots Fund (MBSF) to help tackle mobile black spots on state highways and at key tourist destinations. Initially, the Canterbury Mayoral Forum needs to identify the key black spots within the region, and then prioritise a list of the top 10 sites for which funding will be sought.

Crown Infrastructure Partners Limited (CIP) and the Ministry of Business Innovation and Employment (MBIE) have GIS mapped mobile coverage using publicly available data. However, experience on the ground and anecdotal evidence indicate that this may not paint an accurate picture of the actual coverage that can be achieved throughout rural Canterbury.

As part of the study, CIP will be contacted to establish what regionally specific mobile coverage data they hold, including drive test data, planned tower build locations and the proposed coverage of these towers. Available mobile coverage data will also be gathered from telecommunications companies. We will also interface with CIP and the telecommunication providers to understand what constitutes an acceptable level of service for cellular data and communications.

Once the full list of black spots has been identified, Beca will facilitate a virtual workshop with the key stakeholders so that we can collectively prioritise the top 10 sites.

3 Communication Objectives

The following communication objectives have been identified for this project:

- Key stakeholders are identified and invited to participate

- Key stakeholders are well informed of the project early in the process
- Key stakeholders understand the project timeframe and when they will have opportunities to feed into the process
- Key stakeholders' knowledge and resources support the information requirements for the project
- Key stakeholders feel that their input has been considered and has helped to shape the priorities
- Key stakeholders buy into, and support, the project outcomes
- Key stakeholders understand the limits of the project scope
- Key stakeholders feel that there is clear understanding of the issues each stakeholder faces

4 Roles and Responsibilities

The below table outlines the key team members, and interfaces with Environment Canterbury and Mayoral Forum -

Role	Name	Organisation	Responsibility
Environment Canterbury Chair	Jenny Hughey	Environment Canterbury	
Canterbury Mayoral Forum Chair	Sam Broughton	Environment Canterbury	
Canterbury Mayoral Forum secretariat – Principal Advisor	Maree McNeilly	Environment Canterbury	Communications with the forum
Project Director	Orlando Kootstra	Beca	Job Director
Project Manager	Bianca Clark	Beca	Job Manager - main client contact. Has weekly meetings with the Canterbury Mayoral Forum secretariat – Programme Manager
Canterbury Mayoral Forum secretariat – Programme Manager	Rosa Wakefield	Environment Canterbury	

5 Communication Protocols

Genevieve Doube (Beca) will prepare and update the Communications and Engagement Plan during the project, working closely with Bianca Clark, Beca Project Manager and Rosa Wakefield, CREDS Programme Implementation Manager.

All documents will be reviewed by the Project Director Orlando Kootstra, Project Manager Bianca Clark (Beca) and Project Manager Rosa Wakefield (Canterbury Mayoral Forum secretariat).

Engagement and coordination with the relevant stakeholders will be initiated by Genevieve Doube. Relationships with Environment Canterbury staff will be managed by Bianca Clark.

COVID impacts

As of 6 September 2021, indoor gatherings up to 50 people are allowed. However, organisations may have different approaches to Health and Safety requirements for their staff which may impact their ability to attend face to face meetings and workshops. Digital engagement techniques such as MS Teams call or Miro 'brainstorming' boards will be utilised.

6 Stakeholders

Environment Canterbury previously supplied a list of stakeholders to be contacted in the first instance, which we have used as our starting point. Where the employee no longer works at the organisation, we have endeavoured to find an alternative contact. We have also included the attendees from the Phase 1 workshop and extended the stakeholder group to include several additional organisations. These details are provided in the table below:

Organisation	Contact	Contact Details
Kaikōura District Council	Dave Clibbery Sam Murphy	Dave.Clibbery@kaikoura.govt.nz sam.murphy@kaikoura.govt.nz
Hurunui District Council	Hamish Dobbie, CE, and Chair of the Canterbury Operations Forum Dan Harris	hamish.dobbie@hurunui.govt.nz dan.harris@hurunui.govt.nz
Waimakariri District Council	Jim Palmer, CE Gerard Cleary Jenny Wilkinson Carl Grabowski	Jim.Palmer@wmk.govt.nz gerard.cleary@wmk.govt.nz Jenny.Wilkinson@wmk.govt.nz carl.grabowski@wmk.govt.nz
Christchurch City Council	Dawn Baxendale, CE Andrew Hensley	dawn.baxendale@ccc.govt.nz Andrew.hensley@ccc.govt.nz
Selwyn District Council	David Ward, CE Murray Washington (Chair, Canterbury Engineering Managers Group)	david.ward@selwyn.govt.nz murray.washington@selwyn.govt.nz
Ashburton District Council	Hamish Riach, CE Simon Worthington James Lamb Martin Lo	Hamish.riach@adc.govt.nz Simon.worthington@adc.govt.nz James.lamb@adc.govt.nz Martin.Lo@adc.govt.nz
Timaru District Council	Bede Carran, CE Ashley Harper Andrew Dixon Suzy Ratahi Richard Lovell	bede.carran@timdc.govt.nz ashley.harper@timdc.govt.nz andrew.dixon@timdc.govt.nz suzy.ratahi@timdc.govt.nz richard.lovell@timdc.govt.nz

