

## **Decision on the treatment of Transpower interruptions and outages caused by Cyclone Gabrielle (Transpower normalisation application)**

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## Chapter 1 Introduction

### Purpose of this paper

- 1.1 This paper sets out our decision to approve Transpower New Zealand Limited’s (Transpower) application (**Application**)<sup>1</sup> to treat the outages and interruptions to service resulting from Cyclone Gabrielle (**Cyclone**) on 13 and 14 February 2023 as a ‘normalisation event’ under the *Transpower Individual Price-Quality Path Determination 2020* [2019] NZCC 19 (**IPP**).<sup>2</sup>
- 1.2 We also set out in this paper the reasons for our decision along with the calculations in relation to Transpower’s quality measures because of our decision.

### What is a normalisation event?

- 1.3 The IPP sets quality standards for Transpower which comprise of measures of grid performance (**GP1** and **GP2**) and asset performance (**AP2**). These measures quantify interruptions to service and outages of core transmission assets (disconnection of assets from service), respectively.
- 1.4 Clause 20 of the IPP allows Transpower to apply to us to ‘normalise’ an interruption or outage that lasts 24 hours or more and meets certain additional criteria. Our policy intent is that the relevant quality standards should not apply to such interruptions or outages that are beyond Transpower’s reasonable control, in circumstances where Transpower exercised good electricity industry practice (**GEIP**).<sup>3</sup>
- 1.5 If we approve an application for normalisation under the IPP’s criteria, Transpower can exclude the impact of the normalised outage or interruption from the application of the relevant quality standard under the IPP.<sup>4</sup> Treating an outage or interruption as a normalisation event also affects the outcome of the performance incentives applicable to Transpower.

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<sup>1</sup> Transpower “Normalisation Application under clause 20.3 of the Transpower Individual Price-Quality Path Determination 2020 (IPP 2020)”, 12 June 2023 (**Application**).

<sup>2</sup> Commerce Commission, IPP, available at <https://comcom.govt.nz/regulated-industries/electricity-lines/electricity-transmission/transpowers-price-quality-path/setting-transpowers-price-quality-path-from-2020>.

<sup>3</sup> Commerce Commission, “Transpower’s individual price-quality path from 1 April 2020 Decisions and reasons paper”, 29 August 2019, (**IPP reasons paper**), available at: [https://comcom.govt.nz/data/assets/pdf\\_file/0028/170398/Transpower-IPP-for-RCP3-Decisions-and-reasons-paper-29-August-2019.pdf](https://comcom.govt.nz/data/assets/pdf_file/0028/170398/Transpower-IPP-for-RCP3-Decisions-and-reasons-paper-29-August-2019.pdf).

<sup>4</sup> IPP reasons paper, above n 3, at F344.

## We have decided to approve the Application

- 1.6 Having evaluated the Application and supporting documents against the requirements for normalisation set out in clauses 20.2.1 to 20.2.4 of the IPP, we have decided to approve Transpower’s Application to treat the outages and interruptions that were the result of the Cyclone as a normalisation event.
- 1.7 Our decision enables Transpower to exclude the specified outages and interruptions that were the result of the Cyclone from the relevant quality standards under the IPP.<sup>5</sup>
- 1.8 The quality standards affected by these outages and interruptions are AP2, GP1 and GP2.<sup>6,7</sup>

## Transpower’s Application to treat the impact of the Cyclone as a ‘normalisation event’

- 1.9 The Cyclone significantly affected the northern and eastern regions of the North Island between 13 and 14 February 2023. Gisborne, Hawke’s Bay, and the Bay of Plenty suffered some of the most severe flooding and damage. The strong winds and flooding caused extensive damage to key infrastructure in the east coast of the North Island, including roading, electricity, telecommunication, and water infrastructure.<sup>8</sup>
- 1.10 From the evening of 13 February 2023 and throughout 14 February 2023, the Cyclone affected the transmission network in the Hawke’s Bay and Central North Island. Flooding in Hawke’s Bay resulted in an unplanned interruption to supply in the region.
- 1.11 Strong winds caused unplanned outages of transmission lines that resulted in loss of connections (interruptions) to Kaponga (Nova Energy), Tuai, Whirinaki and Rangipo power stations. The loss of Fernhill, Redclyffe and Whirinaki points of service (**POSS**) caused interruptions to supply to the Hawke’s Bay region.

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<sup>5</sup> IPP reasons paper, above n 4, at F344.

<sup>6</sup> AP2 measures the percentage of time selected core high voltage AC transmission circuits are available for service. The circuits to which AP2 apply, including those affected by these outages, are listed in Schedule G of the IPP.

<sup>7</sup> GP1 measures the number of unplanned interruptions by point of service (**POS**) and GP2 measures the average duration of unplanned interruptions by POS. For the purpose of GP1 and GP2 quality measures, each POS is assigned a sub-category depending on its level or type of service. Schedule F of the IPP provides lists of all POSs and their respective sub-categories.

<sup>8</sup> Ministry of Foreign Affairs and Trade, ‘Cyclone Gabrielle’s impact on the New Zealand economy and exports - March 2023’. Available at <https://www.mfat.govt.nz/en/trade/mfat-market-reports/cyclone-gabrielles-impact-on-the-new-zealand-economy-and-exports-march-2023/>.

- 1.12 Over the following week, Transpower and Unison Networks Limited (**Unison**), the local electricity distribution business, restored supply and in some cases through temporary network configuration and bypasses. Transpower then undertook a series of planned outages to return the network to its normal configuration.
- 1.13 On 12 June 2023, Transpower applied to us to treat outages and interruptions that were the result of the Cyclone and the consequential planned outages as a normalisation event. Transpower applied on the basis that the outages and interruptions were the result of strong winds, heavy rain, and consequential flooding due to the Cyclone.
- 1.14 Table 1.1 below shows the interruptions by POS sub-categories and Table 1.2 lists the outages of assets in respect of which Transpower has made the Application.<sup>9</sup>

