Before the Wellington City Council Proposed District Plan Hearings Panel

Under	the Resource Management Act 1991 (the Act)
In the matter of	the Wellington City Council Proposed District Plan – Hearing Stream 11: • **Ecosystems and Indigenous Biodiversity (ECO)** • **Infrastructure - Ecosystems and Indigenous** • **Biodiversity (INF-ECO)** • **Schedule 8 – Significant Natural Areas** • **Appendix 2 – Biodiversity Compensation** • **Appendix 3 – Biodiversity Offsetting** • **Appendix 15 – Ecological Assessment** • **Definitions**
Between	**Wellington City Council** Local authority
And	**Transpower New Zealand Limited** Submitter 315 and Further Submitter FS29

Statement of evidence of Sarah Shand for Transpower New Zealand Limited

Dated 28 August 2024

Executive Summary

1. Transpower New Zealand Limited (**Transpower**) operates the National Grid, which transmits electricity throughout New Zealand. Within Wellington City there are 6 substations and several high voltage National Grid transmission lines ranging from 11 kilovolts ("kV") to 350 kV. Transpower also has an interest in the West Wind Substation and has other facilities across the region such as communication assets. Three 350kV submarine cables across the Cook Strait, which transmit electricity between the North and South Islands (commonly known as 'The Cook Strait Cables'), connect in to the Oteranga Bay cable termination station. National Grid assets in Wellington City serve communities at local, regional and national levels.

2. Within Wellington City there is approximately 118km of overhead transmission lines, of which over half are located outside the urban area. Using the PDP maps as a guide, approximately 20-25km of actual lines traverse Significant Natural Areas identified in the PDP.

3. While a resilient National Grid remains at the heart of New Zealand's energy future, climate change has become a central issue. Transpower will play a critical role for New Zealand in meeting the country's climate change commitments, by both investing in its existing assets and enabling connections to new sources of renewable energy.

4. Managing the effects of vegetation on the National Grid is a continuous task for Transpower. Vegetation growing too close to existing National Grid transmission lines can pose a potential hazard to life, property and the environment, and a threat to the security and reliability of the electricity supply system. While not over-riding RMA obligations and requirements, Transpower has a legal requirement to maintain its lines to minimise any tree-related interruptions to the supply of electricity.

5. In relation to the development of new National Grid assets, Transpower adopts a progressive filtering process known as "ACRE" for identifying the preferred location of new National Grid assets. During the Area, Corridor, Route and Easement/Designation process, consideration is given to the location of the proposed infrastructure, with more negative

scoring being given to any special areas, such as Significant Natural Areas, Outstanding Natural Landscapes, Sites and Areas of Significance to Māori, and historic heritage sites.

6. Transpower wishes to see appropriate planning provisions included in the Proposed District Plan ("**PDP**") to ensure that Transpower can operate, maintain, upgrade and develop the National Grid to enable a sustainable, secure and reliable supply of electricity to the Wellington region and nationally. Alongside an appropriate regulatory framework, Transpower has adopted a Sustainability Strategy, part of which seeks to proactively manage the effects of its activities on biodiversity with an aspirational "biodiversity net gain" initiative.

7. **Ms Whitney's** evidence largely supports the officer recommendations as they relate to the National Grid, noting the NPS-IB does not apply to electricity transmission activities. On this basis Ms Whitney's evidence is confined to amending the rule framework for new National Grid assets within significant natural areas ("**SNAs**"). I concur with the amendments sought in **Ms Whitney**'s evidence.

8. The provisions Transpower seeks in Wellington City are generally consistent with the provisions Transpower seeks elsewhere around New Zealand to give effect to the NPSET.

Qualifications and experience

10. My full name is Sarah Louise Shand.

11. I am employed by Transpower as an Environmental Planner (part of the Environmental and Policy and Planning Group). My relevant experience, qualifications, and commitment to comply with the code of conduct for expert witnesses are included in **Appendix A**.

12. I confirm that I am authorised to give this evidence on behalf of Transpower.

Scope of Evidence

13. My evidence will address the following:

    a) Transpower's assets within Wellington City and the significant role these play locally, regionally and nationally
    b) Transpower's approach to manging effects on indigenous biodiversity
    c) Transpower's process for establishing new National Grid assets
    d) Transpower's Sustainability Strategy; and
    e) Conclusions.

14. This is the second PDP hearing at which I have appeared before the Hearings Panel noting that this is the first brief of evidence I have lodged.

15. A full outline of Transpower and the National Grid is provided in the Hearing Stream 1 evidence of Mr Dougall Campbell.

Transpower's assets within Wellington City

16. There are six (designated) substations and several transmission lines operating at either 11kV, 33kV, 110kV, 220kV or 350kV within and traversing Wellington City. Transpower also has an interest in the West Wind Substation and has other assets across Wellington City such as

one communication site, four links supporting the High Voltage Direct Current (HVDC) transmission line, and fibre cables.

17. These assets are shown in **Figure 1** below, and a map including a legend is provided in **Appendix B** to my evidence.