Mackenzie District Council	Suzette van Aswegen, CE David.adamson@mackenzie.govt.nz	suzette@mackenzie.govt.nz David.adamson@mackenzie.govt.nz
Waimate District Council	Stuart Duncan, CE	stuart.duncan@waimatedc.govt.nz
Environment Canterbury	Natasha Densey contact for Environment Canterbury Operations group Jacob Davies	Natasha.Densey@ecan.govt.nz Jacob.davies@ecan.govt.nz
Rural Post	Adrian Sexton, Rural Contracts Manager	adrian.sexton@nzpost.co.nz
Fire and Emergency New Zealand (Canterbury)	Steven Greenyer, Area Commander Mid/South Canterbury Mike Gaskin – Fire Risk Management Officer / Specialist Fire Investigator (Selwyn contact) Chis Munro Karl Patterson	steven.greenyer@fireandemergency.nz mike.gaskin@fireandemergency.nz chris.munro@fireandemergency.nz karl.patterson@fireandemergency.nz
St John Ambulance	David Thomas, General Manager South Island Region Daryl Tomlinson	david.thomas@stjohn.org.nz Daryl.Tomlinson@stjohn.org.nz
Police	Jonathan Lin, Operations	jlin94@police.govt.nz
Fonterra	Robb Stevens, Manager Local Government & Stakeholder Affairs Nola Turner	Robb.Stevens@fonterra.com Nola.turner@fonterra.com
Synlait	Yves Denicourt, Environmental Sustainability Manager	Yves.Denicourt@synlait.com
NZ Trucking Association	Dave Boyce, Chief Executive Officer Carol McGeady, General Manager	dave.boyce@nztruckingassn.co.nz carol.mcgeady@nztruckingassn.co.nz
Federated Farmers	Caroline Amyes, Federated Farmers North Canterbury rep Jacob Haronga	caroline.amyes@gmail.com jharonga@fedfarm.org.nz
Enterprise North Canterbury	Miles Dalton, Business Support Manager	miles@enterprisenc.co.nz
LandSAR		LandSARChristchurch@outlook.com

Westland Milk was initially contacted but asked not to be included going forward. Given staff changes at Waitaki District Council, no replacement contact has been identified.

7 Key Messages

The following key messages will guide discussion with the stakeholders –

- Publicly available data sets have been used as a base
- More data has been gathered via drive testing
- Importance of working together to agree criteria for prioritisation recognising that organisations may have different perspectives
- Desire to understand the impact of mobile blackspots on safety and productivity as well as the potential economic or social impacts of reducing these
- Identify the top 10 blackspots in the region
- Limits of project to effect change

8 Communication and Engagement Tactics

The table below outlines the tactics and timings for engagement with stakeholders -

Date	Audience	Activity / Action	Responsibility	Status
October 2021	Stakeholders	Email to introduce Phase 2 of the project and the process that will be followed, along with when we expect to make further contact with them. Outline how we will record their feedback and ideas.	Genevieve Doube draft email and coordinate stakeholders	Completed 29 October 2021
	Canterbury Mayoral Forum	Agree criteria of social and economic impacts for assessment of prioritisation of black spots	Bianca and / or Genevieve	Completed Conversation with Rosa prior to stakeholder engagement
November 2021	Stakeholders	Joint online engagement workshops to: • Understand the key drivers for each stakeholder • Assess the potential economic or social impact of the identified blackspots on their business based on the set of agreed criteria.	Genevieve Doube	Completed 23 November 2021
November 2021	Stakeholders	Follow up conversations via phone, online surveys or interactive maps to capture information from those who may not be able to attend workshops.	Bianca Clark / Genevieve Doube	Completed

Ongoing	Canterbury Mayoral Forum	Outline process to keep them up to date on project progress	Maree McNeilly	

9 Risks and Opportunities

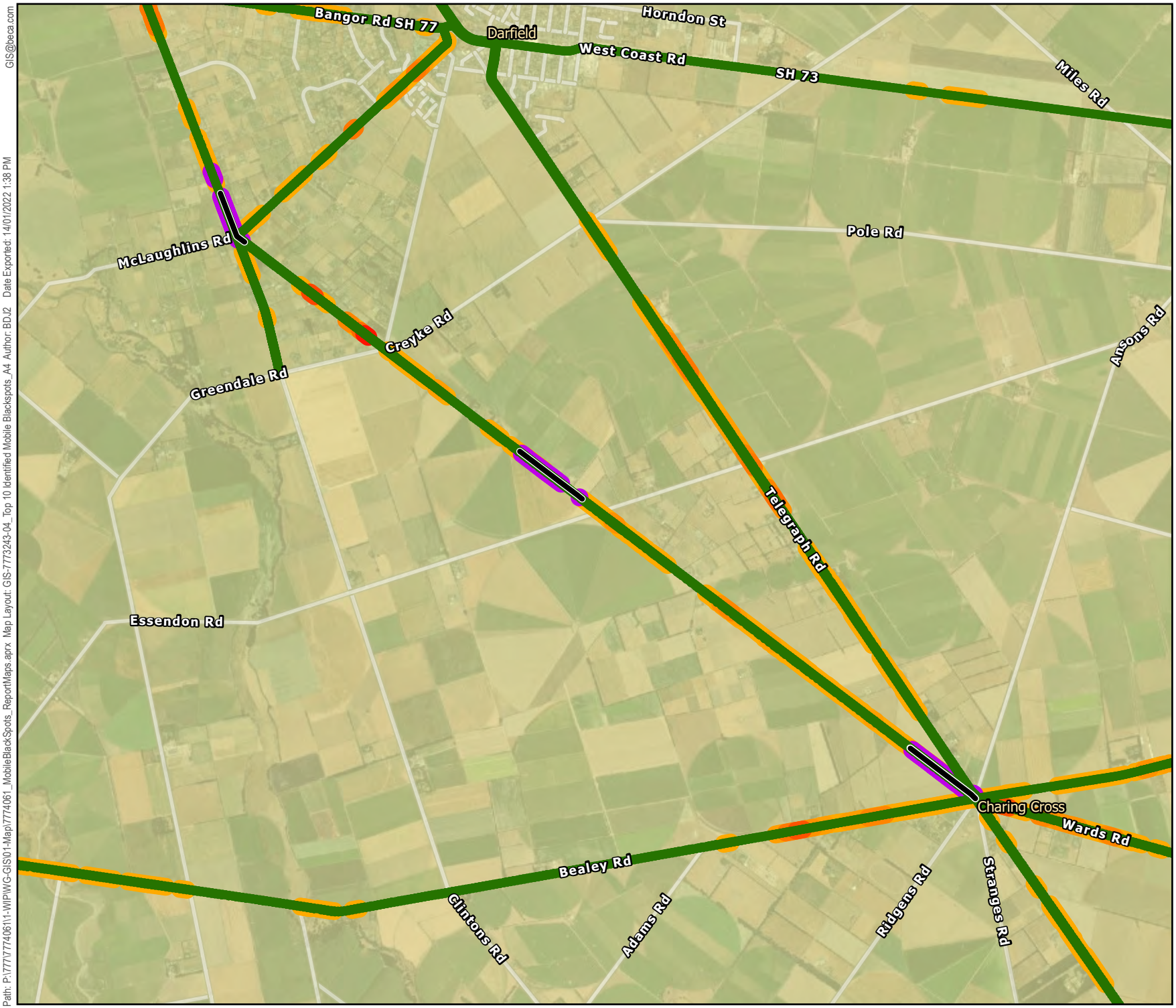
Risk	Likelihood	Level of Impact	Mitigation approach / opportunity
Competing priorities identified	Medium	High	Further tease out the impact of the mobile black spot on each priority
Agreement cannot be reached between stakeholders	Medium	High	Use the evaluation criteria
Prioritisation criteria are not fit for purpose	Low	Medium	Be agile in the workshop and take robust notes of the conversation
A stakeholder feels this project is a duplication of work already done	Low	Low	Clear communication about the project, work that has been done and work we are planning

