
Feeder Reliability Investment Case

Business case: Reliability Program - WYK13

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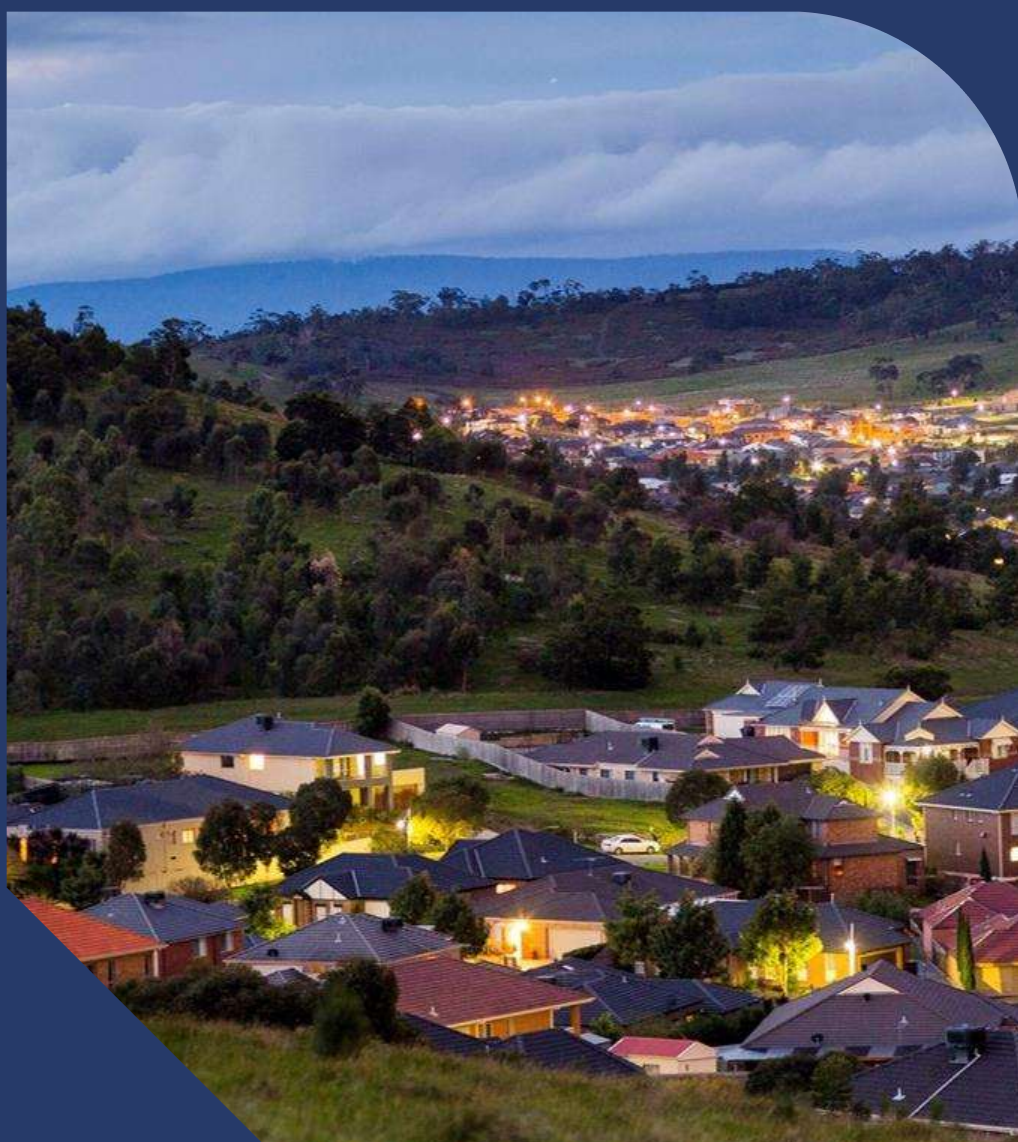


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1. Introduction

1.1. Background

The document outlines a business case for intervention investments as they relate to improving the reliability and resilience of Woori Yallock distribution feeder WYK13.

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.

1.2. Feeder Summary

The following table gives a summary into the feeder:

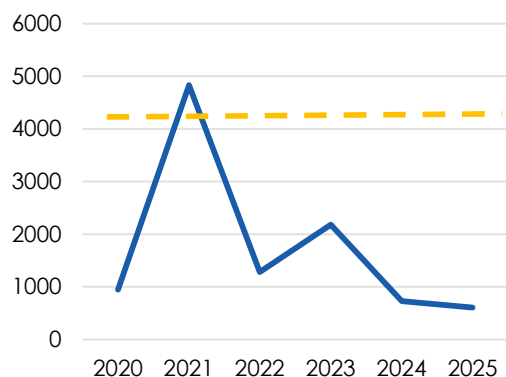
Table 1: Feeder WYK13 Summary

Feeder Name	Woori Yallock WYK13			
Feeder Type	Rural Short			
Feeder Zone Substation	Woori Yallock			
Length of Line	Total	128kms.		
	OH	107.7kms (84%)	UG	20.3kms (16%),
Number of Customers	3647			
Number of Life Support Customers	102			
Number of Switches	Total Reclosers	15		
	Total Switches on Feeder	66	Auto Sectionalisers	9 (13.65%)
	Manual Gas Switches	41	Fuse Saver	1
Tie points	Total	6	Automated	3 (50%)

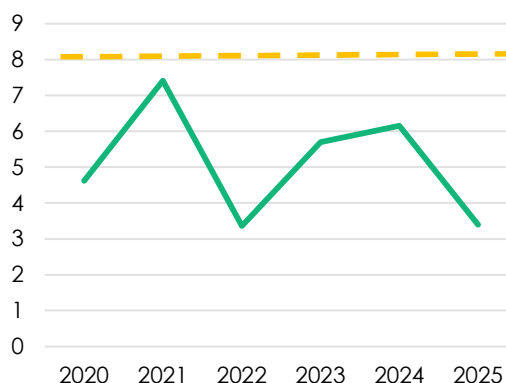
1.3. Feeder Reliability Summary

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

Feeder SAIDI



Feeder SAIFI



As it can be seen from the above graphs, this feeder became poor performing during 2023 due to duration of outages. The feeder has been performing well against SAIDI and SAIFI during this time.

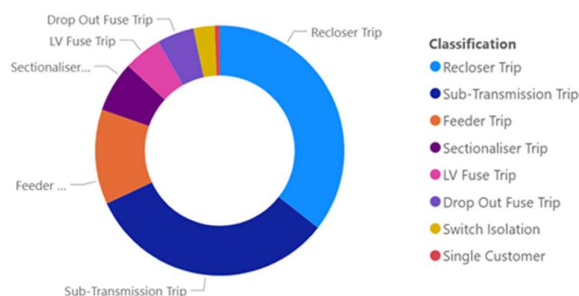


Figure 1 Unplanned Outage SAIDI by fault classification

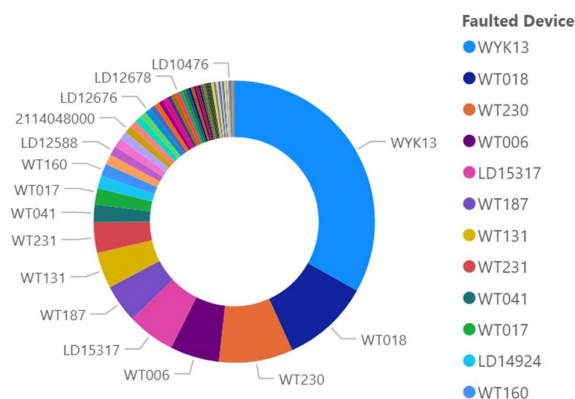


Figure 2 Unplanned Outage USAIDI by Faulted Device

The most impacted devices in terms of overall USAIDI are the circuit breaker (32.72%), WT018 (9.94%), WT230 (8.46%), and WT006 (5.62%), as highlighted in the single-line diagram and geographic map. This suggests that the key areas for reliability improvement are the Don Valley spur line, as well as the Millgrove and Warburton sections.

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.

1.3.1. Cause Summary

Table 2 compares average historical performance against the last 12 months.

