BEFORE THE HEARING PANEL APPOINTED BY THE OTAGO REGIONAL COUNCIL

UNDER	The Resource Management Act 1991 (**Act** or **RMA**)
IN THE MATTER	of an original submission on the Proposed Regional Policy Statement for Otago 2021 (**PRPS**)
BETWEEN	**AURORA ENERGY LIMITED**
	Submitter 0315
AND	**OTAGO REGIONAL COUNCIL**
	Local Authority

EVIDENCE IN CHIEF OF DAVID LENARD PATERSON ON BEHALF OF AURORA ENERGY LIMITED

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1. Executive Summary

1.1 Electricity Network Businesses (**EDBs**) operate in accordance with relevant legislation, particularly the Electricity Act 1992 (**Electricity Act**), the RMA and the Utilities Access Act 2010. There are also numerous National Industry Codes of Practice and Electricity Network Technical Specification Standards that EDBs are required to observe, including the New Zealand Code of Practice for Electrical Safe Distances 2001 (**NZECP34**). Compliance with many of these codes and standards is mandatory not only for EDBs, but the public at large.

1.2 Entities that distribute electricity through a network, like the EDBs, are classified as a 'lifeline utility' for the purposes of the Civil Defence Emergency Act 2002. As a lifeline utility, EDBs have certain obligations to manage their network so it can be operated to the fullest possible extent during and after an emergency.

1.3 EDB networks comprise overhead lines (pole and conductors), underground cables, zone substations, transformers and a range of ancillary equipment including kiosks, pillar boxes, power poles, together with other buildings and structure which may be used to house or support that infrastructure. Together, this series of infrastructure comprises the electricity distribution network which an EDB is responsible for developing, operating, maintaining and upgrading.

1.4 EDB networks are hierarchical (or branchlike) in nature in that a large number of high voltage overhead lines and underground cables each carry a large amount of electricity to supply thousands of customers. EDBs receive electricity from the National Grid (at Grid-Exit Points (**GXP**) or directly from generation sources, where electricity is distributed via the network. In order for high voltage electricity to be of an appropriate voltage for consumer connections it must first be transformed by a series of zone substations (principally) and other transformers before it is directed to thousands of low voltage lines which can serve anywhere between one and a few hundred customers. If faults occur in low voltage lines, this will impact the consumer but will not impact the rest of the network.

1.5 Within a network there are a select number of lines that are of particular importance. These are typically high voltage lines (33kV or 66kV) that stem from the electricity generation sources to Zone Substations. Other parts of the network of high importance are lines that service isolated communities with limited or no alternative supply sources, large consumers or other lifeline utilities.

1.6 NZECP34) sets minimum safe electrical distance requirements for overhead electric line installations and other works associated with the supply of electricity from generating stations to end users. The minimum safe distances have been set primarily to protect persons, property, vehicles and mobile plant from harm or damage from electrical hazards. The minimum distances are also a guide for the design of electrical works within substations, generating stations or similar areas where electrical equipment and fittings have to be operated and maintained.

1.7 I discuss in my evidence the issues and risks associated with breaches of the safety clearance requirements. These safety clearance breaches both in terms of position of structures and earthworks can be minimized and/ or mitigated with suitable corridor protection rules in both Regional and District Plans. Without such corridor protection rules there is a risk of development under, or in close proximity, to high voltage lines. The Regional and District Plans are the only mechanisms which provide suitable safeguard from development and removing these safeguards may put this infrastructure at risk.

1.8 The amendments sought to various plan provisions seek to provide greater clarity and certainty around the application and interpretation of proposed provisions, and to better enable the secure and efficient operation of the electricity distribution networks in Otago. The submissions made by the various EDBs are founded on a desire to achieve sustainable environmental outcomes and to meet customer requirements for a safe and reliable electricity distribution network.