10 Stakeholder Outcomes

Successful stakeholder engagement will have been achieved if the workshop builds understanding between the attendees of the challenges that a lack of mobile coverage creates for each of them, and the 10-priority mobile black spots can be agreed upon.

C

Appendix C – Report Maps



Canterbury Plains - Charing Cross

Legend

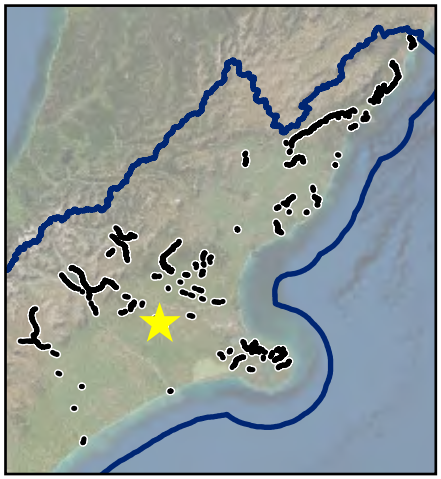
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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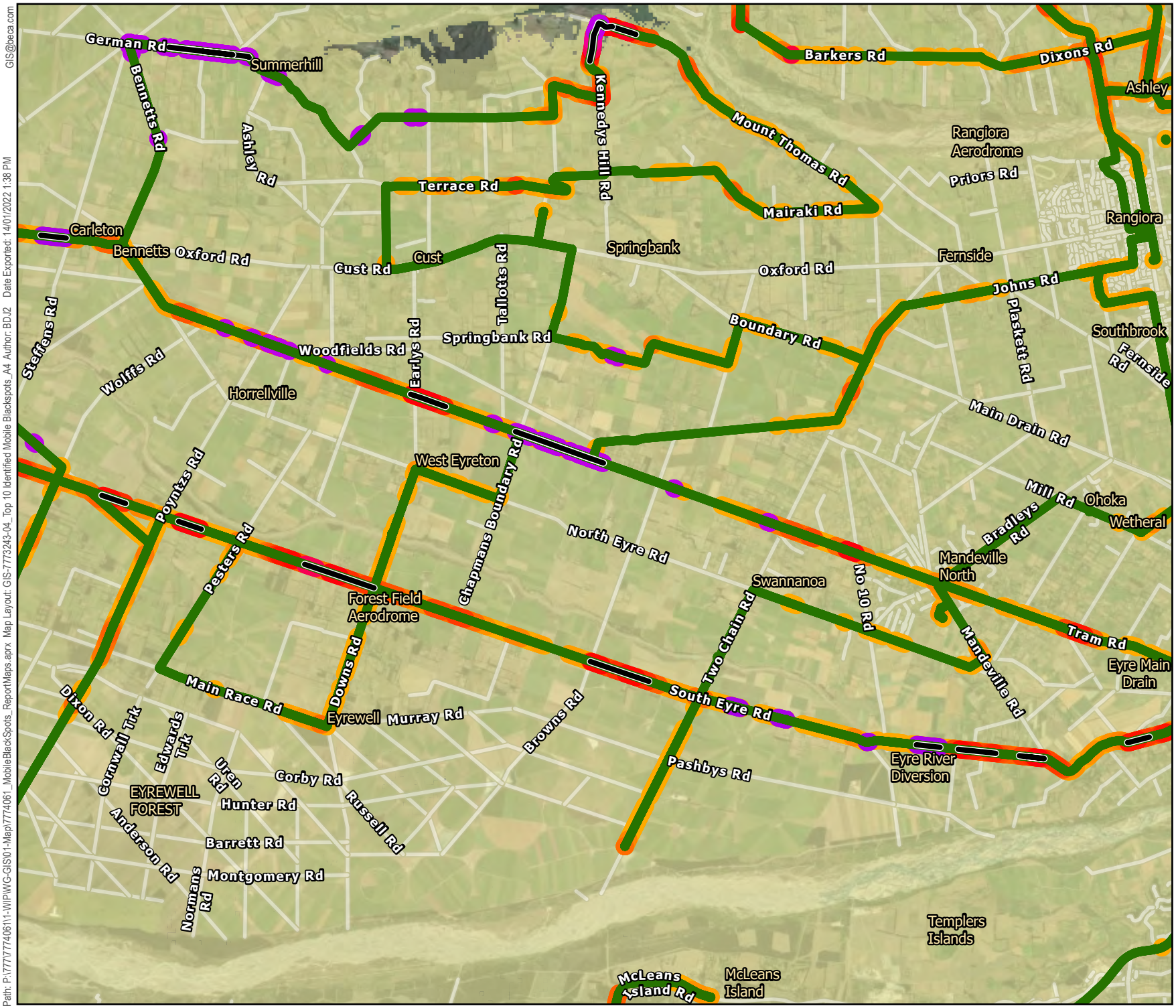
Kilometers

