BEFORE THE HEARING PANEL

Under the Resource Management Act 1991

In the matter of **Hearing 15 - Designations**

of the Proposed Waikato District Plan

Between

Transpower New Zealand Limited

Submitter

and

Waikato District Council

Statement of Evidence of Andrew Charles Renton on behalf of Transpower New Zealand Limited

14 April 2020

Executive Summary

1. Transpower New Zealand Ltd ("**Transpower**") owns and operates the National Grid which transmits electricity throughout New Zealand from energy generation sources to distribution networks and direct-connect customers. The Grid is made up of a number of assets and components which form the basis of the integrated network. The Meremere Switching Station located within Waikato, is one of the assets.

2. The Meremere Switching Station is operational. It enables electricity supply to be maintained between the Waikato and South Auckland.

3. Transpower has dismantled some assets at the Meremere Switching Station (hereafter referred to as the "**Meremere site**"), following the closure of the Meremere Power Station. No further assets can be removed without further project work elsewhere on the Grid, to ensure security of electricity supply. Such project work is not currently planned (although is under investigation).

4. The long-term use of the Meremere Power Station is uncertain – if any options require a large power supply, further assets would be constructed within the Meremere site to ensure that supply.

5. In my opinion it would be premature to either remove or reduce the extent of the existing designation given the provision for a connection that already exists, secure electricity supply is required, and there is uncertainty as to the long-term use of the site.

Qualifications and Experience

6. My full name is Andrew Charles Renton.

7. I am employed by Transpower as the Senior Principal Engineer. I have a New Zealand Certificate of Engineering and Bachelor of Engineering (Electrical).

8. I have over 26 years' experience in transmission engineering work. I currently work in the Grid Development Division of Transpower. My role involves investigating and providing holistic, pragmatic and strategic advice to developers and infrastructure

divisions of councils, on suitable and cost effective transmission solutions as well as new developments and technologies. My previous roles at Transpower have included the Asset Development Engineering Manager responsible for all substation and transmission line engineering development work.

Scope of Evidence

9. My evidence will address the following:

- A description of the assets at the Meremere site
- The history of the Meremere site
- The current state/use of the site (e.g. a description of the current equipment at the site and its purpose)
- The potential future uses of the site and assets

Transpower's Meremere Site Assets

10. Transpower owns and operates the following assets at Meremere (refer to **Appendix A** of my evidence for a location map and **Appendix B** for an aerial image of the switching site and wider Meremere assets):

    (a) 110kV Wood pole and steel tower HAM-MER_A line;

    (b) 110kV Wood pole and steel tower HAM-MER_B line;

    (c) 110kV Wood pole and steel tower BOB-MER_A line;

    (d) 110kV Wood pole and steel tower MER-TAK_A line; and

11. The site used to include switchgear and power transformers to connect the lower voltage generators to the high voltage grid. This equipment has been removed with remaining assets being those to connect the lines together.

History of the site

12. The site was commissioned in 1958 to supply the growing power demands of Auckland. Meremere power station was the first major coal fired power station to be constructed in New Zealand. Located adjacent to local coal fields and cooling water from the Waikoto River the power station connected into the two 110kV National Grid lines that ran from Arapuni and Hamilton to Bombay.

Figure 1 Former Meremere Power Station

13. The power station used to connect its steam generators to the Grid at an outdoor substation located south of the main building, where the present Transpower designation is located. Typical of most substations it consisted of a secure fenced area that included an outdoor lattice steel gantry with associated buswork, electrical switchgear, transformers, foundations, cables and other connections. The power station ceased operation in early 1990s as the boilers came to the end of their economic life. The site was put up for sale by Electricity Corporation and subsequent owner Genesis Energy in 2001, after Global waste management company Olivine decided against reusing the Meremere plant as a waste to energy plant and instead build one in Australia.

Present use of site and state of assets

14. Since the site was decommissioned and sold, all of the Transpower substation electrical equipment associated with the generator connections has been removed along with as much buswork and supporting gantries as possible. What remains within the secure fenced area (i.e. within the existing Transpower designation) includes disused foundation and cabling and the minimum connections to enable the existing lines to loop in and out and electricity supply to be maintained between the Waikato and South Auckland. The purpose of the remaining assets is to maintain and continue the electricity supply on the lines between Auckland (specifically Bombay) and South Waikato and is a reflection of the historic large capacity connection to the site.