**Table 1.1 Interruptions relevant to the measure of grid performance by POS sub-category**

Point of service sub-category	Point of service	Time - Out of service	Interruption (hrs)
<b>Generator POS</b>			
N Security Generator - GPnF <sup>10</sup>	Kaponga 110I1	13/2/2023 2126	1.60
N-1 Security Generator - GPnE	Rangipo 220I1	14/2/2023 0116	0.23
N-1 Security Generator - GPnE	Rangipo 220I1	14/2/2023 0141	8.45
N-1 Security Generator - GPnE	Tuai 110I1	14/2/2023 0739	4.37
N-1 Security Generator GPnE	Whirinaki 220I1	14/2/2023 1056	527.35 <sup>11</sup>
<b>Demand POS</b>			
N-1 Security Material Economic Consequence – GPnB	Fernhill 033S1	14/2/2023 0739	2.25
N-1 Security Material Economic Consequence – GPnB	Redclyffe 033S1	14/2/2023 0739	157.58
N-1 Security High Economic Consequence – GpnA	Whakatu 033S1	14/2/2023 0739	80.87
N-1 Security High Economic Consequence – GpnA	Tuai 110S2	14/2/2023 0739	6.22
N Security High Economic Consequence – GPnC	Whirinaki 011S2	14/2/2023 0532	537.98 <sup>11</sup>

<sup>9</sup> Application, above n 1, p. 3.

<sup>10</sup> n = 1 or 2 for GP1 or GP2 quality measures respectively.

<sup>11</sup> When calculating the assessed values of quality measures, the duration of unplanned interruptions is capped at 24 hours, as per the definition of duration in the IPP.

**Table 1.2 Outage blocks relevant to the AP2 affected by the Cyclone**

Outage block <sup>12</sup>	Outage start	Planned/ unplanned	Outage (hrs)
Redclyffe –T3	14/2/2023 0739	unplanned	1192.30
Redclyffe –T4	14/2/2023 0739	unplanned	584.55
Rangipo-Tangiwai_1	14/2/2023 0116	unplanned	0.22
Rangipo-Tangiwai_1	14/2/2023 0141	unplanned	8.40
Rangipo-Wairakei_1	14/2/2023 0116	unplanned	0.23
Rangipo-Wairakei_1	14/2/2023 0141	unplanned	8.38
Rangipo-Tangiwai_1	27/3/2023 0739	planned	0.75
Rangipo-Tangiwai_1	1/4/2023 1640	planned	0.53
Rangipo-Wairakei_1	27/3/2023 0742	planned	129.48
Redclyffe –T3	4/4/2023 2300	planned	5.75
Redclyffe –T4	4/4/2023 2335	planned	0.82
Redclyffe –T3	3/5/2023 0752	planned	415.84
Redclyffe –T4	01/6/2023 0749	planned	<b>537.03<sup>13</sup></b>

- 1.15 Tables 1.1 and 1.2 show that there were multiple outages and interruptions spread over different geographical locations.
- 1.16 We have considered the outages and interruptions that were the result of the Cyclone on Transpower’s network in aggregate. For the reasons discussed in more detail below, this approach is consistent with the purpose of the normalisation event mechanism. Summarised at a high level, that purpose is to remove the impact of a severe event from Transpower’s quality standards where the interruptions and outages are, among other things, outside Transpower’s reasonable control.
- 1.17 The alternative would require an artificial separation of shorter outages and interruptions.

<sup>12</sup> Outage block is the description used for the assets in the IPP.

<sup>13</sup> The outage duration for Redclyffe-T4 in the Application is 657.7 hours. Transpower subsequently advised that the correct duration was 537.03 hours. (Transpower email: Joel Cook dated 23 August 2023).

- 1.18 Table 1.2 shows that there were several post-restoration planned outages to return the system to normal operation. These planned outages were included in the Application on the basis they were the result of the damage caused by the Cyclone. The planned restoration outages did not cause any interruptions to supply.<sup>14</sup>
- 1.19 In the rest of this paper we set out:
- 1.19.1 the IPP framework and criteria for normalisation;
  - 1.19.2 our evaluation of the Application according to the IPP criteria; and
  - 1.19.3 our calculations of the impact of our decision on Transpower's quality measures.

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<sup>14</sup> Transpower initially restored electricity supply to the EBDs and generators using temporary solutions and then required another set of outages to return the system to normal operation.

## Chapter 2 The IPP framework and criteria for normalisation

### Normalisation is set out in Transpower's individual price-quality path

- 2.1 Transpower is a regulated supplier under Part 4 of the Commerce Act 1986 (the **Act**). We set Transpower's individual price-quality path in a determination we make under Part 4 of the Act. This includes the quality standards of measure of grid performance and asset performance measure.
- 2.2 For a given disclosure year, clause 20.1 of the IPP provides that an interruption or outage can be excluded from the calculations of measure of grid performance,<sup>15</sup> or asset performance measure,<sup>16</sup> where the Commission decides that the relevant interruption or outage is a normalisation event.<sup>17</sup>
- 2.3 The IPP requires that Transpower apply to us to assess whether an interruption or outage event meets the criteria for a normalisation event. The application requirements and criteria for a normalisation event are set out below.

### Transpower must apply for normalisation

- 2.4 If Transpower wants an interruption or outage to be taken into account as a normalisation event, clause 20.3 of the IPP requires Transpower to make a written application to us for each applicable interruption or outage in the disclosure year. The application must:
- 2.4.1 be made no later than 42 working days after the end of the applicable disclosure year;
  - 2.4.2 include the reasons why Transpower considers the normalisation event has occurred and why Transpower considers:
    - 2.4.2.1 the interruption or outage was beyond Transpower's control;
    - 2.4.2.2 the effect of the interruption or outage on the grid, including managing to a shorter duration than that which actually occurred, was beyond Transpower's reasonable control; and
    - 2.4.2.3 Transpower exercised GEIP in relation to the cause and effects of the interruption or outage;

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<sup>15</sup> IPP, above n 2, clause 14.6-14.11, 16.6-16.11 and 19.3.1-19.3.2.

<sup>16</sup> IPP, above n 2, clause 17.2-17.3, 18.2, 19.3.3-19.3.4 and 19.4.

<sup>17</sup> IPP, above n 2, clause 20.4.



