

Feeder Reliability Investment Case

Business case: Reliability Program – CNR1, CNR2 & CNR3

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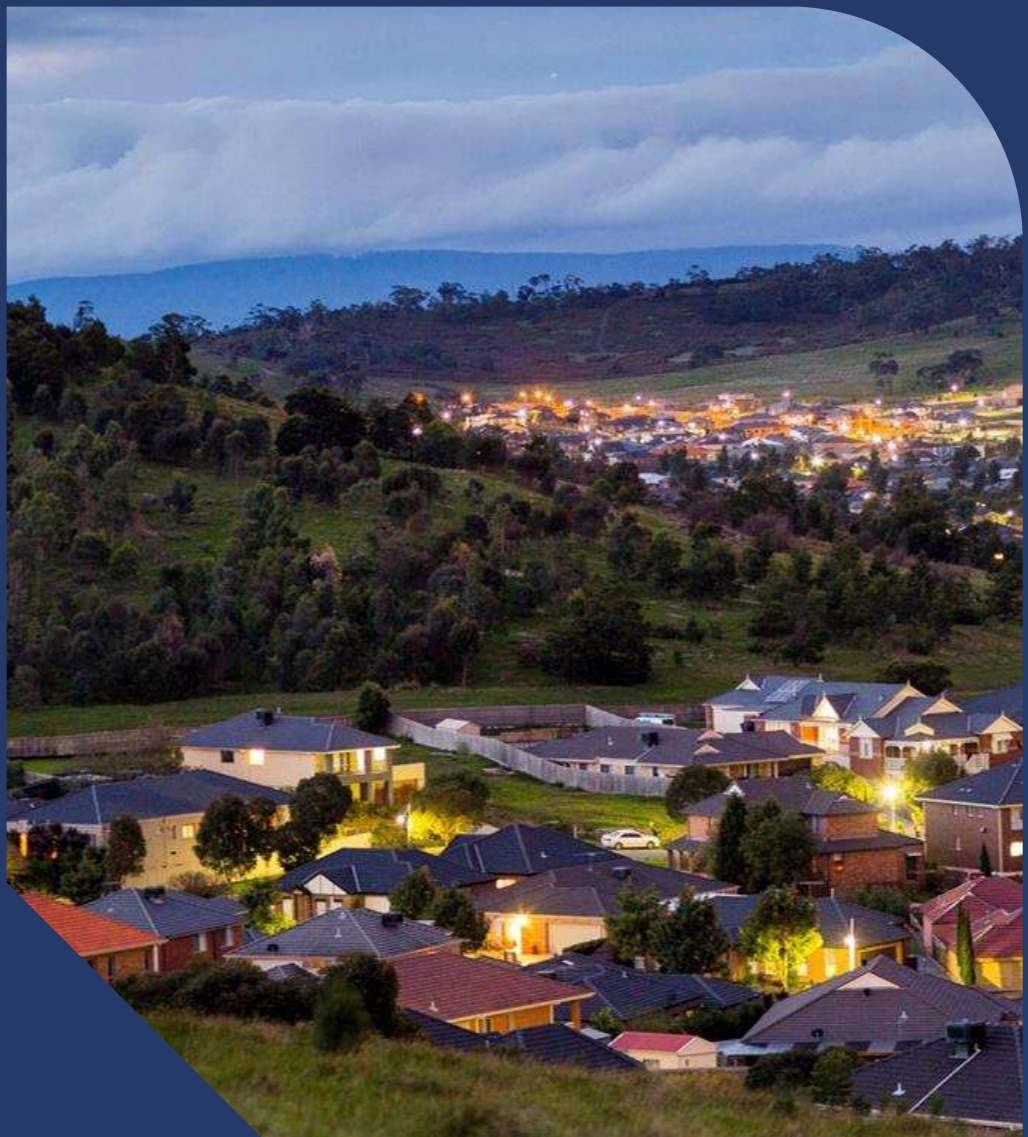


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1. Introduction

1.1. Background

The document outlines a business case for intervention investments as they relate to improving the reliability and resilience of Cann River distribution feeders CNR1, CNR2 and CNR3.

This business case outlines the following processes:

- **Analysed data to forecast risk:** Utilising historical network reliability and asset data to outline the current exposure risk associated with the investigated feeder.
- **Assessed various options:** Analysing potential investment factoring in cost and benefit and comparing them against the status-quo / do-nothing options.
- **Identified the preferred option:** Costs and benefits from above were converted into cashflow streams to allow the Net Present Value (NPV) to be calculated. We have selected the preferred option based on the option that is able to deliver the highest NPV of all the options assessed, across all sensitivity scenarios.
- The three feeders at Cann River have been combined in this analysis due to their shared reliability impacts from the sub-transmission feeder (explored further below). Where relevant, the reliability of these feeders are combined.

1.2. Feeder Summary

The following table gives a summary into each feeder:

Table 1: Feeder Summary

Feeder Name		CNR1	CNR2	CNR3
Feeder Type		Short Rural	Short Rural	Short Rural
Feeder Zone Substation		Cann River	Cann River	Cann River
Length of Line	OH	9.04kms (81.7%)	143.15kms (98.9%)	85.63kms (99.8%)
Length of Line	UG	2.03kms (18.3%)	1.61kms (1.1%)	0.14kms (0.002%)
	TOTAL	11.07kms	144.76kms	85.77kms
Number of Customers		147	1,256	51
Number of Life Support Customers		4	36	2
Number of Switches	Auto Reclosers 22kV		3	1
	Auto Reclosers 12.7kV			
	Fuse Saver			
	Manual Gas Switches	6		9
	Auto Gas Sectionalisers (% sectionalisers automated)	0 (0%)	4 (100%)	0 (0%)
Tie points	Feeder Tie		1	1
	Zonesub Tie			1

1.3. Feeder Reliability Summary

1.3.1. Feeder Topography Summary

The topography of the CNR feeders is shown in Appendix 4.2. The Cann River Zone Substation is supplied via a 162km radial 66kV BDL-NLA-CNR subtransmission line that crosses state forest off eastern Victoria. While the CNR zone substation is in the locality of Cann River, over 70% of its connected customers are in Mallacoota, which is a locality 80km+ further to the east through CNR3 feeder. Almost 60% of the annual average customer minutes off supply (CMOS) at CNR were due to faults on the BDL-NLA-CNR subtransmission line. The predominant cause is related to weather and vegetation.

1.3.2. Feeder Performance Summary

Below graphs illustrate the significant impact of NLA-CNR 66kV subtransmission faults on the reliability of CNR as represented in value of unserved energy (VOUSE) and customer minutes off supply (CMOS).

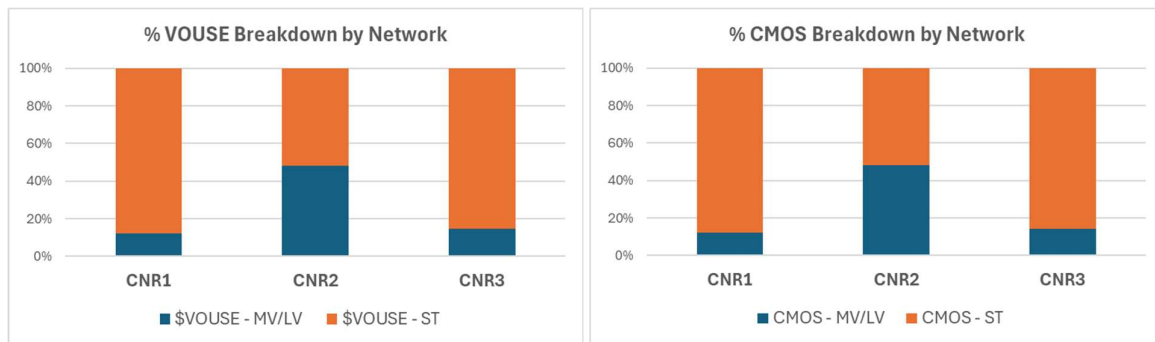
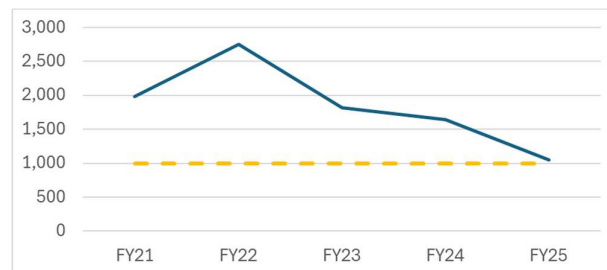


Figure 1 – VOUSE and CMOS Breakdown

Figure 1 above indicate the significant contribution of the BDL-NLA-CNR subtransmission faults to the overall reliability of the Cann River feeders.

