ENERGY NETWORKS
CONSULTING

INDEPENDENT ENGINEERING REVIEW

The Lines Company (TLC) asset management

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EXECUTIVE SUMMARY

Energy Networks Consulting was jointly engaged by the Commerce Commission New Zealand (Commission) and The Lines Company (TLC) to undertake an independent engineering review of TLC's asset management. The context for the review was a period of poor reliability performance between 2017 and 2020 where TLC exceeded its compliance limits for reliability performance. In response the Commission and TLC agreed to Enforceable Undertakings to procure an independent engineering review.

We were asked to develop an appropriate standard for TLC's asset management strategy, practices, and asset management data.

Observations at a high level

We found a culture of openness and transparency, as exhibited in our interviews and willingness to provide documentation. In the course of our review, we found that TLC displayed positive attributes in respect of asset management:

- Strong leadership and governance including active involvement of TLC's Board in setting the asset management and risk policies.
- Staff have a strong focus on customer expectations and experiences.
- Staff are continually striving to improve their performance and work effectively and constructively to develop solutions.

However, we also found that TLC have opportunities to improve its asset management. This includes:

- Implementing a risk framework consistently across its asset fleets to support making investment decisions, particularly in respect of replacing network assets.
- Improving its documented plans to achieve the asset management objectives including development of fleet plans that articulate asset health and emerging issues.
- Periodically reviewing its Asset Management System, and improving the system by defining the hierarchy of documents and processes that enable the system.

Asset management standard

Our asset management standard reflected the scope and context of the terms of reference for our independent review. We defined an appropriate and fit for purpose standard for asset management, having regard to the organisation and its context, needs and expectations of relevant stakeholders, and good electricity industry practice in New Zealand.

Our asset management standard reflects key elements of ISO 55001, particularly where the scope of the terms of reference required us to. However our standard reflects the context of the review including an emphasis on reliability performance, vegetation management and asset health.

We assessed TLC's systems to record and analyse outage data and address their cause, asset data collection and maintenance systems, asset management strategies, lifecycle practices (including overarching elements, investment plans, maintenance and operations), asset management maturity, and supporting functions including leadership, resourcing, capability and awareness. For each

element of our standard, we considered TLC's current and target maturity based on a scoring scale as set out in Table 1, and which is consistent with industry standards.

Table 1: Scoring description

Maturity level	Description
0	The elements of asset management required by the standard are not in place.
1	Aware of the need for asset management system and is in the process of deciding how to do this.
2	Developed a structured process to determine what is required for an asset management system and has commenced implementation of the process.
3	The element of the asset management system has been implemented as required by a recognised standard with adequate evidence to demonstrate all requirements have been addressed.
4	The element of asset management has surpassed the minimum standard required to comply with requirements set out in a recognised standard.

Assessment against standard

A summary of our assessment against our AM standard is depicted in Figure 1. The orange line is the maturity target we consider TLC should operate at, with the blue line depicting our assessment of current maturity.
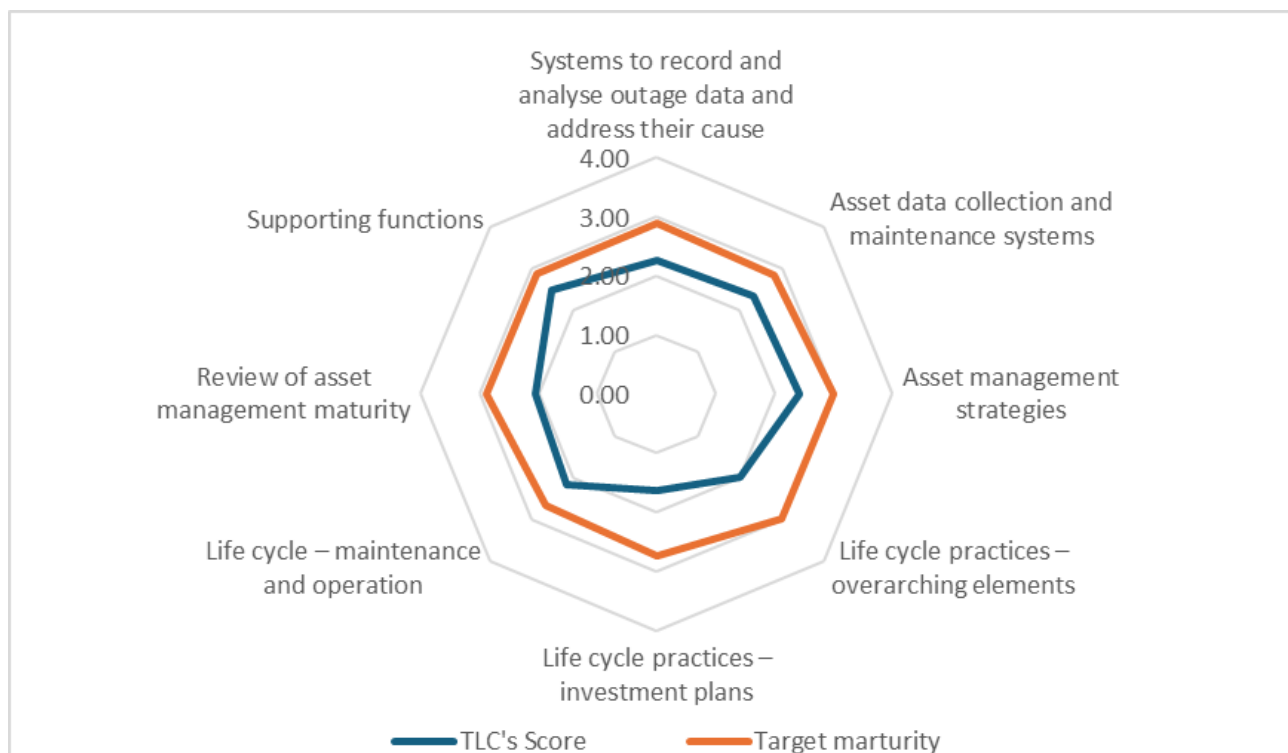

Figure 1: Assessment of TLC's current and target maturity against our Asset Management Standard

We note that scoring is a subjective measure, and that more focus should be applied to our qualitative findings.

Customers and stakeholders expectation for service levels and willingness to pay for improvement should be considered when TLC establishes their target levels for asset management maturity. This recognises that additional resources and costs are required to reach higher levels of maturity and need to be carefully considered in an organisation that has a small and dispersed customer base.

Without information from TLC's customer engagement, which is planned for August this year, we considered that an organisation in TLC's context should be operating at a reasonable level of maturity (between 2.5 and 3.0) across the standard, but should not be expected to exceed good industry practice.

We found that TLC's current performance is generally below the target performance. Our report highlights areas of improvement. Table 2 provides our key findings in relation to our asset management standard, with further information provided in Chapters 4 to 11, and recommendations presented in Chapter 13.

Table 2 Summary of key findings in relation to our asset management standard

Asset Management Standard Area	Key findings
Systems to record and analyse outage data and address their cause	We found that TLC had reasonable systems to monitor and evaluate reliability performance, including strong governance to monitor performance. We considered however that there was less maturity in respect of systems to prevent reliability events and address emerging issues.
Asset data collection and maintenance systems	We found that asset condition data is collected through reasonable inspection programs, and that TLC's approach to record this information is sound. We noted opportunities to increase the frequency of the inspection programs in relation to on-site/physical testing of poles.
	We found a lack of consistency and clarity on how asset health data was being applied to make decisions.
	We also found that TLC could improve how it integrates outage data into asset health information.
Asset management strategies	We found that TLC have a well-articulated Asset Management Policy, Risk Policy and framework, and clear asset management objectives. We considered that further focus needs to be placed on how the underlying plans are directed at achieving the asset management objectives. This includes prioritising fleet plans as per its current workplan, and developing strategies that cross over asset types such as reliability and future networks.
Lifecycle practices - overarching elements	While TLC has a well-documented risk policy and framework, it is not practically applied to asset management decisions. We found that TLC are in the process of developing a criticality framework that could be applied consistently across fleets to improve forecasting and decision making practices.
	We found that there is strong governance on expenditure plans through the AMP process. However the lack of consistent application of risk analysis across the fleet limits opportunities for prioritisation.
Lifecycle practices - investment plans	We found that TLC considers key drivers of investment in developing investment plans including security of supply, replacement and reliability.

	We considered that TLC should review its zone substation security of supply standard and consider the cost and benefits of the different levels of security. We also considered that it should apply its feeder security standard over the 10 year AMP horizon.
	We considered that asset replacement investment decisions would be improved through a criticality framework, and that TLC should document fleet plans.
	We considered that TLC should continue to mature its strategy for network resilience including actions to mitigate the impacts of adverse weather such as that experienced in RY23.
Lifecycle practices - maintenance and operations	We found that TLC documents its inspection and maintenance standards, and these appear reasonable. However we recommend documenting the underlying rationale and routinely reviewing the inspection standards. We also found that TLC could consider more regular on-site/physical inspection and testing of poles to align to industry practice.
	We found that TC has a well documented vegetation management strategy and an awareness of the impact of out of zone trees on its performance. We consider that it should fully develop a plantation and vegetation database as a key enabler to improve risk management, leveraging the recent work to use aerial photography and LiDAR with its GIS platform.
Asset management maturity	While TLC has demonstrated its commitment to improve its asset management processes and systems, it has not had a focus on improving its asset management system. We consider that TLC's overall asset management effectiveness would be improved if it undertook comprehensive and periodic reviews of its asset management system, beyond the requirements of the annual Information Disclosures. We also consider that TLC could define the hierarchy of documents, systems and processes that support and enable its asset management system.
Support functions	We found that TLC's senior leadership team and Board display an active commitment to achieving asset management objectives. We found that resourcing appears sufficient to undertake activities, but that further resources should be considered in the network control function. We also consider that the assessment and monitoring of staff qualifications should include engineering staff.

1.   INTRODUCTION

The purpose of this chapter is to identify the context and scope of our review, provide an understanding of how we conducted our investigations, and information on the structure of our report.

1.1   Context for this review

TLC provides electricity to over 20,000 customers through its distribution network. The network supplies a large number of small towns, requiring a relatively high number of assets compared to peer businesses. The terrain is rugged and includes considerable mountain ranges and several national parks impacting TLC's maintenance and vegetation management practices.

A key driver for this review was TLC's reliability performance between 2017 and 2020. TLC is subject to price-quality regulation, which sets limits for reliability performance for each regulatory year. Between 2017 and 2020, TLC exceeded its compliance limits set out in the 2015 DPP. This included exceeding the limits for outage duration per customer (SAIDI) for each regulatory year between 2017 and 2020, and exceeding outage frequency per customer (SAIFI) in the 2018 and 2019 regulatory years.

The Commission commenced an investigation into the circumstances of the assessed values and found that TLC contravened the Quality Standards imposed by the DPP Determination 2015 in the 2018, 2019 and 2020 Assessment Periods (Contraventions). 2017 was not considered a breach as the Limits were not exceeded in the 2016 Assessment Period.

The Commission and TLC agreed to Enforceable Undertakings under s74A of the Act (Undertakings). This report addresses the element of the Enforceable Undertakings to procure an independent engineering review of TLC's asset management practices.

The Enforceable Undertakings also require TLC to publish this report, develop a delivery plan and undertake annual delivery reports.

1.2   Purpose and scope of review

The purpose of this review is to assess the state of The Lines Company's (TLC) asset management strategy, practices, and asset management data. This includes:

- Systems to record and analyse system outages and interruptions to supply and address their cause.
- Asset data collection and maintenance systems.
- Asset management strategies.
- Asset management practices from forecasting to implementation.

The scope of the review (see Appendix A) required us to:

- Define an appropriate and fit for purpose standard for asset management, having regard to the organisation and its context, needs and expectations of relevant stakeholders, and good electricity industry practice in New Zealand.

- Assess past and emerging trends in asset health condition and asset reliability on the TLC network for RY21 to RY24 (inclusive, ie 1 April 2020 to 31 March 2024).
- Assess the current state of the areas of TLC's asset management system, and identify any gaps. This shall include an assessment of:
  - Asset management policies, objectives, and strategies with particular reference to vegetation management and asset management maturity.
  - Practices for performance evaluation and improvement in relation to planned system outages, unplanned interruptions to supply and response and recovery from interruptions.
  - Life cycle asset management practices.
  - Asset management information, with particular reference to asset information maturity, information on asset health condition and outages.
  - Asset management maturity annual self-assessments and improvement plan.
  - The governance and senior management review of asset management (refer to ISO 55001, section 9.3);
- Assess the progress of the remedial matters and whether they will close any identified gaps to the required asset management standard.
- Recommend any further actions required to close any identified gaps to the required asset management standard.

Include other matters that the Expert considers necessary to fulfil the objective of the Expert Report.

1.3   Investigation approach to achieve the review objective

This section provides an overview of the approach applied to undertake this review and achieve the objectives as set out in the Terms of Reference. We undertook both desktop review and meetings with TLC's staff to investigate the asset management system, asset management strategies and performance. Key steps shown in Figure 2 include:

- Step 1: Project initiation and management - An initial meeting via Teams to introduce the key personnel form both ENC and TLC, confirm the scope with the team and who is responsible from TLC for each area of the review, plan indicative dates for meetings on site and submit an initial information request regarding past performance and asset management system documentation.
- Step 2: Desktop review and asset management standard – In this phase of the review we firstly developed the asset management standard required to assess TLC's asset management system and practices. The process to develop the standard is described in detail in Chapter 0. We then undertook a preliminary review of the initial information request.
- Step 3: Assessment and gap analysis – In this phase we interviewed TLC staff in person and through teams to understand documentation provided, provide context on their activities, and to identify new information requests.
- Step 4: Reporting – The final step was to prepare a draft report submitted to TLC and the Commission for review and feedback on errors of fact and clarity and a final report that is suitable for publishing by TLC.

Figure 2: Investigation approach steps

1.4 Report structure and alignment to Terms of Reference

The rest of the report is structured as follows:

- Chapter 2 identifies our Asset Management Standard with reference to the Terms of Reference, and identifies the target maturity for TLC in respect of the standard.
- Chapter 3 identifies our analysis of TLC's recent performance in relation to reliability and asset health.
- Chapters 4 to 11 identify our assessment of TLC's asset management with reference to our standard, and improvements to meet the target maturity appropriate for TLC.
- Chapter 12 identifies TLC's progress on the remedial matters, and whether they will help close the gap to the standard.
- Chapter 13 provides a fully list of identified gaps and further actions.

Table 3 identifies the relevant section of the report in relation to the TOR Scope.

Table 3 Relationship of report to Terms of Reference scope

Terms of Reference scope	Report section
A description of the asset management standard	0
A description of the investigations undertaken and key findings	1.3 and Executive Summary
A description of any emerging trends in asset condition and reliability;	3
A description of the current state of TLC's asset management strategy, practices, and asset management data, including identifying any gaps to the required asset management standard;	4 to 11
An assessment of asset management maturity;	10
A description of the remedial matters and whether these will close the identified gaps to the required asset management standard; and	12
Any further actions required to close identified gaps to the required asset management standard.	13

2. THE ASSET MANAGEMENT STANDARD

The purpose of this chapter is to identify the asset management standard we have applied in assessing TLC's maturity in asset management strategy, practices, and asset management data. The chapter is structured as follows:

- Section 2.1 describes the process for defining an Asset Management standard including consideration of the Terms of Reference for the Expert Report.
- Section 0 provides information on the scale we have used to assess TLC's current maturity in respect of our Asset Management standard.
- Section 2.3 identifies key considerations on TLC's target maturity against the Asset Management standard including its unique context, needs and expectations of stakeholders, performance of peers, and good industry practice.
- Section 3.4 identifies the target maturity by the key assessment areas in our AM Standard.

2.1   Defining the Asset Management standard

In developing our Asset Management standard (AM Standard) we have considered the context and scope of the Terms of Reference.

The context of the Terms of Reference relates to systems to record and analyse outage data, asset information systems, asset strategies, and asset management practices from forecasting to implementation. The scope of the Terms of Reference has particular regard to asset management maturity, vegetation management and how decisions are linked to emerging trends in asset condition. In making assessments, the Terms of Reference clearly identified relevant clauses of ISO 55001, which we have considered in developing the asset management standard.

Table 1 identifies the Asset Management Standard. The items in the standard reflect the ordering of the context (1.1a-d) of the Terms of Reference and are mapped to the topic matters in the scope (3.1(c)). Importantly, this does not reflect the structure and breadth of ISO 55001, nor does it reflect the current AMMAT self-assessment of maturity undertaken by NZ EDBs.

The standard however is aligned to key items in ISO 55001, including items specifically specified in the scope of the Terms of Reference. The AM Standard includes ISO 55001 elements of leadership and commitment, resourcing, capacity and awareness. While these were not expressly called out in the scope of the Terms of Reference, we considered they were necessary to the context and scope of the Terms of Reference.

In general terms, our AM Standard assesses 2 aspects:

- The maturity of the asset management system being the policies, plans, processes and information systems which are integrated and applied to give assurance that asset management activities will be delivered.
- The maturity of asset management practices that are applied to manage individual asset fleets including collection and analysis of data, modelling to forecast replacement needs and emerging trends, through to implementation.

Table 4 Mapping Terms of Reference and ISO55001

Terms of Reference context	Topic	Terms of Reference Scope	Assessment area in our report	Section of our report	ISO55001 Clause(s)
1.1(a)	Systems to record and analyse system outages and address their cause	3.1(c)(ii)	Monitor and analyse outage data	4.1	9.1, 9.3, 10.1, 10.2
			Management review	4.2	
			Corrective actions	4.3	
			Preventative actions	4.4	
			Continual Improvement	4.5	
1.1(b)	Asset data collection and maintenance systems	3.1(c)(iv)	Sufficiency and quality of asset health data	5.1	7.5, 9.1
			Making decisions with asset health information	5.2	
			Asset information maturity	5.3	
1.1(c)	Asset management strategies	3.1(c)(i)	Asset management objectives	6.1	6.2.1
			Asset management policies	6.2	5.2
			Plans to achieve asset management objectives	6.3	6.2.2
1.1(d)	Asset management practices from forecasting to implementation, including how decisions are linked with emerging trends in asset condition	3.1(c)(iii)	Decision making	7.1	6.2.2(a) and 6.2.2 (b)
			Governance and prioritisation	7.2	
			Implementation of plans	7.3	
			Capacity and security of supply	8.1	
			Asset replacement	8.2	
			Network reliability investments	8.3	
			Network resilience	8.4	
			Maintenance	9.1	
			Vegetation management practices	9.2	
			Response and recovery from outages	9.3	
Supporting 1.1(a)-(d)	Governance and maturity of the asset management system	3.1I(v)	Asset Management Improvement	10.1	9.3, 10.1, 10.2,
			Asset Management self-assessment	10.2	
		3.1(c)(vi)	Senior management review of asset management	10.3	4.3, 4.4, 5.1, 5.3, 6.1, 7.1, 9.3
			Governance of asset management	10.4	
	Supporting capabilities	3.1(c)(i-vi)	Leadership and commitment	11.1	5.1
			Resourcing	11.2	7.1
			Competency	11.3	7.2
			Awareness	4.2	7.3

2.2 Assessing TLCs AM maturity

The Terms of Reference requires us to provide an assessment against our AM Standard. We have applied a quantitative assessment of maturity based on the current grading systems in AMMAT. In our view, this provided a degree of comparability between AMMAT and our AM Standard. The maturity grading scale is a score between 0 to 4 based on the descriptions set out in Table 5. In our detailed assessment, we have applied the principles of this description to the specific element being addressed.

Table 5 High level summary of AMMAT grading system applied in our AM Standard

Maturity level	Description
0	The elements of asset management required by the standard are not in place.
1	Aware of the need for asset management system and is in the process of deciding how to do this.
2	Developed a structured process to determine what is required for an asset management system and has commenced implementation of the process.
3	The element of the asset management system has been implemented as required by a recognised standard with adequate evidence to demonstrate all requirements have been addressed.
4	The element of asset management has surpassed the minimum standard required to comply with requirements set out in a recognised standard.

We note that scoring is likely to be subjective, and that a different assessor may form an alternative view based on the same set of materials. For this reason, it is very important to understand the materials and reasoning underlying our scores.

For each element of the AM Standard, we have provided a qualitative assessment of maturity, referencing our views and reasoning with reference to documents or interviews. We have also identified improvement opportunities that effectively represent the 'identified gap' to meet the appropriate maturity for TLC.

2.3 Appropriate maturity for TLC

The Terms of Reference requires us to define the appropriate and fit for purpose standard for asset management for TLC, having regard to the organisation and its context, the needs and expectations of relevant stakeholders and good electricity industry practice in New Zealand.

We have sought to satisfy this requirement by identifying the target maturity appropriate for TLC for each item in our AM Standard, using the grading scale outlined in Table 5.

At a high level, we have sought to balance the costs and value to stakeholders in achieving different maturity levels. This recognises that there is a cost in terms of systems and staff effort involved in improving maturity. Therefore, it is important to identify the areas of development that will benefit customers and assess whether the benefits gained from achieving an improved level of asset management maturity outweigh the costs.

As illustrated in Figure 3, staff effort and system costs are likely to increase as a network increases its maturity, and this has also been a consideration in our assessment of the appropriate standard for TLC.
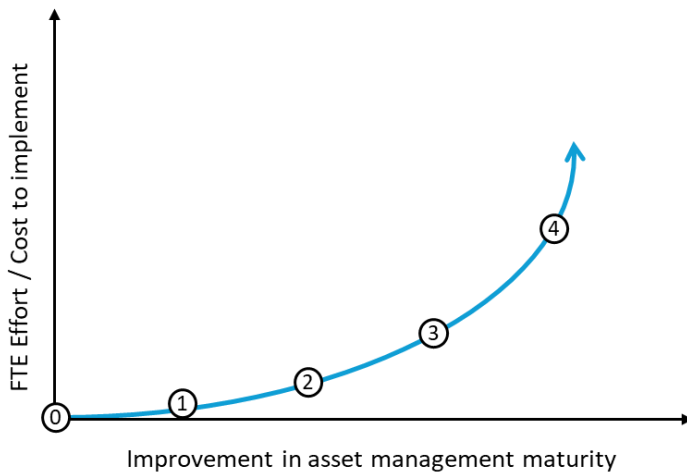
Figure 3 Trade off of costs and effort against improving asset management maturity

Our assessment of the factors we are required to consider in the Terms of Reference and the impact on the expected level of maturity is described below.

2.3.1   Considerations of TLCs context

Our review requires us to consider the context of TLC's network when assessing the appropriate standard for asset management. We consider that the following aspects of TLC's organisation are relevant factors when assessing TLC's target maturity.

TLC is located in a rural area of New Zealand, almost 3 hours from Auckland and 1 hour from Hamilton. The terrain is rugged with the network traversing across mountain ranges, through national parks and forestry plantations. TLC has a relatively small customer base of about 20,000 connections, but spread over many small load centres. These characteristics impact:

- Resourcing and capability – It is difficult to recruit appropriately skilled and qualified staff in the rural area compared to other networks. Evidence provided demonstrated that some skilled roles have taken over a year to recruit into.
- Outages – A large rural geographic area with significant vegetation and rugged terrain is likely to result in longer duration outages relative to an urban network with limited vegetation.
- Inherently higher costs to serve – TLC's RAB per customer is relatively high compared to other networks, due to the spread of customers it has to serve. This means that TLC has to exert discipline on its costs, and does not have the same scale opportunities as other networks to invest in new systems.

2.3.2   Needs and expectations of relevant stakeholders

The Terms of Reference requires us to consider stakeholder needs and expectations when considering the appropriate standard that TLC should achieve. We consider that customers and the broader community are the key stakeholders to consider in our assessment.

We have not been able to form a view on the expectations of customers. While the 2023 AMP (Doc Ref 1) indicates that TLC regularly engages with customers and the community, there is little information on customer's views on willingness to pay. We understand that TLC will be shortly commencing its customer consultations (Doc Ref 239) where it expects to receive more information

on topics such as customer's views on the trade off between costs and improvements in quality of services.

In our interviews, we have noted staff's awareness of customers on the network including relatively limited economic means in the area.

Based on the above, we have considered the increased costs associated with improving asset management maturity to ensure any higher maturity targets will provide a net benefit to customers. This has been reflected in the target maturity we have set for each aspect of the assessment.

2.3.3   Good industry practice

In establishing the AM Standard and the level of maturity we expect TLC should demonstrate we have had regard to good industry practice and our experience working with EDBs in New Zealand.

We have interpreted good industry practice as demonstration by TLC that their asset management activities and supporting policies, plans, processes, models and information systems are of a similar standard to those applied by peer non-exempt EDB's in New Zealand.

To assess whether practices meet good industry practice we have had regard to:

▪ A review of the AMMAT self assessment of peer EDBs, that is required by the Information Disclosures, to determine an average maturity level. We used a cohort of seven EDBs that were identified in the 2021 Strata report (Doc Ref 241) and verified that their characteristics were sufficiently comparable to TLC. We used the reported data to determine an average per AMMAT assessment question and then mapped this to our AM Standard. This analysis is set out at Appendix B.

▪ Information presented in the AMPs of other EDBs where we are able to compare practices in sufficient detail.

▪ Our experience working with or reviewing the asset management systems and practices of peer EDBs.

▪ Our understanding of expectations from the Commission based on publicly available documentation.

As required by the scope we have considered good industry practice in the context of New Zealand and have not considered our experience in other jurisdictions such as Australia where different drivers can result in different levels of asset management maturity.

We note that good industry practice is not an absolute measure and businesses can apply some practices that are consistent with good industry practices and other that are not. Therefore, we have considered practices at a granular level when assessing whether or not good industry practice has been applied. In our assessment, we have considered that good industry practice for an individual process would be graded as a 3 in the AMMAT scale. For example, good industry practice in the New Zealand context for risk assessment would be application of a matrix style assessment, whereas best practice would be fully quantified risk assessment into a dollar value, which would be graded a 4 in the AMMAT scale.