- 2.4.3 include supporting evidence for the reasons provided in accordance with clause 20.3.2, including, without limitation, information on the relevant design standards of any Transpower equipment involved in the interruption or outage;
- 2.4.4 include proposed reassessed values of any calculations of measures of grid performance<sup>18</sup> or calculations of measures of asset performance measures<sup>19</sup> that are relevant to Transpower’s written application, reassessed as if the interruption or outage was excluded from those measures in accordance with clause 20.1; and
- 2.4.5 include any other information that Transpower considers is relevant to its application.<sup>20</sup>

### Definition of outages and interruptions

- 2.5 Clause 7 of the IPP defines “interruption” as meaning the cessation of conveyance of electricity between grid assets owned by Transpower and the assets owned or operated by a customer at a POS to the grid.
- 2.6 Clause 7 of the IPP defines an “outage” as having the meaning:
  - ...set out in Clause 12.130 of the **code**, as amended from the time to time, other than as specified in **code** subclauses 12.130(2)(c) and 12.130(2)(d), and excludes those that are:
    - (a) of less than one minute in duration;
    - (b) at the request of, or caused by, a **customer**; and
    - (c) due to correct operation of **Transpower’s** assets, caused by events in a **customer’s** assets.
- 2.7 Clause 12.130 of the Electricity Industry Participation Code (**Code**) defines “outage” as meaning the following for current purposes:
  - (1) An **outage** exists when **interconnection assets** or **connection assets** are temporarily not provided in accordance with—
    - (a) the requirements of a **transmission agreement**; or
    - (b) the requirements of subpart 6.

<sup>18</sup> IPP, above n 2, at clauses 14.6-14.11, 16.6-16.11 and 19.3.1-19.3.2 sets out the approach to calculating grid performance measures.

<sup>19</sup> IPP, above n 2, at clauses 17.2-17.3, 18.2, 19.3.3-19.3.4 and 19.4 sets out the approach to calculating asset performance measures.

<sup>20</sup> IPP, above n 2, clause 20.3.

- (2) Without limiting subclause (1), an **outage** includes any situation in which—
- (a) **Transpower** removes **assets** from service temporarily; or
  - (b) **assets** are not able to be provided due to grid **emergencies**, in order to deal with health and safety issues, or due to circumstances beyond **Transpower's** reasonable control;... or
  - (e) **Transpower** is required by law to carry out an **outage**.

### Criteria for normalisation

2.8 Clauses 20.2.1 to 20.2.4 of the IPP define a 'normalisation event' as an interruption or outage that:

20.2.1 was beyond Transpower's reasonable control;

20.2.2 Transpower did not cause, or materially contribute to, by any failure to exercise GEIP;

20.2.3 had a duration of 24 hours or more, in circumstances where that duration was:

- a) beyond Transpower's reasonable control; and
- b) not caused, or materially contributed to, by any failure of Transpower to exercise GEIP; and

20.2.4 was the result of:

- a) natural disaster;
- b) fire not caused by Transpower equipment failure;
- c) explosion not caused by Transpower equipment failure;
- d) civil commotion;
- e) a terrorist act;
- f) malicious damage;
- g) war (declared or undeclared);
- h) revolution;
- i) contamination;
- j) action or inaction by a court or government agency (including denial, refusal, or failure to grant any authorisation, despite timely best endeavour to obtain an authorisation);

- k) a work stoppage;
- l) a dispute between an employer and employees;
- m) work bans; or
- n) acts or omissions (other than failure to pay money) of a third party that affect the ability of Transpower to prevent or minimise the interruption or outage.

**The Commission must assess the application and publish its decision**

2.9 Clause 20.4 of the IPP requires us to:

2.9.1 decide whether each interruption or outage that is the subject of that written application is a normalisation event, using the criteria in clauses 20.2.1-20.2.4;

2.9.2 publish our decision on our website, with the decision describing:

- a) any interruption or outage that we have decided is a normalisation event;
- b) reasons why we have reached that decision, based on the criteria in clause 20.2.1-20.2.4; and
- c) what calculations of measure of grid performance or calculations of asset performance measure we have decided are affected as a result of the interruption or outage that we have decided is a normalisation event; and

2.9.3 advise Transpower of our decision.

## **Chapter 3 Our evaluation of the outages and interruptions for normalisation**

### **Approach to our evaluation**

- 3.1 Applying the criteria under clause 20.2.1-20.2.4 of the IPP, listed above, we evaluated the Application by considering whether:
  - 3.1.1 Transpower made the Application no later than 42 working days after the end of the 2023 disclosure year (30 June 2023);
  - 3.1.2 Transpower complied with the information requirements;
  - 3.1.3 the subject matter of the Application were interruptions and outages;
  - 3.1.4 the applicable outages and interruptions were:
    - 3.1.4.1 the result of an event listed under clause 20.2.4 of the IPP;
    - 3.1.4.2 beyond the reasonable control of Transpower; and
    - 3.1.4.3 not caused, or materially contributed to, by any failure of Transpower to exercise GEIP; and
  - 3.1.5 the duration of the normalisation outages and interruptions was:
    - 3.1.5.1 at least 24 hours;
    - 3.1.5.2 beyond Transpower's reasonable control; and
    - 3.1.5.3 not caused, or materially contributed to, by any failure of Transpower to exercise GEIP.

### **Transpower's application meets the timeframe and information requirements**

#### **Transpower made the Application within the IPP's specified timeframe**

- 3.2 Clause 20.3.1 of the IPP requires Transpower to make a written application to us no later than 42 working days after the end of the disclosure year.
- 3.3 The disclosure year ended on 30 June 2023. Transpower made the Application on 12 June 2023, which was within the disclosure year and therefore Transpower complied with the requirements of clause 20.3.1 of the IPP.

**Transpower's application provided reasons, evidence and calculations in support**

- 3.4 Transpower's Application provided reasons, evidence, reassessed values of the applicable performance measure and calculations in support of the Application. We are satisfied that it contains the information required by clause 20.3 of the IPP in sufficient detail for the Commission to assess the Application. We also sought additional information about some aspects of the Application, which is published alongside this decision.
- 3.5 We present the results of our evaluation in the sequence set out above.

**The subject matter were outages and interruptions**

- 3.6 We are satisfied that the subject matter of the Application fall within the IPP's definitions of outages and interruptions. The definitions are set out above starting at paragraph 2.5, and the characteristics of the specific outages and interruptions are discussed below.