Table 2: Cause type summary

Cause Type	Quantity			Feeder CMOS			Average Contribution per event
	Avg p.a. (FY20-25)	Last 12 months	% of average	Avg p.a. (FY20-25)	Last 12 months	% of average	(Av CMOS / Av No Incidents)
Equipment Failure	15	14	92.11%	301,312	14,338	4.76%	19,823
Foreign Object	3	0	0.00%	1,108,213	0	0.00%	346,317
Lightning	1	0	0.00%	8,130	150	1.85%	13,550
Other	2	0	0.00%	24,303	0	0.00%	10,126
Overload	3	3	107.14%	34,284	748	2.18%	12,244
Unknown	12	11	91.67%	197,844	381,181	192.67%	16,487
Vegetation	31	42	136.36%	2,348,482	1,736,362	73.94%	76,249
Vermin	7	8	114.29%	137,417	114,470	83.30%	19,631
Weather	10	4	100.00%	2,973,719	27,324	0.92%	297,372
Third Party Impact	2	2	125.00%	68,862	508	0.74%	43,039
Corrosion	3	1	35.71%	3,330	4020	120.71%	1,189
Total	88	85	96.15%	7,205,895	2,279,101	31.63%	81,515

As it can be seen from the above table, the feeder experiences an average of 88 sustained interruptions per year (more than 1.5 per week), with an average contribution of 7.2 million customer minutes. The predominate causes of incidents on this feeder are:

- **Adverse weather:**
 - Contributing 41.2% of the CMOS and 11.4% of total incidents.
 - The majority of weather-related incidents were due to: vegetation fall-in, namely trees falling on HV lines; and, conductor clashing. These commonly triggered recloser operations and drop-out fuse trips.
- **Vegetation:**
 - Attributing 32.6% of total CMOS and 35% of the incidents.
 - The vegetation incidents can be further categorised into:
 - Fall-in vegetation (the predominant cause) accounting for 65.3% of incidents and 87.4% of CMOS impact; and,
 - Blow-in vegetation represents 34.7% of incidents and 22.6% of CMOS impact.
 - This clearly indicates that fall-in vegetation poses the greatest risk to the network. The most effective mitigation strategy is proactive overhang removal.
 - The most significant outages on this feeder have been caused by falling vegetation damaging HV conductors to an extent requiring construction work. This is particularly evident in radial sections of the WYK13 feeder where there are no tie points.
- **Foreign Object:**
 - Attributing 15.4% of total CMOS and 3.6% of the incidents;
 - The majority of these outages are due to bark on the feeder.

With reference to Figure 3 below, it can be seen that the variability of the feeder's performance can be attributed to 'weather' and 'vegetation' impacts, as it can be seen in calendar years 2021 and 2022

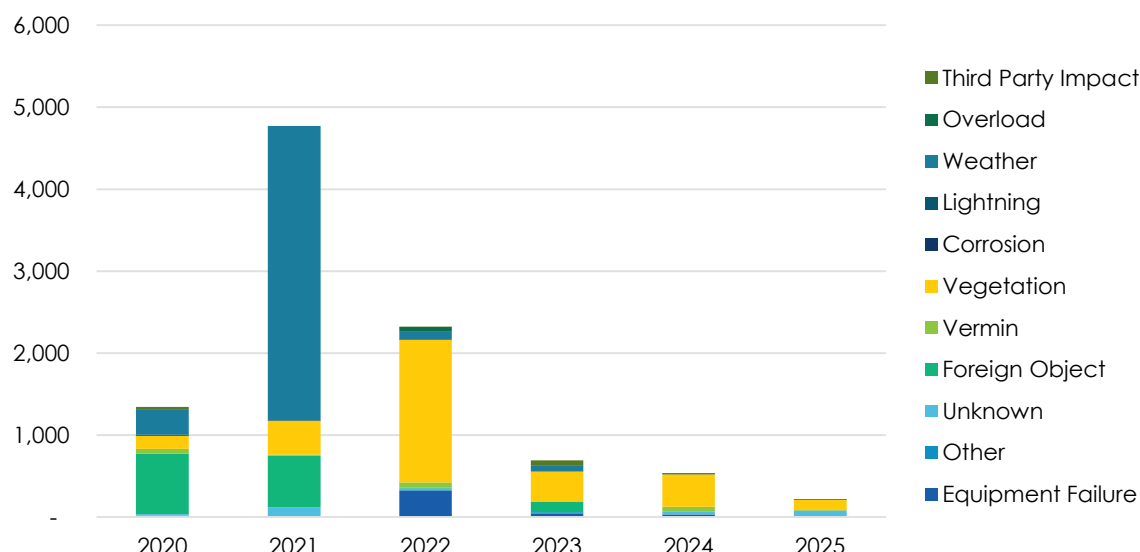


Figure 3 – Feeder performance due to cause

1.3.2. Major Event Day Summary

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

Table 3 – 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)
02-Sep-24	Major Storm	8001	654,087	82
28-Aug-24	Major Storm	96	120,052	1251
02-Jan-24	Major Storm	2	492	246
03-Aug-22	Major Storm	3071	2,348,155	765
19-Dec-21	Major Storm	66	93,568	1418
02-Dec-21	Major Storm	3	3915	1305
29-Oct-21	Major Storm	984	1,629,886	1656
09-Jun-21	Major Storm	3564	12,403,116	3480
16-Nov-20	Major Storm	3560	2,724,541	765
27-Aug-20	Major Storm	640	533,249	833
Total		19987	20,511,061	1026

The following observations can be made about this feeder's performance during major event days:

- This feeder is affected regularly by major storm events, averaging 2 events per year, where on average 1998 customers (54% of the feeder) are affected with customers experiencing an 1026mins (17 hours) outage each incident.
- Across the ten recorded storm days there were 50 incidents in total.
- Of these, three incidents involved sub-transmission trips, which accounted for 60.4% of the total MED CMOS impact.
- In contrast, one incident was a feeder trip, contributing only 2.6% of the total MED CMOS, indicating that feeder trips are not the primary driver of USAIDI during major events.
- Additionally, 19 incidents were recloser trips, representing 30.8% of the total MED CMOS impact. For the recloser trips, the most impacted devices contributing to USAIDI during major event days were ACR WT018

The WYK13 feeder is approximately 128 km and traverses through the Yarra Ranges, with more than 80% of its medium-voltage network constructed as overhead lines in heavily vegetated terrain. This exposure makes the feeder highly susceptible to outages caused by severe weather events that frequently affect surrounding vegetation.

Customer density is highest in Millgrove and Warburton, which increases outage impact in these areas.

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2. Investment Analysis

2.1. No Proactive Interventions

With no proactive intervention, the business as usual (BAU) reliability risk costs are detailed in Table and Table . 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 4: Summary of risk by cause type

Cause Types	Avg CMOS p.a. (between FY20 & FY25)	Reliability risk cost p.a. (between FY20 & FY25)
Equipment Failure	301,312	159,834
Foreign Object	1,108,212	587,865
Lightning	8130	4,313
Other	24,303	12,892
Overload	34,283	18,186
Unknown	197,844	104,949
Vegetation	2,348,482	1,245,781
Vermin	137,417	72,894
Weather	2,973,719	1,577,446
Third Party Impact	68861	36,529
Corrosion	3,330	1,767
Total	7,205,895	\$3,822,456

Table 5: BAU risk cost summary

	Total risk cost p.a.	PV20 of residual risk
BAU reliability risk cost	\$3,822,456	\$49,275,734

2.2. 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.

2.2.1. Operational Actions

Given that the root cause of outages on the feeders is predominantly vegetation-related, with fall-in vegetation identified as the dominant contributor, targeted mitigation strategies are essential to improve reliability.

Table 6: Operational options assessment

Identified Options	Investigation assessment	Option credibility
Option 1 - Targeted vegetation trimming and hazard tree removal	Fall-in vegetation, specifically trees falling on HV lines, is the dominant cause of outages, contributing 87.4% of CMOS impact for vegetation-related incidents. A cost-effective approach to mitigate this risk is early identification of hazardous vegetation, particularly in high-risk areas such as Millgrove, Warburton, and Don Valley. Early detection significantly improves feeder reliability and minimizes service disruptions during severe weather events. Removal of hazard trees rated 4 and 5 are essential to reduce outage risk. The vegetation management team has identified 175 hazard trees on WYK13, with 37.2% completed and 62.8% pending and scheduled. As this is already part of the existing vegetation management program, it is not considered a credible option.	Not Credible
Option 2 - A detailed patrol of the WYK13 Feeder for WT230, WT006, and WT018 section, along with a biannual rapid patrol of the entire feeder	<p>A detailed arborist patrol of the WYK13 front end and backbone (WT230, WT006, and WT018 section) is proposed every three years. Arborists are trained to detect hidden hazards that may be missed during routine inspections. This is complemented by a bi-yearly rapid patrol, which involves a drive-by inspection to identify immediate risks such as hanging or broken branches.</p> <p>While annual maintenance by assessors focuses on clearance and visible hazards, it may not capture all high-risk vegetation. Therefore, combining detailed arborist patrols with rapid inspections provides a more proactive approach to vegetation risk management.</p>	Credible

2.2.2. Network Options

Analysis indicates that the most impacted devices contributing to USAIDI on the WYK13 feeder are WT230, WT006, and WT187, all located between Millgrove and Warburton. These devices are critical because when any of them trip, customers downstream in East Warburton are left without supply due to the absence of a backup feed. This lack of redundancy significantly increases CMOS during fault events. The proposed solutions aim to address the radial line to East Warburton by enabling alternative supply paths such as feeder extensions.

