IN THE MATTER **of the Resource Management Act 1991**

AND

IN THE MATTER **Mackenzie District Plan**

Hearing – Plan Change 26 & 27

JOINT STATEMENT OF EVIDENCE OF

GRAEME MCCARRISON FOR

SPARK NEW ZEALAND TRADING LTD

AND

ANDREW KANTOR FOR

CHORUS NEW ZEALAND LTD

AND

COLIN CLUNE FOR

ONE NZ GROUP LTD AND FORTYSOUTH

AND

FIONA MATTHEWS FOR

CONNEXA LTD

3 MAY 2024

1. EXECUTIVE SUMMARY

1.1 Spark, One NZ (formerly Vodafone), Chorus, Connexa and FortySouth welcome the opportunity to provide this evidence. The core of Chorus' business is the nationwide network of fibre optic and copper cables connecting homes and business together. FortySouth is responsible for, building, owning, operating, and maintaining the mobile tower/structure infrastructure for One NZ to attach their active network equipment. Spark and 2degrees have the same arrangement with Connexa. Spark and One NZ remain telecommunication network operators providing customers the opportunity for digital connectivity. The diagrams in Appendix 1 give a general understanding of what each organisation is responsible for and highlights the split between passive structures owned by Connexa and Forty South and the active components of the Spark and One NZ wireless networks.

1.2 Telecommunications providers provide critical communications infrastructure that connects communities, promotes inclusivity, supports economic and environmental objectives, and is a critical part of our response to climate change. Telecommunications infrastructure is highly dynamic and - unlike other infrastructure sectors - our network requirements are changing and evolving constantly and at a fast pace.

1.3 In parallel, Spark, One NZ and 2Degrees are currently rolling out new 5G mobile networks, deploying over 1,000 new mobile sites and extending network coverage to regional communities. Work has started on planning for the 6G network. Chorus continues to expand its fibre network in urban and small rural settlements. The continuous technology upgrades are needed to keep up with the increasing demand from consumers and businesses – exponential growth in the use of data is continuing and each year the amount of data handled by telecommunications networks roughly doubles[1]. Chorus, Spark, One NZ, Connexa and FortySouth, along with other telecommunication providers, invest significantly every year in our networks to ensure New Zealanders have access to world class digital services.

1.4 We rely on regulatory frameworks both nationally, via the National Environmental Standards for Telecommunications Facilities 2016 (NESTF), and locally, via the Mackenzie district plan including the plan changes, to appropriately enable the planning and funding for upgrading of existing networks and construction of new

[1] The New Zealand Commerce Commission, *Annual Telecommunications Monitoring Report – 2021 Key Facts*, 17 March 2022

networks to support growth as well as to increase the resilience of the networks in response climate change and natural hazards.

1.5 Enabling additional height for cell sites in urban and rural environment environments is essential to support the provision on telecommunication services to businesses, residents and visitors of Mackenzie district. We support pole heights of 20m in commercial and mixed-use zones, 25m in Industrial and 35m in Rural zones plus an additional 5m to for co-location. As well as providing efficient networks for communities to use, these heights assist to ensure compliance with radiofrequency standards, which is becoming more difficult to achieve with new generations of networks.

1.6 Telecommunication connections for all new allotments is as essential as electricity. People purchasing new lots should be warned if telecommunication connectivity may not be available. Applicants for subdivision should have to provide information that establishes what connectivity is available or not at the time of subdivision.

1.7 Satellite technology with satellites acting as cell towers and integrating with the existing on the ground networks is still new and evolving technology. The technology will enable the satellites to connect devices (mobile phones) directly. The first service will be texts expected in late 2024[2] and followed by voice and data services in the future. Satellite broadband services are widely available in NZ via a range of providers. This service depends on satellite connected via a dish which connects via cable to a wifi router inside the building receiving the service. These networks, supplement, rather than replace, ground-based networks. Dependency on the ground-based networks for telecommunication services is not changing anytime soon.

1.8 The companies would like to commend the officers on the engaging process to create the Proposed Plan changes. The opportunities to workshop and provide feedback on early drafting versions of the Plan has we believe has resulted in a Plan that is practical and generally works well for telecommunications.

[2] https://one.nz/why-choose-us/spacex/

2. INTRODUCTION

Graeme McCarrison

2.1 My full name is Graeme Ian McCarrison. I am the Environment & Planning Manager at Spark, a position I have held since February 2015. I am authorised to give this evidence on Spark's behalf.

2.2 I hold the qualification of Bachelor of Regional Planning (Honours) from Massey University. I am a Fellow member of the New Zealand Planning Institute and have 40 years' experience in New Zealand and overseas. I was on the board of the New Zealand Planning Institute ("NZPI") between April 2018 and April 2022. Between 2012 and April 2015 I was the chairperson of the Auckland branch of the New Zealand Planning Institute. In 2024 I was honoured made a Fellow of NZPI. In 2016 I received a NZPI Distinguished Service Award, and I part of the team that received a best practice award for iwi engagement by NZPI in 2015.

2.3 During the last 40 years I have worked in the public sector in Auckland including as Director of Regulatory Services at Papakura District Council, Planning Manager for Waitakere City Council and in the private sector as a self-employed consultant and as a consultant at Murray North Partners. I have worked the last eight years in the telecommunications sector. Prior to Spark I held the equivalent position at Chorus (November 2011 to January 2015), where I advised both Chorus and Spark on resource management and government matters. I am involved in the review of all regional and district plans plus any related local government documents that have the potential to enable or impact the telecommunications industry. During the proposed Unitary Plan process, I led and facilitated the combined approach of the Auckland Utility Operators Group (Spark, Chorus, Vodafone, Counties Power and Vector) over the four years of our involvement.

2.4 I continue to co-ordinate a wider group of network utility organisations with interests in Auckland and nationally. I organise a shared approach and resources that enables Spark, FortySouth, One NZ, Connexa and Chorus to be involved at a national level in every relevant Plan reviews including: Horizons, Gore, Wairarapa, Wellington City & Region, Dunedin, Timaru, Selwyn, Waitomo, Whangarei, Waimakariri, Timaru, Waitaki, Waikato Region, Porirua, Far North, Napier and Nelson. In addition, we are engaged with the Future Development Strategies across NZ.

2.5 I represented the telecommunications industry on the MfE established project and working group to draft a potential draft National Planning Standards for Network

Utilities, which first met on the 12 October 2016. Post February 2018, I co-ordinated the project working group of experts and specialist knowledge from in-house and external professionals representing a range of network utilities including telecommunications, rail, electricity distribution, gas transmission, 3 waters, road transportation which continued to fund and develop as draft provisions until early 2020. The work was in part been adapted into the Transitional National Planning Framework under Chapter 13.2.

2.6 I represent the Telecommunications Forum (TCF) on the Technical Advisory Group for the NESTF alongside my colleagues Andrew Kantor – Chorus, Colin Clune – FortySouth, and Fiona Matthews Connexa. Since the NESTF 2016 amendments, the group made up of representatives from the Ministry of Business, Innovation and Employment, Ministry for the Environment ("MfE"), and Local Government New Zealand meet at least annually to discuss and review the effectiveness of the National Environmental Standards for Telecommunication Facilities Regulations 2016 (NESTF). The NESTF was integrated to the draft Transitional National Planning Framework (dTNPF) under the now reappealed Natural and Built Environments Act. Chapter 13.2 of the dTNPF contains standards for telecommunications facilities. We are currently working toward either amended NESTF standards being integrated in a new Infrastructure National Direction or a updated NESTF.

2.7 I have submitted on behalf of Spark and/or combined with Chorus (Andrew Kantor) and/or One NZ/Vodafone (Colin Clune) on a wide range of Resource Management Act and Resource Management reform documents including:

a. Spark Trading New Zealand Limited submission – Fast Track Approvals Bill, April 2024.
b. Spark Trading New Zealand Limited and Vodafone New Zealand Limited Submission - Resource Management (Enabling Housing Supply and other matters) Amendment Bill, November 2021.
c. Spark Trading New Zealand Limited and Vodafone New Zealand Limited Submission - Urban Development Bill, February 2020.
d. Spark Trading New Zealand Limited Submission - Proposed National Policy Statement Urban Development, October 2019.
e. Spark Trading New Zealand Limited - Submission National Policy Statement for Highly Productive Land, October 2019.
f. Spark Trading New Zealand Limited Submission – Te Waihanga/Infrastructure Commission Infrastructure for a Better Future, July 2021.

Colin Clune

2.8 My full name is Colin William Clune. I am the Resource Management Manager at FortySouth, previously I held a similar a position at One NZ/Vodafone since October 2014. I was an in-house contractor for Vodafone (September 2010 to September 2014). I advise FortySouth and One NZ on resource management and government matters. I am authorised to give this evidence on FortySouth and One NZ behalf.

2.9 I hold the qualifications of Bachelor of Urban Planning and Master of Planning from the University of Auckland.

2.10 I am currently on the Technical Advisory Group for the NESTF amendments. I am also a participating member of the New Zealand Telecommunications Forum, working to efficiently resolve regulatory, technical and policy issues associated with network telecommunications.

Andrew Kantor

2.11 My full name is Andrew Robert Kantor. I am Environmental Planning and Engagement Manager at Chorus, where I been employed since 2015. I am authorised to give this evidence on Chorus' behalf.

2.12 I hold the qualification of Master of Science (Environmental Science) from the University of Auckland and am an associate member of the New Zealand Planning Institute. I am also a participating member of the New Zealand Telecommunications Forum's local government working group.

2.13 I have 15 years of resource management experience, comprising of roles for various infrastructure providers in New Zealand and overseas.

2.14 I am currently on the Technical Advisory Group for the NESTF amendments. I am also a participating member of the New Zealand Telecommunications Forum, working to efficiently resolve regulatory, technical and policy issues associated with network telecommunications.

