Request for additional information – Cyclone Gabrielle Normalisation Event Application

	Question	Response
1	The causes of the interruptions to supply at Fernhill, Whakatu and Whirinaki substations. I.e., which of the interruptions was due to flooding and which were caused by strong wind.	**Fernhill** is supplied via the RDF 220 kV bus and interconnecting transformers.[1] The interruption at FHL occurred as a direct result of the RDF 220 kV bus tripping due to flooding. **Whakatu** is also supplied via the RDF 220 kV bus. It also lost supply when the RDF 220 kV bus tripped due to flooding. **Whirinaki** 11 kV supply to Pan Pac Forest Products failed due to flooding of the 11 kV reactor building at Whirinaki, which caused T2 and T3 to trip.
2	The components that failed and caused the trippings, including those on each of the transmission lines mentioned in the application. What does KPA stand for?	None of the trippings were due to component failure. The circuit trippings were due to high winds, wind borne debris, and vegetation strike. KPA is Kaponga Tee, located off the Opunake–Kapuni–Stratford–2 circuit. It provides a generation connection to Nova Energy.
3	For the RPO_TNG_1 and RPO_WRK_1 circuit, the components that failed. Were the failures and their effects beyond Transpower's reasonable control. Were the failures due to Transpower not exercising GEIP?	There were no component failures on these circuits. A red phase to earth fault occurred as a result of tree strike, during heavy rains and strong winds. Both circuits tripped as they were tied together via the Rangipo bypass for the RPO–BS–220 626-664 planned outage. The red phase to earth fault occurred twice. On the first occasion, we were able to quickly return the circuits to service. When they tripped again a short time later, we were unable to return them to service without dispatching crews into the forest blocks, which was considered unsafe in the prevailing extreme weather conditions and darkness. Our crews were able to safely enter the forest the following morning. It was identified that the trees that had contacted the conductors, causing the trippings, were outside the Tree Regulations: these are trees we can only remove with the agreement of landowners. Prior to this event, we had been negotiating with NZ Forest Managers (who manage the blocks on behalf of forest owners) to obtain permission to remove

[1] The 110 kV Fernhill to Waipawa circuits were in their normal 'open' position at the time of the interruption.

		trees in very limited (specified) circumstances, but agreement had not been reached. Following the event, we were given broader permission to remove trees including those that were leaning towards the line. We have now completed this work. As such, we do not consider the circuit trippings to be due to failure to exercise GEIP.
4	Since you identified vulnerability and criticality risks for the Redclyffe substation in 2020, what factors did Transpower consider in deciding to undertake the work in future RCPs rather than in RCP3?	While we identified vulnerabilities in 2020 (at 12 substations), this was through a desktop assessment. Further work to understand the vulnerabilities and investigate possible options on the substations identified was scheduled to begin from July 2023. Until this work was completed, we were not in a position to implement options to mitigate the risks. (link: Our work to understand and mitigate substation flood risk | Transpower). We prioritise work (in terms of assessment, design, and delivery) through our asset management framework, this includes assessing risk and criticality. The Redclyffe substation has been in its current location since 1927, Cyclone Gabrielle exceeded what had been modelled for a 1-in-500-year event. The risk reduction resilience work would ideally bring the asset to current standard, which is a 1-in-450-year event plus climate change plus freeboard. The new standard would have not have entirely mitigated all of the impacts from Cyclone Gabrielle. As Redclyffe substation has a large proportion of connection assets, any significant changes to it must be agreed and supported by our customers as they bear the costs.
5	The cost to repair the damages caused by the cyclone.	For the year ending 30 June 2023, Transpower spent $8.5m in opex and $5.8m in capex to repair and replace assets damaged by Cyclone Gabrielle. This relates to work in both the Hawkes Bay and Northland regions. There continues to be ongoing work in Hawkes Bay – particularly at Redclyffe as well as some recent slips in Northland that will need addressing. This work is expected to be completed in September 2023.
6	If available, an estimate of energy not supplied due to the interruptions?	Total MWh supply lost was 36,499 MWh. This comprised 26,620 MWh at WHI, 5,462 MWh at RDF, 4,096 MWh at WTU, 242 MWh at TUI and 78 MWh at FHL.
7	The factors that were considered when planning the restoration outages. How did Transpower exercise [GEIP] with respect to these outages?	We have assumed the Commission meant how did we exercise GEIP (missing word in question). The key objectives/stages for the response and recovery works were: • Hawkes Bay Emergency Response – restoring power with basic protection • Redclyffe Substation Recovery – measured response to restore substation to full duplicate

		protection on all 220 kV circuits • Redclyffe Substation 110 kV Rebuild – measured response to build new 110 kV control room with full duplicate protection on all transmission circuits. In planning the work, particularly in the early stages, key factors that had to be considered included: • Ensuring the safety of our service providers, and the public. This included safety with respect to wider hazards (asbestos, flood waters, silt, worker fatigue, crime) as well as electrical safety concerns. • Resource constraints, both personnel and equipment, were significant. We brought in work crews and equipment from outside the region, from multiple companies, to meet resource needs in terms of numbers and expertise, and to ensure worker safety. • The need to coordinate our response with the needs and work plans of our customers and other elements of recovery. In particular, we worked closely with Unison on prioritising restoration and in assessing protection solutions (to ensure safe operation of protection throughout Unison's network). The planning was driven from Coordinated Incident Management Systems (CIMS). Plans were reviewed regularly and revised as needed, including changing work sequencing to better achieve our objectives, and developing the detailed plans for future phases of work. We consider GEIP to have been an integral part of all of our work from the initial situational analysis and planning, through the immediate response period, and the longer recovery. With regard to the exercise of GEIP in planning of restoration outages, specifically, outages were planned to meet the response and recovery objectives, while working within the considerable constraints we faced.
8	The reason for multiple restoration outages in the case of some assets.	We assume this question is in relation to the two planned outages for each of RPO_TNG_1, RDF–T3 and RDF–T4. The planned circuit outages were required to remove storm damaged trees that were a fall distance hazard and deemed unsafe due to other wind damaged trees leaning against them. This work was carried out over several days, and across multiple sites. A specialist harvest machine was used to remove the trees and had to be moved between the sites. Using multiple outages enabled us to minimise the total outage duration.

		In the case of RDF–T3 and T4, the use of multiple outages reflects the staged approach taken to restoration. The initial outages enabled us to restore supply with basic protection. Additional outages were needed to restore full protection and undertake repair and rebuild works at RDF. The work is not linear, and multiple outages enabled us to minimise the total outage duration.

9	Now that the disclosure year is complete, the impact of the incident on the GP1 and GP2 – could be provisional at this stage.	The Normalisation Event Application affects GP1, GP2 and AP2.
		• If the Cyclone impact is included in calculations:
		  ○ GP1 – 69 interruptions associated with the event – meets all 6 POS subcategory limits – meets quality standard;
		  ○ GP2 – Does not meet 4 out of 6 POS sub-category limits – but meets quality standard, as previous years quality limits have been met for at least 4 out of 6 sub-categories;
		  ○ AP2 – 98.21% – does not meet quality standard.
		• If the Cyclone impact is excluded from calculations:
		  ○ GP1 – 59 interruptions – meets all 6 POS subcategory limits – meets quality standard;
		  ○ GP2 – Does not meet 1 out of 6 POS sub-category limits – meets quality standard;
		  ○ AP2 – 98.68% – meets quality standard.
		Note that these numbers are not yet audited, so should be considered provisional.