Memo

To: Nicola Rykers, Justine Ashley, Benjamin Rhodes

From: Rodney Yeoman, Associate Director

Date: 30 October 2019

Re: Selwyn District Plan Review - Electricity Protection Yards and Corridors

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Introduction

The purpose of this memo is to summarise the evidence/research base that relates to economic matters associated with the Electricity Transmission Line Protection Yards and Corridors ("ETLPC") which are proposed in the Selwyn District Plan Replacement ("DPR").

Scope

The national grid of high-voltage electricity transmission lines is nationally significant infrastructure, which facilitates the movement of bulk power from generators (predominately in South Island and rural areas) to major consumers (mainly in the North Island and in urban areas). The efficient transmission of power facilitates a large proportion of the national economy. The transmission lines are also inherently dangerous, which means that activities near them need to be managed. In 2008 the Government released a National Policy Statement on Electricity Transmission ("NPSET") that requires councils to consider protections for high voltage transmission lines and associated structures.[1]

There are also lower voltage subtransmission lines which distribute power within the regions and districts. While these subtransmission lines are not covered by the NPSET, they are regionally significant infrastructure. The subtransmission lines have important roles in the local economies in each district, but also produce safety concerns to the community. While there are a range of national standards that govern activity on or near these lines, in some instances there may be benefits from councils introducing rules to create a protection corridor associated with the subtransmission lines.

Selwyn District Council ("SDC") is undertaking a review of the District Plan, part of which includes the changes to the provisions to account for the transmission lines (NPSET) and subtransmission lines. There are a number of high-voltage transmission lines that traverse Selwyn District, which facilitate the transmission of power from south of the District to consumers north of the District (Christchurch and beyond). There are also lower voltage subtransmission lines that distribute power around the District, which then is supplied to the local community. SDC has consulted with the key operators of

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[1] Ministry for the Environment (2008) National Policy Statement on Electricity Transmission.

high voltage transmission lines (Transpower) and lower voltage subtransmission lines (Orion and Transpower) and developed a preferred option for protecting the transmission lines in the DPR.

The key purpose of this memo is to consider the costs and benefits associated with the proposed changes in the ETLPC in the DPR, as compared to the operative District Plan. The following steps have been undertaken in this assessment,

- Review of existing research on the economic case for ETLPC,
- Discussion of the proposed ETLPC in the Selwyn DPR, and
- Application of the economic case to the proposed ETLPC.

Economic Case for Electricity Transmission Line Protections

A key step in this memo is to review the existing research and material available on protections of transmissions lines. This review is of research that has been conducted by Ministry for the Environment ("MFE"), Transpower and Orion. The review of the economic case for the ETLPC included the following documents,

- Ministry for the Environment (2008) National Policy Statement on Electricity Transmission.
- Ministry for the Environment (2010) National Policy Statement on Electricity Transmission: Implementation Guidance for Local Authorities.
- Ministry for the Environment (2010) National Policy Statement on Electricity Transmission: Further Guidance on Risks of Development near High-voltage Transmission Lines.
- Copeland, M. (2013) Assessment of the Economic Benefits and Costs of the using Transpower's Proposed Approach to Implementing Policies 10 and 11 of the national Policy Statement on Electricity Transmission in District and City Plans. – Prepared for Transpower.
- Ministry for the Environment and Ministry for Business, Innovation and Employment (2019) Evaluation of the National Policy Statement on Electricity Transmission and National Environmental Standards for Electricity Transmission Activities.
- Transpower (2018) Transpower Assets Selwyn District – Map.
- Orion (2018) Regional Distribution Corridor Selwyn District – Maps and corridor Diagrams.
- Orion (2019) Selwyn District Plan Supporting Document – Corridor Protection.
- Chapman Tripp (2019) Legal Opinion Regarding Proposed Protections for Electricity Distribution Assets in Selwyn District Plan – for Orion New Zealand Limited.
- Butcher, G. (2015) Statement of Evidence – Independent Hearings Panel Christchurch Replacement District Plan – for Orion New Zealand Limited.

In summary, the NPSET, the MFE Guidelines and Mr Copeland's report outline the costs and benefits associated with the national significant transmission lines and the potential protection of these lines

via 'Yards' and 'Corridors'. The outlined benefits and costs, as well as the ways in which these accrue to the community, are uncontroversial. In broad terms the documents provide sufficient evidence confirming that transmission Yards and Corridors are likely to provide positive benefits at the national level to support protection of the national grid that transmits bulk high-voltage power.

However, the documents do not refer to Selwyn District or provide any detailed economic assessment for the District. Also, none of the documents refer to subtransmission lines or local lines that distribute lower voltage power to supply local needs.