Fiona Matthews

2.15 My full name is Fiona Elisabeth Matthews. I am the Planning Manager at Connexa Limited (Connexa). I have held this position since October 202.Previously, I was a Planner for Spark New Zealand, (May 2018 to September 2022), where I advised Spark on resource management and regulatory matters. I am authorised to give this evidence on Connexa's behalf.

2.16 I obtained a Bachelor of Science and a Post-Graduate Diploma of Environmental from Massey University. I have 12 years' experience in the resource management field, and in addition to my roles at Connexa and Spark I have had various local and central government roles. c I hold an associate New Zealand Planning Institute Membership.

2.17 I am on the Technical Advisory Group for the National Environmental Standard Telecommunication Facilities amendments (NESTF amendments). I am also a participating member of the New Zealand Telecommunications Forum, which works to efficiently resolve regulatory, technical and policy issues associated with network telecommunications.

Scope of evidence

2.18 This statement of evidence covers the following areas:

a. Telecommunication in New Zealand.
b. National Environmental Standards for Telecommunication Facilities
c. 5G Connectivity
d. Network Height
e. Rural Telecommunication Coverage
f. Satellite services
g. Subdivision SUB-S7

3. TELECOMMUNICATION IN NEW ZEALAND

3.1 Modern telecommunication networks are about enabling the opportunity to create and connect data and provide digital services such as being able to communicate with family, friends and businesses or other services.

3.2 Every day, it is estimated that roughly 2.5 quintillion bytes of data are created globally. By 2025, the amount of data generated globally each day is expected to reach 463 exabytes. In 2019 the World Economic Forum estimated that the amount of data globally was 44 zettabytes in 2020. A zettabyte is 1,000 bytes to the seventh power

(one zettabyte has 21 zeros). By 2025 the global amount of data is predicted to be 175 zettabytes. Some examples of the way data are generated or consumed include social media sites, financial institutions, medical facilities, shopping platforms, vehicles, and mobile calls, gaming, video conferencing, streaming films/series including via Netflix or YouTube and smart technology machine to machine.

3.3 The critical and essential nature of the telecommunications network infrastructure to a modern economy was only highlighted during the COVID-19 pandemic where a significant portion of people's businesses, working ability and life transitioned to an at home online set up. Overnight COVID-19 disrupted and changed the way we work, where we work, live and human interaction. Face to face meetings, travel (overseas and domestic), or meetings at a restaurant just stopped. Video conferencing via Zoom and Microsoft Teams gained critical importance even though neither was a new tool for digital communication. Long periods of time working and learning from home made the realities of living in a 'digital world' very real. Connectivity to those 'invisible' telecommunication networks that deliver the calls, digital services, internet to our devices, were no longer a "nice to have" but essential and critical to economic activity and daily life wherever you were. Access to and awareness of the quality/speed of your connection became and remains today a topic of conversation and need especially for communities in rural or more remote locations.

3.4 The COVID-19 pandemic demonstrated just how much we rely on access to 'public digital infrastructure'. A lack of, or limited access, to telecommunications for whatever reason is referred to as digital inequity. The consequences of digital inequity are explored in later sections of this evidence.

3.5 Public digital infrastructure, even though privately owned and funded, is commonly used to describe telecommunication technologies, equipment and systems/networks that connect people, communities, businesses and public infrastructure (including transport, social education, health) with data, products and services. Our physical networks/infrastructure include fibre, satellites, IoT devices, high-powered computing facilities and data centres, to support telecommunication services such as the mobile network, fixed phone and broadband services and location-based services that enable the digital economy with access to data. This public digital infrastructure is critical and is fundamental to digital transformation of private and public (social and network) infrastructure if New Zealand is going to remain competitive internationally and face up to challenges such as climate change.

3.6 Telecommunication connectivity appears simple. For example, via my device I dial a phone number and I am connected. I can ask Siri or Google a question, and in a fraction of a second, I have an information response. The telecommunications network provides an invisible connectivity that the user does not need to understand. However, the invisible infrastructure is a complex, ever changing and expensive technology that has a lot of dependencies and components including cell towers, cabinets, cables, antennas, buildings with a variety of functions (ie switch software technology) and data centres for cloud services. These components are connected as a global network which all come together to provide a seemly instant digital service for most users wherever they are. New Zealand's networks are part of the global networks of connectivity on which we depend on a few international submarine telecommunication cables. Approximately 98% of our digital traffic travels via these submarine cables.

Digital connectivity underpins essential services

3.7 Digital connectivity and services, provided by Spark, One NZ and Chorus, underpin and transform a range of services delivered by Central Government and businesses alike, including (to name a few):

(a) Remote environmental sensing for early fire detection network in forests or areas at risk from fire. The 360-degree cameras and IoT sensors are continuously monitoring conditions, supported by Artificial Intelligence ("**AI**") analytics providing valuable real-time data on statistics such as air quality and ground temperature. Warning data is transmitted to Fire and Emergency New Zealand who can then take action if appropriate.

(b) Smart pay apps on your device and other payment services including payWave.

(c) Infrastructure management ie monitoring movement and traffic flow, monitoring and managing water, electricity and other utility services including waste management providing customers real-time information.

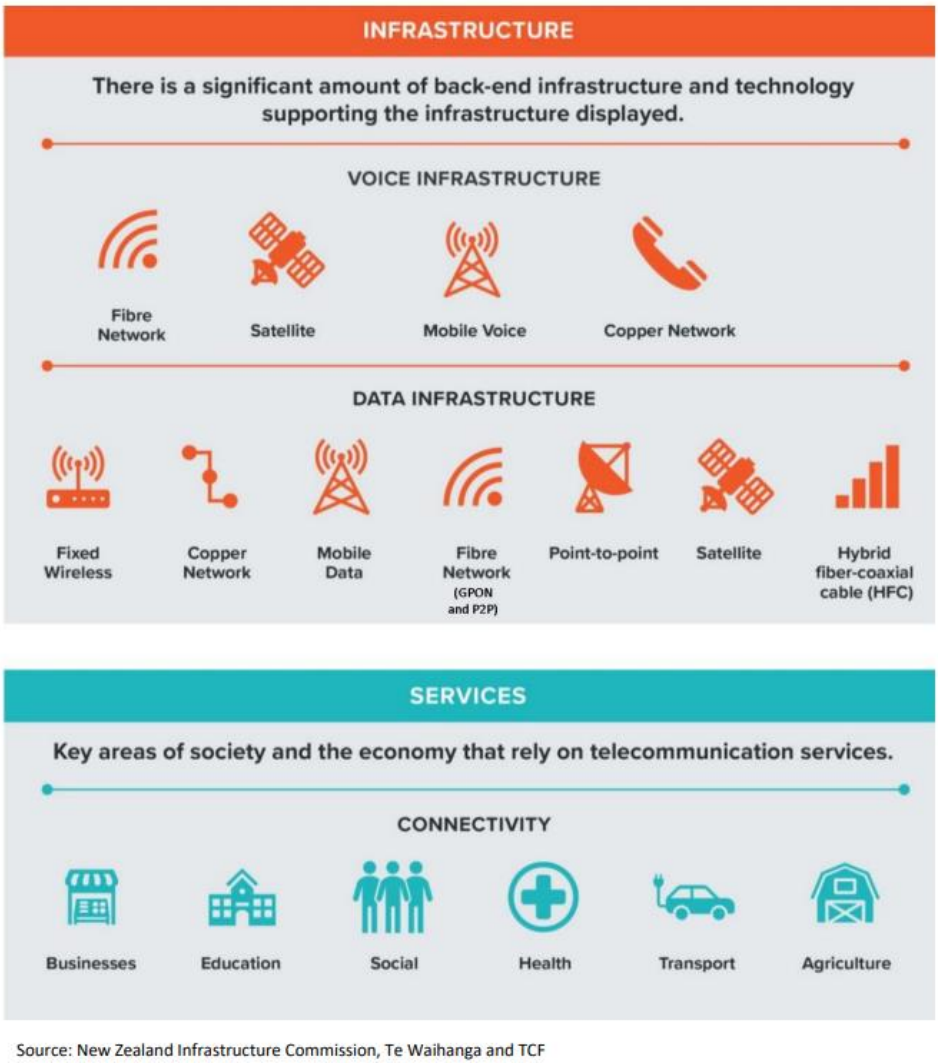
(d) Monitoring and real-time reporting of air flow and quality; or water quality for swim ability or drinking; flood warning accompanied with real-time mapping and predictions.

(e) Drones for monitoring especially in high hazard environments e.g. during a forest fire or a flood event when it is unsafe to fly other aircraft; reporting fires and managing search and rescue situations; mapping for hazards or size of forests for carbon credit assessments.

(f) Health and safety monitoring, for example GPS tracking sensors.

(g) Communication in all its forms from calling, text, social media, Microsoft Teams or Zoom to evolving VR meeting and collaboration interaction services in 3D platforms such as MeetinVR.

3.8 The telecommunications services that are relied on by many areas of society and the economy are provided via several different types of infrastructure and technologies, as illustrated in the diagram below by New Zealand Infrastructure Commission, State of Play: Telecommunications discussion document December 2020.[3]



Source: New Zealand Infrastructure Commission, Te Waihanga and TCF

New Zealand's Telecommunication Networks

3.9 Rapid advances in technology are driving transformational changes as our products and services become increasingly important in the daily lives and businesses of New

[3] New Zealand Infrastructure Commission / Te Waihanga *State of Play: Telecommunications Discussion Document*, (December 2020) www.tewaihanga.govt.nz at page 9.

Zealanders. These advances have seen the telecommunications industry collectively investing on average $1.6 billion each year to deliver new services and network technology. The latest Commerce Commission industry monitoring report[4] shows the industry has invested $15.7 billion over the past decade. At the same time, fierce competition is delivering more value to consumers at lower prices, meaning New Zealand is now in the enviable position of having world-class networks and services, at below OECD average prices, for both fixed and mobile communications.

