Unplanned Interruptions Report

for the assessment period ended 31 March 2023

Contents

1. Introduction

1.1 Overview

As detailed in section 4—Quality Standards, of our Annual Compliance Statement for the assessment period ended 31 March 2023, we have exceeded our unplanned SAIDI limit[1] for the assessment period. And because we have exceeded our unplanned limits, we have provided the Commerce Commission with unplanned interruptions reporting[2] and made the report publicly available on our website.[3]

Our Unplanned Interruption Report provides information the Commerce Commission requires when a non-exempt electricity distribution business exceeds its unplanned SAIDI or SAIFI limits as prescribed by the DPP Determination. A copy of this report is available on our website at https://firstlightnetwork.co.nz/

1.2 Background

Firstlight Network is the electricity lines company for Tairāwhiti and Wairoa. We acquired the Eastland Network from the Eastland Group, with the transaction completed on 31 March 2023. For this report, we provide this information from the position of Firstlight Networks, including all historical references.

Firstlight Network is subject to price-quality regulation administered under Part 4 of the Commerce Act 1986. The Commerce Commission (the Commission) regulates the maximum annual revenue we can earn from our customers and the minimum quality of service we must deliver.

Clause 9.7 of the DPP Determination requires non-exempt electricity distribution businesses (EDBs), in respect of each assessment period[4], to comply with the annual unplanned reliability assessment specified in clause 9.8 for that assessment period. To comply with the annual unplanned interruption's reliability assessment, non-exempt EDBs must not exceed the unplanned SAIDI limit or the unplanned SAIFI limit specified in paragraph (1) of Schedule 3.2 of the DPP Determination.

For the assessment period that ended 31 March 2023, we exceeded our unplanned SAIDI limit and performed within our SAIFI limits. Our unplanned SAIDI and SAIFI performance, as reported in our RY23 Annual Compliance Statement, is shown in Table 1 and Table 2.

1 As per clause 9.8(a) of the Commerce Commission, Electricity Distribution Services Default Price-Quality Path Determination 2020, consolidating all amendments as of 20 May 2020 (the DPP Determination).

2 As per clause 12.3(a) of the DPP Determination.

3 At the same time as we provide the report to the Commission as per clause 12.3(b) of the DPP Determination.

4 The 12 month period between 1 April and 31 March.

Table 1: Performance against the Unplanned SAIDI limit RY23

Unplanned interruptions quality standard RY23 - SAIDI		
Unplanned SAIDI assessed value ≤ Unplanned SAIDI limit		
Unplanned SAIDI limit		219.46
Unplanned SAIDI assessed value	*Sum of normalised SAIDI values for Class C interruptions commencing within the assessment period*	295.44
Compliance result		**Not Compliant**

Table 2: performance against the Unplanned SAIFI limit RY23

Unplanned interruptions quality standard RY23 - SAIFI		
Unplanned SAIFI assessed value ≤ Unplanned SAIFI limit		
Unplanned SAIFI limit		3.1525
Unplanned SAIFI assessed value	*Sum of normalised SAIFI values for Class C interruptions commencing within the assessment period*	2.6402
Compliance result		**Compliant**

For the assessment period, by exceeding our unplanned SAIDI limit, we did not comply with clause 9.8(a) of the DPP Determination, and accordingly, we must—

(a) provide the Commission with the ‘unplanned interruption reporting’ specified in clause 12.4 of the DPP Determination within five months after the end of that assessment period; and

(b) make the ‘unplanned interruptions reporting’ specified in clause 12.4 of the DPP Determination publicly available on our website while providing the report to the Commission.

This Unplanned Interruptions Report is provided to meet the reporting requirements following our non-compliance with the quality standards for the assessment period that ended 31 March 2023. A copy of the report is available on our website at https://firstlightnetwork.co.nz/

1.3 Structure of our Unplanned Interruptions Report

We have provided the information required by the Commission in this Unplanned Interruptions Report as follows—.

Section 2 — we discuss the reasons for the non-compliance and provide supporting evidence for those reasons;

Section 3 — we provide a link to the underlying data for each unplanned interruption on our network for the assessment period;

Section 4 — we provide the findings of the independent review of the state of our network and operational practices completed during the assessment period and the three preceding assessment periods;

Section 5 — we provide a summary of the major events that occurred during the assessment period and our internal investigations into that SAIDI or SAIFI major event;

Section 6 — we provide a summary of the investigations conducted to date following the extreme weather events of 2023, including Cyclone Gabrielle;

Section 7 — we discuss the findings of the analysis conducted in the assessment period and the three preceding assessment periods:

(i) trends in asset conditions

(ii) causes of the unplanned interruptions

(iii) asset replacement and renewal

(iv) vegetation management

Section 8 — we provide an outline of our internal review, analysis and investigation of the events that contributed to our non-compliance in this assessment year;

Section 9 — we included the signed Director certification in the form set out in Schedule 10 of the DPP Determination.

2. Causes of our non-compliance

2.1 Overview

Clause 12.4(a) of the DPP Determination requires our unplanned interruptions reporting to include the reasons for not complying with our unplanned SAIDI limits and providing supporting evidence for those reasons.

> The assessment period saw a unprecedented number of severe weather events across the region, including Cyclone Hale in January and Cyclone Gabrielle in February 2023.

2.2 Four factors principally caused our unplanned SAIDI non-compliance

Four factors principally caused our unplanned SAIDI non-compliance:

1. An increase in the number and severity of extreme weather events;
2. An increase in the number of out-of-zone tree contacts;
3. An increase in vehicle damage to the network;
4. Due to the nature of the outages, there were fewer 24-hour periods where the Major Event threshold was triggered than might have been expected, given the extent of the extreme weather.

2.2.1 Extreme weather events

Over the assessment period, we experienced 44 days of extreme weather, up from 34 days over the 2022 assessment period and 28 Days over the 2021 assessment period, and 14 days over the 2020 assessment period.[5]

Rainfall increased materially during the assessment period and was 50% higher than the average of the prior three assessment periods.[6] The increase in extreme weather resulted in more adverse environments and adverse weather outages, and due to the weather conditions, in particular the impact on the roading, these outages took longer to restore.

[5] Extreme Weather Days are days where either a Red and Orange warnings is issued that resulted in rain, wind or snow extreme weather event (i.e. excluding false alarm warnings). These included Tairawhiti region and Hawkes Bay. Wairoa is in the Hawkes Bay region. In RY23 there were 40 Extreme Weather Days in Tairawhiti and a further 4 in Hawkes Bay (that didn't overlap with events in Tairawhiti). Source: MetService, Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx, Tab: Warning_Day_Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx, Tab: Warning_Day_Data.

[6] In RY23 rainfall was 1,868mm and the prior three year average was 1,242mm. Applicable weather stations were: Te Pohue, Wairoa Aerodrome, Mahia, Gisborne Aerodrome, Tolaga Bay, Hicks Bay. Source: MetService. Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx, Tab: Warning_Day_Data.

The extreme weather events can be broken into specific events on our network:

- The storm events of April, May, June, July, September and November 2022 (impacts on our network shown in Photograph 1 to Photograph 4)
- The floods and high winds experienced by Cyclone Hale on 11 January 2023 (impact on our network shown in Photograph 5
- Cyclone Gabrielle hit New Zealand from 12 to 14 February, with a national state of emergency being declared on 14 February (impacts on our network shown in Photograph 6 to Photograph 8).

Photograph 1: line damage caused by trees outside the fall zone going through lines in April 2022

Photograph 2: line damage caused by forestry trees outside the fall zone in June 2022

Photograph 3: lines damaged running through the Tuangaheru Mata forest in July 2022

Photograph 4: Line damage in Tiniroto caused by trees outside the fall zone in November 2022

Photograph 5: damage to infrastructure in Tairāwhiti caused by floods in January 2022

Photograph 6: Main street of Wairoa township

Photograph 7: Roading impacted in Tairawhiti

Photograph 8: The town of Wairoa is completely cut off by flood waters

Cyclone Gabrielle hit the Hawkes Bay Region on 12 February. Considered the costliest tropical cyclone on record in the Southern Hemisphere[7], the total damages from Cyclone Gabrielle are estimated to be at least NZ$13.5 billion. Gabrielle was also the deadliest cyclone and weather event felt in New Zealand since Cyclone Giselle in 1968.

Flood waters breached stopbanks across Hawke's Bay, caused partly by the buildup of forestry slash at bridges. There were over thirty stop bank breaches covering some five kilometres.[8] Power was lost to our entire network (i.e., all 26,000 ICPs) when the transmission network was extensively damaged; of those ICPs, 4,500 were impacted due to damage to our distribution network. Roading was widely impacted, with 19 bridges washed away and many unsafe crossings.

---

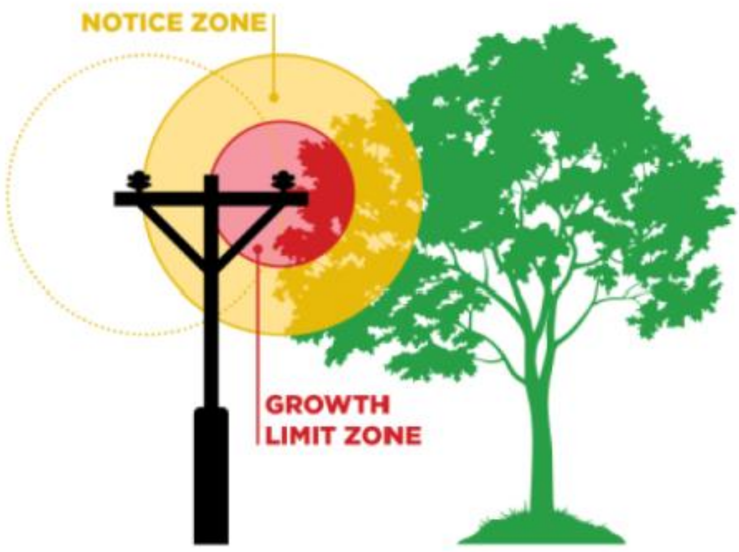
[7] https://en.wikipedia.org/wiki/Cyclone_Gabrielle

[8] Bidwell, Hamish (28 February 2023). "Cyclone Gabrielle: One-in-500-year flood prevention system on its way". The New Zealand Herald.

2.2.2 Out-of-zone tree contacts

Trees within the fall zone are managed under the Electricity (Hazards from Tress) Regulations 2003, which clearly define our responsibilities and those of the tree owners. The regulation aims to protect the safety of the public and the supply of electricity. Under the regulations, trees within the 'growth limit zone' must be clear of power lines, as shown in Figure 1.

Figure 1: Illustration of the responsibility for trees within the fall zone.



During the assessment period, we experienced a significant increase in out-of-zone tree contacts (i.e., trees outside the growth limit zone). We believe the adverse weather conditions throughout the period were a key reason for this increase. Wind speeds during Cyclone Hale exceeded 85 km/h, and Cyclone Gabrielle exceeded 150 km/h, toppling many large trees, some of which went through our lines. During the Extreme Weather Days (where wind was a factor), Metservice recorded 56 days with wind gusts above 85 km/h and eight days with windspeeds above 100 km/h.[9] The wet ground conditions throughout the year meant out-of-zone trees fell at lower windspeeds than in prior years.[10]

Figure 2 to Figure 4 are maps of the damage to our network caused by trees in June, July, and January. The maps illustrate that tree damage during the period was sporadic and widespread. Vegetation management and tree ownership do not appear to contribute to tree damage. The maps show a mix of counsel, forestry, and privately owned trees caused damage to the network. Our records show that the areas were part of our vegetation management programme, and the trees causing the damage were outside the regulated notice and growth limit zone.

Damage to our lines during the assessment year was not from trees within the notice or growth limit zone. Rather the extreme weather conditions resulted in out-of-one trees being thrown into our lines, causing extensive damage. The regulations give us no power to manage vegetation outside the notice zone, leaving us vulnerable to outages caused by out-of-zone trees.

9 Applicable weather stations were: Te Pohue, Wairoa Aerodrome, Mahia, Gisborne Aerodrome, Tolaga Bay, Hicks Bay. Source: MetService.

10 The TreeSafe guide states that large branch and tree fall can occur at wind speeds above 80 km/h.

Figure 2: Tree Fault Map June 2023

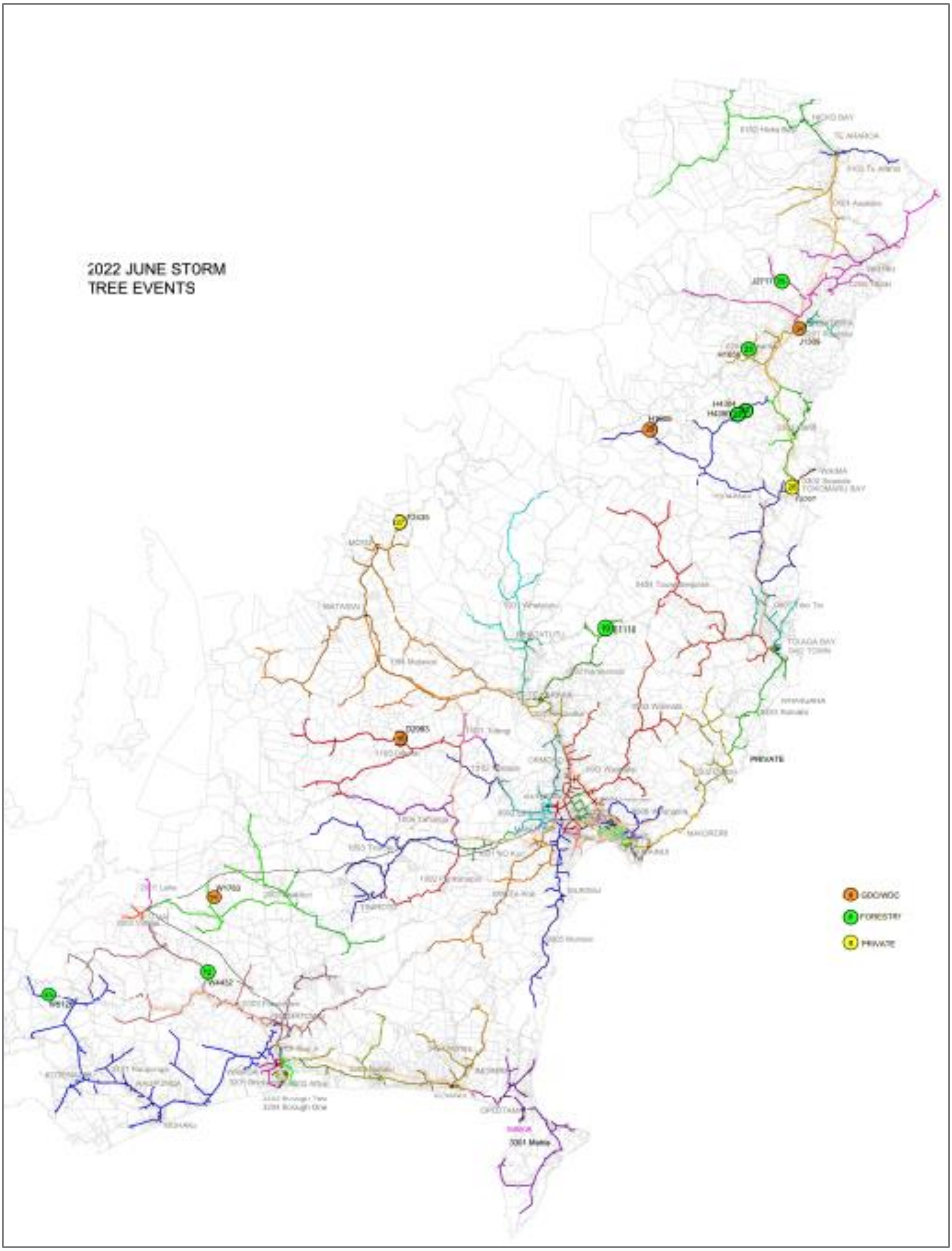


Figure 3: Tree Fault Map July 2023

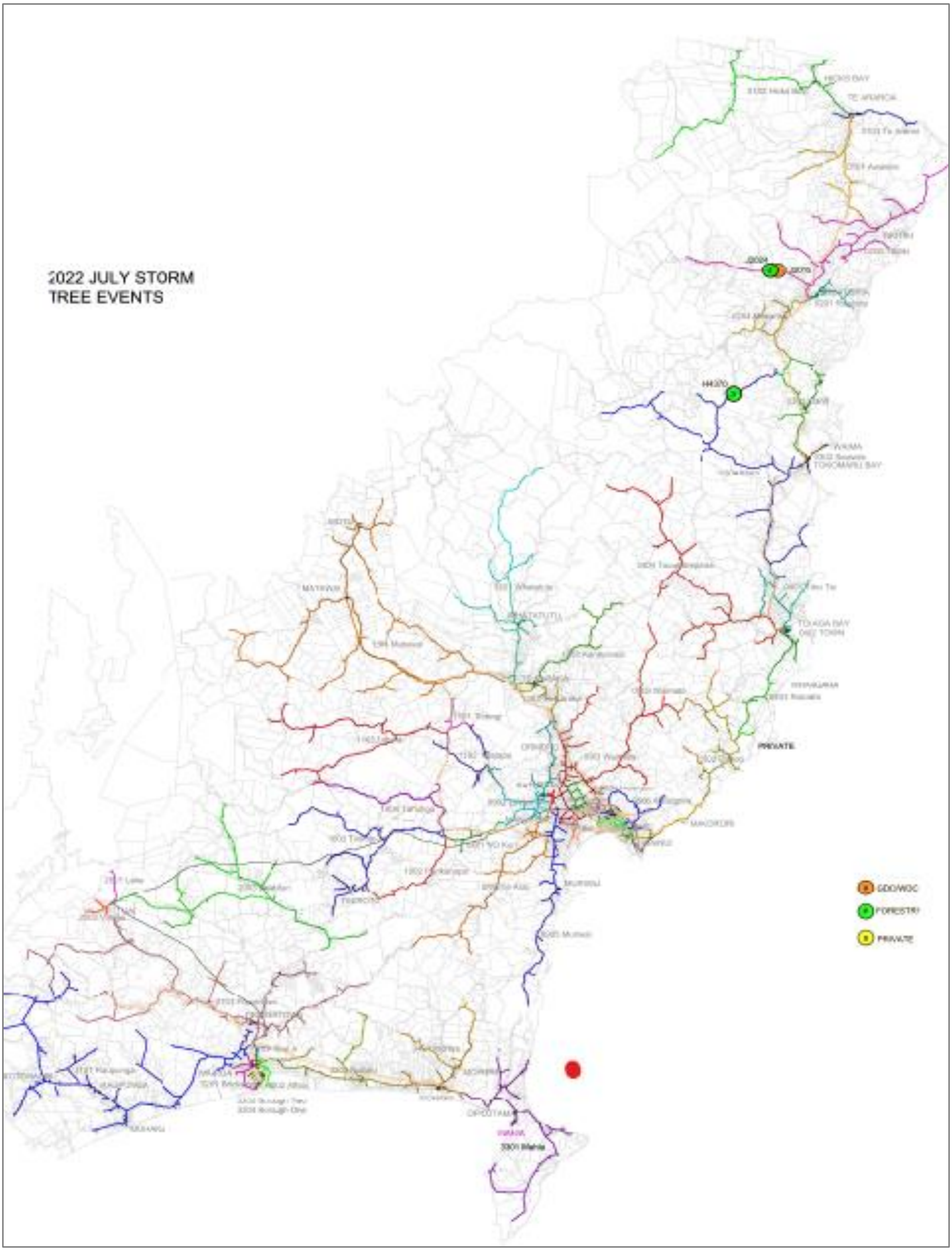
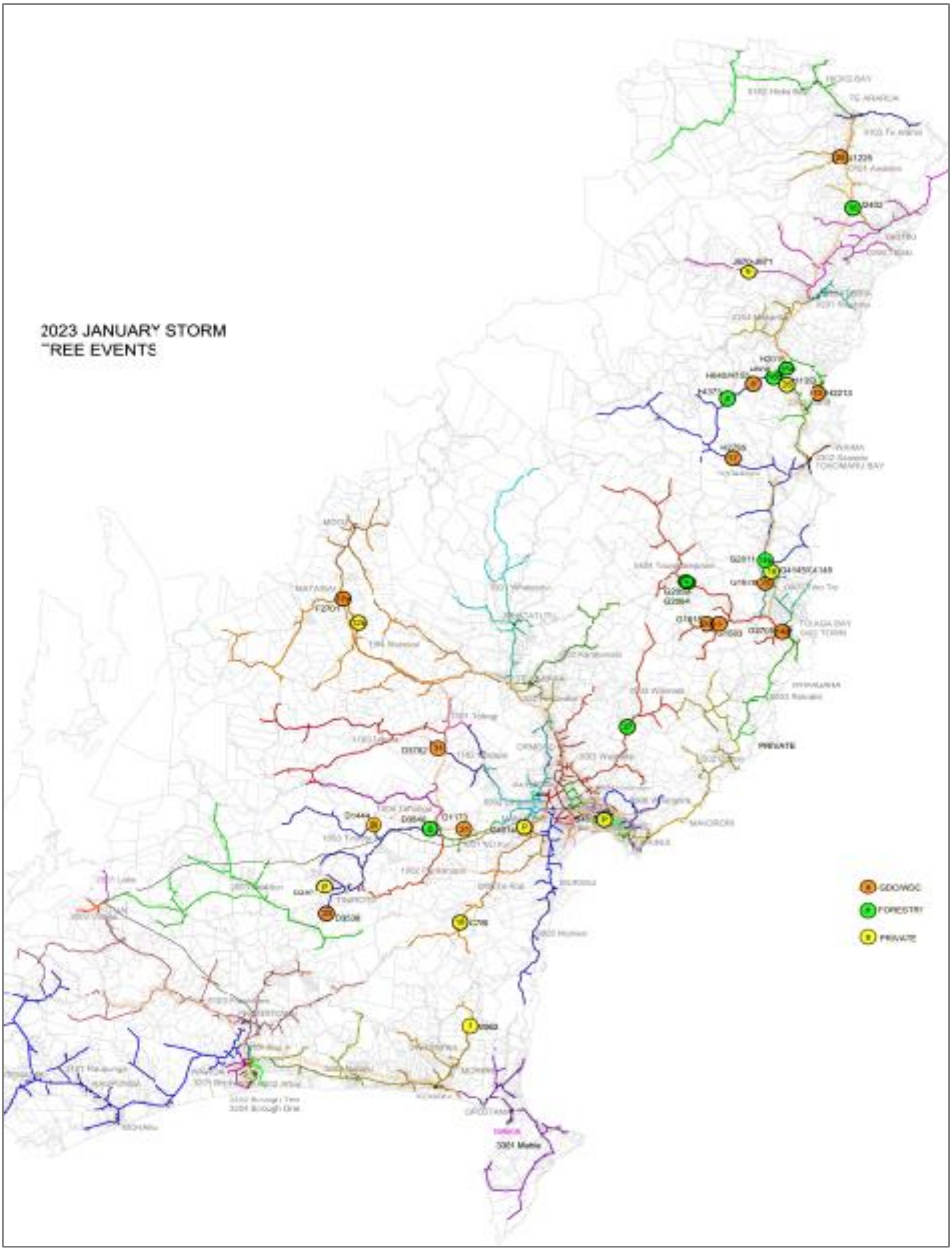


Figure 4: Tree Fault Map January 2023



2.2.3 Change in land use to forestry plantations has contributed to our SAIDI performance

Our network, built in the 1950s and 60s, is a largely rural network originally designed and constructed to deliver electricity to beef and sheep farms. In the 1980"s farms were sold to forestry, and there has been extensive conversion to forestry, with a mix of farming usually located at the end of a spur. The change from farming to forestry has seen many of our lines go from being built through large tracks of most open farmland to running through the middle of large forestry plantations. We have never built a distribution line through a forestry plantation. All our lines running through plantations were built well before the plantation was planted.

