FPP RMA Report

Draft Pricing Review Determination for Chorus' Unbundled Copper Local Loop Service

10 February 2015

INCITE

Quality Control

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Contents

Executive Summary

In light of the *Draft Pricing Review Determination for Chorus' Unbundled Copper Local Loop (UCLL) Services,* 2 December 2014, prepared by the Commerce Commission, Incite has been asked to provide our expert opinion on some of the assumptions around deployment methods and resource consent issues included in that report. Specifically, we have now been asked to address the following matters:

- An overview of the constraints on Chorus's existing suite of aerial deployment resource consents
- Comment in light of those restrictions whether the Hypothetical New Operator (HNO) would be able to:
    - Obtain the benefit of Chorus' existing suite of resource consents through normal legal means; and
    - Be able to use Chorus' existing suite of resource consents to achieve the deployment strategy in line with the build assumptions modelled by TERA.
- Comment on the ability of the HNO to deploy a new pole network to replicate Chorus's service pole network.

Our report outlines the suite of resource consents Chorus has obtained for its aerial UFB rollout programme, and the nature of the limitations and restrictions that apply to those consents. While it is valid for the Commerce Commission to assume a HNO could obtain the benefit of Chorus' existing suite of resource consents, there would be a number of practical considerations in utilising them. The resource consents only provide for one additional fibre distribution line to be deployed on existing pole networks, so this would not be available to a HNO if such a line was already deployed by another operator utilising the Chorus resource consents. Further and most importantly, the Chorus resource consents rely heavily on the existing Chorus service pole network to connect customers on the other side of the road to the distribution line. The modelled approach assumes there is no Chorus local access network existing (aside from nodes such as exchanges), which would include the Chorus service poles. If the Chorus service poles are assumed not to exist, this would severely limit the benefit of the Chorus resource consents to a HNO.

A HNO would need to meet all of the same conditions for utilising the resource consents as Chorus does, such as having a workforce of contactors appropriately trained on the required deployment processes, having a suitable GIS based tool set up to identify consenting constraints and where additional processes need to be followed, and having the necessary trusted relationships with iwi that Chorus has built up to deploy infrastructure in areas sensitive to Maori.

Key areas where the modelled approach could not be deployed under the Chorus suite of resource consents for aerial deployment include:

- No new road crossings can be created, so providing an aerial connection to a customer across the road by the shortest route would not be allowed unless there was already an aerial line following that path; and

- In most instances where resource consents are in place, no new poles can be installed where connecting customers.

Replicating Chorus's service pole network in urban areas to enable aerial deployment in accordance with Chorus' suite of aerial resource consents would be very difficult from a resource consenting perspective if there was no existing service pole network to replace. The Chorus service pole network is a legacy network not covered by specific resource consents, and as such, if it is assumed there is no Chorus access network in the modelled approach, then there are no consents a HNO could reply on to replicate that service pole network.

Introduction

Incite has received instructions from Chapman Tripp on behalf of Chorus New Zealand Limited (Chorus) to provide our expert opinion on some of the assumptions around deployment methods and resource consent issues included in the report released by the Commerce Commission entitled *Draft Pricing Review Determination for Chorus' Unbundled Copper Local Loop (UCLL) Services*[1], dated 2 December 2014.

We previously provided a report to Chorus providing expert opinion on the likelihood of a Hypothetical New Entrant (HNE) obtaining all necessary approvals under the Resource Management Act 1991 (RMA) from the relevant regulatory authorities to deploy a Fibre to the Home (FTTH) aerial network to deliver Unbundled Bitstream Access (UBA) and UCLL services throughout New Zealand. That report was supplied to the Commerce Commission by Chorus, and is referred to in the Draft Determination.

In light of the Draft Determination, we have now been asked to address the following matters:

- An overview of the constraints on Chorus's existing suite of aerial deployment resource consents
- Comment in light of those restrictions whether the Hypothetical New Operator (HNO) would be able to:
    - Obtain the benefit of Chorus' existing suite of resource consents through normal legal means; and
    - Be able to use Chorus' existing suite of resource consents to achieve the deployment strategy in line with the build assumptions modelled by TERA.
- Comment on the ability of the HNO to deploy a new pole network to replicate Chorus's service pole network.

As we understand the Draft Determination, the modelling methodology selected assumes there is no Chorus local access network in place although the HNO would have exchanges in the same locations, and that a HNO would deploy a FTTH network along with a Fixed Wireless Access (FWA) network at the edges of the current Rural Broadband Initiative (RBI) coverage footprint, on the basis that this network would represent a Modern Equivalent Asset (MEA). Specific deployment assumptions in the TERA methodology are discussed further later in this report. The HNO would use aerial deployment in some areas[2] where existing Electricity Distribution Business (EDB) poles are available.

[1] Referred to hereafter as "Draft Determination"
[2] In the Draft Determination, the Commission accepts that although EDB poles presently cover 51% of routes, constraints mean the HNE would only deploy aerially for 36% of distribution and 49% of lead-ins.

This report has been prepared by Chris Horne as a planning expert in accordance with the High Court of New Zealand's Code of Conduct for Expert Witnesses (Schedule 4).

Chorus Aerial Deployment Resource Consents

Overview

In our previous report (31 July 2014) we outlined the aerial resource consent programme completed to date in Auckland from Chorus' UFB aerial deployment programme[3]. At that time, Chorus had obtained 27 area wide aerial resource consents for the Auckland UFB footprint under a 'standard' deployment methodology, but Chorus was yet to apply for various other resource consents needed to work in areas subject to heritage and 'mana whenua' controls, which were 'tagged out' of the area applications. Chorus has since obtained these additional resource consents. Chorus has also obtained a number of resource consents and certificates of compliance in other centres around New Zealand. Where certificates of compliance have been obtained (i.e. confirmation no resource consent is required), these may be subject to meeting particular controls, such as how a customer connection may be effected, or the size of a line etc.

A summary of the resource consents and certificates of compliance currently held by Chorus for UFB aerial deployment is as follows:

Territorial Authority	Type of Consent	Comment
Auckland Council	27 area wide resource consents.	Subject to Consenting Rule Book (see section on "Standard Methodology" below and Appendix A for an explanation of this document).
Auckland Council	Certificates of compliance for former Papakura District, parts of Franklin District, and Waiheke Island.	These certificates of compliance did not cover all aspects of the aerial deployment which are coved by separate 'gap filler' consents.
Auckland Council	'Gap Filler' resource consents for former Papakura and Franklin Districts and Waiheke Island.	As above.
Auckland Council	City wide 'process' resource consents to undertake works in heritage and mana whenua areas.	Additional engagement processes and specific design solutions over and above the Consenting Rule Book. These

[3] RMA Analysis Report: Fibre to the Home (FTTH) Aerial Network for Hypothetical New Entrant, Incite, 31 July 2014.

		areas are extensive and based on advice from Chorus affected 84 of the approximately 400 cabinet areas for Chorus' Year 4 build in Auckland.
Wellington City	Eight area resource consents for aerial distribution.	Subject to Consenting Rule Book.
Wellington City	City wide certificate of compliance for customer connections.	Subject to deployment restrictions in district plan, which includes no new road crossings for customer connections.
Porirua City	Two area resource consents for aerial distribution.	Subject to Consenting Rule Book.
Porirua City	City wide certificate of compliance for customer connections.	Subject to deployment restrictions in district plan. New road crossings and one additional pole for a new customer connection is allowed in this district plan area.
Hutt City	One area wide resource consent granted and one being processed.	Subject to Consenting Rule Book.
Gisborne District	City wide resource consent for UFB footprint.	Subject to Consenting Rule Book.
Levin	Town wide certificate of compliance.	Subject to Consenting Rule Book to demonstrate district plan requirement for a network upgrade to have effects of the same or similar character, intensity and scale.
Greymouth	Town wide certificate of compliance	No deployment restrictions in district plan.
Dunedin City	City wide certificate of compliance.	Subject to deployment restrictions in District Plan. In Dunedin deployment of distribution lines is being undertaken on the Chorus service poles which is necessary due to very high proportion of EDB poles that

		are not structurally suitable.
Hastings District	City Wide certificate of compliance.	No deployment restrictions in district plan.
Gore	Town wide certificate of compliance	No deployment restrictions in district plan.
Fielding	Town wide certificate of compliance	Limited deployment restrictions in district plan.

Table 1: Chorus UFB Project Consent Summary

To the best of our knowledge Chorus does not hold UFB aerial resource consents for any other areas in New Zealand. Our understanding is that Chorus has elected not to pursue consents in some areas given the amount of distribution already deployed underground in Years 1-3 of the build programme and the amount of available EDB poles in the balance of the programme. We also note that a number of areas are not within Chorus' UFB contract areas and may be subject to resource consents by other infrastructure companies.

Standard Deployment Methodology

Resource consents held by Chorus for UFB aerial deployment in the Auckland and Wellington regions, as well as the regional population centre of Gisborne, applies to a substantial proportion of the New Zealand urban footprint. These consents are subject to a deployment methodology we refer to as the 'Standard Methodology', initially developed by Chorus for the Auckland consenting programme. While there are some minor variations to the Standard Methodology to reflect some variances in local planning controls, the basic method of deployment allowed for in the resource consents is largely the same.

The principal reason why district plans require resource consents for aerial deployment is to control visual effects. Therefore, it was necessary for Chorus and its consultant team to develop an aerial deployment methodology that minimised visual effects to the position where councils were comfortable to grant resource consents on a non-notified basis. For an application to be processed on a non-notified basis without the need for written consents from 'affected parties' (which is potentially the wider community who represent the viewing audience), the Council is required to conclude that any adverse visual effects are "less than minor". Chorus, in association with its planning advisors and landscape architects, developed a set of rules entitled *Chorus Overhead UFB, Overhead UFB Architecture Consenting Rule Book, 14 March 2014, Version AKL01, Revision 11* (the "Consenting Rule Book"). This document was ultimately accepted by the Auckland Council but had numerous revisions during its development following review by Council staff and an independent peer review from a landscape architecture firm engaged by the Auckland Council. The version approved by the Auckland Council is attached in **Appendix A**. The Consenting Rule Book is what we refer to as the 'Standard Methodology' for Chorus' aerial resource consents. Minor variations to this document used in other council areas around New Zealand are primarily based on this same base document. For example, in Wellington it was necessary to specifically limit a customer lead-in and connection to a maximum of three spans which is not a requirement in Auckland.