2.4 Expected level of maturity

In forming our view on the level of maturity we expect TLC should target to ensure they can achieve their asset management objectives and meet expectations of stakeholders we also considered the context of TLC, its size and scale, and the considerations set out in the sections above. The orange line in Figure 4 is our view of what TLC's target maturity should be for each of our Asset Management assessment areas. The green line shows that our assessment is similar to what other networks are reporting as part of their self-assessment for similar questions in the AMMAT. In Chapters 4 to 11, we set out the target maturity for each individual element of the assessment area.
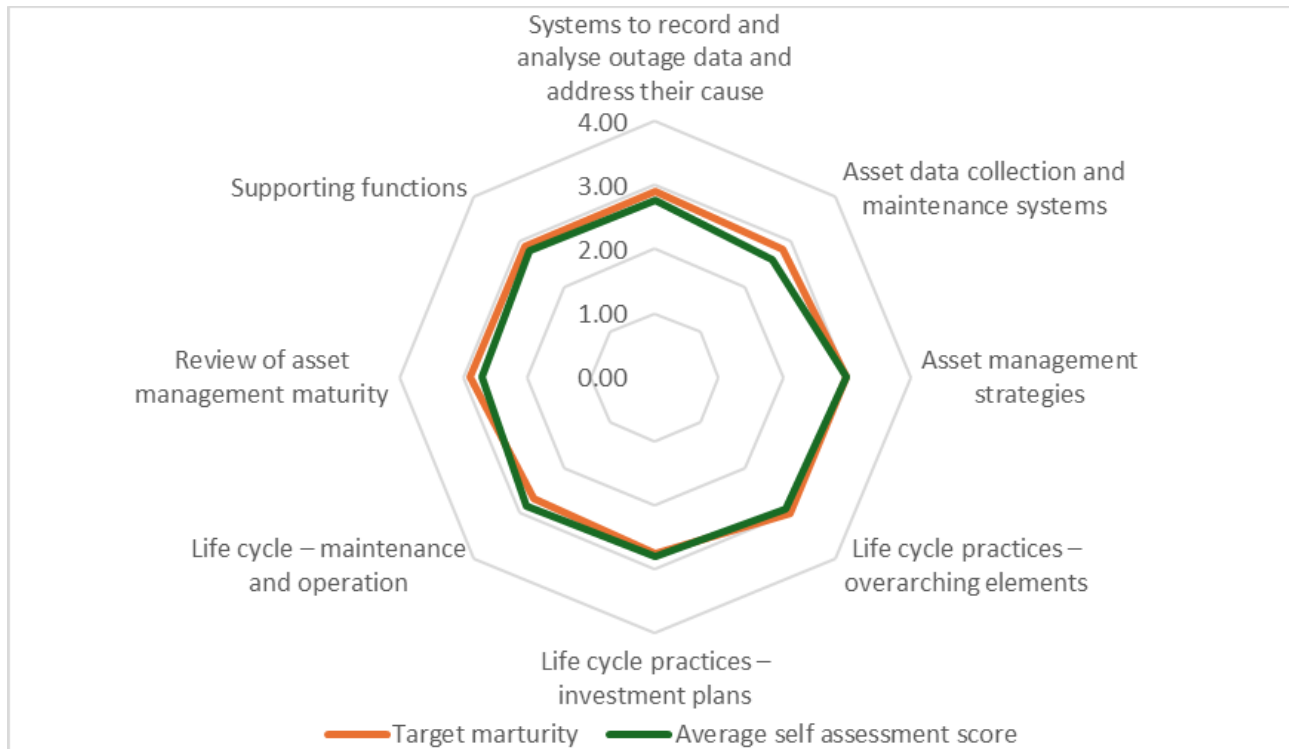
Figure 4: Expected level of maturity for our assessment areas and comparison to self-assessment scores of peers

3.   TLC'S RECENT PERFORMANCE

The scope of the review requires us to assess TLC's past and emerging trends on asset health and asset reliability for the current and previous three regulatory years (RY21 to RY24). This analysis provides a lens for assessing TLC's current maturity against the AM Standard outlined in Chapter 0.

We note that limiting the analysis to a four year period limits our ability to draw conclusions on trends for reliability performance.

Section 3.1 discusses past and emerging trends on asset reliability with Section 3.2 addressing asset health.

3.1   Asset reliability performance

We have assessed TLC's reliability performance and causes from RY21 to RY24 to assess emerging trends or issues. We note that reliability performance is inherently volatile, and this is likely to be even more pronounced for TLC that have a relatively low customer base and operate in remote areas. Relevantly, the RY23 year was impacted by Cyclone Gabrielle and other weather events.

We have relied on data in TLC's systems to assess reliability performance over the four year period. We have used industry measures such as average frequency of interruption per customer (SAIFI) and average duration of outage per customer (SAIDI).

In the sections below, we have focused on unplanned and planned outages.

Unplanned outages

Our review of unplanned outages includes trend analysis of SAIDI and SAIFI based on a normalised (excluding major events) and raw data.[1] We have also sought to understand trends in outage duration. We have then undertaken a review of causes of unplanned outages with a focus on vegetation management and asset defects. Finally, we have performed a partial review of the regions of TLC's network to assess emerging trends.

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[1] We note that in RY21 the reporting requirements for DPP3 came into effect meaning that all four years of the assessment period have the same normalisation methodology applied.

Unplanned SAIDI and SAIFI

The unplanned SAIDI and SAIFI data for normalised and raw data is provided in Figure 5 together with the compliance limits and performance targets. The data shows that SAIDI was reasonably consistent during RY21, RY22 and RY24 for both raw and normalised values and compliant with the DPP3 limits. SAIFI has shown similar trends to SAIDI albeit with more volatility in RY21, RY22 and RY24.

SAIDI and SAIFI were above the compliance limits in RY23 for both raw and normalised data. Cyclone Gabrielle was a major cause of the raw data performance but had less impact on normalised data due to it being classed as a Major Event.
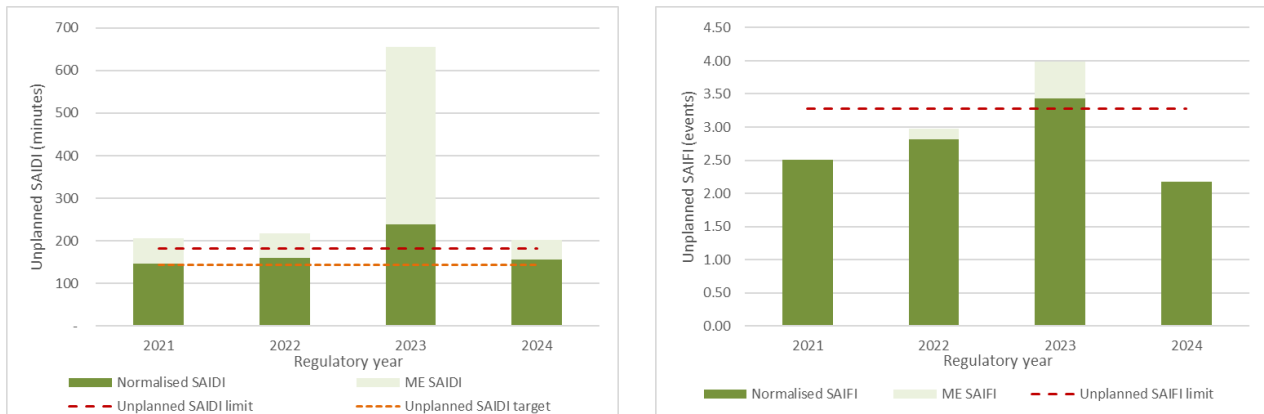
Figure 5 Unplanned outages with contribution from Major Events

Figure 6 shows the cumulative trend of SAIDI for the four regulatory years and highlights where the trend in RY23 departed from the other three years.
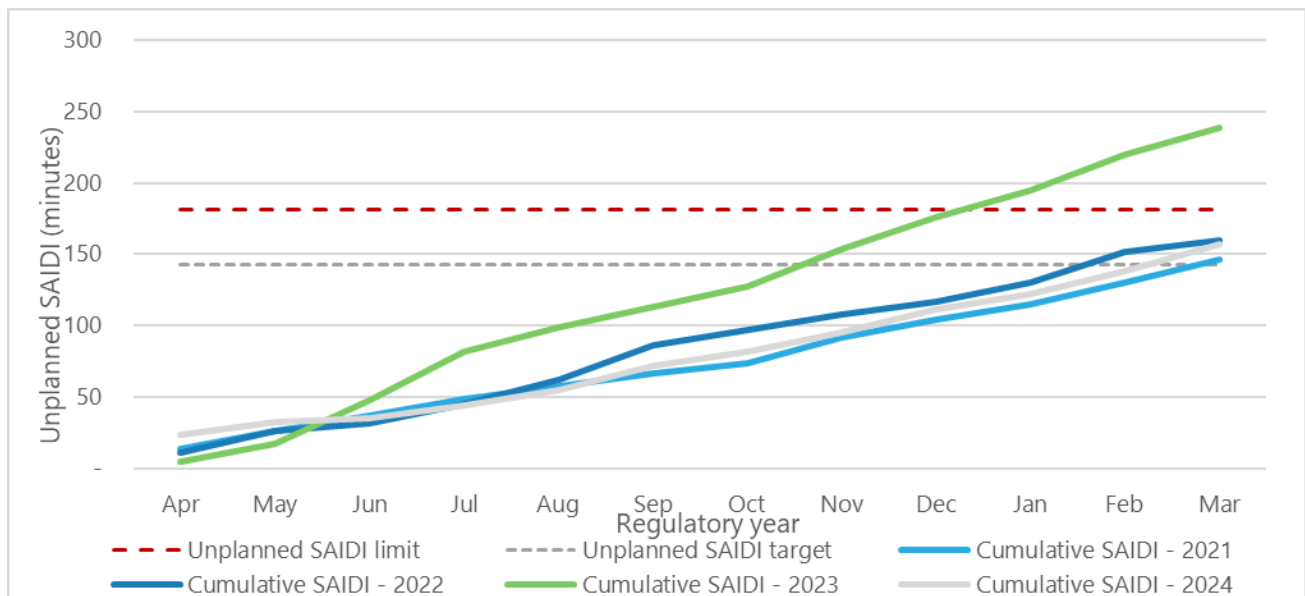
Figure 6 Cumulative trend of SAIDI for each regulatory year RY21 to RY24

Multiple events in June, July and November contributed approximately 47.5 minutes to SAIDI. These were predominately caused by vegetation and defective equipment, in particular:

- Out of zone plantation trees contributed 17.5 minutes
- Out of zone residential trees contributed 10.5 minutes
- Conductor and joint issues contributed 10.5 minutes

- Cross arms contributed approximately 9 minutes

TLC's analysis of reliability in RY23 (Doc Ref 26) suggests that adverse weather played a key role in performance suggesting almost three times the number of extreme days than the 20 year average.

We note that there was an elevated number of vegetation related outages in the normalised data for RY23. This could have been the result of storms that did not qualify as major events or the impact of significant rainfall on the structural integrity of trees making them more susceptible to falling over. In any case, we have not observed the same impact in RY24 which suggests that weather is likely to have played a significant role rather than a systematic and enduring performance issue.

We assess outages by cause in the following section and discuss the relationship of the observed outages to the asset management practices in chapters 7 to 9.

Outage duration

We examined outage duration times to assess if there were any emerging trends in how TLC responds or manages unplanned outages. Outage duration is comprised of response time to arrive at the fault and the restoration time to restore supply to customers. The average outage duration per outage can be expressed as the Customer Average Interruption Duration Index (CAIDI). The trend for raw and normalised CAIDI is shown in Figure 7.
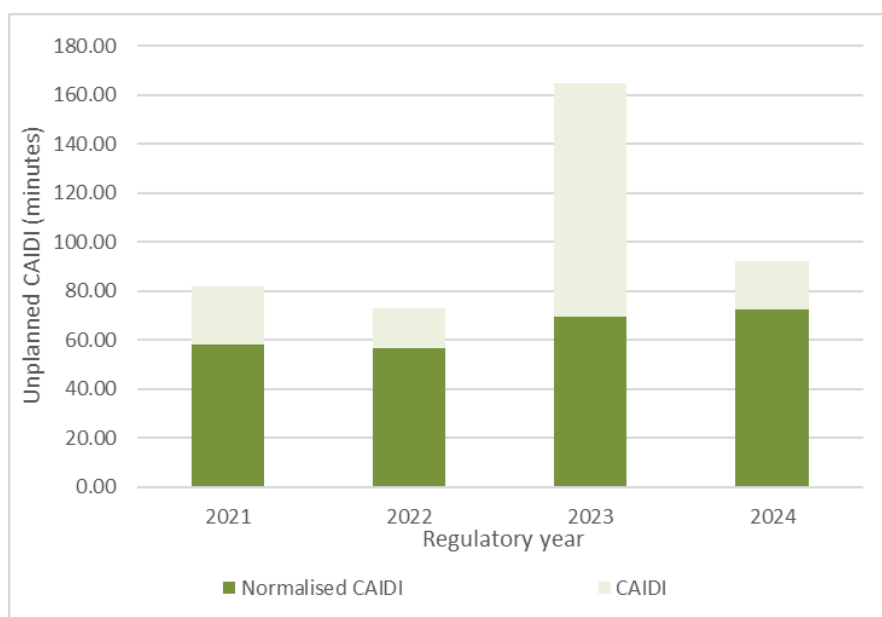
Figure 7 Network CAIDI

Figure 7 shows a slightly increasing trend in normalised and raw CAIDI. While RY23 was marked by Cyclone Gabrielle and other weather related impacts, RY 24 has been higher on a normalised basis. In chapters 7 to 9, we discuss reliability practices including response times and recent initiatives put in place by TLC.

Analysis of unplanned outages by cause

We examined the data to assess the main contributors to reliability performance, and any emerging trends in the most material causes.

Figure 8 and Figure 9 below show the magnitude of the impact of each cause as well as the contrast between the number of outages and the impact to SAIDI.
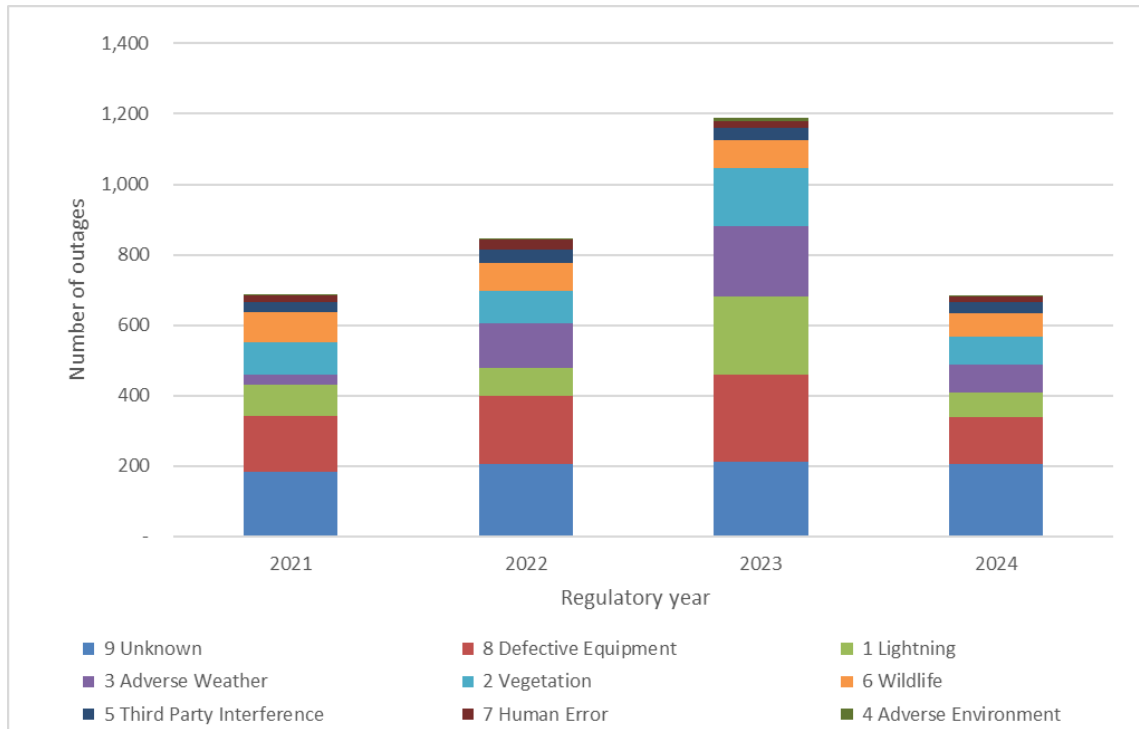
Figure 8 Number of outages by cause
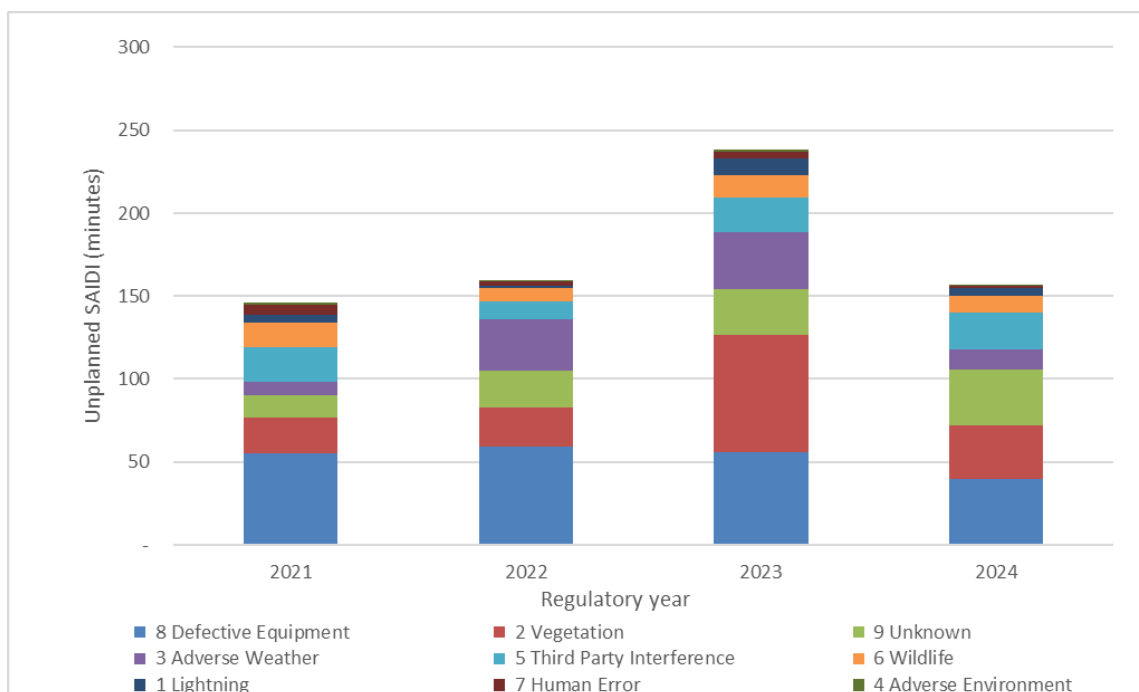
Figure 9 Normalised SAIDI by cause

The largest contributors to SAIDI were Defective Equipment, Vegetation and Unknown. Unknown and defective equipment were also the largest by number, but vegetation was 5th (out of 9 cause codes) which indicates that the impact of vegetation is having a disproportionate impact on customers in terms of SAIDI compared to the number of events.

Based on the analysis above, we undertook more detailed examination of defective equipment and vegetation issues.

Defective equipment

Figure 10 identifies the percentage of outages for defective equipment by asset type. While it is difficult to draw conclusive views on four years of data, we note that

- Conductor failures have increased as a proportion of defective equipment, and are the leading cause of outages. As noted in section 8.2, TLC has not historically had a conductor replacement program and only reactively addresses faults. We note that TLC has recently undertaken analysis on TLCs planned approach to assess condition to improve understanding of condition and failure modes. We understand that there is a future plan for improved modelling and increasing the rate of conductor replacement. (Doc Ref 212).
- Cross arm failures have increased proportionally to other outages recently and is consistent with our findings in section 3.2 about decreasing health scores for discreet assets. As noted in section 8.2, TLC undertakes condition assessment of cross arms and plans replacement based on AHI scores and alignment with pole replacements (Doc Ref 142). TLC however has started to implement condition monitoring based on helicopter photography but it was not clear if the results have been incorporated into the AHI scores at the time of this review.

The other defect types have remained relatively constant, as a percentage of outages caused by asset defects, during the past four years.
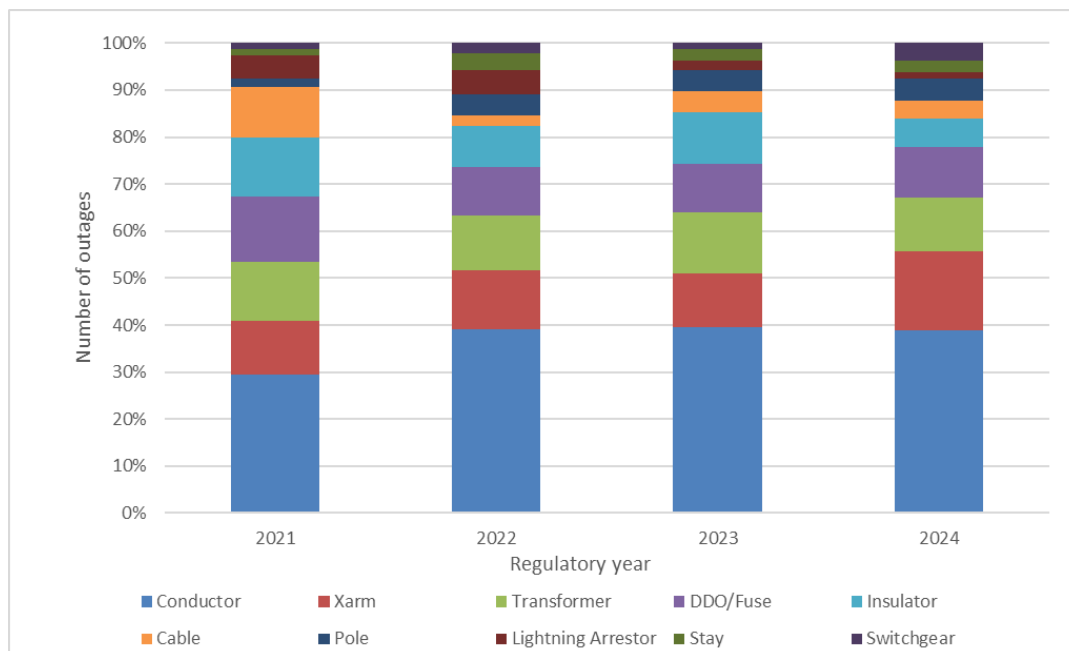
Figure 10 Number of outages as a percentage of total outages by equipment type

Vegetation

Figure 11 shows the contribution of vegetation management to SAIDI and SAIFI by cause grouped into base level, 'out of zone' trees, and major events. Excluding RY23, there appears to be an upwards trend in 'out of zone' trees, which is the largest contributor to outages caused by vegetation. These are trees that lie outside the growth management zone and cannot be directly managed by TLC without the permission of the land owner.
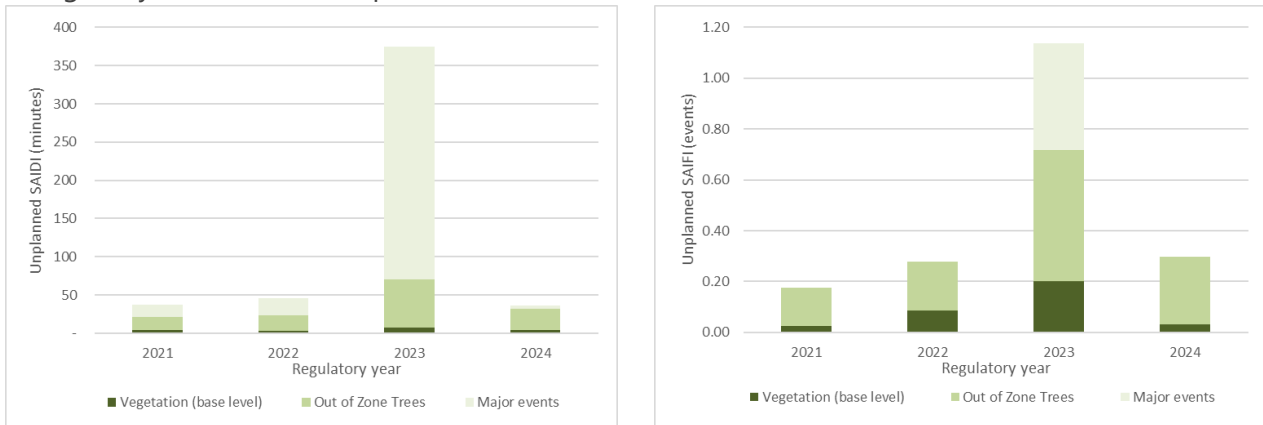
Figure 11 SAIDI and SAIFI contribution from vegetation by cause sub category

TLC collects and monitors granular data by sub-category of vegetation management. Figure 12 indicates that out of zone trees from commercial (including plantations) areas are the major cause. Section 9.2 discusses TLC's vegetation management practices, noting that its strategy is targeted at out of zone trees, demonstrating an awareness of its contribution to outages.

In section 9.2, we identify TLC's practices including a recent strategy that identifies 10 initiatives to improve vegetation management. We also describe TLC's governance of vegetation management including a committee that oversees performance and monthly reporting to its Board on performance. We also note initiatives to improve performance including aerial surveys that link to geographic systems (GIS) and new trials to prune trees through helicopter sawing.
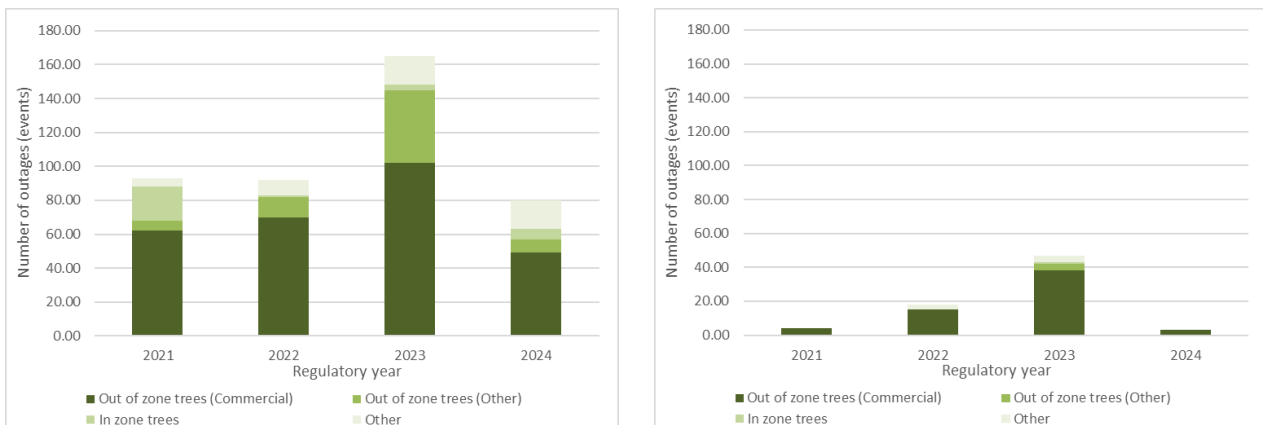
Figure 12 Number of outages caused by vegetation by cause sub category

Outage by region

TLC has three distinct regions - Northern, Southern and River. We assessed if there were any emerging trends for each region based on normalised and raw SAIDI, SAIFI, CAIDI and the number of outages. The data is set out in Appendix C, and the key findings were:

- The Northern regions appears to have an emerging trend of increasing CAIDI
- The Southern region was most severely impacted by Cyclone Gabrielle and had a very consistent CAIDI.
- The River region did not have evidence of emerging trends and had the most varied performance across the four metrics.
- All regions showed an increase in the number of outages from RY21 to RY23 and a reduction in RY24.

This analysis indicated that the potential issues with CAIDI could be addressed most effectively by focusing improvement efforts in the Northern Region.

Planned outages

We analysed emerging trends in SAIDI and SAIFI for planned outages. Figure 13 shows the annual contribution to planned outages by notified and non-notified categories. Both planned SAIDI and SAIFI are higher in FY23 and FY24 and duration of outages has been relatively constant sine RY22, indicating more work is likely to have been undertaken on the network.

While there is an apparent increase in annual planned SAIDI and SAIFI, we note that compliance is assessed based on the cumulative SAIDI and SAIFI over the 5 year DPP3 period. With one year remaining in the period, TLC has only used 47% of the SAIDI allowance and 25% of the SAIFI allowance. We found that the level of planned SAIDI is unlikely due to a reduction in maintenance or replacement works as review of historical expenditure in Information Disclosure schedules 7(ii) and 7(iii) found that over the review period TLC has delivered in line with forecast expenditure and we did not find evidence that TLC was not delivering planned volumes of work.