Transpower and Orion have both provided maps of the district, which show the location of their network of transmission lines. The maps show that,

- Transpower has five high-voltage transmission lines (220kV and 350kV) that traverse east-west straight through the District, mostly in rural zones. The route represents the purposes of these lines – i.e. to transmit bulk power efficiently from the generators that are south of the District to consumers that are north of the District.
- Transpower has a lower voltage subtransmission line (66kV and 110kV) that follows the valleys of the high country and then snakes across the foothills and northern plains of the District. Again, this route also indicates the purpose of this line which includes distribution of lower voltage power to the local communities in the high country and northern areas of the District.
- Orion has a lower voltage subtransmission line (66kV) that connects the substation at Springston to the major substation at Islington. Again, this route also indicates the purpose of this line which includes bringing lower voltage power into the southern part of the District ("spur" line[2]).
- Orion also has a web-network of single circuit lines (all currently at 33kV) that extend out from the Springston substation. Again, this network also indicates the purpose of these lines which includes distribution of lower voltage power to substations around the District ("arterial" lines[3]), which is then supplied directly to consumers via the local wires.

Clearly each line indicated in Transpower and Orion maps has different levels of power being transmitted and different purposes. The level of power transmitted, and the end use of the power in each line will have implications for the costs and benefits that are associated with protection of each line.

For example, it is apparent that the safety issues associated with Transpower's high-voltage transmission lines will be different from the lower-voltage lines in Orion's arterial network. The high-voltage lines are inherently more dangerous, but those lines tend to cross rural zones so there is lower chance of an accident impacting people in the community. While Orion's lower voltage arterial

[2] Orion (2019) Selwyn District Plan Supporting Document – Corridor Protection.
[3] Ibid.

network is inherently less dangerous, but the lines tend to cross more closely to urban areas (and have less ground clearance) so there is a higher chance of an accident impacting people in the community.

Likewise, it is clear that most of the power transmitted by Transpower's high-voltage transmission lines simply traverses the District, and will have little implication for economic activity in the District. However, these lines are of significant importance to the national economies. Conversely, Orion's lower voltage arterial network transmits power to the local residents and businesses, which has obvious implications for economic activity in the District. These lines have significant importance to the regional economies.

Orion has also provided legal and planning opinions on the potential protections for its network in the District. We have also sourced Mr Butcher's economic assessment of Orion's network in Christchurch, which is relevant because it relates to similar provisions and planning process (i.e. Christchurch District Plan).

Orion's economic evidence is similar to Transpower's assessment, as they both consider the same range of costs and benefits. The main difference between their assessments is that Orion's economist provides quantification of the costs and benefits at the district level (rather than national level). This is understandable as each economist was tasked with assessing very different networks, Orion's local network (Mr Butcher) as compared to Transpower's national grid (Mr Copeland). We consider that both approaches are not inconsistent. However, in the case of Selwyn District it is more sensible to apply Mr Butcher's assessment method.

The reminder of this memo briefly outlines the proposed ETLP in the DPR and establishes the potential costs and benefits of the proposed protections in the Selwyn District.

Proposed Electricity Transmission Line Protections

The proposed ETLP utilises a range of set-backs, which restrict activity within certain distances of the lines and structures that make up the electricity infrastructure. The following 'Yards' have been defined by set-backs from the centre point of the lines and the base of towers/poles have been proposed[4],

- High-voltage transmission lines (220kV and 350kV): 12 metres setback is proposed for Transpower's national grid,
- Lower voltage subtransmission line (66 kV and 110kV): 12 metres setback is proposed for Transpower's distribution lines,
- Lower voltage subtransmission line (66 kV): 10 metres setback is proposed for Orion's double-circuit distribution lines, and

[4] Selwyn District Council (2019) 002 SDC DPR – Transpower and the National Grid – Briefing Note.
Selwyn District Council (2019) 002 SDC DPR – Orion and Significant Electricity Distribution Lines – Briefing Note.

- Lower voltage subtransmission line (33 kV): 5 metres setback is proposed for Orion's single-circuit distribution lines.

In summary, activities that could potentially compromise the integrity of the electricity infrastructure or be harmed are controlled in the 'Yard' area, with everything else being permitted. The proposed sets of rules associated with trees, fences and earthworks are broadly similar for areas within the set-backs and are based on standard codes of practise which should not result in additional costs or benefits.

The rules on sensitive activities and buildings within the Yards may, in some cases, be more stringent than the national legislative and regulative rules.[5] However, in other instances the rules in the DPR provide greater setbacks (see Mr Butcher's discussion at para [14] to [16][6]).

