

TCF Response to the Proposed Amendments to the National Environmental Standards for Telecommunications Facilities

1. The New Zealand Telecommunications Forum (the TCF) generally supports the proposed amendments to the National Environmental Standards for Telecommunications Facilities (“NESTF”). This submission proposes some amendments to better achieve the intention of the proposed review, suggests some tighter definitions and proposes limits to some of the changes where they appear more permissive than is necessary.
2. The importance of telecommunications services to New Zealand’s economic and social wellbeing is highlighted by the Government’s investment in the UFB roll-out, and the rural broadband initiative (RBI). Notably, the Government has recently announced an intention to increase its investment to extend both of these initiatives. The industry is also undertaking significant investment in fixed line and mobile infrastructure. These investments are necessary if New Zealand is to achieve the economic and social benefits expected to result from the productivity gains from improved telecommunications networks. The economic benefits to New Zealand from ultra-fast broadband alone have been estimated to be approximately \$32.8 billion over 20 years¹.
3. These economic benefits can be achieved only through efficiently delivered infrastructure. The NESTF provides an important level of consistency across local councils for the development of telecommunications infrastructure. The draft changes to the NESTF reflect the infrastructure requirements of modern telecommunications equipment and will permit infrastructure upgrades to existing sites and, in some cases, remove the need to develop new sites. The proposals also recognise current practice already permitted in some local council areas.
4. The TCF wishes to make the following points in its submission:
 - Efficient development of telecommunications infrastructure is essential if the possible economic benefits of the UFB and RBI to New Zealand are to be fully realised;
 - The NESTF will provide a consistent approach to developing telecommunications infrastructure across all local council areas;
 - The proposed changes to the NESTF will not result in a burgeoning of telecommunications infrastructure being built;
 - The TCF proposes amendments to permit telecommunication infrastructure in natural hazard zones within the NESTF;
 - The TCF supports the proposed amendments to extend the NESTF to include aerial and underground deployment of telecommunication

¹ Alcatel Lucent, <http://www.tmcnet.com/tmc/whitepapers/documents/whitepapers/2013/6687-building-benefits-broadband-how-new-zealand-increase-social.pdf#>

cables within the road reserve and the associated lead-ins to private premises as a permitted activity;

- The TCF supports the inclusion of regulations within the NESTF that permit aerial deployment of telecommunication cables where there is an existing overhead network;
- The TCF supports the proposal to provide for underground cabling, including ancillary equipment, as a permitted activity;
- The TCF proposes refined and modified definitions of masts, antenna and support structures are proposed in order to achieve consistency and meet the requirements of modern equipment and trends;
- The TCF supports the incorporation of the New Standard AS/NZS 2772.2:2011 *Radiofrequency Fields Part 2: Principles and Methods of Measurement and Computation 3kHz to 300 GHz* however, further amendments are required to ensure that this doesn't result in unnecessary operational testing; and,
- The TCF proposes minor changes are proposed to definitions and the structure of the NESTF to assist in clarity and ease of compliance.

5. Each of these points are expanded below.

Telecommunications Infrastructure Contributes to Economic Growth

6. Telecommunications is a vital cornerstone of the NZ economy. As noted by MBIE in its 2014 Briefing for the Incoming Minister, the use of communications services has the ability to lift productivity across all sectors of the economy. The Productivity Commission stated that: "ICT is catalysing social and economic change on a scale comparable to those resulting from previous breakthrough technologies such as steam power, the internal combustion engine, and electricity.... Such breakthrough technologies occur rarely – perhaps less than once in a generation." Recent research notes that if firms currently making low use of internet services became more like high use firms, it could be worth an additional \$32 billion in productivity impacts to the economy.
7. The telecommunications industry not only contributes to the New Zealand economy indirectly via the services it provides, but it also contributes directly by creating jobs and investment.
8. An explosion in the number of end-user devices, the increasing consumption of high definition online video, and the 'blurring' of professional and personal requirements are increasing demand for more consumer choice and ubiquitous connectivity, which translates to demand for infrastructure. There has also been significant growth in the transfer of data between devices (Machine to Machine (M2M) communication) and this demand is expected to increase rapidly over the next few years.
9. Consumers and businesses increasingly demand that their telecommunications services are always available, and able to be connected from anywhere; at home, at

work and at play. This demand requires that both fixed line and mobile networks are widespread and also resilient, that is, able to withstand disasters, accidents and failures.

10. Resilience comes from a variety of sources:

- multiple networks (different providers offering alternative networks);
- multiple technologies (fibre fixed networks available alongside mobile networks);
- providers building their own networks with resilience in mind (building redundancy into their networks so that network component failures have a minimum impact).

11. Telecommunications services play an important role in supporting the New Zealand economy. These services can meet consumer demand for resiliency and ubiquitous connectivity if the industry is able to roll-out infrastructure efficiently, and this requires the consistency offered by having a coherent NESTF.

NESTF Provides Consistent Approach by Local Councils

12. The proposed NESTF will provide an important level of consistency across local councils for the development of telecommunications infrastructure. Inconsistent rules or inefficient local council processes increase the cost of network builds and upgrades, and delay the realisation of economic benefits.

13. The existing National Environmental Standards for Telecommunications Facilities came into effect in 2008 and, among other things, set the baseline for what is permissible. It includes rules on RF emissions and size and noise standards relating to putting facilities on road reserves (antennas, utility structures, and cabinets). It has facilitated the rollout and upgrade of new networks as well as market entry by new network providers. In particular it has aided in streamlining the consent process for infrastructure in residential areas; areas in which demand for services has driven an increased presence.

14. Telecommunications technology has changed considerably since 2008 and will continue to evolve rapidly in the future. Examples of changes include:

- UFB fibre access networks being rolled out across the country providing ultrafast broadband services alongside existing copper networks;
- RBI upgrading fixed and mobile networks in rural areas and schools;
- Mobile network providers rolling out 4th Generation (4G) networks today (with an eye to 5G networks in the future), all of which use very different technology to the second generation (2G) networks which were in place in 2008;
- New public networks such as WiFi are being rolled out in urban areas by a range of providers.

15. Technology innovation means the NESTF needs to adjust to keep pace with the changes in technology to ensure that it is fit for purpose. This adjustment to the NESTF will provide a national best practice for councils and assist in removing the variation in practice between different council jurisdictions.
16. National rules mean providers can apply the same solution across the country. This consistency reduces equipment cost, as well as reducing the time required to install and commission new or upgraded infrastructure.
17. The NESTF allows District Plans to introduce more stringent rules than the NESTF conditions. These include conditions protecting trees and vegetation, historic heritage values, visual amenity values, and coastal marine areas.
18. We recognise that these sensitive/special areas may require different approaches in some areas. However, the onus should be on the council to justify why it needs to vary its rules from the standard NESTF conditions in those areas and should be obliged to minimise the differences from the NESTF conditions as much as possible. It is proposed that these special areas will only apply in regard to Regulation 6 if the special areas are established in accordance with the definitions of special areas in the NESTF; see Appendix 1 of this submission.
19. Tight drafting of the final NESTF text will assist consistent implementation at council level by providing a more consistent interpretation. The Industry authored a guidance document to help councils interpret the current NESTF when it was introduced. The TCF would like to be involved in an update to this guidance document to reflect the proposed amendments to assist with interpretation.
20. Practical interpretation requires a certain degree of understanding of how fixed and mobile infrastructure is designed and built, and what it looks like in practice. The industry is prepared to assist MfE and MBIE run a series of roadshows to educate local councils on the practicalities of the NESTF changes and what this means for infrastructure deployment (with examples of the equipment telecommunications providers will be installing).

The NESTF Change Will Not Result in Unnecessary Increases in Infrastructure

21. Providers take their community relationships very seriously. Neighbourhoods are made up of potential customers and are the reason that the network is being installed. It is in a provider's interest, and those of the wider industry, to be reasonable when selecting locations to install network infrastructure.
22. Providers engage with communities around changes which are likely to have more than a trivial impact on residents. The TCF has Community Engagement Guidelines for New Wireless Telecommunications Facilities with similar communication principles being applied as part of the UFB rollout.
23. Further, there are natural limits to how much infrastructure is likely to be in place. Providers do not want to over-invest in networks and it is usually more efficient to

upgrade existing facilities than build new infrastructure which needs to be installed and maintained. The updated NESTF will encourage better use of existing infrastructure, but should not rule out further efficiencies through things like infrastructure sharing.

24. We note that some of the amendments are drafted wider in scope than necessary. Where relevant, we propose wording to provide clarification and certainty to the terms introduced through appropriate definitions and/or to ring-fence the amendments to remove concerns about the rules being too broad in scope.

Natural Hazard Zones

25. We disagree with the proposal to include natural hazard zones/areas within the list of areas where more stringent rules can be introduced. Providers build networks to meet demand. The number of areas deemed hazardous can be quite extensive and is increasing as knowledge and research occurs into natural hazards. It is common to find residential developments, business premises and leisure locations covered by these natural hazard classifications.
26. Telecommunications consumers still live and work in many of these areas and have an expectation of receiving service when they are in these areas. Further, telecommunications infrastructure is often relied upon when there are incidents and disasters as a way to contact emergency services and coordinate response. This is the one area where the amendments reduce the incentive to invest.
27. Providers should be able to make their own commercial decisions on placing equipment in hazardous areas based on their own risk analysis. Providers will not want to regularly replace equipment which is waterlogged or suffers other damage so will naturally take steps to protect their equipment without the need for external conditions which result in uneconomic 'over engineered' solutions.
28. There is a question about what value is added through requiring resource consent in hazard zones, particularly within the road reserve. The NZUAG has developed a code for works in the road reserve and the special conditions that road controlling authorities can impose on Works Access Permits (WAP) can include requirements related to geotechnical supervision, stormwater management and timing of works (as relevant).
29. Where resource consent is required, there is a crossover of responsibilities. The industry's experience is that different areas of councils often do not work together, resulting in a requirement for two sets of supervision (in accordance with WAP and Resource Consent conditions) involving two separate contacts within council. This problem is further exemplified by a reluctance within council to internally share information. We are aware of multiple examples of councils refusing to provide a single point of contact, meaning the telecommunications operator was required to coordinate responses and the distribution of information to multiple council departments, each with different timeframe requirements and expectations on the

level of content required. This is inefficient and it is difficult to establish what benefit this approach provides. Further, there is potential for conflicting advice to occur which can give rise to compliance issues.

30. We consider that the duplication of costs associated with complying with both district plan requirements in addition to those under the Utilities Code in particular is unjustified. We are aware of a recent example whereby resource consent was required for works in a natural hazard zone (land stability) where significant additional time delays and costs were incurred due to the coordination required to manage discussions between different council departments (the road corridor manager and the resource consent department). This included ensuring conditions imposed on the resource consent did not conflict with requirements of the Utility Access Code and that the required monitoring could be managed to meet both WAP and consent obligations.
31. While we recognise that it is prudent to avoid siting new building and structures in areas subject to natural hazards, it is not practical to avoid these areas. The equipment associated with telecommunications infrastructure generally has a small footprint, is non-habitable and where necessary the telecommunications operator will design mitigation measures to protect their asset. A number of our members are active in submitting on District Plan provisions seeking exemptions for network utilities, in particular telecommunications infrastructure, with respect to natural hazard rules. There has been a good level of success with respect to this approach, however it is ad hoc and requires significant time and costs (submissions, hearing attendance and discussions).
32. We consider there is significant benefit in having a nationally consistent approach that recognises that small scale telecommunication facilities and infrastructure do not affect natural hazards and/or the effects can be managed through alternative means (such as through the Utilities Access Code). Accordingly, we have amended the control so that it is a permitted activity subject to there being a technical, operational or functional need to provide services to customers within existing and new natural hazard areas.

Telecommunication Cables

33. The TCF supports the proposed amendments to extend the NESTF to include aerial and underground deployment of telecommunication cables within the road reserve and the associated lead-ins to private premises as a permitted activity. The proposed amendments would deliver national consistency in a manner that provides deployment flexibility and efficiencies while ensuring that potential environmental effects are appropriately managed.
34. We support the use of the term “telecommunication cables” in the proposed regulations as it affords the necessary flexibility with respect to potential future technological advancements, while also providing for fibre and copper lines. We consider that the term could benefit from being defined (without limiting the intent)

and/or aligned with the definition of “line” under the Telecommunication Act 2001 to provide further clarity.

35. As recognised in the Discussion Document fibre-optic cables can be deployed either overhead (aerial) or underground. Aerial deployment is designed to be complementary to underground deployment and, in the case of the UFB rollout, in any given area a mix of these two methods will generally be utilised. It is appropriate for the proposed regulations permitting these activities to be subject to conditions to control potential effects but not impose undue constraints that negate the benefits of the regulations. To ensure consistent interpretation and remove the potential for ambiguity the proposed regulations should be supported by clear definitions.

Aerial Cabling

36. The TCF supports the inclusion of regulations within the NESTF that permit aerial deployment of telecommunication cables where there is an existing overhead network. The extent to which aerial deployment of overhead telecommunication cables is provided for under current district and unitary plans throughout the country, varies significantly. In many cases, where aerial deployment is permitted, the rules and/or associated performance standards have been drafted in a way that results in ambiguity and leaves them open to interpretation. Our experience shows that this less regulated approach has not lead to a proliferation of aerial networks, either for telecommunications or electricity.
37. There have been a number of instances where the activity status has been disputed due to differing interpretations and application of performance standards. In one example, the council has deemed its “Code of Practice for Subdivision and Land Development”, being a document incorporated by reference to the District Plan, to apply. As a consequence, the requirements associated with new subdivisions, in particular those relating to undergrounding of services, are deemed to apply, therefore triggering the need for resource consent for aerial deployment of UFB. The time and costs incurred trying to resolve this matter were significant with the outcome being that efforts to deploy aerially were abandoned, despite this being the more efficient and practical solution.
38. Appendix B of the Jacobs SKM report “Environmental Effects of Implementing Ultra-Fast Broadband and Mobile Infrastructure” (6 May 2014) provides a high level review of a number of district and unitary plans throughout New Zealand, indicating the status of activities within each district. It does not purport to be a detailed analysis of specific provisions and we consider it understates the variability of the rules with respect to aerial deployment. Our assessment of this table has determined that up to 30% of areas are wrongly identified as permitting aerial deployment, with closer review and actual experience showing that resource

consents would be or have been² required. This degree of variability in interpretation is one of the primary reasons we consider that national consistency in the treatment of aerial deployment is appropriate and would deliver significant benefits. The proposed additions to the NESTF would provide greater certainty and efficiency for telecommunication lines infrastructure providers in the delivery and operation of telecommunications networks and services.