The following graphs show a rolling 12-month reliability summary for both frequency (SAIFI) and duration (SAIDI) of normalised unplanned sustained outages for all three CNR feeders combined. This performance is compared against a performance threshold¹.

Combined Feeders SAIDI



Combined Feeders SAIFI

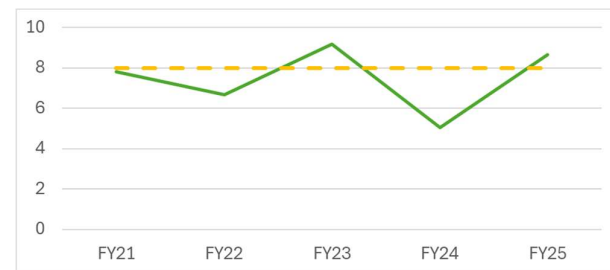


Figure 2 – Duration and Frequency performance over the past 5 periods.

As it can be seen from the above SAIDI graph that overall trend is improving. Feeders have been performing well against SAIFI in recent years. Given that both CNR1 and CNR3 feeders are relatively small, and that their reliability can be significantly improved by addressing subtransmission faults, these two feeders were excluded in the development of improvement options. Appendix 4.5 contains the graphical feeder level breakdowns.

¹ As there are currently no published individual feeder thresholds for Victoria, the published NSW thresholds have been used for Short Rural, Urban and Long Rural Metrics.

1.3.3. Cause Summary

Table 2 compares average historical sustained performance against the last 12 months for all CNR feeders combined.

Table 2: Cause type summary

Cause Type	Quantity			Feeder CMOS			Average Contribution per event (Av CMOS / Av No Incidents)
	Avg p.a. (FY20-25)	Last 12 months	% of average	Avg p.a. (FY20-25)	Last 12 months	% of average	
Animal	3.8	5.0	132%	154,281	88,985	58%	40,600
Asset failure	3.2	4.0	125%	36,809	102,782	279%	11,503
Other	3.2	1.0	31%	27,286	112,457	412%	8,527
Overload	0.6	0.0	0%	17,373	0	0%	28,955
Third party	0.4	1.0	250%	7,643	494	6%	19,108
Vegetation	8.4	8.0	95%	1,546,133	575,225	37%	184,063
Weather	3.4	9.0	265%	278,100	604,695	217%	81,794
Unknown	4.2	5.0	119%	620,411	46,169	7%	147,717
Total	27.8	34.0	122%	2,690,026	1,530,835	57%	96,764

As it can be seen from the above table, the CNR zone sub experiences an average of 28 sustained interruptions per year, with an average contribution of 2.7 million customer minutes. The predominate causes of incidents on this feeder are:

- **Vegetation:**
 - attributing 58% of total CMOS and 30% of the incidents.
 - About 60% of vegetation CMOS were due to bark on lines, or 65% of CNR vegetation faults were caused by bark followed by tree fall-in at 24%.
- **Adverse weather:**
 - contributing 10% of the CMOS and 12% of total incidents.
 - About 19% of weather-related CMOS were due to lightning, or 60% of weather-related faults were caused by lightning.
- **Unknown:**
 - contributes 23% of the CMOS.
 - it is believed that this can largely attributed to combination of possum, bird and vegetation. Analysis of unknown faults by time of occurrence show consistent patterns with confirmed animal/bird faults. Others were recorded during elevated wind speeds, which may have caused barks to go airborne and contacted live overhead assets.

Additionally, the variability of the performance of this feeder is due to weather and vegetation related impacts, as it can be seen in regulatory years FY16 and FY25.

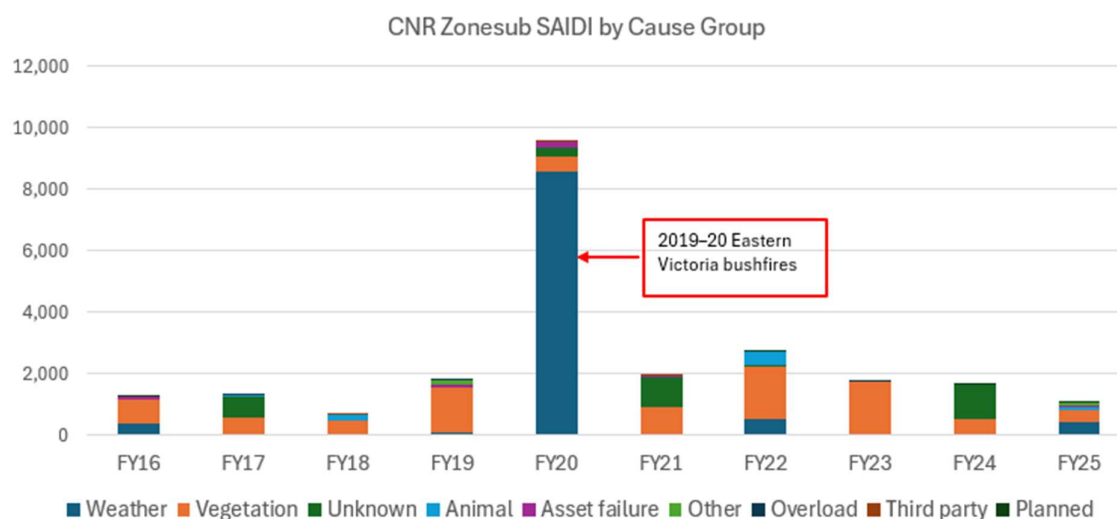


Figure 3 – Feeder performance due to cause

1.3.4. Major Event Day Summary

The following gives a break down on the number and size of the major event days over the last five regulatory years which have impacted this feeder.

Table 2 – Recorded Major Event Days

Date	Major Event Day Cause	Number of Customers Interrupted	Total CMOS	Average customer outage duration mins (CMOS / No of Customers Interrupted)
27-Aug-20	Storm	1,298	1,053,831	812
29-Oct-21	Storm	1,369	1,265,434	924
13-Feb-24	Storm	1,402	1,558,390	1,112
Total		4,069	3,877,655	953

As it can be seen from the above table, these feeders are affected occasionally by major storm events, averaging 0.6 events per year, where on average 1,356 customers are affected each MED event with customers experiencing a 16-hr outage each instance.

2. Investment Analysis

2.1. Current Planned Investments

There are no recent and planned reliability improvement investments on these feeders.

2.2. No Proactive Interventions

With no proactive intervention, the business as usual (BAU) reliability risk costs are detailed in Table 3 and Table 4 the reliability risk costs are calculated using the Values of Customer Reliability (VCR) and an average of Customer Minutes of Interruption (CMOS) per annum across 5 years of historical interruptions.

Table 3: Summary of risk by cause type

Cause Types	Avg CMOS p.a. (between FY20 & FY25)	Reliability risk cost p.a. (between FY20 & FY25)
Animal	154,281	\$ 68,152
Asset failure	36,809	\$ 15,846
Other	27,286	\$ 11,744
Overload	17,373	\$ 7,402
Planned	1,990	\$ 970
Third party	7,643	\$ 4,007
Vegetation	1,546,133	\$ 685,382
Weather	278,100	\$ 130,184
Unknown	620,411	\$ 269,809
Total	2,690,026	\$ 1,193,495

Table 4: BAU risk cost summary

	Total risk cost p.a.	PV20 of baseline risk
BAU reliability risk cost	\$ 1,193,495	\$15,385,485

2.3. Potential and Recommended Interventions

The following sections detail the potential investment options considered categorised in the three investment areas: Operational actions, network options and non-network options.

2.3.1. Operational Actions

Investigation on subtransmission vegetation-related faults that affected CNR customers indicate 61% occurred between the 81km NLA and CNR connection points. It takes an average of 3.7 hours to fully restore impacted customers. This is due to the time it takes to travel long radial lines often with no road access supplying small number of customers.