Key deployment rules included in the Consenting Rule Book are summarised as follows:

- A single distribution fibre line (max diameter 15mm unless a strengthened sheath deployed in bush spans) is deployed on the EDB network poles within the Low Voltage (LV) electricity envelope, or in the telecommunications envelope 300mm to 600mm below the LV electricity envelope.
- Fibre lines have the same sag to the extent possible as the majority of existing lines (therefore options such as aerial blown fibre ducts cannot be considered).
- No new road crossings can be created – road crossings must follow existing electricity or telecommunications lines across the road (and must achieve the same sag of the majority of existing lines in the road crossing).
- The maximum allowable number of fibre lines per road crossing (e.g. to serve customers across a road from the EDB poles) is 2 (which may require individual customer lead-ins to be swapped for a multi-core fibre line if more than two lines are required).
- In Auckland only, street tree canopy pruning rules apply, which in some circumstances may determine that aerial deployment in a certain street may not practically be able to occur and deployment will have to occur underground.
- Existing Chorus service poles may be replaced with a new pole within 2m and up to 1m higher, but no new poles may be installed[4].
- Customer lead-in lines up a right-of-way or linking between poles in the road reserve must follow the existing copper network in the same envelope (no link up of new spans where there is not copper is allowed).
- The final customer connection span from the last pole to the premises must either replace an existing copper line with a new hybrid copper/fibre line, or if no copper then follow an existing electricity connection, but not create a completely new overhead connection where one doesn't exist. If there is existing Chorus underground duct space available this must always be used in the first instance.
- Where the above requirements cannot be met, the line must be placed underground or a specific resource consent sought.

Chorus considered two main options for its distribution line including a 14.9mm 'All Dielectric Self Supporting' (ADSS) fibre line, and a larger Air Blown Fibre (ABF) aerial duct which, inclusive of the carrier, had a maximum cross section of approximately 38mm. Advice from the project landscape architects, and feedback from the Auckland Council during development of the Consenting Rule Book, was that the ABF line was not appropriate due to its bulk and inability to match the sag of existing lines. The approximate 15mm diameter line was supported visually by the project landscape architect and peer reviewer, and was, therefore, adopted as the maximum line diameter for the resource consent applications (aside from an option to have larger diameter strengthened line of approximately 22mm in heavily treed spans such as where the lines traversed dense bush areas). While most district plans that permit lines attached to existing poles do not have a diameter control, the 15mm diameter line used by Chorus would also assist with permitted activity status in any

[4] An exception to this is in Porirua City where their district plan specifically allows for one additional pole in association with a customer connection.

district plans where there is a diameter control - e.g. 20mm applies in Christchurch City (see Appendix A to our previous report of 31 July 2014).

The detailed deployment rules and pictorial descriptions are included in the Consenting Rule Book attached in **Appendix A**.

As outlined above, the restrictions in the Consenting Rule Book apply to areas where aerial deployment is not otherwise a permitted activity in the local district plan, and has required Chorus to obtain a resource consent and mitigate the level of visual effects. There will be areas where aerial deployment can be lawfully deployed without meeting the restrictions in the Consenting Rule Book (see Table 1 above). Appendix A to our July 2014 report identifies the areas where aerial deployment is a permitted activity, and key permitted activity conditions needing to be met to avoid needing to obtain a resource consent.

Variations to Standard Deployment Methodology

In Auckland, in particular, a number of further resource consents were required which add a further layer of control over and above that required by the Standard Methodology. We include this discussion in the report to demonstrate how potentially large areas can be subject to additional layers of control and ongoing compliance costs over and above the requirements of the Standard Methodology. Variations to the Standard Methodology are primarily in regard to deployment in and around sites and places of significance and value to Mana Whenua (affecting both aerial and underground deployment), and connections to scheduled heritage buildings.

The further resource consents as outlined above are 'process based' resource consents (i.e. a process to determine suitable design solutions has been consented) that trigger further processes of engagement with Mana Whenua or the Council heritage department as relevant, and will have ongoing time and cost implications for Chorus for both the distribution network rollout and connecting customers. For Chorus's Year 4 build programme, we are advised by Chorus that 84 of approximately 400 cabinet areas in Auckland were subject to resource consents triggered under the Mana Whenua or heritage provisions under the relevant district planning documents for the main distribution line roll out.

By way of example, as notified, the Proposed Auckland Unitary Plan (PAUP) included 61 Sites and Places of Significance to Mana Whenua (SSMW), and 3600 Sites and Places of Value to Mana Whenua (SVMW). From the extensive hui (meetings) with iwi Chorus was involved with throughout the Chorus UFB consenting programme, it is understood that many of the iwi are seeking that substantially more Sites and Places of Significance and Value also be added to the PAUP.

SSMW cover those sites assessed as having the most cultural significance to Maori, and include areas such as urupa, waahi tapu and former battlefields. These are not well defined on the planning maps as they include a simple indicative triangle, rather than the full extent of the site. Research is required to properly identify the full extent of the site and therefore where the site and the associated 50m buffer area are located to determine where a resource consent is required.

SVMW are more related to recorded archaeology such as middens or pits. As currently included in the PAUP these are primarily based on information taken from 'legacy' district plans, the former Auckland Regional Council's Cultural Heritage Inventory ("CHI") and New Zealand Archaeological Association ("NZAA") recorded sites information.

The SVMW in particular have had a substantial impact on the Chorus UFB programme as they include a 200m diameter buffer circle centred on where best information indicates the archaeological feature is located, with a further 50m buffer around the buffer circle, resulting in a 300m diameter circle that covers an area of approximately 7ha for each of these 3600 sites[5]. These areas therefore affect a substantial number of roads as well as private adjacent sites where customers will require connections.

The Auckland Council currently recognises 19 iwi and hapu as Mana Whenua in Auckland, and keeps a register of the Local Board areas in which they have indicated they have an interest. Based on current Council information, the number of Mana Whenua groups with an interest in any Local Board area would range from a minimum of 8 groups to a maximum of 14 depending on the Local Board area. To obtain resource consent for each cabinet area or individual customer connection for Mana Whenua consent matters on an individual basis would therefore require engagement with 8-14 groups depending on the Local Board area to determine any specific interest, and whether one or more Cultural Impact Assessments (CIA) is required. Aside from the timeframe, cost and logistical issues for Chorus to work through such a process, experience since notification of the PAUP has been that many Mana Whenua groups are simply not resourced to deal with the volume of work in a timely manner, particularly when combined with requests by numerous other applicants across Auckland.

Accordingly, Chorus elected to seek a resource consent on an Auckland-wide basis to come up with a more practical and efficient way to deal with the multitude of Mana Whenua resource consents required that affect its deployment, and at the same time to develop relationships with iwi, given the relatively recent formation of Chorus as a separate infrastructure company. The methodology for this consent was to seek resource consent for a 'Framework Process' for working with Mana Whenua throughout the deployment and installation of UFB (and maintenance and upgrading of the copper network in the same areas). The Framework Process has included the development of a 'traffic light' system set up to identify and record in a GIS database all known areas of interest/significance to Mana Whenua recorded on recognised publicly accessible databases. These include:

- All Mana Whenua and heritage layers in the PAUP;
- All identified sites of significance to Maori in the legacy district plans;
- The Cultural Heritage Inventory; and
- The NZAA database of registered archaeological sites.

[5] Some of the buffer areas around thee 3600 SVMW overlap.

The traffic light system identifies three categories of risk, which are Green, Orange and Red. With the assistance of archaeological consultants Clough and Associates, these colours/levels of risk have been allocated to each cabinet area in Auckland.

In broad terms, a Green cabinet area has no known sites of interest/significance to Mana Whenua and may proceed to the build phase without further input from Mana Whenua, although the works must operate under a discovery protocol. An Orange cabinet area requires the Chorus project archaeologist to review the specific design and determine if the listed feature triggering an Orange risk level is impacted on by the design. This may trigger a redesign. If the design for an Orange cabinet area can avoid known sites of interest/significance to Mana Whenua (e.g. it may be a well recorded stream bank feature well away from the road), then it is reclassified to Green. If these areas cannot be avoided, it is reclassified to Red. Further engagement with Mana Whenua is required for all Red cabinet areas.

An extract from Chorus' resource consent application documentation for its Auckland Mana Whenua consent, including screen shots of the GIS tool showing the cabinet area colour categorisation and underlying information utilised to allocate heritage alert status is attached as **[CI: Appendix B]**. This information indicates the extent of areas affected by Red and Orange status where ongoing iwi engagement and design input may be required.

The collaborative approach in which this framework process was developed with iwi is based on relationships and trust between Chorus personnel and iwi, and cannot necessary be replicated by a HNO who does not have these relationships.

HNO Deployment Methodology

Could a HNO obtain the benefit of Chorus' existing suite of resource consents

From a legal perspective, I understand the answer to the above question is "yes". Land use consents (resource consents) from territorial authorities under s9(3) of the Resource Management Act 1991 (RMA) run with the land, so they can be implemented by a party other than the entity to which resource consent was granted. This said, the resource consents noted above in Table 1 were granted to Chorus as a trusted network utility operator on the basis of there being particular processes in place. For example, Chorus' contractors need to be trained in relation to specific processes required under the consents such as how Council owned street tree assets are dealt with, and protocols to follow if archaeological remains are discovered, which can still be a consideration for aerial networks in regard to pole replacements and linking into underground assets. Chorus has also developed GIS tools that identify specific items that may trigger particular requirements under the suite of resource consents (e.g. engagement with iwi groups or special requirements for connecting to scheduled heritage buildings). In our view a system of this nature is necessary to ensure compliance with the suite of Chorus resource consents. Chorus' mana whenua resource consent as previously outlined is also based on specific Chorus relationships with iwi, which has been developed as a result of ongoing relationship meetings, which could not be immediately replicated by a HNO.

There would also be a number of other practical constraints to a HNO and any other operator trying to implement the same resource consents concurrently for FTTH networks. The resource consent applications, deployment diagrams and assessments that formed part of Chorus's resource consent applications, were prepared around the assumption of one Chorus fibre distribution line being deployed on the EDB poles, so anything already built by another operator other than the HNO, in reliance on the Chorus resource consents, would result in the affected spans of that aerial network not being available for the HNO, unless they obtained their own consents for additional lines. In Wellington, aerial cable owned by Vodafone (previously Telstra Saturn) previously erected for a cable television service is in place throughout much of the urban part of the greater Wellington Area. For areas where there is Vodafone cable, the Consenting Rule Book was amended specifically for the consenting programme in the greater Wellington area to allow one fibre distribution cable in addition to the existing Vodafone aerial network to be erected on existing pole networks.

