Before the Independent Hearings Panel
at Rolleston

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under:	the Resource Management Act 1991
in the matter of:	Submissions and further submissions in relation to the proposed Selwyn District Plan
and:	Strategic Directions Proposal
and:	**Orion New Zealand Limited** *Submitter DPR-0367*

STATEMENT OF EVIDENCE OF GARRY HEYES

INTRODUCTION

1 My full name is Garry Heyes.

2 I am the Procurement and Land Services Manager at Orion New Zealand Limited (*Orion*).

3 In this role, I act as the principal's representative for a wide range of services involving the management, installation, maintenance and replacement of the Orion electricity distribution network.

4 My experience includes over 18 years' engineering and electrical infrastructure management experience in the New Zealand electricity transmission and distribution sectors, with seven of these years being at Orion. In my role, I lead a team providing a wide range of services overseeing the management, installation, maintenance and replacement of the Orion electricity distribution network.

5 I have been authorised by Orion (submitter number DPR-0367) to provide evidence on its behalf.

CODE OF CONDUCT

6 While I am an employee of Orion, I have expertise in the field of engineering and confirm that I have read and agree to comply with the "Code of Conduct for Expert Witnesses' contained in the Environment Court Consolidated practice Note 2014. In particular, unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

QUALIFICATIONS AND EXPERIENCE

7 I have the following professional qualifications:

7.1 New Zealand Certificate Engineering from UCOL Manawatu Polytechnic (2001);

7.2 Electrical Service Technician (2001) (Electrical Workers Registration Board);

7.3 National Certificate Aeronautical Engineering from Avionics Aviation, Tourism and Travel Training Organisation (2003);

7.4 Bachelor of Engineering (First Class Honours) from the University of Canterbury (2006);

7.5 Project Management Professional from Project Management Institute (2010);

7.6 Managing Successful Programmes Practitioner from the Office of Government Commerce (United Kingdom) (2011);

7.7 Master of Business Administration from the University of Canterbury (2014).

8 Throughout my career, I have also undertaken the following professional development:

8.1 High Voltage Substation Equipment, Power Transformers and Reactive Power Plant Course through Queensland University of Technology (2008);

8.2 Leadership in Safety through Site Safe (2013);

8.3 ICAM Lead Investigator through Safety Wise Solutions (2016) and

8.4 Coaching Programme for Leaders through GMD Partnerships Ltd (2017).

8.5 RMA: The Engineer's needs and Experiences through Engineering New Zealand (2019)

9 My career history includes:

9.1 Royal New Zealand Airforce: I started my career in 1993 as an Avionic Technician for the Royal New Zealand Air Force.

9.2 Bombardier Transportation: In 2001, I moved to the United Kingdom and was employed by Bombardier Transportation:

(a) In their London branch as a Modification Engineer from 2001 – 2002; and

(b) In their Chart Leacon branch as a Warranty Technician from 2002 – 2003.

9.3 NGC Metering: I moved back to New Zealand in 2003 and was employed by NGC Metering as Technical Support.

9.4 Transpower New Zealand Limited: In 2006, I moved to Transpower New Zealand Limited. I was initially employed as a Technical Advisor. In that role, I was responsible for its maintenance management system and for providing analysis of its contractor safety and quality and primary asset performance.

9.5 In 2007, my role at Transpower changed to Project Manager. I was responsible for scoping, tendering and the safe delivery of new build and replacement capital projects associated with substations, pole and tower lines.

9.6 I became the HVDC Maintenance Manager at Transpower in 2011. HVDC stands for High Voltage Direct Current. I was responsible for the safe operability of the HVDC inter-island link connecting the power supplies between the North and South Islands of New Zealand.

9.7 Orion New Zealand Limited: In October 2013, I was employed by Orion as the Contract Works Manager (Distribution). I was responsible for the execution of capital and operational contracts, including emergency works, maintenance and vegetation contracts. My role included resolving escalated customer complaints and or queries regarding these contracts.

9.8 In July 2018, my role at Orion changed to Procurement and Land Services Manager. In this capacity, I manage the team responsible for Orion's resource consents and environmental approvals, acquisition and compliance processes. I am also responsible for master contracts, procurement and negotiation of land easement acquisitions and leases.

10 I am also a member of Engineering New Zealand and the Electricity Engineers' Association.

SCOPE OF EVIDENCE

11 My evidence will address:

11.1 Orion's role as the electricity distribution network provider for Selwyn District;

11.2 Orion's operations and the importance of enabling the efficient maintenance, use, development and upgrade of electricity infrastructure; and

11.3 the reasons why Orion seeks corridor protection for its strategic electricity distribution lines.

EXECUTIVE SUMMARY

12 Orion, as an electricity distributor or lines company, is responsible for constructing and maintaining an efficient and safe electricity distribution network.

13 Orion's core purpose is to power a cleaner and brighter future for our communities and we are committed to operating New Zealand's most advanced electricity network.

14 Broadly, the Orion electricity distribution network comprises underground cables, overhead lines, substations, transformers, kiosks, electricity structures (poles/pylons, earth rods and associated buildings) and access tracks. Orion is responsible for the establishment, operation, maintenance and upgrade of the electricity distribution network.

15 Orion undertakes, and will continue to undertake, these activities in accordance with relevant legislation, particularly the Electricity Act 1993 and the Utilities Access Act 2010, National Industry Codes of Practice and Electricity Network Technical Specification Standards, and Council requirements.

16 Like other electricity distribution businesses in New Zealand, Orion is regulated under Part 4 of the Commerce Act. We are required to operate within certain parameters and meet a number of network quality and reliability targets.

17 We are customer driven and customer focused. The location of the network and its development is driven by the demand for electricity.

18 Orion seeks amendments to various plan provisions 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 network. Orion's submissions are founded on a desire to achieve sustainable environmental outcomes and meet customer requirements for a safe and reliable electricity distribution network.

ORION'S NETWORK AND OUR ROLE IN THE ELECTRICITY INDUSTRY

19 Orion owns and operates the electricity distribution network that provides power to central Canterbury. Our aim is to consistently deliver a safe, secure and cost-effective supply of electricity to our customers. Orion has a long history in the Canterbury region – with its origins in 1903, when Christchurch City Council established a small-scale public

supply of electricity. Over the years, the electricity departments of Christchurch and Central Canterbury grew, merged, and were restructured a number of times. Orion, as it exists today, was formed in 1998, following widespread government reforms of the industry.

20 The Orion network is both rural and urban and covers around 8,000 square kilometres across central Canterbury from the Waimakariri in the north, to the Rakaia river in the south; from the Canterbury coast to Arthurs Pass. The network includes 11,500 kilometres of overhead lines and underground cables, 50 zone substations, 396 steel sub transmission towers, 90,000 power poles and 11,700 distribution substations.

21 Through this network, we deliver electricity to more than 200,000 homes and business throughout Christchurch City and the Selwyn District. We are New Zealand's third largest electricity distribution business.

22 Orion's network serves a diverse range of customers, spread over a variety of terrains with different challenges. For planning purposes, our network is divided into two regions:

- Region A: Christchurch City and other suburbs, including Prebbleton; and
- Region B: Selwyn District and Banks Peninsula.