It is recommended to adopt a more targeted approach in managing vegetation by undertaking a quarterly bark patrol on this feeder to particularly around Willow Grove and Tanjil South where faults can affect significant number of customers.

Table 5: Operational options assessment

Identified Options	Investigation assessment	Option credibility
Option 4 - Quarterly bark patrol of NLA-CNR 66kV line in addition to the annual maintenance cycle of the feeder	With climate change accelerating vegetation growth and risk, quarterly bark patrols provide a cost-effective and proactive solution to reduce outages. Early detection of hazardous vegetation significantly improves feeder reliability and minimizes service disruptions.	Credible
Option 1 - Routine (monthly) bark patrols between NLA and CNR	This is to undertake monthly bark patrols between NLA and CNR 66kv connection points. This will be mainly OPEX cost but is expected to reduce vegetation-related faults on this 66kv segment by 50% p.a.	Credible

2.3.2. Network Options

As described in section 1.3, majority of the minutes lost on this feeder were caused by extreme weather events and vegetation. Faults on the BDL-NLA-CNR subtransmission faults account for 60% of CMOS lost p.a. The options explored in this business case specifically explores improvement initiatives on the 66kv radial line supplying CNR zone sub.

Table 6: Network options assessment

Identified Options	Investigation assessment	Option credibility
Option 2 - Permanent transfer of CNR3 load to NLA31 plus quarterly bark patrols between NLA and CNR	<p>This is to: Undertake monthly bark patrols between NLA and CNR 66kv connection points. This will be mainly OPEX cost but is expected to reduce vegetation-related faults on this 66kv segment by 25% p.a.</p> <p>To allow more load transfer capability to NLA (via NLA31 feeder) from CNR, install a 150m overhead tie line between CNR1 and CNR3 via new ACR. Shift the normal open point between NLA31 and CNR3 from LE013 to the CNR3 feeder CB (NOP). The relocation of the normal open point would leave the 22kV Feeder alive to the CNR Zone Substation unless it is also involved in the 66kV Line fault. The 22kV supply via NLA31 can then be used to restore customer supply. The additional ACR is required to re-energise the CNR1 feeder (Cann River township) via remote control without waiting for on site crews to perform the switching.</p>	Credible

Running mostly on the same poles as the 66kV Line is a 22kV alternate supply from NLA31 22kV Feeder via CNR3 22kV Feeder. This supply can be used to supply most if not all the CNR 22kV load especially if the Mallacoota Grid Storage unit (MAGS) is operating to supply the far end of the CNR2 feeder. At the present time this cannot be safely used if the 66kV Line trips as there is no way of confirming if the CNR3 22kV Feeder has not been involved in the same fault and could therefore pose a public risk if re-energised without first patrolling the line.

2.3.3. Non-Network Options

Table 7 outlines identified non-network options.

Table 7: Non-network option assessment

Identified Options	Investigation assessment	Option credibility
LV Quick Connect Generation	The low customer density LV sections between Cann River and Mallacoota where most MV faults related to weather and vegetation makes it economically unviable option.	Not credible

2.3.4. Economic Evaluation

Table 8 details the credible network investments identified in this investigation, their cost and residual reliability risk if implemented.

Table 8: Investment summary

Option	Investment details	Estimated OPEX Cost (\$) p.a.	Estimated CAPEX Cost (\$)	PV ₂₀ of residual risk (\$)
1	Monthly bark patrol between NLA and CNR 66kv connection points (OPEX only)	CIC	CIC	\$10,954,737
2	Install feeder tie with new ACR; shift NOP from LE013 to CNR3 FCB; three new ACRs to replace existing switches along NLA31 feeder backbone; quarterly bark patrol between NLA and CNR 66kv connection points (OPEX only) – Combination of Option 1 and Option 3.	CIC	CIC	\$10,565,260
3	Install feeder tie with new ACR; shift NOP from LE013 to CNR3 FCB; three new ACRs to replace existing switches along NLA31 feeder backbone.	CIC	CIC	\$10,768,931

Table 9 summarises the cost-benefit assessments for proposed investments as compared to the BAU case using net present value (NPV) calculations over a 20-year assessment period.

Table 9: Economic evaluation summary

Option	Residual risk cost	PV of benefits	PV of investment	NPV	BCR	Rank	Comments
BAU	\$15.39M					4	BAU – Does not capture benefits
1	\$10.95M	\$4.43M	\$0.23M	\$4.20M	19.09	1	
2	\$10.57M	\$4.82M	\$0.64M	\$4.18M	7.56	3	
3	\$10.77M	\$4.62M	\$0.52M	\$4.10M	8.85	2	Preferred option

The proposed investment cost of \$0.52M for Option 3 is economically viable, with a positive NPV of \$4.10M and BCR of 8.85 over a 20-year assessment period. Although Option 1 has the best overall rank, it is mainly OPEX and does not provide additional capability when a fault indeed occurs like what Option 3 offers.

2.3.5. Preferred Option Details

The preferred investment is Option 3 in which a 150m overhead line is installed to create a new tie between CNR1 and CNR3 feeders via a new normally open (NOP) ACR. This will enable load transfers from CNR to NLA zone sub via NLA31 feeder in the event of an extended outage on the NLA-CNR 66kV line.

A summary of the CMOS, feeder SAIDI and risk costs for the residual and benefit of the preferred investment is detailed in Table 10.

Table 10: Residual risk and annualised benefit summary

	Baseline p.a.	Outcome p.a.	Annualised Benefit
CMOS	2,690,026	1,900,398	29.4% Reduction
Customers Interrupted	10,859	7,671	
Reliability Risk Cost	\$1,193,495	\$835,376	\$358,119

2.3.6. Sensitivity Analysis

Option 3 provides an optimal solution by providing a reliable load transfer capability between NLA and CNR zone substations in the event of a subtransmission outage on the NLA-CNR 66kV line. The sensitivity on this solution is also favourable in all cases as indicated in Table 11.

Table 11: Net Present Value (\$m, 2025 dollars)

	Central assumptions	Higher WACC	10% increase in capex	Average	Comments
Do nothing	\$0	\$0	\$0		
Option 1	\$4.20M	\$3.78M	\$4.20M	\$4.06M	
Option 2	\$4.36M	\$3.71M	\$4.13M	\$4.07M	This option has the best NPV result from all three options
Option 3	\$4.28M	\$3.63M	\$4.04M	\$3.98M	Section 2.3.4 Economic Evaluation has this as the preferred option.

Base WACC = 5.56%

Higher WACC = 7.00%

2.3.7. Proposed Investment Timing

The proposed Option 3 is recommended to be completed by 30th March 2027.