Hence, notwithstanding a significant change in processes, TLC is on track to remain compliant with the planned reliability limits. The target and cap shown for planned SAIDI is only for the purpose of the quality incentive scheme and not related to compliance. There is no planned SAIFI component in the quality incentive scheme.

We also note that from RY23, that there has been improved performance in notified outages, where affected customers are provided with at least 10 days notice of the outage window. The SAIDI and SAIFI incurred for notified outages is discounted by 50% for compliance purposes.

Figure 13 Planned outages with contribution from notified outages

3.2   Asset health

Asset health is a marker of current and future performance in relation to reliability and safety of services. We have assessed if there are any emerging trends on asset health based on data from RY21 to RY24.

As noted in chapter 5, TLC collects data on asset condition using electronic inspection forms, which are quality assessed and loaded into Basix, TLC's asset management system. The data is used by a separate propriety software program called Asset Altitude to develop an Asset Health Index (AHI). The index ranges from H1 (assets at end of life) to H5 (new assets) based on information including asset type, asset age and asset condition. The AHI ranking from Asset Altitude is used directly for reporting in Schedule 12a of the Information Disclosures.

Our assessment of past and emerging trends has relied primarily on the data reported in the Information Disclosures. We have not reviewed the methodology applied by the Asset Altitude program or sought to validate its outcomes as this was not within the scope of our review.

Our review focused on assets classified as H1 and H2, as these are defined as reaching the end of their life within the next 3 years. We examined two categories - linear assets (including cables and conductors) and discrete assets (including poles, switches and transformers). The percentage of the assets that are assessed to be in H1 and H2 condition are shown in Figure 14.
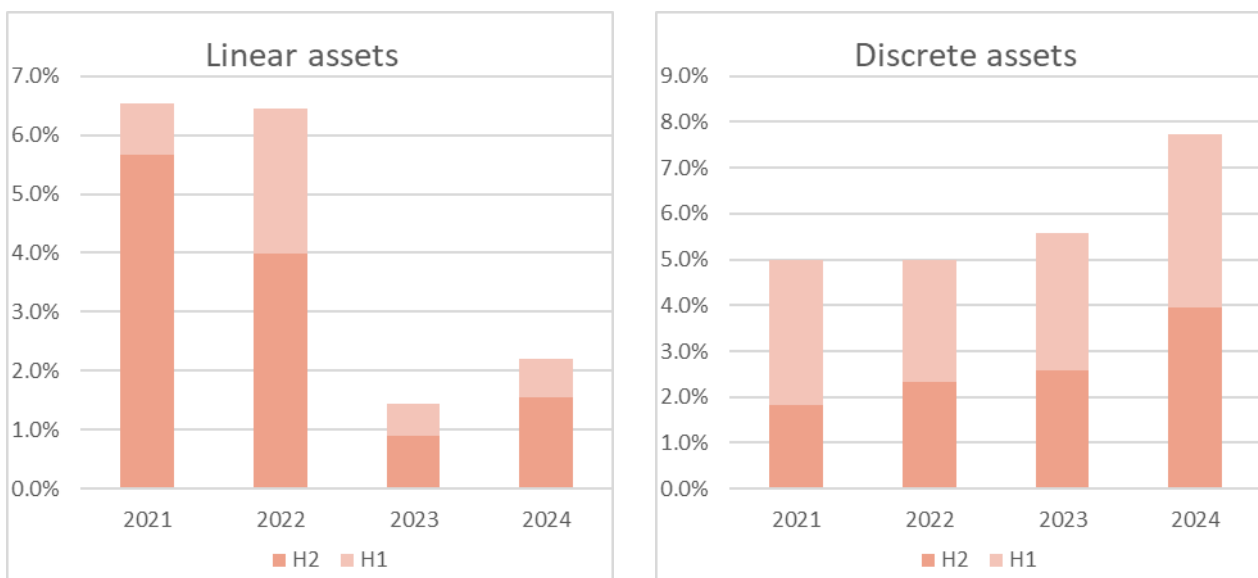
Figure 14 Percentage of H1 and H2 distribution assets

Linear assets

The reduction in H1 and H2 assets for linear assets was confirmed by TLC to be due to the application of an improved AHI calculation methodology and data cleansing for conductors and cables between RY22 and RY23. The result was a large number of assets classified as H1 and H2 being reclassified to H4 (Doc 215).

Given this re-classification it is difficult to draw any conclusion on trends in asset health for these assets. In section 8.2, we discuss TLC's replacement practices including its historical reactive approach for underground cables and overhead conductors. However, we also note recent

information to suggest that TLC are undertaking further analysis on overhead conductors with a view to modelling future replacement needs (Doc Ref 212).

Discrete assets

For discrete assets, there appears to be an increase in assets categorised as H1 and H2. We have reviewed the underlying data, and the upward trend appears consistent across the poles, distribution switches and distribution transformers asset categories.

These findings are broadly consistent with our assessment of replacement practices (see Chapter 8), particularly:

- Pole mounted distribution transformers and distribution switches are managed using 'run to failure' approach while ground mounted distribution transformers are replaced based on inspection outcomes. Pole mounted distribution transformers are also subject to a long inspection cycle of 15 years. We note that a 'run to failure' approach is not uncommon for smaller sized distribution transformers and a deterioration in overall asset health is expected given assets are getting older.
- Pole top assets have historically been inspected visually by helicopter annually or every three years, based on voltage, as part of the vegetation inspection process and more recently helicopter photography has been established on a 5 yearly basis. However, on site testing of the pole base (common point of failure) and visual inspection is undertaken on a 15 year cycle.
- Based on the number of poles installed and average expected lives of 45 years for wood poles and 60 years for steel and concrete poles, we would expect approximately 700 poles to be replaced per year, not accounting for known type issues. It is not clear if this is being achieved, hence a deterioration in overall asset health is expected. Approximately 20% of concrete, 40% of wood and 50% of steel poles have exceeded their expected lives, which further supports the AHI profile showing a deterioration over time.

Further information on our assessment of asset management practices is provided in chapters 7 to 9.

4. SYSTEMS TO RECORD AND ANALYSE OUTAGE DATA AND ADDRESS THEIR CAUSE

This section provides a maturity assessment against our AM Standard for TLC's systems to record and analyse system outages and interruptions to supply and address their cause. This was key context in scope item 3.1(c)(ii) to achieve the objective set out in scope item 2.

We have defined systems as a set of principles, procedures, and technologies to achieve an identified purpose.

Section 4.1 sets out an overview of TLC's systems. By applying our AM Standard, we assessed TLCs practices for monitoring and evaluating outage data (section 4.2), management review of the data(section 4.3), corrective action in respect of reliability performance (section 4.4), preventative actions (section 4.5) and continual improvement (section 4.6).

Table 6 below sets out a summary of our findings of the maturity assessment.

Table 6 Summary of maturity assessment against relevant AM Standard

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Monitoring and analysis of outage data	2.25	2.50	• 'Clear line of sight' between reliability data and the asset and vegetation management plans.	9.1
Management review	2.00	3.00	• No actions	9.3
Corrective actions	2.50	3.00	• Workflow system that tracks actions and reports on outcomes. • Developing a risk/criticality approach for expenditure plans that considers reliability impacts • Implementation of an ADMS to improve response times and network control, provided the benefits to customers outweigh the cost of the system.	10.1
Preventative actions	2.00	3.00	• Documenting the rationale for maintenance practices. • As part of developing fleet plans, methodically and consistently consider the criticality/risk of assets to unplanned outages. • Developing a coordinated resilience strategy.	10.2
Continual Improvement	2.50	3.00	• Annual review and improvement plan for the AMS as part of the AMP process. • Assigning resources to reviewing and actioning improvements to the AMS.	10.3

	• As part of reporting annual reliability performance, also consider and action improvement opportunities to provide a centralised framework for review.

4.1   Overview of systems

TLC has a manual system for identifying, recording and analysing outages that is supported by information systems and spreadsheets. There are separate processes for planned or unplanned outages. The process also differs depending on whether the fault was identified through SCADA or through customer notification via the call centre. About 4 per cent of devices on the network are telemetered (Doc Ref 59).

A simplified view of the processes are set out in Figure 15.
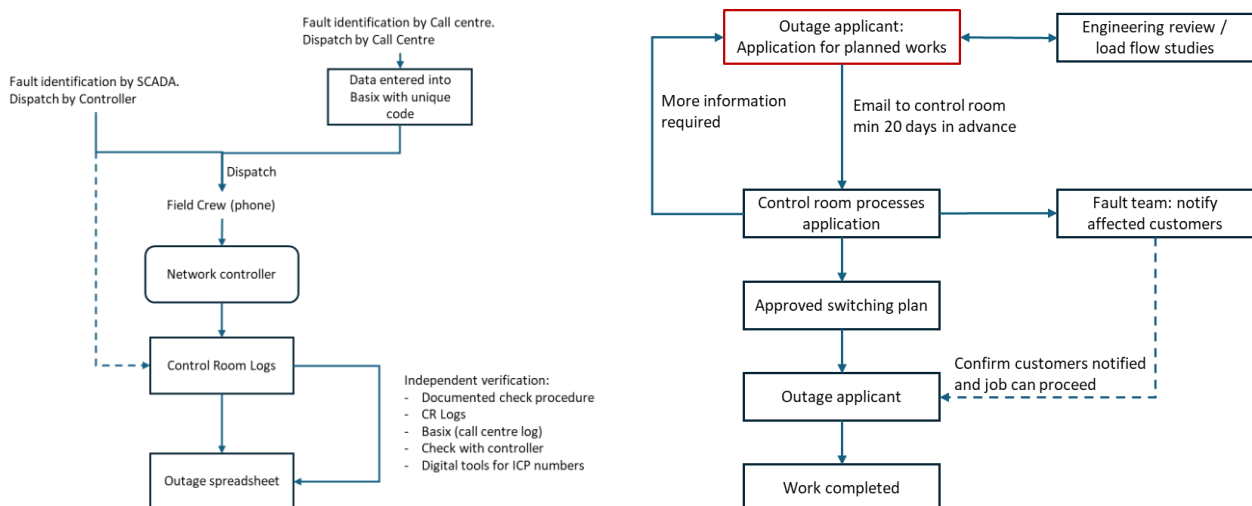
Figure 15 Overview of outage data capture processes

Unplanned outages

The two sources for identifying unplanned outages are through customer calls and SCADA, with the majority of faults notified via the call centre.

The call centre uses the system Basix to record faults as they occur. The system enables the call centre staff to identify where multiple calls are related to the same outage so only a single fault is recorded.

The Network Control Procedure (Doc Ref 60) documents the process and responsibilities for dispatching field crew to site and the priorities and communications. Once a fault is identified, field crew are dispatched to the site based on a standby roster (Doc Ref 62). If the fault was identified by the call centre, the current procedure is for call centre staff to dispatch the crew and then contact the control room. Where the fault is detected via SCADA, the controllers dispatch the crew. Once dispatched, the field crew communicate directly to the controllers until the fault is addressed and power restored. There is communication between the controllers and the call centre via MS Teams Chat (Doc Ref 55) to ensure timely communication to customers.

During the fault, the Controllers record each step of the process in the Control Room Logs (CR Logs) from when the field crew arrive on site (Doc Ref 181)). This includes all information provided by the combination of the field crew, SCADA and the time of each action.

Each day, the control room log is transcribed manually by a controller into an outage spreadsheet through a documented procedure (Doc Ref 44). This includes data verification of the transcription of the Control Room Logs by another staff member, and a number of quality assurance steps. The documented procedure provides instruction on the appropriate fault codes, causes and other relevant information. The information in the outage spreadsheet brings together CR Logs, information from Basix on initial notification of fault, and information from other reporting tools on the ICPs impacted.

The outage spreadsheet is developed for each regulatory year (Doc Refs 15 to18) and has been designed to enable analysis of performance compared to regulatory parameters, seasonal trend analysis to better forecast annual performance, cause analysis and emerging trends. The outage data is also used to undertake more in depth analysis regarding performance and emerging issues, such as to inform vegetation management plans and performance reporting (Doc Refs 39, 102 and 140).

Planned outages

There is a documented Planned Outages Policy that identifies the key principles underlying planned works and outages including safety, customer communications and temporary generation back-up to minimise duration of outages (Doc Ref 109).

There is also a documented procedure between the employee or contractor seeking access to undertake planned works and the control room (Doc Ref 81). The applicant plans the switching process which is then verified by the controllers. Customers are notified at least 10 working days in advance to ensure compliance with the Notified Outage requirements of the DPP3 quality scheme.

The job is recorded in the CR Logs and then is incorporated into the outage spreadsheet according to the Outage Data Collection process.

Quality assurance processes

The Outage Data Collection process includes actions that are aimed to ensure the quality of the data and methods to amend or correct the data.

The outage data is audited annually as part of the Information Disclosures. The auditors have given a qualified opinion on the outage data due to limitation with verifying the base data as it is gathered verbally by telephone calls which cannot be verified after the event.

4.2   Monitoring and analysis of outage data

Our assessment first considered whether the outputs from the system to record outage data were aligned to TLC's corporate strategy, asset management policy and strategies. This provides assurance that the outage information being collected in the system is 'fit for purpose' and supports the asset management objectives.

TLC has established a suite of policies that include the Asset Management Policy (Doc Ref 3), Planned Outage Policy (Doc Ref 109) and Risk Management Policy (Doc Ref 7). Together these

policies identify an objective to minimise the frequency and duration of planned and unplanned outages.

These policies are then translated into Asset Management Objectives in the 2023 AMP (Doc Ref 1) which expressly identifies network reliability under two of the five AM Objectives - Asset Stewardship and Operational Excellence. The AMP identifies quantified performance targets that relate to the AM Objectives including planned and unplanned reliability targets for the industry standard metrics of SAIDI and SAIFI. The outputs of TLC's outage system relate to the targets in the AMP, demonstrating a linkage between the measures in the outage system and the AMP.

Monitoring and measuring

TLC's systems are reasonable to monitor and measure unplanned and planned outages. There is an 'end to end' process for collecting information on planned and unplanned outages (Doc Ref 43) that culminates in the recording of outage data in a centralised Excel spreadsheet for each regulatory year (Doc Ref 15 to 18).

TLC's system for identifying an outage is largely based on customers contacting the call centre. We note that TLC has a relatively low number of telemetered distribution assets (Doc Ref 59). This is likely to increase the reliance on the call centre and increases the difficulty of validating the quality of data input. But with a relatively small network in terms of ICP count, and based on practice to date, data quality appears reasonable in the context of the organisation.

We note that information on the outage duration and the cause of the outage is communicated from field staff present on the job, and this is largely through conversations with the control room and/or call centre. TLC is currently providing tablets to field staff to improve the data quality consistent with an identified initiative (Doc Ref 98).

Overall we consider that TLC's systems rely on manual processes, but are adequately supplemented by documented procedures and reasonable processes. The manual nature of recording outages gives rise to errors and would be difficult to validate if errors are occurring, despite the quality assurance in place.

While automation through an Outage Management System may improve accuracy of data, there is the potential for significantly higher costs. The benefit could be investigated by TLC as part of its assessment of functionalities delivered by the proposed Advanced Distribution Management System (ADMS) (discussed in section 4.4).

Analysis and evaluation

The outage data spreadsheet has been designed to provide analysis that assists TLC to understand the cause of unplanned outages at a granular level, trends in both planned and unplanned outages from a raw and normalised perspective, and seasonal trends to forecast performance relative to compliance obligations and targets (Doc Ref 33).

We note that analysis is undertaken by several teams on current issues and broader trends in performance. There is a monthly report on material outages (Doc Refs 47 and 48) that identify causes and potential actions. There are also detailed reports for extreme incidents (Doc Ref 54). This shows that unplanned outages are being analysed as they occur. Performance reports are also prepared for instance on annual planned and unplanned outages for the regulatory year. These reports are highly detailed and provide substantial analysis (Doc Refs 24 and 25). In addition, there was a detailed report on performance in RY2023 when unplanned outages were significant (Doc 26).

This report sought to understand the impact of weather on performance using an innovative approach.

The analysis is disseminated to the asset management teams including the asset managers with respect to their fleets and vegetation and addressed through developing mitigation projects (capex or opex). However, we note that there is not a clear line of sight between the reliability data and the fleet and vegetation plans.

Key performance trends are also reported in the AMP and update AMPs with historical performance and forecast performance based on the investment plans (Doc Ref 1 and 2. In addition, key risk drivers are reported in the AMP and we observed evidence that reliability performance is monitored, evaluated and mitigation actions identified.

Overall we consider the maturity level is well developed and there are reasonable controls in place providing a maturity score of 2.25. We consider that a maturity rating of 2.5 is reasonable in the context of TLC given the value to customers of improving reliability, and the relative low costs involved in uplifting maturity. We consider the gap could be bridged through a clear line of sight between reliability data and development of fleet plans and vegetation management plans.

4.3   Management review

Reliability analysis and evaluation is reported through committees including the Outage and Vegetation Management Committee that overlooks operational issues (Doc Ref 34) and through to the Asset Management Committee (AMC, Doc Ref 21). The Board are also provided with reports on reliability performance from the Chief Executive (Doc Ref 202).

The AMP process involves oversight and direction by the AMC and Board in particular on unplanned and planned reliability performance, and expenditure to maintain and improve performance (Doc Ref 191).

We consider that the approach to establishing review committees and ongoing refinement of the committee terms of reference demonstrates that there is an appropriate level of review given to network performance and ensuring the AMS remains relevant and effective in helping TLC achieve their objectives. However, we consider that the underlying systems to correct and prevent outages (as discussed in the next section) could be improved to enable management to provide direction. For this reason, we have rated TLC's maturity at 2.0 and we consider that a maturity rating of 3.0 is reasonable in the context of TLC given the low cost to improve review practices.

4.4   Corrective actions

We have assessed whether TLC's systems can address systematic and emerging issues with planned or unplanned performance.

As discussed above, there are relatively mature reporting and evaluation systems that enable TLC to monitor, evaluate and report the performance of planned and unplanned outages.

There are two mechanisms for action to be undertaken on issues and trends. Firstly, issues are brought to the Outage and Vegetation Management Committee, with actions assigned to address corrective issues (Doc Ref 46). The actions are tracked. We note that the approach to tracking the

issues is through continued updating of the minutes. There may be opportunities to implement a workflow system.

The second mechanism is through asset management and vegetation plans identified in the annual AMP process. This includes expenditure to replace assets in poor health, opex and capex for vegetation management, and reliability focused expenditure (Doc Ref 1 and 2). There is also some evidence of tracking the effectiveness of corrective action (Doc 108) in respect of automation focused reliability expenditure.

We have not observed a systematic approach that provides a clear "line of sight" between addressing asset defects and vegetation management and the impact on unplanned outages and/or reduction in risk (future outages). There has been early development of a criticality based approach to reliability management (Doc Ref 8) but in our view, TLC would benefit from embedding its corporate risk framework to its fleet and vegetation management plans.

We note that TLC currently does not have an ADMS and instead has a system that is reliant on the experience of individual controllers and their knowledge of the network in order to make the best switching decisions in terms of safety and customers impacted. An ADMS integrates SCADA with software to assist monitoring, control and optimisation of network switching operations as well as providing other functionality such as information management.

We understand that implementation of an ADMS is part of the TLC digitalisation strategy. We consider this would likely reduce the dependence on individual controllers to make decisions and help improve reliability performance and data capture. AMDS are often modular and selection of the appropriate functionality is critical to achieve the AM Objectives while managing cost to customers.

Overall, we consider that TLC is operating at maturity level of 2.5 in terms of addressing non-conformity and corrective actions. We consider that TLC should target a maturity of 3.0 to ensure that systematic and emerging issues are effectively addressed to ensure that reliability targets are achieved. The gap could be addressed through:

- Workflow system that tracks actions and reports on outcomes.
- Developing a risk/criticality approach to be applied when developing expenditure plans that facilitates targeting risks that relate to outages.
- Implementation of an ADMS to improve response times and network control, provided the benefits to customers outweigh the cost of the system.

4.5   Preventative actions

Preventative action involves identifying emerging issues before they give rise to systematic deterioration in planned or unplanned outage performance. We have considered three aspects:

- Firstly, we assessed if TLC's systems are able to identify emerging asset health issues that may give rise to unplanned outages. In this respect, TLC has maintenance practices (Doc Ref 89) in place that provide information about asset health, however the existing documentation on the rationale for the practices is limited. The asset managers determine preventative actions for assets according to health or reliability impact. Our observation is that these systems (see chapters 7 and 8) are not well documented and are inconsistently applied across the fleet. We consider there are opportunities to improve documentation including expanding on its current FMEA analysis (Doc Ref 80) as part of developing new fleet plans.

- Secondly we have considered whether vegetation management plans are designed to detect and address systematic and emerging issues. Our observation (see section 9.2) is that TLC has detected that out of zone trees are the primary driver of outages, but that it is still in the early stages of developing a targeted approach that identifies areas of highest risk.
- Thirdly, we note that TLC have completed the EEA Resilience Management Maturity Assessment Tool (RMMAT, Doc Ref 82) and are in a relatively early stage of developing a resilience strategy. The adverse weather experienced in RY2023 (Doc Ref 101) may become more common due to climate change. This will require a strategic response to resilience and security of supply measures in terms of reducing outages and their duration in adverse weather. TLC are aware of the need to improve the maturity of its resilience practices (Doc Ref 1 and 82) and are doing this by working with peer EDBs and through the Northern Energy Group.

Overall, we consider that TLC is operating at a maturity level of 2.0 in relation to preventative actions. We consider that TLC should target a maturity of 3.0 to ensure that emerging issues are addressed proactively to ensure that reliability targets are achieved. The gap could be achieved through:

- Documenting the rationale for maintenance practices to ensure that drivers of asset health are captured.
- Developing fleet plans that more directly, methodically and consistently consider the criticality/risk of assets to unplanned outages.
- Developing a coordinated resilience strategy that identifies gaps in maturity based on the RMMAT completed, creates initiatives to address the gaps and prioritises them based on assessment of costs versus benefits (avoided risk to the network).

4.6   Practices for improvement

By applying our AM Standard, we assessed TLCs practices for improving their performance in relation to its system to record and analyse outage data, and address issues.

The relevant ISO55001 clause that our AM Standard applied for assessing these practices was 10.3. We assessed whether TLC examines opportunities for improvement to its Asset Management System as it relates to outages, and its practices for outages.

Continual improvement – AMS

The 2023 AMP documents TLC's Asset Management System. Improvement of the AMS has not been systematically embedded in TLC. The last systematic review of an asset management framework was undertaken in April 2021 (Doc Ref 98). This set out 9 actions that were categorised as improving reliability outcomes. However, the initiatives do not seem to have been tracked and there is no clear evidence that the initiatives were actioned and implemented.

We note that TLC also undertake an annual assessment of asset management maturity under the AMMAT framework (Doc Refs 11-14). We note that AMMAT reviews show a consistent improvement in ranking suggesting that TLC have reviewed its maturity and implemented measures. The last AMMAT review (Doc Ref 14) was undertaken in 2023. We have not found evidence how the latest report has been internally reviewed, and the recommendations implemented, by TLC.

Interviews with TLC staff recognise that continual improvement of the Asset Management System should be implemented. We understand that resourcing issues including the departure of key personnel has reduced the focus in developing an improvement plan for the AMS.

Continual improvement – practices

While the AMS was not specifically improved, the practices regarding the collection, analysis and dissemination of data have been improving. This includes:

- TLC developed a dashboard that allowed staff to identify the ICPs that would be impacted by the outage of each asset. This allowed for improved understanding of planned outage risk and outage risk per asset as well as validation of ICPs affected during outage events.
- Adding additional granularity to cause codes to improve understanding of underlying causes of outages.
- The outage spreadsheet was updated to reflect the DPP3 definitions, however, there was not improvement of the system itself.
- Additional staff to verify and quality assure the control room log data.

As noted in section 4.4, TLC is also proposing to implement an ADMS to improve the control of its network when there is an outage.

Maturity assessment

We consider that TLC is operating at a maturity level of 2.5 with a current deficiency in its review of the asset management system but continued improvement of its data collection practices. We consider a target of 3.0 is appropriate in its context, and can be achieved through the following key actions:

- Developing a plan for annual review and improvement of the AMS as part of the AMP process.
- Assigning resources to reviewing and actioning improvements to the AMS.
- As part of reporting annual reliability performance, also consider and action improvement opportunities to provide a centralised framework for review.

5. ASSET DATA COLLECTION AND MAINTENANCE SYSTEMS

This section provides a maturity assessment against our AM Standard for TLC's asset data collection and maintenance systems identified in context item 1.1(b) of the Terms of Reference. Clause 3.1(c)(iv) of the scope of the Terms of Reference specifies that we should be assessing TLC's asset management information with particular reference to asset information maturity, information on asset health condition and outages.

We applied our AM Standard to assess whether TLC's maturity aligns with the key requirements of clause 7.5 of ISO 55001, as required by the scope in the Terms of Reference. This examines whether the information collected and applied by TLC support its assets, asset management, and asset management system and the achievement of its organizational objectives. In respect of asset management maturity, we also considered 10.3 of ISO 55001, which relates to continual improvement.

In applying the AM Standard, we have considered:

- Whether the asset health information is sufficient and demonstrates quality controls (section 5.1)
- Whether there is a reasonable process for using asset health information in decision making (section 5.2)
- Whether TLC demonstrates continual improvement in improving asset health information (section 5.3)

Table 7 sets out a summary of our findings of the maturity assessment in relation to information on asset health condition and outages, and asset information maturity.

Table 7 Summary of maturity assessment against relevant AM Standard for asset health information

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Sufficiency and quality of asset health data	2.0	2.5	- Expand the inspection program and consider methods to collect more condition data on assets through use of new/innovative technology. - TLC complete their review in relation to the frequency of on site/physical inspection and testing of poles to ensure that emerging condition issues are being proactively monitored. - Create inspection standards for asset types based on health model requirements. - Improve alignment between fault codes for asset defects and fleet plans. - Record the equipment ID of the faulted asset and/or its location in the outage data spreadsheet.	7.5

Making decisions with asset health information	2.0	3.0	• In developing fleet plans, document how the various sources of asset health information are used in decision making. • The fleet plans should also explain the methodology and inputs of Asset Altitude, and explain where asset managers will likely depart from Asset Altitude and the reasons why. • Ensure consistent recording of the equipment ID when an asset defect is the cause of an outage and use the data to integrate asset defect outages into health ratings either through Asset Altitude or an alternative methodology.	7.5
Asset information maturity	3.0	3.0	• None	7.5 and 10.3

5.1 Sufficiency and quality of asset health data

There are three primary sources of information on the health condition of TLC's network assets – inspections and maintenance, asset age data, and asset outages. We discuss this in turn:

Inspections and maintenance data

TLC document its planned maintenance activities (Doc Ref 105) on overhead lines, ground mounted assets and substations. Electronic forms have been created that require field crew to use common formats and drop down boxes to record information on asset condition at the time of inspection. The information undergoes a manual quality assurance check and it then uploaded into the Basix (Interview Ref 3 and 10). Dashboards have been created to help the asset managers access information in Basix.

Our observations are:

• The maintenance tasks appear to be based on industry standards and/ or vendor recommendations (Interview Ref 26-28) with respect to typical failure modes. There is only partial evidence of documentation (Doc Ref 105, 216-219) so there is limited visibility or opportunities to review. We understand that TLC have identified the creation of inspection standards as part of its workplan (Doc Ref 103).

