

ORION NEW ZEALAND LIMITED

SUPPLEMENTARY ASSESSMENT OF QUALIFYING AND RELATED MATTERS AND SUBMISSION ON DRAFT PLAN CHANGE 14

- Orion New Zealand Limited ("Orion") operates the electricity distribution network in Christchurch and Selwyn district. We previously provided Christchurch City Council ("Council") a range of material highlighting matters important to the safe and efficient functioning of the electricity distribution network in the context of implementing the Medium Density Residential Standards ("MDRS") in Christchurch.¹
- This document provides a further assessment of relevant qualifying matters and related matters related to protection of the electricity distribution network from potential adverse effects associated with the MDRS. It has been prepared, and is provided to Council, as part of direct stakeholder consultation in relation to Council's Draft Housing and Business Choice Plan Change ("Draft Plan Change").

Overview - Electricity Distribution Network protection under "qualifying" and "related" matter tests

- The electricity distribution network is not listed in the National Policy Statement on Urban Development 2020 (*NPS UD*) as "nationally significant infrastructure". As such, the network as whole (and various controls and restrictions that apply to development adjacent to it) does not fit within one of the pre-subscribed "qualifying matters" ("QM") set out in s77I of the Resource Management Act 1991 ("RMA").
- 4 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
- The electricity distribution network is identified in regional and district planning documents as regionally significant and strategically important infrastructure. There are relevant controls protecting Orion's strategically vital sub-transmission (extra high voltage) network in the operative Christchurch District Plan. These protections apply to existing 66,000 Volt ("66kV") and 33,000 Volt ("33kV") lines, as well as the 11,000 Volt ("11kV") Heathcote Lyttelton line, and are hereafter referred to as Significant Electricity Distribution Line ("SEDL") corridor protection provisions. Further, Orion is a lifeline utility for the purposes of the Civil Defence Emergency Management Act 2002, providing an essential service that must 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. On this basis, existing controls applying to the SEDL network are capable of identification under the QM framework following satisfaction of s77L RMA.

¹ As required by the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021. See Memorandum: Qualifying Matters relevant to Orion New Zealand's Electricity Distribution Network, Orion New Zealand to Christchurch City Council. 3 February 2022.

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

³ For example, see: Operative Christchurch District Plan, Chapter 8, Rule 8.5.1.3, RD5. And Operative Christchurch District Plan, Chapter 14, Rule 14.5.1.5 Non-Complying Activities, NC3.

Material satisfying s77L RMA in relation to existing SEDL corridor protection provisions is set out below.

- 6 s80E(1)(b)(iii) of the Enabling Housing Act provides for the inclusion of "related provisions" (including objectives, policies, and rules) that support or are consequential on the MDRS. Among other things, "related provisions" may relate to infrastructure.⁴
- The development enabled by the MDRS is likely to result in a significant increase to electricity demand, while simultaneously limiting the area of land available for electricity distribution equipment and infrastructure. It is critical that intensification occurs with electricity infrastructure in mind standards must be included in the District Plan to ensure existing infrastructure is protected from hazards and risks associated with inappropriate development, and sufficient land is reserved so that new infrastructure can be installed to service new development as required.
- 8 Electricity equipment servicing and lower voltage line protection standards to protect infrastructure from adverse effects associated with the MRDS are discussed at length below.

Terminology

- 9 At the outset, it is important to note that different terminology applies to Orion's electricity distribution network than that which applies to National Grid assets operated by Transpower. It is important that a clear distinction is made in planning documents.
- Terms such as "transmission lines" and "transmission infrastructure" generally refer to lines and infrastructure that is owned and operated by Transpower New Zealand. This equipment generally runs at an operating voltage of 110,000 or 220,000 volts. In some cases, lower voltages (e.g. 66kV) and higher voltages (up to 400,000 volts) are used on the "National Grid" which collectively describes the infrastructure network that transmits electricity between districts and regions around the country.
- In contrast, Orion's electricity network is generally described as "distribution" infrastructure (rather than "transmission") as it runs at lower voltages and is located in only the Christchurch City Council and Selwyn District Council areas. The Orion network takes electricity from the National Grid and distributes that to townships, communities, businesses and individual customers / homes. The Orion network itself consists of infrastructure and equipment, including:
 - 11.1 **Significant electricity distribution lines and cables**: this is the "subtransmission" network of high voltage lines and cables which connect zone substations, carrying voltages of 66kV or 33kV. In Christchurch it also includes the 11kV Heathcote to Lyttelton line, which is the principal line providing power to Lyttelton. A number of the 66kV lines Orion owns and operates in the Christchurch City Council area were previously owned and operated by Transpower as part of the National Grid. These include the 66kV lines running from the Islington Substation to Papanui Substation, and those running from Islington to Addington and Springston. The function, voltage, and criticality of

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⁴ Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021, s80E(2)(d).

these lines did not change when ownership and operation transferred to Orion – and neither did the safety requirements or clearances associated with them.

