

Proposed National Environmental Standards for Telecommunications Facilities

Resource Management Act Section 32

Analysis of the Costs and Benefits

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Executive Summary

Telecommunications facilities are currently subject to resource management consenting processes that differ widely between the 73 territorial and unitary local authorities in New Zealand. This creates costs and uncertainty for telecommunications operators seeking to extend their networks and improve the capacity and quality of their services. The use of road reserves for aerials and cabinets is seen as critical to the industry, both for increasing coverage of wireless telecommunications and for improving the quality of landline services.

The Proposed National Environmental Standards for Telecommunications Facilities (referred to as the NES in this document) will generate significant cost savings to both industry and local government in terms of time, certainty and economies of scale through the use of standardised equipment across the whole country. This will facilitate faster roll-out and access to new services, and more choice from competition amongst operators. This will in turn benefit the economy and consumers while balancing community and environmental considerations.

Without the NES, roll-out of new services and enhanced capacity will face multiple resource consent application processes. This will increase costs and potentially slow down the rate of roll-out and the availability of new services across the country. With the NES, new facilities with minor environmental impacts¹ will be permitted activities that avoid the cost of obtaining resource consent. The NES would specify (through performance standards) what constitutes minor impacts for radio-frequency fields, size of cabinets in road reserves, noise of cabinets in road reserves, and size of new and extended antennas in the road reserve.

The main costs and benefits of the NES are likely to be:

- benefits for industry in reduced costs and uncertainty in obtaining consents, assessing each district's particular needs
- benefits for councils in reduced costs in processing consents (over and above what they recover from applicants through charges)
- benefits for consumers from faster roll-out and access to new services, and from more choice and competition among operators
- costs for government in supporting the introduction of the standard
- potential cost for the community in loss of local public participation in council control over environmental effects of activities in road reserves.

An independent economic appraisal, or cost-benefit analysis, was commissioned by the Ministry for the Environment. The analysis was undertaken by a multidisciplinary team that included economists and resource management practitioners. The analysis is, by its nature, national in scope and does not include detailed assessment of the impacts on each of the 73 district plans and locations upon which the NES will impact. Nevertheless, local measures are likely to be important in achieving quality outcomes.

¹ Section 43(3)b of the Resource Management Act states that an NES cannot permit an activity if the effects of the activity will be more than minor.

Total costs associated with the NES for Telecommunications Facilities were estimated at \$4.8 million over 10 years.² The majority of costs are attributable to costs for government in supporting the introduction of the standard. The cost to communities from the loss of local input over telecommunications installations in road reserves are difficult to value; these are not included in the cost-benefit analysis. However, the substantial quantified benefits are considered to outweigh the unquantifiable costs of:

- a) reduced local flexibility/community participation in planning
- b) effects on visual amenity.

The estimated total benefits attributable to the NES are estimated at \$94.4 million over 10 years: the majority of the estimated benefits are attributable to cost savings to industry and local government, through a reduction in resource consent processing. Additional benefits are attributable to the facilitation by the NES of faster roll-out of services and improved services and more choice for consumers. The quantified analysis is robust to large changes in individual assumptions; however the analysis will still be sensitive to community impacts and those unquantifiable costs.

Some councils expect there will be costs for them in adjusting their plans and supporting documentation to avoid confusion with the NES. There is no legal requirement for them to do this under the Resource Management Act, but such costs incurred by councils as a consequence of introducing the NES are appropriate to be included in the cost-benefit analysis. Excluding such costs would further increase the net benefit.

Because the quantified net benefit is so large, the result of the quantified analysis is not sensitive to substantial changes in the input assumptions used.

² Costs and benefits have been assessed over a 10-year period instead of the more widely used 20-year period because this aligns with the 10-year review cycle for district plans under the RMA and the rapidly changing nature of telecommunications technology and infrastructure.

1 Introduction

1.1 Overview

The Minister for the Environment proposes to introduce four national environmental standards for the installation and operation of telecommunications facilities (referred to as the NES in this document). This document presents an analysis of the NES, as required by section 32 of the Resource Management Act 1991 (RMA).

1.1.1 National environmental standards

The RMA enables the Minister for the Environment to prepare national environmental standards. These standards have the force of regulation and are binding on local authorities.

An NES can:

- prohibit an activity
- allow an activity subject to compliance with plan rules
- restrict the making of rules and granting of resource consents
- require certification of compliance with the regulations
- specify the effect of the regulations on existing rules, and require local authorities to review existing resource consents within particular timeframes.

National environmental standards can be established for addressing a range of matters associated with issues such as air quality or water quality. They may also be established for managing the effects of specific activities on the environment (for example, electricity transmission or telecommunications). Full details of matters that an NES can regulate are provided in Appendix 4.

The first NESs in New Zealand are the suite of air quality standards introduced in 2004. The NES for Sources of Human Drinking-water, developed to reduce the risk of activities on land contaminating drinking water sources, came into effect on 20 June 2008.

1.1.2 Proposed National Environmental Standards for Telecommunications Facilities

Four national environmental standards are proposed for the installation and operation of telecommunications infrastructure that supplies services related to mobile and fixed telecommunications services. The standards are for radio-frequency fields and telecommunications facilities such as street-side cabinets and the addition of small antennas to existing structures on road sides or verges.

In essence, the proposals are:

1. **Radio-frequency fields:** An activity (such as a mobile phone transmitter) that emits radio-frequency fields would be a permitted activity provided it complies with the existing New Zealand Standard (NZS2772.1:1999 Radio-frequency Fields Part 1: Maximum Exposure Levels 3 kHz–300 GHz).
2. **Roadside cabinets:** The installation of telecommunications equipment cabinets along roads or in the road reserve would be a permitted activity, subject to specified limitations on their size and location.
3. **Noise:** Noise generated by telecommunications equipment cabinets located alongside roads or in the road reserve would be a permitted activity, subject to specified noise limits.
4. **Roadside masts and antennas:** The installation of masts and antennas on existing structures alongside roads or in the road reserve would be a permitted activity, subject to specified limitations to height and size.

Full details of the standards as approved by Cabinet are provided in Appendix 2.

1.1.3 Background

In June 2005, the Ministry of Economic Development completed a stocktake and analysis of regional and district plans and policy statements prepared under the RMA. The aim of the study was to determine the extent to which existing planning documents consider the national benefits of network infrastructure. The study found that such benefits are not always provided for at a district or regional level, leading to inconsistencies and uncertainties for telecommunications companies seeking to install equipment to deliver new or improved services. The analysis also found that NESs have the potential to improve planning consistency.

The following month, the Government approved an industry-led approach to scoping NESs for telecommunications facilities. A Telecommunications Industry Reference Group was convened, with representatives from Telecom, Vodafone and TelstraClear, Local Government New Zealand, the Ministry for the Environment, the Ministry of Health, and the Ministry of Economic Development. Cabinet chose to involve industry groups directly in the initial scoping process as it considered that industry was best placed to identify the main issues.

A range of possible policy options were considered by the reference group to address the inconsistencies in district plans. The options included doing nothing, legislative change, non-statutory methods, national policy statements (NPS) and NESs. After due consideration, the Industry Reference Group considered that NESs would be the most appropriate RMA-based mechanism to address the problems being faced. This was because NESs would be able to achieve national consistency and a greater level of certainty for both local government and the telecommunications industry.

The proposals were submitted to the Ministry for the Environment, who then led the process for developing the NES for Telecommunications Facilities. The proposals developed by the industry reference group were incorporated into a discussion document that contained the groups suggested standards as well as the Ministry for the Environment's perspective on the industry proposals.

In June 2007, the Ministry for the Environment notified the proposed standards. Details of the original proposals were described in the discussion document *Proposed National Environmental Standards for Telecommunications Facilities* (Ministry for the Environment 2007a).

Public consultation ran for eight weeks from 16 June to 10 August 2007 and provided the opportunity for anyone to engage directly with the Ministry for the Environment on the proposals contained in the discussion document.

At the beginning of the consultation period, public notices were placed in 16 major daily newspapers throughout the country and a media release was sent to media agencies, television stations, radio stations and newspapers. Additionally, copies of the discussion document were sent to government departments, every regional council and territorial authority, and to community organisations that had previously expressed concern over telecommunications facilities. This was followed by a series of five public workshops around the country to further inform people of the proposals.

A total of 82 submissions were received on the NES. An overview of these submissions is contained in the report *Proposed National Environmental Standard for Telecommunications Facilities: Report on Submissions* (Ministry for the Environment, 2007b).

The submissions were analysed and used to inform the development of the final policies that were confirmed by Cabinet in February 2008. The policies are presented and evaluated in this document. Parliamentary counsel will draft the actual regulations to reflect the policy positions agreed by Cabinet.

1.2 The section 32 evaluation and report

Section 32 of the RMA requires the Minister for the Environment to evaluate the objectives and policies of any proposed NES, and to prepare a report summarising the evaluation. The requirements contained within section 32 of the RMA are:

- (3) *An evaluation must examine:*
 - (a) *the extent to which each objective is the most appropriate way to achieve the purpose of this Act; and*
 - (b) *whether, having regard to their efficiency and effectiveness, the policies, rules, or other methods are the most appropriate for achieving the objectives.*

[...]
- (4) *For the purposes of this examination, an evaluation must take into account:*
 - (a) *the benefits and costs of policies, rules, or other methods; and*
 - (b) *the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the policies, rules, or other methods.*

There are two main aspects to the test of *appropriateness*:

- weighing up alternative objectives to determine which one will provide environmental outcomes that will best meet the purpose of the Act
- being satisfied that the objective chosen can best be achieved through the Act, rather than through some other mechanism.

Getting a measure of *effectiveness* involves assessing how well something might work.

Determining the relative *efficiency* of various alternatives is more difficult, and involves an examination of costs and benefits. A measure of efficiency is the extent to which the proposed method achieves the purpose of the Act, compared to the magnitude of what is foregone as a result of using this method. Assessing this involves calculating and comparing the net environmental benefits against the net costs (environmental, social and economic). The more the benefits exceed the costs, the more efficient the option is (Ministry for the Environment, 2000).

A detailed cost-benefit analysis comparing the NES to continuing with the status quo was completed as background to this report. The detailed analysis has been used to inform the broader analysis contained in the present document.

2 Statement of the Issues

2.1 The state of telecommunications in New Zealand

Telecommunications has been the subject of a recent government stocktake and the following section draws heavily on reports prepared for it.³

The main telecommunications technologies currently available in New Zealand are:

- conventional landline (public switched telephone network): generally based on copper cable, but being progressively replaced by fibre-optic cable with greater capacity; a process that may require upgrading and perhaps relocating existing roadside cabinets
- cellular networks (mobile phones)
- wireless local loops (eg, WiMax), are emergent systems that provide local access network through establishment of local cell sites.

A combination of changing technologies and service possibilities, and commercial considerations are driving the principal trends and influences on these networks. These include the search for 'Next Generation Networks' capable of supporting new services, convergence in technological capabilities between fixed-line and mobile services, voice services and data transmission; convergence of devices to handle phone and other consumer electronic functions, and convergence between telecommunications and media, with transmission of broadcast content over phone connections.

These influences combine to give telecommunications operators a strong incentive for increasing their network capacities to handle more data at speeds that support the increased range of services. Other commercial considerations include:

- declining revenue from fixed-line voice services in low traffic density areas due to substitution by mobile telephony and voice over internet protocol services
- uncertainty over regulation (eg, unbundling)
- uncertainty over the value of content-based services.

There appear to be therefore a number of current influences that point to imminent upgrade of facilities, including fibre-to-home and fibre-to-node upgrades of the local loop and development of wireless local loops, and replacement of large exchanges with local control cabinets. All imply moving electronic control systems closer to the customer and, given current technologies, hence more roadside cabinets and associated works. The use of road reserves for siting telecommunications cabinets and antennas is seen as critical by the telecommunications industry: this is both for increasing coverage of wireless telecommunications and for improving the quality of landline services such as new and improved fibre-optic networks. This in turn will lead to increased competition amongst suppliers and provide greater choice and potentially cheaper services to consumers.

³ Azimuth Consulting Limited 2006 and Network Strategies Limited 2006.

2.2 Controls over telecommunications facilities

Two statutory documents govern the establishment of telecommunications facilities within New Zealand – the Resource Management Act 1991 and the Telecommunications Act 2001. The current obligations and requirements of each Act are discussed below.

2.2.1 Resource Management Act

The establishment of telecommunications facilities within road reserves is subject to the controls provided by the Resource Management Act 1991 (RMA). The RMA allows territorial authorities to implement rules within their district plans for controlling the environmental effects of telecommunications facilities. To this end, district plans often contain rules to control the location, size and appearance of telecommunications facilities; and also radio-frequency fields and noise emissions from telecommunications facilities.

The decision-making power for network utility infrastructure was devolved to territorial local authorities when the RMA came into force in 1991. While the environmental effects of telecommunications infrastructure are likely to be the same or similar throughout the country, the policies and rules in district plans that have evolved in response to address the new responsibilities lack consistency. Currently each territorial authority provides its own set of district plan provisions by which to address the potential impacts of telecommunications facilities in road reserves. As a land-use activity, each district plan will state that telecommunications facilities of varying heights and configurations are either permitted within the thresholds specified by the plan, or that some form of approval is required through a resource consent process.

There can be marked variances between the provisions of each district plan, particularly with regard to provisions relating to radio-frequency fields and the permitted height of masts and antennas. Such inconsistencies can add costs to installations in various ways, by creating uncertainty for territorial authorities and telecommunications operators. Local authorities face uncertainty when proposed activities do not clearly fit under the current plan provisions and there is no precedent to draw from. In this case, the appropriate level of public consultation and the outcome of proposed facilities will depend on planners' interpretation of the district plan, creating some uncertainty for telecommunications operators as well. Operators can also lose economies of scale if districts have different requirements for facility size and design. They face additional compliance cost from identifying and adhering to different councils' requirements.

It should be noted that the RMA also provides for Telecom, Vodafone, Broadcast Communications Ltd and Clear Communications Ltd (who currently are the only telecommunications providers with status as a requiring authority) to have land designated for their operational purposes. To date this option has not been taken up by these parties for sites within road reserves. Adopting a national policy statement has not been proposed as a practical option by the telecommunications providers, as it would not provide increased consistency nor certainty beyond that currently experienced through compliance with individual district plan provisions.

However, there is inevitably a trade-off between:

- a) the ease of infrastructure investment through minimal planning ‘inconsistency’ and the contribution this can make to initiatives, including the government’s Economic Transformation Agenda and the Digital Strategy, and
- b) the local community-driven standards and values expressed through district planning processes (the principles of the RMA).

2.2.2 Telecommunications Act

The Telecommunications Act 2001 provides telecommunications operators with a statutory right to occupy the road under agreement with the road controlling authority (as the landowner), “subject to reasonable conditions” regarding size and positioning of the facilities so as not to impede use of the road. This agreement process undertaken under the Telecommunications Act runs in parallel with the RMA process. The road controlling authority in most instances is the local territorial authority, but it can also be Transit NZ and the Department of Conservation (DOC), depending on the location of the proposed telecommunications facility.

Under the provisions of the Telecommunications Act, telecommunications operators and the road controlling authorities reach what are essentially property agreements for occupation. These are subject to reasonable conditions which are primarily aimed at ensuring the safe and efficient flow of traffic and pedestrians within road reserves, ensuring that access is maintained, ensuring co-ordination with other works that may occur in the road, providing for reinstatement works, etc.

