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

AND

IN THE MATTER **Proposed Waitomo District Plan**

Hearing – Tranche 2 (Excluding ECO Topic)

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

4 NOVEMBER 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 Spark and One NZ are continuing the roll-out of 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 (approximately $1.5 billion)[2] in our networks to ensure New Zealanders have access to world class digital services.

1.4 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

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

[2] 2023-Telecommunications-Monitoring-Report-15-August-2024.pdf (comcom.govt.nz)

will be texts expected in late 2024[3] and followed by voice and data services in the future. Satellite broadband services are widely available in NZ via a range of providers. These services currently depend on satellites 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.

1.5 We rely on regulatory frameworks both nationally, via the National Environmental Standards for Telecommunications Facilities 2016 (NESTF), and locally, via the Waitomo district plan including the plan changes, to appropriately enable the planning and funding for upgrading of existing networks and construction of new networks to support economic growth, deliver digital services enable connectivity to the rest of the world. As well as to increase the resilience of the networks in response climate change and natural hazards.

1.6 Enabling appropriate permitted heights for cell sites in commercial zones is essential to support the provision on telecommunication services to businesses, residents and visitors of Waitomo district. We support pole heights of 20m in commercial zones, and an additional 5m to promote 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.

1.7 Recognise that we have and will need to build network including earthworks for telecommunication construction works such as foundations including pile drive and concrete pads in Flood and Coastal Hazard Areas overlays. The footprint of a facility is very small i.e. cabinet and pole resulting in limited scale of the earthworks. Supports our professional design foundations appropriate to the hazard and soil conditions of the location without a resource consent. Regulated activities under the NESTF 2016 are exempt from district plan natural hazard rules. The district plan should align with the national direction set by the NESTF. There is no history of the facilities being physically impacted i.e. the pole the falling over by natural hazards.

1.8 Building telecommunication infrastructure in the road that already traverse protected and sensitive environments is a practical space for supporting upgrading and new telecommunications network. The existing road environments are already

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

established as essential infrastructure corridors and have been previously disturbed and visually impacted by roading, electricity and telecommunications networks.

1.9 The companies would like to commend the officers on the early engagement process to create the Proposed District Plan. 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. 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 review including: Horizons, Gore, Wairarapa, Wellington City & Region, Timaru, Selwyn, Waitomo, Whangarei, Waimakariri, Waitaki, Waikato Region, Otago Regional Policy Statement, 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 adapted into the draft Transitional National Planning Framework under Chapter 13.2, now repealed.

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 amended NESTF standards due to be notified for submissions in early 2025 as part of the National Directions package of RMA reform work. The reform package will include the proposed National Policy Statement for Infrastructure.

2.7 I have submitted on behalf of Spark and generally combined with Chorus (Andrew Kantor), One NZ (Colin Clune) and Connexa (Fiona Matthews) on a wide range of Resource Management Act and Resource Management reform documents including:

a. Commentary and feedback to MBIE on amendments to NESTF 2016.
b. Spark Trading New Zealand Limited submission – Fast Track Approvals Bill, April 2024.
c. Spark Trading New Zealand Limited and Vodafone New Zealand Limited Submission - Resource Management (Enabling Housing Supply and other matters) Amendment Bill, November 2021.
d. Spark Trading New Zealand Limited and Vodafone New Zealand Limited Submission - Urban Development Bill, February 2020.
e. Spark Trading New Zealand Limited Submission - Proposed National Policy Statement Urban Development, October 2019.
f. Spark Trading New Zealand Limited - Submission National Policy Statement for Highly Productive Land, October 2019.

g. 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. Closure of the 3G networks
d. Facilities in flood and coastal hazard overlays
e. Need for network Height

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 402.74 million terabytes[4] of data are created each day. In zettabytes, that equates to around 147 zettabytes per year, around 12 zettabytes per month, 2.8 zettabytes per week, or 0.4 zettabytes every day that roughly 2.5 quintillion bytes of data are created globally. 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

[4] https://explodingtopics.com/blog/data-generated-per-day

181 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.

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.

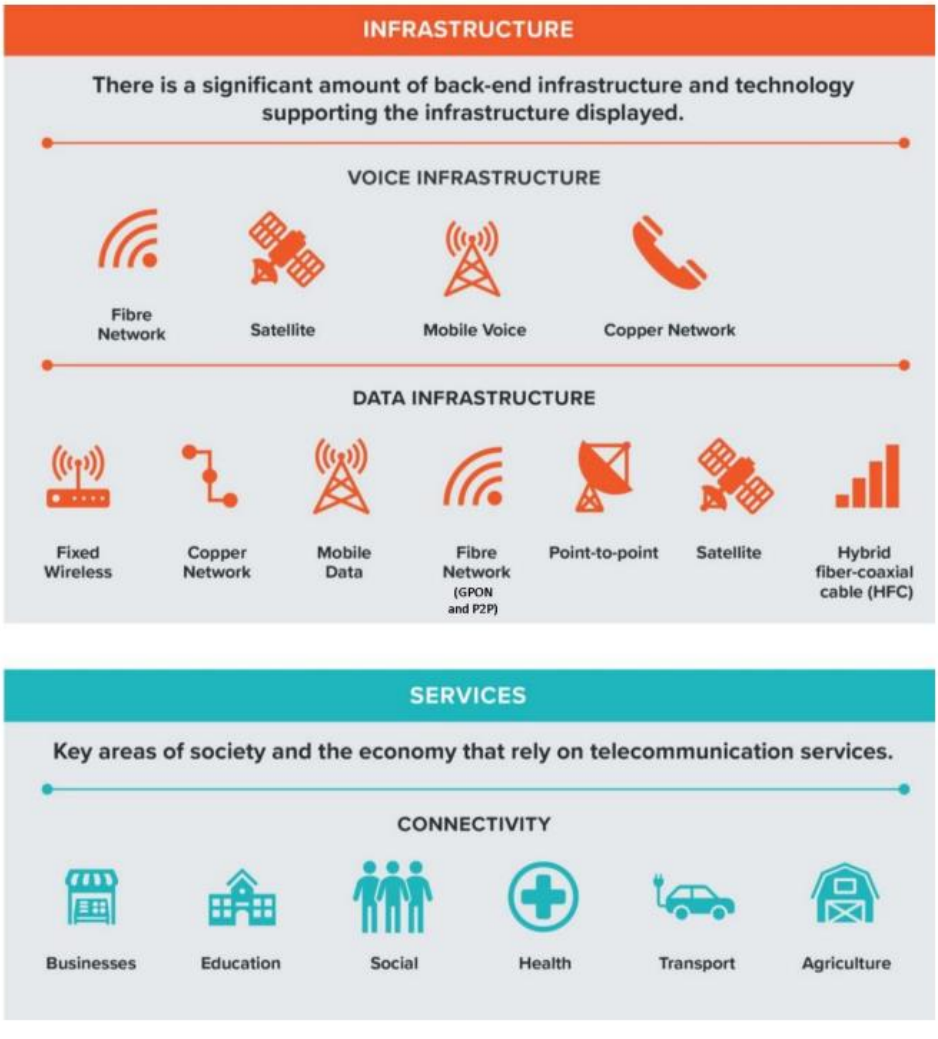
(d) Monitoring and real-time reporting of air flow and quality; or water quality for swim ability or drinking; flood warning accompanied with real-time mapping and predictions.

(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.[5]



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 Zealanders. These advances have seen the telecommunications industry collectively

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

investing on average $1.6 billion each year to deliver new services and network technology. The latest Commerce Commission industry monitoring report[6] 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 Waitomo 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.

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

6 https://comcom.govt.nz/__data/assets/pdf_file/0033/361959/2023-Telecommunications-Monitoring-Report-15-August-2024.pdf

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.

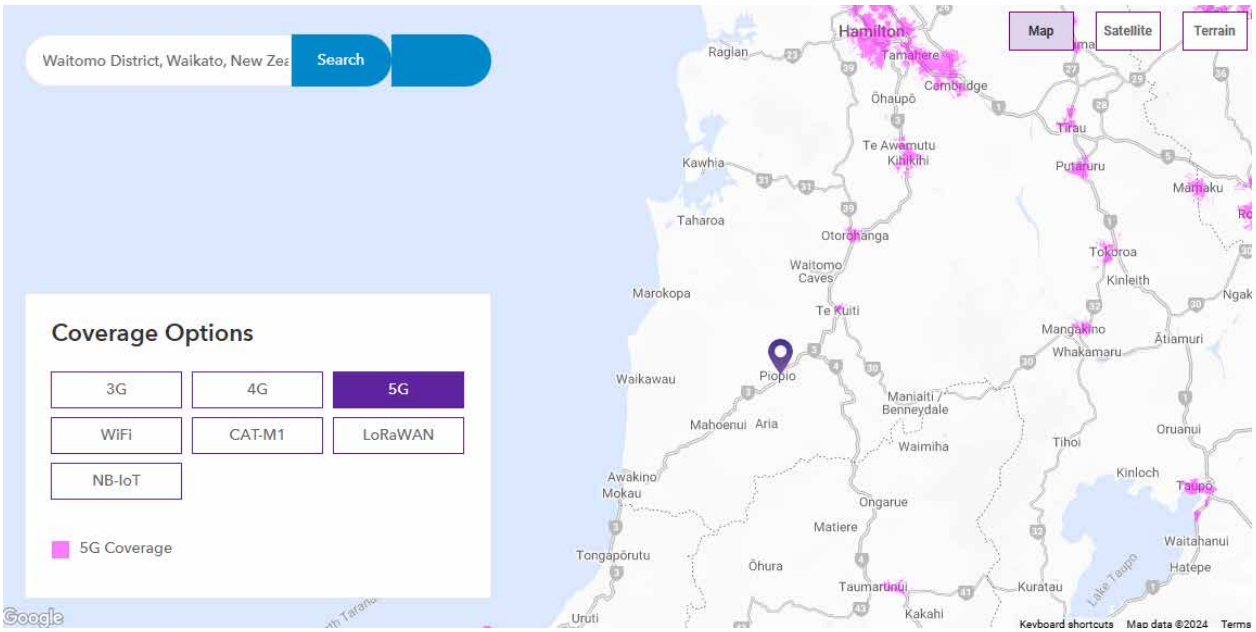
Wireless telecommunications networks

3.15 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.