2. Introduction

2.1 My full name is David Lenard Paterson.

2.2 I am employed by Aurora Energy Limited (**Aurora Energy**) as Primary Systems Manager and I have been in this role since 2019. Prior to that I held the position of Projects Manager with DELTA Utility Services Limited with responsibility for capital projects and network design.

2.3 My professional qualifications are BE (Electrical) from Canterbury University, CPEng (Charted Professional Engineer) and IntPE (International Professional Engineer). I have had over 29 years of experience in electrical and power systems engineering.

2.4 I have been asked to provide this evidence in support of a submission on the Proposed Regional Policy Statement (**PRPS**) lodged by Aurora Energy (OS0315). This evidence is also drafted for the purpose of providing background technical information for the Electricity Distribution Businesses (**EDB**) in the Otago Region: Aurora Energy, Network Waitaki Limited and PowerNet Limited.

2.5 This evidence is intended to be read in conjunction with the evidence of Ms Dowd which sets out and describes the Aurora Energy network in Otago and its relationship to the National Grid. Ms Dowd's evidence also explains the environment that Aurora Energy operates in currently, future challenges that Aurora Energy expects to face, and the measures that will be required to address these.

3. Scope of Evidence

3.1 My evidence will:

(a) Provide background on the electricity industry and the technical and operational requirements of an electricity distribution provider.

(b) Discuss the importance of an EDB's role as a lifeline utility.

(c) Discuss the challenges Aurora Energy faces to comply with the NZECP34.

4. Technical and Operational Requirements of Electricity Distribution in Otago

4.1 The electricity distribution network is extensive, connected, narrow, and linear, following the topography of the Otago region. Given the nature of the topography, sometimes assets must be located within sensitive areas. The components of the network are interconnected, with no part operating in isolation. Therefore, an issue in one part of the network can have consequences much further away. Given its geographic location and the linear nature of the electricity distribution network, it is not always possible to avoid locating assets within sensitive areas.

4.2 The characteristics of the electricity distribution network mean that there are operational requirements and engineering constraints that both dictate and constrain the way it is managed. The operational requirements relating to electricity distribution are set out in various legislation and regulations, including the Electricity Act 1992 and the Electricity Industry Participation Code.

4.3 The efficient transmission and distribution of electricity plays a vital role in the well-being of New Zealand, its people and the environment. Although often taken for granted, electricity supplied by EDBs is essential to life in the modern world.

4.4 Otago's energy consumption primarily relies on hydro-electric, wind, geothermal and thermal plants which are located in the region. From these generation sources, electricity is either transmitted:

4.5 In the case of larger generation sources, by Transpower New Zealand Limited (**Transpower**) through the National Grid to GXPs[1] which is then distributed by EDBs such as Aurora Energy, PowerNet and Network Waitaki; or

4.6 In the case of smaller-scale generation sources, Aurora Energy can connect directly to the facility. Aurora Energy's network connects directly to Waipori Falls, Roaring Meg, Oxburn, and Wye Creek hydro-generation schemes which are operated by Pioneer Generation Limited. PowerNet and Network Waitaki are likely to have direct connections throughout the Otago region.

4.7 Once electricity is received by the EDB, it is then distributed on behalf of electricity retailers through its network to homes and businesses throughout Otago Electricity retailers purchase the electricity from generators on the wholesale market and sell it to customers.

4.8 EDB networks are hierarchical (or branchlike) in nature in that it has a number of high voltage overhead lines and underground cables which each carry a large amount of electricity. The network is also by its nature a combination of linear and interconnected assets. SEDI are examples of linear assets, in which a single overhead line provides electricity to a community (such as in Glenorchy).

4.9 Aurora Energy's high voltage 33kV and 66kV sub-transmission system branches out from GXPs to Aurora Energy's 39 Zone Substations across Otago.

4.10 The location of our ESTI assets is directly connected to the location of smaller-scale generation sources and GXPs which Aurora Energy does not have any control over. Aurora Energy's infrastructure must be located as such to serve and respond to the capacity of the GXP's or the particular generation source that feeds directly into its network.

