A Guide to Planning for Electricity Distribution Networks under the Resource Management Act 1991

March 2017

Disclaimer

This Guide has been prepared by representatives of the electricity supply industry to provide guidance on the Resource Management Act, but it is not a substitute for legislative or other regulatory requirements. If there is uncertainty on what guidelines or legislative requirements should apply in any particular situation, specialist advice, including legal advice, should be sought.

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Purpose and Use of this Document

The purpose of this document is to provide consistent and reliable information in a user-friendly format to support Electricity Distribution Businesses (EDBs), local authorities and Resource Management Act 1991 (RMA) practitioners who are dealing with the subject of electricity distribution networks and associated infrastructure within various planning processes.

- The aim is to facilitate sound outcomes within the RMA framework by educating local authorities and planning practitioners on:
- The requirements in order to efficiently operate, maintain and develop safe and resilient electricity distribution networks;
- The effects that activities relating to electricity distribution infrastructure may have on the environment; and
- The effects that the activities of others may have on the electricity distribution networks.

The guide also includes template planning provisions to give guidance to local government practitioners responsible for developing local plans, and to the EDBs who make submissions on those plans.

This document is split into four sections.

- Section 1 provides a brief overview of the need for this document.
- Section 2 provides educational material on the electricity distribution sector and its requirements.
- Section 3 discusses the issues EDB's currently experience with regard to the RMA; and
- Section 4 then provides template objectives, policies, rules and definitions to guide the plan making process.

Executive Summary

The Electricity Networks Association (ENA) is the industry association for New Zealand's Electricity Distribution Businesses who develop, operate and maintain critical infrastructure to support communities and economic growth. A secure supply of electricity is fundamental to the efficient and effective functioning of New Zealand society.

However, ENA members have reported a lack of consistency in the resource management planning process and as such have identified a need for guidance material to support the operation, maintenance and development of distribution networks in regard to the RMA.

This guide aims to improve outcomes, consistency and certainty, and to reduce costs for all parties participating in the planning processes relating to electricity distribution networks. It is intended to be used as a resource by local authorities to help promote awareness of resource management issues associated with electricity infrastructure, and assist in achieving sound outcomes within the RMA framework.

Electricity networks create and are subject to both positive and adverse effects. If planning provisions to manage these effects are not well drafted, restrictions under district plan rules, in particular, can inhibit or prevent EDBs undertaking essential maintenance or upgrade work. In addition, uncontrolled development near electrical lines presents serious public safety risks and must be avoided. In order to prevent incidents, safety clearances between conductors, buildings, the ground and vegetation must be achieved and maintained at all times. This can be assisted through planning provisions and early dialogue with EDBs.

It is recommended that councils work with their local EDBs in the drafting of planning provisions for consent applications relating to activities near electricity assets. By providing national guidance ENA considers there is an opportunity to:

- give greater certainty to local communities that the environmental effects of electricity distribution activities are being effectively managed; and
- enhance the reliability and resilience of the electricity distribution infrastructure with timely approvals and an appropriate level of control.

The correct balance needs to be struck between enabling electricity distribution activities and managing environmental effects of those activities. The EDBs consider the template provisions contained within these guidelines adequately strike that balance.

Section 1 – Introduction and the need for this guide

What is the ENA and who does it represent?

The ENA is the industry association for New Zealand's EDBs. The ENA and its members have identified a need for guidance material to support the operation, maintenance and development of distribution networks in regard to the RMA.

Why is this document needed?

Until supply is interrupted, consumers generally give little thought to the importance of electricity distribution networks, how they function and how they underpin daily life. But New Zealand's productive economy is increasingly reliant on well-designed and well-maintained power networks — and the advent of new technologies such as electric vehicles will further intensify this reliance.

Planning for the provision of well-designed electricity supply infrastructure is fundamental to successful resource and economic development. Currently, this is of particular relevance, for example, to initiatives that address the need for new housing. New housing developments will rely on the infrastructure requirements being met in a timely and cost efficient way.

While there is increasing pressure for the sustainable development of land, there are also constraints imposed on the development and operation of electricity networks. An effective and efficient planning framework is therefore ever more critical to the successful and timely development of electricity infrastructure; at the same time giving assurance to communities and councils that potential impacts are being appropriately managed.

Electricity Networks Association (ENA) members have reported that there is lack of consistency for them in the planning process.

ENA members have, however, reported a lack of consistency in the planning process. Local planning processes have a wide variety of approaches for managing electricity infrastructure—the same activity of an EDB could be permitted under one district plan, controlled in an adjacent district, and discretionary in the next. Planning outcomes can be poor and difficult to predict and resources (both those of the council and EDBs) get tied up in developing plan provisions, submitting on plan changes and in the consent process.

Many of the issues are similar to those experienced by the telecommunications sector, leading to the proposed, enhanced set of National Environmental Standards for Telecommunication Facilities (NESTF).

The ENA's review of the consent requirements in all operative district plans highlights the following points:

- Many plans make provision for 'minor upgrading' as a permitted activity. However, definitions of commonly used terms (including that of 'minor upgrading') can vary greatly;
- There is a lack of consistency between plans including ones for neighbouring territorial authorities. For example, the upgrade of a line passing through several districts could require resource consents in some districts but not in others. Consenting delays in one district can potentially put a whole project at risk, not just that part;

- There is no consistency with the provision of conditions of consent for the same activity within a district, yet alone the same activity and status in another district;
- Plans frequently contain terms and conditions unnecessarily limiting some activities which have minimal environmental effects. Arguably, these would be more appropriately categorised as permitted activities;
- Many district plans contain unnecessary references to technical criteria, meaning compliance must be repeatedly established;
- Some plans have chapters specifically setting out rules for network utility operators, but a complexity of cross-referencing to other specific rules makes it difficult to determine the potential consent requirements for a distribution activity – especially those involving a variety of activities and multiple zones;
- Within 'legal road' reserve, there is some inconsistency between what may be permitted in a district plan and what is permitted under the provisions of the Electricity Act. There is generally no recognition given to the scope of control provided by the National Code for Utilities' Access to the Transport Corridors;
- There are inconsistent definitions of 'Regionally Significant Infrastructure';
- Many District Plans focus on Council owned utilities and often ignore or give little mention to non-Council owned utilities such as electricity distribution.

By increasing the level of understanding about the electricity industry, and of distribution networks within that, this guide aims to improve outcomes, consistency and certainty, and to reduce costs for all parties participating in the planning processes relating to electricity distribution networks.

Have similar approaches been used elsewhere?

A literature search was undertaken which found that while there is a plethora of material concerning planning for electricity transmission, there was little in regard to distribution. Similarly, this search of overseas models found central agencies had generally provided much more in the way of articulated national guidance and policy statements for transmission, telecommunications and what has been traditionally thought of as 'nationally significant' type infrastructure. Common tools were exemptions in Acts, national policy and some guidance documents, particularly for telecommunications.

It was found that many jurisdictions had declared in legislation at least some electricity distribution activities for which consents were not required. Moreover, overseas jurisdictions often had more central agency control over the decision-making process for distribution; most notably consents for new overhead lines in the UK. The UK's set of exemptions for distribution activities (i.e. those not requiring consents) is also more comprehensive than most, and includes certain replacements, 'design successors' and resilience works. Canada's exemption list is also comprehensive. The USA has multiple federal, state and council/county decision makers and layers. Relevant information on the USA regime was thus harder to unpick, and guidance to date has tended to focus on transmission (although this may also include sub-transmission at times). Australia also has a federal, state and local government system. While there are moves afoot in Australia to provide more direction for nationally significant projects, and Australia has some good guidance and regimes for

telecommunications, there is less national guidance/central consenting for distribution at this time. Of note for the New Zealand context, however, is the trend that EDBs have been acquiring high voltage transmission assets that Transpower has divested, and have also been actively developing their own HV transmission.

Who is the guide for?

Local authorities

This document is intended to be used as a resource by local authorities to help promote awareness of resource management issues associated with electricity distribution infrastructure, and assist in achieving sound outcomes within the RMA framework. This guide:

- provides explanatory material to help understanding about the function and composition of the electricity industry and the distribution networks, along with the scope of EDBs' activities;
- assists in establishing a factual basis for assessing effects;
- is a template for policy development, and for efficient and effective rules and standards;
- creates a platform for developing a consistent approach. Inconsistencies in regard to EDBs occur not only across boundaries, but also within districts;
- supports the integration of infrastructure with land development and structure planning.

Electricity Distribution Businesses

This document has been the initiative of the ENA. It is intended that the guide will:

- provide an information resource for EDBs to share with other parties involved in the planning process to help educate them about the requirements and considerations from a network perspective;
- facilitate more certainty for EDBs in planning for the maintenance, upgrade and development of their networks;
- facilitate greater standardisation between planning documents, and help to avoid re-litigating fundamental issues such as compliance with recognised codes;
- help ensure land development is appropriately integrated with the provision of infrastructure;
- facilitate useful, consistent, appropriately set, timely and meaningful outcomes from the consenting process.

Section 2 – About the electricity distribution sector

The electricity sector

New Zealand's electricity sector is split into five distinct component parts; Generation, Transmission, Distribution, Retail and Consumption. Figure 1 on the following page depicts the sector.

Generation

Companies such as Contact Energy, Genesis Energy, Meridian Energy, Mercury Energy and TrustPower generate electricity that is then sold via the wholesale market to retailers. The electricity is injected into either transmission lines or distribution lines.

Transmission

The national grid is owned and operated by Transpower, a State Owned Enterprise. It comprises over 12,000 km of high voltage lines (generally operating at or above 110,000 volts) and approximately 178 substations, linking the generating power stations to the grid exit points (GXP) from where electricity is taken by the EDBs and some large industrial consumers (direct consumers). In some circumstances Transpower has divested (sold) assets to the relevant EDB where Transpower considers it is no longer appropriate to retain the asset within the transmission system, and where divesting will provide a net benefit to New Zealand. Transpower's assets are afforded the recognition provided by the National Policy Statement for Transmission (NPSET) and the associated National Environmental Standards for Electricity Transmission Activities (NESETA). It is important to recognise that the assets of distribution companies were not included within the scope of these documents.

It is important to note that EDB activities and assets are ***not*** *covered by the National Policy Statement for Electrical Transmission (NPSET) or by the associated National Environmental Standards for Electricity Transmission Activities (NESETA). These apply only to Transpower.*

Distribution

New Zealand's electricity distribution businesses are critical infrastructure providers, partnering with their communities to support people, business and economic growth. EDBs are the companies that operate the electricity distribution networks that sit between the national grid and electricity consumers, businesses and households. EDBs operate approximately 150,000 km of cables and lines. Some EDBs also own and operate electricity lines that transmit transmission-level voltage electricity across a region. For example, Top Energy has recently acquired the 110 kV transmission line connecting Kaikohe and Kaitaia, and Northpower has acquired the 110 kV transmission line between Maungatapere and Kensington. Some small scale and local (embedded) generation may also be linked directly to local distribution networks. New Zealand has 29 electricity distribution businesses, although some contract the management of their networks to neighbouring EDBs. Each network operates within a specific geographical area.

Retail

Retail companies buy electricity from generators and on-sell it to consumers. Electricity is retailed by numerous companies (e.g. Meridian Energy, Contact Energy, Mercury Energy).

Consumption

Consumers include households, vital industries and businesses. Some large industrial companies, such as New Zealand Steel at Glenbrook, the Tasman Pulp and Paper Mill at Kawerau, and the Tiwai Point Aluminium Smelter near Bluff, draw electricity directly from the National Grid via connections to a Transpower substation.

Generation: wind | themal | hydro | geothermal

Transmission: conveying high voltage electricity within the National Grid

Distribution: distributing lower voltage electricity from Grid Exit Points to customers

Customers: end users of electricity: houses | businesses | industry

Activities undertaken by EDBs

Several features relating to EDBs mean that a broad range of their activities fall within the scope of what may be regulated in terms of sections 9 to 15 of the RMA, and therefore are of interest to regional and district councils.

Of note:

(i) Electrical distribution infrastructure is mostly linear. This means that it potentially occupies land, water and air across a range of environments with different physical and natural characteristics, and is often located within more than one region or district. Electricity distribution infrastructure is located everywhere consumers choose to locate.
(ii) Prudent management of distribution infrastructure requires consideration of all phases within its life cycle along with an inherent need to plan for likely, but often uncertain, additional future demand.
(iii) To ensure it is efficiently distributed, electricity must be transformed from large to small voltages and currents, and this is reflected in the range of the physical dimensions of the various components.
(iv) By its very nature, distribution infrastructure comprises a wide assortment of components ranging from large transformers and support structures to small signs for asset and hazard identification.

The activities of EDBs can broadly be described as:

- Operating existing infrastructure by conveying electricity at specified voltage and current carrying capacity.
- Maintaining existing infrastructure by replacing, or repairing various components (including support structures).
- Modifying the size, location and/or composition of various components (including support structures).
- Upgrading existing infrastructure by modifying the size, location and/or composition of various components (including support structures); uprating the operational voltage; adding various components (including conductors and insulators); vegetation and ground disturbance; access formation and use; and, using machinery.
- Construction of new infrastructure by erecting, installing, fixing and laying components; excavations (including trenching); vegetation disturbance; and, using machinery.
- Decommissioning redundant infrastructure by deconstruction, demolishing and removal of components; ground and vegetation disturbance; and, using machinery.
- Vegetation trimming pursuant to the Electricity (Hazards from Trees) Regulations 2003 and felling.
- Ground disturbance.
- Access formation and use.
- Using machinery; and
- Development of new technologies (such as solar, EV chargers and batteries).

Technical considerations

The life cycle of a distribution network

Electricity distribution lines have a functional life beginning with planning and design. Changes, upgrades, renewals and even the decommissioning of equipment can be required as assets age, demands for electricity change, and new technology emerges.

In general terms the components of this lifecycle are:

- planning, design and consenting;
- procurement of material;
- construction;
- use and operation;
- maintenance (including replacement);
- development and upgrade (potentially including relocation);
- decommissioning/removal.

Sound resource/asset management planning acknowledges and accommodates the particular needs of each phase in a practical and pragmatic way. Rectifying the consequences of unsuitable development can impose a considerable social and economic burden on affected communities and electricity consumers.