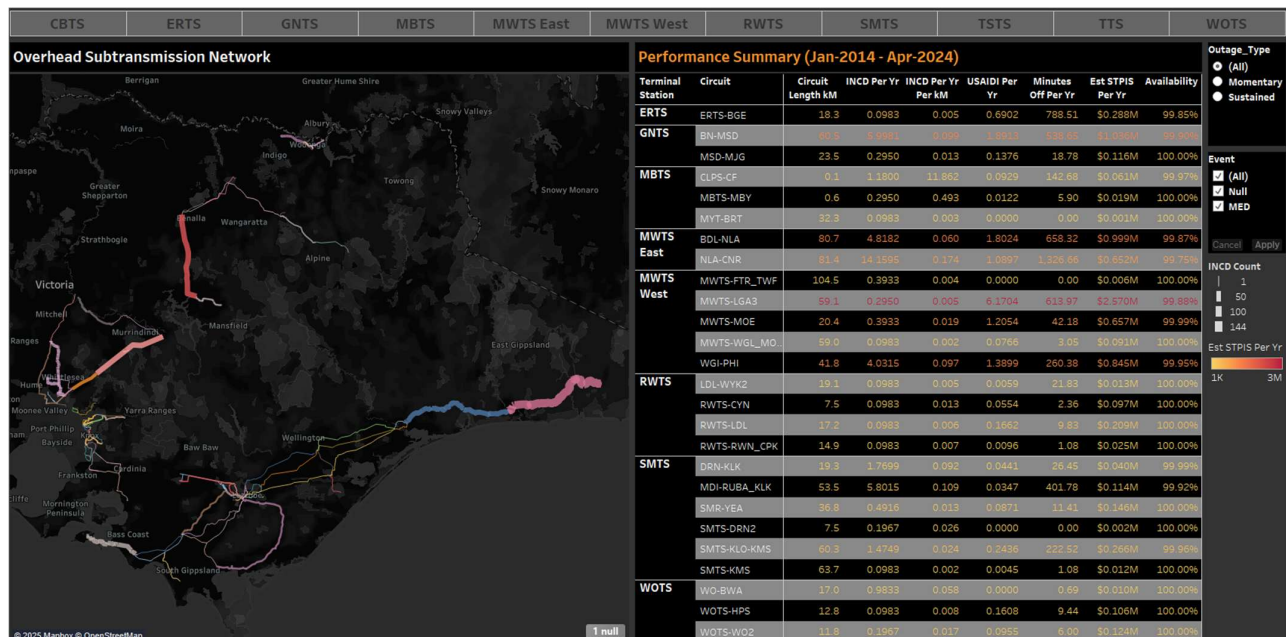
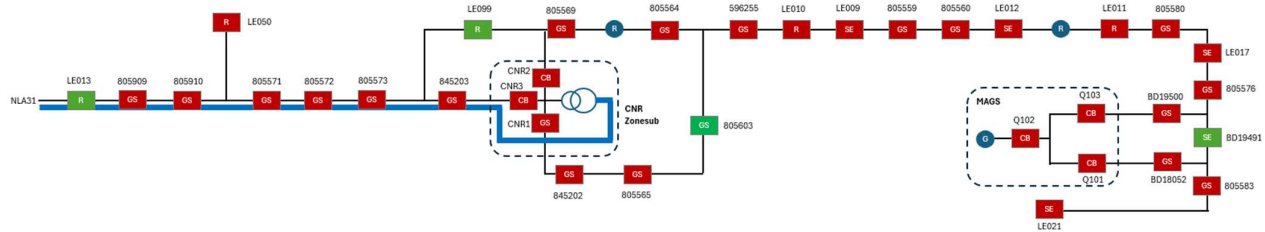
3. Investment Recommendation

To improve the reliability performance of CNR feeders, it is recommended that the following project is included within the current Reliability Works Program.

- **Network Options**
 - Install a 150m overhead tie line between CNR1 and CNR3
 - Install four new remote controlled automatic circuit reclosers (ACR)
 - Total CAPEX of \$CIC and OPEX of \$CIC (CIC of CAPEX).

4. Appendices

4.1. Appendix 1 – Single Line Diagram

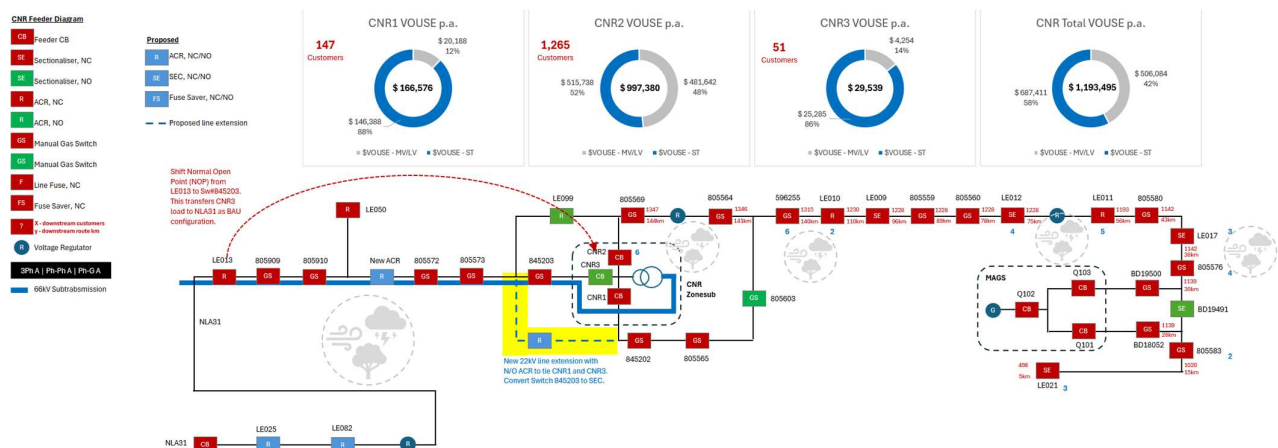
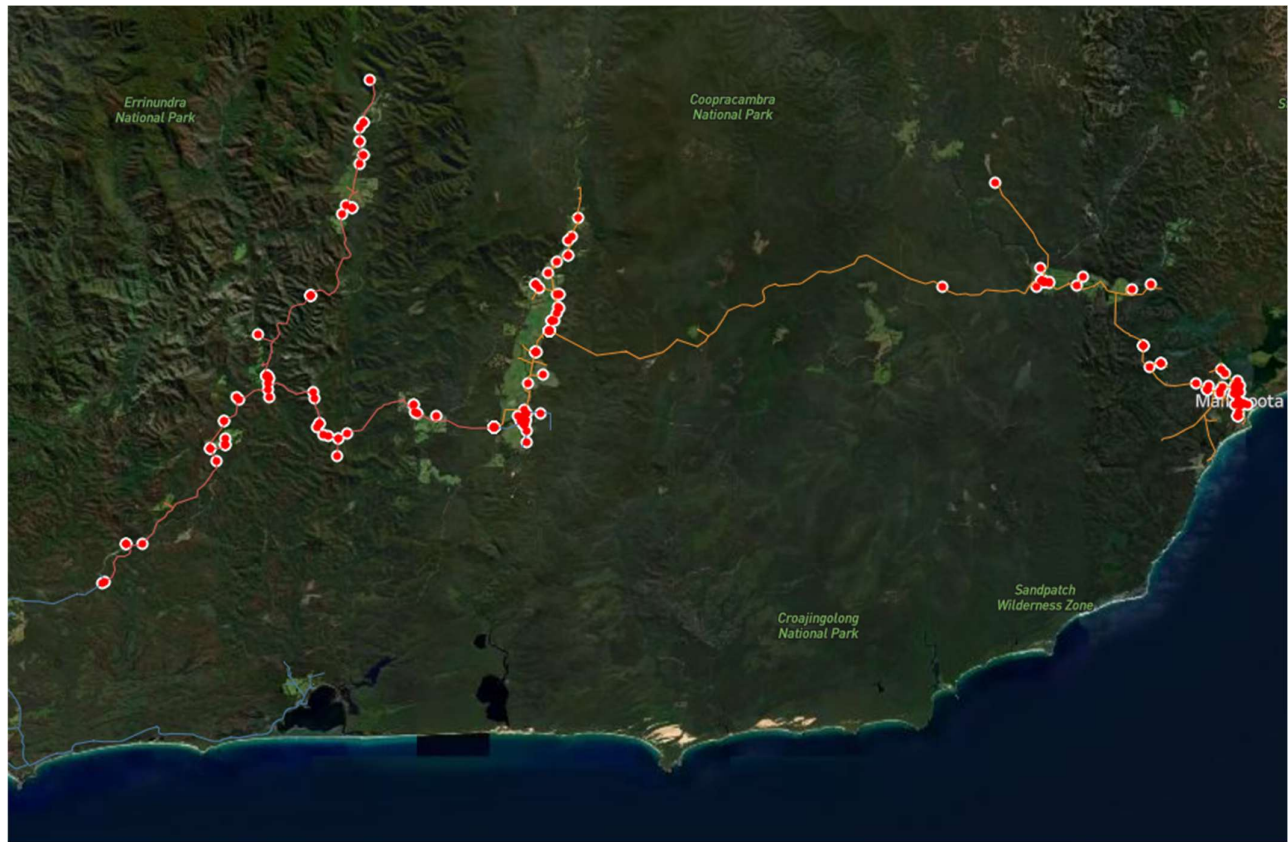