- 11.2 **Zone Substations:** which receive sub-transmission voltages from the SEDL network and convert these down to lower voltages that are then distributed around the local community to individual businesses and households. Zone substations generally include a control room or building as well as a secure gravelled switchyard containing transformers, switching equipment, bus work, and circuit breakers.
- 11.3 Lower voltage lines and cables: 11kV lines and cables, and smaller or lower voltage 400v and 230v lines and cables that make up the vast majority of overhead lines in the greater Christchurch area. These connect to and supply individual suburbs, communities, streets, commercial premises and ultimately individual residential dwellings with electricity. Lines are generally mounted on poles located in the road reserve or berm (although in some cases they are located on (or traverse over) private property often to service rear sections).
- 11.4 **Ground mounted distribution equipment**: such as electricity kiosks, cabinets or distribution substations. While these ranging in size and prevalence, it is important to note there are thousands located around Christchurch. These are discussed in detail below.

EXISTING QUALIFYING MATTER: CORRIDOR PROTECTION FOR SIGNIFICANT ELECTRICITY DISTRIBUTION LINES

Below is an assessment of existing SEDL corridor protection provisions against the relevant sections of the RMA. Section 77K(1) RMA sets out the process for considering existing qualifying matters. Section 77L sets out further requirements that are relevant in this case.

Section	Analysis
s77K(1)(a) Identify by location where an existing qualifying matter applies	The SEDLs subject to the existing corridor protection buffers in the Operative District Plan are shown on the District Plan maps. The existing mapping in the Operative District Plan is an accurate location of the where this existing qualifying matter applies. 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. These lines also run from Heathcote to Lyttelton and Heathcote to Barnett Park, and along Banks Peninsula between Motukarara, Teddington, Diamond Harbour, Little River and Duvauchelle. The Banks Peninsula lines are not directly addressed as part of this workstream given the Council's determination as to where the Enabling Housing Act and MDRS applies. These lines cover (or run for) a total length of approximately 200km in the wider Christchurch District. Figure 1 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 200km distance includes the lines running between zone substations on Banks Peninsula) and the lines pass over many industrially zoned areas around Islington / Hornby South, Sockburn,
	Middleton, Addington, Heathcote / Woolston and Bromley.

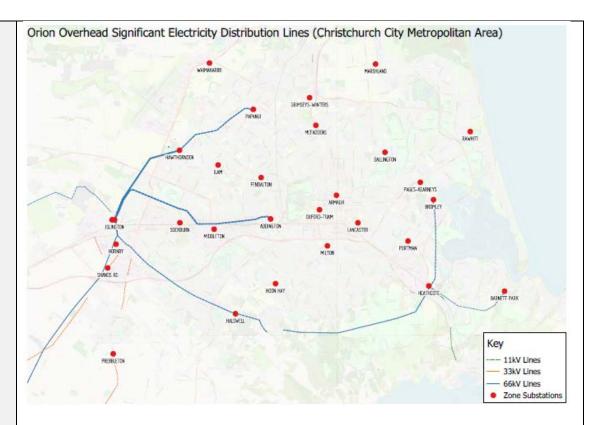


Figure 1: SEDLs in Christchurch Metropolitan Area

Figure 2 below is an extract from the Operative District Plan showing a close up view of the Islington – Papanui 66kV SEDL where is passes over a residential area in Burnside.



Figure 2: Extract from Operative District Plan showing existing SEDL

Note that on the Operative Plan, only the centre line of the SEDL is shown on the planning maps. The corridor protection area is not shown around the centre line of the SEDL.

This can be contrasted against mapping to be included as part of the Proposed Plan Change, as shown in Figure 3 below.



Figure 3: Example of mapping to be included Proposed Plan Change.

Spatially, the same land area is covered by the existing SEDL corridor protection area in the Operative District Plan, and that proposed as a qualifying matter under the Proposed Plan Change.

s77K(1)(b)

Specify the alternative density standards proposed for those areas

The density standards sought for areas proximate to existing SEDLs are those currently included in the Operative District Plan. In essence, the alternative density sought is that which applies immediately prior to the Plan Change.

The image below shows the relevant rules as they currently appear in the Residential Medium Density Zone provisions in Operative Plan: ⁵

NC3

- Sensitive activities and buildings (excluding accessory buildings associated with an existing activity):
 - 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; or
 - ii. 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; or
 - 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.
- b. Fences within 5 metres of a 66kV or 33kV electricity distribution line support structure foundation.
- c. Fences within 5 metres of an 11kV Heathcote to Lyttelton electricity distribution line support structure foundation.
- d. Any application arising from this rule shall not be publicly notified and shall be limited notified only to Orion New Zealand Limited o other electricity distribution network operator (absent written approval).

Advice note:

- The electricity distribution lines are shown on the planning maps.
- 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.

This existing density standard is ultimately a density of zero new residential units or development. Any residential development within a prescribed distance of an SEDL or support structure is currently a non-complying activity.

⁵ Christchurch District Plan, R14.5.1.5, Non-complying activities, NC3.

These same rules currently do apply in all residential zones in the Operative District Plan.

It is intended that these be reflected (i.e. replicated) through the MDRS Plan Change process so that where they apply in the Operative Plan, they are carried through to comparable or equivalent zones under the amended District Plan regime.

