OUR PEOPLE | OUR POWER

ASSET MANAGEMENT PLAN

2016 - 2026

CENTRALINES
LIMITED

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This Asset Management Plan (AMP) is available for public disclosure and applies for the period 1 April 2016 to 31 March 2026.

SECTION 1 **SUMMARY OF THE PLAN**

CENTRALINES LIMITED

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1. SUMMARY OF THE PLAN

1.1 Centralines

Centralines Limited ('Centralines') provides electricity distribution and line function services to consumers and businesses throughout the Central Hawke's Bay region.

1.1.1 *Vision and Values*

Centralines' Vision is "to Energise the Growth of Central Hawkes Bay by Electricity Infrastructure." The Values are the things that really matter to Centralines and what defines Centralines as an organisation. They underpin Centralines' organisational culture and inform the behaviours that are expected of employees. They are Safety, Teamwork, Integrity, Openness, and Passion. Centralines' Vision and Values have an influence on all components of the Asset Management System (AMS).

1.1.2 *Ownership and Governance*

Centralines is wholly owned by the Central Hawke's Bay Power Consumers' Trust (CHBPCT) on behalf of Central Hawke's Bay's electricity consumers. Centralines' Board of Directors is appointed by the CHBPCT.

1.1.3 *Electricity Distribution Business*

Electricity distribution businesses (EDBs) are an integral part of New Zealand's electrical infrastructure, forming the physical link between the transmission network and electricity consumers' premises. Centralines owns the distribution network that serves Central Hawke's Bay consumers, as shown in Figure 1-1. The network is managed and operated by Unison Networks Limited under a Management Services Agreement (MSA) with Centralines.

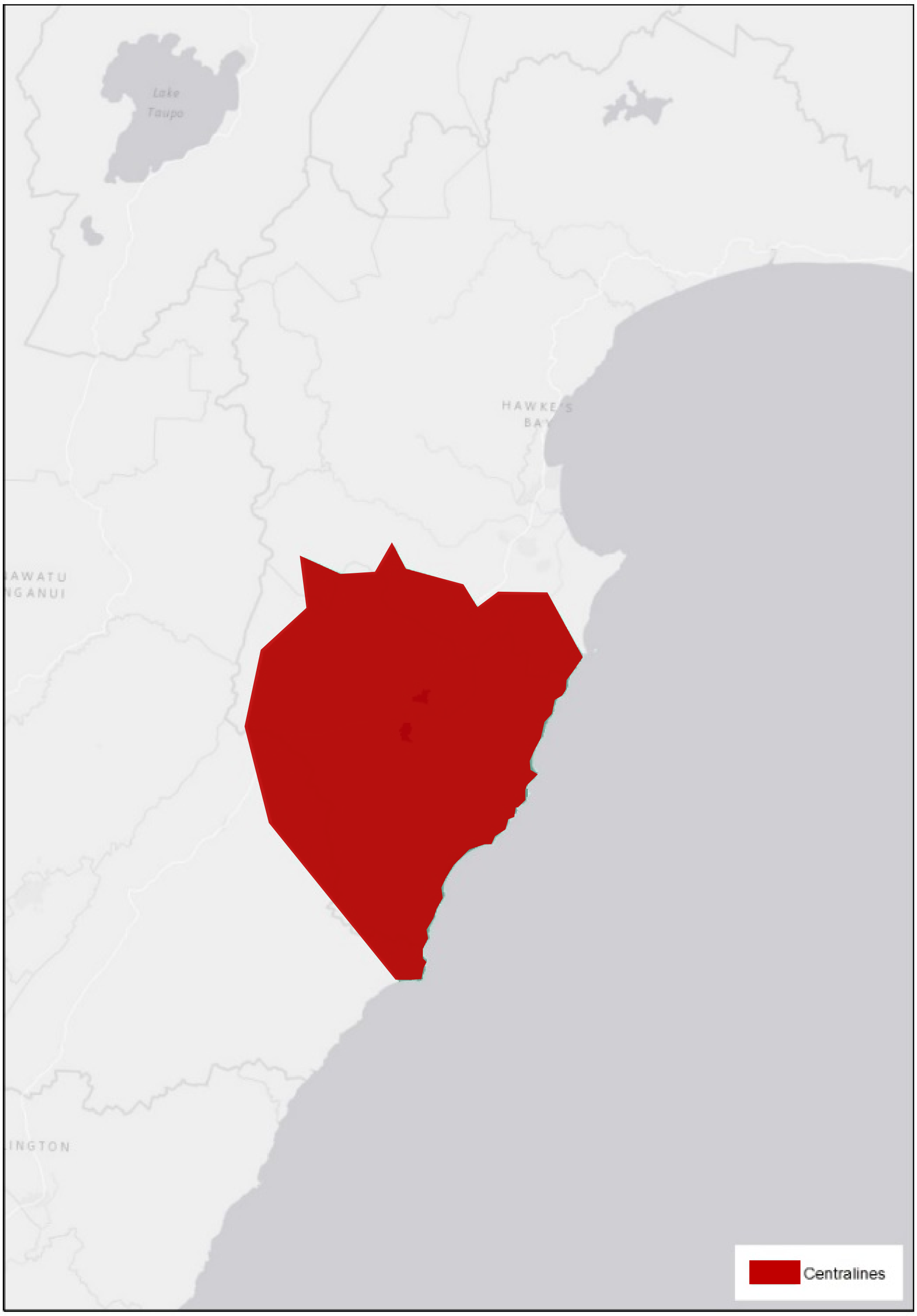

Figure 1-1: Map of Centralines' Network

Electricity supply is provided to Centralines predominantly at 33kV from a single Transpower grid exit point (GXP) and is connected by Centralines' sub-transmission network to zone substations. At zone substations, the voltage is converted to 11kV for distribution. Distribution transformers throughout the network then reduce the voltage to 400V for end use. Centralines' role in the New Zealand electricity industry is shown in Figure 1-2.

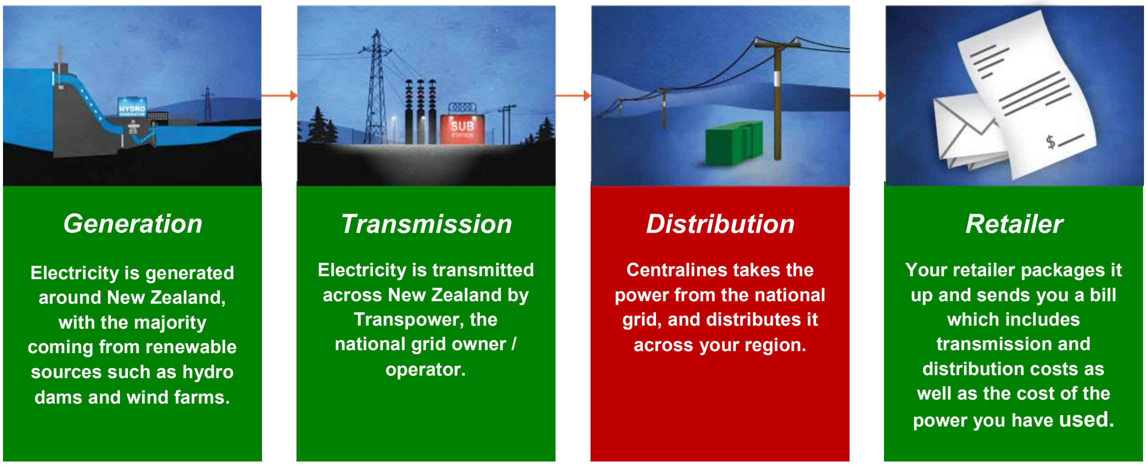

Figure 1-2: New Zealand Electricity Industry Diagram

This Asset Management Plan (AMP) focuses on the management of Centralines' assets that are associated with distributing electricity to Centralines' customers.

1.1.4 *About the Centralines Network*

The Centralines' network is comprised of over $58M worth of assets, is almost 2,000km in length, and supplies around 8,500 connection points. Within Centralines' network footprint there are a variety of terrain types and consumer densities, meaning it is necessary to employ a range of reticulation methods and asset management techniques to strike the optimal balance between quality of supply and efficient deployment of assets.

For context, Table 1-1 provides a comparison between Centralines and an industry median of the New Zealand electricity distribution businesses across a number of key metrics.

Metric	Description	Value 2014/15	Industry Median
Consumers Connected	Total installation control points (ICP) connected to the network.	8,439	30,771
System Length	Total length of all energised circuits.	1,945km	3,954km
Sub-Transmission System Length	Total length of all energised 33kV circuits.	96km	315km
Distribution System Length	Total length of all energised 11kV circuits.	1,414km	2,315km
Low Voltage System Length	Total length of all energised LV circuits.	435km	852km
Percentage Underground	The proportion of total system length that is undergrounded.	7.3%	18.4%

Metric	Description	Value 2014/15	Industry Median
Asset Value	Centralines Regulatory Asset Base.	$54,680,000	$177,215,000
SAIDI	System Average Interruption Duration Index. A measure of the number of minutes per year the average consumer is without electricity supply.	141.4 minutes	191.7 minutes
SAIFI	System Average Interruption Frequency Index. A measure of the number of interruptions per year that affect the average consumer.	2.4	2.05
Electricity Supplied	Electricity entering system for supply to consumers.	115GWh	539GWh
Loss Ratio	Proportion of electricity lost on the high voltage network.	8.9%	5.9%
Zone Substation Capacity Utilisation	Maximum demand on distribution zone substation transformers as a proportion of installed capacity.	42.6%	41.3%

Table 1-1: Network Comparison between Centralines and Industry Median of NZ EDBs

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1.1.5 *Organisational Structure*

Centralines has adopted the following organisation structure. This relatively simple structure reflects the significant number of services that are outsourced to Centralines' Management Services Provider.

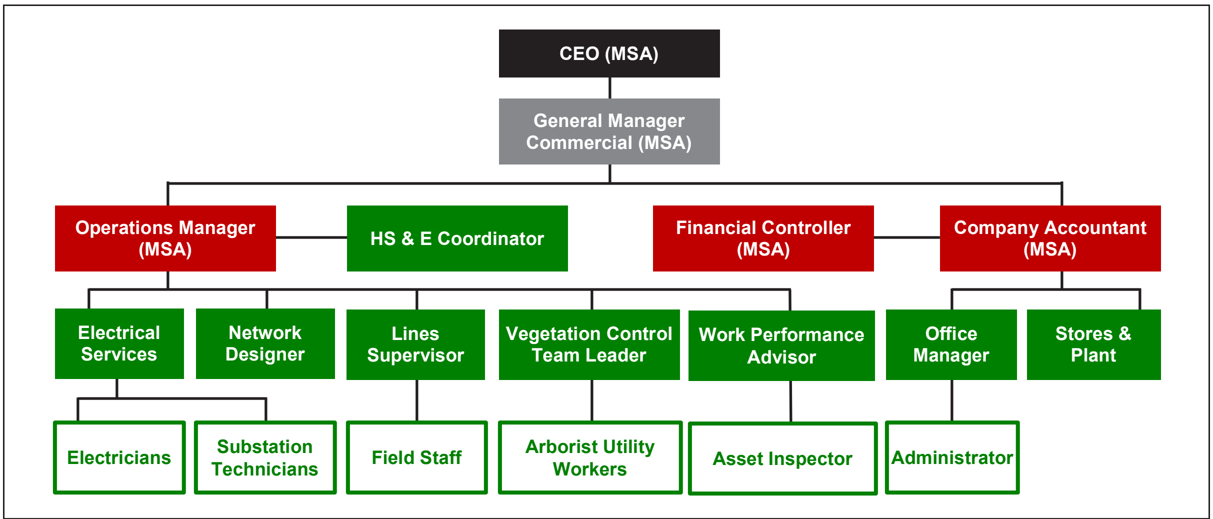


Figure 1-3: Centralines' Organisation Structure

1.2 Introduction to this Document

The Centralines Limited AMP is a comprehensive explanation of how the company will develop and manage the lifecycle of its electricity distribution assets over the period 2016 – 2026 to achieve its Asset Management Objectives.

1.3 Strategic Summary

The 2016 AMP reflects a reduction in the works programme over the AMP planning period. There are a number of key strategic decisions influencing this outcome.

Firstly, the investment made in the Centralines' network over the last few years has enhanced the efficiency of the network, i.e. reducing the average age of assets, therefore decreasing the risk of asset failures, and resulting in an improvement in network performance.

Secondly, shifting from traditional, conventional solutions to a smart network approach (which is being developed and adopted by Centralines) where technologies are used to manage assets more proactively. This approach will have a direct impact on the expenditure required to maintain and operate the network while preserving network performance at sustainable levels.

1.4 Structure

The AMP is structured in nine sections and two appendices as set out in Table 1-2. A reference is provided to the Section of the AMP that meets each requirement of the Electricity Distribution Information Disclosure Determination 2012 (Attachment A).

It should be noted that the structure of Centralines' AMP has changed since the last disclosure. Previously there was a section entitled *Assets Covered* that covered requirements 4.1 to 4.3 of the Determination. This section has now been subsumed by Section 4: Network Development Planning and Section 5: Lifecycle Asset Management Planning as this simplifies the structure of the AMP and brings together key information about the asset portfolio with the network development and lifecycle planning practices employed to manage it.

Section Name	Description	Determination Reference
1. Summary of the Plan	Provides an overview of the AMP and Centralines' company profile.	3.1
2. Background and Objectives	Explains the strategic context for asset management at Centralines.	3.3 – 3.17
3. Service Levels	Sets out the Service Level Framework that Unison uses to measure its performance as an asset management organisation.	5. - 10.

Section Name	Description	Determination Reference
4. Network Development Planning	Provides an overview of the assumptions, processes and systems that Centralines employs to formulate network development plans. Provides a detailed breakdown of network development projects for the planning period.	11.1 – 11.12 4.1 - 4.3 excluding 4.2.6
5. Lifecycle Asset Management Planning	Provides an overview of the assumptions, processes and systems that Centralines employs to formulate its asset maintenance and renewal plans. Provides a detailed breakdown of maintenance plans and renewal projects for the planning period.	12.1 – 12.4 4.2.6, 4.4 - 4.5
6. Non-Network Development, Maintenance and Renewal	Provides an overview of Centralines' approach to management of non-network assets.	13.
7. Risk Management	Explains how Centralines manages the risks of non-achievement of asset management objectives.	14.
8. Evaluation of Performance	Provides an evaluation of Centralines' performance in asset management as well as continuous improvement initiatives.	15.
9. Capability to Deliver	Explains how Centralines assures itself that the AMP can be delivered.	16.
10. Schedules	Completed schedules containing asset management information which must be disclosed with the AMP.	2.6.1 (1) (d), 2.6.1 (1) (e), 2.6.1 (2)
Appendix A: Glossary of Terms	Key technical and industry terms and acronyms.	-

Table 1-2: Structure of the AMP

1.5 Key Stakeholder Information

Centralines firmly believes the AMP should be accessible to readers of varying levels of technical understanding, and that all stakeholders should be able to extract the information they require. From experience, Centralines recognises that for many stakeholders (including the majority of Centralines' customers), the information of most interest is the level of service that can be expected, and projects that have been initiated to improve the quality of electricity supplied. To this end, this section provides an executive summary of these areas.

1.6 Asset Management Objectives

Centralines' Asset Management Objectives are the key point of reference for asset management planning. These are set out below.

Health and Safety Performance: Achieve excellence in health and safety for Centralines and its contractors and foster a high performing and engaged team.

Customer Service Performance: Deliver customer service excellence through provision of a reliable and resilient network at a reasonable price.

Cost and Efficiency Performance: Improve the efficiency and effectiveness of asset management practices through innovative network and energy solutions.

Further detail on the strategic context for asset management at Centralines is provided in Section 2 of the AMP.

1.7 Service Levels

Service levels provide the ability to measure and assess performance against the Asset Management Objectives. Centralines' service level framework is set out in Table 1-3. Further detail on Service Levels can be found in Section 3 of the AMP.

Asset Management Objective	Service Level	Unit/Type	Service Level Targets				
			2015/16	2016/17	2017/18	2018/19-19/20	2020/21-25/26
Health and Safety Performance	Accidents Causing Harm to a Member of The Public	Number of accidents	0	0	0	0	0
	Serious Harm Or Lost-Time Injury to Employees or Contractors	Number of injuries	0	0	0	0	0
	Injuries to Employees requiring Medical Treatment	Number of injuries	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Customer Service Performance	Surveyed Customer Satisfaction	%	> 95%	> 95%	> 95%	> 95%	> 95%
	SAIDI	Minutes	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07

Asset Management Objective	Service Level	Unit/Type	Service Level Targets				
			2015/16	2016/17	2017/18	2018/19-19/20	2020/21-25/26
	SAIFI	Interruptions	2.84 – 3.52	2.84 – 3.52	2.84 – 3.52	2.84 – 3.52	2.84 – 3.52
	Revenue per ICP	$ (nominal)	$1,588	$1,690	$1,792	$1,900-$2,010	$2,030-$2,135
	Restoration of Supply for Unplanned Interruptions	Urban	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours
		Rural	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours
		Remote rural	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours
Cost and Efficiency Performance	Forward Work Planning Horizon	Years	≥ 1	≥ 2 rolling	≥ 3 rolling	≥ 3 rolling	≥ 3 rolling
	Operating Expenditure per ICP	$ (nominal)	$444	$447	$461	$478	$521
	Number of Major (33kv) Faults per 100km of Line	Overhead	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5

Table 1-3: Service Level Framework

1.8 Programmes and Projects to Improve Customer Service

The lifecycle asset management and network development plans and options presented in Sections 4 and 5 of the AMP reflect an asset management philosophy that attempts to balance customer service with other considerations including the management of risk and cost. The planning period considered by this AMP sees a continuation of capital investment in the network to meet customer-driven growth, maintain network security, meet customer service levels and network reliability targets, and ensure compliance with regulatory requirements, e.g. health, safety and environmental.

1.9 Customer Experience Improvement Projects

Year	Project Name	Description
2016/2017	Reconfigure Feeder 13	Urban customers in Mount Herbert Street are experiencing more than ten service interruptions per year. Service level targets for urban customers are between 1-4 interruptions per year. This project will reconfigure the existing network to improve the quality of supply to these customers.
2017/2018-2020/2021	Reconfigure Feeder 19	Feeder 19 is of particular importance as it is the only back-feed into the Wilder Road Substation should the single 33kV line to Wilder Road Substation fault. Reconfiguring the network will ensure that Feeder 19 can support the Wilder Road feeders should this occur.
2017/2018-2020/2021	Prepare a site for a mobile voltage regulator on Feeder 1	Feeder 1 is of particular importance as it is one of the main supporting feeders into the Takapau area should the single 33kV line to Takapau fault. This project will establish a mobile regulator site to ensure that this feeder can support the other feeders if a lengthy outage were to occur.