3.10 In mobile services, Spark, One NZ and 2degrees are the three major mobile network operators who each compete for customers over their own networks, utilising poles and cabinets owned by Connexa and FortySouth, and radio spectrum licensed from Central Government. Sometimes we are able to co-locate our electronic equipment on another operator's facility to save the cost of building a separate facility. Additionally, Spark, One NZ and 2degrees established and jointly own Rural Connectivity Group ("**RCG**"), a wireless network that is extending mobile and wireless broadband coverage to remote areas of rural New Zealand as part of the Government's Rural Broadband Initiative and other dedicated funding sources.

3.11 The national line networks are owned by wholesale companies such Chorus. Chorus is the line network company providing fixed line connections within the Mackenzie district. Retailers like Spark, and One NZ that provide customers connectivity for digital services via fixed, and/or wireless networks.

3.12 Chorus owns the national copper line network, and most of the fibre network built in cities and towns, under the Government-sponsored ultra-fast broadband ("**UFB**") programmes UFB 1 & 2 and extensions.

Ultrafast Broadband

3.13 The Ultrafast Broadband (UFB) network comprises cable, duct and cabinet or exchange based electronics, to provide GPON (Gigabit Passive Optical Network) equipment and routing equipment, between the end customer the Point of Interconnect ("**POI**"). Multiple cables emanate from GPON locations to clusters of end users within a geographic area.

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4 Commerce Commission New Zealand / Te Komihana Tauhokohoko *Annual Telecommunications Monitoring Report 2021* (17 March 2022). **https://comcom.govt.nz/__data/assets/pdf_file/0019/279100/2021-Annual-Telecommunications-Monitoring-Report-17-March-2022.pdf .**

3.14 The UFB network is an open access network, which allows a variety of internet service providers and resellers to operate off the fibre network infrastructure, ensuring end users have a variety of choice as to the ISP as well as packages, pricing and service levels on offer. Fibre is a future-proofed technology that offers a scalable, low-cost pathway to major ongoing performance upgrades. The UFB network is continually developed and expanded to meet demand within the existing coverage area and grown to meet demand where economically feasible.

Wireless telecommunications networks

3.15 Our wireless telecommunications networks have a number of benefits, including enabling the provision of Emergency Mobile Alerts by the National Emergency Management Agency. The alerts have been used numerous times for local and national emergencies, including:

(a) the COVID-19 pandemic; and

(b) natural emergencies such as fire or snow flood event warnings to potentially affected people, such as flooding in Nelson, Marlborough, and Westport areas and regularly in Otago for snow events. The alerts are becoming the means by which nationally significant events and information are communicated to New Zealanders in an immediate and succinct manner.

3.16 New Zealand has multiple layers of networks (wireless, IoT and fixed line, plus satellite) and providers include:

- Wireless networks of Spark, One NZ, 2 degrees and Rural Connectivity Group (RCG) (a joint venture between Spark, One NZ and 2 degrees
- Fixed line networks operated by Chorus nationally including Mackenzie district. Note that Spark and One NZ have large fibre networks of their own.
- Wireless Internet Service Providers (WISPs) – including local provider Ultimate broadband or UBB
- International companies e.g. Starlink (SpaceX service), Lnyx, Amazon, Google

3.17 Our wireless telecommunications networks enable the provision of Emergency Mobile Alerts by the National Emergency Management Agency. These are messages about emergencies sent by authorised emergency agencies to capable mobile phones. The alerts are designed to keep people safe and are broadcast to all capable phones from cell towers within the emergency area.

3.18 Telecommunications infrastructure is a key enabler of future technologies that are expected to be one of the solutions to many of today's challenges, from climate change to lifting our productivity and innovation. The Climate Change Commission's final advice to the government for its emissions reduction plan notes precision agriculture as an example of the ways in which technology will help to improve efficiency and reduce environmental impacts in agriculture – it requires digital connectivity and networks to be possible[5].

3.19 The Infrastructure Commission's discussion document on Infrastructure for a Better Future recognises the critical nature of telecommunications infrastructure. The report notes that 'Increasing reliance on communications makes telecommunications infrastructure more critical.'[6]

4. NATIONAL ENVIRONMENTAL STANDARDS FOR TELECOMMUNICATIONS FACILITIES

4.1 We rely primarily on the regulatory framework of the NESTF to upgrade the existing network and build new telecommunications infrastructure in roads and in rural zoned areas. Significant elements of telecommunication networks are provided for as permitted activities, reflecting their importance as a significant physical resource. However, regulated activities not complying with the relevant permitted activity standards in the NESTF remain subject to the relevant district plan. This essentially means that all new cell-sites (pole with antennas) outside the road and rural zones depend on being provided for in District plans. Once a cell-site is established the maintenance and upgrading is covered via the NESTF. Further, subpart 5 of the NESTF identifies certain types of district plan rules relating to sensitive natural and built environments which still apply to regulated activities and where resource consent would otherwise be required in the relevant district plan.

4.2 Given the above, we constantly face challenges as a result of councils administering the NESTF particularly when it comes to determining which or if any regional or district plan provisions apply to a proposal. It can be difficult and complex especially when a proposal is in one or multiple sensitive environments (NESTF Subpart 5 environments). Consistency across the national, regional and district planning

[5] https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa.pdf; p. 306
[6] https://www.infrastructure.govt.nz/assets/Uploads/Infrastructure-Strategy-Consultation-Document-June-2021.pdf; p. 34

frameworks is fundamental to the industry having certainty and clarity around what is supported and enabled in each region.

5. 5G CONNECTIVITY

5.1 The rollout of 5G and the digital technology that it enables is critical to a well-functioning urban environment. It is widely expected to transform our cities and the ways in which we use other kinds of infrastructure. 5G into the rural communities enables access to the 600Mhz band, which is particularly important for rural areas given its ability to provide 5G connectivity over greater distances, including 3.5GHz.

5.2 In May 2023 the government announced the agreement reached with Spark, One NZ and 2degrees to:

- deliver a faster roll-out of 5G services to around 55 towns across New Zealand. such as Leeston, Milton, Renwick. Twizel and Lake Tekapo now have 5G. In appendix 2 is a photograph of the Fortysouth/One NZ 5G site in Twizel
- further expand mobile wireless coverage in rural areas,

5.3 One NZ & Spark has committed to accelerating deployment of its 5G network aiming to expand 5G connectivity to all towns with a population of more than 1,500 people by the end of June 2026 using the allocated C-band spectrum.

5.4 Telecommunication networks are undergoing a migration towards 5G technology nationwide. 5G technology has a higher bandwidth allowing a greater amount of data to be sent and received. As a result, the radio frequency fields emitted from 5G antennas are larger than previous generations of technology. Consequently, to remove these fields from entering the public domain, antennas need to be placed on correspondingly taller poles.

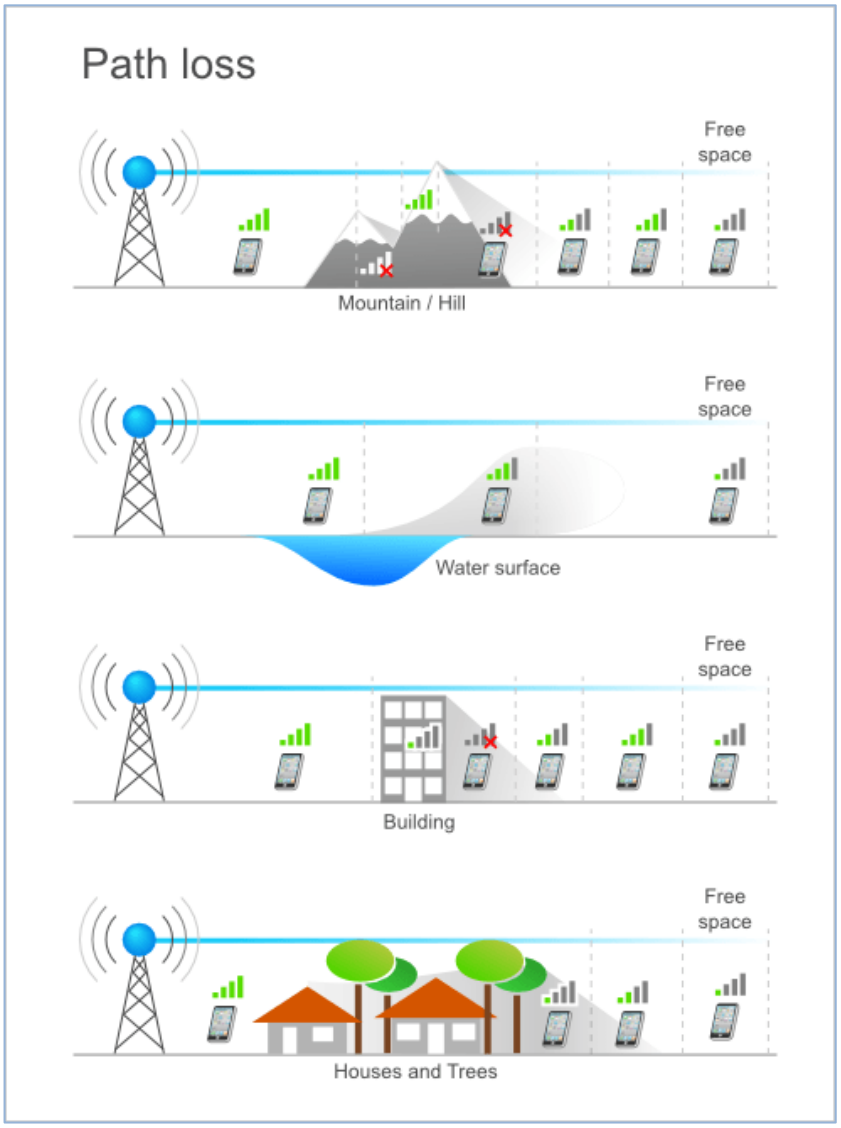
6. NETWORK HEIGHT

6.1 As set out in this evidence above, the telecommunication network technology requirements are constantly changing and evolving. We rely on the NESTF and district plan rules to protect the existing network and appropriately enable the upgrading of existing networks and construction of new networks. We have proposed changes to the permitted pole heights to enable the network operators to efficiently design new cell-sites and upgrade existing network to meet the future needs of Mackenzie district, while not adversely affecting the environment in which they are located. Nationally the industry to seeking to have consistency of pole heights to

enable better standardisation of cell site design and the delivery of more new sites to fill the coverage gaps in the network within same budgets. Connexa and Fortysouth a critical part of driving consistency of network design across Aotearoa. As mentioned in paragraph 2.6 the industry with working with central government on amendments to the NESTF 2016 for a comprehensive update of pole heights and other matters. The proposed pole heights and related provisions are consistent with our NESTF amendments and changes requested in our District Plans.