For example, replacing an existing electricity line where new development has precluded its relocation may require it to be de-energised and dismantled before it can be replaced in-situ. However, this potentially disrupts essential supply to consumers for long periods. ‘Whole-of-life corridors’ can address this by having an 'operating corridor' in which the existing electricity lines operate together with the 'future corridor', which provides space for its eventual replacement.

Structure Selection

A typical distribution network uses a variety of structures for the support and structural integrity of the overhead line conductors. The size, height and spacing of support structures vary considerably and are largely determined by topography, operational and environmental considerations. A typical distribution line will involve the use of three main types of structures: suspension, deviation and terminal.

While new designs sometimes provide wider choices, to a large extent the design, appearance and dimensions of a particular piece of network infrastructure is determined by technical considerations with little potential for alternatives to be viably incorporated. In addition, most electricity distribution equipment is procured by EDBs from overseas manufacturers with little opportunity for customisations for New Zealand requirements. ENA considers the constraints imposed by such technical considerations must be acknowledged and accommodated within the RMA planning framework.

Transmission efficiency

When electricity passes through a conductor some of the energy is lost due to electrical friction (resistance), and heat is generated as the electricity flows through the conductor material.

Generated heat is ‘lost’ energy as it is not available for use by the consumer. At lower voltages this 'transmission loss' can comprise a significant amount of the energy. Conversely these energy losses are reduced by transmitting electricity at higher voltages.

The increase in efficiency and subsequent energy savings at transmission voltages enables the efficient delivery of electricity over long distances and to remote areas. Transmission at high voltages by necessity involves larger componentry and also imposes economic constraints on adopting undergrounding options.

Line and route design

The most visible elements of electricity lines generally understate the underlying complexity of the civil and electrical engineering design work inherent in their design and construction.

In designing overhead electricity lines, preference is given to straight-line routes with minimal corners or deviations. Direction changes require stronger support structures while straight line routes generally reduce the overall visual impacts. Development design that integrates electricity routes into site planning can result in a form and layout that minimises visual impacts and improves environmental outcomes. Technical requirements relating to line routes may constrain design ideas but also provoke new and innovative design and layout ideas.

Electricity infrastructure is very expensive to design and construct. It is not readily or cheaply relocated, and not always technically suitable for replacement with underground cables. Substantial post-construction modifications are generally avoided. It is therefore, far more appropriate for development of areas around the corridors to cater for both the infrastructure already in place, and infrastructure potentially needed in the future.

Utility Corridors

Corridors in regard to electricity distribution lines can have two key functions:

- corridors can be used to define areas where it is considered that utilities should be preferentially located (sometimes called ‘utility corridors’); and
- corridors can be used to define areas within which management techniques are desirable for activities able to adversely affect the infrastructure (sometimes called ‘buffer corridors’).

Utility corridors can take the form of:

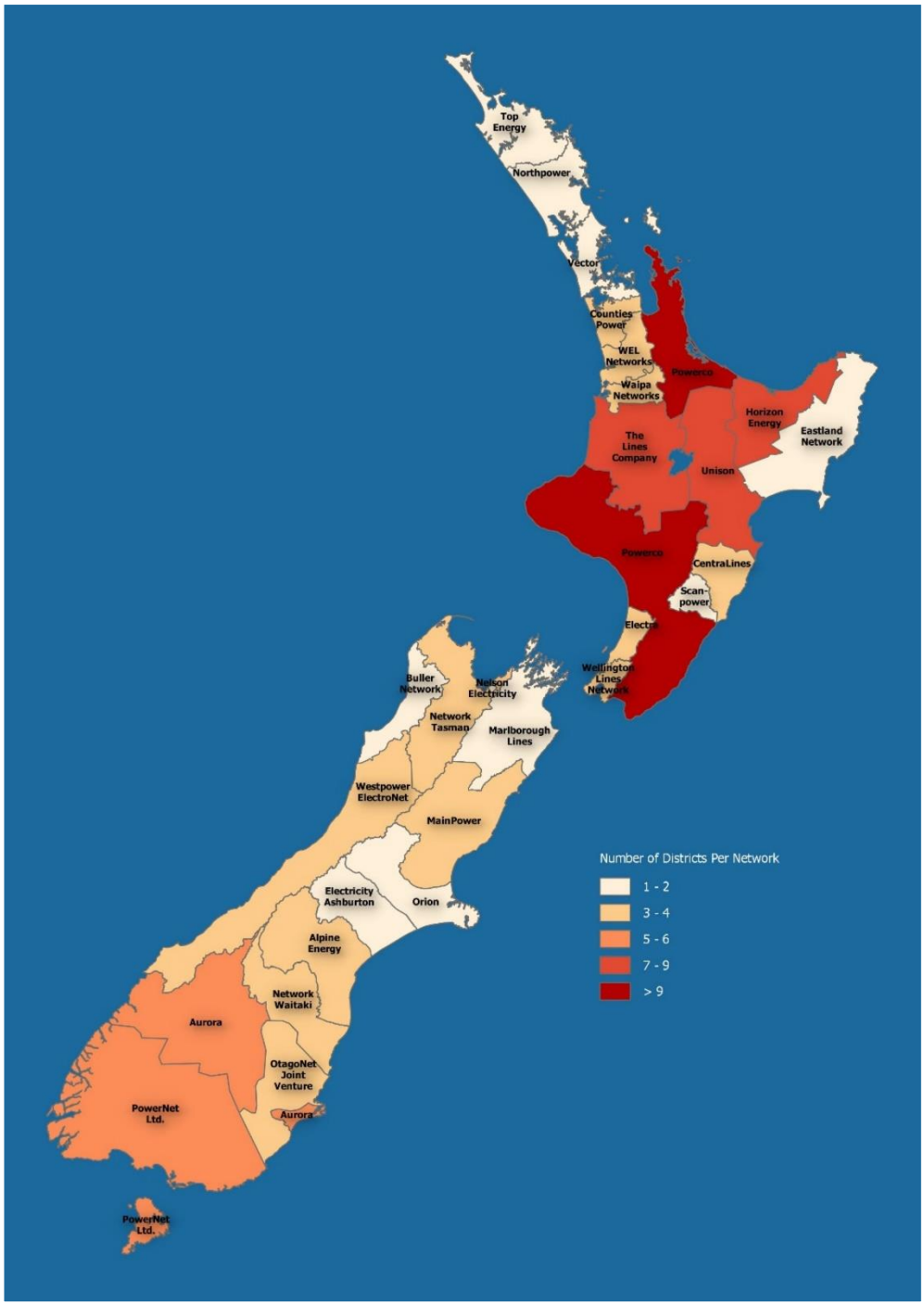
- existing utility corridors;
- road and railway corridors;
- recreational routes and public open space;
- new corridors set aside with planning methods such as structure plans.

Utility corridors are a useful method in mitigating environmental, property, and community impacts of new infrastructure. Where economic and engineering considerations are taken into account (such as the technical compatibility), and the reliability and safety of distribution network is not compromised, utilisation of corridors can be encouraged.

However, it needs to be recognised that there can be technical and safety reasons why sharing structures is not always viable. Utilities have to agree whether or not to share their existing structures with other utilities, and the terms of those agreements.

EDB and council boundaries

Individual EDBs can operate across many council boundaries. There are 67 territorial authorities (unitary authorities, city and district councils). In addition, there are 11 regional councils. The number of territorial authorities associated with the activities of the EDBs is shown in the Figure 2 below. In summary, half of the EDBs interact with three or more territorial authorities, and in six cases (Aurora, Powernet, Horizon Energy, The Lines Company, Unison and Powerco) the area the EDB services is encompassed by six or more different territorial authorities with Powerco working across 21 different district councils. See Appendix 2 for more information on which authority areas each EDB works in.



EDBs legislative framework

Statutes, Regulation, Regulators and EDBs

EDBs have a number of legislative obligations and responsibilities. These are wide-ranging and include responsibilities under more than 25 statutes[1]. It is important to understand the obligations of EDBs under other legislation to avoid as far as practicable any cross over or conflict with district plan rules or conditions of consent for EDB activities. Some of the key pieces of EDB legislation are discussed below.

EDBs and the Electricity Act 1992

One of the key pieces of legislation covering the EDB sector is the Electricity Act 1992. The Electricity Act, among other objectives, sets out relevant legislation in respect of the installation, upgrade and maintenance of electricity lines.

Some of the key provisions under the Electricity Act 1992 are:

- **Protection of existing works** – under section 22 all lawful existing works were able to remain fixed or installed over or under land.
- **Maintaining existing works** – under section 23 the owner of existing works has rights (with conditions and written notice) to enter onto land and to undertake inspections, maintenance, and operations of the works. Sub-section (3) confirms that maintenance includes: "*the carrying out of any replacement or upgrade of existing works as long as the land will not be injuriously affected as a result of the replacement or upgrade".*
- **Construction or maintenance of works on roads** – under section 24 an electricity operator is able to construct and maintain works in, on, over, across, or under any road so long as the voltage does not exceed 110 kV and a current capacity of 100 MVA. Under section 24(2) of the Electricity Act the local authority or other body or person having jurisdiction over the road is able to set reasonable conditions on that access.

New Zealand Code of Practice for Electrical Safe Distances 2001 (NZECP34:2001)

The New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP34:2001) sets minimum safe electrical distance requirements for overhead electric line installations and other works around and/or associated with the supply of electricity from generating stations to end users.

NZECP34 is relevant to the interface between the activities of EDBs and those of nearby landowners. It regulates the activities of both landowners and the electricity operator. Safety is a core focus.

It sets out various minimum separation distances, in particular the clearances between the conductors (overhead 'wires') on electricity distribution lines and:

- buildings and other structures (section 3);
- the ground, including roads and swimming pools (section 4.2);
- navigable waterways (section 4.4);

[1] Some, for example the Electricity (Hazards from Trees) Regulations 2003 and NZECP34:2001 are also applicable to other parties such as those working near lines, and tree owners

- railway tracks (section 4.5);
- works that occur around lines (section 5);
- other transmission lines and telecommunication lines (section 6).

NZECP34:2001 is a mandatory requirement under the Electricity Act and its regime. However, it is the experience of EDBs that it is often overlooked at the design and build stage of a project or development.

It is more difficult and costly to address compliance once a building or structure is constructed and then found to be in breach of NZECP34 than to account for this at the project development stage. EDBs therefore strongly recommend that adequate separations from lines are considered as part of the planning and building consent process.

Although EDBs do not own service lines (i.e. the private lines from the point of supply of the network (usually the fuse) to the individual house or building), NZECP34 still applies. The owner of the house or building own these service lines. Additions or alterations to buildings (e.g. decks) can cause NZECP34 non-compliance deeming the service line to be non-compliant. Local authorities have to be mindful of this when processing resource and building consents.

Electricity (Hazards from Trees) Regulations 2003

The Electricity (Hazards from Trees) Regulations:

- Prescribe distances from electrical conductors from which trees must be kept clear;
- Set rules about who has responsibility for providing cut and trim notices to tree owners when trees come within the prescribed distances;
- Set rules about who has responsibility for cutting and trimming trees that encroach on electrical conductors;
- Assign liability if the rules are breached.

Not all adverse effects on electricity networks from trees are adequately managed by the Electricity (Hazards from Trees) Regulations.

Utilities Access Act 2010 and the National Code for Utilities' Access to the Transport Corridors

Under section 9 of this Act, the purpose of the Utilities' Code is to enable access by utility operators to transport corridors to be managed in a way that:

- maximizes the benefit to the public while ensuring that all utility operators are treated fairly;
- ensures that disruptions to roads, motorways and railways caused by work by utility operators are kept to a minimum, while maintaining safety;
- provides a nationally consistent approach to managing access to transport corridors.

This Utilities' Code sets out the processes and procedures for:

- utility operators to exercise their right of access to the road corridor for the placement, maintenance, improvement and removal of utility structures;
- corridor managers to exercise their right to apply reasonable conditions on working in the corridor;
- managers of railway and motorway corridors to exercise their discretion to grant rights of access to utility operators.

Reasonable conditions generally relate to the:

- safe and efficient flow of traffic;
- health and safety of any person;
- need to lessen the likelihood of damage to property;
- need to lessen disruption to the local community;
- coordination of installation of other works;
- coordination with road and motorway corridor construction and maintenance works;
- needs of the utility operator to establish or maintain its network in a timely manner.

While the Code does not override the need to also comply with the RMA and local plans and processes, the application and assessment processes under the Code may also replicate some matters relating to effects and affected persons that have traditionally been the subject of district plan rules and the resource consent process. It is desirable that duplication of regulation is avoided. Therefore the ENA recommends that territorial authorities ensure that the activities of EDBs encompassed by the Utilities' Code are not also captured unnecessarily by processes relating to the RMA.

Civil Defence Emergency Management Act 2002

The Civil Defence Emergency Management Act 2002 (CDEMA) introduces the concept of 'lifeline utilities' which are businesses providing essential services to the community and required during the response and recovery phases of an emergency. A lifeline utility includes a business that "distributes electricity through a network".

Lifeline utilities are required to be capable of functioning to the fullest possible extent during an emergency. This in turn requires the electricity distribution infrastructure to be reliable and resilient through EDBs being able to undertake any necessary maintenance and upgrade work. The importance central government places on the ability of EDBs to operate effectively is evident from the CDEMA. There is also a growing body of work either underway or in planning or business case stages relating to resilience and the benefit obtained by strengthening the infrastructure in advance of any significant natural event taking place. An example of this is the seismic strengthening carried out on the substation buildings in the Canterbury region prior to the 2010/2011 earthquakes.

EDBs have emergency powers

EDBs also have directives under the RMA, in addition to other statutes, to undertake emergency work. This reflects the importance central government places on the ability of EDBs to operate to the fullest possible extent during and after an emergency.

The following emergency works powers are located in the RMA:

- Section 330(1)(c): to any network utility operator that is authorised to undertake emergency works in regard to any project or work or network utility operation, for which it is the approved requiring authority under s167 of the RMA;
- Section 330(1)(ca): to a person who operates or provides a lifeline utility service or system, as defined by section 4 of the Civil Defence Emergency Management Act.

