Before the Greater Wellington Regional Council Proposed Change 1 to the Regional Policy Statement for the Wellington Region
Hearings Panel

Under	the Resource Management Act 1991 (the Act)
In the matter of	Proposed Change 1 to the Regional Policy Statement for the Wellington Region: • **Hearing Stream 6 Indigenous Ecosystems**
Between	**Greater Wellington Regional Council** Local authority
And	**Transpower New Zealand Limited** Submitter S10 and Further Submitter FS23

Statement of evidence of Sarah Shand for Transpower New Zealand Limited

Dated 30 January 2024

Executive Summary

1. Transpower New Zealand Limited (**Transpower**) operates the National Grid, which transmits electricity throughout New Zealand. Within the Wellington region there are 12 substations and 25 high voltage National Grid transmission lines ranging from 110 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 the Wellington region serve communities at local, regional and national levels.

2. 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.

3. 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.

4. 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.

5. Transpower wishes to see appropriate planning provisions included in Proposed Change 1 ("PC1") to the Regional Policy Statement ("RPS") 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.

6. **Ms Whitney's** evidence seeks amendments to clarify the policies recommended by the reporting officer do not apply to the National Grid in accordance with Section 1.3(3) of the NPSIB. I concur with the amendments sought in **Ms Whitney**'s evidence.

Qualifications and experience

8. My full name is Sarah Louise Shand.

9. 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**.

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

Scope of Evidence

11. My evidence will address the following:

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

Transpower and the National Grid

12. Transpower is a State-Owned Enterprise that plans, builds, maintains, owns and operates New Zealand's high voltage electricity transmission network – the National Grid. The National Grid links generators to distribution companies and major industrial users. It extends from Kaikohe in the North Island down to Tiwai in the South Island and carries electricity throughout New Zealand.

13. New Zealand has become increasingly dependent on electricity. It is an intrinsic part of living and working in the 21st century. Electricity now

accounts for about 26% of all energy used in New Zealand.[1] Transpower, whose main role is to ensure the delivery of a reliable and secure supply of electricity to New Zealand, has a fundamental role in the industry and in New Zealand's economy.

14. Transpower is not a generator of electricity. It can be considered to be a 'freight company' for electricity, in that it carries bulk electrical energy from where it is generated by companies such as Meridian Energy to where it is used, be that by large industrial 'direct connect' customers (such as Tiwai Point Aluminium Smelter and NZ Steel at Glenbrook) or local electricity distribution companies – which for the Wellington region includes Wellington Electricity, Electra and Powerco.

15. Transpower also manages New Zealand's power system in real time. In its role as System Operator, Transpower operates the electricity market to ensure electricity transmitted through the National Grid is delivered whenever and wherever it is needed, 24 hours a day, seven days a week.

16. Transpower's main role is to ensure the reliable supply of electricity to the country. Transpower plays a significant part in New Zealand's economy, with all major industries, cities and communities being reliant on a secure and reliable supply of electricity.

[1] Energy Balance Tables 1990-2022 | Energy statistics | Ministry of Business, Innovation & Employment (mbie.govt.nz)

