

Memorandum

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To: Christchurch City Council

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QUALIFYING MATTERS RELEVANT TO ORION NEW ZEALAND'S ELECTRICITY DISTRIBUTION NETWORK

- 1 This memorandum is provided on behalf of Orion New Zealand Limited (*Orion*).
- 2 Thank you for the opportunity to discuss the Christchurch City Council's (the *Council*) intensification plan change, which will implement the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (the *Enabling Housing Act*), and specifically the incorporation of matters related to the safe and efficient functioning of the electricity distribution network.
- 3 The Enabling Housing Act requires Council to apply medium density residential standards (*MDRS*) to relevant residential zones.¹ The Council may make the standards less enabling of development in a particular area if necessary to accommodate a qualifying matter. The MDRS will have several implications for the electricity distribution network, which we explore below.
- 4 The electricity distribution network is not listed in the National Policy Statement on Urban Development 2020 (*NPS UD*) as "nationally significant infrastructure", nor does it fall within the specific qualifying matter categories listed in new s77I Resource Management Act (*RMA*). However, the Council is able to identify as a qualifying matter "any other matter that makes higher density, as provided for by the MDRS or policy 3, inappropriate in an area" - if s77L RMA is satisfied.² This memorandum sets out an analysis against s77L, as well as setting out the information required by s77K RMA.
- 5 The electricity distribution network is identified in regional and district planning documents as regionally significant and strategically important infrastructure and there are relevant controls protecting Orion's strategically vital sub-transmission (extra high voltage) network in the operative Christchurch District Plan. Further, Orion is a lifeline utility for the purposes of the Civil Defence Emergency

¹ Resource Management Act 1991, s77G: inserted by Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021, s9.

² Resource Management Act 1991, s77I(j): inserted by Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021, s9.



Management Act 2002, providing an essential service that must be able to ensure it is able to function to the fullest possible extent, even though that may be at a reduced level, during and after an emergency.

ISSUES ARISING FOR ELECTRICITY DISTRIBUTION NETWORK

- 6 The matters which are important to the safe and efficient functioning of the electricity distribution network in the context of implementing the MDRS in Christchurch are:
 - 6.1 **Corridor protection buffers:** The operative District Plan contains a range of rules and requirements that create a buffer around Orion's strategic sub-transmission and regionally significant electricity distribution lines. The protected lines are shown on the District Plan maps. In the Christchurch District (as opposed to elsewhere on the Orion network), these are either 66,000 volt (66kV) or 33,000V (33kV) lines and are predominantly located on towers (although some lines are pole mounted). In the case of the regionally significant Heathcote to Lyttelton line, the network operates at 11,000V (11kV) and is pole based. The District Plan corridor rules restrict the establishment of buildings and the carrying out of certain activities, and control (and / or impose requirements in relation to) the subdivision of land within specified distances of the existing protected lines. These protections are an existing qualifying matter which should be provided for in the course of adopting the MDRS. From [22] below we set out the application of the relevant statutory tests to these rules;
 - 6.2 **Height controls and boundary setbacks:** A relaxation of height controls and boundary setbacks (predominantly front boundary setbacks but also internal boundary setbacks) as set out in the MDRS could raise issues for parts of Orion's network. Specifically:
 - (a) Some overhead lines traverse residential properties. If higher buildings are permitted this may compromise safe clearance distances as new or larger residential buildings encroach on existing overhead lines;
 - (b) Where overhead lines run along road boundaries (in the berm or road corridor), higher buildings on private land built close to the boundary may also compromise clearance distances;
 - (c) Where overhead lines run down a right of way, suitable setbacks in internal boundaries are likewise important to ensure safe clearance is maintained between existing lines and new buildings.
 - 6.3 Having buildings and certain activities under, or very near to, overhead electricity lines, and carrying out earthworks in close proximity to them:
 - (a) Increase risk to people (particularly via electric shock or electrocution) and property (through increased risk of electricity outages);



- (b) Complicates operation, maintenance, and upgrading activities on the electricity distribution network - which adds significantly to costs and duration of works;
 - (c) Can affect the amenity of occupiers of residential units;
 - (d) Potentially impacts on the reliability of electrical supply as repair, maintenance and upgrading can be delayed and / or take longer; and
 - (e) Can, if an electrical fault occurs, have the potential to cause significant harm or death as the structure may incur hazardous voltages.
- 6.4 **Subdivision**: Subdivision of land beneath and adjacent to corridors can be problematic as subdivisions that fail to consider the electricity distribution network can restrict or prevent Orion's access to infrastructure, create maintenance issues or challenges, and introduce operational or safety concerns. Similarly, earthworks associated with subdivisions can also negatively impact the sub-transmission network. If these issues are not identified and rectified (or addressed in design) early on, this becomes problematic not only for Orion, but also subdivision applicants and developers.
- 6.5 **Onsite servicing capacity**: Infill development is already creating servicing capacity issues for Orion, as developers (both smaller scale landowners redeveloping small lots, and larger commercial developers) do not approach Orion to discuss servicing matters until after plans for a development are fixed, and often after resource consent has been granted. Developers often fail to include (or set aside) sufficient space on site for the necessary infrastructure (e.g. upgraded electricity distribution kiosks and transformer equipment, or new equipment).
- 6.6 The physical footprint of a full low kiosk is generally 2.2m x 2.5m. An additional 1.5 metre clear operational area is required in front of the kiosk. Depending on the location of adjacent buildings, and fire safety mitigation installed, there can be setbacks of up to 6 meters between transformers and buildings. This infrastructure is usually located just over the front boundary on private land.
- 6.7 Figure 1 below shows a new transformer surrounded by a fire mitigation bunker outside an infill housing development in Riccarton. Note how close the equipment is to the development (hence the need for the large concrete shell). These shells are a significant impediment to maintenance, as the panelling must be removed before equipment maintenance or replacement can be carried out.