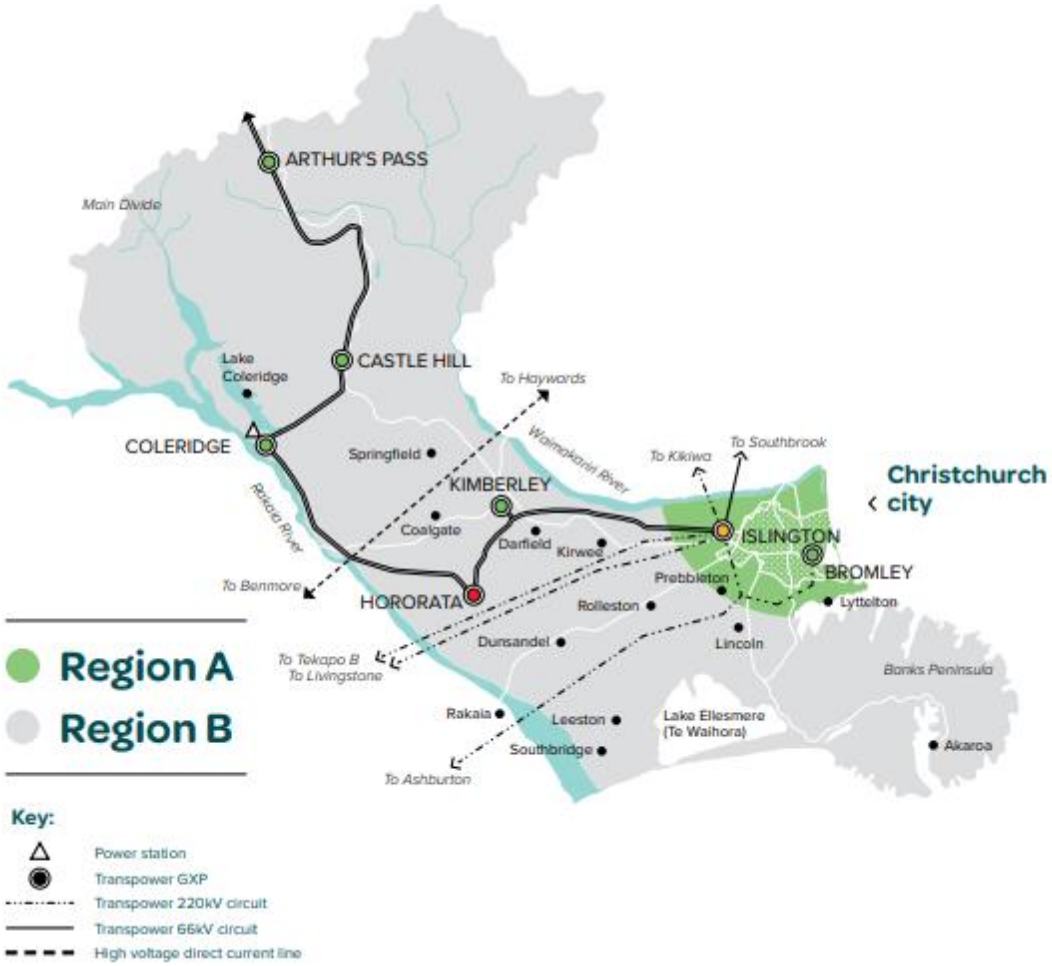
Figure 1: Orion Network Area

23 In New Zealand, electricity produced by generation companies (like Trustpower, Meridian, and Contact) is transmitted from the point of generation around the country via the National Grid (which is owned and operated Transpower).

24 Electricity distribution network operators like Orion take delivery of electricity from Transpower at various locations in the National Grid known as Grid Exit Points (*GXPs*).

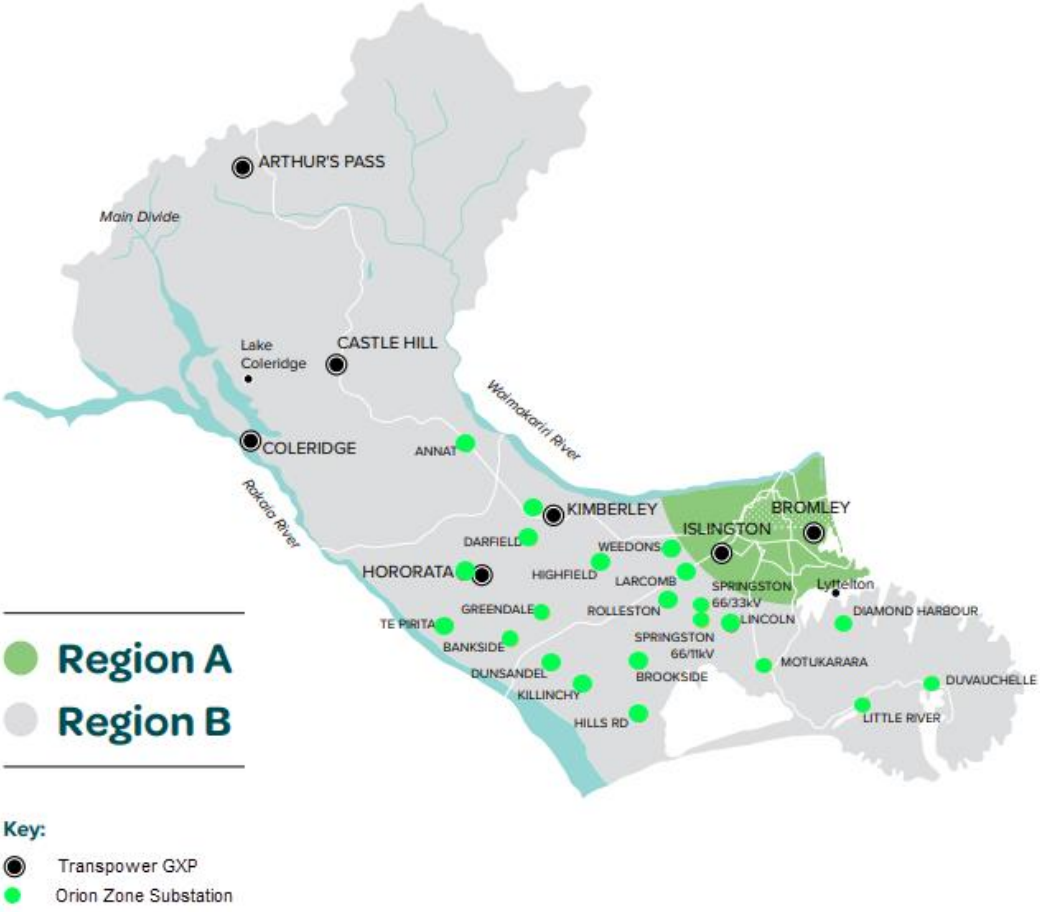
25 The purpose of such facilities is to connect and transform the very high voltages of electricity transmitted by Transpower's network (typically 220,000 Volts in Central Canterbury) down to sub-transmission voltages that are managed by Orion (typically at 66,000V or 33,000V). Currently there are five GXPs within the Selwyn District – at Hororata, Kimberley (near Darfield), Lake Coleridge, Castle Hill and Arthurs Pass. There are also GXPs at Islington and Bromley.

Figure 2: Orion network area, overlaid with National Grid and GXPs



26 Orion distributes these sub-transmission voltages to a number of substations located around its network via a series of critical sub-transmission lines and cables. At zone-substations, electricity is transformed from these sub transmission voltages down to lower voltages. Power is then further distributed via a high and low voltage local network (either via overhead lines or underground cables) which serves anywhere between one and a few hundred (or even a thousand customers). Often the transformation of sub transmission voltages is 66,000V or 33,000V to 11,000V, and then from 11,000V to the 400V (three phase) / 230 volts (single phase) used in the home.

Figure 3: Orion Zone Substations in network Region B[1]



27 Electricity is distributed by a linear and interconnected network. As a distribution business, Orion has no option but to receive electricity from the small number of fixed GXPs within its network area. The configuration of our network is constrained or shaped by where our electricity comes from, and the capacity of supply that each GXP can provide.