**The outages and interruptions were the result an event listed in clause 20.2.4 of the IPP**

- 3.7 Transpower has applied for normalisation under clause 20.2.4 of the IPP on the basis that the outages and interruptions included in the application were the result of a natural disaster, namely the Cyclone.

**Whether the Cyclone was a natural disaster**

- 3.8 The IPP defines a natural disaster as an event caused by forces beyond human control and includes, without limitation, "severe weather events including lightning, storms, wind, and rain".<sup>21</sup>
- 3.9 The IPP does not expressly mention cyclones as falling within the definition of natural disaster. However, the IPP does use the undefined terms "severe weather events" and "storm". The right reference point for whether and in what circumstances a weather event constitutes a storm that is a qualifying severe weather event is therefore a matter to be considered on a case-by-case basis.

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<sup>21</sup> IPP, above n 2, cl. 7.

- 3.10 A useful reference point in this case is that the National Institute of Water and Atmospheric Research (**NIWA**) defines “storms” as being events associated with periods of strong often damaging winds, heavy flood-producing rainfall, thunder and lightning, heavy snowfall or blizzard conditions. NIWA also defines tropical cyclones as revolving storms that begin in the tropics. Therefore cyclones are a subset of storms.<sup>22</sup> The MetService categorised the Cyclone as a tropical cyclone.<sup>23</sup>
- 3.11 In terms of severity, the MetService described the Cyclone as one of the worst storms to hit Aotearoa New Zealand in living history. The MetService report mentions that between 12th and 14th of February, parts of Aotearoa New Zealand recorded rainfall amounts of 300-400mm, wind gusts of 130-140km/hr and waves as high as 11 metres along some of the coasts.<sup>24</sup>
- 3.12 The MetService also provided details on how much rain and wind was experienced by regions:
- Hawke's Bay: Glengarry received nearly 540mm, and Pukeorapa receiving over 400mm of rain. Napier Airport recorded 203.8 mm and Hastings recorded 143.8 mm. Wind gusts were recorded up to 90 km/h with exposed stations near the coast reaching higher such as Cape Kidnappers (131 km/h).
- Gisborne: The largest rainfall accumulation was recorded in Hikuwai where 488 mm of rain fell. Several other stations (mainly in the ranges) recorded over 400 mm. Gisborne Airport received 185.3 mm (although due to power cuts, it stopped recording after 2am Tuesday). Wind gusts were recorded across the region up to 93 km/h.
- Bay of Plenty: The highest rainfall recorded in the region was at Queenshead (163.5mm). Tauranga recorded 122.7 mm, Rotorua 86.1 mm, Whakatāne 82.8 mm, and Te Puke 78.6 mm. Wind gusts recorded in the area were between 80-90 km/h.
- 3.13 On 14 February 2023, the New Zealand Government declared a National State of Emergency due to the Cyclone.<sup>25</sup>
- 3.14 Based on the above, we are satisfied that the Cyclone was a natural disaster.

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<sup>22</sup> NIWA, Storms and Cyclones available at <https://niwa.co.nz/education-and-training/schools/students/storms#:~:text=Tropical%20cyclones%20are%20revolving%20storms,Pacific%20and%20Indian%20Ocean%20region>.

<sup>23</sup> MetService “Tropical Cyclone Gabrielle – event Summary February 2023” (**MetService**) Available at <https://blog.metservice.com/TropicalCycloneGabrielleSummary>.

<sup>24</sup> MetService, above n 23.

<sup>25</sup> Cyclone Gabrielle. Available at <https://www.police.govt.nz/major-events/cyclone-gabrielle>.

### **The interruptions and outages were the result of an event (natural disaster) listed in the IPP**

- 3.15 Heavy rainfall due to the Cyclone caused the rivers in the Hawke's Bay region to burst their banks and flood the Redclyffe 220kV POS and Whirinaki POS. The flooding caused an interruption to supply from these two POSs. The Cyclone also impacted the Fernhill and Whakatu POSs and caused an interruption to supply from these POSs. Since these four POSs supply Hawke's Bay their availability caused a Hawke's Bay-wide interruption to supply.<sup>26</sup>
- 3.16 The heavy rainfall and strong winds damaged some transmission lines in the Central and Eastern parts of the North Island resulting in unplanned outages of these lines. Outages of some these lines contributed to the extent of interruption to supply and the consequential recovery effort. The unplanned outages of transmission lines resulted in interruptions to generation connections in the Gisborne (Tuai POS), Hawke's Bay (Whirinaki POS) and the Central North Island (Rangipo POS). Nova Energy's POS in Taranaki was also affected.
- 3.17 The restoration process required two phases. Initially Transpower reinstated supply using temporary network arrangements. Over the following few months, Transpower undertook some planned outages to restore the network to normal configuration. Transpower's Application includes both the initial unplanned outages and interruptions and consequentially planned outages.

#### *Unplanned outages and interruptions*

- 3.18 Transpower's position is that the unplanned outages and interruptions were the direct result of the adverse conditions during the Cyclone, stating:

In the early hours of 14 February 2023, severe weather from Cyclone Gabrielle started to impact the operation of the National Grid in the Hawke's Bay and neighbouring regions. The Redclyffe (RDF) 220 kV and Whirinaki (WHI) substations tripped because of inundation; we saw a 103 MW loss of supply across the five grid substations in the region (RDF, WHI, Whakatu (WTU), Tuai (TUI) and Fernhill (FHL)), as well as disconnecting generation at TUI and WHI.

- 3.19 Transpower has described the causes of interruptions in the Hawke's Bay area as follows:

3.19.1 the Redclyffe 220 kV bus and the 220 kV/110 kV interconnectors tripped due to flooding caused by the Cyclone, resulting in an interruption to supply;

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<sup>26</sup> Transpower, Interruption Report: Hawkes Bay loss of supply – 14 February to 22 February 2023 (**Interruption Report**), 24 April 2023, p. 10. Available at [https://tpow-corp-production.s3.ap-southeast-2.amazonaws.com/public/uncontrolled\\_docs/Post%20per-event%20unplanned%20interruption%20report%20-%20Cyclone%20Gabrielle.pdf?VersionId=YA1Z4OOxIE7Zc1ZGhMz5jRAF6m4qTRHi](https://tpow-corp-production.s3.ap-southeast-2.amazonaws.com/public/uncontrolled_docs/Post%20per-event%20unplanned%20interruption%20report%20-%20Cyclone%20Gabrielle.pdf?VersionId=YA1Z4OOxIE7Zc1ZGhMz5jRAF6m4qTRHi).