Figure 1: kiosk within concrete enclosure adjacent to infill housing.

- 6.8 Where a development does not include sufficient space for equipment onsite, Orion is forced to locate the infrastructure in an adjacent road berm or other sites (including Council owned reserves).
- 6.9 Further, reduced land for servicing (and reduced boundary setbacks) is problematic for ground mounted electricity distribution infrastructure (such as kiosks and distribution cabinets) because:
 - (a) The size and footprint requirements of this infrastructure is fixed and inflexible. Various safety and electrical standards set clearances around equipment. Neither the equipment nor the standards can be amended or resized to "fit" the equipment within the space available.
 - (b) Sourcing alternative locations for electrical infrastructure is problematic:
 - (i) Locating infrastructure in berms or road corridors exposes equipment to vehicular traffic (which has safety and network security consequences); clashes with existing underground

infrastructure (particularly three waters, telecommunications and transportation network assets); can have adverse visual impacts on the streetscape; and is resisted by corridor managers (at Council);

- (ii) locating infrastructure equipment in reserves is generally opposed by Council and / or Local Boards.

6.10 Figure 2 below shows an example of the outcomes that can result when infrastructure is not well integrated with or accommodated by the surrounding residential environment. Note the doors opening onto the carriage way – and the proximity of the enclosure to any car using the street.



Figure 2: high kiosk located within berm, immediately beside road corridor.

6.11 Similarly, residential intensification increases the load on the electricity network – as additional dwellings and residents require additional electricity. This places more stress on the electricity network (as infrastructure is under increased electrical load) which can result in reduced power quality.

- 7 Ultimately, this is somewhat of a catch-22 situation. Residential intensification generally (and the higher density enabled by the MDRS specifically) triggers and requires reinforcement and upgrading of the electricity distribution network. At the same time, intensification reduces the available land area for electrical (and presumably other) infrastructure. Thus, unless appropriately controlled and managed, intensification can negatively impact the ability of electricity distribution



network operators (such as Orion) to deliver the required infrastructure. Orion seeks to work with Council through the MDRS process to ensure those negative impacts do not occur in Christchurch.

CORRIDOR PROTECTION FOR HIGH VOLTAGE LINES

- 8 The corridor protection and clearances in the District Plan (mentioned above) are based upon the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34: 2001). These clearances were incorporated in the Christchurch District Plan as part of the Christchurch Replacement Plan process in 2015/6. Below the clearance distances are explained and examined against the qualifying matter test in the Enabling Housing Act.
- 9 NZECP34:2001 is an industry standard overseen by Worksafe and which sets minimum safe electrical clearance requirements for structures and certain activities in relation to overhead electric line installations and support structures. Known as The Code in the industry, NZECP34:2001 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.
- 10 Table 1 below is taken from the Code – it 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

- 11 Table 2 below is also taken from The Code – and sets out generic clearances between the ground, third party structures and conductors (the electricity lines) where specific engineering advice or an assessment has not been obtained. Table 2 specifies horizontal clearances of 8.5m – 9.5m for 33kV and 66kV lines. These distances extend out *either side* of the line (and are measured from the conductor) – rather than being total corridor width.



TABLE 2 SAFE DISTANCES FROM CONDUCTORS WITHOUT ENGINEERING ADVICE

Circuit voltage	Maximum span length (m)	Minimum distance beneath conductors under normal conditions (m)	Minimum distance to the side of conductors under normal conditions (m)
Not exceeding 1 kV	50	4	3.5
Exceeding 1 kV but not exceeding 11kV	80	5.5	5
Exceeding 11 kV but not exceeding 33 kV	125	7	8.5
Exceeding 33 kV but not exceeding 110 kV	125	7.5	9.5
Exceeding 110 kV but not exceeding 220 kV	125	8.5	11

- 12 Finally, Table 3 of the Code sets out clearance distances that apply to conductors when an engineering assessment of conductor clearances has been carried out. As shown in Row C of Table 3 below, the horizontal clearances applying to 33kV and 66kV lines can in some cases be as small as 2.1m – 3m. Note also that type and characteristics of a conductor (e.g. whether it is bare or insulated / covered) are relevant to the clearance distances. The distances are nuanced and highly fact specific.

TABLE 3 MINIMUM SAFE DISTANCES OF CONDUCTORS FROM BUILDINGS AND OTHER STRUCTURES WHERE SPECIFIC CALCULATION OF CONDUCTOR MOVEMENT HAS BEEN CARRIED OUT