Most plantation owners maintain their trees within the Growth Zone limits of 4 meters under the Tree Regulations. However, the trees are now over 30 meters tall and, in high winds, such as those experienced in April 2022, come into contact with our line either by falling through the lines or the high winds breaking branches off these trees and throwing them into our lines. This disclosure year, we had several incidents where the trees further back in the plantation fell, knocking the tree next to it over and having a cascading effect until the trees on the fringe fell into our lines.

2.2.4 Vehicle damage

During the assessment period, we experienced increased vehicle damage to the overhead network (i.e. cars vs. poles). The exact reason for the rise is difficult to determine; however, we saw several incidents around the time of extreme weather events and suspect that the high number of rain days experienced during the year was a contributing factor.

2.3 The major event threshold did not normalise as many events as might have been expected

Despite experiencing 44 extreme weather days[11] on our network during the assessment period and our non-normalised (i.e., raw) SAIDI being 1,465 minutes per customer, a 263% increase over the 2022 assessment period, the number of 24-hour periods where the Unplanned SAIDI Major Event trigger was met was lower at 9 days, when compared to 11 days experienced in the 2022 assessment period. Four of the 24-hour Major Event periods occurred during Cyclone Gabrielle (which accounted for only four extreme weather days), meaning there were only five 24-hour Major Event periods across the remaining 40 extreme weather days.

Given the unprecedented events during the assessment period, we believe the spread of the outages across 24-hour periods resulted in fewer outages captured by the major event process than might otherwise have been expected.

Had we experienced a more "normal" year regarding extreme weather events, out-of-zone trees, and vehicle damage, we believe we would have complied with the unplanned interruptions reliability assessment cap.

We explain our reasoning and the impact of our unplanned SAIDI in Section 6.

[11] As measured by successful MetService weather warnings.

3. Interruption data

3.1 Overview

Clause 12.4(b) of the DPP Determination requires has to we provided data for each Class C interruption (i.e., 'unplanned interruption') during the DPP regulatory period (i.e., 1 April 2020 to 31 March 2023) to the Commission, including:

We have provided the data in an Excel spreadsheet Unplanned Interruptions RY23.xlsx publicly disclosed along side our Annual Compliance Statement on our website.

(i) the start date (dd/mm/yyyy) of the Class C interruption;

(ii) the start time (hh:mm am/pm) of the Class C interruption;

(iii) the end date (dd/mm/yyyy) of the Class C interruption;

(iv) the end time (hh:mm am/pm) of the Class C interruption;

(v) SAIDI value of the Class C interruption;

(vi) SAIFI value of the Class C interruption

(vii) the cause;

3.2 Provision of the interruption data

We have provided the data prescribed by clause 12.4(b) of the DPP Determination to the Commission and published it in an Excel Workbook on our website.

The data is operational and detailed, which could be easily misunderstood by interested persons unfamiliar with the data. Before using this data, we urge interested persons to contact us at info@firstlightnetwork.co.nz or +64 6 869 0700.

4. Independent review findings

4.1 Overview

Clause 12.4(c) of the DPP Determination requires us to report* any existing independent reviews of our network or operational practices completed in this or the three preceding assessment periods (i.e., between 1 April 2020 and 31 March 2022).

Post event independent reviews were conducted by energia for Cyclone Hale and Cyclone Gabrielle.

4.2 Cyclone Recovery Taskforce

Following Cyclone Gabrielle in February 2022, we reviewed readiness, response and recovery activities. The aim was to summarise key activities (e.g., establishment, increasing resources, expansion of roles), including discovering constraints in the functional areas that could impact restoration should similar events occur.

The initial review was completed in early July (a copy of the initial findings of that review is included in Appendix A).

4.3 Network ariel review post Cyclone Gabrielle

To assess the initial impacts of Cyclone Gabrielle on our network, we undertook an aerial review of the impacted areas, with a strong focus on the state of our distribution lines (results are shown in Figure 5). We inspected a sample of feeders and assessed the damage, e.g., slips near poles, leaning poles, and trees that had an increased probability of contacting our lines (i.e., trees made unstable by high winds that were at an increased risk of falling into our lines post the event).

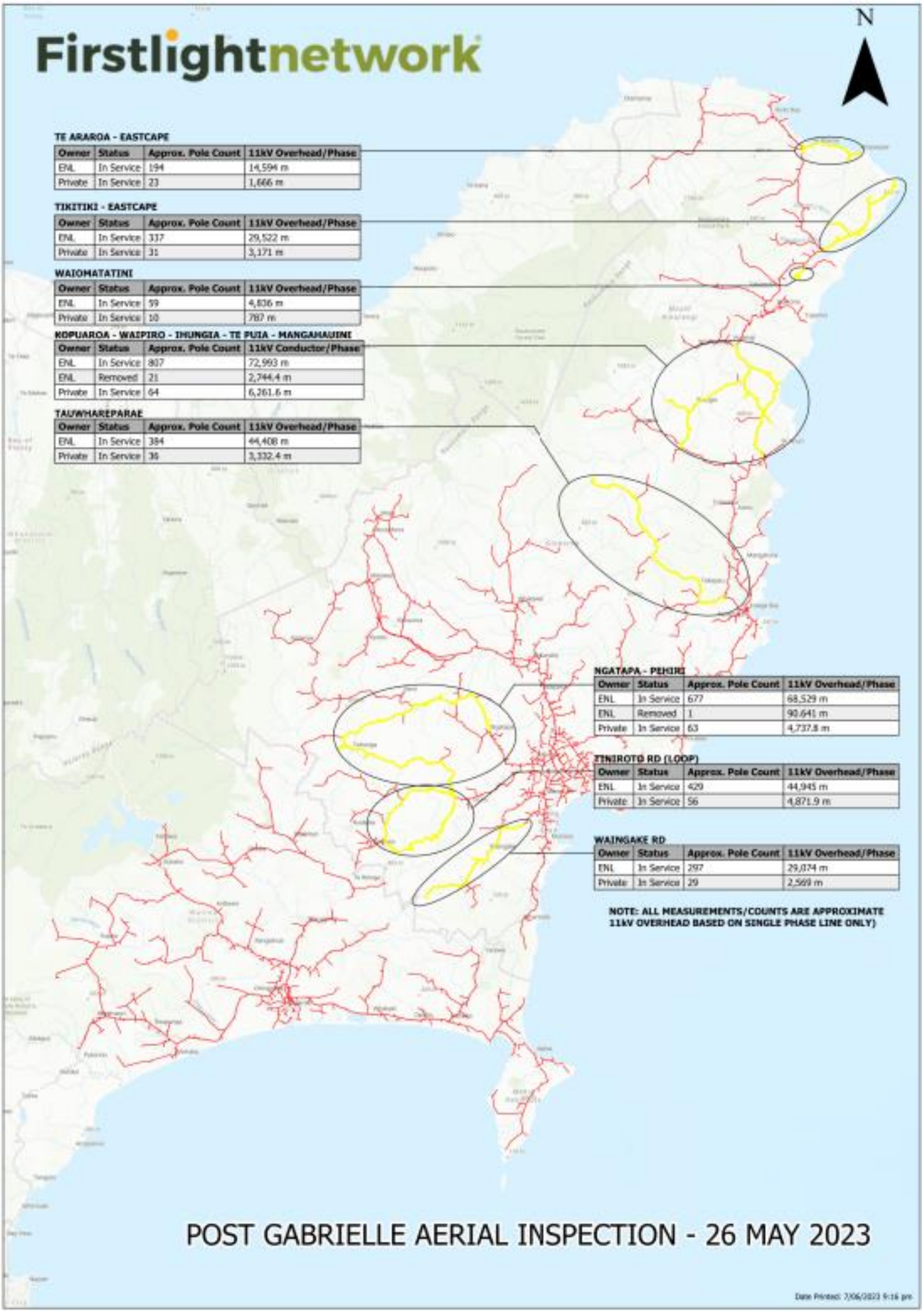
Using this approach in the days following Cyclone Gabrielle, we inspected:

- 2,165 poles, marked 174 for replacement and 176 for remedial maintenance, as
- 536 transformers, earth tested 564, and found 317 defects, as shown.

The maps in Figure 6 and Figure 12 show the worst areas impacted by Cyclone Gabrielle and reveal the scale of the impact on our Network.

In the weeks following Cyclone Gabrielle, we combined the information collected via the flyover and ground observations. We updated our routine maintenance programs to reflect the state of our network post-Cyclone Gabrielle. We identified 11 issues arising from Cyclone Gabrielle that needed immediate attention, remained we rolled into our routine maintenance program. We inspected 13% of our distribution lines (i.e., 309 km of our 2,388 km 11kv conductor) and 12% of our poles (i.e., 3181 of our 25,485 11kv poles). We have included a summary of the results in Table 3.

Figure 5: Post-Gabrielle Aerial Inspection



TE ARAROA - EASTCAPE

Owner	Status	Approx. Pole Count	11kV Overhead/Phase
ENL	In Service	194	14,594 m
Private	In Service	23	1,666 m

TIKITIKI - EASTCAPE

Owner	Status	Approx. Pole Count	11kV Overhead/Phase
ENL	In Service	337	29,522 m
Private	In Service	31	3,171 m

WAIOMATATINI

Owner	Status	Approx. Pole Count	11kV Overhead/Phase
ENL	In Service	59	4,836 m
Private	In Service	10	787 m

KOPUAROA - WAIPIRO - IHUNGIA - TE PUIA - MANGAHAUINI

Owner	Status	Approx. Pole Count	11kV Conductor/Phase
ENL	In Service	807	72,993 m
ENL	Removed	21	2,744.4 m
Private	In Service	64	6,261.6 m

TAUWHAREPARAE

Owner	Status	Approx. Pole Count	11kV Overhead/Phase
ENL	In Service	384	44,408 m
Private	In Service	36	3,332.4 m

NGATAPA - PEHIRI

Owner	Status	Approx. Pole Count	11kV Overhead/Phase
ENL	In Service	677	68,529 m
ENL	Removed	1	90.641 m
Private	In Service	63	4,737.8 m

TINIROTO RD (LOOP)

Owner	Status	Approx. Pole Count	11kV Overhead/Phase
ENL	In Service	429	44,945 m
Private	In Service	56	4,871.9 m

WAINGAKE RD

Owner	Status	Approx. Pole Count	11kV Overhead/Phase
ENL	In Service	297	29,074 m
Private	In Service	29	2,569 m

Figure 6: Map showing pole inspections arising from ariel review following Cyclone Gabrielle

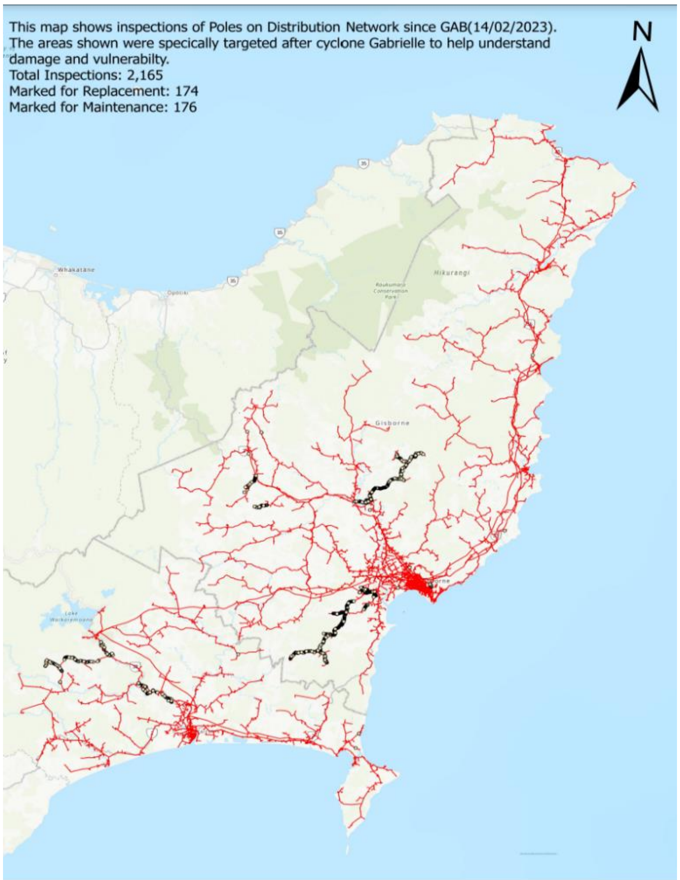


Figure 7: Map showing transformer inspections arising from ariel review following Cyclone Gabrielle

Table 3: Summary table of the results from the network arial review post-Cyclone Gabrielle

Area	Distance (km)	Poles	Issues caused by Cyclone Gabrielle	Plans to resolve
Te Araroa - Eastcape	14.6	194	Nil	Routine maintenance
Tikitiki - Eastcape	29.5	334	Slips three poles at risk	Relocate the three poles
Waiomatatini	4.8	59	Nil	Routine maintenance
Kopuaroa - Mangahauini	73.0	807	One leaning tree, one slip	Remove the tree urgently. Relocate the pole.
Tauwhareparae	44.4	384	One slip near the pole	Relocate the pole
Ngatapa - Pehiri	68.5	677	Nil	Nil
Tiniroto Loop	44.9	429	Slips near 2poles	Relocate both poles
Waingake	2.9	297	One cracked pole, slip and trees near the pole	Replace cracked poles and cut trees
Total	**309km**	**3,181**	**11 issues**	
Percentage of total asset class surveyed	*13%*	*12%*		

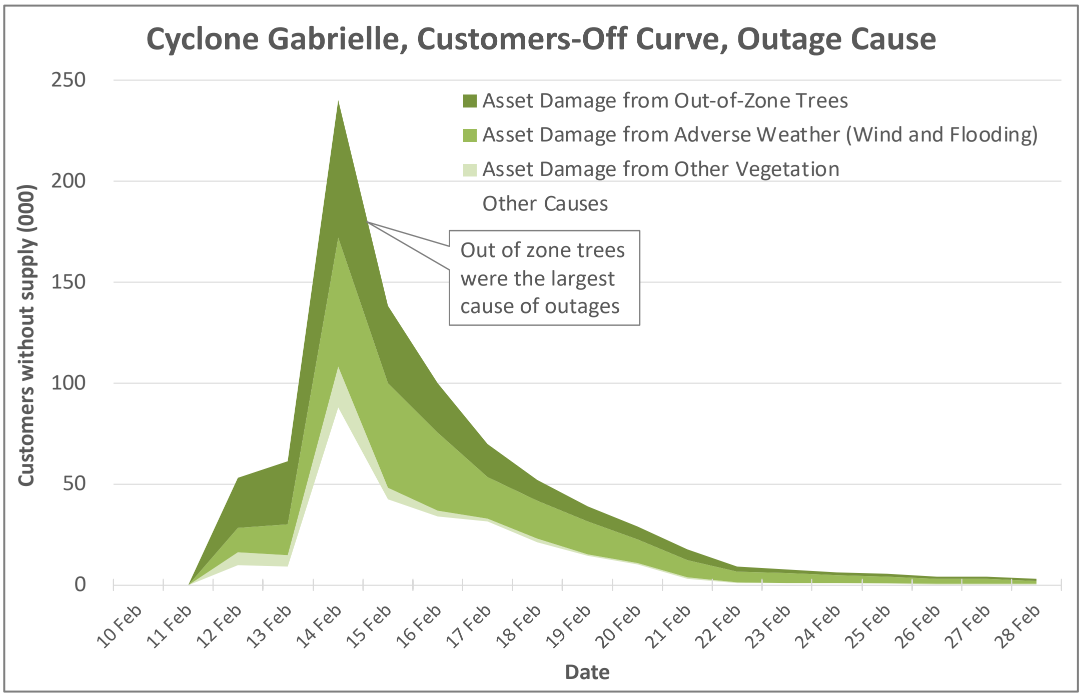
4.4 Electricity Distribution Sector Cyclone Gabrielle Review

In July 2023, energia released its Report to Electricity Networks Aotearoa, Electricity Distribution Sector Cyclone Gabrielle Review. The energia report is an independent assessment of the appropriateness of the electricity distribution sector's risk reduction, readiness and response to Cyclone Gabrielle. The assessment was based on an extensive information-gathering exercise from ten EDBs impacted by the cyclone, including Firstlight Network.[12]

4.4.1 Out-of-zone trees, high winds and flood damage were the main causes of outages.

Energia determined that the largest cause of outages for EDBs was out-of-zone tree damage, and the second largest cause was high winds causing damage to overhead lines, followed by flooding damaging assets (including substations), as shown in Figure 8.[13]

Figure 8: Material causes of customer outages extract from the energia report[14]



Trees pose a significant hazard to distribution assets; strong winds increase this risk by toppling trees and breaking branches. The Tree Regulations are intended to give EDBs mandated powers to address the risk from trees. However, as discussed in Sub-section 2.2.2 above, EDBs are not mandated to trim or remove trees outside the growth zone (i.e., out-of-zone trees). EDBs must negotiate with the tree owner to trim or remove trees at risk of damaging assets.

Engeria found that only 16% of outages during Cyclone Gabrielle were caused by in-zone vegetation indicating that EDBs are—

12 Energia Report to Electricity Networks Aotearoa, Electricity Distribution Sector Cyclone Gabrielle Review, July 2023, Page 2

13 Supra n11.

14 Ibid n12.

> ‘doing a reasonable job managing vegetation within the rules available to them.’[15]

Out-of-zone trees continue to be a point of frustration. The Tree Regulations give tree owners discretion regarding trimming or removing out-of-zone trees. The quality standards make the EDBs responsible for a tree damaging their assets and causing an outage, whether that tree is in or out-of-zone. The asymmetry between the tree owner’s discretion to trim or remove trees and the EDBs responsibility for any tree-damaging assets makes out-of-zone trees an ongoing performance issue unless there is a legislative or regulatory change.