The scope and type of conditions imposed by road controlling authorities can vary widely throughout the country, as can the level of payment requested by the road controlling authorities. Although section 153 of the Telecommunications Act specifically prohibits local authorities from charging rental for any telecommunications 'line or works' in the road corridor, some local authorities have assumed the power to charge for non-traditional facilities like wireless aerials and dishes, and they are also able to collect rates revenue from utility networks. Such inconsistent outcomes create uncertainty for the telecommunications providers over whether they will achieve a satisfactory agreement with the road controlling authority to occupy land within road reserves.

A peculiarity of the Telecommunications Act makes it distinct from other legislation giving utilities rights to access for facilities in the road corridor: the term ‘road’ is defined broadly to include any public open space, which includes parks and reserves as well as legally defined roads. A review of legislation governing utilities in the road corridor, led by the Ministry of Economic Development, considered narrowing this definition to be consistent with that applying to gas and electricity facilities, but such a change has not yet been recommended.

The review did recommend:

- aligning definitions of reasonable conditions for all utilities with those in the Telecommunications Act
- a code of conduct be developed by utilities operators and councils
- suggested changes in legislation so conditions cannot be used to improve the amenity of an area (eg, by requiring overhead wires be relocated underground), but only to restore area road subject to utility works, to the condition as identified in the Long Term Council Community Plan.

The final point should ease disputes and delays over the appropriate standard to which the road corridor should be restored following work on utilities facilities.

2.2.3 Other legislation

When considering applications for facilities in road reserves, Transit NZ also has the ability to impose reasonable conditions under a combination of the Transit NZ Act and the Telecommunications Act. As a potential road controlling authority, DOC does not consider applications under the Telecommunications Act; instead, DOC assesses them through its concessions process, whereby all activities must be shown to be consistent with the intentions of the relevant Conservation Management Plan. Matters considered through the concessions process often differ significantly from those considered under the Telecommunications Act: they tend to focus more on the potential environmental impacts of proposed facilities rather than the safety concerns considered by Transit NZ and territorial authorities.

2.3 How non-standard planning provisions affect industry

Variable RMA provisions for telecommunications facilities can affect the resource use efficiency of the networks in a number of ways:

- Companies incur costs that consume labour and materials for no saleable output in the preparation and processing of applications for consents, in delays in authorisation of work and in uncertainty as to outcome.
- Inconsistent approaches in different districts may reduce the realisation of economies of scale through use of standardised equipment.
- Such impacts on operational costs of the networks are either passed on to and recovered from the network's customers, or met by reduction in profits and shareholder returns – slowing down the rate of new investment.
- Configuration of the networks may be redirected from its otherwise optimal route by the stringency of some local provisions, resulting in increased inefficiencies and risks to the on-going network operation.
- There is potential for delays in rolling out new services, as resources used in additional compliance activity are diverted from new investment (regulatory compliance crowding out investment expenditure).
- The current situation is compounded for new-entrant operators, who have no existing network to build on and are particularly dependent on rapid deployment of new facilities to provide viable services and competition against incumbent operators.

In short, variable planning provisions both reduce the level of investment and delays any investment occurring. A local authority approach to works on telecommunications infrastructure that would make them permitted activities (subject to specific limitations) can reduce both impediments.

2.4 Summary

Telecommunications facilities are currently subject to resource management consenting processes that differ widely between the 73 territorial and unitary local authorities in New Zealand. Infrastructure will require planning approval in one district, where in an adjoining district the same infrastructure may not require resource consent at all. A lack of national consistency in the rules of district plans is leading to uncertainty and inconsistencies around time, costs and outcome of the RMA process. This in turn is seen as impeding the delivery of new and improved services that limit the availability, choice of services, and cost savings to consumers.

There is a significant challenge in achieving a balance between facilitating investments in telecommunications infrastructure and protecting those values identified by communities as important.

3 What are the Options?

3.1 Policy objective

The policy objective seeks the following outcome:

To provide for a nationally consistent planning framework for low impact telecommunications infrastructure on road reserves that will:

- *assist in network and equipment design and equipment sourcing for roll-outs*
- *create a reduction in compliance costs and timeframes for service providers*
- *reduce the timeframe and lower the costs for the availability of new services to consumers*
- *contribute to a reduced workload to councils in processing and determining consent applications*
- *set an appropriate balance between local participation in community planning and cost-effective national infrastructure investment.*

The creation of a level playing field across the country would help redress a significant amount of the current uncertainties around time, costs and outcome that exist through the variability in existing district plans.

3.2 Legislative and policy context

There are several pieces of legislation that can have an influence on the deployment of telecommunications infrastructure. When considering a solution, the effect of other relevant legislation needs to be taken into account. In particular, where an NES is being proposed to facilitate the erection of structures alongside roads, there are several statutes that need to be considered.

3.2.1 Telecommunications Act 2001

The Telecommunications Act 2001 provides a right of tenure for certain infrastructure in roads, subject to a process being undertaken with the relevant road-controlling authority. Telecommunications service providers have a statutory right to install lines and cabinets in roads pursuant to sections 135 and 142 of the Telecommunications Act. What is not clear is the full range of structures that telecommunications service providers are entitled to install. There are legal opinions suggesting that antennas and supporting poles (structures that are the subject of the NES) can be installed alongside roads pursuant to the Telecommunications Act.

Despite the Telecommunications Act providing for telecommunications structures alongside roads, such structures can still be required to obtain resource consents under RMA planning instruments. The scope of the Telecommunications Act, which deals with rights of access, is different from the scope of the RMA, which deals with managing the environmental effects of establishing the structures. Consequently, there is scope for establishing NESs that provide clarity and do not duplicate the purpose and functions of provisions under the Telecommunications Act.

3.2.2 Local Government Act 1974 and 2002

The majority of statutory powers and rights relating to the ownership and control of local roads continue to be those set out in Part XXI of the Local Government Act 1974, which have been carried over by the LGA 2002. For the purposes of allowing access to roads for utilities, however, it is control of the road rather than ownership that is important. Section 317 of the LGA 1974 prescribes control over roads, and states that all roads in a district shall be under the control of the council, except state highways, which are under the control of Transit NZ.

Section 319 of the LGA 1974 sets out the general powers of local authorities relating to roads under their control. This section has the potential to influence the access to and operation of utilities within roading corridors, but such matters are typically dealt with under the relevant utilities legislation (eg, the Telecommunications Act 2001).

There are no appropriate provisions in the LGA 2002 that offer an alternative way to addressing the issues outlined in the previous chapter.

3.2.3 Building Act 2004

The Building Act 2004 introduced the term ‘network utility operator’ (NUO). Under the Building Act, in specified circumstances NUOs are not required to obtain building consents. However, the Building Act does not exempt such structures from any requirement for consents under the RMA. Consequently, although the Building Act has helped simplify the deployment of network infrastructure, including some telecommunications structures, it does not offer an alternative means of dealing with issues outlined in the previous chapter.

3.3 Providing for telecommunications infrastructure through the RMA

Telecommunications infrastructure affects – or potentially affects – more than one region: it may involve the introduction or use of a new technology or process that affects the environment generally. In June 2005, the Ministry of Economic Development completed a stocktake and analysis of regional and district plans and policy statements (Beca Carter Hollings and Ferner, 2005). The study examined all district and regional plans and policy statements to determine the extent to which these documents have regard for the national benefits of network infrastructure.

The analysis identified some key trends:

- benefits at a local and regional level are more commonly noted than that at a national level
- network infrastructure is often considered generically
- there is a high degree of consistency in the general approach of existing planning documents, but the detail differs in its emphasis and approach to regulation
- avoiding, remedying and mitigating any adverse effects of network infrastructure is a key concern in existing planning documents.

The stocktake completed in 2005 by the Ministry of Economic Development found that the extent to which telecommunications activities are specifically referred to in any issues, objectives and policies in planning documents is extremely limited. The majority of planning documents rely on the generic network utility provisions in their issues, objectives and policies for telecommunications. In district and regional plans, telecommunications activities are most commonly provided for by either designation or by activity-based rules. In total, 66 (77%) of regional and district plans contain rules relating to telecommunications facilities, with activity classifications ranging from permitted to discretionary.

The 2005 Ministry of Economic Development stocktake report considered that national environmental standards have the potential to add significant value by providing for consistency among planning documents. Shortly after this analysis was completed, and as part of the wider RMA review process, the Government approved a work programme for scoping potential national policy statements and national environmental standards for telecommunications infrastructure.

A Telecommunications Industry Reference Group was convened in July 2005, which was tasked with scoping possible national environmental standards for telecommunications. The Group delivered the final industry proposals to the Ministry for the Environment in June 2006 (Telecommunications Industry Reference Group, 2006). The report stated that the desire of the major telecommunications network providers is to roll out services using standardised equipment across the country; however, the considerable variation between territorial local authority district plans in how they address and control telecommunications infrastructure makes the deployment process time-consuming, expensive and inconsistent.

The Ministry for the Environment undertook a review of all district plans to examine how they currently provide for radio-frequency fields and telecommunications facilities (Incite, 2006). This review confirmed that provisions for telecommunications facilities in existing district plans are inconsistent, many do not have clear provisions relating to infrastructure within road reserves, and some do not contain any rules for radio-frequency fields or rely on out-of-date standards.

The Industry Reference Group recommended developing a suite of four standards to provide for specific elements of the telecommunications infrastructure. The standards are discussed in more detail in chapter 4.

3.4 Evaluation of the objective

Section 32 requires that the evaluation must examine the extent to which the policy objective is the most appropriate way to achieve the purpose of the RMA.

The purpose of the RMA is to promote the sustainable management of natural and physical resources, which means:

... managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –

- a. sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- b. safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- c. avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Based on the evaluation included in the following sections, it is considered that the objective represents the most appropriate way to achieve the purpose of the RMA. Broadly, it is considered that the objective appropriately reflects the balance contained within the Act's purpose between enabling the use and development of resources, and managing the adverse environmental effects of this use and development.

The objective seeks outcomes in relation to three elements: assisting in the roll-out of new and improved services; reducing costs for service providers, consumers and local authorities; and balancing community input (adverse effects) against national infrastructure investment (use and development). The following evaluation considers each of these elements in turn, against the purpose of the RMA.

3.4.1 Assisting in the roll-out of new and improved services

Given the value of the new and improved telecommunications services to the nation (section 2.1), seeking recognition of it through the facilitation of the use, maintenance, upgrade and development is an appropriate objective in terms of the purpose of the RMA.

This component of the objective clearly relates to section 5 of the Act, which seeks to enable the use and development of resources, including physical resources such as telecommunications networks, so that people and communities can meet their needs. The first element of the objective serves to build upon this broad intent within the Act's purpose by setting specific direction in relation to a nationally significant network. Assisting with the roll-out of new and improved services will contribute to achieving one of the Government's top priorities of economic transformation and the aim of creating a higher-value economy. The policy objective will help deliver on other goals including:

- faster and more cost-effective delivery of telecommunications facilities
- achieving top half of the Organisation for Economic Co-operation and Development (OECD) [broadband] performance by 2010
- becoming a "... world leader in using information and technology to realise its economic, social, environmental, and cultural goals" (The Digital Strategy 2005).

Facilitating these goals through assisting the roll-out of new and improved telecommunications services will aid people and communities by providing for their social and economic wellbeing as well as for their health and safety. Effective communication channels are considered essential to maintaining the health and safety of people and communities.

3.4.2 Reducing costs for service providers, consumers and local authorities

Reducing the development and operating costs of telecommunications services and associated infrastructure has direct benefits to the social and economic wellbeing of people and communities. Access to high-speed broadband is considered not as a competitive advantage to New Zealand businesses anymore, but a prerequisite for remaining competitive in local and international market places. It has a significant impact on economic development in regional New Zealand.

Reducing costs associated with infrastructure investment will aid deployment and help ensure students and families (our future generations) will have enhanced teaching and learning resources and the same opportunities in education, regardless of where they live. This will help communities and people in providing for their economic and social wellbeing.

3.4.3 Setting an appropriate balance between local participation in community planning and cost-effective national infrastructure investment

The management of adverse environmental effects is addressed through the objective of setting an appropriate balance between local participation in community planning and cost effective national infrastructure. Ensuring local participation in community planning will mean that values identified by communities as important are considered and the community can then choose whether to avoid, remedy or mitigate any adverse effects of the activities that may arise. Cultural wellbeing is not explicitly provided for through the objective, however ensuring an appropriate level of local participation in community planning allows for the identification and management of issues important to maintaining cultural wellbeing.

3.5 Resource Management Act options

To improve the delivery of telecommunications infrastructure, a number of national policy options could be considered, including:

- do nothing (status quo)
- non-regulatory approaches (eg, partnership with district councils, production of voluntary guidelines, guidance notes)
- amend the RMA
- a national policy statement
- a national environmental standard.

This section explains these options and assesses their appropriateness for achieving the policy objectives.

3.5.1 Status quo

Telecommunications companies wishing to install their infrastructure are currently subject to resource management consenting processes that differ widely between local authorities. This creates costs and uncertainties for telecommunications operators seeking to roll out new services, or extend their networks and improve the capacity and quality of their services, using their right to occupy road reserves in providing utility services.

Risks

Without change, the roll-out of new services and enhanced capacity will face the costs of resource consent applications processes, increasing costs and potentially slowing the rate of roll-out and the availability of new services across the community. This may in turn create barriers to new services, choice and competition between service providers – leading to higher costs to consumers.

3.5.2 Non-regulatory approaches

In the non-regulatory approach the Ministry for the Environment could, through the use of voluntary measures, encourage and support district councils and telecommunications companies to develop consistent plan provisions and improve the processing of resource consents. There would be a range of measures to support local government, but no compulsion for districts to improve practice or implement guidance.

These measures could include:

- issuing best practice guidelines on appropriate levels of permitted development for new telecommunications infrastructure, and how to develop appropriate district plan rules
- recommended protocols for consulting with affected parties on relevant resource consents
- partnership models to improve communication between district councils (planning and road controlling authority departments) and consent applicants
- issuing best practice guidelines on how to assess the potential effects of new telecommunications infrastructure on the built environment, and how to develop appropriate consent conditions and/or district plan rules.

This approach could lead to greater consistency in how councils manage the consenting requirements and processing of consent applications for telecommunications infrastructure.

Risks

While this option would keep regulatory complexity to a minimum and allow greater flexibility for local decisions, it is doubtful there would be significant improvement to the current situation. Without regulatory compulsion there is no guarantee councils would work together to provide national consistency. In essence, the status quo would prevail through a non-regulatory approach and the objective is unlikely to be achieved.

3.5.3 RMA amendment

The RMA could be amended to make it clear that councils need to explicitly provide for telecommunications infrastructure when preparing plans and making decisions on resource consents. However, the RMA is an enabling and broad-scale piece of legislation. Amending the head statute to accommodate specific matters as they arise would make the legislation unnecessarily complex. The RMA provides for more specific matters to be addressed through regulation-making powers (such as national environmental standards) for individual environmental management issues.

Risks

Legislative amendments are often more expensive and time-consuming than other options. In addition, it is more difficult to amend legislation if changes are needed at a later date (eg, if amendments are made to the Telecommunications Act). It could be likened to ‘using a sledgehammer to crack a nut’.

3.5.4 National policy statement

Part 5 of the RMA provides for the Minister of the Environment to issue national policy statements “to state objectives and policies on matters of national significance that are relevant to achieving the purpose of this Act”. [To date, only the mandatory New Zealand Coastal Policy Statement, and the National Policy Statement on Electricity Transmission have been issued in New Zealand. Several other NPSs are under consideration at the time of writing.]