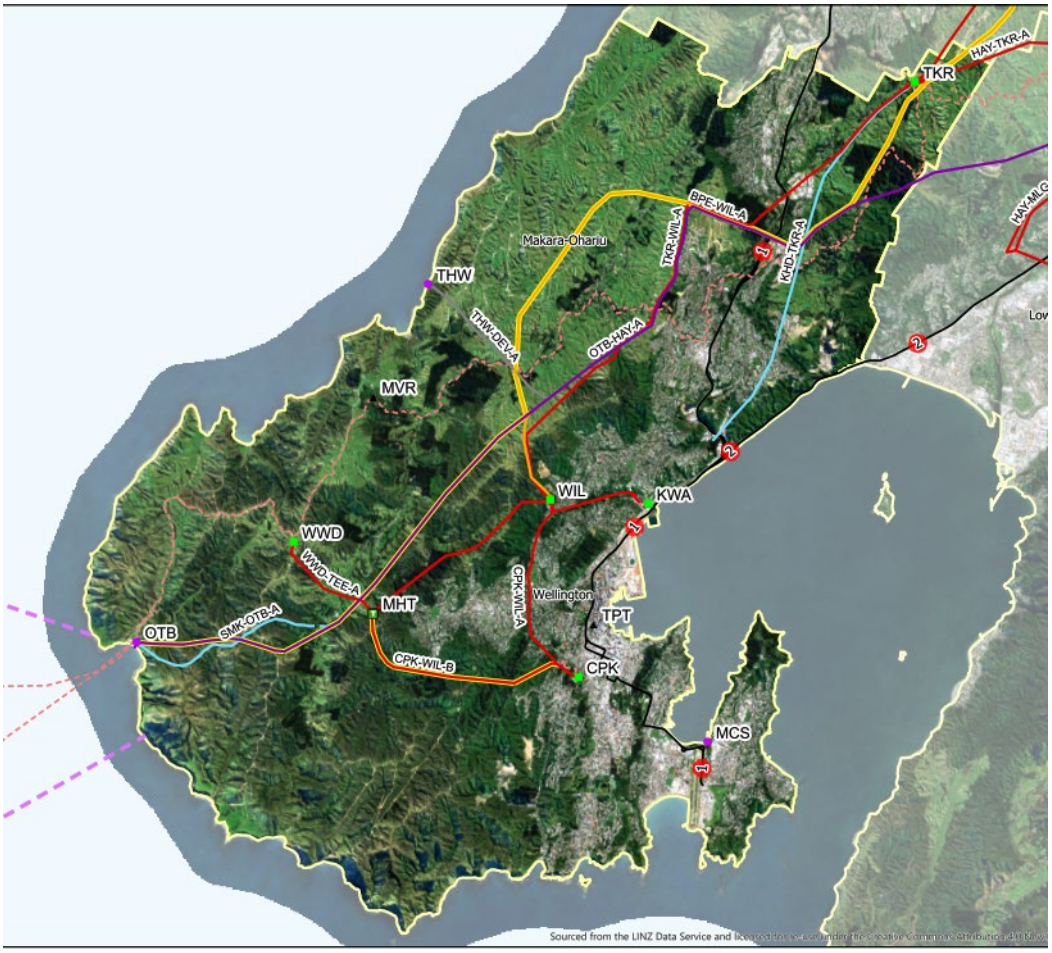


Figure 1: National Grid Assets in Wellington City

18. Wellington City forms part of the main corridor for through-transmission between the North and South Islands, as the HVDC link between Haywards substation in Lower Hutt and Benmore substation in the Waitaki District allows for power to flow between the two islands.

19. The submarine cables across the Cook Strait transitions to an overhead transmission line at Oteranga Bay. The HVDC link is critical infrastructure enabling the transfer of electricity from the South and North Islands, as needed. The submarine cables are nearing the end of their operational life and will need to be replaced within the next 10 years.

Transpower is currently investigating options to replace these cables and whether to install an additional cable to allow for increased capacity on the HVDC link in the future.

Transpower's work within the Wellington Region

20. Transpower has several projects in the investigation or delivery stage concerning its assets in Wellington City, and across the wider region.

21. Transpower is in the process of completing the reconductoring (replacing the "wires") of its Bunnythorpe-Wilton A 220kV transmission line. This has been a staged reconductoring project carried out between Wilton substation and the Judgeford Tee over the last five years. The project involves replacing the conductors (wires) of the line and reducing the number of conductors on the line (from carrying six conductors to three). The last stage of this project will be completed this upcoming summer (2024/2025).

22. Transpower has recently commenced the replacement of old transmission towers on its Khandallah – Takapu Road A (KHD-TKR-A) 110kV transmission line with steel monopoles. This concerns an approximate 6km length of line spanning the Newlands, Woodridge, and Lincolnshire Farm areas. Due to the age and condition of these structures they are being replaced with poles which will be more resilient to extreme weather and natural disasters, as well as reducing the overall maintenance requirements, and therefore the impact on landowners. This work will be completed over the next 8 months.