Cyclone Gabrielle formed on 5 February 2023, developed into a Category 3 tropical cyclone (10-minute sustained winds speeds of 150 km/h) and hit Australia, Melanesia and Norfolk Island before downgrading to a Category 2 equivalent tropical cyclone (1-minute sustained wind speeds of 165 km/h) and hitting the North Island. Our lines are designed to withstand high winds. Wind speeds of 110 km/h are not unheard of in Hawke’s Bay. Our lines are not, however, designed to withstand cyclonic wind speeds over a sustained period. Based on the findings of its independent review, energia found that—

> ‘The wind speeds experienced during Cyclone Gabrielle were very close to current design limits (for the affected regions), and we believe that it is highly likely that the windspeeds in certain locations were above the design limits for older (pre-2000) poles and that this was the primary causes of failures.’[16]

Much of our network was designed and built before 2000. We don’t have access to the pre-2000 design standards used by the predecessors to Firstlight. Before the introduction of limit-stage design in 2000, many EDBs had their own “cook books” they used for line “design”. Many were based on the Electricity Supply Association of Australia (ESAA) standard. The ESAA first published C(b)1, “Guidelines for designing and maintaining overhead distribution and transmission lines”, in 1962. C(b)1 didn’t specify windspeeds (or windspeed return periods), so it is very hard to gauge what the design windspeeds were pre-2000. Given how design standards have evolved, it is very unlikely that the design standards were more robust pre-2000 than post-2000.

Energia found that flooding was the third largest cause of outages from Cyclone Gabrielle, with flood damage being ‘most significant in Hawkes Bay and Tairāwhiti’, interrupting over 60,000 customers.[17] Flooding is a relatively new hazard on our network emerging due to changes in recent weather patterns and climate change. We have yet to consider how we might mitigate the risk of flooding and intend to, as a first step, identify assets vulnerable to flooding and prepare a mitigation plan. Planning is likely to be ongoing and will take some time to complete.

4.4.2 EDBs responses to Cyclone Gabrielle were appropriate, but there is room for improvement

Overall, energia considered that EDBs responses to Cyclone Gabrielle were appropriate.

> ‘In our opinion, the impacted EDBs have appropriate emergency management plans that can respond to weather events. We also believe that all impacted EDBs took the watches and warnings seriously and prepared accordingly. Only with hindsight could we be critical of the preparation efforts.’[18]

---

[15] Energia Report to Electricity Networks Aotearoa, Electricity Distribution Sector Cyclone Gabrielle Review, July 2023, Page 3

[16] Supra n11.

[17] Supra n14.

[18] Supra n14.

[And]

'Our overall comment is that EDBs did an appropriate job restoring supply and competently responded to a wide range of issues. We believe there are incremental improvements that can be made that will enhance restoration and improvement communication with customers.'[19]

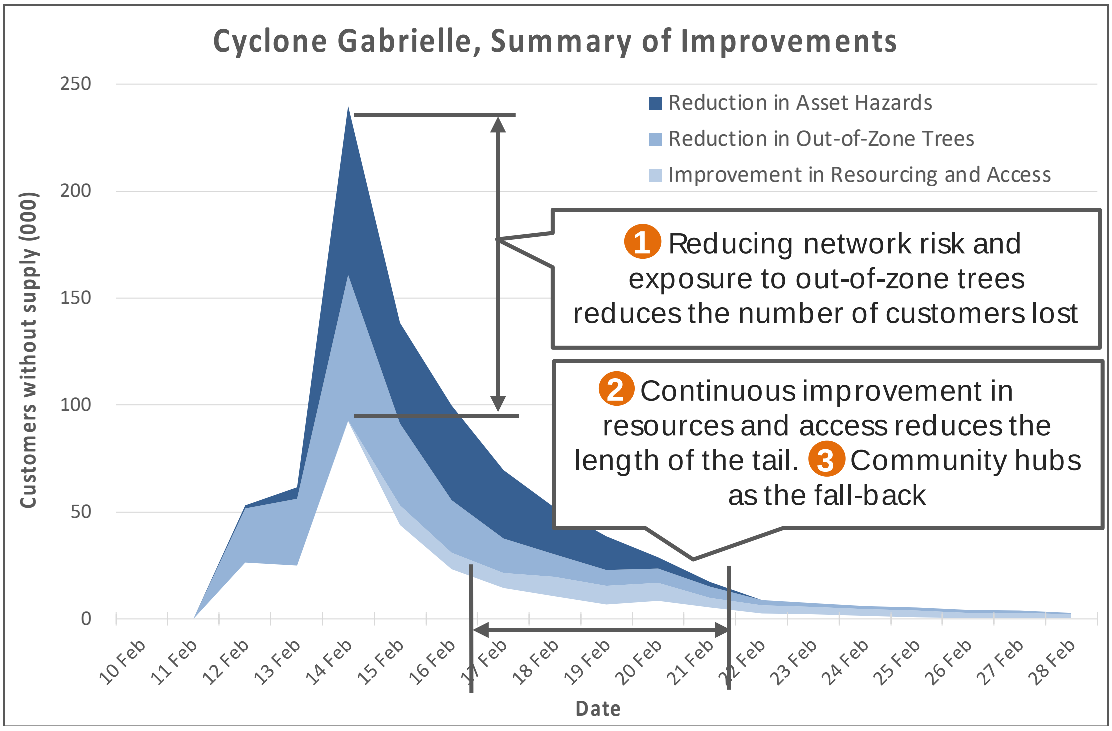
We identified hazards, understood vulnerabilities, and progressed mitigations appropriately.

There is room for us to improve. Energia believes that a combination of strategies is needed to improve resilience, focusing on reducing risk. Energia identified three key activities:

1. Remove hazards—by addressing the risk posed by out-of-zone trees, upgrading critical assets vulnerable to hazards, and incrementally hardening the network as assets are renewed.
2. Continuously improve resourcing and access—improving resourcing and contingency plans helps shorten the restoration tail.
3. Develop secure community hubs—for the hard-to-restore customers (due to topography, vulnerabilities in roading networks, and types of damage that can occur); community hubs provide a secure standalone electricity supply while restoration or alternative can be brought online, offering an important but temporary safety net.

How the development of a multi-strategic approach using these three key areas could improve our resilience is shown in Figure 9.

Figure 9: EDB resilience improvement strategy, extracted from the energia report



19 Ibid n17.

4.4.3 Management response to improvements

We thank energia for their insights and commend the high quality of the report. We intend to consider the review findings in detail, with the intention to adopt a multi-strategic approach. Over the coming months, we will finalise the action plan to embed the approach into our life asset management practices. The action plan will outline the timelines, responsibilities (individuals and teams), and resources needed to realise the improvements.

Once we have established an action plan, we will Implement the plan. Implementation requires us to allocate resources to support the action plan; develop a communication strategy to inform stakeholders about the upcoming changes to our asset management practices; and engage with the relevant stakeholders to seek their input, address concerns and encourage participation in this improvement.

Adopting a multi-strategic approach is an ongoing process with adjustments made often based on lessons learnt and changing circumstances. Management is committed to improving our emergency response and sees improvements to emergency management as synonyms with our commitment to continuous improvement.

5. Major Events

5.1 Overview

This regulatory year, our network had eight SAIDI and four unplanned SAIFI major events. Our Unplanned SAIDI major events are shown in Table 4. Summaries of the investigations into our unplanned SAIDI major events are included in Sections 5.6 to 5.6.

We had unplanned SAIDI major events on our network—

- April-severe wind storms
- January Cyclone Hale
- February Cyclone Gabrielle

5.2 Summary of Unplanned SAIDI Major Events

Table 4: Unplanned SAIDI major events RY23

Unplanned SAIDI major events RY23			
Half hour commencing	Half hour ending	Pre-normalised SAIDI	Normalised unplanned SAIDI
13/04/2022 8:33 AM	27/04/2022 4:22 PM	52.268	2.734
13/04/2022 8:33 AM	16/04/2023 4:30 PM	48.775	2.858
10/01/2023 5:12 AM	17/01/2023 1:52 PM	77.885	2.664
10/01/2023 2:34 PM	17/01/2023 2:09 PM	16.523	2.667
13/02/2023 7.06 AM	17/03/2023 4:37 PM	42.660	2.425
13/02/2023 12:28 PM	15/03/2023 5:15 PM	918.174	5.889
13/02/2023 5:09 PM	15/03/2023 5:15 PM	19.909	0.641
13/02/2023 10:31 PM	20/02/2023 4:29 PM	14.355	1.105
		1190.549	**20.983**

The details of the outages that contributed to the Unplanned SAIDI major events are shown in Table 5 to Table 11 below.

5.3 Our risk-based approach to restoration follows good industry practices

We accept that there is an expectation that we will adapt our asset management practices taking account of the change in land use from farming in the 1960s to forestry in the 1980s. In June 2001, we changed our fault restoration to a risk-based approach whereby we patrolled the line significantly more before reclosing. Before restoring supply, we patrol the line to ascertain establish line damage. For example, it is common in storms for a tree to come in contact with our line at one location and branches to cause damage at another unrelated location resulting in multiple points of damage to our lines. Patrolling empowers us to identify the multiple points of damage and restore them safely.

Our risk-based approach aligns with the Electricity Engineers Association (EEA) Guides and industry standards. We are comfortable that while patrolling under a risk-based approach adds time until restoration, the approach aligns with good industry practices.

5.4 SAIDI Major Events – 13 April 2022

On 13 April 2022, we experienced severe winds across our network. The adverse weather resulted in widespread outages across our network from Hicks Bay in the north to Mahia in the south resulting in two major events.

Table 5 and Table 6 show the details of the outages that contributed to this SAIDI major event.

Table 5: Details of SAIDI Major event – 13 April 2022

Details of SAIDI Major event 13 April 2022									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Adverse Weather	13/04/2022	2:08 PM	16/04/2022	12:14 PM	6.131	0.321	12%	Inland	Distribution lines
Adverse Weather	13/04/2022	9:21 AM	18/04/2022	4:28 PM	4.893	0.256	9%	Hicks Bay	Distribution lines
Vegetation	13/04/2022	5:57 PM	15/04/2022	5:31 PM	4.950	0.259	9%	Tauwhareparare	Distribution lines
Vegetation	13/04/2022	9:25 AM	16/04/2022	4:50 PM	2.357	0.123	5%	Ruatoria	Distribution lines
Vegetation	13/04/2022	1:37 PM	17/04/2022	1:43 PM	3.679	0.192	7%	Matawai	Distribution lines
Adverse Weather	13/04/2022	2:16 PM	13/04/2022	5:09 PM	0.519	0.027	1%	Kanakanaia	Distribution lines
Vegetation	13/04/2022	5:01 PM	14/04/2022	9:44 AM	4.486	0.235	9%	Raupunga	Distribution lines
Adverse Weather	13/04/2022	2:17 PM	14/04/2022	10:08 AM	5.335	0.279	10%	Ruakituri	Distribution lines
Adverse Weather	13/04/2022	1:08 PM	14/04/2022	3:49 PM	1.750	0.092	3%	Tiki Tiki	Distribution lines
Adverse Weather	13/04/2022	8:33 AM	14/04/2022	5:09 PM	7.566	0.396	14%	Tiki Tiki	Distribution lines
Vegetation	13/04/2022	3:07 PM	14/04/2022	3:27 PM	0.553	0.029	1%	Mata	Distribution lines
Vegetation	13/04/2022	2:09 PM	27/04/2022	4:22 PM	6.803	0.356	13%	Mata	Distribution lines
Vegetation	13/04/2022	9:22 AM	13/04/2022	5:17 PM	1.099	0.057	2%	Ruatoria	Distribution lines
Vegetation	13/04/2022	2:03 PM	13/04/2022	4:46 PM	0.410	0.021	1%	Waimata	Distribution lines
Vegetation	13/04/2022	2:53 PM	17/04/2022	10:58 PM	1.739	0.091	3%	Toko Tie	Distribution lines
					52.268	2.734			

Table 6: Details of SAIDI Major event – 13 April 2022

Details of SAIDI Major event 13 April 2022									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Vegetation	13/04/2022	10:46 PM	14/04/2022	11:12 AM	1.328	0.078	3%	Tiniroto	Distribution lines
Vegetation	13/04/2022	5:57 PM	15/04/2022	5:31 PM	0.059	0.003	0%	Tauwharepare	Distribution lines
Vegetation	13/04/2022	5:01 PM	14/04/2022	9:44 AM	4.188	0.245	9%	Raupunga	Distribution lines
Vegetation	13/04/2022	7:21 PM	14/04/2022	10:44 AM	0.821	0.048	2%	Haisman	Distribution lines
Defective Equipment	13/04/2022	9:52 PM	13/04/2022	10:28 AM	0.225	0.013	0%	Dalton	Distribution lines
Adverse Weather	13/04/2022	6:32 PM	14/04/2022	3:09 PM	33.785	1.980	69%	Mahia - Tahenui	Distribution lines
Unknown cause	13/04/2022	6:46 PM	14/04/2022	10:33 AM	3.948	0.231	8%	Mata	Subtransmission lines
Adverse Weather	14/04/2022	3:41 PM	15/04/2022	12:57 PM	0.124	0.007	0%	Matawai	Distribution lines
Adverse Weather	13/04/2022	8:33 AM	14/04/2022	5:09 PM	0.268	0.016	1%	Tiki Tiki	Distribution lines
Defective Equip.	14/04/2022	2:51 PM	14/04/2022	3:47 PM	0.030	0.002	0%	Dalton	Distribution lines
Vegetation	13/04/2022	3:07 PM	14/04/2022	3:27 PM	0.027	0.002	0%	Whatatutu	Distribution lines
Adverse Weather	14/04/2022	3:45 PM	15/04/2022	9:35 AM	0.290	0.017	1%	Kanakanaia	Distribution lines
Vegetation	14/04/2022	4:14 PM	16/04/2022	4:30 PM	0.350	0.020	1%	Waimata	Distribution lines
Adverse Weather	14/04/2022	0:01 AM	14/04/2022	2:11 PM	2.960	0.173	6%	Tahora	Distribution lines
Adverse Weather	14/04/2022	6:19 AM	14/04/2022	2:15 PM	0.368	0.022	1%	Nuhaka	Distribution lines
Adverse Weather	14/04/2022	9:36 AM	14/04/2022	11:57 AM	0.005	0.000	0%	Tiki Tiki	Distribution lines
					48.775	**2.858**			

The largest outage was on our Mahia feeder (940 ICPs), caused by a conductor being brought down by the high winds at the start of the feeder. As a contingency, we have a 1.2MW standby generator in Mahia township. In this instance, we started the generator, which initially ran but developed a fault and was shut down after some time. Conditions made it unsafe to send for a generation technician until the next day, prolonging this outage.

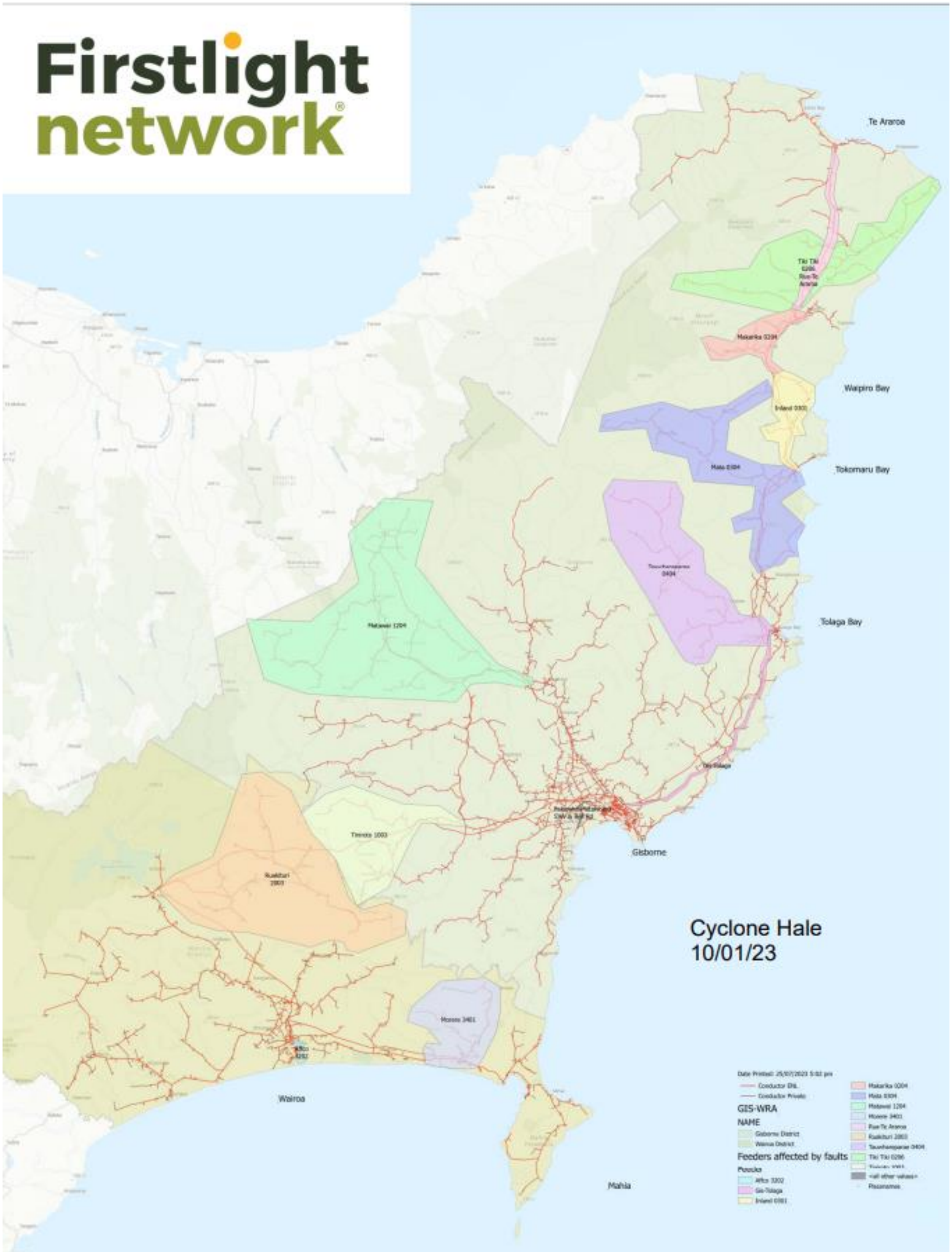
The excessive winds pushed multiple out-of-zone trees into our lines, causing multiple faults at the start of our Raupunga feeder (421 ICPs). We were able to supply some consumers from the interconnected Frasertown backup; however, we have consumers that are past the interconnecting point of the Frasertown feeder, and these consumers had to wait for us to repair the Raupunga feeder to restore supply to them.

5.5 SAIDI Major Events – 10 January 2023

On 10 January 2023, Cyclone Hale crossed the New Zealand coats and hit the North Island, causing widespread outages on our network and resulting in two major events. Figure 10 shows the ten regional locations of the outages that started on 10 January 2023 attributable to Cyclone Hale.

- Tiki Tiki
- Makarika
- Insland
- Mata
- Tawharepare
- Matawai
- Tiniroto
- Ruakituri
- Morere
- Affco

Figure 10: Firstlight Network Outage map showing the areas of our network impacted by Cyclone Hale



The brunt of the storm hit our network in the late afternoon and early evening. For health and safety, we chose not to dispatch teams to conduct a risk assessment of the lines until after the winds had died down, after 8 pm. Initial patrolling found that most faults had been caused by trees coming in contact with our lines. Most of the trees were outside the growth zone limit, with some coming from two or three rows back in plantations.

Table 7 and Table 8 show the details of the outages that contributed to this SAIDI major event.

Table 7: Details of SAIDI Major event – 10 January 2023

Details of SAIDI Major event 10 January 2023									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Adverse Weather	10/01/2023	11:07 AM	11/01/2023	1:59 PM	0.062	0.002	0%	Ruakituri	Distribution lines
Adverse Weather	10/01/2023	4:28 PM	10/01/2023	9:08 PM	0.199	0.007	0%	Affco	Distribution lines
Vegetation	10/01/2023	11:46 AM	12/01/2023	18:17	2.088	0.071	3%	Tiki Tiki	Distribution lines
Vegetation	10/01/2023	5:12 AM	10/01/2023	9:35	1.164	0.040	1%	Morere	Distribution lines
Vegetation	10/01/2023	5:06 PM	11/01/2023	11:59	13.205	0.452	17%	Matawai	Distribution lines
Vegetation	10/01/2023	2:34 PM	11/01/2023	19:37	0.333	0.011	0%	Tiniroto	Distribution lines
Vegetation	10/01/2023	5:59 AM	16/01/2023	16:56	19.605	0.671	25%	Tauwhareparae	Distribution lines
Vegetation	10/01/2023	8:20 PM	11/01/2023	13:16	0.907	0.031	1%	Tauwhareparae	Subtransmission line
Vegetation	10/01/2023	8:25 PM	13/01/2023	19:12	9.175	0.314	12%	Mata	Distribution lines
Vegetation	10/01/2023	7:22 PM	13/01/2023	15:06	13.199	0.451	17%	Tiki Tiki	Subtransmission line
Vegetation	10/01/2023	7:22 PM	12/01/2023	14:47	14.759	0.505	19%	Makarika	Distribution lines
Vegetation	10/01/2023	8:48 AM	12/01/2023	14:49	0.436	0.015	1%	Mata	Distribution lines
Vegetation	10/01/2023	4:15 PM	17/01/2023	13:52	2.753	0.094	4%	Inland	Distribution lines
					77.885	2.664			

On the Tauwhareparare feeder, we had 49 ICPs at the end of the line out for six days (between 10th and 16th January), contributing to 25% of the 10 January 2023 major event. Numerous plantation forestry trees had gone through the line in multiple locations along the feeder. Unstable trees along the corridor and muddy conditions introduced additional hazards, taking six days to restore supply.