Also, Transpower and Orion have requested additional restricts on subdivisions within 'Corridors' outside of the 'Yard'. An existing land holder is allowed to construct dwellings in this additional buffer area, as long as they do not subdivide (i.e. building activity is deemed safe). This implies that the Corridor buffer is intended to facilitate operations, by allowing line operators to submit on the subdivision patterns (and related earthworks) to ensure that access to the lines is maintained (i.e. for repair and maintenance). The following 'Corridors' have been proposed,

- High-voltage transmission lines (350kV): 39 metres buffer is proposed for Transpower's national grid,
- High-voltage transmission lines (220kV): 37 metres buffer is proposed for Transpower's national grid,
- Lower voltage subtransmission line (66 kV): 14 metres buffer is proposed for Transpower's distribution lines, and
- Lower voltage subtransmission line (66 kV and 33kV): 14 metres buffer is proposed for Orion's distribution lines.

Selwyn District Electricity Transmission Line Protections Costs and Benefits

This memo assesses the costs and benefits of the proposed ETLPC, using the methods applied by Mr Butcher (and Mr Copeland) along with information provided by SDC, land use analysis[7] and GIS setback layers[8], which indicates the numbers of properties impacted by the proposed 'Yards' and 'Corridors'.

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[5] Selwyn District Council (2019) Energy and Infrastructure – Orion Protection Corridors. Preferred Option Report to District Plan Committee 27 March 2019.
[6] Butcher, G. (2015) Statement of Evidence – Independent Hearings Panel Christchurch Replacement District Plan – for Orion New Zealand Limited.
[7]Selwyn District Council (Undated, supplied in 2019) Orion Proposed Protection Corridors; Review of Activities and Structures within Protection Corridors and the Immediate Locality
[8] Selwyn District Council (2019) GIS layers of Orion and Transpower Networks, ODP zones and Parcels.

Benefits of ETLPC

First, this memo discusses the types of benefits that accrue from ETLPC and how they differ for each of the electricity line operators. The following list of benefits has been adopted, which is consistent with Mr Copeland[9] and Mr Butcher[10] assessments,

i. Reduced inspection, operation, maintenance, replacement and upgrade costs;
ii. Reduced outages; and
iii. Improved safety to persons and property.

Most of the benefits associated with the potential electricity transmission yards and corridors are private, accruing directly to the transmission line operator (more efficient network) and power consumers (energy security, lower line fees). There will also be public benefits in terms of safety improvements.

The benefits associated with Transpower's transmission lines will mostly accrue to the community outside of the District, being a benefit felt nationally and regionally. The vast majority of the power that is transmitted by Transpower's lines is generated and consumed beyond the boundary of the District. Therefore, it is likely that (most of) the benefits from reduced outages and operation costs will accrue to communities outside the District. However, there will be benefits that are retained in the District, which will mainly relate to potential reductions in the costs of power for local consumers as a result of a more efficient national network.

Most importantly for the local community is the safety improvements that are associated with the protection of Transpower electricity transmission lines. While the high-voltage transmissions lines represent a low risk of impacting humans[11], they have a high consequence (fatal). The transmission line yards will result in reduced chance of an accident or harm to the local community.

The benefits associated with Orion's subtransmission lines will mostly accrue to the community in the region, being a benefit felt regionally and locally. Much of the benefits of reduced outages and operation costs will accrue to the local community in the District, and to a lesser degree the community in the region. The District community will potentially benefit from reductions in the costs of power for local consumers as a result of a more efficient network and less risk in terms of outages.

Most importantly for the local community is the safety improvements that are associated with the protection of Orion's electricity subtransmission lines. While the subtransmission lines represent a

[9] Para [16].
[10] Paragraph [17] to [21].
[11] Acts of God resulting in a conductor (line) falling or unintentional contact with the lines. Also most of the lines run through rural areas, where there is limited chance of community interacting with the lines.

low risk of impacting humans[12], they have a high consequence (fatal). The transmission line yards will result in reduced chance of an accident or harm to the local community.

This memo has adopted Mr Butcher's method to provide a high-level quantification of the benefits. The benefits have been assessed in terms of District and non-district. The assessment was conducted separately for transmission and subtransmission, as well as the Yards and Corridors. Table 1.1 shows the results of the high-level assessment of benefits which provides the following key findings,

- The ETLPC could produce around $1.34 million for the District and $3.80 million for the rest of New Zealand. In total the national value may be $5.14 million.
- Most of the benefits generated in the District are related to the Subtransmission lines Yard (approx. 56%),
- All the benefits generated in the rest of New Zealand are related to the Transmission lines,
- The Yards for both the Transmission and Subtransmission lines produce most of the benefits (approx. 87%),
- The Corridors for both the Transmission and Subtransmission produce relatively small benefits (approx. 13%).