23. Transpower has a role in supporting local electricity distribution networks (such as Wellington Electricity) to meet expected load growth on their networks and improve resilience, along with supporting new generation customers connecting to the National Grid. Transpower is undertaking various investigations across the network within Wellington City and the wider region to assess these types of queries. Currently, this includes an investigation to improve resilience on the Wellington Electricity network which is fed from Transpower's Central Park substation. This investigation may result in requiring new National Grid assets to be located in proximity to the existing substation.

24. Other than these projects and investigations, Transpower continues to carry out its business-as-usual maintenance works on its assets within Wellington (such as support structure foundation strengthening, support structure replacement (i.e., replacing aging towers with poles), vegetation trimming and clearance, and access track maintenance).

Typical vegetation trimming and removal activities carried out by Transpower

Background

25. Transpower's activities can impact on a range of sensitive environments, and specific to Hearing Stream 11, indigenous biodiversity. This section of my evidence largely focuses on how vegetation is controlled as this is a significant workstream Transpower needs to undertake and manage. Within Wellington City there is approximately 118km of overhead transmission line, of which over half is located outside the urban area. Using the PDP maps as a guide, approximately 20-25km of actual lines traverse Significant Natural Areas identified in the PDP including the Karori Wildlife Sanctuary and Otari Wilton Bush which are also identified as Outstanding Natural Features and Landscapes. I note the above calculations do not include access tracks to the transmission line assets.

26. Transpower carries out a range of maintenance activities to ensure efficient operation of the National Grid. Managing the effects of vegetation on the National Grid is a continuous task for Transpower and its Service Providers. Any type of vegetation (indigenous or exotic) growing too close to the National Grid can pose a potential hazard to life, property and the environment, and a threat to the security and reliability of the electricity supply system. Whether this is from inappropriately planted vegetation, or just poorly maintained trees, the risks for Transpower are significant. These risks are expanded on in paragraphs 34 to 38.

27. Specific to access tracks, vegetation works are required to ensure suitably clear access tracks are provided at all times to enable

Transpower to readily access its assets for routine maintenance activities, as well as in an emergency.

28. Transpower does not own the land where the majority of its assets are located, meaning the vegetation being removed or trimmed is on privately-owned land.

Regulatory framework

29. Due to the technical, operational and locational requirements of the National Grid, transmission lines, including access tracks to the structures, often traverse areas of indigenous biodiversity value, including pockets of native vegetation stands, forestry blocks, covenanted areas, reserves and Department of Conservation land. This vegetation may also be protected by significant natural area (SNA) or outstanding natural landscape (ONL) overlays in district plans. This protection can also be said for some vegetation located at substations, such as Wilton Substation which has areas identified with an SNA overlay in the PDP. **Figure 2** below is a screen shot of the Wilton substation, with transmission lines shown in black, SNAs shown in purple and ONLs in blue.