Table 8: Details of SAIDI Major event – 10 January 2023

Details of SAIDI Major event 10 January 2023									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Adverse Environment	10/01/2023	11:25 PM	17/01/2023	2:09 PM	2.270	0.366	14%	Mata	Distribution lines
Defective Equipment	11/01/2023	2:02 PM	11/01/2023	4:47 PM	0.013	0.002	0%	Nuhaka	Distribution lines
Vegetation	10/01/2023	2:34 PM	11/01/2023	7:37 PM	0.989	0.160	6%	Tiniroto	Distribution lines
Vegetation	11/01/2023	0:42 AM	11/01/2023	6:06 AM	9.067	1.463	55%	Campion	Distribution lines
Adverse Environment	11/01/2023	1:37 PM	12/01/2023	12:30 PM	1.102	0.178	7%	Toko Tie	Distribution lines
Vegetation	11/01/2023	8:01 AM	11/01/2023	6:40 PM	0.222	0.036	1%	W O Kuri	Distribution lines
Vegetation	10/01/2023	8:20 PM	11/01/2023	1:16 PM	0.161	0.026	1%	GIS - Tolaga	Subtransmission lines
Vegetation	10/01/2023	7:22 PM	13/01/2023	3:06 PM	0.205	0.033	1%	Rua-Te Araroa	Subtransmission lines
Adverse Weather	11/01/2023	3:00 PM	12/01/2023	11:30 AM	0.143	0.023	1%	Waimta	Distribution lines
Vegetation	11/01/2023	1:56 PM	11/01/2023	7:40 PM	0.146	0.024	1%	Te Arai	Distribution lines
Adverse Weather	11/01/2023	10:42 AM	11/01/2023	2:15 PM	0.058	0.009	0%	Lavenham	Distribution lines
Unknown cause	11/01/2023	1:00 PM	11/01/2023	2:30 PM	0.097	0.016	1%	Kanakanaia	Distribution lines
Unknown cause	11/01/2023	5:37 PM	12/01/2023	11:40 AM	1.633	0.263	10%	Hicks Bay	Distribution lines
Adverse Weather	11/01/2023	5:20 PM	12/01/2023	9:15 AM	0.369	0.060	2%	Hicks Bay	Distribution lines
Unknown cause	11/01/2023	5:40 PM	11/01/2023	8:17 PM	0.049	0.008	0%	Tauwhareparae	Distribution lines
					16.523	**2.667**			

The health and safety of the public and our people is central to our actions. Matawai, Rua-Te Araroa, and Tiki Tiki feeders are some of the most remote feeders on our network. The remoteness adds complexity to the restoration of these feeders, and to ensure the wellbeing of our faultman, we stood them down after 7 pm. Our outlook on health and safety meant that 386 ICPs on the Matawai feeder and 311 IPCs on the Rua-Te Araroa feeder were restored more than 24 hours after the cause of the fault was determined and a risk-based assessment was completed as per good industry practices.

Consumers on our Inland (163 ICPs) and Makarika (116 ICPs) feeders are interconnected and can be fed from either feeder in an outage. Trees damaged both feeders during Cyclone Hale when a slip brought down a pole on the Inland feeder, and the Makarika feeder faulted. Access issues to safely restore prolonged the outage longer than would normally be for an outage.

5.6 SAIDI Major Events – 13 February 2023

On 13 February 2023, Cyclone Gabrielle crossed the New Zealand coast and slammed into the North Island, causing widespread outages across our network from Hicks Bay in the North to Mahia in the South, as shown in Figure 11: Firstlight Network Outage map showing the areas of greatest impact from Cyclone Gabrielle and resulting in four major events.

Figure 11: Firstlight Network Outage map showing the areas of greatest impact from Cyclone Gabrielle

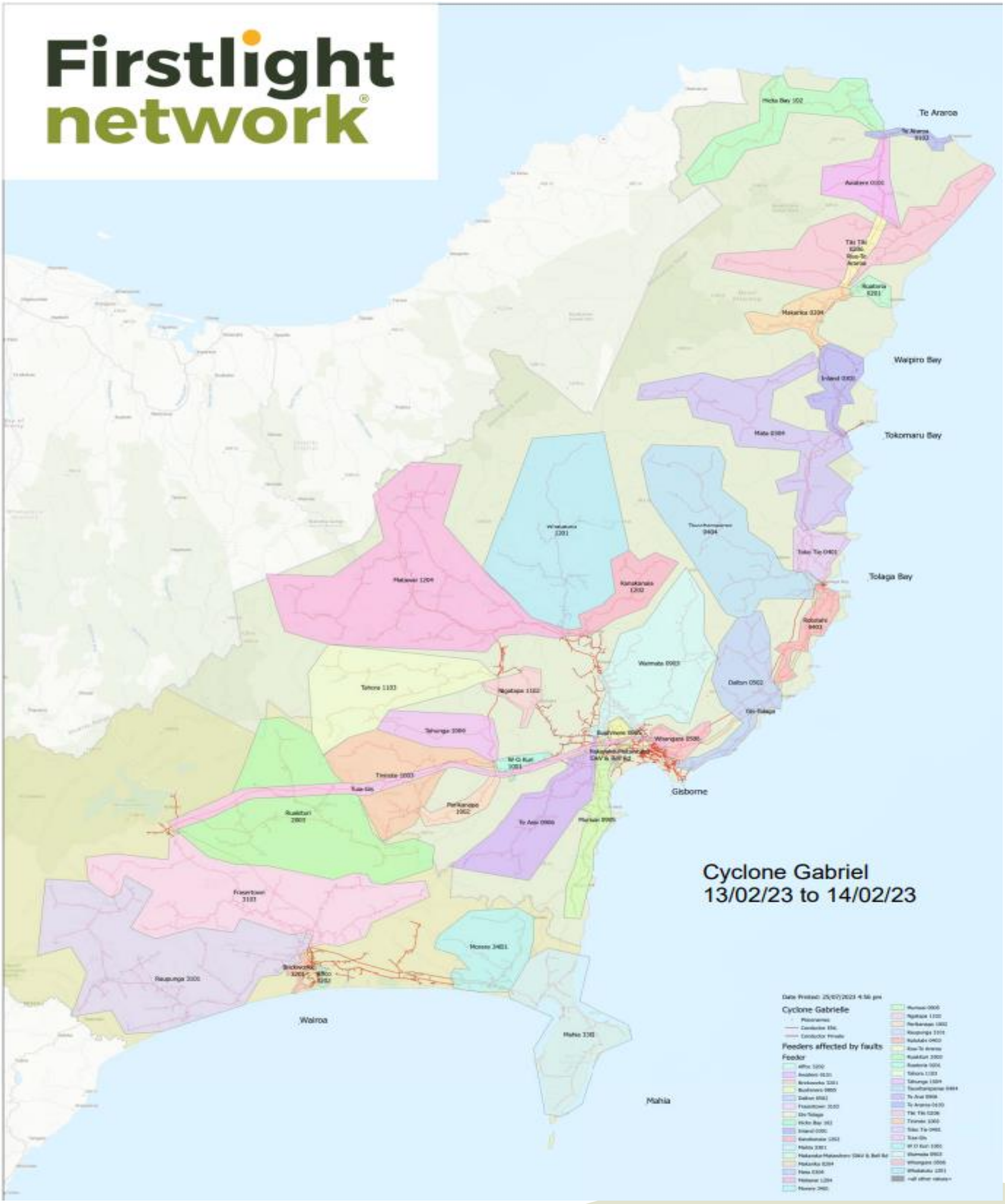


Table 9 to Table 12 shows the details of the outages that contributed to this SAIDI major event.

Table 9: Details of SAIDI Major event – 13 February 2023

Details of SAIDI Major event 13 February 2023									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Adverse Weather	13/02/2023	9:27 AM	13/02/2023	9:47 AM	0.038	0.002	0%	W O Kuri	Distribution lines
Adverse Weather	13/02/2023	7:06 AM	23/02/2023	12:32 PM	2.116	0.120	5%	Mata	Distribution lines
Unkown cause	13/02/2023	11:43 AM	13/02/2023	1:21 PM	0.178	0.010	0%	Matawai	Distribution lines
Unkown cause	13/02/2023	10:50 AM	13/02/2023	12:17 PM	0.225	0.013	1%	Mata	Distribution lines
Defective Equipment	13/02/2023	8:27 AM	13/02/2023	9:11 AM	0.071	0.004	0%	Tiki Tiki	Distribution lines
Vegetation	13/02/2023	3:54 PM	27/02/2023	1:00 PM	2.595	0.148	6%	Waimata	Distribution lines
Vegetation	13/02/2023	12:28 PM	26/02/2023	9:33 AM	0.275	0.016	1%	Inland	Distribution lines
Vegetation	13/02/2023	2:56 PM	13/02/2023	5:09 PM	3.341	0.190	8%	GIS - Tolaga	Subtransmission lines
Defective Equipment	13/02/2023	2:49 PM	13/02/2023	2:56 PM	0.034	0.002	0%	Rototahi	Distribution lines
Vegetation	13/02/2023	4:21 PM	15/02/2023	4:31 PM	31.454	1.788	74%	Ruatoria	Distribution lines
Vegetation	13/02/2023	3:18 PM	13/02/2023	5:22 PM	0.539	0.031	1%	Tiki Tiki	Distribution lines
Adverse Weather	13/02/2023	11:00 AM	17/03/2023	4:37 PM	1.794	0.102	4%	Inland	Distribution lines
					42.660	**2.425**			

Cyclone Gabrielle caused extensive damage to roading infrastructure across the Hawkes Bay. We had 19 bridges wash away on our network alone, creating significant access issues. On the Island feeder (163 ICPs), we had the road and a pole washed away at the start of the feeder, usual these consumers would be fed from the Makarika feeder 9116 ICPs) as these feeders are interconnected. However, on the 15th, the Makarika feeder also faulted when out-of-zone trees went through the line at the start of the feeder. Access was limited due to slips, floods and road damage. We did not send our teams to restore supply until a full risk-based assessment was completed, the restoration plan was completed, and it was safe to do so.

Table 10: Details of SAIDI Major event – 13 February 2023

Details of SAIDI Major event 13 February 2023									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Adverse Weather	13/02/2023	7:28 PM	18/02/2023	8:40 PM	19.118	0.123	2%	Hicks Bay	Distribution lines
Adverse Weather	13/02/2023	8:59 PM	20/02/2023	11:13 AM	6.466	0.041	1%	Muriwai	Distribution lines
Defective Equipment	13/02/2023	5:32 PM	22/02/2023	2:57 PM	21.133	0.136	2%	Tahunga	Distribution lines
Vegetation	13/02/2023	10:43 PM	17/02/2023	7:10 PM	36.975	0.237	4%	Kanakanaia	Distribution lines
Vegetation	13/02/2023	10:43 PM	1/03/2023	2:26 PM	3.579	0.023	0%	Kanakanaia	Distribution lines
Adverse Weather	13/02/2023	8:59 PM	1/03/2023	3:21 PM	59.119	0.379	6%	Te Arai	Distribution lines
Vegetation	13/02/2023	9:06 PM	10/03/2023	1:01 PM	1.373	0.009	0%	Waimata	Distribution lines
Vegetation	13/02/2023	8:51 PM	22/02/2023	5:18 PM	32.645	0.209	4%	Whatautu	Distribution lines
Vegetation	13/02/2023	3:54 PM	27/02/2023	1:00 PM	18.502	0.119	2%	Waimata	Distribution lines
Vegetation	13/02/2023	5:00 PM	3/03/2023	5:00 PM	53.515	0.343	6%	Tauwhareparae	Distribution lines
Vegetation	13/02/2023	5:15 PM	2/03/2023	12:29 PM	3.741	0.024	0%	Tauwhareparae	Distribution lines
Adverse Environment	13/02/2023	5:00 PM	22/02/2023	1:18 PM	16.596	0.106	2%	Toko Tie	Distribution lines
Vegetation	13/02/2023	8:30 PM	25/02/2023	4:00 PM	21.432	0.137	2%	Makarika	Distribution lines
Vegetation	13/02/2023	12:28 PM	26/02/2023	9:33 AM	65.387	0.419	7%	Inland	Distribution lines
Adverse Environment	13/02/2023	4:29 PM	14/03/2023	4:48 PM	47.864	0.307	5%	Mata	Distribution lines
Vegetation	13/02/2023	5:09 PM	15/02/2023	10:45 AM	14.042	0.090	2%	Rototahi	Distribution lines
Adverse Weather	13/02/2023	10:31 PM	16/02/2023	3:44 PM	2.716	0.017	0%	Mahia	Distribution lines
Adverse Weather	13/02/2023	10:53 PM	16/02/2023	10:50 AM	16.032	0.103	2%	Frasertown	Distribution lines
Vegetation	13/02/2023	10:28 PM	14/02/2023	7:01 AM	5.192	0.033	1%	Brickworks	Distribution lines
Vegetation	13/02/2023	5:25 PM	15/03/2023	5:15 PM	63.489	0.407	7%	Raupunga	Distribution lines
Adverse Weather	13/02/2023	8:55 PM	18/02/2023	5:50 PM	10.369	0.067	1%	Mahia	Distribution lines

Details of SAIDI Major event 13 February 2023									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Adverse Weather	13/02/2023	10:53 PM	18/02/2023	1:50 PM	41.610	0.267	5%	Frasertown	Distribution lines
Vegetation	13/02/2023	4:57 PM	15/02/2023	5:35 PM	9.593	0.062	1%	Awatere	Distribution lines
Adverse Weather	13/02/2023	9:37 PM	16/02/2023	11:34 AM	18.727	0.120	2%	Dalton	Distribution lines
Vegetation	13/02/2023	11:34 PM	21/02/2023	5:40 PM	34.141	0.219	4%	Tiniroto	Distribution lines
Adverse Weather	13/02/2023	10:46 PM	13/02/2023	11:31 PM	36.504	0.234	4%	Tuia - Gis	Subtransmission lines
Adverse Environment	13/02/2023	11:36 PM	19/02/2023	12:53 PM	8.398	0.054	1%	Parikanapa	Distribution lines
Adverse Environment	13/02/2023	7:29 PM	23/02/2023	3:40 PM	11.503	0.074	1%	Te Araroa	Distribution lines
Adverse Environment	13/02/2023	11:30 PM	7/03/2023	4:08 PM	3.636	0.023	0%	Mata	Distribution lines
Adverse Environment	13/02/2023	11:34 PM	21/02/2023	1:55 PM	8.458	0.054	1%	Tiniroto	Distribution lines
Adverse Weather	13/02/2023	8:31 PM	14/02/2023	10:41 AM	2.068	0.013	0%	Makaraka-Matawhero	Distribution lines
Adverse Weather	13/02/2023	5:21 PM	16/02/2023	5:06 PM	74.9848	0.4809	8%	Te Araroa/Ruatoria	Subtransmission lines
Adverse Weather	14/02/2023	5:30 AM	14/02/2023	11:12 AM	0.621	0.004	0%	Ngatapa	Distribution lines
Vegetation	14/02/2023	2:48 AM	16/02/2023	5:42 PM	24.458	0.157	3%	Whangara	Distribution lines
Adverse Weather	14/02/2023	2:07 AM	20/02/2023	5:01 PM	26.262	0.168	3%	Tahora	Distribution lines
Vegetation	14/02/2023	2:07 AM	22/02/2023	3:38 PM	16.682	0.107	2%	Tahora	Distribution lines
Adverse Weather	14/02/2023	3:16 AM	2/03/2023	10:58 AM	38.674	0.248	4%	Matawai	Distribution lines
Adverse Weather	14/02/2023	0:25 AM	19/02/2023	2:24 PM	28.947	0.186	3%	Ruatoria	Distribution lines
Adverse Weather	14/02/2023	6:31 AM	27/02/2023	2:03 PM	3.021	0.019	0%	Raupunga	Distribution lines
Adverse Weather	14/02/2023	6:31 AM	17/02/2023	10:05 AM	8.870	0.057	1%	Frasertown	Distribution lines
Adverse Weather	14/02/2023	0:19 AM	16/02/2023	5:30 PM	1.578	0.010	0%	Ngatapa	Distribution lines
Vegetation	14/02/2023	8:46 AM	14/02/2023	9:47 AM	0.158	0.001	0%	Bushmere	Distribution lines
					918.174	5.889			

Following the cyclone, we did not have access to the start of the Kanakanaia feeder (187 ICPs), and as this is a spur feeder, there was no alternative supply to those consumers. Limited access meant that the outages on this feeder were our longest, with most consumers restored on the 17th (two days after the outage began) and the remainder having supply restores on the 1st of March (thirteen days after the outage began). The situation was similar for consumers on the Te Arai feeder (234 ICPs) and spur feeder running through a valley with limited access for several days after the cyclone. We restored supply to these consumers on the 1st of March.

Table 11: Details of SAIDI Major event – 13 February 2023

Details of SAIDI Major event 13 February 2023									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
Vegetation	13/02/2023	5:25 PM	15/03/2023	5:15 PM	13.234	0.426	66%	Raupunga	Distribution lines
Adverse Weather	13/02/2023	8:55 PM	18/02/2023	5:50 PM	0.083	0.003	0%	Mahia	Distribution lines
Adverse Weather	15/02/2023	10:40 AM	15/02/2023	11:10 AM	0.006	0.000	0%	Brickworks	Distribution lines
Adverse Weather	15/02/2023	11:46 PM	17/02/2023	2:59 PM	6.580	0.212	33%	Lavenham	Distribution lines
Vegetation	13/02/2023	5:09 PM	15/02/2023	10:45 AM	0.006	0.000	0%	Rototahi	Distribution lines
					7.9681	**0.6104**			

We sustained multiple points of damage on our Raupunga feeder (421 ICPs) at the start of the feeder. Usually, we can feed these consumers from our interconnected Frasertown feeder (485 ICPs). However, the cyclonic winds that had caused multiple faults at the start of this feeder. Access issues made restoring the Frasertown feeder problematic, prolonging the outage for these consumers.

Table 12: Details of SAIDI Major event – 13 February 2023

Details of SAIDI Major event 13 February 2023									
Cause	Start		End		RAW SAIDI value	Normalised SAIDI value	Contribution	Location	Main equipment involved
	Date	Time	Date	Time					
3rd Party Interference	15/02/2023	11:12 PM	16/02/2023	3:09 PM	4.928	0.379	34%	Whangara	Distribution lines
Adverse Weather	13/02/2023	10:31 PM	16/02/2023	3:44 PM	6.410	0.493	45%	Mahia	Distribution lines
Vegetation	14/02/2023	2:48 AM	16/02/2023	5:42 PM	0.028	0.002	0%	Whangara	Distribution lines
Adverse Environment	16/02/2023	1:55 PM	20/02/2023	4:29 PM	2.989	0.230	21%	Morere	Distribution lines
					14.355	**1.105**			

6. Findings from our internal investigations

6.1 Overview

Clause 12.4(e) requires us to include in our unplanned interruptions reporting any investigations we have undertaken into our non-compliance with the unplanned SAIDI limits.

As discussed in Section 2, our investigation into the non-compliance determined four principal causes of our non-compliance in this assessment period.

> We have comprehensively investigated our non-compliance for the assessment period. The findings of those investigations is that had 2023 been a 'normal year' we would have been compliant.

1. An increase in the number and severity of extreme weather events.
2. An increase in the number of out-of-zone tree contacts.
3. An increase in vehicle damage to the network.
4. Due to the nature of the outages, there were fewer 24-hour periods where the Major Event threshold was triggered than might have been expected, given the extent of the extreme weather.

We discuss these factors below, including how our compliance assessment might have looked had we experienced a more "normal" year.

6.2 Overview of our investigation process

All the analyses presented in this Section exclude outages during Major Events.

The analysis presented below was sourced from the Excel Workbook "FLN Unplanned Reliability Assessment – RY2020 to RY2023 FINAL". The outage data in that workbook was sourced from four other unplanned assessed value workbooks.[20]

The unplanned assessed value workbooks calculated the Major Events per the DPP3 methodology. Under the DPP3 methodology, a Major Event occurs independent of individual outages; however, to analyse reliability excluding Major Events, each outage was assessed as to whether it happened during a Major Event period. An outage was recognised as part of a Major Event if the outage commenced during a Major Event period. Using this approach, we could analyse the contribution of outages to the post-Major Event assessed SAIDI or SAIFI value.

[20] "FLN Unplanned Assessed Values – RY2020", "FLN Unplanned Assessed Values – RY2021", "FLN Unplanned Assessed Values – RY2022", and "FLN Unplanned Assessed Values – RY2023".

The Major Event assessed SAIDI or SAIFI value excludes normalisation.

Our counterfactual analysis is based on a "normal" year. We defined that as the average of RY20 to RY22 (excluding Major Events applying to the DPP3 process). This average includes two years with relatively mild weather and one year when we experienced many extreme weather events.

We added a normalisation value to the Unplanned SAIDI excluding Major Events to determine the assessed Unplanned SAIDI value (in a 'normal' year). We calculated the normalisation as the difference between the Unplanned SAIDI excluding Major Events (per this outage-based analysis) and the Unplanned SAIDI assessed value used in the RY23 Annual Compliance Statement. Table 13 reconciles the Annual Compliance Statement and outage analysis.