39. Undergrounding is not always the most practical methodology for deployment of new cables. There are a number of constraints that can affect underground works. These include issues associated with archaeology, Maori sites of cultural significance which maybe of tangible and intangible value, geological constraints (such as hard sub-surface rock), land stability (slope hazard areas) and potential effects on amenity planting (particularly in areas of dense vegetation or around significant specimen trees). In such cases the ability to consider suitable alternatives, such as aerial deployment where an overhead network exists, without the uncertainty of rule interpretation and outcome in addition to the costs and potential time delays associated with the resource consent process, would enable the telecommunications infrastructure provider to make early, and site appropriate, decisions on the most efficient way to deliver services. A clear set of nationally consistent rules will have benefits not only for the industry but also for councils and the community.
40. We understand that there may be concerns that deploying aerially eliminates or reduces the opportunity to underground utilities in the future. This is not an accurate assumption. In reality, in those areas where there are undergrounding programmes in place such programmes involve discussions between companies, councils and other stakeholders to identify the feasibility of undergrounding all overhead assets and coordination of this work. There are many factors involved in undergrounding multiple utilities and the merits and feasibility of these need to be considered on a case-by-case basis. The addition of the proposed regulations permitting aerial deployment would not negate any future undergrounding initiatives or discussions in this regard.
41. The TCF considers that the proposed regulations permitting aerial telecommunication cables have been drafted to provide an appropriate balance between providing for deployment flexibility while setting suitable conditions to mitigate potential adverse effects. In particular the following points are noted:
- Poles tend to be the most prominent elements of overhead infrastructure and additional poles that extend the overhead network have the potential to generate adverse visual effects. It is therefore accepted that these should be excluded.
 - Deploying aerial cables on poles that have existing cabling (electricity, telecommunications or other) will ensure that the new cables are not visually prominent as they will be viewed within the context of an existing overhead

² Resource consents have been obtained for aerial deployment in Wellington City, Gisborne and Auckland where the Jacobs SKM report has incorrectly indicated that this would be a permitted activity.

network. Previous visual impact assessments undertaken in support of resource consent applications for aerial deployment have concluded that the level of prominence of existing aerial infrastructure does not increase proportionately in relation to its complexity (i.e. the number of lines) – rather it is more a situation of being present or not being present.

- Line diameter has been identified as being a key design factor that can affect visual sensitivity. The proposed maximum cable diameter of 30mm is considered to be an acceptable threshold that provides for a variety of cable types, including strengthened sheaths that are designed to withstand rubbing and impacts from tree limbs (therefore removing the need for trimming) and hybrid (copper/fibre) cables. The proposed maximum diameter is consistent with, and in many cases less than, the diameter of other existing overhead cables (electricity and telecommunication) and will therefore not result in new aerial cables becoming visually dominant.
- Creating new road crossings and corridors (i.e. installing new cables where no existing cables currently exist) has the potential to result in overhead infrastructure becoming more visually prominent within the streetscape. Road crossings are unavoidable without installing a network corridor down each side of the road (which has its own set of effects). Therefore, a condition requiring the use of existing corridors and crossings to manage the effects by ensuring that a proliferation of crossings does not occur is appropriate.

42. In addition to the conditions proposed in the discussion document, we propose an additional condition with respect to the colour of cables. In our experience, nearly all existing electricity and telecommunication cables are black. We consider imposing a condition requiring new cables to be a dark, recessive colour (either black or dark grey) would minimise prominence by ensuring consistency and visual coherence.

43. We support reference to “ancillary equipment” in the proposed regulation with respect to both aerial cables and underground cables. The examples given are an accurate representation of the type of equipment that is often installed to support the effective operation of a telecommunications network. The reference to ancillary equipment as currently drafted does not impose a limitation on what this equipment may entail and is therefore considered to be ‘future-proof’. This is essential within the telecommunications industry where new and improved architecture is constantly being developed in response to different deployment scenarios.

44. Providing a clear regulation around pole replacement and relocation activities is supported. The main scenarios where poles require relocation or replacement are:

- where the existing pole is rotten or at the end of its useful life and/or would not meet the necessary health and safety requirements for access;
- where the existing pole has been damaged (for example by a vehicle);
- to meet the minimal clearances set out under the Telecommunications Act 2001 (5.5 metres for road crossings and 4.25 metres elsewhere); and,

- The utility operator receives a third party request to move the existing pole from its current location (for example where a developer subdividing a section wants to put in a driveway where a pole is located, or a farmer wants to accommodate new agricultural infrastructure).
45. Most pole replacement and relocation activities are carried out under existing use rights. However, we are aware of instances where existing use status has been disputed by councils causing delays to necessary and planned pole replacement programmes. Providing for pole replacement as proposed would ensure that telecommunications network operators can plan for and undertake pole replacement in a timely manner in order to respond to safety requirements.
 46. Having flexibility to position the replacement pole within 3 metres of the original location as proposed in the discussion document is supported. When working on poles located in the road reserve the network utility operator is required to obtain approval from the road controlling authority under the National Code of Practice for Utility Operators' Access to Transport Corridors. Often, as part of this approval process, the road controlling authority will request that poles be relocated from kerb to boundary for traffic safety reasons. Our members have encountered situations where this request has been in contradiction to advice from the same council's planning department that determined that this would trigger the need for resource consent. This inconsistent approach can cause significant delays and uncertainty as attempts to reach a resolution are undertaken.
 47. The positioning of cables on poles with existing infrastructure (namely electricity) must be undertaken to meet the necessary safety requirements associated with separation between cables. In the case of road crossings, a minor increase in pole height may be necessary in order to meet road clearance requirements. Accordingly, we seek that the proposed regulation be amended to allow replacement poles to be increased in height by 1 metre as a permitted activity. Limiting this increase to 1 metre, together with pole location to 3 metres, would ensure that the scale and bulk of a replaced or relocated pole would remain the same or similar, therefore ensuring potential visual effects are minimal.
 48. We concur with the assessment undertaken on Page 33 of the discussion document that concludes that the aerial deployment of telecommunications cables in accordance with the proposed new standard would have less than minor effects on cultural or historic heritage values and would not be affected by natural hazards. We accordingly reiterate that the proposed new condition with respect to natural hazards should not apply and, furthermore, an exclusion should be applied with respect to aerial deployment in road reserve within historic heritage areas (where arguably overhead networks are more likely to exist). We do not seek that this exclusion extend to connections to heritage buildings, where the individual characteristics of a building may need to be considered as part of a more controlled process (which may include compliance with a best practice document).
 49. Overall we consider the proposed regulations for aerial cables are appropriate and, subject to the amendments discussed above and further described in Appendix 1,

provide an acceptable balance between allowing deployment flexibility and managing potential effects. We concur with the Discussion Document that the proposed regulations will not result in a proliferation of new infrastructure (in this case cables), on the basis that:

- The standards be limited to network operators;
- The total number of cables deployed on a pole is self-limiting as a result of the pole design (i.e. structural capacity of a pole); and
- Within New Zealand it is unlikely to be economically viable for another provider to establish an entirely new aerial telecommunications network.

Underground Cabling

50. We support the proposal to provide for underground cabling, including ancillary equipment, as a permitted activity. While most district plans already provide for the installation of underground cables as a permitted activity we consider that having this included as a single nationally consistent rule is appropriate. The proposed regulation removes any ambiguity with respect to the application of earthworks rules when installing underground cables. These rules are generally drafted for site specific ground excavation/disturbance and do not anticipate the requirements for installing a linear telecommunications network.

51. The location and depth (and therefore extent of ground disturbance) of telecommunications cables within road reserve is subject to the approval of the road controlling authority, with the Utility Access Code affording these authorities the ability to impose reasonable conditions on WAPs. These conditions impose standards in regard to earthworks, reinstatement of surface, undertaking temporary works in hazard areas. With respect to the application of the Regulation 6 conditions we note the comments made in paragraph 29 above (Natural Hazard Zones) that identify the frustrations with duplication of process between the requirements of the Utility Access Code and the District Plan. For the reasons described in this submission, we seek an exclusion for underground cabling from the proposed natural hazard zone condition.

Mobile – support structures and antennas

52. Antennas are required to be elevated above surrounding buildings/structures, or other objects, to achieve line of sight to the intended coverage areas. Antennas therefore need to be mounted to a support structure. If an existing structure (such as a building rooftop) cannot be used then a mast structure is required. It is important to accurately define antennas and support structures such as masts. Where masts are utilised, they form the larger visual component of a telecommunications site, but antennas are the most important functioning component.

53. The existing NES already shapes equipment design and selection, but only with respect to the equipment within the road reserve. Antenna size is dictated by technology and all are designed overseas, but a New Zealand operator will use the NES criteria as part of the equipment selection criteria. A wider NES design criteria will positively incentivise operators to select equipment that meets NES specifications, wherever possible. National consistency for nationwide rollouts is valuable, as it provides certainty. Of greatest benefit would be provisions that allow larger antennas and cabinets at mobile facilities as it is inevitable that these types of equipment will continue to expand in size due to technology requirements. With approximately 4000 wireless facilities already in place, broader provisions in the NESTF will have wide application for technology upgrades.
54. We welcome the proposed regulation controlling the provision of antennas on multi-storey buildings. Being able to establish antennas on buildings is critical to the deployment of mobile networks. The buildings selected by the network operator often provide sufficient elevation to provide good coverage, and are located within areas where people require the service. We have proposed amendments to re-organise the controls related to buildings in the various areas, such as residential and commercial areas. The amendments provide clarity around the controls for antennas on multi-storey residential buildings, such as apartments, that are well suited to antennas without generating visual or other impacts. We have also suggested that more lenient rules should apply for buildings in residential areas that are not used for residential activities, such as local dairies. In addition, where buildings are located in business, commercial and industrial zones, we have suggested more lenient controls should apply.
55. It is important to note that a number of councils do not provide for the attachment of antennas to buildings as a permitted activity. An example of this is Porirua District Council, where the attachments of antennas to existing buildings in the suburban zone (not projecting above the highest point of the building) are a non-complying activity. However, the establishment of a 12m high mast not exceeding 2.0m in diameter is a permitted activity, not requiring consent. We would argue that the environmental impact associated with the permitted mast could be seen as greater than the attachment of antennas to existing buildings.
56. In part, we support the regulation controlling the deployment of antennas and masts within rural areas. With food and agri-business products contributing up to two-thirds of New Zealand's export earnings, the benefits of encouraging deployment of modern networks within rural areas are significant, as can be seen by the recent deployment of RBI. The proposed amendments seek to clarify the proposed definitions of "rural" to enable operators to deliver efficient and effective services to the rural community, through permitted standards.
57. We support the regulation controlling the replacement of antennas at existing telecommunications facilities. Upgrading existing facilities is an efficient way to deploy new technology and also has the least impact on the environment and local communities. The proposed amendments provide clarity around the dimension for

panel antennas as diameter rules can be open to interpretation. We also suggest amendments to the regulation controlling additional antennas, these proposed amendments clarify dimension controls and seek to restrict the provision to exclude replacement utility structures within predominantly residential areas. We view the current provision to be inappropriate within these areas.

58. We welcome the NESTF including provision for Small Cell Technology. The deployment of this technology is likely to become more prevalent as the requirement to provide contiguous coverage in small localised areas increases. We have suggested clarification of the definition of the ancillary equipment associated with the technology, in order to ensure that the equipment deployed remains within the permitted standards.

59. The TCF suggests a number of amendments to the proposals, in order to provide clarity. In some cases, the proposals appear to be more permissive than originally intended. The proposed amendments are summarised below:

- New masts in a predominantly residential road reserve:
 - Clarify the location of the existing structure that is to be used as the benchmark for the dimension rule when establishing standalone masts; and,
 - Reinstate the revised dimension rules and ensure ancillary equipment is provided for.
- The TCF proposes a new provision relating to standalone masts within road reserves within commercial and industrial zones. These areas are often important business hubs that require access to the latest telecommunication services. Currently, the NESTF does not allow for standalone masts within these areas. However, masts and cabinets within these areas are more able to be accommodated in terms of size and visual impact due to the nature of the activities in the area. In general, the road reserves within these areas are larger than residential areas and therefore can accommodate larger structures.
- A 5m height allowance above the zone height has been requested as antennas need to be located above the general building heights for a particular zone so that the signals can reach consumers. Masts and cabinets are generally permitted within these zones and therefore this should also be extended to the road reserve.
- Regulation 8 of the NESTF contemplates that these areas are able to accommodate cabinets of a larger dimension than those in residential areas, the TCF seek that this should be extended to the establishment of masts within road reserves.
- The TCF supports the proposed dimension control for antennas on replacement utility structures and suggests that these should be applied to structures within the road reserve. We propose that these dimensions should also be applied to existing replacement utility structures (established sites) where existing replacement utility structure dimensions are less than allowed under these new NESTF.

Under the existing NESTF, if an operator wishes to change antennas at an established site, for example deployment of additional technology, they are restricted to the existing height of the structure and therefore need to apply for consent for these changes. Being able to upgrade existing sites within the road reserve is an efficient way of deploying new technology, and has the least impact on the environment and local communities.

Radio Frequency Standard

60. The TCF supports the incorporation of the new standard *AS/NZS 2772.2:2011 Radiofrequency Fields Part 2: Principles and Methods of Measurement and Computation 3kHz to 300 GHz*. However, further amendments are required to ensure that this doesn't result in unnecessary operational testing. The TCF has commissioned an independent expert in this field to provide the scientific rationale for the proposed amendments, a detailed discussion of the issues and recommended amendments are set out in Appendices 1 & 3.
61. The Standard is based on the current best practice techniques and provides for a more comprehensive and scientific method of calculating Radiofrequency Field Levels. The TCF proposes the New Standard's methods of calculating predicted RF field levels be incorporated into an amended Regulation 4 of the NETSF. Including the standard will provide certainty in the calculation of RF field levels and determine if further post-installation testing is required, based on an appropriate and pragmatic assessment of the level of risk.
62. The trigger for whether operational testing is required is important, as in-field testing can be impracticable and consumes significant time and resources. It is proposed to provide an option in which the single, simplified threshold of 25% is replaced by one based on the uncertainty in the exposure calculation contemplated in the new standard. It is important that the 25% threshold remains as an alternative to undertaking uncertainty analysis, as there are some instances where this is a more efficient method of calculating compliance.

Other Amendments

63. We note that the definition of "road reserve" as contained within the discussion document differs from that included in the current NESTF. We support the definition included within the discussion document, which is taken from the Telecommunications Act 2001, and seek that this replace the current definition included within the NESTF. Alignment with relevant legislation is important and will avoid confusion or the potential for conflicting interpretations. Use of the Telecommunications Act definition is also consistent with that used for telecommunications under the Utilities Access Code.
64. In relation to the Proposed Amendments set out in Appendix C of the discussion document, the TCF would like the permitted activities be reordered to align with the following categories:

- Recognition of the existing network
- Buildings
- Masts in the Road Reserve (i.e modifications to the existing NES)
- Rural Masts
- Antennas
- Co-location
- Small Cells
- Masts in the Road Reserve (i.e modifications to the existing NES Reg 7)

65. Set out in Appendix 1 are the amendments the TCF recommends in relation to the proposed amendments along with the rationale for those changes. The category referred to in the table reflects the proposed reordering outlined above.