This effective zero density will be in place of the higher residential density associated with MDRS that would otherwise be introduced as part of Plan Change 14.

s77K(1)(c)

Identify why the existing qualifying matters apply to those areas The residential setbacks and effective zero density within existing electricity distribution corridors incorporated into the Operative Christchurch District Plan are based on requirements in the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34: 2001). These setbacks and corridors were incorporated in the Christchurch District Plan as part of the Christchurch Replacement Plan process in 2015/6.

In the Christchurch Replacement Plan hearings process, a through s32 analysis was done in respect of the corridor protection provisions for SEDLs. That analysis remains relevant and applicable to this Proposed Plan Change.

We direct your attention in particular to the following briefs:

- Evidence of Laura Buttimore presented at Stage 1 Residential hearing: http://chchplan.ihp.govt.nz/wp-content/uploads/2015/03/922-Orion-Laura-Buttimore-20-3-151.pdf
- Evidence of Shane Watson presented at Stage 1 Residential hearing: http://chchplan.ihp.govt.nz/wp-content/uploads/2015/03/922_1339-Orion-

 Evidence-of-Shane-Watson-combined-9Mb-20-3-151.pdf

While related to a different district, Orion has also recently presented evidence at the Selwyn District Plan Review hearings. For completeness, we direct your attention to the planning evidence presented for that process: https://extranet.selwyn.govt.nz/sites/consultation/DPR/Shared%20Documents/Hearing%204%20Energy%20&%20Infrastructure%20-

%20Evidence/Hearing%204%20Submitter%20evidence/DPR-

0367%20Orion%20New%20Zealand%20Limited%20-

%20Mel%20Foote,%20Planning.pdf

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 – including electric shock.

Electric shock can be caused by:

- Reach and touch voltages (i.e. where a person or animal comes into direct contact with a conductor);
- Line or conductor drop (where a line or conductor falls to the ground or structure);

- Earth potential rise (i.e. an earth fault at a tower or pole);
- 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);
- Flashovers (i.e. where the electricity arcs from a conductor onto an object such as structure or fence); and
- Proximity of vegetation growing too close to a line and causing a flashover.

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 electricity lines. 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.

The location of the lines subject to the existing electricity distribution corridors is fixed and unchanged, and the hazards associated with development near the lines exist irrespective of the Enabling Housing Act and MDRS. Because the location of the assets subject to the qualifying matter is unchanged, as is the risk of development near them, the location of the protections should also remain unchanged through the MDRS process.

s77K(1)(d)

Describe in general terms for a typical site in those areas identified the level development that would be prevented accommodatin g the qualifying matter. comparison with the level of development that would have been permitted by **MDRS** and policy 3

The Operative District Plan provides that new sensitive activities are a non-complying activity within existing SEDL corridors in residential zones. Ultimately, this means that the level of development which would be prevented by the treatment and inclusion of the existing rules as a qualifying matter is likely to be all residential development within existing SEDL corridors. Residential density will in practice be zero, given applicants are unlikely to meet the threshold test in section 104D of the RMA.

As explained above, this restriction is justified and ultimately already required by the electricity clearances in NZECP34:2001. 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 beneath and immediately adjacent to existing SEDLs 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.

That all said, the way in which the existing SEDL qualifying matters 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 (thus still enabling development on the remainder of the site), while

in other cases they may pass directly over a site (or anywhere in-between these two extremes).

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 4-6 below show examples of the various effects of the corridors on residential sites.



Figure 4: SEDL corridor affecting rear of residential sites.

Figure 4 above shows a number of medium density residential zone sites in Bishopdale partially subject to the proposed SEDL corridor QM.

Under the MDRS, each of these sites could theoretically accommodate a maximum of three residential units with a maximum permitted height of 11 meters.

Following inclusion of the SEDL QM, any residential (re)development and intensification on each of the sites could only occur outside the area subject to the QM. Broadly speaking, the rear third of each site is subject to (or covered by) the SEDL corridor QM. If it is possible to locate three units within the portion of the site outside the SEDL corridor QM (approximately two-thirds of the total site area), that development can still occur (and is unaffected by the QM, given it does not occur within it).

However, given setbacks and site coverage requirements, the more likely effect of the QM on these sites is that they accommodate a maximum of two residential units per site – with these two units being located in the front two-thirds of the site unaffected by the QM.

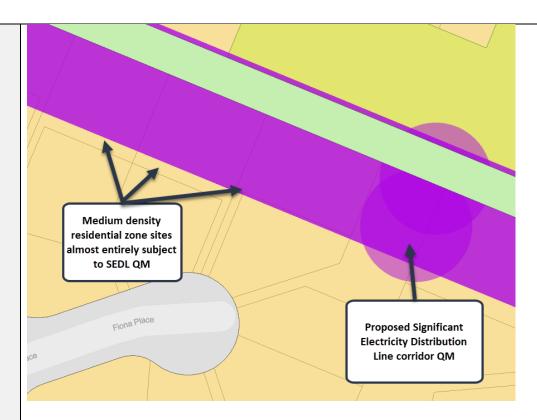


Figure 5: SEDL affecting large proportion of residential sites

Figure 5 above shows a number of medium density residential zoned sites in Sockburn almost entirely subject to the proposed SEDL corridor QM.