28 For example, Islington and Bromley are both large 220kV/66kV GXPs. While they are outside the Selwyn District, they are within Orion's network area - and both are critical to the District's electricity supply.

29 Together, they supply electricity that Orion ultimately distributes to 97% of its customers.[2] Through Orion's sub transmission lines and zone substation network, Islington in particular ultimately supplies a large part of Region B – notably the wider Rolleston and Lincoln townships, as well as surrounding areas and industrial nodes. While the Synlait dairy processing plant, for example, is most immediately connected to and supplied with electricity by Orion's zone substation at Dunsandel, that electricity enters the Orion network at the Islington GXP and is ultimately distributed to the customer via Orion's sub-transmission lines network via zone substations at Springston, Brookside and Killinchy.

[1] Orion also owns and operates a further 26 zone substations within Region A. These are not shown.

[2] Although 97% of customers does not equate to 97% of total network load distributed by Orion

30 It is important to note that this does not mean sub-transmission lines and substations in the Springston, Brookside and Killinchy areas simply exist for the benefit of users elsewhere. On the contrary, this infrastructure is also the key to distributing electricity to communities and business in these areas. Localities around the District are often simultaneously on a network route and are a destination in their own right.

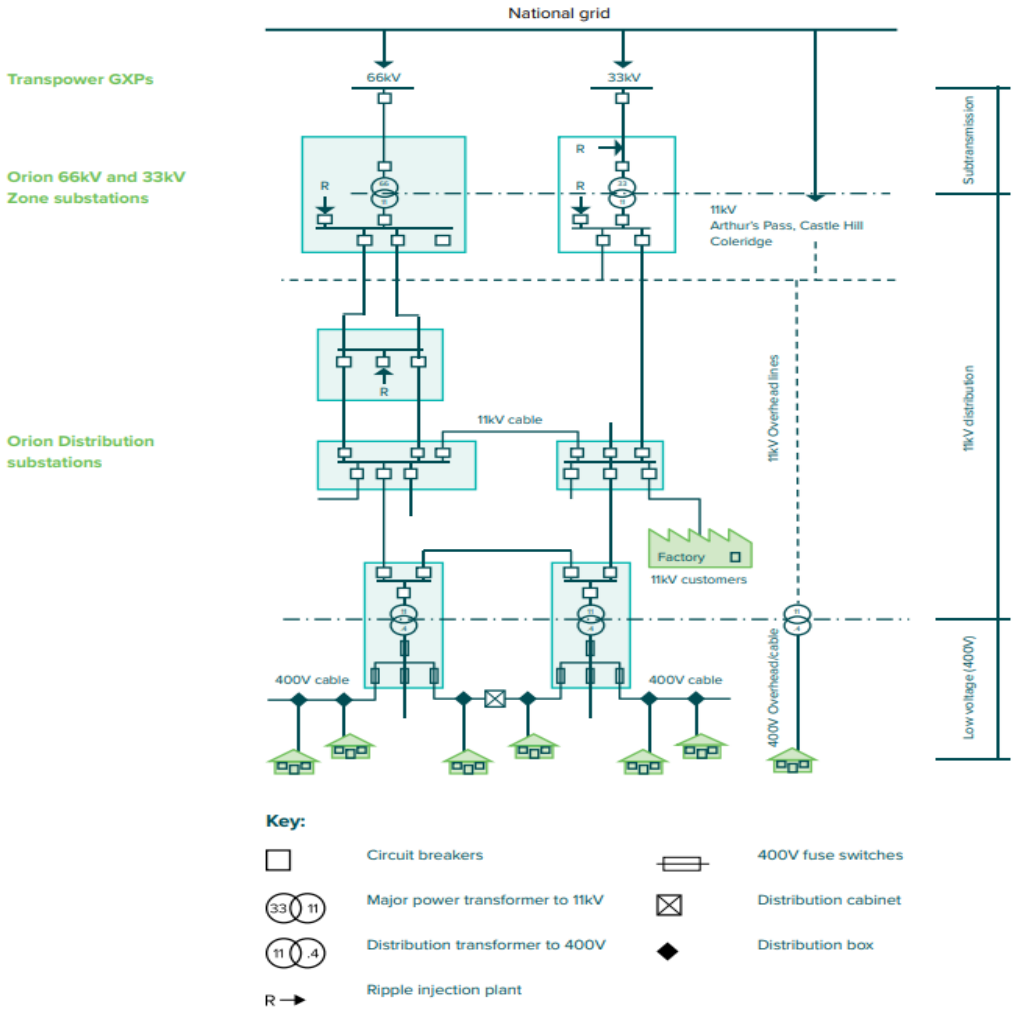
31 What the Islington / Dunsandel example does illustrate, however, is:

31.1 that a substation or sub transmission line in one part of the network or district can be critical to the supply of electricity to customers or areas a considerable distance away; and

31.2 the scale of disruption that can occur if these assets are impact or constrained in any way.

32 To view or consider individual equipment or infrastructure in isolation – whether substations, lines or individual transformers – is to misunderstand the interconnected nature of the distribution network. In my experience, this is rarely understood by those outside the industry, or the public at large.

Figure 4: Basic Orion network architecture



33 Orion's role in the electricity sector does not include the selling of electricity direct to consumers. This is true for all modern electricity distribution businesses in New Zealand. Rather, the day-to-day sale of electricity to consumers is undertaken by electricity retailers who purchase the electricity from generators on the wholesale market and sell it to their customers. Orion provides the physical region-wide network that enables this to occur.

34 Orion is a community owned entity with two shareholders - the Christchurch City Council (89%), through its subsidiary Christchurch City Holdings Ltd, and the Selwyn District Council (11%).

35 Connetics Limited is a wholly owned subsidiary of Orion with a focus on construction and maintenance of substations, overhead and underground lines and associated equipment. It also operates an electricity distribution equipment supply and contracting business, and provides electrical engineering design and consultancy services.

36 Orion is continually investing in the operation and development of its network to cater for growth and to enhance the resilience of the network. Over the next ten years, we are forecasting operational expenditure of $650 million, underpinned by our programme of inspection, testing and monitoring. Over the same period, we are forecasting total capital expenditure of $746 million across our network. This expenditure is necessary to meet increased demand for electricity from major industrial customers and continued growth in residential locations, as well as maintenance of safety levels and asset condition.

37 Our business is operating in an increasingly dynamic environment. Over the past decade we have rebuilt significant parts of our network that sustained extensive damage during the Canterbury earthquakes. This was a massive undertaking, and we are incredibly proud of the work our teams have carried out to rebuild the network and support our communities.

38 Alongside this, we have seen unprecedented growth in electricity demand from rapid large-scale development in the Selwyn District. This growth is from both residential and commercial electricity users and exists across urban and rural areas. Rapid and extensive growth of residential areas around Rolleston, Lincoln, Prebbleton and West Melton has necessitated reinforcement of the network, as has the expansion of commercial and industrial areas and major electricity users in the District.

39 In rural areas, we have continued to reinforce and upgrade our network to meet the needs of our primary producers. Irrigation infrastructure across central Canterbury is powered by Orion's network and significant investment has been made over the past 10 to 15 years to ensure the milk processing sector and other large industrial users have the electricity they need.

40 While conventional demand increases, Orion is also subject to (and is adapting to meet) rapidly evolving customer expectations of what an electricity distribution business is and should or could be. These expectations are fuelled by new technology that is quickly changing customer behaviour – as the uptake in electric vehicles gathers momentum, the electrification of process heat shifts gears and the greening of infrastructure becomes more widespread.