GIS@beca.com

Path: P:\7717\7740611\1-WIP\WG-GIS\01-Map\7774061_MobileBlackSpots_ReportMaps.aprx Map Layout: GIS-7773243-04_Top 10 Identified Mobile Blackspots_A4 Author: BDJ2 Date Exported: 14/01/2022 1:38 PM



Canterbury Plains - Eyrewell

Legend

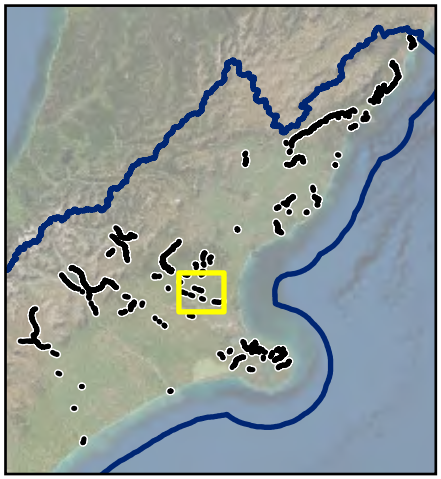
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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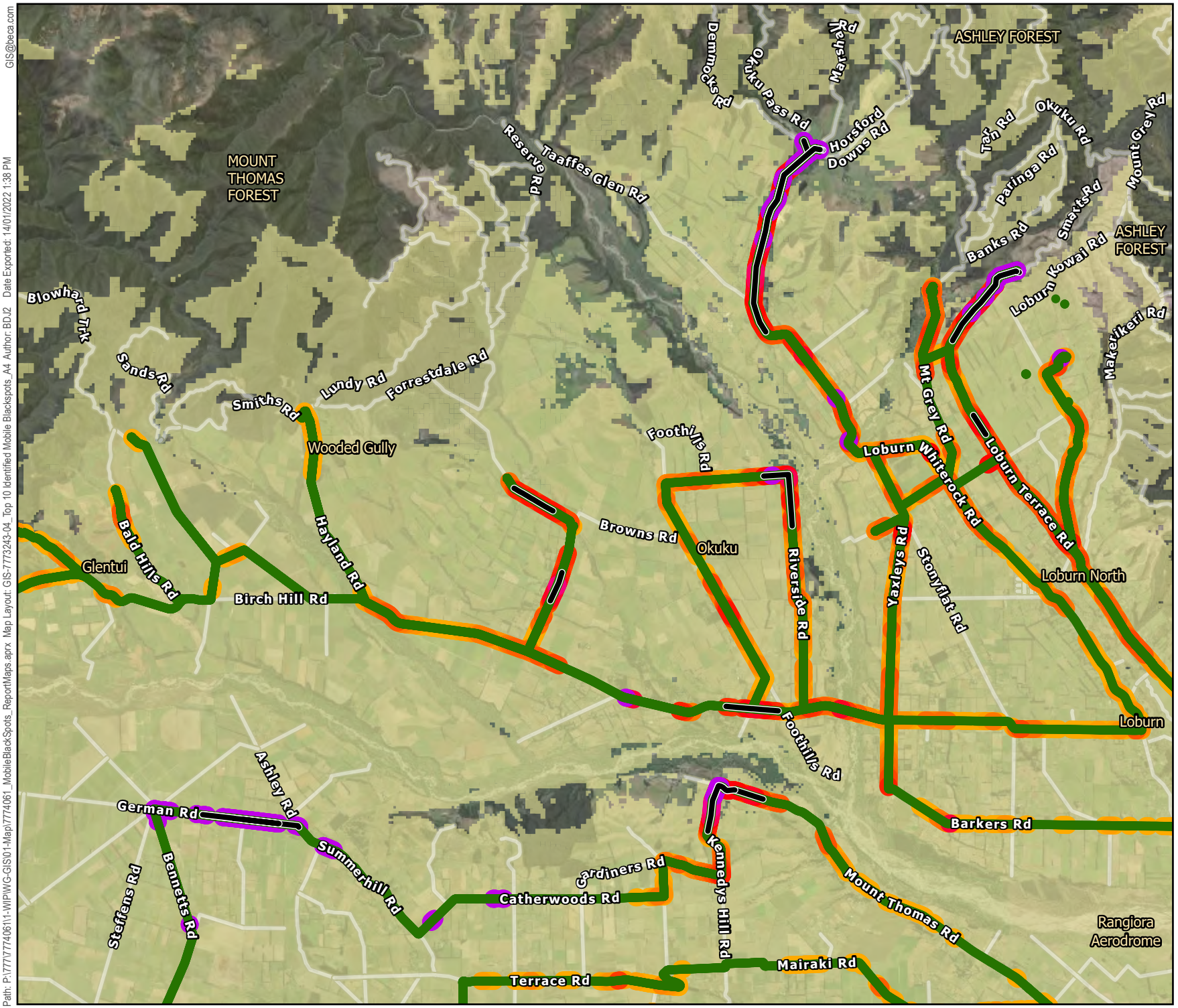
Kilometers