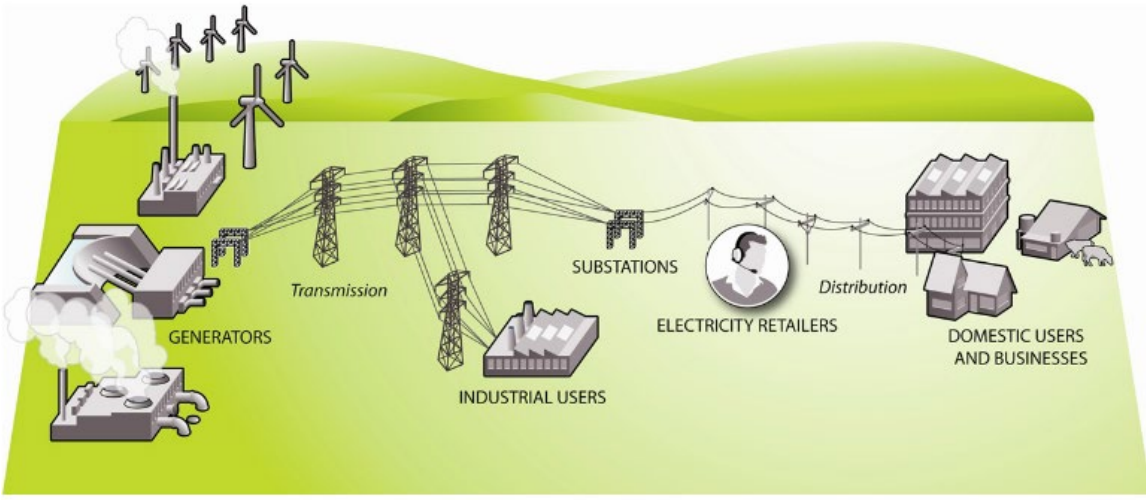


Figure 1. Electricity Industry in New Zealand. Source MBIE

17. As a State-Owned Enterprise, Transpower's principal objective is to operate as a successful business. It must operate within certain legislative constraints and report regularly to its shareholding Ministers. Transpower is required to deliver and operate a National Grid that meets the needs of users now and into the future.

18. One of Transpower's key objectives therefore is to maintain and develop the National Grid, which contributes to New Zealand's economic and social aspirations. This objective is reflected in the single objective in the National Policy Statement on Electricity Transmission 2008 (NPSET).

19. Prudent investment in the National Grid (including for maintenance and access), long term transmission planning strategies, and developing technologies are crucial to ensure the most can be made from existing infrastructure. Proper maintenance and access to the Grid is essential to defer the need for new lines and substations and to create better options for when new build is required. This investment will, in turn, help to limit the cost and environmental footprint of the National Grid for future generations.

The National Grid

20. The National Grid is an interlinked network comprising some 11,000 km of transmission lines supported by towers and poles, and over 170 substations across the country. Electricity flows along transmission lines

The Grid is supported by a telecommunications network of some 300 telecommunication sites, which help link together and communicate with the components that make up the National Grid.

21. The National Grid comprises a high voltage backbone which runs the length of the country and links major generation (such as the geothermal power stations near Taupō) to major loads in the main cities. The bulk of the National Grid backbone was built around 60 years ago and comprises most of the 220 kilovolt (kV) lines throughout New Zealand, along with the High Voltage Direct Current (HVDC) link between the North and South Islands.

22. Connected to this National Grid backbone are regional National Grid lines (also owned or operated by Transpower) which connect smaller generation stations and supply regional communities. A map showing National Grid substations and transmission lines within the Wellington region is included in **Appendix B** to this evidence.

23. Transpower's strategic role in in Aotearoa New Zealand's energy future is expanded on further in **Appendix C**.

Transpower's assets within the Wellington Region

24. There are 12 substations within the Wellington region, and 25 transmission lines operating at either 110kV, 220kV or 350kV within or traversing the Wellington region. Transpower also has equipment located at the West Wind Substation and has other assets across the region including seven communication sites, four links supporting the High Voltage Direct Current (HVDC) transmission line, and five overhead fibre cables.

25. These assets are listed and shown on the map in **Appendix B** to my evidence.

26. The Wellington region includes the large load centre of Wellington City, together with five other significant centres (Lower Hutt, Upper Hutt,

Masterton, Porirua and Paraparaumu) along with provincial towns and smaller rural localities.

27. It is 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. The HVDC link can transfer up to 850 megawatts (MW) to the South Island (depending on the load and generation in the Wellington region and Central North Island), and up to 1,200 MW from the South Island. As generation capacity in the region is much lower than local load, power is normally imported, either via the HVDC link (from the South Island) or from the Central North Island.

28. The submarine cables across the Cook Strait which form part of the HVDC link are critical infrastructure in enabling the transfer of electricity from the South and North Islands, as needed. It is likely that these cables will need to be replaced within the next 10 years and potentially an additional cable installed to increase the HVDC transfer capacity for future use.

Transpower's work within the Wellington Region

29. In terms of Transpower's current projects in the Wellington region, 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 6 conductors to 3). Work is currently underway this summer on the final sections of this project.

30. Transpower has a role in supporting local electricity distribution networks 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 the Wellington Region to assess these types of queries, including several relating to new solar or wind farm developments in the Wairarapa. These may require a connection to existing National Grid assets, or the construction of new assets.

31. 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

32. While Transpower's activities can impact on a range of sensitive environments and indigenous biodiversity, this section largely focuses on typical vegetation control as this is a significant workstream Transpower needs to manage.

33. 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 39 to 43.

34. 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

35. 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 with an SNA overlay under the Wellington City Proposed District Plan. Resource consent requirements for vegetation control in such areas is considered under the Resource Management (National Environmental Standards for Electricity Transmission Activities) Regulations 2009 for all lines in existence on 14 January 2010.