Table 1-4: Projects that will Improve Customer Experience

1.10 Stakeholder Feedback

Centralines encourages feedback on all aspects of the AMP to enable continued improvement in meeting the needs of consumers and stakeholders. Feedback should be addressed to:

Grant Hogan
Asset Manager
c/o Centralines Limited

2 Peel Street
PO Box 59
Waipukurau 4200
New Zealand

grant.hogan@unison.co.nz

1.11 Determination Reference Mapping Table

Section 1 Reference	Determination Reference
1.1 Centralines 1.2 Introduction to this Document 1.3 Strategic Summary 1.4 Structure 1.5 Key Stakeholder Information 1.6 Asset Management Objectives 1.7 Service Levels 1.8 Programmes and Projects to Improve Customer Service 1.9 Customer Experience Improvement Projects 1.10 Stakeholder Feedback	3.1

Table 1-5: Determination Reference Mapping Table

SECTION 2 BACKGROUND & OBJECTIVES

CENTRALINES
LIMITED

CONTENTS

2. BACKGROUND AND OBJECTIVES

2.1 Introduction to this Section

Section 2: Background and Objectives provides an overview of how Centralines conducts asset management. The most important role that the section plays is showing how asset management awareness or "line of sight" flows through the business, and how the various elements of the asset management organisation interconnect and function together to enable Asset Management Objectives to be achieved.

2.2 Purpose of Asset Management Planning

The purpose of asset management planning is to determine how best the Company should manage its assets to achieve its Asset Management Objectives and provide a service to customers that will meet or exceed published Service Levels both now, and over the long-term. Centralines aspires to achieve this to a high standard in the context of the scale and scope of its business, its customers' needs and the expectations of its stakeholders.

Asset management planning is a fundamental part of Centralines' business planning. It is essential that it is undertaken in a structured and rigorous manner and makes best use of all relevant information available, as it has a direct impact on a wide range of business outcomes including the quality of service that customers receive, the safety of employees, contractors and the public, the price that consumers pay for electricity distribution, and the sustainability of the business. At Centralines, asset management planning is provided by Unison Networks Limited (Unison), under the provisions of the Management Services Agreement (MSA).

2.2.1 Overview of Asset Management System

Asset management planning occurs within a framework referred to as an asset management system (AMS). Unison's AMS ensures that Centralines' asset management activities are aligned with its external context, including stakeholder interests, and its internal context, including its vision, values and organisational strategy. Figure 2-1 shows the main contextual influences on the AMS.

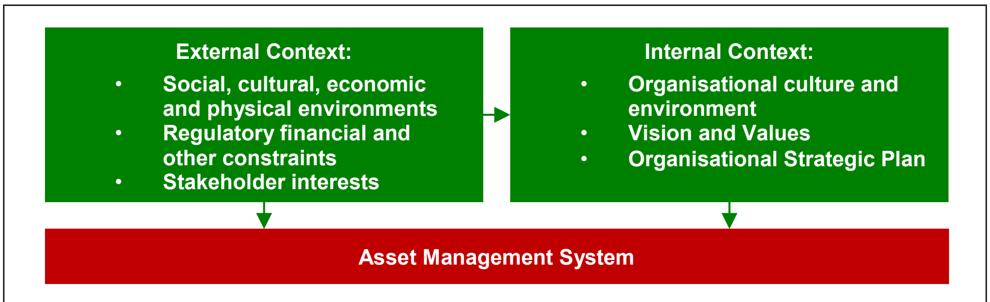


Figure 2-1: Context for Asset Management System

The AMS also provides a useful framework for explaining how Centralines performs asset management. A simplified depiction of the AMS is provided in Figure 2-2. The key components are represented in green, and the direct internal influences in red.

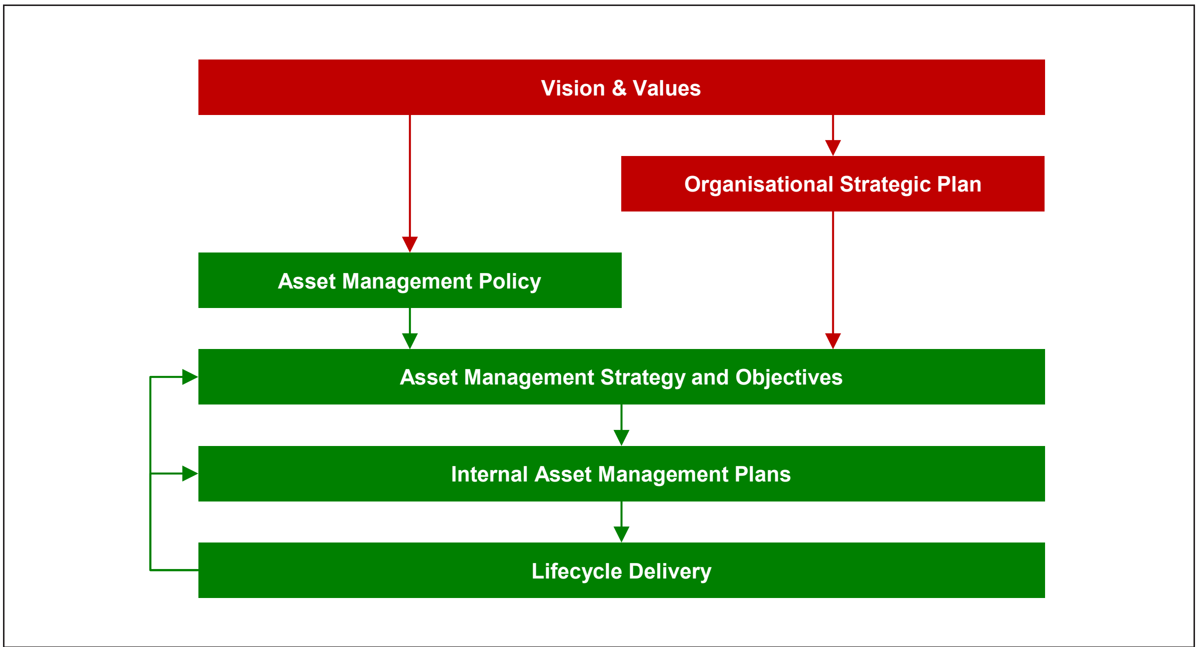


Figure 2-2: AMS and Influences

Each of the elements shown in Figure 2-2 is discussed in detail in this section and a brief overview of each is provided below.

2.2.1.1 Vision and Values

Centralines' Vision is "to Energise the Growth of Central Hawke's Bay by Electricity Infrastructure." The Values are the things that really matter to Centralines and what defines Centralines as an organisation. They underpin Centralines' organisational culture and inform the behaviours that are expected of employees. They are Safety, Teamwork, Integrity, Openness, and Passion. Centralines' Vision and Values have an influence on all components of the AMS.

2.2.1.2 Organisational Strategic Plans

Organisational Strategic Plans include all of the documents that drive and record Centralines' strategic planning. These include the Statement of Corporate Intent (SCI), the Business Plan and the Enterprise Risk Profile. The Organisational Strategic Plans provide direction for the development of Centralines' Asset Management Strategy and Objectives.

2.2.1.3 Asset Management Policy

The Asset Management Policy is the document that articulates Centralines' commitment to principles-based management. In this way it can be thought of as a translation of Centralines' Values into an asset management context. The Policy contains five principles and is developed and approved by the Management Team.

2.2.1.4 Asset Management Strategy and Objectives

The Asset Management Strategy is a container for Centralines' Asset Management Objectives, as well as the documents that record the Centralines' strategies for achieving the Objectives. The objectives are aligned to the outcomes desired from the Organisational Strategic Plan and tested for consistency with the Asset Management Policy. Centralines has commenced upgrading this element of the AMS to a ISO 55001:2014 aligned Strategic Asset Management Plan. Asset Management Strategy and Objectives are subject to ongoing review from the top-down as the Organisational Strategic Plan changes and from the bottom-up as the asset changes and the organisation's asset management planning and lifecycle delivery capabilities improve.

2.2.1.5 Internal Asset Management Plans

Internal Asset Management Plans are the plans developed to enable achievement of the Asset Management Objectives. These include plans for renewing, upgrading and maintaining network assets, connecting new customers, managing information systems and asset information, managing network risk and improving the AMS. Asset management planning practices are updated as the organisation learns. Centralines' Internal Asset Management Plans should not be confused with this document (referred to as the AMP), which has a much wider scope and is prepared for consumption by external stakeholders and to satisfy the requirements of the Electricity Distribution Information Disclosure Determination 2012.

2.2.1.6 Lifecycle Delivery

Lifecycle Delivery involves the execution of Centralines' Internal Asset Management Plans by Management, Centralines' office staff, field staff and external contractors. Much of this work occurs in the field; however there is also a significant contribution from Unison's Operations Team in controlling the network and commissioning new assets and from the Unison Asset Information team in reflecting changes to the network within information systems.

2.3 Purpose of the Asset Management Plan

The Asset Management Plan (AMP) outlines Centralines' strategies and plans for managing its electricity distribution networks over the next ten years. It contains information about all of the components of the AMS.

Centralines' AMP is produced to achieve two main purposes. The first is to provide stakeholders with a clear and comprehensive overview of how Centralines' electricity distribution networks are managed. It is recognised that stakeholders have a strong interest in the asset management outcomes that Centralines delivers, and therefore should have the opportunity to be informed on how Centralines intends to realise these outcomes now and in the future. Feedback received from stakeholders in relation to the AMP represents an opportunity for Centralines to improve the quality of its asset management planning.

The second reason is to discharge Centralines' responsibilities under the Electricity Distribution Information Disclosure Determination 2012. The Determination is the regulatory document that requires Centralines to disclose an AMP and specifies the minimum content requirements. The purposes of AMP disclosure provided in the Determination are that the AMP:

(1) Must provide sufficient information for interested persons to assess whether;

- (a) assets are being managed for the long term;
- (b) the required level of performance is being delivered; and
- (c) costs are efficient and performance efficiencies are being achieved;

(2) Must be capable of being understood by interested persons with a reasonable understanding of the management of infrastructure assets;

(3) Should provide a sound basis for the on-going assessment of asset-related risks, particularly high impact asset-related risks.

In preparing the AMP, Centralines has endeavoured to ensure that both purposes are fully achieved. In most cases there is commonality of content required to achieve both purposes; there are however also some instances where information has been provided to achieve one purpose or the other.

2.3.1 Status of the Asset Management Plan in Asset Management Practices

The AMP is a consolidation of the asset management information required to achieve the purposes set out above, which includes documentation that comprises Centralines' Internal Asset Management Plans. The process of compiling the AMP (this document) requires Centralines to further scrutinise and reflect upon asset management and planning processes, as well as the Internal Asset Management Plans that these processes generate. The scrutiny placed upon asset management during AMP preparation has resulted in improvements to asset management practices over the years.

Beyond the point at which the AMP is published, its status in Centralines' asset management practices is limited to providing a comprehensive point of reference for employees and external stakeholders. While the AMP contains a full and transparent articulation of Centralines' plans at the time of publication, Centralines reserves the right to alter its plans without notice, where doing so will result in improved asset management outcomes. Material alterations to plans are published in annual updates to the AMP in years where a full AMP is not required under the Determination.

2.3.2 *Objectives of Asset Management and Planning Processes*

To ensure there is a clear *line of sight* through the AMS, Centralines' Asset Management Objectives are informed directly by the Organisational Strategic Plan and the Asset Management Policy. There are three objectives:

1. **Health and Safety Performance:** Centralines' objective is to achieve an incident free workplace by creating a culture where each person truly believes that "Safety First" is a core value and that working safely is part of all employees' everyday activities. Centralines is committed to the Health and Safety of its Employees, Contractors, Customers and Community.
2. **Customer Service Performance:** Deliver great customer service through provision of a reliable and resilient network at a reasonable price.
3. **Cost and Efficiency Performance:** Improve the efficiency and effectiveness of asset management practices through innovative network and energy solutions.

The current measures that enable Centralines to monitor and improve performance in relation to these objectives are provided in Table 2-1. More detail on Centralines' Customer Service Performance objective and associated measures is provided in Section 3: Service Levels.

Asset Management Objective	Measure	Current Target (2016/17)
Health and Safety Performance	Accidents causing harm to a member of the public or significant damage to public property	0
	Serious harm or lost-time injury to employees or contractors	0
	Injuries to employees or contractors requiring medical treatment	< 2
Customer Service Performance	Surveyed Customer Satisfaction with delivery of customer works	> 95%
	SAIDI minutes	98.80 – 119.07
	SAIFI interruptions	2.84 – 3.52
	Revenue per ICP (nominal)	<$1,690
	Restoration of Supply for unplanned interruptions	See Section 3
Cost and Efficiency Performance	Forward work planning horizon at a project level provided to contracting services providers	≥ 2 years rolling
	Operating expenditure per ICP (nominal)	<$447
	Faults per 100km of network (33kV overhead)	< 8.5

Table 2-1: Asset Management Objectives

2.3.3 Centralines' Vision, Values and Asset Management Policy

Centralines' corporate vision is "to energise the growth of Central Hawke's Bay by electricity infrastructure". Centralines' electricity distribution network assets have an essential role to play in enabling the company to realise its vision; the Company is therefore committed to delivering to a best practice standard.

Centralines' people understand that the term 'best practice' is context-dependent, and is influenced by factors including the demographics, economies and geographies of the region it serves and the scale of the business. For Centralines, in the asset management domain, best-practice is about making trade-offs between asset lifecycle cost, performance and risk that best reflect the needs of customers and other stakeholders.

Alignment between Centralines' Vision and its asset management practices is created primarily through the organisation's Values and the principles embodied in the Asset Management Policy. These are elaborated upon below:

2.3.3.1 Centralines' Values

It has been said that "People do asset management".[1] This statement observes that more than any other organisational factor, it is people who can influence asset management outcomes. Following the update to Centralines' Vision statement in 2015, an initiative was launched to identify and enshrine the key values that make Centralines a successful business.

Centralines' Vision and Values are presented in Figure 2-3.

Figure 2-3: Centralines' Vision and Values

[1] David McKeown, Chief Executive of the Institute of Asset Management

2.3.3.2 Asset Management Policy Principles

Centralines' Asset Management Policy articulates the five principles that guide the practice of asset management at Centralines. The principles were derived by viewing the Vision and Values through the lens of asset management, and are set out below:

No-Compromise on Health and Safety – Zero Harm

Create and maintain a culture of strong health and safety awareness and strive for Zero Harm by:

- Developing the skills and knowledge of all staff, and
- Ensuring that accountabilities are well-defined and clearly understood.

Quality Customer Service

Customer Focus

Thoroughly understand and respond to our customers' requirements.

Quality and Reliability

Meet or exceed customer and regulatory requirements for reliability and quality of supply.

Resilience following a Catastrophic Event

Understand and respond to our customers' expectations regarding the reinstatement of services after low-likelihood, high-impact events.

People are Special

Achieve and uphold a culture where people are valued and achievements are recognised. We will comprehensively invest in the skills and knowledge of our people to ensure staff and contractors' capabilities, understanding and attitudes enable and empower us all to perform best-practice asset management.

Innovation and Continuous Improvement

Embed a culture of innovation and continuous improvement in the business.

Leadership

Be an industry leader nationally and in targeted areas, internationally in the development and application of innovative means to improve our asset management practices.

Embrace Change

Continuously compare ourselves to national and international leaders in asset management to identify opportunities for improvement, and encourage a positive attitude towards beneficial change.

Clarity

Progressively and proactively transform our asset management practices so that we all have a common understanding of the organisation's goals, and instinctively use high-quality, fact-driven knowledge as the central basis for our decision-making.

To do this we will keep our eyes open to new ways of doing things and find new technologies that we can apply so that we are continuously improving.

Balance Performance, Risk and Cost

Asset Management requires us to balance these three competing factors:

- Maximising asset performance;
- Minimising risk; and
- Minimising life-cycle cost.

At the same time we must take into account legislative compliance, regulatory requirements and the preferences of our communities.

2.3.4 Documented Plans Produced from Annual Business Planning Processes

Table 2-2 sets out the documented plans produced in Centralines' annual business planning processes.

Name of Plan	Role in AMS	Description
Business Plan	Organisational Strategic Plan	The Business Plan is Centralines' key Organisational Strategic Planning document and therefore strongly influences the AMS. It is updated annually and includes: • An overview of Centralines' strategic context both internally and externally; • Key corporate goals; • Financial information including capital and operating expenditure forecasts, revenue forecasts and a summary of the Company's financial position; and • An overview of each strategic initiative to be undertaken. The strategic initiatives included within the Business Plan include initiatives to continuously improve Centralines' asset management capability. The Business Plan is reviewed and approved annually by Centralines' Board of Directors.
Statement of Corporate Intent	Organisational Strategic Plan	The Statement of Corporate Intent sets out the Centralines' scope of activities and strategic aims as well as the key performance targets over the next three financial years. These include asset management targets and customer service levels.
Asset Management Strategies and Improvement Initiatives	Asset Management Strategy and Objectives	Unison, as Centralines' Management Services Provider, is committed to improving its asset management capabilities and has a number of asset management strategies in place to achieve this. They are however outlined in disparate documents with different business owners. While they are developed carefully within individual asset management functions, it has been recognised that they are not sufficiently integrated if Unison is to meet its asset management aspirations. In 2016/17 a key initiative for Unison is to establish a formalised framework for strategic asset management planning and to develop a comprehensive and integrated Strategic Asset Management Plan (SAMP) that meets the requirements of ISO 55001:2014.