- 3.19.2 the interruption at Fernhill occurred as a direct result of the Redclyffe 220 kV bus tripping because Fernhill is supplied via the Redclyffe 220 kV bus and the 220/110 kV interconnecting transformers;
- 3.19.3 Whakatu also lost supply when the Redclyffe 220 kV bus tripped because Whakatu is supplied from Redclyffe; and
- 3.19.4 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.<sup>27</sup>
- 3.20 Transpower also stated as part of the Application that:
- 3.20.1 Rangipo-Tangiwai and Rangipo-Wairakei circuits outage was due to a tree striking the powerline during the Cyclone;<sup>28</sup> and
- 3.20.2 interruption to Tuai power station occurred when a conductor on the Redclyffe-Tuai circuit was damaged by fallen trees.<sup>29</sup>

#### *Planned outages*

- 3.21 The planned outages listed in Table 1.2 above were the result of the unplanned outages caused by the Cyclone. This subsequent set of planned outages was necessary to reinstate the network to normal configuration. Table 1.2 also shows that most of the affected assets had to have two planned outages.
- 3.22 The two-stage restoration approach is consistent with GEIP, where Transpower initially focused on re-instating supply quickly using temporary arrangements where necessary and feasible. Later Transpower undertook planned outages to repair or replace the affected assets or clear fallen trees and remove any temporary arrangements to return the network to normal configuration. On that basis (and interpreting the applicable clauses of the IPP in light of their context and purpose), the planned outages can reasonably be described as the result of the Cyclone.

#### *Conclusion*

- 3.23 We are satisfied that the unplanned outages and interruptions and the subsequent planned outages included in the Application were the result of the Cyclone, noting the following:
- 3.23.1 the MetService report on the severity of the Cyclone;
- 3.23.2 a national state of emergency had to be declared;

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<sup>27</sup> Transpower, Response to Request for Information – Cyclone Gabrielle Normalisation Event Application (RFI Response) p. 1.

<sup>28</sup> RFI Response, above n 27, p. 1.

<sup>29</sup> Interruption Report, above n 26, p. 9.



- 3.23.3 the strong winds in the Upper, Central and Eastern North Island;
- 3.23.4 the resulting flooding that affected the POSs in the Hawke’s Bay region;  
and
- 3.23.5 the timing of the unplanned outages and interruptions - which were on 13 and 14 February 2023 – coincides with the Cyclone hitting the affected areas of New Zealand.

**The outages and interruptions were beyond Transpower’s reasonable control**

- 3.24 We have split our analysis in this section between the unplanned outages and interruptions and the planned outages.

*The unplanned outages and interruptions were beyond Transpower’s reasonable control*

- 3.25 As discussed above, the unplanned outages and interruptions to supply to Hawke’s Bay were the result of the flooding caused by the Cyclone.
- 3.26 The Rangipo-Tangiwai and the Rangipo-Wairakei circuits unplanned outages and interruptions were directly due to trees contacting the power lines because of strong wind during the Cyclone. Both circuits tripped because, prior to the Cyclone, they had been electrically connected together via the Rangipo bypass. This scheduled bypass had temporarily configured the Rangipo-Tangiwai and the Rangipo-Wairakei circuits to operate as a Rangipo-Tangiwai-Wairakei circuit. The bypass was not connected to the Cyclone. It was instead for a planned outage to maintain an asset on the Rangipo bus (asset RPO-BS-220 626-664).<sup>30</sup>
- 3.27 Regarding whether the unplanned outages and interruptions on the Rangipo-Tangiwai and Rangipo-Wairakei circuits were within Transpower’s reasonable control, Transpower states:<sup>31</sup>

...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 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.

As such, we do not consider the circuit trippings to be due to failure to exercise GEIP.

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<sup>30</sup> RFI Response, above n 27, p. 1.

<sup>31</sup> RFI Response, above n 27, pp. 1-2.

- 3.28 Generation and supply at Tuai were lost when the RDF 220 kV bus tripped and there was a consequential loss of supply in the Hawkes Bay. The events that lead to the loss of generation at Tuai and subsequent interruption at Tuai POS reflect normal system response. Generation was lost due to the resulting imbalance in demand and generation.<sup>32</sup>
- 3.29 We are therefore satisfied that the unplanned outages and interruptions were beyond Transpower's control.

*The subsequent planned outages were beyond Transpower's reasonable control*

- 3.30 Included in the Application, and listed in Table 1.2 above, are two sets of planned outages for the two interconnecting transformers at Redclyffe and three planned outages of the Rangipo-Tangiwai circuit. There were other planned outages but these do not affect the quality measures and therefore are not included in the Application.
- 3.31 The planned outages mentioned above were a direct result of the unplanned outages caused by the Cyclone. These outages were necessary for safety reasons to return the transmission assets to normal operating configuration or to remove storm-damaged trees near the transmission lines. Therefore the need for these outages was beyond Transpower's reasonable control.
- 3.32 In order to satisfy ourselves that the planned outages could be normalised, we assessed whether Transpower managed the timing and duration of these outages to minimise disruption to the operation of the power system. Transpower advised:<sup>33</sup>

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.

And for the Rangipo-Tangiwai circuit:

The planned 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.

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<sup>32</sup> Interruption Report, above n 26, p. 8-9.

<sup>33</sup> RFI Response, above n 27, pp. 3-4.

- 3.33 We are satisfied that the planned outages were outside Transpower's reasonable control when the IPP is interpreted in light of its context and purpose. The planned outages were a direct result of the unplanned interruptions and outages caused by the Cyclone and were required to restore the affected transmission assets to normal and safe operation. We are satisfied that Transpower exercised GEIP in managing these planned outages.