Further, and perhaps the most critical factor of the network modelled by TERA, the Chorus resource consents rely heavily on being able to connect to Chorus service poles on the opposite side of the road to the EDB poles to connect customers. These pole networks are not subject to the Chorus suite of resource consents and are a legacy network assumed to date back to before any consents for such networks were required (and are protected by existing use rights). There are therefore no consents for the HNO to use to authorise deployment of such network poles if Chorus' local distribution network is assumed to not exist in the model.

Could a HNO use Chorus' existing suite of resource consents to achieve the deployment strategy in line with the build assumptions modelled by TERA

In addressing this question, it is important to be able to directly compare the network components of the Chorus consents with the components of the network modelled by TERA. This is set out in the table below:

Chorus Network	HNO Model Specification
Distribution Line: The communal network line from the point it enters any cabinet area, to a Fibre Access Terminal (FAT).	**Distribution Line:** Equivalent to Chorus Distribution Line. Runs from a node such as active cabinet to Copper Connection Terminal (equivalent to Chorus FAT).
Customer Lead-In: A customer service connection from the FAT to the last pole before it connects to the customer premises (may run for one or more spans before the final span)	**Customer Lead-In:** Essentially the same as the Chorus Customer Lead-In + Customer Connection. Runs from the Copper Connection Terminal (equivalent of Chorus FAT) to ETP (External Termination Point) on the customer premises.
Customer Connection: The final span from the last pole to the customer premises - may be directly from the FAT or the final span at the end of a multi-span customer lead-in.	

The basic architecture for the distribution network in the two models is similar in so far as for each network, the main distribution line is deployed on one side for an aerial network, with the customer access terminal on the same side as the distribution line. However, there are differences in the way customers are connected from that point.

As set out in Section 1.5.1 Modelling Approach of the TERA Model Specification[6], the path to be followed by the cable connecting any dwelling to a network aggregation point is the shortest path, to ensure optimisation of the network length in order to ensure best quality of service. The method of connecting a customer on the opposite side of the road to the distribution cable by the shortest path is demonstrated in schematically in Figure 26 – *Length of lead-in cable* of the Model Specification (see Figure 1 below).

Experience with the Chorus suite of UFB resource consents is that the existing network architecture often does not follow this shortest distance approach. Where aerial deployment has occurred, electricity and Chorus lines generally cross the road to connect to a Chorus service pole on the opposite side, before redistributing to customer premises, often via multiple lead-in spans between service poles along the opposite side of the road. Incite's observations on site visits during the consent process is that a direct connection across a road to a customer premises on the opposite side (without first connecting to a Chorus service pole) is not the typical deployment scenario. Further, in many instances, there are no 'direct' road crossings of lines between an EDB pole and Chorus pole immediately on the opposite side, so there is often no existing road crossing to follow across the road to ensure the shortest possible connection distance to a customer (e.g. the customer

[6] TSLRIC Price Review Determination for the Unbundled Copper Local Loop and Unbundled Bitstream Access Services: Model Specification, TERA Consultants, November 2014.

lead-in may need to run along several spans to connect to a customer on the opposite side of the road).

Figure 26 – Length of the lead-in cable

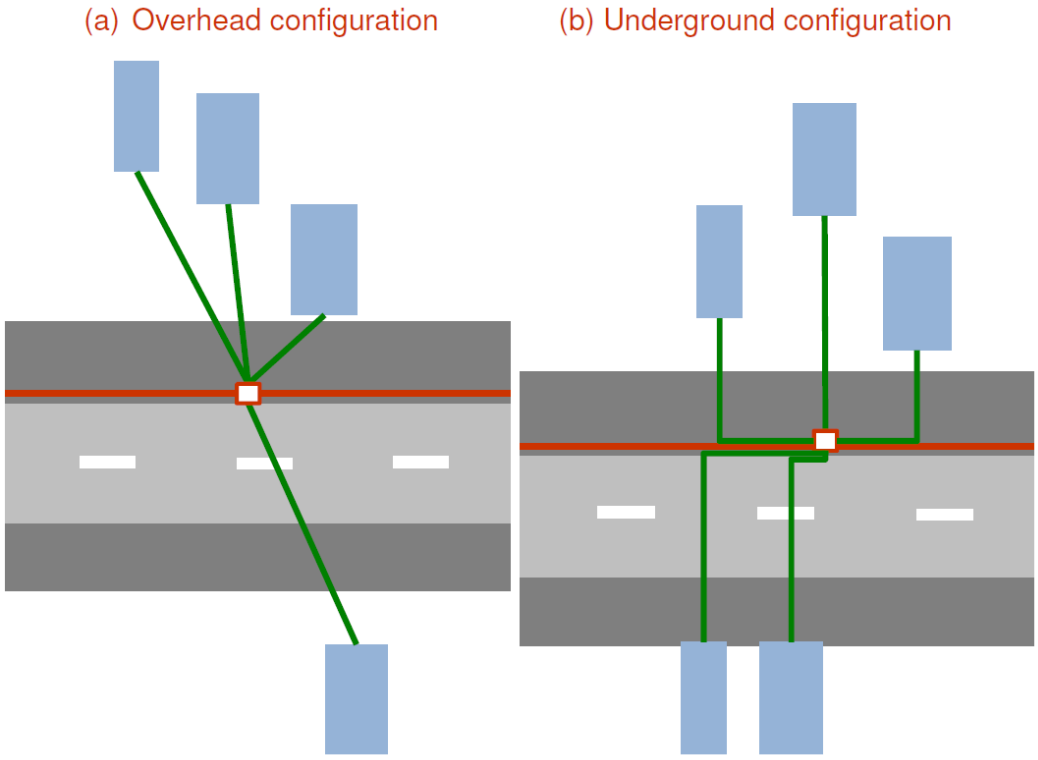

Figure 1: Length of Lead-In Cable, Source: Model Specification Document, TERA Consultants

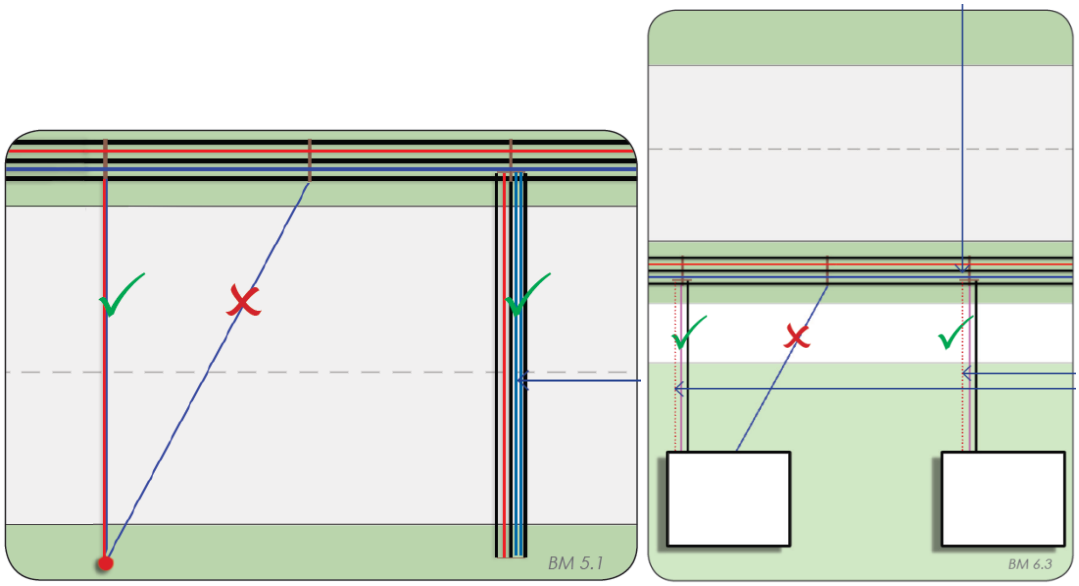

Figure 2: Rule 2.1 and Rule 3.2 of the Chorus Consenting Rule Book demonstrating situations where Chorus cannot deploy new road crossing or customer connection lines.

The detailed deployment rules for road crossings for Chorus' Standard Methodology are set out on Sheet 5 of the Consenting Rule Book in **Appendix A**. A key plank of the methodology developed and subsequent visual assessments and resource consents was to reduce visual impact by not creating any new road crossings. Therefore, the network modelled by TERA of simply connecting customers across a road by the shortest route will, in a significant number of situations, fall outside of the Chorus suite of resource consents, and may be difficult for another HNO to gain consent for. Where an existing road crossing cannot be followed, the Chorus resource consents would require underground deployment unless a separate resource consent for that work could be obtained (noting that in some areas resource consents are not required for aerial deployment, so these restrictions on deployment may not apply – see Table 1 above). The road crossing restrictions in the Standard Methodology apply to the resource consents granted for all of Auckland Council area, , Hutt City, Gisborne City and the certificates of compliance granted for Wellington City customer connections, and Levin. They do not apply to Porirua City.

The Chorus Standard Methodology also does not allow for any new poles to be installed in association with the service connection to a customer. However, the TERA methodology assumes a pole or poles will be installed where the lead-in cable (from the distribution cable side to the customer premises ETP across the road, exceeds the maximum distance between poles that is allowed for in the model. This is shown schematically in *Figure 28 – Location of poles* of the Model Specification (see Figure 3).