Conclusion

66. The TCF supports the aim of the proposed changes to the NESTF, which is to remove unnecessary local variations in rules and processes for investing in new infrastructure. National consistency facilitates efficient network investment which in turn will improve consumer choice, increase coverage, provide better resilience, and improve the quality of service provided. All of which will encourage investment and result in economic and social benefits to New Zealand.

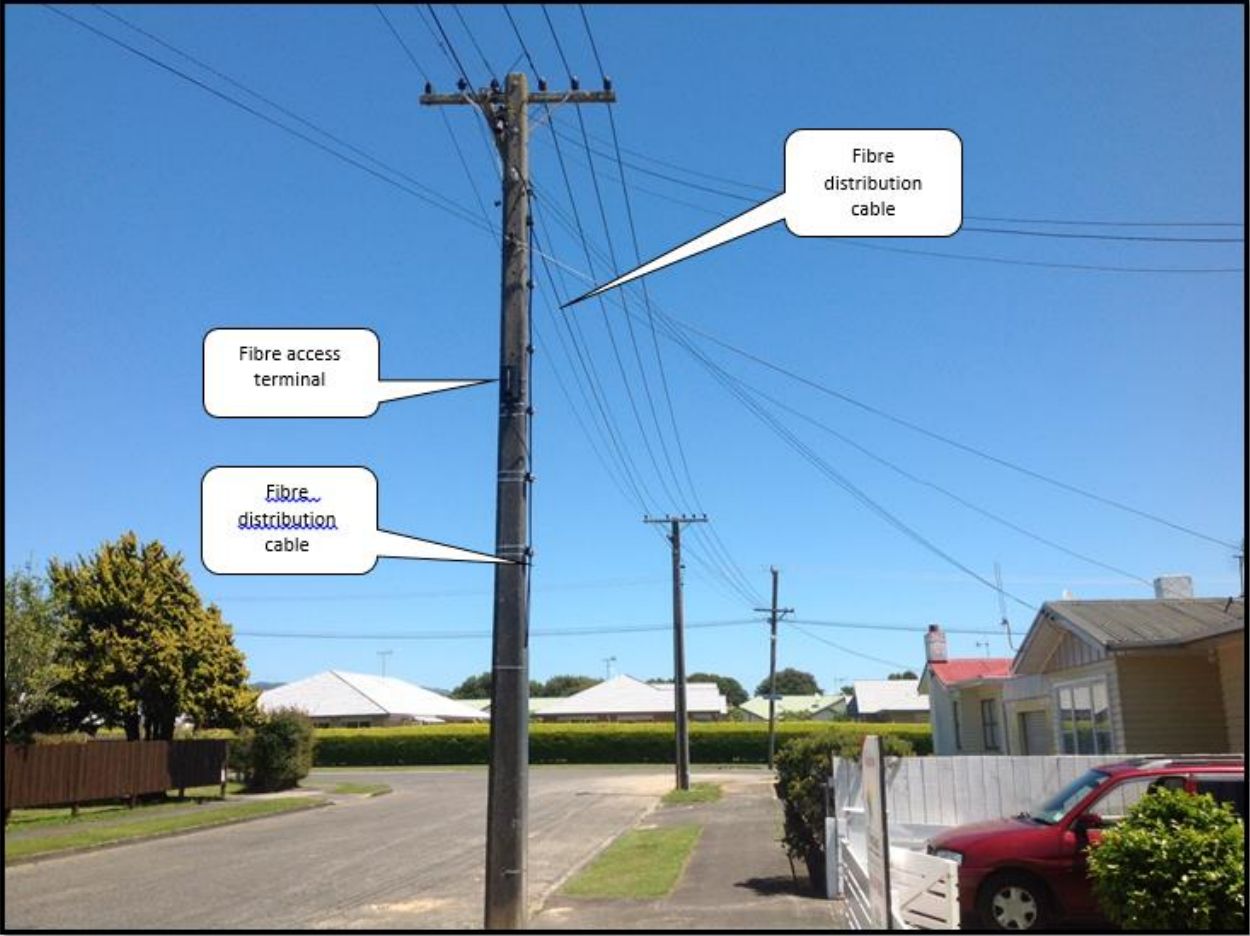
Appendix 1

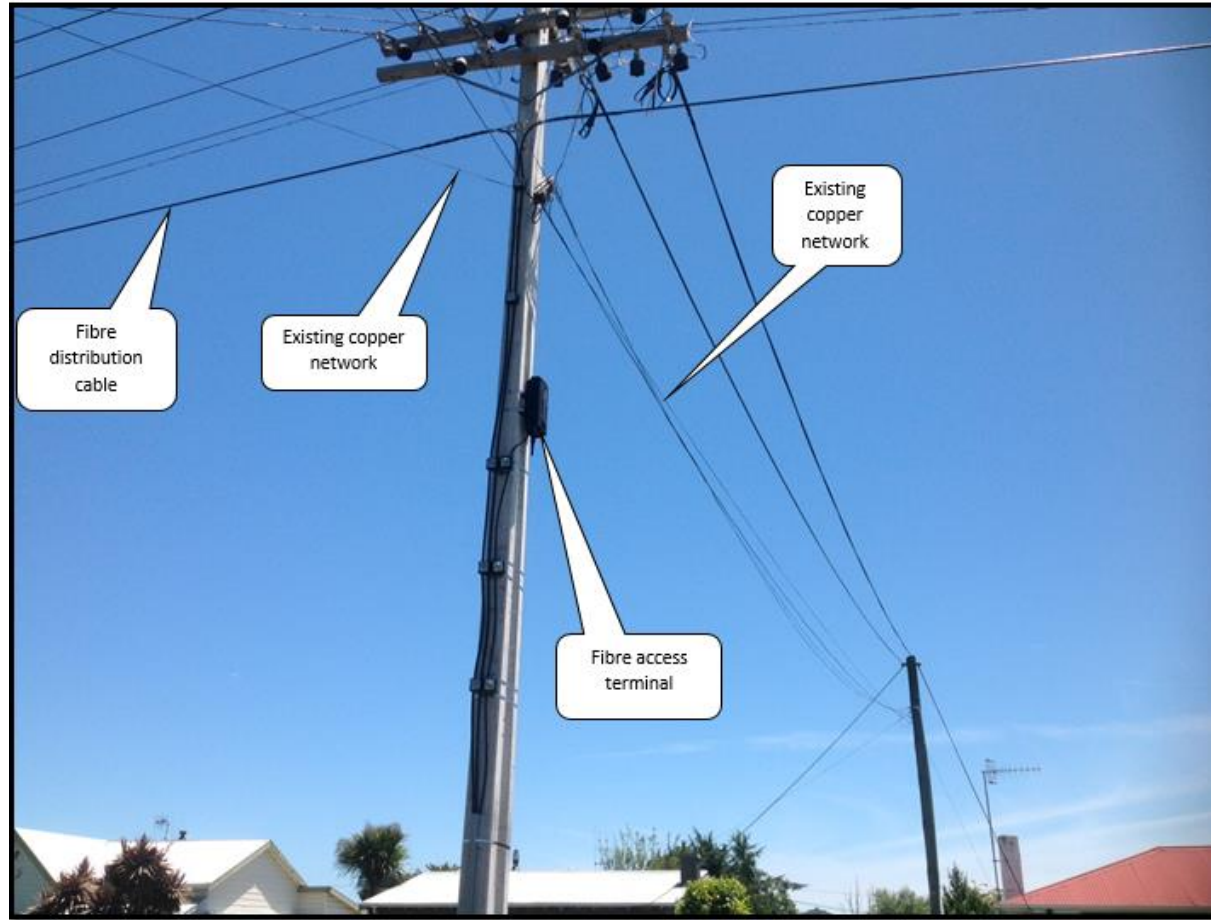
Table 1: Proposed new permitted activities (with associated standards)

Term	Proposed Drafting	Rationale/Background
Definitions		
<u>Telecommunications Cables</u>	means a line, wire or a conductor of any other kind (including a fibre optic cable) used or intended to be used for the transmission or reception of signs, signals, impulses, writing, images, sounds, instruction, information, or intelligence of any nature by means of any electromagnetic system;	This proposed definition is consistent with (although not identical to) the definition of “line” as set out under Section 5 of the Telecommunications Act 2001. It is considered that having a definition for “Telecommunications Cable” will assist with providing certainty over the nature of any new cables to be installed under the revised NESTF. It is further considered that this definition does not limit it to current architecture and is therefore future proof.
<u>Road Reserve</u>	<p><u>Includes Roads as defined under the Telecommunications Act 2001, as set out below, and includes all land from boundary to boundary (including the Berm and Carriageway).</u></p> <p><u>(a) a street and any other place to which the public have access, whether as of right or not; and</u></p> <p><u>(b) land that is vested in a local authority for the purpose of a road as shown on a deposited survey plan; and</u></p> <p><u>(c) all bridges, culverts, ferries, and fords that form part of any road, street, or any other place referred to in paragraph (a) or paragraph (b).</u></p>	This proposed definition is consistent with the definition of “road” as set out under the Telecommunications Act 2001 and the Utilities Access Code. The current definition for road reserve under the NESTF does not align with either of these pieces of legislation. We consider that maintaining consistency with other relevant legislation is essential. In this case we consider that the Telecommunications Act 2001 and Utilities Access Codes to be the most relevant to activities being undertaken under the NESTF.
<u>Ancillary Equipment</u>	<u>Equipment required to support the technology and frequencies deployed at a site or an underground or aerial telecommunications network. Ancillary equipment may include for example, but is not limited to: power distribution unit, microwave unit, DC and surge arrester/units, cables, remote radio unit, fibre access terminals, fibre coils, protection guards, ducting, aerial to underground connections, feeder breakout points, hand holes and plinths.</u>	By its nature a telecommunications network, whether this be a fixed line network (fibre or copper) or mobile network, is made up of many constituent parts. It is considered appropriate for the NESTF to recognise and provide for ancillary equipment required to support the core/ primary facility or infrastructure. The TCF supports a definition that does not limit the “ancillary equipment” to a set list. This ensures that future advances in technology and architecture design(which are often smaller and more efficient) are not excluded and therefore inadvertently deemed to fall outside the NESTF and trigger the need for resource consent.
<u>Rural</u>	<u>A zone/s which provides predominantly for rural type activity/businesses.</u>	The lack of definition for what constitutes “rural” and “residential” has been identified as an issue with respect to the application of the current NESTF. In particular land used for rural residential/ countryside living purposes is deemed by some councils to be a rural land use while being considered residential to others, therefore resulting in an inconsistent application of the standards. Incorporating definitions for these zones will assist in providing clarity and certainty on which conditions apply to these different areas.

Rural residential	<u>A property in a rural area for the purpose of a very low density residence with opportunity for a small rural productive activity.</u>	As above
Residential	<u>A zone/s which provides for predominantly forms/types of residential housing/accommodation and does not include land zoned for rural residential or countryside living purposes.</u>	As above
Commercial	<u>A zone/s which provides for predominantly retail, commercial and business type activities.</u>	Newly proposed standards by the TCF reference these zones, therefore it is appropriate to include definitions.
Industrial	<u>A zone/s which provides predominantly for businesses and industry both light and heavy</u>	As above
Special Areas	<p>Special areas means:</p> <ul style="list-style-type: none"> ● <u>Scheduled/notable trees - notable trees identified in a Unitary/District Plan determined through appropriate expert professional assessment process that are significant for amenity-related matters (size and age of tree or uniqueness of the species) or may have a historic connection to a location or significant person.</u> ● <u>Historic heritage defined areas (Archaeological site, Historic place, Historic area, Site of interest to Māori, Wāhi tapu, Wāhi tapu area and Wāhi tūpuna) under the Heritage NZ Pouhere Taonga Act 2014 or in a Unitary/Regional/District Plan determined through appropriate expert professional assessment process to be of significance to people on account of historical, physical (i.e., technological, archaeological, architectural) and cultural values.</u> ● <u>Outstanding Natural Landscape or Outstanding Natural Feature or</u> 	<p>Without clear controls and definitions of what each of the special areas are, and how they can be established there is the potential for local communities to use broad application and interpretation of the current terms set out under Regulation 6 to restrict the ability for new telecommunication technology to be introduced.</p> <p>We recognise that these sensitive/special areas may require different approaches in different areas. However, the onus should be on the council to justify why it needs to vary its rules from the standard NESTF conditions in those areas and should be obliged to minimise the differences from the NESTF conditions as much as possible. It is proposed that these special areas will only apply in regard to Regulation 6 if the special areas are established in accordance with the definitions of special areas.</p> <p>The proposed definitions in the preceding column set out the framework we consider appropriate for special areas to qualify under Regulation 6 of the NESTF. They require that the special area or feature be determined based on expert and professional assessment in association with a set of suitable criteria.</p>

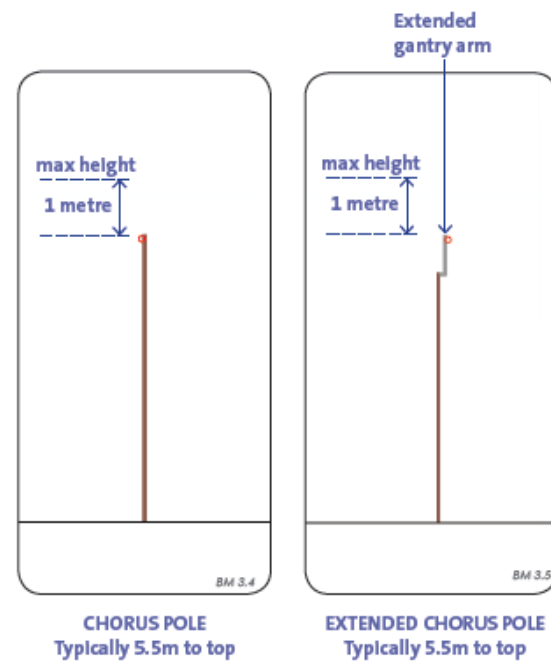
	<p><u>Outstanding/Significant ecological areas (ONL, ONF, OEA/SEA) are defined areas in a Unitary/Regional/District Plan determined through an appropriate expert professional assessment process that identifies whether the sum of its values equates to it being considered outstanding, conspicuous, eminent, especially because of excellence or remarkable.</u></p> <ul style="list-style-type: none">• <u>Natural hazard areas are defined areas related to (earthquake, stability, flooding, Geothermal activity, coastal and climate change hazards) in a Unitary/Regional/District Plan determined through an appropriate expert professional assessment process.</u>	
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Section	Category	Proposed Drafting	Rationale/Background
Recognition of the existing network			
<u>Existing telecommunications and support networks</u>	<u>Existing Networks</u>	<u>The use, operation, maintenance, repair and replacement of existing telecommunications networks including those supporting other network utilities in existence at the date of the NES or which has been lawfully established or granted a resource consent</u>	Recognition of the existing networks is a critical and fundamental planning essential. This will provide confidence to enable and encourage further investment in maintaining the assets
Aerial cabling		<p>Aerial placement of telecommunications cables by a telecommunications operator is permitted, including any necessary ancillary equipment, subject to the following conditions:</p> <ul style="list-style-type: none"> • no additional poles are installed • there is existing aerial cabling using the poles to be used for the new telecommunications cables (for electricity or telecommunications or other utilities) • the diameter of the new cabling does not exceed 30 mm • cables use existing crossings and corridors (ie, no new road crossings may be installed). • <u>new cables are black or dark grey in colour.</u> <p>Associated earthworks and ancillary equipment may include (but is not limited to) fibre access terminals, fibre coils or loops, protection guards, ducting, and aerial to underground connections.</p> <p>Ongoing operation and maintenance of the network is permitted.</p> <p>Relocation and/or replacement poles where necessary for structural or safety reasons may be up to 3 m from the original location <u>and be increased in height by 1m from the tallest point of the existing pole up to a maximum height of 8 m.</u></p> <p><u>The conditions set out under Regulations X (natural hazard zones) and 6(2) (historic heritage values) shall not apply to the activities described in Regulations X (being those described above) except as Regulation X relates to aerial connections to scheduled heritage buildings.</u></p>	<p>Visual Impact Assessments undertaken in support of resource consents for aerial deployment have concluded that black/ dark grey cables are consistent with the existing overhead network and therefore more visually recessive.</p> <p>The below pictures demonstrate what the proposed standard would permit (Chorus New Zealand aerial deployment of UFB, Levin):</p> 



An increase in pole height by one metre to achieve safe clearance distances would not generate adverse visual effects and provides a simple and effective way of achieving compliance.