4.2. Geographic Location of Feeders



Figure 4: Map view of the CNR feeders

4.3. Heat Map of Outages

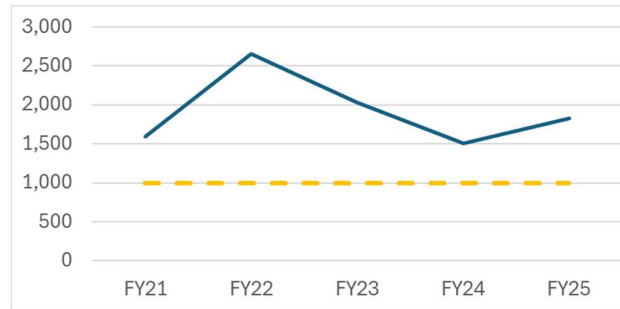


4.4. Assumptions and Unit Rates

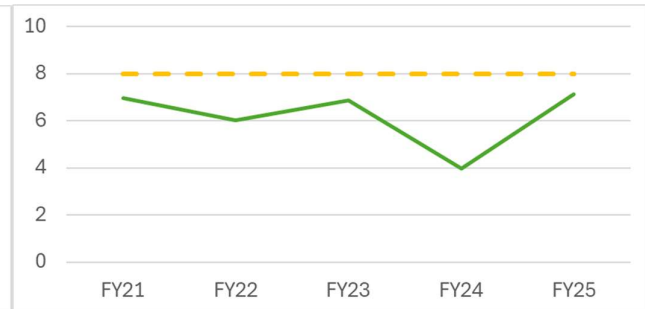
2026-2031 Electricity Distribution Repex & Safety program forecasts				Option 3	
Note: Direct costs expressed in real 2023-24 and excluding contractor support costs, overheads and real cost escalation					
Description	Values	Units	Comments	Qty	Amt
Conductor - Aluminium	CIC	per km		0.15	CIC
Cables - Underground	CIC	per km		0	CIC
ACR	CIC	per unit		4	CIC
Control Boxes	CIC	per unit		0	CIC
MV Switches – Manual Gas	CIC	per unit		0	CIC
Est OPEX (0.5% of CAPEX) per year	CIC		Assumed cost per year	1	CIC
One-off Tree removal (CAPEX)	CIC	per span	2 hazard tree removals or multi tree trim	0	CIC
Bark patrol – quarterly	CIC	per day	2 person crew	0	CIC
Detailed Patrol by a qualified arborist	CIC	per span	30 spans per day	0	CIC
bi-yearly Vegetation rapid patrol	CIC	per rapid patrol	2-person crew for 2 days	0	CIC

4.5. Feeder Performance Trends

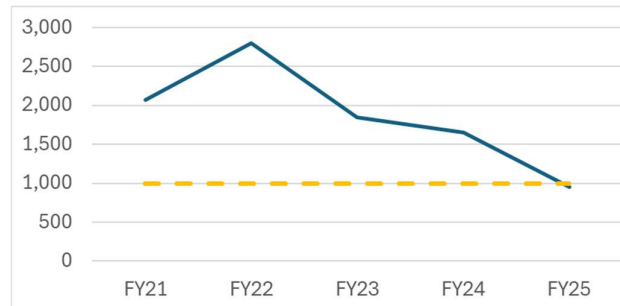
CNR1 Feeder SAIDI



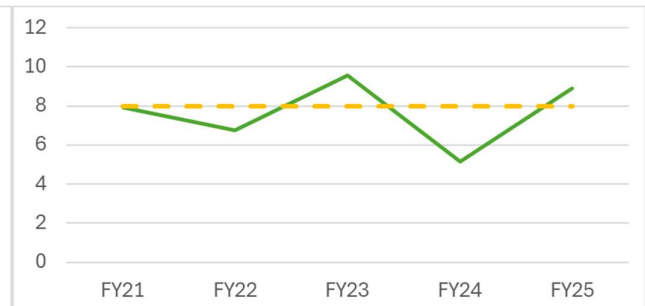
CNR1 Feeder SAIFI



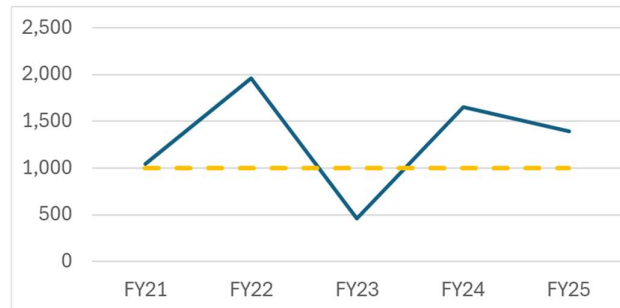
CNR2 Feeder SAIDI



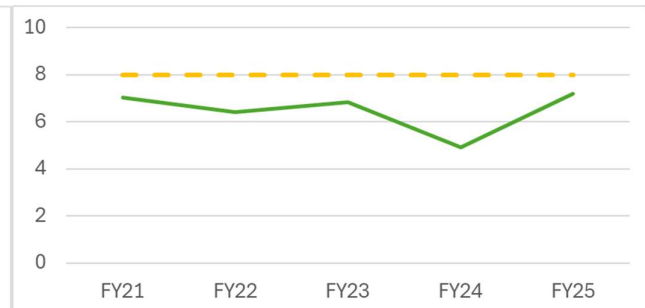
CNR2 Feeder SAIFI



CNR3 Feeder SAIDI



CNR3 Feeder SAIFI



4.6. Outage Summary

DATE	INCD REF	FEEDER	CAUSE	CAUSE_DESC_COMBO	SUSTAIN	CMOS	CUSTOMERS AFFECTED	Feeder SAIDI
29/07/20	INCD-3500-a	CNR2	Unknown		NO	0	1101	0.00
5/02/21	INCD-17395-a	CNR2	Unknown	Cause Not In List	NO	0	943	0.00
9/09/21	INCD-29265-a	CNR1	Vegetation	Public Tree Bark	YES	63646	146	50.67
29/10/21	INCD-34330-a	CNR2	Vegetation	Extreme Weather	YES	1069882	1033	851.82
5/04/22	INCD-60255-a	CNR1	Vegetation	Public Tree Branch Outside Clearance	YES	35	1	0.03
30/04/22	INCD-61615-a	CNR2	Weather	Extreme Weather	YES	23226	42	18.49
30/04/22	INCD-61557-a	CNR2	Weather	Extreme Weather	NO	0	988	0.00
30/04/22	INCD-61581-a	CNR3	Unknown		NO	0	52	0.00
18/10/22	INCD-74597-a	CNR3	Unknown		NO	0	49	0.00
20/02/23	INCD-86978-a	CNR2	Unknown		NO	0	24	0.00
20/02/23	INCD-87004-a	CNR2	Unknown	No Cause Found	NO	0	1012	0.00
20/02/23	INCD-87004-a	CNR2	Unknown	No Cause Found	YES	4048	1012	3.22
20/02/23	INCD-87003-a	CNR3	Unknown		NO	0	49	0.00
5/10/23	INCD-105326-U	CNR3	Unknown		NO	0	49	0.00
8/11/23	INCD-109055-U	CNR2	Unknown		NO	0	1101	0.00
8/11/23	INCD-109085-U	CNR3	Unknown		NO	0	19	0.00
22/11/23	INCD-110527-U	CNR2	Network business	Inter distributor connection failure	NO	0	2036	0.00
22/11/23	INCD-110544-U	CNR2	Planned	Normal Planned outage	NO	0	1018	0.00
29/11/23	INCD-110968-U	CNR2	Asset failure	Rot	NO	0	1	0.00
7/12/23	INCD-112330-U	CNR2	Unknown	No Cause Found	YES	231	3	0.18
2/01/24	INCD-115802-U	CNR1	Animal	Bird or Animal	YES	1225	7	0.98
13/02/24	INCD-121167-U	CNR2	Asset failure	Below Regulatory Height	YES	1590	2	1.27
2/04/24	INCD-128838-U	CNR2	Asset failure	External Fault	NO	0	1029	0.00
2/04/24	INCD-128894-U	CNR2	Unknown		NO	0	50	0.00
2/04/24	INCD-128893-U	CNR2	Unknown	Cause Not In List	YES	18504	1028	14.73
27/06/24	INCD-107628-V	CNR2	Asset failure	Age	YES	1284	3	1.02
23/12/24	INCD-155917-U	CNR1	Vegetation	Tree/Bark	NO	0	8	0.00
15/01/25	INCD-157736-U	CNR2	Weather	Lightning	YES	2835	9	2.26
15/01/25	INCD-114706-W	CNR1	Weather	Lightning	YES	4648	8	3.70
24/01/25	INCD-115437-W	CNR3	Animal	Bird or Animal	YES	9814	14	7.81
16/03/25	INCD-162852-U	CNR2	Unknown	No Cause Found	NO	0	1050	0.00
30/03/25	INCD-163538-U	CNR2	Weather	Extreme Weather	NO	0	51	0.00
30/03/25	INCD-163538-U	CNR2	Weather	Extreme Weather	YES	62009	1051	49.37
30/03/25	INCD-163543-U	CNR2	Vegetation	Tree/Bark	NO	0	190	0.00