• Inspection cycles are generally between 1 to 5 years, but appear to be 15 years for on site/physical testing of the base of poles (common point of failure) and visual inspection. This may not be frequent enough to detect emerging asset health issues and enable replacement prior to failure. We understand that the interval for on site/physical testing and inspection cycles for poles is under review. As part of their review TLC should consider practices of other EDBs and the EEA guide on timber pole condition assessment (Doc Ref 248) which indicates inspection cycles should be determined with consideration to the inspection technique used and expected intervention time based on the pole condition.

- TLC staff are allocated to ensuring that the electronic form data is complete and accurately uploaded into Basix.

Overall, aside from the current onsite inspection and testing cycle of poles, we consider that the process provides sufficient information on the condition of assets subject to regular inspection and maintenance. We also consider there are controls in place However, we consider that more frequent inspections on overhead assets is required to provide more information in respect of asset health. We consider that documenting inspection standards including the rationale is important as part of developing fleet plans (see section 6.3).

Asset age information

TLC also consider asset age as a proxy for asset condition, particularly in circumstances where there is insufficient information from inspection and maintenance. Asset age is calculated based on commissioning dates of assets held in the Basix. We understand that, similar to other EDBs, there is limited accuracy of commissioning dates for assets. This is an issue that cannot be addressed retrospectively, but also underlines the importance of gathering information on the condition of assets rather than relying on age as a proxy for health.

Asset outages

The "Network Outage Data" tab in TLC's Outage Data spreadsheet (Doc Ref 18) identifies the cause of an outage using the Commissions cause codes and provides a more granular reason for the fault with a predefined list of cause options that align to each cause code. There is also an equipment ID column in the spreadsheet. This data is used to assess network performance and provide information through the dashboard portal. Our observations are:

- Our review of the 2023-24 data shows that that there is information on the failure mode of the assets where it was identified to be caused by defective equipment, such as "switchgear – insulators". This column is coded to provide a sub-categorisation and appears to be always completed, demonstrating a completeness of information.
- There is also an equipment ID column, which we understand enables the asset to be identified. However, only about 50% of these fields are complete, suggesting that there is a lack of data on which specific asset has failed.
- As identified by TLC staff (Doc 102), the fault code classifications do not align to the asset fleet categories which creates some limitations in the analysis that can be done.

Maturity rating

We consider that TLC is currently performing at a maturity level of 2.0. In our view, the target maturity in the context of TLC's business should be 2.5. A higher rating would require TLC to invest in information systems and investigate the age of its assets, which in our view would not necessarily improve the quality of information. To reach a 2.5 rating, we consider the following improvements could be made:

- Increase frequency of on site/physical inspections of overhead line assets (pole base in particular) to ensure that emerging condition issues are being proactively monitored.
- Create inspection standards for asset types based on health model requirements.
- Improve alignment between fault codes for asset defects and fleet plans.
- Collect information on the equipment ID in the outage data spreadsheet.

5.2   Making decisions with asset health information

The purpose of this section is to assess whether there is a clear, consistent and 'fit for purpose' method for how TLC uses asset health information to make decisions.

We note that TLC examines four categories of assets – overhead lines, zone substations, underground assets, and automatic switching devices – overlooked by different asset managers. We sought to understand how asset health information was being used by the asset managers in developing plans to meet the AM Objectives. Our observations were:

- There is no documented process on how asset health information is used by TLC asset managers to make decisions.
- TLC has a methodology for calculating the AHI that was submitted to the AMC at the end of RY21 (Doc Ref 215). However, the version we reviewed was not complete for all asset fleets and it is not clear if it was approved or the extent to which it was applied.
- TLC reports on asset health as part of its Information Disclosures using information derived from a centralised software program called "Asset Altitude". The program seeks to classify TLC's assets based on information in Basix relating to inspection and maintenance results and the age of assets. Given this is a proprietary software, we have not been able to assess the method used to derive the reported results. In our interviews (Interview Ref 5) it was clear that staff did not have a clear understanding of the method applied by Asset Altitude to derive the results.
- We note that individual asset managers have different approaches to collecting and analysing asset information to derive plans. As discussed in section 8.2, some asset managers place more reliance on the asset condition ratings from Asset Altitude. In other cases, asset managers appear to be placing less reliance on its results.
- The equipment ID of the asset that has failed is not consistently recorded in the outage database and therefore there it is not possible to consistently link the asset health to reliability performance.

We consider that TLC is currently performing at a maturity of 2.0. In our view, the target maturity in the context of TLC's business should be 3.0. Key improvements to reach the target maturity include:

- Expedite development of the fleet plans proposed by TLC
- The fleet plans should document how the various sources of asset health information are used in decision making, explain the methodology and inputs of Asset Altitude, and explain where asset managers depart from using the outputs of Asset Altitude and the reasons why.
- Ensure consistent recording of the equipment ID when an asset defect is the cause of an outage and use the data to integrate asset defect outages into health ratings either through Asset Altitude or an alternative methodology.

5.3   Asset information maturity

We assessed whether TLC demonstrates continual improvement in collecting and analysing information on asset health.

To assess maturity of gathering asset information we assessed TLC's quality assurance processes and any initiatives that have been established, or are planned, to improve quality of the data collected.

Documented improvement processes

Our starting point was to examine whether TLC documents initiatives to improve asset health data. We found that TLC has a forward working plan which identifies many initiatives to improve asset health information (Doc Ref 103) including some of the improvements identified in sections 5.1 and 5.2 above. We have also found business cases and assessments of new methods to collect asset health data (Doc Ref 143).

Data collection process improvement

TLC has implemented an asset inspection system that uses digital forms completed on a mobile device to record specific information for each asset type (Doc 172). The forms are built to ensure all fields are completed and include hierarchical selections, that is, the fields available for data entry are dependent on inputs to preceding fields.

The forms were developed by TLCs Digital team in consultation with the asset managers for each fleet (Interview Ref 3). For distribution assets (outside the boundaries of zone substations) the forms were built by creating a digital version of the existing paper based inspection forms.

For zone substation assets, the process was more bespoke for each zone substation. The forms were developed based on the paper based form for each asset type, however, since inspections are completed for all assets at each substation, the configuration of assets and asset types within each zone substation was created with detailed input from the SME. The result is that field crew can select a specific zone substation from a dropdown list all assets with relevant inspection items are automatically populated.

Once the forms are completed they undergo a manual quality assurance process and are then uploaded into Basix. The quality assurance team consists of approximately 5 FTE. If issues are identified, the review team contacts the relevant field crew who attended site to correct the information.

Data quality improvement

Asset information maturity can be improved by improving existing inspection techniques or implementing new inspection techniques, training of inspectors for improved consistency of inspection data (refer to section 11.3), better quality assurance and consistency, and enhancing how the data is accessed and used across the business.

In addition to improved asset data collection processes using digital forms, TLC is assessing new methods to collect data. Notably these have included:

- LiDAR for vegetation encroachment, asset location and ground clearances (Doc 143)
- Drone/Helicopter photography to improve understanding of condition of pole tops and cross arms.
- Pole testing techniques (for example acoustic testing)

These new information collection methodologies are expected to improve the data quality and provide more information to the engineers to undertake root cause analysis and assess the condition of individual assets and therefore improve asset replacement forecasts.

Dashboards

The digital team develops tailored dashboard for stakeholders within TLC to combine data from multiple sources into an easy to access format that will remain up to date (Interview Ref 3 and 10).

With the new data available and improved access to the data through the digital dashboards, TLC has the opportunity to assess how well their inspection, maintenance and replacement plans are enabling them to achieve the AM Objectives.

We consider that TLC is operating at a maturity level of 3.0 in relation to asset health information maturity. We consider this is an appropriate maturity level in its context.

6.   ASSET MANAGEMENT STRATEGIES

This section provides a maturity assessment against our AM Standard for asset management policies, objectives and strategies with particular reference to vegetation management and asset management maturity. This was required by scope item 3.1(c)(i) to achieve the objective set out in context item 1(c).

The relevant ISO55001 clauses that our AM Standard applied for assessing these practices were 5.2, 6.2.1 and 6.2.2. The chapter provides our assessment of TLC's Asset Management Policy (section 6.1), Asset Management Objectives (section 6.2) and plans to achieve asset management objectives (Section 6.1). Table 8 below sets out a summary of our findings of the maturity assessment.

Table 8 Summary of maturity assessment against relevant AM Standard

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Asset Management Policy	3.0	3.0	• Explicitly embed vegetation management objectives in the Asset Management Policy showing its link to unplanned outages for customers.	5.2
Asset Management Objectives	2.75	3.0	• More explicit link between the Asset Management Policy items and the Asset Management Objectives. • A centralised reporting framework for the measures published in the 2023 AMP, and incorporating the performance against the measures in each AMP update or on its website to better communicate outcomes to external stakeholders. • Strengthen the focus on asset management system improvement as part of the objectives and/or initiatives.	6.2.1
Plans to achieve asset management objectives	1.5	3.0	• The AMS discussion in the AMP should be broadened to include key elements in ISO 55001 such as integration with other business functions, decision making criteria, and performance evaluation and improvement. • The Asset Management System should identify the full suite of documents and systems in a hierarchy to achieve the asset management objectives, and should be reviewed periodically • Strategies for individual asset classes should be developed as a priority. • Strategies should be developed for areas that cross over asset plans, such as for reliability and future networks.	6.2.2

6.1　Asset management policies

An Asset Management Policy (AM Policy) demonstrates commitment to asset management by the executive management of the business and sets the framework for developing asset management objectives.

TLC has established an AM Policy (Doc Ref 3). We assessed the policy in relation to key aspects of 5.2. Our findings are:

- It is consistent with the purpose of TLC, for instance items 4 and 5 of the AM Policy discuss value to community and customers which is aligned to the strategic purpose outlined in section 3.1 of the 2023 AMP (Doc Ref 1).
- It provides guidance to develop Asset Management Objectives, however the link between the AM Policy and the Objectives could be presented more clearly in the AMP or other document (see section 6.2)
- It provides a commitment to the relevant business objectives including compliance, safety and network reliability.
- It includes a requirement for continual improvement of asset management practices.
- It is communicated and made available to stakeholders through the AMP.
- It is current as it is shown to be updated and approved by the Board of Directors in February 2024.

We note that TLC inserted four key changes to the AM Policy in 2024 demonstrating that TLC is continually reviewing and improving its asset management maturity. While we noted in Chapter 10 that the AMS has not been systematically reviewed since 2022, we consider that amending the AM Policy demonstrates that aspects of the AMS are being reviewed and improved.

The AM Policy does not explicitly address requirements for vegetation management. However, it is indirectly addressed in two ways:

- As far as vegetation management is a compliance issue (ie the no growth zone) it will be captured by clause 12 of the policy covering compliance with regulatory requirements.
- In relation to reliability, the objectives set out in the policy to reducing unplanned outages at a least cost approach which will capture managing the impact of vegetation.

Additional supporting policies include the:

- Delegation Policy (Doc Ref 63) which sets out principles for delegation of authority for different groups and specific budget limits for Executive and the Board. This provides a practical means of ensuring TLC deliver the themes of its Asset Management Policy including efficiency and value for customers.
- Planned Outage Policy (Doc Ref 109) sets out TLC's approach to managing and minimising planned outages which aligns and gives effect to item 7 of the Asset Management Policy.
- Risk Policy and Risk Management Policy (Doc Ref 7 and 151) which set out the approach to identifying, assessing and reporting risk. These policies are supported by a risk framework that is currently under review (Doc Ref 6).

Overall, we consider the maturity level is well developed in terms of an Asset Management Policy with reasonable controls in place for review and improvement. We consider that TLC is operating at 3.0 which is reasonable for its context.

We consider that a potential improvement for its next review would be to explicitly embed vegetation management objectives in the Asset Management Policy showing its link to unplanned outages for customers. This would recognise the complexity of managing vegetation management in the current regulatory environment (see discussion in section 9.2) and would align with TLC's internal focus on improving vegetation management outcomes (Doc Ref 35).

6.2 Asset management objectives

Asset Management Objectives (AM Objectives) must be established with consideration to relevant stakeholders, aligned to the organisational objectives and be consistent with the AM Policy. The objectives must be established and updated, measurable where practicable, monitored and communicated.

Our findings are:

- TLC has documented its AM Objectives in the 2023 AMP and 2024 AMP update (Doc Refs 1 and 2) as required by the Information Disclosures.
- There are five high-level objectives including safety and environment, asset stewardship, customer and community, networks for today and tomorrow, and operational excellence. The objectives are consistent with the detail contained in the AM Policy (Doc Ref 3), however there are elements of the AM Policy that do not have a clearly defined objective. The link between the AM Policy and AM Objectives could be improved by making it more explicit.
- TLC has internal processes to review AM Objectives as part of the AMP development through the Asset Management Committee (Doc Ref 203) and through papers presented to the Board. This demonstrates that the AM objectives are reviewed and updated to remain current with the organisational objectives.
- Each of the objectives is described in detail with supporting initiatives identified. Within these initiatives, TLC describes:
  - The approach to improving risk assessment related to vegetation including the use of new technologies and assessment approaches to improve their understanding of the risks and how to manage the assets.
  - The initiatives also focus on the strategy to become a digital utility and to improve business processes and asset management practices.
- AMP23 sets out targets against the AM Objectives that are measurable and at an appropriate level for each objective. The targets are consistent with requirements of the DPP3 quality standard, consistent with good industry practice regarding safety and demonstrate consideration of cost to customers and environmental issues.
- We have observed performance tracking of the target measures in the AMP including unplanned and planned outages (Doc Refs 23 to 25) and vegetation management (Doc Ref 37), we have not cited a centralised reporting framework to track performance of the AMP targets at regular intervals. We also note that the performance against the metrics was not reported in the 2024 AMP (Doc Ref 2) which would have been an appropriate opportunity to communicate performance and progress against the Asset Management Objectives.

- We consider that the objectives and/or initiatives should include continual monitoring and improvement of the Asset Management System, with a clear target for reviews. This would embed continual improvement of the Asset Management System, which has not been methodically undertaken since 2022 (Doc Ref 99).

Overall, we consider the maturity level is well developed in terms of establishing Asset Management objectives with reasonable controls in place to review and improve. We consider that TLC is operating at 2.75.

We consider that TLC should target a maturity of 3.0 in its context given the criticality of appropriate and measurable asset management objectives, and the minimal costs of achieving a higher maturity target. The gap could be achieved through:

- More explicit link between the asset management policy items and the objectives.
- A centralised reporting framework for the measures published in the 2023 AMP, and incorporating the performance against the measures in each AMP update or on its website to better communicate outcomes to external stakeholders.
- Strengthen the focus on asset management system improvement as part of the objectives and/or initiatives.

6.3 Plans to achieve asset management objectives

We assessed TLC's maturity in respect of the strategic elements of managing an asset fleet as well as the tactical, or planning, elements. This includes development, documentation and maintenance of asset management plan(s) to achieve the AM Objectives. The strategic elements are discussed in this section and tactical element are discussed in chapters 7 to 9.

The strategic elements include identifying processes (initiatives) to be applied to manage its assets over their life cycles, defining the method and criteria for decision making, how activities and resources will be prioritised, and how outcomes will be evaluated.

We have evaluated this element of the standard on key aspects discussed below

Asset Management System

TLC describes the scope of its Asset Management System (AMS) in Chapter 5 of the 2023 AMP, with discussion on key elements. While the AMS identifies a process and key documents, we note that the inputs and outputs are not expressed in a way that clearly links to the asset management objectives and targets. We also consider that the AMS would be improved if there was a clear flowchart that brings together the key documents (ie: strategies, procedures and plans) and systems, and their hierarchy and relationship to each other.

Consistent with our observations in Section 6.1, we note the AMS has not been subject to formal review since 2022. We consider that continual review of the AMS will assist TLC examine whether the system is helping to achieve the AM Objectives. We note that TLC have identified a review of the AMS in their forward looking workplan (Doc Ref 103).

Strategic Asset Management Plan (SAMP)

ISO 55001 contemplates the development of a stand-alone SAMP to provide guidance on how asset management objectives are achieved. We note that under the current regulatory obligations, the AMP must include elements that would form the basis of a separate SAMP, and that there is no obligation to produce a stand-alone document. For this reason, our maturity assessment has disregarded the requirement for a stand-alone SAMP when providing a view on current maturity. Rather, we have looked to see if elements of the SAMP are reflected fully in the AMP.

We have used the Companion Guide to ISO 55001 as a basis for establishing the elements that would form part of a SAMP. Broadly, the key elements of a SAMP were included in the 2023 AMP (Doc Ref 1) such as organisational overview, identifying asset management objectives, scope of the asset management system, organisation roles, leadership and commitment, and asset management processes. We considered the following elements required further information to meet the requirements of a SAMP: integration with other business functions, decision making criteria, and performance evaluation and improvement.

Integration of strategic pillars into the network strategy

We note that TLC has developed strategic pillars for the organisation including a focus on the Core (Safety, Resilience, Reliability and Environment), Decarbonisation, Decentralisation, Digitalisation, and Shareholder Value (Doc Ref 5). This demonstrates continual improvement as a business to identify strategic objectives and adapting to key changes impacting its operating landscape. This has then been developed into network strategies relevant to asset management including targets and initiatives that have been described in the 2024 AMP (Doc Ref 2) and assigned to teams (Doc Ref 207).

Overarching (across asset class) strategies

We have assessed whether TLC have broader network strategies that cover across multiple asset classes. We note that TLC recently updated its vegetation management strategy (Doc Ref 210) and that this is linked to the AM Objectives for vegetation management. It outlines the key issues impacting performance and key strategies to maintain and improve performance.

We have not found evidence of a broader reliability strategy for planned and unplanned outages, but note that initiatives are identified in reporting documentation (Doc Ref 102). While we recognise that aspects of reliability are covered in the vegetation management and network initiatives, we consider there is an improvement opportunity to develop a reliability specific strategy to more formally target the AM Objectives.

We consider that strategies could also be developed in relation to key strategic pillars. For example, we consider that a Future Network Strategy could complement some of the initiatives being considered for EV charging and standalone customer power systems (Doc Ref 205 and 206).

Our observation is that strategies are generally presented in the form of papers to Committees (Doc Ref 35). While we consider that this provides for effective governance and leadership, there is an opportunity to develop stand-alone documents as part of the AMS that are structured and formatted on a consistent basis and will provide a clear 'line of sight' in relation to how the AM Objective will be achieved.

Asset class (fleet) plans

There are no clearly documented strategies for individual asset classes. Currently, TLC consolidate its maintenance practices in a spreadsheet (Doc Ref 105) with some evidence of documented supporting evidence for certain assets (Doc Ref 177). In terms of asset replacement, there are separate spreadsheets developed for asset classes (Doc Ref 178) which provides some evidence for the method used to develop replacement plans.

We note that TLC have identified the development of fleet plans for asset classes (Doc Ref 103) and this has been emphasised in our interviews with TLC staff. We consider this should be a priority and should cover key information on asset populations and technologies, information systems that provide data, age and condition of assets, failure modes, consequence analysis, and expenditure strategies including maintenance and capital expenditure.

We have assessed maturity of strategies to achieve the AM Objectives as 1.5. We consider that a target maturity of 3.0 is appropriate for TLC's context, noting that the improvement opportunities identified above may involve additional costs and resources, but would provide a better opportunity to meet the AM Objectives. The key improvement areas are:

- The Asset Management System discussion in the AMP should be broadened to include key elements in ISO 55001 including integration with other business functions, decision making criteria, and performance evaluation and improvement.
- The Asset Management System should identify the full suite of documents and systems in a hierarchy to achieve the asset management objectives, and should be reviewed periodically
- Strategies for individual asset classes should be developed as a priority.
- Strategies should be developed for areas that cross over asset plans, such as for reliability and future networks.

7. LIFE CYCLE PRACTICES – OVERARCHING ELEMENTS

Chapters 7 to 9 provide a maturity assessment against our AM Standard for TLC's life cycle management practices from forecasting to implementation, including how decisions are linked with emerging trends in asset condition. This was a requirement of scope item 3.1(c)(iii) to achieve the objective set out in context item 1(d).

The relevant ISO55001 clauses that our AM Standard applied for assessing these practices were 6.2.2(a) and 6.2.2(b). This requires the organisation to determine and document the method and criteria for decision making and prioritizing of the activities and resources to achieve its asset management objectives and plans, and the processes and methods to be employed in managing its assets over their life cycles.

TLC documents its life cycle approach in the 2023 AMP (Doc Ref 2). We have assessed individual elements of TLC's life cycle practices:

- In this chapter 7, we focus on overarching elements of TLC's lifecycle practices including decision making, governance and prioritisation, and delivery.
- Chapter 8 assesses TLC's lifecycle practices for investment plans including its approach to forecast capital projects for capacity, replacement, reliability and resilience.
- Chapter 9 assesses TLC's lifecycle practices for maintaining and operating its network including maintenance, vegetation management, and restoration from outages.

Table 9 below sets out a summary of our findings of the maturity assessment for lifecycle practices for decision making and governance of lifecycle practices.

Table 9 Summary of maturity assessment against relevant AM Standard for lifecycle practices – overarching elements

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Decision making	2.0	3.0	• TLC implement a criticality framework that aligns with its Risk Framework to support decision making across the lifecycle practices. • Ensuring that the criticality framework is applied consistently to investment planning, maintenance and vegetation management activities.	6.2.2(a)
Governance and prioritisation	2.0	3.0	• Ensure that appropriate analysis is undertaken and required by the existing process to ensure the least cost/highest value options are selected and there is clear supporting documentation. • Amend DS26 to include all project approval process requirements including business cases to provide clarity and ensure compliance with governance processes. • Develop a prioritisation framework to ensure the process is clear and	6.2.2(a)

			repeatable. It should be consistent with the risk framework implemented under the recommendations made for asset replacement forecasting. • Document the outcomes and reasoning for the prioritisation of the projects.	
Implementation of plans	2.0	2.5	• See sections 11.2 and 11.3 on improvements to resourcing and capability.	6.2.2(a) and (b)

7.1   Decision making

A key requirement of ISO55001 under clause 6.2.2(a) is that an organisation must establish the decision making and prioritisation criteria for determining how the AM Objectives are to be met.

We assessed TLC's approach and found that the AM Policy sets out clear decision making criteria for managing the network. The requirements relevant to network investment planning are ensuring network safety through a proactive approach (AM Policy 1), improving network reliability performance (AM Policy 7), least cost and best overall value investments (AM Policy 8 and 9) and cost effective risk management (AM Policy 2, 15, 18 and Risk Policy)

The AM Policy specifies that risk management must be integrated into TLC's business operations, projects and decision making processes. This requirement is supported by the Risk Policy (Doc Ref 7), Risk Management Policy (Doc Ref 151) and Risk Framework (Doc Ref 6).

Our observations are:

- We found that the AM Policy and Risk Policy provide strong evidence that TLC's objective is to consider risk in its decision making criteria, and that the risk based approach is supported by TLC's senior leadership team and Board.
- We understand that TLC are in the process of updating its corporate risk register (Doc Ref 152) and are integrating risk reporting into a Power BI dashboard (Doc Ref 153).
- We have seen evidence of risks being considered in decisions on asset planning, inspection and vegetation management practices. For example, we have evidence that outage duration is considered in replacement models (Doc Ref 142 and 179) and projects to improve automation (Doc 108).
- However, we have not evidenced the implementation of the risk management framework into lifecycle processes such as investment planning and vegetation management. For example, we noted that risk assessment was applied inconsistently across the overhead, underground and substation replacement plans (Doc Ref 142, 168, 179) and this only reflected elements of the AM Policy and Risk Policy. This means there is currently a disconnect between the stated policies and the application to lifecycle practices in respect of decision making.
- We have also not seen a common methodology applied to lifecycle practices that provides a common framework for analysing consequences of failure/criticality from emerging trends in asset condition, and what represents best value in terms of prioritising investment plans. We found that TLC staff have been developing a new criticality framework (Doc Ref 9), however it is not yet implemented. The proposed framework is based on a quantitative approach to monetise

the consequences of failure and would bring TLC closer to good industry practices in New Zealand. We consider that implementation of this framework would make a material improvement to the risk analysis practices at TLC.

We have assessed TLC's current maturity at 2.0. We consider that the target maturity should be 3.0. The key improvements we recommend are:

- TLC implement a criticality framework that aligns with its Risk Framework to support decision making across the lifecycle practices.
- Ensuring that the criticality framework is applied consistently to investment planning, maintenance and vegetation management activities.

7.2　Governance and prioritisation

A supporting element of lifecycle practices is appropriate governance and prioritisation of expenditure plans and activities. The AMP process provides a pathway for TLC to coordinate its capital and operating expenditure plans for the planning horizon.

In the following sections, we assess TLC's project governance and prioritisation practices to develop expenditure plans.

Project governance

We found that TLC has implemented a robust governance process and found evidence of ongoing improvements (Doc Ref 154). The key steps of the process are:

- Issue, Risk or Opportunity (IRO) document (Doc Ref 157) is completed to obtain seed funding and approval for investigation of new identified network needs.
- Projects are then approved based on the completion of a Project Definition Sheet (Doc Ref 157) or Business Case, subject to the cost under the Delegation Policy (Doc Ref 63).
- The IRO, PDS and business case are reviewed and approved by the Design Review Group (DRG). If the cost is above the delegation of the DRG, then they are escalated to the appropriate level.
- The process is documented in DS 26 Works Management (Doc Ref 104) with additional documentation defining the business case process (Doc Ref 32).

Evidence of process review and improvement was found in the review of the PDS approval process where options for modification to improve control and review of proposed projects were assessed (doc ref 154).

Our observations:

- The Project Definition Sheet (PDS) is the primary approval pathway with a business case only required for projects above a specified cost threshold. The PDS does not provide adequate evidence of the least cost/highest value project option being selected. However, the limited business cases reviewed demonstrated least cost analysis was undertaken.
- The business case process document (doc Ref 32) appears to be an informal document that is not signed off. DS26 Works Management (doc ref 32) defines the PDS approval process but does not reference the business case process.
- The DRG is responsible for assessing proposed projects and establishing the projects required in the current year.

- The Board is responsible for approval of the long term plan via approval of the AMP. This responsibility was not clearly documented but evidenced through Board approval of the AMP.

Prioritisation

The process for project prioritisation is defined in DS26 works management (Doc Ref 104). The metrics to be used for prioritisation are consistent with the AM Policy, Risk Policy and AM Objectives, namely safety, environment, reliability and reputation.

We found that while the metrics to be assessed and the order of priority was specified, there was no framework to define how the risks are to be compared. This potentially creates more subjectivity with prioritisation decisions and may result in inconsistent outcomes.

We also found that, based on our review of replacement modelling, there are different approaches applied in relation to risk for each asset class and therefore the risk metrics being assessed are prepared on a different basis and may not be equivalent. Hence, prioritisation between fleets undertaken by the DRG may not result in the desired risk management outcome.

After assessing TLC's project governance and prioritisation practices, we have assessed TLC's current maturity at 2.0. We consider that the target maturity should be 3.0. The key improvements we recommend are:

- Ensure that appropriate analysis is undertaken and required by the existing process to ensure the least cost/highest value options are selected and there is clear supporting documentation.
- Amend DS26 to include all project approval process requirements including business cases to provide clarity and help ensure compliance with governance processes.
- Develop a prioritisation framework to ensure the process is clear and repeatable. It should be consistent with the risk framework implement under recommendation made for asset replacement forecasting.
- Document the outcomes and reasoning for the prioritisation of the projects.

7.3 Implementation of plans

We sought to understand TLC's processes for delivering its investment and maintenance plans, and whether outsourcing is managed effectively.