Under the MDRS, each of these sites could theoretically accommodate a maximum of three residential units with a maximum permitted height of 11 meters.

Following inclusion of the SEDL corridor QM, any residential (re)development and intensification on each of the sites could only occur outside the area subject to the QM. A large percentage of these sites are subject to (or covered by) the SEDL corridor QM – with only the site accessways and a slither of the main site area outside the proposed SEDL corridor QM.

Given boundary setbacks and the layout of land unaffected by the QM, the effect of the QM on these sites is that they are unlikely to be able to accommodate any residential (re)development or intensification.

It is important to note that dwellings are often currently located on these sites (within the area that would be covered by the SEDL QM (and the area covered by the SEDL corridors included in the Operative Plan) given they predate NZECP34 and / or the SEDL rules in the Operative District Plan. Any such existing dwellings or units would not be affected by the inclusion of the QM, with the existing residential land use able to continue despite the inclusion of the SEDL QM. The QM would only prevent intensification or new dwellings being created on sites such as these.

The third and final typical site configuration influenced by the SEDL Corridor QM is shown in Figure 6 below.

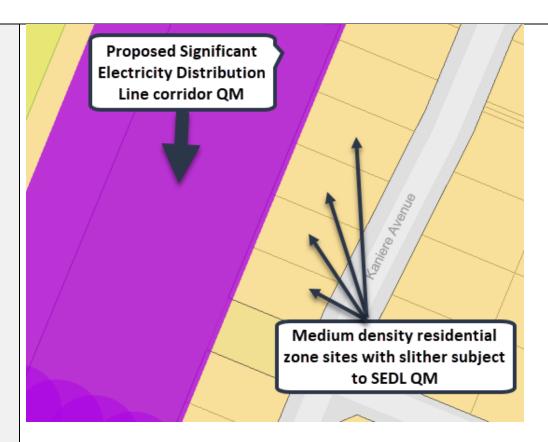


Figure 6: SEDL corridor affecting slither of land are rear of residential sites

Figure 6 above shows a number of medium density residential zone sites in Hei Hei almost entirely subject to the proposed SEDL corridor QM.

Under the MDRS, each of these sites could theoretically accommodate a maximum of three residential units with a maximum permitted height of 11 meters.

As with the previous two examples, following inclusion of the SEDL corridor QM, any residential (re)development and intensification on each of the sites could only occur outside the area subject to the QM. Only a small portion of these sites at (the rear boundary) are subject to the SEDL Corridor QM, with between 80 - 95% of the site being outside the proposed SEDL corridor QM.

Given boundary setbacks and the layout of land unaffected by the QM, it is expected that effect of the SEDL corridor on these sites will be negligible. It is likely that each site can accommodate the maximum level of (re)development or intensification permitted by the MDRS.

The three site configurations set out above demonstrate that the ultimate effect of the SEDL corridor on a site is highly fact specific. The corridors may affect a slither of land at the front or rear of a site (having a minimal impact on the intensification and (re)development potential of the site), or they may cover the majority of the site (effectively preventing all residential development or intensification on site).

Table 1 below stows the total area of residentially zoned land (in the operative plan) affected by the SEDL Corridor.

Table 1				
Land affected by SEDL corridor QM				
Total residentially zoned land area affected	425,194m² (42.5 hectares)			
Number of sections that could be located on area of land effected*	Approx. 650 sections**			
Total units theoretically enabled by MDRS on effected land by SEDL Corridor QM	1950 residential units			
Total sum of units thoracically lost by inclusion of SEDL Corridor QM***	1350 residential units			

^{*}Theoretically, if the land affected was in a single uniform block section size of 650m²

**Assuming

***This value

reflects that a significant majority (perhaps 550 of the 650) of residential sites affected by the SEDL corridors currently contain a single existing residential unit with the corridor.

The area of residentially zoned land affected has been calculated based on the scale maps included **Appendix 1**.

It is important to note that the area of land and units affected calculations presented above are theoretical and based on a number of generalisations and assumptions, as detailed below Table 1.

It is expected that in reality both the total number of sites actually affected by the SEDL Corridor QM, and the number of units and development capacity lost by inclusion of it as qualifying matter, are significantly less than what is presented here.

s77L(a)

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

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. There is no one particular standard (or characteristic) in Schedule 3A which makes the application of the MDRS to corridors inappropriate. Rather, it is the enablement of residential development per se given any dwelling risks electricity clearances and can prevent or hinder access to lines and associated support structures. Thus, the MDRS proceeds on an assumption that is contrary to the starting point that applies to electricity distribution infrastructure.

Of all the characteristics specified in Schedule 3A, building height could be the most problematic (or inappropriate) in terms of SEDLs. That said, while the building height limits in the MDRS (up to 11m in height) are inappropriate within corridors, far lower height limit of say 5 or 6 meters are also incompatible with SEDLs given lines heights, clearances and access requirements.

⁶ Enabling Housing Act, Schedule 3A CI 2(1).

s77L(b)

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

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 <u>safe</u> from electrical hazards.