In summary, the restrictions on the use of land and water and discharges into the environment under sections 9, and 12 to 15 of the RMA do not apply to any activity undertaken by any authorised person acting under either sections 330 or 330B of the RMA to remove the cause of, or mitigate any actual or likely adverse effect of, the emergency. Effectively, this means that the need to obtain a resource consent before carrying out work is overridden.

Section 3 – EDBs and the Resource Management Act 1991

The Importance of managing EDB assets as physical resources

Section 5 of the RMA sets out the purpose of the RMA. Of relevance and importance in this context is the requirement to manage the use, development, and protection of natural and physical resources while, among other things, avoiding, remedying, or mitigating any adverse effects of activities on the environment (s 5(2)(c)).

Electricity line networks are already existing and are considered physical resources under the RMA. In many cases the need to sustainably manage these is a matter of regional significance.

To comply with the requirements of the RMA, plans must therefore consider and include rules and standards necessary to avoid, remedy, or mitigate the effects on electricity networks.

Management of activities is required so the infrastructure is resilient, can be maintained, repaired and upgraded, and it can safely and reliably provide for the need of people and communities to have electricity. In addition, distribution of electricity must be enabled or facilitated so natural and physical resources can be used and developed by activities or processes that require electricity to function.

If the supply of electricity is not secure, society's ability to provide for its social, economic, and cultural well-being and for its health and safety will be hindered.

A secure supply of electricity is fundamental to the efficient and effective functioning of New Zealand society and this must be recognised as a key matter in all assessments and decisions under the RMA.

If not well set, restrictions under district plan rules, in particular, can inhibit or prevent EDBs undertaking essential maintenance or upgrade work on the one hand, while on the other hand the activities of third parties may be permitted, even though they are able to constrain the proper functioning of an electricity network.

Inconsistency in planning for linear networks

Many activities undertaken by EDBs are not confined to a particular site and with linear networks it is quite common for EDBs' activities to be the subject of different zones and overlays, and also different district plans where lines cross territorial authority boundaries (see Figure 2). Consequentially the planning for, and provision of, a particular piece of linear infrastructure is often subject to different rules, standards and assessment criteria. This is time consuming to plan for and manage, and can sometimes lead to inconsistent outcomes. A lack of national guidance in regard to EDB infrastructure has not helped. This guide aims to ensure that there is more certainty and standardisation and that any differences are by design and need, rather than inadvertent consequence of planning demarcations.

Procedures and decisions under the RMA should be consistent with, and support, the objectives under other legislation relating to peoples' safety. Provisions in planning documents can potentially avoid adverse effects from inappropriate development, and this would be consistent with the purpose of the RMA.

One of the purposes of the Electricity Act is: *"to protect the health and safety of members of the public in connection with the supply and use of electricity in New Zealand."*

While the Electricity Act is therefore the primary statute for identifying, avoiding or mitigating activities relating to the distribution of electricity that have the potential to adversely impact people's safety, the planning regime can play a valuable role in supporting and promoting those objectives, and ensuring these requirements are considered at the most effective stage in the process. This is at the design phase.

The Court[2] has accepted that it is legitimate to make rules to restrict activities where reverse sensitivity is an issue. It has found in particular that such constraints are appropriate where long established activities cannot internalise the adverse effects and the continued presence of the activity in the area is nationally, regionally or locally important. An example of this is subdivision occurring around an established substation.

Applicability of district plans to EDB activities and assets

District plans contain objectives, policies and rules that govern aspects of electricity distribution and aim to manage the environmental aspects of electricity distribution activities, such as:

- earthworks and vegetation disturbance;
- visual and landscape effects;
- noise;
- subdivision

Most district plans specify that some minor activities associated with the maintenance and upgrading of electricity distribution infrastructure are permitted activities, subject to conditions. Some plans recognise the regional and district significance of the distribution network by permitting a wider range of electricity distribution activities (such as new lines), whereas other plans provide only for a limited range of activities, or impose stringent conditions.

Applicability of regional plans to EDB activities and assets

Generally, EDBs find the regional regulatory environment does not significantly constrain their activities. Nonetheless, because of the planning hierarchy, meaning district plans need to have regard to regional plans and policy statements, it is important that regional policy statements enable and give greater recognition to the importance of reliable, resilient and affordable electricity distribution infrastructure, along with appropriate direction to territorial authorities in terms of section 75(3)(c) of the RMA – *"A district plan must give effect to .. any regional policy statement."*.

[2] *Winstone Aggregates Ltd v Papakura DC*.

There is also a general view that the provisions of some regional plans (including regional coastal plans) do not adequately accommodate the operational and maintenance issues related to assets that, for one reason or another, are located where development is nowadays discouraged (for example, estuaries and river beds). Further, as infrastructure providers we need to be where our customers choose to locate and therefore at times we need to be located in sensitive or hazardous locations. For those existing assets, these limitations should be given greater recognition in regional plans.

EDBs as network utility operators and requiring authorities

Companies and organisations that distribute gas, petroleum, geothermal energy, telecommunications, electricity, water and wastewater, or which construct or operate roads, railway lines and airports, are specifically provided for in the RMA, and therein defined as 'network utility operators' in accordance with Section 166.

Under section 167 of the RMA companies defined as network utility operators can apply to the Minister for the Environment for approval as a 'requiring authority'.

With requiring authority status an EDB is able to:

(a) give notice of a requirement to designate land for the purpose of undertaking a project or work[3];

(b) apply to the Minister of Lands to have land that the EDB needs for its project or work to be compulsorily acquired or taken under the Public Works Act 1981.[4]

The restrictions relating to land use in terms of section 9(3) of the RMA and the rules of the district plan are not applicable where an EDB has a designation for a project or work.[5]

Most EDBs are approved as requiring authorities as detailed in Appendix 2. In some cases, EDBs that are requiring authorities choose to gain authorisation under the RMA for a new project by way of a designation. The reasons a designation is sometimes preferred vary, but often it is because a designation gives certainty that a project is fundamentally viable without the need to proceed with detailed design work too early in the project. Modern designations are usually subject to conditions, in much the same way as permitted activity rules in district plans are often linked to performance standards.

An outline plan is usually prepared once detailed design work for a designated project is complete. However, the scope of what can reasonably be required within an outline plan is limited to the matters specified in section 176A (3) of the RMA. Primarily, managing the effects from a project or work is the purpose of conditions on a designation. Unlike a notice of requirement, the resource

3 Section 168(2)(a) of the RMA.

4 Section 186(1) of the RMA.

5 Section 176(1)(a) of the RMA.

consent processes in Part 6 of the RMA do not apply to outline plans. In particular, a territorial authority:

- cannot request further information relating to an outline plan;
- cannot postpone processing of an outline plan under section 88B;
- is not able to consider whether there may be adversely affected persons;
- cannot notify an outline plan.

The only parties legally involved in the outline plan process are the requiring authority and the territorial authority.

EDBs, effects and the RMA

Section 17 of the RMA requires effects on the environment to be managed. Electricity networks create and are subject to both positive and adverse effects. The following discussion is divided into two key sections: the effects created **by** networks and the effects third parties can have **on** networks.

Effects of electricity networks

Noise Emission

Overhead electricity lines and substations can generate noise. There are two types of noise associated with overhead electricity distribution lines:

- wind-induced or aeolian noise;
- corona and surface discharge noise.

In most circumstances:

- low level noise associated with corona and surface discharges will be less than background levels and imperceptible;
- wind generated noise generally only becomes an issue under strong wind conditions which also causes the background noise level to increase, masking the electricity line noise.

The operation of equipment at substations can generate audible noise. There are three basic sources of substation noise with different characteristics:

- Transformer noise is a generally constant low-frequency hum generated by the periodic mechanical deformation of the transformer core and the winding coils.
- Switchgear noise is generated by the operation of circuit breakers and is of short duration with an ‘impulsive’ character.
- Substation auxiliary plant such as fans may also contribute to noise.

Transformer noise will transmit and attenuate at different rates depending on the transformer size, voltage rating, design, and electrical loading. Generally speaking, noise level is directly related to transformer power rating and its age. The nature and character of the noise will also depend on the

type of installation, how it is operated, time of day, and any mitigation provided by acoustic fences or building enclosures.

Emission of Electric and Magnetic Fields

Electric and magnetic fields (EMFs) are all around us. EMFs are associated with all electrical apparatus, including power lines, underground cables and domestic appliances such as toasters and electric blankets. Their strength diminishes rapidly with distance from the source. Electric fields are associated with voltage, and magnetic fields vary with the current in the line or appliance.

The Ministry of Health (MoH) has established an Interagency Committee on the Health Effects of Non-Ionising Fields. It monitors research into extremely low frequency (ELF) electric and magnetic fields, and radiofrequency fields.

The MoH has published an information booklet, Electric and Magnetic Fields and Your Health, which presents an overview of the nature and occurrence of ELF fields and the health effects research, along with the limits recommended by ICNIRP. The booklet is available in printed form or on the Ministry's website[1].

The MoH recommends the use of guidelines published by the International Commission on Non-Ionising Radiation Protection (ICNIRP)[i] to manage public exposures to ELF fields (WorkSafe recommends their use for occupational exposures). ICNIRP is an independent scientific body, recognised by the World Health Organization (WHO) for its independence and expertise in this area. Its guidelines are based on a careful examination of the research data on the health effects of exposure to ELF fields, and include margins for safety. The Ministry also notes that a comprehensive review by the WHO published in 2007 recommended the use of exposure guidelines such as those used in New Zealand, together with very low cost measures to reduce exposures where this can be readily achieved. The Committee and the Ministry of Health support these recommendations.

The MoH also notes that there are two instruments under the RMA that provide national guidance for controls on exposures to ELF fields from transmission lines and associated infrastructure – NPSET and NESETA. The MoH also notes that both instruments apply only to transmission lines (and, in the case of the Transmission NPS, associated infrastructure such as substations), but not, say, to local electricity distribution infrastructure. The MoH notes that some district plans have guidance based on the Transmission NPS, and also cover other activities that produce ELF fields.

ENA considers it would be reasonable to include the Ministry's recommendations, including reference to ICNIRP, as a specification for permitted EDB activities. This is included within the suggested model rules in Section 4.

As noted above, in 2010 ICNIRP revised its definitive guideline, the basis for most international standards. The table below includes data for comparison with these ICNIRP references levels.

Table with data relating to electric and magnetic fields

Activity	Electric Field (kV/m)	Magnetic Field (μT)
ICNIRP public exposure limit	5	200
beneath high voltage line	0.3 – 3.0	0.5 – 5
distribution transformer (at 2m distance)	< 0.1	0.1
near household switchboard (1-2m distance)	0.01 – 0.03	0.1
above electric blanket	0.06 – 0.6	0.02 – 0.5

Source: 'Electric and Magnetic Fields and Your Health', Ministry of Health, 2013

Your local EDBs are able to provide further information and advice to councils and individuals about expected EMF levels for different EDB equipment, configurations and operating voltages and current capacities.

Radio Equipment & Interference

Some electronic and radio equipment may be susceptible to electromagnetic fields and low level radio noise produced by electricity distribution equipment.

Earthworks Effects

In most cases, ground disturbances undertaken by EDBs relate to activities such as forming or upgrading access tracks, trenching, and excavations for foundations. The adverse effects potentially arising are short term and can be appropriately managed by adopting sound site work practices. In some cases earthworks need to be undertaken on sites (including some roads) that are subject to the National Environmental Standards for Assessing and Managing Contaminants in Soils to protect Human Health. In particular this occurs on substation sites which are included in Ministry for the Environment's list of hazardous activities and industries (the HAIL).

Effects on Sensitive Environments – Landscapes, Natural Areas and Heritage Areas

In broad terms, impact on landscape values from electricity distribution infrastructure can relate to:

- effects of structures and civil engineering on biophysical elements of the landscape (potential modifications of landform features, rivers and their margins and natural character);
- effects of structures and civil engineering on perceptual dimensions of landscape;
- other values associated with the landscape (for instance historical and tangata whenua values);
- visual effects of structures, including effects on landscape character, aesthetic coherence, and views from public roads and individual properties;
- cumulative effects in conjunction with other developments.

Potential impacts from distribution infrastructure on indigenous vegetation and indigenous fauna can be divided into two groups – direct impacts and indirect impacts. Direct impacts could include:

- habitat loss and damage, and destruction of plants and other wildlife, in the course of electricity line and access track construction;

- sediment run-off from access track and electricity line construction affecting waterways.

Indirect impacts could include such things as the introduction of weeds into natural areas by machinery.

Some construction activities undertaken by EDBs have the potential to damage or modify archaeological sites. This potentially applies to:

- recorded archaeological sites;
- previously unrecorded but visible archaeological sites;
- as yet unknown archaeological sites that might be exposed by earthworks.

The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga may also be a relevant consideration.

Sections 6 and 7 of the RMA set out matters of national importance and other matters, including the efficient use and development of natural and physical resources, which may require particular protection or regard when making RMA decisions.

For example, outstanding natural features and landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, and historic heritage, all require specific considerations under sections 6(b), (c) and (f) of the RMA respectively, which includes "protection from inappropriate subdivision, use, and development". It is reasonable that the development of new electricity distribution infrastructure suitably accommodates these matters of national importance.

Further material to guide appropriate policies in regard to Section 6 and 7 can be found by looking at the approaches set nationally for other utilities through the NPSET, NESETA and the NES for telecommunications. The Telecommunication NES is currently being expanded and further guidance on these sorts of issues is expected to result, including guidance on the assessment of cultural effects.

It is also important to recognise that some EDB infrastructure has been in place for a long time. Infrastructure may for example be already situated in sensitive areas which may not be preferred under today's planning rules – however plans should recognise that these assets and land use have existing rights, and need to be accessed, repaired and maintained to ensure a safe and secure power supply.

Effects on Amenity Values

Amenity values are defined in the RMA as being: *" …. those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes".* Under section 7(c) of the RMA the *"maintenance and enhancement of amenity values"* is a matter to which decision makers are required to have particular regard, along with 7 (b) the efficient use and development of natural and physical resources.

Contributing factors to suburban amenity values include public and private open space, historic and cultural heritage, neighbourhood character, vegetation (e.g., bush, trees and gardens), safety, views, and noise levels. Amenity values may be affected by electricity distribution infrastructure from the:

- construction of new assets or the modification of existing assets;
- development of new urban areas or subdivision near established electricity lines.