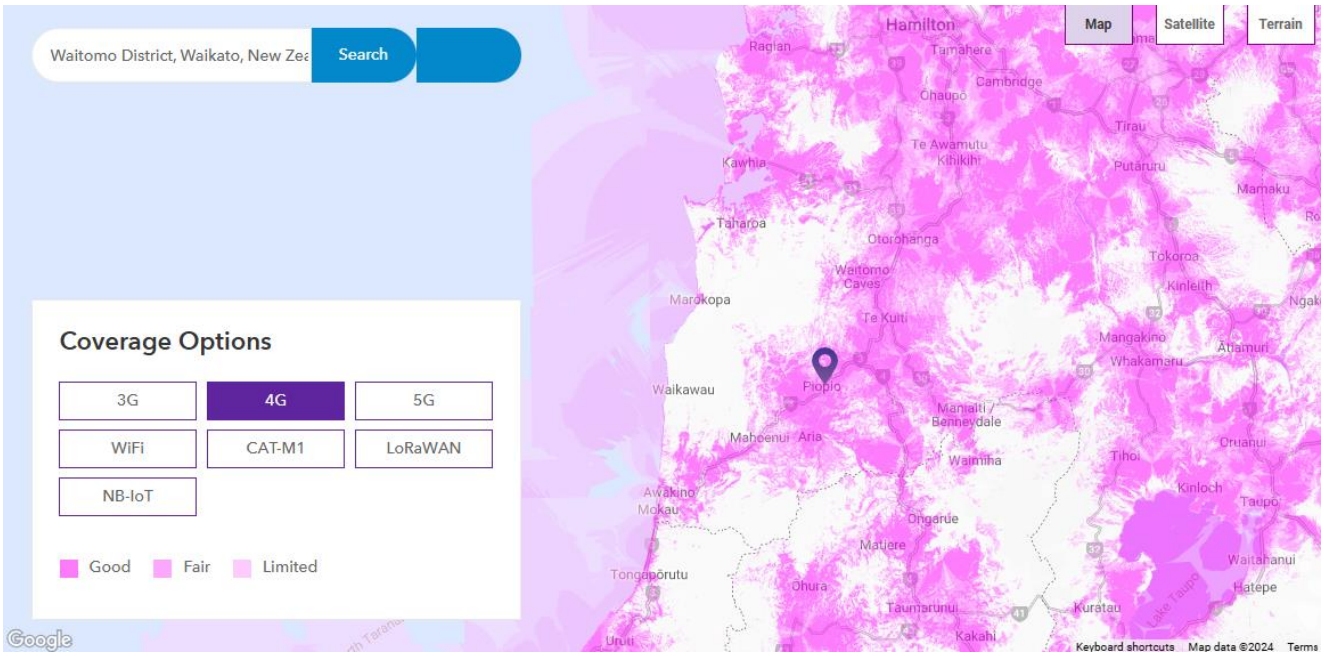
3.16 In May 2023 the government announced the agreement reached with Spark, One NZ and 2degrees to:

- deliver a faster roll-out of 5G services to around 55 towns across New Zealand. such as Te Kuiti and Otorohanga in the adjoining Otorohanga district see below Spark coverage map.
- further expand mobile wireless coverage in rural areas,

3.17 Spark 5G coverage map



4G coverage maps



3.18 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.

3.19 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.

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

(a) the COVID-19 pandemic; and

(b) natural emergencies event warnings to potentially affected people for earthquakes, flooding or other natural emergencies. The alerts are becoming how nationally significant events and information are communicated to New Zealanders in an immediate and succinct manner.

3.21 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 Waitomo 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

3.22 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[7].

3.23 The Infrastructure Commission's discussion document on Infrastructure for a Better Future recognises the critical nature of telecommunications infrastructure. The report

[7] 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

notes that 'Increasing reliance on communications makes telecommunications infrastructure more critical.'[8]

Satellites

3.24 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. SpaceX Starlink service is one such global company that retail wireless broadband services into New Zealand. Starlink has approximately 37,000 customers across New Zealand. Lynk Global is a satellite service provider that is expanding services into Aotearoa.

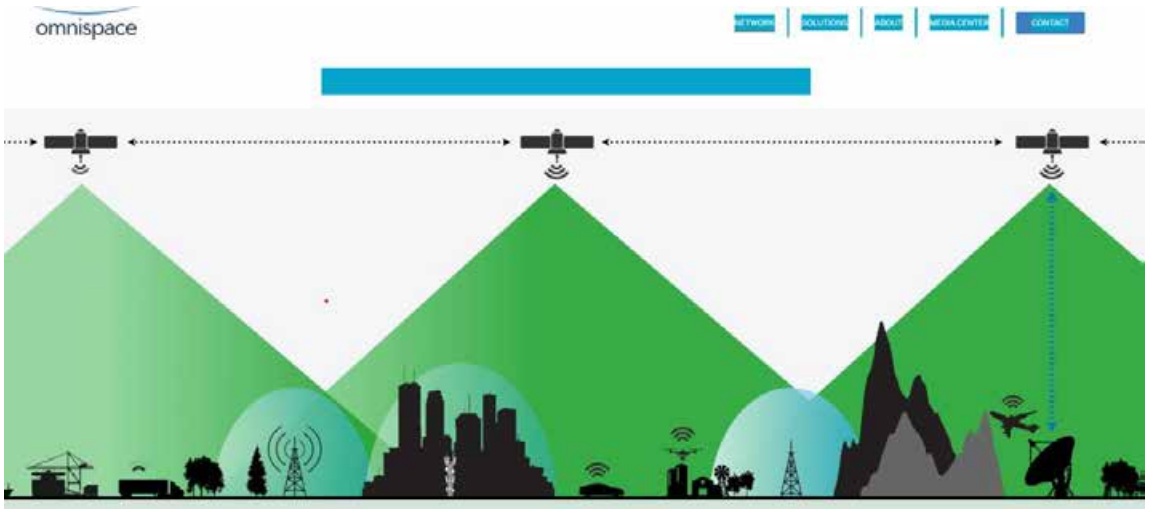
3.25 Spark and One NZ have announced they will set providing satellite-to-mobile services. The One NZ expects in late 2024 to be providing text to mobile phone/devices via the Starlink satellite network. It is worth remembering that the technology is still evolving, so the service and experience will improve and expand as the number of satellites in the sky increases. Satellite services can't provide 100% connect ability, as you need a clear line of sight to the sky to get connected. Satellite services 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.

3.26 Satellites are part of the integrated communications network solution and are not expected to replace the need for cell towers. The mobile operators in Aotearoa/New Zealand have significant upgrade and new sites planned for across the country. Our networks reach 99% of populated areas of Aotearoa. Satellite enables coverage of the areas currently difficult to service mainly due to our topography. A satellite has finite capacity (e.g. when a satellite service is used for making calls, connectivity is lost inside a building). Hence partly why there will be continued need for cell towers. To address this, there will continue to be an increasing number of new infill cell towers

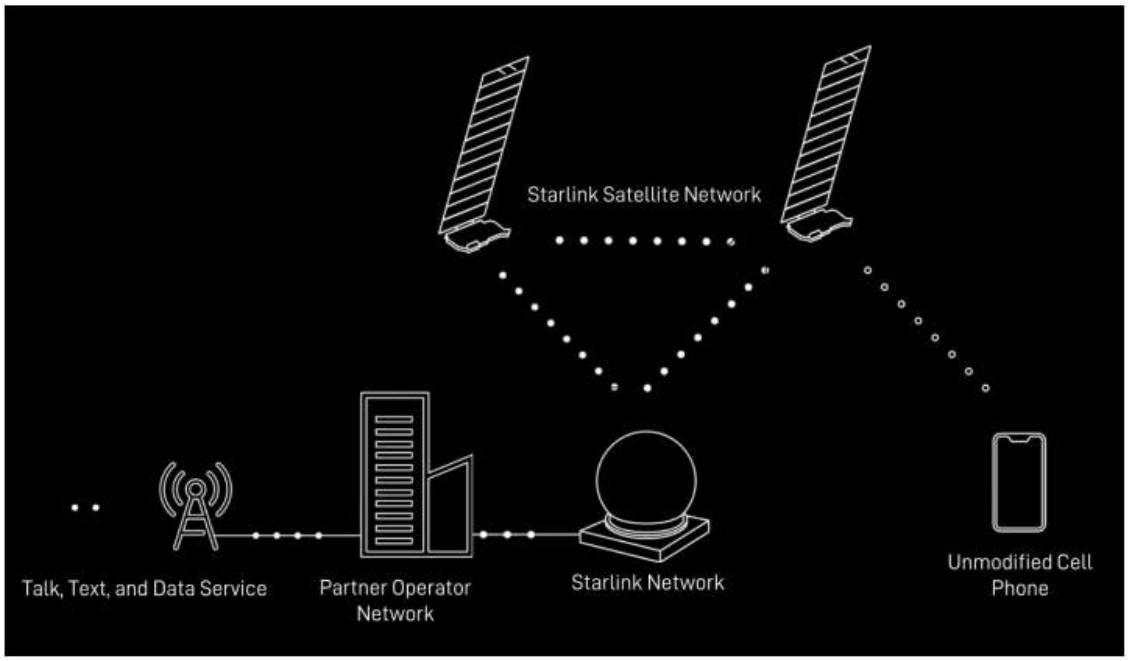
[8] https://www.infrastructure.govt.nz/assets/Uploads/Infrastructure-Strategy-Consultation-Document-June-2021.pdf; p. 34

constructed across Aotearoa, including in sensitive environments such as outstanding natural landscapes, or in the coastal environment.