36. 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.

37. The Tree Regulations apply when trees create risks of electrical contact by growing into the 4m zone shown on **Figure 1**[2]. Transpower can give notice to trim when vegetation is 5m from the conductors (wires).

[2] 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.

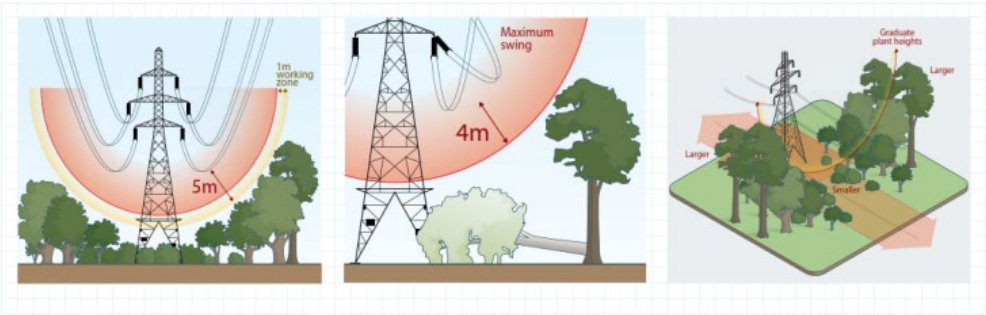


Figure 1: Trees Regulations tree trimming requirements

38. 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.

Risks from vegetation

39. 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).

40. 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:

    i. Vegetation causing a flashover[3] 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.

[3] 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.

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 is also causing 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.

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.

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

Photo 3: Tree fall example

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

43. 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

44. Transpower needs to carry out routine (often small scale but frequent) works on its ~30,000 structures, for example removal of naturally established vegetation as part of regular maintenance of transmission tower access tracks.

45. 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.

46. 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.

47. 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.

48. 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.

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

Approach to vegetation control for large projects

50. 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.

51. 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.

52. 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 resource consents may still be required for the physical works (e.g., under the Resource Management (National Environmental Standard for Electricity Transmission Activities) Regulations 2009 (NESETA)) and input from an arborist may be necessary.

53. Overall, Transpower encounters a range of sensitive environments through its larger projects. A case study concerning Transpower's replacement of the Cook Strait Fibre Cable at Oteranga Bay (a known habitat for banded dotterel) is provided in **Appendix D**.

Establishing new National Grid Assets

54. 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 region are only in the early investigation stage, it means that the extent to which the RPS objectives and policies regulate both existing and new National Grid transmission infrastructure and associated activities is critical to Transpower.

55. 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.[4] 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.

56. 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.

[4] Add in statement here about how the NESETA applies to existing transmission line assets.

57. 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):

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).

58. 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).

59. 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.

60. 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.

61. 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.

62. 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.

63. 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

64. 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.

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

- Climate change
- Environmental stewardship
- Sustainable business

66. 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.

67. 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.

Conclusions

68. The National Grid is critical to the social and economic wellbeing of the Wellington region 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 RPS Change 1.

69. 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.

70. 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 NPSIB and the NPSET, while providing clarity for RPS interpretation and the implementation of lower order planning documents. I concur with Ms Whitney's recommendations.

Sarah Shand
30 January 2024

Appendix A – Relevant Experience and Qualifications

1. I am an Environmental Planner and part of Transpower's Environmental Policy and Planning 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 9 years' experience working as an