15. The extent of the existing designation is shown in Figure 2. Meremere designation below, and reflects that area previously used to accommodate the substation electrical equipment. The extent also reflects that area which Transpower holds a registered 999 year leasehold interest for (as outlined in the evidence of Ms Whitney).

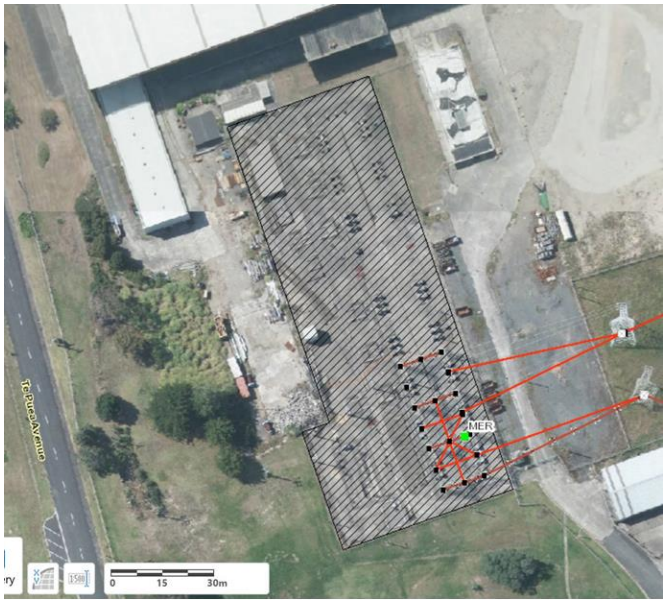


Figure 2. Meremere designation

Future use of site and assets

16. Since its decommissioning, the future use of the former Meremere Power Station and associated Grid connection (the Transpower Meremere designation area) have been

considered by various proponents. Identified future uses have ranged from new dedicated power generation, waste to energy, new industrial loads, and water supply schemes. All options have foreseen a need for a large capacity connection to either take supply from or export electricity to the Grid. This would require further equipment to be established within the designated site. Until the future development plans of the site are confirmed by the new owners and their need for a large capacity Grid connection are confirmed it would be imprudent to fully decommission the site, remove all the assets and reroute the transmission line.

17. Should the new owners confirm that a large capacity Grid connection is not required, it would be technically possible to reroute the transmission line and decommission the Substation site. However, a precursor to that occurring would be new assets being funded, necessary property rights being obtained and new assets constructed.

18. Transpower is highly regulated, and its costs borne by the electricity consumer. Transpower would not carry out such a project until there was a justified need from a cost benefit perspective, or some other party incurred the costs of the project. Such a need does not exist at present.

Response to Tainui Group Holdings Limited submission

19. Tainui Group Holdings Limited has submitted that Transpower should reduce the extent of Transpower designation (Meremere Switching Station) as far as practicable. In response to this submission, Transpower has reviewed at a high level its short and long term needs for the assets at Meremere.

20. I have discussed future re-establishment of the substation above, should future use of the Power Station site require large scale electricity supply. I do not repeat those comments here. Instead, I focus on options should Transpower be able to consider exiting the Meremere site completely – both in the short and long-term.

Longer term option

21. Transpower has a project presently in the investigation and delivery phase to reinforce the power supply to Bombay substation. Once completed the HAM-MER_A and B lines, HAM-MER_B line; BOB-MER_A line; and MER-TAK_A line will cease to

be a crucial part of the grid from ~2024/25 once other grid reconfiguration work is completed at Bombay Substation. It is expected that those lines will likely then be able to be removed from ~2024 onwards, and by 2030 at the latest. These removal plans will gain more certainty from mid-2020 once the Bombay plans are finalised. Refer Figure 3. Bombay to Meremere.