3.27 The below diagram shows that when standing within the mobile network's coverage area your device will connect to your local provider's network (eg Spark or One NZ). When beyond this coverage or roaming, your device will seamlessly connect through the satellite network.



3.28 The below diagram[9] from SpaceX shows how the services via satellites will be provided.



Direct to Cell satellites act like cell towers in space, sending traffic to partner operator's cores using Starlink's space and ground systems

[9] https://www.starlink.com/business/direct-to-cell

4. CLOSING 3G NETWORKS

4.1 One NZ[10] and Spark[11] (plus 2degrees) are currently progressing the closure of their 3G networks by the end of 2025. As in New Zealand operators around the world are shutting down 3G networks to make way for faster and more power efficient 4G and 5G technology. Customers will transition to the 4G & 5G networks. Older devices will need to be upgraded to devices that are at least 4G enabled to connect via VOLTE (voice over LTE (LTE is the technical name for 4G)) and/or wifi calling. The existing 3G spectrum will be repurposed to support 5G especially in rural areas.

4.2 The shutdown of the 3G has been driving a large construction program of additional sites to ensure that there is 4G coverage to support people moving from the 3G network. In rural communities and urban areas, we need reasonable pole height especially to overcome the undulating topography of the Waitomo district so that the antennas can transmit large coverage as possible to enable users to connect.

5. NATIONAL ENVIRONMENTAL STANDARDS FOR TELECOMMUNICATIONS FACILITIES

5.1 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.

5.2 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

[10] https://one.nz/3g-switchoff/?srsltid=AfmBOopr_uJLCGG9iSNR37t87fPhycjfRBRiaNpmr4QBrMyMU_wMebsI
[11] https://www.spark.co.nz/online/shop/mobile-devices/4g-ready

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

5.3 The government has recognised that the NESTF 2016 requires amendment. As mentioned in the introduction to this evidence MBIE reviewing the NESTF to amendment it be hopefully fit for purpose and expand the range of regulated activities. The exclusion from the NESTF of the sub-part 5 matters is not going to change. The extent of amendments to the NESTF 2016 will become clear in early 2025 when public submissions open.

6. CHALLENGES OF ENSURING NETWORK RESILIENCE

6.1 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.'[12]

6.2 We recognise and understand that New Zealand depends on our construction and provision of resilient lifeline telecommunication networks especially during and post emergencies is critical. Our national networks exist in and need to traverse areas subject to climate change, sensitive environments including the coast and marine areas and the full range of natural hazards to provide access to digital and communication services to communities, business and people that live and recreate in these environments. Recent extreme weather events have again highlighted the interdependence between telecommunications and other essential infrastructure providers such as electricity, roading and fuel, in the event of a natural disaster.

6.3 It is critical consider the impact on communities that disruption to telecommunications and electricity could have during an extreme natural hazard event, such as Cyclone Gabrielle. Such events create challenges for providing telecommunications across a wide area impacted by flooding, landslides, roads and bridges collapsing, prolonged electricity outages. The '*Strengthening the resilience of Aotearoa New Zealand's critical infrastructure*'[13] system discussion document outlines why a resilient critical infrastructure system matters for our country and people. New Zealanders live in areas subject to all kinds of natural hazards and climate change. Consequently, our networks are in these same areas to provide critical connectivity.

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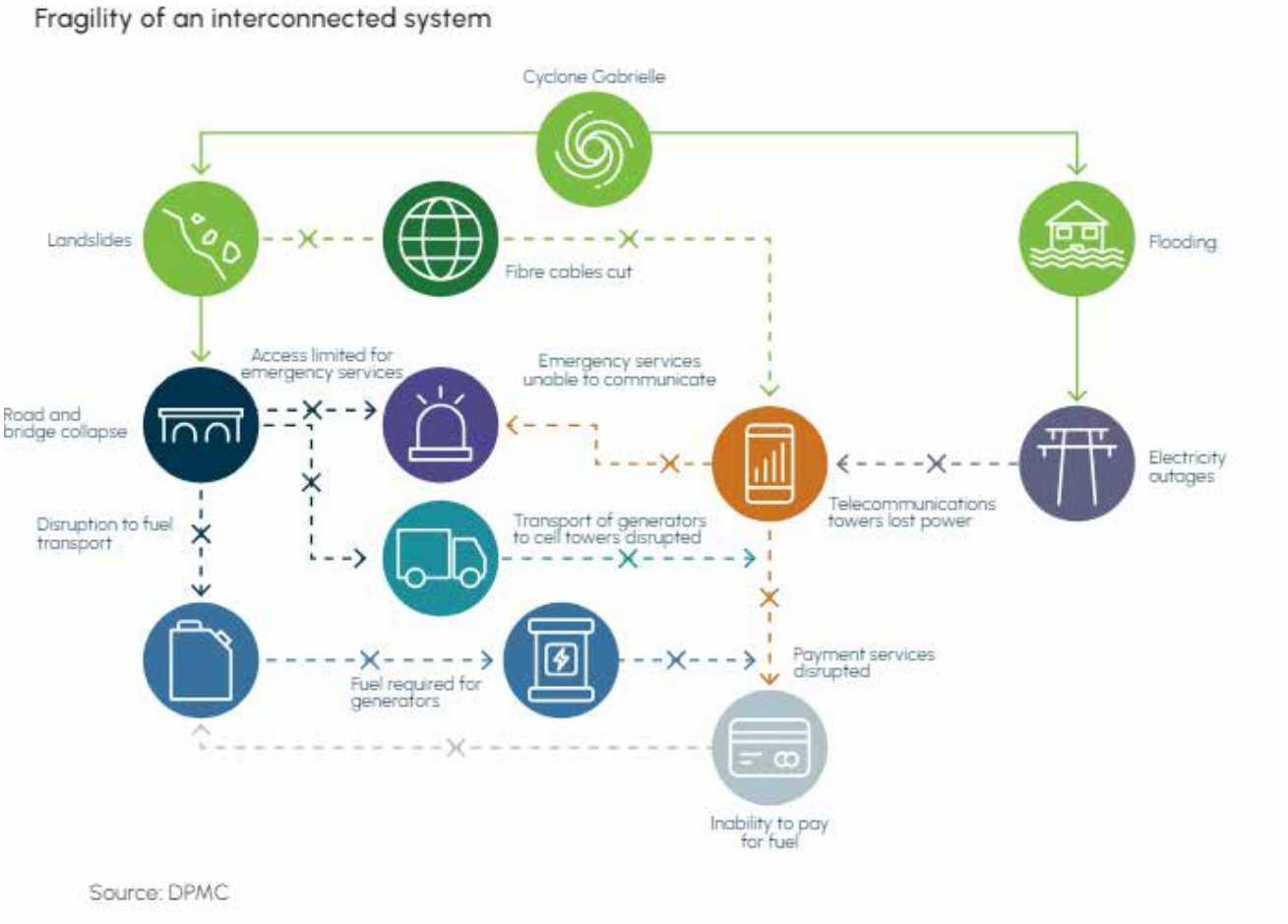
[12] https://www.infrastructure.govt.nz/assets/Uploads/Infrastructure-Strategy-Consultation-Document-June-2021.pdf; p. 34

[13] https://consultation.dpmc.govt.nz/national-security-group/critical-infrastucture-phase-1-public-consultation/user_uploads/discussion-document--strengthening-the-resilience-of-nzs-ci-system.pdf

6.4 The following diagram from the *Report of the Government Inquiry into the Response to the North Island Severe Weather Event*[14] created by Department of the Prime Minister and Cabinet (DPMC) shows the fragility and interdependencies between critical infrastructure and impacts of outages in one sector can have flow on consequences for other sectors. Telecommunications and electricity are the critical sectors our communities and the economy depend.



6.5 We recognise the importance of planning for and designing for being in sensitive and/or areas subject to climate change and/or natural hazards has increased focus within local and central government plans. In May 2023 the sector released our plan for enhancing the resilience of our networks. "Enhancing resilience in telecommunications - industry plan and suggested areas for collaboration with government."[15] Reviewing the vulnerability of the fixed network to damage or being severed due to other infrastructure being washed out or significantly damaged or coastal environments changing there is increasing challenges to the resilience of our

[14] https://www.dia.govt.nz/diawebsite.nsf/Files/Government-Inquiry-into-Severe-Weather-Events/$file/Report-of-the-Government-Inquiry-into-the-Response-to-the-North-Island-Severe-Weather-Events.pdf

[15] https://s3.documentcloud.org/documents/23854635/telco-resilience-plan-17p-may-2023.pdf

existing networks. The NESTF 2016 exempts regulated telecommunications networks from hazard provisions in district plans.

6.6 Our position is that district plans are not the place to regulate for a resilient telecommunications infrastructure when it is in coastal environments and settlements where we have existing networks and customers. In New Zealand, avoiding a natural hazard and other overlays area is not practical or possible for technical and operational reasons to service companies. The Telecommunication companies work together to better understand the impacts of natural hazards caused by climate change (including work on climate related scenario analysis), taking steps to make telecommunications infrastructure more resilient to natural hazards.