41 As business and communities increasingly rely on technology, and as New Zealand steps up its decarbonisation in order to respond to climate change and reduce carbon

emissions, the need for a reliable, secure, and efficient electricity network is becoming ever more critical. This is both a significantly challenging time for Orion, and an incredibly exciting one.

ORION'S NETWORK AND ACTIVITIES IN THE SELWYN DISTRICT

42 Orion's network in Selwyn includes:

42.1 19 zone substations, where electricity is managed and transformed from sub-transmission voltages down to lower voltages;

42.2 Approximately 250 kilometres of sub transmission lines and associated support structures - which provide the critical link between zone substations;

42.3 Around 4250 kilometres of high and low voltage lines and associated poles (as well as various pole mounted equipment) which connect zone substations with hundreds of distribution or building substations and kiosks, and ultimately to electricity customers; and

42.4 Thousands of ground mounted distribution cabinets and distribution boxes that manage the supply of power to individual locations.

43 Through our network, we provide electricity to approximately 40,000 individual customers or connection points[3] throughout Selwyn. Individual customers or connection points range from single dwellings requiring approximately 5KW at peak demand through to major industrial users who require in excess of 15MW at their peak.

44 Maximum electricity demand in the Selwyn District currently occurs during high summer – with a peak at around 145 megawatts. This represents around 29% of the total power load through Orion's network at that time. In contrast, during winter, electricity demand in Selwyn peaks at around 90 megawatts – which only represents around 15% of total load demand on Orion's network. This seasonal variation is largely attributable to increased demand for power in rural areas associated with summer irrigation peaks, and comparatively higher demand in Christchurch City during winter months as a result of conventional winter electricity needs (such as increased heating, lighting, and appliance use etc).

45 The vast majority of Orion's overhead network in the Selwyn District can be described as lines or conductors supported by either single wooden or concreate poles. This is true for sub transmission lines, as well as for high and low voltages. There are around 45,000 Orion owned poles within Selwyn.

46 Individual poles or spans (i.e. sections of line) will often support or contain multiple circuits - which are usually three individual lines or conductors operating at the same voltage. Specifically, many poles will support both 11,000V and 400V circuits, with the higher voltage located one meter or so directly above the lower voltage. Similarly, poles or spans may include sub transmission circuits located above 11,000V and / or 400V circuits. In some cases, poles and spans will include two different circuits operating at the same voltage. These arrangements are standard practice around the New Zealand.

[3] Note individual customers does not equate to the total number of end users.

47 While the overhead network in Selwyn is predominantly located on poles, it also includes approximately 10 kilometers of double circuit lines and towers / pylons which connects Orion's Zone Substation at Springston to the GXP at Islington via Shands Road. These lines and towers were previously owned and operated by Transpower as part of the National Grid, before being purchased by Orion a few years ago. In this regard, I note that through this change of ownership they lost (or were no longer subject to) corridor protection provisions which apply to National Grid assets – even though their function did not change.

48 In more recently established urban / residential and commercial areas around Rolleston, Lincoln, Prebbleton and West Melton, the electricity network is largely underground.

49 The vast majority of Orion's sub-transmission network in Selwyn (whether overhead or underground), as well as its ground mounted distribution substations, kiosks and cabinets, are located within with the road corridor. This is standard practice throughout the country as the location of utilities within the road corridor is enabled, authorised and protected by various legislation.[4] In a small number of areas, particularly around the Motukarara, Hororata, Springston and Hills Road zone substations, the sub transmission network extends over boundary.

50 The 11,000V network is predominantly located within road corridors. However, where electricity is supplied to large rural landholdings and / or to major commercial or industrial users, the 11,000V network will often extend over boundary to meet customer needs.

51 The low voltage network frequently traverses both road reserve and over boundary. Particularly in rural areas, the low voltage network is characterised by pole-mounted transformers in the road reserve converting electricity down to 400V, with long over-boundary spans then transporting power to rural residential dwellings and / or farm buildings etc.

52 Networks located over boundary and established prior to 1993 is enabled, authorised and protected by the Electricity Act 1992. Over boundary networks established after this date are generally authorised by private property rights – particularly easements.

53 Zone substations are located on Orion owned sites.

54 In my experience, the general public give little (if any) thought to the nature of electricity network in their neighbourhood beyond whether it is overhead or underground.

[4] For example, the Utilities Access Act 2010.

Figure 5: Orion's sub-transmission electricity network in the Central Canterbury Plains[5]

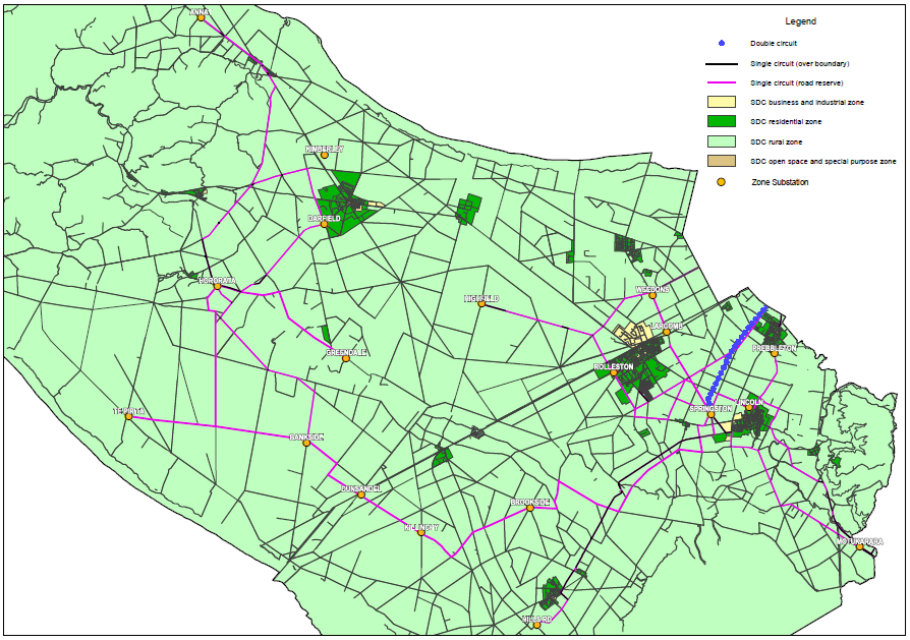
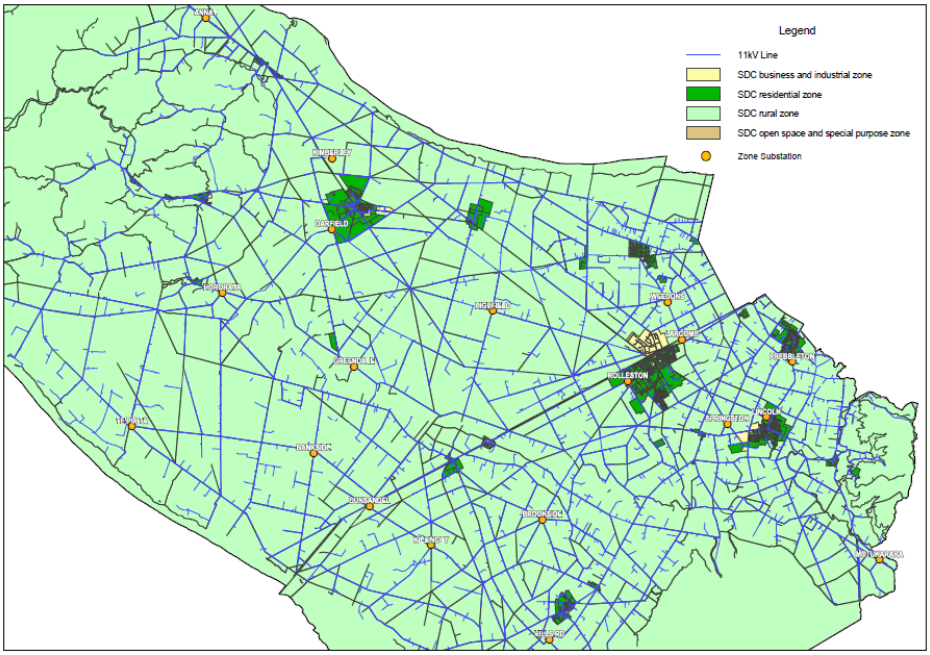


Figure 6: Orion's 11,000V network in the Central Canterbury Plains[6]



[5] Note this plan was prepared prior to notification of the Proposed District Plan. The Zoning shown does not necessarily reflect what is now proposed. Updated plans can / will be included as relevant to later chapters.