Name of Plan	Role in AMS	Description
Network CAPEX Plan	Internal Asset Management Plans	The Network CAPEX Plan documents the network capital projects and the corresponding estimates of expenditure that will be required to meet Centralines' Asset Management Objectives. The plan has a rolling ten-year planning horizon that sees detail added to plans as time goes on. • Ten years out holistic expenditure requirements are estimated and disaggregated using the CAPEX categories within in Schedule 11 of the Determination. • Three years out specific projects are identified. • One year out a project scope and detailed budget is prepared. The planning processes that are used to develop the Network CAPEX Plan are covered in Sections 4 and 5 of the AMP. The Network CAPEX Plan is compiled through an iterative process by Centralines' Management Services Provider teams: Asset Management Team, Network Development, Commercial and Centralines' staff. The process is managed by the Centralines' Management Services Provider Network Investment and Delivery Manager. The outputs and justifications from the Network CAPEX Plan are included in the Business Plan in an aggregated form for approval by the Board of Directors.
Network Maintenance Plan	Internal Asset Management Plans	The Network Maintenance Plan is a consolidated summary of the preventative maintenance programmes and reactive maintenance budget provisions that will be required to keep the network performing at an acceptable level for minimum cost in the following financial year. Work tasks are specified during the financial year and draw down against the programme budgets. The Network Maintenance Plan is consolidated from the maintenance plans of each of Centralines' Management Services Provider Asset Specialists following input from Centralines' staff, in a process managed by Centralines' Management Services Provider Network Investment and Delivery Manager. The outputs and justifications from the Network Maintenance Plan are included in the Business Plan in an aggregated form for approval by the Board of Directors.
Business Continuity Management Plans	Internal Asset Management Plans	Centralines' Business Continuity Management Plans exist to support a robust response to high-impact low-likelihood events that could threaten Centralines' ability to provide a safe and resilient service to customers and meet Asset Management Objectives. They include: • Crisis communications plans; • Business Continuity Plans by function; • Disaster recovery procedures; and • Network and crisis response plans.

Name of Plan	Role in AMS	Description
Annual Works Programme	Lifecycle Delivery	The Annual Works Programme details the planned capital works to be completed in the current financial year. The Programme is developed collaboratively by Centralines' Management Services Provider and Centralines' staff, and includes both network and customer-driven projects. The plan serves the purpose of recording planned projects, and benefits Centralines by creating visibility, by allowing total budgeting, and by providing a firm view of work to Centralines' field staff.
Maintenance Schedule	Lifecycle Delivery	Documented plans for maintenance scheduling exist in the form of bespoke spreadsheets which define maintenance cycles and timing for individual asset classes. Accountability for the scheduling of specific asset classes lies with the respective Centralines' Management Services Provider Asset Specialist or in *ad hoc* cases where the maintenance task spans multiple asset classes Centralines' Management Services Provider, Unison's Network Investment and Delivery Team assume responsibility for scheduling.
Legislative Compliance Programme	Supports AMS	The Legislative Compliance Programme is a structured assurance process completed every six months. This ensures that Centralines is aware of any real or potential non-compliance with Legislation and Regulation across the business, and action can be taken to rectify such situations.
Information Management Group Strategy	Supports AMS	Centralines' Management Services Provider Information Management Group (IMG) is responsible for delivery of fit-for-purpose information systems to support the AMS. IMG annually produces a strategy that details changes to the information systems' landscape that will support the achievement of business objectives, including Asset Management Objectives.
Enterprise Risk Profile	Supports AMS	Reporting of the Enterprise Risk Management Profile and the resultant processes provide a disciplined, structured and systematic approach to identifying, prioritising, managing and reporting on the effects of uncertainty on objectives (including network requirements). The Enterprise Risk Management Profile is reviewed by Management and reported to the Audit and Risk Committee at least biannually.

Table 2-2: Documented Plans Produced as Outputs of Annual Business Planning

2.4 Planning Period of the Asset Management Plan

The AMP covers the period from 1 April 2016 to 31 March 2026. Necessarily all prospective information is provided based upon the currently best-assumed future. As for any long-term planning exercise, uncertainty increases the further forward in the future the Company looks. This is due to factors including the condition of assets, growth of demand, the cost and availability of contracting resources, technology changes, and stakeholder expectations. Centralines' assumptions in respect of these factors are set out in Section 2.8.

Accordingly, for the first five years of the planning period, more detailed information in respect of asset management plans is provided. In the second half of the planning period, plans are presented in less detail reflecting increasing uncertainty.

2.5 Date of Director Approval

The AMP was approved by Centralines' Board of Directors on 23 March 2016.

2.6 Centralines' Stakeholders

Centralines' stakeholders are individuals, organisations and groups who have an interest or concern in Centralines' business and the outcomes it delivers. Stakeholder interests influence each element of Centralines' AMS as represented in Table 2-3. The importance of the service that Centralines provides to the community means that the Company has a large number of different stakeholders. Although many of these stakeholders have common interests, including the safety and reliability of Centralines' assets, there are also some divergent and even conflicting interests that need to be accommodated.

2.6.1 Stakeholder Interests

In Table 2-3, Centralines' stakeholders are listed alongside the ways that their interests are identified, and what their key interests are.

Stakeholder	Method of Identifying Interests	Key Interests
Shareholder. The interests of the shareholder are represented by the Central Hawke's Bay Consumers' Power Trust (CHBCPT)	• Meetings between Trustees and Centralines' Board of Directors • Meetings and interactions between Trustees and Centralines' Management Team • Consultation on the Statement of Corporate Intent • Annual General Meeting	• Return on investment • Sustainability of the business • Energy affordability • Energy efficiency and safety initiatives in the community • Economic prosperity in Central Hawke's Bay • Community representation
Residential customers	• Annual customer satisfaction survey • Community initiatives • Customer service interactions (e.g. 'no power' calls, new connection requests) • Use of System Agreements with energy retailers	• A safe and secure electricity network • Price of electricity • Annual discount • Cost of new connections • Quality of supply • Fast restoration post-fault • Connection policies

Stakeholder	Method of Identifying Interests	Key Interests
Commercial and industrial customers	• Annual customer satisfaction survey • Relationship meetings • Customer service interactions (e.g. 'no power' calls, new connection requests) • Use of System Agreements with energy retailers	• A safe and secure electricity network • Price of electricity • Cost of new connections and customer contributions • Quality of supply • Fast restoration post-fault • Connection policies • Advance notice of planned outages and compliance with outage windows
Entities providing essential services to the community (e.g. fire stations, police stations, hospitals)	• As for commercial and industrial customers • Direct contact with Unison's Control Room	• As for commercial and industrial customers • Cooperation in emergencies and natural disasters • Back-up electricity supply
Directors	• Monthly Board meetings • Board sub-committee meetings • Interactions with Management	• Health and safety • Good governance • Company performance against business goals • Legislative compliance. • Management of key risks • Corporate strategy and growth initiatives
Employees	• Feedback from employees to the Management Team • Annual employee engagement survey • Consultation preceding business change • Annual performance appraisal process	• A safe and healthy workplace • Fair remuneration • Training and development opportunities • Opportunities for career progression • A positive and professional organisational culture • Stability and security in the employment relationship • The opportunity to have a say in business decisions

Stakeholder	Method of Identifying Interests	Key Interests
Energy retailers	• Use of System Agreement • Relationship meetings	• Terms of Use of Systems Agreement being met • Price of line services • Metering • Tariff structure • Outage management and notification
Transpower	• Quarterly relationship meetings • Operational contact between Transpower System Operator and Centralines' Management Services Provider Control Room • Transpower's Annual Planning Report and other publications	• Safety • Power system stability • Planning assumptions • Network development • Load management • System operation • Accounts payable
Territorial Authorities	• Coordination meetings • Strategic meetings • Emergency response and Lifelines meetings • Hearings and submissions • Publications including District Plans	• Public health and safety • Environmental impact • Regulatory compliance • Quality of supply • Street lighting and amenity lighting • Development of local economy and infrastructure • Corridor management • Overhead to underground conversion programme • Disaster response
Regulators	• Relationship meetings • Consultation processes and publications • Industry working groups • Legislation and regulation	• Compliance with statutory and regulatory requirements
Interest groups and community groups	• Consultation	• The opportunity to be heard on issues that matter to the groups

Stakeholder	Method of Identifying Interests	Key Interests
Landowners	• Consultation	• Property values • Amenity value • Asset location • Trees and vegetation • Exercise of Centralines' rights of access
Property developers	• Consultation • Site meetings	• Timeliness of network connection • Overhead to underground conversion programme • Connection policies including the Customer Contribution Policy
Financial institutions	• Relationship meetings	• Investment opportunities. • Sustainability of the business.
Other local utilities and their contractors	• Relationship meetings • Site meetings	• Safety around Centralines' assets • Asset location services • Opportunities for co-location of assets • Corridor management

Table 2-3: Centralines' Stakeholders and their Interests

2.6.2 Accommodation of Stakeholder Interests in Asset Management Practices

The way that the stakeholder interests identified in Table 2-3 are accommodated into Centralines' asset management practices vary according to the type of interest, and at which level of the AMS the interest is most appropriately accommodated. Four practical examples of how stakeholder interests are accommodated at two levels of the AMS are provided below.

2.6.2.1 Asset Management Planning

Accommodation of Landowners' Interests – Selecting Asset Locations

The location and appearance of Centralines' assets in the road reserve or on land not owned by Centralines can be a contentious issue. Relevant stakeholder interests include visual amenity, land values, public safety and ongoing access by Centralines and its contractors. To ensure that these interests are accommodated where possible, Centralines employs a proactive and consultative approach to engaging with potentially affected parties and then working with them to reach mutually acceptable outcomes. This process occurs early in the project initiation process to ensure that as many options are available as possible.

Accommodation of Stakeholder Interests – Capital Expenditure Planning

Centralines' Management Services Provider uses a decision support framework called the Investment Prioritisation Tool (IPT) to select the highest-priority capital projects to undertake each year. Each of the drivers within the IPT represents a number of stakeholder interests, meaning that these interests are explicitly accommodated in Centralines' capital expenditure decision-making. The IPT drivers are shown in Figure 2-4.

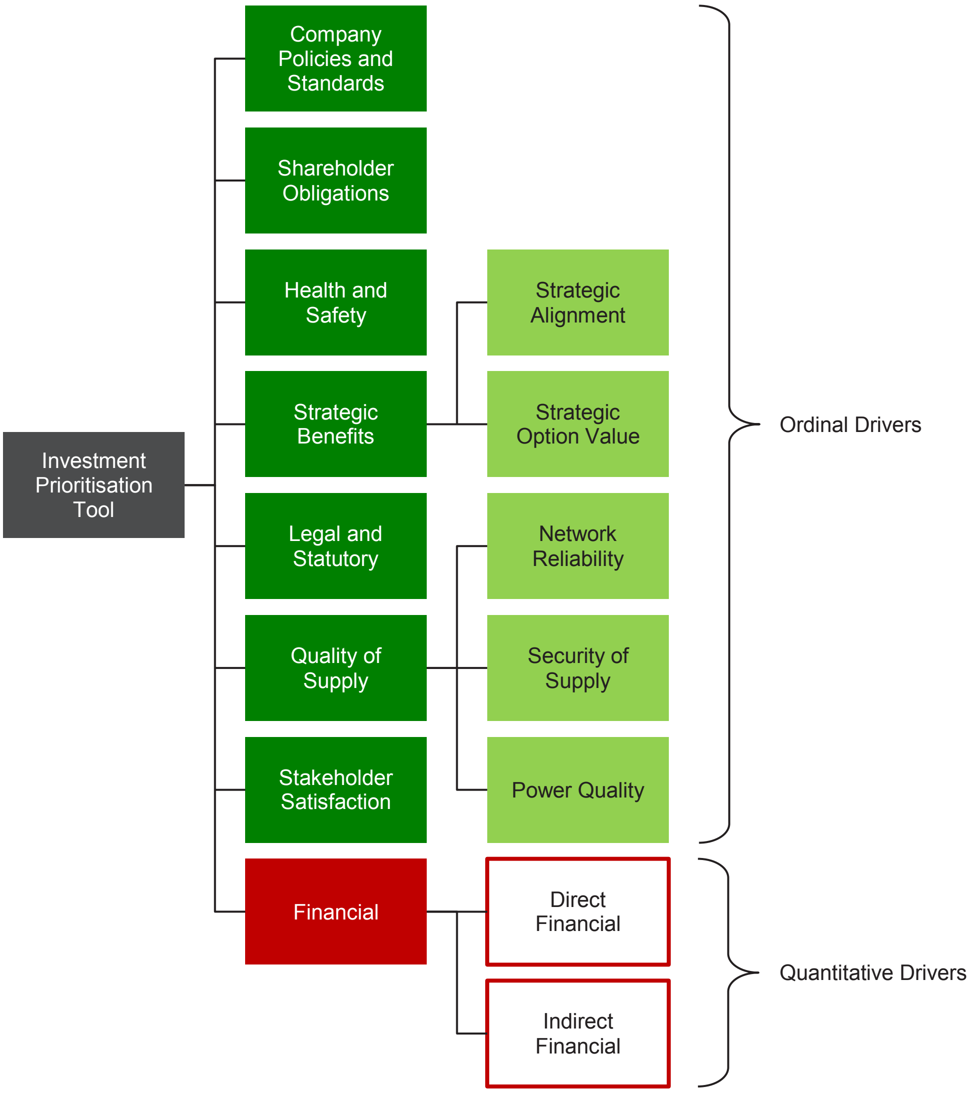


Figure 2-4: Investment Prioritisation Tool Drivers

2.6.2.2 *Lifecycle Delivery*

Accommodation of Stakeholder Interests – Seismic Strengthening of Zone Substations

The Christchurch Earthquakes were a powerful reminder of the forces that can be put on man-made structures during natural disasters. Health and safety is the most important interest to many of Centralines' stakeholders, and therefore the Company undertook a review of the seismic strength of its existing installations to ensure they would not present an undue risk in an earthquake event. This review will lead to Centralines undertaking seismic strengthening work at all of its zone substations in the current planning period.

Accommodation of Stakeholder Interests – Vegetation Management Programme

Tree contact with Centralines' overhead assets is a leading cause of unplanned interruptions. From an asset management perspective, the ideal outcome would be to maintain a corridor around assets wide enough to ensure that vegetation contact cannot occur. However it is recognised that customers, landowners and other stakeholders have interests in the visual amenity, shade and shelter that trees afford.

To accommodate these interests while maintaining the integrity of the network and complying with regulations, Centralines has implemented a comprehensive Vegetation Management Programme. This includes use of the Vegetation Prioritisation Process used to identify where field vegetation resources should be deployed to maximum effect, liaison with landowners who have trees close to Centralines' overhead lines to identify a mutually-acceptable course of action, and trimming or felling of trees.

2.6.3 *Managing Conflicting Interests*

Situations sometimes arise where Centralines must make asset management decisions that bring interests of different stakeholders into conflict. Once such a situation has been identified, Centralines endeavours to work with each of the parties to ensure that their respective interests have been properly and fully understood. Often through this process a solution that is acceptable to each party can be identified. If such an outcome is not possible however, Centralines uses a set of guidelines along with principles of natural justice, fairness and equity to come to a decision. The guidelines applied in order of importance are:

- Health and safety of Centralines' employees, contractors and the public;
- Compliance with statutory and regulatory requirements;
- Congruence with the Statement of Corporate Intent;
- Congruence with Centralines' Asset Management Policy;
- Reasonable needs of customers;
- Synergy with asset management plans;
- Lowest lifecycle cost; and
- Congruence with other stakeholder interests.

2.7 Accountabilities and Responsibilities for Asset Management

Accountabilities for asset management at Centralines can be divided into three levels: Governance, Management and Field Operations, as shown in a simplified representation of the AMS in Figure 2-5. Accountabilities and responsibilities of each level are described in further detail below.

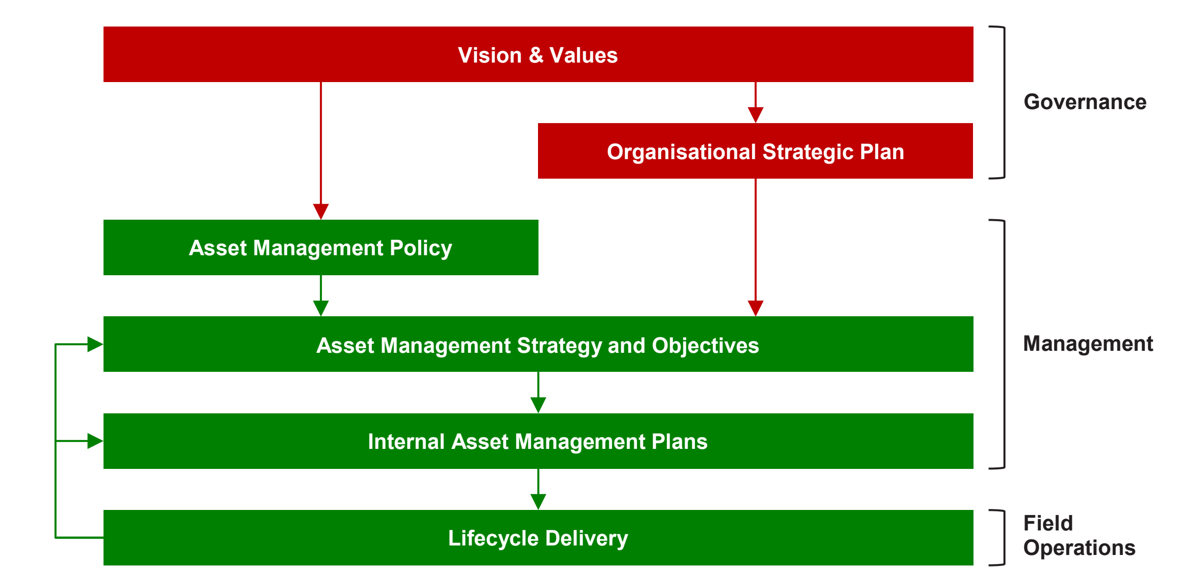


Figure 2-5: Accountabilities and Responsibilities in the Context of AMS

2.7.1 Governance

Centralines' Governance level is represented by the Board of Directors. Directors have ultimate accountability for approving the strategic direction of the business as proposed by the Chief Executive and the Management Team. Once the Organisational Strategic Plan is approved, it is the responsibility of the Management level to implement it. As explained earlier, the Organisational Strategic Plan has a strong influence on Centralines' Asset Management Strategy and Objectives and the *line of sight* that runs through the AMS.

2.7.1.1 Approval for Asset Management Decisions

Any enterprise-wide strategic initiatives relating to asset management are approved by Directors as part of the Business Plan in Centralines' annual planning processes. Initiatives approved in this manner typically involve a significant outlay of resources and duration of a year or more. An example is Centralines' Accelerated Vegetation Programme that commenced in 2011, took place over a three and a half-year period, and involved approximately $2.0M of expenditure aimed at improving Centralines' network performance, reliability and power quality.