4.11 In the Queenstown Lakes District, the Frankton GXP supplies 94% of the electricity for the Wakatipu Basin area and the Cromwell GXP supplies 60% of the electricity for the Upper Clutha Basin area. The electricity from these GXP's supplies 80% of our customer

[1] Transmission is a term which, in the electricity industry, refers only to the National Grid owned by Transpower.

peak demand. The Cromwell GXP also supplies a further 5000 customers within Central Otago District who are connected to the Cromwell – Lindis Crossing – Queensberry Loop. Tarras and Queensberry are areas of demand (due to growth) and they are serviced by the ESTI that feeds into Wanaka.

4.12 Electricity that is conveyed through the ESTI network cannot be used by consumers directly and must be transformed systematically to a lower consumer level voltage. A series of Zone Substations (in the case of 33kV or 66kV) transform electricity which is then fed to substations and transformers. From the transforming equipment, a series of lines[2] and cables[3] convey the newly transformed electricity which can each serve up to one hundred customers (at an estimate).

4.13 Transformation voltages may vary between geographical locations. Often, electricity is transformed from a high voltage of 33kV to a low voltage of 11kV. In Wānaka and Cardrona, the Aurora Energy network currently converts electricity from 66kV to 11kV, to feed into roadside distribution transformers which supply the 400/230 volts used in a standard residential dwelling. As discussed above, the electricity network is highly interconnected.

4.14 The nature of electricity distribution is such that new generation sources and GXPs are rare, so EDB networks must be adaptive to change in population to enable supply or upgrade capacity as and when needed. For that reason, infrastructure in one part of the region (i.e. a GXP) can be critical to electricity supply elsewhere. An infrastructure fault in a critical location can have potential for wide-scale disruption across the network. For example, Glenorchy (supplied by SEDI) obtains its electricity supply from the Frankton GXP which then connects to the Commonage, Queenstown and Fernhill Zone Substations before being fed by a single overhead line that straddles Glenorchy-Queenstown Road. A fault to critical high voltage lines anywhere in that network can result in power loss for the community of Glenorchy which Aurora Energy seeks to avoid.

4.15 Given the interconnected the electricity sector, it would be artificial to assess EDBs in isolation from generation sources, the National Grid and individual point of supply. One cannot serve its purpose without the other. The driving force behind all electricity infrastructure is to meet the needs of people and communities, thereby dictating its location. It is my experience that this is rarely understood by people outside of the sector or by the wider public.

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[2] Lines refer to overhead conductors and poles.
[3] Cables refer to direct buried or ducted cables beneath the ground.

5. Lifeline Utility

5.1 EDBs are recognised as a "lifeline utility" in the Civil Defence Emergency Management Act 2002 (**CDEM Act**). That status recognises the role an EDB plays to ensure distribution of a reliable and secure supply of electricity to the community. Reliable and secure electricity supply supports a community's health, safety, and wellbeing as well as their economic, social, and cultural prosperity.

5.2 Under the CDEM Act, EDBs are required to ensure functionality to the fullest possible extent, acknowledging that functionality may be reduced during and after an emergency. EDBs are also required to undertake hazard and risk analysis and carry out risk mitigation measures.

5.3 In recognition of the importance of this role, Aurora Energy was an active participant in the Otago Lifelines Project which assessed the potential impacts of hazards on the region's lifeline infrastructure and identified mitigation strategies to reduce the risk to our community. This is a key consideration for Aurora Energy when undertaking asset planning and management functions.

5.4 One of Aurora Energy's identified vulnerabilities is the risk of damage occurring to the ESTI network and feeders serving other critical assets and communities, including the ability to repair distribution lines easily. This risk arises from a range of sources:

(a) Environmental factors, such as weather events and vegetation damage.

(b) Locational factors, particularly the isolated nature of some of our infrastructure and the likelihood that access will be compromised during an emergency.