Table 7: Network options assessment

Identified Options	Investigation assessment	Option credibility
Option 3 - Express Feeder from WYK	The WYK Zone Substation currently has three spare circuit breakers available (WYK14, WYK21, and WYK22). An express feeder from WYK was considered as a potential option to enhance backup supply. However, this option was excluded for two key reasons: First, there is already an existing backup supply to Millgrove via feeder WYK23. Second, the cost of implementing an express feeder is high and not economically justifiable.	Not Credible
Option 4 - Extend the WYK23 feeder and back-feed WT010 via the existing WT088 branch line	This option involves a 2.96 km overhead feeder extension from WYK23, using fully covered conductor due to the fire risk codified area in Millgrove and Warburton. Codified area is shown in Appendix 4.4. The proposed route extends from WT159 through the WT088 branch line to back-feed WT010, enhancing backup supply for East Warburton, and making WT162 the new normal open switch. Historical outage data over the past five years shows no recorded incidents on the WT088 branch, which only serves 263 downstream customers. The existing cable size 185 mm ² ABC conductor is sufficient to support the load as a backbone line. The option diagram illustrating this proposal is shown in Appendix 4.2 and 4.3.	Credible
Option 5 - Extend WYK23 Feeder to East Warburton	This option involves constructing a feeder extension from WYK23 at Millgrove to East Warburton to provide a backup supply and improve network sectionalisation. The proposal includes approximately 10 km of overhead line (5 km covered conductor and 5 km standard conductor), 7 remote-controlled gas switches. The feeder will be split into three zones using automated switching and fault detection, enabling faults to be isolated and limiting customer impact to the affected section only. Customers downstream of East Warburton can be supplied via the extended WYK23 feeder during outages. The option diagram illustrating this proposal is shown in Appendix 4.4 and 4.5.	Credible
Option 6 - Underground Cabling of Targeted Vegetation Section	Undergrounding repeated faulted areas, including Don Valley (WT018) and Warburton (WT006, WT230, WT187), would reduce vegetation impacts, however, the feeder is already at its capacitive current limit, meaning any undergrounding is not possible as the REFCL system would not be able to meeting the mandatory performance requirements.	Not Credible

Identified Options	Investigation assessment	Option credibility
Option 7 - Upgrading Manual Switch WT254 to Remote-Controlled Sectionaliser	There are 525 customers located between LD15317 and LD15094, and an additional 159 customers downstream of LD15317 which experience long-duration outages when HV backbone conductors are damaged in this section. Upgrading Manual Switch WT254 to Remote-Controlled Sectionaliser would prevent 190 customers from experiencing sustained outages for faults downstream. While this installation will not eliminate vegetation-related problems, it will significantly reduce the number of customers affected. The option diagram illustrating this proposal is shown in Appendix 4.6.	Credible
Option 8 - Covered conductor for Targeted Vegetation Section	Covered conductor was assessed as a potential solution for reducing vegetation-related outages; however, this option is not considered practical or cost-effective for the WYK13. The dominant cause of outages is fall-in vegetation, which accounts for 87.4% of CMOS impact for vegetation-related incidents. In these scenarios, covered conductor offers limited benefit because large trees falling onto the line can still cause conductor clashing and structural damage. While covered conductor is more effective against blow-in vegetation, these events typically occur on spur lines or at the end of the feeder, where outages are already mitigated by fuses or switches.	Not credible

2.2.3. Non-Network Options

Table 8 outlines identified non-network options

Table 8: Non-network option assessment

Identified Options	Investigation assessment	Option credibility
Option 9 - HV Quick Connection Site	<p>Quick connection sites are typically used for planned outages, they would only be considered during fault conditions as a last resort.</p> <p>The proposal involves utilising an existing permanent HV quick connection site (ID: 2601669500), located upstream of Switch LD15317, to enable faster customer restoration during outages by providing upstream supply up to WT006. The site supports a generation capacity of approximately 6–8 MVA, with setup durations ranging from 24 to 48 hours, significantly longer than the average 17-hour duration of MED outages.</p>	Not credible

2.2.4. Economic Evaluation

Table 9: Investment summary

Option	Investment details	Estimated OPEX Cost (\$)	Estimated CAPEX Cost (\$)	PV ₂₀ of residual risk
4	Extend the WYK23 feeder and back-feed WT010 via the existing WT088 branch line	\$CIC	\$CIC	\$45,751,706
5	Extend WYK23 Feeder to East Warburton	\$CIC	\$CIC	\$45,647,423
7	Upgrading Manual Switch WT254 to Remote-Controlled Sectionaliser	\$CIC	\$CIC	\$47,461,945

Table 10 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 10: Economic evaluation summary

Option	Residual risk cost	PV of benefits	PV of investment	NPV	BCR	Rank	Comments
BAU	\$49.28M	-	-	-	-		BAU – Does not capture benefits
4	\$45.75M	\$3.52M	\$1.64M	\$1.89M	2.15	1	Preferred Option
5	\$45.65M	\$3.63M	\$3.14M	\$0.5M	1.16	2	
7	\$47.46M	\$1.81M	\$1.00M	\$0.81M	1.8	3	

When risk reduction is considered, Option 5 achieves a slightly greater reduction in residual risk cost, lowering it from \$49.28M under BAU to \$45.65M. However, Option 4 has a significantly higher NPV of \$2.13M and BCR of 2.15, compared to Option 5's NPV of \$0.5M and Option 7's NPV of \$0.81M. This indicates that Option 4 provides a substantial reliability improvement along with greater economic value and is therefore the preferred option.

2.2.5. Preferred Option Details

The preferred investment is Option 4 in which extending the WYK23 feeder and back-feed WT010 via the existing WT088 branch line.

A summary of the CMOS, feeder SAIDI and risk costs for the residual and benefit of the preferred investment is detailed in Table 11.

Table 11: Residual risk and annualised benefit summary

	Baseline p.a.	Outcome p.a.	Annualised Benefit
CMOS	7,205,895	6,690,554	7% Reduction
Customers Interrupted	97,313	90,501	7% Reduction
Reliability Risk Cost	\$49.28M	\$45.75M	\$3.53M

Extending the WYK23 feeder and back-feed WT010 via the existing WT088 branch line will provide an approximate 7% improvement in reliability for all customers on this feeder.

2.2.6. Sensitivity Analysis

Table12: Net Present Value (\$m, 2025 dollars)

	Central assumptions	Higher WACC	10% increase in capex	Comments
Do nothing	-	-	-	
Option 4	\$1.89M	\$1.63M	\$1.79M	This is the preferred option under all scenarios
Option 5	\$0.5M	\$0.23M	\$0.38M	
Option 7	\$0.81M	\$0.72M	\$0.72M	

Option 4 remains the preferred option under all tested scenarios. Even when WACC rate is increased from 5.56% to 7%, or when CAPEX rises by 10%, Option 4 continues to deliver a positive NPV. This indicate that Option 4 provides a economically resilient solution.

2.2.7. Proposed Investment Timing

The proposed Option 4 is recommended to be completed by 30th March 2027.

3. Investment Recommendation

To improve the reliability performance of WYK13 feeder, it is recommended that the following project is included within the current Reliability Works Program.

- **Network Options**

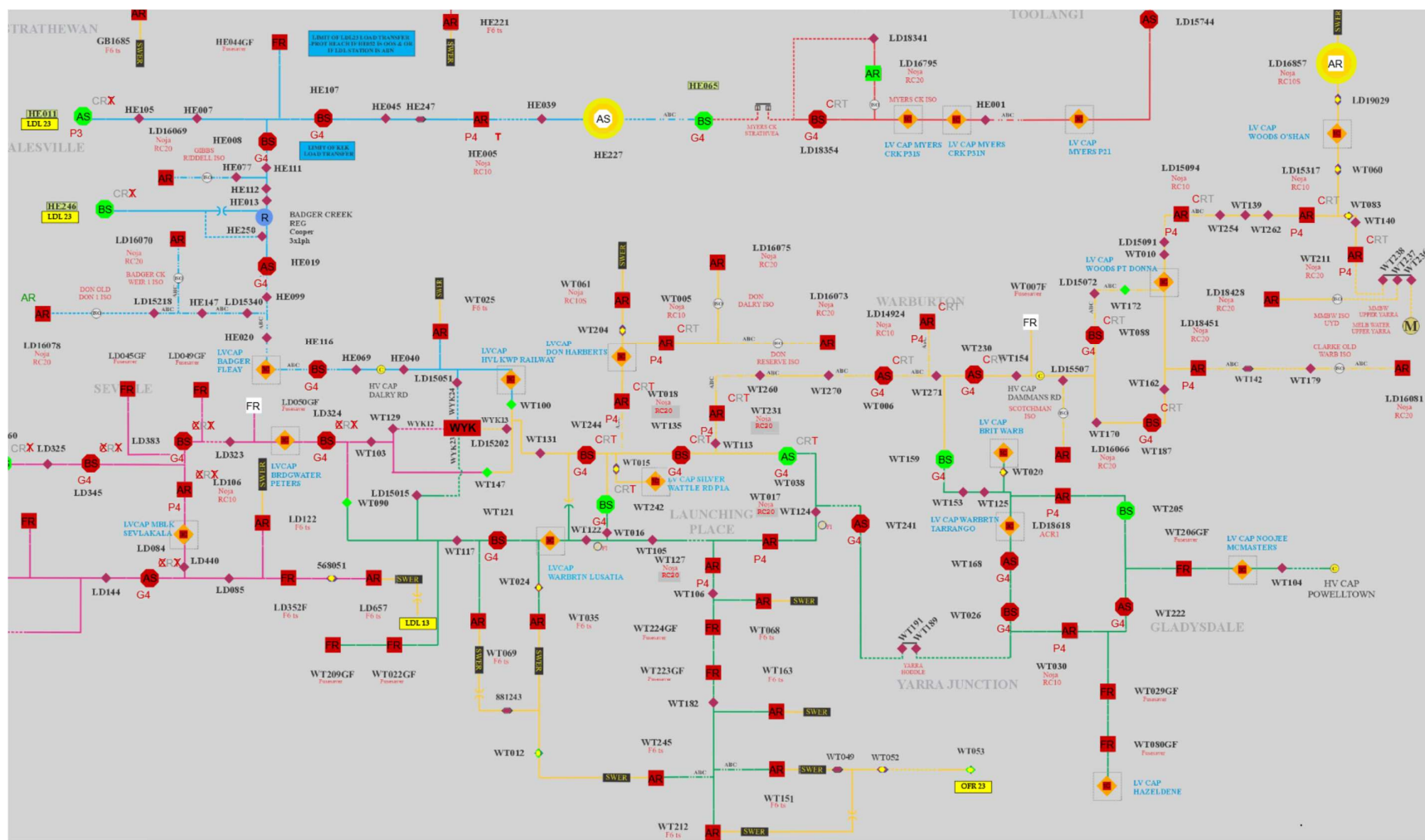
- Extend the WYK23 feeder and back-feed WT010 via the existing WT088 branch line. This solution involves a 2.96 km overhead feeder extension from WYK23, using fully covered conductor due to the fire risk codified area in Millgrove and Warburton.
- Total CAPEX of \$CIC.