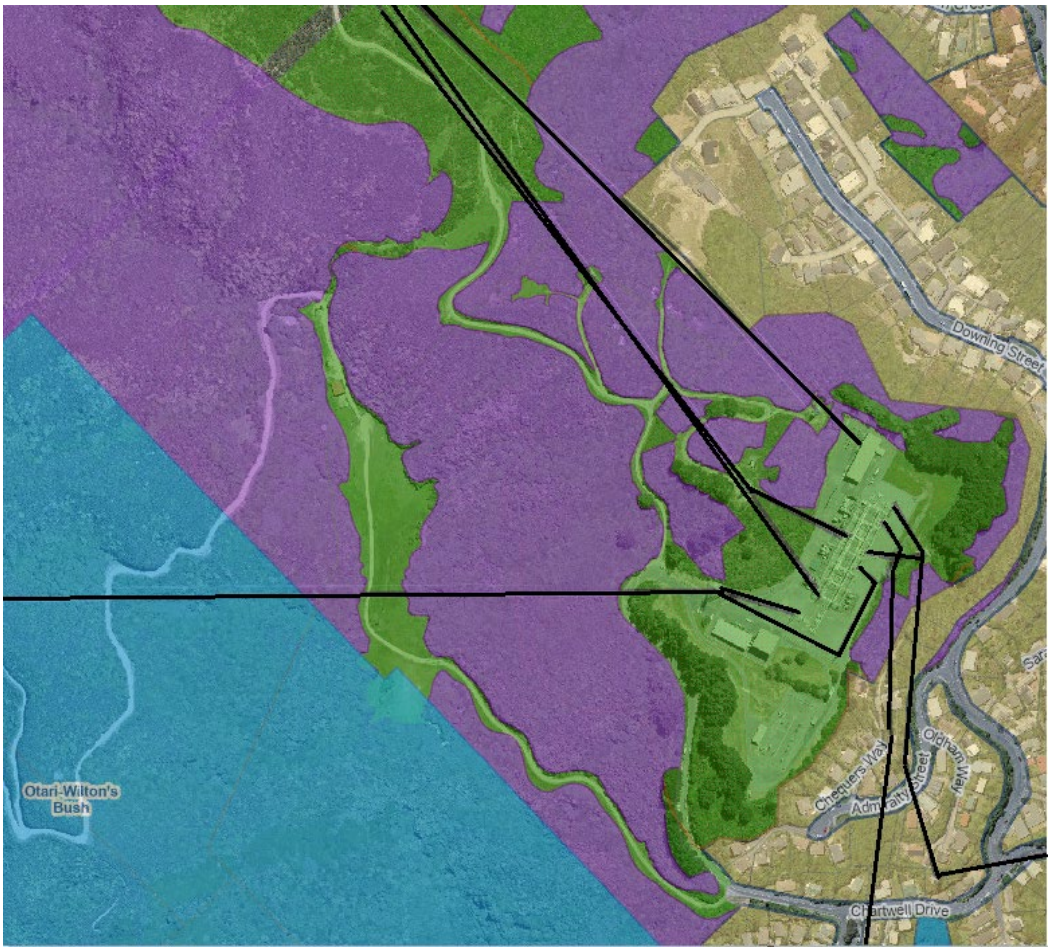


Figure 2: SNAs around Wilton Substation

30. Resource consent requirements for vegetation control in such areas is regulated by the Resource Management (National Environmental Standards for Electricity Transmission Activities) Regulations 2009 for all lines in existence on 14 January 2010.

31. Transpower also has a legal requirement to maintain its lines to minimise any tree-related interruptions to the supply of electricity. The Electricity (Hazards from Trees) Regulations 2003 (the Tree Regulations) impose compliance obligations on Transpower and tree owners to avoid or mitigate hazards from trees on transmission lines. The Tree Regulations came into effect on 1 July 2005 and compliance with them is mandatory.

32. The Tree Regulations apply when trees create risks of electrical contact by growing into the 4m zone shown on **Figure 3**[1]. Transpower can give notice to trim when vegetation is 5m from the conductors (wires).

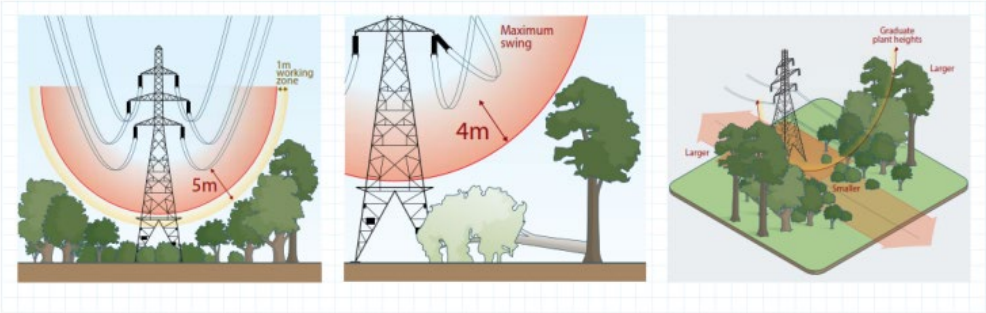


Figure 3: Trees Regulations tree trimming requirements

33. The Trees Regulations contain some restrictions on tree growth. However, they do not address fall distance trees, nor do they ensure that the right tree is planted in the right place from the outset. They are reactive, and require a resource-intensive inspection and management regime. In order to maintain a sufficient separation distance of vegetation from the lines and assets, a more proactive approach to vegetation works is required, beyond that provided in the Tree Regulations.

Risks from vegetation

34. Currently, ~6000km of Transpower overhead lines are at risk from inappropriately located trees. Of this 6000km, ~900km of lines have plantation forestry within 40m (this is generally the “fall distance” – the distance where a tree could fall into a line and cause damage).

35. Inappropriately planted vegetation and trees growing too close to transmission lines creates risks to the assets, people, stock and other property. The main risks include:

[1] Apart from Trees, which can include trees in the Fall Distance Zone. Electrical contact includes trees touching conductors (wires) and flashovers, where there is no physical contact.

i. Vegetation causing a flashover[2] resulting in wildfire. Due to the high voltages involved the flashover can cause the tree to ignite, and under the right conditions cause a wider fire hazard if the tree is near buildings or forests.

ii. Vegetation causing loss of supply, either by vegetation being blown into overhead lines, or too close to them, and a flashover occurring.

iii. Vegetation causing asset damage, by trees and branches falling into transmission lines causing damage to the conductors, poles and towers. Additional risks of trees striking lines occurs when forestry is felled. Slash also causes asset damage.

iv. Access is restricted and/or made more difficult due to the location of planting or slash.

Photo 1: Tree damage from fire caused by a flashover.

[2] A flashover is caused when an object, or vegetation comes into contact with the conductors the electricity arcs from a conductor onto an object such as a tree branch.

Photo 2: Damage to the Bunnythorpe-Wairakei A transmission line caused by plantation forestry falling into the line. The damage was caused by plantation forestry falling into the line near Rangipo in 2012. New foundations and tower repairs were in the order of $500,000.

36. Photo 3 below is one of many images of tree fall during the early 2023 severe weather events in Northland, which resulted in electricity supply being interrupted. Given the number of trees striking the lines it was incredibly lucky the entire region did not lose electricity supply. Extensive damage was done, requiring weeks of repair work to Grid lines.