National policy statements take effect in one of four ways. Local authorities must:

- give effect to the NPS by amending a regional policy statement or plan (in line with the timeframe specified in the NPS, or ‘as soon as practicable’)
- when making a decision on a resource consent application, have regard to an NPS
- when making a recommendation on a notice of requirement, have particular regard to an NPS
- take any other action specified in an NPS.

For example, an NPS could be prepared stating that enabling the provision of telecommunications infrastructure and services is a matter of national significance. This would give clear guidance to consent authorities that they need to make provision for this when making decisions on resource consents, and when preparing plans and regional policy statements.

Risks

However, there are limitations to the certainty about decision-making that could be achieved by an NPS alone. An NPS will not ensure there is national consistency at the required level of detail. This is because it can only state objectives and policies, not how to achieve them. As a result, an NPS alone cannot be sufficiently specific to ensure national consistency in the approach to allowing low impact development in road reserves.

An NPS would need to be incorporated first into the regional policy statement then district plans to give effect to it. National policy statements establish objectives and policies; they do not establish methods or rules (ie, they do not establish how the objectives and policies are to be achieved). Therefore, there could be a wide variation of interpretation of the NPS requirements at the individual council level. This may not achieve sufficient consistency or certainty to ensure the roll out or provision of telecommunications infrastructure and services around the country and it is unlikely that the policy objective would be achieved.

3.5.5 National environmental standard

The RMA enables the Minister for the Environment to prepare national environmental standards. These have the force of regulation and are binding on local authorities. Standards can prescribe methods or requirements and be either quantitative or qualitative. Section 43 of the RMA outlines the matters that can be covered by an NES (Appendix 6).

National environmental standards can be more prescriptive instruments than national policy statements and legislation. This provides some key benefits over other options. An NES would fulfil the policy objectives by providing certainty about the levels of permitted development provided for telecommunications infrastructure in road reserves in every local authority area in New Zealand. The NES requirements would remove any ambiguity over whether or not a particular piece of equipment would require resource consent or not.

The national environmental standards will substitute the existing rules in every district plan in New Zealand. The new rules will permit radio-frequency fields generated by telecommunications antennas and the construction and operation of certain types of telecommunications infrastructure – subject to requirements and limitations including height, size, density and noise limits. The NES would override any existing district plan rules on the subject material. A plan change is not required for the NES to become part of a district plan, although some local authorities may choose to undertake a plan change process specifically to incorporate the new rules into their plan. Alternatively, the new rules can be incorporated into a district plan as an administrative change by ‘piggy-backing’ them on another unrelated plan change or as part of the forthcoming review of all district plans required by the Resource Management Act. The NES effectively reduces the stock of existing regulation by replacing the variability or absence of rules in 73 district plans with one set of nationally consistent provisions for telecommunications infrastructure.

Risks

Local authorities could use their road controlling authority powers to impose conditions on the installation of infrastructure that had been addressed in the NES, effectively ‘double-dipping’, thereby reducing the impact of the NES’s permitted activity status of those facilities. However, an NES and the current work on a legally binding code of practice for utilities working in the road will clarify the extent of the roles and requirements of the two separate processes.

3.6 Comparison of alternatives

Of the options considered, the only two that are appropriate to meet the policy objectives are RMA amendment and a national environmental standard.

None of the other options are considered appropriate: they would not satisfy the policy objectives of providing for consistent and certain regulatory planning provisions that apply on a national basis to assist in network and equipment design and equipment sourcing for roll-outs; and for a reduction in compliance costs and timeframes. A national environmental standard was considered a more appropriate instrument than a RMA amendment for the following reasons:

- An NES is a more specific instrument. It allows for more prescriptive requirements than the legislative amendments suggested. It is less open to interpretation, providing more direction and certainty to practitioners. This means there is a decreased likelihood of the intention of the policy being diluted.
- An NES can be more readily and quickly amended than legislation if later changes are required.
- Alterations to legislation are likely to be more expensive and take longer than the promulgation of an NES, since the steps to be followed are more numerous and arduous than for implementing an NES. There may also be regulatory inconsistency between districts, depending on how councils interpret instructions such as ‘recognise and provide for’. Implementation is likely to be protracted, so changes may not be made until the time of scheduled plan reviews.

Having considered the available alternatives, a national environmental standard was considered the most appropriate means of achieving the policy objective.

Table 1: Assessment of options for achieving policy objective

Criteria	Alternative options that did not satisfy the selection criteria				Preferred option
	Status quo	Non-regulatory approaches	Amend RMA	National policy statement	Permitted activities NES
National consistency	x	x	✓	✓	✓
Manage effects of telecommunications infrastructure	~	~	✓	~	✓
Certainty of outcome	x	x	✓	x	✓
Local input	✓	✓	x	✓	~
Enables telecommunications activities	~	~	✓	~	✓
Cost-effective	x	x	x	~	✓
Timeliness of process	x	x	✓	x	✓
Reduced workload for councils and industry	x	x	~	~	✓

Key to table:

✓ Meets the criterion

x Does not meet the criterion

~ Partly meets the criterion

3.6.1 Balancing community input (adverse effects) against national infrastructure investment (use and development)

The statement in the objective on managing the adverse effects of telecommunications infrastructure is appropriate in terms of the purpose of the RMA, which refers, among other things, to “avoiding, remedying, or mitigating any adverse effects of activities on the environment”.

The general intent of the statement within the objective offers a degree of appropriateness in relation to the purpose of the RMA. It provides a balance to recognising the importance of the telecommunications against the need to minimise any adverse effects on the environment. The statement in the objective recognises both the potential of the infrastructure to create adverse environmental effects and the need to balance these with recognition and provision for its benefits, and to facilitate sustainable development.

While the policy objective’s statement on managing the adverse environmental effects is general and, to an extent, simply implies the requirements of the Act, the methods contained in the national environmental standards specifically address how adverse effects will be managed:

- the standards would only apply to low-impact activities
- the standards provide for the protection of matters of national importance and values identified by communities through district plans.

To this extent, the standards contain links to district plan provisions. Where specific values such as amenity or historic heritage have been identified as a local issue by the community, these values will be preserved. This provides a mechanism to avoid remedy or mitigate potential adverse effects of development on the built environment.

3.6.2 What are the risks of acting if there is uncertain or insufficient information about the NES subject?

Section 32(4)(b) of the RMA requires an evaluation to take account of the risk of acting or not acting if there is uncertain or insufficient information about the subject matter. Through the discussion above, the following risks have been identified.

Risks of not acting

Configuration of telecommunications networks may be redirected from an otherwise optimal route by the stringency of some local provisions, resulting in increased inefficiencies and risks to the ongoing network operation.

There is potential for delays in rolling out new services, as resources used in additional compliance activity are diverted from new investment (regulatory compliance crowding out investment expenditure).

The status quo is compounded for new entrant operators, who have no existing network to build on and are particularly dependent on rapid deployment of new facilities to provide viable services and competition against incumbent operators.

In short, variable planning provisions both reduce the level of investment, and delay any occurring. The risks of not acting are well defined and cannot foreseeably be mitigated by continuing with the status quo.

Risks of acting

The risks of acting, identified in previous sections, can be effectively mitigated. The key risks are:

- the potential of new infrastructure to create adverse environmental effects
- the loss of local input in the decision-making process for telecommunications infrastructure.

The methods contained in the standards specifically address how adverse effects will be managed:

- the standards would only apply to low-impact activities
- the standards provide for the protection of matters of national importance and values identified by communities through district plans.

To this extent, the standards contain links to district plan provisions. Where specific values such as amenity or historic heritage have been identified as a local issue by the community, these values will continue to be preserved. It is appropriate that local input into identifying issues of importance to communities is through the plan process, and not on an *ad hoc* or case-by-case basis.

4 Proposed National Environmental Standards for Telecommunications Facilities

4.1 Introduction

There are four national environmental standards relating to telecommunications infrastructure. The standards are for radio-frequency fields and telecommunications facilities such as road side cabinets and the addition of small antennas to existing structures on road sides or verges. The effect of the standards is to introduce new rules for district councils that set specific levels for permitted development that will apply across the whole country. In essence, the proposals say:

- An activity (such as a mobile phone transmitter) that generates radio-frequency fields would be a permitted activity provided it complies with the existing Standards New Zealand Standard.
- The installation of telecommunications equipment cabinets along roads or in the road reserve would be a permitted activity, subject to specified limitations on their size and location.
- Noise generated from telecommunications equipment cabinets located alongside roads or in the road reserve would be a permitted activity, subject to specified noise limits.
- The installation of antennas on existing structures alongside roads or in the road reserve would be a permitted activity, subject to specified limitations to height and size.

The final standards that were agreed by Cabinet in February 2008 are discussed in this chapter along with an analysis of issues raised through the consultation process and their effects on the final form of the NES.

The standards would provide the opportunity to clarify the consenting process for roadside facilities. They would further strengthen links to district plan provisions where specific values such as amenity had been identified as a local issue. This clarification would assist economies of scale to be realised when sourcing equipment, reduce timeframes when establishing desired networks, and ultimately provide an improved service to the customer.

The proposed standards, as notified in the discussion document (Ministry of the Environment, June 2007), are provided in Appendix 1. The final narrative form of the standards, as agreed by Cabinet following consideration of consultation responses and further analysis, is provided in Appendix 2.

4.2 Exposure to radio-frequency fields from wireless telecommunications infrastructure

4.2.1 Proposed standard for radio-frequency fields

Wireless telecommunications infrastructure (eg, mobile phones and wireless internet) uses radio waves, formed from radio-frequency fields, to transmit and receive information. The radio-frequency fields are basically very low-power microwaves.

The proposed NES for radio-frequency fields states that an activity by a telecommunications operator that generates radio-frequency fields is a permitted activity provided the following conditions are met:

1. Exposures to the radio-frequency fields generated by the activity (in conjunction, where applicable, with exposures to radio-frequency fields from existing transmitters in the vicinity) comply with NZS2772.1: 1999 Radio-frequency Fields Part 1: Maximum Exposure Levels 3 kHz–300 GHz ('the New Zealand Standard').
2. Before beginning any activity that generates radio-frequency fields, the following are sent to and reviewed by the relevant council:
 - a. a written notice of the location of the facility or proposed facility, and
 - b. a report prepared by a radio engineer/technician or physical scientist containing a prediction of whether the New Zealand Standard will be complied with.
3. If the report provided to the council under condition 2(b) predicts that exposures will reach 25 percent of the exposure limit set for the general public in the New Zealand Standard, then, within three months of radio-frequency emissions beginning, a report from an appropriately qualified person/organisation (for example a radio-frequency engineer) certifying compliance with the New Zealand Standard, based on measurements at the site will be provided to the council.

The proposed national environmental standard is intended for telecommunications infrastructure in public areas and is not intended to cover fields inside homes, schools or offices or mobile phones. The NES also sets limits that take into account the radio-frequency fields from a particular location, not just the fields from a single new antenna, thereby addressing potential cumulative effects.

The NES is based on the existing national guidelines for radio-frequency fields (Ministry for the Environment and Ministry of Health, 2000). The national guidelines were issued to provide direction for local authorities, the public and resource consent applicants on how the effects of radio-frequency transmission facilities can be appropriately addressed under the RMA. Many local authorities already use the New Zealand Standard either through their district plan provisions or in a more informal way. However, many district plans currently refer to an earlier Standards New Zealand standard (NZS6609: 1990). This is due in part to the fact that many plans were written before the release of NZS2772.1: 1999. The incorporation by reference of the New Zealand Standard into a regulation provides an efficient and cost-effective method of updating out-of-date district plans that currently rely on the old standard without the requirement to go through individual plan changes.

The national guidelines are based on the relevant voluntary New Zealand Standard NZS2772.1. This New Zealand Standard is based on international guidelines produced by the International Council for Non-Ionising Radiation Protection (ICNIRP). The New Zealand 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, 50 times less than ICNRP maximum levels. The NES also allows councils to maintain a record of the location of radio-frequency transmitters.

4.2.2 Response to submissions

Organisations including local government supported the proposal that would require compliance with the standard NZS2772.1: 1999 across the whole country.

By contrast, individuals who submitted on the issue of radio-frequency unanimously opposed permitting radio-frequency fields in compliance with NZS2772.1: 1999.

In response to submissions, there is only one change to the original proposal. It is amended to take out the reference to the National Radiation Laboratory and replace it with a reference to any appropriately qualified person capable of undertaking the reporting requirement.

The standard is a very conservative one and the scientific basis for setting the limits is robust and widely accepted and implemented around the world. New Zealand reviews the basis for the standards twice yearly to identify any new research or risks associated with radio-frequency fields. On this basis it is not appropriate to adopt an *ad hoc* approach to setting radio-frequency field maxima when there is already a widely accepted method for doing so, the basis of which is reviewed regularly.

4.3 Telecommunications equipment cabinets within road reserves

4.3.1 Proposed standard for roadside cabinets

The national environmental standard proposes that telecommunications cabinets in road reserves be permitted activities, provided they meet restrictions as to height, area, siting and clustering. Limits vary depending on whether the cabinet is to be located within a residential or non-residential area.

The NES further provides that rules in district plans take precedence over the NES in certain circumstances (ie, when the site of the cabinet is adjacent to a building or place with historic heritage or landscape value, or where work is to be undertaken within the drip-line of a tree).

Any cabinet installed under the NES would have to comply with any performance standards contained in a district plan, for example standards relating to appearance or location.

The specifications in the NES provide national consistency and certainty to telecommunications operators while still ensuring that values identified by the community, through the district plan process, are taken into account. If the district plan process has not identified any specific values at a particular location, then they need not be considered.

By virtue of s43A(3) of the RMA, any development permitted through the NES must not have significant adverse effects. The impact of cabinets permitted by the NES would be minor. The maximum allowable footprint and minimum separation distances seek to minimise the impact on streetscape and amenity of any new cabinets in road reserves. The standard does not preclude larger structures. However, a telecommunications provider will have to apply for resource consent from the district council for anything that does not comply with the NES.

The split of cabinet footprint allowance provides capacity for more than one provider through limiting the proportion of space available to the first cabinet. This approach is seen as a good compromise: the RMA by default operates on a first-come first-served basis and any regulation that sought to circumvent the intent of the act would be cumbersome in the least. The decision on Local Loop Unbundling⁴ (LLU) and the operational separation of Telecom into a service provider for home and businesses and a fixed line access provider for other telecommunications suppliers, occurred after the drafting of the NES. Sub-loop unbundling, the next step after LLU (also referred to as cabinetisation of the local loop) will provide the opportunity for other service providers to utilise cabinets and lines in providing telecommunications services to consumers.

The additional provisions seek to address the need for additional cabinet space whilst minimising the potential for adverse effects from proliferation of cabinets through maximum footprints and minimum separation distances.

4.3.2 Response to submissions

Issues raised in submission included:

- amenity:
 - concern about size limits
 - colour and screening
 - concern about potential clustering
- siting considerations and co-location
- exceptions.

In response to these issues the following have been incorporated into the NES:

The minimum separation distances between cabinets or groups of cabinets have been increased to address concerns over amenity issues. Minimum separation distances were originally one per property frontage; this has been increased to a minimum separation distance of 30 metres.

⁴ Local Loop Unbundling (LLU) is the regulatory process that allows multiple telecommunications and internet service providers to use the incumbent telecommunications company's local exchanges and access the copper wire telephone network at wholesale rates. (Digital Strategy) This would enable non-Telecom providers to access Telecom's local loop network directly to service end customers.