6.2 The permitted rules for height of new or upgraded telecommunication facilities are where possible to ensure that the antennas are of an effective height above the permitted building height to ensure:

- Radiofrequency emission compliance with the NESTF regulation 55
- Certainty of network coverage and capacity to service customer needs
- Potential Path loss risks are taken into account – the following diagrams & appendix 3 demonstrate the issues



6.3 Causes of Path loss, as shown above, commonly result from:

- Free-space loss (distance) from the antenna to the device
- Fading (frequency dependent)
- Trees
- Shadowing from trees and structure
- Reflections at large obstacles
- Refraction depending on the density of the medium

6.4 While telecommunication network technology requirements are constantly changing and evolving at a fast rate, it remains expensive to build new or have to relocate a site because of increased development and building height. The common reasons for relocation being required include where changes to property ownership leads to a lease being terminated or a new building is constructed that blocks some of the coverage footprint of a cell site. For Spark/Connexa, each time a site has be relocated

or significantly rebuilt it costs on average $350,000 per site and upwards of $1million depending on the location. The cost to find new sites can be anywhere from 3 to 18 months. Complexity of this is partly due to the wide range of disciplines involved, including engineers, project managers, resource management experts, council, mana whenua and the community.

6.5 It is increasingly difficult to acquire new locations especially in residential and rural locations in sensitive environment overlay areas for a range of reasons:

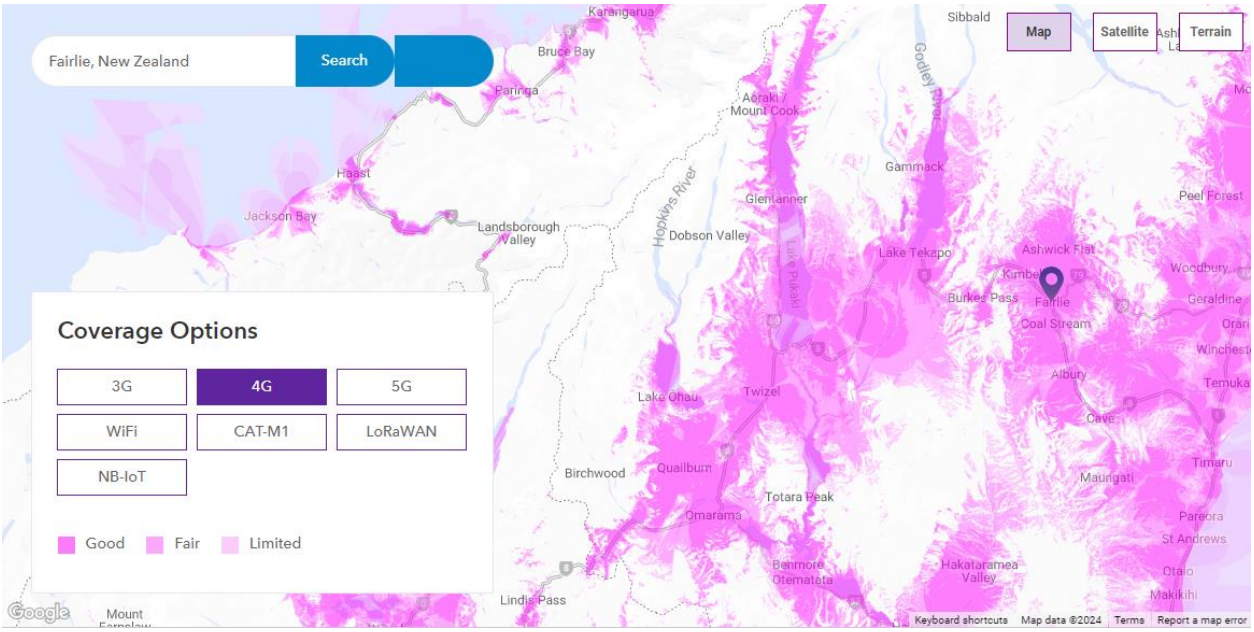
(a) Physical environment e.g. contours of the locality, height of existing buildings or shelter belts/vegetation that interfere with coverage;
(b) Site characteristics e.g. wind, soil conditions, access to the site, fibre and power, geotechnical conditions and slope of the property;
(c) Finding a new landowner to establish a site and in agreeable position for both parties;
(d) Opposition to telecommunication facility in residential areas, even if permitted under the NESTF or the district plan (noting that our responsibilities under the Telecommunications Forum require us to inform residential neighbours of our proposals to construct a new site in a residential area;

6.6 Industrial, Commercial and Mixed-Use zones are the locations where we have constructed taller and larger cell-sites. Commonly the height is 20 to 25m. A site in a commercial or mixed-use zone can be used to provide service adjoining or nearby residential. We support the S42A recommended amendment to support 25m poles in Industrial zones. Further 5m provides the opportunity to have a 25m pole and headframe that enables the facility to accommodate multiple operators away from residential areas. The height of these facilities delivers a larger coverage footprint, which is essential in less densely populated urban areas. The Industrial zones have the ability to absorb the effects of 25m taller infrastructure, see appendix 2 for a couple of examples.

6.7 In rural zones the permitted height should be up to 35m for a single operator and 40m for co-location. In appendix 2 are a few examples of rural masts we commonly build in flat and expansive rural environments. Pole height of 35m enables the sites to be above trees and shelter belts, see the plans and photograph of Sparks SGLD Geraldine site which is 48m.

7. RURAL TELECOMMUNICATION COVERAGE

7.1 Availability of telecommunication connectivity in rural areas can be variable. Each of the network operators such as Spark and One NZ provide indicative coverage tools to show what services are available nationally. The following image is from Spark showing 4G coverage across part of Mackenzie district https://www.spark.co.nz/shop/mobile/network.html. Note that the information comes with the following note: *updated on a monthly basis around mid-month. They may not reflect the coverage we have available today due to the timing of updates and the nature of coverage being predicted. RCG customers select "4G" in the options above to check your coverage. If you're in a rural area and a nearby site has recently been activated you will see reception bars and the words 'Spark NZ' displayed at the top of your mobile whilst you are located in the area you're expecting coverage and using an eligible device.*



7.2 The following image is from Broadband Map NZ[7] for Fairlie and it's surrounding area. This tool is supported from data from the network operators to assist New Zealanders to establish what telecommunication services should be available locally. Note that the data is indicative, and customers should confirm availability with the relevant provider. While the map can show coverage there may not be network capacity to offer a service. The capacity constraints also apply to satellite services.

[7] https://broadbandmap.nz/home

7.3

8. SATELLITE SERVICES

8.1 Telecommunication connectivity infrastructure (satellite direct to phone or device) continues to be fast evolving and ever changing as we integrate new technology to expand customer opportunity to connect when they want it just about anywhere. New Zealand has a long history of satellite services going back to Warkworth Satellite Earth Station to broadband services satellite to a dish connected to wifi router into a building. However, the utilisation of new non geostationary constellations of multiple satellites that orbit earth has significantly improve the broadband services available to business/rural and residential customers[8]. SpaceX Starlink service is one such global company that retail broadband services into New Zealand. Lynk Global is a satellite service provider that is expanding services into Aotearoa.

8.2 Spark and One NZ have announced they will set providing satellite-to-mobile services. The One NZ expects in late 2024 to be providing text to mobile phone/devices[9]. It is worth remembering that the technology is still evolving, so the service and experience will improve and expand as the number of satellites in the sky increases. Satellite services can't provide 100% connectability, as you need a clear line of sight to the sky to get connected. Satellite services[10] add an additional layer of resilience, particularly now, as we face increasingly severe and frequent weather events due to climate change. Once there are more satellites launched and the service is available more broadly, it will allow mobile customers to start to use their phones in more areas that aren't reached by traditional mobile coverage.

[8] https://www.sparkwholesale.co.nz/products/satellite/corporate-satellite-internet/
[9] https://one.nz/why-choose-us/spacex/
[10] https://www.sparknz.co.nz/news/Spark_sends_first_satellite_text_message

8.3 Satellites are part of the integrated communications network solution and are not expected to replace the need for cell towers. A satellite has finite capacity (e.g. when a satellite service is used for making calls, connectivity is lost inside a building). Hence the continued need for cell towers. To address this, there will continue to be an increasing number of new infill cell towers constructed across Aotearoa, including in sensitive environments such as outstanding natural landscapes, or in the coastal environment.

9. SUBDIVISION – SUB-S7

9.1 We recognise that potentially any new subdivision can be serviced via the fixed and/or wireless networks. Given that telecommunication connectivity is classified as critical infrastructure especially in an emergency and very day life subdivision applicants should be required to prove that at the time of subdivision telecommunication connectivity to the allotment was available. The network operators are the only organisation that can confirm availability. The public connectivity availability tools are indicative only. Purchasers of new allotments should be advised if not service would be available at the time of subdivision. In our experience it is common for people purchasing rural properties to expect connectivity but check what is available or not.

9.2 We believe it is important for SUB-S7 to provide stronger direction to guarantee the provision of an appropriate level of service at the time of subdivision, alongside other essential services. Failing to provide adequate telecommunications infrastructure at the time of subdivision can lead to unnecessary disruptions and increased costs for end-users when installed retroactively. An example of this would be to dig up new berms and or footpaths to trench for fibre. The Reporting Planner for the Subdivision Chapter has recommended rejection of our request for the level of service required to be specified within certain zones.