Photo 3: Northland tree fall example on Henderson-Maungatapere A 110kV transmission line

37. Ultimately these risks can result in a “lights out” scenario for communities, especially smaller regional communities with limited redundancy in the network.

38. It is therefore vital that trees and all other vegetation is trimmed or removed so that it complies with the Tree Regulations, and to avoid damage to transmission lines including fires and loss of supply, as well as maintaining access to transmission lines.

Approach to vegetation control for maintenance activities

39. Transpower needs to carry out routine (often small scale but frequent) works on its ~30,000 structures. This can require the removal or trimming of naturally established vegetation along existing access

tracks in order to reach the structures and carry out maintenance activities.

40. For any vegetation control required as part of routine maintenance work, Transpower first carries out an onsite assessment to determine what is required, i.e. trimming only or full removal. The vegetation control work could be located at the base of the structures, directly under the transmission line as well as alongside it, and on access tracks to ensure clear access is available. The proposed works are then assessed by a planner to understand the potential effects of any vegetation proposed to be trimmed or removed and whether involvement of an ecologist is required and if a resource consent is likely.

41. Where the planner identifies an assessment of effects is required to support a resource consent application, it might include an assessment on tree health, visual and landscape effects from removing or altering significant or prominent trees, effects on stability of land and slopes (e.g., riverbanks) or effects on habitats of native or indigenous fauna (e.g., lizards, birds and bats). Most assessments will need to be carried out by suitably qualified terrestrial ecologists. Management plans may be required to manage any visual effects or effects on wildlife during and after vegetation works take place.

42. Where habitat management is required, an ecologist or relevant specialist will be contracted to determine the level of ecological effects and make recommendations to avoid, minimise, or remedy any adverse or potential adverse ecological effects of the activity. Mitigation could include altering designs or work methods and undertaking restoration/rehabilitation e.g. replanting and avoiding periods of significance to certain species.

43. If it is not practicable to mitigate the effects of habitat modification, environmental offsetting may be appropriate - but there are times where it may not always be the best course of action. For example, where areas of clearance are very modest and will be readily infilled by natural regeneration. Transpower understands from expert ecological

advice that this is a preferable alternative to replacement planting with nursery sourced plants, which has risks of pests, pathogens and if Kauri dieback is present, may exacerbate the spread through soil disturbance. Replanting can also cause concerns in relation to disturbance of unknown archaeological features.

44. To illustrate Transpower's routine vegetation maintenance work in sensitive environments, a case study about Fiordland National Park is provided in **Appendix C**.

Approach to vegetation control for large projects

45. Transpower follows a similar approach for its larger maintenance, upgrading and development projects that concern existing assets and that might involve vegetation removal. The need for vegetation removal will be identified early in the design stage, at which point a planner can assess whether there is need for involvement of other experts such as a landscape and visual expert or ecologist. Advice from the experts may influence the design and location (or route), along with preparation of an assessment of environmental effects to support consenting and providing mitigation options.

46. There may be times where an ecologist recognises the indigenous biodiversity value of the vegetation to be trimmed/removed, but no resource consent is required. This is when recommendations or best-practice advice is sought from the expert to inform the works methodology.

47. In areas known to not have any significant vegetation or habitats or where the vegetation being managed are pest plant species, then an ecology assessment is not likely to be required, although input from an arborist may be necessary.

Establishing new National Grid Assets

48. As the economy electrifies in pursuit of the most cost efficient and renewable energy sources, electricity demand is likely to more than

double by 2050. This increase will necessitate significant and frequent investment in New Zealand's electricity infrastructure portfolio over that period, including the National Grid. While any plans for new National Grid assets in the Wellington City are only in the early investigation stage, it means that the extent to which the PDP objectives and policies regulate both existing and new National Grid transmission infrastructure and associated activities is critical to Transpower.

49. Transpower relies on the resource consent and/or designation process under the RMA to gain approval for any new National Grid transmission line assets and associated activities (including vegetation clearance) constructed after 14 January 2010.[3] As part of the process of securing RMA approvals for new National Grid infrastructure, Transpower uses various tools to select the route of any new transmission line or the site of any new substation. A key methodology is the "Area Corridor Route Easement/Designation" process ("**ACRE**"). Transpower developed the ACRE model to identify an appropriate location for transmission infrastructure. It is based on a progressive filtering approach, where increasing and more specialised detail is provided on environmental, property and engineering constraints throughout the process to enable the identification of a preferred route or site.

50. Where vegetation is in the area being considered, the ACRE process would include SNAs as a constraint. Based on the advice of an ecologist, additional areas may also be included in the constraints assessment that the ecologist has identified as having significance in terms of the types of values the vegetation has.

51. The key stages of the ACRE process are summarised below (these can be modified or combined, depending on the scale and nature of the project):

[3] The NESETA only applies to existing transmission lines. Existing transmission lines are transmission lines that were operating, or able to be operated, at 14 January 2010.