[6] Note the 11,000V network also extends through to and from Lake Coleridge, Castle Hill and Arthurs Pass. This plan was prepared prior to notification of the Proposed District Plan. The Zoning shown does not necessarily reflect what is now proposed. Updated plans can / will be included as relevant to later chapters.

Day-to-day work on the network

55 Our work frequently involves installing, maintaining/repairing, and upgrading our lines, poles, and cables, as well as maintaining and upgrading equipment such as transformers (at ground level or on poles), substations (both large and small), kiosks and distribution cabinets. We also have a large building, facilities and ground works program.

56 Orion has a suite of specifications and standards which govern our assets and how work on the network is to be carried out. These apply consistently across our activities and assets on the entire Orion network (whether in Selwyn or elsewhere) and include:

56.1 Design standards – which contain numerous detailed requirements setting out how components of the network and particular equipment are designed and configured. Among other matters, these set the design of substations, cable arrays, earthing systems and overhead lines around our network. These are often based on industrial or manufacturer standards and specifications, applied to our specific network context.

56.2 Equipment specifications – which set out the individual equipment, materials and components to be used on the network. The specifications cover off numerous matters as diverse as the selection criteria for soft and hard wood power poles; the particulars of metal shells, cabinets, or kiosks within which distribution transformers and switchgear are housed; and the circuit breakers we use within our zone substations.

56.3 Technical specifications – which dictate how our network is managed and activities in relation to it are carried out. These 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.

57 Technical specifications also set out specific maintenance programmes for each of our asset classes. All works roughly fall into the following categories:

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

57.2 Non-scheduled Maintenance – work that must be performed on network Assets outside a predetermined schedule, but which does not constitute emergency work; and

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

58 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.

59 Our approach to asset replacement (which we define 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. This CBRM framework utilises asset information, engineering knowledge and experience to define, justify and target asset replacements.

60 Works that create a new asset or improve an existing asset beyond its existing capacity are known at Orion as creation or acquisition works.

61 Most of the works we undertake are largely of short duration in nature. Most of our activities take less than half a day. This minimises any disruption to the public.

62 To undertake this work, we employ or contract nearly 550 people. Our staff are either based at our head office in Burnside (including our network operators – who are largely in the field) or at the Connetics depot in Islington.

Network reinforcement in the Selwyn District

63 Orion's activities and operations in the Selwyn District (and across our wider network) are guided by a rolling 10-year asset management plan. This sets out our asset management policy, strategy, practices, work plan and expenditure forecasts for the next decade.

64 As part of our asset management programme, we are constantly monitoring, modelling and forecasting low, mid and high electricity peak load demand and growth scenarios across the network.

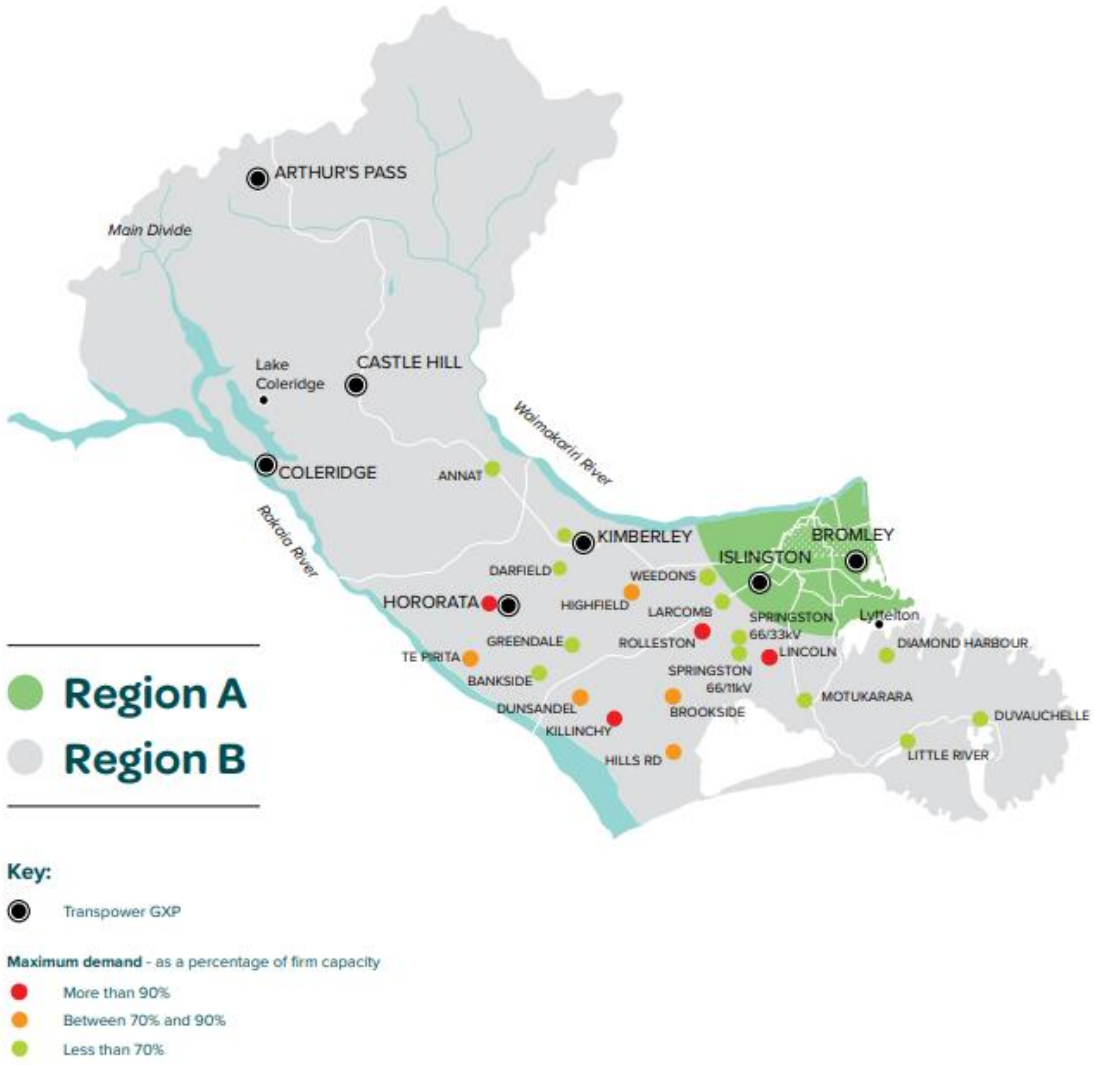
65 For Region B of our network (particularly the Selwyn District) we are currently forecasting electricity network peak load growth of around 15% over the next 10 years.[7]

66 This increase is particularly related to electricity demand from the residential sector, with significant ongoing growth expected - particularly around Rolleston, Lincoln, and Prebbleton. At the same time, we are also projecting growth in electricity demand from commercial premises, businesses and industrial uses as the region continues to prosper, and as a result of the decarbonisation of large industrial processes – particularly in the food processing sector.