9.3 Without a clear directive to applicants of the level of service to be provided to each new allotment, owners of new lots may not have access to the telecommunication connectivity they expect. This concern is particularly pronounced in urban settings where there is an expectation for access to higher capacity networks.

9.4 If the level of service is not met, the activity status of the subdivision activity would change, and an applicant would have the opportunity to set out the reasons as to why the level of service is not necessary or appropriate for a proposed subdivision. The Telecommunications Companies believe this achieves an appropriate balance to

ensure that all allotments created by any subdivision are adequately serviced by telecommunications in accordance with SUB-O1, SUB-P7.

9.5 The following are the amendments proposed to S42A report amendments to SUB-S7 Section 42A version – underlined. Chorus, Spark, One NZ, Fortysouth and Connexa proposed changes are shown in red.

SUB-S7	Electricity Supply and Telecommunications	Activity status when compliance not achieved:
RLZ and GRUZ	1. All allotments, other than allotments for access, roads, utilities, or reserves, must be provided with connection at the boundary of the allotment to an electricity supply and telecommunication system networks.	**RDIS** **Matters of discretion are restricted to:** a. Whether an electricity supply is needed for the intended use. b. The suitability of the alternative provision of electricity supply. **c.** What method(s) are to be used to inform prospective purchasers of an allotment that an electric supply or telecommunication connection has not been installed.
All Other Zones	2. All allotments, other than allotments for access, roads, utilities, or reserves, must be provided with connections at the boundary of the allotment to an electricity supply and open access fibre ~~telecommunication system~~ networks.	**RDIS** **Matters of discretion are restricted to:** d. Whether an electricity and telecommunication supply are needed for the intended use. e. The suitability of the alternative provision of telecommunication and electricity supply. f. ~~Whether telecommunication and electricity connections shall be made available to any allotment; and, if not, the~~ What method(s) are to be used by which to inform prospective purchasers of an allotment ~~are to be informed~~ that these connections are not installed.[27] Note [27] submission MFL (35.04)

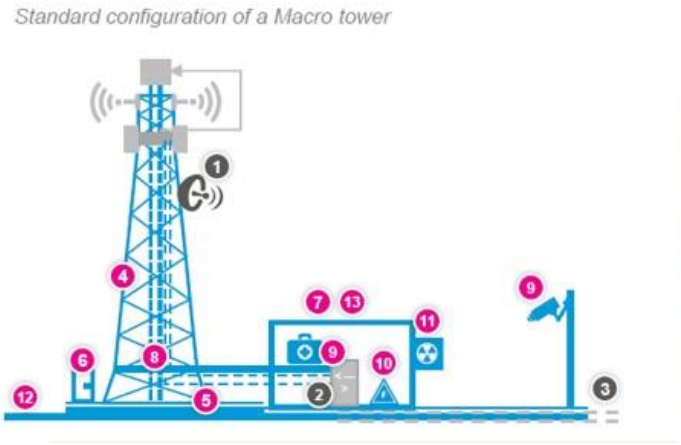
9.6 We are more than happy to work with Council to establish a process to assess connectivity requirements.

GRAEME MCCARRISON, COLIN CLUNE, ANDREW KANTOR AND FIONA MATTHEWS,

3 May 2024

Appendix 1 Connexa, FortySouth and Chorus

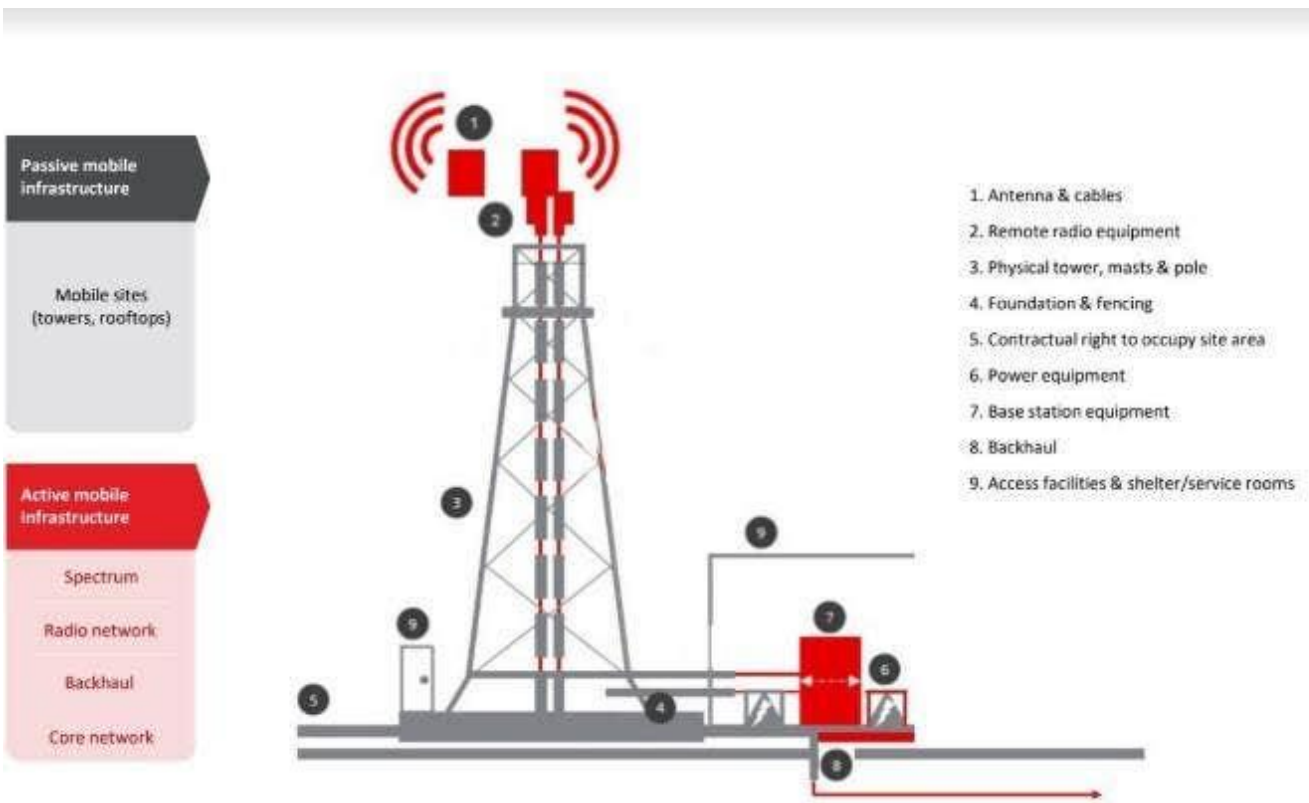
Spark / Connexa asset split on a typical macro tower



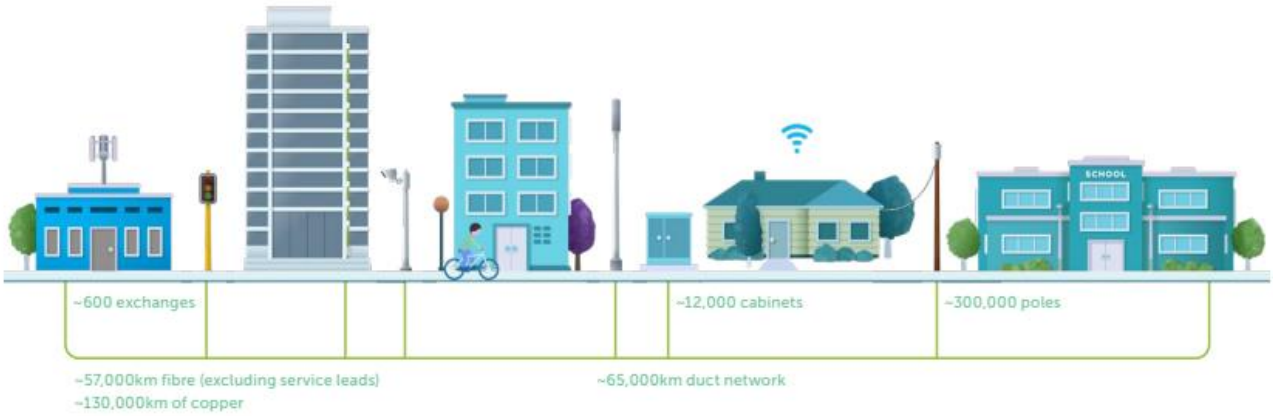
	Asset / Equipment	Ownership
1	Active radio-transmission equipment	Spark / third parties
2	Backhaul router	
3	Backhaul fibre	
4	Transmission masts and towers	Connexa
5	Fencing / gates	
6	Access facilities	
7	Huts (incl. rack space and cabinets)	
8	Rooftop walkways / ladders	
9	Fire suppression and security systems[2]	
10	DC power, back-up generators and batteries	
11	Airconditioning units	
12	Mobile only freehold sites	
13	Other passive equipment	