Safe distance conditions	Not exceeding 1 kV			Exceeding 1 kV		Exceeding 1 kV but not exceeding 33 kV	Exceeding 33 kV but not exceeding 110 kV	Exceeding 110 kV but not exceeding 220 kV	Exceeding 220 kV a.c. or d.c.
	Insulated m	Bare neutral m	Bare active m	Insulated with earthed screen m	Insulated without earthed screen m	Bare or covered m	Bare m	Bare m	Bare m
A Vertically above those parts of any structure normally accessible to persons	2.7	2.7	3.7	2.7	3.7	4.5	5	6.5	7
B Vertically above those parts of any structure not normally accessible to persons but on which a person can stand	0.1	2.7	2.7	0.1	2.7	3.7	4.5	6	6.5
C In any direction (other than vertically above) from those parts of any structure normally accessible to persons, or from any part not normally accessible to persons but on which a person can stand	0.1	0.9	1.5	0.1	1.5	2.1	3	4.5	5
D In any direction from those parts of any structure not normally accessible to persons	0.1*	0.3*	0.6*	0.1	0.6	1.5	2.5	3.5	4
E In any direction from the ground	Refer to Table 4								

* This distance can be further reduced to allow for termination at the point of attachment

- 13 The setbacks incorporated into the Operative Christchurch District Plan are based on the above. However, as part of its work on the District Plan review, Orion ensured that the clearances included were amended compared to the Code for consistency and usability, and to reflect the realities of Orion's network and operating environment. In this regard, note that the Operative Christchurch District Plan contains slightly different setback rules depending on whether the lines are in residential, commercial, industrial or rural areas.



- 14 The image below shows the setback rules as they currently appear in the Residential Medium Density Zone provisions in Operative Plan:³

NC3	<p>a. Sensitive activities and buildings (excluding accessory buildings associated with an existing activity):</p> <ul style="list-style-type: none">i. within 10 metres of the centre line of a 66kV electricity distribution line or within 10 metres of a foundation of an associated support structure; orii. within 5 metres of the centre line of a 33kV electricity distribution line or within 5 metres of a foundation of an associated support structure; oriii. within 5 metres of the centre line of the 11kV Heathcote to Lyttelton electricity distribution line or within 5 metres of a foundation of an associated support structure. <p>b. Fences within 5 metres of a 66kV or 33kV electricity distribution line support structure foundation.</p> <p>c. Fences within 5 metres of an 11kV Heathcote to Lyttelton electricity distribution line support structure foundation.</p> <p>d. Any application arising from this rule shall not be publicly notified and shall be limited notified only to Orion New Zealand Limited or other electricity distribution network operator (absent written approval).</p> <p>Advice note:</p> <ul style="list-style-type: none">1. The electricity distribution lines are shown on the planning maps.2. Vegetation to be planted around electricity distribution lines should be selected and/or managed to ensure that it will not result in that vegetation breaching the Electricity (Hazards from Trees) Regulations 2003.
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- 15 The Plan's definition of "sensitive activities" includes "residential activity", which itself means "the use of land and/or buildings for the purpose of living accommodation." This includes a "residential unit, boarding house, student hostel, or family flat (including accessory buildings), emergency and refuge accommodation and sheltered housing."⁴
- 16 As is shown in the rule above, these activities are "non-complying" where they are located within specified distances of protected lines and their support structures. Applications arising from the rules require limited notification to Orion.
- 17 Simply put, because the corridors in the plan are based on the mandatory clearances in NZECP34, residential activity which does not meet the rules is almost always inappropriate. Accordingly, Orion is typically unable to support any application that seeks consent for such an activity. The effectively results in a "no build" area around the protected lines and associated support structures.
- 18 Orion's experience is that the corridor protection rules are often engaged in relation to large multi-stage greenfield residential developments. Specific recent examples include the *Karamu – Riccarton Park* and *Yaldhurst Park* developments, where bare land has been increasingly built up, with new residential units built right up to corridor boundaries. The rules have also recently been engaged in relation to redevelopments on established residential sites located beneath lines in areas like Burnside and Bishopdale in the North West, and Hornby, Halswell and Prebbleton in the South West.
- 19 Where the rules are engaged, and Orion is notified of an application by Council, Orion works with developers / applicants to ensure the activity is designed in a way that respects the requirements in NZECP34 and the District Plan. In the case of greenfield developments, Orion will often obtain an easement over the underlying land. Frequently this sees the land beneath corridors used for greenspace or another

³ Christchurch District Plan, R14.5.1.5, Non-complying activities, NC3.

⁴ Christchurch District Plan, Definitions – "Residential activity".



activity that does not compromise clearance distances or otherwise impede Orion's ability to operate and maintain this critical infrastructure.

- 20 In Orion's experience, the District Plan rules have been effective in regulating the issue and engaging developers and the Council with NZECP34:2001 earlier in design stage that would have otherwise occurred, in order to proactively resolve any potential breach of safe clearance distances before it occurs.
- 21 Orion considers these corridor protection matters to be an existing qualifying matter. As such, they must be accommodated in the Council's plan changes implementing the Enabling Housing Act. This is explained below, with reference to the process and tests which the Enabling Housing Act has introduced.

Accommodation of sub-transmission corridor protections as an existing qualifying matter

- 22 New section 77K(1) Resource Management Act 1991 (*RMA*) sets out the process for considering existing qualifying matters. Section 77L sets out further requirements that are relevant in this case. We step through the assessment required to evaluate this existing qualifying matter below.

Identify by location where an existing qualifying matter applies (s77K(1)(a))

- 23 The electricity distribution lines subject to the existing corridor protection buffers in the Operative District Plan are shown on the District Plan maps. Spatially, the lines run across the Christchurch District between zone substations. They are particularly focused around the existing Transpower National Grid Exit Point and associated Orion substation at Islington, and along corridors running from Islington to Papanui, Islington to Addington, Islington to Springston, and Islington to Bromley via Halswell. They also run from Heathcote to Lyttelton, and along Banks Peninsula between Motukarara, Teddington, Diamond Harbour, Little River and Duvauchelle.
- 24 These lines cover (or run for) a total length of approximately 200km in the wider Christchurch District. Figure 3 below shows the broad extent of these lines in the Christchurch metropolitan area. The vast majority of land beneath these lines is rural (given the distance includes the lines running between zone substations at on Banks Peninsula) and the lines pass over many industrially zoned areas around Islington / Hornby South, Sockburn, Middleton, Addington, Heathcote / Woolston and Bromley.