6.7 The telecommunication companies have obligations under the Civil Defence Emergency Management Act 2002 (CDEMA) to provide resilient infrastructure. This is regulated under the CDEMA and adding another layer of regulation of resilience through regional and district plans is not necessary.

6.8 Consequently, the engineering design for a new cell-site, not regulated by the NESTF 2016, in Flood and Coastal Hazard Areas will be the same as any NESTF regulated facility in natural hazard areas. Appendix 2 shows examples of facilities designed to mitigate potential natural hazards based on natural hazard information. The pad foundations for a cell tower pole is commonly 1.5m in depth, refer to the foundation plans for the Spark site ATKI – 187 Amreins Road, Taupaki. Plans for the Spark site AKAE – Corner Hingaia Road and Harbourside Drive Karaka show an example of a typical pile driven foundation. Noting that a concrete pad foundation is the most common foundation design when soil conditions enable this. A restriction of 0.5m depth in the flood and coastal zones is overly restrictive and limits our engineer's ability to design to the requirement of the location. The difference will be the requirement for resource consent. The requirement for resource consent is not going to change how we design or construct our networks to be resilient. All that a requirement for a resource consent achieves is a delay and additional cost to network operators. For network utility operators there is no perceivable value in requiring resource consents to establish telecommunication facilities in natural hazard overlays.

6.9 We support the more detailed mapping of natural hazard information as this is essential for our company's engineers to undertake professional risk information as part of the decision making on the appropriate design of telecommunication infrastructure in Flood and Coastal Hazard Areas. We are not aware of our networks being permanently or significantly damaged due to floods or coastal natural events. Temporarily the network

may be down, often due to disruptions in power supply. Repairs to any damaged network happen within hours or days. We have temporary network solutions for restoring the network/s, refer to appendix 2.

6.10 Our position is that the Flood and Coastal Hazard provisions in the proposed plan should be aligned to the national direction of the NESTF 2016. That is to exempt telecommunications network from the Flood and Coastal Hazard overlays. However, as outlined by Mr Horne in this instance we have pragmatically elected to limit our relief to Flood and Coastal Hazard areas. We seek national consistency and a common-sense approach for the implementation of our networks.

7. OUSTANDING SIGNIFICANT AREAS

7.1 Waitomo recognises the diversity of amazing and sensitive natural features and landscapes. It can be extremely challenging to provide telecommunications networks because the infrastructure needs to traverse sensitive landscapes and other significant environments into locations that communities or businesses expect coverage and services. There will no doubt be times when infrastructure is required to be located in sensitive environments to support and service both urban and rural environments. Given this, it is critical that the proposed Waitomo district plan to provide an enabling framework that recognises the functional and operational needs of such infrastructure to locate in sensitive environments.

7.2 Building telecommunication infrastructure in the road that already traverse protected and sensitive environments is a practical space for supporting upgrading and new telecommunications network. The existing road environments are already established as essential infrastructure corridors and have been previously disturbed and visually impacted by roading, electricity and telecommunications networks. We support and encourage roads to be exempt from the overlay rules of adjoining sensitive environments. This is a practical method for encouraging infrastructure to locate in the environment already setup for them.

8. NETWORK HEIGHT

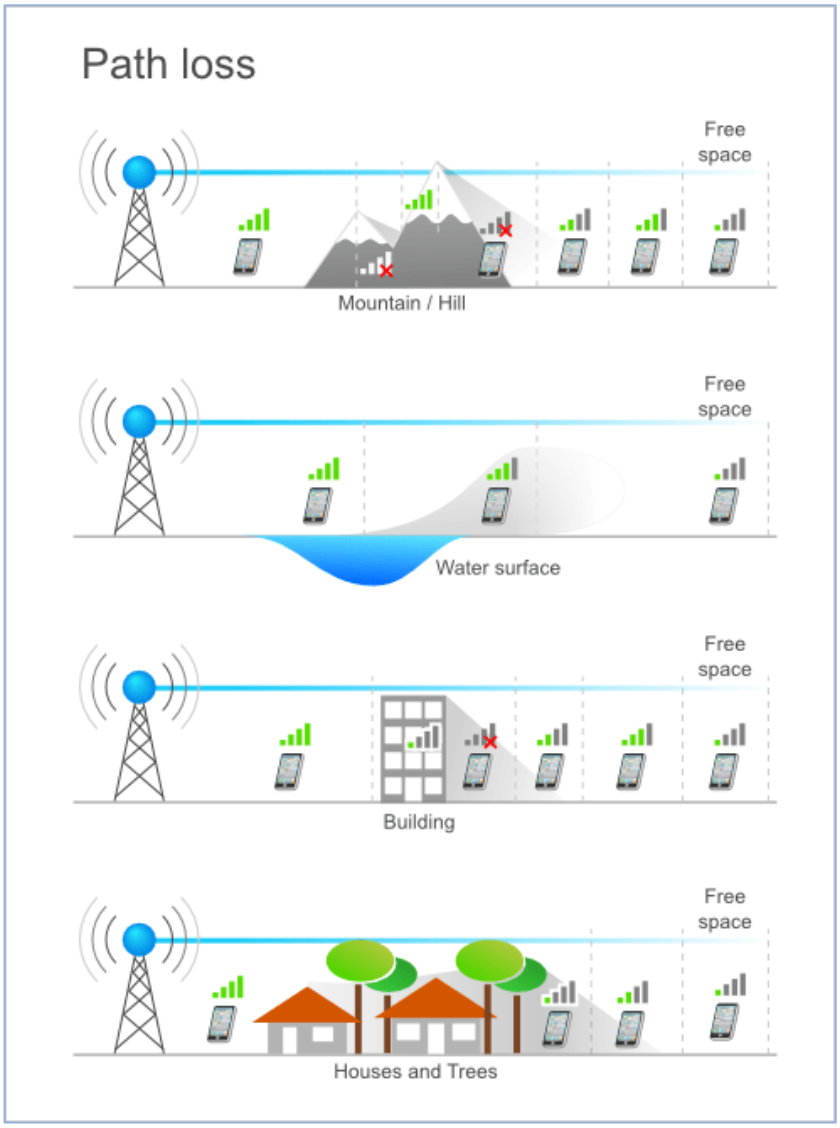
8.1 As set out in this evidence above, the telecommunication network technology requirements are constantly changing and evolving. We rely on the NESTF and district plan rules to protect the existing network and appropriately enable the upgrading of existing networks and construction of new networks. 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 Waitomo 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. As part of the NESTF amendments we have requested the following pole heights relevant to this hearing:

- *Maximum permitted height of 20 metres adjoining a local centre or neighbourhood zone; or*
- *Maximum permitted height of 35 metres adjoining Rural zones; or*
- *Maximum permitted height of 25 metres in road reserve subject to or adjoining areas defined under regulation 40, 41, 43, 44, 45, 46 and 47; or*
- *All other zones maximum permitted height is the greater of either 25 metres or the relevant building for the adjoining zone, plus 5 metres.*
- *A further 5 metres in height, is afforded where two or more facility operators are co-located on the same pole in all zones except for a residential zone.*

8.2 We recognise while our preferred commercial height is 25m plus 5m for co-location 20m in the COMZ-PREC5 zones is acceptable. 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 diagram & appendix 4 demonstrate the issues