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 via the corridor protection provisions and SEDL QM integrates local authority decision making with infrastructure planning and funding decisions as it gives some certainty around residential development adjacent to critical network assets and infrastructure.

s77L(c)

Site-specific analysis that

This analysis has been completed to extent reasonably practicable given linear nature of the infrastructure to be discussed.

s77L(c) requires that a site-specific analysis for qualifying matter:

- (i) identifies the site to which the matter relates; and
- (ii) evaluates the specific characteristic on a site-specific basis to determine the geographic area where intensification needs to be compatible with the specific matter; and
- (iii) (iii) evaluates an appropriate range of options to achieve the greatest heights and densities permitted by the MDRS (as specified in <u>Schedule 3A</u>) or as provided for by policy 3 while managing the specific characteristics.

The SEDL qualifying 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 individual residential 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. Mapping of this kind supplied by Orion is provided in **Appendix 1**. Further, the SEDL corridors are shown on the Planning Maps included in the Draft Plan Change 14 Zoning Map viewer.

RELATED PROVISIONS FOR ELECTRICTY EQUIPMENT AND LINES PROTECTION

- s80E(1)(b)(iii) of the Enabling Housing Act provides for the inclusion of "related provisions" (including objectives, policies, and rules) that support or are consequential on the MDRS. Among other things, "related provisions" may relate to infrastructure.
- The MDRS seeks to enable significant residential development and intensification, with a total enabled plan capacity of up to 222,478 dwellings. This represents a major increase on current enabled capacity. 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 which can result in reduced power quality and electricity demand exceeding the network supply. Significant and sustained investment and upgrades of the electricity distribution network are required to ensure the increased electricity demand associated with this development can be met.
- Similarly, intensification results in greater building density with more and larger buildings to be constructed through Christchurch City. Larger and denser buildings can lead to encroachment on critical safety clearances associated with the overhead electricity distribution network (namely power lines and poles).
- The clearances associated with SEDLs (generally 33kV and 66kV lines) are addressed above in the context of a new SEDL corridor QM. However, it is also vital that the smaller clearances associated with lower voltage lines are also addressed as part of the Proposed Plan Change introducing the MDRS. Encroachment on clearances increases risks to infrastructure assets from third part activity; can bring the public into hazard areas around lines; and compromise Orion's ability to operate, repair, maintain and upgrade this infrastructure. Ultimately, compromised clearances can threaten the safe, secure and reliable supply of electricity.
- While existing development presents challenges to the location of electricity infrastructure and protection of lines clearances, the scale and density of intensification associated with the MDRS will see these challenges increase significantly in prevalence and severity. The potential issues created by the MDRS in this regard are set out below, and two "related provisions" are proposed to address these consequences of the MDRS.

INTENSIFICATION AND GROUND MOUNTED ELECTRICITY EQUIPMENT

17 The electricity distribution network can be upgraded to service new dwellings and greater intensification, <u>provided that</u> intensification and development takes into account the need for upgraded infrastructure. Intensification (and the resulting increased demand for electricity) generally results in a need for upgraded / reinforced overhead electricity lines and / or underground cables, and larger or an increased number of ground mounted equipment such as electricity distribution kiosks, cabinets and distribution boxes. Examples of this ground mounted equipment are shown below in Figures 7 – 10 below.

⁷ Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021, s80E(2)(d).

⁸ New Medium Density Residential Standards (MDRS) Assessment of Housing Enabled in Christchurch City, The Property Group, January 2022.



Figure 7: Full Kiosk (left), Half Kiosk (right)



Figure 8: Quarter Kiosk (left) berm kiosk (right).



Figure 9: Standalone Switchgear



Figure 10: Distribution cabinet (left) and distribution box for residential dwelling (right).

- When sites are developed (or redeveloped) as part of intensification, it is critical that the electricity network is considered, and sufficient land is reserved for electricity distribution infrastructure. This is because:
 - 18.1 There is a functional need for electricity distribution infrastructure to be located on or immediately adjacent to sites the infrastructure services. Lines and cables must connect to the site in order to provide electricity. Kiosks, cabinets and distribution substations must be located around the electricity network in accordance with the demand for electricity. This equipment cannot perform its function if it situated away from the location of electricity demand.
 - 18.2 The size and footprint requirements of this infrastructure are often fixed and inflexible (and are directly related to the electricity demand in the immediate area). For example, the physical footprint of a full low electricity distribution kiosk is generally 2.2m x 2.5m. An additional 1.5metre clear operational area is required in front of the kiosk. Depending on the location of adjacent buildings, and fire safety mitigation installed, it can necessary for setbacks of up to 6 meters between transformers and buildings. In order to operate and maintain this equipment, Orion must be able to access kiosks 24 hours a day, 7 days a week. Because of these requirements, is usually necessary for this equipment to be located just over the front boundary on private land.
 - 18.3 Various safety and electrical standards set clearances around ground mounted equipment. Neither the equipment nor the standards can be amended or resized to "fit" the equipment within the space available. There is often very little opportunity to compromise on the land area required for electricity distribution infrastructure.
 - 18.4 Putting aside functional and operational constraints, sourcing alternative locations for electrical infrastructure (i.e. other than on or immediately adjacent to the site which the infrastructure services) is problematic as:
 - (A) 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 generally resisted by corridor managers (e.g. Council or Waka Kotahi etc);
 - (B) Locating above ground infrastructure equipment in reserves and parks is generally opposed by Council and / or Local Boards;