These are both legitimate considerations for decision makers in terms of section 7(c) of the RMA. In some cases there is convergence between 'amenity values' and components of the natural environment encompassed by section 6 matters. New built development within a landscape can reduce amenity values, but if the landscape is not 'outstanding' (in terms of section 6(b) of the RMA) it is important to remember that the RMA does not require persons to 'protect' amenity values. Here RMA practitioners should acknowledge that the maintenance and enhancement of amenity values is not an absolute requirement, and there should be an appropriate balance with other matters such as allowing people and communities to provide for their wellbeing, and recognition that the landscape is not static.

Effects on Open Spaces Including Community Facilities

Recreation and open space areas include parks, reserves, tracks, riparian margins, lakes, or other areas where recreational activities occur. On the one hand these areas are generally suitable for accommodating electricity distribution infrastructure due to the absence of built features that can impede the EDBs access and maintenance activities. However, on the other hand, new electricity lines within such areas can have adverse effects, such as:

- altering biodiversity by creating more edge habitat or providing access to previously inaccessible areas;
- Creating potential safety risks by positioning new poles or overhead conductors in the path of recreational vehicles or activities.

Some of these effects can be mitigated by design. Generally these open space areas are in public ownership. In most instances resolution of the potentially conflicting issues can be appropriately achieved with discussions (outside any formal RMA process) between the EDB and the relevant landowner, which could be the Department of Conservation or the district council.

Effects on Property Rights and Landowner Approvals

Generally an EDB's right to operate, access and maintain a particular line is provided either by statute (the Electricity Act) in the case of existing lines (those constructed before 1 January 1993) or by a property right known as an easement.

These access considerations adequately address any considerations about a directly affected landowner being an 'affected party' in respect of work undertaken by an EDB. EDBs see the provisions of the Electricity Act as defining appropriate processes for managing relationships with landowners, and that there is no need to duplicate this aspect with an RMA process.

Managing the effects of third party activities on EDBs

EDBs have an interest in land uses, and land use changes, near their assets, including at times in adjacent land. Often, EDBs are not deemed to be statutory consultees in the resource consent

process. However, the Government has recently recognised the importance of allowing them to be consulted (see the Housing Accords and Special Housing Areas Act 2013).

Few existing district plans place controls on activities that may affect the integrity of distribution networks; for example, subdivision that cuts off access to networks for maintenance and operations.

Designing with lines in mind ensures only development that is compatible with the lines occurs under and in close proximity to the lines and structures. This minimises safety risks and ensures the EDB has access for routine and urgent maintenance work and for project work.

For further reading, in addition to the sections below, we suggest reading 'The problems with development near high voltage Transmission Lines[6]'. The issues can be similar for distribution networks, and in many cases worse because the distribution lines are lower than the transmission lines and therefore have less clearance from people operating equipment at ground level.

Safe and Functional Separations from Lines and Structures

Contact or near contact between people or objects and electricity is extremely dangerous and must be avoided. In order to prevent such incidents, safety clearances between the conductors and buildings, the ground and vegetation must be achieved and maintained. Safety needs to be considered during construction (for example while building and digging) as well as for the longer term.

The New Zealand Code of Practice for Electrical Safe Distances (NZECP34:2001) is issued under Part 4 of the Electricity Act and specifies minimum safe separation distances in relation to various activities, including buildings, earthworks, fences, and the use of mobile machinery.

Four metres is the minimum safe approach distance for people and machinery to a circuit operating at voltages of 110 kV and less.

NZECP34 can be viewed at the link below[7], and a summary chart is included in Figure 3. This sets out many minimum requirements including separations of conductors from buildings and minimum safety separations when work is being undertaken near lines, and other considerations including excavations near support structures.

It is the experience of EDBs that while NZECP34 is a legal requirement under other legislation, the required separations are often not thought about at the design and build stage of a project or development. It is obviously much more costly to address compliance once a building or structure is constructed and then found to be in breach of NZECP34 than to account for this at the project

[6] http://www.mfe.govt.nz/publications/rma/nps-electricity-transmission-further-guidance-jan2010

[7] http://www.energysafety.govt.nz/legislation-policy/electricity-acts-regulations-codes/standards-and-codes-of-practice/new-zealand-electrical-codes-of-practice

development stage. EDBs therefore strongly recommend that adequate separations from lines and structures are considered as part of the planning process. Developments have also proceeded in the past that physically block access to lines for maintenance and repair – for example through subdivision and fencing.

At times greater separation than the minimum specified in NZECP34 may also be advisable. For example, it is possible in some cases when poles are very tall for developments to be able to meet the minimum requirements specified in NZECP34, and build a house under a line. To minimise future safety risks, and operational impacts on the networks, such underbuilding is not desirable. Possible risks include to property and persons should lines break and fall on the house, and workers and homeowners could potentially encroach minimum safe distance requirements (for example when working on house roofs) in future.

As well as avoiding incompatible activities, considering EDB requirements in the planning process will also help to ensure developers are aware of the safety and technical requirements when work is being constructed near electrical infrastructure.

It is recommended that as a minimum EDBs are involved early in the process when consents are sought for new developments.

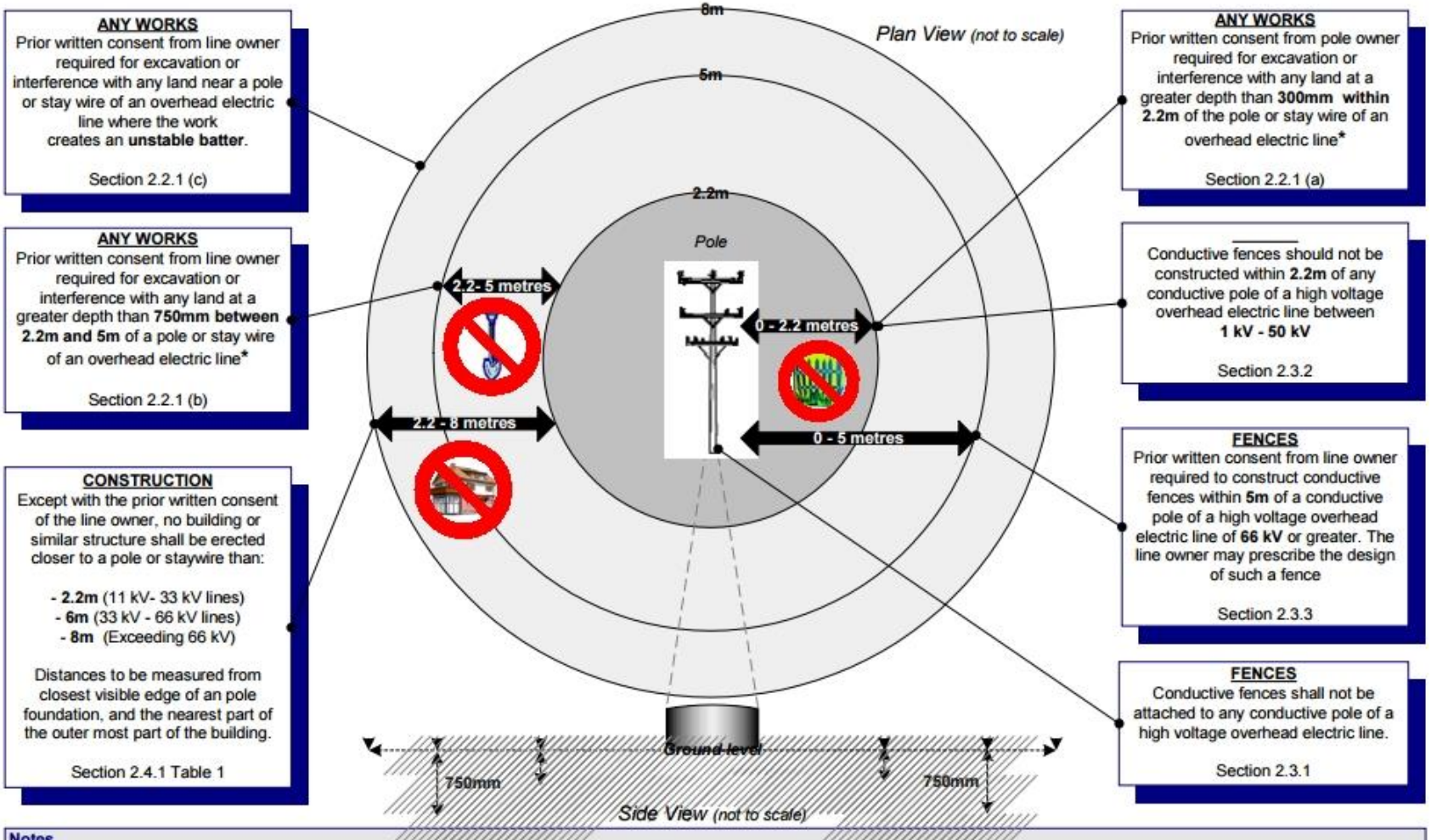
Separations may be required to:

(a) Help to ensure safety from contact, or near contact, with lines including during construction and when working near the lines in future;
(b) Ensuring the electrical performance of supply security is maintained - for example it is not made vulnerable to vegetation, mechanical equipment, or unauthorised access by the proposed land use change;
(c) Maintaining the ability to access lines for operation and maintenance. This can include access ways for large plant and equipment and the occasional need for significant excavation.
(d) Ensuring the mechanical performance is maintained i.e. that the environment around that foundation is protected, and any change of environment does not affect the condition or operation of the mechanical components
(e) Consider reverse sensitivity surrounding EMFs, audible noise, radio interference, or amenity

Model rules for third party effects are suggested in Section 4.

Diagram summarising some minimum safe distances under NZECP34:2001

FIGURE 1 MINIMUM SAFE DISTANCES FOR EXCAVATION AND CONSTRUCTION NEAR POLES OR STAY WIRES



Notes

- **This diagram is for quick reference only. Please refer to Section 2 for the complete safe distance requirements.**
- Nothing in clauses 2.2.1 - 2.2.3 applies in respect of normal agricultural cultivation or the repair, sealing, or resealing of the existing surface of any road, footpath, or driveway (Section 2.2.4).

* Clause 2.2.1 does not apply to vertical holes, not exceeding 500 mm diameter, beyond 1.5m from the pole or stay wire.

Safe and functional separations from lines and vegetation

For safety and supply security, it is important that adequate separations are maintained between trees and lines. Trees grow, bend, flex and sometimes break or fall (for example, in storms) and as a result they can come into contact with the live conductors of an overhead electricity line. This can cause power outages, public safety issues, and fires.

People clearing trees in the vicinity of lines need to be aware of the safety considerations and applicable rules which are set when professionals are required to undertake such work. Electricity can jump gaps, so getting too close to lines can be dangerous. Trees can conduct electricity and children might climb trees close to conductors.

An EDB undertakes regular assessments of potential risks to its network and also the public arising from trees near electricity lines. Where found to infringe on the prescribed clearances as set out in the Electricity (Hazards from Trees) Regulations 2003 (the Tree Regulations), vegetation is cut and/or removed.

It is important to ensure that district plans consider as a minimum the legal requirements to keep trees clear of lines under the Electricity (Hazards from Trees) Regulations. These regulations are important for public safety. Wider clearances may also be required/advisable.

Not all adverse effects from trees in regard to electricity networks are managed by the Electricity (Hazards from Trees) Regulations. ENA members reported in a 2012/13 survey that approximately 13 percent of all recorded SAIDI (system interruptions) was due to trees, despite a decade of work under the tree regulations, and considerable expenditure on vegetation management. The industry working group considering this survey also noted that approximately 60 – 70 percent of outages in storm events could be attributed to trees. It concluded that this was because the tree regulations have a relatively narrow coverage. Trees outside the zones mandated by the regulations can still fall onto lines, and branches and other bits of vegetation can also contact lines in certain situations. The industry has prepared a Risk Based Vegetation Management Guide – A Guide to assessing and prioritising vegetation management outside of the requirements specified in the Electricity (Hazards from Trees) Regulations 2003[8].

The tree regulations do not deal with trees at the planning or planting stage, but provide for minimum clearance distances when trees are growing near lines. They are reactive, rather than proactive.

Good decisions at the planting and clearing stage, thinking of the longer-term impact, can benefit the wider community in terms of safety and reliability, and can lead to more efficient and optimal outcomes for all parties. While EDBs are responsible for provision of the cut and trim notices when trees get within the prescribed clearances, and the cost of first cut clearances in accordance with the

[8] http://ena.org.nz/wp-content/uploads/2016/07/Risk-Based-Vegetation-Management-Guide-Final-July-2016.pdf

tree regulations, the cost of subsequent cuts are the responsibility of the tree owner. Safety rules require professionals who are appropriately qualified and equipped to clear these trees, and this work can be expensive for landowners.

Guidance to support the Transmission NPS also sets out information on areas of concern in regard to vegetation[9].

Protected Trees and other Rules in Regard to Tree Clearing and the Tree Regulations

District plans often identify trees for protection because they are considered to be significant, historic, or important for amenity values, or preventing erosion.

However, rules in plans which prevent or restrict the trimming or removal or trees can frustrate the requirements of the tree regulations and have a significant impact in relation to achieving the clearances required in the tree regulations. Additional costs and time associated with seeking resource consents to do such work can be significant, and this can affect tree owners, who are responsible for the costs of trimming trees near lines after the first free cut or trim.

It is important that district plan policies and rules in regard to which trees are protected are mindful of transaction costs on other parties.

In summary, it is recommended that councils work with their local EDBs to determine sound planning approaches in regard to separations and clearances between vegetation and power lines, which recognise public and worker safety as a minimum, and also consider other risks, benefits and costs to the community, tree owners and utilities. These include the need for a safe and reliable power supply and the benefits that brings to communities, while also appropriately recognising the environmental and aesthetic value of trees. Some model rules and policies are suggested in Section 4.

EDBs can provide advice about technical considerations pertaining to the establishment or maintenance of vegetation.