(c) Human factors, including activities occurring in close proximity to lines. Activities may affect the operation of lines or impact Aurora Energy's ability to carry out repairs efficiently. This risk can be minimised or mitigated with suitable corridor protection rules in the District Plan.

6. Managing the Network – Keeping the Lights on Today

6.1 Aurora Energy's work involves installing, maintaining/repairing, and upgrading their equipment. Equipment includes lines, poles, cables, transformers (at ground level or on poles), substations (both large and small), kiosks, and distribution cabinets. Aurora Energy also maintain a large building, facilities, and ground works program.

6.2 EDBs are subject to a suite of specifications and standards which govern electricity distribution infrastructure, including how work on the network is to be carried out.

6.3 Design standards contain numerous detailed requirements which set out how components of the network and equipment are to be designed and configured. The standards set the design of substations, cable arrays, earthing systems, and overhead lines. These standards are often based on industrial or manufacturer standards and specifications.

6.4 Equipment specifications set out the individual equipment, materials, and components to be used on the network. The specifications apply to matters as diverse as the selection criteria for softwood and hardwood power poles; the particulars of metal shells, cabinets, or kiosks within which distribution transformers and switchgear are housed; and the circuit breakers used within zone substations.

6.5 Technical specifications dictate how networks are managed and activities are carried out. Technical specifications include asset inspection regimes; requirements for excavation, backfilling, and the restoration of services; the management of hazardous substances; environmental management; and procedures when installing specific equipment.

6.6 Technical specifications also set out specific maintenance programmes for each asset class. All works generally fall into the following categories:

(a) Scheduled Maintenance – work carried out on network assets to a predetermined schedule and allocated budget;

(b) Non-scheduled Maintenance – work that must be performed on network assets outside a predetermined schedule, but which does not constitute emergency work; or

(c) Emergency Maintenance – work that must be carried out on network assets that requires immediate repair.

6.7 Maintenance work also involves activities such as cutting trees near lines where they threaten the safe operation of the network, re-tightening components (such as the lines themselves), and pole or tower foundation refurbishment.

6.8 Our approach to asset replacement (defined as works that do not increase an assets design capacity but restore, replace or renew an existing asset to its original capacity) is based on a Condition-Based-Risk Management (**CBRM**) framework. The CBRM framework assesses information, engineering knowledge and experience to define, justify and target asset replacements.

7. Managing the Network – Keeping the Lights on Tomorrow

7.1 Aurora Energy (like other EDBs) undertakes long-term planning to manage its network which is condensed into a rolling 10-year asset management plan (**AMP**). AMPs are published annually on Aurora Energy's website. The AMP describes Aurora Energy's policy, strategy, practices, work plan and expenditure forecasts for asset management over the next decade.

7.2 As part of the AMP, Aurora Energy is constantly monitoring, modelling and forecasting low, mid and high electricity peak load demand and growth across the network.

7.3 For the Queenstown Lakes market, Aurora Energy is currently forecasting an electricity network peak load growth of around 45% over the next 10 years. This increase is typically related to electricity demand from the residential sector, with significant ongoing growth expected. At the same time, Aurora Energy is anticipating growth in electricity demand from commercial premises, as the region continues to prosper and rebound from the impacts of COVID-19.

7.4 Increased growth in the QLDC region creates additional demand on the network and infrastructure. Specific areas of demand can be localised. However, overall demand may cause heavy reliance on select GXPs that are often located a considerable distance from an 'area of demand'. This results in capacity constraints on the ESTI network and localised at certain zone substations. For example, Aurora Energy's network is experiencing increased overall demand in Cardrona Valley due to the development of the ski field and residential growth.

7.5 To meet this demand, significant reinforcement or Aurora Energy's network is both required and planned. In many situations, the most plausible solution is the construction of additional lines or cables.