Table 1.1: Benefits Assessment of ETLPC - $ million NPV

Benefits ($m - NPV*)	Selwyn District	Rest of NZ	Total National
Transmission Yard (12 metre)			
Improved Efficiency	$0.01	$1.53	$1.55
Reduced Outages	$0.01	$1.75	$1.77
Improved safety	$0.41	$0.00	$0.41
Total Transmission Lines Yard	**$0.44**	**$3.29**	**$3.73**
Transmission Corridor (39, 37, 14 metre - subdivision)			
Improved Efficiency	$0.00	$0.51	$0.52
Total Transmission Corridor	**$0.00**	**$0.51**	**$0.52**
Subtransmission Yard (5 and 10 metre)			
Improved Efficiency	$0.44	$0.00	$0.44
Reduced Outages	$0.01	$0.00	$0.01
Improved safety	$0.30	$0.00	$0.30
Total Subtransmission Yard	**$0.75**	**$0.00**	**$0.75**
Subtransmission Corridor (14 metre - subdivision)			
Improved Efficiency	$0.15	$0.00	$0.15
Total Subtransmission Corridor	**$0.15**	**$0.00**	**$0.15**
Total ETLPC Provisions	**$1.34**	**$3.80**	**$5.14**

**Discount rate of 5%*

[12] Again, Acts of God resulting in a conductor (line) falling or unintentional contact with the lines. Also most of the lines run through rural areas or along road reserves, where there is limited chance of community interacting with the lines. However, there are some instances where the lines come into close proximity to urban areas.

The benefits assessment shown in the table above have been based on the following assumptions,

- Net Present Value: annual values have been converted to Net Present Value (NPV) using a Discount rate of 5% and assuming that benefits are in perpetuity (as applied by Mr Butcher). The 5% discount rate is fairly standard; however it is common to test sensitivity of the estimation using lower and higher discount.[13] The assessment extends well beyond the life of the District Plan, which is typically a decade. Again, it is wise to test the sensitivity of the estimation using short time periods that match the length of the planning horizons associated with the DPR (10 and 20 years).[14]

- Improved Efficiency: was estimated using Mr Butcher's assumptions on the maintenance savings per span if there are no underbuilds ($2,000), incidence of maintenance (3% per annum) and an average span distance (150 metres). This memo has also drawn on SDC estimates of the proportion of each network that is within private property (85% for Transmission lines and 17% for Subtransmission), as opposed to the road carriageway.

  Combining Mr Butcher's assumed cost savings with the transmission and subtransmission lines that traverse private land shows that the value of costs savings per annum could be $0.08 million (Transmission Yard) and $0.02 million (Subtransmission Yard). Unfortunately, there is no economic assessment of the cost savings associated with either of the Corridors (neither Mr Copeland nor Mr Butcher estimate the benefits of a Corridor). In the absence of any evidence on the impact of the Corridors, it is assumed that it is less than the savings received from the Yards (one third) or less than $0.03 million per annum for Transpower's lines and $0.01 million per annum for Orion's lines.

  The savings associated with Transpower lines will accrue mainly to customers – pro rata with lower lines fees. In this memo the savings are attributed between the District and the rest of New Zealand according to the relative scale of economic activity in 2017 (excluding agriculture).[15] All savings associated with the Orion network are assumed to remain in the District.[16]

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[13] The overall findings set out in the conclusion of this report are not sensitive to the discount rate. For this memo the discount rate has been varied to 4% and 6%, the findings from the high-level assessment stays the same.

[14] The overall findings set out in the conclusion of this report are not sensitive to the time period selected. For this memo the time period has been varied to 10 and 20 years, the findings from the high-level assessment stays the same.

[15] Stats NZ Regional GDP and MBIE Modelled Territorial Area 2017 data indicates that Selwyn District has 1% of the economy north of the Rakaia. Therefore, it is assumed that 1% of the savings from the Transpower corridor accrues to the District and 99% flows to areas north of the District.

[16] It is acknowledged that some of the savings may flow out of the District to other Orion customers in the rest of the region and as profits to shareholders of Orion.

- Reduced Outages: the economic assessments conducted by Mr Butcher and Mr Copeland do not quantify the value of reduced outages. Both economists provide examples of recent cases, however conclude that it is difficult to estimate the value.

  In this memo an indicative method has been adopted to provide an understanding of the potential value. First, Mr Butcher notes that there is redundancy in the system such that in most instances (80%) there are ways to re-route power to supply customers, such that there is no interruption for these customers. Second, it is estimated that non-agricultural businesses in the District produce approximately $0.4 million in GDP per daytime hour.[17] The economy north of Selwyn District is assumed to produce around $55 million in GDP per daytime hour.[18] Third, it is assumed that an incident occurs once every 50 years, which lasts for four hours and impacts 10% of the network. Finally, it is assumed that there are no reduction in outages from the Corridors.

  Combining these assumptions provides an estimate of the cost of reduced outages of $0.09 million per annum for Transpower's transmission lines[19] and less than $0.01 million per annum for Orion's subtransmission lines.