1

FortySouth

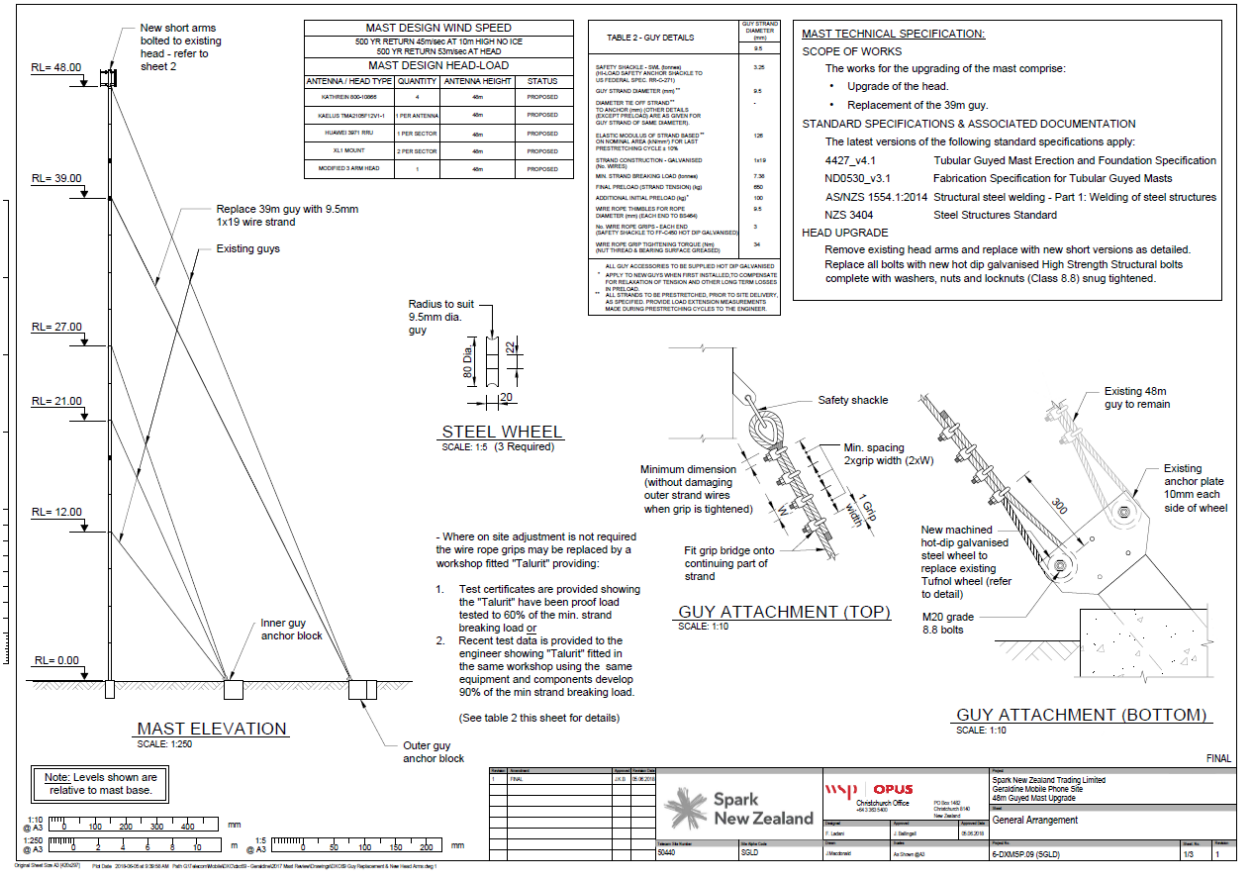


Chorus


SCHOOL
~600 exchanges
~12,000 cabinets
~300,000 poles
~57,000km fibre (excluding service leads)
~130,000km of copper
~65,000km duct network

Appendix 2 Examples of Rural Sites 30m plus

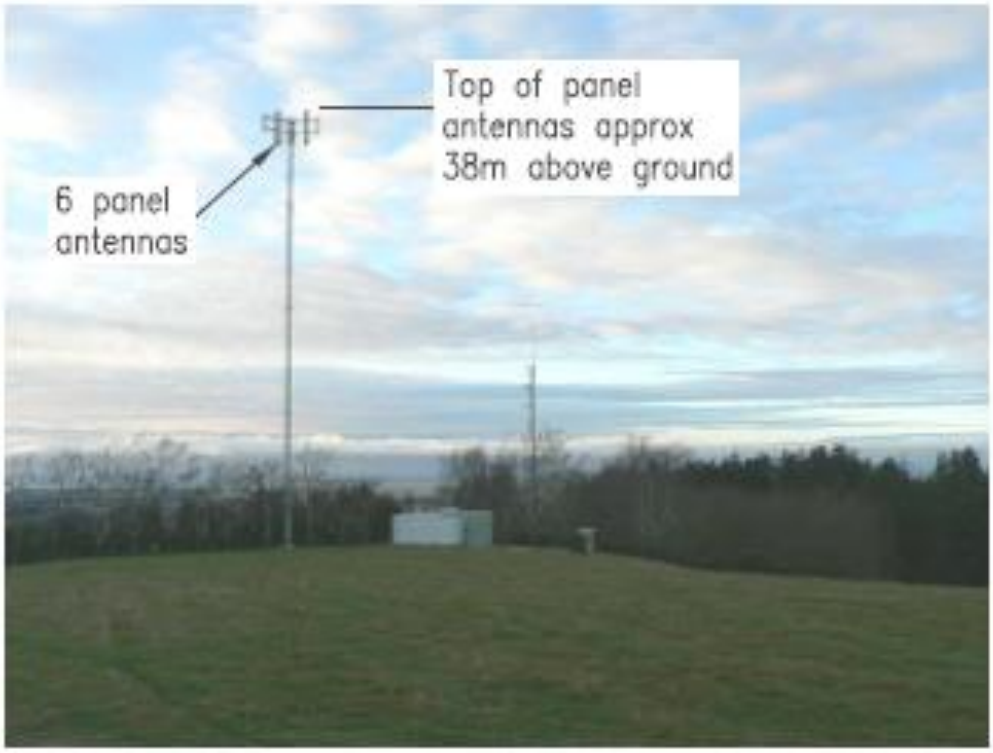
SGLD Geraldine – 48m



View from the top of the SGLD mast

SGLD

SHLB – Mt Horrible Road South Caternbury – 36m mast height



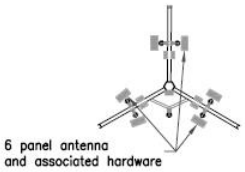
AS BUILT VIEW A

NOT TO SCALE

APPROXIMATE GRID REFERENCE
NZMS 260 J39 K39 571428

LOCATION PLAN

(1:50,000 approx)

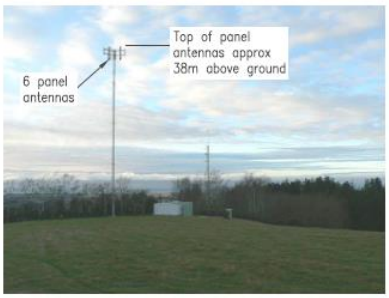


6 panel antenna
and associated hardware

MAST HEAD PLAN

1:100

(Antenna orientations to be confirmed.)