Canterbury Plains - Loburn

Legend

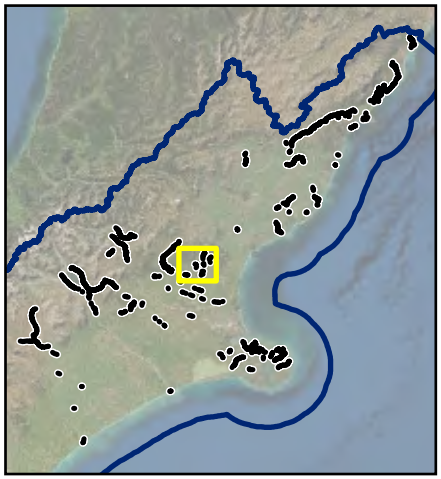
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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Map Scale @ A4: 1:100,000

0 1 2 3 4

Kilometers

Kaikōura Alternative Route

Legend

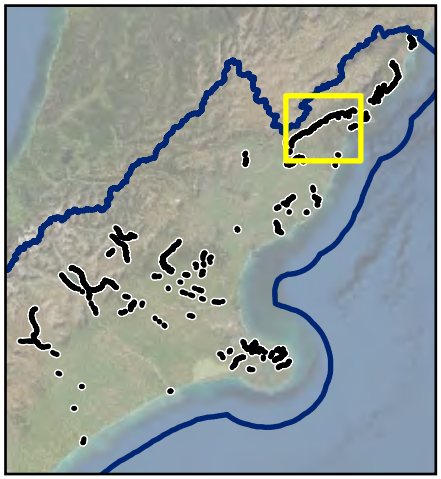
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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Kilometers

GIS@beca.com
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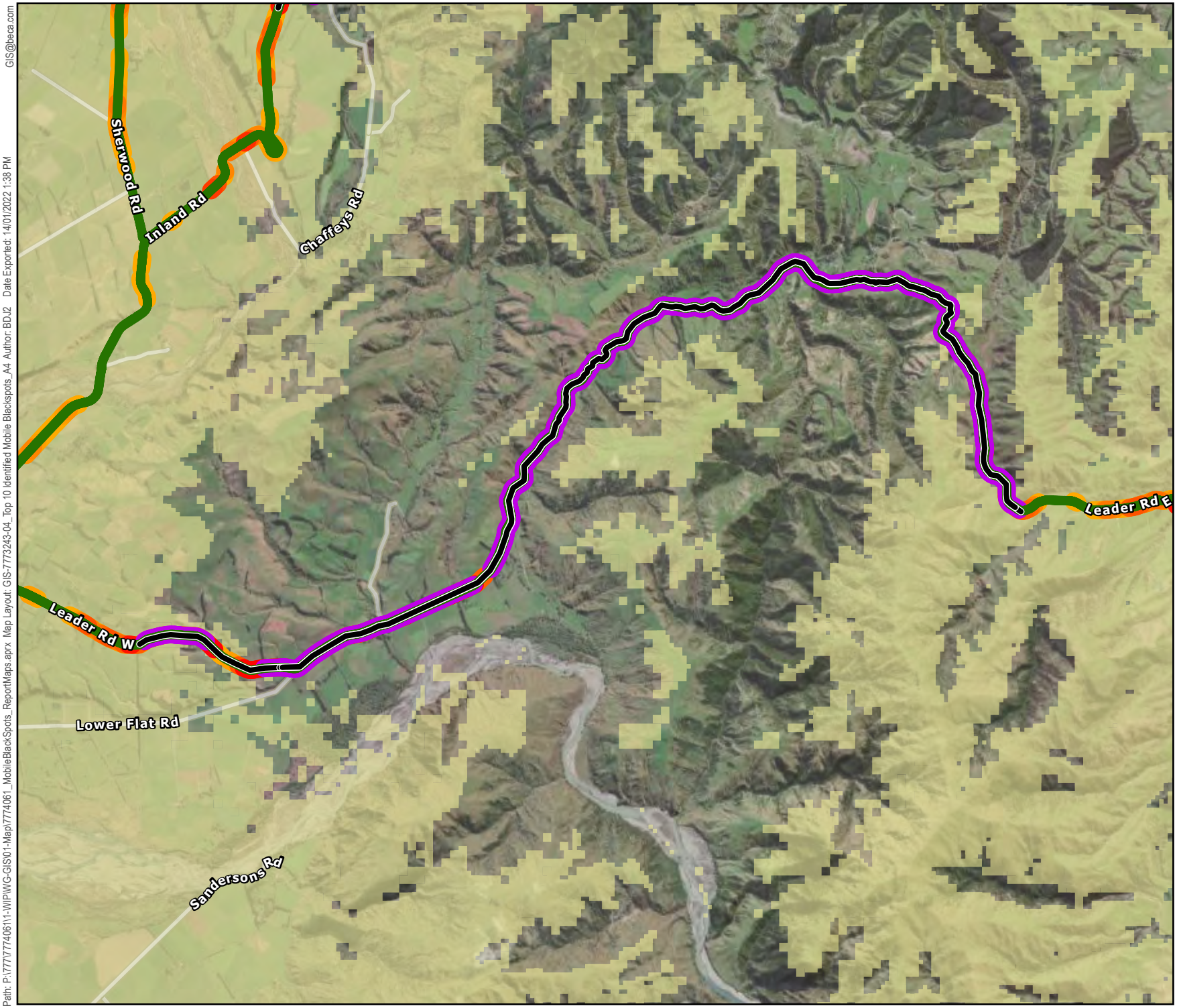