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

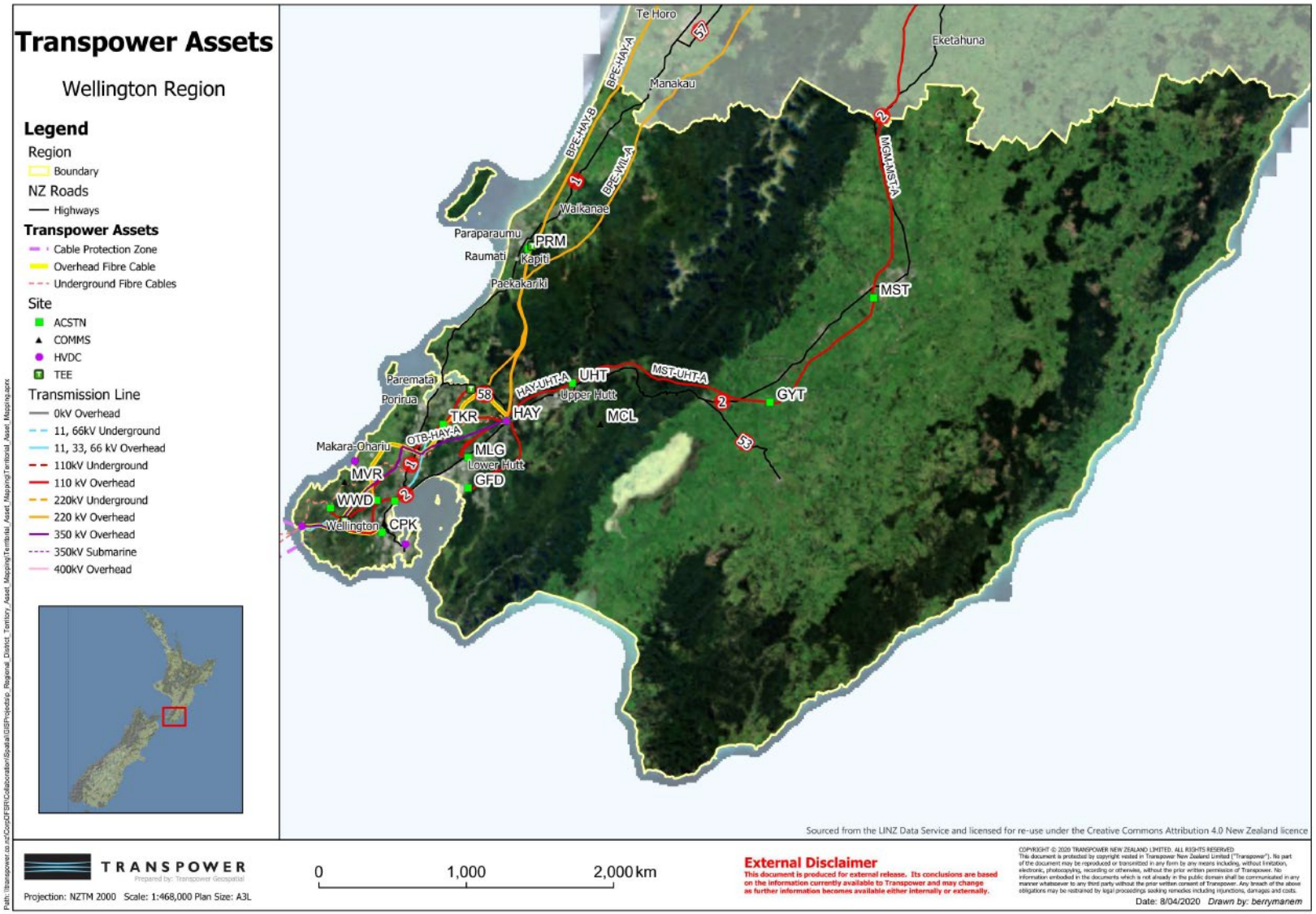
4. I confirm I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Consolidated Practice Note 2023. As I am employed by Transpower, I acknowledge I am not independent; however, I have sought to comply with the Code of Conduct. In particular, unless I state otherwise, 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 the Wellington Region

The following National Grid assets are within or traverse the Greater Wellington Region:

- National Grid Transmission Lines (25 lines in total)
  - Bunnythorpe-Haywards A (BPE-HAY A) 220 kV single circuit line on steel towers.
  - Bunnythorpe-Haywards B (BPE-HAY B), 220kV single circuit line on steel towers.
  - 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.
  - Gracefield-Haywards A (GFD-HAY A), 110KV double circuit line on steel towers.
  - Haywards-Judgeford A (HAY-JFD A), 220kV double circuit line on steel towers.
  - Haywards-Melling A (HAY-MLG A), 100kV double circuit lines on steel towers.
  - Haywards-Melling B (HAY-MLG B), 110kV double circuit lines on steel towers.
  - Haywards-Takapu Road (HAY-TKR A), 110kV double circuit lines on steel towers.
  - Haywards-Upper Hutt A (HAY-UHT A), 110kV double circuit lines 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.
  - Mangamaire-Masterton A (MGM-MST A), 110kV single circuit lines on poles.
  - Masterton-Upper Hutt A (MST-UHT A), 110kV double circuit lines on steel towers.
  - Oteranga Bay-Haywards A (OTB-HAY A), 350kV double circuit lines on steel towers.
  - Paraparaumu Tee A (PRM-TEE A), 220kV single circuit lines on pi poles.
  - Paraparaumu Tee B (PRM-TEE B), 220kV single circuit lines on pi poles.