67 This is placing increased demand on the network and our existing infrastructure. While there is some nuance to these demands, they can be broadly summarised as a heavy reliance on a small number of GXPs and capacity constraints on our sub transmission network and at certain zone substations.

[7] AMP 6.3.3.2, p 118.

Figure 7: Capacity constraints on zone substations:



68 In order to meet this expected demand, significant reinforcement or our network is both required and planned.

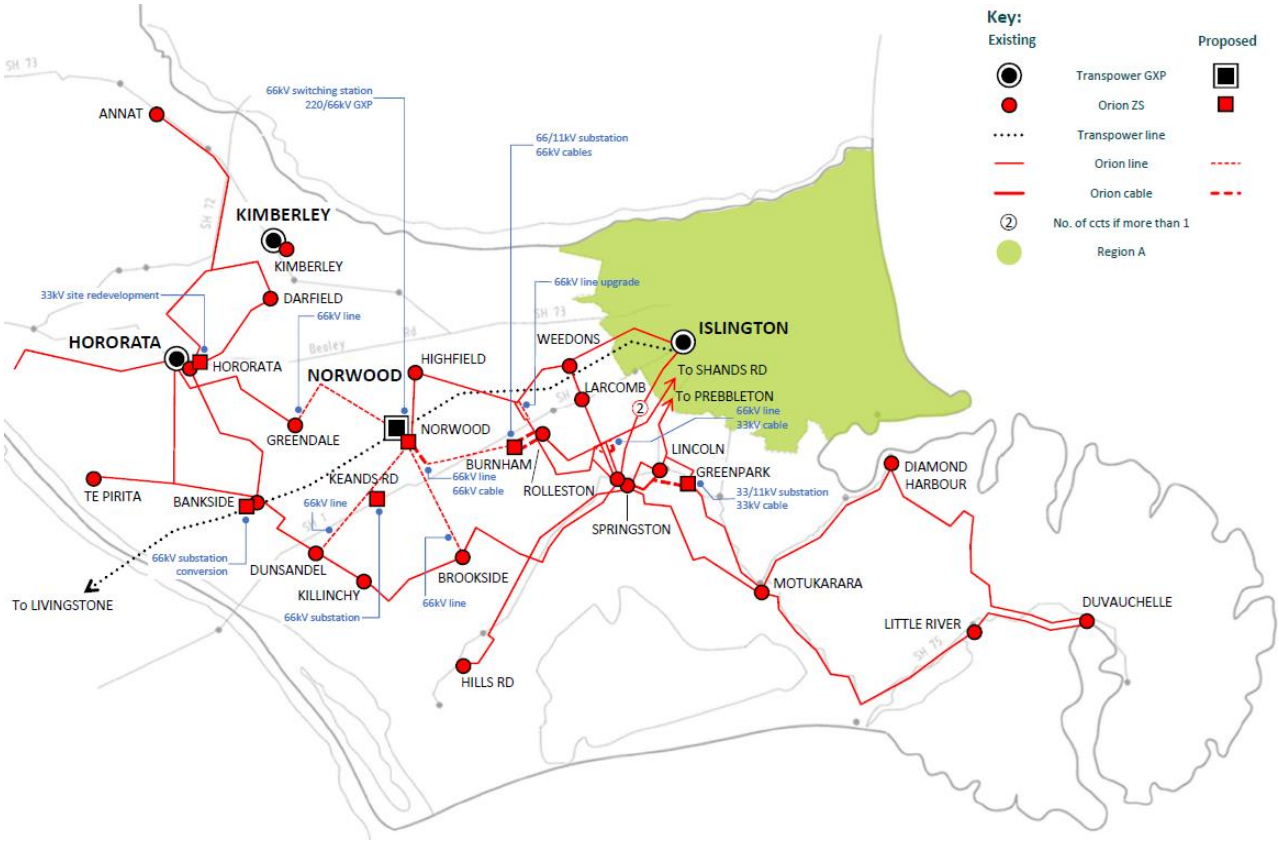
69 In particular, Orion is working closely with Transpower to establish a new 220kV/66kV GXP in the Norwood area in the next few years. This will be supplied from the existing Transpower Islington – Livingstone 220kV circuit and will alleviate a key capacity constraint on Orion's distribution network. Orion's investment in this single project is in the order of tens of millions. Over the next 10 years or so, Orion will incrementally connect that new facility to existing zone substations in the area via the reinforcement and upgrading of the sub transmission lines network as required.

70 Orion is also planning for the establishment and development of new zone substations at Burnham, Greenpark (near Lincoln) and in the broader Dunsandel area. To connect these key facilities, Orion will again reinforce and upgrade parts of our sub transmission lines network.

71 Numerous other smaller substation reinforcement and lines upgrading activities are also planned throughout the district over the same period. Collectively, this work programme

will ensure Orion can continue to meet electricity needs of our customers in the Selwyn District.

Figure 8: Reinforcement of network in Region B over 10 years to meet electricity demand



72 Our programme of work in the Selwyn District is (and will continue to be) updated annually – ensuring that at all times Orion effectively has a rolling 10-year network investment, reinforcement and upgrade plan in place. In particular, depending on how forecast demand materialises, certain projects may be brought forward or pushed back. Similarly, new projects (not currently in train) may be brought online, and / or previously planned projects may be not be pursued. This flexibility and agility ensures Orion can take in to account actual / observed demand, and any unexpected changes in our operating environment. It is a fine balance however, as we seek to provide an upgraded network in step with customer requirements, whilst also ensuring installed assets are not underutilised.

73 The need for flexibility in our work programme is increasingly important as forecasting the specifics of load growth is ever more complex. Customer behaviour and demand is increasingly influenced by a range of factors and new technologies that do not neatly fit within traditional models. In particular, 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 round our network.

74 Orion seeks a number of amendments to the Proposed District Plan to ensure our most critical assets are appropriately protected, and continued investment in the network is supported and enabled. These amendments will ensure we can continue to power the homes, business and communities of the Selwyn District.

Key concerns as part of the Strategic Directions Chapter and broader Plan Process

75 Below I address the key issues in the broader plan process – focusing particularly on those that are directly in issue as part of the Strategic Directions chapter.

Corridor protection for existing SEDLs

76 Orion seeks that the Plan include appropriate corridor protection rules to ensure existing sub transmission lines are protected. These lines are called Significant Electricity Distribution Lines (*SEDLs*) in the Plan context and I refer to them as such below.

77 As mentioned earlier in my evidence, SEDLs comprise approximately 250 kilometres of lines connecting our 19 existing zone substations in the district. These lines cover (or extend along) less than 6% of Orion's overhead network in the District.

78 The SEDL network is predominantly co-located on poles with other existing high and /or low voltage lines. While there are spans where this network is built over boundary (on private property), the vast majority of it is within the road reserve. That said, much of the SEDL network within the road reserve is built close to the boundary with private property, given the width of the road corridor in rural areas. This is material to the discussion which follows.

79 The importance of these SEDLs to the Selwyn District warrants, I believe, protection under the proposed District Plan through suitable corridor protection rules. Without such corridor protection rules there is an unacceptable risk of inappropriate development and / or activities immediately adjacent to these lines (if not directly beneath them). This can both pose a serious health and safety risk to people, stock and property, and can significantly impact and constrain (if not prevent entirely) Orion's ability to operate, maintain and upgrade these critical network assets and thereby provide electricity to our region.