The picture below shows in a schematic what the proposed addition would permit. The increase in height could be achieved by replacing the existing pole with a higher (by 1 metre) pole or through the addition of a gantry arm as shown.




Underground cabling

Existing

Underground placement of

Reordered the wording to clarify the intention

	Network	<p>telecommunications cables <u>and underground ancillary equipment, including (but not limited to) ducting, feeder breakout points, and hand holes or plinths by a telecommunications operator is permitted, including any necessary trenchless and trenching activities and associated earthworks.</u></p> <p><u>The conditions set out under Regulation X (natural hazard zones) shall not apply to the activities described in Regulations X (being those described above).</u></p>	<p>[Previous wording: Underground placement of telecommunications cables by a telecommunications operator is permitted, including any necessary drilling and trenching and associated earthworks and underground ancillary equipment, including (but not limited to) ducting, feeder breakout points, and hand holes or plinths.]</p>
Buildings			
<p>Antennas on multi-storey buildings including buildings such as apartments in areas zoned residential (see proposed definition)</p>	Buildings	<p>The placement of antennas on the roof or side of a building is permitted, subject to the following conditions:</p> <ul style="list-style-type: none"> the building is no less than 15 m high rooftop antennas do not extend 5m beyond the part of the building to which they are attached. <u>If attached to a sloping roofline 5m beyond the lowest point of attachment</u> <u>the face of the antenna does not exceed a surface area of 1.5m² and the diameter of the dish antenna at its widest point does not exceed 0.8m or 1.2 m.</u> <p>Lightning rods may extend beyond the height of the antennas.</p> <p>Associated cabinets with a footprint of no more than 2 m² and no more than 2 m high <u>and any associated earthworks including any necessary trenching or underground works</u> are permitted. <u>The permitted dimensions for cabinets shall apply to each additional operator where there is already an operator on the site.</u></p> <p>All other equipment necessary for the operation of the antennas, such as the mast or other support structure, <u>feeder cables</u> and ancillary <u>equipment antennas</u>, is permitted.</p>	<p>Being able to establish antennas on buildings is critical. The amendments re-organise the controls related to buildings in the various areas. Where buildings are in predominantly residential areas there is a greater degree of control as opposed to buildings in business, commercial and industrial zones. Multi-storey residential buildings such as apartments provide reasonable tall and dominant buildings that are well suited to antennas without generating visual amenity or other effects.</p> <p>The further amendments will ensure that:</p> <ul style="list-style-type: none"> When attached to a sloping roof and an antenna mounting is ‘spread’ across the roof, that the antennas do not extend more than 5m above some points of attachment. Panel antennas and dish antennas are suitably controlled by respective surface area and diameter size controls. Other works necessary to establish the site such as underground works near the building and ancillary equipment are adequately provided for. <p>Example Photo of what the proposed standard will permit</p> 
Antennas on non-	Buildings	<u>The placement of antennas on the roof or</u>	Additional Rule Proposed

residential buildings in residential zones

side of a building is permitted, subject to the following conditions:

- the building is used for predominantly non-residential activities and not zoned residential
- rooftop antennas do not extend 5m beyond the part of the building to which they are attached. If attached to a sloping roofline 5m beyond the lowest point of attachment
- the face of the antenna does not exceed 1.5m² and the diameter of the dish antenna at its widest point does not exceed 1.2 m.

Lightning rods may extend beyond the height of the antennas.

Associated cabinets with a footprint of no more than 2 m² and no more than 2 m high and any associated earthworks including any necessary trenching or underground works are permitted. The permitted dimensions for cabinets shall apply to each additional operator where there is already an operator on the site.

All other equipment necessary for the operation of the antennas, such as the mast or other support structure, and ancillary equipment is permitted.

It is common for antennas to be established on local/neighbourhood commercial buildings. Generally these have ensured that providers do not need to establish roadside solutions in many residential areas. It is considered that this solution or option should be encouraged as they often provide good coverage with a low visual impact.

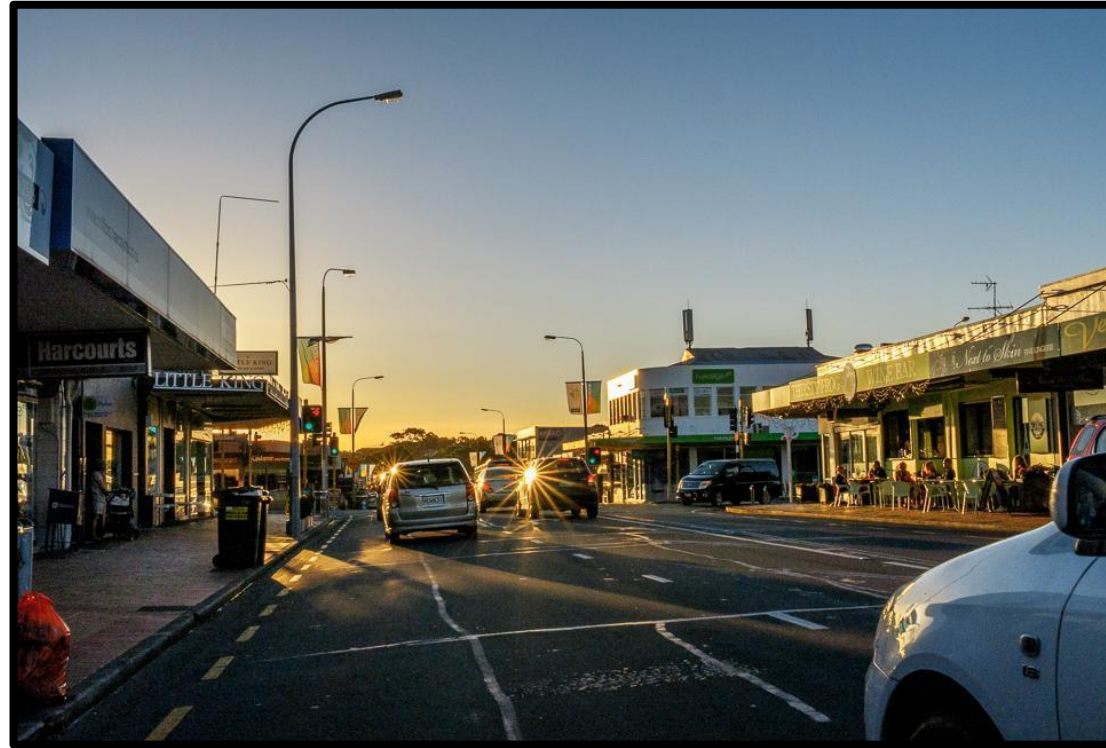
Example Photo of what the proposed standard will permit





<p><u>Antennas on buildings in locations that are not in residential zones.</u></p>	<p><u>Buildings</u></p>	<p><u>The placement of antennas on the roof or side of a building is permitted, subject to the following conditions:</u></p> <ul style="list-style-type: none"> • <u>the building is used for predominantly non-residential activities and not zoned residential</u> • <u>rooftop antennas do not extend 5m beyond the part of the building to which they are attached. If attached to a sloping roofline 5m beyond the lowest point of attachment</u> • <u>the face of the antenna does not exceed 1.5m² and the diameter of the dish antenna at its widest point does not exceed 1.2 m.</u> <p><u>Lightning rods may extend beyond the height of the antennas.</u></p> <p><u>Associated cabinets with a footprint of no more than 2 m² and no more than 2 m high and any associated earthworks including any necessary trenching or underground works are permitted. The permitted dimensions for cabinets shall apply to each additional operator where there is already an operator on the site.</u></p>	<p>Additional Rule Proposed</p> <p>It is common for antennas to be established on commercial and industrial buildings. The NETSF should provide for this option as it will encourage providers to explore and evaluate a wider range of site options.</p> <p>Example Photo of what the proposed standard will permit</p>
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All other equipment necessary for the operation of the antennas, such as the mast or other support structure, and ancillary equipment is permitted.



Milford, Auckland



Howick, Auckland



Lower Hutt, Wellington

Rural Masts

Antennas in rural areas

The placement of antennas in an area zoned rural in the relevant district plan is permitted, subject to the following conditions:

- the total height (of the mast and antennas) does not exceed 25 m
- the diameter of the structure at its widest point (excluding the concrete plinth) does not exceed 6 m
- the site is not a scheduled site or area subject to any special rules (eg, landscape provisions for outstanding natural landscapes or outstanding natural features)
- the antennas is not located closer than 50m from the boundary of an area zoned residential and excluding rural residential
- ~~the antenna is not located closer than 50 m from the closest external wall of a dwelling in a sensitive land use area~~
- lightning rods may extend beyond the height of the antennas
- all equipment necessary for the operation and security of the antennas and ancillary equipment, such as the mast or other support structure, casing or coverings, ~~feeder cables,~~ ancillary antennas, cabinets,


The amendments including the proposed definitions of rural and rural residential clarify and enable the establishment of antennas and masts in rural areas to deliver efficient and effective services to the rural community, through permitted standards. Masts with a reasonable height achieve wider coverage and are essential outside the urban environment and are key to ensuring that operators are able to provide coverage to areas with low population densities. The majority of RBI facilities are 25m in height, in some cases where terrain and vegetation affects the coverage footprint 30-40m high towers have been deployed.

The **further** amendments will ensure that:

- Rural residential areas (which are obviously most commonly found adjacent or within Rural areas) are excluded from the 50m boundary rule, as use within many of these areas will form the purpose for the proposed Rural site. Given increased data use and the increased importance of proximity to a site providing service, it is expected that sites will increasingly be required nearer to where people live and work.
- Ancillary equipment that is essential to enabling the facility to operate is adequately provided for.
- The colouring of a site is determined by what is most suitable on a site to site basis. Grey or green for example may not be suitable in an alpine environment. The important aspect is that the site is recessive in colour, and does not reflect the light.
- Rural areas tend to have an abundance of trees that obstruct signals for our sites, in many cases tree removal and trimming is required to ensure that our sites can operate effectively. Therefore controls around tree removal and trimming should be limited to the effect of the proposal on trees that are Scheduled within the District Plan.
- Controls around proximity to water bodies and vegetation removal are suitably addressed.
- Unrealistic timeframes around reinstatement are not imposed.
- Provision of clear definitions of residential and rural residential

Larger masts as permitted by the proposed changes are also essential to ensure that co-location can occur on those masts in the future.

Example Photos of what the proposed standard will permit (Rural Masts large enough to support co-location of a number of operators)

		<p>security equipment, fences, handrails, and steps or ramps, is permitted</p> <ul style="list-style-type: none"> the support structure shall have a recessive colour coloured <u>recessive grey or recessive green</u> <u>any associated earthworks required for the establishment of the site including the any trenching or underground works are permitted subject to</u> if any earthworks are required to prepare the site: <ul style="list-style-type: none"> <u>sediment control measures shall be in place to ensure sediment runoff does not enter a water course or stormwater system the earthworks do not occur closer than 20 m from the nearest water body</u> the ground or other surfaces being reinstated <u>within 72 hours</u> if any vegetation clearance (trimming or removal) is required to prepare the site: <ul style="list-style-type: none"> the tree(s) must not be scheduled <u>any indigenous vegetation must be reinstated or replaced within the practicable vicinity of the site.</u> 			
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Antennas					
<p>Replacement of existing antennas to improve service or operate on additional or new spectrum bands such as the new 700 MHz spectrum band</p>	<p>Antennas</p>	<p>Replacing existing antennas with a larger antennas capable of operating over additional or new spectrum bands is permitted, subject to the following conditions:</p> <ul style="list-style-type: none"> the total height of the replacement infrastructure (mast and antennas) is no more than 2m higher than the total height of the existing infrastructure <u>the face of the antenna does not exceed 1.5m² and the diameter of the dish antenna at its widest point does not exceed 1.2 m.</u> the diameter of any existing mast is extended no more than the diameter of the existing mast, plus 30 per cent the existing mast and antennas are lawfully established (ie, authorised by a regulation, plan 	<p>Larger antennas allow the operator to either control more frequency bands through that antenna (such as those used for LTE technology), or achieve better control of frequency, such as delivering it to a more targeted area.</p> <p>Referencing the antenna dimension rule to the face of a panel antenna is a more practical method of defining panel antenna size and will provide consistency in interpretation. 1.5m² provides for antennas for current and future technologies.</p> <p>Dish antennas have been specifically included and have been referenced as a diameter rule as is the Industry standard.</p> <p>Controls around proximity to water bodies and vegetation removal are suitably addressed. The focus should be protected scheduled trees rather than any vegetation.</p>		

- or consent under the RMA).
- the facility is not a utility structure located within an area predominantly zoned residential except as provided above for multi-storey apartment buildings in residential areas.

Lightning rods may extend beyond the height of the antennas.

An additional cabinet with a footprint of no more than 2 m² and no more than 2 m high housing the necessary equipment of the additional telecommunications operator(s) may be installed at the site.

~~Additional~~ Ancillary equipment (~~such as feeder cables,~~) on the outside of the support structure is permitted.