7.6 Aurora Energy is presently concerned with the limited paths for the supply into the Cardrona Valley and Transpower's reliance on single structures to support both lines into Queenstown. One option being considered is linking Cromwell to Cardrona and Arrowtown with a new 33kV line and/or cable. This would both relieve pressure on the lines between Cromwell and Wanaka and provide a limited backup to Transpower capable of supplying key services in the Queenstown/Arrowtown area.

7.7 Aurora Energy's existing overhead lines into Queenstown and Wanaka are also nearing their designed limits. Aurora Energy's decision-making framework when considering options to address this issue is to first look for ways to increase capacity without additional infrastructure. However, there are practical and physical limitations as to how much can be achieved with existing infrastructure. Where those options have been practically exhausted the remaining option is to upgrade, develop, or install larger equipment.

7.8 Aurora Energy's programme of work throughout Otago is (and will continue to be) updated annually as part of its rolling AMP. Each AMP will include investment, reinforcement, and upgrade plans. The rolling process is important because the AMP is designed as a forecasting tool. However, extraneous factors such as COVID-19 or sudden demand in new areas can bring projects forward that might have otherwise been scheduled towards the end of the AMP period. Similarly, existing projects may be cancelled where necessary and new projects may be brought online, or existing projects scrapped where necessary. Aurora Energy and other EDBs must be in a position to adapt and respond to locations of demand. It is a fine balance to achieve.

7.9 Aurora Energy is a business wholly owned by a public entity (the Dunedin City Holdings Limited on behalf of the Dunedin City Council) and funded by lines charges (based on consumption of electricity). As a public entity Aurora Energy must ensure that its infrastructure is sufficient to meet customer demand, whilst as a business the assets must be utilised and provide return on investment.

7.10 Flexibility continues to be an important driver in Aurora Energy's business and forecasting specific demand or load growth is becoming increasingly complex. Customer behaviour and demand is influenced by a range of factors and new technologies that do not neatly fit within traditional models. For example, there is a degree of uncertainty over the medium term regarding the rate of electric vehicle uptake; how (or when) large industrial boilers will be converted to renewable electric alternatives; and the future use of solar voltaic, distributed generation and battery systems across the network. Aurora Energy, as an EDB, must be in a position to adapt and respond to any sudden or sustained shifts in customer behaviour. Otherwise, it will be failing to achieve its purpose of supplying electricity and the social, cultural, and economic needs of the community will not be met.

8. New Zealand Electrical Code of Practice for Electrical Safe Distances

8.1 NZECP34 is a code established pursuant to the Electricity (Safety) Amendment Regulations 2013 which sets mandatory minimum distances allowed between any new buildings/structures and overhead lines. The purpose of NZECP34 is to protect persons, property, vehicles and mobile plant from harm or damage from electrical hazards.

8.2 The height, scale and physical location of a building is a key risk associated with the operation, maintenance, and potential future development of Aurora Energy's network as well as its ability to avoid or reduce to the extent possible health and safety risks associated with its network. As discussed by Ms Dowd, this is an ongoing issue which has driven Aurora Energy's involvement in District Plan reviews where its network is located.

8.3 In my experience, many developers (and the general public) are either completely unaware of the requirements of NZECP34 or choose to ignore it because it is not considered relevant to their development and may inhibit their development aspirations. The latter has been somewhat facilitated by a lack of awareness by local authorities of NZECP34 and led to it not being considered when an application for resource consent or building consent is lodged with the relevant local authority. Aurora Energy has been proactively working with the Queenstown Lakes District Council and Dunedin City Council to ensure that processes consider risks of breaches to NZECP34. However, it is clear that greater direction is required through documents such as the PRPS.

8.4 Where a developer has failed to consider the minimum safe distances under NZECP34 and constructed a building or structure, such a breach cannot be ignored and must be addressed due to the safety concerns it raises. In some instances, there are acceptable engineering solutions that reduce the risk to persons from a nearby electric line but on many occasions there are not. Where engineering solutions are not viable the structure or the electric line must be removed. In my view, the application of retrospective engineering solutions is not an efficient process for managing risk to people and leads to unsatisfactory outcomes for the developer and Aurora Energy.