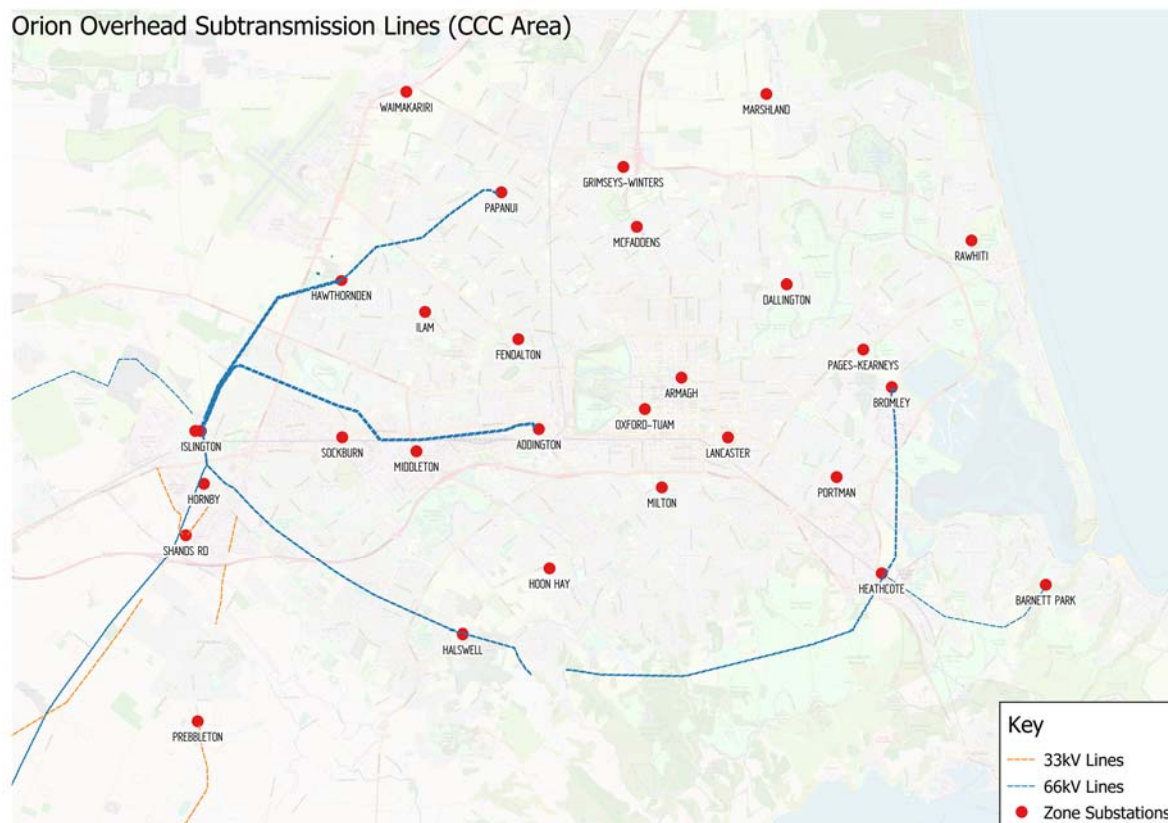


Figure 3: Extent of sub-transmission lines within Christchurch metropolitan area (note this map does not show the 11kV Healthcote to Lyttelton line, which is on the District Plan maps)

- 25 In the time available, Orion has not been able to calculate the specific distance of lines that passes over existing residentially zoned land. However, Orion could undertake that type of analysis of analysis, if required by Council to assist with the MDRS workstream.
- 26 Similarly, the exact extent or total area of the buffer corridor (whether over residentially zoned land – or any other land) is not included here. Nor are the buffers themselves mapped or displayed in the District Plan. Rather, it is just the lines themselves. It is difficult to display the nuance regarding particular activities and given the level of detail and extent of information in the maps. However, Figure 4 below shows an example for a 66kV line (such as that which currently runs over residential areas between the zone substations in Avonhead and Papanui) and the associated corridor area.

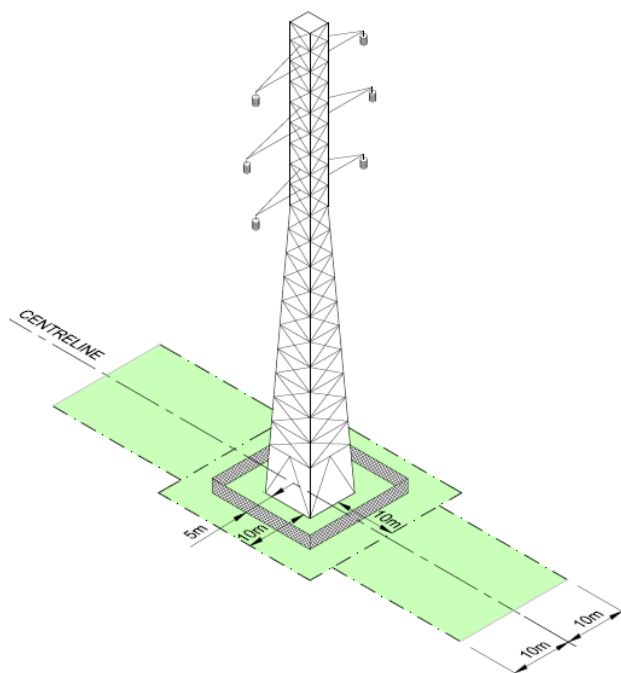


Figure 4: example of extent of corridor applying to existing 66kV line and associated tower support structure.⁵