Leader Road, Waiau

Legend

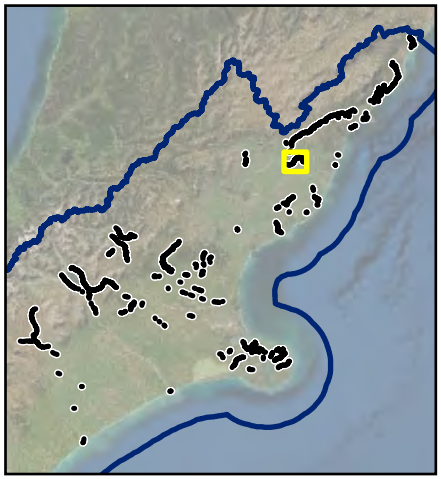
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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Kilometers

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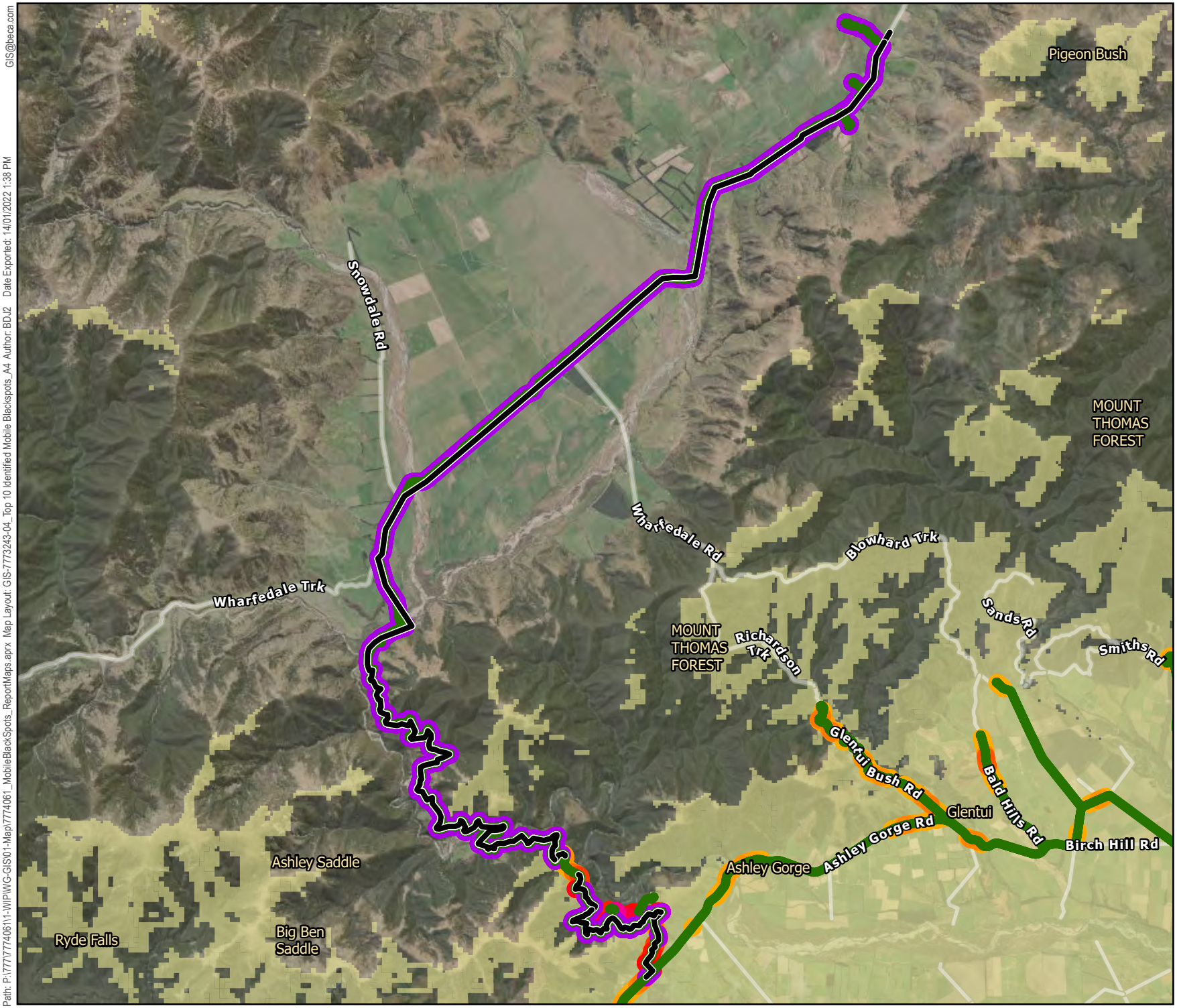
GIS@beca.com