Linkages to district plans have been strengthened to pick up the values that have been identified by the community through the district plan process. Where performance standards exist, cabinets will have to comply with them to comply with the permitted activity requirements. The linkage to existing district plan provisions provides a local context for the NES. Identification of areas with specific values is a consultative process with the community and the approach does not preclude future areas being identified through the plan process where the NES provisions may not be appropriate. Resource consent will be required where the district plan has identified specific attributes valued by the community that require closer consideration. These include, for example, historic heritage areas. The process for inclusion of such areas in a district plan is consultative and very rigorous; there is therefore little risk of it undermining the overall intent of the NES yet it provides for local decision-making on areas a community wants to manage specifically.

Issues regarding the impact of cabinet location on safety and access are best addressed through the road opening notice requirements of the Telecommunications Act. Telecommunications companies must obtain a road opening notice from the road controlling authority before they undertake any works in the road. The Telecommunications Act gives road controlling authorities the ability to attach reasonable conditions to a road opening notice; the criteria for reasonable conditions include:

- a) the safe and efficient flow of traffic (whether pedestrian or vehicular)
- b) the health and safety of any person who is, or class of persons who are, likely to be directly affected by the work on the road.

4.4 Noise from telecommunications equipment located within road reserves

4.4.1 Proposed standard for cabinet noise

The proposed standard for noise from equipment cabinets in road reserves sets daytime and night-time limits for residential and commercial areas.

The proposal is largely based on the voluntary Standards New Zealand standards for environmental noise.⁵ The Standards New Zealand standards were commissioned by the Ministry of Health and prepared by a committee of environmental noise experts. The standards have recently been revised and the NES incorporates the revised New Zealand Standard that was officially released in early 2008.

The Standards New Zealand standard for assessing noise (NZS 6802) gives a range of noise levels as a guideline for the reasonable protection of health and amenity for land used for residential purposes. The NES is within the recommended range of noise limits for residentially zoned sites. Noise limits for less sensitive areas (business and industrial) are typically less stringent, as reflected by the proposal.

⁵ Standards New Zealand 1991 and 1999.

The NES is generally more restrictive than approximately half of current district plans. Noise levels in some district plans are more restrictive than the voluntary Standards New Zealand standards and set unrealistically low limits. The proposal would provide a consistent and practical approach to environmental noise from telecommunications equipment cabinets.

4.4.2 Response to submissions

In response to submissions, the NES shall be referenced to the most current Standards New Zealand standards for noise. The updated NZ6801: 2008 contains revised methodology that addresses the concerns that have been raised about measurement of noise. The new Standards New Zealand noise standard addresses some technical debate about the most appropriate location and methodology to measure noise levels.

4.5 Masts and antennas for wireless telecommunications networks within road reserves

4.5.1 Proposed standard for antennas and masts

The proposed standard for antennas and masts would allow existing structures in road reserves (such as street lights) to be replaced or extended for telecommunications purposes. Any extensions would have to be proportionate and not be more than 50% of the maximum diameter of the structure, and a new antenna would not extend more than 3 metres or 30% (whichever is the lesser) above the highest point of the existing structure. Panel antennas extending above the height of the original structure will be required to fit within a cylindrical envelope 2 metres high by 0.5 metres in diameter. The proposal provides for a maximum of two dish antennas on any site.

The main concern for placement of antennas is within residential areas or areas of high amenity value. Potential visual amenity effects of panel antennas may be minimised by being attached to existing structures (co-located). The proposal promotes co-locating with existing structures within road reserves, such as traffic lights or street lights.

New free-standing cellphone towers are not included in the proposal. New towers may create additional clutter in road reserves and result in environmental effects that are more than minor. It is appropriate that new towers continue to be considered in terms of existing district plan provisions.

4.5.2 Response to submissions

Issues raised in submissions included:

- amenity
- extension size / maximum height
- future proofing the standard against changing technologies
- safety issues.

In response to submissions, changes have been made to limit the visual impact of extensions by providing for additions to existing structures that are proportionate to the size of the existing structure. Reference to panel antennas has been removed in favour of an envelope approach that will future-proof the NES against changing technologies. The diameter of the envelope is small to minimise the visual impact of any additions to structures.

Allowances for dish antennas have been included to provide for the use of wireless communications between sites used by some telecommunications operators.

The NES emphasises that any addition to an existing structure is one-off, and any revisits must stay within the original envelope. This avoids the potential for more than one addition to an existing structure.

Traffic safety is most appropriately addressed by road controlling authorities as it is one of their primary functions. Safety is clearly specified in the Telecommunications Act as a reason for imposing conditions on a road opening notice by the road controlling authority.

5 Efficiency and Effectiveness of the National Environmental Standards

5.1 Overview

Effectiveness considers whether the policy option will actually be effective in achieving its aims and objectives. In this case, the setting of national environmental standards provides firm regulation for achieving the stated aims and objectives. It is, therefore, the most direct and effective option.

Efficiency considers the benefits and costs of any policy intervention. If the benefits outweigh the costs over time, then the policy is deemed to be 'efficient'. This, however, assumes that benefits and costs can be quantified in monetary terms. In this case there are a number of 'intangible' considerations outlined later that cannot be given monetary values. Yet they are identified so they can be included in the broader consideration of the efficiency and effectiveness of the NES.

Within this framework, the measure of efficiency will generally consider the national environmental standards package as a whole rather than breaking it down into its constituent parts. So apart from radio frequency fields, the components of the package will not be considered individually.

The results of the analysis suggest there is a substantial net benefit from the NES, if the rate of roll-out is anywhere near what the telecommunications operators suggest it will be in the next 10 years. The net benefit is larger than predicted in the initial analysis carried out in 2006: the expected profile of facility roll-out has been revised by the companies and now predicts greater activity in the near future. Because the quantified net benefit is so large, the result of the quantified analysis is not sensitive to substantial changes in the input assumptions used.

There are unquantifiable effects on both the cost and the benefit side of the ledger. The size of the quantified benefit also suggests that unquantified costs, particularly of loss of community participation and control, would have to be large to overturn the result. There is no ready means of valuing these unquantifiable effects. However, they are discussed in detail in the following sections.

5.2 Costs and benefits of adopting the national environmental standards

The figures presented in this chapter should be regarded as indicative rather than definitive. However the overriding conclusion to be drawn from the cost-benefit assessment is that the analysis indicates adopting the NES is likely to result in positive net benefits.

5.2.1 Assumptions

Cost-benefit analysis is a long-established technique intended to identify the economic efficiency of a proposed project or policy change. Efficiency is broadly about maximising outputs obtained from available inputs, but there are different variants used in economics.

- **Technical** (or productive) efficiency refers to the most cost-effective way of providing a given service. For instance, reducing or eliminating regulatory costs that serve no useful purpose improves technical efficiency of the (formerly) regulated activities.
- **Allocative** efficiency refers to the ease with which resources can move across an economy to their most productive uses. For instance, a regulatory process that unduly impedes investment in a particular new activity would not be allocatively efficient.
- **Dynamic** efficiency refers to the optimisation of innovation and rate of change over time.

Both allocative and technical efficiency have a dynamic component to them: for instance, a regulatory process that discourages new investment and prolongs use of older, less productive infrastructure would not be efficient in a technical, allocative or dynamic sense.

A cost-benefit analysis proceeds by comparing effects and outcomes with a proposed change in policy against what would have occurred under a counter-factual, without the proposed change. This counter-factual is an expectation of what would happen in the absence of the proposed change, ie, a continuation of the current status quo of varying consenting requirements across local authorities, with which industry must contend in rolling out new services and the facilities to provide them. It can be described as a projection of supply and demand into the future as conditions change, while the regulatory status quo remains as it is today. It provides the baseline against which to compare the likely effects under the NES.

5.3 Components of the status quo

Under the status quo (counter-factual), costs of variable consenting provisions for telecommunications facilities across local authority districts comprise:

- various costs for companies in applying for consents, complying with localised requirements, surveillance of different districts' requirements, and lost revenue from delayed roll-out of new facilities
- costs for consumers of delay in obtaining upgraded and new services
- costs for local councils in processing and deciding on consents.

These categories refer to costs where they originally fall, not on where they are finally borne. For instance, extra costs for companies will either be passed on to consumers in service prices, (in which case there may be negative price response and reduced consumption), or costs could be borne out of a company's profitability, affecting returns to investors and the ability to reinvest.

Ultimately the costs are likely to fall on:

- consumers, in the form of higher prices and services denied/deferred
- company shareholders, in the form of reduction of profits, dividends and market value of shares
- local ratepayers, who pay the costs incurred by councils in setting and processing local consenting procedures (except costs recovered from applicants' charges)
- the economy as a whole, by losing some dynamic efficiency as the drag on availability of new services impedes the rate of innovation among customers (business and personal) that could be supported by them.

The benefits of variability of provisions across local authorities are less tangible, and all relate to the value to the community of self-determination and control over the pattern of development.

- The economic value of such self-determination can be inferred through the community's willingness to pay for restrictions and processes that result in opportunity costs incurred within the community, due to additional resources used and benefits forgone.
- Such willingness to pay can be estimated through market research type surveys, but these require more time and resources than is provided for in this project.
- In practice, community value is usually determined through the political process that approves the rules applied in each locality, and the economic value implied by these decisions can often vary widely between apparently similar outcomes.
- Opportunity cost, or benefits forgone, as a result of individual rules adopted provide one measure of value of community-imposed restrictions. For instance, if rules delay the date of new services becoming available in a district, the economic cost comprises the benefits forgone by denial of service, and/or additional resource costs incurred in using less efficient substitutes for those services.
- This is also difficult to estimate in practice, as it depends on local circumstances; but there may be situations where denial of new services results in measurable additional costs for users of an inferior substitute. For instance, non-availability of broadband capacity that requires customers to retain dial-up internet services results in costs for customers of additional time required for operations/downloads.

Any reduction in the above costs, or gains in the above benefits that are likely to arise from adopting the new standard, are relevant to economic cost-benefit analysis. In practice, the benefits are often less completely valued than the costs. But by getting some measure on the more tangible effects on costs, the analysis can provide insight on how big the benefit of local control would need to be to justify retaining it.

The case for national standards is more readily justified in the presence of externalities than for effects that are purely localised.

5.4 Distribution of impacts with and without the national environmental standards

5.4.1 Situation under the status quo

The current arrangements governing environmental effects of telecommunications facilities fall differently on different parties in the community. The principal resource use effects are listed below and in Table 2.⁶

- Industry:
various effects on the cost side arise from:
 - cost of preparing applications for consents and steering them through the process (a once-only cost for each consent, but varying widely across local authorities with the complexity of the applications and, in aggregate, dependent on the number of applications)
 - cost of complying with non-standard requirements and conditions of consents once issued (may be once only or recurring cost)
 - cost of staff assessing requirements of different councils (a recurring cost, but fixed irrespective of number of consents sought)
 - deferred market penetration, revenues earned and cumulative presence in the market.
- Consumers:
 - are faced with restricted competition and denied or delayed access to new services and capacity provided by new technology, to the extent that the process slows the roll-out of that technology.
- Residents:
 - enjoy the benefit of participating in and influencing local planning processes through approvals of works, submissions to local plans etc⁷
 - incur a cost from the potential for residual intrusions of street clutter.
- Councils:
 - enjoy the benefit of exercising on behalf of constituent's localised control over amenity, noise and radio-frequency exposure
 - incur costs on processing consents (variable with number of consents)
 - incur costs on setting criteria by which to judge consent applications.
- Government:
 - has no particular cost or benefit from the current arrangement.

⁶ Note that listing here does not imply that all individual entities are equally impacted, for example not all residents participate in local planning, and not all councils control visual, noise and radio-frequency effects.

⁷ Operators may be required to obtain written approvals from neighbours through the non-notified consent process.

Table 2: Costs and benefits under status quo

Costs	Benefits
Industry (producers)	
Applications for consents Complying with non-standard requirements Fixed costs of staff assessing requirements Market penetration deferred	
Consumers	
Denial/delay in use of new services	
Residents	
Neighbourhood street clutter	Input into notified applications Input into local regulation setting Improved local amenity
Councils	
Consent processing (per application) Criteria setting	Control over visual intrusion Customised noise / radio-frequency limitation
Government	

Source: NZIER

5.4.2 Changes with the proposed standards

The effects of the proposed changes on the different parties in the community are summarised below and in Table 3.

- Industry:
 - a number of benefits from the changes including:
 - reduced time and cost spent in obtaining consents, and reduction in unanticipated delays in operations
 - economies of scale realised from using standard components across wider areas
 - reduced cost of assessing compliance with each individual district’s particular requirements
 - reduced uncertainty about outcomes across districts
 - removal of redundant regulation (such as by-laws) that are superseded by the NES
 - faster market penetration and corresponding increase in revenues
 - higher expected returns from investment.
- Consumers:
 - benefit from:
 - faster roll-out and access to new services
 - increased competition, choice and consequent improvements in service quality in new areas, and price reduction in existing serviced areas.

- Residents:
 - benefit as potential consumers: this is subsumed within the consumer benefit above and should not be counted twice, but is listed separately here to distinguish the residents affected by proximity to a roadside facility from the wider group of potential consumers served
 - incur costs from potential proliferation of street clutter
 - incur costs from loss of input into local control measures
 - may incur adverse effect on property value (although within the controls of the NES, such effects are probably negligible; there remains the possibility of inappropriately sited equipment impacting on street appeal of individual properties with an appreciable effect on their value)
 - commercial property owners and commercial activities are also affected – especially those sensitive to the quality of the adjoining streetscape, in mixed-use / commercial areas which are also likely to be of key interest for telecommunications network development.
- Councils:
 - benefit from avoiding the cost of consent processing (should there be costs in excess of the fees recovered from applicants)
 - benefit from avoiding the cost of setting criteria and determining outcomes
 - incur cost in reduced control over visual, noise and radio-frequency impacts of street facilities
 - potentially incur costs in managing more utilities operators locating equipment in limited road space.
- Government:
 - benefits from facilitation of roll-out of new technologies, new entrant competitors and support for economic transformation; however, the economic benefit is realised primarily by consumers, producers and their shareholders
 - incurs costs in promulgating, promoting and monitoring the application of the new standards.

Table 3: Changes in costs and benefits with the national environmental standard

Costs	Benefits
Industry (producers)	
	Reduced consent cost and time Economies of scale from standard components Reduced cost of assessing requirements Reduced delays in processing Reduced regulation from bylaws Faster market penetration
Consumers	
	Faster roll-out of new services Increased competition, choice and service quality
Residents	
Potential proliferation of street clutter (visual disamenity) Adverse property value effects (questionable) No input into local applications	Benefit as potential consumers (but not to be counted twice)
Councils	
Reduced control over visual effects Reduced control over noise and radio-frequency levels Increased cost of road-space management Adjustment to district plan (questionable)	Avoided cost of consent Avoided cost of criteria setting
Government	
Promulgating, promoting and enforcing standard	Facilitating roll-out of new technologies

Source: NZIER

5.5 Other potential costs and benefits

The listings above focus on economic costs and benefits, ie, they are effects that have some bearing on real resource use efficiency, which is relevant to RMA section 7(b) and to section 5 more generally, through its impact on community wellbeing. The items in the list share the characteristics of having appreciable resource use implications.

Other things could be regarded as costs and benefits, but if they have no appreciable resource use implication they cannot be incorporated in a cost-benefit analysis. In any community with a plurality of views, what some regard as a benefit may be regarded as a cost by others. This particularly occurs where one person gains the benefit but the cost is borne elsewhere. If there is appreciable cost for some, but the benefit accrues to others with no indication of what they are willing to pay to obtain it (because they are free-riding off imposition on others), then on balance costs are likely to exceed benefits.