Figure 28 – Location of poles

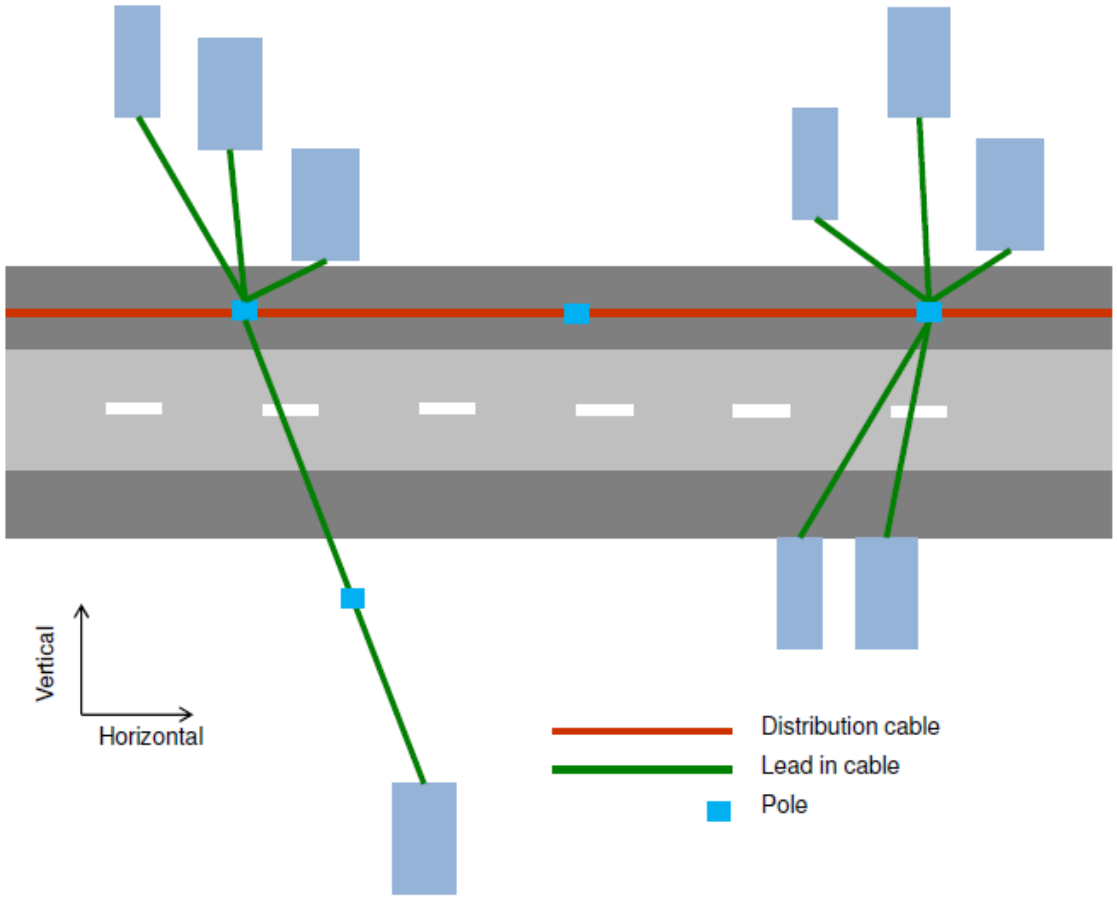

Figure 3: Location of Poles, Source: Model Specification Document, TERA Consultants

The Chorus Standard Methodology does not allow for these additional poles to be erected in association with customer connections (there are exceptions in some of the certificates of compliance granted such as customer connections in Porirua City where one new pole is allowed to facilitate a customer connection).

As previously noted, the Standard Methodology covered by the Chorus resource consents would require an aerial crossing to follow an existing electricity or telecommunications line across the road, typically to the Chorus service pole on the opposite side, and then connect to a premises, often via several lead-in spans along the road or along a right of way.

In our opinion, the customer connection scenarios associated with crossing of roads over-simplify the practical constraints of the Chorus resource consents and in many cases would require a longer route to be followed (often multi-spans), or the connection deployed across the road to the customer underground.

Deployment of a New Pole Network

In our previous report (31 July 2014) we outlined the difficulties that would be encountered in deploying a new overhead pole network, particularly in an urban environment that would be served by a FTTH network. The Draft Determination acknowledged at paragraph 609 the uncertainty around the likelihood that a HNO would gain the resource consents necessary to deploy aerial infrastructure in these areas, and accordingly has limited consideration of aerial deployment to areas where there is existing aerial infrastructure.

As outlined in our previous report, in many areas where there is an EDB pole network, the EDB utilises the Chorus service pole network on the opposite side of the road to connect customers on that side. The Draft Determination sets out at paragraph 613 that the efficient replacement costs of the Chorus network have been modelled, and that where Chorus has consent to deploy its network aerially, the Commerce Commission has assumed that the HNO would have the ability to replace Chorus's aerial network with its own.

Our understanding of the Modified Scorched Node modelling approach is that Chorus local access network lines (which would presumably include its service poles), do not exist. As part of the suite of aerial resource consents Chorus obtained for UFB, it did not get consent for its service pole network, the resource consents merely allow Chorus to attach lines to its existing service poles. These poles are part of a legacy network, which to the best of our knowledge has no existing consents given it would have been deployed before such restrictions were in place, and thus would be operating under "existing use rights" under the RMA. Existing use rights apply where an activity was lawfully established (i.e. the Chorus service pole network), and later the planning regulations change to the point that the activity would otherwise require a resource consent to establish and operate. Existing use rights allow the activity to continue provided the effects of the use remain the same or similar in character, intensity and scale.

Accordingly, if the service poles were not in existence, then there is no Chorus consent allowing their erection on which an HNO could rely in the same way as utilising the aerial deployment resource consents that were obtained for the Chorus UFB rollout.

Given the previous work undertaken in our July 2014 report, in our view it would be extremely difficult to gain resource consents for a completely new service pole network if it assumed that there is not currently one in place (i.e. there would not be an existing network to justify the visual effects of a replacement network). Without the Chorus service pole network, then based on our experience with the Chorus UFB rollout, it would generally not be practical to provide aerial connections to customers on the opposite side of the road to the EDB pole network under the Chorus suite of resource consents (aside from the customers already having direct across-road connections that are not via a Chorus service pole in the road reserve or a right-of-way, which as previously outlined is not the typical across-road solution).

Appendix A

Chorus Overhead UFB Architecture Consenting Rule Book

Chorus

CHORUS OVERHEAD UFB

Overhead UFB Architecture Consenting Rule Book

14 March 2014

Version AKL01 Revision 11

Boffa Miskell

Contents

Document Quality Assurance

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Introduction to this Rule Book

Welcome to the Overhead Ultra Fast Broadband (UFB) Architecture Consenting Rule Book. The objective of this book is to outline the agreed set of design principles that will guide the deployment of overhead UFB in a manner that limits the potential visual effects of the proposed network.

This book has been prepared by Boffa Miskell Ltd landscape architects, in consultation with Chorus technical experts. It is not intended as a technical set of rules, but as a schematic guide to deployment methods. It has been prepared following extensive field research, viewing and analysing existing electricity and fibre optic line networks throughout the country.

The drawings included in this rule book are schematic only and not intended to be used as a visual reference or simulation. Drawings are not to scale. The following colours are used to identify different infrastructure:

- Blue - Proposed Chorus Fibre Optic Lines
- Purple - Proposed 'Hybrid' Copper and Fibre (refer below)
- Black - Existing Electricity Lines
- Red - Existing Copper Lines
- Solid for Overhead, Dashed for Underground and Dotted for Removed

A hybrid line is defined as a copper line physically attached to a fibre optic line, either within the same outer sleeve, or bound together using a flexible coil sleeve. Sheet 3 contains additional details on the appearance of the typical hybrid lines to be used.

Additional photographs, visual simulations and a visual assessment report have also been prepared as separate documents.

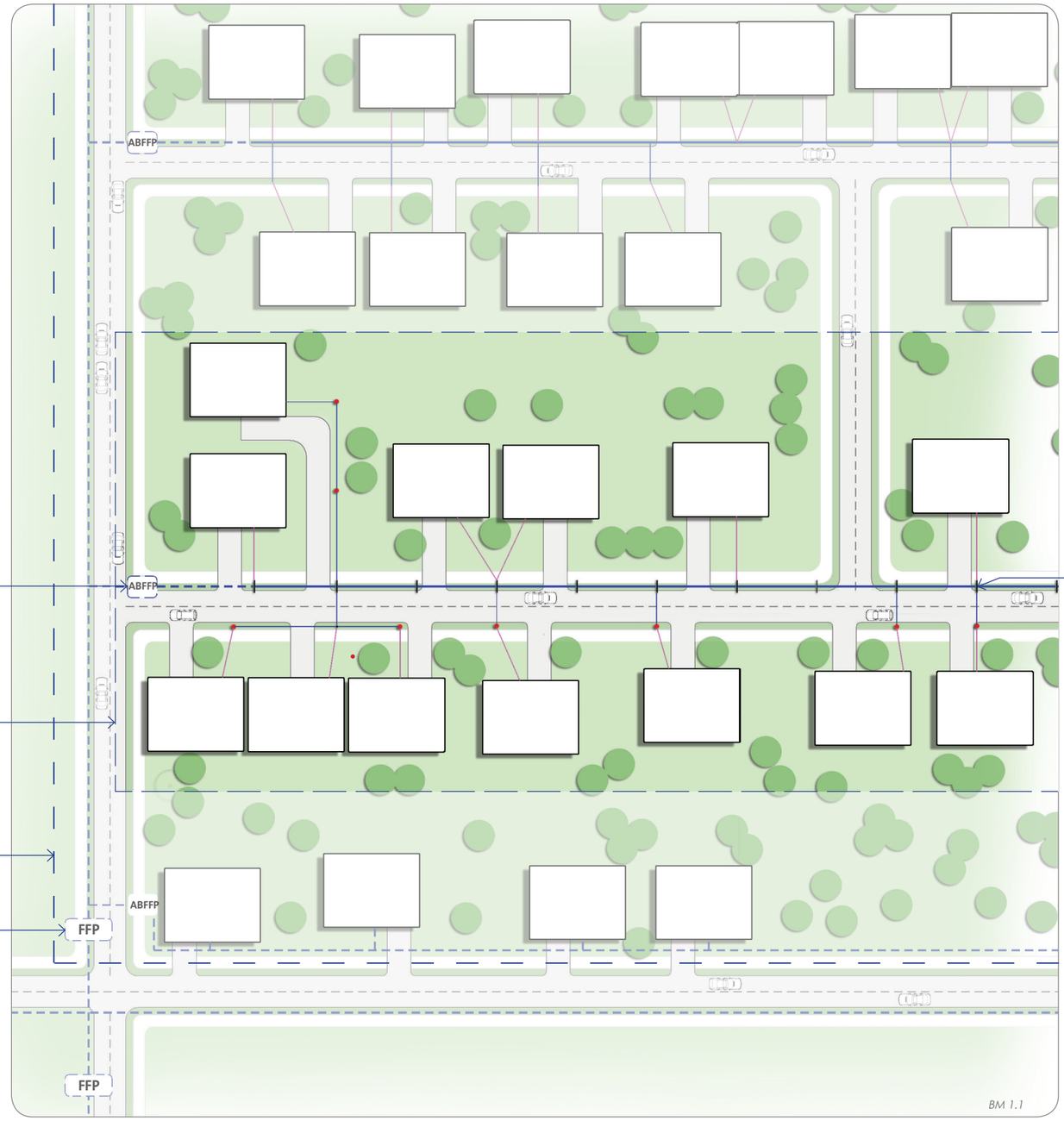
The first two sheets of this book provide an overview of the proposed network and the terminology used, with Sheet 3 providing information about the infrastructure onto which the fibre optic lines will be mounted. The deployment rules are indicated on Sheets 4, 5 and 6, with Sheet 7 outlining rules for the treatment of trees.