Delivery plans

A key aspect of lifecycle practices is ensuring that the organisation has the resourcing capacity and effectiveness to maintain, operate and invest according to its plans. As noted in sections 11.2 and 11.3, we consider that TLC has adequate resourcing and capability to implement its plans, but there are gaps that need to be addressed to improve to a level of maturity appropriate for its context.

While we have not undertaken an exhaustive review of TLC's implementation of plans, we have found evidence of TLC planning for additional staff and contractors to meet forthcoming workloads across different business units (Doc Ref 234 and 243). We also note initiatives such as the 36 month shovel ready program (Interview Ref 8) to improve its project delivery.

Outsourcing

A key requirement of ISO55001 under clause 8.3 is to ensure that the types of activities outsourced are clearly identified, any outsourced activities are controlled with defined processes, and that the information transfer between the organisation and the contractor is defined.

TLC delivers project work both in-house and through external contractors. In-house design capability is maintained for line related works and minor design changes to other asset classes, subject to resource and skills availability, while all other design works are outsourced. The allocation of work between internal and external resources is shown in section 8.3 of AMP23 (Doc Ref 2).

The impact of any changes to design or introduction of new equipment are assessed by engineering staff as part of the design review process.

The approach and practices applied for planning outages in order to minimise the impact to customers and ensure all customers are notified are discussed in section 4.2.

The Network Services business unit carries out minor project works where their skillsets and resources allow as well as line related construction work. They engage external contractors for support and to manage fluctuations in workload.

All major projects (e.g., construction or renewal of zone substations) are outsourced either as a design and build package or design is completed by specialists with construction contracted out separately.

Project related work is managed by the project management team to ensure stakeholder, technical and commercial requirements for work completed are met.

Our review found that these processes and requirements are adequately addressed and documented in DS26 Works Management (Doc Ref 104). We also found that information transfer through electronic forms is also required from contactors and undergoes the same quality assurance processes as all inspection, new asset or asset modification forms.

We consider that the use of external contractors for support or full outsourcing of project delivery is appropriate for the size of TLC and to ensure specialist skills can be resourced efficiently when required. This is a common approach for peer EDBs. Retaining internal project management should help retain control of the works and ensure the necessary data is obtained.

We have assessed TLC's current maturity at 2.0. We consider that the target maturity should be 3.0. Key improvements relate to our findings in sections 11.2 and 11.3 in relation to resourcing and capability.

8. LIFE CYCLE PRACTICES – INVESTMENT PLANS

In this chapter, we assess whether TLC's forecasting processes for identifying network investments supports its AM Objectives. TLC identifies its investment plans in the 2023 AMP and 2024 update AMP (Doc Ref 1 and 2) for network and non-network investment.

We have assessed TLC's practices to forecast investment for security of supply, asset replacement, network reliability, and network resilience. Our focus has been on how its practices enable TLC to address emerging trends in asset health and improve reliability performance.

Table 10 below sets out a summary of our findings of the maturity assessment of lifecycle practices applied to develop investment plans.

Table 10 Summary of maturity assessment against relevant AM Standard for lifecycle practices – investment plans

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Capacity and security of supply	1.75	3.0	• Undertake risk (cost) benefit analysis of whether there is value to customers from improving the security standard at zone substations that are currently N-1 switched or constrained. • Update the zone substation security assessment model to capture cost-benefit analysis and link the demand constraint to the identified project. • Apply the feeder security standard to each feeder over the 10 year planning horizon.	6.2.2(a) and (b)
Asset Replacement	1.5	3.0	• Ensure all analysis for each fleet, including FMEA or similar, are included in the proposed fleet plans. • Consistent with our findings in section 7.1, TLC should develop models that embed the organisation's Risk framework into its asset replacement decisions leveraging the new criticality framework it is currently developing. • Expand the modelling to all major asset classes by applying the risk framework to develop a forecast of replacement expenditure and volumes. The categories set out in the Information Disclosures would be a suitable guide. This will improve visibility of fleet condition and any expected changes to asset performance. Consideration should be given to the value of each asset fleet	6.2.2(a) and (b)

			when determining the granularity and methodology of modelling required.	
Network reliability	1.75	3.0	• Expand the functionality of the 'Network Automation Analysis' to demonstrate where there is a net benefit to customers from automation initiatives. • Consider the costs of increasing telemetered devices when assessing the preferred option for the proposed ADMS.	6.2.2(a) and (b)
Network resilience	1.5	2.0	• Establish a target level of resilience that TLC must achieve then identify the gaps to the desired level, identify where programs are not yet established that will address the gaps, prioritise the residual gaps and investigate approaches to address them. • Extend the resilience roadmap to include all actions that will improve network resilience.	6.2.2(a) and (b)

8.1   Capacity and security of supply

A key determinant of the reliability performance of the network is the capability to meet demand growth under normal and contingency conditions.

The 2023 AMP (Doc Ref 2) sets out TLC's approach to identifying capacity investment to meet growth in demand or improve security of supply. Demand is forecast for the network at zone substation level and used to identify the need for capacity augmentation.

TLC updated its Security of Supply Policy in 2022 (Doc Ref 100). The policy is set out in section 5.9 of the 2023 AMP (Doc Ref 2) which shows that TLC applies a deterministic approach to managing capacity, but allow for restoration time based on the size and location of the assets.

Our observations of TLC's forecast approach for growth and security of supply investment are:

▪ The Security of Supply Policy is consistent with NZ industry practice, noting that the definitions and restoration times differ between EDBs.
▪ While detailed review of the demand forecast methodology and modelling was out of scope, we identified that distributed energy resources, such as electric vehicles, and decarbonisation are considered (Doc Ref 1)
▪ While a feeder security standard has been developed, planning is primarily focused on the sub transmission and zone substation assets (Doc Ref 207).
▪ The zone substation security assessment model (Doc Ref 193), which included sub transmission, appeared functional and applied the security of supply standard correctly. However, it could be improved to:

- o Apply formulas and avoid using hard coded values.
- o There were notes in the model that demonstrated that overall cost was considered, however there was no cost benefit analysis provided for review. Refer to section 7.2 for further discission on project justification.
- o The link from the demand constraint identification to the identified project in the model and to the AMP was not clear. This link should be strengthened for clear line of sight from identified need to approved project.
- There are many zone substations that are identified to have insufficient capacity under N-1 scenarios. These substations are denoted in other documents as 'N-1 Switched', indicating that customers will be off supply until switching is completed to restore full supply, and 'N-1 Constrained' meaning there is insufficient capacity and customers will be off supply until the fault is rectified. It is not clear if these are planned situations or if analysis been undertaken to assess if it would be prudent and efficient to address the constraint.
- The sub transmission and zone substation security of supply standards were established prior to 2019 and we are not aware of the basis of establishing the requirements. We recommend reviewing the standards with a quantitative approach to document and justify the appropriate level of security.
- We did not observe evidence of the feeder security standard being applied to identify augmentation works. We recommend that TLC develop a model that assesses each feeder against the standard for the 10 year planning period to ensure compliance.

We have assessed TLC's current maturity at 1.75. We consider that the target maturity should be 3.0. The key improvements we recommend are:

- Undertake risk (cost) benefit analysis of whether there is value to customers from improving the security standard at zone substations that are currently N-1 switched or N-1 constrained.
- Update the zone substation security assessment model to capture cost-benefit analysis and link the demand constraint to the identified project.
- Apply the feeder security standard to each feeder over the 10 year planning horizon.

8.2   Asset replacement

Assets are replaced when they either functionally fail in service (reactive) or where an active decision is made to replace the asset before it fails (proactive). Reliability performance will be related to how well an organisation is monitoring the condition of its assets and making decisions to address emerging health issues. Our analysis sought to understand how TLC's asset replacement decisions contribute to its asset management objectives.

At TLC, specialist asset engineers have responsibility for assessing the condition of assets and developing replacement plans. There are separate asset engineers for overhead, underground and zone substation assets.

Our general observations of asset replacement practices were:

- This split of asset fleets is consistent with peer EDBs, however larger EDBs may have more staff and break down the responsibility for each asset fleet further so each asset engineer manages fewer different asset types.

- Consistent with our findings in section 5.2, asset information systems are generally reasonable to inform decision making comprising condition data from inspections, information recorded on outages, and asset age data contained in Basix. The asset managers also have access to purpose built dashboards such as information on the number of customers impacted by an outage if an asset fails.
- We found that the three asset engineers appear to have a good understanding of failure modes and emerging trends impacting their fleets. However, we observed that the information is not captured in fleet plans or other documentation. TLC have identified the development of fleet plans as a key future initiative (Doc Ref 103).
- We observed evidence that Failure Mode Effects Analysis (FMEA) was completed in 2022 (Doc Ref 80), which appears to capture modes of failure by asset type and material. However, we did not receive evidence of a process to regularly review the document, for instance, to capture emerging failure modes.
- Consistent with our findings in section 7.1, there is limited focus on consequence of failure, with inconsistent approaches applied by asset engineers (Doc Ref Doc Ref 142, 168, 179), and approaches that were not aligned to the risk framework (Doc Ref 6).
- We found some evidence of longer term forecasts of asset replacement for poles and cross arms, but only a 2 year planning horizon for underground and ground mounted distribution assets. We consider that longer term planning could capture the impact of ageing assets on asset health and defects.
- Good industry practice would require models that forecast deterioration of condition over time and calculate volumes of assets that need to be replaced to maintain overall network risk at current levels. This functionality is partly addressed by Asset Altitude however it was not consistently applied across the asset fleets and we were not able to review the methodology applied by Asset Altitude.
- The impact of replacement on network performance was considered for individual assets for some fleets, but the cumulative impact of the replacements was not considered. The analysis did not demonstrate how the investments would contribute to the AM Objectives, however, the new fleet plans that are planned to be developed are likely to address this issue.
- Unit rates were generally based on actual historical data by working with the finance team (Interview Ref 26 to 28).

We also made the following observations in respect of individual asset fleets:

- Replacement of power transformers is not modelled. (Interview Ref 28). The condition of transformers is based on diagnostic testing (including dissolved gas analysis) and visual inspections which is consistent with good industry practice. However, risk is not modelled and the decision for replacement is made in consultation with the DRG where risk is considered qualitatively and not well documented.
- Historically there has not been a replacement program for conductors or cables. These were managed through a 'reactive replacement' budget established based on historical average/trend of costs to cover replacement of distribution asset failures. We found that TLC is currently assessing how to implement a replacement program for conductors (Doc Ref 212).
- Pole mounted distribution transformers and distribution switches are run to failure while ground mounted assets are replaced based on condition when identified through inspection. This is a common approach with other EDBs based on the value of the asset and impact to customers if it

fails. There is no specific forecast for the pole mounted asset fleets, but an allowance is incorporated in the pole unit rate based on past projects. The costs are allocated to the correct assets in Business Central finance system at a later date.

- We found that analysis and project development has been done for the ground mounted transformers (doc ref 179), however the same level of analysis has not been undertaken for other ground mounted asset fleets (including Voltage Regulators and RMUs).

We would expect models that forecast deterioration of condition over time and calculate the resultant risk and then determine the volumes of assets that need to be replaced to maintain overall network risk at current levels.

As the network ages, the need for investment will increase and the ability to model the future increases in expenditure is critical to ensure that adequate works can be undertaken to avoid a significant deterioration in reliability and for TLC to continue to achieve their AM Objectives.

We have assessed TLC's current maturity at 1.5. We consider that the target maturity should be 3.0. The key improvements we recommend are:

- Ensure all analysis for each fleet, including FMEA or similar, are included in the proposed fleet plans.
- Consistent with our findings in section 7.1, TLC should develop models that embed the organisation's Risk framework into its asset replacement decisions leveraging the new criticality framework it is currently developing.
- Expand the modelling to all major asset classes by applying the risk framework to develop a forecast of replacement expenditure and volumes. The categories set out in the Information Disclosures would be a suitable guide. This will improve visibility of fleet condition and any expected changes to asset performance. Consideration should be given to the value of each asset fleet when determining the granularity and methodology of modelling required.

8.3   Network reliability investments

Network reliability investments are targeted projects that reduce the risk of an outage or reduce its duration. Our key observations are:

- We note that currently only approximately 4% of distribution switches are telemetered or remote controllable (Doc Ref 59). This means that the majority of switching must be done by field crews and prevents remote switching for more rapid restoration of supply.
- TLC has identified this issue and established a network automation program to install automatic circuit reclosers, sectionalisers, remotely controllable switches and fault indicators. The program is outlined in the AMP23.
- We observed evidence that the analysis described to determine the automation program has been undertaken by assessing the cost to install a switch compared to the annual SAIDI expected to be saved based on historical performance of the feeder (Doc ref 108). While an effective tool for analysis, the model could be improved to clearly show the benefit to customers in the long term and the benefit from the quality incentive adjustment mechanism.
- The current processes applied to manage the switching and data gathering related to the distribution network was described as being heavily reliant on network controller knowledge and capability. As a result, it can take longer than a year to adequately train a new controller to a

level of competency that they can operate the network independently. The current processes can result in longer outage durations while the controller identifies the best switching arrangement to isolate a fault while minimising the number of customers affected.

- TLC has established a 'Digital Utility Programme' (doc ref 2) that will assess the benefits of implementing an Advanced Distribution Management System (ADMS) which will assist with process efficiency, along with other broader benefits related to network visibility and data recording. Evidence of progress of this approach was provided for review (doc ref 204).

We consider that the current maturity rating is 1.75. We consider that a target maturity of 3.0 is appropriate in the context of TLC with the following improvements:

- Expand the functionality of the 'Network Automation Analysis' to demonstrate net positive benefit to customers from automation initiatives.
- Consider the costs of increasing telemetered devices when assessing the preferred option for the proposed ADMS.

8.4   Network resilience

In chapter 3, we noted that TLC's reliability performance in RY23 appeared to be impacted by a succession of adverse weather events. We expect that climate change is likely to increase the probability of adverse weather events and that networks will increasingly need to consider how they mitigate the impacts through resilience plans.

TLC has shown an awareness of the need for resilience planning, and has taken initial steps to further its practices in this areas. For example, TLC recently undertook a self assessment of their resilience practices against the EEA resilience management maturity assessment (RMMAT) with an average score of 2 (based on a scoring scale equivalent to that described in section 0). The results are shown in Figure 16.
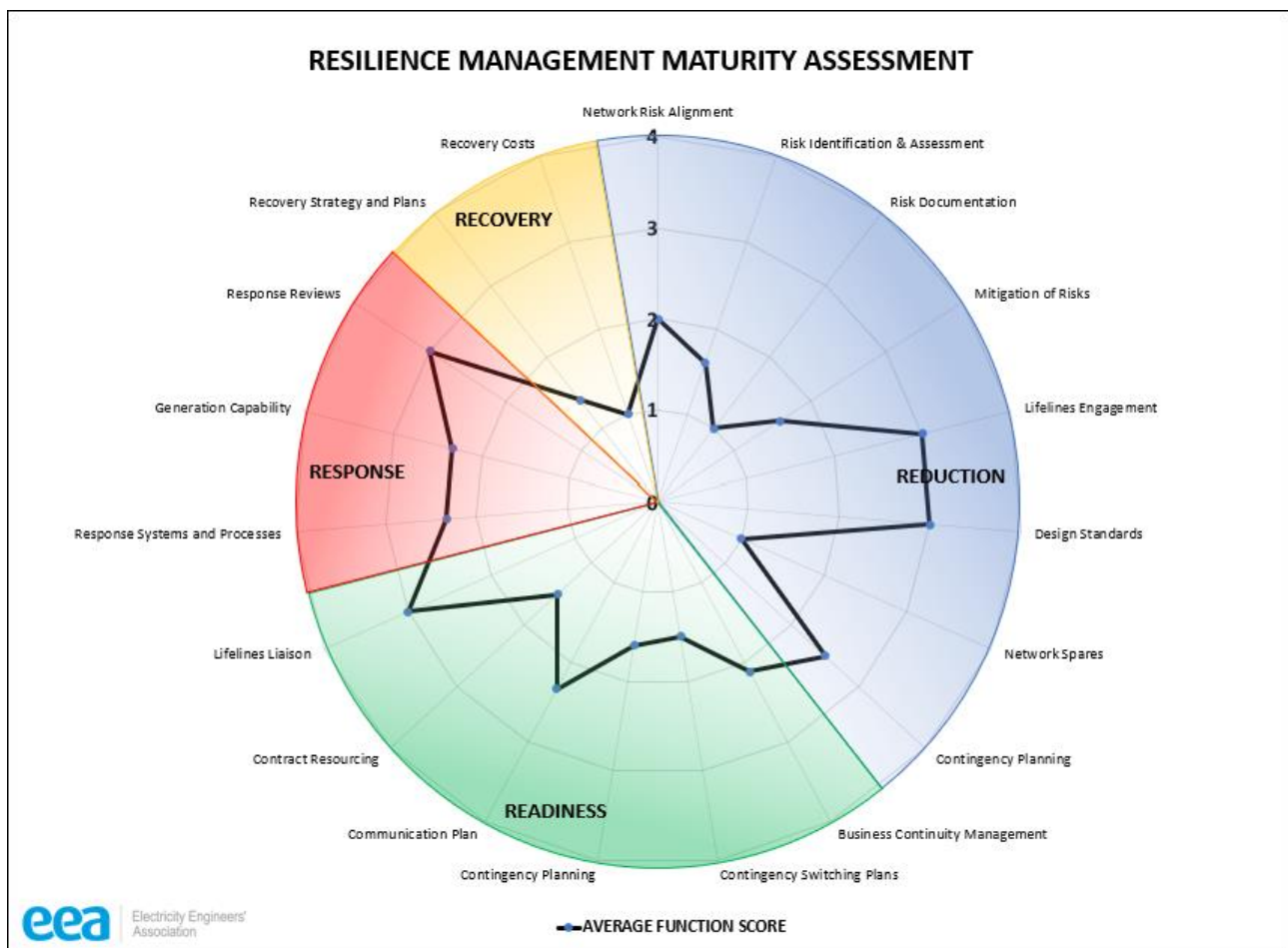
Figure 16 TLC's RMMAT self assessment outcomes (doc ref 82)

Based on the outcomes of this assessment, TLC has developed a network resilience roadmap (doc ref 83), however it is limited to understanding the causes of risks to network resilience through analysis to be undertaken with NiWA.

We found that a number of the areas identified to have a low level of maturity will be addressed through network initiatives we have identified in other sections of this report, including:

- Improvement of the risk register which includes resilience related network risks with allocation of a risk owner (Doc ref 84).

- ICAM and CIMS training and planned event simulation to improve how the network responds and improve recovery plans (Interview Ref 6).
- The digital utility programme to implement CRM and ADMS and network automation which will assist with switching during the event.
- Management of fault crews and locating strategic spares around the network (refer to section 9.3).

We consider that the current maturity rating is 1.5. We consider that a target maturity of 2.0 is appropriate in the context of TLC given this is an emerging issue and TLC needs to leverage its expertise through learnings from the industry. We consider the following improvements would assist TLC:

- Establish a target level of resilience that TLC must achieve then identify the gaps to the desired level, identify where programs are not yet established that will address the gaps, prioritise the residual gaps and investigate approaches to address them.
- Extend the resilience roadmap to include all actions that will improve network resilience.

9. LIFE CYCLE – MAINTENANCE AND OPERATION

In this chapter we specifically address TLC's lifecycle practices for maintaining network assets and operating its network. The chapter is structured as follows:

- Section 9.1assesses TLC's preventative maintenance including inspection and testings on a cyclic basis, and its reactive maintenance which comprises fixing defects identified through preventative maintenance and fault response.
- Section 9.2 assesses TLC's vegetation management practices including tree trimming and removal, inspections to determine the amount of work required, and liaising with tree owners regarding the work needed on their property.
- Section 9.3 assesses TLC's practices in respect of response and recovery from unplanned outages.

Table 11 below sets out a summary of our findings of the maturity assessment for lifecycle practices for maintenance and operations.

Table 11 Summary of maturity assessment against relevant AM Standard for lifecycle practices – maintenance and operations

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Maintenance	2.00	2.50	• TLC complete their review in relation to the frequency of on site/physical inspection and testing of poles to ensure that emerging condition issues are being proactively monitored. This should consider practices of other EDBs and the EEA guide (Doc Ref 248). • Document the justification for inspection standards and frequency for each asset class. • Periodically review its standards for any proposed changes, and report any variation from the standard to the Senior Leadership Team including reasons for the variation. • Consistently include reporting of asset replaced and maintenance tasks delivered compared to forecast volumes in monthly reporting to the appropriate committee(s).	6.2.2(a) and (b)
Vegetation management	2.00	2.50	• Fully develop a plantation and vegetation database as a key enabler for improved risk management and prioritisation of initiatives. This would leverage the recent work to overlay aerial photography on the GIS platform.	6.2.2(a) and (b)

			• Implement a risk based approach for planning vegetation actions. This includes prioritising activity on plantations where there is likely to be a high risk, with consideration to getting the land owner's consent to take action. • Undertaking cost-benefit analysis of options to mitigate the risk of vegetation incidents including examining capital and operating activities.	
Response and restoration from outages	2.50	2.50	• If cost effective, implement a procedure to record the time it takes for field crew to arrive on site to determine if the deterioration in CAIDI is due to response time or fault type. • Undertake further analysis into the drivers of the deterioration of CAIDI in the northern region to identify if there is a specific underlying cause. • Improve the documentation of proposed initiatives to demonstrate TLC's commitment to improving its response and restoration of outages.	6.2.2(a) and (b)

9.1   Maintenance

Maintaining the health of network assets is a core life cycle practice. Preventative maintenance is directed at ensuring an asset remains in service and that emerging issues are detected before failure. Reactive maintenance refers to the repair of faults, as well as urgent unplanned work that may be required to avoid a safety or environmental issue or prevent an imminent failure.

TLC's preventative maintenance activities include inspections, testing, routine tasks, and corrective maintenance when defects are rectified at the time of preventative maintenance. Consistent with its replacement practices, TLC has three separate asset fleet portfolios to maintain its assets including overhead, underground and zone substation assets.

We have assessed TLC's practices to develop preventative maintenance programs including how it develops its routine inspection and testing processes, and how it undertakes corrective maintenance. Our observations are:

▪ In general, preventative maintenance activities and the data collected have been developed based on appropriate standards, manufacturer manuals, experience and collaboration with other EDBs.
▪ Visual inspection by helicopter is undertaken annually for 33kV assets (sub transmission) and on a three year cycle for distribution assets with a focus on vegetation issues. More recently a five yearly cycle for pole top photography has been established and TLC is considering incorporating LiDAR.

- However, we considered that the stated inspection of 15 years for on site/physical inspection and testing of poles (pole base in particular) and pole mounted assets is too long to detect emerging condition issues given the age of TLC's asset base, and does not appear consistent with good NZ industry practice. Review of peer AMPs found that inspection of distribution assets typically occurred on a much more frequent basis of approximately one year for higher capacity assets and up to five years for other assets. As part of their review TLC should consider practices of other EDBs and the EEA guide on timber pole condition assessment (Doc Ref 248) which indicates inspection cycles should be determined with consideration to the inspection technique used and expected intervention time based on the pole condition.
- Related to the above, we understand that TLC is reviewing its inspection practice to assess the value of moving to a 5 or 8 year cycle. However, we note that previous reviews of maintenance and inspection cycles to reduce the interval between inspection cycles for overhead assets were conducted in 2020 (Doc Ref 92) and in 2022 (Doc Ref 80).
- While the inspection schedule is documented in a standard (Doc Ref 105), we found conflicting evidence of inspection cycles in TLC's planned maintenance cycle (Doc Ref 89) and that the inspection cycle of underground and ground mounted distribution assets appear to differ in practice from the standard (Interview Ref 26). We consider that there needs to be a formal review and update of the current standard(s) to ensure there is an up to date master document that sets out inspection and maintenance requirements with justification and evidence of approval by the appropriate level of management according to the Delegation Policy.
- Consistent with our findings in section 5.1, we found that the inspection program generally provided sufficient and quality-controlled information on asset condition. Similarly, in section 5.3 we found evidence of maturity in how TLC are collecting asset condition information through new inspection techniques.
- We found that TLC is recording and reporting regularly on replacement and renewals and operational expenditure, material projects and volumes. We found that monitoring of expenditure against forecast and budget is done consistently in several forums including the AMC and PSG. However, the volumes of assets replaced and maintenance tasks delivered compared to the forecast amounts was not consistently reported and could be improved. This will help ensure that the network expenditure is delivering the intended network outcomes.

In respect of reactive maintenance we note that TLC uses a portal termed the 'Vault' to report defects that are not scheduled. Faults are identified through outage reports in the Network Operations Centre. A separate phone line is provided for safety related issues.

Fault events are managed according to NOP 13 Fault Management (doc Ref 60) while network defects reported through the Vault are assessed by the asset engineers who then develop a response based on the urgency of the issue and the defined governance procedures (Doc Ref 104, Interview Ref 26).

We reviewed 10 incidents reported through the Vault (Doc Ref 220-229) and found that they provided adequate information to initiate a response by field crew. We found that the reactive maintenance systems for identifying faults and defects and for initiating a response were appropriate for an EDB in TLC's context.

Overall, we consider that TLC's current maturity rating for maintenance is 2.0. We consider that a target maturity of 3.0 is appropriate in the context of TLC. We consider the following improvements would assist TLC:

- TLC consider reducing the interval time for on site/physical inspection and testing of poles (pole base in particular) and pole mounted assets from 15 years to align with peer EDBs.
- Review, update and document inspection standards including the justification for each task and its frequency for each asset class. The updated document should be approved by the appropriate level of management according to the Delegation Policy.
- Periodically reviews its standard for any proposed changes, and reports any variation from the standard to the Senior Leadership Team including reasons for the variation.
- Consistently include reporting of asset replaced and maintenance tasks delivered compared to forecast volumes in monthly reporting to the appropriate committee(s).

9.2   Vegetation management practices

Vegetation is a material cause of network outages as evident in our analysis of reliability performance in chapter 3. Given its criticality, the Terms of Reference specifically required consideration of TLCs policies, objectives and strategies regarding vegetation management.

Since 2020, TLC have developed specific strategies, targets and initiatives to improve vegetation management. Our observations are:

- Accountability for vegetation performance has been establish with the appointment of a dedicated vegetation manager and team. Key responsibilities of the vegetation manager are analysing vegetation performance, establishing the vegetation strategy and plan, day to day assessment of defects and managing the vegetation service providers.
- A Vegetation Management Committee was established in 2020. It has now been combined with the Outage Management Committee for improved efficiency. This provides an effective means of raising current issues with vegetation management. We also note that strategies are brought to the Asset Management Committee (Doc Ref 144) with its most recent strategy presented to the Board in 2023 for approval (Doc Ref 210). This demonstrates a commitment from senior management.
- TLC has conducted detailed analysis on the root causes of vegetation outages, with its Outage Database establishing granular codes to identify the causes of vegetation issues (Doc Ref 15). In 2020 (Doc Ref 144), TLC established that the core cause of vegetation related outages stemmed from 'out of zone' trees, and this related to the increasing number of forestry plantations in their network area. Its vegetation management strategies and plans since that time have sought to develop approaches to address this complex but core issue (Doc ref 145).
- TLC have established vegetation management targets that have been incorporated into the AMP. However, these targets are not currently being achieved.
- A vegetation management plan that developed actionable initiatives to implement the RY21 strategy was approved in RY21 and updated annually through to RY24. We have evidenced many initiatives in the vegetation plan being acted upon:
  - o A detailed process for identification of where and when tree trimming is required based on customer notifications and inspection results was implemented at the start of RY23.