80 In my view, it is (or would be) artificial for the Plan to include corridor protection provisions for National Grid infrastructure but not for SEDLs as sought by Orion. As set out above, electricity is delivered to individual customers through a series of steps or cascades. As far as individual customers are concerned, each step in the process is equally important to ensuring it is available for their use – whether that is the power entering the grid at a generation point; the individual low voltage line that takes it to their supply fuse; or any step in between.

81 That said, I recognise it is not appropriate to include substantive corridor protection provisions in the Plan for every Orion line or asset within the district. The "line" must be drawn somewhere. Orion has considered this carefully and considers that appropriate protection should apply to SEDLs.

82 Corridor protection provisions of the kind Orion seeks here are already included in the Christchurch City Plan. In my experience, this has improved safety around our network and has ensured a number of new dwellings, warehouses and commercial buildings have been constructed in accordance with safety requirements. Ultimately this benefits all involved – particularly developers, landowners and council staff (who all have more clarity and certainty about setbacks and clearances) as well as Orion (in that we can continue to operate, maintain and upgrade these critical network assets).

83 Below I briefly set out the existing legislative protection and code of practice that applies to the SEDLs in the Selwyn District, before discussing why Orion is seeking that the Plan specifically address these matters. However, I do not address in detail the specific distances and provisions associated with corridor protection as they apply to individual activities, zones and lines. These matters will be addressed in detail at relevant times as the plan review process progresses.

Legislative protection of electricity lines

84 Protection of existing lines by way of property rights is either by land ownership, easement, or rights established by the Electricity Act 1992 (Electricity Act).

85 The Electricity Act granted rights for lines that were legally installed under previous Acts and Regulations i.e. before 1993. The majority of the lines that we seek protection for were all installed before 1993. The Electricity Act provides a right to occupy exclusively the space occupied by the lines, and to operate, inspect, maintain, replace and upgrade the lines, because the lines have the status of "existing works" under the Electricity Act. These rights are sometimes referred to as statutory easement rights.

86 However, the Electricity Act does not include detailed obligations for land owners regarding the use of land under lines, or immediately adjacent to them. It does not prevent underbuild, corridor encroachment or land use incompatible with the ongoing use and maintenance of the lines. Buildings could be (and are) constructed, and other activities undertaken, beneath the lines or in very close proximity to them. The Electricity Act protections also do not apply to assets within the road corridor. Simply put, the Electricity Act does not sufficiently protect lines or prevent third party activities interfering with them.

87 The New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34: 2001) (the Code) is also particularly relevant to the protection of electricity lines and the regulation of actions in relation to them.

88 The Code sets minimum safe electrical clearance requirements for structures and certain activities in relation to overhead electric line installations and support structures. The Code states that the minimum safe distances have been set primarily to protect persons, property, vehicles and mobile plant from harm or damage from electrical hazards. A full copy of the Code can be provided at a later stage of the hearing process.

89 While it is not necessary to set out in detail requirements of the code here, I do highlight Table 1 below - which specifies minimum safe distances between buildings (of third parties) and overhead electric line support structures:

TABLE 1 MINIMUM SAFE DISTANCES BETWEEN BUILDINGS AND OVERHEAD ELECTRIC LINE SUPPORT STRUCTURES

Circuit Voltage	Pole	Tower (pylon)
11 kV to 33 kV	2 m	6 m
Exceeding 33 kV to 66 kV	6 m	9 m
Exceeding 66 kV	8 m	12 m

90 Amongst other things, the Code also specifies safe distances from electrical conductors to buildings, conductive fences and the ground, and includes requirements for the depth of earthworks in proximity to poles and towers.

91 While the Code goes further than the Electricity Act and actually specifies distances that apply to lines and particular activities, it does not always prevent underbuild or encroachment in practice.

92 The specific distances that are of relevance to the conductors/lines that Orion seeks protection for can be briefly summarised as setbacks for:

92.1 buildings and structures 10 metres from the centreline and / or foundation of a tower on the Significant Electricity Distribution Line (Islington to Springston); and

92.2 buildings and structures 5 metres from the centre line and / or foundation of a support structure on all other Significant Electricity Distribution Lines in the district.

93 With regard to earthworks, Orion seeks that the requirements of the Code are also specifically included in the District Plan, including that:

93.1 Earthworks be no deeper than 300mm within 2.2m metres of a foundation of the electricity distribution line support structure;

93.2 be no deeper than 0.75m between 2.2 and 5 metres from the foundation of the electricity distribution line support structure.

94 With regard to fences, Orion seeks that where the fences' primary material consists of conductive qualities, the fence shall be setback a minimum of:

94.1 5m from the foundation of Significant Electricity Distribution Line (Islington to Springston) and all other Significant Electricity Distribution Lines.

95 The setbacks Orion seeks in this regard are *generally* consistent with those in the Code. However, in some cases, the setbacks sought are amended for consistency and usability, and to reflect the realities of Orion's network and operating environment.

96 Including the rules in the Plan will assist in ensuring they are actually considered and complied with. Use of the land and change of use (including building) are controlled by the Council who reference the District Plan and Building Act during approval processes. Similarly, when planning development on sites, landowners and developers consult the District Plan. In my experience, requirements of the Code can be missed in this process. Even where a Plan may specify in a heading or advice note that Code compliance is mandatory, it is often still not appropriately considered and addressed.

97 By highlighting and specifically incorporating the requirements of the Code in the proposed District Plan rules, we are able to improve safety to the public, remove cost and promote good electricity network outcomes. In particular, time and effort are associated with remedial works to address structures or other activities that have established beneath Orion's electricity lines or encroach electricity clearance distances. These costs can be in the order of $20,000 to $100,000 and are normally borne by the landowner.

98 Orion's view is that clear rules in the proposed District Plan would improve clarity and reduce the likelihood of breaches of the Code and Electricity Act arising. This would then result in a reduced risk to landowners, and assist Orion in operating, maintaining and upgrading the SEDL network.

Reasons for seeking protection for SEDLs

99 Having structures/fences under, or very near to, one of Orion's SEDLs, and carrying our earthworks in close proximity to them:

99.1 Increases risk to people (particularly via electric shock or electrocution) and property (through increased risk of outages);

99.2 Complicates operation, maintenance, and upgrading activities by adding significantly to costs and duration of works;

99.3 Can annoy occupiers;

99.4 Potentially impacts on the reliability of electrical supply as repair, maintenance and upgrading can be delayed and / or take longer; and

99.5 Can, if an electrical fault occurs, have the potential to cause significant harm or death as the structure may incur hazardous voltages.

100 The above reasons can be explored further in my evidence in later chapters as required. However, I wish to address the main and most obvious risks relating to health and safety and the very real risk of electric shock in circumstances where structures are permitted to be built in close proximity to electrical hazards.

101 Electric shock can be caused by:

101.1 Reach and touch voltages (i.e. where a person or animal comes into direct contact with a conductor);

101.2 Line or conductor drop (where a line or conductor falls to the ground or structure);

101.3 Earth potential rise (i.e. an earth fault at a tower or pole);

101.4 Step and touch voltages (i.e. where a fault arises which raises the voltage at the base of the tower or pole and the surrounding ground);

101.5 Flashovers (i.e. where the electricity arcs from a conductor onto an object such as structure or fence); and

101.6 Proximity of vegetation growing too close to a line and causing a flashover.

102 The severity of the shock depends on the current's path through the body, the current intensity and the duration of the contact. All may occur as a result of third-party activities coming into close proximity with conductors. Exposure to such a risk can result in damage to property and injury to people or animals ranging from a mild tingling sensation to serious injury or death.