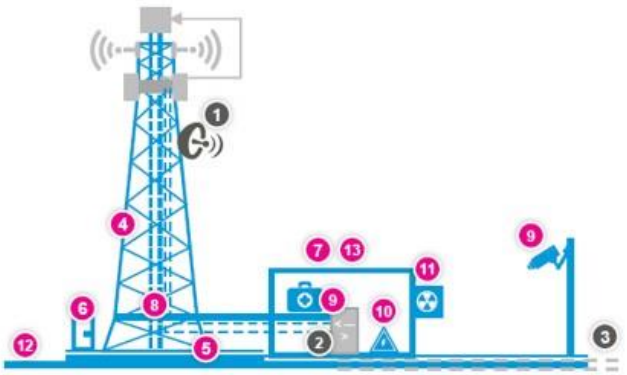


GRAEME MCCARRISON, COLIN CLUNE, ANDREW KANTOR AND FIONA MATTHEWS,

4 November 2024

Appendix 1 Connexa, FortySouth and Chorus

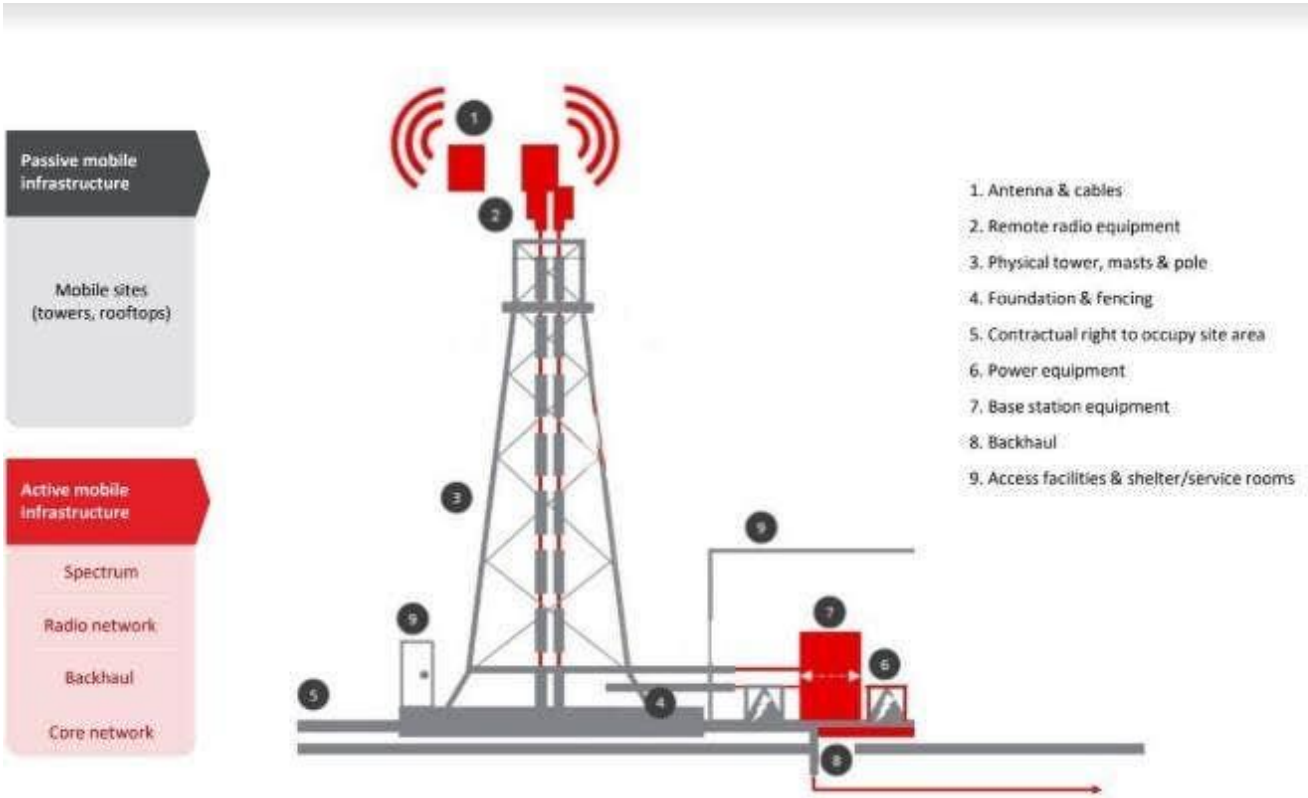
Spark Connexa asset split on a typical macro tower



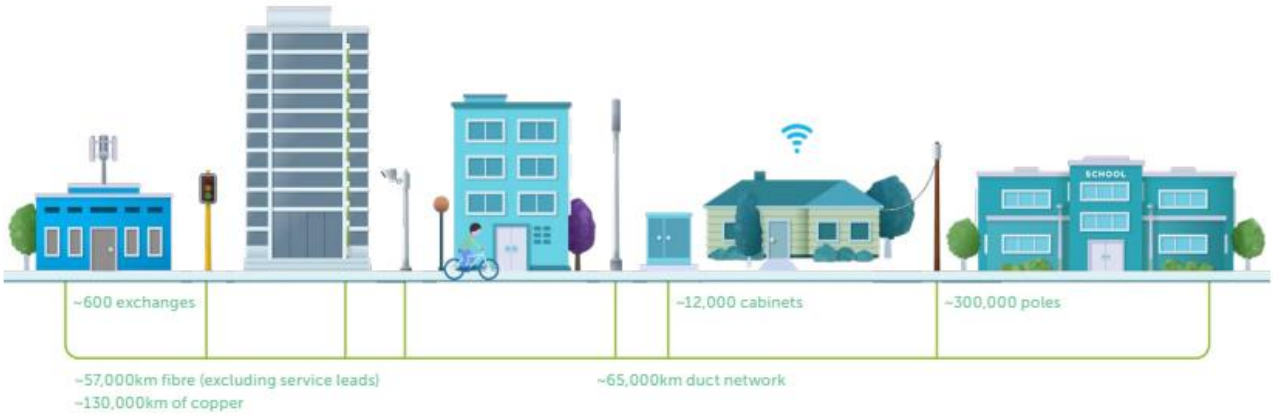
1	Active radio-transmission equipment
2	Backhaul router
3	Backhaul fibre
4	Transmission masts and towers
5	Fencing / gates
6	Access facilities
7	Huts (incl. rack space and cabinets)
8	Rooftop walkways / ladders
9	Fire suppression and security systems(2)
10	DC power, back-up generators and batteries
11	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 sites designed to mitigate natural hazards or climate change

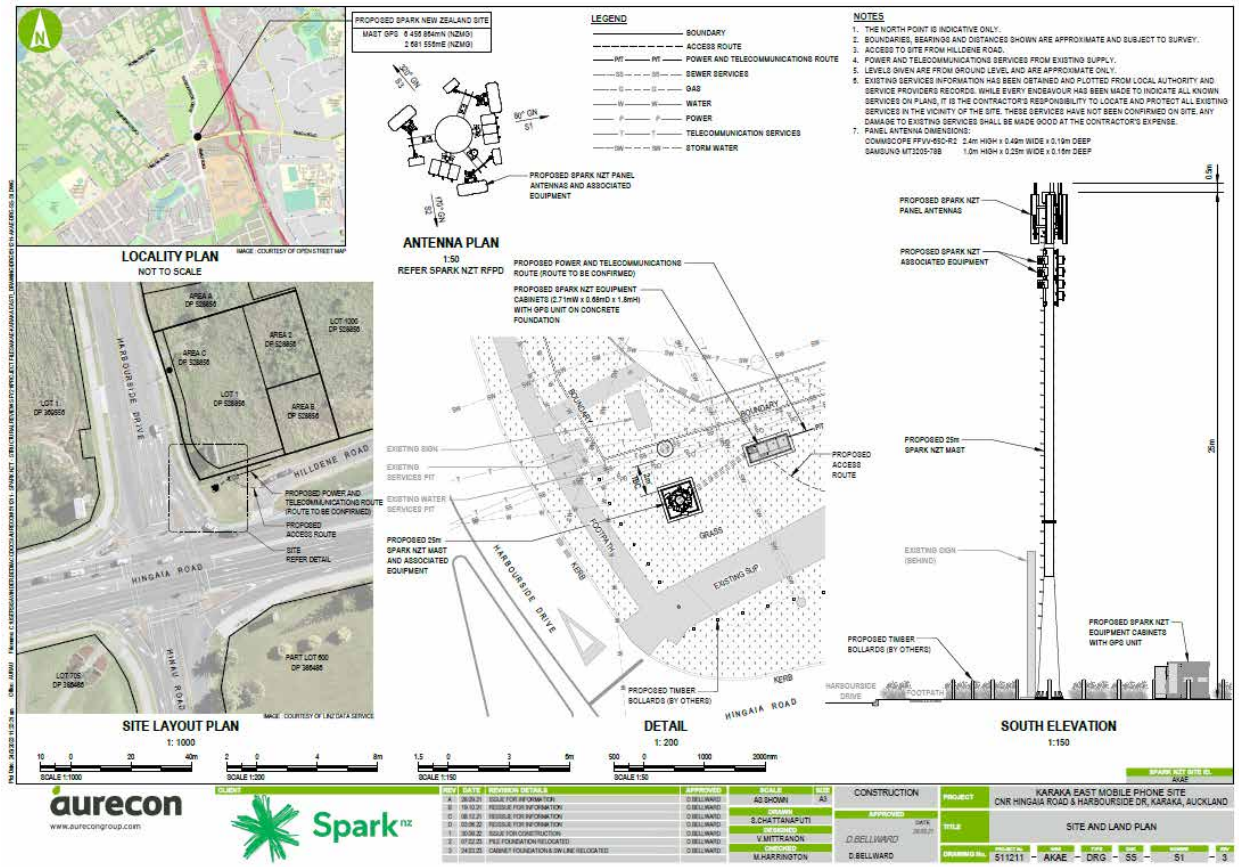
Below – pile foundations designed to soil conditions in this case 20m deep at the Christchurch airport

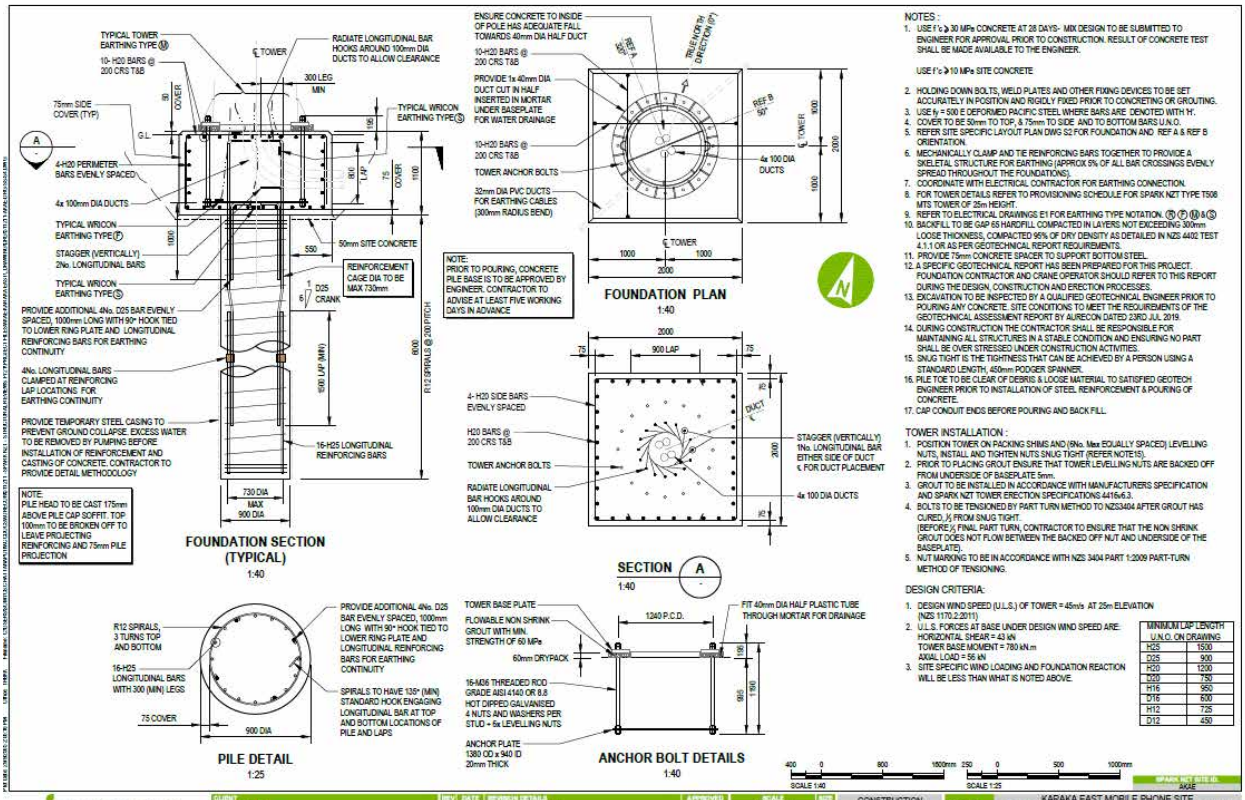
Examples of Temporary sites – CoW and CoP