Network Overview

This sheet provides an overview of the proposed Chorus Ultra Fast Broadband (UFB) network in order to provide an overall context. The remainder of this rule book applies to the overhead network only.

The main network line will be run underground from various exchanges within the city. In strategic locations a 'Fibre Flexibility Point' (FFP) will be installed (underground), with each FFP terminal providing up to 288 customer connections. From each FFP, the fibre optic network then runs either underground or overhead, often to a number of streets, known as a 'FFP Block'. It is also possible that parts of an FFP Block may be installed overhead, and other parts undergrounded.

In some locations, a buried 'Air-Blown Fibre Flexibility Point' (ABFPP) may also be installed, providing up to 48 household connections (such as down a single street). Individual customers connect to the network through a 'Fibre Access Terminal' (FAT), a small box which is located on a pole, or buried within an underground network.



PLAN SHOWS FIBRE NETWORK ONLY
(ELECTRICITY AND COPPER NETWORKS NOT SHOWN)
DRAWING IS INDICATIVE & NOT TO SCALE

LEGEND

- Proposed Chorus Fibre Optic Line (Overhead or Underground)
- Proposed Chorus Hybrid Cable (Overhead only)
- Indicative FFP and ABFFP Block Boundaries

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Overhead UFB Architecture Consenting Rule Book

CHORUS OVERHEAD UFB NETWORK OVERVIEW

Date: 14 March 2014 | Revision: 11

Graphics prepared for Chorus by Boffa Miskell Limited
Author: **shannon.bray@boffamiskell.co.nz**
Drawn By: Kieran Dove & John Jeffcock

Aerial UFB Terminology

This sheet provides an outline of the terminology used within an aerially run FFP Block (refer Sheet 1). Where a FFP block contains both underground and overhead architecture, the rules contained within this book shall apply to the overhead portions only. The main components to an overhead fibre optic network are as follows:

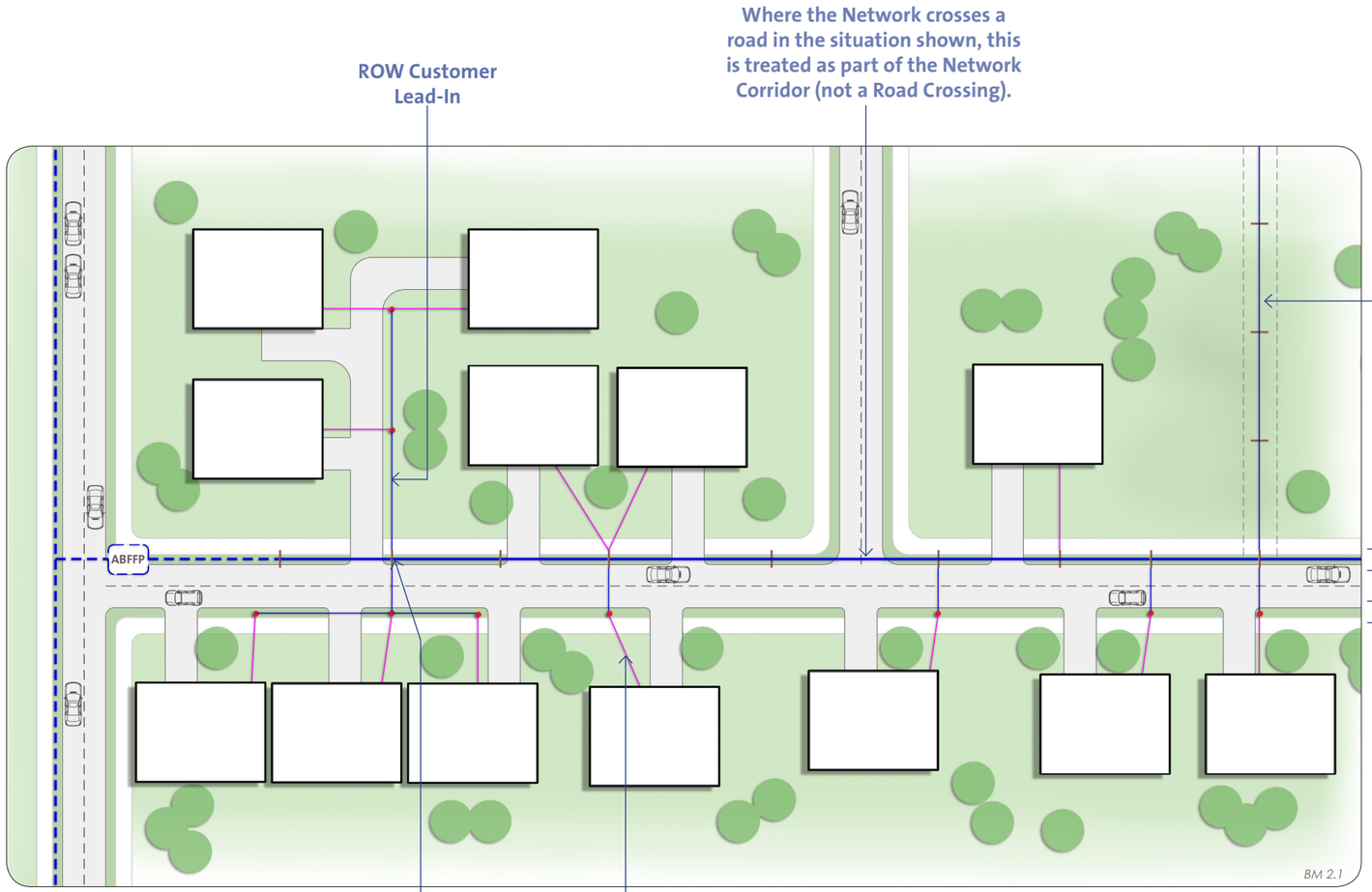
Network Corridor
This is where the overhead network fibre optic line runs parallel to the road (or in a defined easement corridor), either within the existing overhead electricity or telecommunications envelope (refer Sheet 3). It includes road crossings at intersections where the 'grain' of the network flows over a side road. The rules for network corridors are included on Sheet 4.

Road Crossing
A road crossing is where the fibre optic line branches off the network corridor, crossing the street to provide fibre on the opposite side of the road. The rules for road crossings are provided on Sheet 5.

Customer Connection
A single (or sometimes multiple) customer connection starts from a Fibre Access Terminal (FAT) on a pole on the street and runs one span to the dwelling. All customer connections will use a 'hybrid' line (refer Sheet 3). Further details and the rules for customer connections are provided on Sheet 6.

Customer Lead-In
In some circumstances, such as along a Right of Way (ROW), a customer lead in will be provided from the street to multiple dwellings. In these circumstances, the copper network will need to be retained. Where possible, the fibre optic lines will be multi-core to provide several connections from the same line.

Envelope
The envelope is the location in the air where each type of infrastructure is placed. This can either be the medium voltage electricity envelope, the low voltage electricity envelope, or the telecommunications envelope. New fibre optic lines will be kept within the bounds of each envelope (refer Sheet 3) and will follow the same sag as a majority of lines in that envelope.



LEGEND

- Proposed Chorus Fibre Optic Line (Overhead or Underground)
- Proposed Chorus Hybrid Line (Overhead only)