- o   Pole top photography and LiDAR survey of the entire network has been completed and overlayed geographically through the GIS (Doc Ref 38).
- o   Innovative techniques such as helicopter sawing have been trialled and are demonstrating to be effective low cost methods to manage vegetation (Doc Ref 38).
- o   However, there was no evidence presented that the key initiatives of establishing a high risk plantation register and comprehensive vegetation database were implemented.
- o   It is not clear if the FY24 plan is still a draft or final. It should be updated to consolidate the most recent analysis, update the status of initiatives, and identify where there may be outstanding gaps.
- TLC's recent strategy identified 10 key approaches to manage vegetation in the context of recent performance and increasing plantations (Doc Ref 210). The strategy appears fit for purpose, covers key areas that are impacting reliability and established the process shown in Figure 17 that is still currently applied for vegetation management. We observed evidence that the process has been implemented except for the vegetation database and risk assessment.
- TLC will need to apply a risk framework that considers which regions give rise to highest probability of SAIDI and SAIFI, and consider where there are likely to be positive interactions with land owners to develop effective solutions.
- TLC reports on vegetation management on an annual basis including its performance (Doc Refs 37 to 39).

Overall, we consider that TLC's current maturity rating for vegetation management is 2.0. We consider that a target maturity of 2.5 is appropriate in the context of TLC given the complexity of the issues it faces. We consider the following improvements would assist TLC:

- Fully develop a plantation and vegetation database as a key enabler for improved risk management and prioritisation of initiatives. This would leverage the recent work to overlay aerial photography on the GIS platform.
- Implement a risk based approach for planning vegetation actions. This includes prioritising activity on plantations where there is likely to be a high risk, with consideration to getting the land owner's consent to take action.
- Undertaking cost-benefit analysis of options to mitigate the risk of vegetation incidents including examining capital and operating activities.
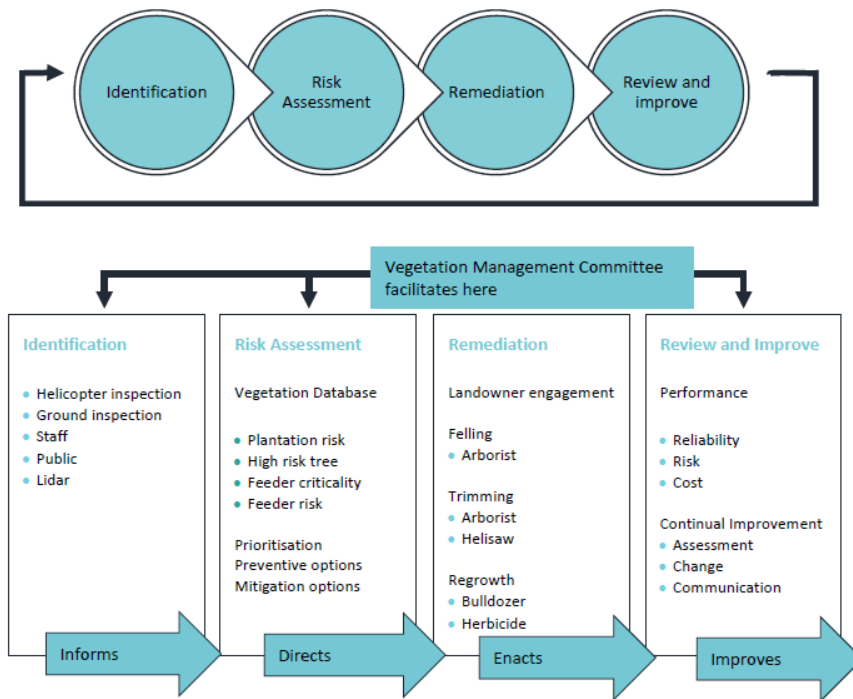
Figure 17 Vegetation management process (source AMP23 page 67)

9.3 Response and recovery from outages

Responding to faults in a timely manner is a critical aspect to maintaining reliability. In the context of TLC, remoteness and accessibility of the network due to terrain can be challenging in many areas. In addition, the radial nature of the network can limit options to back feed or to bypass the fault to more rapidly restore supply to customers.

Our analysis in section 3.1 found that there is potentially an increasing trend in CAIDI in the northern network region. Restoration time (CAIDI) can be impacted by the type of faults occurring as well as the accessibility of terrain to arrive at the fault. We note that only overall restoration duration was available and we were not able to separated out the duration to arrive on site and the duration to address the fault for a more granular assessment.

Network Operating Procedure 13 (Doc Ref 60) defines fault response management for all faults from major events that require an incident management team through to every day minor outages. TLC has a relatively small resource base of field workers. As a result, there is no dedicated fault response team. Instead, field crew workers are dispatched to faults based on set criteria including proximity to the fault, skills and fatigue management. In practice, a field crew worker is typically identified as the first responder and is tasked with inspection duties that can be easily and rapidly stopped or made safe to help with minimising response times (Interview Ref 14).

Our review found that a number of initiatives are being implemented, or are being planned, to improve response and recovery from interruptions. These included:

- Network solutions to improve back feed capabilities.
- Standardisation of equipment and spares carried by field crew to ensure core assets, tools and components are available.

- Strategic storage of spares in locations around the network where certain assets types are specific to a region (as a result of previously being different networks) to minimise travel time for sourcing the required replacement assets.
- Increasing the number of field crew available, improving scheduling and improved collaboration with neighbouring EDBs to share resources in times of high demand.
- Sending first responders to areas with weather warnings in advance to ensure rapid response.

Overall, we consider that TLC's current maturity rating for response and restoration of outages is 2.5, which we consider is an appropriate maturity target given the remoteness of TLC's network. We identified the following improvement opportunities:

- If cost effective, implement a procedure to record the time it takes for field crew to arrive on site to determine if the deterioration in CAIDI is due to response time or fault type.
- Undertake further analysis into the drivers of the deterioration of CAIDI in the northern region to identify if there is a specific underlying cause.
- Improve the documentation of proposed initiatives to demonstrate TLC's commitment to improving its response and restoration times.

10. REVIEW OF ASSET MANAGEMENT MATURITY

The purpose of this section is to assess the maturity of TLC's asset management system and its asset management practices. This required in scope items 3.1(c)(v) and 3.1(c)(vi) to achieve the objective set out in context items 1(a-d).

The relevant ISO55001 clauses that our AM Standard applied for assessing these practices were 9.3, 10.1, 10.2 and 10.3. The chapter provides our assessment of:

- Asset management maturity annual self-assessment in section 10.1.
- Asset management improvement in section 10.2.
- Senior management review of asset management in section 10.3.
- Governance of asset management in section 10.4.

Our assessment reflects that the ISO55001 standard places a strong emphasis on establishment and continual improvement of an asset management system. We have also considered whether TLC demonstrates review and improvement practices in relation to aspects of its asset management including practices and information systems.

Section 5.1 of the 2023 AMP (Doc Ref 2) describes how TLC has established and implemented an asset management system. The elements of the system are further articulated in Sections 5.2 to 5.8 including accountabilities, governance structures, risk management, lifecycle management, information systems, business continuity planning and communications and participation.

Table 12 sets out a summary of our findings of TLC approach to review and improvement of asset management maturity.

Table 12 Maturity assessment of asset management maturity

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Asset Management self-assessment	2.0	3.0	• A process to report the detailed findings of the AMMAT reviews. • Additional internal processes to undertake self assessments on a periodic basis that consider a holistic view of asset management and re not limited to the requirements set out in the Information Disclosures.	9.2
Asset Management Improvement	1.75	3.0	• A process to track improvements recommended in the AMMAT reviews. • Internal 'staff led' reviews of TLC's asset management system (beyond Information Disclosure requirements) with clear identification of improvement opportunities.	10.1-10.3
Senior management review of asset management	2.5	2.5	• Senior leaders to establish a process for reviews and improvement of TLC's	4.3-4.4, 5.1-5.3, 6.1

				Asset Management System at regular intervals.	
Governance of asset management	2.0	3.0	• Comprehensive and periodic reviews of the Asset Management System which provide direction on targeted initiatives. • Document the hierarchy of the documents, systems and processes that support and enable the asset management system described in the AMP. • Formal process to monitor, track and record improvements over time.	7.2

10.1 Asset Management self-assessment

We assessed TLCs practices in relation to asset management self assessment with reference to ISO55001 clause 9.2. This requires processes to undertake an internal audit of the asset management system at planned intervals.

The Commission requires EDBs to conduct an annual asset management maturity assessment based on the Asset Management Maturity Assessment Tool (AMMAT). While the full AMMAT has over 100 questions relating to asset management standards, the Commission only requires EDBs to report against 31 of the questions. The annual AMMAT review therefore does not reflect a comprehensive review of TLC's asset management system such as what would occur under a review against the full set of AMMAT questions or against the ISO 55001 standard.

Consistent with its regulatory requirements, TLC have undertaken four annual AMMAT assessments between 2020-2023 (Doc Refs 11-14). The assessment is undertaken by an independent party to ensure that the assessment provides impartial results and findings. We consider that the reports demonstrate that TLC is undertaking assessment against a relevant standard.

However, we have not observed a documented process within TLC to consider the results and recommendations of the AMMAT review, and therefore it falls short of a complete self-assessment process. We note that there was some evidence of self-assessment in 2022 (Doc Ref 98) but there was no formal evidence that recommendations had been actioned.

We consider that the current maturity rating is 2.0 based on evidence of annual AMMAT reviews. We consider that a target maturity of 3.0 is appropriate in the context of TLC with the following improvements:
▪ A process to report the detailed findings of the AMMAT reviews to relevant Committees and Senior leaders and noting of key findings to the Board.
▪ Additional internal processes to undertake holistic self assessments (not limited to the requirements of the Information Disclosures) on a periodic basis by responsible TLC staff, potentially using the ISO 55001 as a reference standard.

10.2   Asset Management Improvement

We assessed TLCs practices in relation to asset management improvement with reference to ISO55001 10.1,10.2 and 10.3.

TLC undertake regular reviews and implement improvements on elements of asset management processes and practices. This is documented in working papers including asset management improvement review and work plan (Doc Ref 98 and 103), vegetation management plans and strategies (Doc Ref 35 and 38), processes to improve information systems and data (Interview Ref 10 and 11), and works management (Doc Ref 114). It is also evident in the analysis in the spreadsheet for outage data where new sub-categories for faults have been applied particularly for vegetation management (Doc Ref 68). The improvements help with identifying non-conformities and preventative actions to mitigate reliability outages and maintain asset health.

Our review of TLC's performance against the AMMAT framework (Doc Refs 11 to 14) demonstrates improvement in maturity scores and evidence that some action is undertaken. However, we have not observed evidence that the AMMAT 2023 review was brought to Committees or was noted to TLC's Board. However, the recent proposed agenda structure for the Asset Management Committee now includes a response to AMMAT reviews, including a review of the latest AMMAT review in the third quarter (Doc Ref 195).

We also note that since 2022, TLC has not undertaken an internal (staff-led) review of its Asset Management System. We consider that continuous improvement of the asset management system requires a commitment to undertake reviews at periodic intervals and for broader elements of the AMS that are not covered by the AMMAT elements required by the Information Disclosures.

We consider that the current maturity rating is 1.75 based on documented evidence of improvements in processes and practices and improvement in AMMAT scores over time. We consider that a target maturity of 3.0 is appropriate in the context of TLC with the following improvements:

- A process to report on AMMAT results and to track improvements recommended in the AMMAT reviews.
- Internal 'staff led' reviews of TLC's asset management system, that has a scope that covers the full asset management system and is not limited to the requirements of the Information Disclosures, with clear identification of improvement opportunities.

10.3   Senior Management Review of Asset Management

We assessed TLCs practices in relation to senior management review of asset management with reference to ISO55001 clause 9.3. This requires top management to review the organization's asset management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness.

As above, we have not observed an internal process to review the Asset Management System against an industry standard since 2022. This means that there has been no process in place for senior management review.

However, we have observed that TLC's Senior Management undertakes reviews of strategic direction and asset management practices, most notably in preparing the 2024 AMP update (Doc Ref 2). This includes changes to the AM Policy (Doc Ref 3) to target areas of improvement. We note:

- TLC's Senior Leadership Team have developed strategic pillars (Doc Ref 3) with the approval of the Board (Doc Ref 209). The strategic pillars reflect an understanding of the future internal and external drivers of change impacting the business, and articulate objectives to meet those challenges.
- Senior leaders have considered how the strategic pillars would influence network strategies and targets (Doc Ref 207) and resourcing capabilities (Doc Ref 61 and 234).
- Senior Leaders are presented with papers as part of the AMP process which seek approval of asset management objectives and expenditure programs (Doc Ref 196)
- Senior Leaders chair key committees such as the Asset Management Committee and the Outage and Vegetation Management Committee where initiatives are brought for actioning (Doc Ref 148).
- We have observed evidence of offsite meetings, attended by the General Managers, which discuss asset management initiatives and responsibilities for actioning (Doc Ref 146).

We consider that the current maturity rating is 2.5 based on documented evidence of senior leaders being actively involved in asset management strategies and maturity initiatives. We consider that a target maturity of 2.5 is appropriate in the context of TLC with the following improvements:

- Senior leaders to establish a process for reviews and improvement of TLC's Asset Management System, with improvements reported back to senior leaders at regular intervals.

10.4   Governance of asset management

We assessed TLCs practices in relation to asset management self assessment with reference to provisions in ISO 55001 including clauses 4.3 to 4.4, 5.1 to 5.3 and 6.1. In general terms, we sought to assess whether TLC had good governance to enable improvement of asset management maturity.

Our observations are:

- TLC has a documented Asset Management System as set out in Chapter 5 of the 2023 AMP (Doc Ref 2). TLC also has evidence of documented policies and procedures in relation to asset management.
- We consider that TLC has established committees in place to identify improvements in asset management practices and TLC's senior leaders drive strategic direction. However, this is predominately focused on network outcomes and investment governance.
- We found that systemic and formal review of the asset management system is limited to the annual AMMAT review for the Information Disclosures and implementation and monitoring of improvement recommendations has not been adequately demonstrated. This is inhibiting TLC from improving asset management maturity.
- There is limited detail on how the suite of documents, systems and processes work together within the asset management system and alongside or with other business systems and business units.

- We found that TLC lacks a formal process to monitor, track and record improvements for the asset management system over time.

We consider that the current maturity rating is 2.0 based on only informal processes to improve asset management maturity. We consider that a target maturity of 3.0 is appropriate in the context of TLC with the following improvements:

- Comprehensive and periodic reviews of the Asset Management System which provide direction on targeted initiatives.
- Formal documentation of the documents, systems and processes with the hierarchy that supports and enables the asset management system described in the AMP.
- Formal process to monitor, track and record improvements over time.

11. SUPPORTING FUNCTIONS

The purpose of this section is to assess TLC's maturity in relation to key supporting functions. In our view, this is tied to the achievement of the AM Objectives including with reference to vegetation management, reliability and asset maturity.

We have considered four supporting functions in our Asset Management Standard – leadership, resourcing, competency and awareness. The maturity rating is identified in Table 13.

Table 13 Maturity rating for support functions

Topic	Current maturity	Target maturity	Improvement area	ISO Clause
Leadership and Commitment	3.0	3.0	• Champion continual improvement in the asset management system.	5.1
Resourcing	2.5	3.0	• Increase the number of staff that undertake a network control function. • Improve documentation to help mitigate key person risk. • Develop an overarching resourcing strategy that identifies the quantum of new staff and skill sets to meet future needs.	7.1
Competency	2.0	2.5	• Track current qualifications and competencies of TLC staff including engineering staff. • Consider if the ENA Common Competency Framework is suitable for TLC's needs.	7.2
Awareness	2.5	3.0	• Improve staff training in the discipline of asset management and have staff participate in reviews of the Asset Management System.	7.3

11.1 Leadership and commitment

We assessed TLCs practices in relation to leadership and commitment with reference to ISO 55001 clause 5.1. In general terms, we were assessing whether there was evidence that TLC's Senior Leadership Team and the TLC Board are involved in establishing asset management objectives in line with the corporate objectives, and demonstrated commitment to achieving the objectives, and improvements in asset management maturity.

Our observations are:

▪ The Board is actively involved in asset management strategies and decisions including signing off the Asset Management Policy and Risk policy. The Regulatory Asset Management Committee (RAMC) is effectively a sub-committee of the Board (Doc Ref 244) including senior leaders and Board members and provides input on direction of initiatives including the development of the

AMP (Doc Ref 194). The Terms of Reference define the function, composition and responsibilities of the RAMC (Doc Ref 244)

▪ The responsibility for the Asset Management Policy (Doc Ref 3) lies with the General Manager for Network and is approved by the Board. The policy was recently amended to reflect four key focus areas. This shows that senior leaders are involved and committed to improving asset management maturity.

▪ The approval process for the AMP involves the Senior Leadership Team bringing forward a recommendation to the Board to approve the AMP as demonstrated in internal memos (Doc Ref 196, 201 and 203). The papers discuss issues such as asset management objectives, key changes from the previous year, consideration of strategies, and expenditure plans.

▪ Senior leaders chair committees including the Asset Management Committee (Doc Ref 91) that routinely meet to discuss measures of asset management maturity and performance (Doc Ref 19-22).

▪ The Board approve the proposed direction of the Senior Leadership Team including strategic direction (Doc Ref 209) and note updates to the AMP (Doc Ref 201).

▪ Our meeting with a subset of TLC's Board and with its Chief Executive Officer emphasised their commitment and support for TLC to achieve their stated asset management objectives, and to improve asset management maturity over time.

▪ The digital utility strategy as approved by senior leaders demonstrates a commitment to improve data quality and business processes to improve asset management outcomes.

▪ We have not seen an emphasis on reviewing and improving the asset management system since 2022.

We have assessed TLC as having a score of 3.0 in terms of maturity of leadership and commitment, which in our view is the target maturity for TLC. We consider that there is room for improvement in championing continual improvement in the asset management system.

11.2   Resourcing

We assessed TLCs practices in relation to resourcing with reference to ISO 55001 clause 7.1. Our review examined whether TLC's resourcing provided support to meet its AM Objectives. We assessed TLC's organisational structure, resourcing adequacy, resourcing strategy and planning, and key person risk.

Organisational structure

We assessed if the organisation's structure helped support TLC meet its asset management objectives. We observed:

▪ TLC has a documented organisational structure (Doc Ref 230 and 238) that reflects industry practice including senior leaders across key functions of the business.

▪ There appears to be structured teams with carriage of asset management activities including field staff, reliability performance, asset planning, control room and operational planning.

Resourcing adequacy

While we are not in a position to undertake a detailed review of resource adequacy, we observed at a high level:

- The roles in the organisation chart appear to be filled within the organisation, including the appointment of two senior leaders that had previously been unfilled.
- Currently, we consider there is a key risk in relation to resources in the control room, with only 3 controllers operating over day and night shifts. We understand that TLC will be seeking to engage additional controllers to mitigate this risk. We also note that the proposed digitalisation strategy includes an ADMS that will assist automation of control decisions and make it less dependent on individual staff knowledge and experience.
- There is a stand-by roster for unplanned outages (Doc Ref 62) with contact details. We understand that the standby roster has been designed to have relevant skills to address and rectify different outage types.
- In our interviews with TLC staff (Interview Ref 25), we noted that the call centre is outsourced in the evening shifts to ensure resource adequacy to field outage calls from customers.
- We found that TLC effectively uses peer networks to help develop strategies and provide guidance on key issues. For example, the Chief Executive of TLC is the Chair of the Northern Energy Group that comprises other networks and drives joint solutions (Doc Ref 247). We consider that joining together with other networks is an effective use of limited resources for a network the size of TLC.

Recruitment and retention of staff

TLC is a relatively remote network where there may be risks in recruiting new staff to fill vacant positions. We observed:

- Employee turnover has improved and is currently only at 8% (Doc Ref 122). There was evidence of a comprehensive Employee Value Proposition (Doc Ref 118) which includes initiatives to retain staff including flexibility to work from home. Employee satisfaction is also a key metric that is monitored and reported through a People and Safety report (Doc Ref 124). This indicates that TLC value the retention of its employees and in turn this supports its resourcing capability.
- Our interviews found that many staff had started with TLC recently indicating that vacant roles had been filled through successful recruitment.
- We note that TLC are highly dependent on key staff across functions who have extensive experience and knowledge. We consider that prescriptive documentation would provide a means of mitigating the risk of a key person leaving the organisation.
- Evidence provided demonstrated that it can take on average approximately three months to recruit skilled staff with recruitment of line mechanics taking over a year.

Resourcing plan

We note that the 2024 AMP indicates an uplift in expenditure and activities, including new initiatives to meet TLC's strategic pillars. There also appear to be drivers over the next 10 years that may increase TLC's resourcing requirements including support for new automated systems, and higher peak demand growth from electrification, and an ageing asset base. With this in mind, we assessed whether TLC had evidence of a resourcing plan. Our observations are:

- We did not find an overarching resourcing strategy that sought to understand the quantum and skill sets to deliver the asset management objectives over the medium term.
- We found some evidence of resourcing requirements to meet new initiatives related to the strategic pillars (Doc Ref 211 and 234).
- We identified that TLC has an approach to outsourcing that will supplement any small gaps in internal resources (refer to section 7.3).

We consider that the current maturity is at 2.5. We consider that a maturity of 3.0 is reasonable in TLC's context given the risk of inadequate resourcing and key person risk. We consider the following is required to meet the maturity gap:

- Increase the number of staff that undertake network control room functions.
- Improve documentation to help mitigate key person risk.
- Develop overarching resourcing strategy that identifies the quantum of new staff and skill sets to meet future drivers.

11.3   Competency

Competency relates to whether the resources have the necessary qualifications, skills, knowledge and experience. We have only provided a high level view based on documentation and interviews with key staff.

Our observations are:

- In our interviews (Interview Ref 9) we were advised that the recruitment process seeks out staff with relevant qualifications and experience.
- Field workers are provided training with coaching by experienced staff.
- We have observed a competency table for field workers which also shows training undertaken (Doc 139). However, we have not sighted a competency table for engineering and office based staff. In our view, it would be useful to track and record qualifications and competencies of staff, and ensure this is updated regularly.
- We also note that TLC has developed their own approach to identifying and monitoring competency requirements. The ENA has published a Common Competency Framework (CCF) that has been developed in collaboration with the electricity distribution sector. TLC should review the ENA CCF as a guide to good industry practice and determine whether it will address their needs.
- However, we have not sighted documentation which demonstrates there is a formal process to periodically review whether the competency and training requirements are adequate, if there are any potential gaps in competency, or if the requirements in the competency table reflect the current and future needs of the business.

We consider that the current maturity level is 2.0. We consider that a maturity of 2.5 is reasonable in TLC's context. We note that there are informal processes in place to ensure staff are adequately qualified and experienced, and that a formal framework would entail higher costs without too much value. We consider the following improvement would be valuable:

- Track current qualifications and competencies of TLC staff including engineering staff.
- Consider if the ENA CCF is suitable for TLC's needs.

11.4 Awareness

Our assessment was based on interviews with key staff at TLC. We were unable to assess awareness of all TLC staff. Our observations were:

- Staff appear to have an awareness of the AM Objectives and the benefits of improved asset management practices.
- Staff work together in teams to achieve the AM Objectives with a reasonable understanding of the roles of other teams and staff.
- We did not observe that staff in general have an awareness of the importance of the asset management system, including the need for cohesive end to end processes and documentation. However, there were exceptions with some senior staff understanding the needs for an asset management system.

We consider that the current maturity is at 2.5. We consider that a maturity of 3.0 is reasonable in TLC's context given that awareness is a key enabler of asset management outcomes and continuing maturity. We consider the following is required to meet the maturity gap

- Improve training and have staff participate in reviews of the Asset Management System.

12. ASSESSMENT OF REMEDIAL MATTERS

As part of the Enforceable Undertakings, TLC committed to implementing a number of initiatives termed the Remedial Matters. These were focused on vegetation management, reliability data collection systems and security of supply.

As part of the Terms of Reference, we are required to assess the Remedial Matters to determine:

- Whether they will close any identified gaps to the required asset management standard; and
- progress on the remedial matters.

In our interviews we discussed the Remedial Matters with TLC and their approach to achieving them. TLC identified that they decided not to establish a project or program of work to address each individual matter, instead they were incorporated into the initiatives and objectives of their business as usual operations with the committees set up to provide governance (Interview Ref 17).

We have set out the remedial matters in Table 14 below and provided our assessment of each item in relation to progress to complete the Remedial Matter element and whether it will close any identified gaps.

Table 14 Assessment of remedial matters

Remedial Matters	Progress	ENC Comment	Residual gap
Assessing and responding to vegetation risk			
Vegetation management strategy to address weaknesses in vegetation management:	🟢	Vegetation strategy developed and submitted to board on 27 July 23. Strategy appears fit for purpose and covers key areas that are impacting reliability. Vegetation management plan identifies activities for the year.	None
Establishment of baseline measurement of vegetation stock (use of LiDAR data to create a vegetation database to assess the current risk to the network).	🟡	LiDAR identified as completed in RY22 Vegetation management plan and used to create a layer in GIS to identify areas with potential clearance issues. GIS data has not been updated as the risk areas have been addressed. However, the vegetation database has not yet been developed. It was started in RY22 but did not progress due to departure of a key person. It is currently included as part of the digital roadmap.	Development of vegetation risk database.
Embedded risk management and continuous improvement frameworks.	🟡	Risk management appears to be improving through improved processes and supporting analysis, although no specific improvement plan or roadmap	Risk framework for application to vegetation management.

Remedial Matters	Progress	ENC Comment	Residual gap
		has been developed. We found that risk is considered qualitatively when identifying, prioritising and implementing vegetation management works, but there has not been a specific framework applied.	
Establishment of a Vegetation Management Committee to enable broader oversight and faster decision making.	🟢	Veg mgt committee was established and then merged with the outage committee as they found both committees had significant overlap.	None.
Increased OPEX expenditure.	🟢	Annual vegetation management opex increased from $1.1 million in 2019 and $1.2 million in 2020 to approximately $1.5 million in RY21 to RY23. Routine and corrective maintenance and inspection increased progressively from $1.25 million in 2019 to $1.7 million in RY23.	None. However TLC needs to assess the appropriate level of expenditure required to achieve their AM Objectives.
Data collection, systems and processes to identify and respond to reliability issues and inform asset management planning			
Use of new risk database to improve analysis techniques to enable asset health to be more accurately assessed.	🟡	TLC has implemented Asset Altitude to improve assessment of asset health. However, our review found it was not applied by the asset engineers for assessing condition and only the asset health index module has been implemented.	Consistent application of AHI calculation and assessment of risk across asset fleets.
System and practice development to provide greater insights to help understand and mitigate the causes of faults.	🟢	The outage recording system provides reliable data to analyse performance. It has been developed by improving granularity of cause codes to track specific items, for example out of zone trees.	None
Preventative maintenance practices to collect information on health of assets and reduce preventable defects.	🟢	Digital inspection forms have allowed improved asset condition data to be captured and used.	None
Analysis on mitigation of the impact of outages when they occur (e.g. using further investment in network switches and switch automation to mitigate the impact of outages by isolating faults).	🟡	Evidence of ongoing analysis of performance that is used to identify improvement actions has been provided (Doc ref 102). Evidence of analysis to identify where network automation should be installed has been provided (Doc ref 108).	While the analysis has been done, the modelling can be improved.