Landscaping and Re/planting Rules

A parallel issue relates to the frequent practice of resource consents or designations applicable to new substation projects, and for the projects and developments of third parties, being made subject to conditions requiring site landscaping. Landscaping can address visual effects of new buildings. However, in the case of substations, vegetation creates new issues such as:

- growth too close to overhead conductors;
- root damage to buried cables;
- creating a habitat for undesirable fauna (e.g., possums);
- a seed source for weeds within outdoor switchyards; and,

[9] Appendix 1: Further Information on the Risks of Development near High-voltage Transmission Lines. http://www.mfe.govt.nz/publications/rma/national-policy-statement-electricity-transmission-further-guidance-risks-1

- electrical shorts from windblown leaves and twigs.

Security of supply and safety risks potentially arising from vegetation need to be considered and addressed before landscaping conditions are imposed.

Similarly, when planting (or replanting) is proposed near lines and support structures, consideration should be given to the long-term impacts on a safe and secure power supply, and on ensuring ongoing access is clear for line maintenance activities. The ongoing costs of managing such vegetation near lines should also be taken in to account.

Earthworks near EDB Assets

Inappropriate excavations by third parties can cause ground instability which adversely impacts on the structural integrity of electricity line supports. Increasing ground levels by filling can reduce the clearance distances between the overhead conductors and the ground.

The excavation setbacks are specified in Section 2.2 of NZECP34 while minimal vertical conductor clearances are listed in Section 4.3 and Table 4 of NZECP34.

Earthwork activities are mainly regulated in terms of section 9(3) of the RMA by district plan rules. It is therefore appropriate for district councils to also adopt ways to manage earthworks near electricity lines and attend to any associated adverse effects.

There are many specific technical and safety considerations and legislative requirements in regard to underground power cables. Safety is an important consideration for third parties working near these assets. Third parties can damage underground assets, impacting on supply and performance. Third party activities can mean underground cables are buried deeper than their optimal depth, or shallower than the levels required by industry standards. Minimum separations from utility assets also apply. Power cables may require thermally stable fill and backfill. Safety separations must be adhered to when working near underground and overhead lines.

The National Code of Practice for Utility's Access to Transport Corridors (which applies only to utilities in the road corridor) provides a useful resource setting out some of the many considerations around underground utilities and works near transport corridors, including earthworks and reinstatements.

EDBs are keen to ensure others not covered by the Code, and for work outside the road corridor, think about overhead and underground utilities when planning and undertaking works.

It is recommended that as a best practice rule, EDBs are consulted when work or developments occur near their assets.

Protecting Infrastructure

Critical Corridors

Particular protections in critical corridors in regard to some activities can be used to manage the risk to people and property from potential electrical hazards; to recognise the particular importance of

the line to supply; and as part of that to ensure that the operation, maintenance and upgrade of the electricity network is not unduly hindered by other land uses such as buildings or vegetation; and to ensure any developments are appropriate.

There should be increased consideration when there is increased risk to security of supply, or when a disruption in the supply of electricity will have significant consequences. In this context, each EDB is able to identify 'Critical Electricity Distribution Lines' within its network. These lines generally comprise overhead lines that:

- supply public services such as the hospital, civil defence facilities or lifeline sites;
- supply industrial or commercial electricity consumers with a high electricity demand;
- supply large numbers of consumers;
- are difficult to replace with an alternative electricity supply if they are compromised.

Other areas should be considered for additional rules where there is increased likelihood or consequence (including safety) of any failure or interference with the network. For example, this could include areas of commercial and high volume planting (such as forests, woodlots and other commercial planting operations).

Access

From time-to-time access is required on private and public land to inspect, maintain and upgrade physical components of an electricity distribution network. Upgrading of electricity lines can involve the replacement of conductors, insulators and associated fittings, and repairing corrosion, or damage to support structures or foundations.

EDBs rights of access to undertake such works on private land are contained within the relevant provisions of the Electricity Act, where the asset was installed prior to 1st January 1993 or since 1st January 1993 by way of an easement in gross.

Although new technology is helping to reduce community impacts, maintenance, repair and upgrade activities can cause disruption and adversely affect the general amenity of an area. EDBs seek to minimise the effects of such disruption. However, EDBs are statutorily obligated to maintain safe and secure networks and therefore must have access.

Managing access rights usually falls outside the scope of the RMA, except within the coastal marine area (CMA) where section 12(3) of the RMA applies, or on or over the bed of a river, where section 13(2A) of the RMA applies.

In recognition of the dependence society has on a reliable supply of electricity and the statutory obligations on EDBs to maintain assets, regional plans should give specific consideration to accommodating these access rights and any related or ancillary activities.

District councils should focus on ensuring built developments are designed so they suitably acknowledge electricity lines and in particular requirements for access to support structures. Compatible developments are ones that integrate access needs.

Section 4 – Best Practice and Model EDB Planning Provisions

How should networks be managed under the RMA?

This section outlines the industry's perspective about best practice as it relates to the policy components of both regional planning documents and district plans. In reviewing, understanding and adopting any parts of this guide is important to note that each electricity distributor, district and region will have their own specific needs and issues which should be taken into consideration. As such specific wording or parameters of objectives, policies and rules proposed in the guide should be reflective of that particular locality.

The efficiency and effectiveness of resource management is also affected by the way the planning functions, in particular how the consenting process is undertaken. Poorly conceived or implemented procedures, protocols and systems impose unnecessary costs and time delays with no material benefit for the environment or the community.

Efficiency of regulation

Local plans have a wide variety of approaches for managing electricity infrastructure. The same activity of an EDB could be permitted under one district plan, controlled in an adjacent district, and discretionary in the next district.

The complexity and variability of district plans results in:

- variability in the way the adverse effects of electricity distribution activities are managed;
- costlier RMA approvals (and these costs may be passed to electricity consumers through higher charges and/or to ratepayers);
- delays in projects, which result in higher costs and impacts on supply provision and reliability;
- costs to EDBs to make submissions on plans, and to appeal plan changes, in an effort to get consistent, efficient and workable provisions into plans;
- local authorities bearing the costs of responding to submissions and appeals.

By providing national guidance, ENA considers there is an opportunity to:

- *give greater certainty to local communities that the environmental effects of electricity distribution activities are being effectively managed;*
- *enhance the reliability and resilience of the electricity distribution infrastructure with timely approvals and an appropriate level of control.*

Model provisions for managing effects on, and from, distribution networks are outlined in this section. The correct balance needs to be struck between enabling electricity distribution activities and managing environmental effects of those activities. The correct balance in turn is only achieved if the criteria or triggers for initiating an RMA consent process (which is usually achieved with permitted activity standards) are set or defined appropriately. If triggers are set at the correct level, resource consents will only be required for those activities where costs potentially outweigh benefits.

Efficient use of resources

Electricity distribution networks comprise existing infrastructure that, in many instances, is capable of being modified to meet increased demand for electricity. This can be achieved in various ways with the most common being:

- adding an additional circuit (comprising three conductors);
- adding additional conductors to an existing circuit (duplexing);
- increasing the operating voltage.

At times new line routes and structures may be required. However, it is important that the RMA regulatory environment does not unduly inhibit the more efficient use of existing assets, or inadvertently incentivise the construction of new assets that would not otherwise be needed if upgrades were permitted.

Best practice considerations

It's the experience of most EDBs that better outcomes for their businesses, communities and the environment stem from well formulated and effectively implemented council procedures.

In this report, ENA recommends the following as meaningful points for councils to consider:

(i) The positive effects of having a reliable, safe, resilient and affordable supply of electricity are acknowledged, and appropriately weighed against potential adverse effects of an EDB undertaking an activity.

(ii) It is acknowledged there will always be some level of residual effect associated with the presence of network utility infrastructure.

(iii) There is awareness that third party activities relating to buildings, vegetation and earthworks can (if inappropriately undertaken or located) adversely impact on EDBs activities.

(iv) An environmental bottom line is the safe, reliable and efficient operation of any particular component of an electricity distribution network. Consent to a third party activity should not denigrate from this environmental bottom line.

(v) Analysis with respect to Part 2 of the RMA means that the sustainable management of resources should be promoted by a proposed activity, and this must factor in consideration of physical resources.

(vi) Safety aspects in regard to how an EDB operates its infrastructure are already effectively regulated by other legislation (for example, the Electricity Act)

(vii) As a matter of course, the information requirements specified in a councils standard application form should include:

- *"Is the application site within 30 metres of an above ground, or within 10 metres of underground, electricity distribution infrastructure"; and if it is;*
- *"Have you discussed your proposal with the electricity distribution business and if so what was the outcome of that consultation".*

(viii) Consultation with the relevant EDB early in a third party's consent process should be encouraged so potential adverse effects can be identified and addressed in development proposals at an early stage.

(ix) Developers should be made aware of the potential implications of electricity distribution lines and accommodate EDBs requirements for access and maintenance in land development designs.

(x) Developers should be made aware of EDBs expectations in terms of being affected parties where third party proposals potentially affect electricity distribution lines and other EDB assets, and that councils will consult with the relevant EDB about such applications.

(xi) Applications for resource consents by an EDB should be assessed by an officer knowledgeable about the electricity industry, relevant technical considerations, and legislation such as the Electricity Act, and the council's own functions and powers under the Utilities' Code.

(xii) EDBs are provided with the option of reviewing a draft decision and commenting on draft conditions before the consent is issued.

(xiii) Consents are not made subject to invalid conditions and all conditions must:

- be imposed for a planning purpose;
- fairly and reasonably relate to the development for which permission is being given;
- be reasonable.

(xiv) Conditions are drafted to avoid other potential issues arising such as:

- uncertainty about compliance requirements;
- poorly targeted compliance and reporting requirements;
- disagreements about what is required to obtain a resource consent secondary approval from a council officer;
- resource consents granted for inappropriately short term;
- poorly targeted conditions that address an indirect potential consequence of an activity;
- unnecessary expenditure on unnecessary or poorly targeted monitoring and reporting;
- monitoring requirements not directly linked to a specific need for information arising from the exercise of the resource consent.

Model regional and district policy statements and objectives

The table below contains objectives and policies designed to provide a meaningful, suitable policy framework giving appropriate recognition to the importance of electricity distribution networks by facilitating the:

- operation, maintenance and upgrade of the existing distribution network.
- establishment of new electricity distribution infrastructure to meet the needs of present and future generations.

The model provisions have been based on a detailed assessment of existing network utility objectives and policies in regional policy statements, regional plans and district plans across the country. The provisions were categorised into common themes, and then specific provisions developed under each of these themes. The template objectives and provisions aim to strike a balance between enabling and protecting electricity distribution infrastructure, and ensuring that adverse effects of electricity distribution infrastructure are appropriately managed.

The ENA asks regional and district councils to engage with their local electricity distributor on any specific issues, objectives and policies they may face in that district or region and to use these base provisions as a starting point when preparing or reviewing network utility and electricity provisions of policy statements and plans. The ENA recommends that its members use these provisions as a basis for submissions on plans and policy statements.

REGIONAL POLICY STATEMENT OBJECTIVE

Theme	Suggested Model Provision
Minimising Adverse Effects from Electricity Distribution	Adverse effects of electricity distribution infrastructure on the environment are minimised.
Enabling Electricity Distribution Networks	To maintain and enhance the quality and functioning of electricity distribution infrastructure.
Integrating Electricity Distribution with Development	The development of electricity distribution infrastructure is integrated with other land uses so the needs of people and communities, and future generations, are met.

REGIONAL POLICY STATEMENT POLICY

Theme	Suggested Model Provision
Overarching Policy	Ensure the distribution of electricity throughout the region by: (a) avoiding development which constrains the ability of this infrastructure to be developed, maintained and used; (b) facilitating resilient infrastructure and providing for its continued operation; (c) enabling the expansion of existing infrastructure and development of new infrastructure: (i) by recognising the logistical, technical, operational and locational needs of this infrastructure (ii) while avoiding adverse effects on significant natural and physical resources and cultural values where practicable; (iii) and appropriately managing other adverse effects on the environment.

DISTRICT PLAN OBJECTIVES

Theme	Suggested Model Provision
Enabling Electricity Distribution	The development, operation and upgrading of safe, efficient and resilient electricity distribution infrastructure is enabled by the planning process.
Managing Effects from Electricity Distribution	Adverse effects on the environment from electricity distribution infrastructure are appropriately managed.
Avoiding Effects from Others' Activities	Electricity distribution networks are not constrained or adversely affected by the activities of others.

DISTRICT PLAN POLICIES

Theme	Suggested Model Provision
Recognising Benefits of Electricity Distribution	The benefits from a resilient, reliable and affordable supply of electricity are recognised in decisions about the use and development of resources.
Facilitating Electricity Distribution	Decision makers facilitate the operation, maintenance, and upgrade of existing electricity distribution infrastructure, as well as the provision of new electricity distribution infrastructure.

DISTRICT PLAN POLICIES

Theme	Suggested Model Provision
Acknowledging Technical Considerations	Economic considerations, and the technical and operational requirements of the distribution network, are acknowledged and accommodated when assessing and managing adverse environmental effects from electricity distribution infrastructure.
Minimising Effects Relating to Section 6 Matters.	New electricity distribution infrastructure is designed and located to minimise adverse effects on sensitive environments (being environments to which section 6 of the RMA relates) where practicable.
Assessing and Addressing General Effects	Where upgraded and new electricity distribution infrastructure has adverse effects on the environment, these are assessed and addressed through a planning process.
Avoiding Effects from Third Party Activities	Subdivision, use and development does not compromise the operation or development of electricity distribution infrastructure and existing strategic or critical assets are protected.
Structure Planning and Utility Corridors	The identification of dedicated utility corridors during the structure planning process where electricity distribution infrastructure can be established is encouraged.
Integrated Development	To ensure adequate electricity distribution is integrated into new land development proposals.
Other Legislation	To acknowledge the rights of, and obligations on, electricity distribution businesses under other statutes including the Electricity Act 1992 and associated regulations.

Model Standards and Rules – EDB Activities

The tables below set out the model standards and rules based on generic activity categories (for example, maintenance, upgrading, new lines) and in most cases incorporate a 'condition' which if not met would trigger a consent requirement.

The trigger condition in some cases relates to particular characteristic of the asset (e.g. current, voltage, dimensions). To a large extent this approach mirrors that adopted in many district plans. Recommended definitions are also provided to assist with consistency.

In many existing situations, new plan "overlays" can place additional onerous and impractical restrictions on assets which already exist and were lawfully established. As such, it is recommended that any additional restrictions that overlays impose over an area should not be imposed on existing electricity infrastructure.