- Improved safety: was estimated using Mr Butcher's assumptions on the potential risk of death (1 in 500 years) and the latest Treasury value of a life ($4.71 million)[20]. These values have been applied *pro rata* according to the relative length of the transmission lines in Christchurch (150km) as compared to Selwyn District, 240km for Orion's assets and 330km for Transpower. Based on Mr Butcher's approach the safety improvements could be valued at $0.02 million for both Transpower's transmission lines and Orion's subtransmission lines. It is noted that while this estimate of the safety impacts is rough, the value is relatively small. Finally, it is assumed that there are no safety improvements from the Corridors.

The ETLPC are likely to produce real benefits to the District, region and nation.

Costs of ETLPC

Second, this memo discusses the types of costs that accrue from ETLPC and how they differ for each of the electricity line operators. The following list of costs has been adopted, which is consistent with Mr Copeland[21] and Mr Butcher[22] assessments,

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[17] MBIE Modelled Territorial Area – shows non-agriculture GDP of $1.6 billion per annum. Apply this value evenly across 365 days and 12 daytime hours, provides an estimate of approx. $36,000 of GDP per daytime hour.
[18] Stats NZ Regional GDP – shows non-agriculture GDP of $241.6 billion per annum. Apply this value evenly across 365 days and 12 daytime hours, provides an estimate of approx. $55.2 million of GDP per daytime hour.
[19] This value is attributed to Selwyn District and the rest of New Zealand based on the relative size of economic activity – i.e. Selwyn District has 1% of the economy north of the Rakaia, therefore 1% of the interruption costs are allocated to the District and 99% is allocated to the rest of New Zealand.
[20] Treasury New Zealand (2018) CBAx assessment tool assumptions.
[21] Para [18].
[22] Paragraph [22]-[27].

i. Reduced flexibility in land use;
ii. Spill over implications for the wider economy; and
iii. Consenting costs.

The transmission and subtransmission Yards both place limits on how land can be used. However, the potential costs are limited by the following three aspects of the Yard rules,

- Non-sensitive activities are generally permitted in the Yards. For the most part, both yards are either along roadways or through rural areas which means that most activities that could be expected in these locations will not be constrained by the Yards (with the exception of buildings in the Orion Yard). The largest costs will occur where the Yards come into close proximity to the existing urban areas or growth areas. There may also be costs to rural landholders, where buildings and fences may need to be sited outside the Yards.
- The provisions in the Yards only affect new activities, all existing activities will be unaffected.
- It is still possible to apply for consent to undertake any activity within the Yards. If it can be shown that this activity does not adversely affect public safety and access requirements then a consent may be obtained.

The likely costs associated with the reduction of land use flexibility is likely to be limited for Transpower's Transmission lines (mainly in rural areas) and Orion's Subtransmission lines (mainly on roadways and rural areas).

However, there will be some costs associated with the Yards and the Corridors in the areas of the District that have potential for future development for sensitive uses. This is mainly around the edges of the existing urban areas and to a lesser degree the areas that could be used for rural residential.

The spill over costs to the wider economy are related to the level of activity that is impacted by the reduction in land use flexibility. However, it is not likely to be a one-to-one relationship, as it is likely that land users will either re-situate the activity within their land or the activity may be transferred to another location in the District. Therefore, it is likely that the spill over costs to the wider economy will be a small fraction of the lost land use flexibility.

Finally, there are potential consenting costs associated with developments that fall within the Corridors. For example, any new subdivision that occurs within 14 metres of Orion's single circuit lines would be Restricted Discretionary. This may create an additional cost on land holders during the subdivision process.

This memo has adopted Mr Butcher's method to provide a high-level quantification of the costs. The costs have been assessed in terms of District and non-district. The assessment was conducted separately for transmission and subtransmission lines, as well as Yards and Corridors. Table 1.2 shows the results of the high-level assessment of costs which provides the following key findings,

- The ETLPC could produce around $3.03 million in costs to the District (and the nation).

- Most of the costs generated in the District are related to the Transmission Yard (approx. 66%) and Subtransmission Yard (approx. 24%),
- The remaining 10% of the costs are associated with the Corridors, which mainly relates to the large area (1,253 ha) of land impacted by the buffer.