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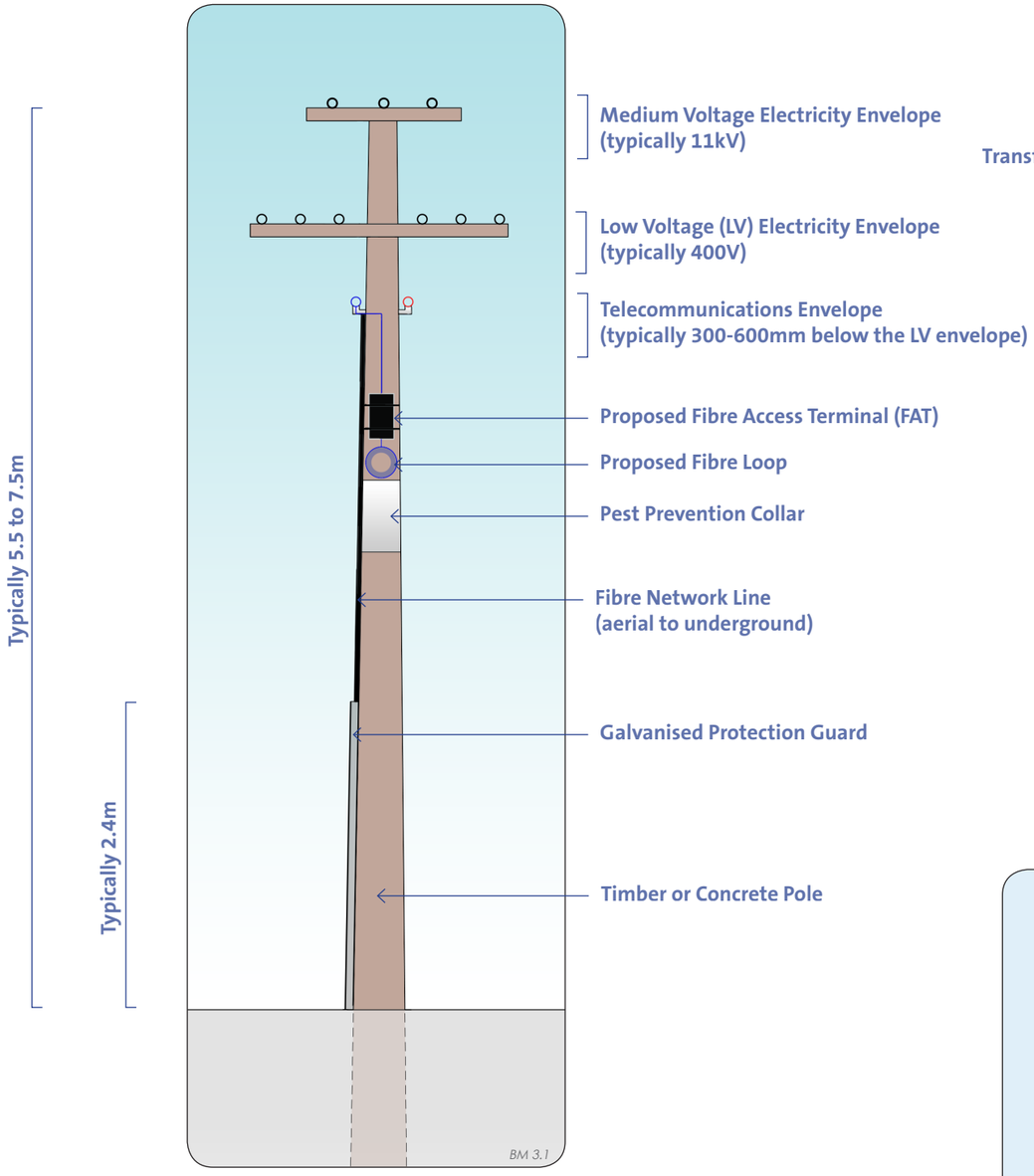
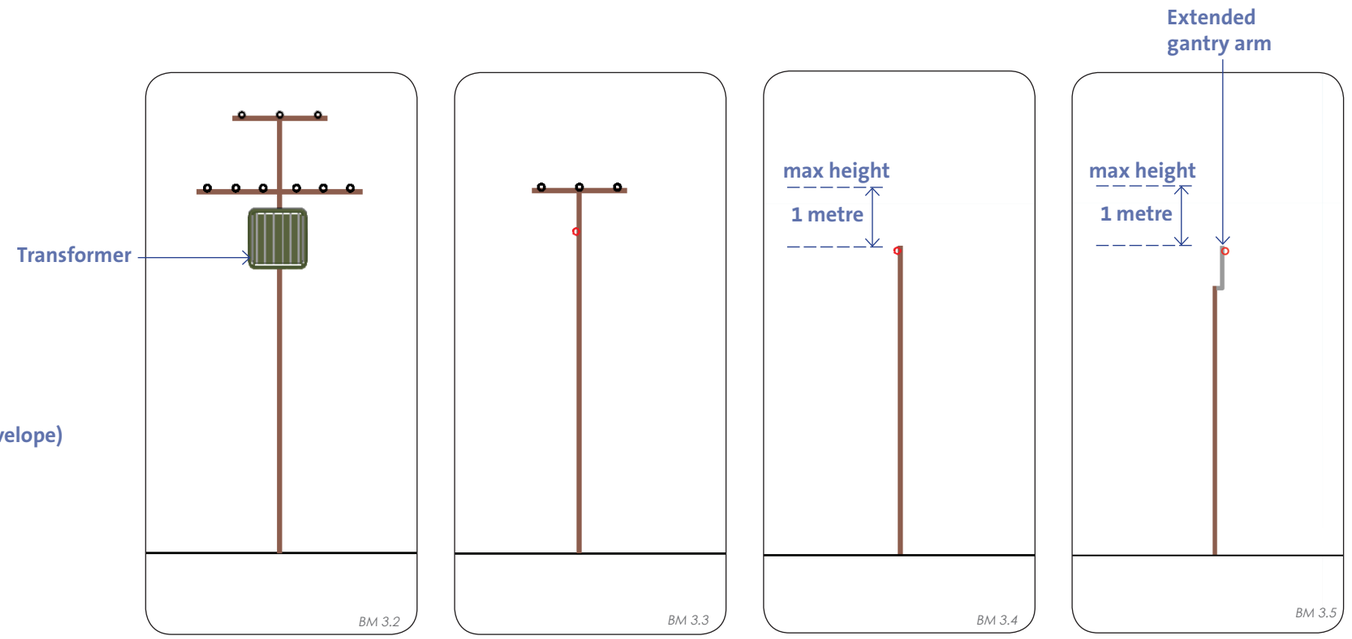
Drawn By: Kieran Dove & John Jeffcock



TYPICAL ELECTRICITY POLE
(NOT TO SCALE)

Dimensions provided by Chorus



TRANSFORMER POLE
Typically 7.5m to top

LOW VOLTAGE POLE
Typically 6.5m to top

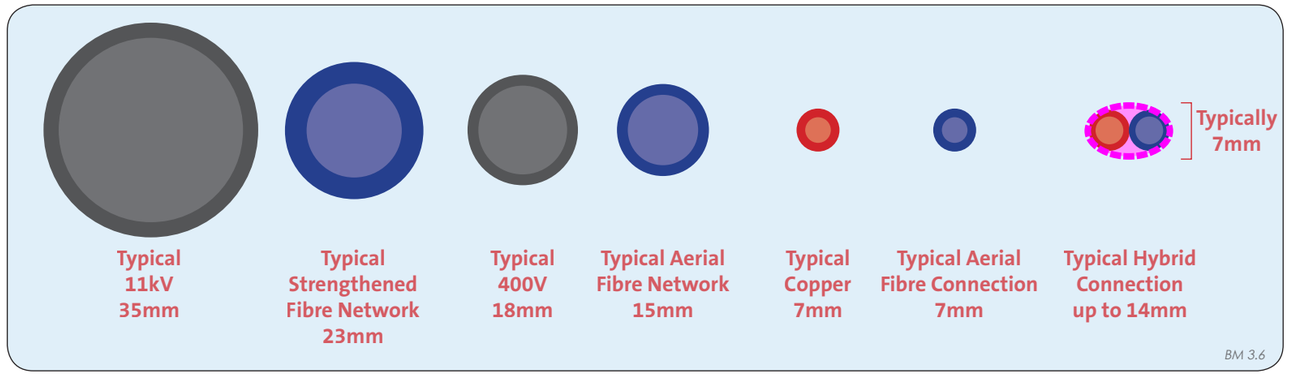
CHORUS POLE
Typically 5.5m to top

EXTENDED CHORUS POLE
Typically 5.5m to top

Other types of poles are also in existence, but are a minority.

Where required to meet clearance safety standards, Chorus poles may need to be upgraded to provide an additonal 1 metre in height. Chorus poles may be also be moved within 2.0m of the current location, or increased by an additional 50% in diameter.

As a general rule, in all instances opportunities will be sought to improve the visual appearance of the whole network through looking for opportunities to remove unnecessary cables or clutter.



RELATIVE LINE DIAMETERS (APPROXIMATE)
DRAWN REAL SIZE (SCALE 1:1)

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CHORUS OVERHEAD UFB
POLE TYPOLOGIES

Date: 14 March 2014 | Revision: 11

Graphics prepared for Chorus by Boffa Miskell Limited
Author: **shannon.bray@boffamiskell.co.nz**
Drawn By: Kieran Dove & John Jeffcock

Network Corridor Rules

The following rules provide details on how the new fibre optic lines will be run within the network corridor.

RULE 1.1

No new network poles are permitted. Existing Chorus poles may be replaced by timber or concrete poles up to 1.0m higher than existing, and may also be relocated by up to 2.0 metres from their existing location. Poles may be smaller or up to 50% larger diameter as deemed necessary for structural reasons.

By default, the Typical Aerial Fibre Network line shall be used (Refer Sheet 3). However in streets where there is a dense continuous tree canopy and where the tree pruning Rules 4.1 and 4.2 cannot be met, the Strengthened Aerial Fibre Network line may be used. Refer to Sheet 7 for further details.

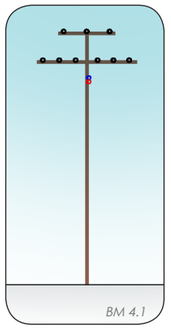
RULE 1.2

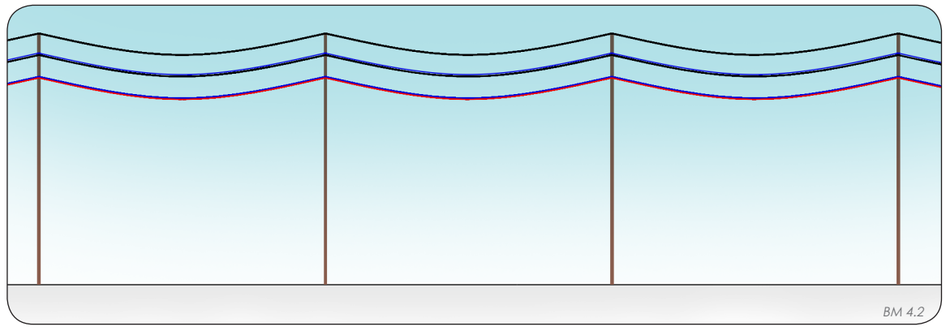
Fibre optic lines may be located either within the telecommunications envelope or within the low voltage envelope, including where these cross the road as part of the Network Corridor.

Lines shall be sagged to match as best as possible the majority of existing low voltage and copper lines, and remain above the road authority minimum safety clearance requirement (which varies).

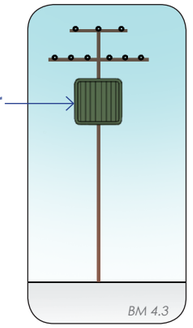
RULE 1.3

Where Rules 1.1 and 1.2 cannot be met, the fibre optic lines shall be undergrounded or a specific Resource Consent shall be obtained.

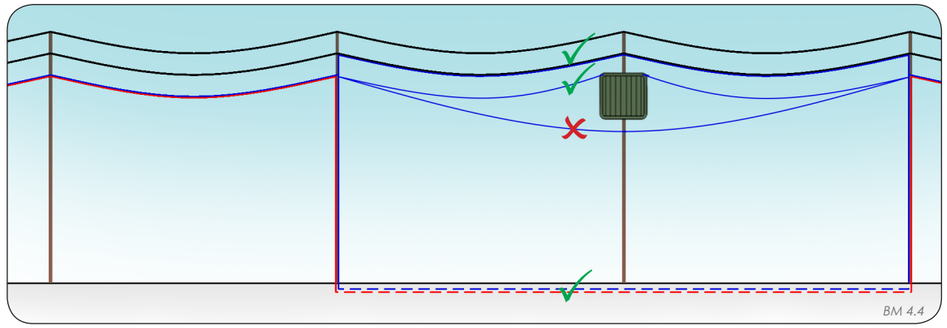

BM 4.1


BM 4.2

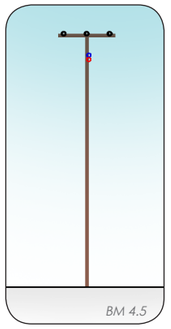
RULE 1.2
Route fibre optic line either within the telecommunications envelope or the low voltage electricity envelope.



