

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 5:

General District Wide Matters:

- **Natural Hazards (NH) and Coastal Hazards (Coastal Hazards are housed in the Coastal Environment (CE) chapter)**
- **Earthworks (EW)**
- **Subdivision (SUB)**
- **Three Waters (THW)**
- **Noise (NOISE)**

Between **Wellington City Council**
Local authority

And **Transpower New Zealand Limited**
Submitter 315 and Further Submitter FS29

**Statement of Evidence in Chief of Roy Noble for
Transpower New Zealand Limited**

Dated 18 July 2023

Summary of Evidence

1. Excavations and earthworks around and under National Grid structures and lines have the ability to impact the stability and strength of those structures, limit access to structures, or create unsafe electrical clearances. The New Zealand Electrical Code of Practice for Safe Electrical Distances 2001 ISSN 01140663 (“NZECP34”)¹, provides guidance on safe clearances.
2. NZECP34 provides a pathway for reducing excavation clearances near structures with the approval of the line owner. There is no such pathway for ground to conductor clearances.
3. The scope of NZECP34 is limited to safe distances. It does not provide guidance on issues such as earthworks restricting access to structures.
4. My evidence provides a number of examples where tight controls were not in place and developments including excavations and earthworks were undertaken without regard to the National Grid.
5. Management and approvals for excavations and earthworks around National Grid assets can only safely occur within a robust planning framework, ensuring those developments are fully considered within the regulatory requirements before they commence.

¹ <https://www.worksafe.govt.nz/laws-and-regulations/standards/electricity-standards-and-codes-of-practice/>

Qualifications and Experience

6. My full name is Roy John Clement Noble. I am the Head of Grid Delivery Integration at Transpower, based in Wellington.
7. I have over 38 years' experience in the design, construction and maintenance of high voltage transmission lines. I hold a New Zealand Certificate of Engineering (Civil).
8. My previous roles at Transpower have included being the General Manager of Transformation (seconded) from April 2015 to February 2017, acting General Manager Grid Performance from February 2017 to June 2017, and Tactical Engineering Manager from June 2017 to March 2020. I held the role of Project Director for the Clutha Upper Waitaki Lines Projects (CUWLP) based in Cromwell between September 2020 and June 2022. Following my return to Wellington I was the Head of Engineering Integration from June 2022 to June 2023 before taking up my current role.
9. My experience also includes five years as a South Island Transmission Line Maintenance Manager for a contractor for Transpower, followed by three years working in a transmission line design and project management consultancy.
10. I have worked for Transpower directly for nearly 25 years, initially in a national engineering support role for maintenance works. I then transitioned into engineering design, construction and asset management roles for transmission line development and enhancement projects.
11. I am familiar with the National Grid assets within Wellington City.
12. I confirm that I am authorised to give this evidence on behalf of Transpower.
13. While this is a Council hearing, I confirm I have read the Code of Conduct for Expert Witnesses contained in Section 9 of the Environment Court Practice Note 2023. As I am employed by Transpower, I acknowledge I am not independent, however I have sought to comply with the Code. I

confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise.

14. While I am employed by Transpower, I am providing this evidence in my capacity as an expert in transmission engineering and matters relating to the National Grid.
15. Where relevant, I have relied on the Hearing Stream 1 Evidence of Dougall Campbell. This includes the description of National Grid assets in the Wellington City jurisdiction set out in Mr Campbell's evidence.

Earthworks compromising the National Grid

16. Transpower seeks controls on earthworks near the National Grid, as outlined in **Ms Whitney's** evidence. As a general matter, earthworks adjacent to towers or poles can significantly reduce the capacity and stability of the structure foundations, causing the structure to lean or, worse, collapse. Earthworks including filling or increasing the ground levels within the span can also increase risks of electrical flashover by reducing the clearance between the ground and conductors.
17. NZECP34 Section 2, regulates excavation in proximity to the National Grid by stipulating allowable excavation depths, and Section 4 regulates the minimum distances from the conductor to ground.
18. Section 2 also provides for a number of exemptions and a "dispensation" pathway for certain earthworks that breach the specified excavation depths and distances. This pathway allows the owner of the line utility to assess the impact of the earthworks, risk to the structure and mitigations planned to be put in place prior to the works being undertaken.
19. Section 4, governing minimum clearances to ground, has no such dispensation pathway.
20. A proposition often put forward is solely relying on NZECP34 to manage earthworks. I do not support such an approach. The scope and purpose of NZECP34 is confined to safety, setting minimum safe

distances to primarily protect persons, property, vehicles and mobile plant from harm or damage from electrical hazards. It does not address the wider third-party effects that compromise the National Grid.

21. In the following sections I elaborate on the effects of earthworks on the National Grid, including examples of situations where Transpower is not able to grant a dispensation for earthworks under NZECP34.

Exceeding depths around structures

22. The foundations of structures on the National Grid are designed to obtain their strength, or ability to sustain their applied loads, by utilising the strength and weight of the soil that they are founded in. Significant reductions in the strength of the structure are likely to occur when excavations occur around these structures.
23. Figure 1 shows earthworks that occurred around a tower as part of development for an urban subdivision in Whitby, Porirua. The earthworks were well within 12 metres of the support structure and reduced the structural capacity of the tower. While NZECP34 provides a dispensation pathway for earthworks within 12 metres of a support structure, Transpower would not have given dispensation for these earthworks as proposed without mitigation being designed and put in place to ensure the structural capacity of the tower was maintained, and the potential erosion issues were addressed.