As well as for asset management strategic initiatives, approval from Directors is also required in respect of network projects costing in excess of $1M. When the need for such a project has been identified through asset management planning processes, a Board Report is compiled. The structure of the report includes an explanation of the constraint motivating the project, the possible options for addressing the constraint, selection of the best option with justifications from both a technical and commercial perspective, identification of any risks associated with the selected option, a disaggregated costing for the project, and an estimated timeframe for delivery.

2.7.1.2 Reporting on Asset Management Outcomes

Reporting to the Governance level occurs at Centralines' monthly meeting of the Board of Directors. Asset management outcomes including network reliability, progress in the execution of asset management plans, network CAPEX and OPEX budget management and health and safety outcomes are reported on. Explanations are provided by management in respect of deviations from expected performance.

Progress against asset management strategic initiatives is typically reported quarterly. At the conclusion of these initiatives an internal review of the organisation's performance in executing the project is furnished to the Board with opportunities for improvement identified.

Performance against measures underpinning the Asset Management Objectives that are not part of standard Board reporting are reported at the end of the financial year as part of the annual business planning process.

Each year a Board report is prepared on network performance. This report includes in-depth analysis that examines network performance from a range of perspectives, critically probes underlying trends, highlights areas where improvement is required and provides an update on changes to the regulatory framework for quality.

2.7.2 Management

In the asset management area, implementation of the strategy begins with the setting of appropriate Asset Management Objectives. This is followed by the development of strategies, the deployment of resources and the establishment of processes for monitoring and review of progress. Appropriate asset management plans can then be developed. Management is accountable for these activities.

2.7.2.1 Structure of the Asset Management Organisation

Centralines' asset management organisation is led by Centralines' Management Services Provider, the CEO and five General Managers, as shown in Figure 2-6.

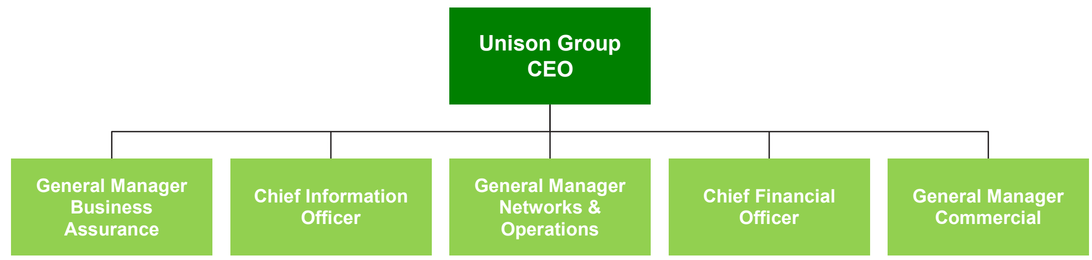


Figure 2-6: Management Structure of the Asset Management Organisation

The Board delegates financial approval of up to $1M to the Group Chief Executive and the General Manager Commercial in respect of network CAPEX projects.

The General Manager Commercial ensures that the Management Services Provider delivers the Asset Management outcomes as outlined in the Management Services Agreement. The Management Services Provider General Manager Networks & Operations has primary responsibility for implementation of the AMS, although each of the other Management Services Provider's General Managers has an important role to play in the asset management organisation, as shown in Table 2-4.

General Manager	Key Accountabilities within Asset Management System
Business Assurance	• Risk management and review • Health and safety • Internal audit • Legal and regulatory compliance • Pricing
Information Management	• Enterprise asset management systems (information systems) • Infrastructure and communications hardware • Business analysis including process improvement
Networks & Operations	• Facilitate development of Asset Management Strategy and Objectives • Lead execution of asset management strategies • Asset management planning including network development planning • Asset information management • Real-time operation of the network
Chief Financial Officer	• Treasury and financial control • Human resources and organisational culture • Procurement and logistics
Commercial	• Customer projects • Customer engagement and service levels • Billing

Table 2-4: General Manager Key Accountabilities within Asset Management System

Management of the Management Services Provider's Networks & Operations Group is organised according to Figure 2-7.

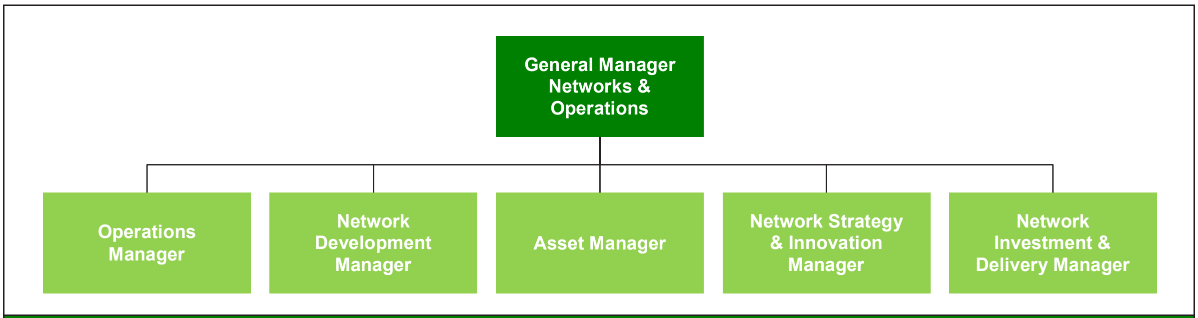


Figure 2-7: Management Structure of the Networks & Operations Group

The key responsibilities of each member of the Networks & Operations Line Management Team are set out in Table 2-5.

Line Manager	Key Responsibilities within the Asset Management System
Operations Manager	• Manage the real-time, 24/7 operation of the network from the Control Room in Hastings • Respond to network outages • Provide input to asset management plans from a network operations perspective
Network Development Manager	• Formulate network development plans to enable Centralines to meet its Asset Management Objectives • Develop and manage demand forecasts • Manage the introduction of new technology on to the network
Asset Manager	• Develop asset management plans to meet Centralines' Asset Management Objectives • Manage asset information processes • Manage standards including network, construction and maintenance
Network Strategy and Innovation Manager	• Facilitate processes for the development of Asset Management Strategy • Lead initiatives to improve the AMS • Lead innovation in the areas of asset management decision-making and technology-based approaches to improving the efficiency and effectiveness of asset management at Centralines
Network Investment and Delivery Manager	• Management of the capital and maintenance works programmes • Substation design and project engineering

Table 2-5: Line Manager Key Responsibilities within the Asset Management System

2.7.3 Field Operations

Completion of the asset lifecycle activities that are specified in asset management plans is the responsibility of the Field Operations level. Activities include design, construction, inspection, maintenance, refurbishment, fault response and repair, vegetation management, replacement and disposal. (Substation design and project engineering are performed in-house within the Management Services Provider's Network Investment and Delivery Team.)

2.7.3.1 Responsibility for Field Operations

Responsibilities for Field Operations are discharged primarily by the Centralines' field staff. Centralines has a depot in Waipukurau The field staff report to the Centralines' Operations Manager who in turn reports to the Management Services Provider's General Manager Commercial, as shown in Figure 2-8.

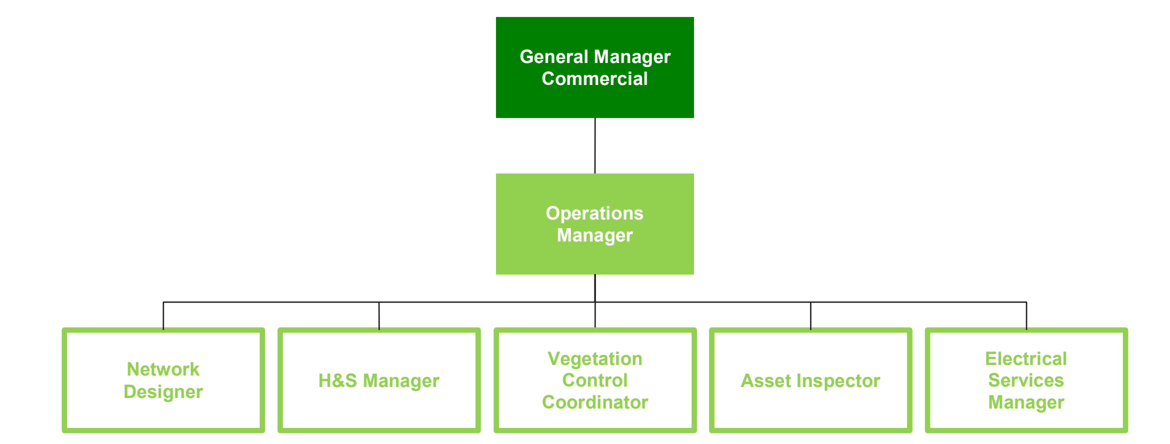


Figure 2-8: Field Leadership Structure of Centralines

2.7.3.2 Outsourcing of Field Operations

Centralines' subcontracts work during times when demands on contracting resources cannot be met by the Company's existing capacity. From time-to-time Centralines directly engages other contractors when specialist capabilities are required. An example is the engagement of protection technical specialists to assist with substation upgrades.

2.7.3.3 Field Operations and the Asset Management Organisation

The Operations Manager has the key responsibility for the delivery of the overall capital and maintenance work programmes, however in the course of individual project lifecycles people from

Centralines and the Management Services Provider's Network and Operations Teams collaborate closely to ensure efficient and effective delivery.

The Operations Manager and the Management Services Provider's Control Room staff are critical enablers and stakeholders of work taking place in the field. They ensure that the network is configured in a way that allows work to proceed, the impact of outages to be minimised, safety protocols relating to access to the network are observed, and Centralines' field staff have the information that they require about the state of the network to work safely.

2.8 Significant Assumptions made in the Asset Management Plan

In preparing the AMP for a ten-year planning period it is necessary for a number of assumptions to be made. Centralines' planning assumptions fall into five main categories:

- Macro-environmental assumptions;
- Assumptions about actions of regulatory bodies and other external entities;
- Governance and ownership assumptions;
- Asset management planning assumptions; and
- Price inflator assumptions.

The significant assumptions under each of these categories are described below.

2.8.1 Macro-environmental Assumptions

Assumption	Significance of the Assumption
No change to the structure of the electricity industry	Centralines' Organisational Strategic Plan and AMS are premised upon the assumption that the current industry structure will not change and that Centralines will remain a regulated electricity distribution business. Change to the structure of the industry could alter one or more of the input parameters to the AMP which would have a fundamental impact on the plans disclosed.
No discontinuous change in customer demands for power quality and reliability	Centralines' Customer Service Levels are an important input into the AMP. They have been formulated based upon Centralines' understanding of customer needs through quality regulation and Centralines' own customer engagement. Discontinuous change in the needs of customers in relation to power quality and reliability due to a societal or technological shift could result in Centralines' Asset Management Objectives and Customer Service Levels becoming out of date. A change to these would necessarily have an impact on the AMP.

Assumption	Significance of the Assumption
No material uptake of distributed energy resources on Centralines' networks over the planning period	Technologies such as solar photovoltaic (PV) cells and batteries have the potential to reshape the electricity industry if they reach a level of efficiency that makes them complementary to or even a credible alternative to centralised generation, transmission and distribution. Research on these technologies strongly suggests that they will have an impact on the business, but that material uptake will occur beyond the planning period of the AMP within Centralines' network footprint. Most of the assets that will be installed during the ten-year planning period will however last far beyond that time (some assets have a life of up to 80 years). It is therefore essential that the asset investment decisions being made now take into account the prospect of future uptake of distributed energy resources. Research in this area is discussed further in the context of demand forecasting in Section 4: Network Development Plans.

Table 2-6: Macro-Environmental Assumptions

2.8.2 Assumptions about Actions of Regulatory Bodies and other External Entities

Assumption	Significance of the Assumption
Industry regulators employ and strengthen incentives for innovation and excellence in asset management	Centralines strongly believes that best-practice asset management combined with an appropriate regulatory framework will lead to long-term benefits for electricity consumers. Industry regulators should therefore incentivise electricity distribution businesses to innovate and continuously improve asset management outcomes. Centralines continues to invest in innovation which will generate long-term asset management benefits in the form of reduced capital expenditure with the potential for improvements in service quality for consumers. Current regulatory settings and approaches are ineffective in promoting businesses to take a long-term view. Additional short-term costs associated with innovation and research and development are not rewarded by long-term pay-offs to the regulated business. Accordingly, Centralines' innovation and R&D activities are undertaken in spite of regulation, not because of it. Centralines believes the introduction of network performance incentives in the 2015 Default Price Path is the beginning of a trend towards incentivising innovation and promoting investment. This will ultimately result in long-term benefits to consumers.

Assumption	Significance of the Assumption
The regulatory environment provides sufficient investment certainty for Centralines	To make the decision to invest, Centralines requires sufficient certainty that we will be able to make a return on that investment over the asset life (up to 80 years). Industry regulators have an important role to play in balancing the long-term interests of consumers with creation of a regulatory environment that is sufficiently certain for businesses to invest. The AMP assumes that the regulatory environment will adapt to threats posed by consumer uptake of alternatives, such that this uptake does not result in undue risk to Centralines.
Availability of field personal capability and capacity to deliver the AMP	Suitably-resourced and competent field personnel, both in-house and external, will be necessary for the delivery of the AMP. It is assumed that such a resource will continue to exist within Centralines' network footprint during the planning period. In Centralines' estimation there are two main sources of uncertainty relating to this assumption. Firstly, will the industry continue to be able to attract people into electrical, line mechanic, fitting and technician apprenticeships at a rate that keeps up with people leaving the workforce? Secondly, will contracting businesses be able to match the pace of change in electricity distribution network technology and upskill and supplement their existing workforce?

Table 2-7: Assumptions about Actions of Regulatory Bodies and other External Entities

2.8.3 Governance and Ownership Assumptions

Assumption	Significance of the Assumption
Centralines remains wholly owned by the Central Hawke's Bay Consumers' Power Trust (CHBCPT)	A key assumption in Centralines' Organisational Strategic Plan is that the business remains wholly-owned by the CHBCPT. This assumption is therefore also relevant in the AMS and asset management planning. A change in ownership or ownership structure could alter key input parameters to the AMS including the Asset Management Strategy and Objectives, the availability of funding to deliver on asset management plans, and risk appetite. It is likely that asset management plans would need to be re-formulated entirely. Under the Trust Deed of the CHBCPT, every five years the Trustees are required to initiate a review of ownership of shares in Centralines. The next review will be required in 2018.

Assumption	Significance of the Assumption
Constant appetite for risk at a corporate level	Risk to the business is an input into all decision-making. Risk associated with particular decisions is assessed against the Company's risk appetite which is managed across the following categories: financial, legal and contractual, reputational and customer, business operations and disruption and people, staff and contractors. Centralines' risk appetite is premised upon the Company's internal and external environments. Changes in these environments could result in a shift to a more aggressive or conservative stance. A material change to Centralines' risk appetite would systematically affect Centralines' asset management plans.

Table 2-8: Governance and Ownership Assumptions

2.8.4 Asset Management Planning Assumptions

Assumption	Significance of the Assumption
Accuracy of demand forecasts	Demand forecasting provides a view of the expected future outputs required of Centralines' assets. It is therefore a fundamental part of both the Asset Management Strategy and Objectives and Asset Management Planning elements of the AMS. Traditionally the key uncertainty in demand forecasting has been the rate of growth in the number of dwellings and businesses of different types connected to the network. To address this type of growth Centralines has drawn upon demographic and economic data and projections to create demand forecasts down to the level of 11kV feeders to enable development of robust asset management plans. This is the approach that has been taken in formulating the AMP and it is assumed that this will be fit-for-purpose for the first half of the planning period. Centralines believe that uptake of distributed energy resources and electric vehicles and ongoing improvements in energy efficiency will render such demand forecasting approaches incomplete beyond 2020. Future demand forecasting will need to be able to forecast not only the quantity of consumers, but also their energy use intensity by segment, degree of distributed energy resource uptake and be able to provide information down to the level of low voltage (400V) reticulation.
Situational awareness of the network continues to improve and this delivers opportunities to defer, curtail or otherwise reduce network expenditure without resulting in increased network risk	In 2009 Centralines commenced the installation of sensors and automated switches on the network, and in 2016 the transition onto Centralines' Management Services Provider's Advanced Distribution Management System will commence. As a result Centralines' situational awareness will significantly improve. This will enable better asset management decisions to be made, and ultimately will result in more efficient and effective asset management. The theme of improved situational awareness leading to better asset management remains a key plank in Centralines' Asset Management Strategy, and it is assumed that progress will continue to be made. The network expenditure forecasts in this AMP assume that Centralines improved situational awareness does continue to enable the managed deferral of investment. The key factor that could lead to a difference between the expenditure forecasts disclosed and actual information recorded in future disclosures is if the situational awareness developed reveals that Centralines earlier understanding of the condition of a material quantity of assets was optimistic. In such a situation, this would in fact require investment to be brought forward, rather than deferred. Although this would have an unfavourable financial impact, it would mean that underlying network risk would be reduced.

Table 2-9: Asset Management Planning Assumptions

2.8.5 *Price Inflator Assumptions*

Capital and operational expenditure forecasts reported in the AMP have been indexed for future years to take into account wage and material price inflation.

The inflation rates from 2017 to 2020 were provided by the Commerce Commission. The rates for the years thereafter are an average rate based on the previous period. The rates used are provided in Table 2-10, presented as a forecast annual rate of inflation.

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
2.11%	2.17%	2.11%	2.06%	2.04%	2.04%	2.04%	2.04%	2.04%	2.04%

Table 2-10: Price Inflator Assumptions

2.9 Overview of Asset Management Strategy and Delivery

In this Part, further detail is provided on the Asset Management Strategy and Objectives element of the AMS. Centralines' Management Services Provider is currently reviewing this element to align the business with ISO5500x:2014, as in their view this represents good practice and will support the Centralines' overall asset management aspiration of delivering best practice AMS. The strategy framework presented in Figure 2-9 represents the current practice.

- Asset Management Objectives are established based upon external context and internal context (see Figure 2-9: Asset Management Strategy and Objectives in the Asset Management System). Alignment with the principles of the Asset Management Policy is ensured.
- Measures are developed to quantify the gap between where current asset performance and asset management capability levels lie in relation to where they must be for the Asset Management Objectives to be realised.
- Asset Management Strategies are developed to close gaps, taking into account the lifecycle of the assets.
- Strategies are implemented in Internal Asset Management Plans as well as through separate improvement initiatives.
- Implementation progress is reported on as required (see Section 2.7), and major projects are reviewed upon completion. Externally conducted assessments of asset management maturity against good practice standards (formerly PAS55:2008; now ISO55001:2014), and expert review of key pieces of work are employed as quality assurance mechanisms.