Lees Valley

Legend

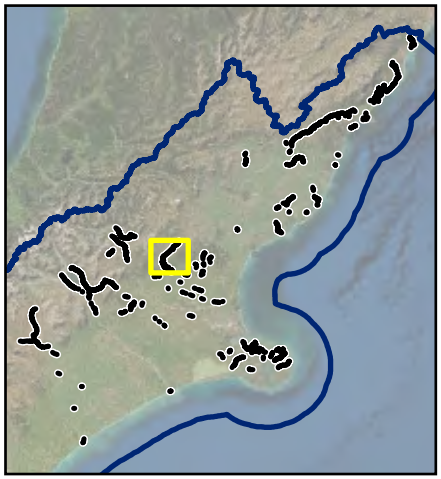
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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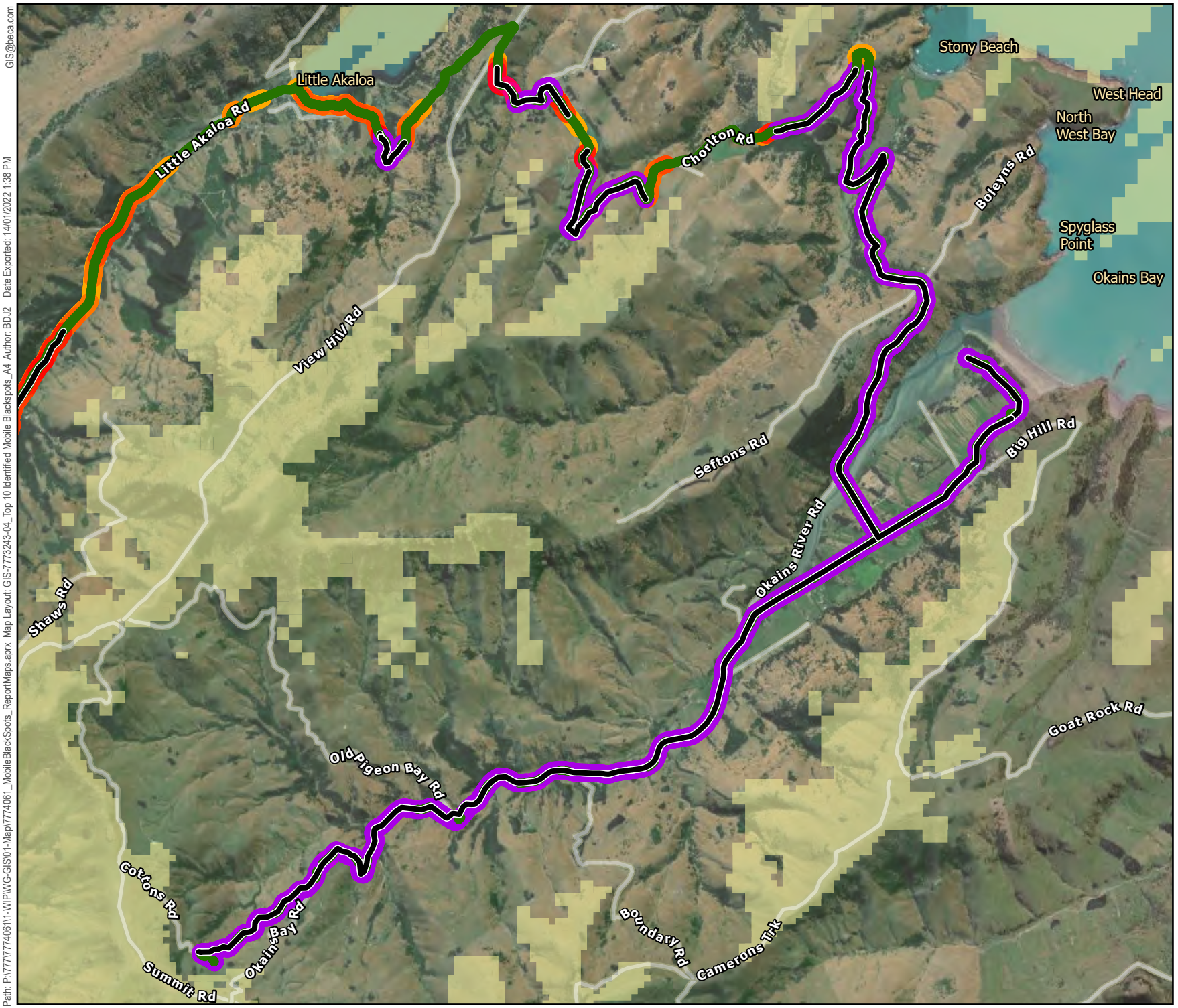
Kilometers