Specify the alternative density standards proposed for those areas (s77K(1)(b))

- 27 Orion considers that the density standards for the areas that are currently protected by the corridor protection provisions should be the same as the existing rules in the operative Christchurch District Plan. As set out in [14]-[17] above, this standard is essentially zero density (i.e. no residential activity) within the corridors. Orion considers it appropriate that the existing non-complying activity status for residential activity within the corridors is carried through to any new / amended Plan as part of the MDRS and Enabling Housing Act workstream. Further, Orion considers that the standards should continue to apply to the entirety of Orion's 66kV, 33kV and 11kV Heathcote – Lyttelton lines within the Christchurch District Plan area. Applying the protections to certain portions of the lines but not others would be inappropriate. The need for protection is common to all – irrespective of location.

Identify why the existing qualifying matters apply to those areas (s77K(1)(c))

- 28 As explained in paras [9]-[13] above, the corridor protection provisions in the existing district plan are based on NZECP34:2001, and they are designed primarily to protect persons, property, vehicles and mobile plant from harm or damage from electrical hazards. The location of the lines is fixed and unchanged, and the hazards associated with development near the lines exist irrespective of the Enabling Housing Act. That is, because the location of the assets subject to the qualifying

⁵ Note the 5m distance shown on the image relates to fencing standards.



matter is unchanged, the location of the protections should also remain unchanged through the MDRS process.

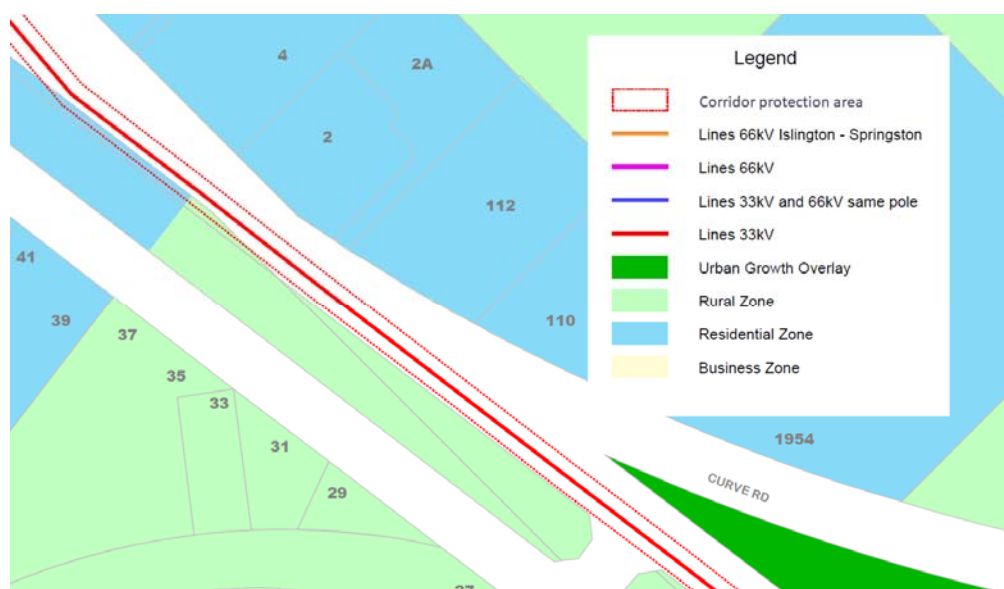
- 29 Orion filed evidence in a number of hearings to support the inclusion of the corridor protection buffers in the Christchurch Replacement District Plan process. This included economics evidence which assessed the costs and benefits associated with corridor protections, evidence from Orion, and planning evidence. While the economic analysis was done predominantly to inform the corridor protections in the rural zones, it contains general assessment which is also relevant to the current exercise. Updated analysis following this earlier work – but specific to residential areas – could assist the Council.

Describe in general terms for a typical site in those areas identified the level of development that would be prevented by accommodating the qualifying matter, in comparison with the level of development that would have been permitted by MDRS and policy 3 (s77K(1)(d))