8.5 Inserting corridor protection provisions in the PRPS will not reverse existing cases of underbuilding or encroachment. However, the inclusion of these provisions in the PRPS will stop more instances of underbuilding or encroachment occurring without the EDB first having an opportunity to review and participate in the process. It will also increase awareness of the care that needs to be taken when developing in close proximity to critical distribution lines such as ESTI and SEDI.

8.6 NZECP34 does not limit underbuilding or development entirely as there is a process of notification that must occur where there is a risk of close approach. In such case, the network owner should be contacted, and an engineering assessment undertaken to determine whether it is safe for a particular development to be located in close proximity to a particular line. Unfortunately, Aurora Energy has had many experiences of undertaking inspection or maintenance only to find that a new non-complying structure has been built without Aurora Energy's involvement. I gather that Aurora Energy is not the only EDB experiencing this issue.

8.7 When such developments occur, they can be very difficult and costly to overcome, especially retrospectively. If they cannot be overcome, as is often the case, then the security of the affected line is compromised.

8.8 Having a structure under a line can cause various issues which a property owner may not be aware of. The following problems may arise in the context of underbuilding.

8.9 Lines (technically called conductors) do occasionally fall to the ground. Fortunately, such instances are rare, but it does happen. Often such failures are due to third party activities such as falling trees; but insulators, conductors or conductor joints can fail. Clearly a dropped conductor poses significant risk both in terms of mechanical damage and electrocution.

8.10 The large majority of Aurora Energy's overhead lines are distribution lines. In terms of height and intensity, distribution lines are lower and smaller than ESTI or National Grid lines. Therefore, underbuild presents a greater challenge due to lower clearances.

8.11 The maintenance and replacement techniques between a sub-transmission line and that of a distribution line vary greatly. Allowing underbuild at all requires close assessment and management decisions around maintenance procedures.

8.12 Underbuild also causes problems for maintenance and replacement. For instance, if a damaged meter on a line needs to be replaced due to a fault, it is difficult to replace the meter section. The normal process of lifting a maintenance crew up to the line (in a crane or industrial cherry picker) cannot be followed due to underbuilding. Instead, the entire length of line between the towers needs to be "rolled back" to a support structure and a new section rolled out. Maintenance crews are required to climb the support structure and the work is significantly more complicated. This adds time, cost and safety risks to the maintenance.

8.13 Maintenance of support structure foundations can be problematic if structures exist around them making access to the structure difficult.

8.14 When structures are placed near lines and towers Aurora Energy needs to communicate their maintenance and replacement plans with home or business owners. This means that Aurora Energy needs to accommodate requests of the property owner for timing of works and quality of reinstatement (e.g., tower foundation replacement that involves extensive digging can lead to 'owner requests' for an alternative look).

8.15 Physical inspection of a line with underbuild becomes problematic as inspectors generally walk along the line route looking up at the conductor and joints. Most inspection is visual. Clearly the closer the inspector can get to the line the better. Buildings restrict access. Thermal imaging cameras may sometimes be used; however, these are not effective if placed far from the line.

8.16 With any underbuild, there is the risk that landowners will install additional aerials and other ancillary structures which may be too close to the live conductors to be electrically safe. Because such additions tend to be of a random nature and often do not require consent there is no practical way for the line operator to be responsive to the risk posed to both the landowner and the security of electrical supply from such installations.

8.17 Difficulties created from underbuilding and encroachment of land (uses such as residential activity or buildings/structures) creates a need for the protection of existing electricity infrastructure and provisions for its ongoing development and upgrade. In my view, this type of protection should be provided to both ESTI and SEDI, given that both have a broad function for providing for the community.