A – Area (identification of the wider study area within which the project might occur; undertaking constraints and opportunities mapping);

C – Corridor (identification and confirmation of alternative corridors, ranking and selection of preferred corridor);

R – Route (selection and evaluation of a route, or alternative routes, within the preferred corridor, consultation on one or more routes and confirmation of preferred route, following public consultation); and

E – Easement/Designation (identification and confirmation of the easement and designation centreline).

52. There are two further process steps, referred to as “D” and “S”.

D – Documentation (preparation of full documentation for lodgement with councils); and

S – Statutory Process (lodgement of documents for statutory approvals under the RMA, board of inquiry/council hearings, Environment Court appeal process where relevant).

53. During the Area, Corridor, Route and Easement/Designation stages, consideration is given to the location of the proposed infrastructure, with negative scoring being given to any special areas, such as SNAs, ONLs, Sites and Areas of Significance to Māori, and historic heritage sites.

54. The ACRE process allows for a trade-off between several factors, with the intent of finding a preferred solution:

a. It takes into account technical and operational requirements, such as the need to connect to existing assets, or maintain safety clearances;

b. It demonstrates that adverse effects have been avoided as far as practicable through the site, route and method selection – although it will not always be possible to avoid all adverse effects;

c. Sensitive activities such as residential areas can be mapped, so that options which avoid effects on sensitive activities are known and appropriately factored in; and

d. Town centres and other valued locations such as areas of high recreational value, ONLs, ecological areas and areas of high natural character are also mapped, so that consideration to avoiding those areas can occur.

55. The above trade-offs demonstrate that it is not always possible to consider one effect in isolation.

56. Often it is not practicable to avoid adverse effects on all identified values, including indigenous biodiversity. For example:

a. Avoidance of urban areas and sensitive activities can often deflect assets towards areas with greater landscape, natural character or recreational value (i.e., non-urban locations);

b. Avoiding particular locations can also mean a National Grid transmission line must take a longer route, impacting a greater number of people and values along that longer route, and costing more to develop, operate and maintain (that cost being borne by electricity users);

c. Reducing the height of lines (to reduce their visibility) can mean that a greater number of support structures (towers or poles) are required to maintain safe ground-to-conductor clearances. Lower conductors can require greater vegetation clearance, and more extensive access tracks for the greater number of support structures; and

d. Undergrounding lines is often prohibitively expensive, still requires earthworks, a clear corridor (including clear of vegetation and

above-ground structures) and can complicate maintenance and repairs.

57. The extent of vegetation clearance when constructing new National Grid assets will be influenced by a range of factors including Transpower's design criteria, such as the sag and swing of the conductors, location of tower and access roads (and the earthworks required for them), and the height of underlying and surrounding canopy vegetation.

58. Overall, the ACRE process reflects NPSET policies in terms of seeking to avoid adverse effects while taking in to account the technical and operational requirements of the Grid in the route, site and method selection process.

Transpower's Sustainability Strategy

59. Against the regulatory background in which Transpower must operate, it has developed the Sustainability Strategy 2023/24, which sets a framework for improving the sustainability of its ongoing operations while driving long term change within the business. It is underpinned by an extensive implementation programme to ensure that it is delivered across all divisions and teams within Transpower, as well as its service providers, suppliers and community partners.

60. It sets out goals and enabling actions across three challenge areas:

- Climate change
- Environmental stewardship
- Sustainable business

61. The strategic driver of the environmental stewardship challenge is focussed on ensuring environmental impacts are minimised, while using a kaitiakitanga approach to restore the environment, creating a net gain in biodiversity.

62. Initiatives such as Transpower's Takapū Valley restoration project shows Transpower's commitment to improving the biodiversity and ecological condition of the land and waterways near its assets. Planning for the restoration project commenced in 2021 and around 19 ha of land beside the Takapū Road substation has been identified for planting. Planting is taking place on Transpower land and Crown land administered by the Department of Conservation. The restoration project also neighbours the Belmont Regional Park, so it is in an excellent location to be widely enjoyed by the community. The restoration involves planting indigenous vegetation, removing weeds and undertaking pest control. This project is being done in collaboration with many partners including The Growing Places Charitable Trust, Ngāti Toa Rangatira (mana whenua), Greater Wellington Regional Council, Department of Conservation, Porirua City Council, Wellington City Council, schools of Tawa, community groups, and local landowners. Together the partners have put over 10,000 plants in the ground and continues to support and expand this restoration project.

Photo 4: Planting activities at Takapū Valley

Conclusions

63. The National Grid is critical to the social and economic wellbeing of Wellington City and our nation generally. It will also play a critical role in New Zealand's carbon zero commitment and mitigating the effects of

climate change. This will necessitate the upgrade of existing, and construction of new, National Grid assets. As an infrastructure asset of national significance, the NPSET requires that the National Grid be recognised and provided for in PDP.

64. Transpower has a consistent approach to assessing and managing the impact of vegetation removal across its different workstreams, including when establishing new National Grid assets. While it is recognised it is not always practicable to avoid effects on indigenous biodiversity, there are appropriate steps taken to ensure that any adverse or potential adverse ecological effects of the activity are minimised or remedied.