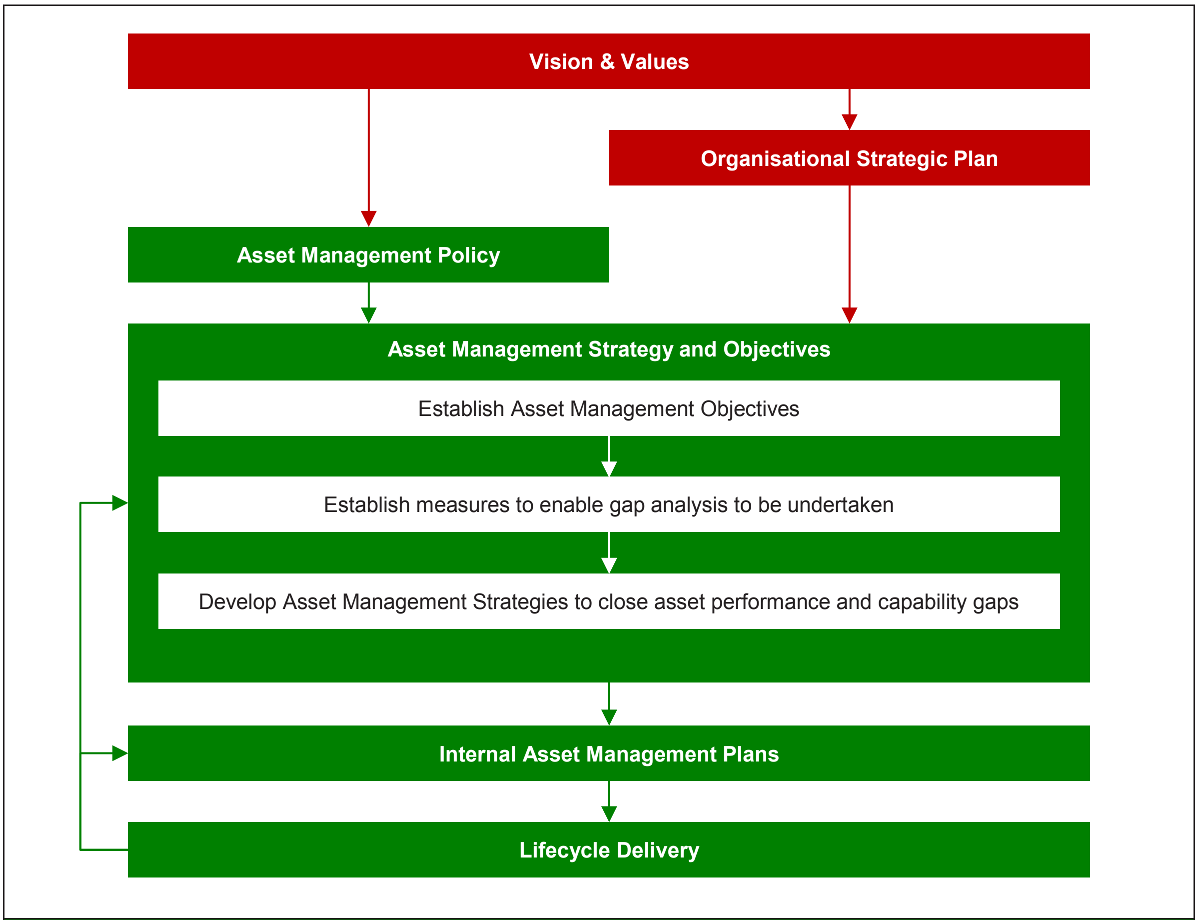


Figure 2-9: Asset Management Strategy and Objectives in the Asset Management System

2.9.1 Alignment of Asset Management Strategy and Objectives

Centralines' Asset Management Strategy involves translation of the strategic intent underpinning the Organisational Strategic Plan into the AMS. In this way, it is ensured that asset management is aligned with Centralines' corporate strategy and policies. In practice this is achieved through the following mechanisms:

- The Management Team is involved in both the development of corporate strategy and the Asset Management Strategy and Objectives;
- The Management Services Provider's Group Chief Executive has overall accountability for the Management Services Provider delivering a fit-for-purpose AMS;
- The Management Services Provider's General Manager Networks & Operations has overall responsibility for the implementation of the AMS and is also closely involved in the development of corporate strategy;
- Key asset management initiatives and large projects are approved at both the Management and Governance levels of the organisation;
- Asset Management Objectives are established and tested for congruence with the Organisational Plan; and
- A subset of the measures underpinning Asset Management Objectives is included in the Business Plan, a key element of the Organisational Strategic Plan.

Asset Management Objectives are provided below.

1. **Health and Safety Performance:** Achieve excellence in health and safety for Centralines and our contractors and foster a high performing and engaged team.
2. **Customer Service Performance:** Deliver customer service excellence through provision of a reliable and resilient network at a reasonable price.
3. **Cost and Efficiency Performance:** Improve the efficiency and effectiveness of asset management practices through innovative network and energy solutions.

2.9.2 Asset Management Strategies

An overview of the strategies in respect of each Asset Management Objective is provided in Table 2-11. These strategies have been prioritised as they represent the optimal use of Centralines' resources and capabilities to deliver on the Asset Management Objectives as represented by the measures set out in Table 2-11.

Asset Management Objective	Asset Management Strategies
Health and Safety Performance	• **Safety by Design**: Implement changes to processes to ensure compliance with Health and Safety at Work Legislation. • **Zero Incident Performance (ZIP) Programme**: This initiative has run for five years.
Customer Service Performance	• **Network Reliability Process:** Implement enhanced process for responding to unplanned outages and identifying root causes. • **Disruptive Technology**: Develop knowledge in the business about so-called disruptive technologies such as solar PV and batteries, and how they might affect the business in the future.
Cost and Efficiency Performance	• **Smart Grid:** Develop a network with more measuring points, increased automation and faster communications to reduce cost-to-serve.

Table 2-11: Asset Management Strategies

2.9.3 Internal Asset Management Plans

Internal Asset Management Plans are developed through the processes described in Sections 4 and 5.

2.10 Overview of Systems and Information Management Data

Information systems and asset data and information are essential building blocks of asset management, and continual improvement in each of these areas will be required for Centralines to deliver its Asset Management Strategies and achieve its Asset Management Objectives.

Asset Information is a general term used for a number of different types of information relating to assets, which includes those set out in Table 2-12.

Asset Information Type	Description
Asset inventory	A catalogue of all assets managed by, or relevant to, an organisation.
Asset attributes	Details of assets such as size, dimensions, serial number, age, etc.
Asset location and connectivity	Details of the physical location and spatial extent of an asset.
Inspection data	Assessments of an asset such as its condition and serviceability based upon agreed criteria.
Document-based information	Drawings, documents and photographs of assets.
Automatically acquired data	Automated condition monitoring, process and telemetry data.
Asset financial information	Purchase costs, running costs, valuation and disposal costs.
Work management data	History of past activities and plans for future activities.
Metadata	Data about the asset information captured, including the quality of that information.

Table 2-12: Asset Information Types

2.10.1 Asset Information Strategy

During 2015 Centralines' Management Services Provider developed an Asset Information Strategy to provide direction on how asset information is managed and how improvement initiatives are prioritised and undertaken. The vision of the strategy is to:

1. Ensure the right information is available to the right people, in the right format, at the right time;
2. Achieve this in the most cost-effective way possible; and
3. Appropriately balance the trade-off between asset performance, cost and risk when making asset information decisions.

The goals of the strategy and how progress against those goals is measured is set out in Table 2-13.

Goal	Metric	How Measured
Know what asset information we have and where it is held	Number of attributes held by Centralines, by repository.	Initially estimated using existing data models.
Know what asset information is important to achieving which business goals	Percentage of attributes that have been linked to a business goal.	Number of attributes that have been linked to a business goal as a percentage of the total number of attributes.
Know the state (quality, completeness, etc.) of the asset information we have	Percentage of attributes that have been profiled.	Number of attributes that have been profiled as a percentage of the total number of attributes.
	Of those profiled the percentages that are of acceptable quality.	Number of attributes that are of acceptable quality as a percentage of the total number of attributes profiled.
Be able to make informed decisions about asset information	Number of decisions made by the Asset Information Governance Group based on data quality information presented to them.	All decisions will be recorded in meeting minutes and given a unique identifier.

Table 2-13: Goals of Asset Information Strategy

The key processes that have been developed to guide achievement of these goals are described in sub-parts that follow.

2.10.1.1 Mapping Goals to Data Requirements

Managing asset information has a cost in direct financial and human resource terms. In order to be able to prioritise asset information management activities it is necessary to be aware of the relationship that each piece of asset information has with asset management goals and objectives.

This requires understanding the data and information required to manage assets through their entire lifecycle – from acquisition to disposal. In the absence of such understanding, asset management outcomes will be sub-optimal. For example, to achieve network and asset performance goals comprehensive and accurate maintenance records are required. This information enables asset specialists to set maintenance levels that optimally balance cost with the risk of failure.

The process that Centralines uses to map asset management goals to data requirements is presented in Figure 2-10.

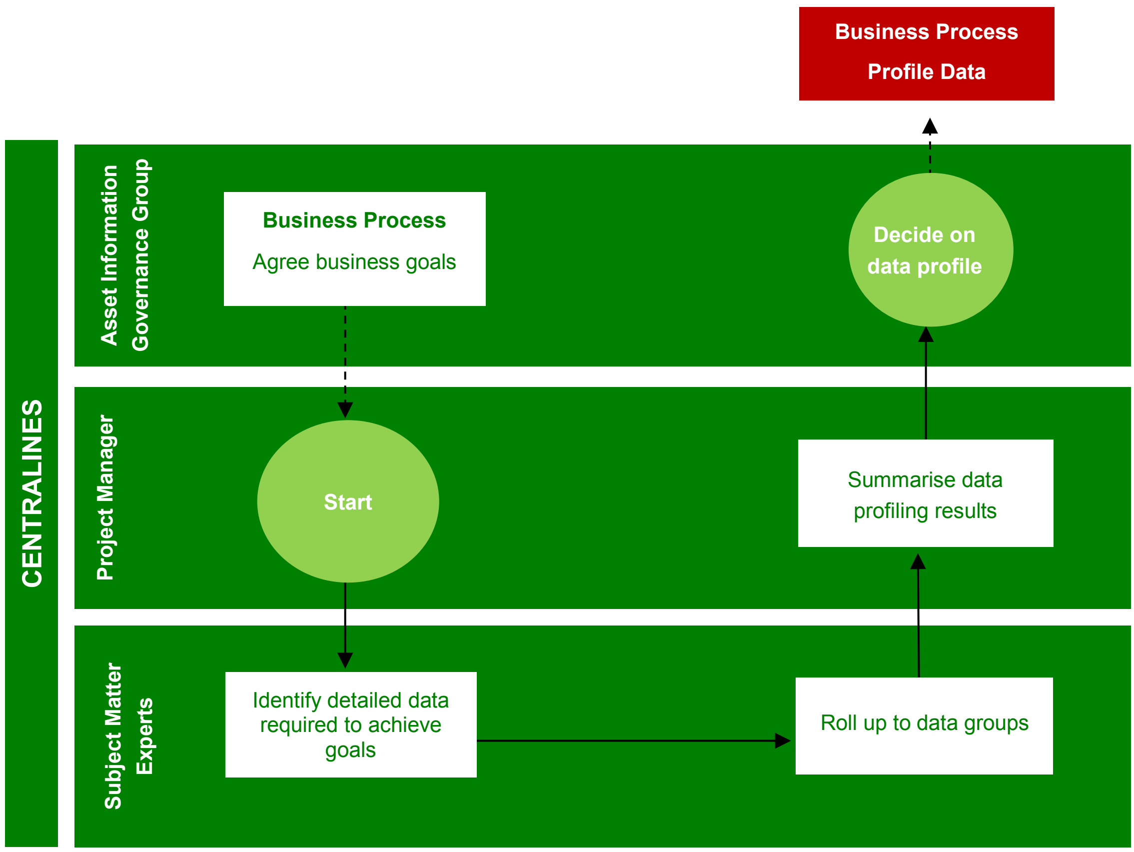


Figure 2-10: Mapping Goals to Data Requirements

2.10.1.2 Data Assurance Process

To provide assurance that data is suitable for achieving Centralines' business goals it is from time-to-time, necessary to review the state of the data required to support those goals. This requires a series of activities to check, and if necessary remedy, the data quality. The following diagram provides a generic process for completing the data assurance exercise.

This process is used whenever a particular dataset will be required in order to develop and implement a new application. It has been Centralines' experience that data quality improvement initiatives are easiest to motivate when they are seen as a means to an end, rather than an end in themselves. An initiative such as the implementation of the Centralines' Management Services Provider's Schneider ADMS has provided focus and impetus to data assurance activities.

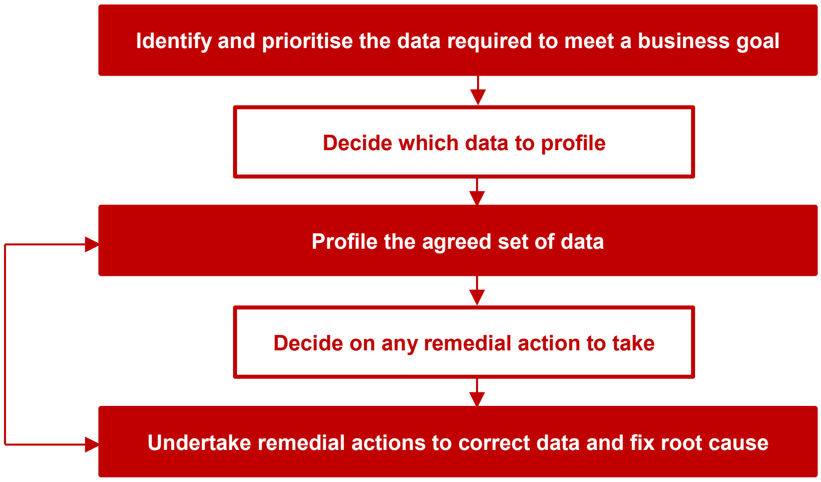


Figure 2-11: Data Assurance Process

2.10.1.3 Asset Data Profiling Process

Profiling data is a key step in the Data Assurance Process. In the Data Profiling Process, data is assessed against up to seven quality characteristics, as set out in Table 2-14.

Data Quality Characteristic	Definition	How Measured	How Assessed
Completeness	A complete set of data is available for each data record.	Of the total number of records, what percentage has a value?	Database tools.
Validity	All data held complies with data validation rules.	Of the total number of records, what percentage has a value that complies with the current validation rules?	Database tools.
Accuracy	If the data is a true reflection of the physical entity it is represented in a way that is fit-for-purpose.	Of the total number of records, what percentage has a value that is accurate?	Field check sample. Inferred from other data. Within the bounds of what is reasonable.
Consistency	There is a consistent understanding of the meaning of the data.	Yes / No / Partial (Most of the time)	Assessed through discussion with data owner / expert.

Data Quality Characteristic	Definition	How Measured	How Assessed
Timeliness	Data reflects the current state of an asset and complies with organisational standards for data update timescales.	How long between capturing the data and it being available in Centralines' systems (average)?	Assessed through discussion with data owner / expert. Spot check.
Uniqueness	All keys should be unique with no duplication of data.	True / False	Assessed through discussion with data owner / expert / users
Fit for purpose structure	The data is easy to use.	Ease of use / work around available / Not accessible	Assessed through discussion with data owner / expert / users

Table 2-14: Quality Characteristics

The Data Profiling Process is presented in Figure 2-12.

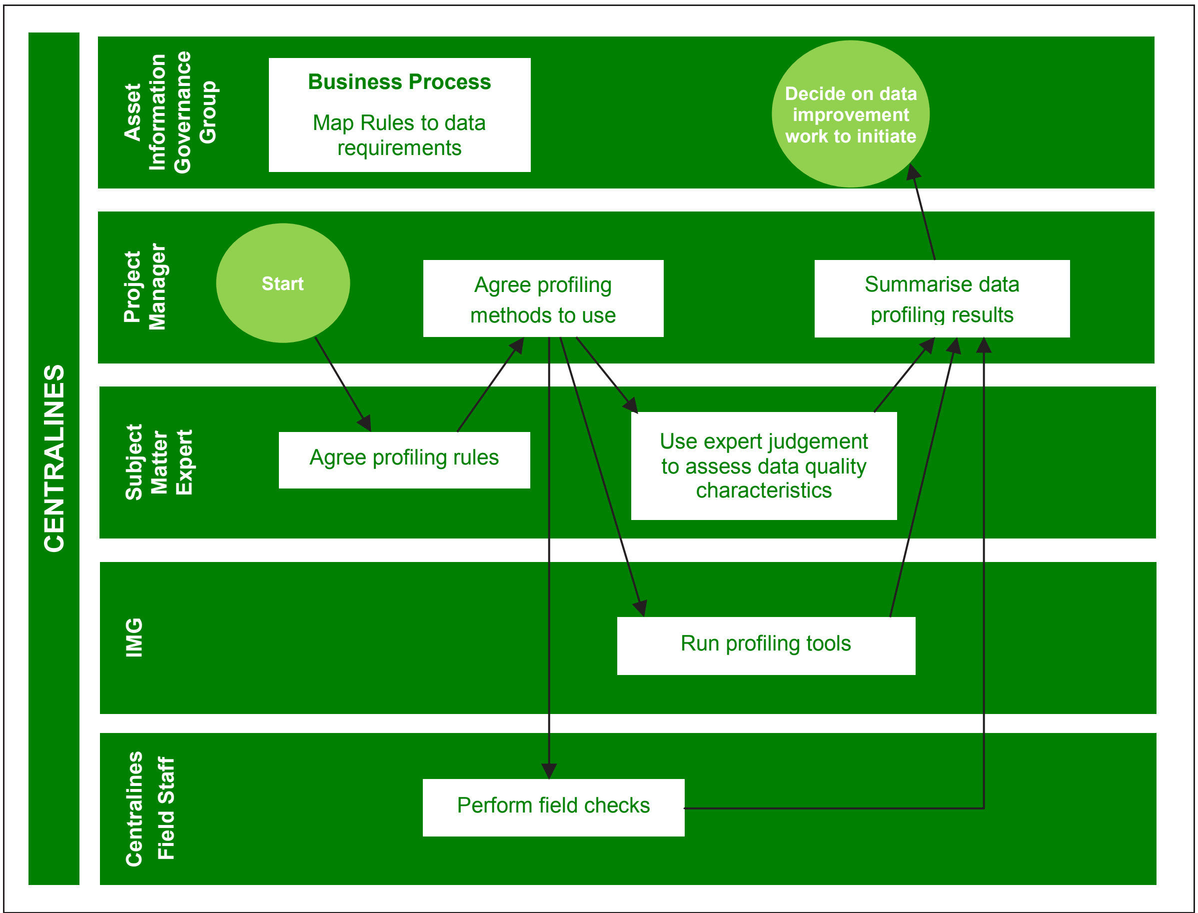


Figure 2-12: Data Profiling Process

2.10.2 Asset Management Information Systems

Asset management information systems are software tools used to improve the efficiency and effectiveness of asset management. In Table 2-15 Centralines' Management Services Provider's information systems are mapped to the Asset Information Types set out in Table 2-12 to provide an overall impression of Centralines' asset management information systems landscape.