Where things may be regarded as both costs or benefits by different people, an expected balance of appreciable resource impact is recorded in the listing. In light of this, other potential costs and benefits include:

- *Costs for industry of increased regulation from the NES in areas which currently do not regulate the affected activities* (eg, in Palmerston North). This applies in a minority of local authority districts, and is expected to be less significant than the opposite effect of benefit for industry from reduced and more consistent regulation country-wide.
- *Benefit to residents of increased certainty of regulation.* Anecdotally, residents appear much more willing to expend time, energy and resources on tailoring plan provisions to local concerns than they do on subjecting them to national standards, so this benefit seems likely to be small and outweighed by the loss of local participation and influence over controls.
- *Costs to residents from street clutter.* Obstacles placed in road reserves provide some degree of nuisance to those using the street and are therefore a cost to wellbeing. This includes trees, signposts, rubbish bins and bus shelters. If the NES results in proliferation of obstacles and clutter that cost will increase, although with the NES requiring a minimum separation distance between cabinets of 30 metres, then perhaps not by much.
- *Benefit to councils of certainty in national direction, and in not having to update plans to keep up with technological changes.* These are variants of the benefit from avoiding cost of setting criteria and determining outcomes, as listed in Table 3. These are all examples of government performing one function that would otherwise be undertaken by 73 territorial authorities: this should reduce administration costs across local government by more than the increased cost for government.
- *Costs for councils in adjusting district plans to remove confusion over conflicts with the NES.* In principle the NES should entail no such cost as there is no formal requirement to change plans to accommodate the NES. However, council respondents envisaged some additional cost for informal notification of the change in council publications, websites and supporting documentation. One council expected formal change to the plan would be required, to remove conflicting provisions between the plan and the NES; and to protect the council from potential future liabilities that might arise should others suffer economic loss as a result of such conflicts. While government may not regard this as a real cost because it is not a formal requirement of the NES, if councils do so anyway, because of extreme risk aversion or other factors, there is still an expected value cost to be accounted for as a consequence of the introduction of the NES.
- *Costs cited by telecommunications companies, in the dual role of each local authority as the local planning authority and the road controlling authority.* Road controlling authorities are able to impose reasonable conditions on utilities operators who seek to exercise their statutory rights to use the road corridor in its jurisdiction. These conditions must be complied with. This may be a benefit to the community in that some aspects of concern (such as specific location of roadside facilities) may be controllable through this route, but it detracts from the benefit for telecommunications operators: some have reported difficulties in dealing with some local authorities in their road controlling role to the point where they avoid using the road-space.

5.6 The cost-benefit model

A fully quantified model (if possible) would compare the ‘with’ and ‘without’ standards situation over a period of some years. This would entail developing scenarios for ‘with’ and ‘without’ standards situations over a foreseeable future, and comparing the differences between them. This requires for each scenario:

- a projection of likely investment in telecommunications in successive years over the analysis period, taking account of any changes in the rate of investment attributable to the costs or uncertainty around consenting
- the proportion of that investment that is likely to be affected by the NES – in particular, the role of works in road reserves in those future investment plans
- the compliance cost of obtaining consent for works that would be subject to the NES, arising from application and processing costs and any additional costs from meeting non-standard requirements
- an estimate of how additional costs without the NES translate into higher prices, and the likely price responsiveness of customers as a result.

The model structure is based on the premise that the NES is likely to:

- reduce the costs of compliance for those works in road reserves
- increase the speed of investment and roll-out of new services
- reduce the price of some services, with corresponding increase in demand for those services, due to improved facilities and increased competition.

The summation of these components is a measurable benefit of the NES, against which to compare the dis-benefit of losing local control and potential localised amenity/streetscape effects.

5.7 Cost-benefit analysis – Does it stack up?

To assess whether the NES is likely to be worthwhile, it is necessary to assess the magnitude of the effects its introduction would have, and value these in dollar terms as far as possible. Interviews with industry and local government stakeholders have provided some information on which to make such an assessment. This is subject to some uncertainty due to imprecision in the ability to record current costs and effects, and to the difficulty in respondents’ self-assessment of likely future changes under the NES. The analysis that follows is therefore subject to wide confidence bounds and should be regarded as indicative when aggregated across the country.

This section outlines the interview results and infers some representative or typical values to use in the analysis of national costs and benefits. These typical values are then subjected to sensitivity analysis, to establish how robust the results are to changes in the input assumptions used. As much of the information obtained is commercially sensitive and offered in confidence by the respondents, the figures that appear here are in most cases ‘blended’ from different respondents, and are not attributed to individual sources.

The focus of this section is on the NESs relating to roadside cabinets, noise and associated aerials and masts, as these represent the most quantifiable activity for assessing the difference with and without the NES. Most operators anticipate some easing of consenting processes with the radio-frequency standard as well, but the quantum of effect is less well defined. To some extent the use of large masts to which the radio-frequency standard would apply depends on the uptake of activity in road reserves, as one tall mast covering a wider area can be a substitute for several smaller roadside facilities.

Improved or cheaper services assist other industries in innovating and creating business and wealth for the community; this is acknowledged as an underpinning reason for facilitating roll-out of new technologies, but these consequences cannot feasibly be quantified in this analysis.

5.8 Identification of unit costs and benefits

5.8.1 Effects on the industry (producers)

The benefits of the NES for industry are likely to come principally from reductions in costs and timing delays in the roll-out of their upgraded facilities. For new entrants, this may be the difference between having a service to sell or not. For incumbents it can be the difference between expanding or contracting their share of the telecommunications market, and in extracting higher value and volume of business from existing customers upgrading to newer services.

Changes in consenting costs

Most industry interviewees anticipated reductions in the cost of obtaining RMA approvals, although they varied in their estimates of how much this would be worth.⁸ Partly this is because of the difficulty of disentangling RMA consent processes from the parallel process of dealing with local councils as the road controlling authority: these activities within businesses are often inextricably linked. Partly it is because respondents cannot easily isolate the class of road reserve applications from their total operations.

The responses on cost of obtaining consent per site range from \$3,000–5,000 to \$25,000–30,000. The first figure refers only to identifiable expense items (eg, cost of consultants' time) and excludes staff time and resources associated with each application. The latter figure refers to both RMA and road controlling authority processes, and is estimated to drop down to around \$12,000–15,000 if roadside facilities became a permitted use (implying a saving in consenting cost of \$13,000–15,000). Other responses were between these extremes, implying an unweighted mean of \$11,000–12,000 saving per site on consent costs alone.

⁸ Businesses with highly localised networks had a different view: they were concerned that the NES would adopt more stringent requirements and a more restrictive regulatory regime than they currently face. The NES improves certainty only for operators that work across multiple authorities.

Table 4: Current range of costs for obtaining resource consents for telecommunications facilities

	Range	Mean
Industry costs per application*	\$3,000–\$30,000	\$11,220
Councils net costs per application	\$1,200–\$5,000	\$2,590

* Based on an estimated annual roll-out of 1100 sites per year.

Changes in consenting timing

Although the RMA provides for consent processing within 20 working days, operators report considerably longer times for consent approvals. One respondent provided an average across councils it deals with of around 70 working days, an interval that has increased from just under 40 days in 2003. Its figures show that the processing interval tends to be longer for councils in Auckland than in other metropolitan centres, and that all Auckland councils have undergone a distinct step change increase in interval since 2004: they appear to have become more wary of approving anything that may be controversial with constituents. Some applications require 6–8 months to process, and a few have taken up to 12 months.

The consequences of such delays can be illustrated with a hypothetical example. Suppose a roadside aerial and cabinet brings into reach 2000 suburban properties, of which the operator expects to sign up 10% as subscribers to its services. If these 200 new customers pay \$50 per month for the new service, a delay of one month in consenting results in forgone revenue of \$10,000. So if, on average, consent approvals take 70 working days instead of the statutory guidelines of 20 working days, there could be a delay of 50 working days – 10 weeks – which in the example above would amount to around \$22,600 forgone revenue.

If this is representative of the opportunity cost incurred per site, eliminating delay would provide a substantial revenue boost for operators across all sites. If the delay is predictable, operators can adjust to this by allowing more time for their application to be processed. If the delay is unpredictable, it not only forgoes revenue but can also incur additional cost by interfering with scheduling of installation work. Operators report there is random variation in the timing of processing, with even apparently similar applications to the same council having markedly different processing times – depending on how different individuals within the council approach the task. Beyond this, delays can be compounded by network effects, as the benefits of some network upgrades depend on the last (slowest) site to get approval.

These timings and costs are all for non-notified consents. Notified consents would take longer, but are less typical. Some operators deliberately avoid sites where notification is likely, because of the additional timing and cost expected.

Faster market roll-out and penetration

A corollary to shorter processing and consent approvals is faster roll-out of installations and the availability of services dependent on them. Particularly for operators without an existing landline or cellular network, being able to fill in the gaps in coverage quickly would confer a momentum to roll-out that is likely to increase the effectiveness of their promotional activities and improve their market penetration. Conversely, having ‘holes’ in their coverage because of localised consenting impediments has the opposite effect. Although all operators anticipate a faster roll-out under the NES, none has provided a quantifiable estimate of how much faster it might be.

How many sites are likely to be affected?

Most operators indicated a proposed programme of roll-out for their works in road reserves, which could be combined into a country-wide figure. The precise location and timing of these programmes is still not determined, because it is affected by factors such as the implications of local loop unbundling and local circumstances. Most operators intend initially rolling out in areas with the highest expected revenue yield, such as the main metropolitan centres, then extending into lower-density and rural areas. They also indicate some stepping up of activity over an initial 2–3 years before sustaining a steady rate of roll-out. This rate is expected to settle on around 1000 roadside sites per year across all operators over the next 6–10 years.

The simplest assumption is that the rate of roll-out will be unaffected by the NES. However, an average consenting cost of \$12,000 per site represents between 5% and 12% of the cost of installations, so it is plausible that an NES that reduced costs by that amount could improve the attraction of roadside sites and increase the rate of use of such sites. One operator, who identified the RMA costs as the biggest single obstacle to its roll-out operations, suggested its roll-out plans were contingent on the removal of this obstacle. Other operators suggested that, in some areas, dealing with the road controlling functions of local authorities was more problematic than consenting processes, so their use of roadside sites would not greatly change.

While most operators suggested there would be an increase in the rate of roadside facility roll-out under the NES, there is no numerical basis for assuming what that change in rate would be. The analysis uses a central ‘blended’ estimate informed by the indicated plans of separate operators, which is the same with NES and in the counter-factual. This gives an average of 968 sites a year (with a bulge of 1800 sites in the first three years), varying these rates through sensitivity analysis. This yearly average is lower than the 1200 a year used in the Phase 1 report, but the pronounced bulge in the early years in Phase 2 tends to increase the benefit in the discounted analysis. This change in profile over time is due to revisions of figures by the companies, not to the effect of the NES.

Economies of scale from standard components

The larger operators all suggested there would be savings if they could place larger purchase orders with their equipment suppliers, in confidence that the equipment could be used more widely across the country.⁹ None however suggested how large that saving might be. As an individual site may entail works costing \$100,000 to \$250,000, even a small percentage saving may accumulate across a number of sites; but given the variety of components involved, there is no reliable basis for quantifying a typical saving.

⁹ Economies of scale may be offset to the extent that the NES overrides existing local standards that enable lower-cost equipment to be used. If the NES raises the standard and requires higher-cost equipment over wide areas, it may raise costs by more than the scale economies realised.

How much new business is created?

Rolling out new capacity and facilities into new areas affects the value of telecommunications services in those areas in two ways. One is, if customers see the value in new services and are willing to pay to obtain them. The other is improvement of service quality (eg, greater capacity for dial-up downloading), the value of which is reflected in the customers' willingness to pay for the service (if the improvement is reflected in the tariff structure) or by time saving and convenience for customers (if it is not).

While a service operator may see a business opportunity in increasing market penetration, from a national perspective some of this is a trade diversion from other operators or existing business. For instance, extending broadband capacity into a suburb may attract customers to switch from their former dial-up arrangements, in which case the business gain is to some extent cannibalising the previous service provided. The net benefit is therefore not the total gain in revenue, but the incremental increase in revenue over what was there before.

This incremental increase could be represented by the change in average revenue per customer (the value effect). There will also be a volume effect if the number of telecommunications customers increases in an area with the arrival of new facilities. In each case, telecommunications services displaced need to be netted off the estimate of increase to arrive at incremental gain. How large the incremental value effect is, however, is difficult to determine because the quality of services changes simultaneously with the new facilities. For example, the monthly retail charge for broadband services is around 50–60% greater than the monthly charge for dial-up alternatives, but these are not equivalent services.

In summary, if a site generates new revenue for an operator of \$50 per month, the net gain to the economy will be \$50 less the value of any similar service displaced.¹⁰ For example, if broadband is 55% more valuable than its dial-up alternative, the value of service displaced is \$32.25 and the net gain is \$17.75. This means that from the operator's point of view, increasing market share is more valuable than cannibalising its existing customers (which generates only \$17.75 extra revenue). However, from a national perspective, this adjustment of apparent revenues applies whether the previous service displaced is that of the same operator, or that of a competitor, ie, the gain is just \$17.75.

The cost of providing these benefits

The cost of providing new services needs to be netted off the value of their benefits, to arrive at a net benefit. These costs are principally the new facilities' capital installation costs, operations and maintenance costs over their lifetime, and transaction costs in dealing with local councils on consenting and obtaining permission to occupy the road reserve.

¹⁰ No adjustment is required for displacement of dissimilar services. If customers pay more for broadband (and hence telecommunications in total) and less on food, it simply implies they place a higher value on broadband than on the food they forgo to pay for it: a realignment of preferences.

5.8.2 Effects on consumers

The effects on telecommunications of the NES arise from the faster roll-out of new capacity and services, and the increased competition, service choices and price/quality improvements that should result. This could affect them in three main ways, by obtaining:

- the same service at lower prices, enhancing their consumer surplus (eg, by switching to a lower cost supplier)
- an improved quality service at the same price: the value of such service improvement will be at least as large as the difference in cost with the next best alternative of providing that improvement (ie, the avoided cost of obtaining the improvement by some other, more costly means)
- new services, the value of which is represented by consumers' willingness to pay for them.

As indicated in section 5.1 above, quantifying the consumer benefit with any precision is beyond the practical bounds of this report. The assumption is that consumers obtain value from any new service they pay for, in excess of what they actually pay by some indeterminate amount.

5.8.3 Effects on residents

Residents will benefit as potential consumers of the new, improved services. They may also suffer a number of adverse consequences, perceived or real. These include:

- potential proliferation of street clutter, detracting from amenity
- potential adverse effects on property value¹¹
- loss of input into local decisions on applications that concern them.

Insensitive siting of such structures in places that obscure sightlines or detract from the street appeal of properties is a potential concern. The NES provides for a minimum separation distance of 30 metres between cabinets, and does not specify positioning of such structures. The NES does however, require compliance with any performance standards that already exist in a district plan. The assumption is that, through the district plan process, the community has had the opportunity to identify whether the potential effects on amenity from street clutter is an issue for them. The extent to which residents have any effective say in that process is difficult to judge. Judging by the level of response on RMA and other local government consultation, most residents are not active on trying to influence decisions, except where it affects them very directly. A small minority are active across a broad range of issues.