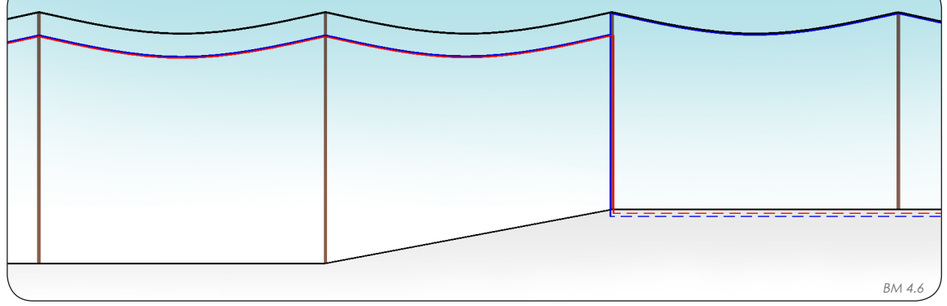
BM 4.3


BM 4.4

RULE 1.2
Follow as best as possible the sag of the majority of the existing lines.



BM 4.5


BM 4.6

RULE 1.2
Ensure minimum safety clearances are maintained, either by routing the line in the low voltage envelope or underground.

LEGEND

- Proposed Chorus Fibre Optic Line (Overhead)
- Copper Line (Overhead and Underground)
- Electricity Line (Overhead and Underground)

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Author: **shannon.bray@boffamiskell.co.nz**
Drawn By: Kieran Dove & John Jeffcock

Road Crossing Rules

These rules do not apply to road crossings considered to be part of the Network Corridor (refer Sheet 2).

RULE 2.1

Where necessary, a Chorus pole can be increased in height by a maximum of 1.0m to achieve the minimum safety clearance defined by the roading authority. It may also be moved by up to 2.0m in location or increased by up to 50% in diameter.

No new road crossings are permitted – in all circumstances the fibre optic line shall follow existing road crossings as detailed by the following rules, with a maximum of two fibre lines per road crossing (if more than two fibre lines are required, then a single multicore fibre lines shall be used).

In all situations, the fibre optic line shall follow the same sag as the majority of other lines crossing the road.

By default, the Typical Aerial Fibre Network line shall be used (Refer Sheet 3). However in streets where there is a dense continuous tree canopy and where the tree pruning Rules 4.1 and 4.2 cannot be met, the Strengthened Aerial Fibre Network line may be used. Refer to Sheet 7 for further details.

RULE 2.2

In the first instance, where both electricity and copper cross the road together (in respective envelopes), route the fibre optic line in the telecommunications envelope below an existing low voltage electricity crossing.

RULE 2.3

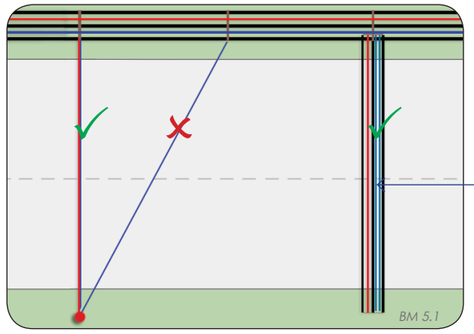
Where Rule 2.2 cannot be met, route the fibre optic line in the low voltage electricity envelope.

RULE 2.4

Where Rules 2.2 and 2.3 cannot be met, and only where an existing copper crossing occurs, route the fibre optic line in the telecommunications envelope.

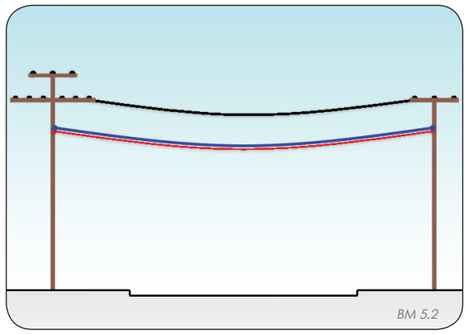
RULE 2.5

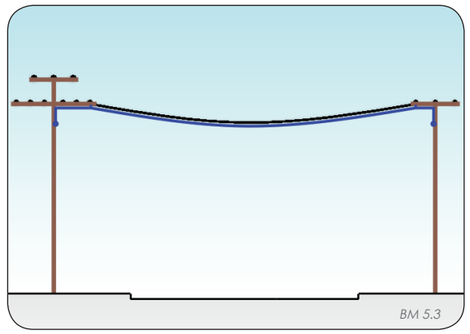
Where Rules 2.2, 2.3 and 2.4 cannot be met, the fibre optic line shall be undergrounded or a specific Resource Consent shall be obtained.

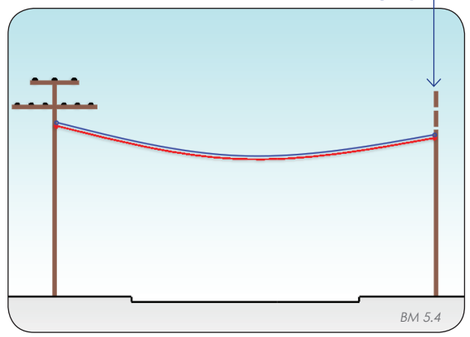


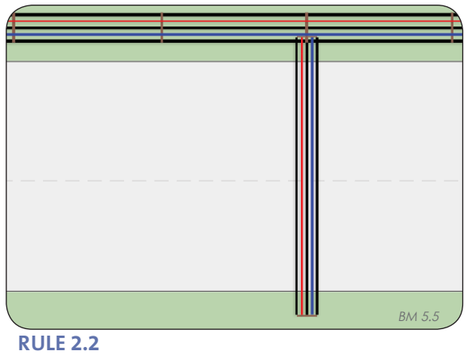
RULE 2.1
Follow only existing infrastructure.
No new crossings.

A maximum of two fibre lines per crossing

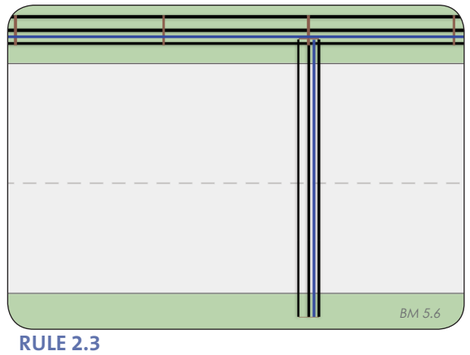




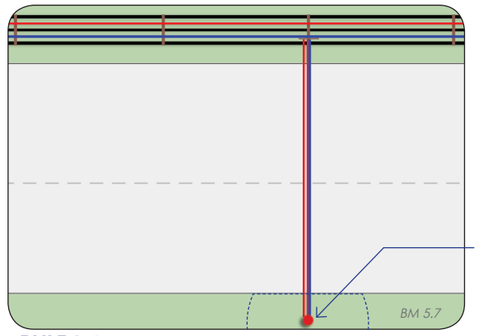




RULE 2.2
Route the fibre optic line under an existing electricity road crossing, within the telecommunications envelope.



RULE 2.3
Route the fibre optic line in the low voltage electricity envelope.



RULE 2.4
Route the fibre optic line in the telecommunications envelope only where an existing copper crossing occurs.

LEGEND

- Proposed Chorus Fibre Optic Line (Overhead)
- Copper Line (Overhead)
- Electricity Line (Overhead)

Graphics prepared for Chorus by Boffa Miskell Limited
Author: **shannon.bray@boffamiskell.co.nz**
Drawn By: Kieran Dove & John Jeffcock

Customer Connections

These rules apply to the installation of fibre optic line from a Fibre Access Terminal (FAT) located on a pole to individual dwellings.

RULE 3.1

Where an overhead electrical customer connection exists, but no overhead copper connection (eg. this is underground), a new fibre optic connection may be installed from the same pole as the electricity line, terminating at a similar location (and height) on the customer property as the electricity line. However, wherever practicable, the fibre optic line should be undergrounded.

RULE 3.2

Where an existing overhead copper connection exists, the final span of the existing copper line from the street shall be replaced with a 'hybrid' line (refer Sheet 3), such that in all such circumstances no additional overhead lines shall be installed to the customer.

RULE 3.3

Where a copper lead-in for a single customer exists, the section of copper from the final pole to the customer shall be replaced by a hybrid line.

RULE 3.4

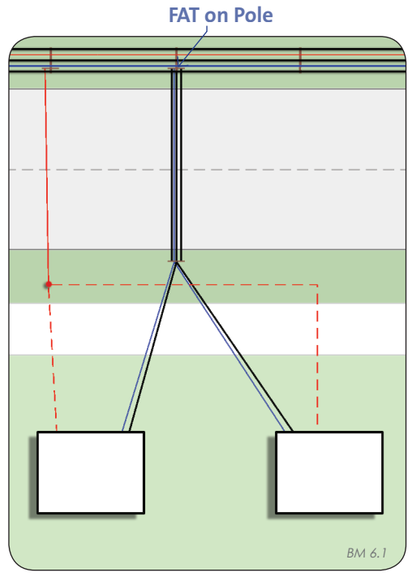
Where copper lead-ins for multiple customers exist (such as down a ROW or between poles along a road), a fibre line shall be installed in the same corridor and in the same horizontal plane as the majority of existing lead-in lines.

RULE 3.5

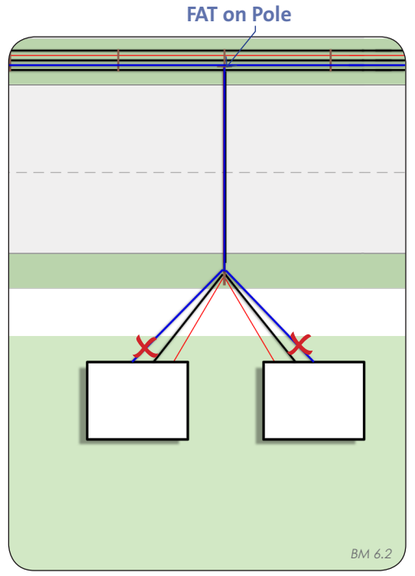
Where rules 3.2, 3.3 and 3.4 cannot be met, then the fibre optic line shall be undergrounded or a specific Resource Consent obtained.