- 30 Orion considers that it is artificial to view inclusion or accommodation of the existing corridor protection provisions as “preventing” a level of development that would otherwise be enabled by the MDRS and Policy 3. While carrying the existing corridor protection provisions through to the MDRS Plan Change process (and modifying the MDRS to accommodate this existing qualifying matter) would mean residential development is heavily restricted from a resource consent perspective (given the non-complying activity status applying to residential development within the corridors), in the absence of these consent requirements the clearance distances specified in NZECP34:2001 would still apply. As set out above, the clearances in NZECP34:2001 are mandatory and must be adhered to. They are designed to protect people, buildings and equipment from hazards associated with their location and operation close to electricity infrastructure. Even if the corridor protection provisions are not carried through or accommodated as a qualifying matter, NZECP34:2001 still significantly restricts residential (and other) development within electricity distribution corridors.
- 31 In this regard, Orion emphasises that this fact does not undermine the argument for accommodating the corridors as a qualifying matter. On the contrary, it reinforces the importance of their inclusion. This is because – in Orion’s experience – including the corridor protection rules in district plans assists in ensuring critical electricity safety clearances are actually considered and complied with in practice. 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. Requirements of the Code can be, and often are, 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.
- 32 Highlighting and specifically incorporating and retaining the requirements of the Code (as applied to the realities of Orion’s network) in the proposed District Plan rules through the MDRS process, will improve safety to the public, remove cost associated with remediation, 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. Orion's view is that retaining these rules in the District Plan will promote clarity and efficiency in the consenting process and reduce the likelihood of the Code and Electricity Act being overlooked (and ultimately breached). This has flow on effects in that it reduces risk to landowners and the Council, and assists Orion in operating, maintaining and upgrading the critical sub-transmission network.

- 33 It is not realistic to assume that every residentially-zoned site will take up the opportunity to develop to the extent enabled through the MDRS. Many sites in residential zones have been recently re-developed and contain newly built dwellings that are unlikely to be further modified to re-built in line with MDRS. Other sites may contain additional practical constraints which limit the ability to take up MDRS.
- 34 Similarly, the way corridor protection provisions interact with a site is highly site-specific. The lines do not necessarily follow street lines or a particular orientation – meaning depending on the site they may pass over only a small portion or corner of a site, while in other cases they may pass directly over a site (or anywhere in-between these two extremes). Moreover, in other cases, the lines themselves may not pass directly over a site, but the corridor protections will nevertheless apply to that part of the site which is within 10 meters of the centre line of the existing 66kV line (for example). Figures 5 and 6 below⁶ show two scenarios where slithers of sites are affected by the corridor protections.
- 35 The ultimate effect of the corridors is thus also highly fact specific – ranging from essentially creating a front boundary setback, through to a more substantive control on residential development where the lines themselves pass directly over a site.



⁶ Taken from Statement of Evidence of Mr Gary Heyes on behalf of Orion, Selwyn District Plan Review Topic 4 – Energy and Infrastructure. 8 September 2021.

Figure 5: Example of electricity distribution corridor associated with 33kV line affecting slither of rural and residential zoned land. In this scenario, the corridors essentially create (or mirror) front boundary setbacks.



Figure 6: Example of electricity distribution corridor associated with 33kV line affecting slither of land within an urban growth overlay and existing residentially zoned land.

- 36 Orion is happy to provide further examples or discuss particular scenarios further if that would assist the Council's understanding.

Identify the specific characteristic that makes the level of development provided by the MDRS (as specified in Schedule 3A or as provided for by policy 3) inappropriate in the area (s77L(a))

- 37 As set out above, in the vast majority of cases, virtually any new or expanded residential development within an electricity distribution corridor is inappropriate. In contrast, the MDRS provide a framework whereby residential development is permitted provided certain standards are met.⁷ There is no one particular standard (or characteristic) in Schedule 3A which makes the application of the MDRS to corridors inappropriate. Rather, it is residential development per se given any dwelling risks electricity clearances and can prevent or hinder access to lines and

⁷ Enabling Housing Act, Schedule 3A Cl 2(1).



associated support structures. Thus, the MDRS proceeds on an assumption that is contrary to the starting point that applies to electricity distribution infrastructure.

- 38 If it is particularly necessary to identify a characteristic from the MDRS that is problematic, building height could be identified. That said, while the building height limits in the MDRS (up to 11m in height) are inappropriate within corridors, so are far lower height limit of say 5 or 6 meters given lines heights and access requirements. We reinforce our earlier comments – essentially any residential development within an existing electricity corridor is problematic and existing corridor protection provisions must continue despite the MDRS programme.

Justify why that characteristic makes that level of development inappropriate in light of the national significance of urban development and the objectives of the NPS-UD (s77L(b))

- 39 The content above explains why development within protection corridors is inappropriate as a matter of health and safety, as well as a matter of secure and efficient functioning of the electricity distribution network.
- 40 Objective 1 of the NPS-UD is focused on “well-functioning urban environments... that enable... social, economic and cultural wellbeing...and...health and safety, now and into the future”. Accommodating the existing corridor protection provisions as a qualifying matter is entirely consistent with this objective. In particular, the corridors enable and facilitate the distribution of electricity – which is critical for social and economic wellbeing, and they are specifically designed to keep persons, property, vehicles and mobile plant safe from electrical hazards.
- 41 Objective 6 of the NPS-UD is also particularly pertinent in this context. Electricity network planning and development decisions are made based on scenarios that span many decades, with individual network assets often having a service life exceeding 40 or 50 years. Limiting residential development (height) via the corridor protection provisions integrates local authority decision making with infrastructure planning and funding decisions as it gives some certainty around residential development adjacent to critical network assets.

Site-specific analysis (s77L(c))

- 42 The matter relates to all sites that are within the corridor protection buffers (as set out above) for all existing 66kV, 33kV and 11kV (Heathcote – Lyttelton) lines within the Christchurch District. It is not possible to evaluate each site affected by the corridor protection buffers in the time available to determine whether some development beneath lines may be possible. This is because any such assessment requires detailed engineering analysis taking into account a range of factors, including location, voltage, sag (how much the line drops or loops between the two nearest support structures) the length of the span in issue (i.e. the distance between the two nearest support structures / towers), conductor materials and atmospheric / weather conditions. However, the geographic area where intensification needs to be compatible with this qualifying matter is readily identifiable via GIS mapping exercise, which can show where the lines intersect with residentially zoned areas.
- 43 Orion is happy to work with the Council further on this analysis in the coming months. We note that economic assessment of the sites affected was undertaken to



inform the insertion of these provisions into the Christchurch District Plan review, which would likely further inform this assessment.