Table 1.2: Costs Assessment of ETLPC - $ million NPV

Costs ($m - NPV*)	Selwyn District	Rest of NZ	Total National
Transmission Yard (12 metre)			
Reduced Land Use	$1.68	$0.00	$1.68
Spillover to Wider Economy	$0.34	$0.00	$0.34
Consenting Costs	$0.00	$0.00	$0.00
Total Transmission Lines Yard	**$2.01**	**$0.00**	**$2.01**
Transmission Corridor (39, 37, 14 metre - subdivision)			
Reduced Land Use	$0.10	$0.00	$0.10
Spillover to Wider Economy	$0.02	$0.00	$0.02
Consenting Costs	$0.03	$0.00	$0.03
Total Transmission Corridor	**$0.15**	**$0.00**	**$0.15**
Subtransmission Yard (5 and 10 metre)			
Reduced Land Use	$0.61	$0.00	$0.61
Spillover to Wider Economy	$0.12	$0.00	$0.12
Consenting Costs	$0.00	$0.00	$0.00
Total Subtransmission Yard	**$0.73**	**$0.00**	**$0.73**
Subtransmission Corridor (14 metre - subdivision)			
Reduced Land Use	$0.09	$0.00	$0.09
Spillover to Wider Economy	$0.02	$0.00	$0.02
Consenting Costs	$0.03	$0.00	$0.03
Total Subtransmission Corridor	**$0.14**	**$0.00**	**$0.14**
Total ETLPC Provisions	**$3.03**	**$0.00**	**$3.03**

**Discount rate of 5%*

The costs assessment shown in the table above have been based on the following assumptions,

- Reduced land Use: was estimated using Mr Butcher's assumptions on rural land value impacts[23], average value of urban land in the District[24], and GIS estimates of the proportion of each of the ETLPC that is within private property, as opposed to the road carriageway.

  Combining the assumed rural land values and urban values urban with the GIS land areas in each ETLPC, indicates that the Districts private land that could be impacted by the in the Yards has a value of $23 million (Transmission) and $10 million (Subtransmission). The Corridors impact land worth $25 million (Transmission) and $32 million (Subtransmission).

  Mr Butcher's assessment (conservatively) assumes that 10% of the rural value of the land in the Yard could be impacted. He did not assess urban land in his evidence, in this memo it is assumed that the corridors impact 5% of the urban value of land in the corridors. Applying these assumptions to Selwyn District corridors indicates that land values may (at

[23] Butcher, G. (2015) Statement of Evidence – Independent Hearings Panel Christchurch Replacement District Plan – for Orion New Zealand Limited.
[24] MBIE and MFE (2019) Urban Development Capacity Dashboard – Selwyn District.

most) decrease by approximately $1.7 million (Transmission Yard) and $0.6 million (Subtransmission Yard).

Unfortunately, there is no economic assessment of the costs associated with the subdivision Corridors (neither Mr Copeland or Mr Butcher mention a buffer). In the absence of any evidence on the impact of the subdivision buffer, it is assumed to be much less than the costs associated with the Yards (5%), which indicates a cost of approximately $0.1 million for the District for each of the Corridors.

It is acknowledged that the assessment above is relatively coarse (zone level) and is based on assumed land values. [25] It would be possible to assess (at a parcel level) the land use and value that are impacted by the ETLPC (which is beyond the scope of this memo). However, it is likely that a detailed assessment would yield fairly similar results as the coarse assessment. The method applied in the high-level assessment is conservative, which is likely to overestimate the costs. As such, a detailed assessment may not add much value to the overall assessment of the ETLPC. M.E is available to conduct more detailed assessment if required.

- Spill over to the economy: the economic assessments conducted by Mr Butcher and Mr Copeland do not quantify the value of spill over costs. Both economists provide examples of costs, however conclude that it is difficult to estimate the value.

  In this memo an indicative method has been adopted to provide an understanding of the potential value. It is assumed that 1% of the lost land value accrues as lost economic activity per annum. Indicatively, spill over to the economy may be $0.02 million per annum for Transpower's transmission Yard and $0.01 million per annum for Orion's subtransmission Yard.

- Consenting Costs: were estimated by assuming that subdivision is marginally more expensive per dwelling in the subtransmission subdivision Corridors. It is assumed that there are no additional consenting costs in the Yards, as subdivision in these areas is already governed by national safety rules. The subdivisions within the Corridors are assumed to have additional consenting cost, which is assumed to be marginal additional cost of $100 per subdivided property. Conservatively, it is assumed that 20% of the growth in the District occurs in the Corridors.[26] This results in an additional consenting cost of $0.002 million per annum.

The ETLPC are likely to produce real costs to the District. The high-level assessment provides an indication of the potential scale of these costs.

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[25] For example, the impact on rural land is estimated using Mr Butcher's value of rural land in Christchurch and Banks Peninsula. Land values and land uses are different in Selwyn District.

[26] Note: this assumption is not based on a GIS assessment of growth areas. It is likely that an GIS assessment would result in an estimate of much less than 20% of growth being affected by the Corridors.

Net Position of ETLPC

Table 1.3 shows the comparison of the benefits and costs of the three ETLPC, for the District and the rest of New Zealand. The results show that ETLPC is beneficial for the rest of New Zealand ($3.80 million), as all of the costs accrue to the District while some benefits flow to the rest of the country.