65. Transpower's relief will ensure that the National Grid is able to be operated, maintained, upgraded and developed in a manner that will ensure security of supply while managing the adverse effects of its activities. The amendments sought in Ms Whitney's evidence will give effect to both the NPS-IB and the NPSET, with Ms Whitney largely supporting the recommendations of the reporting officer. I concur with Ms Whitney's recommendations.

Sarah Shand
28 August 2024

Appendix A – Relevant Experience and Qualifications

1. I am an Environmental Planner and part of Transpower's Environment Group, whose responsibilities include:

    a) Strategic planning. This planning is achieved through the development and implementation of Transpower's approach to the NPSET at a national level and local level.

    b) Delivering Transpower's policy approach on environmental regulations, legislation and council planning documents.

    c) Ensuring that all environmental approvals are obtained for Transpower's physical works.

    d) Managing third party interactions to ensure that Transpower's interests are appropriately maintained.

2. I have been employed by Transpower for over 9 years, and during this time my responsibilities have included:

    a) preparing environmental planning assessments, developing strategy and policies, and processes to deliver and monitor all the necessary environmental approvals for numerous major capex projects concerning both transmission lines and substations across the country.

    b) working with customers to secure the necessary environmental approvals to enable new generation and local electricity distribution connections to the National Grid.

    c) responding to landowners and developers to ensure that reverse sensitivity effects of any development are managed, and the National Grid is not compromised, and more importantly people are not harmed.

    d) partnering and working with stakeholders, ensuring that key relationships are informed, risks are identified, and reputations are enhanced.

3. I have a Master of Environmental Planning and Resource Management from Massey University and a Bachelor of Arts in English and Geography from Victoria University. I have over 10 years' experience working as an

environmental planner, and I am a member (Intermediate) of the New Zealand Planning Institute.

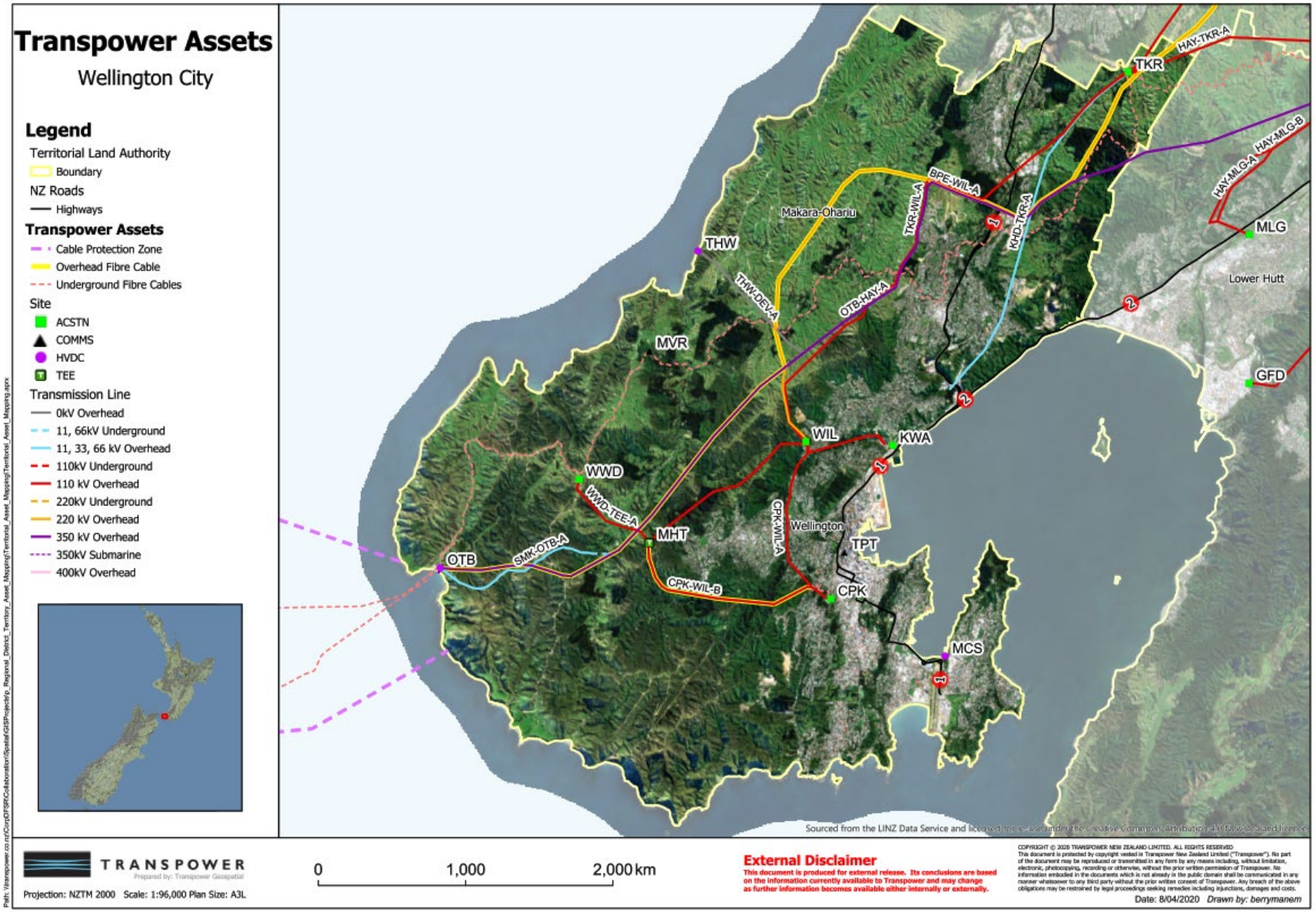
4. I confirm I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Consolidated Practice Note 2023. As I am employed by Transpower, I acknowledge I am not independent; however, I have sought to comply with the Code of Conduct. In particular, unless I state otherwise, this evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Appendix B – National Grid Assets within Wellington City