- **Operational Options**

- A detailed arborist patrol of the WYK13 front end and backbone (WT230, WT006, and WT018 section) every three years.
- Bi-yearly rapid patrol, which involves a drive-by inspection to identify immediate risks such as hanging or broken branches.
- Total OPEX of \$CIC

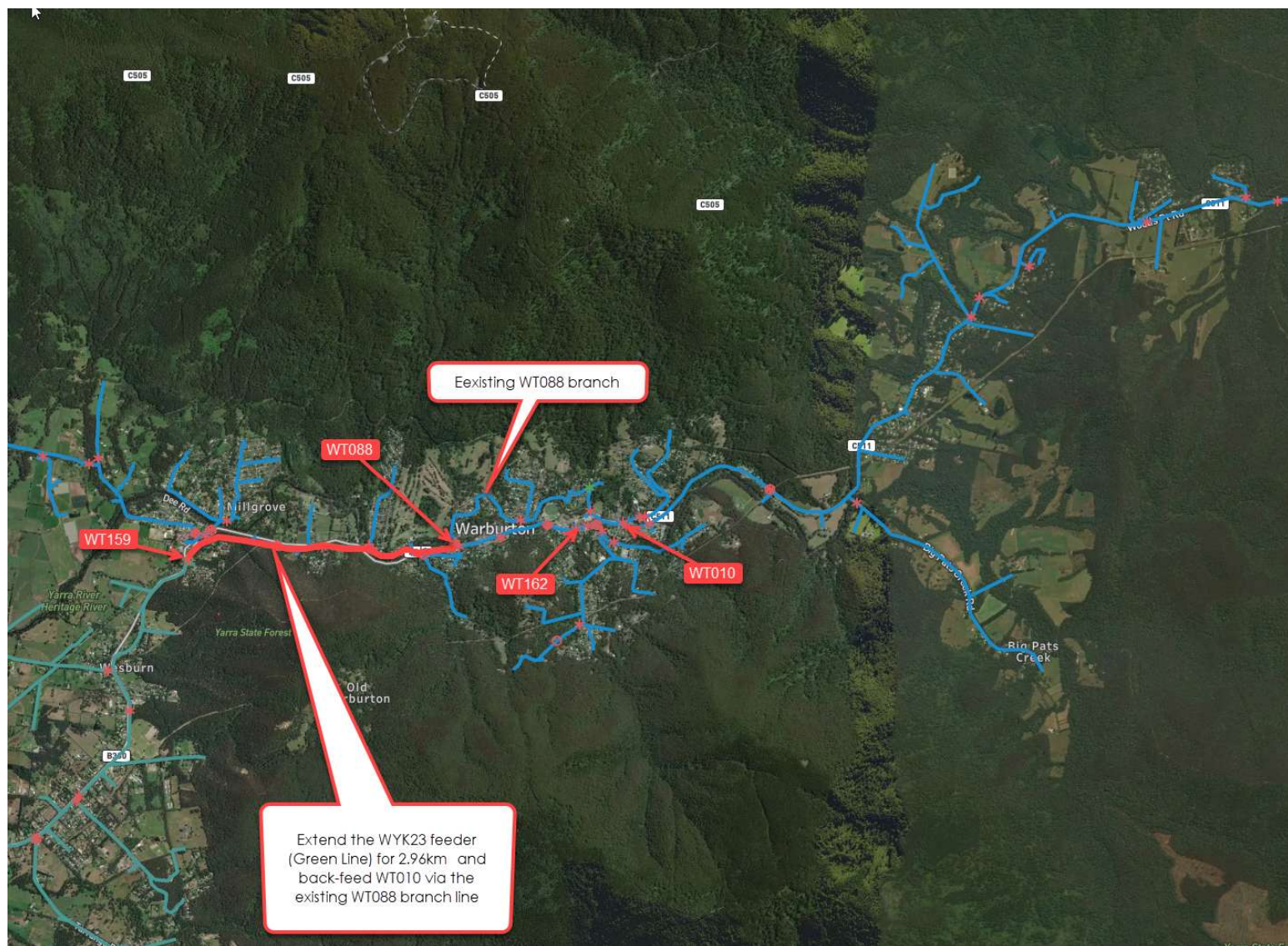
4. Appendices

4.1. Appendix 1 – Single Line Diagram

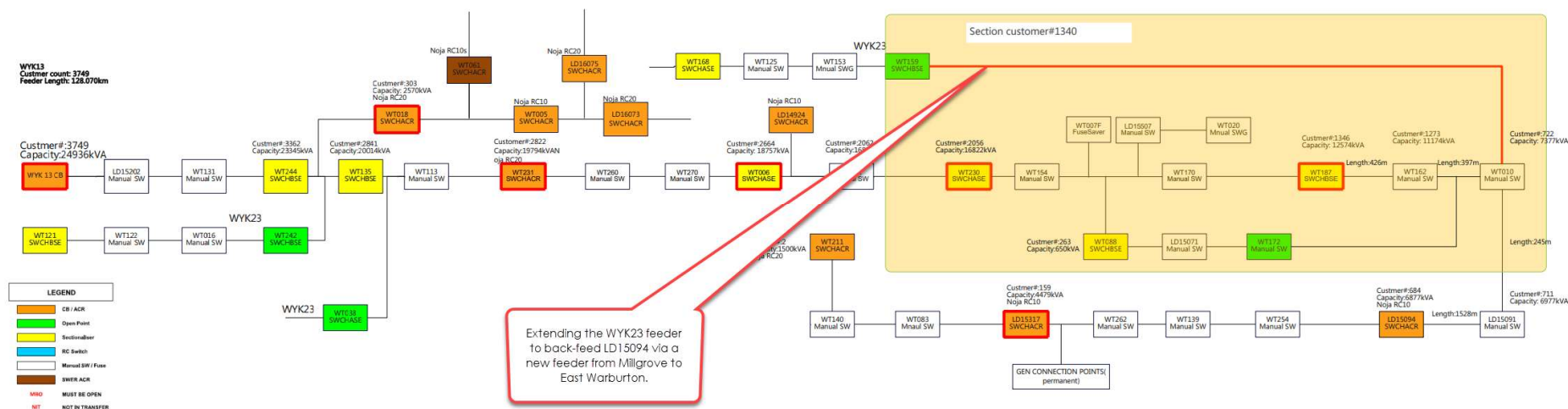




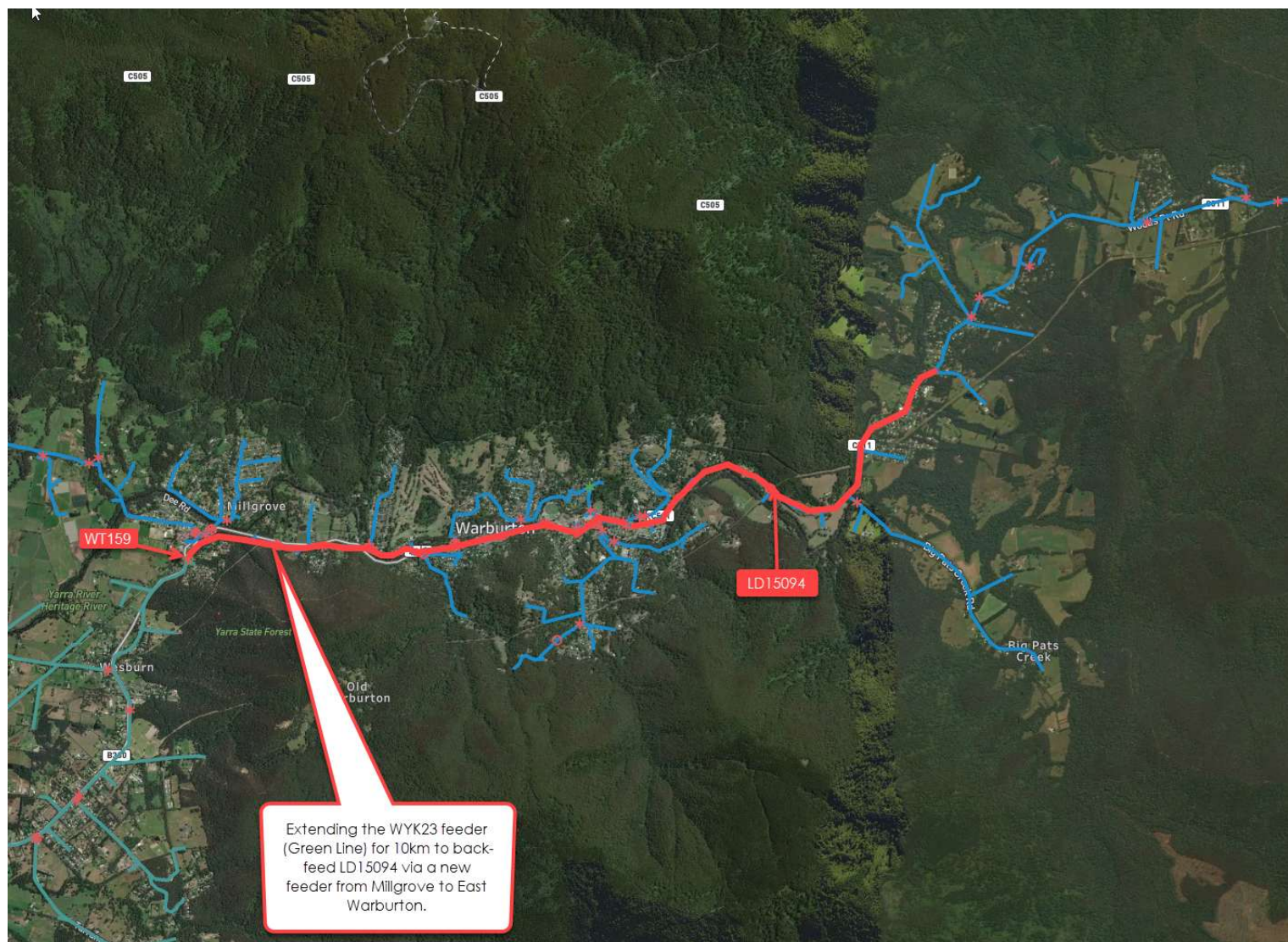
4.3. Appendix 3 -Option 2 Map View



4.4. Appendix 4 -Option 3 Single-Line Diagram

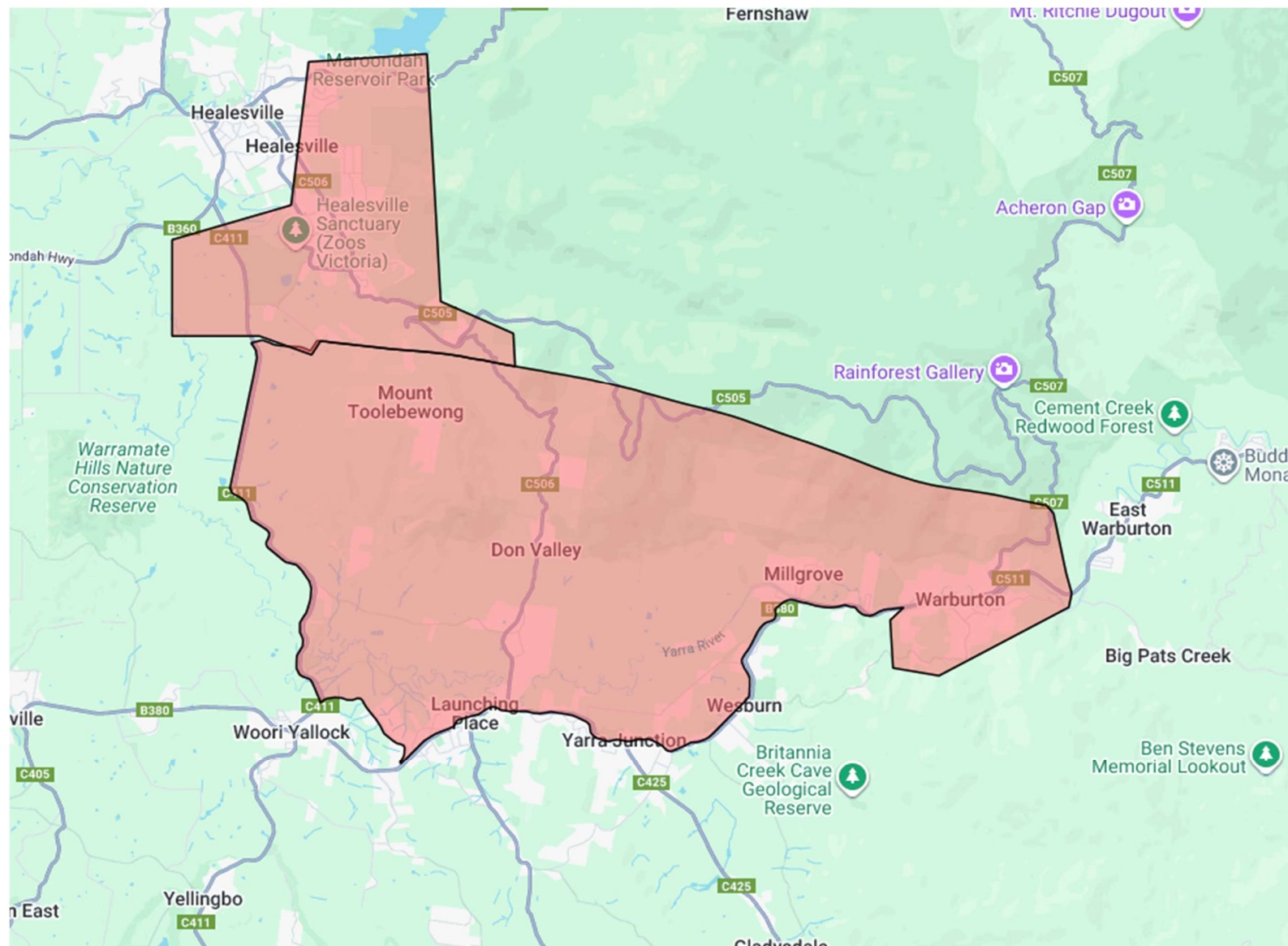


4.5. Appendix 5 -Option 3 Map View





4.7. Appendix 7 – WYK13 fire risk codified area



4.8. Appendix 8- Geographic Location of Feeder

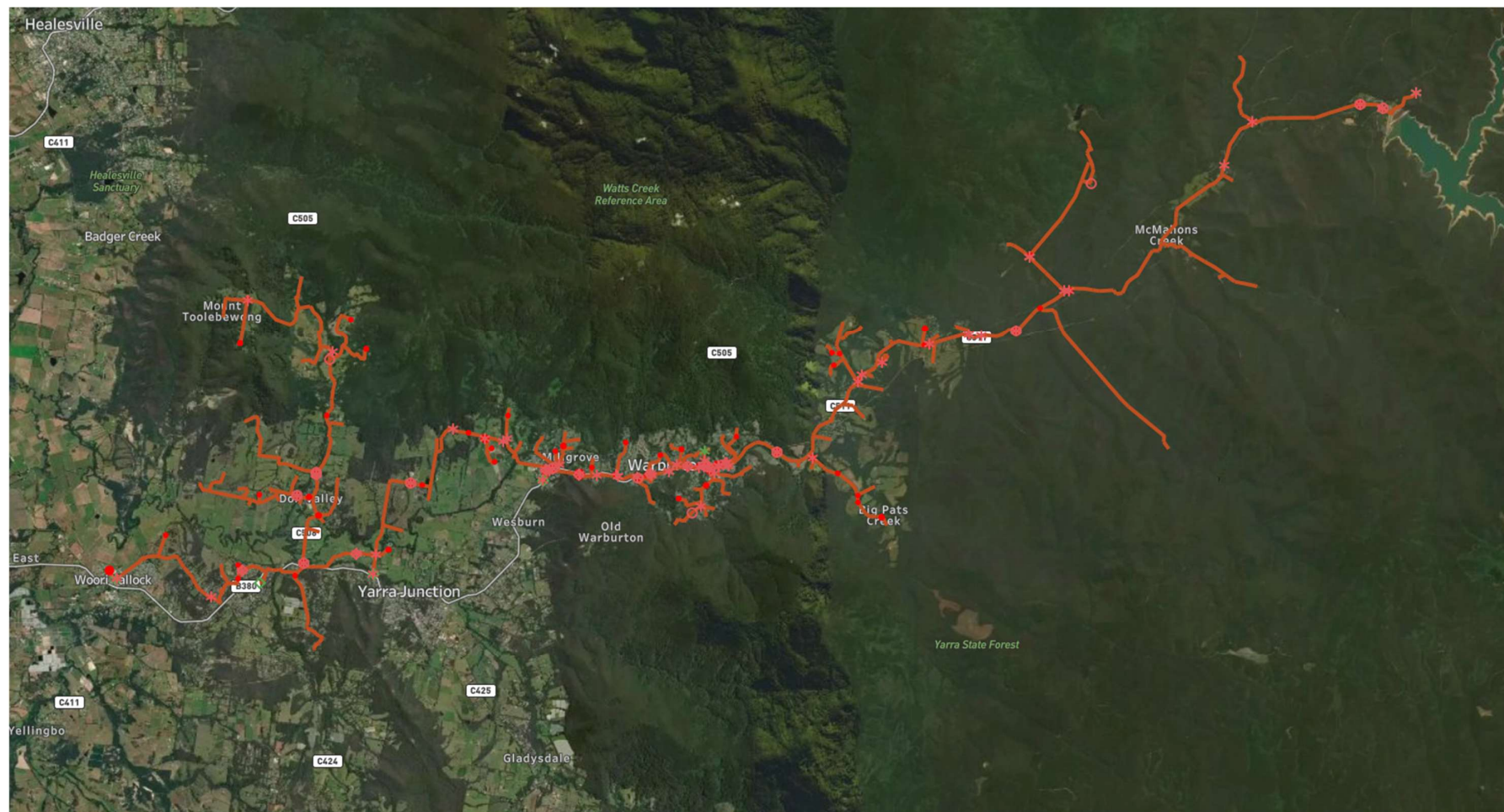
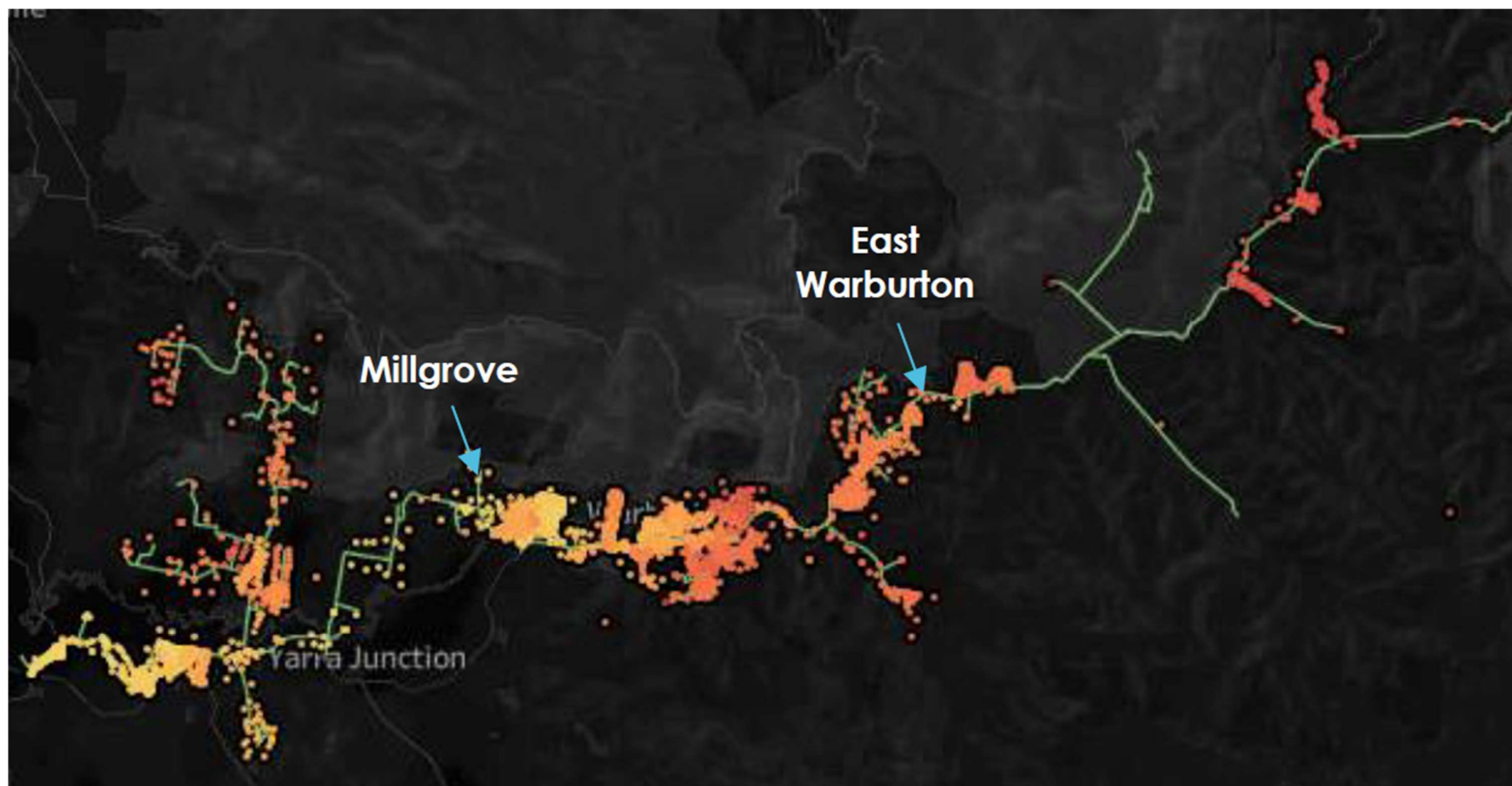


Figure 3: Map view of the WYK13 feeder

4.9. Appendix 9- Heat Map of Outages



4.10. Appendix 10 - Unit Price Cost

2026-2031 Electricity Distribution Repex & Safety program forecasts				Option 4-Preferred Option	