Table 13: Reconciliation between the Annual Compliance Statement and Outage Analysis[21]

SAIDI Unplanned	SAIDI Minutes Annual Compliance Statement	SAIDI Minutes Outage Analysis	Difference
RAW SAIDI	1465.10	1465.10	-
Normalisation before adding Normalisation, less: SAIDI during Major Events	1190.71	1190.72	0.01
SAIDI, excluding Major Events	274.39	274.39	-
Normalisation	21.05	21.05	-
Unplanned SAIDI Assessed Value	**295.44**	**295.44**	**-**

We could have undertaken our analysis using RAW data (before removing Major Event SAIDI); however, this approach would not have enabled an evaluation of the impact on our compliance.

Table 14: Re-assessment of our compliance position for the assessment year[22]

SAIDI (Excl. Major events) Unplanned	RY23 Outage Analysis	Adjustment to a normal year	RY23 Normalised SAIDI
Adverse Environment	12.59	10.25	2.34
Adverse Weather	52.53	30.82	21.71
Cause Unknown	27.26	-	27.26
Defective Equipment	51.58	-	51.58
Human Error	7.80	-	7.80
Lightning	2.45	-	2.45
Third-Party Interference	28.40	12.87	15.53
Vegetation	75.80	37.18	38.61

21 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx, Tab: Overall.

22 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx, Tab: Overall.

SAIDI (Excl. Major events) Unplanned	RY23 Outage Analysis	Adjustment to a normal year	RY23 Normalised SAIDI
Wildlife	15.97		15.97
Unplanned SAIDI (Excl. Major Events)	274.39	91.13	183.26
Normalisation value	21.05		21.05
Unplanned SAIDI Assessment	295.44		204.31
SAIDI Cap	219.46		219.46
Compliance result	Non-compliant		Compliant

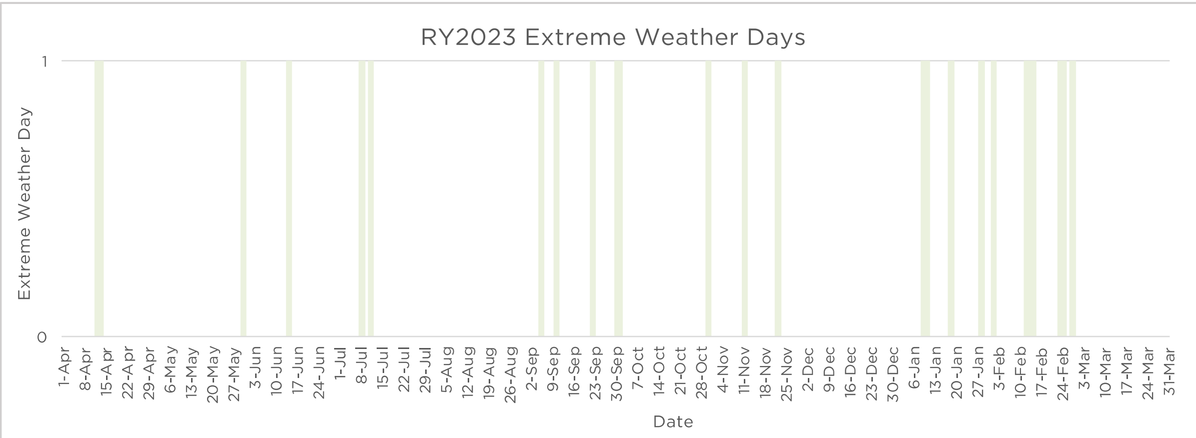
6.3 Increase in the number and severity of extreme weather events

This section shows how the number and severity of extreme weather days have increased in RY23.

6.3.1 The weather was materially worse during the assessment year

Figure 12 to Figure 15 shows the extreme weather days for recent years. Over the assessment period, we experienced 44 days of extreme weather, up from 34 days over the 2022 assessment period, 28 days over the 2021 assessment period, and 14 days over the 2020 assessment period.[23]

Figure 12: Assessment year Extreme Weather Days[24]



[23] Extreme Weather Days are days where either a Red and Orange warnings is issued that resulted in a rain or wind extreme weather event (i.e. excluding false alarm warnings). Source: MetService. Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx, Tab: Warning_Days_Data.

[24] Source: MetService. Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx

Figure 13: 2022 Assessment year Extreme Weather Days[25]

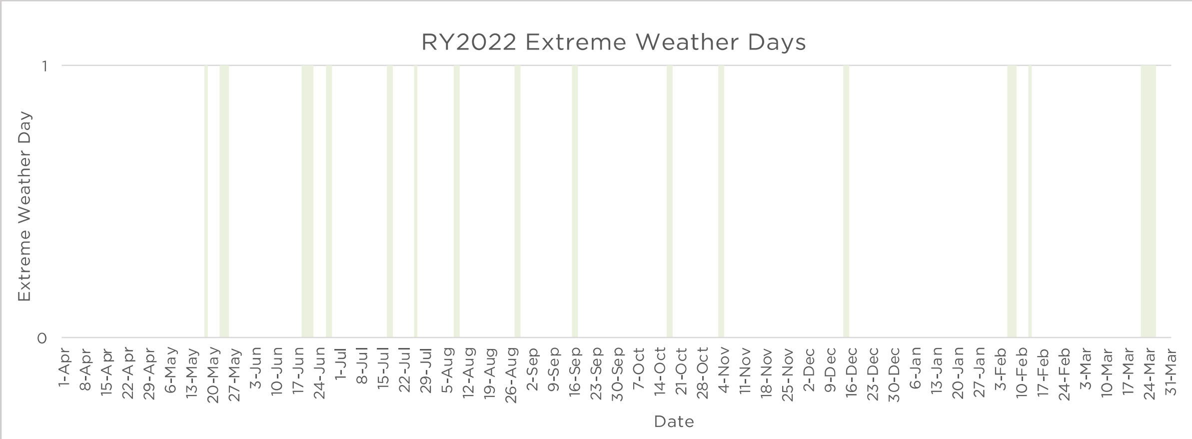


Figure 14: 2021 Assessment year Extreme Weather Days[26]

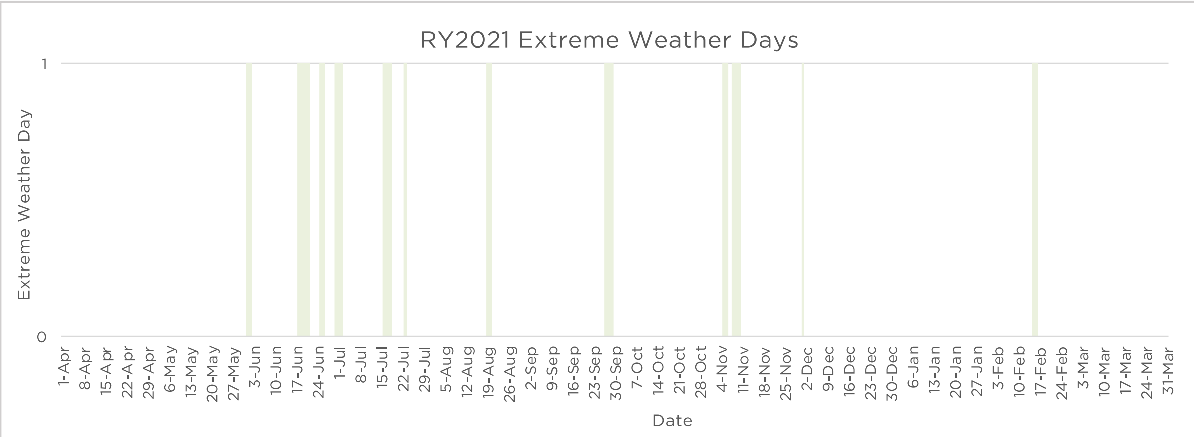
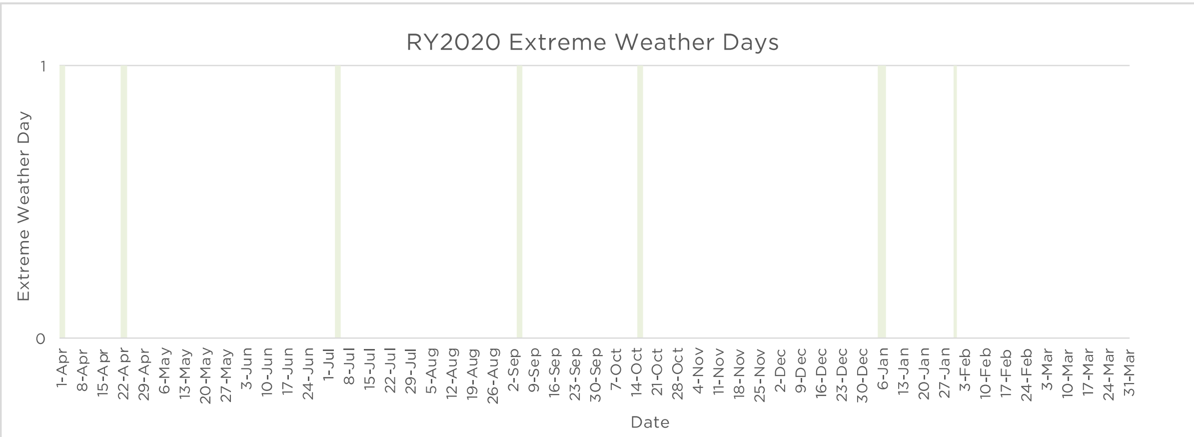


Figure 15: 2020 Assessment year Extreme Weather Days[27]



As shown in Table 15, rainfall increased materially in RY23 and was 50% higher than the average

25 Source: MetService. Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx

26 Source: MetService. Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx

27 Source: MetService. Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx

of the prior three years.[28]

Table 15: Daily Rainfall Data[29]

Sum of Daily Rainfall	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Rainfall (in mm)	979	1077	1668	1868	1242	626	+50%

6.3.2 Extreme weather, adverse environment and adverse weather impacts

The increase in extreme weather resulted in more adverse environment and adverse weather outages, with these outages lasting longer

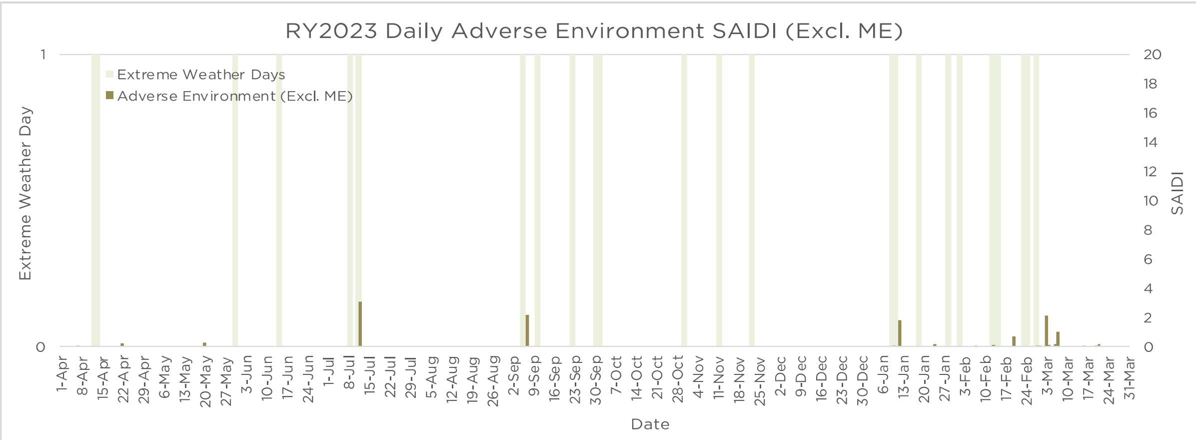
Table 16 shows the increase in Adverse Environment and Adverse Weather outages in RY23. Across both causes, there was a 134% increase in outages outside the Major Event periods.

Table 16: Change in Adverse Environment and Weather Outages[30]

Adverse Environment and Weather, number of outages (Excl. Major events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Adverse Environment	1	8	6	22	5	17	+340%
Adverse Weather	31	40	64	95	45	50	+111%
Total	**32**	**48**	**70**	**117**	**50**	**67**	**+134%**

As shown in Figure 16, there was a strong correlation between Extreme Weather Days and Adverse Environment and Adverse Weather outages. Hence, we believe the increase in outages was due to the rise in extreme weather days.

Figure 16: Adverse Environment SAIDI vs. Excluding Extreme Weather Days[31]



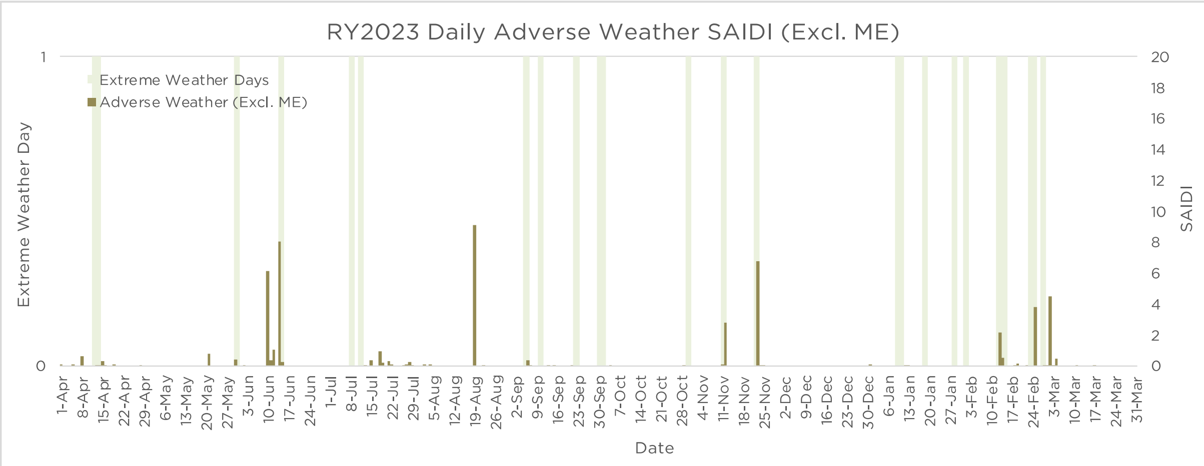
[28] Source: Metservice weather station data. Included in "FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx", Tab: Weather station data in Weather_Station_Data tab. Summary included in Daily_Weather Tab.

[29] Source: Metservice weather station data. Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Daily_Weather.

[30] Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: AW&AE.

[31] Source: MetService and Firstlight Analysis. Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx

Figure 17: Adverse Weather SAIDI vs. Excluding Extreme Weather Days[32]



Restoring the Adverse Environment and Weather outages took longer than previous years, as shown in Table 17.

Table 17: Adverse Environment and Adverse Weather CAIDI[33]

Adverse Environment and Weather, CAIDI (Excl. Major events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Adverse Environment	0	71	154	274	75	199	+265%
Adverse Weather	125	44	145	267	105	162	+154%
Total	**126**	**49**	**146**	**268**	**107**	**161**	**+151%**

We believe that the increase in outage time was due to access restrictions (due to damage to the roading network) and the extent of the destruction and time taken to affect repairs to the network.

The increased number of outages and longer duration causes a material increase in Adverse Environment and Adverse Weather SAIDI. As discussed above, the rise in SAIDI resulted from the material increase in extreme weather we experienced in RY23.

Table 18: Adverse Environment and Adverse Weather SAIDI[34]

Adverse Environment and Weather, SAIDI (Excl. Major events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Adverse Environment	0.1	5.4	1.5	12.6	2.3	10.3	+439%
Adverse Weather	19.9	14.4	30.8	52.5	21.7	30.8	+142%
Total	**20.0**	**19.8**	**32.3**	**65.1**	**24.0**	**41.1**	**+171%**

As shown in Figure 12 to Figure 17 above, we believe the weather conditions throughout the year were a key reason for the increase in Adverse Environment and Adverse Weather SAIDI, as

32 Source: MetService and Firstlight Analysis. Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx

33 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: AW&AE

34 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: AW&AE

shown in Table 18 above. We consider the weather conditions abnormal and have normalised them in our counterfactual assessment.

Had RY23 been a more "normal" year, we believe the post-Major Event Adverse Environment and Adverse Weather SAIDI would have been materially lower. Table 19 and Table 20 show our calculation of the SAIDI in a 'normal' year using the prior three-year average number of outages and the prior three-year average SAIDI per outage.

Table 19: Adverse Environment SAIDI Adjustment to a 'Normal Year'[35]

Adverse Environment SAIDI (Excl. Major Events) Adjustment to a Normal Year	Assessment Year
RY23 Adverse Environment SAIDI	12.59
Less: Normal Year SAIDI	2.34
Reduction in SAIDI if Normal Year	**10.25**

Table 20: Adverse Weather SAIDI Adjustment to a 'Normal Year'[36]

Adverse Weather SAIDI (Excl. Major Events) Adjustment to a Normal Year	Assessment Year
RY23 Adverse Weather SAIDI	52.53
Less: Normal Year SAIDI	21.71
Reduction in SAIDI if Normal Year	**30.82**

6.3.3 An increase in the number of out-of-zone tree contacts

Out-of-zone trees are outside the 'growth zone' prescribed by the Tree Regulations. Under the Tree Regulations EDBs only have the power to trim or remove trees within the growth zone.

During RY23, we experienced a 163% increase in out-of-zone tree contacts compared to the prior three years, as shown in Table 21.

Table 21: Number of Vegetation outages by outage type[37]

Vegetation type, Number of outages (Excl. Major Events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
In-zone tree	49	34	26	28	36	(8)	(23%)
Out-of-zone tree	11	30	23	56	21	35	+163%
In-zone plantation tree		6	6	9	6	3	+50%
Out-of-zone plantation tree		12	9	18	11	8	+71%
Vegetation other	7	1		6	4	2	+50%
Total	**67**	**83**	**64**	**117**	**71**	**46**	**+64%**

35 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: AW&AE

36 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: AW&AE

37 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Vegetation.

The increase in out-of-zone tree contacts was weather related. As shown in Figure 18 and Figure 19, many out-of-zone tree contacts also correlated with the high rainfall and wind.[38]

Figure 18: Out-of-zone tree contacts vs. Extreme Weather Days[39]

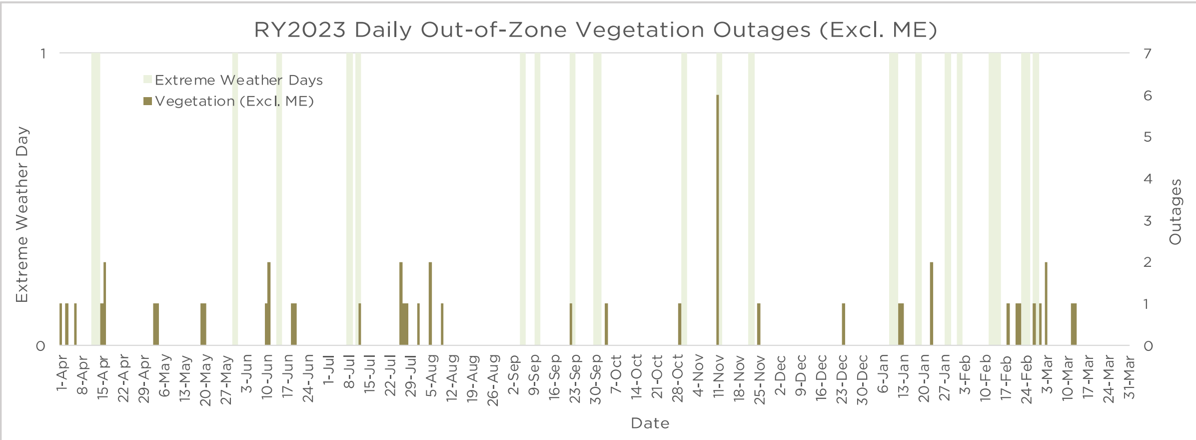
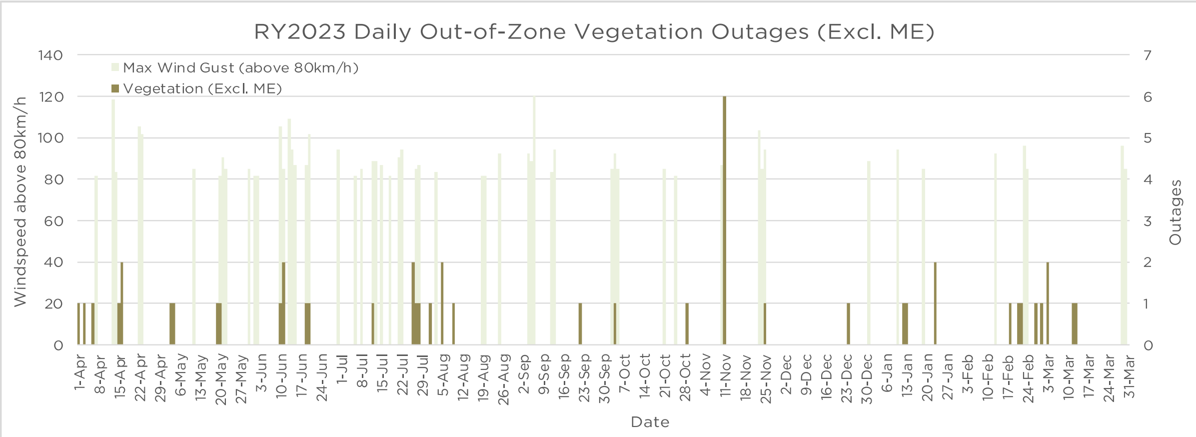


Figure 19: Out-of-zone tree contacts vs. high winds[40]



In addition, the SAIDI impact per out-of-zone tree outage was materially higher than in prior years, as shown in Table 22.