The model provisions below are intended to support the adoption and implementation of the objective and policies relating to distribution activities with the aim of:

- ensuring that plan requirements are nationally consistent and adequately provide for maintenance and upgrading;
- minimising RMA processing costs and delays.

The meaning of key terms used in the tables can be found in Appendix 2.

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
Operation	The operation of all electricity distribution infrastructure (but excluding substations that are not minor utility buildings), established by the date this provision was notified, including increasing the operating voltage of a circuit where it has been operating below its design capacity **– permitted activity.**	None	NA
Access	The use of a track (and any associated culvert or bridge) that provides access, and is ancillary, to existing electricity distribution infrastructure **– permitted activity.**	None	NA
Ground Disturbance and Vegetation Maintenance	Ground disturbance and/or trimming, felling, or removal of vegetation associated with access to, or maintenance, replacement or upgrading of, electricity distribution infrastructure **– permitted activity.**	The ground disturbance and/or trimming, felling, or removal of vegetation must be required to enable the safe and efficient operation of the infrastructure, and its maintenance. All general site works conditions are complied with.	**Controlled activity** in terms of: - construction noise and vibration - soil erosion and land stability - sediment discharge and water quality - re-vegetation - need for a reliable, resilient and affordable supply of electricity

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
		Any trimming or selective removal of vegetation undertaken on protected trees or land identified in the relevant district plan as being within a sensitive environment [in terms of s6(c) RMA] is done within the following parameters: a) the diameter of any branch at the cut is not greater than 200mm; b) no more than 25 percent of the live growth of any one tree is removed; c) all trimming is undertaken in accordance with accepted arboriculture practice; and, d) the natural shape, form and branch habit of the tree is retained. NB: Selective removal of trees may be undertaken where there is a demonstrable risk to safety or property.	**Discretionary restricted activity** in terms of: - the section 6 matters applicable to the land - need for a reliable, resilient and affordable supply of electricity
		Any trimming of a tree encompassed by sections 76(4A), (4B), (4C), and (4D) of the RMA is undertaken within the following parameters: a) the diameter of any branch at the cut is not greater than 200 mm; b) no more than 25% of the live growth of any one tree is removed; c) all trimming is undertaken in accordance with accepted arboricultural practice; and, d) the natural shape, form and branch habit of the tree is retained.	**Discretionary restricted activity** in terms of: - offsetting with replanting; - visual, landscape, and ecological effects;, - need for a reliable, resilient and affordable supply of electricity

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
Decommissioning, Demolition or Removal	The decommissioning, demolition or removal of all or part of existing electricity infrastructure – **permitted activity.**	All general site works conditions are complied with.	**Controlled activity** in terms of: - construction noise and vibration. - visual and amenity effects. - need for a reliable, resilient and affordable supply of electricity.
Asset Maintenance, Replacement or Upgrading	The maintenance, replacement or upgrading of electricity distribution infrastructure (but not including discharges or the application of protective coatings) – **permitted activity.**	All general site works conditions are complied with.	**Controlled activity** in terms of: - construction noise and vibration - visual and amenity effects - need for a reliable, resilient and affordable supply of electricity.
		Any amendments or alterations must fall within the scope of minor upgrading (refer definition).	**Discretionary restricted activity** in terms of: - amenity effects - visual and landscape effects - timing of construction works - need for a reliable, resilient and affordable supply of electricity.
Temporary Assets	The establishment of electricity distribution infrastructure (except diesel-fuelled generation activities) for a period not exceeding 24 months, or	The Council must be notified in writing of the route or location of the temporary assets and the date by which they will be removed. All general site works conditions are complied with.	**Controlled activity** in terms of: - construction noise and vibration - visual and amenity effects - need for a reliable, resilient and affordable supply of electricity

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
	The operation of temporary diesel-fuelled generation activities, including associated transformers and fuel storage tanks, located within a non-urban area for a period not exceeding 6 months – **permitted activity.** **Note:** Rules relating to new assets will apply if these time periods are exceeded.	The activity is not undertaken on land identified in the relevant district plan as being within a sensitive environment [in terms of s6(b) or (f) RMA].	**Discretionary restricted activity** in terms of: - the section 6 matters applicable to the land - need for a reliable, resilient and affordable supply of electricity
Signs	Attaching or modifying signs on any part of the electricity distribution network by the EDB for the purpose of safety or asset/owner identification or in relation to emergency works – **permitted activity.**	None	- NA
Blasting and Painting (Regional Rule)	Discharges to land, water or air from the use of water or abrasive materials, and from the application of protective coatings – **permitted activity.**	Conditions relating to blasting and painting. - effective containment measures are in place to prevent dispersal of abrasion materials to water bodies, public places and occupied buildings - silica content < 5% - site remediation - lead based paint - restricted chemicals - methods used to apply protective coatings so adverse effects from particulate dispersal are avoided.	**Discretionary restricted activity** in terms of: - water quality - human health - soil contamination - need for a reliable, resilient and affordable supply of electricity

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
New Individual Connections	New overhead connection to a consumer from existing overhead reticulation in legal road or a utility corridor **– permitted activity**	None	NA
New Underground Assets (including any associated ground or vegetation disturbance)	Underground or in-ground electricity distribution infrastructure, including additional cable circuits, together with switchgear, fusegear and other associated equipment for conveying electricity to a voltage up to and including 110 kV **– permitted activity.**	All general site works conditions are complied with.	**Controlled activity** in terms of: - noise, vibration, traffic, site remediation - need for a reliable, resilient and affordable supply of electricity
		Any minor utility structure must not exceed: a) a height of 2.5m; and, b) a footprint area of: (i) $10m^2$ in a non-urban area and where it is located in a legal road or a dedicated utility corridor; or, (ii) $6m^2$ in all other cases including urban areas.	**Discretionary restricted activity** in terms of: - visual effects - need for a reliable, resilient and affordable supply of electricity
		The activity is not undertaken on land identified in the relevant district plan as being within a sensitive environment [in terms of s6 (b), (c) or (f) RMA]	**Discretionary restricted activity** in terms of: - the section 6 matters applicable to the land - need for a reliable, resilient and affordable supply of electricity
New Overhead Assets (including any associated ground or vegetation disturbance)	The construction, operation and maintenance of new electricity distribution infrastructure, for the purpose of distributing electricity using overhead conductors, and	All general site works conditions are complied with.	**Controlled activity** in terms of: - noise, vibration, traffic, site remediation - need for a reliable, resilient and affordable supply of electricity

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
	any associated support structures, transformers and ancillary components, where: (a) it is located within an urban area and designed to operate at a voltage not exceeding 33 kV; or, (b) it is located within a non-urban area and designed to operate at a voltage not exceeding 110 kV – **permitted activity**	Any minor utility structure must not exceed a volume of 3.0 m^3	**Discretionary restricted activity** in terms of: - visual effects - effects on residential amenity - need for a reliable, resilient and affordable supply of electricity
		The activity is not undertaken on land identified in the relevant district plan as being within a sensitive environment [in terms of s6 (b), (c) or (f) of RMA]	**Discretionary restricted activity** in terms of: - the section 6 matters applicable to the land - the extent to which alternative sites, routes and methods have been considered - need for a reliable, resilient and affordable supply of electricity
	The construction, operation and maintenance of new electricity distribution infrastructure for the purpose of distributing electricity using overhead conductors, and any associated support structures, transformers and ancillary components, where: (a) it is designed to operate at a voltage exceeding 33 kV but not exceeding 110 kV; and,	All general site works conditions are complied with.	**Controlled activity** in terms of: - noise, vibration, traffic, site remediation - need for a reliable, resilient and affordable supply of electricity
		Any minor utility structure must not exceed a volume of 3.0 m^3 Any emission of noise from transformers must meet the applicable night time urban area levels for the zone	**Discretionary restricted activity** in terms of: - visual effects - need for a reliable, resilient and affordable supply of electricity

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
	(b) it is located in an urban area – **permitted activity**	Support structures (and all attached components) and the corridors for the overheard conductors must be located: a) on or over legal road, reserve vested as road, or a dedicated utility corridor; and, b) not on or over land identified in the relevant district plan as being within a sensitive environment [in terms of s6 (b), (c) or (f) of RMA].	**Discretionary unrestricted activity**.
Substations	The operation, maintenance and minor upgrading of an established substation (not being a minor utility building) or a works depot with no buildings **– permitted activity.**	Except where existing use rights under section 10 of the RMA apply, noise from the operation of a substation (excluding warning devices) must not exceed the more lenient of the following noise limits: (a) At any point on the boundary of any adjoining site in an urban area or in non-urban areas one metre from the facade of the closest occupied building: 7am to 10pm Monday to Saturday 50dBA Leq; and, at all other times – 40dBA Leq and 70 dBA Lmax. (b) the relevant maximum noise limits for the district plan activity areas or zone where the activity is located.	**Discretionary restricted activity** in terms of: - visual effects - amenity effects - need for a reliable, resilient and affordable supply of electricity
		Any artificial lighting system shall ensure that its use does not result in an added illuminance, over and above the measured ambient level, in excess of 8 lux measured in the vertical plane at the windows of any residential dwelling.	
	The establishment, upgrade (not being "minor upgrading") or replacement of a substation (not	Any transformer is designed to operate at voltage not more than 66 kV.	**Discretionary restricted activity** in terms of:

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
	being a minor utility building), or a works depot containing buildings not located in an urban area – **permitted activity**	Any new substation mist be enclosed within a building.	- visual effects - amenity effects - access and parking - effects from earthworks
		Drainage water potentially able to contain petroleum contaminants (but excluding water from roof and vehicle accesses) must be directed through a staged interceptor or other system.	
		Any transformer (including any applicable bunded areas) must be set back at least: • 50m from the CMA • 20m from the edge of any waterbody identified in the relevant district plan as a sensitive environment in terms of sections 6(a), (b) or (c) of the RMA • 10m from the edge of any other waterbody (excluding aquifers).	
		The following standards apply to buildings at any site (refer note about set backs): • the combined footprint area must not exceed 50 m^2. • the height must be less than 3.5 m. • buildings with a footprint area more than 10m^2 shall be set back from any boundary shared with land in an urban area by a distance of not less than half the height of the structure. • Set back should be a minimum of 3 metres from a dwelling.	

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
		The activity is not undertaken on land identified in the relevant district plan as being within a sensitive environment [in terms of s6 (b), (c) or (f) of RMA].	
	The establishment, upgrade (not being "minor upgrading") or replacement of a substation (not being a minor utility building), or a works depot containing buildings located in an urban area is a **controlled activity.** in terms of: - visual effects - amenity effects - access and parking effects from earthworks	Any transformer is designed to operate at voltage not more than 66 kV.	Discretionary unrestricted
		Any new substation must be enclosed within a building.	
		Drainage water potentially able to contain petroleum contaminants (but excluding water from roof and vehicle accesses) must be directed through a staged interceptor or other system.	
		Any transformer (including an applicable bunded areas) must be set back at least: • 50m from the CMA. • 20m from the edge of any waterbody identified in the relevant district plan as a sensitive environment in terms of sections 6(a), (b) or (c) of the RMA. 10m from the edge of any other waterbody (excluding aquifers).	
		The following standards apply to buildings at any site (refer note about setbacks): • the combined footprint area must not exceed 50 m^2. • the height must be less than 3.5 m. • buildings with a footprint area more than 10m^2 shall be set back from any boundary shared with land in an urban area by a distance of not less than half the height of the structure.	

Activity	Activity Rules	Conditions	Activity Status where Conditions are Not Met
		Set back should be a minimum of 3 metres from a residential dwelling. The activity is not undertaken on land identified in the relevant district plan as being within a sensitive environment [in terms of s6 (b), (c) or (f) of RMA]	
Subdivision	Subdivision to create an allotment of any size to accommodate electricity distribution infrastructure – **controlled activity** in terms of: • site design, frontage and area; • vehicular access; and, • suitability for intended use.	None	NA
All Other Activities	Any activity associated with the establishment, operation, maintenance, upgrade or removal of infrastructure for the distribution of electricity that is not provided for in the rules above - deemed to be a **discretionary unrestricted activity**.	None	NA

Managing effects on an electricity distribution network – third party activities

Certain activities need to be managed to avoid reverse sensitivity effects and that distribution networks are not compromised. The main objectives for managing the activities near distribution infrastructure are focused toward:

- helping to protect the public and property from live distribution lines;
- helping to ensure a reliable and safe power supply to residents, businesses and communities;
- ensuring activities able to affect or damage electricity infrastructure are sufficiently separated from assets, particularly those that are considered regionally critical or where there are elevated risks of interference;
- allowing for existing distribution lines to be routinely inspected and maintained so they operate effectively;
- development is appropriately managed so it does not preclude the option of upgrading existing regional critical infrastructure and so adequate considerations given to amenity values.

One objective of this guideline is to help address the predominant absence of district plan provisions that recognise the importance of managing the tension between the electricity distribution activities and the activities of others who are generally the owners of land near the infrastructure. This paucity contrasts with the provisions in many district plans or proposed plan changes designed to give effect to the NPSET and its imperative relating to third party activities. This guide aims to encourage inclusion of these considerations, but to do so in a reasonable way, while also being aware of the need not to unreasonably impose additional consenting costs on landowners.

The objectives and policies proposed are designed to provide a meaningful suitable policy framework, giving appropriate recognition to the importance of avoiding activities that can compromise the security of electricity distribution networks. Suitable plan provisions to give effect to this policy direction and for managing these risks will promote greater security of electricity supply (i.e., fewer outages resulting from third-party activities). In applying provisions that provide protection to electricity assets, particular consideration should be given to assets which are regionally significant or critical to providing for the social and economic wellbeing of that region. Another primary objective is to enhance public and worker safety.

The table below contains model standards and rules for managing third party activities, which are largely based on the key provisions of the Electricity Act and related regulations such as NZECP34:2001. ENA considers it appropriate to translate these matters into a RMA framework so control is achieved over the following matters:

- excavations (which can destabilise distribution line support structures) and filling which can cause safety issue by reducing clearance distances;
- erecting buildings so adequate clearances are achieved, so maintenance of assets is not impeded and so potential upgrade of critical parts of the network is not precluded; and
- managing vegetation growth and fall hazards.