While in principle all these things can detract from residents' welfare, there is no empirical basis on which to quantify these effects, and they may be rather small. The analysis uses assumed values to test how big these effects would need to be to appreciably change the results.

¹¹ Distinction is drawn here between two issues. One is general proliferation of street clutter and loss of amenity, which may be a nuisance but is too diffuse to be attributed with any appreciable effects on property values. The other is the possibility that absence of local consenting control results in insensitive siting that does detract from street appeal and the value of specific properties. See comment above.

Effects on property value

Evidence on the relationship between cellular facilities and property values is mixed (see Appendix 5). While media reports and qualitative surveys of residents' concerns suggest an expectation of substantial price falls following on from installation of cell towers (Bond & Beamish 2005),¹² quantitative analysis of actual transaction data suggests the negative impact is very much smaller (Bond & Squires 2006)¹³ and falls away rapidly with distance from the site (Bond & Xue 2005,¹⁴ Bond & Squires 2006). The perceived reduction in value from close location of towers is much greater than that realised across the neighbourhoods in which they are located. It is also greater in cases where tower location attracts a lot of media interest in the locality (Bond & Beamish 2005).

The main impacts on values come from visual effects rather than electro-magnetic radiation concerns. Visual effects are often strictly localised and moderated by other aspects of the local landscape. In the absence of visual intrusion, for an antenna tower to have an actual impact on property values the public concerns about health risks from exposure to radio-frequency fields would need to be strong and pervasive (Industry Canada 2006). This does not currently appear to be the case in New Zealand.

Even at the more conservative proportional estimates above, a lot of properties could fall within a 250-metre radius of cell towers, each covering an area of around 19 hectares. This, however, would exaggerate the value effects for New Zealand at large. The value impact depends on assumptions about the visibility of towers and the density of housing around them which are likely to be highly variable across the country. Moreover, if cell towers appreciably reduce the value of (and demand for) certain properties, there will be a corresponding increase in demand (and value) for properties not perceived as being affected. From a national perspective, the impact of cell towers on property values is almost entirely an intra-community transfer which is irrelevant to a national cost-benefit analysis.

The current analysis does not quantify such property value effects because:

- property value effects are largely transfer effects of no consequence for a national cost-benefit assessment
- the roadside facility sites that are the main subject of the NES are less obtrusive than the stand alone cell towers for which estimates exist, and likely to have less impact on property prices
- attempting to model impacts on a geographical basis would be complex, costly and provide no useful information for a cost-benefit analysis.

¹² Bond and Beamish 2005.

¹³ Bond and Squires 2006.

¹⁴ Bond and Xue 2005.

Loss of input into local planning decisions

Residents receive some benefit from being consulted and having input into the planning decisions that affect their neighbourhoods, so to the extent that an NES restricts that ability there will be a cost for residents. No studies have come to light, however, about what value residents place on retaining the ability for such input eg, how much residents are willing to pay to retain that right, or are willing to accept compensation for its loss.

This analysis does not use an explicit value for residents' rights of input, but does include some sensitivity analysis to identify how valuable such a right would need to be to alter the cost-benefit results.

5.8.4 Effects on councils

Councils gain a benefit from the avoided cost of consent processing, and from avoiding the cost of setting their own criteria with which to assess the applications they received. Against this they lose an option for controlling visual impacts, noise and radio-frequency levels, and they may face increased costs over managing road-space between competing users, and for adjusting their district plans to be consistent with the NES if introduced.

In canvassing their views, most councils indicated roadside telecommunications facilities were a very small part of their total consenting activities. The apparent cost per consent varied quite widely between different authorities, which is not surprising in a small sample where single exceptional experiences can markedly skew the overall pattern. There is also a difference in the way councils categorised the cost of applications. Some indicated a fee for applicants which were less than the apparent cost they identified in full-time equivalent time for processing. Some estimated the cost at a standard charge-out rate to cover council fixed overheads that is nearly four times the hourly cost of labour at average public sector earnings rates (\$29.50/hour).¹⁵

Two councils indicated a labour cost per consent application equivalent to about 44.5 hours at the average wage rate. At the updated wage rate, this amounts to \$1,333 per consent. This dollar amount is used here as the standard value for council costs saved per consent. This excludes overheads, which are incurred regardless. It also excludes any application fee received by council, which is assumed to be already counted in the costs for operators.

Although there is no legal requirement for councils to formally change their plans to align with the NES, one council believed it would need to formally change its plan to accommodate the NES, rather than waiting for the next plan review. According to the council, this would be a one-off cost of \$80,000–\$100,000.¹⁶ Other councils indicated all that would be required was a minor change to their website until the plan undergoes its routine review, incurring negligible marginal cost. The analysis examines the effect of including such a cost (\$90,000 per plan change) for a number of councils on the overall net benefits of the NES. Removing this cost from the analysis entirely would increase the net benefits of the NES.

¹⁵ Statistics New Zealand 2007.

¹⁶ Such costs if generally required would vary significantly between local authorities (due to the varying impact on their district plan and varying wage rates).

There is no information on which to base an estimate of additional road management costs and reduced control over environmental effects that might arise as a consequence of the NES. Sensitivity analysis is used to examine how big these values would need to be to change the results.

Local authorities face revenue consequences from telecommunications development in their areas, as utilities networks are subject to local body rates; in some cases councils collect rent from facilities on road reserve, in apparent contravention of section 153 of the Telecommunications Act 2001.¹⁷ However, these payments do not add value to the assets charged, and are simply transfer payments of no relevance to a cost-benefit analysis.

5.8.5 Effects on central government

Central government will incur costs in implementing an NES, involving the costs of promulgating and promoting the standard. The Ministry for the Environment indicated these costs could be \$150,000 over three years. In the analysis, this sum has been divided evenly over the first three years, ie, \$50,000 a year.

5.9 Aggregate costs and benefits

5.9.1 Outline structure of the analysis

The aggregate cost-benefit analysis is constructed by estimating the costs and benefits associated with the projected number of roadside sites constructed over the next 10 years. A net present value is calculated from the central estimates, then sensitivity analysis is conducted to see which values are most critical to the results. Notional values are inserted for some of the intangible effects, to see how big they would need to be to overturn the results.

The counter-factual (without-NES situation) is the progression of telecommunications roadside roll-out under the current status quo. All costs and benefits are relative to that counter-factual.

The period of analysis is confined to 10 years, which may appear short but is chosen for the following reasons:

- district plans have a 10-year review cycle, so beyond 10 years all plans that currently pose obstacles for telecommunications development will have been changed in ways that cannot be foretold, leaving no basis for assuming benefits beyond that time
- telecommunications technology developments are moving so rapidly that investments placed today may need upgrading beyond 10 years
- in a discounted analysis the main impacts will come in the initial years of the NES.

¹⁷ Although this is reported by more than one operator, none said they were willing to challenge the councils in court, because of their desire to retain goodwill and avoid repercussions in other dealings with local bodies.

The discount rate used is 10% real, in line with current Treasury guidelines. All costs and values are real resource costs, excluding all taxes, subsidies and other intra-community transfer payments.

5.9.2 Results with assumed ‘typical’ values

Section 5.2 above has indicated that the information base for this cost-benefit analysis is somewhat patchy and couched in uncertainty. Only the following items have empirical values in the central quantified analysis:

- benefits for industry in terms of reduced consenting costs
- benefits to local authorities in terms of reduced consent processing costs
- costs to local authorities in terms of premature adjustments to district plans
- costs to central government from implementing the NES.

The results are summarised in Table 5. On the basis of the central ‘typical’ assumptions, the quantified analysis returns a very healthy net benefit, as expressed in the cost-benefit ratio, and this is robust against changes in the discount rate (in either direction). This raises the question about how large the unquantified items would need to be to overturn that result.

The analysis assumes that such unquantified items as the dis-benefits to residents from having visual intrusion, proliferation of street clutter, and inability to influence decisions on the road outside their properties vary in proportion to the number of sites: ie, there is a notional value of dis-benefit per site, just as there are benefits related to sites. Such dis-benefit is incurred just once per site, at the time at which consenting would have occurred in the absence of the NES. Table 5 shows that even a small value of dis-benefit – \$500 per site – is enough to put a dent in the benefit-cost ratio. The break-even dis-benefit value, at which the benefit-cost ratio is reduced to 1.0, is \$12,177 per site.

Table 5: Results under base assumptions

	‘Typical’ base assumptions		Community dis-benefit \$500 per site	Community dis-benefit \$10,000 per site	Community dis-benefit \$12,177 per site
	10%	8%	10%	10%	10%
Discounted at	10%	8%	10%	10%	10%
PV benefit \$000	94,479	102,438	94,479	94,479	94,479
PV costs \$000	4,837	5,134	8,518	78,454	94,479
PV net benefit \$000	89,642	97,304	85,961	16,025	0
Benefit-costs ratio	19.53	19.95	11.09	1.20	1.00

Note: PV = present value.

Source: NZIER

The question this raises is whether this is a reasonable figure to represent the value of community dis-benefit. A single roadside site may serve around 2000 houses, so this figure amounts to only around \$6 per house. However, an economic value is an expression of relative preference for one thing over others, and needs to be related to other expressions of value. One way to approach this is to ask whether a neighbourhood of 2000 houses would care enough about the positioning of an aerial extension to an existing pole and roadside cabinet to expend \$12,177 or more in an effort to avoid or mitigate its positioning there.

In principle this could be addressed through a non-market valuation technique that identifies community willingness to pay for different levels of public involvement in community decisions, but there do not seem to be any empirical studies of such issues. Circumstantial evidence suggests the value placed on public participation – the community’s willingness to pay for civic engagement – is not high. Submission rates struggle to exceed 5% of households on local council consultation, except on certain celebrated causes. The opportunity cost of individuals’ time spent on such consultation is low, being mainly substituted for leisure rather than work time.¹⁸ If it were equivalent to the average public sector wage of around \$29.50/hour, the break-even value would be equivalent to 413 person hours on consultation activity – which could easily be expended across a community on a controversial issue, but may not on a minor localised issue. There is no definitive evidence on whether this break-even value is consistent with the value of unquantifiable effects in other circumstances. Further, the number of properties directly affected by a mast and cabinet site will be much smaller than the full 2000 properties within range, and probably smaller than the number who expect to benefit from the new services it provides and would welcome the roll-out facilitated by the NES.

5.9.3 Sensitivity to changes in assumptions

Table 6 presents results from changing a number of assumptions in the analysis. The changes are broadly applied – reducing or increasing costs and benefits by some factor to indicate whether the broad magnitude of particular assumptions is critical to the result.

Table 6: Changes relative to base assumptions (PV = present value)

	Half as many sites	Industry benefits half as large	Industry benefits one-tenth as large	Costs to local authorities four times as large	Half the benefits and double the costs
Discounted at	10%	10%	10%	10%	10%
PV benefit \$000	47,240	52,150	18,286	94,479	23,620
PV costs \$000	4,837	4,837	4,837	18,976	9,550
PV net benefit \$000	42,402	47,312	13,448	75,503	14,070
Benefit:costs ratio	9.77	10.78	3.78	4.98	2.47

Note: PV = present value.

Source: NZIER

The table shows the quantified analysis is robust to large changes in individual assumptions. The right-hand column shows that halving all the benefit assumptions and doubling all the cost assumptions reduces the benefit cost ratio to 2.47, still sufficient to indicate the likelihood of positive net benefits on the quantified analysis.

¹⁸ At the margin, individual opportunity cost may be considered equal to the expected wage rate. But the resident population also includes people not participating in the workforce, so the average opportunity cost of leisure across the population is generally lower than the expected wage rate.

The analysis remains incomplete by the omission of:

- *Increased business from new facilities:* the companies anticipate this, but there is no way to assess how much of the increase would be new business, or how much diverted business and associated changes in value and cost, so these aspects of producer surplus and consumer surplus are outside the quantified analysis. This omission tends to underestimate the net benefit of the NES.
- *Unquantifiable effects:* the break-even value for community dis-benefits reduces as the net benefits figure comes down. For the analysis reported in the right hand column of Table 6, the break-even value is \$3,822 per site. Such lower figures have a higher probability of coinciding with how the community values these unquantifiable effects than a higher figure. The omission of a value for unquantifiable effects (mostly costs) means the analysis may over-state the net benefit of the NES.
- *Flow-on and general equilibrium effects:* the cost-benefit analysis is conducted in a 'partial equilibrium' framework which is not able to trace the consequences of changes in costs and benefits on users and producers across the economy. Such flow-on effects are a major part of the justification for roll-out of broadband and other services, for it is what people do with the new services and connections that supports innovative behaviour and contributes to dynamic efficiency across the economy. Such flow-on effects can in principle be tracked through general equilibrium models, which show how price changes in one sector feed through to changes in resource use and prices in all other sectors. However, there are few such models available in New Zealand and all are limited by out-of-date inter-industry models that no longer accurately reflect the relationships between sectors. The omission means the analysis tends to understate the value of the NES in stimulating new activity widely across the economy and society.

Nevertheless, there are some broad patterns and similarities in the information provided. The analysis and its robustness to large changes in input assumptions indicates that if the actual figures on roll-out and costs are anywhere near to those in the analysis, the NES should provide a substantial net benefit.

5.9.4 Update to industry expectations

The cost-benefit analysis above includes new information on the number of roadside sites that industry participants expect to be installed over the next 10 years. Given the recent progress on local loop unbundling we asked industry participants to update their expectations of the number of roadside sites they would be installing from 2008 to 2018. Feedback has indicated an appreciable change in industry expectations since the initial economic analysis was completed in late 2006. The total number of roadside sites expected to be installed in the next three years has increased approximately 1.6 times, followed by an almost halving of the number of roadside sites over the following seven years. In the cost-benefit analysis framework, benefits accruing sooner receive more weight (due to the discounting of the value of future benefits over time) and as a result the change to industry plans has improved the net benefit (or net present value, NPV) of the NES.

It is difficult to determine how much the changes in expected roll-out are due to perceived easing of the process brought about by the NES, and how much by exogenous factors (for example, the progress on local loop unbundling or the operational separation of Telecom). If the NES induces the expected early bulge in roll-out, it would be inappropriate to use the same profile for the counter-factual in the absence of the NES. If that were the case, the net benefits

of the NES would be greater than those calculated here, because relative to the counter-factual the NES not only reduces consenting costs but brings forward more roll-out into the near future, where benefits are discounted less.

5.10 Radio-frequency national environmental standard

The foregoing analysis has focused on the roll-out of telecommunications facilities in road reserves. The NES for radio-frequency fields does not lend itself to such a quantifiable analysis for various reasons. A number of local authorities appear to be converging on an approach similar to that in the NES in any case, and telecommunications companies appear to be more comfortable on this issue than with roadside facilities, in which there is greater variability in dealing with localised effects. Also, the number of sites whose costs may be appreciably affected by adoption or non-adoption of the NES is more indeterminate, depending in part on the success or otherwise of roadside facilities. To some extent these are substitutes: increased use of roadside sites reduces the need to use larger aerials that are more affected by the radio-frequency NES. In such circumstances, and given the high level nature of the information obtained from canvassing respondents, it is not feasible to postulate a number of sites needing consents in future years, to which a difference in costs with and without the NES can be applied.

Councils and communities would arguably lose less local control by adopting the radio-frequency NES, while gaining the benefit of reduced load on consenting and other planning activities.

5.11 Conclusions

The quantified results suggest substantial net benefits from adopting the national environmental standards. Sensitivity analysis suggests the analysis is robust to large changes in the input assumptions, so if the actual roll-out rates and costs are anywhere close to those used in the analysis, they are likely to result in a net benefit for the country at large.