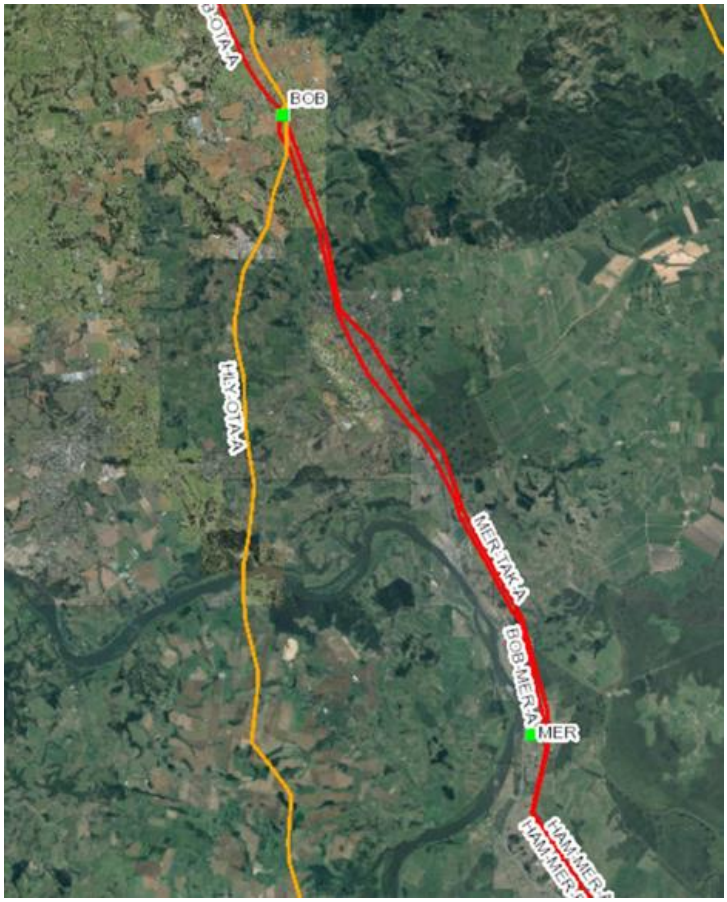


Figure 3. Bombay to Meremere

Short term option

22. There is the option in the short term of diverting the line from the Meremere site and decommissioning of the site earlier. This could be achieved by adding a transmission line span (blue line) to bypass the Meremere site (refer Figure 4. Potential deviation option. Transpower could then remove the remaining assets at the site. Transpower would require an easement for the new alignment. Given the uncertainty of the use of the former Power Station site, the current investigations for the Bombay project, and the existing workability of the existing Meremere site, Transpower has no imminent

plans or need to undertake the deviation option. However, there is the potential option for the landowner, or other party, to fund this option.

Figure 4. Potential deviation option

23. As outlined in the evidence of Ms Whitney, both options have been conveyed to Tainui Group Holdings Limited. Transpower will continue to engage with Tainui Group Holdings Limited as to the use of the Meremere site and options.

24. To assist the panel in understanding the technical components of National Grid assets, **Appendix C** explains the components of transmission lines.

Conclusions

25. At present the Meremere site is operational. It is required to maintain electricity supply between the Waikato and South Auckland. The site cannot be decommissioned without further project work elsewhere on the Grid. Such a project is not currently planned.

26. The long term use of the Meremere Power Station is uncertain – if any options require a large power supply, further assets would be constructed within the Meremere site designation to ensure that supply.