DATE	INCD REF	FEEDER	CAUSE	CAUSE_DESC_COMBO	SUSTAIN	CMOS	CUSTOMERS AFFECTED	Feeder SAIDI
30/03/25	INCD-163543-U	CNR2	Vegetation	Tree/Bark	YES	280417	1051	223.26
30/03/25	INCD-163536-U	CNR3	Unknown	No Cause Found	NO	0	49	0.00
30/03/25	INCD-163536-U	CNR2	Unknown	No Cause Found	NO	0	799	0.00
30/03/25	INCD-163536-U	CNR1	Unknown	No Cause Found	NO	0	140	0.00
7/04/25	INCD-163917-U	CNR2	Other	Poor Installation	YES	112457	1051	89.54
13/07/2020	INCD-1614-a	CNR3	Unknown		NO	0	51	0.00
8/08/2020	INCD-4436-a	CNR2	Unknown		NO	0	972	0.00
15/08/2020	INCD-4704-a	CNR2	Unknown		NO	0	971	0.00
8/10/2020	INCD-5571-b	CNR3	Animal	Bird or Animal	NO	0	1	0.00
15/10/2020	INCD-9687-a	CNR2	Unknown		NO	0	1005	0.00
14/11/2020	INCD-11216-a	CNR2	Unknown		NO	0	982	0.00
17/11/2020	INCD-11585-a	CNR1	Other	Bird or Animal	YES	2190	10	1.74
15/12/2020	INCD-7663-b	CNR2	Asset failure	Corrosion	YES	43043	143	34.27
26/12/2020	INCD-14369-a	CNR1	Asset failure	Thermal Overload	YES	2178	11	1.73
25/01/2021	INCD-16695-a	CNR2	Other	Bird or Animal	YES	1568	7	1.25
4/02/2021	INCD-17356-a	CNR2	Unknown	Cause Not In List	YES	5676	946	4.52
11/03/2021	INCD-19094-a	CNR3	Animal	Bird or Animal	YES	1290	1	1.03
13/03/2021	INCD-19166-a	CNR2	Unknown	Cause Not In List	NO	0	47	0.00
13/03/2021	INCD-19166-a	CNR2	Unknown	Cause Not In List	YES	444154	956	353.63
23/03/2021	INCD-19641-a	CNR2	Unknown	Cause Not In List	YES	947749	1004	754.58
6/05/2021	INCD-21703-a	CNR3	Unknown	Cause Not In List	NO	0	50	0.00
6/05/2021	INCD-21703-a	CNR2	Unknown	Cause Not In List	NO	0	181	0.00
6/05/2021	INCD-21703-a	CNR1	Unknown	Cause Not In List	NO	0	142	0.00
7/05/2021	INCD-21708-a	CNR3	Vegetation	Tree/Bark	YES	550	50	0.44
7/05/2021	INCD-21708-a	CNR2	Vegetation	Tree/Bark	YES	3077	181	2.45
7/05/2021	INCD-21708-a	CNR1	Vegetation	Tree/Bark	YES	14200	142	11.31
8/05/2021	INCD-21751-a	CNR3	Unknown		NO	0	50	0.00
8/05/2021	INCD-21765-a	CNR3	Unknown		NO	0	50	0.00
9/05/2021	INCD-21782-a	CNR3	Asset failure	Bird or Animal	YES	820	4	0.65
13/05/2021	INCD-21957-a	CNR2	Unknown		NO	0	48	0.00
13/05/2021	INCD-21956-a	CNR2	Unknown	Cause Not In List	YES	23040	960	18.34
13/05/2021	INCD-21959-a	CNR2	Unknown	Cause Not In List	NO	0	1	0.00
28/05/2021	INCD-22597-a	CNR3	Unknown		NO	0	50	0.00
28/05/2021	INCD-22597-a	CNR2	Unknown		NO	0	1139	0.00
28/05/2021	INCD-22597-a	CNR1	Unknown		NO	0	143	0.00
2/06/2021	INCD-22759-a	CNR2	Unknown		NO	0	1006	0.00

DATE	INCD REF	FEEDER	CAUSE	CAUSE_DESC_COMBO	SUSTAIN	CMOS	CUSTOMERS AFFECTED	Feeder SAIDI
29/06/2021	INCD-20940-b	CNR2	Animal	Cause Not In List	YES	126	1	0.10
5/07/2021	INCD-26294-a	CNR2	Animal	Bird or Animal	YES	591	3	0.47
5/08/2021	INCD-27987-a	CNR2	Unknown		NO	0	964	0.00
14/08/2021	INCD-28240-a	CNR3	Vegetation	Public Tree Bark	NO	0	51	0.00
14/08/2021	INCD-28240-a	CNR2	Vegetation	Public Tree Bark	NO	0	183	0.00
14/08/2021	INCD-28240-a	CNR1	Vegetation	Public Tree Bark	NO	0	144	0.00
24/08/2021	INCD-28596-a	CNR2	Unknown	Cause Not In List	NO	0	964	0.00
1/09/2021	INCD-28891-a	CNR2	Unknown	Cause Not In List	YES	19280	964	15.35
6/09/2021	INCD-29103-a	CNR2	Vegetation	Tree/Bark	YES	98197	183	78.18
7/09/2021	INCD-29177-a	CNR2	Vegetation	Public Tree Branch Outside Clearance	YES	216578	1042	172.43
14/09/2021	INCD-29405-a	CNR2	Vegetation	Tree/Bark	YES	24153	183	19.23
4/10/2021	INCD-30350-a	CNR3	Weather	Lightning	NO	0	51	0.00
4/10/2021	INCD-30350-a	CNR2	Weather	Lightning	NO	0	183	0.00
4/10/2021	INCD-30350-a	CNR1	Weather	Lightning	NO	0	142	0.00
23/10/2021	INCD-31999-a	CNR2	Unknown		NO	0	80	0.00
24/11/2021	INCD-39318-a	CNR2	Unknown		NO	0	49	0.00
24/11/2021	INCD-39319-a	CNR2	Weather	Extreme Weather	YES	237620	986	189.19
7/01/2022	INCD-46682-a	CNR2	Unknown		NO	0	1174	0.00
2/03/2022	INCD-55945-a	CNR2	Unknown		NO	0	1036	0.00
7/03/2022	INCD-56211-a	CNR2	Overload	No Cause Found	YES	40	4	0.03
22/03/2022	INCD-58641-a	CNR2	Unknown		NO	0	1035	0.00
23/03/2022	INCD-58701-a	CNR3	Weather	Lightning	YES	2770	10	2.21
31/03/2022	INCD-59604-a	CNR2	Vegetation	Public Tree Bark	NO	0	48	0.00
31/03/2022	INCD-59604-a	CNR2	Vegetation	Public Tree Bark	YES	118048	992	93.99
3/04/2022	INCD-60013-a	CNR1	Vegetation	Tree/Bark	YES	22518	18	17.93
3/04/2022	INCD-60014-a	CNR2	Unknown		NO	0	1037	0.00
3/04/2022	INCD-60015-a	CNR2	Animal	Bird or Animal	NO	0	2074	0.00
3/04/2022	INCD-60016-a	CNR1	Unknown		NO	0	125	0.00
3/04/2022	INCD-60017-a	CNR2	Vegetation	Tree/Bark	NO	0	758	0.00
3/04/2022	INCD-60017-a	CNR2	Vegetation	Tree/Bark	YES	467406	414	372.14
4/04/2022	INCD-60119-a	CNR2	Vegetation	Tree/Bark	YES	17700	20	14.09
4/04/2022	INCD-60042-a	CNR2	Vegetation	Tree/Bark	YES	406760	738	323.85
4/04/2022	INCD-60162-a	CNR2	Other	Tree/Bark	YES	9540	9	7.60
15/04/2022	INCD-61075-a	CNR2	Animal	Bird or Animal	YES	299	1	0.24
23/04/2022	INCD-61318-a	CNR3	Animal	Bird or Animal	YES	263	1	0.21
5/05/2022	INCD-62122-a	CNR3	Unknown	No Cause Found	YES	18238	52	14.52