Pale green shaded cells mean the information system contains master data records of the relevant asset information type. Each asset information record is mastered in a single information system.

	Asset Information Type (from Table 2-12)								
Information System	**Asset inventory**	**Asset attributes**	**Asset location and Connectivity**	**Inspection data**	**Document-based information**	**Automatically acquired data**	**Asset financial information**	**Work management data**	**Metadata**
ACTIVA EAMS									
GE Smallworld GIS									
Schneider ADMS									
Bentley Drawing Management									
Master Data Services									
Document Management System									
OSISoft PI Historian									
SAP									
Gentrack									
Sparx Enterprise Architect									

Table 2-15: Mapping Asset Information Types to Management Services Providers' Information Systems

More detail on each of the information systems is provided in Table 2-16.

Information System	Description
ACTIVA EAMS	ACTIVA is Centralines' Enterprise Asset Management System (EAMS). It is built on the BASIX platform provided by EMS solutions. ACTIVA houses Centralines' asset register which is the master repository for asset data and stores both current attributes as well as historical information. The asset data that ACTIVA masters is available for viewing within the GIS.
GE Smallworld GIS	The Geographic Information System (GIS) stores records of Centralines' network assets according to their location and electrical connectivity. This includes the electrical connectivity within substations and Centralines' fibre infrastructure. Design and estimation of CAPEX projects is mastered in the Design Manager module of the GIS.
Schneider ADMS	The Advanced Distribution Management System (ADMS) integrates SCADA with a suite of advanced distribution management and grid-optimisation applications. Network operation and control includes managing and communicating with assets in the field along with tools to enable operators to make informed decisions based on the current network status. Network optimisation and analysis provides Centralines with the ability to optimise the state of the network by identifying the optimal configuration to reduce electrical losses and maximise asset utilisation.
Bentley and Meridian Drawing Management	The Meridian drawing management system integrates with the Bentley Microstation Computer-Aided Design (CAD) tool to manage the versioning and renditions of CAD drawings. It gives CAD technicians the functionality to work on projects and then publish finished drawings. The drawings are discoverable to the business via the Meridian web client.
Master Data Services	Microsoft Master Data Services (MDS) is a system for storing relatively static but important information used by key downstream systems and processes. It is primarily used for storing manufacturers' specifications of electrical and physical characteristics of equipment models.
Document Management System	The document management system (DMS) is used to track, manage and store documents while keeping a record of the various versions created and modified by different users. DMS houses all of Centralines' controlled documents including standards, as well as capital project files.
OSISoft PI Historian	PI is Centralines' primary tool for the storage and analysis of time-series data generated by telemetered network devices. Each data point for each piece of equipment is assigned a unique reference tag against which data is recorded and can be accessed. Interfaces are developed between PI and other applications in use in the business. Examples of data that is recorded in PI include switching events, transformer oil temperature, and current and voltage values at measuring points.

Information System	Description
SAP	An integrated suite of SAP modules proving management of finance, sales and distribution, and materials management (inventory and purchasing). SAP masters the location of network assets prior to installation and utilisation.
Gentrack	Gentrack is Centralines' customer relationship management (CRM) information system. It provides a platform for consumption and ICP-based network billing. Gentrack also masters the new connections and decommissioning process, network tariffs and registry updates.
Sparx Enterprise Architect (EA)	EA is a business modelling tool that allows Centralines to create and maintain the metadata for asset information. The tool uses diagrams to create linkages between business objects and data attributes.

Table 2-16: Further Detail on Asset Management Information Systems

The integration of Centralines' information systems described above is shown in Figure 2-13. Arrows represent the flow of data and information from one system to another.

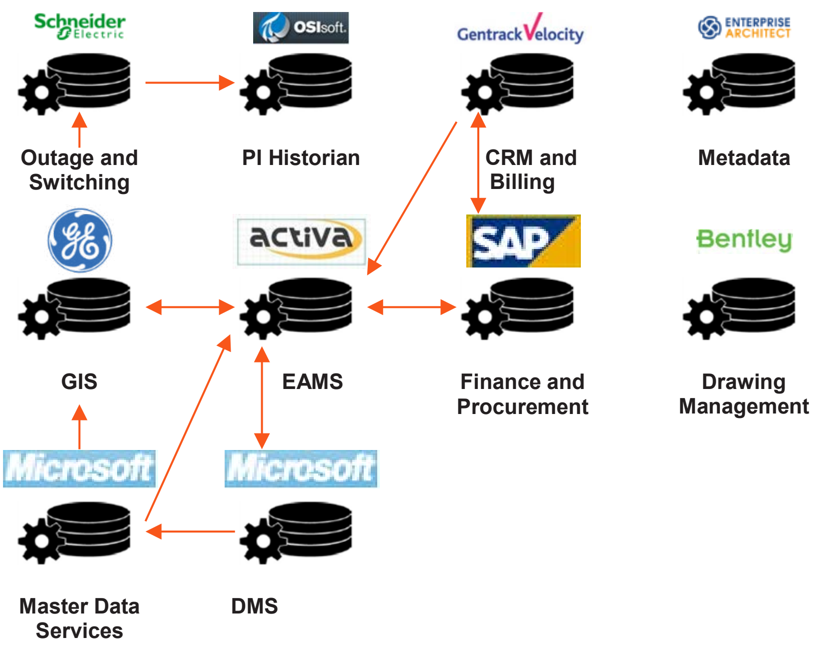


Figure 2-13: Integration of Information Systems

2.10.3 Asset Management Data Limitations

Availability of fit-for-purpose asset management data and information is essential to Centralines' asset management strategy and capability development. Business process improvement and data assurance and correction are substantive activities that are occurring as part of Centralines' asset management journey.

People involved in the asset management organisation were surveyed in 2014 in relation to key limitations in asset management data. Responses were consolidated and the most commonly mentioned shortcomings were prioritised according to frequency of use and potential impact upon decision-making. The top ranked limitations and improvement initiatives are itemised in Table 2-17.

Data Limitation	Improvement Initiative
Situations where pole condition data has not been cleared from the asset location when a new pole has been installed.	Identify situations. Clear out old condition data recorded that should have been removed when new poles where installed. Address business process. Complete by March 2016.
Missing date commissioned and date manufactured on some poles within ACTIVA.	Enter missing dates where data can reliably be drawn from other sources. Complete by March 2017.
Incomplete phasing data for single phase transformers, main lines and spur lines.	Field checks being undertaken to identify correct phasing. Records updated in ACTIVA and GIS. Complete by June 2016.
Asset data to undergo assurance and profiling to enable implementation of ADMS.	Assurance and correction. Complete by June 2016.
Lines and cables are not represented as individual assets in ACTIVA so work history is not captured against specific assets.	Lines and cables are to be recorded in Activa as individual assets to record asset characteristics, asset related documents and photos, work history, costs and defects. Complete by March 2017.
Accuracy of HV conductor types.	Improve accuracy of HV conductor types. Complete by March 2017.

Table 2-17: Data Limitations and Initiatives

As discussed in section 2.10.1.2 new requirements and applications for data and information are powerful means of identifying systemic issues with data quality and then motivating improvement. It is expected that as Centralines implements asset management strategies that depend on data and information, further limitations will be identified. These limitations will then be addressed as required by developing the capability of Centralines' employees, improving business processes, and where necessary, conducting data profiling and correction.

2.11 Key Asset Management Business Processes

In the following subparts a description of key asset management business processes is provided.

2.11.1 Processes for Routine Asset Inspection and Maintenance

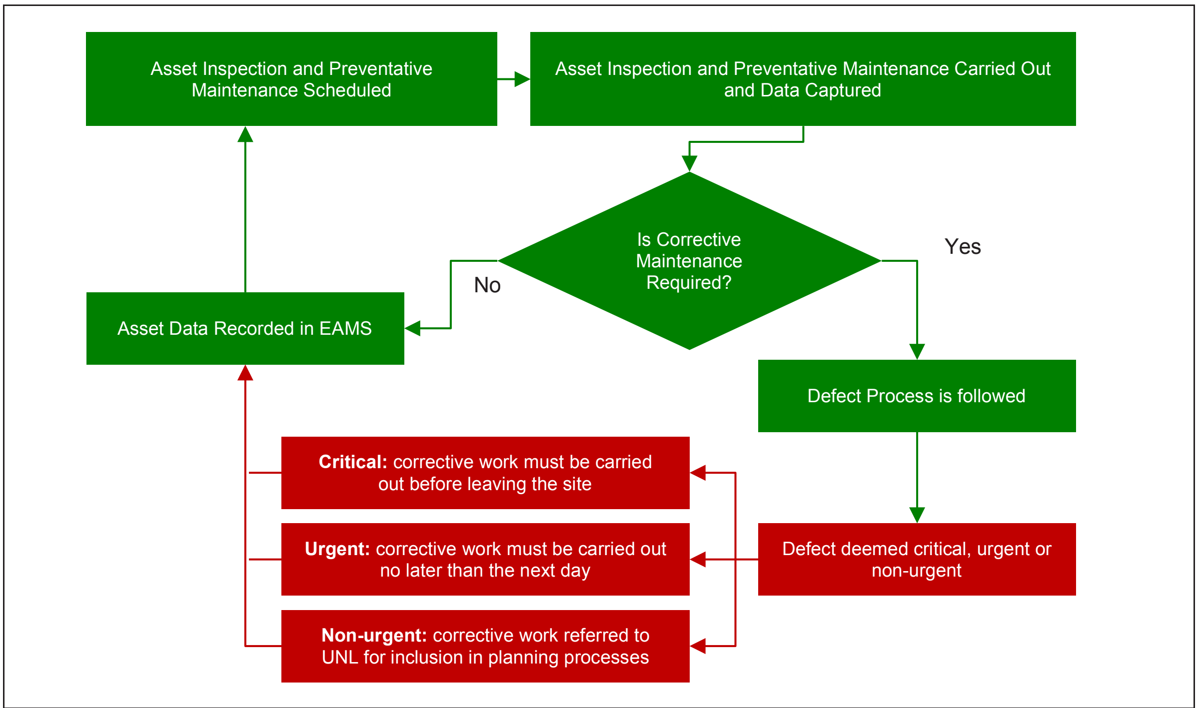


Figure 2-14: Asset Maintenance and Inspection Process Overview

Step	Description
Asset inspections and preventative maintenance (PM) scheduled	Inspections and planned maintenance tasks are scheduled by the Asset Specialist responsible for the relevant asset class. These schedules are predominantly time-based or based upon count of operations.
Asset inspection and PM carried out and data captured	This step covers the physical inspection or PM of the asset and capture of required measurement points by field personnel.
Corrective maintenance required	This decision point is raised when a measurement point is outside the acceptable thresholds, or if during the course of a maintenance task, a divergence from acceptable condition is identified.
Asset data captured in EAMS	Any measurements taken or task performed is recorded against that asset in the EAMS to inform future management of the asset.
Defect process followed	If corrective maintenance is identified as being required once on-site inspection or maintenance is being undertaken, the nature of that work follows the Network Defect Reporting Standard (OS1015).

Table 2-18: Asset Maintenance and Inspection Process Steps

2.11.2 Processes for Planning and Implementing Network Development Projects

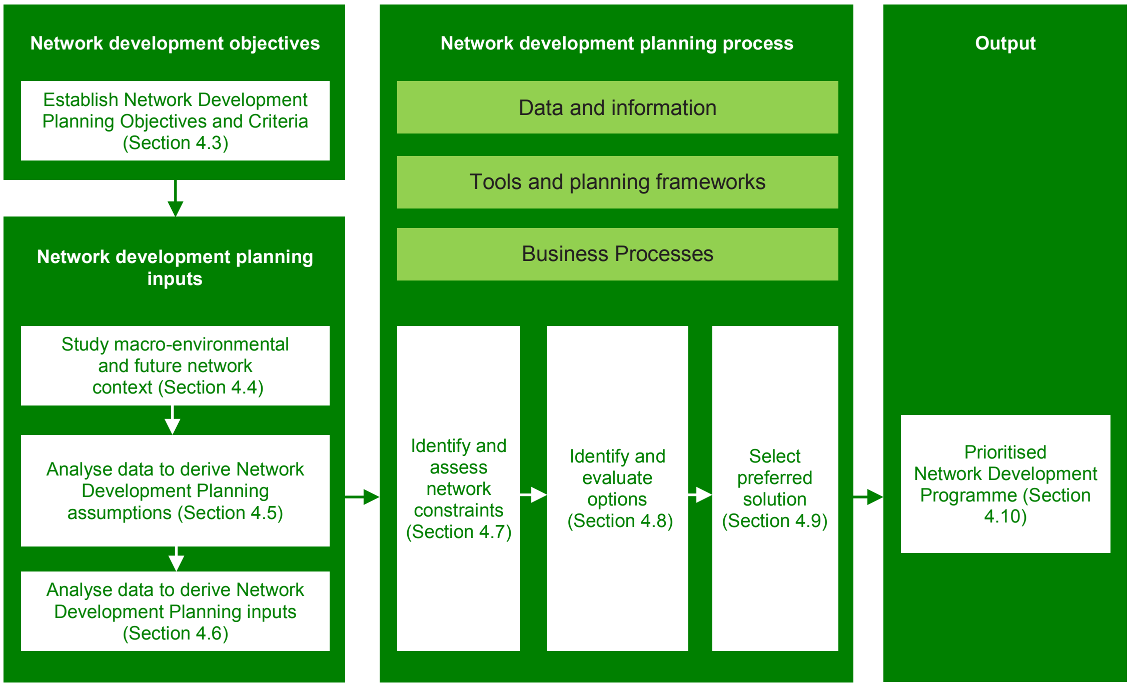


Figure 2-15: Process for Planning and Implementing Network Development Projects

Process Stage	Overview
Objectives	Network development planning objectives and criteria are derived from Centralines' asset management objectives. These objectives set the scene for the network development planning process.
Input	The inputs define and set the external landscape, fundamental thresholds and boundaries, and network demand. Three key inputs for the network development planning process are, • Study macro-environmental and future network context; • Analyse data to derive network development planning assumptions; and • Analyse data to derive network development planning inputs.
Planning process	The network development planning process identifies the need, evaluate options, and select the most cost effective solution. Three key stages of the planning process are, • Identify and assess network constraints; • Identify and evaluate options; and • Select preferred solution.
Output	Output of the planning process is the network development programme formalising a prioritised project list. This is essential to ensure overall financial sustainability in any given year for asset management and network development investments.

Table 2-19: Process for Planning and Implementing Network Development Projects

2.11.3 Processes for Measuring Network Performance

Currently the process for measuring network performance is the RealFlex SCADA process. Centralines' Management Services Provider's Advanced Distribution Management System (ADMS) is planned to go live on the Centralines' network in March 2016. The two processes are set out in Figure 2-16 and Figure 2-17.