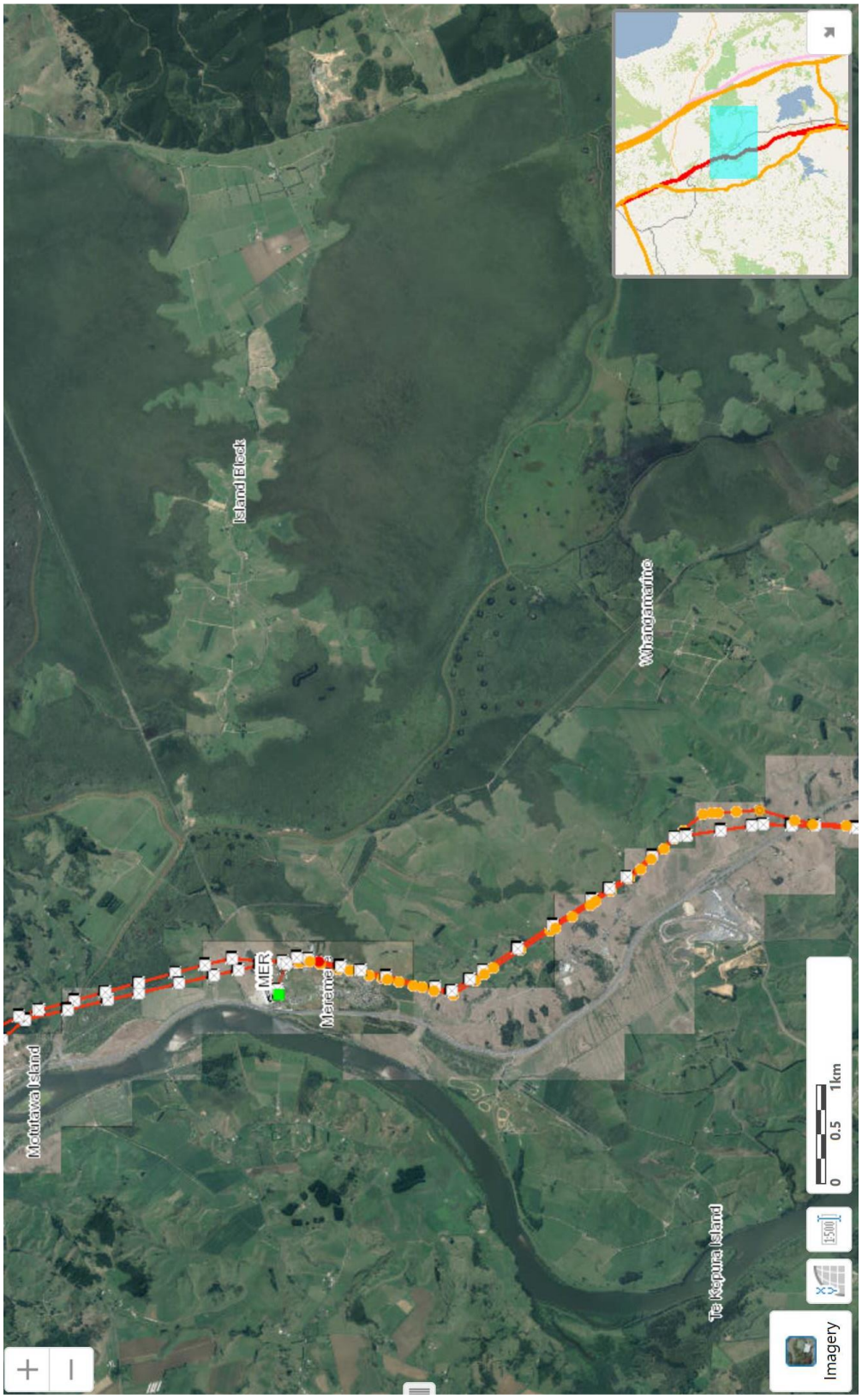
27. In my opinion it would be premature to either remove or reduce the extent of the existing designation given the provision for a connection already exists, secure electricity supply is required, and there is uncertainty as to the long-term use of the site.