EDBs consider it appropriate to include controls on subdivision where the subdivision has potential impacts for the network and where the network can impact on subsequent dwellings. As examples, fences can be constructed which block access to distribution networks or effluent lines installed on rural subdivisions that can then be damaged when it is necessary for large vehicles to access support structures. Future network expansion should also be factored into development design. Subdivision generally requires resource consent in district plans.

The model provisions below are intended to support the adoption and implementation of the objectives and policies relating to third party activities so they do not compromise EDBs' ability to operate, maintain and develop their networks.

Greater involvement with EDBs at earlier stages in the planning process is to be encouraged, including at a strategic level with councils but also where appropriate when individual developments are being planned. In addition to minimising potential conflicts with networks, this would also provide an opportunity to talk to the EDB about the health and safety considerations while working near EDB assets, and to help with early planning should the new development require additional infrastructure or upgrades to support it.

Activity	Discretionary Activity Rules	Limitations	Scope of Discretion
Buildings	The erection of a building, or any alterations/additions to an existing building outside the existing building envelope or footprint – **discretionary restricted activity.**	The rule only applies to activities located within *10 metres* of: (a) the centreline of an electricity distribution line; or, (b) a substation boundary. The rule does not apply if written approval from the relevant electricity distribution business accompanies the application for building consent. Restricted discretion would be limited to: 1. The safe and efficient operation and maintenance of the electricity supply network including: a) the use, design and location of buildings b) compliance with NZECP34 and any further recommendations from the EDB 2. Public and worker health and safety 3. Effects on access to the EDB infrastructure for operations, maintenance and upgrade activities.	Discretion is restricted to: - public safety - operation and maintenance of the electricity distribution line - reverse sensitivity - need for a reliable, resilient and affordable supply of electricity. Restricted discretion would be limited to: 1. The safe and efficient operation and maintenance of the electricity supply network including: a) the use, design and location of buildings b) compliance with NZECP#4 and any further recommendations from the EDB 2. Public and worker health and safety 3. Effects on access to the EDB infrastructure for operations, maintenance and upgrade activities.
Earthworks	Any ground disturbance resulting in non-compliance with: (a) the minimum ground to conductor clearance distances; or (b) the depth limits; required by NZECP34:2001 – **discretionary restricted activity**.	Condition (b) of this rule does not apply if the relevant electricity distribution business has provided written dispensation under NZECP34:2001.	Discretion is restricted to: - public safety - operation and maintenance of the electricity distribution line - risks to land and property - need for a reliable, resilient and affordable supply of electricity.
	Any excavations above and within one metre of an underground electricity distribution cable –	The rule does not apply if the relevant electricity distribution business has provided written approval.	Discretion is restricted to: - public safety

	discretionary restricted activity		- operation and maintenance of the electricity distribution line - risks to land and property - need for a reliable, resilient and affordable supply of electricity.
Vegetation	Planting vegetation using species able to exceed a height of two metres – **discretionary restricted activity.**	The rule only applies to plantings where at mature height the vegetation will be within the fall distance of: (a) an electricity distribution line; or, (b) a substation boundary.	Discretion is restricted to: - public safety - operation and maintenance of the electricity distribution line - risks to land and property - need for a reliable, resilient and affordable supply of electricity.
	Allowing vegetation (including shelterbelts, production forestry or commercial horticultural operations) to grow so: (a) it encroaches into any growth limit zone under the Electricity (Hazards from Trees) Regulations 2003; or, (b) at mature height the vegetation will be within the fall distance of any line – **discretionary restricted activity**.	None	
Subdivision	Subdivision of any land within 30 metres of: (a) the centreline of a critical electricity distribution line; or, (b) a substation boundary – **discretionary restricted activity**.	The rule does not apply if: (a) the subdivision is for the purpose of creating a utility lot accommodating electricity distribution infrastructure; or, (b) each lot within the subdivision will accommodate an existing dwelling.	Discretion is restricted to: - subdivision construction works - subdivision design and lot configuration - public health and safety - operation and maintenance of the electricity distribution line - need for a reliable, resilient and affordable supply of electricity

Template Definitions

Definitions below have been developed to support the template rules provided above. These form the basis of the definitions for rules regarding electricity distribution infrastructure.

General Site Works Conditions referred to above are:

a) Temporary construction buildings must remain on a construction site for no longer than the duration of the project or 12 months, whichever is the lesser.
b) All construction work shall be designed, managed and conducted to ensure that construction noise complies with the requirements of NZS6803:1999 Acoustics - Construction Noise.
c) Vibration from all construction activities shall not exceed the limits of, and shall be measured and assessed in accordance with, German Standard DIN 4150-3 (1999-02) Structural Vibration — Effects of Vibration on Structures.
d) All disturbed or cut vegetation, soil or debris shall be deposited or placed in a position where it will not enter any water body or cause diversion, damming or erosion of any waterway.
e) Construction sites must be reinstated as soon as reasonably practicable following the completion of construction activities by, for example, re-contouring to reinstate the existing landform and re-establishment of pasture grass or other vegetation which is generally consistent with the immediately surrounding areas.
f) Any damage to entranceways and public roads caused by construction traffic and activities must be repaired within two months of work being completed.
g) All work is undertaken between the hours of 7am and 6pm, except where the activity comprises emergency work as provided for in section 330 of the RMA.
h) Appropriate procedures are implemented in the event that urupā, traditional sites, taonga (significant artefacts) or kōiwi (human remains) or archaeological sites (whether recorded or unrecorded) are exposed during site works.
i) Appropriate protocols are in place for managing potentially contaminated soil where it is exposed during site works.

In-Ground:

In-ground includes components such as transformers that might be (in part) above ground. Any height restriction applies only to the part of the structure located above ground level.

Works depot:

Works depot means an area of land under the control of an electricity distribution business and used for the storage of materials and equipment used in the provision or maintenance of the electricity distribution infrastructure. A works depot may or may not include buildings associated with the business.

Transformer:

Transformer means a device that converts an alternating current (AC) of a certain voltage to an alternating current of different voltage, without change of frequency, by electromagnetic induction. A 'step up' transformer receives a low voltage and converts into a higher voltage, and a 'step down' transformer does the reverse.

Minor Upgrading:

Minor upgrading encompasses improving the carrying capacity, efficiency or security of electricity distribution network by:

a) installing an additional mid-span support structure to achieve network stability or minimum clearances;
b) changing the location or dimensions of a distribution line support structure that is required:
   (i) to accommodate any one of the matters listed in (c) to (h) below; or,
   (ii) to address non-compliance with minimum safe separation distances in NZECP34:2001.
c) modifying the design or composition of support structures to comply with minimum mechanical loading requirements, including the reconfiguration of equipment such as stay wires and anchor blocks;
d) retensioning conductors;
e) bonding of conductors;
f) adding conductors, and/or installing additional distribution line support structures, and/or replacing conductors on a line with higher capacity conductors, where:
   (i) the circuit is designed to operate at a voltage not exceeding 33 kV and is located entirely within an urban area; or,
   (ii) the circuit is designed to operate at a voltage exceeding 33 kV but not exceeding 110 kV and is located:
      • entirely within an urban area; and,
      • on or over a legal road, reserve vested as road, or a dedicated utility corridor; and,
      • not on or over land identified in the relevant district plan as being within a sensitive environment (refer definition); or,
   (iii) the circuit is designed to operate at a voltage not exceeding 110 kV and is located entirely within a non-urban area.
g) installing pole-mounted transformers not exceeding a volume of 2.0m^3 and associated equipment;
h) Addition of “smart network” technologies and equipment;
i) adding larger or more efficient insulators;
j) adding earthpeaks, earthwires, earthmats or lightning rods; or
k) The replacement of existing cross arms with cross arms of an alternative design.
l) The replacement of substation or works depot components with components of a smaller, same or similar size, site location and appearance.
m) The addition of substation or works depot components (excluding enclosing an existing substation within a building) that results in no increase to the height of the substation or works depot and no reduction to the setbacks from the boundary of any urban site.
n) Enclosing an existing outdoor substation (or parts of it) within a building that meets the permitted activity standards of the relevant zone.

Upgrading does not encompass:

- increasing the voltage of a circuit unless it was originally constructed to operate at the higher voltage but has been operating at the lower voltage; and/or,
- adding components to facilitate new individual connections to an existing distribution line.

Sensitive Environment:

A sensitive environment is a part of a district specifically identified in the relevant district plan as containing features or values that warrant specific consideration with respect to the matters of

national importance in section 6 of the RMA. As the case may be discretion will be exercised in terms of:

- natural character values where the land is in a sensitive environment by reason of section 6(a);
- landscape values where the land is in a sensitive environment by reason of section 6(b);
- ecological values where the land is in a sensitive environment by reason of section 6(c); or,
- heritage and cultural values where the land is in a sensitive environment by reason of section 6(e), (f) or (g).

Non-Urban Land:[10]

Non-urban land means:

- farm land, and;
- any land other than land that is both in an urban area, and used for commercial, industrial, or residential purposes.

Farm land:

Farm land means land used exclusively or principally for agricultural, horticultural, or pastoral purposes, or for the keeping of bees, poultry, or livestock.

Electricity Distribution Infrastructure:

Electricity Distribution Infrastructure means all electrical and communications components (including buildings and fences for housing those components) owned and operated by an electricity distribution business for the purposes of conveying electricity between a national grid exit point and a consumer, or between an electricity generator and a consumer.

Utility corridor:

Utility corridor means a strip of land, and the air space above, varying in width and forming a passageway, that has been identified or specifically set aside for the purpose of accommodating various utilities. A dedicated utility corridor is one which is mapped and described as such in a district plan.

Road:

Has the same meaning as in section 315 of the Local Government Act 1974.

Minor utility structure:

Minor utility structure means any aboveground box-like structure or enclosure associated with a network utility, or that receives or transmits to or from any part of a network utility. It includes:

- electricity junction pillars
- transformers
- switchgear
- recharging stations
- cable pits
- battery banks
- cabinets

It does not include any structure for the purpose of supporting conductors and other components of a distribution line.

10 This definition is derived from the Overseas Investment Act 2005.

Substation:
Substation means those parts of works or electrical installations, being a building, structure or enclosure incorporating fittings and other ancillary equipment, that are principally for the purpose of the control of the distribution of electricity, including any ancillary works (e.g. signs and fencing) as may be required to comply with any relevant electricity regulation.

Definitions for Rules Managing Effects from Third Party Activities

Building:
Building has the same meaning as in sections 8 and 9 of the Building Act 2004.

Critical Electricity Distribution Line:
Critical Electricity Distribution Lines are identified in the planning maps of the district plan and generally comprise overhead lines that:

- supply public services such as the hospital, civil defence facilities or lifeline sites; or,
- supply industrial or commercial electricity consumers with demand exceeding 1MW; or,
- supply 1000 or more consumers; or,
- are difficult to replace with an alternative electricity supply if they are compromised.

Vegetation Height
Vegetation height is the vertical dimension of a tree or other plant from its base at ground level to the top outermost part of the tree or plant (noting this may not be the tip of the highest branch).

Vegetation Setback Distance
Vegetation setback distance is the minimum distance required to avoid a tree, or other vegetation, (as it falls through the air to the ground) coming into contact with any part of an overhead electricity distribution line, with an additional safety margin of two metres incorporated. On flat ground the setback will be determined from the actual vegetation height plus two metres. On steep ground, where vegetation is able to slide downhill, the setback will need to incorporate an additional margin to reflect its final resting place on the ground.

Vegetation Management Plan:
A Vegetation Management Plan should outline a framework for ensuring that any vegetation is selected, located, pruned, trimmed or felled so it doesn't pose a risk to electricity distribution lines in terms of growing too close to the conductors (into the growth limit zone) or falling onto conductors or support structures (the fall hazard zone). This should also include considerations for the safe operation of any equipment near lines in accordance with safety requirements, and setting out when professionals will be required to do any harvesting or tree work near those line is accordance with safety codes and regulations. Vegetation plans must also allow for access to the electricity distribution network to be maintained and not blocked by that vegetation. The Vegetation Management Plan should also include sufficient information for the Council to be satisfied that there will be compliance with other permitted activity rules relating to vegetation, and over the lifespan of the vegetation.

NOTES:

NESCS:
The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health is potentially relevant and applies to ground disturbances on sites where HAIL activities or industries are being undertaken, have been undertaken, or, more likely, has been

undertaken. HAIL activities include: *"electrical transformers including the manufacturing, repairing or disposing of electrical transformers or other heavy electrical equipment; and, power stations, substations or switchyards."* The Ministry for the Environment has produced a guideline about the application of the regulations. It contains case studies and good-practice examples. See http://www.mfe.govt.nz/publications/rma-land-hazards/users-guide-national-environmental-standard-assessing-and-managing

NPSET and NESETA:
The National Policy Statement on Electricity Transmission 2008, outlines the national policy framework under the RMA for matters associated with the national grid. The NPSET does not apply to distribution networks. Similarly, the National Environmental Standards for Electricity Transmission Activities 2009 (NESETA) comprise a consenting framework for Transpower's activities associated with its existing transmission lines but those regulations do not apply to EDBs' activities.

In some circumstances, an EDB's assets may include transmission lines previously forming part of the national grid. It is legitimate for the EDB to inherit the benefit of any RMA approval that Transpower may have previously obtained in respect of that particular line, although in some circumstances the consent or designation may need to be formally transferred, under the provisions of sections 135, 136, 137 or 180 of the RMA.

The electricity distribution network was not included in the scope of the policy statement as it was only ever intended to apply to Transpower. The roles of EDBs however have evolved in recent years with many EDBs now owning and operating major transmission assets (including assets divested by Transpower) and other critical lines.

Setbacks for Substation Buildings:
There shall be no yard setbacks applicable to:

a) above ground network utility structures located within legal road reserve;
b) above ground network utility structures located outside legal road reserve where the structure does not exceed 10m² in area.

Distances:
Specified distances are measured from a point directly below the centreline of the line, where the centreline is a line between the highest parts of two adjacent support structures.