- Any vegetation clearance (trimming or removal) is required to prepare the site:
 - the tree(s) must not be scheduled
- Any associated earthworks required for the establishment of the site including the any trenching or underground works are permitted subject to:
 - the ground or other surfaces being reinstated

Example Photos of what the proposed standard will permit


Before



After (taller antennas - artists impression for illustration)



Rural example of upgrading existing mast for better coverage and new technology

				
<p>Additional antennas at existing sites to improve service or operate on additional or new spectrum bands such as the new 700 MHz spectrum band</p>	<p>Antennas</p>	<p>Installation of additional antennas at a telecommunications operator's existing site (ie, on an existing mast on which a telecommunications operator has an existing antennas) to ensure the site is capable of operating over additional or new spectrum bands is permitted, subject to the following conditions:</p> <ul style="list-style-type: none"> the total height of the replacement infrastructure (mast and antennas) is no more than 3.5m higher than the total height of the existing infrastructure the total diameter of the head frame of the structure at its widest point is no more than the diameter of the existing structure plus 100 per cent the face of the antenna does not exceed 1.5m² and the diameter of the dish antenna at its widest point does not exceed 1.2 m. the diameter of any existing mast at its widest is extended no more than the diameter of the existing mast, plus 30 per cent the area is not zoned residential in the relevant district plan 	<p>Additional antennas are required to improve coverage from a particular site and also deploy additional technologies, deploying additional antenna ensures that the current antennas at a site are not affected by the changes and therefore service from the site is not degraded.</p> <p>Additional height of up to 3.5m has been requested to accommodate the additional antenna and the necessary ancillary equipment.</p> <p>Referencing the antenna dimension rule to the face of a panel antenna is a more practical method of defining panel antenna size and will provide consistency in interpretation. 1.5m² provides for antennas for current and future technologies.</p> <p>Dish antennas have been specifically included and have been referenced as a diameter rule as is the Industry standard.</p> <p>Controls around proximity to water bodies and vegetation removal are suitably addressed. The focus should be protected scheduled trees rather than any vegetation.</p> <p>Example Photos of what the proposed standard will permit</p>	

- [if located on a building it shall be predominately non-residential activities or a multi storey apartment above 15m including in a residential zoned area](#)
- [the facility is not a replacement utility structure located within an area predominantly zoned residential except as provided above for multi-storey apartment buildings in residential areas](#)
- the existing mast and antennas are lawfully established (ie, authorised by a regulation, plan or consent under the RMA).

Lightning rods may extend beyond the height of the antennas.

An additional cabinet with a footprint of no more than 2 m² and no more than 2 m high housing the necessary equipment of the additional telecommunications operator(s) may be installed at the site.

~~Additional~~ Ancillary equipment (~~such as feeder cables~~) on the outside of the support structure is permitted.

- [Any vegetation clearance \(trimming or removal\) is required to prepare the site:](#)
 - [the tree\(s\) must not be scheduled](#)
- [Any associated earthworks required for the establishment of the site including any trenching or underground works are permitted subject to](#)
 - [the ground or other surfaces must be reinstated](#)

Before



After (additional antennas - artists impression for illustration)



Before

After (additional antennas installed)




Example of LTE or 4G upgraded site in an industrial area

Location of utility structures in natural hazard areas

Antennas

It is permitted to locate utility structures within zoned natural hazard areas where there is a technical, operational or functional need.

The proposed rule establishes a nationally consistent approach for utility structures within natural hazard areas. Local government is regularly expanding the areas of natural hazards. Providers are required to provide services to customers located within the area or the networks have to traverse these areas. We note that the Building Act has requirements in regard to structures such as masts so that there is already protection for the public from buildings in natural hazard areas.

Co-location			
Co-location of multiple telecommunications operators' antennas	Co-location	<p>Increasing the total height of an existing mast and antennas by up to 5.0m is permitted, subject to the following conditions:</p> <ul style="list-style-type: none"> ● one or more additional telecommunications operators place an antennas on the existing mast at the time the height is increased ● the area is not zoned residential in the relevant district plan ● the existing mast and antennas are lawfully established (ie, authorised by a regulation, plan or consent under the RMA) ● this provision is not applied to a single site more than once ● telecommunications operators cannot exercise this right of activity until they have disclosed their co-location agreement with the relevant local authority and the Ministry of Business, Innovation and Employment. <p>Lightning rods may extend beyond the height of the antennas.</p> <p>An additional cabinet with a footprint of no more than 2 m² and no more than 2 m high housing the necessary equipment of the additional telecommunications operator(s) may be installed at the site.</p> <p>Additional Ancillary equipment (such as feeder cables,) on the outside of the support structure is permitted.</p> <ul style="list-style-type: none"> ● <u>Any vegetation clearance (trimming or removal) is required to prepare the site:</u> <ul style="list-style-type: none"> ● <u>the tree(s) must not be scheduled</u> ● <u>Any associated earthworks required for the establishment of the site including any trenching or underground works are permitted subject to</u> <ul style="list-style-type: none"> ● <u>the ground or other surfaces must be reinstated</u> 	<p>The amendments provide clarification of what enabling and ancillary works can be undertaken to support the establishment of a co-location site. Controls around proximity to water bodies and vegetation removal are suitably addressed. The focus should be protected scheduled trees rather than any vegetation.</p> <p>Example Photos of what the proposed standard will permit</p>  <p>Urban co-location examples</p>



Small Cells

Small-cell units in the road reserve

Small Cells

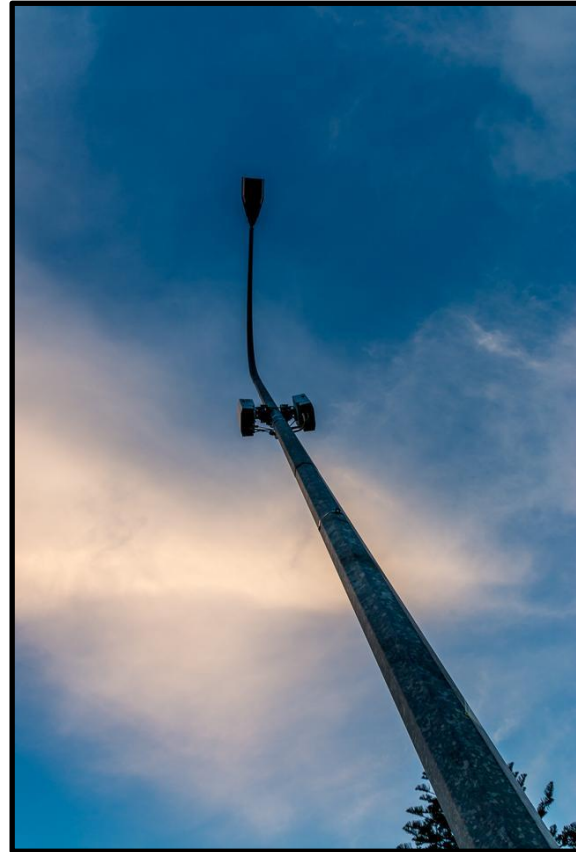
Installation of a small-cell unit including units/antennas supporting other utility networks such as smart meters on a structure (eg, bus stops, cabinets, traffic poles, signage, [telecommunication kiosks](#), light poles) and all ancillary equipment necessary for the operation of the small-cell unit (eg, mounts, cables, combiner / junction boxes) by a telecommunications operator within the road reserve is permitted, subject to the following condition:

- the small-cell unit ~~excluding and the~~ ancillary equipment do not exceed a volumetric dimension of 0.11 m³(eg, 700 mm high x 500 mm wide x 300 mm deep).
- [Any associated earthworks required for the establishment of the site including any trenching or underground works are permitted subject to](#)
 - [the ground must be reinstated](#)

Small cell units such as Wi-Fi are currently commonly provided but the technology and options are expanding. These units are critical to providing significantly improved coverage and capacity in high traffic areas or filling black spots. The units have lower capacity and power levels than a traditional cell site, however due to their small size they are faster to deploy and provide coverage to a localised target area such as high traffic intersections and streets within the CBD areas. As the examples show small cells are designed to attach to existing objects or buildings rather than requiring the construction of new a structure.

The amendments provide clarification of what enabling and ancillary works can be undertaken to support the establishment of small cell unit.

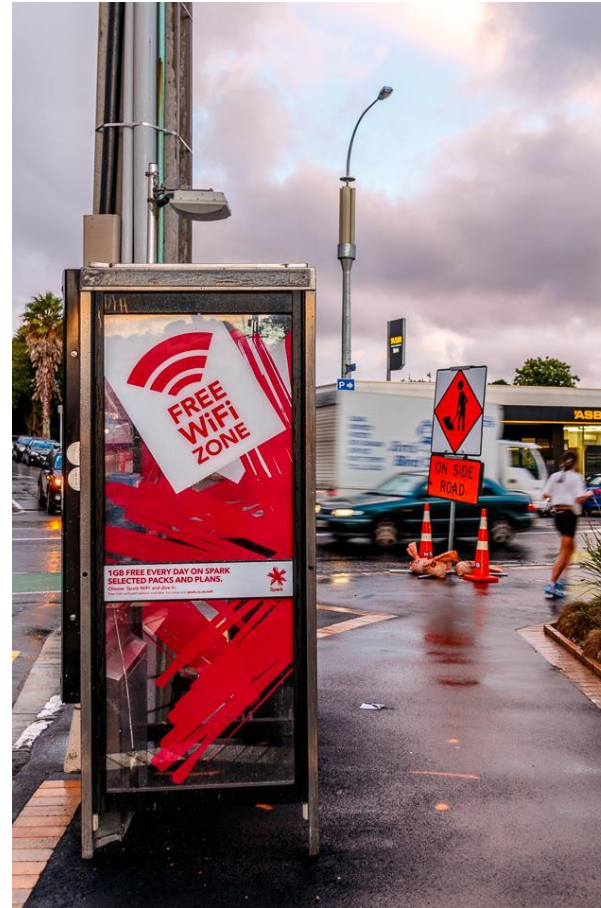
Photos illustrate what the proposed standard will permit (microcells attached to existing street light column shown up close and when viewed from across the street)



Small Cell Equipment and separate Antenna within Auckland CBD



Small Wi-Fi antenna on phone kiosk



Small-cell units on private land (eg, on the outside of buildings)

Small Cells

Installation of a small-cell unit including units/antennas supporting other utility networks such as smart meters on private land (eg, on the outside of a building) and all ancillary equipment necessary for the operation of the small-cell unit (eg, mounts, cables, combiner/junction boxes) by a telecommunications operator is permitted, subject to the following condition:

- the small-cell unit ~~and the~~ excluding ancillary equipment do not exceed a volumetric dimension of 0.11 m³ (eg, 700 mm high x 500 mm wide x 300 mm deep).

See comments above.

Relating to Facilities in the Roadside Reserve (i.e modifications and additions to the current NES rules)

New masts to carry antennas in a predominantly residential road reserve

Masts on the Road Reserve

The installation of a new mast with antennas attached in the road reserve is permitted, subject to the following condition:

- The height must be no more than the utility structure/poles nearest the new structure plus the lesser of 3.5 m or 35 per cent. ~~the total height and width of the mast and antenna is no larger than it would have been if installed in accordance with Regulation 7 (of the existing NESTF) on an existing utility structure within 100 m of the installation site. If there are multiple poles in the 100 m radius, operators must take the average of the poles.~~
- ~~The antenna(s) – excluding the mount, if there is one, and the shroud, if there is one, and ancillary equipment, if there is any – must fit within the dimensions of a cylindrical shape that, when measured along the centre line of the mast (original utility structure or replacement utility structure), is not more than 0.7m in diameter.~~
- ~~All other equipment necessary for the operation of the antennas and ancillary equipment, such as the mast or other support structure, is permitted.~~
- ~~if any vegetation clearance (trimming or removal) is required to prepare the site it is permitted:~~
 - ~~the tree(s) must not be scheduled~~
- ~~any associated earthworks required for the establishment of the site including the any trenching or underground works are permitted subject to:~~
 - ~~the ground or other surfaces must be reinstated~~

The amendments provide clarification of what enabling and ancillary works can be undertaken to support the establishment of new masts in a residential road reserve.

In some cases the replacement of an existing light pole structure is not the best means to introduce wireless infrastructure into a roadside reserve. Whilst it is acknowledged that the use of an existing structure may result in no net increase in pole structures in the road, light poles may not be optimally located for both technical reasons and to meet the concerns or preferences of a nearby surrounding community. Allowing new masts within the road corridor will ensure that infrastructure remains within this established environment, is constrained by the same size limitations and can be flexibly located to ensure that the best possible solution is proposed for both the operator and the community.

Case Study – Stanmore Bay, Whangaparaoa

Nearby residents were disappointed that 2degrees installed this NES compliant side in a residential area (photo below). 2degrees also had a strong preference for a site outside or within Open Space, including on the roof of a large building or a floodlight replacement (example also below) nearby. However a combination of the Reserves Act and District Plan restrictions meant that the Open Space options were either not possible, or would be subject to a long and costly hearing process

Permitted under the current NES



Example of a Standalone Roadside Option (permitted by the proposed changes) – situated outside a park



<p><u>New masts to carry antennas in a predominantly commercial/industrial zone</u></p>	<p>Masts on the Road Reserve</p>	<p><u>The installation of a new mast with antennas attached in the road reserve is permitted, subject to the following condition:</u></p> <ul style="list-style-type: none"> ● <u>The height must be no more than the 5.0m above the permitted building height of the commercial/industrial zone adjoining the road reserve:-</u> ● <u>the face of the antenna does not exceed 1.5m² and the diameter of the dish antenna at its widest point does not exceed 1.2 m.</u> ● <u>lightning rods may extend beyond the height of the antennas</u> ● <u>all equipment necessary for the operation and security of the antennas and ancillary equipment, such as the mast or other support structure, casing or coverings, cabinets, security equipment, fences, handrails, and steps or ramps, is permitted</u> ● <u>if any vegetation clearance (trimming or removal) is required to prepare the site it is permitted:</u> <ul style="list-style-type: none"> ● <u>the tree(s) must not be scheduled</u> ● <u>any associated earthworks required for the establishment of the site including any trenching or underground works are permitted subject to:</u> <ul style="list-style-type: none"> ● <u>the ground or other surfaces must be reinstated</u> 	<p>Additional rule proposed</p> <p>The amendments provide clarification of what enabling and ancillary works can be undertaken to support the establishment of new masts in a commercial/industrial areas. These areas are often important business hubs that require access to the latest telecommunication services in order to operate.</p> <p>Currently the NESTF does not allow for standalone masts within these areas, however masts and cabinets within these areas have greater ability to be accommodated in terms of size and visual impact due to the nature of the activities in the area. In general the road reserves within these areas are larger than residential areas and therefore can accommodate larger structures.</p> <p>A 5m height allowance above the zone height has been requested as antennas need to be located above the general building heights for a particular zone so that the signals can reach the customers. Masts and cabinets are generally permitted within these zones and therefore this should also be extended to the road reserve.</p> <p>Referencing the antenna dimension rule to the face of a panel antenna is a more practical method of defining panel antenna size and will provide consistency in interpretation. 1.5m² provides for antennas of current and future technologies.</p> <p>Lightning rods are a minor addition and should be allowed to extend beyond the height of the structure.</p> <p>Ancillary equipment is required to operate the antennas.</p> <p>Controls around tree removal and trimming are limited to the effect of the proposal on trees that are Scheduled within the District Plan.</p>
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<p>Location of replacement utility structures</p>	<p>Masts in the Road Reserve</p>	<ul style="list-style-type: none"> ● A replacement utility structure may be moved to within a 3 m radius of the original utility structure location, provided the structure is still located within the roadside reserve. ● <u>Any vegetation clearance (trimming or removal) is required to prepare the site:</u> <ul style="list-style-type: none"> ● the tree(s) must not be scheduled ● <u>Any associated earthworks required for the establishment of the site including any trenching or underground works are permitted subject to:</u> ● the ground or other surfaces must be reinstated 	<p>The amendments provide clarification of what enabling and ancillary works can be undertaken to support the replacement of an existing masts in a road reserve. The amendments allow for additional technologies to be deployed on new and existing structures within the road reserve, the dimensions and restrictions within the current NESTF are obsolete and are not capable of accommodating these new technologies.</p> <p>Being able to utilise existing structures and telecommunication facilities within the road reserve is represents and efficient approach to network deployment and also has the least impact on the environment and local communities.</p>
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Size envelope for antennas on replacement utility structures within a road reserve

Antennas in the Road Reserve

The antennas– excluding the mount, if there is one, and the shroud, if there is one, and ancillary equipment, if there is any – must fit within the dimensions of a cylindrical shape that, when measured along the centre line of the mast (original utility structure or replacement utility structure), is not more than 3.5 m high and no more than 0.7 m in diameter.