Table 22: Out-of-zone tree SAIDI per outage[41]

Vegetation type, SAIDI per outage (Excl. Major Events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Out-of-zone trees	0.7	0.6	0.4	0.9	0.6	0.3	+56%

The increase in SAIDI per outage was due to more customers being impacted, on average, per outage, as shown in Table 23. The significantly higher number of customers affected was caused by two outages on the 50kV coastal subtransmission line, which impacted 3,300 and 2,250 customers each. Excluding these two outages, the average number of customers impacted per outage falls to 122.

---

38 The TreeSafe guide states that large branch and tree fall can occur at wind speeds above 80 km/h.

39 Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx.

40 Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx.

41 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Vegetation.

Table 23: Out-of-zone tree average customers impacted per outage[42]

Vegetation type, Average Customers Impacted per Outage (Excluding Major Events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Out-of-zone trees	146	113	164	217	141	76	+54%

The increase in out-of-zone tree outages and the higher SAIDI per outage resulted in a materially higher out-of-zone tree SAIDI for RY23, as shown in Table 24.

Table 24: Out-of-zone tree SAIDI[43]

Vegetation type, SAIDI (Excluding Major Events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Out-of-zone trees	7.4	18.5	8.7	48.7	11.6	37.2	+322%

As shown in Figure 18 and Figure 19 above, we believe the weather conditions throughout the year were a key reason for the increase in out-of-zone tree outages. We consider the weather conditions abnormal and have normalised them in our counterfactual assessment.

Had RY23 been a more 'normal' year, we believe the post-Major Event Vegetation SAIDI would have been materially lower. Table 25 shows our calculation of the SAIDI in a 'normal' year for out-of-zone trees

Table 25: Normalisation of the assessment year out-of-zone SAIDI[44]

Out-of-zone tree SAIDI (Excl. Major Events)	Assessment Year
RY23 Out-of-zone tree SAIDI	48.7
Less: Normal Year SAIDI for an outage caused by out-of-zone trees	11.6
Reduction in SAIDI	**37.2**

6.3.4 An increase in the number of vehicle damage incidents

During RY23, we experienced an 55% increase in vehicle damage to the overhead network (i.e. cars vs. poles), as shown in Table 26.

[42] Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Vegetation.

[43] Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Vegetation.

[44] Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Vegetation.

Table 26: RY23 Third-party Damage by Type[45]

Third-party Damage Type, No. of Outages (Excl. Major events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Vehicle Damage	11	25	20	29	19	10	+55%
Overhead Contact	3			1	3	(2)	(67%)
Other	2	10	8	3	7	(4)	(55%)
Total	**16**	**35**	**28**	**33**	**26**	**7**	**+25%**

The exact reason for the rise in vehicle damage to the network is difficult to determine. We suspect that the increase in extreme weather events and the significantly higher rainfall contributed to the increase.

Figure 20: Vehicle Damage vs. Extreme Weather Days[46]

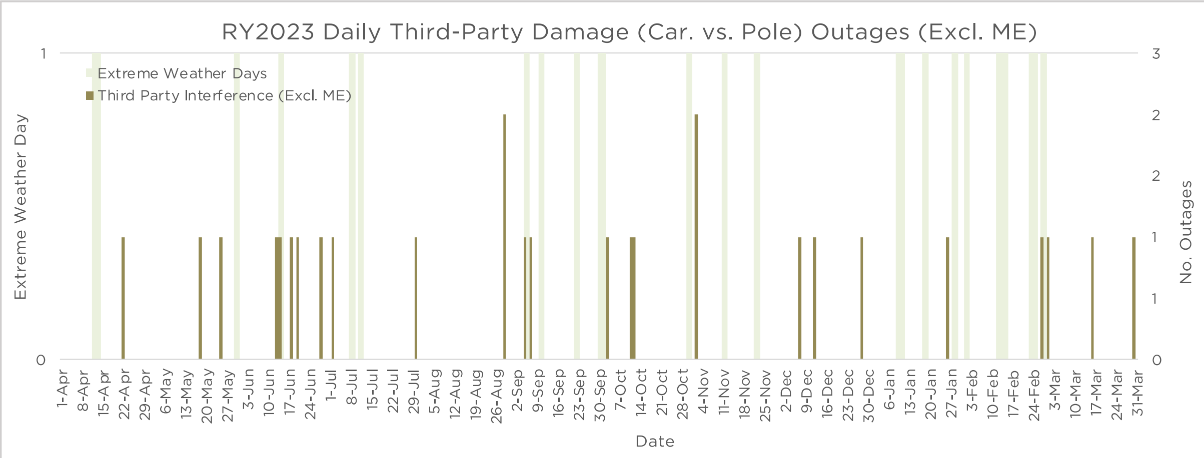
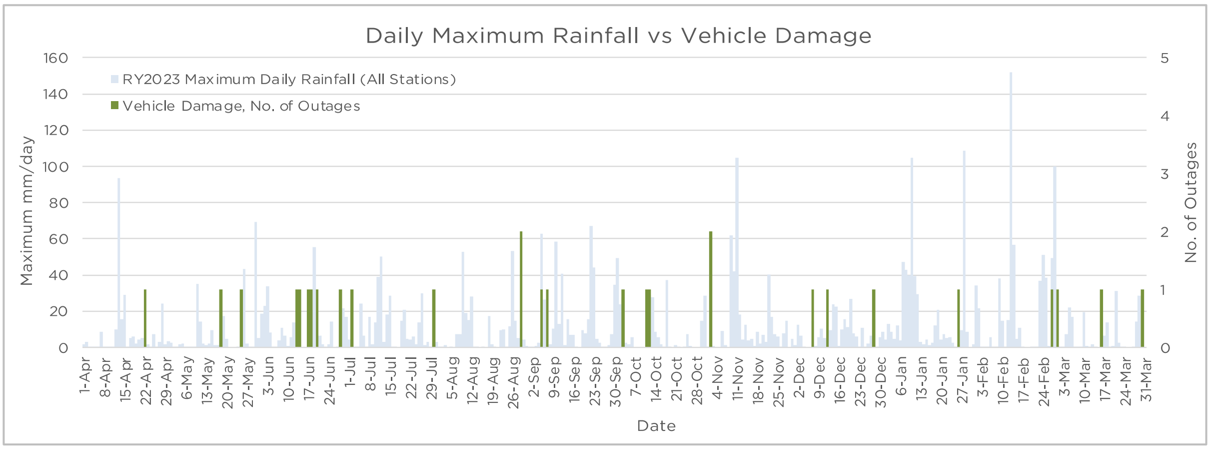


Figure 21: Vehicle Damage vs. Daily Rainfall[47]



As shown in Figure 20 above, we saw many vehicle damage incidents during extreme weather

45 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: TPD.

46 Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx.

47 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: TPD.

events. As shown in Figure 21 above, many vehicle incidents coincided with high rainfall and wind.

We also saw a 23% increase in the average SAIDI per vehicle damage incident, as shown in Table 27.

Table 27: Average SAIDI per Vehicle Damage Incident[48]

Third-Party Damage Type, SAIDI per outage (Excl. Major Events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Vehicle Damage	0.5	0.6	1.2	1.0	0.8	0.2	+23%

The increase in outages due to vehicle damage and the higher SAIDI per outage resulted in a materially higher vehicle damage SAIDI for RY23, as shown in Table 28.

Table 28: Vehicle Damage SAIDI

Third-Party Damage Type, SAIDI (Excl. Major Events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Vehicle Damage	5.9	15.7	23.8	28.0	15.1	12.9	+85%

As shown in Figure 20 and Figure 21 above, we believe the weather conditions throughout the year contributed to increased vehicle damage SAIDI. We consider the weather conditions abnormal and have normalised them in our counterfactual assessment.

Had RY23 been a more 'normal' year, the post-Major Event Vehicle Damage SAIDI would have been materially lower. Table 29 shows our calculation of the SAIDI in a 'normal' year for Vehicle Damage.

Table 29: Vehicle Damage SAIDI Normalisation[49]

Third-party Damage SAIDI (Excl. Major Events)	Assessment Year
RY23 Third-Party Damage SAIDI	28.0
Less: Normal Year SAIDI	15.1
Reduction in SAIDI	**12.9**

6.3.5 Due to the nature of the outages, there were fewer 24-hour periods where the Major Event threshold was triggered

RAW SAIDI was 1,465 minutes per customer, a 263% increase over RY22 (where we experienced several extreme weather events). However, the number of rolling 24-hour periods where the Major Event trigger was met was lower than in RY22. As shown in Figure 22, there were relatively few Major Events despite many Extreme Weather Days.

The clustering of outages did not trigger many Major Events, resulting in higher assessed Unplanned SAIDI. However, as indicated in Figure 23 and Figure 24, there were many days

[48] Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx.

[49] Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: TPD.

where significant SAIDI was incurred, with many of these being around Extreme Weather Days.

There were nine 24-hour periods where the Unplanned SAIDI Major Event trigger was met (compared to 11 days experienced in the 2022 assessment period.) Four of the 24-hour Major Event periods occurred during Cyclone Gabrielle (which accounted for only four extreme weather days), meaning there were only five 24-hour Major Event periods across the remaining 40 extreme weather days. This is far lower than expected due to how the outages were clustered.

Figure 22: Major Events vs. Extreme Weather Days[50]

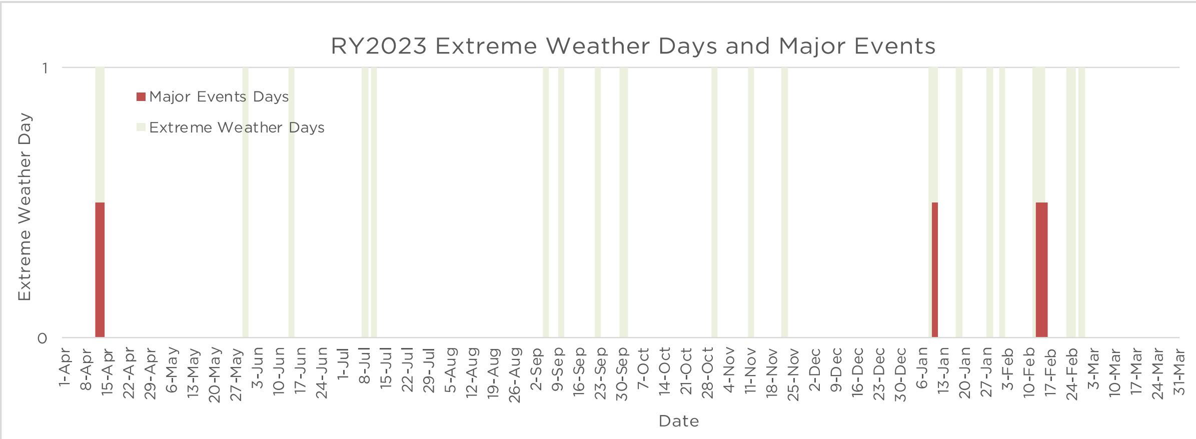
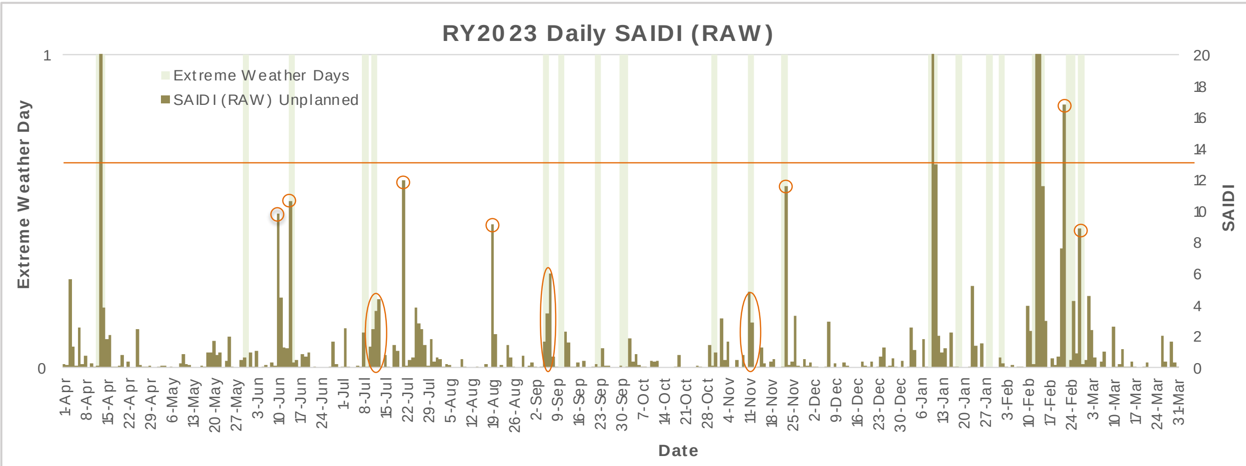


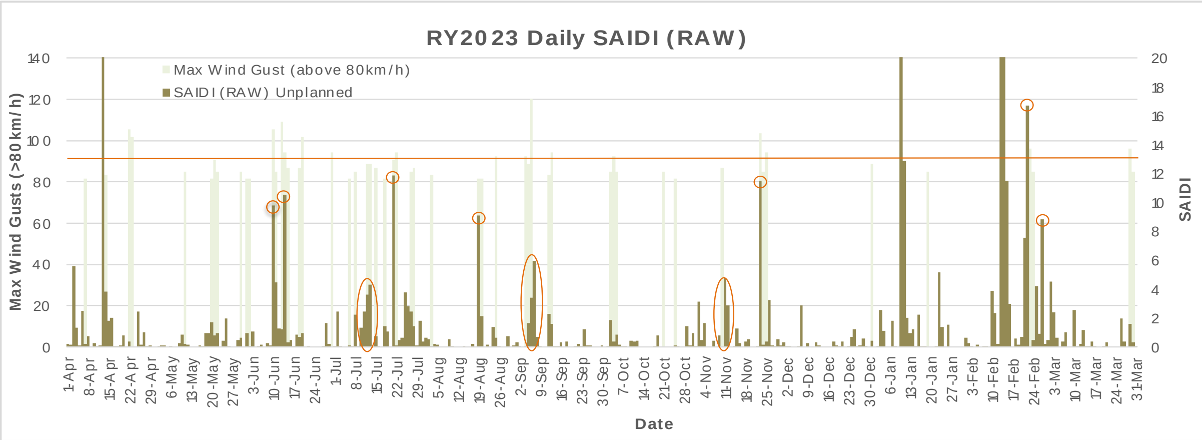
Figure 23: Raw Daily SAIDI vs. Extreme Weather Days[51]



50 Graph in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx.

51 The Daily SAIDI has been capped at 20 minutes. SAIDI was materially higher than 20 during the Major Event periods. The Graph has been capped to show the outages below 20 minutes per customer in more detail. On 22 February 2023, the SAIDI was above the boundary value; however, this is based on the dataset that allocates the outage SAIDI to the commencement date of the outage (not across ½ hour periods as used in the assessment model). The outages on 22 February spanned more than 24 hours and hence did not trigger a Major Event under the DPP3 methodology.

Figure 24: Raw Daily SAIDI vs. Wind Speed



7. Our network is in good condition

7.1 Overview

Clause 12.4(f) of the DPP Determination requires us to report on any analysis conducted during the assessment period or in any of the three preceding assessment periods, including:

(i) trends in asset condition;

(ii) the cause of the unplanned interruptions;

(iii) asset replacement and renewal; or

(iv) vegetation management;

Analysis of performance found that 94% of the outages and 83% of the SAIDI minutes were related to distribution lines (excluding LV).

This Section discusses our approach to asset condition monitoring, asset health assessment, and asset renewals. It presents the asset health and the level of renewals for relevant overhead asset classes, including an assessment of the causes of defective equipment outages.

Our analysis found that 94% of outages and 83% of SAIDI minutes (excluding Major Events) were related to distribution lines.[52] Accordingly, the focus of our investigations has been on overhead distribution asset classes.[53]

7.2 Our assets are in good condition

We consider that the assets are in good condition and are monitored and renewed appropriately. We do not believe that the condition of the assets contributed to the non-compliance. We believe this to be the case because:

- our approach to asset health assessment and renewal forecasting is appropriate and has improved since RY2020;
- the asset attribute, asset age, and asset condition data used in asset renewal forecasting is appropriate and is being continuously improved;
- we have generally been renewing assets at a faster rate than forecast;
- we accelerated wood pole renewals in response to the changing asset health of that fleet;
- expenditure on asset renewals has generally been above that forecast;

[52] 94% of all outages were also related to distribution lines. FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Overall.

[53] Noting that overhead structures includes subtransmission, distribution and low voltage assets.

- the historical and current health of the assets is appropriate and is generally better than the industry average; and
- the number of outages for asset types has generally improved, and where there has been some deterioration, this was weather related.

We discuss each of these areas below.

7.2.1 Our approach to asset health assessment is appropriate

Before RY21, we forecasted asset renewals based on age data and selected specific renewal projects based on an engineering assessment of condition and test data. Commencing in RY21, we started transitioning our asset renewal forecasting and introduced an asset health-based approach that utilises asset condition data and the DNO common network asset indices methodology.[54] We made this change consistent with how asset health assessment techniques were evolving, driven by the view that the historical age-based approach was not adequately improving the performance of the asset fleets.[55]

In RY21, we adopted the DNO common network asset indices methodology ("DNO Methodology") to determine asset health. The DNO Methodology is a common framework of definitions, principles and calculation methodologies for assessing and forecasting asset health and risk. All distribution network operators in Great Britain have adopted the DNO Methodology, and many EDBs in New Zealand are also now adopting the standard. There are limitations with the DNO Methodology in that it does not cover all the asset classes used in the Information Disclosure Schedule 12a reporting. We use age-based renewal forecasting based on the EEA AHI guidelines for the asset classes not covered by the DNO Methodology.[56] EDBs in New Zealand commonly use the EEA AHI guidelines.

7.2.2 Our approach to asset renewal forecasting has been improving and is appropriate

Before RY21, we forecast asset renewals considering the asset age profile targeting a steady-state renewal rate based on historical levels. We adjusted the renewal rate based on observed changes in the population of H1 and H2 assets within the particular asset fleet. This strategy maintained the current level of asset health over time.[57] This approach was appropriate while the asset fleet age was generally below the onset of unreliability (OOU), and this was the general case with the FLN fleet before RY21.[58]

In the 2021 AMP, we outlined the revised approach to asset renewal forecast (where there was a specific asset renewal strategy for each asset class). The revised process was generally to (a) renew all H1 assets present over the forecast period and (b) ensure that H2 assets are replaced before they deteriorate to H1.[59]

We adopted a run-to-fail approach for some asset fleets where a failure's reliability and environmental consequences are low (for example, small pole-mounted transformers). However, these assets are replaced earlier if condition issues are identified through the inspection or

---

54 2021 AMP, Section 11.3.1

55 2021 AMP, Section 11.3.1

56 2021 AMP, Section 11.3.2

57 2019 AMP, Section 5.1.3.5 and 5.14

58 The OOU is the age when end-of-life drivers start to become more apparent and when failure risks start to increase

59 2021 AMP, Section 11.5.2 (pole fleet), Section 11.7.2 (conductor fleet)

defect process.[60]

For other assets, where it is challenging to assess condition accurately, we adopt an age and risk-based approach (i.e. pole mounted switches and fuses). In this case, fleet renewals are primarily based on asset-type risks and age-based health.[61]

We believe that the approaches we have adopted are generally consistent with the industry in New Zealand.

7.2.3 The asset attribute, asset age, and asset condition data used in asset renewal forecasting are appropriate and are being continuously improved

Asset attribute, age, and condition data support our asset health assessment. A combination of asset attribute, age, and condition data establishes the asset's health. During RY20, we reviewed the quality of our asset data and revised (upwards) the data accuracy scores for some asset classes based on the results of field surveys. These surveys found that data accuracy was significantly higher than previously disclosed.[62]

The Commerce Commission defines data accuracy between 1 – 4[63] . As we were assessing the accuracy of the data using field surveys, we interpreted the Commerce Commission's definitions to mean:

- Accuracy of greater than 99.5% is required to score 4 (being errors of no greater than 5/1,000);
- Accuracy of greater than 95%, but less than 99.5%, is required to score 3 (being errors of no greater than 5/100);
- Accuracy of greater than 75%, but less than 95%, is required to score 2;
- Accuracy of less than 75% scores 1.

Our approach results in generally lower data accuracy scores than the Commission's methodology. The Commission's methodology does not quantify the extent of poor-quality data. For example, an accuracy score of 3 in the Commission's methodology means—

> "data is available for all assets but includes a level of estimation where there is understood to be some poor quality data for some of the assets within the category."