HEIGHT AND BOUNDARY SETBACKS CONFLICTING WITH LOWER VOLTAGE OVERHEAD INFRASTRUCTURE

- 44 This issue is not currently addressed through a rule in the operative District Plan. It is therefore a qualifying matter that must be assessed pursuant to s77J(3)-(6). In the time allowed, Orion has not been able to provide the information necessary for a complete assessment, but we set out high-level information below and are happy to work with Council to provide all the necessary detail.
- 45 At the outset, it is important to note that the infrastructure in issue here are generally either 11kV, 400V lines. These voltages are generally the most common on any electricity distribution network and – broadly speaking – are the vast majority of lines that are seen in any given residential street. 11kV lines sit above 400V lines and connect streets and communities to substations. 400V (and in some cases 230V) lines are those which generally connect to and supply individual streets and ultimately residential dwellings with electricity.
- 46 Within the Christchurch District, Orion owns, operates and maintains around 750 kilometres of 11kV line, and 1050 kilometres of 400V line. These lines are generally mounted on poles that are located in the berm or road reserve. Depending on the layout of the road corridor in any given location, they may be hard up against the boundary of the road corridor and private property - or set out in the berm closer to the carriageway. These lines (particularly 400V lines) often run down rights-of-way or along driveways to service rear sections and residential properties.

Assessment against s77J

Demonstrate why the territorial authority considers— (i) that the area is subject to a qualifying matter; and (ii) that the qualifying matter is incompatible with the level of development permitted by the MDRS (as specified in Schedule 3A) or as provided for by policy 3 for that area (s77J(3)(a))

- 47 Whether an area subject to the existing 11kV or 400V overhead infrastructure is a “qualifying matter” is determined by the existence of the infrastructure at any given site. Orion can provide GIS maps and shapefiles which show the location of this infrastructure but - given the size of the network (and need to update this information so that Council records are correct) - this may be an unwieldy thing to incorporate as an overlay or mapping layer in the Plan.
- 48 Existing 11kV and 400V overhead infrastructure may be incompatible with the level of development permitted by MDRS because of electricity safety clearances contained in NZECP34:2001. The premise of NZECP34:2001 is explained in detail above. The important point to note here is that the Code specifies certain clearances distances for 11kV and 400V lines - just as it does for 33kV and 66kV lines (among other voltages).
- 49 Specifically, Table 2 of NZECP34:2001 (shown at [11] above) states there must be at least 5.5 meters of vertical clearance (and at least 5 meters of horizontal



clearance) between lines not exceeding 11kV and buildings / structures. These clearances can reduce to a few meters or so following specific engineering assessments and depending on the circumstances. For 400V network, vertical clearances start at 4 meters, and can reduce to less than half a metre in some cases.

- 50 Where front and side boundary building setbacks are reduced through the MDRS, there is a real risk clearances to existing lines will be compromised by new development enabled under the Standards. In particular, the MDRS would enable residential development up to 3 stories / 11m high as little as 1.5m back from the front boundary (and closer to internal or side boundaries in certain circumstances). This is problematic from an electricity network perspective.
- 51 For example, where an 11kV line is located in the berm 1.5m from the boundary with private property, this would allow a clearance of just 3m between lines and the façade of a new residential building / development built to the 1.5m setback specified in the MDRS. These clearances would fall well short of the generic clearance distances set out in NZECP34:2001.

Assess the impact that limiting development capacity, building height, or density (as relevant) will have on the provision of development capacity (s77J(3)(b))

In the time available, Orion has not been able to provide detailed calculations as to the specific area (or extent) of residentially zoned land affected by 11kV and 400V clearances – or the effect of accommodating these clearances as a qualifying matter through the MDRS process. As with the existing sub-transmission corridors however, Orion considers this is essentially a moot point in that clearances in NZECP34:2001 must be adhered to irrespective of any district plan permitted activity standards (including those in the MDRS). Accordingly, accommodating clearances as a qualifying matter through the MDRS process should have a net-zero effect on development capacity in practice.

That said, at a very high level, the impact of these clearances can be summarised as generally ranging from limiting the extent to which any given development can take advantage of the reduced boundary setbacks enabled by the MDRS, through to having no tangible impact at all where lines are located well away from property boundaries. For example, if an existing 11kV line was located within a berm 3m from a residential boundary, the façade of an adjacent 11m high development must be setback a minimum of 2m from that same boundary – as this is required to achieve the 5m clearance required by Table 2 of NZECP34:2001. As noted above, this 5m clearance may reduce to a far smaller distance following an engineering assessment. Depending on the outcome of the site-specific engineering assessment, this may then allow development on the residential site right up to minimum 1.5m setback distance potentially enabled by the MDRS. Clearances and resulting “effects” will vary from site to site, depending on the location and nature of the lines, and the development proposed.

Assess the costs and broader impacts of imposing those limits (s77J(3)(c))

- 52 As set out above, the costs of imposing the clearance limits as part of the MDRS process is negligible – given compliance must be achieved regardless of any



enabling activity status. However, there are significant benefits to the inclusion or recognition of clearances as part of the MDRS process, as well as a range of costs for failing to do so.