    - South Markara Road to Oteranga Bay A (SMK-OTB A), 110kV 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 (five in total); Bunnythorpe-Wilton A, Central Park-Wilton B, Haywards-Judgeford A, Haywards-Takapu Road, Oteranga Bay-Haywards A.
- Substations (12 in total):
    - Within Wellington City; Central Park Substation (CPK), Kaiwharawhara substation (KWA), Wilton substation (WIL), Takapu Road substation (TKR), West Wind substation (WWD).
    - Within Hutt City; Gracefield Substation (GFD), Melling substation (MLG), Haywards substation (HAY).
    - Within Upper Hutt City; Upper Hutt Substation (UHT).
    - Within the South Wairarapa District, Greytown substation (GYT).
    - Within the Porirua City, Pauatahanui Substation (PNI).
    - Within the Kapiti Coast District; Paraparaumu Substation (PRM).
    - Within the Carterton District; Masterton Substation (MST).
- Communications sites (seven in total); Axa House, Kaukau, Makara Village Repeater, Transpower House, Rangitumau, Mt Climie, Mt Bruce.


Transpower Assets
Wellington Region
Legend
Region
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
Te Horo
Manakau
Eketahuna
BPE-HAY-A
BPE-HAY-B
BPE-WIL-A
MCM-MST-A
Waikanae
Paraparaumu
PRM
Raumati
Kapiti
Paekakariki
MST
Paremata
Porirua
58
HAY-UHT-A
UHT
Upper Hutt
MST-UHT-A
GYT
TKR
HAY
MCL
OTB-HAY-A
Makara-Ohariu
MLG
Lower Hutt
MVR
GFD
WWD
Wellington
CPK
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TRANSPOWER
Prepared by: Transpower Geospatial
Projection: NZTM 2000 Scale: 1:468,000 Plan Size: A3L
0
1,000
2,000 km
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Date: 8/04/2020 Drawn by: berrymanem
Path: \\transpower.co.nz\Corp\DFSRICollaboration\Spatial\GISProjects\p_Regional_District_Territory_Asset_Mapping\Territorial_Asset_Mapping.aprx

Appendix C -

Transpower's role in Aotearoa New Zealand's Energy Future

1. Transpower recognises the critical role that the National Grid has in helping Aotearoa New Zealand's journey towards achieving net zero carbon emissions by 2050. Through a series of strategic publications produced since 2016, Transpower has been sharing its views on this new period of electrification growth and how it will plan for the development of the transmission system of the future. Our electricity system is already around 85% renewable, and this is set to increase at pace over the coming years. Significant increases in new renewable generation – and substations and transmission lines to connect to the Grid – will be required to provide enough electricity to meet growing demand from decarbonisation of transport and process heat. New connections to major industries and for local electricity distribution networks to supply their customers will also be needed. This cumulates in a needing a modern, flexible and resilient National Grid which will provide a safe and secure supply to industrial and residential consumers under a wider-than-ever range of operating conditions.

2. In terms of a brief summary, the National Grid:

   a) Transports electricity across the country (connecting generation to consumers);

   b) Supports New Zealand's national and regional economic growth;

   c) Plays an essential role in maintaining reliability and security of supply of energy;

   d) Provides a basis for investment decisions to be made by both suppliers and consumers of electricity;

   e) Enables competition among suppliers and retailers of electricity, thereby providing the basis for competitively priced electricity;

   f) Assists the development of new electricity generation technologies, including renewable energy, by providing access to markets;

g) Enables the electrification of transport and process heat, without which there is no way in which our Paris Agreement and net-zero carbon economy commitments can be met; and

h) Is predicted to play a key role in the decarbonisation of the economy.

Appendix D – Case studies

Case study A – 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 6 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 4: Regenerating vegetation under and around the Manapouri – Tiwai A transmission line

Case Study B – Banded Dotterel at Oteranga Bay

The Cook Strait Fibre Replacement project involved laying a new fibre optic cable across Cook Strait and trenching it in at Transpower's terminal stations at Fighting Bay and Oteranga Bay at either end. Oteranga Bay is a known habitat for threatened banded dotterel and is identified as an SNA equivalent in the Greater Wellington Regional Coastal Plan. As a precautionary measure bird deterrents were installed around the works area to discourage dotterels from nesting there. The site was inspected on a regular basis, by an ornithologist engaged by Transpower, to confirm that no nesting or breeding birds would be impacted by the works.