NOTE:

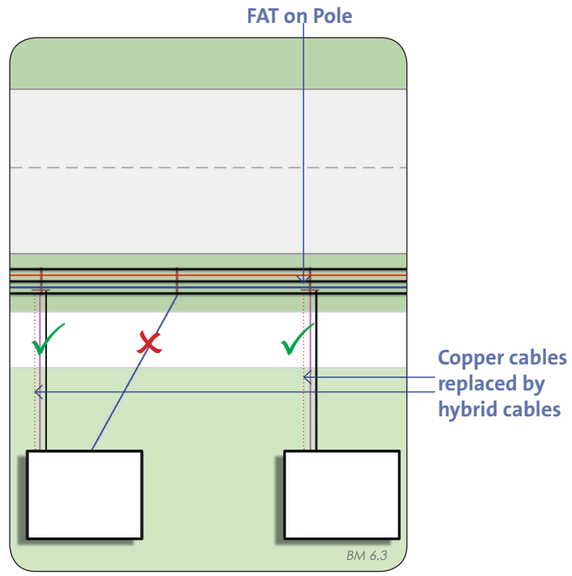
Where it is possible and practicable, any redundant copper customer connections should be removed at the time of deployment of the fibre optic line.



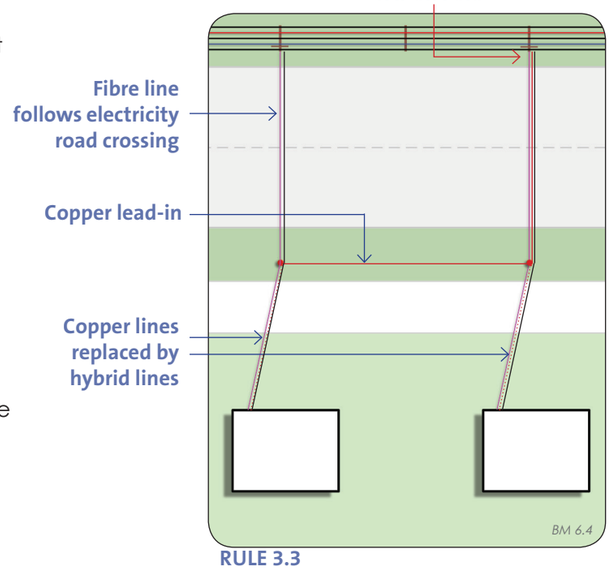
RULE 3.1
Where there is no overhead copper connection, route the fibre optic line to follow the electricity line.



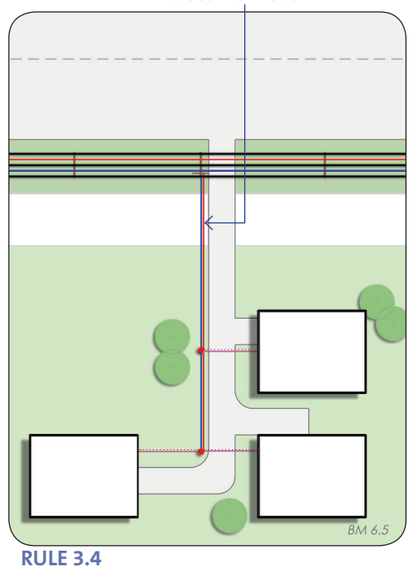
RULE 3.2
Where an overhead copper connection exists, there shall be no additional overhead connections.



RULE 3.2
Where an overhead copper connection exists, there shall be no additional overhead connections.



RULE 3.3
The final section of copper from the pole to the customer will be replaced by a hybrid line.



RULE 3.4
Fibre lines will follow existing copper lines along a ROW. Where possible, multiple lines will be combined into a multicore line.

LEGEND

- Proposed Chorus Fibre Optic Line (Overhead)
- Proposed Chorus Hybrid Line
- Copper Line (Overhead, Underground and Removed)
- Electricity Line (Overhead)

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Overhead UFB Architecture Consenting Rule Book

CHORUS OVERHEAD UFB CUSTOMER CONNECTIONS

Date: 14 March 2014 | Revision: 11

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Author: **shannon.bray@boffamiskell.co.nz**
Drawn By: Kieran Dove & John Jeffcock

Tree Rules

All tree works will be undertaken in accordance with the approved arboricultural management plan. The tree works will be undertaken in accordance with the rules set out below.

RULE 4.1: CLASS 1

The tree works listed below must be undertaken with the direction and/or supervision of a Works Arborist.

Works involving Pruning that create a wound no greater than 50mm in diameter
and
Works involving removal of no more than 10% of a Tree's live canopy
and
The natural shape, form and branch habit of the Tree is retained where practicable
and
All pruning undertaken by the Works Arborist.

RULE 4.2: CLASS 2

The tree works listed below require approval of the Council and must be undertaken with the direction and/or supervision of a Works Arborist.

Works involving Pruning that create a wound 50mm or greater in diameter
and/or
Works involving removal of more than 10% of a Tree's live canopy
and
The natural shape, form and branch habit of the Tree is retained where practicable
and
All pruning undertaken by the Works Arborist.

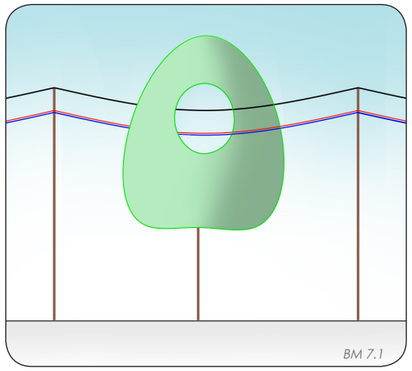
RULE 4.3

Where Rules 4.1 and 4.2 cannot be met, and where there is a continuous tree canopy within a street, then a Strengthened Aerial Fibre Network line may be used with no pruning undertaken.

RULE 4.4

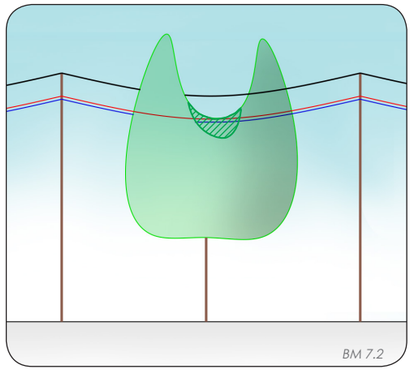
Where Rules 4.1, 4.2 and 4.3 cannot be met then the fibre optic line shall be undergrounded, deployed in the low voltage electricity envelope, or a specific Resource Consent shall be obtained.

NOTE:
A 'Works Arborist' is a qualified and suitably experienced arborist appointed by Chorus who understands this rule book and the consenting requirements, and who has been approved by the Council to undertake works to Council trees.



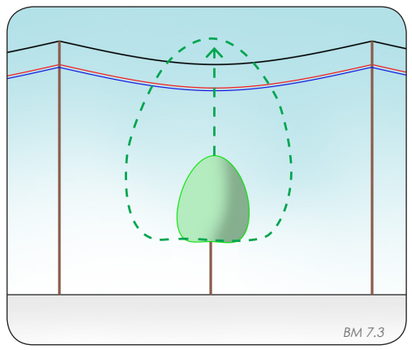
BM 7.1

In this example the existing tree pruning has acheived sufficient clearance and any tree works are likely to be minor in nature. This would be assessed as Class 1 works.



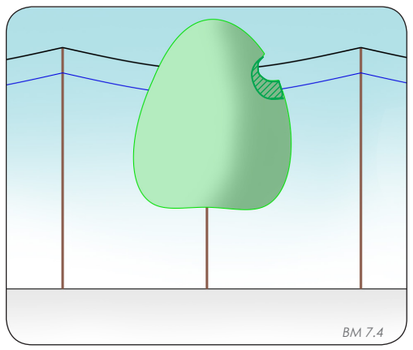
BM 7.2

In this example, the extent of additional pruning required will determine what class of tree works will be required. A Works Arborist will need to undertake an assessment of the required works to ensure the health and form of the tree is maintained.



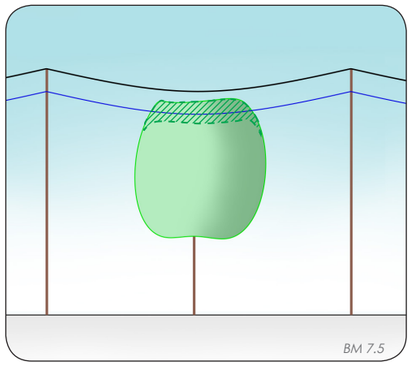
BM 7.3

As trees grow above the existing and proposed infrastructure, Class 1 tree works will ensure safety pruning can be undertaken to maintain required clearance.



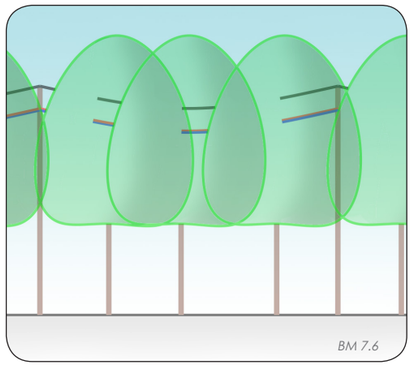
BM 7.4

In this example, the extent of additional pruning required will determine what class of tree works will be required. A Works Arborist will need to undertake an assessment of the required works to ensure the health and form of the tree is maintained.



BM 7.5

In situations where trees have already been pruned and/or require additional pruning, the works arborist will assess to determine whether the works fall within Class 1 or Class 2. In this example, works would result in more than 10% of the live canopy, and therefore would be assessed as Class 2.



BM 7.6

In situations where there is a dense continuous tree canopy within a street, and Class 1 or Class 2 pruning is not possible, then a Strengthened Aerial Fibre Network line may be used. This will be deployed through the canopy with no pruning undertaken.

LEGEND

- Proposed Chorus Fibre Optic Line (Overhead)
- Proposed Chorus Hybrid Line
- Copper Line (Overhead)
- Electricity Line (Overhead)

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[Confidential: Appendix B

Screenshots from Chorus GIS Alert Layer]