103 In the rural context, issues with sensitive activities such as houses are less likely to occur (although Orion still seeks to avoid them locating in proximity to its lines) than the risk caused by ancillary buildings and fences underneath Orion's lines.

104 Some examples of where underbuild or encroachment has occurred on our high voltage network are shown in the following photos.

Figure 9: Underbuild and encroachment on Orion's high voltage network.

105 Whilst existing cases of underbuild or encroachment will not be affected or be able to be reversed by the insertion of the corridor protection rules Orion seeks, it will reduce the likelihood of more instances occurring going forward. There remain many places on Orion's SEDL network where such underbuilding and encroachment is possible.

106 Having a structure under or in close proximity to a line can cause various issues, including some which a property owner may not be aware of before taking ownership of the property or building. Similarly, where a power line or pole is located within the road corridor but adjacent to a boundary, landowners often fail to consider the line when planning and carrying out development or activities on their land.

107 While these issues arise in relation to any voltage of conductor, they are particularly acute where SEDLs are involved. Issues associated with reduced clearances include:

107.1 Maintenance, replacement and upgrading: Periodically conductors and support structures need to be replaced or upgraded. As explained earlier in my evidence, Orion will be upgrading parts of the SEDL network over the next 10 years to ensure we can continue to meet the electricity needs of the Selwyn District. Underbuild and encroachment on clearances makes maintenance, replacement and upgrading far more complex. In some cases, it can prevent these activities entirely. Similarly, where SEDL support structures are being upgraded, encroachment can make this significantly more difficult. All of the above adds time, cost and safety risks to the network activity.

107.2 Communication and Logistics: Having structures near SEDLs and associated support structures complicates communication and coordination with owners as

to our maintenance, upgrade and replacement plans. This in turn means that we need to work in with any requests of the property owner for timing of works and nature of reinstatement.

107.3 Ancillary structures and extensions: With any underbuild or encroachment, there is the risk that landowners will over time install additional extensions or structures and aerials and other ancillaries too close to live conductors. This puts both the landowner and the security of electrical supply at risk. It is simply not possible for Orion to regularly check the SEDL network for this incremental encroachment.

107.4 Maintenance of third-party structures: Maintenance of the buildings and structures under or adjacent to a line also becomes problematic and can be fatal if electrical clearances are not maintained at all times. Replacing roofing and guttering can be particularly hazardous. Orion's experience is that these issues are best managed by ensuring clearances are maintained at the outset.

107.5 Reverse sensitivity: Two types of noise occur with high voltage overhead lines. The first is caused by wind blowing across the conductors, insulators and structures. The second is caused by electrical discharges (corona) along insulators and conductors which produce a crackling sound. While this noise is not particularly loud, it can be unpleasant and lead to complaints.

108 Electricity lines can also be compromised by earthworks and excavations. In particular, excavations near poles and towers can destabilise these structures and result in poles and lines leaning over. Where this occurs, conductor-to-ground or conductor-to-building clearances are compromised as line sag increases. This can increase the risk of electric shock and many of the issues described above. In extreme cases, earthworks near poles or towers can cause these structures to fail completely. While this is rare, the consequences are potentially fatal for those in the immediate vicinity, and they can cause significant disruption to the network. While these activities present risks to all overhead lines and support structures, the consequences are higher where the SEDL network is concerned.

Other key matters Orion seeks to resolve as part of the District Plan process

Plan framework that supports and enables regular maintenance and upgrading

109 Through the District Plan process, Orion is seeking a framework that supports and enables day-to-day operation maintenance and upgrading activities on the network. While the detail of this will be covered off in subsequent hearings, I wish to emphasis here that Orion seeks a plan which:

109.1 is not overly prescriptive or burdensome in terms of consent requirements for electricity network infrastructure and associated activities; and

109.2 is clear and consistent across chapters.

110 In terms of the former, Orion again highlights the critical nature of our electricity network to the District. Ultimately, every resident, business and community in the District is directly reliant on and / or substantively benefits from the electricity network. The Plan's treatment of electricity infrastructure must be seen in that context. Any consent cost or obligation on Orion is ultimately borne by our customers. I also refer back to my earlier comments regarding new technologies and the future of electricity networks. In the

context of network utilities, Orion seeks a plan that is flexible, pragmatic and sees the bigger picture.

111 With regard to the latter, Orion seeks clarity about which chapters are and are not relevant to our network. In particular, Orion seeks that all provisions relevant to Network utilities activities are consolidated within the infrastructure chapter of the plan as far as possible. The exception to this relates to reverse sensitivity and specific corridor protection provisions – which Orion considers should be located within the chapters where they apply. This is explained in detail in the evidence of Ms Foote.

Management of reverse sensitivity effects

112 Orion is also seeking appropriate protections to avoid reverse sensitivity effects - largely related to noise. In particular, Orion seeks setbacks to ensure that new residential dwellings are not located immediately proximate to existing substations.

113 As the district continues to grow, and residential development continues at pace, the risk of this encroachment increasingly grows. Although not in Selwyn, we are currently seeing these issues emerging in growth areas around Halswell and Hoon Hay. Previously vacant farmland adjacent to substations is increasingly being converted to residential development, with housing proposed immediately adjacent to substation boundaries.

114 Even where substations are fully compliant with relevant requirements and are lawfully established, adjacent landowners and / or occupiers can take issue with substation noise and operational activities. These issues must not adversely affect the electricity network and Orion's work on it.

Emergency Generators

115 Occasionally, it is necessary for Orion to use diesel generators as a mobile source of electricity to maintain the supply or provide a short-term backup supply to customers during a fault, emergency or maintenance event. Orion currently has a fleet of approximately 13 static and mobile diesel generators ranging from 8kVA up to 550 kVA, and fuel trailers and tanks to supply these.

116 An obvious example of the use of generators was after the February 2011 earthquake, when Orion used 28 generators, primarily in the eastern suburbs of Christchurch City to meet customer needs. We estimate that in total 10,000 people received electricity supply from an Orion generator (be it a truck or containerised generator) at some point. Generators continue to be an important part of our toolbox for maintaining supply during natural disasters and / or extreme events – whether earthquakes, flooding, or otherwise.

117 On an ongoing basis, generators are also important for continuity of supply to our rural communities. In particular, generators are especially useful on our rural network in the High Country when undertaking maintenance on long linear spur lines that have no alternative point of supply (i.e. we cannot back feed the network).

118 Similarly, generators also allow Orion and counter parts at Transpower to carryout maintenance on the GXPs at Lake Coleridge, Castle Hill and Arthurs Pass. These sites operate off a single large transformer. In the absence of generators, annual maintenance on that equipment would see those sites go offline – with no electricity flowing into Orion's network at those locations. Generators allow us to overcome this issue, and ensure we can maintain continuity of supply to our customers.

119 Orion's experience is that the public are far more concerned about having electricity at their property, than being concerned with limited temporary noise or reduced air quality from a nearby generator.

120 Whilst mobile generators can operate without consent during a declared Civil Defence emergency, Orion considers the Plan should also provide for the situations described here.

CONCLUSION

121 A secure, well protected, reliable and efficient electricity distribution network is more critical than ever for the people, businesses and communities of the Selwyn District.

122 Orion seeks recognition of the importance of the network and its activities in the Strategic Direction section of the Plan – and more broadly - via and through provisions which protect and facilitate the safe and efficient operation, use, maintenance, upgrade, and development of the network.

Dated: 23 July 2021

Garry Heyes