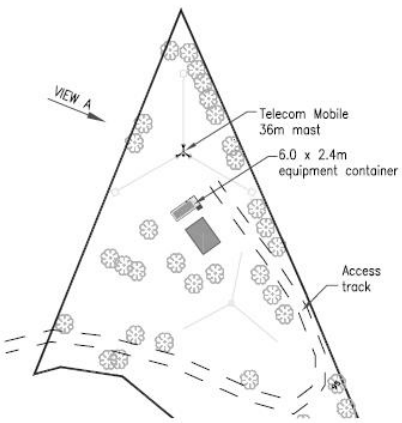


AS BUILT VIEW A

NOT TO SCALE

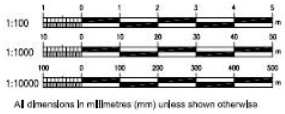
SITE PLAN

1:10000



DETAIL

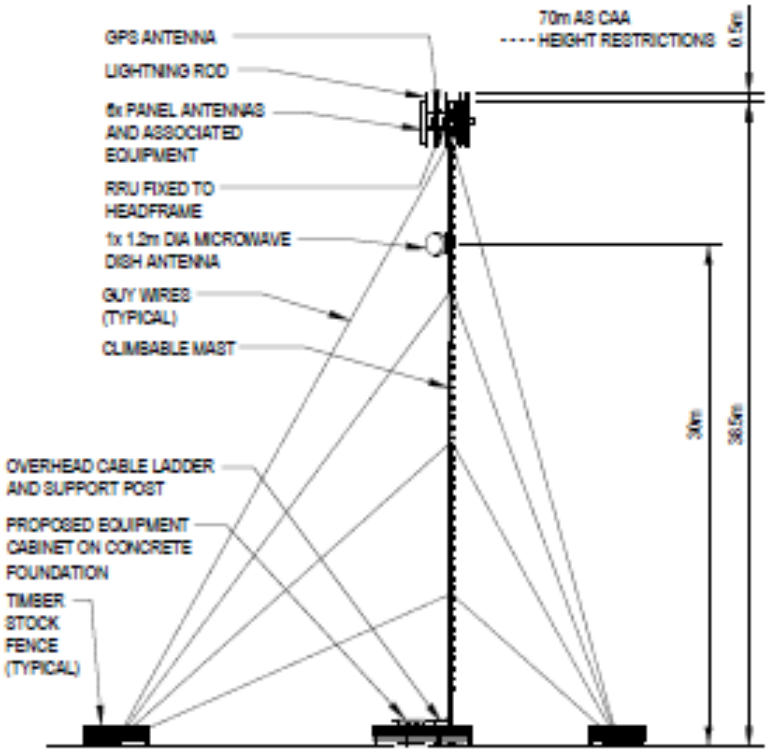
1:1000



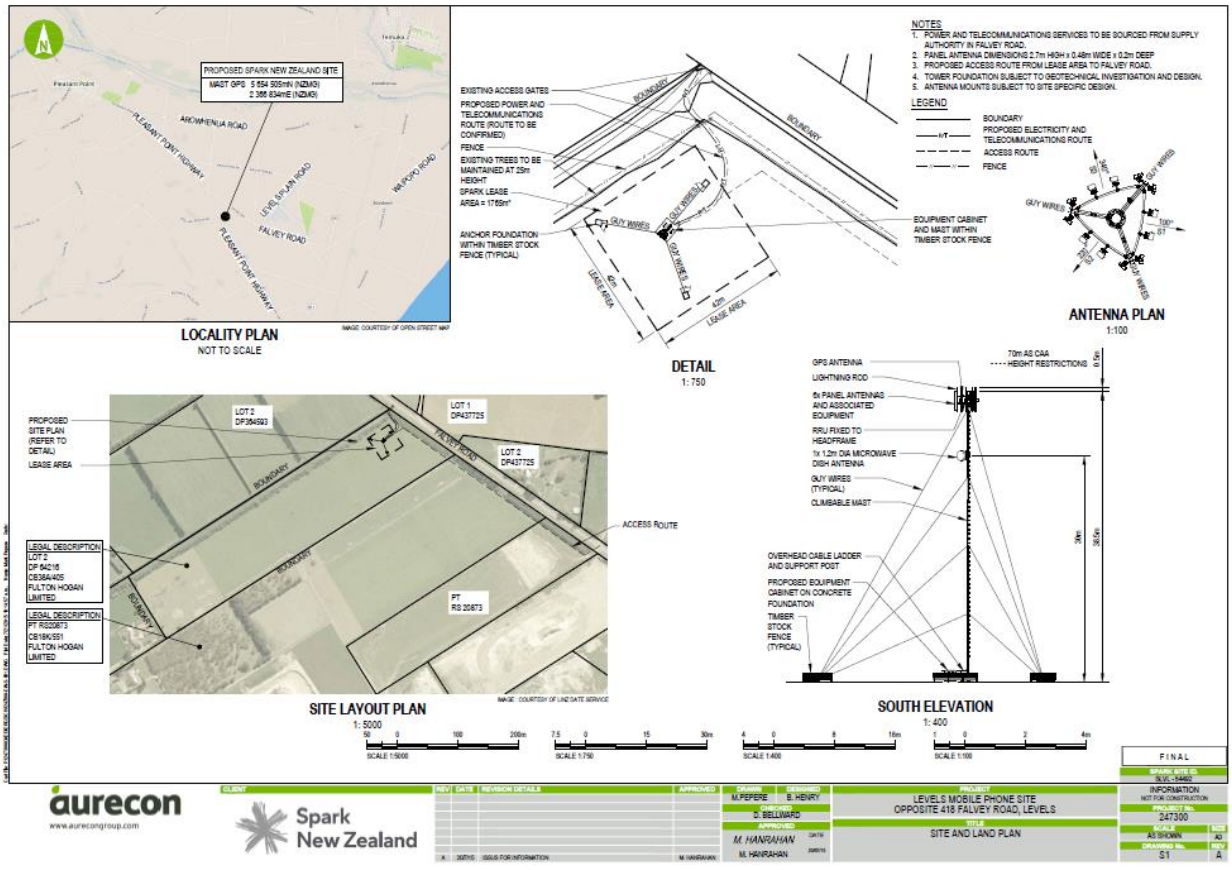
All dimensions in millimetres (mm) unless shown otherwise

Details shown are indicative only and are subject to survey.

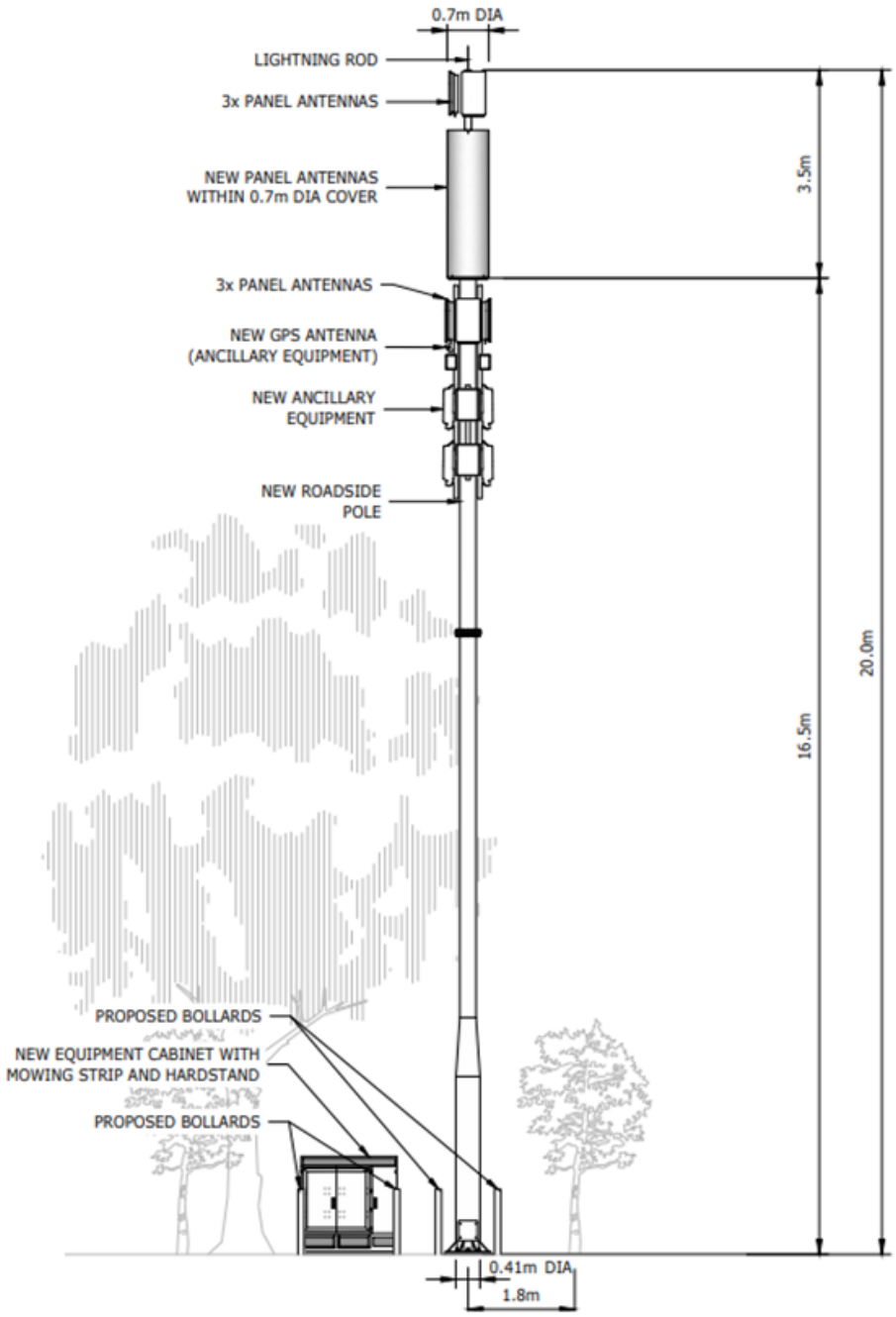
418 Falvey Road, Levels - 36.5m mast excluding the lightning rod