That is, the score is not quantified. Based on these criteria, an accuracy score of 3 could be applied to all asset classes in Table 30, Table 31 and Table 32. We consider our approach provides a more meaningful measure.

The following tables summarise the improvements in data quality we have made over the last five years. Our field auditing (during RY20) indicates that the data accuracy for age and health is generally between 75% and 95%, with higher accuracy for data where date information is available on the assets. The field auditing also indicated that the types of errors were not material.

---

60 2021 AMP, Section 11.11.3 (pole mounted transformers)

61 2021 AMP, Section 11.15.5 (pole mounted switches and fuses)

62 Eastland Network's asset management committee memorandum, "Data Quality Review, Verification and Remediation", August 2010

63 Electricity Distribution Information Disclosure Determination 2022, Schedule 16, Definitions of terms used in Schedules 1 to 15.

Table 30: Schedule 9a asset attribute data quality[64]

Asset class	Data Accuracy Score				
	RY19	RY20	RY21	RY22	RY23
Concrete poles	1	3	3	3	3
Wood poles	1	3	3	3	3
Distribution OH Open Wire Conductor	1	1	1	1	1
3.3/6.6/11/22kV Switches and fuses (pole mounted)	1	2	2	2	2
Pole mounted transformers	1	2	2	2	2
3.3/6.6/11/22kV CB (pole mounted) – reclosers and sectionalisers	1	2	2	2	2

Table 31: Schedule 9b asset age data quality[65]

Asset class	Data Accuracy Score				
	RY19	RY20	RY21	RY22	RY23
Concrete poles	1	2	2	2	2
Wood poles	1	2	2	2	2
Distribution OH Open Wire Conductor	1	1	1	1	1
3.3/6.6/11/22kV Switches and fuses (pole mounted)	1	1	2	2	2
Pole mounted transformers	1	2	2	2	2
3.3/6.6/11/22kV CB (pole mounted) – reclosers and sectionalisers	1	2	2	2	2

Table 32: Schedule 12a asset health data quality[66]

Asset class	Data Accuracy Score				
	RY19	RY20	RY21	RY22	RY23
Concrete poles	1	1	2	2	3
Wood poles	1	1	2	2	2
Distribution OH Open Wire Conductor[67]	1	1	1	1	1
3.3/6.6/11/22kV Switches and fuses (pole mounted)	1	1	1	2	2

[64] Information Disclosure Schedule 9a.

[65] Information Disclosure Schedule 9b.

[66] Asset Management Plan Schedule 12a.

[67] This relates to the inspection of conductor, joints and jumpers in association with pole inspections.

Asset class	Data Accuracy Score				
	RY19	RY20	RY21	RY22	RY23
Pole mounted transformers	1	1	2	2	2
3.3/6.6/11/22kV CB (pole mounted) – reclosers and sectionalisers	1	1	2	2	2

The audit observation concerning wood poles was that "the checks indicate that visual pole condition is commensurate with the pole age."

In relation to switches and fuses, pole mounted transformers, and reclosers, we believe the attribute and age data accuracy is likely to be scored at a 3 or 4. However, we have not yet completed audits of the data to validate increase the data accuracy.

Concerning asset health data accuracy, where we use age data as the primary determinant of asset health, we set the health data accuracy at or below the age data accuracy. Where we use extensive condition inputs to determine asset health, the extent of recent inspections drives the asset health data accuracy.

With the adoption of the DNO Methodology, we revised our inspection standards to ensure we captured the condition data necessary to drive the health assessment. In response to this new approach, beginning in RY20, we fast-tracked some asset inspections to populate the condition data in the asset health model. The target set in the 2021 AMP was to capture condition information using the new DNO methodology by 2024 (or earlier).

Table 33 summarises the availability of asset condition information that can be used for asset health assessment.

Table 33: Current percentage of asset condition data in asset health assessment[68]

Asset class	% assets inspected since the commencement of RY20
Concrete poles	52%
Wood poles	52%
Distribution OH Open Wire Conductor	52%
3.3/6.6/11/22kV Switches and fuses (pole mounted)	58%
Pole mounted transformer	56%
3.3/6.6/11/22kV CB (pole mounted) – reclosers and seconalisers	77%

7.2.4 We have generally been renewing assets at a faster rate than forecast

In Figure 25 to Figure 30, we compare our forecast renewal activity[69] against our actual renewal

[68] Calculated from the number of inspections recorded in our ODK field data capture system.

[69] The forecast renewal activity was obtained from Schedule 12a and is the percentage of asset forecast to be renewed over the next five-year divided by five. This yield an average annual renewal rate.

activity[70] between RY20 and RY23. The charts indicate that other than RY20, we have generally renewed assets at or above the target rate for key overhead asset fleets.

Figure 25: Concrete pole renewals

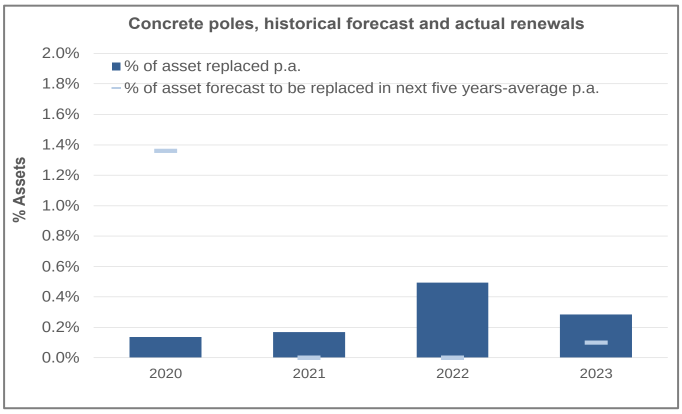


Figure 26: Wood pole renewals[71]

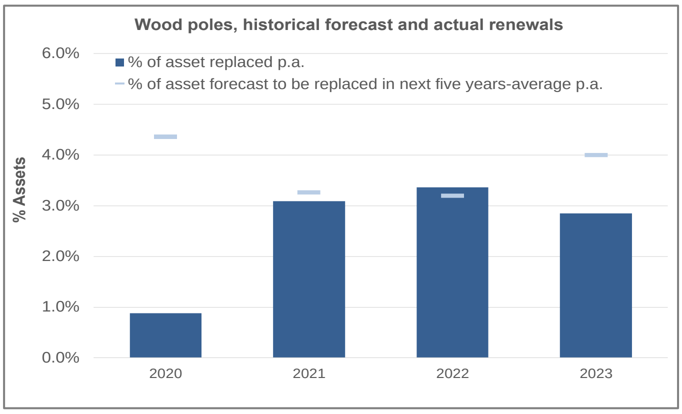


Figure 27: Distributor conductor renewals

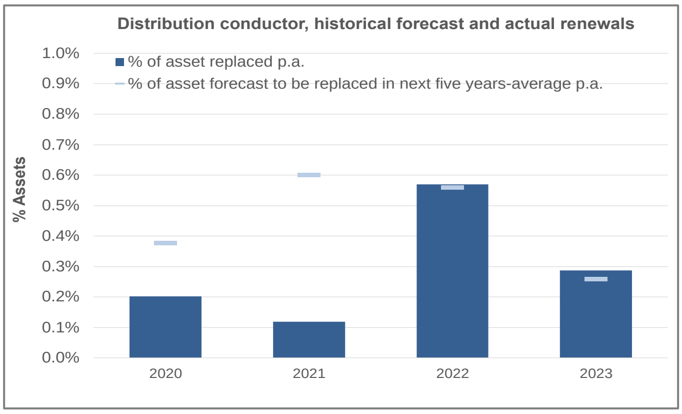


Figure 28: Distribution pole switches and fuse renewals

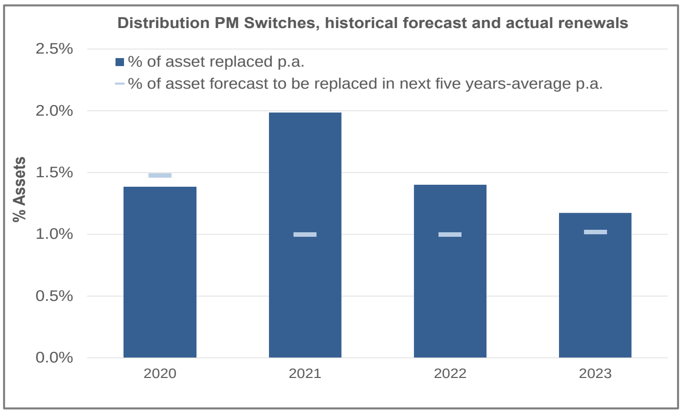


Figure 29: Pole mount transformers renewals

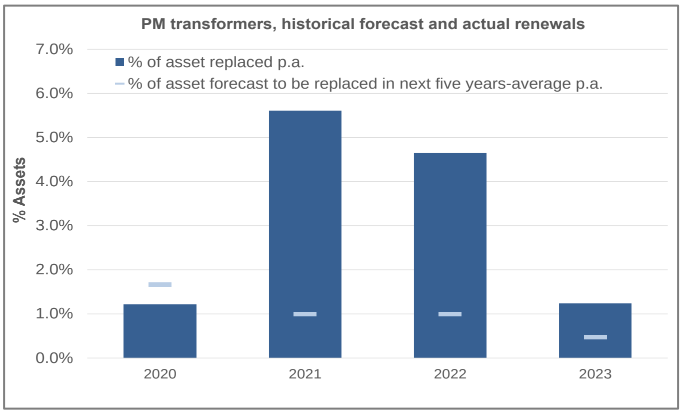
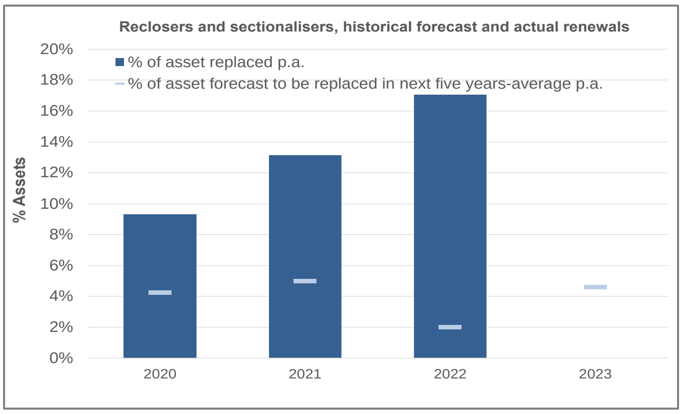


Figure 30: Reclosers and sectionalisers renewals



The higher renewal rate for reclosers and sectionalisers reflects the implemented automation

70 The actual renewal rate was calculated from the number of assets removed from the network divided by the number of assets on the network at the start of the year. The number of assets removed could be no greater than the number of assets installed that year. This data was obtained from Schedule 9b. We reviewed the age profile changes, which indicated that the removed assets were older than OOU or MPL, indicating asset renewals.

71 Graph in FLN Asset Health Renewal Analysis RY2020 to RY2023 FINAL.xlsx. Source: Information Disclosure Schedules 9b and Asset Management Schedule 12a.

strategy.[72]

The failure to meet the target renewals in RY20 relates to a data-set timing issue between the forecast renewal and actual replacements.[73] In RY20, Firstlight overspent the distribution and LV lines asset renewal category ($4,113k vs. planned of $3,985k), and the reason noted in the disclosure was "the overspend is related to additional 11kV pole replacements in Gisborne and Wairoa".[74] The difference between the expenditure and actual assets renewed in a particular year relates to the time taken to as-built the work in GIS, which can sometimes be after the end of the financial year to which the expenditure relates.

Wood pole renewal has been a focus for us, and since the start of RY20, we have replaced 1791 poles or 10% of the fleet. During RY21 and RY22, we replaced 550 and 590 wood poles, respectively. Pole replacement was reduced to 490 in RY23 due to the impact of the extreme weather events on our planned work programme (as resources were diverted onto fault repair and restoration efforts).

It is worth noting that the renewal of assets includes planned and unplanned work. Assets identified in poor condition outside the renewal planning process are replaced through our defects process. The defects process minimises the risk that poor-condition assets remain on the network.

7.2.5 We accelerated wood pole renewals in response to changing asset health of the fleet

In our 2021 AMP, we forecasted 2,930 poles to replace between RY22 and RY26. This forecast reflected the expected transition of H3 poles to H2 and uncertainty about the data quality (where we suspect the actual H1 and H2 poles level was higher than reported). As we progressed our fast-track line inspection programme during RY22, we observed a higher proportion of H1 wood poles (while the overall incident of H1 + H2 did not change materially).

In the 2022 AMP, we continued to forecast 2,930 poles reaching condition grade H1 and H2 over the five years (ending RY27). However, given the increase in observed H1 poles, and the expectation that we will identify additional poor health poles, we accelerated the replacement of H1 poles to replace all H1 poles 'as soon as practicable via our pole replacement program. The acceleration was in line with our asset fleet strategy. The accelerated replacement program effectively brought forward 530 wood pole replacements for RY23 and RY24.

In the 2022 AMP, we continued to forecast the replacement of all H1 and H2 poles over the next five years, and we increased the budget to reflect the current costs for replacement. The program's additional cost in RY23 and RY24 was $4.4 million (compared to the 2021 AMP) and

---

72 Refer 2020 AMP s4.4 (automation strategy), 2021 AMP s10.7.1, 2020, 2021 and 2022 IDs Schedule 6a(vi). Much of the automation strategy required the replacement of older reclosers and sectionalisers.

73 The forecast renewal rate obtained from Schedule 12a referenced regulatory years (2020 means the forecast renewal for the regulatory year-end 31 March 2020). The actual assets replaced was obtained from the age profile in Schedule 9b where the age profile data referenced calendar years (assets qualities in 2020 means the assets installed in the calendar year-ending 31 December 2020). This age profile dataset was also produced soon after the calendar year ended so did not include the financial end-of-year as-builting process. What this means is that there is a lag in the assets removed data. That is, the assets removed in 2020 includes only the processing of assets removed for the 12 months to 31 December 2019. Hence, the low number of removals recognised in RY2020 is due to it only including assets removed in the 12 months to 31 December 2019, and it reflects the lower number of removals in RY2019. This data timing issue effectively "washes through" over time.

74 Forecast distribution and LV lines asset renewal expenditure was obtained from 2019 AMP schedule 11a(iv). Actual distribution and LV lines asset renewal expenditure was obtained from 2020 ID schedule 6a(iv). The commentary was obtained from 2020 ID schedule 14 Box 11.

was in addition to our regulatory capex allowance.[75]

7.2.6 Expenditure on asset renewals has generally been above the forecast

Figure 31 and Figure 32 illustrate that our total spending on asset replacement and renewal capex, and distribution and LV lines asset replacement and renewal capex has been above forecast across RY20 to RY22. For RY23, our expenditure was well above the forecast due to the additional asset replacements due to the storm response and recovery work.[76]

Figure 31: Forecast vs. Actual Total Asset Replacement and Renewal Capex[77]

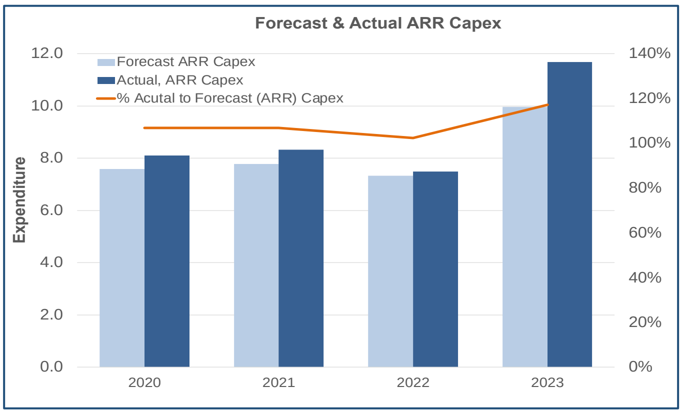
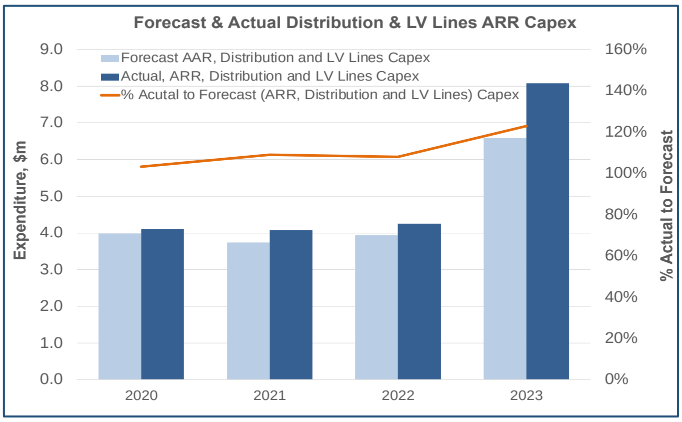


Figure 32: Forecast vs. Actual Distribution and LV Lines, Asset Replacement and Renewal Capex[78]



7.2.7 The historical and current health of the assets is appropriate and is generally better than the industry average

Figure 33 to Figure 38 show the changes in the health of key overhead asset classes. The data indicates that asset health (concerning H1 and H2) has improved across all asset classes. A combination of the adoption of the DNO Methodology and the capture and use of asset condition data in the asset health assessment has driven changes to the assessed asset health.

The changes in the health of the wood pole fleet reflect the adoption of the DNO methodology and the improvement in data quality as asset inspections were completed. Our pole inspections commenced in areas considered to be in poorer condition, which is the reason for the increase in H1 and H2 assets between RY21 and RY23.

As can also be observed, the current (RY23) health of our concrete poles, wood pole and distribution conductor assets is materially better than that of the industry (concerning the % of H1 and H2 assets).

The health of our pole-mounted transformers, switches and fuses, and reclosers lags that of the industry. The health of these assets is primarily driven by asset ages, which we believe explains the difference. The number of outages for these assets does not indicate that the performance of these asset classes is deteriorating. Except for fuses, the number of outages attributable to these asset classes was lower in RY23 compared to the prior three years (refer to Table 34).

75 2022 AMP, Section 7.2.

76 The higher expenditure incurred in RY23 has not yet translated into higher numbers of assets replaced in Figure 25 to Figure 30. This is due to ID Schedule 9b being prepared soon after the end of the 2022 calendar year so it does not yet include the as-builts of assets installed between 1 January 2023 and 31 March 2023.

77 Graph in FLN Renewal Capex Analysis - RY2020 to RY2023 FINAL.xlsx. Source: Information Disclosure Schedule 6a(iv) and Asset Management Schedule 11a(iv).