Remedial Matters	Progress	ENC Comment	Residual gap
General increased digitisation of information and systems (including asset management planning).	🟢	Significant improvement with gathering and dissemination of data through digital platforms. The digital team has developed dashboards based on specific needs of internal teams. The data is obtained from multiple systems and sources, is compiled and generates dashboards and reports.	None. Requires ongoing development as requirements change.
Reliability Committee: formation of a reliability committee to meet bi-monthly to review and recommend 'quick win' improvements to reliability based on emerging trends.	🟢	Reliability committee was established but has been merged with the vegetation committee as they found both committees had significant overlap.	None
Post-incident reviews.	🟢	Post incident reviews (ICAM) are triggered automatically based on exceeding the Major Event threshold (Interview ref 6). There is also an option to trigger an ICAM based on staff discretion. Evidence was provided to support this occurring (Doc Ref 55, 106).	Consider implementing a review requirement at a lower threshold. Develop a formal ICAM Process.
Asset investments/improvements for security of supply			
Investment in zone substations and points of supply.	🟡	The AMP identifies proposed works in each region that will address security of supply deficiencies at zone substation and points of supply. It is not clear based on expenditure in the Information Disclosures schedule 6a if work specific to improving security of supply has been implemented.	Continue the proposed works in the AMP.
Line renewal and reconductoring programme.	Pole and cross arm renewal 🟢 Reconductoring 🔴	Lines are defined as the conductor as well as the poles and cross arms that support the conductor. We found that TLC is undertaking renewal of the poles and cross arms that support conductors. (Doc Ref 141 to 143) A line reconductoring and renewal program has not been initiated and remains a reactive	TLC has demonstrated the initiation of actions to improve understanding of the asset fleet, what tools can be used to assess condition and how replacement program could be established. However, a line renewal and reconductoring programme has not been established.

Remedial Matters	Progress	ENC Comment	Residual gap
		replacement program. However, we identified TLC has initiated works to improve understanding of conductor condition and to investigate how line renewal could be undertaken (Doc Ref 212, Interview Ref 27)	
Creation of a floating stock of transformers to deploy when failures occurs.	🟡	Working with asset engineers to move to standard sized assets. Project stock purchased specifically for projects. Working to establish appropriate levels of asset stock based on historical usage plus contingency across two large and two small stores. (Interview Ref 14)	Improve documentation to support work completed. Should be captured in the asset fleet plans once developed.
Switch renewal/upgrades (allow downstream line sections to be de-energised for repair and allow upstream sections to be restored earlier).	🟡	Evidence of analysis to identify where network automation should be installed has been provided (Doc ref 108). Evidence of ongoing installation of switches and reclosers is provided in the Information Disclosures schedule 9b, however, it does not demonstrate a material change from previous years.	Improved modelling in relation to recloser and remote controlled switch installation. Improved demonstration of net increased automation of the network.

13. GAPS AND RECOMMENDATIONS

Table 15 summaries the areas of improvement to close the identified gaps to the required asset management standard and other matters that were identified throughout the review.

Table 15 Summary of improvement actions

AM Standard assessment area	Improvement area
Systems to record and analyse outage data and address their cause (see Chapter 4)	
Monitoring, and analysis of outage data	• 'Clear line of sight' between reliability data and the asset and vegetation management plans.
Corrective actions	• Workflow system that tracks actions and reports on outcomes. • Developing a risk/criticality approach for expenditure plans that considers reliability impacts • Implementation of an ADMS to improve response times and network control, provided the benefits to customers outweigh the cost of the system.
Preventative actions	• Documenting the rationale for maintenance practices. • As part of developing fleet plans, methodically and consistently consider the criticality/risk of assets to unplanned outages. • Developing a coordinated resilience strategy.
Continual Improvement	• Annual review and improvement plan for the AMS as part of AMP process. • Assigning resources to reviewing and actioning improvements to the AMS. • As part of reporting annual reliability performance, also consider and action improvement opportunities to provide a centralised framework for review.
Asset data collection and maintenance systems (see Chapter 5)	
Sufficiency and quality of asset health data	• Expand the inspection program and consider methods to collect more condition data on assets through use of new/innovative technology. • TLC complete their review in relation to the frequency of on site/physical inspection and testing of poles to ensure that emerging condition issues are being proactively monitored. • Create inspection standards for asset types based on health model requirements. • Improve alignment between fault codes for asset defects and fleet plans. • Record the equipment ID of the faulted asset and/or its location in the outage data spreadsheet.
Making decisions with asset health information	• In developing fleet plans, document how the various sources of asset health information are used in decision making. • The fleet plans should also explain the methodology and inputs of Asset Altitude, and explain where asset managers will likely depart from Asset Altitude and the reasons why. • Ensure consistent recording of the equipment ID when an asset defect is the cause of an outage and use the data to integrate asset defect outages into health ratings either through Asset Altitude or an alternative methodology.
Asset Management Strategies (see Chapter 6)	
Asset Management Policy	• Explicitly embed vegetation management objectives in the Asset Management Policy showing its link to unplanned outages for customers.

Asset Management Objectives	- More explicit link between the Asset Management Policy items and the Asset Management Objectives. - A centralised reporting framework for the measures published in the 2023 AMP, and incorporating the performance against the measures in each AMP update or on its website to better communicate outcomes to external stakeholders. - Strengthen the focus on asset management system improvement as part of the objectives and/or initiatives.
Plans to achieve asset management objectives	- The AMS discussion in the AMP should be broadened to include key elements in ISO 55001 such as integration with other business functions, decision making criteria, and performance evaluation and improvement. - The Asset Management System should identify the full suite of documents and systems in a hierarchy to achieve the asset management objectives, and should be reviewed periodically - Strategies for individual asset classes should be developed as a priority. - Strategies should be developed for areas that cross over asset plans, such as for reliability and future networks.

Lifecycle practices – overarching elements (see Chapter 7)

Decision making	- TLC implement a criticality framework that aligns with its Risk Framework to support decision making across the lifecycle practices. - Ensuring that the criticality framework is applied consistently to investment planning, maintenance and vegetation management activities.
Governance and prioritisation	- Ensure that appropriate analysis is undertaken and required by the existing process to ensure the least cost/highest value options are selected and there is clear supporting documentation. - Amend DS26 to include all project approval process requirements including business cases to provide clarity and help ensure compliance with governance processes. - Develop a prioritisation framework to ensure the process is clear and repeatable. It should be consistent with the risk framework implemented under the recommendations made for asset replacement forecasting. - Document the outcomes and reasoning for the prioritisation of the projects.

Lifecycle practices – investment plans (see Chapter 8)

Capacity and security of supply	- Undertake risk (cost) benefit analysis of whether there is value to customers from improving the security standard at zone substations that are currently N-1 switched or constrained. - Update the zone substation security assessment model to capture cost-benefit analysis and link the demand constraint to the identified project. - Apply the feeder security standard to each feeder over the 10 year planning horizon.
Asset Replacement	- Ensure all analysis for each fleet, including FMEA or similar, are included in the proposed fleet plans. - TLC should develop models that embed the organisation's Risk framework into its asset replacement decisions leveraging the new criticality framework it is currently developing. - Expand the modelling to all major asset classes by applying the risk framework to develop a forecast of replacement expenditure and volumes. The categories set out in the Information Disclosures would be a suitable guide. This will improve visibility of fleet condition and any expected changes to asset performance. Consideration should be given to the value of each asset fleet when determining the granularity and methodology of modelling required.

Network reliability	• Expand the functionality of the 'Network Automation Analysis' to demonstrate where there is a net positive benefit to customers from automation initiatives. • Consider the costs of increasing telemetered devices when assessing the preferred option for the proposed ADMS.
Network resilience	• Establish a target level of resilience that TLC must achieve then identify the gaps to the desired level, identify where programs are not yet established that will address the gaps, prioritise the residual gaps and investigate approaches to address them. • Extend the resilience roadmap to include all actions that will improve network resilience.

Lifecycle practices – maintenance and operations (see Chapter 9)

Maintenance	• TLC complete their review in relation to the frequency of on site/physical inspection and testing of poles to ensure that emerging condition issues are being proactively monitored. This should consider practices of other EDBs and the EEA guide (Doc Ref 248). • Document the justification for inspection standards and frequency in Fleet Plans for each asset class. • Periodically reviews its standards for any proposed changes, and reports any variation from the standard to the Senior Leadership Team including reasons for the variation. • Consistently include reporting of asset replaced and maintenance tasks delivered compared to forecast volumes in monthly reporting to the appropriate committee(s).
Vegetation management	• Fully develop a plantation and vegetation database as a key enabler for improved risk management and prioritisation of initiatives. This would leverage the recent work to overlay aerial photography on the GIS platform. • Implement a risk based approach for planning vegetation actions. This includes prioritising activity on plantations where there is likely to be a high risk, with consideration to getting the land owner's consent to take action. • Undertaking cost-benefit analysis of options to mitigate the risk of vegetation incidents including examining capital and operating activities.
Response and restoration from outages	• If cost effective, implement a procedure to record the time it takes for field crew to arrive on site to determine if the deterioration in CAIDI is due to response time or fault type. • Undertake further analysis into the drivers of the deterioration of CAIDI in the northern region to identify if there is a specific underlying cause. • Improve the documentation of proposed initiatives to demonstrate TLC's commitment to improving its response and restoration of outages.

Review of asset management maturity (see Chapter 10)

Asset Management self-assessment	• A process to report the detailed findings of the AMMAT reviews. • Additional internal processes to undertake self assessments on a periodic basis that consider a holistic view of asset management and are not limited to the requirements set out in the Information Disclosures.
Asset Management Improvement	• A process to track improvements recommended in the AMMAT reviews. • Internal 'staff led' reviews of TLC's asset management system (beyond Information Disclosure requirements) with clear identification of improvement opportunities.
Senior management review of asset management	• Senior leaders to establish a process for reviews and improvement of TLC's Asset Management System, with improvements reported back to senior leaders at regular intervals.

Governance of asset management	• Comprehensive and periodic reviews of the Asset Management System which provide direction on targeted initiatives. • Document the hierarchy of the documents, systems and processes that support and enable the asset management system described in the AMP. • Formal process to monitor, track and record improvements over time.
Supporting functions (see Chapter 11)	
Leadership and Commitment	• Champion continual improvement in the asset management system
Resourcing	• Increase the number of staff that undertake a network control function. • Improve documentation to help mitigate key person risk. • Develop an overarching resourcing strategy that identifies the quantum of new staff and skill sets to meet future needs.
Competency	• Track current qualifications and competencies of TLC staff including engineering staff. • Consider if the ENA Common Competency Framework is suitable for TLC's needs.
Awareness	• Improve staff training in the discipline of asset management and have staff participate in reviews of the Asset Management System

APPENDIX A – ENFORCEABLE UNDERTAKINGS SCOPE OF WORK

1   CONTEXT

1.1   TLC breached its DPP quality standards in the 2018, 2019 and 2020 Assessment Periods. TLC has offered and the Commission has accepted enforceable undertakings in lieu of further enforcement proceedings. A requirement of TLC's enforceable undertaking is that an Expert Report shall be procured and made public that addresses TLC's:

    (a)   systems to record and analyse system outages and interruptions to supply and address their cause;

    (b)   asset data collection and maintenance systems;

    (c)   asset management strategies; and

    (d)   asset management practices from forecasting to implementation, including how decisions are linked with emerging trends in asset condition.

1.2   During the course of, and subsequent to the Commission's investigations, TLC has planned a number of remedial actions intended to improve network reliability, which are included in Table 1 below. These matters are amongst the areas of focus for the Expert Report.

2   OBJECTIVE

2.1   The objective of the review is to determine the state of TLC's asset management strategy, practices, and asset management data (relevant to 1.1(a) to (d) above), having regard to:

    (a)   the appropriate standard for asset management; and

    (b)   the remedial matters in Table 1 below.

3   SCOPE

3.1   The Expert Report shall:

    (a)   define the appropriate and fit for purpose standard for asset management, having regard to:

        (i)   the organisation and its context, in particular TLC's scale and network configuration (refer to ISO 55001, Section 4.1);

        (ii)   the needs and expectations of relevant stakeholders (refer to ISO 55001, Section 4.2); and

        (iii) good electricity industry practice in New Zealand;

    (b)   assess past (within the current year and three prior years) and emerging trends in asset health condition and asset reliability on the TLC network;

    (c)   with reference to clauses 3.1(a) and (b), assess the current state of TLC's asset management system in the areas that are relevant to clauses 1.1(a) to (d) above and identify any gaps to the required asset management standard. This shall include an assessment of:

        (i)   asset management policies, objectives, and strategies (refer to ISO 55001, Section 5.2, 6.2.1) with particular reference to vegetation management and asset management maturity;

        (ii)   practices for performance evaluation and improvement in relation to planned system outages, unplanned interruptions to supply and response and recovery from interruptions (refer to ISO 55001, Section 9.1, 9.3, 10.1, 10.2 preventative

action);

(iii) life cycle asset management practices (refer to ISO 55001, Section 6.2.2(a) and (b));

(iv) asset management information (refer to ISO 55001, Section 7.5), with particular reference to asset information maturity, information on asset health condition and outages;

(v) asset management maturity annual self-assessments and improvement plan (refer to ISO 55001, Sections 9.3 and 10 and Commerce Commission Electricity Distribution Information Disclosure Determination 2012 [2012] NZCC 22, Schedule 13, Report on Asset management maturity);

(vi) the governance and senior management review of asset management (refer to ISO 55001, section 9.3);

(d) assess the remedial matters, including:

(i) whether they will close any identified gaps to the required asset management standard; and

(ii) progress on the remedial matters;

(e) recommend any further actions required to close any identified gaps to the required asset management standard;

(f) include other matters that the Expert considers necessary to fulfil the objective of the Expert Report.

APPENDIX B – AVERAGE PEER EDB AMMAT SCORES

Table 16 shows a summary of the asset management self assessment scores (AMMAT) of peer EDBs against each of the key assessment areas required by this review. These values were considered when setting the target values for TLC.

Table 16 Summary of average peer EDB maturity against the key assessment areas of this review

Topic	Assessment area in our report	Maturity of peers
Systems to record and analyse system outages and address their cause	Monitor and analyse outage data	3.0
	Management review	2.6
	Corrective actions	2.8
	Preventative actions	2.6
	Continual Improvement	2.8
Asset data collection and maintenance systems	Sufficiency and quality of asset health data	2.8
	Making decisions with asset health information	2.5
	Asset information maturity	2.5
Asset management strategies	Asset management objectives	3.1
	Asset management policies	3.0
	Plans to achieve asset management objectives	2.9
Asset management practices from forecasting to implementation, including how decisions are linked with emerging trends in asset condition	Decision making	2.7
	Governance and prioritisation	3.1
	Implementation of plans	2.9
	Capacity and security of supply	2.8
	Asset replacement	2.8
	Network reliability investments	2.8
	Network resilience	2.8
	Maintenance	2.8
	Vegetation management practices	2.9
	Response and recovery from outages	2.8
Governance and maturity of the asset management system	Asset Management Improvement	2.6
	Asset Management self-assessment	2.7
	Senior management review of asset management	2.6
	Governance of asset management	2.9
Supporting capabilities	Leadership and commitment	3.0
	Resourcing	3.0
	Competency	2.5
	Awareness	2.6

APPENDIX C – PERFORMANCE BY REGION

Northern region
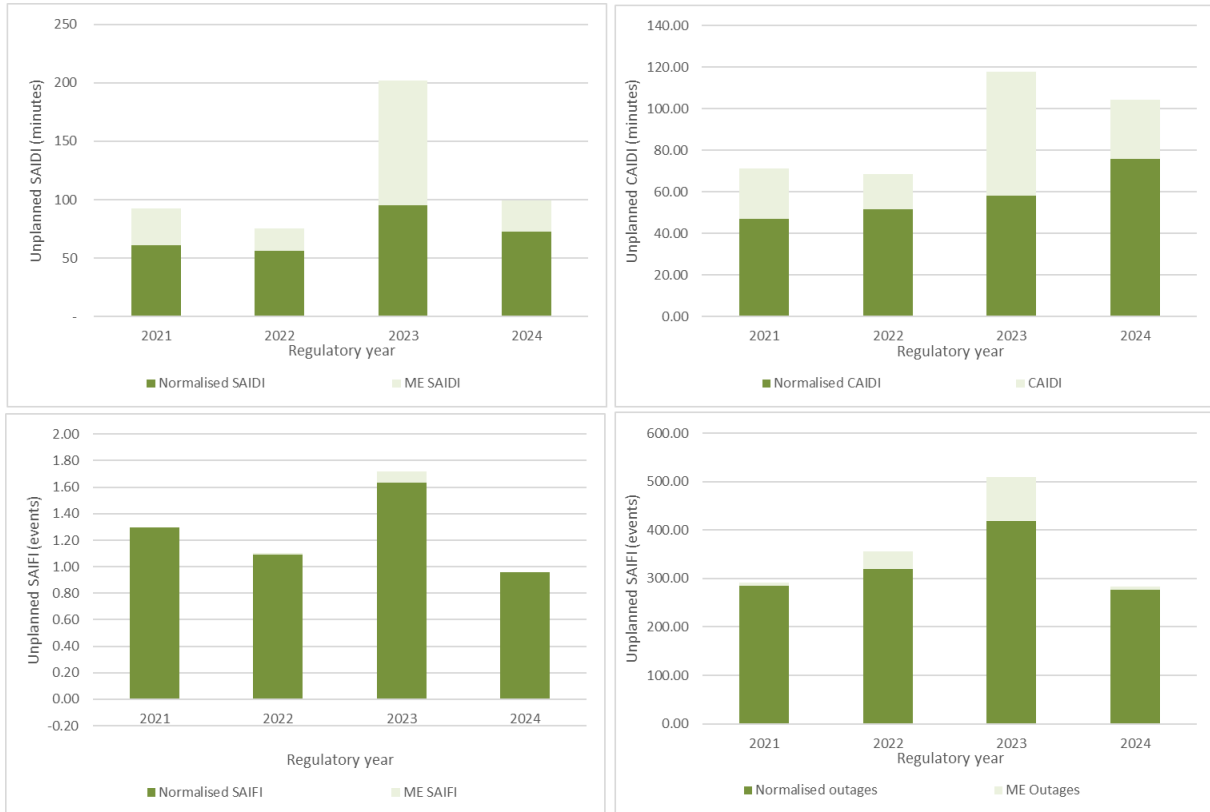
Southern region
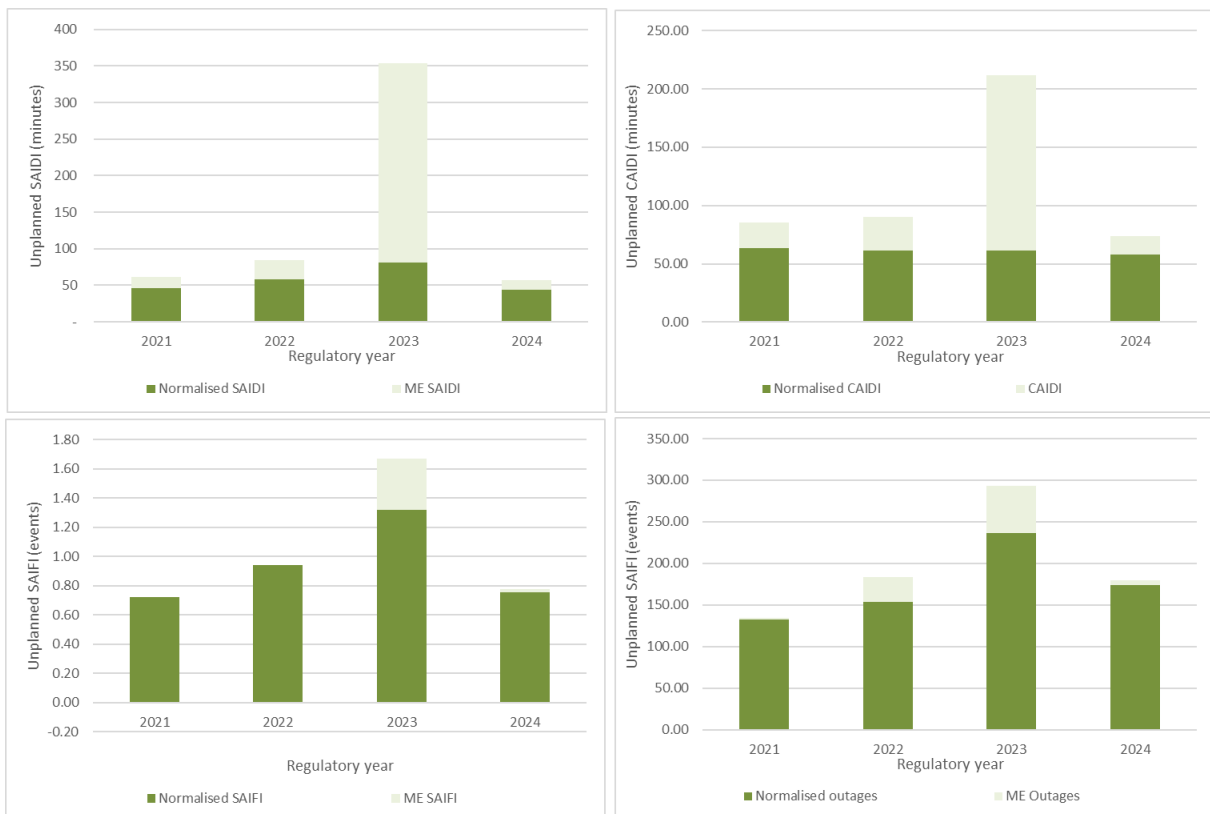
River region
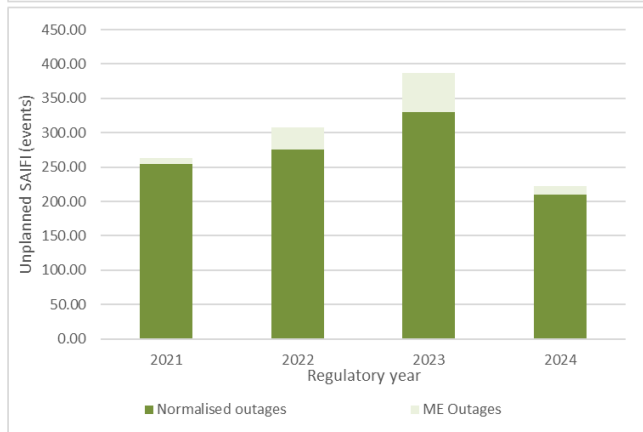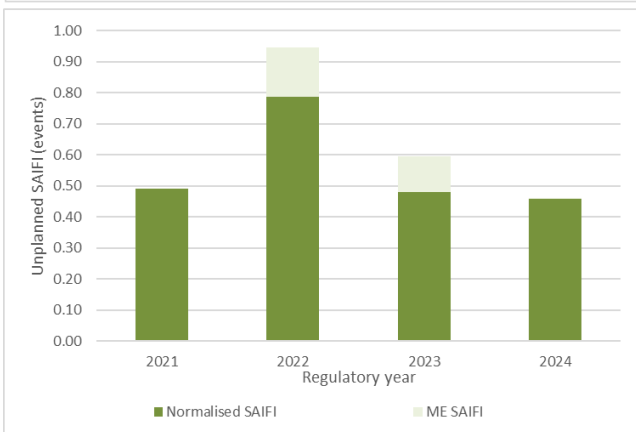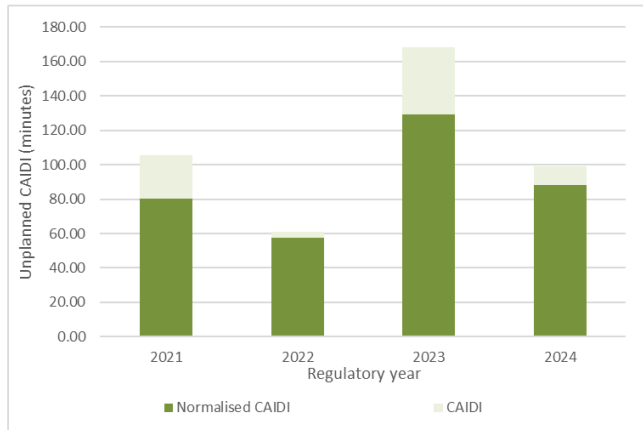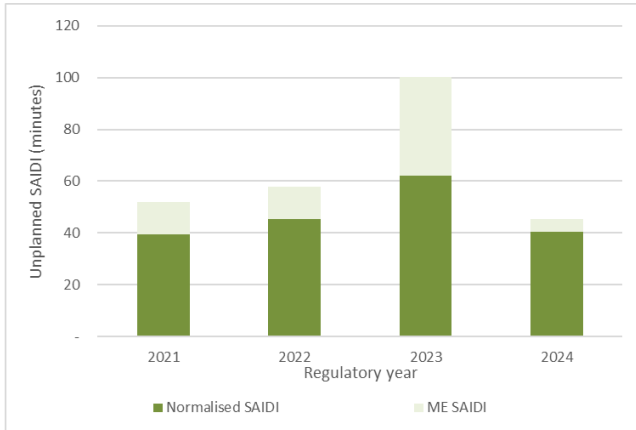
APPENDIX D – INTERVIEWS HELD

Table 17 List of interviews held during the review

Interview Ref	Title	Topic
1	8 May - EU - Warren - Outage Data Models.mp4	Overview of outage data models, inputs and workings
2	9 May - EU - Tony - Network need to Business case.mp4	Discussion of the process for developing and justifying capital works.
3	13 May - EU - BASIX demo session - Miftah.mp4	Overview of the Basix asset data system and digital dashboard platform.
4	13 May - EU - Gerhard, Craig Hackett.mp4	
5	13 May - EU - Mikaere.mp4	Plans for developing AM practices, use of data - future focused
6	13 May - EU - Warren.mp4	
7	14 May - EU - Abdul.mp4	
8	14 May - EU - Jared.mp4	
9	14 May - EU - Jill.mp4	
10	14 May - EU - Miftah.mp4	Digitisation of inspection and data reporting
11	14 May - EU - Sid, Miftah.mp4	Process flow
12	14 May - EU - Tony Hollart.mp4	
13	15 May - EU - Asim, Steve, Ash, Mikaere.mp4	Asset fleet management - focus on poles and OH distribution
14	15 May - EU - Carl Botha.mp4	Stores fault response, competency
15	15 May - EU - Jason.mp4	Vegetation
16	16 May - EU - Brendon.mp4	Financial stuff
17	16 May - EU - Craig.mp4	
18	16 May - EU - Miftah (Remedial).mp4	
19	16 May - EU - Romay.mp4	
20	16 May - EU - Tony (DRG).mp4	
21	17 May - EU - Ash Singh.mp4	Asset fleet management - focus on zone subs
22	17 May - EU - Wrap up On site.mp4	Summary of interview process and findings as at the end of the week of interviews.
23	20 May - EU - Asim.mp4	Asset fleet management - focus on UG distribution
24	23 May - EU - Grant Dellow.mp4	Recording and processes for outage data collection, verification and control room operations.
25	27 May - EU - Jacqui, Arniya (Call centre).mp4	Responsibility and processes of the call centre regarding fault identification and dispatch
26	June 13 - EU - Asim	Asset fleet management - focus on inspection processes/standards and forecasting models
27	June 13 - EU - Steve	Asset fleet management - focus on inspection processes/standards and forecasting models
28	June 13 - EU - Ash	Asset fleet management - focus on inspection processes/standards and forecasting models

