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Interruption Report: Maraetai Bus C – 24-25 September 2023

The Maraetai (MTI) 220 kV C Bus tripped at 1617 hours on 24 September 2023, causing loss of the Maraetai–Waipapa–1 (MTI–WPA–1) 220 kV circuit, and connection to Mercury Energy at Waipapa. Waipapa was generating 11.6 MW at the time of tripping. There was no loss of load. The remainder of MTI equipment was still available for the 10 Mercury generating units to be dispatched (upto 360 MW).

Protection indicated a fault within the MTI 220 kV bus zone on the yellow phase. The tripping was subsequently found to be caused by flashover due to bird streaming, from a bird nest located directly above the centre phase insulator string. Due to fading daylight and weather concerns, the MTI bus was kept isolated overnight, with lines service providers undertaking the required works the following morning. The connection was restored at 1323 hours on 25 September.

Transpower must publicly report on unplanned interruptions over one system minute, or which last 12 hours or longer, including about:

- the cause of the unplanned interruption
- the start date and time of the unplanned interruption
- the end date and time of the unplanned interruption
- the megawatts affected by the unplanned interruption
- the grid exit point(s) and grid injection point(s) affected by the unplanned interruption
- actions Transpower took to minimise the effect of the unplanned interruption
- a description of steps that Transpower proposes to take to mitigate the risk of future unplanned interruptions of this type.

Transpower is required to report on such unplanned interruptions within 42 working days of the interruption, in this case, by 22 November 2023. Whilst the event was managed, the

requirement to report was missed, hence this late submission. We have reviewed our process to ensure future events are reported within required timeframes.

Please find **attached** our report in accordance with clause 26.1 of our Individual Price-Quality Path (IPP) Determination 2020. This letter and the attachment will be published on our website.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Mark Ryall', is positioned above the printed name.

Mark Ryall

General Manager, Grid Delivery

INTERRUPTION REPORT – MARAETAI BUS C INTERRUPTION 24-25 SEPTEMBER 2023

Summary

The Maraetai (MTI) 220 kV C Bus tripped at 1617 hours on 24 September 2023, causing loss of the Maraetai–Waipapa–1 (MTI–WPA–1) 220 kV circuit, and connection to Mercury Energy at Waipapa. The remainder of MTI equipment was still available for the 10 Mercury generating units to be dispatched (total 360 MW).

Protection indicated a fault within the MTI 220 kV bus C zone on the yellow phase. A service provider was dispatched to the site, and carried out careful visual inspection within the substation outdoor structure and the towers on the adjoining bus tie lines¹. The source of the fault was located on a bus tie line transmission tower; the tripping had been caused by flashover due to bird streaming from a heron's nest located directly above the centre phase insulator string, within the existing bird deterrent.

Due to fading light and weather concerns (safety considerations), a decision was made to keep the MTI bus isolated overnight. Lines service providers removed the nest and cleaned the string insulator the following morning. The required works were completed and the connection restored at 1323 hours on 25 September. We are satisfied that documented policies were adhered to, including ensuring safety and assessing risk prior to restoring service as quickly as was practicable.

Clause 26.1.1 – the cause of the unplanned interruption

A flashover² caused the MTI 220 kV Bus C to trip, resulting in loss of the MTI–WPA–1 220 kV circuit, and connection to the WPA generator. The flashover was caused by bird streaming on a bus tie line transmission tower, from a heron's nest located directly above the centre phase insulator string.

Clause 26.1.2 – the start date and time of the unplanned interruption

The interruption started at 1617 hours on 24 September 2023.

¹ The Maraetai substation is unusual in that its top and bottom yards are connected by a bus comprised of towers rather than a gantry.

² Insulators connect live conductor to the tower steel, providing electrical insulation. Flashover refers to the situation where electricity bridges the air gap between the conductor and the tower, bypassing the insulator. This can be caused by several factors, including bird streaming.

Clause 26.1.3 – the end date and time of the unplanned interruption

The interruption ended at 1323 hours on 25 September 2023.

Clause 26.1.4 – the megawatts affected by the unplanned interruption

No load was interrupted. The WPA generator was producing 11.52 MW at the time of the interruption. The interruption duration was 21.1 hours.

Clause 26.1.5 – the grid exit point(s) and grid injection point(s) affected by the unplanned interruption

WPA 22011. This is the WPA grid injection point.