The results also indicate that at the District level costs outweigh the benefits for two of the four ETLPC (Transmission Yard at -$1.57 million and Corridor at -$0.14 million). The Subtransmission Yard and Corridors show a positive benefit to the District ($0.02 million). In total the four ETLPC as a package produce a negative outcome of -$1.69 million for Selwyn District.

Table 1.3: Benefits and Costs Assessment of ETLPC - $ million NPV

Benefits and Costs ($m - NPV*)	Selwyn District	Rest of NZ	Total National
Transmission Yard (12 metre)			
Benefits	$0.44	$3.29	$3.73
Costs	-$2.01	$0.00	-$2.01
Position	**-$1.57**	**$3.29**	**$1.71**
Transmission Corridor (39, 37, 14 metre - subdivision)			
Benefits	$0.00	$0.51	$0.52
Costs	-$0.15	$0.00	-$0.15
Position	**-$0.14**	**$0.51**	**$0.37**
Subtransmission Yard (5 and 10 metre)			
Benefits	$0.75	$0.00	$0.75
Costs	-$0.73	$0.00	-$0.73
Position	**$0.02**	**$0.00**	**$0.02**
Subtransmission Corridor (14 metre - subdivision)			
Benefits	$0.15	$0.00	$0.15
Costs	-$0.14	$0.00	-$0.14
Position	**$0.00**	**$0.00**	**$0.00**
Total ETLPC Provisions	**-$1.69**	**$3.80**	**$2.11**

**Discount rate of 5%*

Conclusions

In conclusion, this memo has reviewed the existing economic research available on the benefits and costs associated with protection Yards and Corridors for electricity lines, both transmission and subtransmission. The memo has applied these previous studies to the Selwyn District to provide an indication of the potential benefits and costs associated with a proposed set of provisions that would protect transmission and subtransmission in the District (i.e. the ELTPC).

The assessment in this memo indicates that,

- Transmission lines Yard and Corridors that are proposed to protect Transpower's network produces a positive outcome to the nation. This is unsurprising given the national significance of the transmission lines and reflects the rationale behind the NPSET.
- Subtransmission lines Yard and Corridors that are proposed to protect Orion's network produces a (small) positive outcome to the District. This is unsurprising given the local

significance of the subtransmission lines and reflects the rationale behind the national legislation that already protects the lines.

In total, the ETLPC provisions may **not** produce a positive outcome for the local community in the District. Specifically, the assessment indicates that the overall costs of the package in the District may outweigh the benefits. However, an important caveat to the assessment in this memo is that it has been conducted based on other economists' methods (Mr Copeland and Mr Butcher), which are both based on assumptions which cannot be verified.

However, it is considered likely that the ELTPC as a package would produce positive outcomes for New Zealand.

To explain this outcome, it is instructive to take a practical example of the subtransmission lines from the District. The map in Figure 1.1 shows the proposed ELTPC for the corner of Shands and Blakes roads which is in the eastern part of the District near Christchurch. The map shows,

- Orion's the 33kV Subtransmission Line (blue line),
- proposed Yard which is 5 metres setback (yellow dotted lines),
- proposed Corridor for consideration of subdivision which is 14 metres (red dotted lines), and
- private land (boxes outlined in black and shaded grey parcels).

Figure 1.1: Subtransmission Lines Yard and Corridor Example – Shands and Blakes Roads

In this example most of the land covered by the proposed Yard setback is in the roadway, with a small slither of land impacted along the front of the properties on the north-western side of Shands road. The Yard does not extend to properties on the south-eastern side of the road.

For this location the Yard covers very little private land, which means that there are limited safety issues (i.e. safety benefits from the Yard would be small) and limited impact on the land use (i.e. most cases buildings will be set back from the boundary). Also there will be minimal (no) access issues for Orion, as they can freely access the lines from the roadway to undertake maintenance. This means that the Yard in this location would have very little impact, either positive or negative.

In terms of the proposed subdivision Corridor, this extends back into the properties on the north-western side of the road which covers a greater area of private land than the Yard. The Corridor will cause costs to the landholders, in terms of subdivision potential and consenting costs.

Conversely, it seems evident that there are no access benefits associated with restricting subdivision to the properties on the north-western side of the road (i.e. there is already free access). There also seems to be no safety benefits from this Corridor.

This practical example shows why there is potentially limited benefits and greater costs from the proposed Corridor, relative to the Yard. Notwithstanding the discussion above, Orion may provide further information on the purpose of the Corridor which could change the findings on this particular provision in the ELTPC.

Finally, it is also informative to provide an example of the Corridor that Transpower is requesting for the transmission lines, as compared to the Corridors that have recently been adopted in Auckland.