APPENDIX E – DOCUMENTS REVIEWED

Table 18 List of documents reviewed and considered in our assessment

Doc Ref	Document	Notes
1	Asset Management Plan 2024 (Update)	AMP update
2	Asset Management Plan 2023	AMP as required by IDs
3	Asset Management Policy Feb2024.pdf	Policy was updated and approved in Feb 24 with annual approval cycle noted. Includes evidence of changes/improvement from previous version. It contains all the relevant areas that would be generally expected. It is more detailed than many AM Policies.
4	Asset Managment Operational Framework.png	Shows the structure of the review groups (ie DRG, OMC) and overarching committees (AMC, RAM)
5	Strategy Pack - TLC.pdf	New strategy with targets and initiatives - included in AMP24
6	Risk Management Framework.pdf	Specifies a matrix style risk assessment
7	Risk Policy.pdf	Fairly standard content but details concept, objective roles and responsibility. The objective could be clarified.
8	3d Line Segment Criticality Model.pdf	A methodology to allocate criticality to each line segment for improved prioritisation of works
9	Criticality Framework (2023-Latest).pdf	Sets out a detailed methodology for quantifying risk that is consistent with good industry practice and derived from other regulators (CNAIM and Norwegian power)
10	TLC_QIT_011.00003 (Oldest).pdf	Seems to be a superseded version of the Criticality Framework
11	TLC 2020 AMMAT Review v1-0 Draft 2020-02-11.pdf	RY20 AMMAT review by external consultant
12	TLC 2021 AMMAT Review v1-0.pdf	RY21 AMMAT review by external consultant
13	TLC 2022 AMMAT Review v1-0.pdf	RY22 AMMAT review by external consultant
14	TLC 2023 AMMAT Review v1-0.pdf	RY23 AMMAT review by external consultant
15	TLC Outage Data 2020-21.xlsx	Have reviewed and combined into one file. Analysis to be done.
16	TLC Outage Data 2021-22.xlsx	Have reviewed and combined into one file. Analysis to be done.
17	TLC Outage Data 2022-23.xlsx	Have reviewed and combined into one file. Analysis to be done.
18	TLC Outage Data 2023-24.xlsx	Have reviewed and combined into one file. Analysis to be done.
19	16 November 2023 AMC Meeting Minutes.pdf	Covers capex and opex, Terms of Reference review
20	4 March 2024 AMC meeting minutes.pdf	Covers capex and opex, AMP24
21	Asset Management Committee Meeting Agenda 16 November 2023.pdf	Covers capex and opex, AMP24
22	Asset Management Committee Meeting Agenda 4 March 2024 (Q4).pdf	Covers capex and opex, Notes future plans to track reliability, risks which is aligned to the ToR
23	1 Memo - TLC Network Reliability FY24 V2.pdf	Good analysis of reliability issues and recommendations to address.
24	3a Network Performance FY22 April.pdf	Outage/reliability analysis

25	A Network Performance Review FY23 to end October.pdf	Analysis of performance Apr-Oct RY23.
26	Unplanned Interruptions Report.pdf	Summarised the findings from reviews conducted in response to the non-compliance with quality standards in RY23. The finding is that the non-compliance was the result of extreme weather and out of zone trees - both outside the control of TLC
27	2024 March 15th ERG (Event Review Group) Meeting AGENDA.docx	documents previous event/actions, new events, observations
28	PSRG (Public Safetly Review Group) Meeting Minutes - 2023-03-15.docx	documents previous event/actions, new events, observations
29	IRO_PDS-Blank.xlsx	Blank IRO form used for proposing a new project
30	Job Number 24NXR129 BC Copy of YTD 3 April 2024.jpg	screen shot of work order from system
31	WP19430-Tamarunui Depot- Oh to UG Work pack created AG 403-01 Western Feeder PDS 204.doc	pack describing scope of work for OH to UG project
32	BC process flow status rev 30012024 contains notes from meeting from Warren Ref to DS 26.xlsx	spreadsheet showing 15 steps for project creation to delivery.
33	Guideline for Network Outages Classification - Final.pdf	Flow diagram / decision tree for fault code allocation
34	Meeting Minutes 2024 - 04 - 17 Vegetation and Outage Managment.dotx	describes outstanding actions and steps taken, new issues and actions allocated. Covers Veg and Outages
35	Vegetation Strategy_Board.pdf	Veg strategy - covers background, strategy and specific activities.
36	2023-08-16 Veg Management Committee meeting minutes.docx	minutes from before committee combined with outage committee.
37	3b Vegetation Management Plan FY23.docx	Describe Veg Mgt plan for next 12 mths. Includes review of past 12 months performance and sets improvement plan, actions and targets
38	3d. Vegetation Management Plan FY22 V3 - Final Clean.docx	Describe Veg Mgt plan for next 12 mths. Includes review of past 12 months performance and sets improvement plan, actions and targets
39	FY24 Vegetation Management Plan.docx	Describe Veg Mgt plan for next 12 mths.
40	1 Memo - TLC Network Reliability FY24 V2.pdf	Repeat of Doc Ref 23
41	3a Network Performance FY22 April.pdf	Repeat of Doc Ref 24
42	A Network Performance Review FY23 to end October.pdf	Repeat of Doc Ref 25
43	Guideline for Network Outages Classification - Final.pdf	Repeat of Doc Ref 33
44	Outage Data Collection Process.pdf	Detailed description of the process to transfer data from the Daily Control Log to the Outage Spreadsheet, including all checks to be done with other systems. Includes outage type and cause decision flow diagram.
45	PSMS Chart for lineys.xlsx	List of all codes for faults and public safety incidents
46	Meeting Minutes 2024 - 04 - 17 Vegetation and Outage Managment.dotx	Repeat of Doc Ref 34

47	Outage Reports - February 2024.docx	summary of specific outages
48	Outage Reports - March 2024.docx	summary of specific outages
49	2023-05-18 - CR Log.pdf	Control room logs detailing outages and network actions
50	2023-05-19 - CR Log.pdf	Control room logs detailing outages and network actions
51	2023-05-20 - CR Log.pdf	Control room logs detailing outages and network actions
52	2023-05-21 - CR Log.pdf	Control room logs detailing outages and network actions
53	Copy of TLC Outage Data 2023-24.xlsx	3 months of outage data
54	Incident Report - Extreme Weather.docx	Report of impact of bad weather related to four CR Logs provided.
55	MS Chat.docx	Evidence of ongoing communications between teams and filed crew during faults
56	Outages loged in Basix.xlsx	Evidence of use of Basix by call centre and dispatch of flied crews
57	Standby Roster 17.05.23 amended Nathaniel to cover.pdf	Standby roster
58	Timeline.xlsx	Chart that was used in the incident report
59	Read me.docx	Summary number of telemetered devices
60	Network Operating Procedure 13 - Fault Management (1).pdf	Describes emergency state criteria, triggers for each state, team structure required, responsibility and fault response actions.
61	NEW Competency.xlsx	List of all field crew employees with relevant qualifications and ample competency declaration form
62	Standby Roster - 17.04.24.pdf	Standby roster
63	Delegation Policy.pdf	Sets out principles for delegation of authority for different groups and specific limits to GM level.
64	Outage Data_FY14-FY20.xml	Outage data fro RY14 to RY20
65	TLC Outage Data 2020-21.xlsx	Repeat of Doc Ref 15
66	TLC Outage Data 2021-22.xlsx	Repeat of Doc Ref 16
67	TLC Outage Data 2022-23.xlsx	Repeat of Doc Ref 17
68	TLC Outage Data 2023-24.xlsx	Repeat of Doc Ref 18
69	2023-05-18 - CR Log.pdf	Repeat of Doc Ref 49
70	2023-05-19 - CR Log.pdf	Repeat of Doc Ref 50
71	2023-05-20 - CR Log.pdf	Repeat of Doc Ref 51
72	2023-05-21 - CR Log.pdf	Repeat of Doc Ref 52
73	Copy of TLC Outage Data 2023-24.xlsx	Repeat of Doc Ref 53
74	Incident Report - Extreme Weather.docx	Repeat of Doc Ref 54
75	MS Chat.docx	Repeat of Doc Ref 55
76	Outages loged in Basix.xlsx	Repeat of Doc Ref 56
77	Standby Roster 17.05.23 amended Nathaniel to cover.pdf	Repeat of Doc Ref 57
78	Timeline.xlsx	Repeat of Doc Ref 58

79	Outage process changes for DPP3.pdf	Identifies changes to outage recording based on DPP3 definitions and improvements to outage analysis and planning
80	B FMEA Analysis.pdf	Summary of a FMEA analysis undertaken to assess potential new inspection methods. Is used as the basis to develop a request for proposal for the market.
81	Network Operating Procedure 01 - Work Applications.pdf	Procedure for apply for planned works (planned outage)
82	EEA RMMAT.xlsx	Resilience maturity self assessment
83	TLC_ Network Resilience Roadmap.docx	Not really resilience - more roadmap to improve use of weather data. Plan to use improved analysis of weather data to improve operational decision making and eventually for planning the network. Include three development levels.
84	New Risk Register Oct 2023.xlsx	Risk assessment of 33 risks, controls, residual risk, target risk and plans
85	Proposed Tier 1 Risk.PNG	Screen shot of 11 Tier 1 risks
86	Risk workshop.pdf	Summary outcome of recent ELT risk workshop
87	2024-05-03 TLC Schematics Network.pdf	Full schematics (HV and SubT) and Sub T only SLD of network
88	TLC Network 1.kmz	GIS depiction for Google Maps
89	OPEX Planned Maintenance.xlsx	Detailed breakdown of distribution inspections, frequencies and costs
90	Strategy Pack - TLC.pptx	Repeat of Doc Ref 5
91	2019 - AMC Terms of Reference.pdf	Appear appropriate - covers monitoring network risks, asset condition, reliability, actual and forecast capex and opex, AM Policy and Objectives are being met
92	2020 - 3c - Maintenance Review V5 Final.docx	Review of maintenance processes in light of not completing maintenance tasks 2017-20
93	2020 - 3f - Progresses in Asset Information Management V3 Final.docx	Describes three key areas of focus of the digital group on data cleansing, current and proposed process automation.
94	2020 - 4 AMC Work Plan FINAL.docx	Sets out work plan for 8 months. Include 'AM Continuous Improvement'
95	2020 - 6c Progressing our Approach to Asset Management V3.docx	AM improvement plan - Provides good gap analysis, covers asset info, risk methodology, formalising continual improvement, asset class strategies.
96	2020 - 6d Proposed approach for Implementing Asset Risk Management TLC.docx	Considers different methodologies for assessing risk and suitability for TLC.
97	2020 - Data Improvement Process Summary Sep 2020 V2.docx	Summary of data improvement activities
98	2021 - 3e. Asset Management Improvement Plan FY22 V2 - Final clean.docx	This outline activities for AM System improvement - a follow on from Doc Ref 95
99	2022 - 3c Asset Management Improvement Review.docx	Outlines are as of asset management improvement
100	2022 - 3d Security of Supply Policy.docx	Proposed updated SoSS and implementation timeframe to refocus response time to faults onto the major contributing events to reliability performance
101	2023 - Unplanned Interruptions Report.docx	Repeat of Doc Ref 26
102	1 Memo - TLC Network Reliability FY24 V2.docx	Repeat of Doc Ref 23
103	Asset Management Work Plan FY25.docx	Sets out AM improvement plans, including AM systems and practices

104	DS 26 Works Management.pdf	Describe project development workflow from ideation to delivery and closeout. Include Work Prioritisation. Includes process flow diagram.
105	DS 40 TLC Maintenance and Inspections.pdf	High level summary of asset class, inspection type, and frequency
106	Incident Report - Template.docx	Template only. Appear to cover key elements to be reported.
107	McDonalds Cable Fault 16 Oct 2021.docx	Example of completed incident report
108	Network Automation Analysis.xlsx	Does cost analysis to assess benefit of installing a switch/recloser
109	Planned Outage Policy.pdf	Policy setting out approach to planned outages
110	FW_ POLE JUST RED TAGGED .eml	Email describing process: "Our process is that as soon as the line inspector knows they will be tagging a pole they are at, they call Angela who puts it in the schedule. Then if it hasn't arrived to her from us in a timely manner she can chase us up to make sure it hasn't been lost"
111	FW_ WP21188.doc.eml	Email with attached pole replacement work package
112	FW_ WP21268.doc.eml	Email with attached pole replacement work package
113	Network Monthly Planner .xlsx	List of tasks per planner with date and relevant reference numbers.
114	Project Presentation - 4 Levels of Project - Final.pptx	Proposes changes to the works management system to improve efficiency and consistency. Includes implementation of new digital forms. Includes full 'swim lanes' style process flow diagrams with actions, inputs and responsible person/team.
115	PSG Meeting _March_2024.pdf	Overview of RY24 spend, including resource use in manhours. Major program and project overview including actual v forecast, status, concerns, etc
116	Service Delivery Business plan 23.docx	Five year business plan with objective to service other EDBs as a contractor. Potentially bringing more work back internally for TLCs networks. Specifies the planned 3 year shovel ready pipelines. Sets qualitative operational KPIs for the team. Establishes initiatives to improve the business unit. Establishes team size and composition.
117	(No subject).eml	Email containing three attachments - extracted
118	7.8 TLC Group - Employee Value Proposition	Memo to Board in Dec 22. Sets out the "Employee Value Proposition" and initiatives to build TLC culture and retain staff.
119	7E_HR Report January 2018	HR report showing turnover rates and detailing strategy regarding some HR issues.
120	7E_HR Report March 2018	HR report showing turnover rates and detailing strategy to address resourcing and retention.
121	2018 CEO Summary incl comparisons.docx	Summary or employee engagement survey outcomes.
122	Current Information.PNG	Snap shot of current turn over - 8%
123	EVP.eml	Email containing three attachments - extracted
124	People and Safety Report	Step 23 report with overview of safety performance for past 12 months and summary of staff issues - recruitment, turnover, engagement, etc
125	SnipImage	States approval of the EVP - refer Ref Doc 118
126	RoutineDataCleaningActivities.docx	Outlines some key asset data processes
127	Claims_v0.2.pdf	Process map for customer claims
128	Complaints_v0.2.pdf	Process map for customer complaint

129	DG Application for 10KW or less.pdf	Process map for distributed generation application
130	DG Application form.pdf	Screenshot of electronic DG application form
131	Disconnect for Safety in event of Incident.pdf	Process map for disconnection- safety event
132	Disconnect for Safety in event of Private Works.pdf	Process map for disconnection - private works
133	Faults.pdf	Process map for disconnection - responding to a fault
134	High Load Permit Process_v1.0.pdf.pdf	Process map for disconnection - high load (>4.25m) access
135	New Connection Process_v2.0.pdf	Process map for disconnection - new connection application
136	Red tag pole magmt.pdf	Process map for disconnection - red tag pole management
137	Vegetation_Cut&Trim management process.pdf	Process map for disconnection - vegetation management
138	CIMS Link.txt	Link to Civil Defence website for Coordinated Incident Management System (CIMS) third edition document
139	CIMS Training - Roles and Completed courses.xlsx	CIMS roles and training register
140	Vegetation Analysis FY23-24.pdf	Analysis showing impact of Cyclone Gabrielle and Out of Zone Trees
141	FYE25 Work Split Steve-Nathan.xlsx	Data with some type of analysis and programming.
142	Line Renewal Planning Tool.xlsx	Detailed analysis of poles and cross arms to determine replacement requirements.
143	Neara LiDAR Business case.pdf	BC to move lidar data from current tool to Neara tool used for line design to improve use cases for the lidar data and improved design capabilities.
144	3e Vegetation Strategy to AMC 2020 FINAL.pdf	sets out vegetation management strategy including establishing baseline of vegetation stock and risk, create a risk management framework and set up a Vegetation Mgt Committee. Includes flow diagram of VMC responsibilities
145	3f Vegetation Management Plan FY21 V3 FINAL.pdf	Builds on the 2020 Veg Strategy with more detail and resourcing considerations. It sets performance and operational KPIs and timeframes.
146	April2024 Off site Objectives with RACI.xlsx	Sets out business objectives, with timeframe, purpose, output and RACI.
147	Network Standup meeting 7 May 2024.pdf	Presentation to all staff demonstrating communication of RY25 objectives related to asset management and network operations.
148	Outage and Vegetation Meeting Minutes 2024 - 05 - 15.dotx	Meeting minutes for outage and vegetation management committee
149	Read Me.docx	Terms of Reference for Vegetation Management Committee
150	Risk Management Framework (new).docx	Minor update to Doc Ref 6
151	Risk Management Policy.docx	Possibly an update to Doc Ref 7
152	Risk Register (Risk workshop).xlsx	Risk register - comparable to Doc Ref 84, slightly different layout with columns and risk inputs
153	Risk Register.pdf	Screenshots of Power BI risk register dashboard for use of Execs and Board to understand risk. Power BI functionality allows for user to drill down into each item as required.
154	Copy of PDS and Planning tool - process V1.xlsx	PDS and planning process and evidence of development.
155	Customer count on feeders split into asset groups includes zone sub size.xlsx	Shows customers and transformer sizes per zone substation and per feeder. Includes identification of flood risk and land ownership.

156	IRO_PDS Rangitahi Street Hall Otorohonga.xlsx	Example PDS completed
157	IRO_PDS-Blank.xlsx	Repeat of Doc Ref 29
158	Read me.docx	DRG ToR was not developed, but the process of how it fits into the project approval work flow was developed (Version 6 in Doc Ref 154.
159	SAB 024001_Te Waireka_A Bus Building Works_03042024.pdf	Sample advisory bulletin detailing asset failed testing and not fit for service
160	SAB 024002_Taharoha T10_Test Fail to Energize_03052024.docx	Word version of Ref Doc 161
161	SAB 024002_Taharoha T10_Test Fail to Energize_03052024.pdf	Sample advisory bulletin detailing works that will limit building exit points and impact on safety risk.
162	Te Waireka_A Bus Building Works_03042024.docx	Word version of Ref Doc 159
163	Re_ Borough sub.msg	Email evidence of comms with digital team to address issues with inspection forms
164	Re_ Sub Check Inspection Sheets -2024_25 via Tablets .msg	Email evidence of comms with digital team to address issues with inspection forms
165	Sub checks missing info.msg	Email evidence of comms with digital team to address issues with inspection forms
166	Zone sub inspection Training.msg	Email evidence of comms with digital team to address issues with inspection forms
167	A. Substation Master Sheet - TLC - ASH .xlsx	Spreadsheet with TF data and tracking work packs
168	C. Substation Forcast Maintenance Planner.xlsx	Spreadsheet forecasting maintenance works for ZSS assets
169	D. Power Transformer Criticality.xlsx	Spreadsheet with list of all TFs and characteristic data ranking them to a scale
170	Annual Zone Sub Insp Sepcification - 2024-25_Rev 1.0.1_2024.pdf	List of tasks and instructions for major zone substation asset annual inspections
171	Bi-Monthly Zone Sub Insp Sepcification - 2024-25_Rev 1.0.1_2024.pdf	List of tasks and instructions for major zone substation asset bi-monthly inspections
172	Borough Sub_April.May_2024 Sub Check.pdf	Example of substation inspection outputs from electronic forms
173	Kaahu Tee_April.May_2024 Sub Check.pdf	Example of substation inspection outputs from electronic forms
174	Otoku Sub_April.May_2024 Sub Check.pdf	Example of substation inspection outputs from electronic forms
175	WP 20897_Maintain 33kV Pedestal Insulators 25NMT0042.doc	Example work pack for zone substation minor works
176	WP 21088_Otokou Sub - Repaint Container Outside 25NMT0055.doc	Example work pack for zone substation minor works
177	EEA- Asset Health Guide.pdf	EEA (Peak body) guideline describing how to allocate AHI to assets
178	GMT Renewal Master File -Asim Hussain.xlsx	Spreadsheet showing list of projects for different asset classes
179	GMT Renewals Yr24-25.xlsx	12 GMT renewal projects with budget, health index, rating and photos.
180	GMT.VR V3.xlsx	GMT data and analysis to allocate condition to AHI score based on age, condition inputs, Asset Altitude Score and 'Ian' Score
181	2024-05-11 - CR Log.pdf	Example of Control Room Log
182	2024-05-12 - CR Log.pdf	Example of Control Room Log
183	2024-05-13 - CR Log.pdf	Example of Control Room Log
184	2024-05-14 - CR Log.pdf	Example of Control Room Log

185	2024-05-15 - CR Log.pdf	Example of Control Room Log
186	2024-05-16 - CR Log.pdf	Example of Control Room Log
187	2024-05-17 - CR Log.pdf	Example of Control Room Log
188	2024 AMP UPdate Approval.pdf	Memo to RAMC for approval of the AMP24 Update
189	AMC discussion paper - AMP24 Opex.docx	Memo to AMC that sets out operational expenditure forecast for AMP24 along with justification for the change.
190	AMC discussion paper - AMP24 Overhead.docx	Memo to AMC that sets out capital expenditure forecast for AMP24 for Overhead assets along with justification for the change and a step and ramp up change approach.
191	AMP FY24 Investment - Overhead Line Renewal Network OPEX.msg	Email with the two discussion papers attached (Doc Refs 189 and 190)
192	AMP Layout and Responsibilities - Copy1.xlsx	Plan do deliver AMP25 including people responsible for each section and approval timeframes
193	Copy of Zone Sub Security Assessment v4.xlsx	Spreadsheet assessing substation capacity and security rating and assessment of required rating against forecast demand to identify shortfalls. Shows compliance rating before and after AMP23 projects and again after AMP24 projects. Includes a number of additional tabs without clear purpose or identification of being notes/workings.
194	RAMC - AMP25 timeline.docx	Memo to RAMC to endorse proposed plan to deliver AMP25
195	2c. Proposed New Asset Management Committee Agenda.docx	Updated agenda for AMC showing reliability as a standing item and AM maturity as a 6 monthly item.
196	3b - AMP Objectives Review and Forecast V3 Final.docx	2020 submission to AMC covering AM Policy and Objectives, AMP forecast.
197	3b Update on AMP Objectives (1).docx	Summary update on AMP21 expenditure objectives
198	3e. Asset Management Improvement Plan FY22 V2 - Final clean.docx	Repeat of document 98
199	4 2022 Business Transformation.pdf	Provides an overview of business plan to transform from traditional EDB to more integrated systems and take advantage of opportunities presented by DER.
200	6c Progressing our Approach to Asset Management V3.docx	Repeat of document 95
201	AMP24 Board report.docx	Board paper for approval of AMP24 budget and schedule
202	CE Report.docx	CE report to board including discussion on safety and reliability.
203	Decision Memorandum AMP24.docx	Memo for approval of AMP24 objectives and budgets
204	Digital Utilty Programme Update 2.docx	Describes the four phases of the digital utility program.
205	EV Strategy.docx	Describes TLCs EV strategy, commitment to Evs and progress
206	Future Energy Report.docx	Summary of progress on different elements of the future networks strategy
207	FY24 Strat Targets.xlsx	A list of initiatives with description and commentary.
208	Section 4 - Approach to Asset Mgt - for MF review.docx	Appears to be a draft version of the AM section of the AMP24
209	Strategy on a Page - For Board Approval.pptx	2 pages from Document 5
210	Vegetation Strategy 2.docx	Repeat of document 35
211	Information Disclosures - Statistics V2	Performance analysis by TLC. Input to memorandums and making recommendations

212	RAMC - Conductor Management	Provides analysis of fleet performance. Describes industry approach. Describes TLCs planned approach to assess condition to improve understanding of condition and types. Future plan for improved modelling and increase the rate of conductor replacement.
213	DS 34 Public Safety Management System	Description of the PSMS including processes, controls and monitoring
214	List of controlled documents	List of NOP and DS documents and current review status and planned updates
215	Asset Condition Grading for Regulatory Disclosure	Describes the method for calculating the AHI, reason for change in methodology and grading system
216	Annual Voltage Regulator Insp Specifications_Rev1.0.pdf	Describes inspection requirements for voltage regulators
217	GMT Inspections Specification 2024-25.docx	Describes inspection requirements for ground mount transformers
218	Pillar Inspections Specifications and scope of work 2024-25.docx	Describes inspection requirements for pillars - is focused on RY25 scope of works rather than being a standard
219	Secification Annual RMU Inspections - 2024-25.doc	Describes inspection requirements for ring main units
220	16359- Pillar Box.pdf	Example defect report received through the Vault reporting system
221	16379 - UG Cable Fault.pdf	Example defect report received through the Vault reporting system
222	16579.pdf	Example defect report received through the Vault reporting system
223	Event 16579.pdf	Example defect report received through the Vault reporting system
224	Event 16661.pdf	Example defect report received through the Vault reporting system
225	Event 16664.pdf	Example defect report received through the Vault reporting system
226	Event 16666.pdf	Example defect report received through the Vault reporting system
227	Event 16669.pdf	Example defect report received through the Vault reporting system
228	Event ID 16615.pdf	Example defect report received through the Vault reporting system
229	n7i2mcexyxrbftsa9ecjfby1i3b0obaa.pdf	Example defect report received through the Vault reporting system
230	Asset_Eng_Asset info team structure.pptx	More detail on org structure/chart
231	Control room board paper V1.0.pdf	Paper describing plans to improve network control centre operations with FTE increase and systems improvement. Considers costs, options and benefits.
232	Controller roster.xlsx	Sample roster for controllers demonstrating how three FTE are able to managed the NOC and also have adequate leave. 2 FTE during day, 1 FTE at night.
233	Digital Utility Steerco 2024-05-23.pptx	Overview of digital utility program, workstreams and schedule. Recommended preferred supplier for ADMS and GIS.
234	FY25-29 Business Plan.pdf	Compilation of summaries for different initiatives and business unit plans including additional staffing needs.
235	Notes ADMS TE Resourcing.docx	Demonstration of working with other EDBs to understand business needs/impacts of systems - ADMS in this example.
236	Security-of-Supply-Participant-Rolling-Outage-Plan-18.10.2023.pdf	Standard/procedure that describes how TLC will comply with EIP Code 2010 Part 9 and schedule rolling outages if required
237	SLT Briefing Note _ Customer Advisory Panel.dotx	Briefing note to SLT for feedback on how to set up customer advisory panels and the type of information that should be presented

238	TLC Org Chart (Complete).pdf	Org chart of first level or two of staff
239	SLT Briefing Customer Advisory Panel 2024_gb	Updated version of the Customer Advisory Panel briefing note with date, schedule, agenda and topics
240	The Lines Company Dashboard Q2 2024	Partly interactive dashboard displaying results from community surveys
241	TLC Report Strata Consulting May 2020	Strata Energy Consulting draft report on TLC's non-compliance with quality standards. March 2020
242	2021 Report TLC (FINAL DRAFT)(4166983.1)	Strata Energy Consulting final draft report on TLC's non-compliance with quality standards. August 2021
243	FY 26 Additional Resources Request	Request and general justification for additional resources
244	Regulatory and Asset Management Committee - Clean Version (2)	Defines the function, composition and responsibilities of the RAMC
245	time-to-hire-01-07-2024 - All time	Time to recruit roles by role type
246	time-to-hire-01-07-2024 - past year	Time to recruit roles by role type
247	Email: Fwd: NEG - email on behalf of Andrew McLeod - upcoming NEG meeting Nov 7	Email setting out the agenda as context for TLC involvement in the NEG.
248	EEA Timber Pole Condition Assessment Guide	Consultation Draft version, final published in Feb 2022. Describes approaches to assess and grade condition of timber poles, including the need for inspection cycles that are consistent with the ability of the inspection technique to forecast condition and time to intervention.