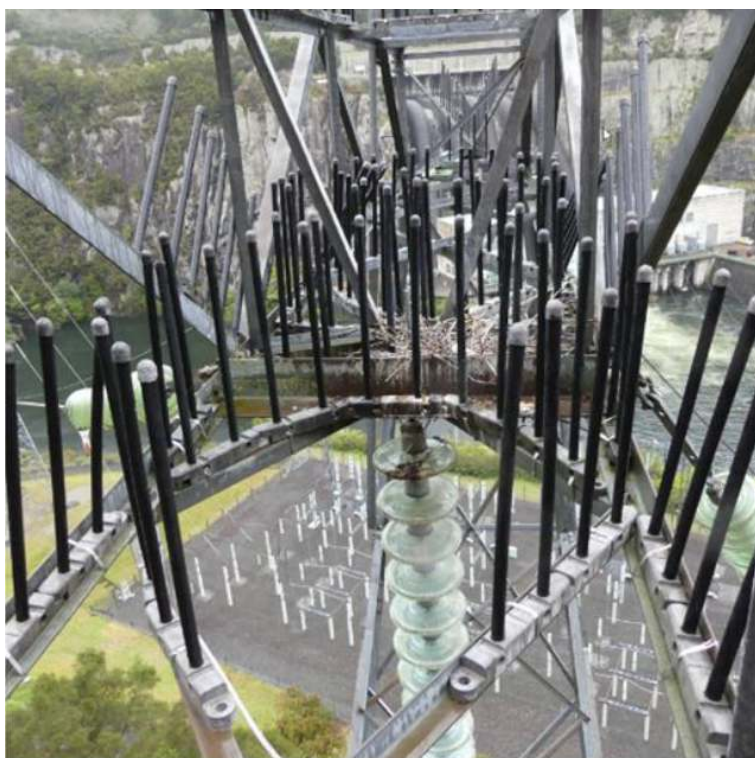
Clause 26.1.6 – actions Transpower took to minimise the effect of the unplanned interruption

To minimise the effect of the unplanned interruption, Transpower:

- had, following historical bird activity at this site, installed bird deterrents (as shown in Figure 1) on the affected tower and other nearby equipment, and installed bus couplers to minimise interruption impact³. However, the bird was able to construct a nest within the 'bird spikes';
- immediately dispatched a service provider to inspect the bus. Within two hours of the tripping (1811 hours), the service provider had identified the issue, and found the bird nest;
- decided that, for safety reasons (daylight and weather concerns), removal of the nest should be deferred to the following morning, at which time it was carried out as soon as was practicable;
- communicated with Mercury Energy regarding the interruption, both immediately following the event and throughout the period of the interruption.

³ Prior to the protection upgrade and addition of bus couplers this interruption would of removed all of Maraetai and Waipapa generation.

Figure 1 – Bird nest as found, within the existing bird spikes



Clause 26.1.7 – a description of steps that Transpower proposes to take to mitigate the risk of future unplanned interruptions of this type

Birds nesting in our towers is an issue in several areas of the country. Historically we managed this by installing deterrents and other mitigating measures in affected locations. A more proactive approach has been warranted in recent years as changes in land use have exacerbated bird-related issues. Our approach has involved identifying and trialling several new deterrent options, with a focus on high risk locations.⁴ We are currently installing new deterrents at the first tranche of sites, following which we will look at what additional sites are required. To some extent the choice of sites will be driven by new connections onto the grid where the performance requirements of a bus or circuit become more critical.

Bird deterrents and mitigations were applied at MTI in 2014-16, following a series of faults attributable to bird activity. This included installing 'bird spike' deterrents (designed to deter large species, such as herons) on the towers that make up the MTI bus, together with some guards on the rooftop bus. Bus couplers were installed, to reduce the impact of interruptions. Activity at the site was relatively quiet for a number of years after this was completed. However, following the recent interruption, it was found that a heron had managed to construct a nest within the deterrents.

⁴ High risk areas have been defined by factors including the load affected, whether a site has a bus coupler and/or underhung insulators, and history of bird activity.

We have decided to apply a further engineering solution at this site. This consists of pyramid shaped Bird Cones (shown in Figure 2) which are being positioned above the insulator strings to provide additional shielding from bird streaming, with a mesh on the underside to prevent small birds nesting inside. These were developed for use on the Islington–Livingstone circuit. These will be installed in conjunction with a future planned outage at the site.

Figure 2 – Bird Cone to be fitted to the MTI Bus Tie line above the middle phase insulator string