The height of the replacement utility structure must be no more than the original utility structure's highest point, plus the lesser of 3.5 m or 35 per cent.

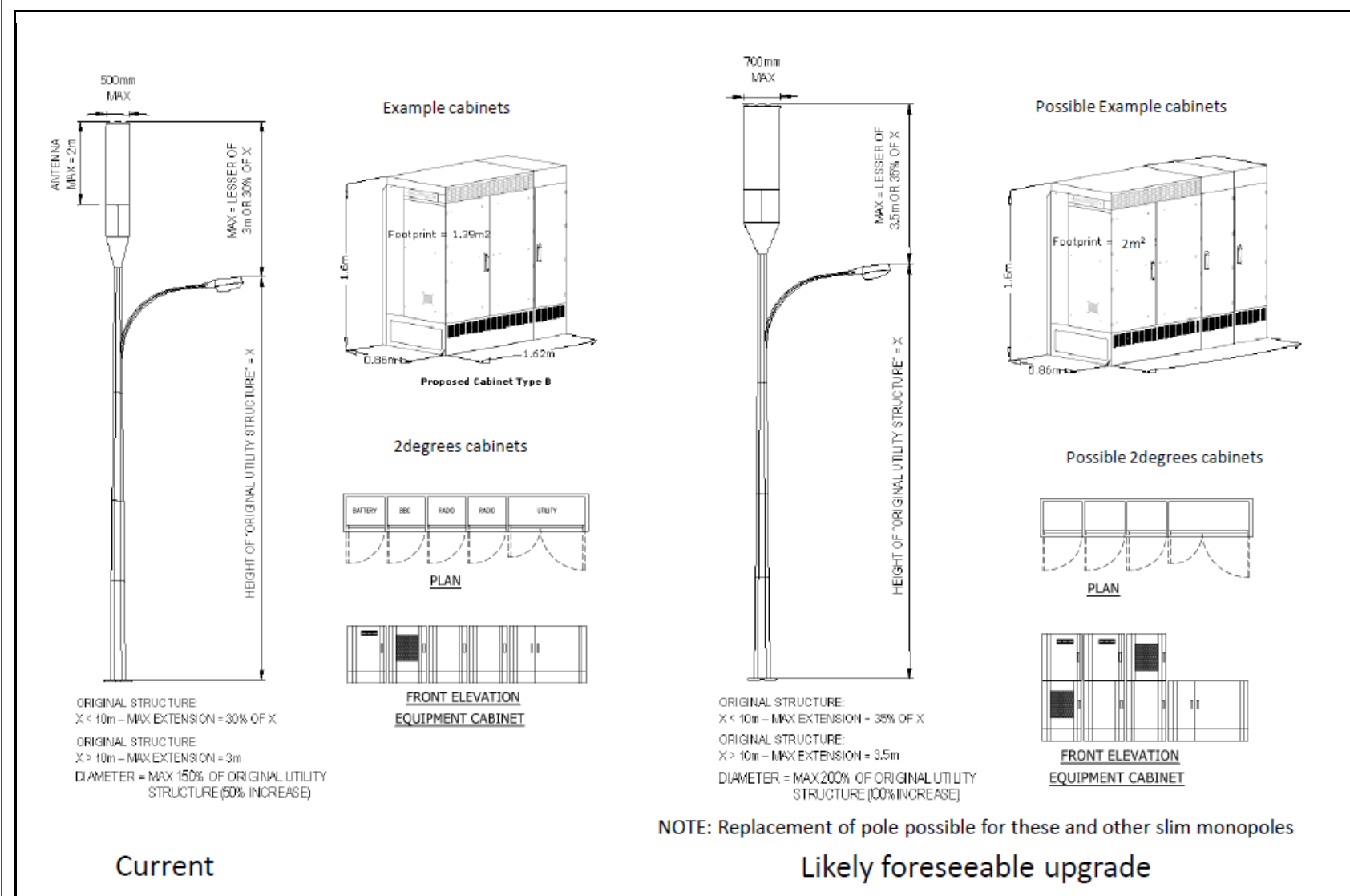
These dimensions also apply to changes to existing replacement utility structures where existing replacement utility structure dimension are less than allowed under these amendments.

The permitted dimensions within the current NESTF were based on the technological requirements at the time. New technologies have been developed since the original NESTF was established and therefore a revised NESTF is required to enable these technologies to be deployed.


In practice replacement utility structures within road reserves are designed to accommodate 3 panel antennas, each antenna needs to be capable of providing services to an area across multiple technologies. As more technologies are deployed the larger each antenna need to be to accommodate each additional technology. Additional technologies also require additional ancillary equipment, such as feeder cables to be accommodated; therefore the poles need to be increased in size.

Under the existing NESTF if an operator wishes to change antennas at an existing established site, for example deployment of additional technologies, we are restricted to the existing height of the structure and therefore need to apply for consent for these changes. Being able to upgrade existing sites within the road reserve represents an efficient approach to network deployment and also has the least impact on the environment and local communities. Therefore the proposal is to allow the new dimension controls to apply to existing replacement utility structures (established sites) where existing replacement utility structure dimensions are less than allowed under these new NESTF.

Example of possible upgrade Path



Example of a lightpole site with diplexers (VODAFONE site at corner of Ranui and Rangitoto, Remuera)

				
<p>Size of replacement utility structure (including the antennas and the mast) <u>within a road reserve</u></p>	<p>Antennas</p>	<p>The height of the replacement utility structure must be no more than the original utility structure's highest point, plus the lesser of 3.5 m or 35 per cent.</p> <p>The replacement utility structure must not have a diameter that is more than the original utility structure's diameter at its largest point, plus 100 per cent or to a maximum of 6.0m.</p>	<p>See rationale above</p>	

Special requirements for certain areas

Set out below are the amendments the TCF recommends in relation to the proposed special requirements amendments along with the rational for those changes.

Table 2: Proposed amendments to standards for existing permitted activities

Section	Proposed Drafting	Rational/Comment
Expanding conditions under Regulation 6 to include telecommunications facilities outside the road reserve	<p>Conditions protecting scheduled trees and scheduled vegetation, historic heritage values, visual amenity, coastal marine areas, and natural hazard areas will apply to all activities under the NESTF where these areas meet the special area definition as provided in the NESFT.</p> <p>If an area was established in such a way that the definition was not met then the area would not be valid and not subject to the NESTF special requirement.</p>	The definition of where these areas apply under Regulation 6 needs to be redefined and could be replaced with the term special areas. Refer to the proposed definitions above.
Adding 'natural hazard zones' to Regulation 6	<p>Conditions managing infrastructure in natural hazard zones in the relevant district plan will prevail over the NESTF where they are more stringent than the NESTF requirements. when the permitted standard is not complied with.</p>	The definition of natural hazard zones needs to be tightened. Please see the main discussion document above.
Incorporation by reference	<p>Replace reference to NZS 6609.2:1990 <i>Radiofrequency Radiation – Principles and Methods of Measurement – 300 kHz to 100 GHz</i> with reference to AS/NZS 2772.2:2011 <i>Radiofrequency Fields Part 2: Principles and Methods of Measurement and Computation – 3 kHz to 300 GHz.</i></p>	The TCF does not agree with this proposal in its current form. Please see the main discussion document above.
Clarification of per 'site' terminology	<p>'Site' will be defined as an area where cabinets are located. The requirement that each site must be located a minimum of 30 m from another site will remain unchanged.</p>	
Time for cabinets to be replaced	<p>Two cabinets on the same side of the road may be located within 30 m of each other, but more than 500 mm apart, as a permitted activity subject to the following conditions:</p> <ul style="list-style-type: none"> the replacement cabinet is being installed <u>to enable the development of upgraded facility or new network</u> or to replace a the existing cabinet the existing cabinet must be removed <u>when crossover to the new network is exclusively</u> 	It is recognised that removal of cabinets is visually important. However in most cases the cabinet can only be removed once the customers have all be transfer to the new network. The providers have limited control over timing.

	achieved no later than 12 months following installation of the replacement cabinet.	
Additional cabinets	This condition applies if two or more cabinets are located at the same site in a road reserve next to land that a relevant district plan or proposed district plan classifies as primarily for residential activities. Each cabinet's footprint must be no more than 1.4 m ² . The total footprint of all the cabinets must be no more than 2 m ² . The distance between each cabinet and the cabinet or cabinets closest to it must be no more than 500 mm. The cabinets must be no higher than the height of the concrete foundation plinths, if there are any, plus 1.8 m.	This amendment provides a reasonable standard and clarification.

Regulation 4 (Rf)

Table 3 Proposed amendments to Regulation 4 of the NESTF

Amendments (indicative NESTF requirements only)		
Section	Proposed Drafting	Rational/Comment
Incorporation by reference	Replace reference to NZS 6609.2:1990 <i>Radiofrequency radiation – Principles and methods of measurement – 300 kHz to 100 GHz</i> with reference to AS/NZS 2772.2:2011 <i>Radiofrequency fields Part 2: Principles and methods of measurement and computation – 3 kHz to 300 GHz (and any subsequent revisions thereof)</i> .	
<u>Refine measurement threshold</u>	<p><u>Regulation 4 – Telecommunications facilities generating radiofrequency fields: activity status</u></p> <p><u>(4) The second condition is that the network operator ensures that the relevant local authority receives, before the telecommunication facility becomes operational, the following:</u></p> <p>a. <u>Written or electronic notice of where the facility is or where it is proposed to be; and</u></p> <p><u>(b) A report that:</u></p> <p><u>(i) Predicts whether the radiofrequency field levels at places in the vicinity of the facility that are reasonably accessible to the general public will comply with NZS 2772: Part 1:1999 Radiofrequency Fields Part 1 – Maximum Exposure Levels – 3 kHz to 300 GHz (and any subsequent revisions thereof); and</u></p>	<p>The measurement of radiofrequency fields has been clarified and provides a number of reporting options as anticipated in the NESTF and AS/NZS 2772.2:2011. The reasons for the amendments are set out in the discussion of the issues below.</p> <p>Regulation 4 of the NESTF incorporates two New Zealand Standards by reference. These relate to:</p> <ul style="list-style-type: none"> • maximum exposure levels for radiofrequency fields; and • methods of measuring radiofrequency fields. <p>The exposure level Standard (NZS 2772.1:1999 <i>Radiofrequency Fields Part 1: Maximum exposure levels – 3 kHz to 300 GHz</i>) was developed based on international guidelines produced by the International Committee on Non-Ionising Radiation Protection (ICNIRP). The New Zealand exposure Standard sets limits for public exposure which are 50 times lower than the level at which health effects may start to occur. This is a widely accepted conservative measure.</p> <p>The maximum radiofrequency exposure limits allowed by the current exposure Standard remain fit for purpose. While mobile networks will require additional antennas, exposures from any infrastructure expansion will still not be allowed to exceed the current radiofrequency field exposure limits.</p> <p>The NESTF also allows councils to maintain a record of the location of radiofrequency transmitters.</p> <p>Subclause 4 of Regulation 4 of the current NESTF requires that mobile network operators calculate the predicted levels of radiofrequency field exposure from all antennas operating in the vicinity of the telecommunication facility. Should the cumulative radiofrequency field exposure levels reach or exceed 25% of the maximum allowed levels, subclause 5 requires that operators take measurements and provide a report to local authorities to confirm that exposures comply with the maximum allowed levels. Regulation 4 (5) is reproduced below:</p> <p>5 <i>The third condition applies if the prediction referred to in subclause (4)(b)(iii) is that the radiofrequency field levels will reach or exceed 25% of the maximum level authorised by NZS 2772: Part 1:1999 Radiofrequency Fields Part 1 – Maximum Exposure Levels – 3 kHz to 300 GHz for exposure of the general public. The network operator must ensure that the</i></p>