Okains Bay Campground

Legend

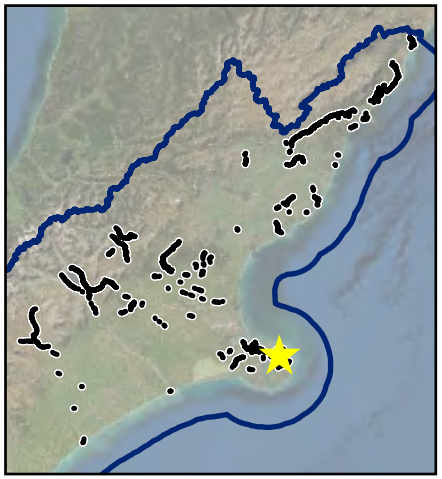
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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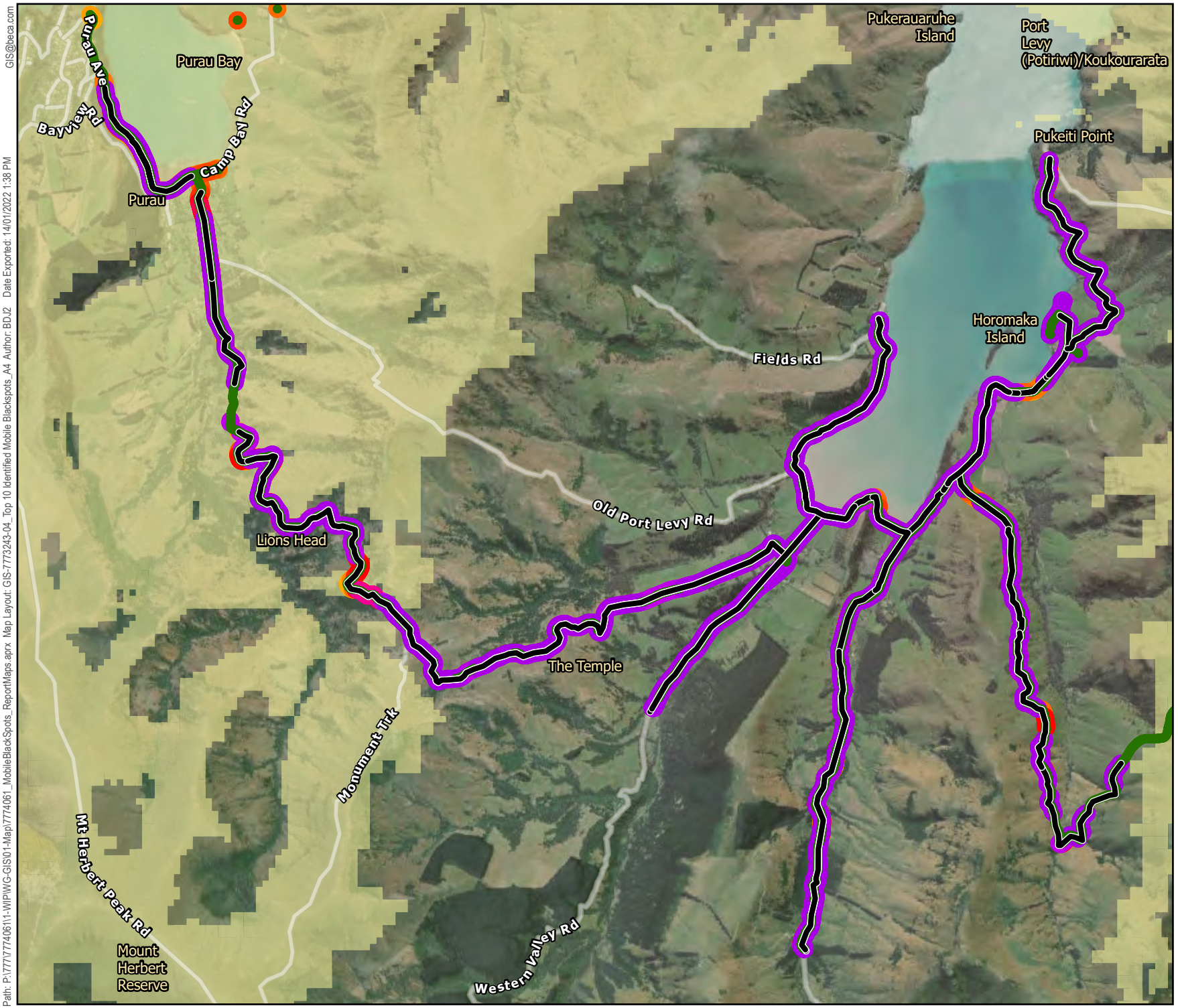


Purau - Port Levy

Legend

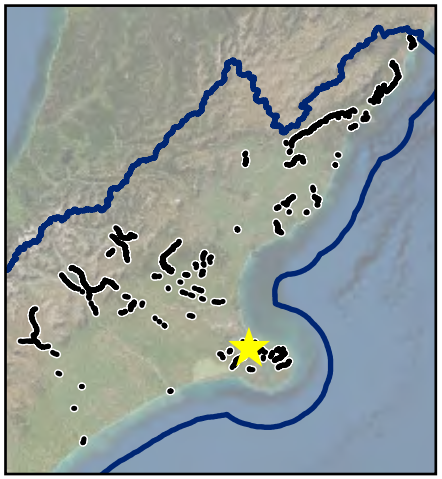
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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Map Scale @ A4: 1:40,000

0 1

Kilometers

Rangitata River Mouth Camping Ground

Legend

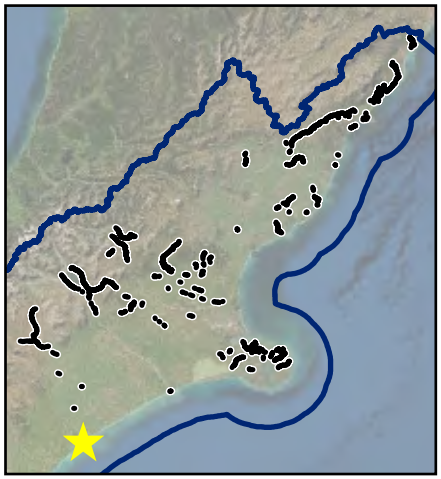
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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0 1

Kilometers

South Rakaia Huts

Legend

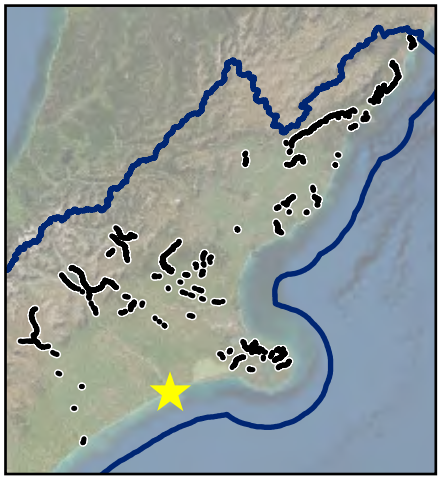
- Mobile Blackspot

NetMonitor Data

- Has Service (>-123 dBm)

Low Service Levels

- -140 (dBm)
- -120 (dBm)
- Commercial Mobile Voice Coverage
- Canterbury Regional Council Boundary



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Kilometers