### **Transpower did not cause or materially contribute to the interruptions and outages by any failure to exercise GEIP**

- 3.34 The Code states at clause 1.1 that:

good electricity industry practice in relation to transmission, means the exercise of that degree of skill, diligence, prudence, foresight, and economic management, as determined by reference to good international practice, which would reasonably be expected from a skilled and experienced asset owner engaged in the management of a transmission network under conditions comparable to those applicable to the grid consistent with applicable law, safety, and environmental protection. The determination is to take into account factors such as the relative size, duty, age and technological status of the relevant transmission network and the applicable law.

- 3.35 Based on the above definition of GEIP, we consider that Transpower, as a skilled and experienced asset owner engaged in the management of existing transmission network, would have exercised GEIP in this context if it had prior to the Cyclone:

3.35.1 identified and understood the risks associated with flooding and strong winds; and

3.35.2 either-

(i) implemented solutions to mitigate the risks within a reasonable timeframe; or

(ii) put in place a programme to implement the solutions.<sup>34</sup>

- 3.36 We discuss the above criteria with respect to the following outages and interruptions:

3.36.1 interruptions due to unplanned outages of the Redclyffe, Whakatu and Whirinaki POSs;

3.36.2 interruption due to the unplanned outage of the Fernhill POS;

3.36.3 interruption due to the unplanned outages of Tangiwai-Rangipo and Rangipo Wairakei circuits;

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<sup>34</sup> For new assets, we expect Transpower to identify risks and incorporate all mitigation strategies during design and construction phases of the project.

3.36.4 interruption due to unplanned outage of the Tuai POS; and

3.36.5 unplanned interruption at Kaponga power station.

3.37 Interruptions due to unplanned outages of the Redclyffe, Whakatu and Whirinaki POSs. In its Application, Transpower stated that it was aware of the flooding risks at substations including Redclyffe, Whakatu and Whirinaki and had developed a resilience plan for regulatory control period 4 (**RCP4**) and regulatory control period 5 (**RCP5**). Transpower stated that:<sup>35</sup>

We currently design our assets to be resilient to 1-in-450 Average Recurrence Incidence (ARI) events, and this is the standard to which the RDF 110 kV switch yard was constructed a decade ago. However, the RDF 220 kV switch yard was constructed ~50 years ago to the standards in place at the time and assumes the stop banks can be relied upon. Recognising potential vulnerability and criticality of the substation, we carried out a desktop study of the site in 2020. It was estimated that in a 1-in-200-year ARI event, flooding of up to 0.5m may be experienced at the lowest point on the site, and at around a 1-in-500 ARI event upstream, stop banks may be overtopped. It is possible that had we undertaken resilience works at the site, it may still have been significantly impacted.

As a result of the studies of this and other sites, we developed a resilience plan for RCP4 and RCP5, including funding specifically for proactive substation flooding remediation / resilience works. This work identified twelve sites – including RDF, Whakatu (WTU) and WHI – as both vulnerable to flooding and critical for local network resilience. A detailed assessment of risk and planning for improved resilience at the RDF site was scheduled to begin later in 2023.

3.38 We asked Transpower what factors Transpower considered when deciding to undertake the work in RCP4 and RCP5 rather than in RCP3. Transpower responded that:<sup>36</sup>

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.

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.

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<sup>35</sup> Application, above n 1, at [5].

<sup>36</sup> RFI Response, above n 27, p. 2.

- 3.39 Taking Transpower's response into account, we are satisfied that Transpower did not cause or materially contribute to the outages and interruptions by any failure to exercise GEIP. Transpower had identified the risks and had a plan to develop solutions and implement them in RCP4 and RCP5.

#### **Interruption at Fernhill POS**

- 3.40 Fernhill POS is supplied from the Redclyffe substation. There is also a connection to Fernhill from Waipapa. This connection is normally open, which was the case during the Cyclone.
- 3.41 The interruption at Fernhill was due to the outage of the interconnecting transformers at Redclyffe. The Cyclone did not affect Fernhill directly.
- 3.42 We are therefore satisfied that Transpower did not cause or materially contribute to the interruption at Fernhill POS by any failure to exercise GEIP.

#### **Interruption due to the unplanned outages of Tangiwai-Rangipo and Rangipo-Wairakei circuits**

- 3.43 The outage of the Tangiwai-Rangipo and Rangipo-Wairakei circuits disconnected the Rangipo power station. This outage was a result of tree strike, during heavy rains and strong winds.<sup>37</sup> Transpower's response regarding the trees is set out at paragraph 3.27 above.
- 3.44 We note that:<sup>38</sup>
- 3.44.1 Transpower was aware of the risks posed by the trees and had the mitigation strategy to remove them, but required the agreement of landowners before being able to do so; and
- 3.44.2 Transpower had been negotiating with the landowners' agents (NZ Forest Managers) to obtain permission to remove some trees, but agreement had not been reached.
- 3.45 Based on the above, we are satisfied that Transpower did not cause or materially contribute to this outage and interruption by any failure to exercise GEIP.

#### **Interruption at the Tuai power station and POS**

- 3.46 In paragraph 3.28 above we summarised the events that contributed to the interruption at Tuai power station and POS.<sup>39</sup>

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<sup>37</sup> RFI Response, above n 27, p. 1.

<sup>38</sup> RFI Response, above n 27, pp. 1-2.

<sup>39</sup> Interruption Report, above n 26, pp. 8-9.

- 3.47 Given the nature of the multiple events involved, we are satisfied that Transpower did not cause or materially contribute to the outage and interruption at Tuai POS by any failure to exercise GEIP. We generally do not expect Transmission network to be resilient to the risk of multiple low probability events occurring as they did at Tuai, as designing and building such networks would be uneconomic.

#### **Interruption at Kaponga power station**

- 3.48 The interruption at Kaponga power station was due to the Opunake–Kapuni–Stratford–2 circuit outage. The circuit outage was due to high winds.<sup>40</sup> High wind can swing powerline conductors that can cause trippings.
- 3.49 While there are measures that can reduce the possibility of trippings, given the high winds during the Cyclone, we are satisfied that Transpower did not cause or materially contribute to the outage and interruption at Fernhill POS by any failure to exercise GEIP.