DATE	INCD REF	FEEDER	CAUSE	CAUSE_DESC_COMBO	SUSTAIN	CMOS	CUSTOMERS AFFECTED	Feeder SAIDI
9/05/2022	INCD-62612-a	CNR3	Unknown		NO	0	52	0.00
12/05/2022	INCD-62956-a	CNR2	Unknown		NO	0	49	0.00
13/05/2022	INCD-63105-a	CNR2	Asset failure	Age	YES	2130	2	1.70
2/06/2022	INCD-31937-c	CNR2	Other	No Cause Found	YES	285	1	0.23
22/06/2022	INCD-65729-a	CNR2	Other	No Cause Found	YES	211	1	0.17
22/06/2022	INCD-65734-a	CNR2	Unknown	No Cause Found	YES	420	2	0.33
6/07/2022	INCD-66554-a	CNR2	Other	Poor Work Practice	YES	117	2	0.09
7/07/2022	INCD-66736-a	CNR2	Overload	Bird or Animal	YES	11280	40	8.98
27/07/2022	INCD-67878-a	CNR3	Asset failure	Age	YES	389	1	0.31
7/08/2022	INCD-69408-a	CNR2	Unknown	No Cause Found	NO	0	995	0.00
8/08/2022	INCD-69438-a	CNR2	Unknown	No Cause Found	NO	0	995	0.00
28/08/2022	INCD-72082-a	CNR2	Unknown	No Cause Found	NO	0	998	0.00
21/09/2022	INCD-73472-a	CNR2	Weather	Extreme Weather	NO	0	1002	0.00
24/09/2022	INCD-29924-b	CNR3	Other	Cause Not In List	YES	77	1	0.06
9/10/2022	INCD-74110-a	CNR3	Unknown		NO	0	49	0.00
14/10/2022	INCD-74339-a	CNR2	Animal	Bird or Animal	YES	16032	1002	12.76
14/10/2022	INCD-74341-a	CNR2	Unknown		NO	0	49	0.00
5/11/2022	INCD-75819-a	CNR2	Overload	Thermal Overload	NO	0	1004	0.00
5/11/2022	INCD-75819-a	CNR2	Overload	Thermal Overload	YES	75546	181	60.15
11/11/2022	INCD-76275-a	CNR3	Unknown		NO	0	19	0.00
11/11/2022	INCD-34552-b	CNR2	Animal	Lightning	YES	2684	2	2.14
11/11/2022	INCD-76290-a	CNR2	Weather	Lightning	YES	2874	2	2.29
11/11/2022	INCD-34553-b	CNR2	Weather	Lightning	YES	1466	1	1.17
12/11/2022	INCD-76393-a	CNR3	Unknown		NO	0	49	0.00
8/12/2022	INCD-37295-b	CNR2	Asset failure	Age	YES	5580	155	4.44
8/12/2022	INCD-78147-a	CNR2	Other	Poor Installation	YES	5	1	0.00
8/12/2022	INCD-78167-a	CNR2	Vegetation	Public Tree Branch Inside Clearance	YES	2817	9	2.24
10/12/2022	INCD-78227-a	CNR2	Animal	Bird or Animal	NO	0	2380	0.00
10/12/2022	INCD-78228-a	CNR2	Unknown		NO	0	1190	0.00
10/12/2022	INCD-78230-a	CNR2	Vegetation	Tree/Bark	NO	0	1190	0.00
10/12/2022	INCD-78230-a	CNR2	Vegetation	Tree/Bark	YES	275667	1190	219.48
13/12/2022	INCD-78468-a	CNR1	Other	Age	YES	1447	5	1.15
16/12/2022	INCD-37224-c	CNR3	Vegetation	Foreign Object	YES	1173	1	0.93
18/12/2022	INCD-78700-a	CNR2	Other	Cause Not In List	YES	3177	9	2.53
9/01/2023	INCD-80975-a	CNR2	Animal	Age	YES	1402	1	1.12
16/01/2023	INCD-81887-a	CNR2	Other	Bird or Animal	YES	293	1	0.23

DATE	INCD REF	FEEDER	CAUSE	CAUSE_DESC_COMBO	SUSTAIN	CMOS	CUSTOMERS AFFECTED	Feeder SAIDI
31/01/2023	INCD-84289-a	CNR3	Animal	Bird or Animal	YES	266	1	0.21
5/02/2023	INCD-85065-a	CNR2	Unknown		NO	0	1059	0.00
12/02/2023	INCD-85845-a	CNR2	Unknown		NO	0	1061	0.00
13/02/2023	INCD-85965-a	CNR2	Other	Bird or Animal	YES	654	1	0.52
24/02/2023	INCD-87634-a	CNR3	Animal	Bird or Animal	YES	63	1	0.05
1/03/2023	INCD-88141-a	CNR2	Unknown		NO	0	1061	0.00
28/03/2023	INCD-91730-a	CNR2	Animal	Bird or Animal	YES	748	1	0.60
2/04/2023	INCD-92391-a	CNR2	Other	Bird or Animal	YES	4168	2	3.32
3/05/2023	INCD-94884-a	CNR2	Unknown		NO	0	181	0.00
6/05/2023	INCD-95071-a	CNR3	Unknown		NO	0	19	0.00
15/05/2023	INCD-95382-a	CNR3	Unknown		NO	0	49	0.00
30/05/2023	INCD-95949-a	CNR3	Unknown		NO	0	49	0.00
20/06/2023	INCD-96808-a	CNR2	Asset failure	No Cause Found	YES	336	1	0.27
24/06/2023	INCD-97311-a	CNR2	Unknown		NO	0	1065	0.00
26/06/2023	INCD-97532-a	CNR2	Animal	Bird or Animal	NO	0	2	0.00
19/07/2023	INCD-46132-b	CNR2	Asset failure	Age	YES	148	2	0.12
16/08/2023	INCD-101035-U	CNR2	Unknown	Cause Not In List	NO	0	2038	0.00
24/08/2023	INCD-101527-U	CNR2	Unknown		NO	0	1068	0.00
2/10/2023	INCD-104758-U	CNR2	Other	Work Standard Change	YES	7	1	0.01
19/11/2023	INCD-110406-U	CNR2	Unknown	No Cause Found	NO	0	1018	0.00
19/11/2023	INCD-110408-U	CNR2	Unknown	Cause Not In List	NO	0	1018	0.00
19/11/2023	INCD-110411-U	CNR2	Unknown	Cause Not In List	NO	0	1018	0.00
19/11/2023	INCD-110424-U	CNR2	Unknown	Cause Not In List	NO	0	1018	0.00
19/11/2023	INCD-110426-U	CNR2	Unknown	Cause Not In List	NO	0	1018	0.00
21/11/2023	INCD-110510-U	CNR2	Planned	Normal Planned outage	NO	0	2036	0.00
23/11/2023	INCD-110556-U	CNR3	Unknown	No Cause Found	YES	201	1	0.16
25/11/2023	INCD-110783-U	CNR2	Unknown		NO	0	1068	0.00
25/11/2023	INCD-110784-U	CNR3	Unknown	No Cause Found	YES	1108	4	0.88
1/12/2023	INCD-111657-U	CNR2	Vegetation	Tree/Bark	YES	184830	184	147.16
2/12/2023	INCD-111836-U	CNR2	Other	Cause Not in List (Use Comments)	NO	0	1020	0.00
3/12/2023	INCD-111867-U	CNR2	Unknown	No Cause Found	NO	0	1020	0.00
3/12/2023	INCD-111874-U	CNR2	Unknown	No Cause Found	YES	954	3	0.76
6/12/2023	INCD-112206-U	CNR2	Unknown	No Cause Found	NO	0	1020	0.00
13/12/2023	INCD-113370-U	CNR3	Unknown		NO	0	19	0.00
13/12/2023	INCD-113431-U	CNR2	Weather	Lightning	NO	0	2048	0.00
15/12/2023	INCD-114027-U	CNR2	Animal	Bird or Animal	NO	0	1024	0.00