The following National Grid assets are within or traverse Wellington City:

- National Grid Transmission Lines
    - Bunnythorpe-Wilton A (BPE-WIL A), 220kV double circuit line on steel towers.
    - Central Park-Wilton A (CPK- WIL A), 110kV double circuit line on steel towers.
    - Central Park-Wilton B (CPK-WIL B), 220kV double circuit line on steel towers.
    - Haywards - Takapu Road A (HAY-TKR-A) – 110kV Double Circuit on steel towers.
    - Paekakariki - Takapu Road A (PKK-TKR-A) – 110 kV Double Circuit on steel towers.
    - Khandallah-Takapu Road A (KHD-TKR A), 110kV double circuit lines on steel towers.
    - Kaiwharawhara-Wilton A (KWA-WIL A), 110kV double circuit lines on steel towers.
    - Kaiwharawhara Power Cable (KWA-CBL-42) 110kV Underground Power Cable.
    - Oteranga Bay-Haywards A (OTB-HAY A), 350kV double circuit lines on steel towers.
    - South Makara Road to Oteranga Bay A (SMK-OTB A), 11kV single circuit lines on poles.
    - Te Hikowhenua Deviation A (THW-DEV-A), single circuit lines on steel towers and poles
    - Takapu Road-Wilton A (TKR-WIL-A), 110kV double circuit lines on steel towers.
    - West Wind Tee (WWD-TEE-A), 110kV double circuit lines on poles.
- Three submarine cables across the Cook Strait; South Markara Road-Oteranga Bay A, poles 1A to 1B (SMK-OTB-A1-CBL-1A-1B), which transmits electricity between the North and South Islands (commonly known as ‘The Cook Strait Cables’).
- High Voltage Direct Current (HVDC) links (four in total); Haywards DC (HAY-DC), Miramar Cable Store (MCS), Oteranga Bay (OTB), and Te Hikowhenua Electrode (THW).
- Overhead fibre cables (three in total); Bunnythorpe-Wilton A, Central Park-Wilton B, Oteranga Bay-Haywards A.
- Substations (5 in total);
    - Central Park Substation (CPK), Kaiwharawhara substation (KWA), Wilton substation (WIL), Takapu Road substation (TKR), West Wind substation (WWD).

- Communication site: Transpower House (TPT)


Transpower Assets
Wellington City
Legend
Territorial Land Authority
Boundary
NZ Roads
Highways
Transpower Assets
Cable Protection Zone
Overhead Fibre Cable
Underground Fibre Cables
Site
ACSTN
COMMS
HVDC
TEE
Transmission Line
0kV Overhead
11, 66kV Underground
11, 33, 66 kV Overhead
110kV Underground
110 kV Overhead
220kV Underground
220 kV Overhead
350 kV Overhead
350kV Submarine
400kV Overhead
TKR
HAY-TKR-A
BPE-WIL-A
TKR-WIL-A
KHD-TKR-A
HAY-MLG-B
HAY-MLG-A
MLG
Lower Hutt
GFD
Makara-Oharui
THW
THW-DEV-A
OTB-HAY-A
MVR
WIL
KWA
WWD
WWD-TEE-A
MHT
CPK-WIL-A
Wellington
TPT
OTB
SMK-OTB-A
CPK-WIL-B
CPK
MCS
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Prepared by: Transpower Geospatial
Projection: NZTM 2000 Scale: 1:96,000 Plan Size: A3L
0
1,000
2,000 km
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Appendix C – Case study

Vegetation regeneration in Fiordland National Park

Transpower's Manapouri – Tiwai A transmission line is located within part of the Fiordland National Park. In order to maintain the transmission corridor, the vegetation needs to be trimmed/felled under and around the line. Instead of clearing all vegetation debris following felling, vegetation is laid down underneath the line to provide a lower profile canopy that still allows cover for fauna (as shown in the photo 5 below). Vegetation has also been laid down following emergency access track works in 2021 as this allows seeds to disperse under the line and for the forest to naturally revegetate. Ecological advice was sought on this approach over two decades ago.

Photo 5: Regenerating vegetation under and around the Manapouri – Tiwai A transmission line