	<p><u>(ii) takes account of exposures arising from other telecommunication facilities in the vicinity of the facility; and</u></p> <p><u>(iii) is prepared in accordance with one of the following two approaches to be determined by the Network Operator</u></p> <p><u>(A) AS/NZS 2772.2:2011 Radiofrequency fields Part 2: Principles and methods of measurement and computation – 3 kHz to 300 GHz, including determination of the uncertainty in the predicted exposures ; or</u></p> <p><u>(B) AS/NZS 2772.2:2011 Radiofrequency fields Part 2: Principles and methods of measurement and computation – 3 kHz to 300 GHz, excluding determination of the uncertainty in the predicted exposures</u></p> <p><u>(5) The third condition applies if a report is submitted in accordance with subclause (4)(b)(iii)(A). If the upper bound of the 95% confidence interval of the exposure prediction referred to in subclause (4)(b)(iii)(A) exceeds the maximum level authorised by NZS 2772: Part 1:1999 Radiofrequency Fields Part 1 – Maximum Exposure Levels – 3 kHz to 300 GHz for exposure of the general public then the network operator must satisfy the requirements of clause 7.</u></p> <p><u>(6) The fourth condition applies if a report is submitted in accordance with subclause (4)(b)(iii)(B). If the prediction referred to in subclause (4)(b)(iii)(B) is that exposures will reach or exceed 25% of the maximum level authorised by NZS 2772: Part 1:1999 Radiofrequency Fields Part 1 – Maximum Exposure Levels – 3 kHz to 300 GHz for exposure of the general public, then the network operator must satisfy the requirements of clause 7.</u></p> <p><u>(7) If required under Clause (6) the network operator must ensure that the relevant local authority receives, within 3 months of the telecommunication facility becoming operational, a report that –</u></p> <p><u>a. is prepared in accordance with AS/NZS 2772.2:2011 Radiofrequency fields Part 2: Principles and methods of measurement and computation – 3 kHz to 300 GHz</u></p> <p><u>b. provides evidence that the actual radiofrequency field levels at places in the</u></p>	<p><i>relevant local authority receives, within 3 months of the telecommunication facility becoming operational, a report that—</i></p> <p><i>(a) is prepared in accordance with NZS 6609.2: 1990 Radiofrequency Radiation: Part 2: Principles and Methods of Measurement 300 kHz to 100 GHz; and</i></p> <p><i>(b) provides evidence that the actual radiofrequency field levels at places in the vicinity of the facility that are reasonably accessible to the general public comply with NZS 2772: Part 1:1999 Radiofrequency Fields Part 1 – Maximum Exposure Levels – 3 kHz to 300 GHz</i></p> <p>The issue</p> <p>The NESTF currently incorporates by reference the Standard NZS 6609.2:1990 <i>Radiofrequency radiation – Principles and methods of measurement – 300 kHz to 100 GHz</i> which refers to measurement of radiofrequency fields and gives guidance on calculation of exposures. Specifically, Regulations 4(4)(b)(i) and Regulation 4(5)(a) state that reports on radiofrequency field exposure should be prepared in accordance with NZS 6609.2:1990.</p> <p>This Standard has since been withdrawn and replaced by AS/ NZS 2772.2:2011 <i>Radiofrequency fields Part 2: Principles and methods of measurement and computation – 3 kHz to 300 GHz</i>.</p> <p>The main difference between the two Standards is that the new AS/NZS 2772.2:2011 is more explicit in its requirements and more comprehensive in its guidance for the assessment of exposures to radiofrequency fields. It also introduces a requirement to evaluate the uncertainty in the exposure assessment. There is no change to the exposure levels currently permitted.</p> <p>Proposed Amendment</p> <p>As well as updating the Standard by reference we propose to amend and clarify the conditions under which measurement reports on radiofrequency field exposures are required. Currently, the requirement to produce a report is triggered when radiofrequency field exposure levels are predicted to reach or exceed 25% of the maximum level permitted in the exposure Standard.</p> <p>The requirement for measurements when calculated RF field exposure levels reach 25% or more of the maximum permitted level was carried forward from a suggested District Plan rule in the 2000 MfE/MoH <i>National guidelines for managing the effects of radiofrequency transmitters</i>. This threshold was set based on the consideration of tolerances in transmitting equipment, and the possibility of reflections of the radio signal off nearby buildings or the ground which can lead to localised increases (and decreases) in the exposure compared with the calculated value.</p> <p>AS/NZS 2772.2:2011 provides a more rigorous framework for dealing with such uncertainties, so it is proposed to provide an alternative option in which the simple threshold of 25% is replaced by one based on the uncertainty in the exposure calculation. The uncertainty in the exposure calculation is determined from the uncertainties, or manufacturing tolerances, in the individual quantities which feed into the calculation. The framework for dealing with these is provided in AS/NZS2772.2:2011, which follows the approach of the International Standards Organisation <i>Guide to the expression of uncertainty in measurement</i>.</p> <p>The 25% threshold will remain as an option to be used, for example, in simple situations which do not justify the extra effort required to produce a more detailed evaluation of the uncertainties in the exposure assessment. It is a conservative threshold which will trigger the requirement for measurements well before there is a genuine possibility of exposures in public areas exceeding the maximum permitted level. In some situations, however, such as where there are several transmitters operating independently through a single antenna, it may be unnecessarily onerous, and a full uncertainty evaluation would provide a more realistic evaluation of the distance from the antenna beyond which there is a high degree of confidence that exposures will not exceed the permitted limit.</p> <p>When calculating exposures with an uncertainty analysis, the result is shown as the calculated value of the exposure, accompanied by a ‘coverage interval’. The calculated value is a best estimate of the actual exposure, based on a range of known specifications and inputs that reflect theoretical exposure. The coverage interval accompanying this, is calculated from the uncertainties in the quantities used in the calculated value, and shows the range of values within which the true, real world value might actually lie, with a particular probability (usually taken to be 95%). For example, the calculated exposure at a point of interest might be $X \pm Y$ dB, where X is the exposure as a percentage of the limit specified in NZS 2772.1:1999, and $\pm Y$ is the coverage interval. There is a 95% probability that the true value of the exposure lies between the lower bound of $X-Y$ dB and the upper bound of $X+Y$ dB.</p> <p>Coverage intervals may be either two-sided or one-sided. Two-sided intervals (such as in the example in the preceding paragraph) are normally used if the best estimate of a quantity is needed. One-sided intervals, which provide only an upper bound of the coverage interval, are normally used if the requirement is to specify compliance with a limit. If the upper bound of a one-sided coverage interval exceeds the exposure limit, measurements will be required once the site is operating to confirm that exposures comply with the limit.</p> <p>The proposed change will reduce the compliance costs associated with reporting, whilst still ensuring that radiofrequency field exposure limits are well below levels at which any harmful effects may occur.</p> <p>The NES User Guide will be amended to provide additional guidance on this point. A further explanation can be found in Appendix 3</p>
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[vicinity of the facility that are reasonably accessible to the general public comply with NZS 2772: Part 1:1999 Radiofrequency Fields Part 1 – Maximum Exposure Levels – 3 kHz to 300 GHz.](#)

Regulation 8 (cabinets)

Table 5: Proposed Amendments to Regulation 8 (cabinets)

Amendments		
Clarification of per 'site' terminology	'Site' will be defined as an area where cabinets are located. The requirement that each site must be located a minimum of 30 m from another site will remain unchanged.	The amendments now link the site definition to where the equipment cabinets are located rather than the adjacent Lot Boundary which has caused issues for cabinet placement where cabinets are located adjacent large Lots or Corner Lots.
Time for cabinets to be replaced	Two cabinets on the same side of the road may be located within 30 m of each other, but more than 500 mm apart, as a permitted activity subject to the following conditions: <ul style="list-style-type: none"> the replacement cabinet is being installed to enable the development of upgraded facility or new network or to replace a the existing cabinet the existing cabinet must be removed when crossover to the new network is exclusively achieved no later than 12 months following installation of the replacement cabinet. 	The amendments provide clarification of what enabling and ancillary works can be undertaken to support the establishment of new masts in a residential road reserve.
Additional cabinets	This condition applies if two or more cabinets are located at the same site in a road reserve next to land that a relevant district plan or proposed district plan classifies as primarily for residential activities. Each cabinet's footprint must be no more than 1.4 m ² . The total footprint of all the cabinets must be no more than 2 m ² . The distance between each cabinet and the cabinet or cabinets closest to it must be no more than 500 mm. The cabinets must be no higher than the height of the concrete foundation plinths, if there are any, plus 1.8 m.	The amendments allow for a practical cabinet dimension when adding and locating additional cabinets to sites within the road reserve.

Appendix 2: Questions & Answers

Proposed additions

Regulation 2.1: Telecommunications cables

For each of the proposed new permitted activities that you wish to comment on:

a. Do you agree with the proposals?

Aerial Cabling

The TCF supports the proposal to include a new regulation providing for aerial cabling and any necessary ancillary equipment as a permitted activity. At present there is significant variability in the way in which district plan rules control aerial cables. The TCF therefore supports the introduction of regulations providing for a nationally consistent approach. In summary the TCF considers:

- The terminology used, namely reference to “telecommunication cables” is appropriate and provides for deployment flexibility.
- The reference to ancillary equipment is supported with the examples given being an accurate representation of the type of equipment that is often installed to support the telecommunications network. Further the drafting is considered future-proof and does not limit future architecture advancements.
- The proposed regulations have been drafted to provide the correct balance between providing for deployment flexibility while setting suitable conditions to mitigate potential adverse effects.
- An additional condition requiring aerial cables to be black or dark grey would minimise their prominence by ensuring consistency and visual coherence.
- The proposed amendments appropriately provide for the relocation and/ or replacement of poles where required for structural or safety reasons. Providing for repositioning within 3 metres of the original location as a permitted activity is supported, as it affords flexibility to telecommunication operators and will allow them to accommodate requests from road controlling authorities to move poles from kerb to boundary.

Underground cabling

While underground cabling and ancillary equipment is generally provided for as a permitted activity in most District Plans the TCF supports the inclusion of a regulation that confirms this status and provides national consistency.

b. If not, how could they be amended to better gain your support?

We consider the following amendments would provide further certainty and deployment flexibility while managing potential adverse effects:

- All key terms used in the NESTF should be appropriately defined to ensure consistent interpretation and application. This includes the terms “telecommunication cables” and “road reserve” in addition to the special areas (see below)
- Including a new provision to permit replacement poles to be increased in height by 1 metre to meet the necessary clearance distances for road crossings.

- An exclusion to be provided so that the new Regulation 6 condition relating to natural hazard zones does not apply to aerial or underground deployment (including pole replacement or relocation).
- An exclusion to be applied with respect to aerial deployment within road reserve in historic heritage areas.

c. Are the proposed conditions appropriate?

We consider the proposed conditions to be appropriate subject to the amendments discussed in (b) above. In particular we do not consider there to be justification to require the installation of aerial or underground cables or pole replacement to be subject to natural hazard rules.

d. Are the proposed conditions future-proof? What changes could be made to ensure they remain fit for purpose in the long term?

Technology within the telecommunications industry is constantly evolving. We acknowledge that the proposed amendments have been formulated following detailed consultation within the industry's technology groups and as such represent the current view on where the industry sees network deployment in the future. We consider that the terminology applied with respect to aerial and underground deployment is flexible. In particular the term "telecommunications cables" does not restrict future advancements in architecture and that reference to ancillary equipment is drafted to accommodate for new technologies.

e. What do you consider to be the likely costs of these standards, to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

It is current practice with a number of our members to obtain certificates of compliance when seeking to undertake aerial distribution in those areas where the district plan permits this activity. It is anticipated that this will continue to be the case as it is an appropriate mechanism to demonstrate to councils and communities that compliance with the relevant conditions will be achieved. The cost of such applications however, is not significant in comparison to obtaining resource consent.

As discussed further below the TCF is concerned that the introduction of a new Regulation 6 condition for natural hazard zones has the potential to compromise the cost savings that could be realised through the implementation of the proposed standards if applied to small scale telecommunication facilities and infrastructure (including aerial and underground cables and pole replacement/ relocations). In addition to incurring unnecessary consenting costs and time required for coordination between council departments, it will mean the industry is required to continue to submit on individual proposed district/unitary plans to address the issue. For this reason we seek that an exemption be provided for these activities.

f. What do you consider to be the likely benefits of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

We consider there to be significant benefits in the introduction of the new standards with respect to aerial and underground telecommunication cables, including pole replacement and relocation activities. In particular the proposed new standards will:

- provide certainty by applying a set of consistent standards nationwide.
- remove regulatory barriers therefore allowing the best deployment method to be chosen for a site meaning a faster build, therefore bringing the benefits of new technology to communities sooner.
- reduce the scope of work related to district plan reviews and therefore costs to all stakeholders.
- remove the potential for differing interpretations of rules / existing use rights and the costs that are associated with addressing this (legal opinions, declarations etc).
- remove uncertainty around the activity status of essential maintenance activities such as pole replacement/ relocation.
- provide a regulatory platform that provides for future technological advancements.
- create an opportunity for the industry to work with MBIE/MfE in the development of national guidance and training to assist with the implementation of the amended NESTF.

g. Are there any risks associated with the proposal? How could they be addressed?

With respect to the deployment of aerial telecommunication cables we have identified that the primary concern of communities and councils is visual impact. We consider that the proposed conditions associated with the standard will mitigate potential visual effects by ensuring that new telecommunication cables are only placed in corridors where other aerial cables exist (power, telecommunication or other). We consider that the proposed standard would not result in proliferation of cables as there is a natural state of limitation associated with the structural capacity of a pole as well as restrictions associated with commercial access.

We have proposed an additional condition requiring the colour of the new cable to be black or dark grey, therefore ensuring visual cohesiveness. Overall we consider the proposed standards and associated conditions strike the appropriate balance between providing deployment flexibility while managing potential effects.

h. Is additional guidance required to ensure operators are aware of the requirements of the Heritage New Zealand Pouhere Taonga Act 2014 and the Utilities Access Code?

In our experience operators are familiar with and have mechanisms in place to comply with the requirements of the Heritage New Zealand Pouhere Taonga Act 2014 and the Utilities Access Code.

A number of our members work under archaeological authorities issued by Heritage New Zealand and best practice documents have been prepared (in consultation with Heritage New Zealand) for managing connections to heritage buildings. This is in addition to resource consents required in a number of areas for works in heritage areas and on heritage buildings. We note that Heritage New Zealand is currently consulting on five general statements of policy that are intended to provide leadership and direction in key areas of work. With respect to the General Statement of Policy: Statutory Advocacy we see an opportunity for this policy to recognise the

benefits of Heritage New Zealand (HNZ) collaborating with key industry and businesses in developing best practice documents and information sharing. We intend to continue to work with HNZ to ensure that works and activities associated with the deployment of telecommunication cables comply with the requirements of the Heritage New Zealand Pouhere Taonga Act 2014.

Our members are required to work in accordance with the Utilities Access Code and we do not consider that any further industry training is required in this regard. We recognise that the Utilities Access Code is in the final stage of Ministerial approval to amend the Code after a comprehensive public review and submission process. It is expected that there will be a need for some updating of the utility companies and local government knowledge in regard to the amendments. It has been our industry's experience that local government especially officers outside the roading department have limited or no knowledge of the Code and the requirements or conditions that are imposed via WAPs. Improving the knowledge of the Code especially of planners preparing District plans or those processing resource consents will assist to potentially have confidence in the Code instead of duplicating these rules in other Plans. Therefore we consider there is an opportunity for MBIE and MFE to provide some guidance for planning practitioners in association with any guidance documents or training prepared for the revised NESTF.

Regulation 2.2: Mobile Networks

For each of the proposed new permitted activities that you wish to comment on:

a. Do you agree with the proposals?

With the suggested amendments contained within appendix 1, the TCF support the proposals.

b. If not, how could they be amended to better gain your support?

c. Are the proposed conditions appropriate?