78 Supra n77.

Figure 33: Concrete pole asset health

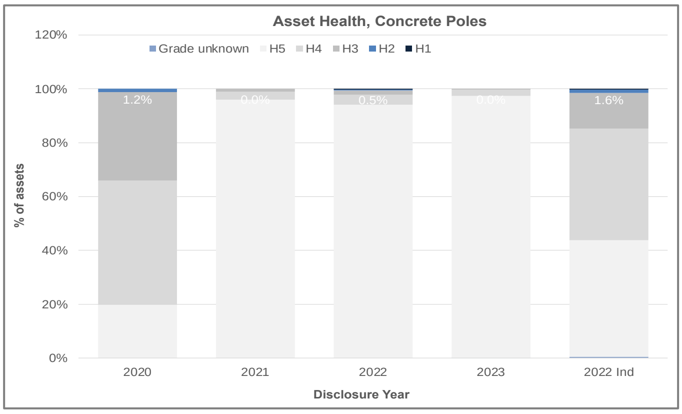


Figure 34: Wood pole asset health

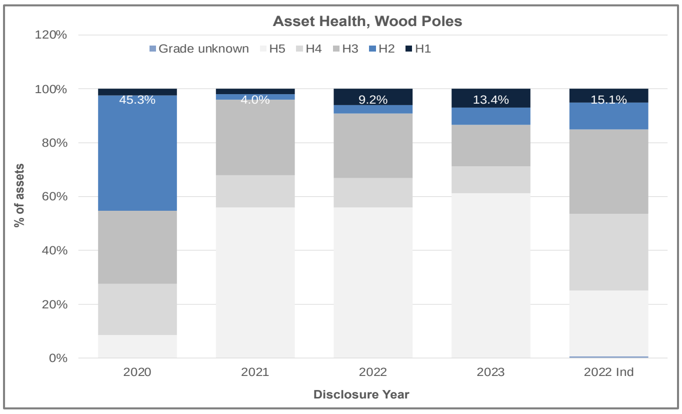


Figure 35: Distribution conductor asset health

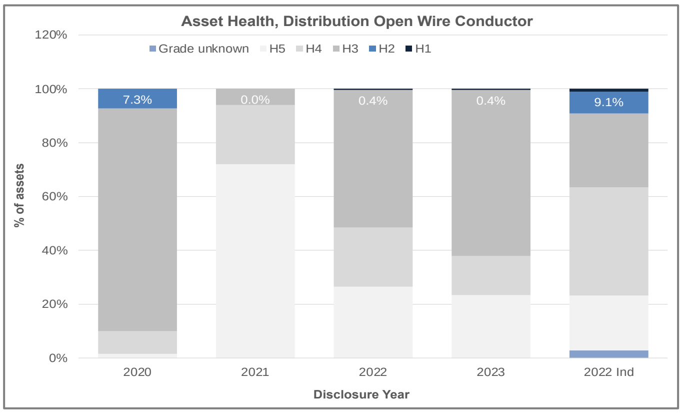


Figure 36: Distribution pole-mounted switches and fuse asset health

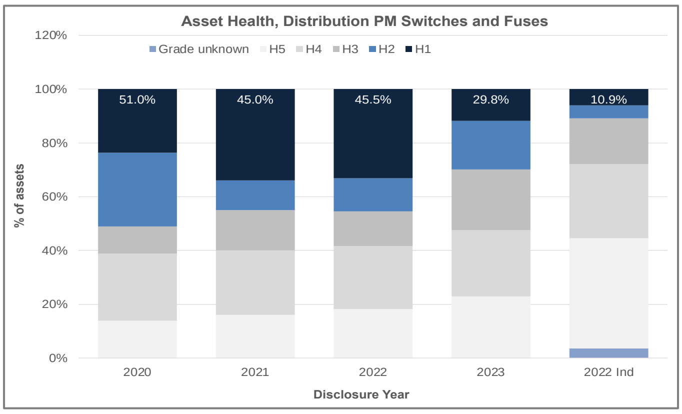


Figure 37: Pole mount asset health[79]

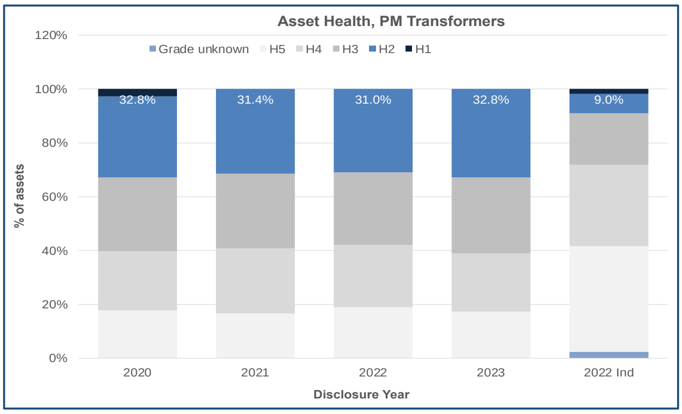
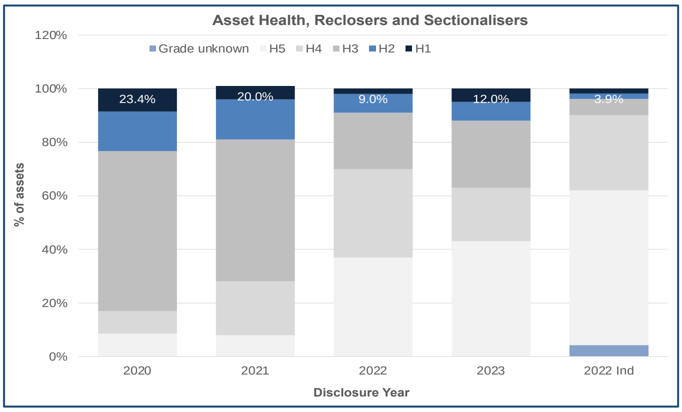


Figure 38: Reclosers and sectionalisers asset health



7.2.8 Outages by asset types have generally improved, with deterioration being attributable to weather

The number of outages for underlying asset types has generally improved, and where there has been some deterioration, this was weather related. Table 34 shows the defective equipment outages (excluding Major Events) by asset type. Overall there was a reduction in defective

79 Graph in FLN Asset Health Renewal Analysis RY2020 to RY2023 FINAL.xlsx. Source: Asset Management Plan Schedule 12a. "2022 Ind" is a RAB weighted average for all EDBs using the 2022 schedule 12a.

equipment outages (excluding Major Events) compared to the prior three years.[80]

Table 34: Defective Equipment by Asset Type[81]

Defective Equipment Type, No. of outages (Excl. Major Events)	RY20	RY21	RY22	RY23	Prior Average	Increase	% Change
Zone substation equipment	1	3	6		3	(3)	(100%)
Pole mounted switchgear		8	3	1	6	(5)	(82%)
Airbreak switches (ABS)	13	3		1	8	(7)	(88%)
Softwood poles		3	3		3	(3)	(100%)
Hardwood poles	13	6	15	13	11	2	+15%
Conductor - binding		3	3	5	3	2	+67%
Conductor – joint and jumper	27	12	10	7	16	(9)	(57%)
Conductor - termination	2	10	7	2	6	(4)	(68%)
Conductor	18	17	29	18	21	(3)	(16%)
Crossarm	5	6	13	12	8	4	+50%
Insulator	5	6	3	11	5	6	+120%
Pole-mounted transformer	12	14	15	13	14	(1)	(5%)
Fuse	7	11	8	15	9	6	+73%
Cable	10	2	6	9	6	3	+50%
Cable - joint	1		1	1	1	0	0%
Cable termination	4	1	6	5	4	1	+36%
Ground-mounted transformer	1	3	4		3	(3)	(100%)
Defective equipment other			5	4	5	(1)	(20%)
Switchgear	1			1	1	0	0%
Other	2				2	(2)	(100%)
Total	**122**	**108**	**138**	**118**	**123**	**(5)**	**(4%)**

For most asset types, the number of outages was reduced, except for hardwood poles, conductor–binding, cross-arms, insulators, fuses, cable and cable terminations. As shown in Table 35, the increase in the number of outages for these asset types was primarily weather-

80 Equipment failures during extreme weather should be categorised as adverse weather. However, sometimes this did not occur, so we excluded defective equipment outages that occurred during Major Events. Defective equipment outages that occurred during Extreme Weather Days (many of which were not Major Events) are included below unless indicated otherwise.

81 Data in FLN Unplanned Reliability Analysis - RY2020 to RY2023 FINAL.xlsx. Tab: Defects.

related—that is, the increase in the number of outages occurred during Extreme Weather Days (that were not Major Events) or occurred on the spillover day (being the day after the Extreme Weather Day). It is generally recognised that the weather event most likely caused a defective equipment outage on the day following the weather event.

Table 35: Defective Equipment by Asset Type, occurring on Extreme Weather of Spillover Days[82]

Defective Equipment Type, No. of outages (Excl. Major Events)	RY23	RY23 Extreme Weather or Spillover Days	RY23 Excluding Extreme Weather or Sillover Days	Prior Average	Increase
Hardwood poles	13	2	11	11	0
Conductor - binding	5	2	3	3	0
Crossarm	12	3	9	8	+1
Insulator	11	4	7	5	+2
Fuse	15	4	11	9	+2
Cable	9	3	6	6	0
Cable termination	5	1	4	4	0

After accounting for Extreme Weather and spillover days, there is no material deterioration in the number of outages for hardwood poles, conductor-binding, cables, and cable terminations–binding. There was a minor increase for cross-arms (1 more), insulators (2 more), and fuses (2 more). Given the material increase in rainfall over the entire RY23, it is probably unsurprising that we saw an increase in faults on insulators and fuses, as these can be impacted by wet weather.

82 Extreme Weather Days were: 12/04/22 to 14/04/22, 30/05/22 to 01/06/22, 14/06/22 to 15/06/22. 08/07/22 to 09/07/22, 11/07/22 to 12/07/22, 05/09/22 to 06/09/22, 10/09/22 to 11/09/22, 22/09/22 to 23/09/22, 30/09/22 to 02/10/22, 11/11/22 to 12/11/22, 11/11/22 to 12/11/22, 22/11/22 to 23/11/22, 09/01/23 to 11/01/23, 18/01/23 to 19/01/23, 28/01/23 to 29/01/23, 01/02/23 to 02/02/23, 12/02/23 to 15/02/23, 23/02/23 to 25/02/23, 27/02/23 to 28/02/23. Spillover day was 1 day after each of the Extreme Weather Days.

8. Intended reviews, analysis, and further investigations

8.1 Overview

Clause 12.4(g) requires us to provide an outline of any intended reviews, intended analysis, or intended investigation that would meet the categories specified in clause 12.4(c)-(f) that were planned but not yet completed.

Our investigations into the events during the assessment period are ongoing.

8.2 We have completed our reviews, analyses and investigations

We do not intend to conduct further reviews, analyses or investigations than those we conducted. Our reviews, analysis and investigations have been completed, and the results are discussed in sections 2 to 7 of this Unplanned Interruptions Report.

9. Director certification

9.1 Overview

Clause 12.4(h) requires a certificate in the form set out in Schedule 10, signed by at least one Director of Firstlight Network. Below we have provided the director certification in the form prescribed by the DPP Determination and signed by two directors of Firstlight Network.

Our Unplanned Investigation report has been certified by two directors of Firstlight Network

9.2 Director certification unplanned interruption reporting

We **Mark Adrian Ratcliffe** and **Fiona Ann Oliver**, being directors of Firstlight Network, certify that, having made all reasonable enquiry, to the best of our knowledge and belief, the attached unplanned interruptions reporting of Firstlight Networks, and related information, prepared for the purposes of the *Electricity Distribution Services Default Price-Quality Path Determination 2020* has been prepared in accordance with all relevant requirements.

Director: ....
Mark Adrian Ratcliffe
25 August 2023

Director: ....
Fiona Ann Oliver
25 August 2023

Appendices

Appendix A—Response to the Cyclone Recovery Taskforce—Cyclone Gabrielle

Functional area	Assessment area	In the days prior	Days 1 & 2	Days 2-7	Day 7-14	Day 14+
Control structure	Brief description of key activities	Planning meeting with the management team to review cyclone tracking, resource placement and plan. The planning meeting occurred on the Friday before, and a second meeting on the Sunday afternoon.	Manage initial fault calls a small number to start with, but these numbers increased as it worked its way down the coast. It escalated on day two to have the control room take the fault log from the call centre and manage the resource dispatch as per the Firstlight network plan.	Control being operated 24/7. The duty controller was sleeping on-site due to not being able to receive alarms via phone due to no comms via phone or internet. Day control was being supported by admin staff undertaking the recording of switching. Controller issuing all instructions. Control room supported by management team re decision making, planning and call management. Still, all internal controls are in place.	The control room no longer required to be slept in, and all comms were back. Only daytime control. The other duty controller was back to help out. Gave controllers rotating breaks of 2 days each.	Back to almost normal operations, faults back to being logged via call centre, fault contractor managing alongside Network management the staff allocation
	Any constraint?[83]	No constraints at this time	Comms were out via email and phone. All communication with field staff and the control room was via Firstlight Network's internal RT system.	One duty controller was away in Auckland at the time storm hit. I was out for one week.	Comms are still a bit patchy. All controllers are back.	No issues are other than still several ongoing faults to manage.
	How was the constraint mitigated?	N/A	RT was used for all comms. Communication with Transpower was via Team talk at this stage.	Other controllers stepped up, admin support helped during the day, and controllers slept on-site.	Still using RT comms.	N/A
	If not, what improvement is planned?		All Network comms worked 100% of the time. Maybe require additional fuel at radio repeater sites for the installed backup generators.	Work on controller numbers. Has been an ongoing piece of work that still needs to be resolved.		
Network control (controllers, system, communication network)	Brief description of key activities	All backup generators at our comms sites were refuelled, and extra fuel was placed at the comms huts in preparation for the storm.	• The key issue was the internet being down. The mapping system works on a cloud platform, so there is no access to the system. Controllers back and using old mapping system, mimic and schematics. Please network mimic on	• Continuing to focus on restoring power to areas where road access was available. We used helicopters to access locations and fly in men and equipment without road access.	All systems work normally; the internet is still a bit hit-and-miss but has no constraints.	All systems were restored to business as usual.

83 The suggested focus is: communication, resources, access, procedures, IT.

Functional area	Assessment area	In the days prior	Days 1 & 2	Days 2-7	Day 7-14	Day 14+
			the wall with the transformer numbers used in the first hours without internet. • The old mapping system was still accessible and was quickly established to ensure more detailed information could be provided to the in-field staff regarding locations of faults.	• Continued to manage workforce through the control room and workflow working. • Focus on built-up and high customer number locations for restoration.		
	Any constraint?	None at the planning for the event stage	Internet connection was an issue with cloud-based platforms, no backup access. These are new systems, so they have not been tested with no connection.	Internet was still patchy, but as we worked through days 4 and 5, a Starlink was installed to provide access to mapping systems. These were the only control room systems that were impacted. Phone comms were still patchy also, but RT managed well over this time. The phone system is a network-owned and operated system independent of anyone else.	The workload was still high; resting staff was key at this point.	
	How was the constraint mitigated?	N/A	Old systems are relieved by internal resources.		The HSE team undertook fatigue management tracking, and ongoing work planning was used to ensure the controllers were rested.	
	If not, what improvement is planned?					
Intelligence (gathering information on damage) and planning (for repairs)	Brief description of key activities	• Fault staff were sent up the coast to base themselves at Tikitiki, often cut off from the south during these events. They included a fault man, a line truck and 2 x tree cutters. They were there to help manage any issues at the North of the Network, plus they can move down the coast if required. • Network was participating with local civil defence at this stage as they had already stood up their emergency management team due to having only just finished from cyclone Hale.	• No internet or phone calls were received, so we were only aware of faults when tripped in the control room. RT was being used by the fault team up north as they were the only ones who could get around as flooding had blocked everyone in Gisborne. • That crew took some time to get information back because they did not know the phones were not working.	• Access started to improve via road access, and although there was major damage to bridges and roads, crews started to get out and make repairs. • The weather cleared, so we put the helicopter up with a lineman on board to patrol, assess faults and, where possible, undertake field switching. • The network staff member was tasked with road access reviews. I was sent to areas where we had known issues and was asked to travel the road until there was no more access. Road status was then called back to the control room via RT radio. Plan to send repair crews then made.	• Access started to improve via road access, and although there was major damage to bridges and roads, crews started to get out and make repairs. • The weather remained clear, so we put a helicopter up with a lineman on board to patrol, assess faults, and, where possible, undertake in-field switching. • A network staff member was tasked with road access reviews. I was sent to areas where we had known issues and was asked to travel the road until there was no more access. Road status was then called back to the control	• All major access routes are open. Coast access only to Tolaga Bay, then travel inland on the back road to get North of Tolaga Bay with an additional road to get North of Toko. • Resource came down from the top of the coast via Opotiki to make repairs north of Toko. • Helicopter use has dropped off, but they still have to use it to fly materials, and in a couple of cases, crews were flown home to reduce the travel via back country roads.

Functional area	Assessment area	In the days prior	Days 1 & 2	Days 2-7	Day 7-14	Day 14+
				• The network representative attended Civil defence IMT meetings thrice daily to gather intelligence and provide information on roading and lifelines regarding areas of concern and planned restoration times and worked to help make certain isolated consumers had been accessed by CD staff. Any intelligence Network had gone to CD in both Wairoa and Gisborne. • Repairs are well underway to areas where access is allowed.	room via RT radio. Plan to send repair crews then made. • The network representative attended Civil defence IMT meetings thrice daily to gather intelligence and provide information on roading and lifelines regarding areas of concern and planned restoration times and worked to help make certain isolated consumers had been accessed by CD staff. Any intelligence Network had gone to CD in both Wairoa and Gisborne. • Repairs are well underway to areas where access is allowed. • Customer numbers are reducing to smaller areas, with a few areas still on generators.	
	Any constraint?	None at this stage; all staff were rested and ready to go. These plans were implemented on a Friday, three days before the storm.	• Could not get out of Gisborne or Tolaga Bay where fault staff were. Staff in Tokomaru Bay were also restricted to where they could go. • No clear information was coming in due to the roading crews being unable to get o the roads to outline issues.	Road access is still very impacted. Seventeen bridges are either gone or damaged to a point where no access can be achieved. Fault crews crossing rivers on small boats to repair power.	Road access is still very impacted. Seventeen bridges are either gone or damaged to a point where no access can be achieved.	Roads.
	How was the constraint mitigated?	N/A	• Several feeders were turned off due to not knowing exactly where or what the faults were. Until we could get someone on-site, the safest way was to drop the feeders. • Supply to Tairawhtii and Wairoa was also lost at this time from Transpower, so very hard to determine where any faults were until we had power. • Cost supply was run from network generators for fault finding, so limited consumers were connected.	• Accessed everywhere we could. Knowledge of back-country access was used. • A helicopter was used extensively to access remote, isolated areas with men and equipment.	• Accessed everywhere we could. Knowledge of back-country access was used. • A helicopter was used extensively to access remote, isolated areas with men and equipment.	• Having to use back country roads to access the coastal areas. The road to the south of Gisborne is accessible; however, the southern area can not be accessed due to a bridge on state highway 2 gone at Putarino.
	If not, what improvement is planned?		We need an alternative comms process with Transpower systems control to restore comms lost. We had to restore Transpower's power via our Hawkes Bay			

Functional area	Assessment area	In the days prior	Days 1 & 2	Days 2-7	Day 7-14	Day 14+
			call centre. A call centre has our RT, so the controller called the call centre on RT; the call centre spoke to systems control on the phone (they still had phones) and then gave instructions back to the Network controller.			
Resources to effect repair and/or alternative like generation (people, equipment, materials)	Brief description of key activities	• Staff were moved forward up the coast, as mentioned above. • All generators were refuelled to ensure they were ready for use. Firstlight has five 1mw diesel generators in the Network to provide network support where we lose sub-transmission or transmission supply. They are located in the following areas. Te Araroa, Ruatoria, Tolaga Bay, Puha, and Mahia. • In addition, our five mobile generators were ready to go. One is located in Wairoa, and the other four are Gisborne based. • A review of stores was also undertaken to ensure there were enough poles and hardware in the region.	• The Network generation sets were all operational during this period. They had fuel to last the first couple of days. We did have no access to them from Gisborne at this stage, but remote operating was working fine. • No other resource or material in the first two days was used due to no access and understanding of the issue.	• Fuel was an issue only due to access. We could get to Tolaga Bay but had to send anything North from Opotiki. A fuel truck was sent via Gisborne in a convoy to get fuel North. • The Mahia Generator was stopped one night due to low fuel, and we could not get to Mahia from Gisborne with our fuel tanker. • The trainer generators were not dispatched to locations until the very end of this period. • A mobile generator was sent from Whakatane to provide power to Te Puia, including the hospital. Fuel went with it from that area.	• We sent a 300kva truck-mounted generator into Tauwhareparae, which had 54 customers completely cut off. A very small window allowed us to get up a back road and install and restore power to these customers. • Generators were installed where we could support customers, mostly our main generators. The rest of the areas were cut off via road to get to them. • Materials were coming into the region as we needed them, and there were no issues with the amount. • Softwood pole stocks got down, but not to a level we could not work; we did 2-second hand poles for one private job. • Two crews from Scanpower come into the region to help with Wairoa restoration. They were here for seven days. • Also, four crew from Horizon Energy worked in the North with our Network crew to help restore consumers.	• No issues with materials or fuel. • Still some access issues in some areas, but it was not an issue.
	Any constraint?	There were no constraints.	Towards the end of day two, we were getting close to fuel issues.		Road access to get generators in place along with fuel.	
	How was the constraint mitigated?				• We used two trailer tankers to cart fuel around to fill up generators. • A tanker from Gisborne travelled around the top of the coast to refuel the main generators.	Continued to work with local roading authority to determine where and when roads would be open. Still, several main routes were blocked or not accessible.
	If not, what improvement is planned?				We have ensured additional fuel distribution ability within the Network by purchasing a second fuel trailer.	

Functional area	Assessment area	In the days prior	Days 1 & 2	Days 2-7	Day 7-14	Day 14+
Communication with customers and stakeholders	Brief description of key activities	While we were planning for the distribution of staff, looking at our plans, we were also posting via social media for the region to prepare. We work closely with other community organisations to push out these messages.	When we lost the internet and phones, we lost all ability for people to call in faults. As noted above, our systems identified areas with faults in them. When we lost supply to the region, we worked with Civil defence to update them on our restoration times and limitations. We had no way to push out via social media the messaging, but CD was doing what it could. We had RT coverage for our staff and contractors, so we communicated very well internally via these means. Major consumers turned up to the office, and we were able to work with them to make sure they knew when they were coming back on. The interruption was mainly due to the Transpower outage, as the storm did not impact the main consumers in the City. Meets with Affco managers in Wairoa were also undertaken by Wairoa staff.	Started visiting the local radio station every morning and gave an update on the areas we had off, what our plans were to restore and the issues we were facing. It also allowed us to let people know even if they had not seen us, we were heading their way and aware of the areas without power. Internet comms came back via Starlink, and fibre was restored. Fault notifications started coming back in because of the internet. We could kick off updates via social media regarding outages, restoration times, etc.	Radio updates continued. Also, internet/social media. Some one-on-one communications were undertaken for consumers in the Wairoa region to update them on their status.	Some one-on-one communications were undertaken for consumers in the Tairawhiti region to update them on their status.
	Any constraint?	None	No coverage with internet or phone. Sat phone we had access to did not work. Also lost the team talk link with Transpower system control.	Coms were still an issue.	None	None
	How was the constraint mitigated?			Using local radio, civil defence networks, and staff on the ground spread the message of what we were doing.		
	If not, what improvement is planned?		Now have Starlink in place.			