Figure 1: Earthworks in Porirua

24. As well as possibly undermining the stability of the tower structure, the earthworks in the photograph have also restricted vehicular access to the tower and the area where Transpower can place vehicles and machinery required to maintain the tower. This compromises Transpower's ability to maintain the existing transmission line. Typical maintenance activities include insulator replacement, climbing assessments, steel replacement and tower painting.
25. In this instance, Transpower worked with the developer retrospectively to ensure that the constraints on the line introduced by the developer were mitigated and the long-term stability of the towers would be retained. This required the installation of a shotcrete surface on the cut batter and the strengthening of the grillage foundation.
26. Such works are an example of how earthworks conducted close to the Grid can undermine Transpower's ability to operate and maintain the network effectively and efficiently. Ultimately, the manner in which Transpower carries out maintenance at this tower needed to change to address the effects.

Compromising stability

27. Another example of the impact of excavations near tower foundations is the recent construction of the Transmission Gully highway. During the design and construction of this highway the builder approached Transpower to obtain approval to excavate within the NZECP34 distances. Given the national significance of this project, agreement was reached to monitor the stability of the slope, and if instability was found then the builder would be liable for the costs of rectifying that instability. During construction, monitoring found that the slope did in fact begin to move and the extensive rectification works cost the builder more than \$600,000.
28. In the above case it was possible to set responsibilities and liabilities before the work commenced. Transpower has experienced other situations such as in Figure 1 above where retrospective mitigation has been required. The period between identifying this non-compliance

and being able to design and construct mitigation placed the security of the National Grid at risk.

Earthworks causing ground to conductor clearance violations:

29. Another example of earthworks adversely impacting the operation of existing National Grid assets is earthworks undertaken in Hastings (Figures 2 and 3 below). Transpower investigated the clearances from the conductor to ground for two Hastings properties and found the minimum clearance was only 5.3m from the ground to conductor at everyday conditions (instead of 6.5m at maximum operating conditions required under NZECP34). In this case there was a significant risk of electrical flashover to vehicles passing underneath and people moving tall objects.

30. Transpower needed to arrange temporary fencing of the two earthworks sites to prevent any further access under the conductors until rectification works were completed. Mitigation included installing a new set of cross arms on the poles. The top and bottom crossarms were changed to shorter steel crossarms with new Horizontal Line Posts (HLPs) attached. This lifts the conductor into a clamp on the end of the HLPs on the same pole by approximately 1200mm and prevented the need to replace the poles. Transpower then carried out ground works to cut the edge of the bench/track back to ensure the regulation 6.5m ground clearance at maximum operating temperature was complied with i.e., remediating the site back to original ground level and achieving compliance with NZECP34. Transpower is not able to grant a dispensation under NZECP34 for earthworks that exceed the clearance distances.



Figure 2: Hastings ground clearance violations



Figure 3: Hastings ground clearance violations

Earthworks compromising access to the National Grid

30. The Porirua subdivision situation described earlier provides a good example of earthworks potentially de-stablising adjacent support structures and permanently impeding vehicular access to the National Grid.
31. Physical access to transmission lines is required for all maintenance and project work, and when a system fault occurs. Transpower has statutory rights to access its assets on private land under the Electricity

Act 1992 (Electricity Act). The Electricity Act provides for access to maintain, inspect and operate the National Grid.

32. In an ideal situation, Transpower would have unimpeded physical access to all transmission line structures. In practice, this is not always possible. Physical barriers and natural obstacles, such as waterways, valleys, and undulating ground and including through earthworks, require Transpower to use alternative access options, for example helicopters and/or walking in are sometimes required.
33. The quality of access is important as some construction plant, for example cranes and concrete trucks, require wider and lower gradient tracks than what is traversable by smaller vehicles. The existing access is usually the most suitable as it was generally used to construct the line and for ongoing maintenance. If the landowner decides that they wish to change the access Transpower should be consulted to ensure that the new route will not impede future works on the Grid.
34. If the planning regime ensures continuation of existing access, this will avoid the need (and associated costs and delays) to dismantle fences and other structures, temporarily bridge waterways, carry out excavation or vegetation removal, just to access the National Grid.
35. Another important reason for unobscured access is for emergency works. In the event of a fault, Transpower must always be able to quickly access its lines to find and fix the fault. Businesses and communities are heavily reliant on electricity, so it is crucial that faults are identified and fixed as soon as possible.
36. While Transpower's assets perform well in storm events or natural disasters, excessive winds and rivers changing course do at times break or collapse National Grid infrastructure and emergency repairs need to be carried out to get these back into operation. During these times there is often a heightened requirement for electricity. The National Grid is a lifeline utility.

Wellington City Context

37. Although the above examples are in other parts of New Zealand they are common to National Grid assets in Wellington City (as described in Mr Campbell's evidence) These assets are impacted by earthworks undertaken for new land development, intensification of housing and development of existing properties. In all cases earthworks needs to be carefully managed to protect the Grid.

Conclusions

38. Earthworks involving both excavation around National Grid structures and building up of ground levels within spans needs to be tightly controlled to ensure structural stability of those structures are maintained, access to the structures is not closed off and safe clearances are provided between the conductors and the ground.

Roy Noble
18 July 2023