Description	Values	Units	Comments	Qty	Amt
Conductor – ABC/Covered	CIC	per km		2.96	CIC
Est OPEX (0.5% of CAPEX) per year	CIC		Assumed cost per year		CIC
Detailed Patrol by a qualified arborist	CIC	per span	30 spans per day	450	CIC
bi-yearly Vegetation rapid patrol	CIC	per rapid patrol	2 person crew for 2 days	2	CIC

4.11. Outage Summary

Table below only shows sustained outage incidents and commentary on incidents caused a Feeder CB or Recloser to trip.

Date	Incident Number	Cause	CMOS	SAIDI Contribution	Customer Count	Sustained?	Commentary
15/09/2023	INCD-101239-V	Vegetation	8094	2.22	114	YES	Tree on HV & LV ABC between poles 1408205 and 1408206
19/08/2023	INCD-101271-U	Weather	172561	47.32	3598	YES	Large eucalypt failed at root plate due to saturated ground, landing on HV conductors HV and LV conductors on ground. Poles Involved: 1406632-1406634
14/02/2024	INCD-102757-V	Unknown	65,835	18.05	77	YES	
7/09/2023	INCD-102833-U	Vegetation	165097	45.27	3646	YES	Mt Ash tree uprooted during strong winds and heavy rain, fell across HV conductors Impact caused a second Mt Ash tree to fall across the line Poles Involved: Between 1408916 and LD16857
1/10/2023	INCD-104699-U	Vegetation	9,666	2.65	54	YES	Tree on HV ABC overhead line between poles 1403674 and 5775979
4/11/2020	INCD-10644-a	Vermin	52,052	14.27	2657	YES	Possible cause possum interference, Pole 1407242
4/11/2020	INCD-10645-a	Unknown	1470	0.40	15	YES	REFER TO INCD-10644-a
20/10/2023	INCD-106965-U	Unknown	30	0.01	2	YES	No cause found
30/08/2024	INCD-107413-W	Vegetation	2430	0.67	3	YES	
8/07/2020	INCD-1074-a	Other	13392	3.67	144	YES	Tree overhanging HV at LIS 1408834
26/11/2023	INCD-110833-U	Third Party Impact	209,792	57.52	298	YES	Car collided with HV/LV pole, Pole LIS #1406909
27/11/2024	INCD-111144-W	Vegetation	11,139	3.05	30	YES	LV conductor down and cross-arm broken at LIS 1407162
7/12/2023	INCD-112399-U	Unknown	2400	0.66	30	YES	Damage at pole #1408520; conductor strands broken