Code and Regulations under the Electricity Act 1992:
Notwithstanding the requirements of these rules, all activities near electricity distribution lines must comply with restrictions on land uses specified in the Electricity Act 1992; namely,

- the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP34:2001);
- the Electricity (Hazards from Trees) Regulations (2003);
- the Electricity (Safety) Regulations (2010);
- DOL safety for underground codes, etc;
- Harvesting codes, etc.

Appendix 1 – Glossary of Electricity Terms

AAC: All aluminium conductor

AAAC: All aluminium alloy conductor.

AC: Alternating current – A flow of electrical current which reaches maximum in one direction, decreases to zero, then reverses itself and reaches maximum in the opposite direction. The cycle is repeated continuously and the number of cycles per second is equal to the frequency (Hz). The New Zealand electricity system frequency is 50 Hz.

Aeolian Vibrations: Steady wind speeds between about 2 to 7 m/sec (7 to 25 km/h) can cause conductors to vibrate. These are known as Aeolian vibrations, which can cause the conductor and fittings to fatigue and possibly fail over a period of time.

Bored Concrete Pile Foundations: A foundation formed by boring a circular hole in the ground, inserting a reinforcing steel cage, and pouring in wet concrete. May have a steel casing to assist with construction.

Cable: One or more insulated conductors forming a transmission circuit above or below ground.

Cable Termination Structure: A pole-like structure allowing an overhead line to connect to underground cables.

Catenary Curve: The shape of the conductor sag is a catenary curve and is a function of tension, weight and the span length. The longer the span, the larger the sag of conductor for a given conductor tension, therefore the taller the structure required to support the conductor above the ground.

Centreline: Reference to the centreline of the t line alignment. Generally taken as a straight line between the highest points on two adjacent support structures.

Circuit: A set of three phases (bundles or conductors) plus associated hardware and insulation on a transmission line, which together form a single connection between two or more substations.

Circuit Breakers: A switching device capable of making, carrying, and breaking currents under normal circuit conditions and also making, carrying for a specified time, and breaking currents under specified abnormal conditions, such as a short circuit.

Conductors: Copper, aluminium or steel wire or wire bundles, including stranded, tubular and solid, that conduct electricity.

Conductor Sag: The vertical displacement in the conductor from a theoretical chord line between the conductor clamping (attachment) points on adjacent structures and the mid-point in the span between the structures.

Conductor Swing: Conductor swing or "blow-out" is how much a conductor moves sideways due to wind.

Consumer/customer: An electricity user.

Corona: Corona discharge is low energy plasma produced by the ionisation of nitrogen and oxygen in the air by the electric field at the surface of the conductors of a high voltage transmission line. It can produce audible noise and radio interference and results in a small loss of the energy being transported by the transmission line.

Current: The rate of movement of electricity in an electrical conductor is known as the current, measured in amperes (amps).

Distribution Line: The facilities and structures used for, or associated with, the overhead or underground conveyance of electricity between two points within a distribution network.

Double circuit: A double-circuit line is a line where two circuits are carried on one set of support structures.

Earth Fault: An electrical short circuit between one or more conductors and the ground.

Earth Potential Rise (EPR): A localised voltage rise on the ground surface caused by electrical current flow into the ground.

Earth wire: The purpose of the earth wire is to bond all the structures together and protect the conductors from lightning strikes. Earth wires can also serve as a communication system (for system operation) by utilising an internal optical fibre ground wire that provides signalling for protection systems, and a communication link between substations.

Electric Field (EF): Electric fields occur because of proximity of charged conductors. These occur whether or not there is current flowing in the conductors.

Electromagnetic Interference (EMI): The electrical equivalent of audible noise, that interferes with the operation of television sets and radios. Also known as electrical background noise.

Electric and Magnetic Fields (EMF): Electric and magnetic fields are intrinsic attributes of any physical electrical system comprising conductors with voltages and currents. Sometimes known as electromagnetic fields.

Electricity distribution network: The system of lower voltage power lines, cables and other equipment in a local area that is used to carry electricity from the national grid to homes and businesses. The function of an electricity distribution business (EDB) is to operate and manage an electricity distribution network.

Electricity distribution infrastructure: Electricity distribution infrastructure means all electrical and communications components (including buildings and fences for housing those components) owned and operated by an electricity distribution business for the purposes of conveying electricity between a national grid exit point and a consumer, or between an electricity generator and a consumer.

Fault Current: A fault current is an abnormal flow of current in an electric circuit due to a short circuit fault.

Feeder: A feeder is a physical grouping of conductors that originates at a zone substation and supplies a number of consumers.

Frequency: The rate of cyclic change in value of current and voltage, quantified by the international standard term "Hertz" (Hz). Electrical power frequency around the world is mostly 50Hz or 60 Hz.

Grid Exit Point (GXP): A point where an electricity distribution network is connected to Transpower's transmission network and where electricity flows out of the national grid to the distribution network.

High Voltage: A voltage level in excess of low voltage (LV).

ICNIRP: International Commission on Non-Ionizing Radiation Protection. This international body of independent scientific experts addresses possible adverse effects on human health of exposure to non-ionising radiation.

Installation Control Point: An ICP is a physical point of connection on a local network or an embedded network that the distributor nominates as the point at which a retailer will supply electricity to a consumer.

Insulators: Unit or assembly of units intended to give support to a live part, which is to be insulated from earth or another live part. They can be made of porcelain, glass or a composite polymer and can be either string or cantilever post configuration.

Lightning Protection: Includes masts and wires to shield substation equipment from direct lightning strikes. Protects equipment connected to antennas, power lines, telephone and data circuits.

Line Losses: As electricity travels through the national grid and local networks, a portion of energy is lost as heat due to the resistance in the lines. The greater the distance the electricity travels and the higher the current on the line, the higher the losses are.

Local Network: The lines, cables and substations used by distributors to transport electricity from grid exit points (GXPs) to consumers. Also known as a distribution network or electricity distribution network.

Magnetic Field (MF): The force experienced in a region of space around a current carrying conductor. Measured in amperes per metre (A/m). Field density is often expressed in microtesla (μT).

Maximum Operating Temperature: The maximum temperature that the conductors of a circuit may be permitted to operate at under any conditions, including the worst combination of load current, solar radiation, ambient temperature, and no wind. The maximum operating temperature sets the maximum load current the circuit can carry, and defines the conditions that produce the lowest ground clearance of the conductor.

Monopoles: Monopoles used for electricity line support structures are a single pole structure, generally of tubular steel construction made of a number of shorter length sections that are combined together by either overlapping joints or by bolted end plate connections. The sections can be circular, but for larger structures they are generally multi sided (e.g. 16 sides to facilitate their practical manufacture). Generally tapered, increasing in diameter from top to bottom, monopoles can be direct embedded in the ground, but are generally attached to a separate foundation using anchor bolts set in concrete. Phase and earth wire supporting cross arms are in turn attached, either welded or bolted, to the individual pole sections as required.

National Grid: The national transmission grid of high voltage power lines and tall towers that connects to power stations to send electricity around the country. The 'grid' is owned by state-owned enterprise, Transpower (NZ) Limited.

Network: A network (also called an electricity distribution network) is the lower voltage power lines and other assets in a local area used to carry electricity from the national grid to homes and businesses.

Non-ionising Radiation: Radiation that does not produce ionisation in matter. When radiation of this nature passes through the tissues of the body it does not have sufficient energy to damage DNA directly.

NZECP34: 2001: The New Zealand Code of Practice for Electrical Safety Distances Number 34: 2001, comprising a set of regulations under the Electricity Act 1992.

Overhead Earth Wire (OHEW): Conductor that is installed between towers to provide lightning shielding and earthing for the transmission line.

Pi Pole (also sometimes called a 'H-pole'): A electricity line support structure comprising two vertical and parallel poles linked by a cross-arm.

Phase: In most high voltage electrical power systems each electrical circuit is made up of three phases, with each phase at the same voltage within the circuit, e.g. 110 kV. A phase can be a single conductor or a multiple sub-conductor bundle. High voltage AC systems are composed of three phases.

PLS-CADD: An overhead line design modelling program developed by Power Line Systems (USA), which works in three dimensions including both the terrain crossed and the line itself.

Pole: A pole-like support structure to hold the conductors clear of the ground – refer monopoles and pi-pole.

Power: Power is the rate of flow of energy past a given point and is the product of voltage and current. It is measured in watts, kilowatts, megawatts, and gigawatts.

Radio Frequency Interference (RFI): Radio frequency interference is a phenomenon where stray signals generated in high voltage equipment can interfere with the operation of some electrical equipment (e.g. AM radio receivers).

Single Circuit Line: A distribution line carrying one circuit.

Soil Resistivity: Measure of soil's opposition to an electric current flow. Soil resistivity is the key factor that determines what the resistance of a grounding electrode will be, and to what depth it must be driven to achieve low ground resistance.

Span Length: The horizontal distance between two adjacent transmission line structures.

Step Voltage: The voltage difference experienced between a person's feet, where feet are one metre apart near a transmission line tower or substation when fault current is flowing into the ground (associated with EPR).

Structure (lines): Any tower or pole irrespective of its physical construction, including all insulators and insulator fittings, which forms part of a distribution line.

Substation: A building, structure or enclosure incorporating electrical equipment used principally for the control or distribution of electricity.

Switching Station: A station that exists solely for the purpose of transmission rather than supply.

Tee Connection: An arrangement on a distribution network where a spur line is directly connected to another line. No switchgear is installed at the point of connection.

Touch Voltage: The voltage difference experienced between a person's hand and foot, where the foot is one metre horizontally from the object being touched at a distribution structure or substation fence.

Transferred Voltage: Potential rise of an earthing system caused by a current to earth transferred by means of a connected conductor (e.g. cable metal sheath, pipeline, rail) into areas with low or no potential rise relative to reference earth.

Transformer: A static electric device consisting of a winding, or two or more coupled windings, that transfers power by electromagnetic induction between circuits of the same frequency, usually with changed values of voltage and current.

Transpower: The state owned enterprise that operates New Zealand's transmission network. Transpower delivers electricity from generators to various electricity distribution networks around the country.

Voltage: The name for electrical pressure [unit is volt (V)]. It is analogous to the pressure of water in a pipeline. The highest voltages in a power system are used for transporting bulk electricity from generation stations to areas of demand.

Appendix 2 – Electricity distribution businesses, areas and territorial authorities

Distribution Company	Area Served	Relevant Territorial Authorities
Alpine Energy	Geraldine, Temuka, Pleasant Point, Timaru, Twizel, Waimate	Timaru, Waimate and MacKenzie
Aurora Energy	Dunedin, Alexandra, Cromwell, Queenstown, Arrowtown, Wanaka, Te Anau	Southland, Queenstown Lakes, Central Otago, Dunedin
Buller Electricity	Westport	Buller
Centralines	Waipawa, Waipukurau	Central Hawkes Bay
Counties Power	Auckland (southern Papakura,Drury, Pukekohe, Waiuku)Tuakau, Pokeno	Auckland, Waikato, Hauraki
Eastland Network	Gisborne, Wairoa	Gisborne, Wairoa
Electra	Foxton, Shannon, Levin, Otaki, Kapiti	Horowhenua, Kapiti Coast
Electricity Ashburton	Ashburton	Ashburton
Electricity Invercargill	Invercargill (inner suburbs), Bluff	Invercargill
Horizon Energy Distribution	Kawerau, Murupara, Edgecumbe, Whakatane, Opotiki	Opotiki, Whakatane, Kawerau, Wairoa
The Lines Company	Otorohanga, Te Kuiti, Mangakino, Taumarunui, Turangi, Ohakune	Taupo, Otorhanga, Waitomo
MainPower	Kaikoura, Hanmer Springs, Oxford, Rangiora, Woodend, Kaiapoi	Hurunui, Marlborough, Waimakariri, and Kaikoura
Marlborough Lines	Blenheim, Picton	Marlborough and Kaikoura
Nelson Electricity	Nelson (CBD)	Nelson, Tasman and Buller
Network Tasman	Takaka, Motueka, Nelson (suburbs), Brightwater, Wakefield	Tasman and Buller
Network Waitaki	Oamaru	Waitaki, Waimate, Oamaru, and MacKenzie
Northpower	Whangarei, Dargaville	Kaipara, Whangarei
Orion	Christchurch, Lincoln, Rolleston, Darfield, Leeston	Christchurch and Selwyn
OtagoNet Joint Venture	Milton, Balclutha	Oamaru, Central Otago, Clutha
The Power Company	Gore, Te Anau, Winton, Riverton, Invercargill (outer suburbs)	Gore, Clutha and Southland

Powerco	Coromandel, Whitianga, Tairua, Thames, Whangamata, Paeroa, Waihi, Waihi Beach, Te Aroha, Morrinsville, Matamata, Putaruru, Tokoroa, Katikati, Tauranga, Te Puke, Waitara, New Plymouth, Inglewood, Stratford, Eltham, Opunake, Manaia, Hawera, Patea, Wanganui, Raetihi, Waiouru, Taihape, Marton, Bulls, Feilding, Palmerston North, Pahiatua, Masterton, Carterton, Greytown, Featherston, Martinborough	Thames-Coromandel, Hauraki, Matamata-Piako, South Waikato, Western Bay of Plenty, Tauranga, Waipa, Rotorua, Waikato, New Plymouth, Stratford, South Taranaki, Ruapehu, Whanganui, Rangitikei, Manawatu, Palmerston North, Tararua, Masterton, Carterton, South Wairarapa
Scanpower	Dannevirke, Woodville	Tararua
Top Energy	Taipa Bay-Mangonui, Kaitaia, Kerikeri, Russell, Paihia, Kawakawa, Moerewa, Kaikohe	Far North
Unison Networks	Rotorua, Taupo, Napier, Hastings	Rotorua, South Waikato, Taupo, Hastings, Napier,
Vector	Wellsford, Warkworth, Snells Beach, Helensville, Waiheke Island, Auckland (excluding southern Papakura and Drury)	Auckland
Waipa Networks	Cambridge, Te Awamutu	Waipa, Otorohanga
WEL Networks	Huntly, Raglan, Hamilton, Ngauruawahia	Waikato, Hamilton, Waipa
Wellington Electricity	Wellington, Porirua, Lower Hutt, Upper Hutt	Porirua, Upper Hutt, Lower Hutt, Wellington
Westpower	Greymouth, Hokitika, Reefton	Buller, Westland