There are limitations in the quantified analysis, due to the information available on what has been hitherto a relatively small part of total telecommunications activity and council resource consenting activity (roadside facilities). The principal parts of the quantified analysis are:

- resource cost savings for telecommunications operators in obtaining consents, and for councils in processing them
- resource costs for government in supporting the introduction of the NES, and for some councils in adjusting their district plans to conform with the NES.

The principal effects outside of the quantified analysis are:

- the economic surpluses for both consumers and producers arising from increased telecommunications service use, due to improved quality and/or reduced price of services
- the value to the community of the loss of local control over environmental effects arising from activities in the road corridor.

While the analysis omits some unquantifiable costs, it also omits some probable benefits, such as the flow-on effects and stimulus to new activity and innovation that availability of new services and technology will provide. Through such flow-on effects, the NES would contribute to dynamic efficiency across the economy and community at large.

As there is no ready means of valuing these unquantifiable effects, there remains some question over whether the NES is appropriate or inappropriate from a community perspective, ie, whether the combined benefits are sufficient to outweigh the loss of local control over environmental effects. However, the net benefits on the quantified analysis are so large that local control would need to have a high value to local communities to overturn the result.

Some factors may reduce the net benefits of the NES. The proposed standard gives councils the opportunity to introduce district plan provisions relating to location, design and external appearance. Such provisions have the potential to place greater restrictions on the application of the NES but they will not undermine the certainty which the NES would provide.

Another factor that may reduce net benefits is the role of local authorities as both environmental resource regulator administering the RMA and as road controlling authority. As such they are able to impose reasonable conditions on utilities seeking to exercise their statutory rights to use the road corridor. Telecommunications operators report difficulties with some local authorities in their road controlling role which, if they became widespread following loss of local control under the NES, could substantially reduce the benefits of standardising the process under the RMA. The recently completed review of utilities' use of the road corridor should reduce the potential for misunderstandings that impede the process between utilities operators and road authorities.

This analysis indicates that adopting the NES is likely to result in positive net benefits.

5.12 Summary: efficiency and effectiveness

Efficiency is a measure of whether the benefits of an option outweigh the costs. It is considered that the NES will deliver substantial benefits. These include reduced costs to industry, local government and ultimately the public, provision of new technologies, greater choice and improved quality of telecommunications services to consumers.

The net environmental and economic benefits are considered to exceed the net environmental and social costs of the NES.

Effectiveness is an assessment of how well an option will work. The NES was considered to be an effective method of achieving the policy objective compared with the available alternatives. In particular, it is considered that it would provide clarity and consistency as to the levels of permitted development provided for telecommunications infrastructure at a national and local level.

In summary, it is considered that the proposed national environmental standard is the most appropriate, effective and efficient means of achieving the objective: to provide for consistent and certain regulatory planning provisions that apply on a national basis, to assist in network and equipment design and equipment sourcing for roll-outs, and to achieve a reduction in compliance costs and timeframes.

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Appendix 1: Proposed National Environmental Standards for Telecommunications Facilities

1 Exposure to radio-frequency fields from wireless telecommunications infrastructure

Permitted activity

An activity that emits radio-frequency fields is a permitted activity provided the following conditions are met.

1. Exposures comply with NZS2772.1: 1999 Radio-frequency Fields Part 1: Maximum Exposure Levels 3 kHz – 300 GHz (“the New Zealand Standard”).
2. Prior to commencing any radio-frequency emissions, the following are sent to and reviewed by the [XXX Department of the] Council:
 - a. written notice of the location of the facility or proposed facility; and
 - b. a report prepared by a radio engineer/technician or physical scientist containing a prediction of whether the New Zealand Standard will be complied with.
3. If the report provided to the Council under condition 2(b) predicts that exposures will exceed 25 percent of the exposure limit set for the general public in the New Zealand Standard, then, within three months of radio-frequency emissions commencing, a report from the National Radiation Laboratory [or XXX being an appropriately qualified person/organisation specifically identified in this rule] certifying compliance with the New Zealand Standard, based on measurements at the site will be provided to the [XXX Department of the] Council”.

2 Telecommunications equipment cabinets within road reserves

Permitted activities

Telecommunications cabinets in road reserves shall be permitted activities subject to the following restrictions.

Limitations on cabinet size and location (above ground level)	Adjacent area type
Maximum height: 1.8 m Maximum volume: 2.5 m ³ Road lay position restriction: nil Maximum number of cabinets per separate property frontage exceeding 900 mm in height: 1	Residential, open space/ reserve
Maximum height: 2 m Maximum volume: 3.5 m ³ Road lay position restriction: nil	Rural, business, mixed-use

Provided that any rule in a district plan shall take precedence over this standard in the following circumstances:

- where the cabinet is located in a road reserve directly adjoining a site containing a building listed as having heritage value (this provision shall apply where a site containing the heritage building is located on the same side of the road reserve centre line as the cabinet)
- where a cabinet is located in a road reserve contained within or directly adjacent to any heritage precinct or area of landscape importance identified in a district plan (where the road reserve itself is not contained within the identified precinct or area, this provision shall apply where a site identified as being within a heritage precinct or area of landscape importance is located on the same side of the road reserve centre line as the cabinet)
- where any excavation work to install the cabinet is undertaken within the drip line or branch spread of any tree or vegetation, where a resource consent would otherwise be required by a district plan to undertake such excavation.

Cabinet – means an equipment casing, usually set on a concrete foundation plinth, that may contain telecommunications equipment, batteries, line terminals, and cooling systems such as heat exchangers and fans, and other such devices and equipment that are required to operate a telecommunications network (source: Telecommunications Industry Reference Group, 2006).

3 Noise from telecommunications equipment located within road reserves

Permitted activities

Noise from telecommunications cabinets located in road reserves shall be a permitted activity provided that the following noise limits are not exceeded.

Assessment point

For the purposes of this standard, the measurement point shall be located 3 m inside the boundary of the site under consideration (ie, the site adjacent to the road reserve in which the cabinet is located).

Residential, mixed-use, rural and open space/reserve areas

All days	Noise limit
Daytime (07.00–22.00)	50dBA LAeq (5 min)
Night-time (22.00–07.00)	40dBA LAeq (5 min) 65dBA Lmax

Business and industrial areas (and any other non-residential zones)

All days	Noise limit
Daytime (07.00–22.00)	60dBA LAeq (5 min)
Night-time (22.00–07.00)	60dBA LAeq (5 min)

Noise shall be measured in accordance with NZS 6801:1999 Acoustics – Measurement of Environmental Sound, and the basis for assessment shall be NZS 6802:1991 – Assessment of Environmental Sound. This includes provision for averaging during daytime such that a maximum daytime noise level of 55dBA LA_{eq} (5 min) in residential, mixed-use and rural zones at the measurement point is allowed, provided that the average noise level over the full day (07.00 to 22.00) does not exceed 50dBA LA_{eq}. No averaging is allowed at night-time.

Definition of terms

L_{eq} is the energy equivalent noise level. It is a time-averaged sound level, a single-number value that expresses the time-varying sound level for the specified period as though it were a constant sound level with the same total sound energy as the time-varying level. It is expressed over a set period of time (eg, 5 minutes, 8 hours, 24 hours etc), known as the ‘time base’ (source: Quality Planning website www.qualityplanning.org.nz).

L_{max} is the maximum noise level measured with a sound-level meter having a ‘fast’ response, or an equivalent method. L_{max} noise limits are normally only set where sleep protection is an issue and therefore usually only apply during night-time (source: Standards New Zealand).

4 Masts and antennas for wireless telecommunications networks within road reserves

Permitted activities

Antennas and their associated support structures in road reserves shall be permitted activities subject to the following restrictions.

Road reserve support structures and antennas	Adjacent area type
<p>The replacement of, or addition to, any existing utility structure in the road reserve, for telecommunications purposes, whereby the new or altered structure does not exceed the maximum diameter of the structure it replaces or modifies by more than 50%, and in the case of antennas or any associated covering shroud, the antennas and/or shroud do not extend more than 3 m above the highest point of the existing structure.</p> <p>Panel antennas to maximum dimensions of 2.3 m (l) x 450 mm (w) x 200 mm (d).</p>	<p>Residential, business, mixed-use, rural, open space/reserve</p> <p>Residential, business mixed-use, rural open space/reserve</p>

Provided that any rule in a district plan shall take precedence over this standard in the following circumstances:

- where the support structure or antenna(s) is/are located in a road reserve directly adjoining a site containing a building listed as having heritage value (this provision shall apply where a site containing the heritage building is located on the same side of the road reserve centre line as the support structure or antenna(s))
- where the support structure or antenna(s) is/are located in a road reserve contained within or directly adjacent to any heritage precinct or area of landscape importance identified in a district plan (where the road reserve itself is not contained within the identified precinct or area, this provision shall apply where a site identified as being within a heritage precinct or area of landscape importance is located on the same side of the road reserve centre line as the support structure or antenna(s)).

Antenna means any device that receives or transmits radio-communication or telecommunications signals (source: Telecommunications Industry Reference Group, 2006).

Mast means any pole, tower or similar structure designed to support antennas to facilitate telecommunications, radio communications and broadcasting (source: Telecommunications Industry Reference Group 2006).

Appendix 2: Final Form of National Environmental Standards as Agreed by Cabinet

Pursuant to s43B of the Resource Management Act 1991, no rule or resource consent shall be more stringent than the national environmental standards for telecommunications facilities.

1 Radio-frequency field exposures from wireless telecommunications infrastructure

Permitted activity

An activity by a telecommunications operator that generates radio-frequency fields is a permitted activity provided the following conditions are met.

1. Exposures to the radio-frequency fields generated by the activity (in conjunction, where applicable, with exposures to radio-frequency fields from existing transmitters in the vicinity) comply with NZS2772.1: 1999 Radio-frequency Fields Part 1: Maximum Exposure Levels 3 kHz – 300 GHz (“the New Zealand Standard”).
2. Prior to commencing any activity that generates radio-frequency fields, the following are sent to and reviewed by the relevant Council:
 - a. written notice of the location of the facility or proposed facility; and
 - b. a report prepared by a radio engineer/technician or physical scientist containing a prediction of whether the New Zealand Standard will be complied with.
3. If the report provided to the Council under condition 2(b) predicts that exposures will reach 25 percent of the exposure limit set for the general public in the New Zealand Standard, then, within three months of radio-frequency emissions commencing, a report from an appropriately qualified person/organisation (for example a Radio-frequency engineer) certifying compliance with the New Zealand Standard, based on measurements at the site will be provided to the Council.

2 Telecommunications equipment cabinets within road reserves

Telecommunications cabinets in road reserves shall be permitted activities subject to the following restrictions:

Limitations on cabinet size and location (above ground level)	Adjacent area type
Maximum height: 1.8 m Maximum footprint of any single cabinet: 1.4 m ² Maximum footprint occupied by all cabinets: 1.8 m ² Maximum number of network utility cabinets exceeding 900 mm in height in any location: one ¹⁹ Minimum separation distance from any existing utility cabinet exceeding 900 mm in height: 30 m (except where specific provision by way of dedicated areas has been made for utilities infrastructure within the road reserve)	Residential
Maximum height: 2 m Maximum footprint: 2.0 m ² Minimum separation distance from any existing utility cabinet exceeding 900 mm in height: 30 m (except where specific provision by way of dedicated areas has been made for utilities infrastructure within the road reserve)	Non-residential

All cabinets permitted by this standard shall comply with:

- any specific performance standards contained in a plan or design guide (that forms part of a district plan) relating to design or external appearance of utility cabinets in the road reserve.

The relevant district plan rules shall prevail over this standard in the following circumstances:

- where the cabinet is located in an area, or adjacent to a site, to which the district plan applies rules protecting historic heritage, or visual amenity values,²⁰ for example:
 - within view shafts identified in district plans (covered above)
 - commercial areas ie, CBD, shopping precincts (covered above)
- where any excavation work to install the cabinet needs to be undertaken within the drip line or branch spread of any tree or vegetation
- where the cabinet is proposed to be located on the seaward side of the road centre-line, and the road abuts the Coastal Marine Area
- where any above ground power supply is not contained within the cabinet.

¹⁹ Cabinets in new subdivisions are often located in areas allocated for utilities, for example dedicated areas of road reserve are provided. In these cases it would be considered a reasonable condition of a Road Opening Notice that the cabinets be located within those areas.

²⁰ Areas identified as historic, historic heritage, cultural sites or open space.

Other considerations:

Cabinet means either an individual cabinet, or a cluster of cabinets. Provided that in the case of a cluster, these cabinets are interdependent on each other to provide a service, and that the spacing between adjacent cabinets is no more than 500 mm, and that the total dimensions of all cabinets (excluding the space between the cabinets) does not exceed the maximum height and area restrictions set out in this standard.

An additional cabinet can be abutted to an existing cabinet, so long as the combined size or footprint of the cabinets does not exceed the maximum specified in this standard.

Issues to do with location of structures to ensure they do not create a safety hazard, including frangibility of structures are addressed by road controlling authorities through the provisions of the Telecommunications Act 2001. The development of a national code of practice for utilities access to the road corridor and the development of a consistent set of reasonable conditions that can be required by road controlling authorities will provide clarity and national consistency.

3 Noise from telecommunications equipment located within road reserves

Noise from telecommunications cabinets located in road reserves shall be a permitted activity provided that the following noise limits are not exceeded:

Residential, mixed-use, rural and open space/reserve areas

All days	Noise limit
Daytime (0700–2200)	50dBA LAeq (5 min)
Night-time (2200–0700)	40dBA LAeq (5 min)) 65dBALmax

Business and industrial areas (and any other non-residential zones)

All days	Noise limit
Daytime (0700–2200)	60dBA LAeq (5 min)
Night-time (2200–0700)	60dBA LAeq (5 min)

Noise shall be measured in accordance with NZS 6801:2008 Acoustics – Measurement of Environmental Sound, and the basis for assessment shall be NZS 6802:2008 – Assessment of Environmental Sound. This includes provision for averaging during daytime such that a maximum daytime noise level of 55dBA LAeq (5 min) in residential, mixed-use and rural zones at the measurement point is allowed, provided that the average noise level over the full day (07.00 to 22.00) does not exceed 50dBA LAeq. No averaging is allowed at night-time.

4 Masts and antennas

Permitted activities

The replacement of, or addition to, any existing utility structure in the road reserve of antennas and their associated support structures by telecommunications operators shall be permitted activities subject to the following restrictions:

- the new or altered structure does not exceed the maximum diameter of the structure it replaces or modifies by more than 50%
- in the case of antennas or any associated covering shroud, the antennas and/or shroud do not extend more than 30% or 3 metres, whichever is the lesser, above the highest point of the existing structure before the addition of any equipment for telecommunications purposes
- antennas extending above the highest point of an existing structure shall be contained within maximum dimensions of a cylindrical shape 2.0 m high by 0.5 m diameter, located along the centre-line of the pole
- dish antennas are permitted up to a maximum diameter of 380 mm, protruding from the centre line of the pole by no more than 0.6 m up to a maximum of two antennas per pole.

This does not apply to new or existing structures that are primarily for the purposes of supporting telecommunications antennas.