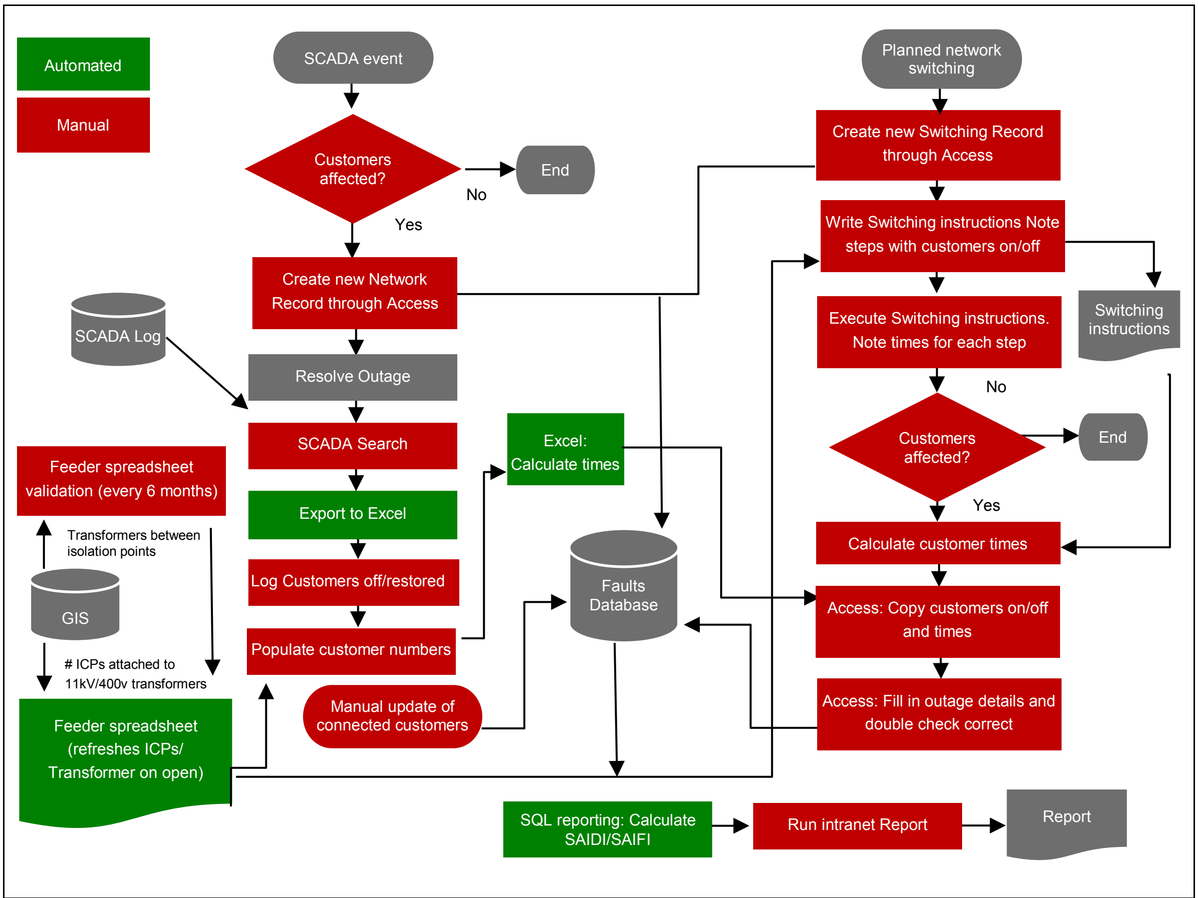


Figure 2-16: RealFlex SCADA Process (legacy)

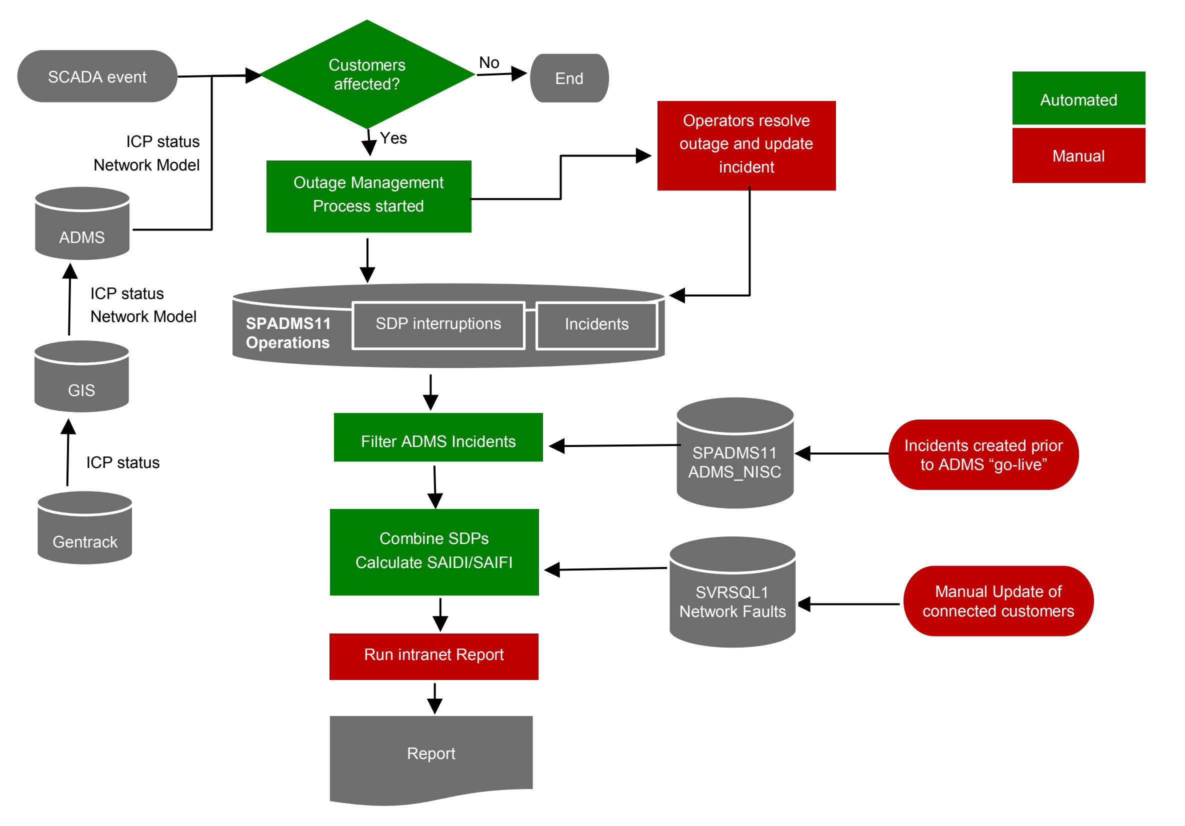


Figure 2-17: Schneider ADMS Process (new and future)

2.12 Asset Management Documentation Controls and Review

In this Part an overview of Centralines' asset management documentation and the controls and review processes are described. Although documentation of elements of the AMS continues to improve, control and review are areas that have been identified by Centralines' Management Services Provider as requiring centralised management to improve assurance. Improvement in this area is within the intended scope of the development of a Strategic Asset Management Plan in 2016/17.

2.12.1 Asset Management Documentation

The key documents that underpin the AMS, their links with each other and the controls and review procedures in respect of these documents are set out in Table 2-20.

Document	Linkages	Controls and Review
Asset Management Policy	• Aligned to Vision and Values. • Asset Management Strategy and Objectives tested for consistency with the principles within the Policy.	• The Asset Management Policy is a controlled document (ref NK0008) and therefore managed within Centralines' Management Services Provider's controlled document framework. • Reviewed annually.
Business Plan – contains Asset Management Objectives	• Business Plan is part of the Organisational Strategic Plan. It is however currently where Asset Management Objectives are recorded. • The Business Plan aggregates key company strategic initiatives, subsets of which are Asset Management Strategies.	• The Business Plan is developed annually by Management, and presented to the Board of Directors for approval. • Centralines will develop a Strategic Asset Management Plan (SAMP) during 2016 that will become the point of reference for Asset Management Objectives.
Asset Management Strategies	• Asset Management Strategies are developed as approaches to support achievement of Asset Management Objectives. • Asset Management Strategies are, in part, implemented in Internal Asset Management Plans.	• Each Asset Management Strategy is currently recorded in a separate document. There are no consistent controls or review procedures in respect of these documents. • As above, development of a SAMP has been motivated to address this shortcoming.
Asset Management Plan (this document)	• The AMP aggregates information from all other documents that are part of the AMS.	• Centralines discloses an AMP and AMP Updates as required by the Electricity Distribution Information Disclosure Determination 2012. • The AMP is reviewed by Management and approved by the Board of Directors.
Fleet Plans	• Fleet Plans are linked to Asset Management Strategies. • Fleet Plans are linked to Network CAPEX and Maintenance Plans. • Fleet Plans provide linkages to relevant standards.	• Fleet Plans are controlled documents and therefore managed within Centralines' Management Services Provider's controlled document framework. • Reviewed annually.

Document	Linkages	Controls and Review
Network CAPEX Plan	• The Network CAPEX Plan is linked to Asset Management Strategies. • The Network CAPEX Plan is included in the Business Plan in an aggregated form.	• The Network CAPEX Plan is updated annually. • It is approved by Management and the Board of Directors.
Network Maintenance Plan	• The Network Maintenance Plan is linked to Asset Management Strategies. • The Network Maintenance Plan is included in the Business Plan in an aggregated form.	• The Network Maintenance Plan is updated annually. • It is approved by Management and the Board of Directors.
Standards (including design, construction and maintenance, and standard operating procedures)	• The Network CAPEX and Network Maintenance Plans are specified in terms of Centralines' standards.	• Standards are controlled documents and therefore managed within Centralines' Management Services Provider's controlled document framework. • Review frequency varies depending on subject matter.

Table 2-20: Asset Management Documentation, Controls and Review

2.12.2 Outsourced Components of the Asset Management System

The majority of the practices and processes within Centralines' AMS are developed and outsourced to Centralines' Management Services Provider. Sometimes Centralines' Management Services Provider obtains external input and expert advice, however these activities generally remain owned and controlled by Centralines' Management Services Provider.

Centralines in-sources the majority of lifecycle delivery activities to its own field staff. Activities including design, project management, construction, vegetation management, civil works, and maintenance services may be outsourced for example to Scanpower Contracting Limited and Unison Contracting Services Limited.

Centralines is committed to continuous improvement of its AMS. External audit and review provides useful feedback on asset management maturity, as well as the efficacy of improvement initiatives. External reviews were undertaken of Centralines' Management Services Provider in 2012 and in 2015 by Covaris Pty Ltd. The 2015 review was then customised by Centralines' Management Services Provider to inform Centralines' asset maturity assessment for the AMP (AMMAT).

The internal and outsourced elements of the AMS are shown in Figure 2-18.

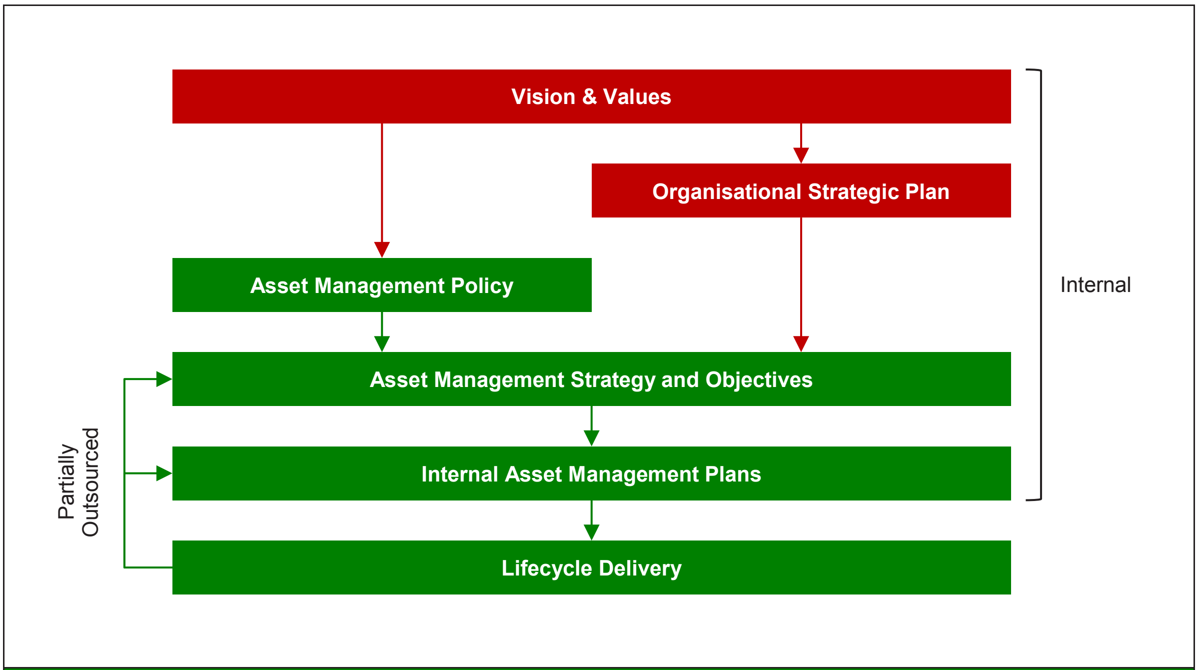


Figure 2-18: Outsourced Components of the Asset Management System

2.13 Overview of Communication and Participation Processes

Communication and participation is an important means of creating awareness of asset management and sets the scene for continual improvement. The following subparts describe the formal and structured communication and participation processes currently in place at Centralines.

2.13.1 Review and Communication of Asset Management Policy

The original development and subsequent reviews of the Asset Management Policy were undertaken as collaborative, cross-functional exercises sponsored by Centralines' Management Services Provider and involving senior management from both Centralines and Centralines' Management Services Provider. Practically this has involved structured workshops where participants have been invited to give their opinion and insights into the practice of asset management at Centralines. This information is then used to inform senior management's task of reviewing the Policy.

The Asset Management Policy is part of Centralines' Management Services Provider's controlled document framework and therefore is available on the corporate intranet. Any updates to the Policy are communicated to the business and contractors by email.

2.13.2 Communication of Asset Management Strategy and Objectives

Asset Management Strategy and Objectives are formally consolidated in the Business Plan. This document is proposed to the Board of Directors for approval annually and made available to the organisation at large.

The Business Plan is communicated throughout the business by Management through an annual presentation.

The goals, objectives and initiatives outlined in the business plan are cascaded to people throughout the organisation as relevant, and these are included within individuals' performance frameworks.

These performance frameworks represent a key element of functional team meetings, project meetings, and one-on-one discussions between managers and their team members.

2.13.3 Development and Implementation of Internal Asset Management Plans

The development and implementation of Centralines' Internal Asset Management Plans is a collaborative process requiring constant communication. The process that is followed to develop the CAPEX portion of the internal AMP follows.

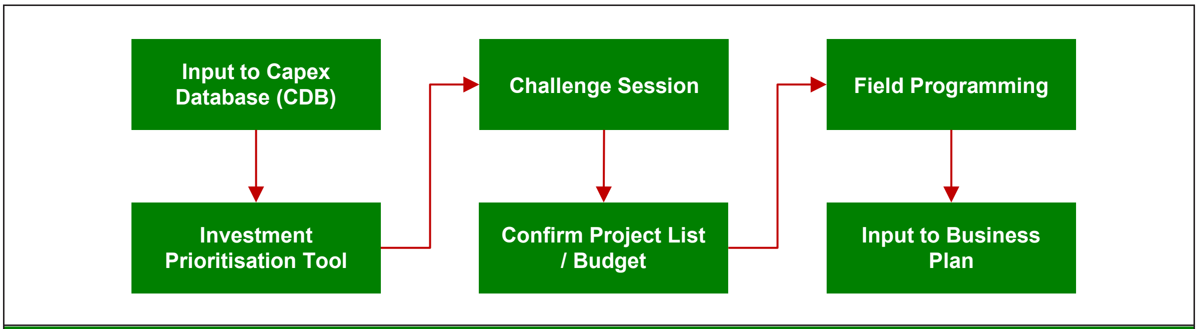


Figure 2-19: Communication Process for CAPEX

At each stage of the process cross-functional communication is required:

Step	Communication
Input to CDB	Internal discussions between Centralines' Management Services Provider's asset management and network development teams to consider potential synergies with renewal and network driven projects.
Run Investment Prioritisation Tool (IPT)	Discussions within teams to assess the scoring of weighted drivers for each project to ensure consistency. Ranked projects are provided to all stakeholders for consideration prior to the challenge session. An indication of total capital budget is provided along with projects that are included within this figure.

Step	Communication
Challenge Session	Formal workshop between all stakeholders (Asset Specialists, Network Development, Operations, Centralines' Field staff) to discuss each project individually. Project synergies, network constraints, resourcing and timing are key considerations.
Confirm Network Capex Plan	CAPEX plan presented to the Centralines' Management Services Provider's General Manager Networks & Operations for approval before being issued to all stakeholders.
Field Programming	The Operations Manager leads the annual programming of the AMP with input from each project initiator and operations.
Input to Business Plan	Annual programme of work (CAPEX and OPEX) presented to Management prior to being included in the Business Plan for Board approval.

Table 2-21: Communication Process for CAPEX

The process and associated communication for development of the maintenance component of the AMP follows:

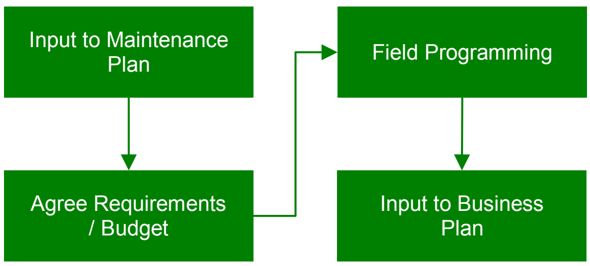


Figure 2-20: Communication of Maintenance Plans

Step	Communication
Input to Maintenance Plan	Centralines' Management Services Provider's Asset Specialists and Investment Specialists and Centralines' Field staff conduct workshops to outline the maintenance tasks that are required for the upcoming year.
Agree Requirements / Budget	Once maintenance tasks and budgets are collated this is presented to Centralines' Management Services Provider's General Manager Networks & Operations for approval.
Field Programming	The Operations Manager leads the annual programming of the AMP with input from each project initiator and operations.
Input to Business Plan	Annual programme of work (CAPEX and OPEX) is presented to Management prior to being included in the Business Plan for Board approval.

Table 2-22: Communication of Maintenance Plans

2.13.4 Development and Implementation of Network Standards

Centralines' Management Services Provider uses a suite of published controlled documents, commonly referred to as 'Network Standards', to ensure the network is designed, built, maintained and operated in accordance with the expectations.

The suite of Network Standards comprise of:

Type	Description
Procedures	Procedures contain a series of specified actions required to: Accomplish a particular goal (or adhere to policy), or complete a course of action.
Standards	Standards provide a set of rules, requirements or conditions relating to performance, design, operation, or measurement of quality, which must be adhered to when completing a specific task.
Service Codes	Service Codes are attached to Standards and are a set of instructions detailing tasks to be carried out on a specific type of asset at regular intervals.

Table 2-23: Types of Network Standard

Network Standards are created at the request of Centralines' Management Services Provider's Asset Specialists or Engineers. They are developed collaboratively by Centralines' Management Services Provider's appointed Network Standards Engineer and the user community. All Network Standards are part of a formal controlled document system with rigorous controls for change management.

Network Standards are implemented through a process of review, communication and publication with high levels of stakeholder/user involvement. This process is shown below.

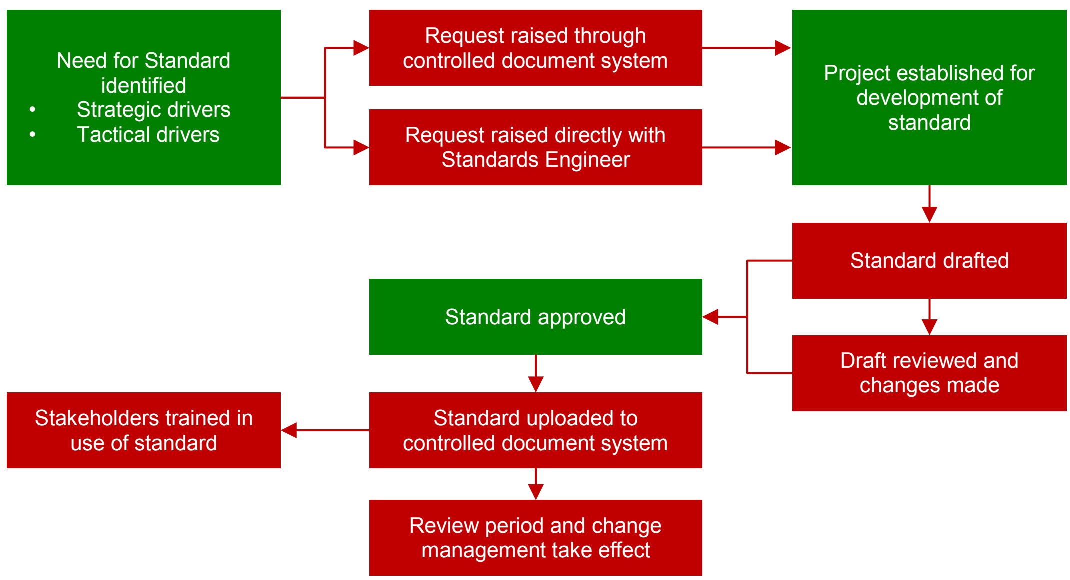


Figure 2-21: Standards Development and Communication

2.13.5 Communication of Asset Management Outcomes

Asset management outcomes are communicated formally through the following mechanisms:

- The Business Plan is made available to all employees. This document contains a comprehensive review of asset management outcomes for the previous financial year.
- On a quarterly basis a business-wide performance brief is delivered by Management.
- The Operations Manager holds a Monthly Team Brief where topical asset management outcomes are presented and discussed.
- Automated network performance and reliability reports are sent to key employees on a daily basis detailing year-end targets, current performance, and forecasts for SAIDI and SAIFI, as well as recent outages.
- Incidents and urgent changes to standard operating procedures are drawn to the attention of all employees through Safety Alert bulletins. These are sent to all employees by email, pinned up in visible locations around the office and managers are required to communicate details to employees.
- Relevant asset management outcomes are included within employee performance frameworks which are reviewed and discussed six-monthly with their manager.
- Favourable and important asset management outcomes are celebrated within the organisation.