- 53 Where developments fail to take into account electricity clearances, either the lines themselves or the development / structure which creates the clearance violation must be modified to reinstate compliance. Safety is non-negotiable for Orion. Where clearances are compromised, they must be remediated.
- 54 Modification to lines in this regard may involve raising the lines – through the installation of taller poles or attachments on existing poles to raise line heights (and thereby achieve clearances) - or through the lateral / horizontal relocation of lines and poles. In some cases, where neither of these is an option, it may be necessary to underground the line. Costs for amending lines to reinstate clearances can cost in the order of \$20,000.00 - \$100,000.00 depending on the nature and extent of the breach. Depending on how widely the MDRS are applied, the costs of remediation across Orion’s network could be very significant.
- 55 Moreover, it is important to note the options for raising line heights, relocation, and undergrounding are often heavily constrained. In particular, berms often support an array of infrastructure (much of which cannot be seen from the surface), meaning there are few options for new pole locations or additional underground electrical infrastructure. Similarly, Orion’s ability to relocate above ground infrastructure and raise line heights is controlled by an array of standards in the operative Christchurch District Plan. For example, there are limits on the height of utility structures, while the horizontal relocation of utility structures is permitted up to 5 meters in any direction where that relocation is for safety reasons. Any relocation beyond this is a restricted discretionary activity.⁸
- 56 Imposing or recognising clearances for 11kV and 400V lines as part of the MDRS process would significantly reduce the likelihood of clearances being overlooked and ultimately compromised by residential development. While the cash costs of remediation can be significant, it is important to remember that clearances are first and foremost about keeping people and property safe around electrical hazards. This is explored above in relation to existing sub-transmission corridors, and is not repeated here.

Alternative option – consent requirement

- 57 Orion understands that the Council is considering how to address the various servicing challenges that are presented by the level of development that may be enabled by the MDRS.
- 58 Orion recognises that the MDRS are focused specifically on residential land use – and are not necessarily a one-stop-shop for all consenting and planning requirements relevant to residential development.
- 59 Accordingly, Orion acknowledges that electricity clearances associated with 11kV and 400V lines (and the challenges residential density intensification poses to them)

⁸ Christchurch District Plan, 11.4.3, RD1.



matter may be incorporated or addressed as / by a separate rule in the District Plan which imposes resource consent requirements where development is proposed within a certain distance of an existing overhead line. Orion may actually prefer to have these issues addressed in this way (rather than via amending the MDRS) depending on how any rule related rule is ultimately drafted.

- 60 This could operate in a similar manner to existing sub-transmission corridor protection rules, but with smaller clearances as applicable to lower voltage lines. For example, a rule might provide that any residential development (or “sensitive activities”) within 4 meters of existing 11kV and 400kV overhead electricity lines and / or associated support structures triggers a consent requirement for a restricted discretionary activity. Any application arising from this rule should require limited notification to Orion, with discretion limited to consideration of whether the application / development demonstrates compliance with NZECP34:2001.
- 61 Orion would appreciate the opportunity to work with Council on any such workstream and to understand further how the Council proposes to address matters such as this in the context of the plan changes which introduce the MDRS.

SERVICING CAPACITY ISSUES

- 62 This issues of residential development failing to properly integrate with associated network servicing requirements, and challenges with locating the necessary infrastructure to service medium and high-density residential development are not currently addressed through any particular rule in the operative District Plan (at least as far as Orion is aware).
- 63 This issue may not strictly fall into the category of a ‘qualifying matter’. It is not necessarily a matter that makes higher density inappropriate in an area. But it is an issue which is integral to the successful uptake and delivery of the MDRS. It is also a challenge which arises already (and will continue to arise) as a result development rules that do not give sufficient consideration to servicing needs. The examples discussed above provide a small glimpse of what can happen when infrastructure not well integrated with or accommodated by residential development.
- 64 Servicing capacity is therefore a matter which the Council should consider in tandem to the intensification plan change implementing the Enabling Housing Act.
- 65 Orion understands that the Council is considering options to deal with various servicing challenges that are presented by the level of development that may be enabled by the MDRS. Orion suggests that this issue may be better addressed and incorporated alongside those other servicing issues as a separate rule or rules. In the context of electricity servicing capacity, it may be appropriate to insert a rule which imposes resource consent (or simply even utility operator consultation) requirements when a development will trigger a particular level of servicing demand (in this case, demand for upgraded or new electricity distribution infrastructure). Similarly, it may be necessary to look at developing rules which impose a resource consent requirement where a site being redeveloped contains (or is within a predetermined distance of) an existing electricity kiosk, cabinet or distribution substation.



- 66 Orion has considered these matters and proposes that as a starting point to address electricity distribution servicing challenges, the district plan should include restricted discretionary activity status for:
- 66.1 Residential intensification \geq 200m from an existing distribution kiosk; and
- 66.2 Residential intensification where there is an existing kiosk on (within) the site boundaries, or within a berm in front of the site.
- 67 Any application arising from this rule should require limited notification to Orion, with discretion limited to consideration of whether the application and development has sufficiently provided for the location of required electricity distribution infrastructure on site.
- 68 In this context “intensification” means where three or more residential units / dwellings are to be constructed on a site occupied by a single unit prior to the triggering intensification / development occurring.
- 69 Orion is open to refinements to the construction and drafting of any such rule.
- 70 Orion requests that Council pursue these options and asks that Orion be included in any such workstream.

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