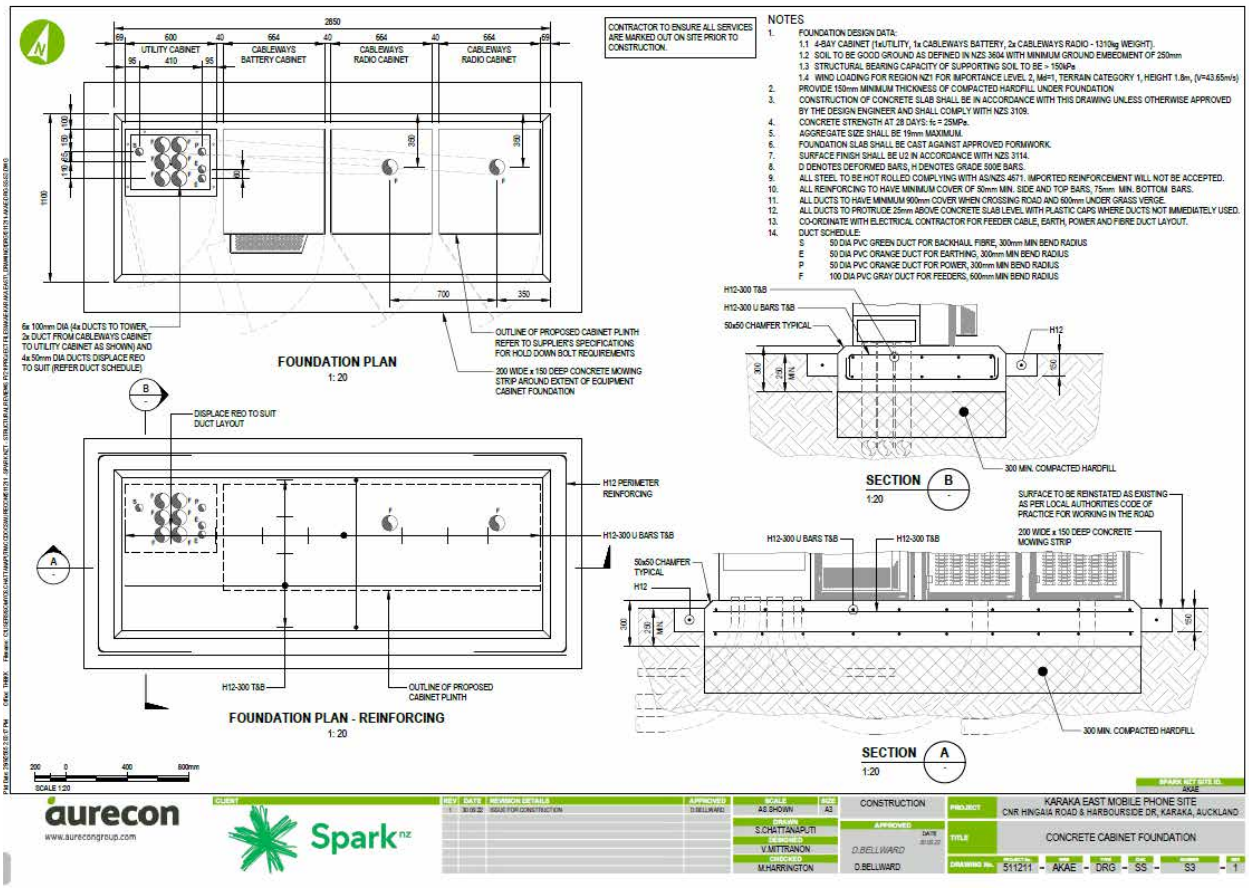
Cell on Wheels

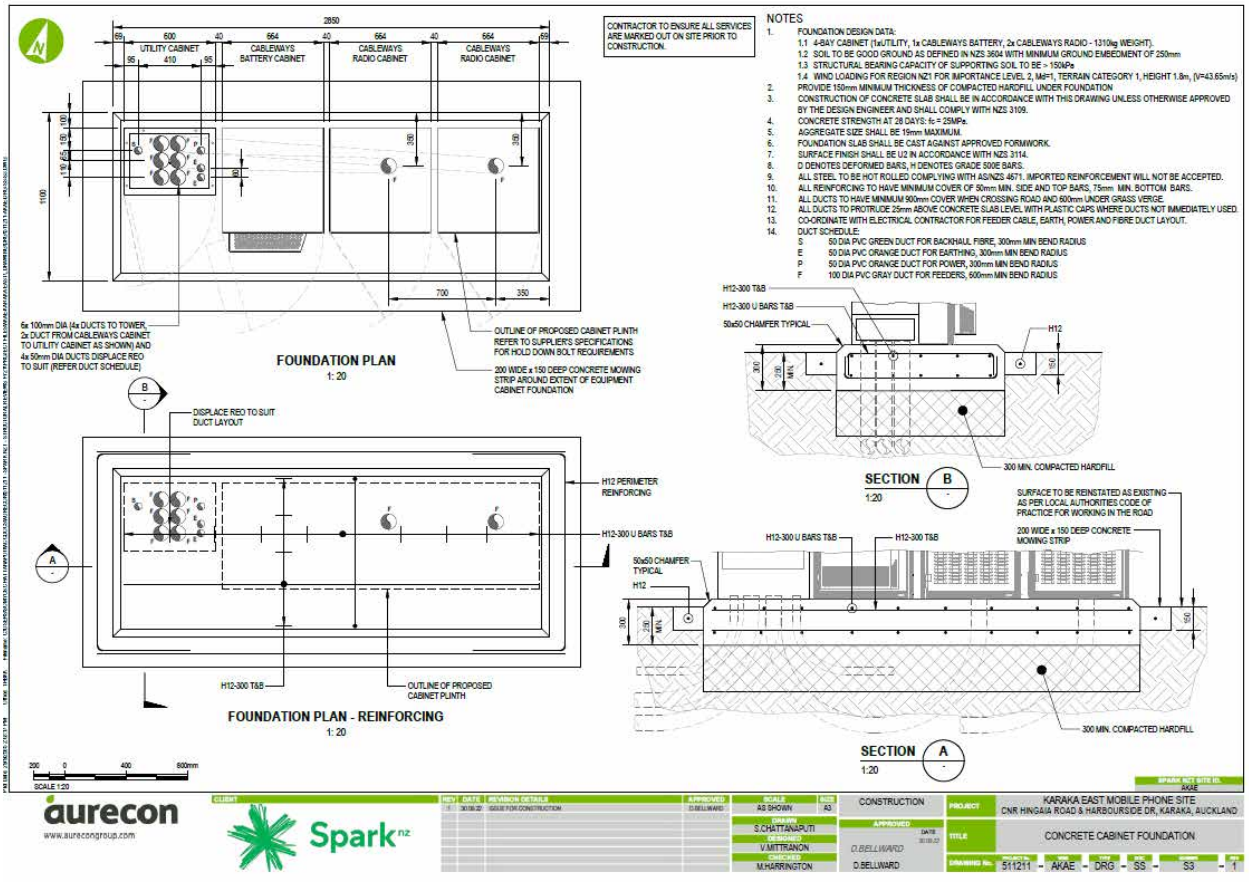
Cell on Platform

Spark site AKAE – Corner Hingaia Road and Harbourside Drive Karaka






CONTRACTOR TO ENSURE ALL SERVICES ARE MARKED OUT ON SITE PRIOR TO CONSTRUCTION.
NOTES
1. FOUNDATION DESIGN DATA:
1.1 4-BAY CABINET (1xUTILITY, 1x CABLEWAYS BATTERY, 2x CABLEWAYS RADIO - 1310kg WEIGHT).
1.2 SOIL TO BE GOOD GROUND AS DEFINED IN NZS 3604 WITH MINIMUM GROUND EMBEDMENT OF 250mm
1.3 STRUCTURAL BEARING CAPACITY OF SUPPORTING SOIL TO BE > 150kPa
1.4 WIND LOADING FOR REGION NZ1 FOR IMPORTANCE LEVEL 2, MdF=1, TERRAIN CATEGORY 1, HEIGHT 1.8m, (V=43.65m/s)
2. PROVIDE 150mm MINIMUM THICKNESS OF COMPACTED HARDFILL UNDER FOUNDATION
3. CONSTRUCTION OF CONCRETE SLAB SHALL BE IN ACCORDANCE WITH THIS DRAWING UNLESS OTHERWISE APPROVED BY THE DESIGN ENGINEER AND SHALL COMPLY WITH NZS 3109.
4. CONCRETE STRENGTH AT 28 DAYS: fc = 25MPa.
5. AGGREGATE SIZE SHALL BE 19mm MAXIMUM.
6. FOUNDATION SLAB SHALL BE CAST AGAINST APPROVED FORMWORK.
7. SURFACE FINISH SHALL BE U2 IN ACCORDANCE WITH NZS 3114.
8. D DENOTES DEFORMED BARS, H DENOTES GRADE 500E BARS.
9. ALL STEEL TO BE HOT ROLLED COMPLYING WITH AS/NZS 4671. IMPORTED REINFORCEMENT WILL NOT BE ACCEPTED.
10. ALL REINFORCING TO HAVE MINIMUM COVER OF 50mm MIN. SIDE AND TOP BARS, 75mm MIN. BOTTOM BARS.
11. ALL DUCTS TO HAVE MINIMUM 900mm COVER WHEN CROSSING ROAD AND 600mm UNDER GRASS VERGE.
12. ALL DUCTS TO PROTRUDE 25mm ABOVE CONCRETE SLAB LEVEL WITH PLASTIC CAPS WHERE DUCTS NOT IMMEDIATELY USED.
13. CO-ORDINATE WITH ELECTRICAL CONTRACTOR FOR FEEDER CABLE, EARTH, POWER AND FIBRE DUCT LAYOUT.
14. DUCT SCHEDULE:
S 50 DIA PVC GREEN DUCT FOR BACKHAUL FIBRE, 300mm MIN BEND RADIUS
E 50 DIA PVC ORANGE DUCT FOR EARTHING, 300mm MIN BEND RADIUS
P 50 DIA PVC ORANGE DUCT FOR POWER, 300mm MIN BEND RADIUS
F 100 DIA PVC GRAY DUCT FOR FEEDERS, 600mm MIN BEND RADIUS
2850
UTILITY CABINET
CABLEWAYS BATTERY CABINET
CABLEWAYS RADIO CABINET
CABLEWAYS RADIO CABINET
6x 100mm DIA (4x DUCTS TO TOWER, 2x DUCT FROM CABLEWAYS CABINET TO UTILITY CABINET AS SHOWN) AND 4x 50mm DIA DUCTS DISPLACE REO TO SUIT (REFER DUCT SCHEDULE)
OUTLINE OF PROPOSED CABINET PLINTH REFER TO SUPPLIER'S SPECIFICATIONS FOR HOLD DOWN BOLT REQUIREMENTS
200 WIDE x 150 DEEP CONCRETE MOWING STRIP AROUND EXTENT OF EQUIPMENT CABINET FOUNDATION
FOUNDATION PLAN
1: 20
DISPLACE REO TO SUIT DUCT LAYOUT
H12 PERIMETER REINFORCING
H12-300 U BARS T&B
H12-300 T&B
OUTLINE OF PROPOSED CABINET PLINTH
FOUNDATION PLAN - REINFORCING
1: 20
H12-300 T&B
H12-300 U BARS T&B
50x50 CHAMFER TYPICAL
H12
300 MIN. COMPACTED HARDFILL
SECTION B
1:20
SURFACE TO BE REINSTATED AS EXISTING AS PER LOCAL AUTHORITIES CODE OF PRACTICE FOR WORKING IN THE ROAD
200 WIDE x 150 DEEP CONCRETE MOWING STRIP
SECTION A
1:20
SCALE 1:20
aurecon
www.aureconngroup.com
Spark nz
CONSTRUCTION
KARAKA EAST MOBILE PHONE SITE
CNR HINGAIA ROAD & HARBOURSIDE DR, KARAKA, AUCKLAND
CONCRETE CABINET FOUNDATION
511211 - AKAE - DRG - SS - S3 - 1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H12-300 T&B
H12-300 U BARS T&B
50x50 CHAMFER TYPICAL
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SECTION B
1:20
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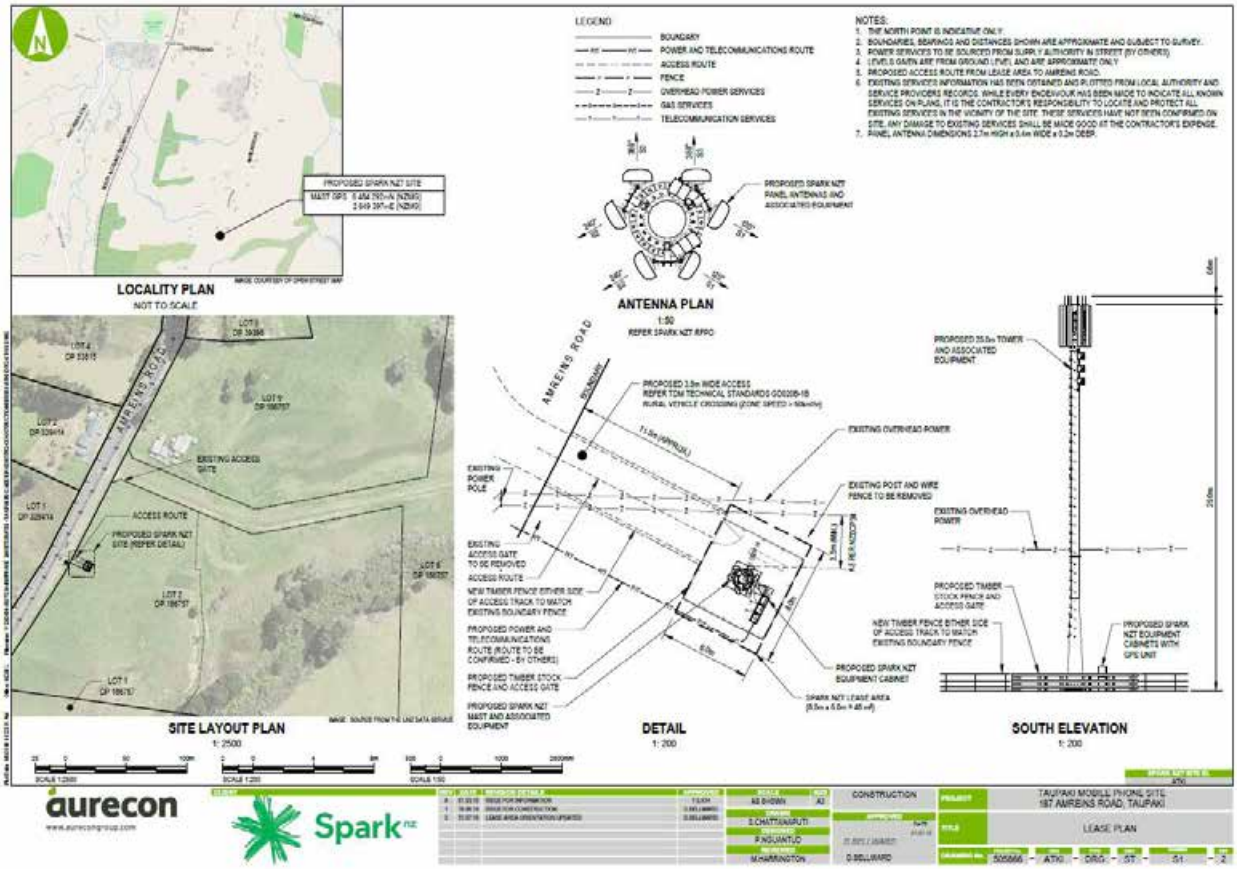
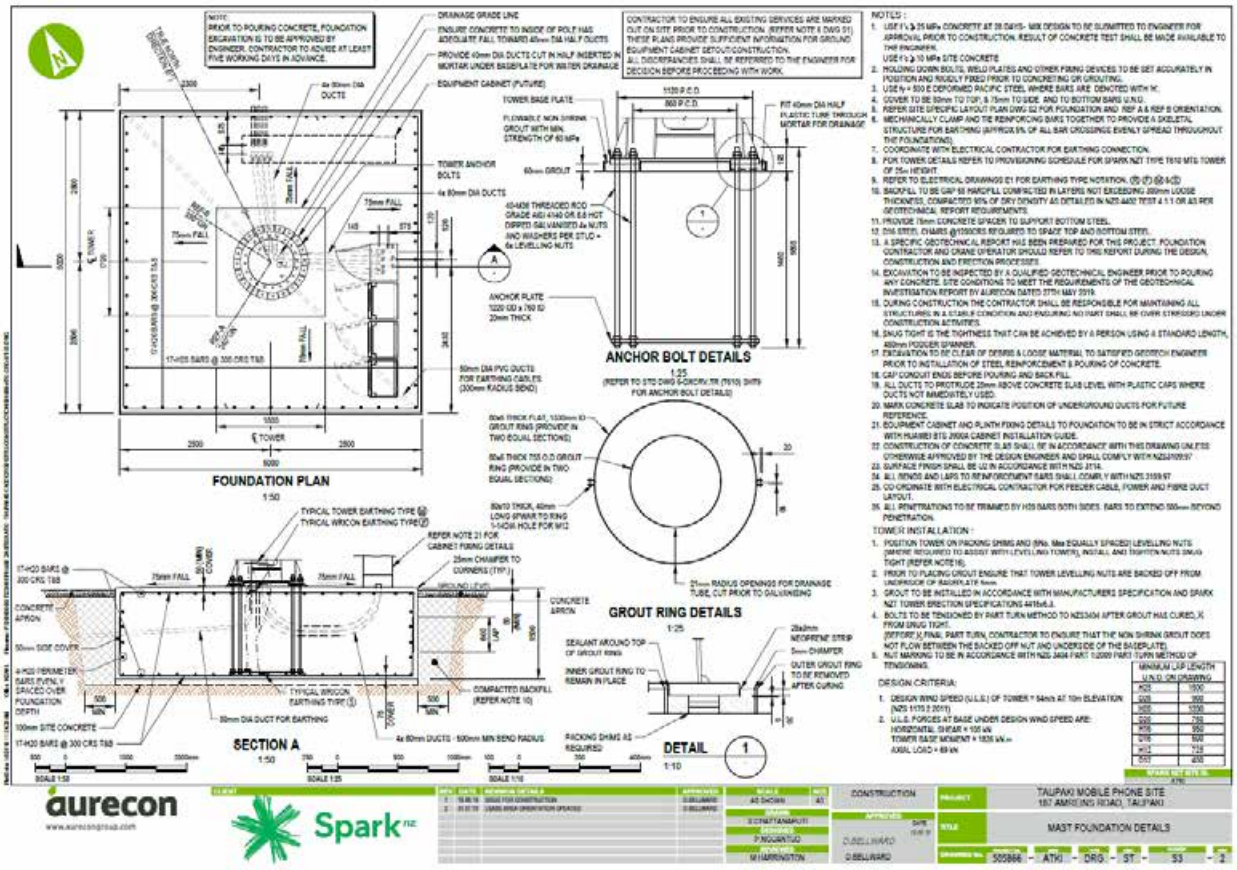
CONCRETE CABINET FOUNDATION
511211 - AKAE - DRG - SS - S3 - 1