Date	Incident Number	Cause	CMOS	SAIDI Contribution	Customer Count	Sustained?	Commentary
8/12/2023	INCD-112507-U	Vegetation	783088	214.72	3504	YES	Strong winds caused failure of spacer cable anchoring, not vegetation impact Between LIS 5702871 and LIS 600015
2/04/2025	INCD-114611-V	Equipment Failure	2500	0.69	25	YES	Faulty HV ABC suspension clamp and LV ABC hook at LIS #1401557
16/11/2020	INCD-11477-a	Vegetation	8848	2.43	4	YES	
22/12/2023	INCD-114805-U	Vermin	76	0.02	1	YES	
25/12/2023	INCD-114966-U	Weather	426	0.12	2	YES	No cause found
2/01/2024	INCD-115909-U	Unknown	492	0.13	2	YES	No cause found
18/11/2020	INCD-11597-a	Unknown	34989	9.59	327	YES	No cause found.
17/01/2024	INCD-118189-U	Unknown	100	0.03	2	YES	No cause found
25/01/2024	INCD-119004-U	Vermin	3480	0.95	58	YES	
19/02/2024	INCD-123312-U	Equipment Failure	93,166	25.55	2728	YES	Equipment Failure
14/03/2024	INCD-126346-U	Vegetation	259	0.07	1	YES	
1/04/2024	INCD-128733-U	Vermin	54	0.01	2	YES	No cause found
2/04/2024	INCD-128879-U	Lightning	1596	0.44	3	YES	
5/04/2024	INCD-129529-U	Not applicable	7775	2.13	2	YES	
5/12/2020	INCD-13011-a	Weather	89544	24.55	246	YES	
5/12/2020	INCD-13020-a	Weather	30,012	8.23	123	YES	
30/04/2024	INCD-132031-U	Vermin	26	0.01	2	YES	No cause found.
30/05/2024	INCD-135846-U	Equipment Failure	57	0.02	1	YES	

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11/06/2024	INCD-136538-U	Vegetation	164694	45.16	662	YES	Tree on HV & LV conductors Branch from a 32m Manna Gum tore away during strong winds and landed on HV conductors. between poles 1408336 & 1408407.
17/12/2020	INCD-13766-a	Weather	847	0.23	7	YES	
29/06/2024	INCD-137674-U	Vermin	86016	23.59	3682	YES	Flagged for REFCL exclusion
20/07/2024	INCD-139139-U	Vegetation	47,126	12.92	26	YES	
20/07/2024	INCD-139140-U	Vermin	727	0.20	1	YES	
22/12/2020	INCD-14144-a	Weather	25495	6.99	0	YES	No fault found during patrol
23/08/2024	INCD-142527-U	Vegetation	36500	10.01	50	YES	
30/08/2024	INCD-143617-U	Vegetation	35190	9.65	45	YES	Two blown HV BA spur fuses at WT043, removed a tree branch from HV conductors at LIS #1409277
30/08/2024	INCD-143623-U	Vegetation	28809	7.90	297	YES	Tree down across powerlines, tree branch removed from HV conductors
2/09/2024	INCD-144380-U	Vegetation	536,896	147.22	151	YES	HV overhead line damaged and on ground Swamp Gum tree suffered codominant stem separation during extreme wind event, fell across HV conductors. Pole LIS 1409161.
7/10/2024	INCD-150229-U	Vegetation	223	0.06	1	YES	
15/10/2024	INCD-150637-U	Vermin	15065	4.13	115	YES	
27/10/2024	INCD-151302-U	Unknown	1248	0.34	2	YES	No cause found
30/10/2024	INCD-151439-U	Vermin	371	0.10	1	YES	
21/11/2024	INCD-153758-U	Unknown	11	0.00	1	YES	
24/11/2024	INCD-154000-U	Vermin	40	0.01	2	YES	No cause found
24/11/2024	INCD-154003-U	Vegetation	8,910	2.44	90	YES	
27/11/2024	INCD-154261-U	Vegetation	562	0.15	6	YES	Tree branch between LIS 1407227 & 1407228 removed; LV service pole broken

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27/11/2024	INCD-154263-U	Vegetation	383606	105.18	3652	YES	Large branch from a 28m she-oak tore away and contacted HV conductors Extreme wind event was the primary contributing factor. Between poles 1407227 & 1407228
19/12/2024	INCD-155548-U	Vermin	78	0.02	2	YES	No cause found
19/12/2024	INCD-155549-U	Unknown	76820	21.06	2739	YES	No cause found
3/01/2025	INCD-156572-U	Vermin	324	0.09	4	YES	
3/01/2025	INCD-156595-U	Unknown	132	0.04	1	YES	
21/01/2025	INCD-158144-U	Unknown	756	0.21	7	YES	
11/01/2021	INCD-15963-a	Equipment Failure	15404	4.22	2	YES	
12/01/2021	INCD-16006-a	Vermin	581	0.16	7	YES	
16/02/2025	INCD-160950-U	Vermin	12	0.00	2	YES	No cause found
23/02/2025	INCD-161304-U	Vegetation	445,729	122.22	3656	YES	Tree branch struck HV conductor, causing sagging and blown fuses. Between poles 1407227 and 1407228
27/02/2025	INCD-161725-U	Unknown	12	0.00	2	YES	No cause found
12/03/2025	INCD-162608-U	Lightning	150	0.04	2	YES	Lightning
17/03/2025	INCD-162952-U	Unknown	299841	82.22	1303	YES	Burnt red phase ABC lead at LIS 1407920
22/04/2025	INCD-165191-U	Vermin	41	0.01	2	YES	No cause found
25/01/2021	INCD-16635-a	Unknown	25503	6.99	0	YES	No cause found during patrol
5/02/2021	INCD-17409-a	Vegetation	19,869	5.45	146	YES	no cause found
10/02/2021	INCD-17722-a	Vegetation	560	0.15	7	YES	
1/03/2021	INCD-18588-a	Unknown	657	0.18	1	YES	No cause found

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6/03/2021	INCD-18827-a	Unknown	12	0.00	1	YES	No cause found
4/04/2021	INCD-20169-a	Vermin	1498	0.41	7	YES	
23/04/2021	INCD-21163-a	Vermin	2358	0.65	18	YES	
2/05/2021	INCD-21486-a	Vegetation	97,412	26.71	3556	YES	Large tree branch resting on HV conductors No immediate damage found Bifurcate swamp gum failed at stem union and blown toward conductors. Pole 1406525
4/05/2021	INCD-21606-a	Vegetation	145	0.04	1	YES	
6/05/2021	INCD-21674-a	Vegetation	580028	159.04	1921	YES	Tall 30m+ pine split at base and fell toward conductors; LIS 1407702
3/06/2021	INCD-22838-a	Vermin	12989	3.56	123	YES	
9/06/2021	INCD-23368-a	Weather	9726498	2666.99	3249	YES	
9/06/2021	INCD-24595-a	Weather	2359938	647.09	294	YES	MED caused tree-related impact.
26/07/2021	INCD-27269-a	Vermin	17,328	4.75	38	YES	
27/07/2021	INCD-27331-a	Vegetation	51,662	14.17	599	YES	tree brought down HV and LV lines at LIS 1408843
27/07/2021	INCD-27397-a	Foreign Object	1106585	303.42	2834	YES	Large tree found over HV lines during line patrol. Between LIS 1406650 & 1406652
27/07/2021	INCD-27513-a	Unknown	346599	95.04	297	YES	MED and No cause found
30/07/2021	INCD-27706-a	Not applicable	47763	13.10	183	YES	Tree branch was sitting on transformer. Replaced 1 × 25E BA fuse at WT007 and 1 × 10A FT at LIS #1407644
31/07/2021	INCD-27732-a	Weather	612214	167.87	1916	YES	15m Eucalyptus tree failed at root plate, landed on 22kV conductors and hung up. LIS #x & #1407369
31/07/2021	INCD-27767-a	Vegetation	1,666	0.46	34	YES	
7/08/2021	INCD-28041-a	Vermin	532	0.15	7	YES	
9/08/2021	INCD-28084-a	Vegetation	3315	0.91	51	YES	Large tree resting on HV ABC

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25/08/2021	INCD-28642-a	Not applicable	226	0.06	1	YES	HV planned outage
22/09/2021	INCD-29917-a	Foreign Object	51637	14.16	641	YES	Four large trees brought down two bays of HV at tee-off pole 1403674 Large messmate failed at root plate, causing domino effect with three more trees Fault location in floodplain with wet ground; risk of further failures in strong winds
19/10/2021	INCD-31555-a	Unknown	4710	1.29	3	YES	
29/10/2021	INCD-32775-a	Unknown	22,365	6.13	3	YES	MED-No cause found
30/10/2022	INCD-33158-b	Weather	122,680	33.64	158	YES	HV conductor broken at WT203 Tree on HV/LV conductors at LIS #1406977
17/07/2022	INCD-33235-c	Vegetation	39	0.01	1	YES	
21/07/2022	INCD-33689-c	Vegetation	2660	0.73	19	YES	
29/10/2021	INCD-34688-a	Weather	14577	4.00	3	YES	
29/10/2021	INCD-34924-a	Vegetation	159300	43.68	90	YES	
29/10/2021	INCD-35233-a	Foreign Object	1,111,671	304.82	151	YES	Two bays of HV down with tree; live wires on ground at LIS 1408837 and 1408840-MED
29/10/2021	INCD-35311-a	Vegetation	260,183	71.34	77	YES	Tree on HV at LIS #1408778-MED
29/07/2020	INCD-3578-a	Vermin	57376	15.73	326	YES	No cause found,
22/11/2022	INCD-35791-b	Vegetation	6095	1.67	53	YES	Tree down on HV ABC south of WT072 between poles 1403676 & 1403674
30/10/2021	INCD-36292-a	Not applicable	17520	4.80	3	YES	
2/12/2021	INCD-40867-a	Lightning	3915	1.07	3	YES	
19/12/2021	INCD-43826-a	Unknown	1,463	0.40	1	YES	No cause found
19/12/2021	INCD-44055-a	Weather	92,105	25.26	65	YES	