SOUTH ELEVATION
1: 400

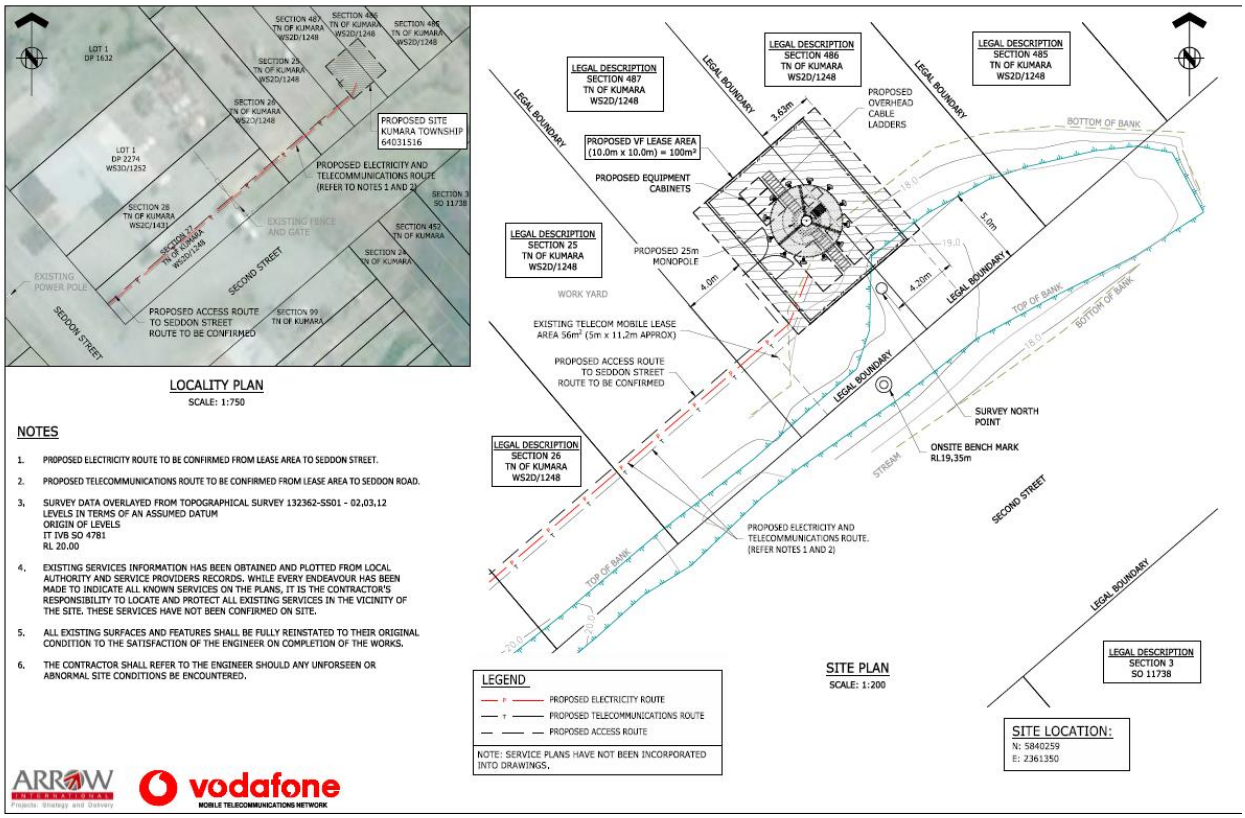


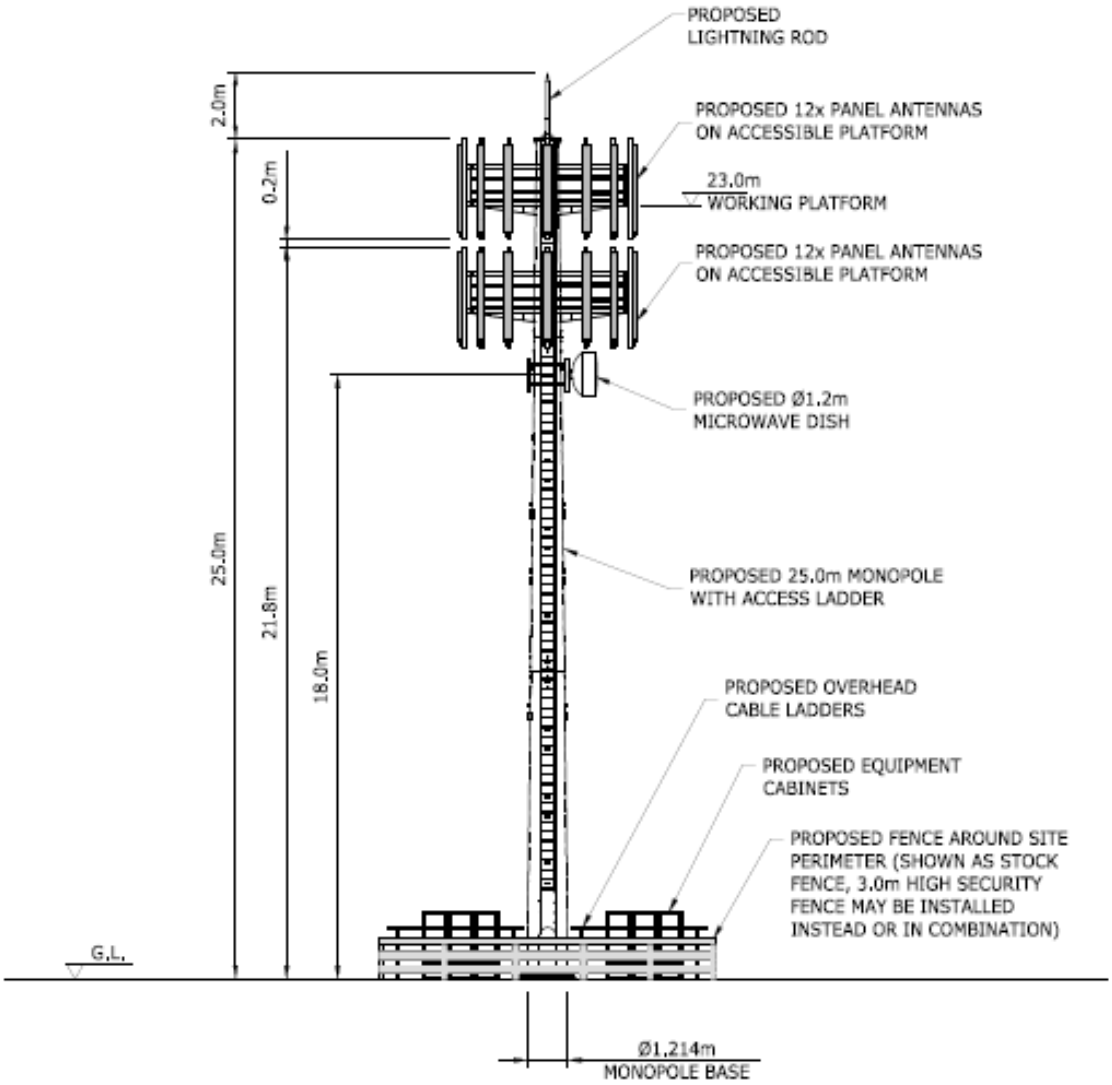
Example 20m


0.7m DIA
LIGHTNING ROD
3x PANEL ANTENNAS
NEW PANEL ANTENNAS WITHIN 0.7m DIA COVER
3x PANEL ANTENNAS
NEW GPS ANTENNA (ANCILLARY EQUIPMENT)
NEW ANCILLARY EQUIPMENT
NEW ROADSIDE POLE
PROPOSED BOLLARDS
NEW EQUIPMENT CABINET WITH MOWING STRIP AND HARDSTAND
PROPOSED BOLLARDS
3.5m
16.5m
20.0m
0.41m DIA
1.8m

Examples of 25m Cell-sites

Kumara 25m General Industrial Zone





NORTHEASTERN ELEVATION

SCALE: 1:200

Note the second (lower) headframe was not constructed.

Auckland Industrial site

5G Twizel

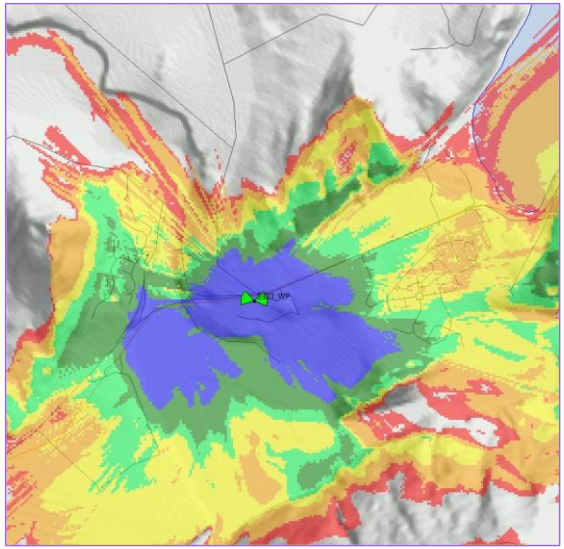
One NZ/Fortysouth Twizel Site (19 Tasman Road) Chorus Exchange

Appendix 3 Supporting Information for increased Pole Heights

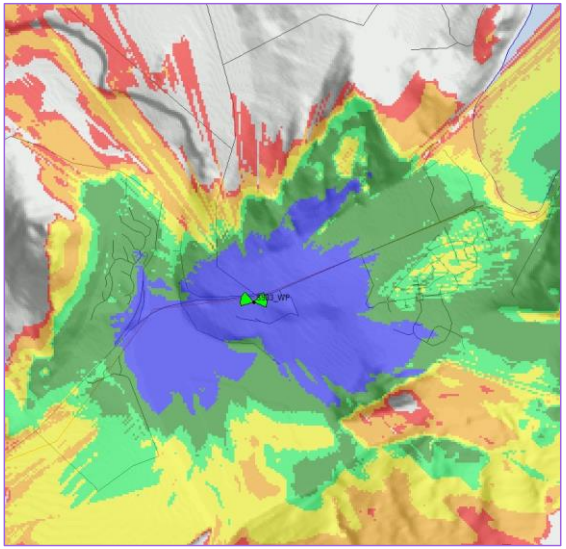
Mast Height vs Outdoor Coverage (2)

However, for street level or compromised locations (i.e. non-line of sight) tower height is extremely important to get above the local clutter otherwise additional sites would be required to provide the same level of coverage, potentially closer to residential areas.

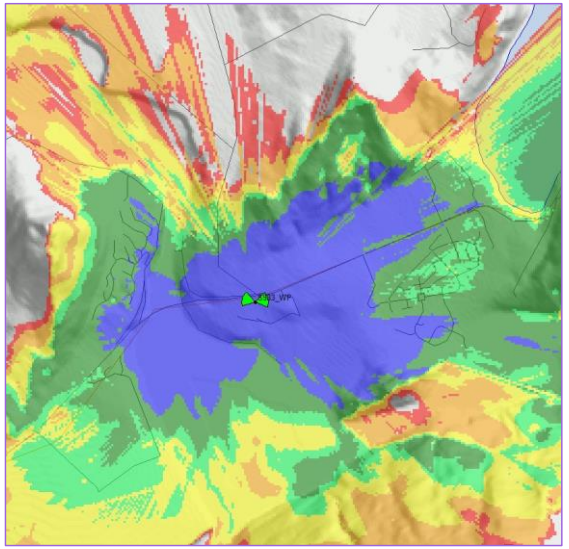
The example below shows coverage from an alternate tower location from the previous slides but at street level showing large differences in **outdoor** coverage based small differences in tower height* .



8m Mast Height – Signal Strength (Blue = Excellent -> Red=Poor)



14m Mast Height – Signal Strength (Blue=Excellent -> Red=Poor)



20m Mast Height – Signal Strength (Blue=Excellent -> Red=Poor)

*850MHz prediction shown. Higher frequency bands (>1800MHz) will be affected more by local clutter, resulting in a much smaller coverage area (range).

8

Radio Propagation – Range

In mobile communications, the range is the usable distance determining the reach (or maximum cell radius) of the radio wave propagation.

The simplified equation below may be used to determine the range:

$$Pr = Pt + G - Lp$$

Where Pr = Received power,

Pt = Transmitted Power

G = Combined antenna gains at Tx and Rx, including any cable losses

Lp = Path Loss (see previous slide)

The range is defined as the maximum distance at which the received power (Pr) is greater than the receiver sensitivity, which can be symbolized as PS, in both uplink and downlink.

Path loss (Lp) increases with distance, and is symmetric in uplink and downlink, but since the transmitted power (Pt) and the received power (Pr) are different, the link itself may not be symmetric. Therefore, the range of a base station is determined as the distance that allows a maximum path loss value without losing connectivity.

The range is variable and various factors influence it:

- **The base station mast – higher base station masts increase the range**
- **The space – open and flat spaces vs. urban spaces with high buildings, forests, mountains etc**
- The antennas used – sector antennas have greater range than an omni antenna, the size of the antenna also determines the gain i.e. the large the antenna the more directional gain.
- The frequency band – low band (850MHz) radios have better range than higher bands (1800/2600/3500MHz) radios.