- (C) Owners of adjacent sites that have sufficient land to accommodate infrastructure should not be required to accommodate it simply because development on an adjacent site requires it (and in the vast majority of cases they will not accept it on their land).
- 19 Where infill development restricts infrastructure corridors, and / or individual sites and road corridors do not adequately account for the provision of infrastructure, providing a secure and reliable electricity supply to new developments can become problematic.
- In some cases, infill housing and intensification is <u>already</u> presenting <u>significant</u> challenges for the location, operation, maintenance and upgrading of electricity distribution equipment and infrastructure. Orion's experience is that in some cases developers (both smaller scale landowners redeveloping small or single 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). Similarly, Orion encounters resistance from corridor managers and Council when seeking to locate new / upgraded infrastructure in the berm or local reserve.
- Development enabled by the MDRS is likely exacerbate existing issues and challenges in this regard, unless this development is appropriately managed through the incorporation of related provisions. In particular, intensification will allow a larger number of residential units in smaller areas dramatically increasing electricity demand. At the same time, with smaller setbacks and intensification enabled, the MDRS framework is likely to see greater site coverage and buildings built closer to road frontages / boundaries where equipment. This will see buildings and development squeezing and increasingly occupying front yards that have historically accommodated electricity distribution equipment and infrastructure. Ultimately, the MDRS is enabling more development, while making it more difficult for infrastructure providers to supply that development with critical infrastructure.

INTENSIFICATION AND CLERANCES AROUND 11KV AND LOW VOLTAGE LINES

- Increased building height limits and smaller boundary setbacks enabled by the MDRS have the potential to cause significant issues for large parts of Orion's existing 11kV, 400V and 230V network.
- As noted above, NZECP34:2001 is an industry standard overseen by Worksafe that sets minimum safe electrical clearance requirements for structures and certain activities in relation to overhead electric line installations and support structures. NZECP34:2001 prescribes that certain clearances must be met in relation 230V, 400V and 11kV lines (and that other larger clearances must be must be met in relation to 33kV and 66kV lines, among others).
- Within the Christchurch City Council Area, Orion owns, operates and maintains around 750 kilometres of 11kV line, and 1050 kilometres of 400V or 230V line. These lines are generally mounted on poles that are located in the berm or road reserve. 400V and 230V lines often also frequently run down right of ways to service dwellings and development on rear sites, setback from the road corridor. Clearances in NZECP34: 2001 apply irrespective of where the electricity line (and any compromising building or structure) is located.
- As has been well traversed, 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 in terms of overhead lines. Specifically:

- 25.1 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;
- 25.2 Where overhead lines run along road frontages (generally somewhere in the berm or road corridor), higher buildings on private land built close to the boundary may also compromise clearance distances. For example, where an existing 11kV line is located in the berm 1.5m from the boundary with private property, the 1.5m front boundary setback specified by the MDRS would allow a clearance of just 3m between lines and the façade of a new residential building. These clearances would fall well short of the generic clearance distances set out in NZECP34:2001.
- 25.3 Where overhead lines run down a right of way, intensification may bring new buildings close these lines compromising clearances. Suitable setbacks in internal boundaries are essential to ensure safe clearance is maintained between existing lines and new buildings. In this regard, it is important to note that electricity clearances down rights of way are often already heavily constrained. Already there is often very little room to relocate lines away from new structures (given the width of the right of ways). Reducing internal boundary setbacks down to just 1m is likely to significantly exacerbate these issues.
- This is problematic as having buildings and certain activities under, or very near to, overhead electricity lines:
 - 26.1 Increases risk to people (particularly via electric shock or electrocution) and property (through increased risk of electricity outages);
 - 26.2 Complicates operation, maintenance, and upgrading activities on the electricity distribution network which adds significantly to costs and duration of works;
 - 26.3 Can affect the amenity of occupiers of residential units;
 - 26.4 Potentially impacts on the reliability of electrical supply as repair, maintenance and upgrading can be delayed and / or take longer; and
 - 26.5 Can, if an electrical fault occurs, have the potential to cause significant harm or death as the structure may incur hazardous voltages.
- 27 Conflicts between development and overhead electricity line clearances are not new. Orion has been working to minimise these issues on its network for a number of years, with dedicated staff working to protect the electricity network, ensure standards are complied with, and to keep the public safe. As townhouses and infill development has become more popular in recent years, Orion has seen an increasing in potential clearance violations on its network.
- 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 one way or another.

- 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.
- 30 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 5 meters in any direction where that relocation is for safety reasons. Any relocation beyond this a restricted discretionary activity. 9
- 31 Given MDRS will enable the construction of taller buildings in closer proximity to boundaries, MDRS has the potential to significantly exacerbate existing clearance issues.
- 32 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 safety around electrical hazards.