Spark site ATKI – 187 Amreins Road, Taupaki





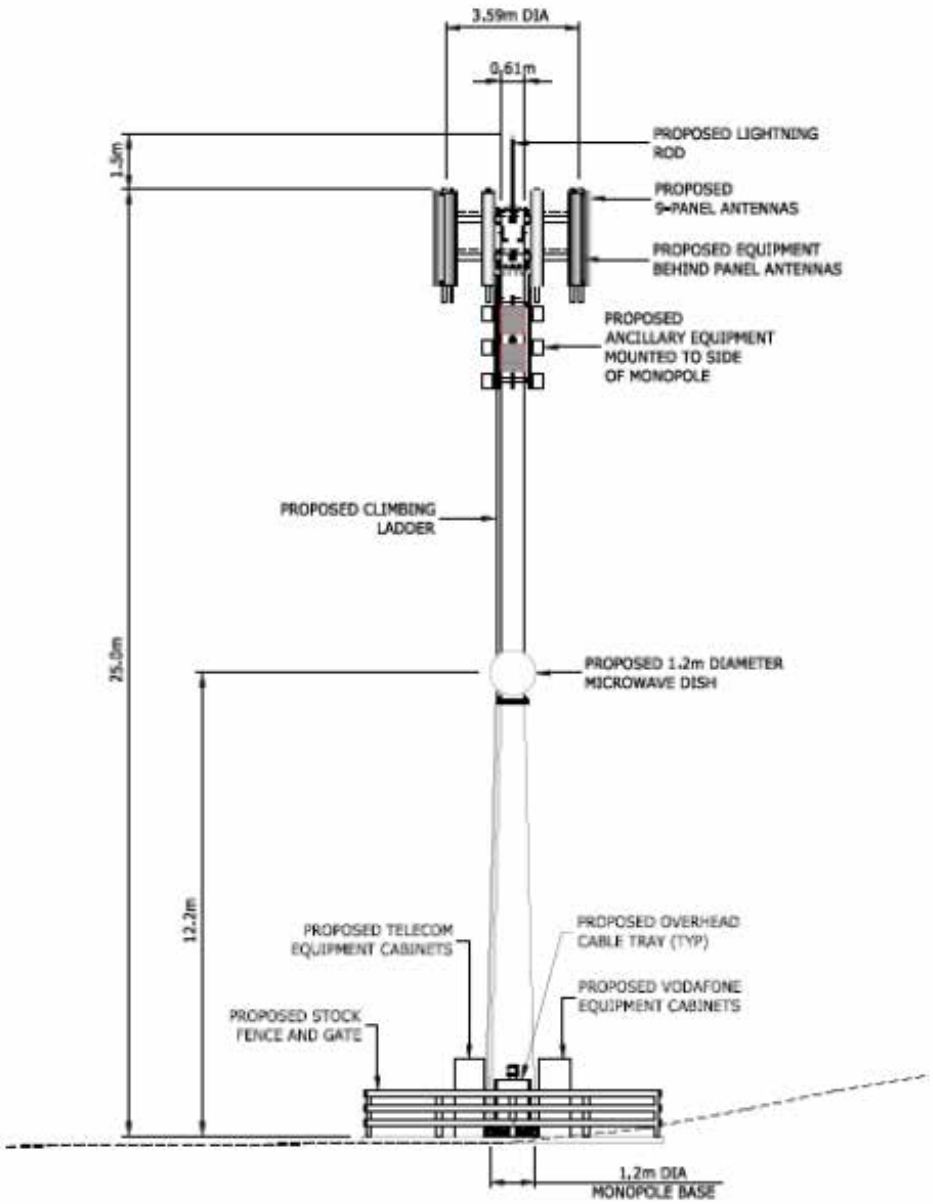
Appendix 3 Examples of Waitomo Sites

Te Kuiti Town 25m

Te Kuiti 25m

Eight Mile Junction 32m

Piopio 50m



NORTH WESTERN ELEVATION

SCALE: 1:150

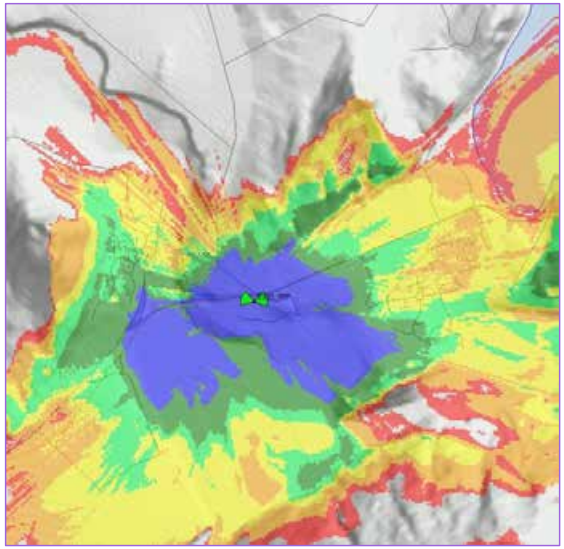
VODAFONE NZ LTD
BENNEYDALE - C4BYL (64091438)
MANIAITI ROAD, BENNEYDALE

Benneydale, Maniati Road - 25m

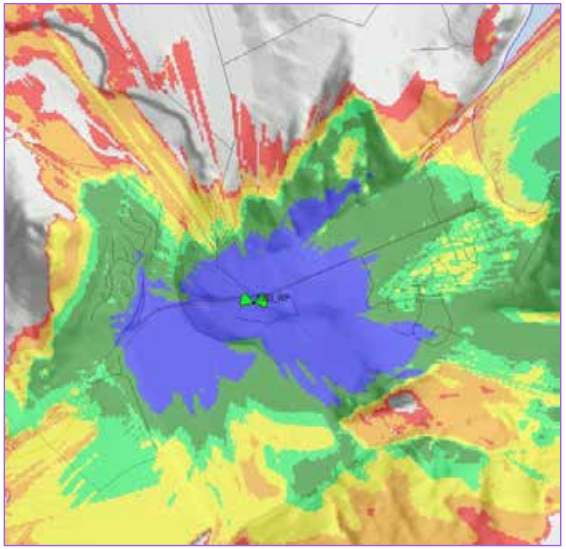
Appendix 4 Supporting Information for increased Pole Heights

owever, 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 re uired to provide the same level of coverage, potentially closer to residential areas.

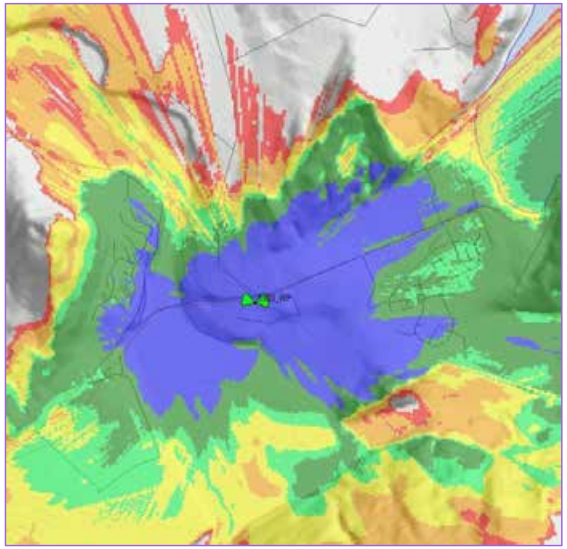
The example below shows coverage from an alternate tower location from the previous slides but at street level showing large differences in coverage based small differences in tower height .



m Mast eight Signal Strength (Blue Excellent Red oor



1 m Mast eight Signal Strength (Blue Excellent Red oor



20m Mast eight Signal Strength (Blue Excellent Red oor

0 M prediction shown. igher fre uency bands (1 00 M will be affected more by local clutter, resulting in a much smaller coverage area (range .

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.