#### **GEIP regarding the subsequent planned outages**

- 3.50 Transpower included planned outages in its Application. These outages were a direct result of the unplanned outages caused by the Cyclone. This is because Transpower exercised GEIP by restoring supply via temporary grid configuration. Transpower then had to undertake planned outages in the following months to restore the grid system to normal operation. The resulting planned outages did not need any supply interruptions.
- 3.51 The alternative would have been for Transpower to repair all damages before restoring supply which would have resulted in significantly more interruptions. We are satisfied that Transpower's multi-stage restoration is consistent with GEIP and does not represent any failure to exercise GEIP.

#### **The combined duration of the outages and interruptions was 24 hours or more**

- 3.52 Table 1.1 above shows the duration of interruptions that were the result of the Cyclone. There were:
- 3.52.1 interruptions to generation connections with durations ranging from 0.23 hours at Rangipo and 527.35 hours at Whirinaki; and
  - 3.52.2 interruptions to supply ranging from 2.25 hours at Fernhill to 537.98 hours at Whirinaki.

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<sup>40</sup> RFI, above n 23, at p. 1.

- 3.53 Table 1.2 above show the durations of the outages for each of the affected asset to which the AP2 quality measure applies. There were 13 unplanned and planned outages on four assets, as follows:
- 3.53.1 an unplanned outage of Redclyffe transformer T3 was 1192.3 hours and two planned outages were for 5.75 hours and 415.84 hours;
  - 3.53.2 one unplanned outage of Redclyffe transformer T4 was 584.55 hours and two planned outages were for 0.82 hours and 657.7 hours. The latter outage is capped at 537.03 when calculating the assessed values of the respective performance measure, as noted in footnote 13 above;
  - 3.53.3 two unplanned outages of Rangipo-Tangiwai circuit for a total of 8.62 hours and two planned outages for a total of 1.28 hours; and
  - 3.53.4 two unplanned outages of Rangipo-Wairakei circuit for a total of 8.61 hours and one planned outage for 129.48 hours.
- 3.54 The duration of some of the outages and interruptions were below 24 hours, but in aggregate the duration was over 24 hours.
- 3.55 Clause 20.2.3 requires that the duration of an interruption or outage must be 24 hours or more to qualify for normalisation. This duration was used as a proxy for normalisation event severity.<sup>41</sup> When clause 20.2.3 is considered in light of its purpose and context, we consider it is appropriate in these circumstances to apply the 24-hour threshold in clause 20.2.3 to the aggregate outage duration of the interruptions and outages that were the result of the Cyclone. The alternative would require an artificial separation of shorter interruptions and outages although they were the result of the Cyclone (an event of equal severity).
- 3.56 Accordingly, we have assessed the Application according to the aggregate duration of the interruptions and outages resulting from the Cyclone and listed in Tables 1.1 and 1.2. Together the interruptions and outages total more than 3000 hours, which exceeds the minimum of 24 hours.

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<sup>41</sup> Commerce Commission, “Transpower’s individual price-quality path from 1 April 2020 decisions and reasons paper”, (**IPP reasons paper**), 29 May 2019, from [F344]. Available at [https://comcom.govt.nz/\\_data/assets/pdf\\_file/0028/170398/Transpower-IPP-for-RCP3-Decisions-and-reasons-paper-29-August-2019.PDF](https://comcom.govt.nz/_data/assets/pdf_file/0028/170398/Transpower-IPP-for-RCP3-Decisions-and-reasons-paper-29-August-2019.PDF).

### **The duration of the outages and interruptions was beyond Transpower's reasonable control**

- 3.57 In assessing this criterion, we considered whether Transpower followed an efficient process in restoring the network. We have included this assessment in the following section because of the close relationship between this and the next criterion.
- 3.58 We are satisfied that the duration of the unplanned interruptions and planned and unplanned outages was beyond Transpower's reasonable control, for the reasons set out in the next section.

### **The duration of the outages and interruptions was not caused, or materially contributed to, by any failure of Transpower to exercise GEIP**

- 3.59 We consider that GEIP in respect to managing the duration of outages and interruptions includes the following features:
- 3.59.1 being prepared for such events by identifying and understanding their risks and consequences;
  - 3.59.2 being prepared for recovering from the event by having systems, strategies, and processes to assess the consequences and the necessary spares to undertake restoration;
  - 3.59.3 restoring service quickly within the constraints of safety; and
  - 3.59.4 reinstating the network to normal configuration efficiently.
- 3.60 We have considered Transpower's approach to reinstating supply in the light of the above features.

#### *Planning and preparing for recovery and restoration of service*

- 3.61 Transpower has outlined its process for planning and undertaking the recovery phase, as below.

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.<sup>42</sup>

### *Duration of the Hawke’s Bay and Tuai outages and interruptions*

- 3.62 With respect to restoring supply to Hawkes’s Bay from the Fernhill (FHL), Redclyffe (RDF), Whakatu (WTU), Whirinaki (WHI) POSs, Transpower states:

Our 110 kV contingency plan for the loss of RDF substation, developed some years ago, enabled us to restore limited service to Fernhill substation in less than 3 hours, and have generation injecting at Tuai (TUI) within 4.5 hours of the interruption.

We implemented innovative solutions to fully restore supply to Hawke’s Bay as quickly as possible. This included bypassing the RDF substation to enable supply to WTU to meet Napier load and supplying the RDF 33 kV buses from TUI, and a temporary backfeed from WTU. These solutions, operating with single rather than the normal duplicated protection, gave us time to complete the clean-up at RDF and WHI, complete repairs to towers and circuits, and return the RDF 220/110 kV interconnecting transformers and WHI 220 kV bus to service. These works enabled injection of generation and all load demanded to be supplied.<sup>43</sup>

We implemented our 110 kV contingency plan which provided limited 110 kV supply from the south (Bunnythorpe via Waipawa) to FHL and enabled re-synchronisation of the generators at TUI (which could then supply Eastland Network and enable additional supply to FHL). Generation was restored at 1201 hours, and supply at 1352 hours on 14/2/23.”<sup>44</sup>

- 3.63 Once the generation at Tuai was established, supply was made available at Tuai POS.
- 3.64 With respect to the planned outages, Transpower stated that “work to return the Redclyffe transformers to normal operation was staged in a manner to minimise disruption to our customers”.<sup>45</sup>

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<sup>42</sup> RFI Response, above n 27, p. 3.

<sup>43</sup> Application, above n 1, at [5].