Related Portions for Electricity Infrastructure Servicing and Clearances

- Section 80E RMA allows the council to include "related provisions, including objectives, policies, rules, standards and zones that support or are consequential on the MDRS" in an IPI (s80E(1)(b)). Related provisions includes provisions that relate to infrastructure, among other things (the list provided is also not exhaustive, being "without limitation") (s80E(2)(d)).
- Orion proposes two additional standards, as related provisions, in order to address the issues related to network upgrades and location of electricity distribution assets discussed above. These proposed standards are not a "density standard" (as defined in Sch3A) and do not make MDRS less enabling of development. Rather, they are additional related standards which are necessary to ensure that new development will be adequately serviced and to maintain clearances ensuring the resilience and operations of the electricity distribution network is not compromised by MDRS.
- 35 The standards proposed are shown in Table 2 below:

Electricity
servicing
standard
standard

For any development of three or more residential units:

• The development must provide sufficient vacant land area (of no less than 4m²) along a road frontage of the site for the location and operation of any electricity distribution equipment required to service the development, if required by the electricity distribution network operator (Orion).

18

⁹ Christchurch District Plan, 11.4.3, RD1.

Specific land area requirements for electricity infrastructure are to be determined through engagement with Orion prior to detailed design of the units.

Where a proposed development does meet the requirements above, and acceptance of this non-compliance has not been provided by Orion, the activity shall be a discretionary activity.

Any application arising from this standard shall require limited notification to Orion.

Electricity clearance compliance standard

Any building or structure shall comply with the following clearances around existing 230V, 400V and 11kV electricity lines:

Existing electricity lines clearance standard			
Line Voltage	Minimum distance for buildings and structures beneath lines under normal conditions (m)		
Not exceeding 1kV (such as 230V or 400V)	4	<u>3.5</u>	
Exceeding 1kV, and up to 11kV	<u>5.5</u>	<u>5</u>	

Where a proposed building or structures does meet the requirements of above, the activity shall be a restricted discretionary activity.

Any application arising from this standard shall require limited notification to Orion.

Advice note: Orion can be contacted to confirm line voltage.

Table 2: Proposed Electricity Servicing and Clearance Compliance Standards

Orion notes that a full s77I style analysis is not required for related provisions incorporated under s80E RMA. Nevertheless, the following analysis and comments are provided.

In relation to the Electricity Clearance Standard

- Orion has considered whether Plan users and implementation of the Electricity Clearance Standard would be assisted by inclusion of affected lines on District Planning Maps. The lines covered by the Standard make up the 90-95% of all overhead power lines in Christchurch City (with the remaining 5-10% being those sub-transmission lines subject to the SEDL corridor QM). They traverse down many roads and streets, and across communities to provide electricity.
- On balance, Orion suggests it is unnecessary to include these lines on the planning maps. This is because under the framework Orion seeks, a power line will either be

covered by the SEDL corridor QM, or it will be covered by the Electricity Clearance Standard. If any given line does not appear under the SEDL corridor QM in the planning maps, plan users can infer it is covered by the Standard. Because of the prevalence of these lines – and the fact they do not fit within the QM regime - their inclusion in planning maps would be likely to overly complicate the maps and reduce usability.

- Where necessary, information on these lines can be readily obtained by Plan Users by contacting Orion on a case-by-case basis. Orion has a large customer service team at our Christchurch Office and can (and frequently already does) provide network information to developers and the public to assist in their projects. Once a site address is provided, Orion can confirm almost instantly the voltage of any implicated lines. Providing electricity network information to those looking to develop their sections and land is nothing new.
- Orion considers that it is artificial to view inclusion or accommodation of the electricity clearance related matter standard as "preventing" a level of development that would otherwise be enabled by the MDRS and Policy 3. This is principally because in the absence of this Standard 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. The distances specified in the electricity lines clearance standard are entirely based on the clearances in NZECP34:2001. Even if the electricity lines clearance standards are not carried through or accommodated as a related provision, NZECP34:2001 must still be complied with. While the Operative District Plan does not include a specific standard setting out clearances that must be maintained around existing lines (like it does for SEDLs), it does require that NZECP34:2001 must be complied with.
- In this regard, Orion emphasises that this fact does not undermine the argument for or need to accommodate the Electricity Clearance Standard as a related matter. On the contrary, it reinforces the importance of their inclusion. This is because in Orion's experience including the electricity clearance provisions 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 NZECP34:2001 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.
- Accordingly, in proposing this standard, Orion is not seeking to introduce new land use restrictions. On the contrary, Orion is simply seeking that existing clearance requirements are given greater prominence and visibility. 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 safety around electrical hazards.
- Orion also notes that there is a consenting pathway proposed for development that does not meet these clearances. This pathway is based on the fact that in some cases an overhead lines clearance assessment by a suitability qualified engineer may

confirm it is safe and appropriate for smaller clearances to apply. Orion acknowledges this, and has proposed the consenting pathway accordingly.