Andrew Renton

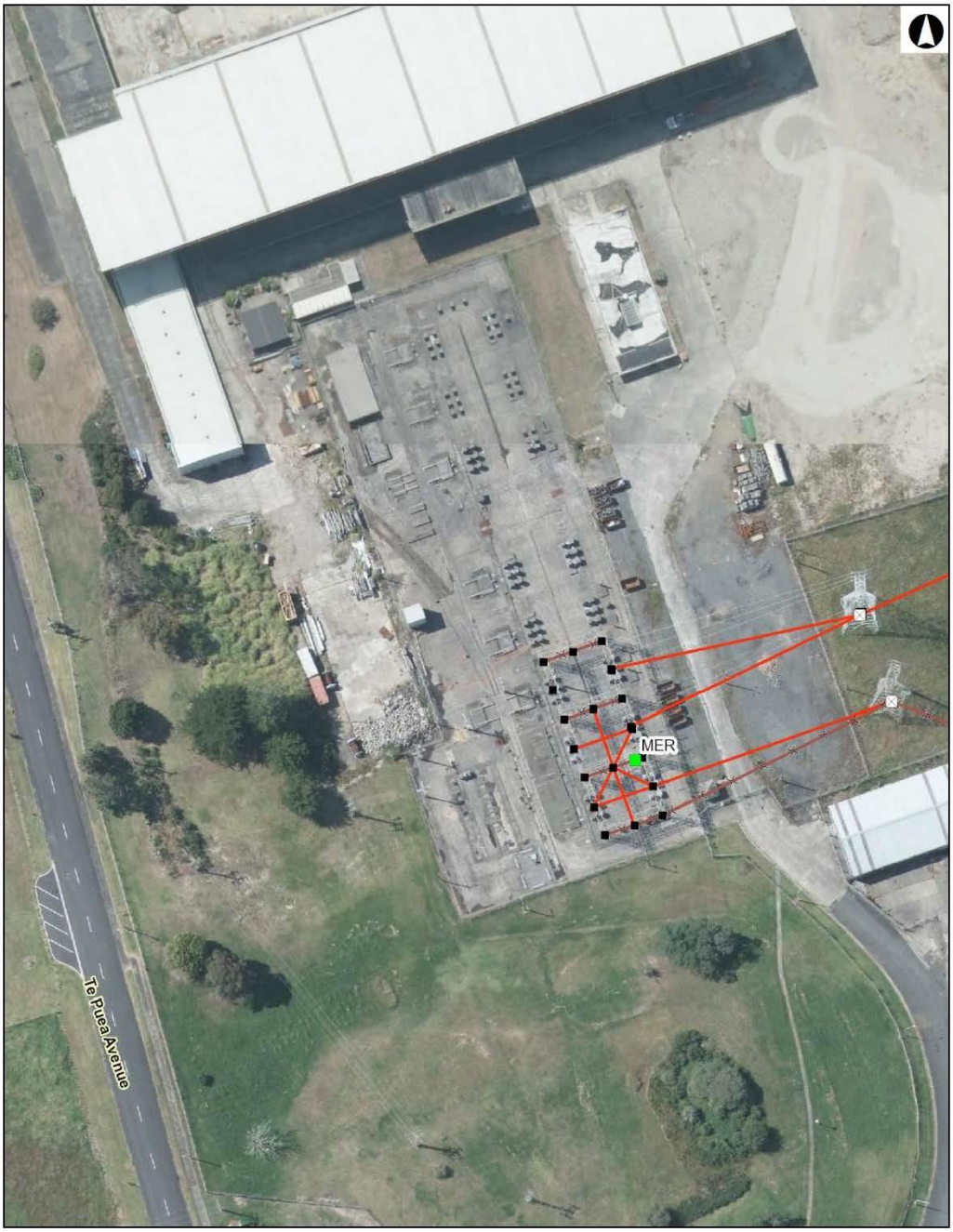
Senior Principal Engineer - Transpower

14 April 2020

APPENDIX A – LOCATION MAP OF THE MEREMERE SWITCHING STATION



APPENDIX B –TRANSPOWER ASSETS AT MEREMERE



TRANSPOWER

05-Apr-2020
Scale: 1,000
Plan Size: A4P

Transpower NZ Ltd - Meremere Switching Station

25 0 25 Meters

TRANSPOWER

Transpower NZ Ltd - Meremere Assets

05-Apr-2020
Scale: 5,000
Plan Size: A4P

125 0 125 Meters

APPENDIX C - BASIC COMPONENTS OF TRANSMISSION LINES

1. Overhead transmission lines consist of five basic components:

(a) Foundations;

(b) Structures;

(c) Insulator sets;

(d) Conductors; and

(e) Earthwires.

These components are all shown on Figure 1 below.