DATE	INCD REF	FEEDER	CAUSE	CAUSE_DESC_COMBO	SUSTAIN	CMOS	CUSTOMERS AFFECTED	Feeder SAIDI
18/12/2023	INCD-114171-U	CNR2	Unknown	Cause Not In List	NO	0	1025	0.00
23/12/2023	INCD-114843-U	CNR2	Unknown	No Cause Found	NO	0	1026	0.00
24/12/2023	INCD-114931-U	CNR2	Weather	Extreme Weather	NO	0	1026	0.00
26/12/2023	INCD-115373-U	CNR2	Weather	Lightning	NO	0	1076	0.00
19/01/2024	INCD-118260-U	CNR2	Unknown		NO	0	1075	0.00
21/01/2024	INCD-118421-U	CNR1	Vegetation	Public Tree Branch Inside Clearance	YES	3688	8	2.94
27/01/2024	INCD-119094-U	CNR3	Unknown		NO	0	49	0.00
20/02/2024	INCD-123568-U	CNR2	Vegetation	Public Tree Bark	YES	24339	0	19.38
8/03/2024	INCD-104831-V	CNR2	Other	Pollution	YES	234	1	0.19
12/03/2024	INCD-99128-X	CNR2	Planned	Normal Planned outage	YES	446	2	0.36
29/03/2024	INCD-128498-U	CNR2	Unknown	No Cause Found	NO	0	50	0.00
29/03/2024	INCD-128498-U	CNR2	Unknown	No Cause Found	YES	13377	1029	10.65
31/03/2024	INCD-128647-U	CNR2	Unknown	Cause Not In List	NO	0	1029	0.00
6/04/2024	INCD-129165-U	CNR2	Unknown	Cause Not In List	NO	0	1077	0.00
24/04/2024	INCD-131350-U	CNR2	Vegetation	Public Tree Bark	NO	0	2058	0.00
24/04/2024	INCD-131351-U	CNR2	Unknown		NO	0	50	0.00
24/04/2024	INCD-131360-U	CNR2	Unknown	No Cause Found	NO	0	51	0.00
24/04/2024	INCD-131353-U	CNR2	Vegetation	Public Tree Bark	YES	135786	427	108.11
1/05/2024	INCD-132180-U	CNR3	Unknown		NO	0	50	0.00
3/06/2024	INCD-105658-V	CNR1	Unknown	No Cause Found	YES	2108	8	1.68
13/06/2024	INCD-106551-V	CNR2	Asset failure	Age	YES	4	1	0.00
17/06/2024	INCD-136916-U	CNR3	Unknown		NO	0	50	0.00
17/06/2024	INCD-106892-V	CNR3	Vegetation	Public Tree Branch Outside Clearance	YES	7347	50	5.85
21/07/2024	INCD-109625-V	CNR1	Vegetation	Tree/Bark	YES	3384	8	2.69
23/07/2024	INCD-109794-V	CNR2	Third party	Vandalism	YES	494	1	0.39
17/10/2024	INCD-150851-U	CNR2	Vegetation	Tree/Bark	NO	0	1040	0.00
17/10/2024	INCD-150850-U	CNR3	Unknown		NO	0	50	0.00
12/11/2024	INCD-152698-U	CNR2	Weather	Lightning	NO	0	1038	0.00
12/11/2024	INCD-152700-U	CNR1	Weather	Lightning	YES	1560	8	1.24
21/11/2024	INCD-110546-W	CNR2	Asset failure	Age	YES	299	1	0.24
29/11/2024	INCD-154362-U	CNR2	Unknown		NO	0	1091	0.00
30/11/2024	INCD-154420-U	CNR2	Asset failure	Age	NO	0	1040	0.00
30/11/2024	INCD-154420-U	CNR2	Asset failure	Age	YES	102128	187	81.31
2/12/2024	INCD-111409-W	CNR2	Overload	Thermal Overload	NO	0	437	0.00
4/12/2024	INCD-154722-U	CNR2	Other	False Call by Customer	NO	0	1041	0.00
9/12/2024	INCD-154958-U	CNR2	Unknown	Cause Not In List	NO	0	1041	0.00

DATE	INCD REF	FEEDER	CAUSE	CAUSE_DESC_COMBO	SUSTAIN	CMOS	CUSTOMERS AFFECTED	Feeder SAIDI
11/12/2024	INCD-155008-U	CNR3	Unknown	No Cause Found	YES	3090	5	2.46
22/12/2024	INCD-155866-U	CNR2	Unknown	No Cause Found	NO	0	1044	0.00
24/12/2024	INCD-156108-U	CNR3	Asset failure	Age	YES	131	1	0.10
1/01/2025	INCD-156499-U	CNR2	Unknown	Cause Not In List	NO	0	1045	0.00
11/01/2025	INCD-157189-U	CNR2	Unknown		NO	0	1096	0.00
23/01/2025	INCD-158359-U	CNR3	Unknown		NO	0	18	0.00
8/02/2025	INCD-160058-U	CNR3	Unknown		NO	0	18	0.00
9/02/2025	INCD-160293-U	CNR2	Weather	Lightning	NO	0	39	0.00
9/02/2025	INCD-160293-U	CNR2	Weather	Lightning	YES	677	1	0.54
14/02/2025	INCD-160826-U	CNR2	Unknown	No Cause Found	NO	0	1049	0.00
15/02/2025	INCD-160885-U	CNR2	Weather	Extreme Weather	NO	0	1049	0.00
18/02/2025	INCD-161041-U	CNR2	Other	Cause Not in List (Use Comments)	NO	0	1049	0.00
18/02/2025	INCD-112588-V	CNR1	Vegetation	Tree/Bark	YES	45664	43	36.36
19/02/2025	INCD-161140-U	CNR2	Planned	Normal Planned outage	YES	28	1	0.02
26/02/2025	INCD-161615-U	CNR2	Animal	Bird or Animal	NO	0	1049	0.00
7/03/2025	INCD-162296-U	CNR2	Animal	Bird or Animal	NO	0	51	0.00
7/03/2025	INCD-162296-U	CNR2	Animal	Bird or Animal	YES	17850	1050	14.21
7/03/2025	INCD-118347-W	CNR2	Animal	Bird or Animal	YES	10692	27	8.51
10/03/2025	INCD-162451-U	CNR2	Other	Cause Not in List (Use Comments)	NO	0	1050	0.00
12/03/2025	INCD-118808-W	CNR2	Unknown	No Cause Found	YES	292	1	0.23
25/03/2025	INCD-114016-V	CNR2	Animal	Bees/Wasps	YES	6	1	0.00
31/03/2025	INCD-114420-V	CNR1	Vegetation	Tree/Bark	YES	328	1	0.26
6/04/2025	INCD-163860-U	CNR2	Unknown	No Cause Found	NO	0	1051	0.00
6/04/2025	INCD-163867-U	CNR2	Unknown	No Cause Found	YES	834	3	0.66
14/04/2025	INCD-164300-U	CNR3	Unknown		NO	0	49	0.00
14/04/2025	INCD-164305-U	CNR3	Asset failure	Age	YES	224	2	0.18
17/04/2025	INCD-164669-U	CNR2	Unknown		NO	0	1099	0.00
17/04/2025	INCD-164670-U	CNR2	Unknown	No Cause Found	NO	0	106	0.00
17/04/2025	INCD-164670-U	CNR2	Unknown	No Cause Found	YES	39562	1235	31.50
21/04/2025	INCD-164988-U	CNR2	Animal	Bird or Animal	NO	0	51	0.00
21/04/2025	INCD-164988-U	CNR2	Animal	Bird or Animal	YES	50623	1049	40.30
23/05/2025	INCD-167407-U	CNR2	Unknown		NO	0	1101	0.00
25/05/2025	INCD-167673-U	CNR2	Unknown		NO	0	1100	0.00
28/05/2025	INCD-168003-U	CNR1	Unknown	No Cause Found	YES	2391	8	1.90
30/06/2025	INCD-170441-U	CNR1	Unknown		NO	0	139	0.00

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