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28/12/2021	INCD-45120-a	Vegetation	165	0.05	3	YES	
6/01/2022	INCD-46265-a	Vermin	10024	2.75	56	YES	
6/01/2022	INCD-46471-a	Vermin	602	0.17	7	YES	
21/01/2022	INCD-49679-a	Vermin	762	0.21	3	YES	Dead possum found on Haggard Allsops sub
21/08/2020	INCD-5131-a	Foreign Object	29,160	8.00	162	YES	Tree about to fall over, overhanging conductors at WT131
3/07/2020	INCD-517-a	Unknown	18,094	4.96	166	YES	
25/02/2022	INCD-55153-a	Unknown	581	0.16	7	YES	
19/03/2022	INCD-58311-a	Vermin	59336	16.27	116	YES	Blue phase lead blown at WT137; white phase showed splash marks with cap blown off. Suspected animal contact
16/11/2020	INCD-5839-c	Vegetation	58875	16.14	25	YES	
27/08/2020	INCD-5914-a	Weather	112554	30.86	493	YES	Tree on HV line near LIS 1408804, MED
5/04/2022	INCD-60196-a	Equipment Failure	37,436	10.26	2707	YES	GFN (Ground Fault Neutraliser) operated and reclosed on WT231
14/10/2020	INCD-6074-b	Other	4	0.00	1	YES	
26/04/2022	INCD-61391-a	Vermin	13	0.00	1	YES	No cause found.
10/05/2022	INCD-62802-a	Vermin	70	0.02	1	YES	No cause found.
10/05/2022	INCD-62803-a	Vermin	130516	35.79	1948	YES	Dead possum found at base of LD15507; possum on LA at switch
14/05/2022	INCD-63237-a	Unknown	10	0.00	1	YES	No cause found
5/06/2022	INCD-65009-a	Vegetation	165,791	45.46	149	YES	HV conductors taken down by large tree into Yarra River. between poles #1409123 & #1409115.
8/06/2022	INCD-65158-a	Unknown	37	0.01	1	YES	No cause found
10/07/2022	INCD-66918-a	Vegetation	1596	0.44	7	YES	

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3/08/2022	INCD-68405-a	Vegetation	2073184	568.46	2368	YES	Tree on HV/LV mains between poles #1407700 & #1407702-MED
3/08/2022	INCD-68449-a	Vegetation	599	0.16	1	YES	No cause found-MED
3/08/2022	INCD-68521-a	Vegetation	50293	13.79	19	YES	
4/08/2022	INCD-68583-a	Weather	5,200	1.43	80	YES	Tree on line at pole #1407024
3/08/2022	INCD-68586-a	Weather	8,895	2.44	3	YES	
3/08/2022	INCD-68615-a	Vegetation	117000	32.08	52	YES	
3/08/2022	INCD-68711-a	Vegetation	40700	11.16	25	YES	HV ABC down between poles #1401556 and #1401558-MED
27/08/2020	INCD-6901-a	Vegetation	412450	113.09	146	YES	
5/08/2022	INCD-69215-a	Equipment Failure	4910	1.35	10	YES	
24/08/2022	INCD-71720-a	Equipment Failure	1,079,503	296.00	2721	YES	HV ABC at Lis 1403752
25/08/2022	INCD-71721-a	Equipment Failure	12,712	3.49	908	YES	Related to incd 71720-a
25/08/2022	INCD-71792-a	Vegetation	58729	16.10	150	YES	Broken conductor on ground; Healthy medium-sized Eucalypt failed at root plate, fell into a dead tree, causing both to fall onto conductors at LIS 1409118
23/09/2022	INCD-73541-a	Vermin	22101	6.06	125	YES	
28/10/2022	INCD-75228-a	Vegetation	37237	10.21	2565	YES	Tree clipped HV open wire in easement; no damage
31/10/2022	INCD-75421-a	Unknown	10332	2.83	6	YES	MED and No cause found
31/10/2022	INCD-75423-a	Vegetation	247,500	67.86	99	YES	Tree on HV ABC and LV at pole #1407077
31/10/2022	INCD-75446-a	Vegetation	1,779,693	487.99	3473	YES	eucalyptus tree failed at rootball during wet and windy conditions Tree brought down 22kV overhead conductors-MED, Pole #1407364
2/11/2022	INCD-75640-a	Vegetation	2241	0.61	3	YES	

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7/09/2020	INCD-7637-a	Vegetation	23985	6.58	123	YES	
13/11/2022	INCD-76462-a	Vegetation	84760	23.24	652	YES	tree branch on HV overhead line at LIS 1408814
8/09/2020	INCD-7676-a	Weather	240086	65.83	3200	YES	Large eucalyptus tree failed at ground level during severe weather. Tree brought down HV wire and LV ABC conductors. Between LIS 1406819 and LIS 1406812
8/09/2020	INCD-7685-a	Third Party Impact	122,006	33.45	217	YES	HV and LV ABC down due to vehicle driving over lines. LIS #1401557
20/11/2022	INCD-76900-a	Unknown	24,664	6.76	3083	YES	Refer to INCD-76903-a
20/11/2022	INCD-76903-a	Vegetation	259752	71.22	274	YES	
19/11/2022	INCD-76907-a	Vegetation	196000	53.74	250	YES	Branch knocked off HV at pole #1411230
8/09/2020	INCD-7734-a	Weather	345800	94.82	247	YES	
11/12/2022	INCD-78336-a	Vegetation	2574	0.71	3	YES	
14/12/2022	INCD-78515-a	Overload	160,908	44.12	132	YES	35mm HV ABC termination burnt out on red phase on LIS #1407920
22/12/2022	INCD-78830-a	Unknown	700	0.19	7	YES	
8/01/2023	INCD-80726-a	Vegetation	288	0.08	3	YES	
17/01/2023	INCD-82271-a	Weather	89424	24.52	81	YES	
20/09/2020	INCD-8330-a	Lightning	34989	9.59	327	YES	
24/01/2023	INCD-83421-a	Corrosion	4266	1.17	3	YES	Hole blown out of CHP cap on white phase cable
21/09/2020	INCD-8365-a	Overload	558	0.15	1	YES	
29/01/2023	INCD-84008-a	Vegetation	243	0.07	3	YES	Tree close to conductors at LIS #1408546
26/09/2020	INCD-8666-a	Equipment Failure	872		8	YES	Fuse found down at LD16073 isolating transformer fuse Bent bracket identified as potential cause

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26/09/2020	INCD-8682-a	Foreign Object	29790		30	YES	
25/02/2023	INCD-87721-a	Vegetation	31936	8.76	124	YES	HV conductors down due to tree impact. Between poles 1406970 and 1406971
25/02/2023	INCD-87723-a	Vegetation	44	0.01	2	YES	No cause found
6/03/2023	INCD-88720-a	Unknown	6,063	1.66	217	YES	Tripped on imbalance when WT022GF opened under related incident. Linked to INCD-88711-a
16/03/2023	INCD-90075-a	Vegetation	8,950	2.45	106	YES	Tree down and wire down at pole #1409298
16/03/2023	INCD-90094-a	Vegetation	20520	5.63	45	YES	
5/10/2020	INCD-9060-a	Weather	212176	58.18	2657	YES	Blown HV BA 6k fuse at TX; HV and LV opened at TX. Pole 5757207
24/03/2023	INCD-91332-a	Vermin	38	0.01	2	YES	No cause found
14/04/2023	INCD-93756-a	Vermin	781	0.21	1	YES	
15/04/2023	INCD-93814-a	Unknown	12	0.00	2	YES	None
16/04/2023	INCD-93879-a	Vegetation	11,526	3.16	51	YES	Branch fell across transformer, damaging lightning arresters and blowing HV fuse
13/10/2020	INCD-9581-a	Vermin	110638	30.34	2649	YES	line-side isolator WT231 red phase blown open, gas switch slightly blackened
17/06/2023	INCD-96666-a	Unknown	60	0.02	2	YES	
22/06/2023	INCD-97079-a	Equipment Failure	23556	6.46	42	YES	identified U/S pole during planned outage
16/10/2020	INCD-97114-a	Equipment Failure	1140	0.31	30	YES	
26/06/2023	INCD-97525-a	Vegetation	23,154	6.35	102	YES	Insulator detached from X-arm at LIS #1407051, hanging by HV dropper leads
18/10/2020	INCD-9789-a	Vermin	18/03/1905	0/01/1900	16/01/1900	YES	
7/07/2023	INCD-98141-a	Foreign Object	15/08/3164	5/05/1900	3/08/1901	YES	
14/07/2023	INCD-98428-a	Vermin	62	0.02	2	YES	No cause found

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