Answer b & c : The TCF suggests a number of amendments to the proposals, these are required to ensure the intentions of the proposals are achieved. In addition we seek to provide clarity around a number of the definitions and proposed regulations where they appear to be more permissive than originally intended.

d. Are the proposed conditions future-proof? What changes could be made to ensure they remain fit for purpose in the long term?

Technology is constantly changing and the suggested amendments have been formulated following detailed consultation within the industry's technology groups, and represents the current view on where the industry sees network deployment in the future.

e. What do you consider to be the likely benefits of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

Since the establishment of the NESTF in 2008, as mentioned in paragraph 12 *et seq* above, the benefits will be certainty, confidence and consistency of standards nationwide except where

there are local special areas that warrant specific additional controls. The industry is involved in reviewing every District Plan or related document that comes up for review to try to achieve a level of national consistency. However each Plan has different telecommunication rules and there is a constant need to re-establish the critical and essential need for telecommunications.

The development of more comprehensive NESTF will

- significantly reduce the scope of the work related to Plan reviews and therefore the associated costs to all stakeholders.
- affirm at a national level the importance of telecommunications to New Zealand communities.

f. Are there any risks associated with the proposal? How could they be addressed?

The proposed controls provide appropriate levels of management of risks and adverse effects normally managed in regulatory documents eg District Plans. The ability to establish appropriate special areas provides an improved degree of protection to sensitive and important areas.

g. Will the proposed permitted activities ensure mobile networks can be built to provide adequate coverage to meet present and foreseeable future demand for services?

The proposed amendments will ensure that operators have a significantly improved ability to roll-out appropriate new technology and improve the coverage to meet the ever increasing demand for services. Consistent and appropriate permitted activities ensure that operators have certainty around the land use consent process, so that it is not a barrier to deployment.

h. Are small-cell units defined adequately? What should be included in, or excluded from, the definition?

Yes, small cell units are appropriately defined. The definition is general to enable small new technology to be introduced as it is developed and demanded by customers, without the need for consents as it is developed and demanded by customers. The critical controls that restrict the size of equipment means that these units can be established in many areas without adverse visual amenity impacts.

i. Do special allowances need to be made for small-cell units for ancillary power supply equipment, such as solar panels, to be attached?

It is considered that the small cell unit area limit should exclude the ancillary equipment as it is extremely difficult to calculate the area or volume of this equipment eg cables.

Given the low power demands of small cell units they are more likely to make use of alternative power sources such as solar power without the need for adversely large solar panels. Solar panels should be separately provided for from ancillary equipment, with an appropriate size limitation to ensure visual effects are adequately controlled.

Regulation 2.3: Special requirements for certain areas

For each of the proposed new permitted activities that you wish to comment on:

a. Do you agree with the proposals?

The TCF is concerned with the current proposal's mechanisms to expand the opportunity for an extensive range of special or sensitive areas to be excluded from the NESTF. This will potentially restrict the ability for customers to access telecommunications services in these areas. Without clear controls and definitions of what each of the special areas are, and how they can be established there is the potential for local communities to significantly restrict the ability for new telecommunication technology to be introduced.

We recognise that these sensitive/special areas may require different approaches in different areas. However, the onus should be on the council to justify why it needs to vary its rules from the standard NESTF conditions in those areas and should be obliged to minimise the differences from the NESTF conditions as much as possible. It is proposed that these special areas will only apply in regard to regulation 6 if the special areas are established in accordance with the definitions of special areas in the NESTF see Appendix 1 (table 1) of this submission.

b. If not, how could they be amended to better gain your support?

As set out in Appendix 1 (Table 1) we have proposed amendments to introduction definitions of these special areas. If an area was established in such a way that the definition was not met then the area would not be valid and not subject to the NESTF special requirement.

c. Are the proposed conditions appropriate?

Only if the special areas are appropriately established as the TCF proposes. In regard to natural hazards we propose a permitted standard that if met means that the special requirements do not apply.

d. Are the proposed conditions future-proof? What changes could be made to ensure they remain fit for purpose in the long term?

National guidance, potentially some research and support on how to research and establish appropriate special areas would ensure that the special areas are fit for purpose. At the moment the adopted approaches can be random and are very dependent on the level of funding available for undertaking robust research.

e. What do you consider to be the likely costs of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

The cost of establishing new and upgrading existing assets within special areas will be potentially significantly higher, which has the potential to discourage the provision of services or delay rollouts of new services in these areas. This could potentially disadvantage communities in these locations.

f. What do you consider to be the likely benefits of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

If the TCF amendments are adopted the benefits are that special areas are afforded appropriate protection. Providers would only establish in these areas if there was a significant demand or need to be met in the special area. Providers will not be able to upgrade assets which are already established without further resource consent approval depending on the local district plan requirements.

g. Are there any risks associated with the proposal? How could they be addressed?

The key risk is that a council under pressure from interest groups establishes special areas that are inappropriate as a way to try to increase the controls and restriction on providers beyond the NESTF.

h. Are territorial authorities likely to have these overlays available at the time of the commencement of these standards? If not, which territorial authorities will not have them available? How long would they take to become available? What are the constraints to them being made available?

It is our experience that most Plans have identified these areas and could apply the rule as proposed. However if the TCF amendments were adopted each council would need to establish that the special areas were developed and adopted in a manner that meets the NESTF definitions for special areas.

i. Which other, if any, types of overlays or scheduled sites that district plans commonly include are relevant to telecommunications infrastructure?

The nature of telecommunication infrastructure, as with any network infrastructure, is that it is required to be located where demand exists. As such it is often established within and/or traverses land subject to overlays or scheduled sites. The type of overlays applied to district and unitary plans vary from council to council. We do not consider, however, that there are any additional overlays that should be deemed special areas under Regulation 6. To remove potential ambiguity, it is essential to have robust definitions that clarify what land the Regulation 6 conditions relates to.

Proposed amendments to existing standards

Regulation 3.1: Radio-frequency measurement standard update

For each of the proposed amendments to existing permitted activities that you wish to comment on:

a. Do you agree with the proposals?

Yes, but subject to the proposed amendments in Appendix 1 (Table 3), for the reasons set out in that table and in Appendix 3. The explanation answers questions (a) to (g) below.

b. If not, how could they be amended to better gain your support?

c. Are the proposed conditions appropriate?

d. Are the proposed conditions future-proof? What changes could be made to ensure they remain fit for purpose in the long term?

e. What do you consider to be the likely costs of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

f. What do you consider to be the likely benefits of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

g. Are there any risks associated with the proposal? How could they be addressed?

Regulation 3.2: Conditions controlling cabinets

For each of the proposed amendments to existing permitted activities that you wish to comment on:

a. Do you agree with the proposals?

b. If not, how could they be amended to better gain your support?

c. Are the proposed conditions appropriate?

Answer a, b & c: With the suggested amendments contained within Appendix 1, the TCF support the proposals.

d. Are the proposed conditions future-proof? What changes could be made to ensure they remain fit for purpose in the long term?

e. What do you consider to be the likely costs of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

Answer d & e: The amendments allow for a practical cabinet dimension when adding and locating additional cabinets to sites within the road reserve. They provide a practical approach for when cabinets need to be replaced and upgraded to meet technological advanced and customer demands.

f. What do you consider to be the likely benefits of these standards to telecommunications operators, territorial authorities and the general public? Can you provide further information to support your view?

The amendments allow for a practical cabinet deployment which will provide for a more practical approach to enable operators to deploy network upgrades to customers in efficient and timely manner.

g. Are there any risks associated with the proposal? How could they be addressed?

The proposal as stands will restrict the practicality of upgrading / replacing cabinets within the road reserve.

Summary questions

For each of the proposed amendments to existing permitted activities that you wish to comment on:

a. Are there situations, not already provided for, whereby activities proposed by the NESTF would not be consented or permitted eventually? What other mitigations and controls would be put in place to facilitate these new communications technologies?

b. How practicable is it to rely on district plan overlays to identify areas where variation is appropriate (ie, areas of natural or cultural heritage value, or areas natural hazard zones)?

As identified above, we consider that there is risk in relying on district plan overlays where these are applied without adequate research by appropriately qualified specialists. Accordingly we are seeking additional definitions be included within the NESTF that set out the process required for an overlay to be deemed a “special area” to which the Regulation 6 conditions apply.

c. Is there evidence that increased consultation opportunities would provide material benefits to communities? Please specify.

The TCF has Community Engagement Guidelines for New Wireless Telecommunications Facilities which provide a framework for community/resident engagement when deploying networks that are likely to have a more than a trivial impact on residents. These have been successful in managing community expectations when deploying new and upgrading networks and certain areas. We do not propose to change the TCF Community Engagement Guidelines.

Appendix 3: Proposed changes to NESTF Clause 4 – further explanation

The measurement threshold of 25% specified in the current NESTF picks up a recommendation for District Plan rules in the 2000 MfE/MoH *National guidelines for managing the effects of radiofrequency transmitters*. The reasons provided for this recommendation were:

- Manufacturing tolerances in equipment (transmitters, antenna, feeders) could add up to total uncertainties of a factor of about two (ie, exposures could be between one half to twice as much as estimated by simple calculation).
- Reflections of the radio signal off some surfaces (eg, steel cladding on buildings) can cause localised increases and decreases in radiofrequency levels over what was estimated by calculation. In theory, the increase can be up to a factor of four.

AS/NZS 2772.2:2011 provides a more rigorous framework for dealing with such uncertainties, so it is proposed to provide an option in which the single, simplified threshold of 25% is replaced by one based on the uncertainty in the exposure calculation. The 25% threshold will remain as an alternative to undertaking the uncertainty analysis.

Regulation 6 and Appendix D of AS/NZS 2772.2:2011 provide a good overview and guidance on performing an uncertainty analysis. This material is currently under review, chiefly with a view to improving and increasing the material, but it should result in no changes which would significantly affect these proposed changes to the NESTF. The proposed change which would have the greatest effect is one which specifies a one-sided 95% confidence interval for compliance assessments. This is discussed further below.

Currently, all that is expected in an exposure calculation is a result that the value of the exposure at some point which is reasonably accessible to the public is X, where X is expressed as a fraction (or percentage) of the public limit in NZS 2772.1:1999. It is expected that X has been calculated using the technical parameters for the equipment at the telecommunications facility, and also takes account of contributions from other transmitters nearby if necessary. If $X \geq 25\%$ of the public limit, then the operator has to commission measurements once the site is operating to confirm that exposures comply with the limit.

AS/NZS 2772.2:2011 requires that all measured or calculated RF field levels include a statement of the expanded uncertainty for a two sided 95% confidence interval around the best estimate value. In other words, the “result” has to be expressed as:

$$X \pm Y \text{ dB}$$

Appendix D of AS/NZS 2772.2:2011 provides guidance on how to estimate the uncertainty.

The proposed change replaces the threshold of 25% as the criterion to determine whether measurements are required by a criterion based on the upper bound of the uncertainty (ie X increased by Y dB). Specifically, if the upper bound exceeds the public limit, measurements are required once the site is operational. However, the operator is still left with the option of sticking with the 25% threshold as in some situations this may greatly simplify the

analysis, while still providing a high degree of confidence that exposures in public areas will not exceed the limit.

Example 1 – single frequency transmitter

Suppose an operator has a transmitter operating at a single frequency, with the following parameters (note that the uncertainty values are illustrative only):

Parameter	Value	Standard uncertainty (dB)	Basis
Frequency	900 MHz	N/A, limit = 4.5 W/m ²	
Power	40 W	0.462	Expanded uncertainty ±0.8 dB, rectangular distribution
Gain	16 dBi	0.816	Expanded uncertainty ±2 dB, triangular distribution
Reflections	-	3.46	Expanded uncertainty ±6 dB, rectangular distribution. (In other words, reflections could cause localised exposures which are up to 4 times higher than suggested by simple calculations.)

The distance at which exposures are 25% of the public limit (and so just require measurements according to the current NESTF) is 10.6 m.

An uncertainty analysis finds that the upper bound of the 95% confidence interval just meets the public limit (and so just requires measurements according to the proposed change) at a distance of 12.0 m.

In this situation, the proposed change, using these assumptions, is more conservative than the current NES.

Example 2 – multiple frequency transmitter

Suppose an operator has a transmitter operating at three frequencies. Uncertainties are as before. Other parameters are:

	Tx 1	Tx 2	Tx 3
Frequency	750 MHz	900 MHz	2150 MHz
Power	40 W	40 W	40 W
Gain	14 dBi	16 dBi	17 dBi
Limit	3.75 W/m ²	4.5 W/m ²	10 W/m ²

The distance at which exposures are 25% of the public limit (and so just require measurements according to the current NESTF) is 16.2 m.

An uncertainty analysis finds that the upper bound of the 95% confidence interval just meets the public limit (and so just require measurements according to the proposed change) at a distance of 14.2 m.

In this situation, the proposed change, using these assumptions, is less conservative than the current NES.

The main reason for the uncertainty analysis not requiring measurements so far from the antenna is that the 25% threshold requirement effectively assumes that the points of maximum exposure due to reflections all occur at exactly the same point at all three frequencies. This is unrealistic, and the uncertainty analysis provides a more realistic assessment.

Other considerations

This analysis has only looked at simple models and particular assumptions. Operators may introduce their own factors into the analysis, provided they can be backed up with supporting evidence. (For example, measurements in Europe have shown that cellular transmitters never operate at full power over continuous periods of six minutes. If an operator has data on the actual distribution of transmitter powers, they should be able to use that in their calculations and uncertainty analysis.)

Some parameters would best be standardised in amendments to the NES User Guide, for example, standardised values of uncertainties to be used in accounting for reflections (a reflection coefficient of 0.6 rather than 1 may be more realistic for reflections off the ground or concrete, giving a standard uncertainty of 2.36 dB).

The User Guide should also provide guidance on the role of uncertainty in measurement assessments (eg whether to follow the default approach suggested in Regulation 6.3 of AS/NZS 2011.2:2011).

Reference to AS/NZS 2011.2:2011 also means that there is the ability to present exposure assessments directly in terms of SAR.

One-sided confidence interval

One of the proposed amendments to AS/NZS 2772.2:2011 is to replace the requirement for a two sided 95% confidence interval around the best estimate value by a one-sided 95% confidence interval for compliance assessments (although leaving open the option to specify anything else). (It is also proposed to call this a “coverage interval”, rather than a “confidence interval”.)

The practical difference that this makes is that with a 95% two-sided CI, there is only a 2.5% probability of the actual exposure being greater than $X + Y$ dB, where X is the calculated exposure value and Y is the expanded uncertainty. (There is also a 2.5% probability of the exposure being less than $X - Y$ dB.) With a one-sided CI, there is a 5% chance of the exposure being greater than $X + Z$ dB, where Z is the expanded uncertainty for the one-sided interval.

In terms of the multiple frequency transmitter example, the upper bound of a one-sided confidence interval would be met at 13.0 m from the transmitter, rather than 14.2 m for the two-sided interval.