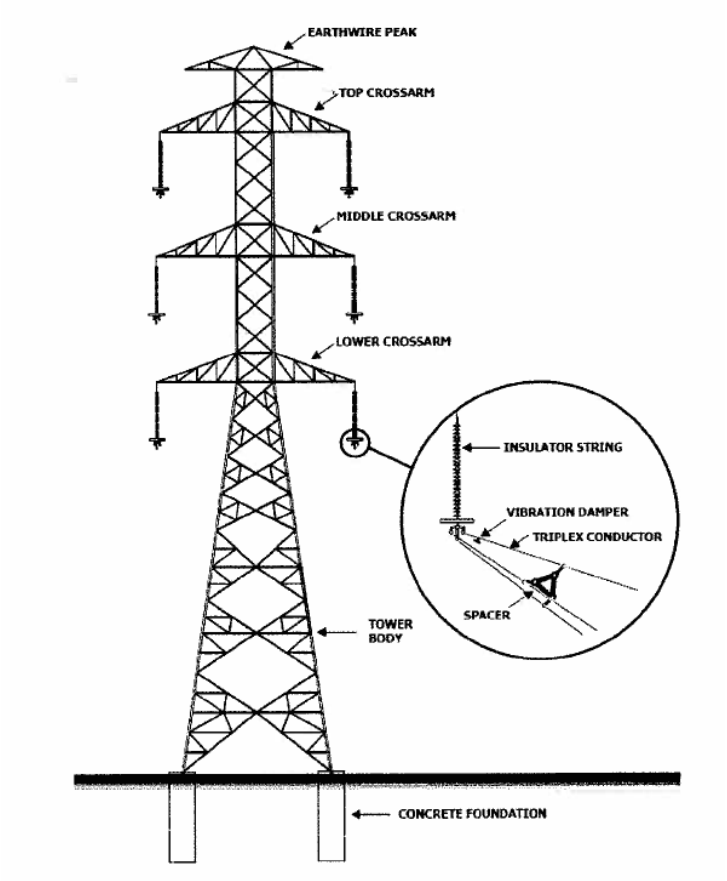


Figure 1: Generic Tower Outline

Foundations

2. Foundations form the base on which the tower sits. Foundations come in three main designs:

(a) Directly buried lattice steel (grillages), where a lattice steel configuration sits on a formed platform and the entire configuration is directly buried;

Photo 1: Grillage Foundation

(b) Formed concrete foundations that connect the tower by either a bolted base plate arrangement or a concrete encased steel connection. These can be bored plugs, driven/screw piles or excavated, boxed up and the back filled; and

(c) Poles, which are generally directly buried.

Structures

3. Structures support the insulators, conductors and earth wires above the ground or other obstacles to maintain safe electrical clearances. Structures take many forms, for example, self-supporting lattice steel towers, concrete, wood, and steel tubular poles All lattice steel structures on or near public areas are fitted with climb deterrent devices to restrict unauthorised climbing. All poles structures have the climbing bolts removed to a minimum of 3m above the ground. All structures have danger signs and a 0800 THE GRID number for emergency contact.

Photo 2 Danger Sign Example

4. All steel structures are galvanised when they are first installed and Transpower now have a policy of painting structures when they meet the requirements of the policy as not all structures are painted.

5. Structures are designed to take one or multiple circuits. The circuits each consist of three phases. The phases can also have one conductor or multiple sub conductors which are held apart by spacers so the sub conductors do not clash or wrap around each other and damage themselves in doing so.

Insulator sets

6. Insulators electrically insulate the live conductors from the earthed structures and prevent any loss of energy to earth. Each phase on each structure requires an insulator set. The sets consist of insulators that may be manufactured from glass, ceramic or a composite material, and the hardware assemblies which attach the insulators to the structure and the conductors. In most cases the insulators are suspended from the pole or tower arms.

Conductors

7. Conductors (wires) are the physical conductive connections that transport live electrical energy at high voltages between circuits (that is, between generators and substation supply points). Conductors usually consist of a number of aluminium stranded wires wrapped around an internal steel reinforced support wire (ACSR). In some cases hard drawn copper is used but these conductors are being phased out as they age.

8. Conductors are arranged in different configurations and with different spacing between them depending on the structure types and circuit voltage. Previous designs for 220kV lines typically have about a 5.5 metre and 110kV lines a 3.25 metre vertical conductor separation. Where conductors are duplexed (two conductors per phase) sub-conductor spacers are installed to separate the two wires to prevent the two parallel wires twisting, particularly in windy conditions.

Earthwires

9. Earthwires are used to bond all conductive structures together and form a protective shield to help mitigate lightning strikes on the conductors. In some parts of the Transpower network, fibre optics are encased in the earthwire and serve as a communication system by utilising an internal fibre capability and providing signalling for protection systems and a communication link between substations.

10. Not all assets have full length earthwires installed. They are, however, installed in at least the first 5 structures out from all substations and generating sites.