<sup>44</sup> Interruption Report, above n 26.

<sup>45</sup> RFI Response, above n 27, p. 4.

*Duration of the Rangipo-Tangiwai and Rangipo-Wairakei\_1 circuits outages and interruptions to Rangipo power station*

- 3.65 As mentioned above, the Rangipo-Tangiwai and Rangipo-Wairakei\_1 circuits outage was caused during the high winds by a tree strike. The strike caused a fault on the line, which in turn caused the outage. Transpower states that the fault occurred twice. The first one was transient since Transpower was able to return the circuits to service within 14 minutes from the time of the tripping.
- 3.66 The second fault arose a short time later. Transpower states that “when they [circuits] tripped again a short time later, Transpower was unable to return them to service without dispatching crews into the forest blocks”. This is because it was unsafe in the prevailing extreme weather conditions and darkness to send crews to assess the damage. The second fault could only be cleared after the damage was assessed and rectified, which resulted in the circuits being out of service for 8.40 hours.
- 3.67 As mentioned above, Transpower also advised that the planned outages were required to remove storm-damaged trees that were deemed unsafe due to other wind-damaged trees leaning against them. Transpower carried out this work over several days, and across multiple sites. Using multiple outages enabled Transpower to minimise the total outage duration.<sup>46</sup>

*Duration of the Interruption at Kaponga power station*

- 3.68 After the auto-reclose failed to return the Opunake–Kapuni–Stratford–2 circuit to service, Transpower requested its service provider to carry out a ‘public places patrol’ of the circuit. The service provider advised that it was safe to undertake the patrol which would take approximately 1 hour. The patrol did not identify any issues, and the circuit was returned to service.

*Conclusion*

- 3.69 The process Transpower followed, including to recover from the Cyclone, reflects good planning, process, and communications to restore service in a safe and effective manner. We are satisfied that this reflects GEIP.
- 3.70 We are satisfied that the duration of the outages and interruptions was not caused, or materially contributed to, by any failure of Transpower to exercise GEIP.

**We conclude the outages and interruptions meet the IPP’s criteria for a normalisation event**

- 3.71 Based on our evaluation above, we conclude that the outages and interruptions meet the criteria under clause 20.2.1-20.2.4 of the IPP for a normalisation event.

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<sup>46</sup> RFI Response, above n 27, pp. 3-4.

## Chapter 4 The impact of the normalisation on quality measures

4.1 Clause 20.4.1(c) of the IPP requires us to include in our decision the calculations of the quality measures we have decided are affected, given our conclusion that the interruptions and outages were a normalisation event. We set out our assessment of the three sets of quality measures below.<sup>47</sup>

### AP2 quality measure

4.2 The Cyclone caused an estimated 2884.28 hours of outages of circuits included in the AP2 quality measure.

4.3 Table 4.1 below shows the settings and actual performance for AP2 for the disclosure year 2023.<sup>48</sup>

**Table 4.1 Settings and performance of AP2: Availability of HVAC circuits**

Components of the AP2	Cap %	Target %	Collar %	Quality standard %	Pre-normalised Actual %	Normalised Actual % Full year 2022/23
HVAC availability	99.2	99.0	98.8	98.6	<b>98.21</b>	98.68

4.4 HVAC Availability in percentage is calculated as:<sup>49</sup>

$$(100 - \frac{100 * (\text{total duration of all outages of selected HVAC assets listed in Schedule G of IPP})}{(\text{Number of selected HVAC assets}) (\text{total hours in the disclosure year})})$$

<sup>47</sup> For assessed values and calculation of incentives, we have used the unaudited numbers provided by Transpower.

<sup>48</sup> IPP, above n 2, Table 4.2. Settings include the Cap, target, collar, and Quality Standard.

<sup>49</sup> IPP, above n 2, at clause 18.

## GP1 quality measure

4.6 Table 4.2 shows the settings and actual performance for GP1.<sup>50</sup>

**Table 4.2 Settings and performance of GP1: number of interruptions for 2023**

Sub-categories of GP1	Cap	Target	Collar and POS limit	Pre-normalisation assessed value	Normalised Assessed actual
GP1A	0	7	14	7	5
GP1B	7	24	41	13	11
GP1C	4	6	8	3	2
GP1E	5	9	13	13	9
GP1F	6	12	18	17	16

4.7 To comply with the GP1 quality standard, Transpower's assessed value for four or more of the point of service sub-categories for the disclosure year must not exceed the POS sub-category limit (**POS limit**).<sup>51</sup>

4.8 Transpower meets the quality standard for GP1 before normalisation.

## GP2 quality measure

4.9 Table 4.3 shows the settings and actual performance for GP2.<sup>52</sup>

**Table 4.3 Settings and performance of GP2: Average duration of interruptions (minutes)**

Sub-categories of GP2	Cap	Target	Collar and POS limit	Pre-normalisation Assessed value	Normalised Assessed Actual
GP2A	30	92	154	<b>783</b>	51.2
GP2B	36	61	86	<b>789.5</b>	61.3
GP2C	0	103	206	<b>3384</b>	36
GP2E	50	174	298	<b>1624.8</b>	<b>1140</b>
GP2F	11	93	175	72.9	71.5

<sup>50</sup> IPP, above n 2, Table 4.1. Settings include the Cap, target, collar and point of service sub-category limit (**POS limit**).

<sup>51</sup> IPP, above n 2, clause 14.5.

<sup>52</sup> IPP, above n 2, Table 4.1.

- 4.10 GP2 assessed value is the sum of the duration of all unplanned interruptions for the POS sub-category GP2 commencing within the disclosure year divided by the total number of unplanned interruptions for the POS sub-category GP2A commencing within the disclosure year.<sup>53</sup>
- 4.11 To comply with the GP2 quality standard, Transpower's assessed value for four or more of the POS sub-categories for the disclosure year must not exceed the POS limit specified for each of those measure of grid performance GP2 POS sub-categories.<sup>54</sup> The assessed values shown in red are for the POS sub-categories for which Transpower exceeded the POS limit.
- 4.12 Without normalisation, Transpower would not have complied with the GP2 quality standard.

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<sup>53</sup> IPP, above n 2, clause 16.6.

<sup>54</sup> IPP, above n 2, clause 16.5.