- Orion also notes that because these clearances already apply as part of NZECP34:2001, and SEDL corridors are currently included in the Operative Plan (with consents required where clearances are not met), application of the Standard (and potentially consenting) after notification of the MDRS but before the ISPP concludes would not be problematic. Orion, Council and developers are already managing clearances and consents in relation to SEDLs. The Clearance Standard proposes a similar process with the only difference being smaller clearances and a more enabling activity status applying under the proposed Standard than what applies under the existing SEDL corridor provisions.
- Notwithstanding that site-by-site analysis and mapping of areas subject to a "related matter" is not required under s80E RMA, Orion provide an example below of how the proposed Electricity Clearance Standard may affect a residential zoned area. It is important to note that a generally only a slither of land at the front of a site is affected where lines are currently located immediately adjacent to private property in the road reserve / berm. In the vast majority of cases, this effect is similar to a standard front boundary setback that applied pre MDRS. Where sites have been subdivided (and / or rear sections otherwise created), clearance areas run over a larger area to access rear lots in order to supply electricity.



Figure 11: Example of land affected by Electricity Clearance Standard in residential area.

- In terms of land affected, it is important to remember that many areas in Christchurch do not have an overhead electricity supply and the Clearance Standard area is effectively a worst-case scenario. Significantly smaller clearances can apply, provided an engineering assessment is obtained and a consent process followed.
 - Ultimately, the costs of imposing the clearance limits as part of the MDRS process are negligible given compliance must already be achieved. However, there are

significant benefits to the protection of clearances as a related matter - as electricity supply is protected and enabled, and safety is promoted.

In relation to the Electricity Servicing Standard

- The land area required for onsite electricity servicing is highly site-specific. Orion has proposed a 4m² land area balancing the size of equipment most frequently required against the ability of landowners and developers to plan for the development of their sites. Ultimately, through engagement between Orion and the developer, it may be possible that the required area is reduced and / or it can be moved away from a front boundary. This is reflected in the Standard in that the land area must be reserved "if required" by Orion. In many cases, it is likely that a smaller area will be needed (if an area is required at all).
- The location of future electricity distribution equipment and infrastructure cannot be mapped and the footprint / area requirements not precisely defined. Both are entirely driven by electricity demand which itself is a product of land development (over which Orion has no control). Accordingly, it is not possible to calculate the area of residentially zoned land or MDRS enabled development that may be affected by proposed Electricity Servicing Standard.
- 50 The Standard is designed to cause meaningful engagement between developers and Orion early on when land use change intensification is in initial planning stage. In Orion's experience, early engagement is highly beneficial for both developers and infrastructure providers, as it reduces the risk of site design needing to be amended to account for infrastructure after designs have already been prepared and / or reduces the risk of poor infrastructure outcomes (with assets forced into the berm- at risk from traffic and to the frustration of corridor managers).

Orion acknowledges the Operative Plan does not include any requirements similar to the proposed Standard. Both Orion and developers bear the negative consequences of this on a regular basis. That said, where it does occur, early engagement between developers and Orion does lead to improved outcomes. When approached about a development at an early stage, Orion is very willing and able to assist developers with servicing requirements. Ultimately, this achieves better outcomes for all parties – whether Orion, developers, corridor managers and the general public.

Other

- Orion highlights two other key aspects of the Draft Plan Change that are potentially problematic from an infrastructure perspective:
 - 51.1 <u>Subdivision near SEDL Lines and Corridors</u>: The Operative Plan includes a number of provisions controlling subdivision near SEDLs.¹⁰ Orion understands these provisions are not directly affected by the MRDS and Draft Plan Change. If these provisions are in fact implicated in the MRDS Plan Change, we note that these matters should be considered an existing qualifying matter (on a similar basis to the existing SEDL corridor land use provisions).
 - 51.2 <u>Financial contributions and trees:</u> Orion understands that as part of the Draft Plan Change, Council are proposing to introduce Financial Contributions that

¹⁰ Operative Christchurch District Plan, Chapter 8, Rule 8.5.1.3, RD5.

will ultimately be used to plan Trees on Council owned land. ¹¹ Orion welcomes the requirement that any Trees planted in relation to proposed Financial Contributions are to be planted on Council owned land. Trees and vegetation can have significant impacts on infrastructure (whether overhead or underground). It is critical that any Trees are not planted in a location (such as berms) which will cause conflicts with infrastructure.

51.3 <u>Commercial zone rules:</u> Orion notes that the Council proposes amendments to Commercial zone rules as part of the Proposed Plan Change. There may be consequential amendments required to those zone provisions to provide for the matters discussed above. Orion would welcome the opportunity to discuss this with Council further.

Final Comment

Orion appreciates the opportunity to work with Council in relation to all of the matters addressed above. We are very happy to provide additional information as would assist Council, and to discuss the Draft Plan Change further.

Kind regards,

David Owen

Land and Planning Advisor

DDI: +64 3 363 9808 david.owen@oriongroup.co.nz

oriongroup.co.nz

Orion

Orion New Zealand Ltd

NPS-UD Plan Change – Draft Financial Contribution Rules – available at https://ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/district-plan/Proposed-changes/2022/PC14/Financial-Contributions-Draft-amendments.PDF

Appendix 1:

SEDL Corridor QM Area

Legend

SEDL corridor in residetial zones

CCC District Plan residential zone