Provided that any rule in a district plan shall take precedence over this standard in the following circumstances:

1. Where the support structure or antenna(s) is located in a road reserve directly adjoining a site containing a building listed as having heritage value (this provision shall apply where a site containing the heritage building is located on the same side of the road reserve centre line as the support structure or antenna(s)).
2. Where the support structure or antenna(s) is located in a road reserve contained within or directly adjacent to any heritage precinct or area of landscape importance identified in a district plan (where the road reserve itself is not contained within the identified precinct or area, this provision shall apply where a site identified as being within a heritage precinct or area of landscape importance is located on the same side of the road reserve centre line as the support structure or antenna(s)).

Comments

- The standard includes a maximum envelope size for panel antennas and makes provision for the addition of up to two small dish antennas on any structure.
- The use of “before the addition of any telecommunications equipment” is intended to convey the meaning that this is a one-off height control, and any revisits must stay within the original envelope.

- Issues to do with location of structures to ensure they do not create a safety hazard, including frangibility of structures are most appropriately addressed by the road controlling authority through the legal requirement for a Road Opening Notice under the Telecommunications Act and reasonable conditions that can be attached by a road controlling authority to the notice.

Definitions

Antenna – means any device operated by a telecommunications operator that receives or transmits radio communication or telecommunications signals.

Cabinet – means an equipment casing, operated by a telecommunications operator usually set on a concrete foundation plinth, used primarily for the purposes of operating a telecommunications network. The cabinet may contain telecommunications equipment, batteries, line terminals, and cooling systems such as heat exchangers and fans, and other such devices and equipment that are required to operate a telecommunications network. Further more, ‘cabinet’ means either an individual cabinet, or a cluster of cabinets. Provided that in the case of a cluster, these cabinets are interdependent on each other to provide a service, and that the spacing between adjacent cabinets is no more than 500 mm, and that the total dimensions of all cabinets (excluding the space between the cabinets) does not exceed the maximum height and area restrictions set out in this standard.

Mast – means any pole, tower or similar structure designed to support antennas to facilitate telecommunications, radio communications and broadcasting. Operated by a telecommunications operator.

Road reserve – means the full extent of the legal road corridor vested in either the local Council or Transit New Zealand. This includes the formed vehicle carriageway and the road berms areas between the vehicle carriageway and adjacent properties.

Telecommunications operator – has the same meaning as network operator in Section 5 of the Telecommunications Act 2001.

Appendix 3: Telecommunications Background

Telecommunications has been the subject of a recent government stocktake and the notes that follow draw heavily on reports prepared for it.²¹

Telecommunications systems consist of a core network for carrying signals between locations, and access networks linking the core to individual users and customers. In New Zealand, the core network operators are:

- Telecom NZ Ltd has the most comprehensive network covering both long distance (core network) and local loop (access network), landline and mobile
- TelstraClear Ltd has a core network that is most developed for inter-city traffic and mainly in the North Island, relying on access to Telecom's local loop for connecting with most customers
- Vodafone NZ Ltd has a nationwide mobile network covering both core and access functions
- Broadcast Communications Ltd (BCL) has nationwide coverage, but offers only 'wholesale' services (bulk customers, not individuals)
- community-based networks (eg, Smartlinx3) provide localised core network capacity, relying on inter-operability with other suppliers.

The principal technologies currently available are:

- conventional landline (public switched telephone network) generally based on copper cable, but being progressively replaced by fibre-optic cable with greater capacity; a process that may require upgrading and perhaps re-locating existing roadside cabinets
- cellular networks (mobile phones)
- wireless local loops (eg, WiMax), which provide local access network through establishment of local cell sites.

The principal trends and influences on these networks come from a combination of changing technologies and service possibilities, and commercial considerations:

- Search for Next Generation Networks capable of supporting new services is driving exploration of the practical feasibility of the different technological options.
- Convergence in technological capabilities between:
 - fixed line and mobile services – moving to seamless interchangeability
 - voice services and data transmission
 - device convergence – consumer electronics and phone in one device
 - telecommunications and media – broadcast media and content over phone connections.

²¹ Azimuth Consulting Limited, 2006 and Network Strategies Limited, 2006.

- Move to increasing phone network capacity:
 - transmitting data as well as voice requires faster signal conveyance
 - as volume of real-time traffic increases, suppliers need to improve the quality of service to ensure end user satisfaction and maintain market share in the face of increased competition from proliferation of services
 - increasing use of fibre connections to improve digital data capacity leads to moving fibre closer to consumers, and to the need for more roadside cabinets.
- Content bottleneck may slow down some service offerings:
 - in New Zealand, Sky has a dominant position with multiple outlets (free to air and pay TV) and purchasing power to acquire breadth and quality of content.
- Commercial considerations include:
 - declining revenue from fixed line voice services in low traffic density areas, due to substitution by mobile telephony and voice over internet protocol services
 - uncertainty over regulation (eg, unbundling) raises questions about the future value of investments in improving the network
 - uncertainty over the value of content-based services for telecommunications carriers may slow down the upgrade of infrastructure to provide such services
 - in low density areas landline development may be less viable than cellular or other wireless technology
 - landline is likely to remain competitive in metropolitan areas, but the need to support more services and increase capacity is likely to require both upgrade of existing roadside facilities and extension of such facilities into new areas.

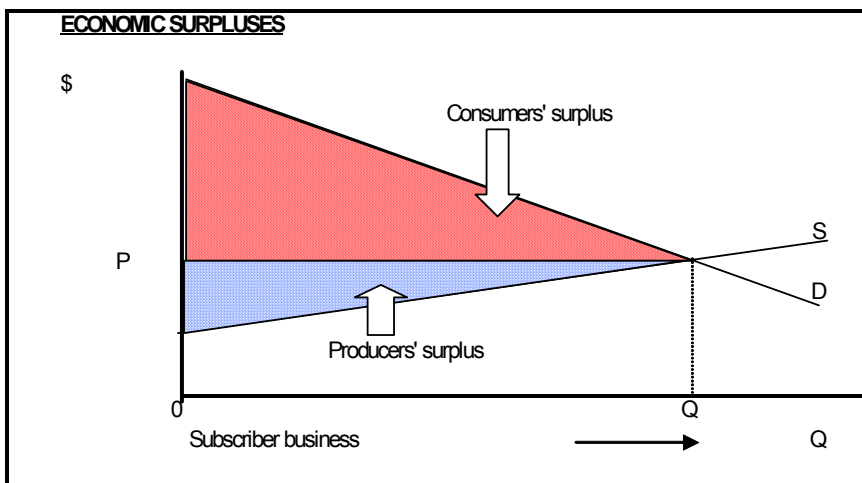
There appear to be therefore a number of current influences pointing to the upgrade of facilities, including fibre-to-home and fibre-to-node upgrades of the local loop and development of wireless local loop. All imply moving electronic control systems closer to the customer and more roadside cabinets and associated works.

Appendix 4: Theoretical Considerations

Cost-benefit analysis is a form of applied welfare analysis, the object of which is to assess how a proposed policy or investment changes the economic welfare of the affected community. Welfare in this sense consists of the economic surpluses associated with the resultant activity, as illustrated in Figure 1. The producer surplus is simply the difference between the market price for transactions in a service and costs incurred in providing that surplus. The costs of supplying different units differ for a range of reasons, yet the market price is determined by the cost of supplying the marginal customer; so a lot of units of supply earn an economic rent. This surplus is broadly consistent with operating surplus or profit of a company, so changes in profit can be indicative of changes in producer surplus.

The other component of economic welfare is consumer surplus, which is the difference between market price and what consumers would be willing to pay to obtain the service. This arises because individual consumers have differing willingness to pay for the same service. As suppliers are rarely able to perfectly discriminate between customers, the market price is determined by the marginal customer's willingness to pay. In short, many consumers obtain goods and services at a price less than they would be willing to pay, obtaining a surplus value which they can use to purchase other goods or services.

Figure 1: Components of economic value



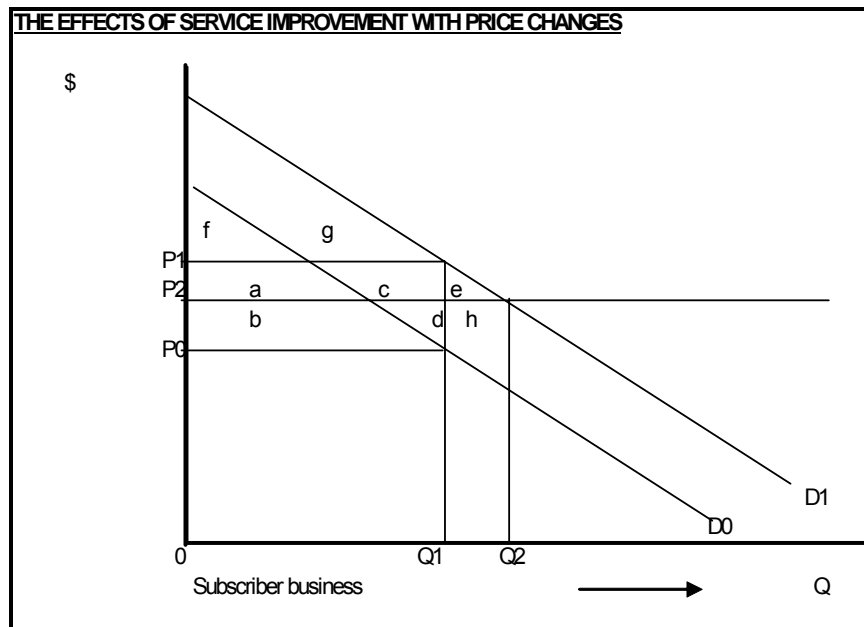
Source: NZIER

Consumer surplus is difficult to observe, and depends on estimating the shape and slope of the demand curve for the service, which itself is no easy task. In considering the welfare effects of the telecommunications NES, therefore, the most tangible measures are likely to be for changes in the producer surplus. There will be changes in consumer benefits over and above what can be observed in changes in the market, but their size and shape cannot be determined with any precision.

This imprecision is compounded in the case of the telecommunications NES because it offers the prospect of simultaneous changes in the quantity and quality of service offerings. Roadside cabinets and aerials rarely provide an exact substitute for a current service: usually they improve an existing service, or provide a new service in an area with no previous service. While the effects on economic surpluses are relatively straightforward if all that is happening is a reduction in the cost of a given service, changing the quality of service offering implies a higher-value offering and involves displacing lower-quality offerings as well.

The welfare effects of the telecommunications NES are illustrated in Figure 2, which assumes for simplicity a downward sloping demand curve and a horizontal supply curve, corresponding with the price line P0. If the original service was offered at price P0 and generated business volume of Q1, an improvement in quality is likely to result in outward shift of the demand curve (D0 to D1). But if it costs more to provide the enhanced quality so the price rises to P2, demand for the new service will settle at Q2.

Figure 2: Changes in economic value



Source: NZIER

The welfare effects are as follows:

- areas a, b and f comprised the original consumer surplus, but area b is captured by producers to contribute to their producer surplus or cost of supply
- areas e, c and g represent new consumer surplus associated with improved quality services
- areas d and h represent new revenues to suppliers that contribute to covering the cost of services.

Therefore, if $(g+c+e)$ is greater than b , there is a net gain in consumer surplus. As drawn, there is no change in producer surplus, as horizontal price/supply lines imply all revenue is absorbed by the cost of providing the service. But if the supply curve slopes up (as is the case with most services) there will also be some gain in producer surplus.

In practice, there is rarely any empirical data on which to base an assessment of change in consumer surplus resulting from new services or improved quality, before they occur. For this analysis, gains in consumer surplus are acknowledged but not quantified, and the focus is on how the NES changes producer surplus, both for industry and regulatory authorities.

Appendix 5: The Impact of Cellphone Towers on Property Values

Cellphone towers can provide an additional source of income for those on whose property they are located, but in the neighbourhood they can raise concerns and opposition. The main concerns arise around:

- potential effects on health from increased electromagnetic radiation
- visual impacts and effects on neighbourhood aesthetics
- property value effects.

Scientific studies have been unable to demonstrate clearly and conclusively any adverse health effects from the presence of cellphone towers, but uncertainty remains in the public mind. Such concerns around perceived risk can affect attitudes and opposition to cell tower location. While towers can have an intrusive visual impact, particularly on specific properties, they need not be particularly visible if shielded by trees or buildings or attached as small modifications to existing structures (as in the case of extensions to roadside lamp posts). Effects on property values can occur, but these are manifestations of these other effects, not additional to them, as has been recognised by the Environment Court in New Zealand.²²

Internationally there have been press reports of substantial negative impacts on value of around 50%, but these are mostly anecdotal opinion from valuers, or reflect exceptionally intrusive situations rather than average or representative cases. The empirical evidence is more varied. Sandy Bond and co-authors conducted a series of studies employing a mix of qualitative opinion surveys, hedonic pricing of proximity to cell towers (using regression analysis of house sales data) and geographical information systems. They found the presence of towers could reduce property values by around 21% in Christchurch suburbs where towers received much contentious publicity, but had no significant effect or even a positive impact on property values in suburbs without such publicity.²³

Applying similar methodology in Florida, Bond found a smaller negative impact of around 2% reduction in value for properties close to cellphone towers, relative to similar properties elsewhere.²⁴ In United States and New Zealand studies, Bond found the impact reduced rapidly with distance of property from a cellphone tower site, to be negligible beyond 200–300 metres of the tower.

²² NZ RMA 66 (1999) Shirley Primary School v Telecom Mobile Communications.

²³ Bond and Wang, 2005.

²⁴ Bond and Squires, 2006.

Bond suggests the lower percentage reduction in Florida than in New Zealand may be due to Americans being more used to, and hence less bothered by, towers than New Zealanders. However, small-percentage impacts on property values are found in other countries as well as the United States. The Canadian Spectrum Management and Telecommunications Report on the National Antenna Tower Policy Review cites case studies finding a 3% reduction from directly backing onto a microwave tower site, and a 7.2% reduction from installation of a broadcasting antenna tower.²⁵ A British study of neighbourhood effects on property values found mobile phone/telecoms masts had a 3% reduction in property values,²⁶ less than electricity pylons (9%) which are sometimes claimed to be similar,²⁷ and substantially less than the 15% reduction from proximity to waste facilities, late-night drinking and entertainment venues, or being under an airport flight path. New Zealand value effects may be proportionately larger because of the novelty or press coverage of cases in the study period, but this is likely to diminish over time as cellphone sites become more common and less intrusive, with more widespread and lower-profile distribution.

²⁵ strategis.ic.gc.ca/epic/site/smt-gst.nsf/en/sf08353e.html

²⁶ www.gafs.co.uk/OP/GAF?Help-The-perfect-neighbourhood.htm

²⁷ McDonough, 2003.

Appendix 6: Section 43 of the Resource Management Act 1991

43. *Regulations prescribing national environmental standards*
- (1) *The Governor-General may, by Order in Council, make regulations, to be known as national environmental standards, that prescribe any or all of the following technical standards, methods, or requirements:*
- (a) *standards for the matters referred to in section 9, section 11, section 12, section 13, section 14, or section 15, including, but not limited to –*
- (i) *contaminants*
- (ii) *water quality, level, or flow*
- (iii) *air quality*
- (iv) *soil quality in relation to the discharge of contaminants*
- (b) *standards for noise*
- (c) *standards, methods, or requirements for monitoring.*
- (2) *The regulations may include:*
- (a) *qualitative or quantitative standards*
- (b) *standards for any discharge or the ambient environment*
- (c) *methods for classifying a natural or physical resource*
- (d) *methods, processes, or technology to implement standards*
- (e) *exemptions from standards*
- (f) *transitional provisions for standards, methods, or requirements.*
- (3) *Section 360(2) applies to all regulations made under this section.*