8.18 The identification of this infrastructure on District Plan maps is one way to facilitate a better understanding of the risks associated with building in close proximity to that infrastructure. However, the identification only goes so far and should be supported by a suite of provisions which protect against reverse sensitivity and potentially incompatible activities as well as providing for long term sustained development.

8.19 Identification and protection of SEDI and ESTI in the PRPS provides another opportunity to make people aware of the issue and a forum for managing the risks. I consider that the relief advanced by Ms Megan Justice will help reduce incidence of prohibited excavation work near those lines. The relief would help reduce the incidence of the following issues:

(a) Earthworks in close proximity to the foundations of towers or poles naturally destabilise the support structures and compromise the structural integrity of these supports and associated overhead distribution lines. Such destabilisation has an impact on the networks' resilience, particularly given the high voltage critical nature of ESTI and SEDI.

(b) Contact with conductors which poses a significant safety risk.

(c) Earthworks may restrict the ability to lower the conductor to the ground, or hinder network maintenance or replacement activities. Restrictions as a result of earthworks may cause additional hazards for Aurora Energy's staff undertaking such works.

(d) Earthworks also create potentially hazardous environments for workers underneath the lines and can cause difficulties when deploying equipment such as a crane or cherry picker.

(e) Piles of soil are often left under Aurora Energy's lines. This can often reduce the clearance distances to the conductor (i.e., the electrical line itself) and create safety issues for workers and the public (particularly children who tend to like to scramble to the top of such soil piles, or ride bikes/motorcycles over them).

8.20 Structures (such as buildings, fences, or swimming pools) and excavations beneath or in close proximity to a line increases the risk to the network. Structured underneath or next to lines may:

(a) increase risk to people and property.

(b) complicate maintenance issues adding significantly to maintenance costs and duration.

(c) frustrate occupiers.

(d) impact the reliability of power supply as repair may be delayed and take longer.

(e) create reliability issues due to land use creating discharges (i.e. smoke, dust) that degrades the electrical insulation performance of the line causing power outages; and

(f) cause significant harm or death in the event of an electrical fault. The structure may incur hazardous voltages before the installed protection devices can operate.

8.21 Underbuild has the potential to become increasingly problematic in the future due to changing weather patterns and demand. Conductors expand as they get hotter, which increases sag and the breadth of conductor blow out ('blow out' is the distance that conductors will swing).

9. Conclusion

9.1 An EDB's role is to distribute reliable and secure electricity supply to the region through its network The importance of this role cannot be overstated as it is essential to the modern world by keeping our economy running and improving community well-being.

9.2 EDBs are a lifeline utility under the CDEM Act. Accordingly, an EDB must ensure its network functions to the fullest possible extent, during and after an emergency (although this may be at reduced level). The risk of damage to critical high voltage distribution lines and difficulty with undertaking repairs is an ongoing risk to EDB networks. In particular, a serious risk impacting the network occurring to significant high voltage distribution lines, including the ability (or lack thereof) to undertake repairs easily.

9.3 A consequence of providing electricity to meet demand is that the infrastructure must often locate in sensitive environments. Aurora Energy, much like all EDBs, cannot itself dictate where people wish to develop but is obliged to meet demand where it is located. This has the effect of requiring new lines be installed in sensitive areas either to provide a new connection or to create redundancies in the network (such as circuit rings) to ensure a resilient supply is always available to the community even in the event of a fault on part of the network.

9.4 Given the number of customers supplied from each of the high voltage lines, the failure of any one of these high voltage lines has a far greater impact than the failure of one, or indeed many, low voltage lines. High voltage lines are critical to an EDB network of significant importance to the Otago Region.

9.5 For the reasons set out in this evidence, I support the suite of objectives, policies and methods as set out in the evidence of Ms Justice. Without such protection or provision there will be a risk that Aurora Energy (or indeed other EDBs) will not be able to perform its function as an EDB, which will in turn jeopardise the health, wellbeing and safety of the region.

David Lenard Paterson
Aurora Energy Limited