Transpower approach is to obtain a one size fits all generic Corridor width for each line, it has requested a fixed width of 39 metres for 350kV, 37 metres for 220kV and 14 metres for 66 kV. This approach is different to approach which was agreed to by Transpower and Auckland Council in 2016. In this situation the parties agreed to a Corridor with variable width that is based on a number of factors, including the length of each span and the location along the span. This method produces a significantly narrower Corridor than Transpower had initial requested. [27]

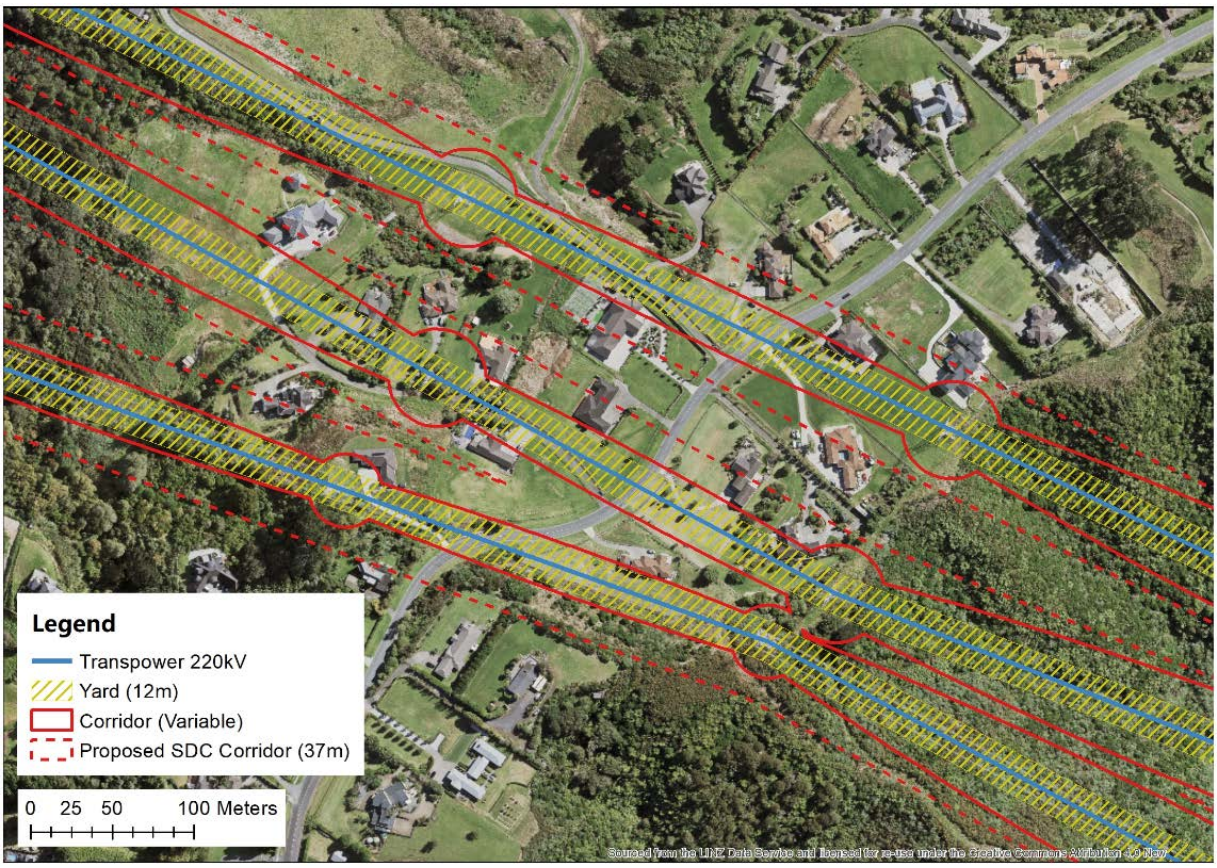
Figure 1.2 below shows Transpower 220kV Transmission lines just South of Auckland (blue lines). The map has the adopted Yard (12 metres - yellow hatch), which is the same as what is requested in Selwyn. The map also shows the adopted variable width Corridor (red line), where the width of the Corridor is greatest at the middle of each span and varies according to the length of each span (i.e.

[27] Transpower asked for the same fixed width corridor in Auckland – i.e. 39 metres for 350kV, 37 metres for 220kV and 14 metres for 66 kV. Transpower based its calculations on a series of assumptions which were considered to be excessively conservative. For example, the fixed widths was based on 85th percentile span, which means that the method produce corridors that was too wide for 85% of the spans.

short spans have smaller corridor widths). The map also shows Transpower's proposed Corridor for Selwyn District (37 metres – red dotted line).

The map shows considerable difference in land being covered by the two alternative approaches. If SDC adopts Transpower's fixed width it may result in more than double the land being impacted by the Corridor, then if a variable width approach was adopted. If a variable approach is adopted in Selwyn it is likely that the costs of the Transmission Corridors could be minimised, while maintaining most of the benefits.

Figure 1.2: Transmission Lines Yard and Corridor Example – Auckland



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