2.14 Determination Reference Mapping Table

Section 2 Reference	Determination Reference
2 Background and objectives 2.1 Introduction to this Section 2.2 Purpose of Asset Management Planning	3.2
2.3 Purpose of the Asset Management Plan	3.3 including 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5
2.4 Planning Period of the Asset Management Plan	3.4
2.5 Date of Director Approval	3.5
2.6 Centralines' Stakeholders	3.6 including 3.6.1, 3.6.2, 3.6.3, 3.6.4
2.7 Accountabilities and Responsibilities for Asset Management	3.7 including 3.7.1, 3.7.2, 3.7.3
2.8 Significant Assumptions made in the Asset Management Plan	3.8 including 3.8.1, 3.8.2, 3.8.3, 3.8.4, 3.8.5, 3.9
2.9 Overview of Asset Management Strategy and Delivery	3.10
2.10 Overview of Systems and Information Management Data	3.11 3.12
2.11 Key Asset Management Business Processes	3.13 including 3.13.1, 3.13.2, 3.13.3
2.12 Asset Management Documentation Controls and Review	3.14, (i), (ii), (iii), (iv), (v)
2.13 Overview of Communication and Participation Processes	3.15, (i), (ii)

Table 2-24: Determination Reference Mapping Table

SECTION 3 **SERVICE LEVELS**

CENTRALINES
LIMITED

CONTENTS

3. SERVICE LEVELS

3.1 Introduction to this Section

Section 3: Service Levels sets out, justifies and contextualises Centralines' asset management service levels and targets, to enable the reader to better understand how Centralines monitors and assesses its performance as an asset management organisation.

3.2 Service Levels Overview

Service levels are objective indicators of performance that allow Centralines' stakeholders to understand how well Centralines is conducting asset management, and provide a framework to guide internal continuous improvement initiatives. They form part of the Asset Management Strategy and Objectives element of the Asset Management System, as shown in Figure 3-1.

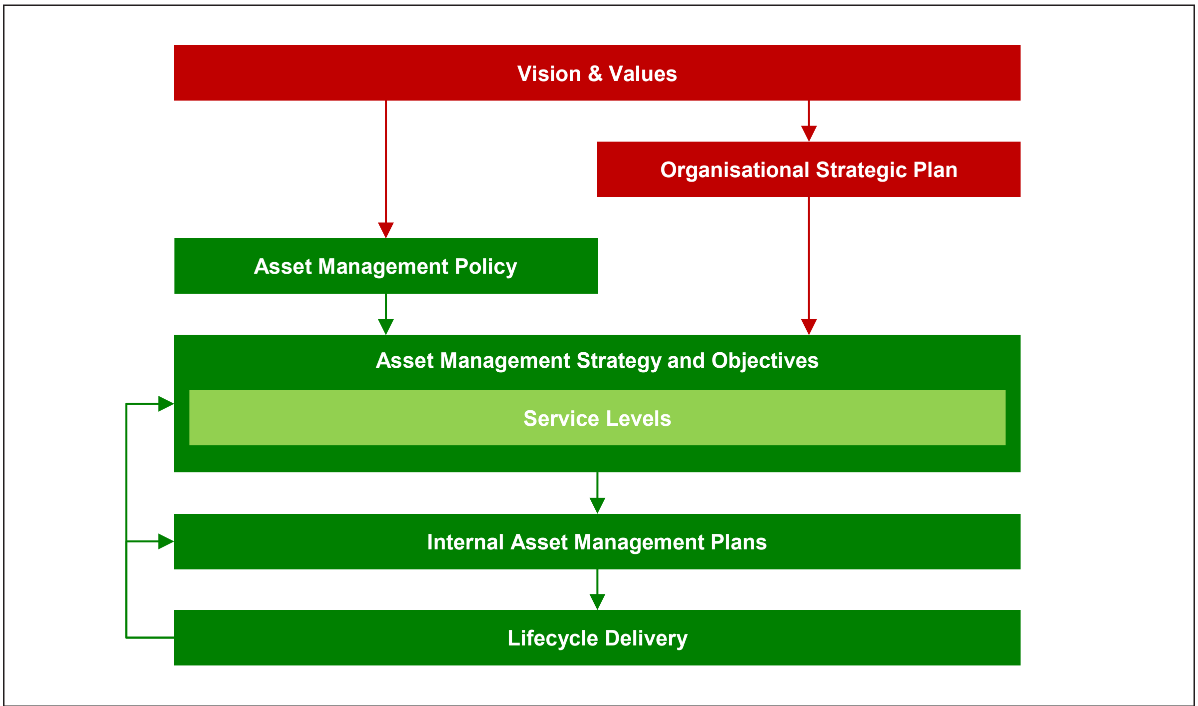


Figure 3-1: Service Levels in the Asset Management System

Centralines' service level framework has been developed with reference to a set of guiding criteria. Service levels should be:

- Objectively measurable with meaningful targets;
- Consistently applied with clear business rules for measurement;
- Possible to monitor efficiently over a period of time;
- Aligned to the Asset Management Strategy and Objectives;
- Possible to explain simply to stakeholders;
- Set in such a way that avoids creating unintended consequences;
- Where possible, comparable with the service levels of other electricity distribution businesses (EDBs) in New Zealand and abroad; and

- Compliant with the requirements of the Electricity Distribution Information Disclosure Determination 2012.

3.3 Service Level Planning and Development

The cycle depicted in Figure 3-2 below shows how stakeholder interests give rise to service levels that are aligned with Asset Management Objectives and how service levels are used to drive continuous improvement in asset management. Section references for this document are provided for each element in the cycle.

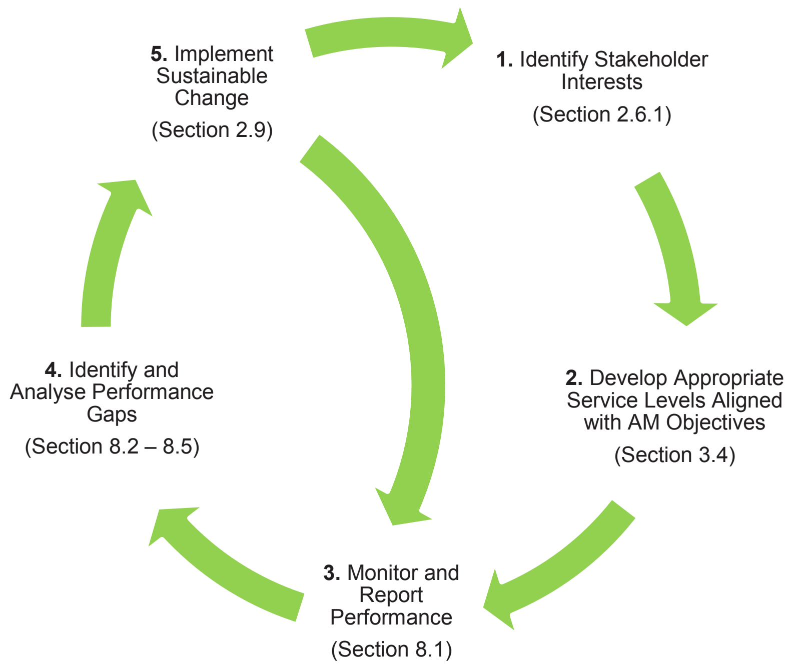


Figure 3-2: Service Level Planning and Development

3.4 Service Level Framework

The Asset Management Service Level framework currently in place at Centralines is provided in Table 3-1. In Section 3.5, further detail is provided on each service level.

Asset Management Objective	Service Level	Unit/Type	Service Level Targets				
			2015/16	2016/17	2017/18	2018/19-19/20	2020/21-25/26
Health and Safety Performance	Accidents causing harm to a member of the public	Number of Accidents	0	0	0	0	0
	Serious harm or lost-time injury to employees or contractors	Number of Injuries	0	0	0	0	0
	Injuries to employees or contractors requiring medical treatment	Number of Injuries	< 2	< 2	< 2	< 2	< 2
Customer Service Performance	Surveyed Customer Satisfaction	Percentage of Satisfied Customers	> 95%	> 95%	> 95%	> 95%	> 95%
	SAIDI	Minutes	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07
	SAIFI	Interruptions	2.84 – 3.52	2.84 – 3.52	2.84 – 3.52	2.84 – 3.52	2.84 – 3.52
	Revenue per ICP	$ (nominal)	$1,588	$1,690	$1,792	$1,900-$2,010	$2,030-$2,135
	Restoration of Supply for unplanned interruptions	Urban	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours	≤ 20 events ≥ 3 hours
		Rural	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours	≤ 10 events ≥ 6 hours
		Remote Rural	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours	≤ 5 events ≥ 12 hours
Cost and Efficiency Performance	Forward work planning horizon	Years	≥ 1	≥ 2 rolling	≥ 3 rolling	≥ 3 rolling	≥ 3 rolling
	Operating expenditure per ICP	$ (nominal)	$444	$447	$461	$478	$521
	Faults per 100km of network	Total	6.2	6.2	6.2	6.2	6.2
		Overhead	7.6	7.6	7.6	7.6	7.6
		Underground	7.4	7.4	7.4	7.4	7.4

Table 3-1: Service Level Framework

3.5 Further Detail on Service Levels

In the following subsections, further detail is provided on each of the service levels in Table 3-1, as well as a justification for the targets assigned. Also each service level target is contextualised against Centralines' historical performance.

As shown in Table 3-1, the service levels can be readily mapped to Centralines' Asset Management Objectives. Because the objectives themselves overlap in places, in practice, some service levels measure performance for multiple aspects of the asset management organisation.

3.5.1 Accidents Causing Harm to a Member of the Public

<table>
<tr><th>Type of service level</th><th>Health and Safety</th></tr>
<tr><td>Description</td><td>Health and safety is Centralines' foremost consideration, and the business is constantly striving to improve its performance in this area through initiatives including the upgrading of its health and safety management systems, training of employees and contractors, and public awareness campaigns.

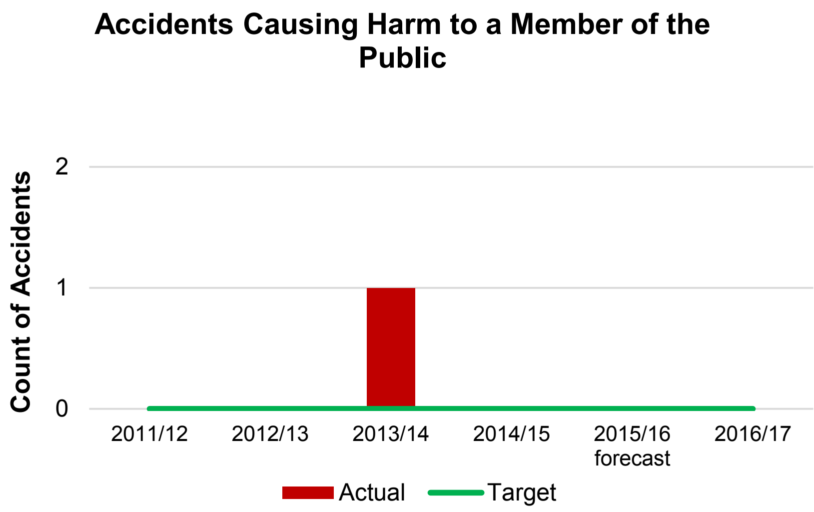
This service level has been implemented to measure the number of accidents per annum that have occurred that resulted in harm to a member of the public or damage to property.</td></tr>
<tr><td>Justification for targets</td><td>Causing harm to a member of the public or damaging their property is and will always be an unacceptable outcome, therefore the target for this service level will remain 0.</td></tr>
<tr><td>Historical context</td><td>

Figure 3-3: Historical Context for Accidents Causing Harm to Member of Public Service Level Target</td></tr>
</table>

Table 3-2: Accidents Causing Harm to a Member of the Public

3.5.2 Serious Harm or Lost-time Injury to Employees or Contractors

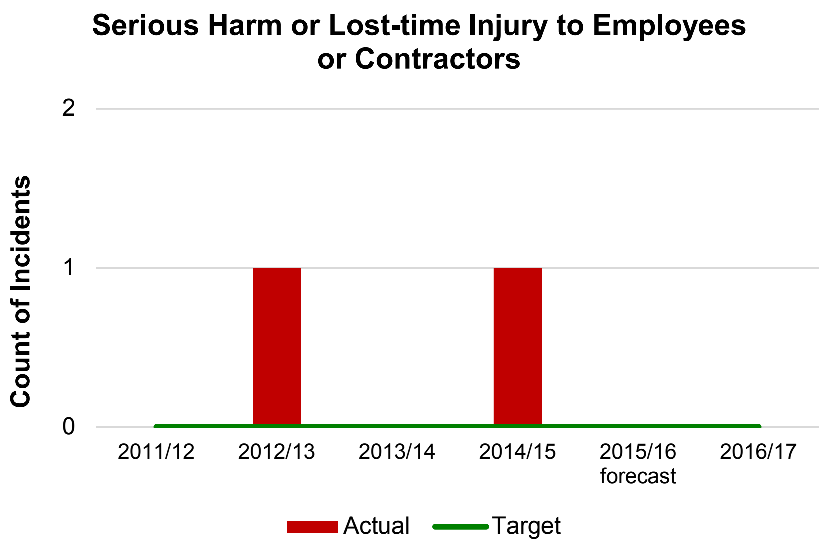
Type of service level	**Health and Safety**
Description	This service level has been implemented to measure the number of serious harm or lost-time injuries (LTIs) incurred by Centralines' employees or contractors.
Justification for targets	Centralines strives to provide a safe and healthy workplace for its employees, contractors and their families. Serious harm and lost-time injuries will always represent an unacceptable outcome, and therefore the target for this service level will remain 0.
Historical context	 ***Figure 3-4: Historical Context Serious Harm or Lost-time Injury to Employees/Contractors Service Level***

Table 3-3: Serious Harm or Lost-time Injury to Employees or Contractors

3.5.3 Injuries to Employees Requiring Medical Treatment

<table>
<tr><th>Type of service level</th><th>Health and Safety</th></tr>
<tr><td>Description</td><td>Where a work-related injury or illness requires ongoing treatment by a medical practitioner, then the injury will be recorded as a medical treatment injury (MTI). Ongoing treatment could be prescribed medication, returning visits to a medical practitioner or referral to another medical practitioner or specialist.

Examples of medical treatment injuries might include removal of embedded foreign material, multiple treatments for an infection, removal of foreign material embedded in eye or use of prescription medications (except a single dose administered on the first visit for minor injury or discomfort).

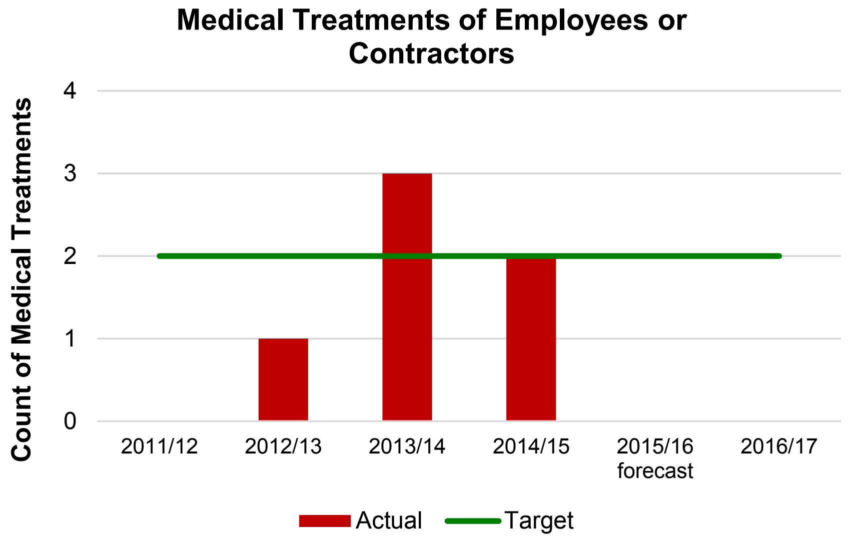
The definition of medical treatments in the Centralines' context is recorded in the controlled document HS5000 Incident Accident Management Procedure.</td></tr>
<tr><td>Justification for targets</td><td>The targets for this service level are based upon Centralines' corporate goal of zero LTIs and to follow Worksafe's national target of reducing work-related fatalities and serious injuries by 25% by 2020. Noting the definition of MTIs, statistically Centralines does not want to exceed two per financial year.</td></tr>
<tr><td>Historical context</td><td>

Figure 3-5: Historical Context for Medical Treatments of Employees or Contractors Service Level</td></tr>
</table>

3.5.4 Surveyed Customer Satisfaction

Type of service level	Consumer Oriented
Description	Following the completion of customer-requested capital works, or non-regulatory works, Centralines undertakes a sample-based approach to gaining an understanding of perceptions of our performance via a short customer survey, conducted over the phone. This is monitored by graphing the results and reviewing them monthly, enabling timely identification of any issues and opportunities for improvements.
Justification for targets	Customer satisfaction targets are set, based upon historical performance and have historically exceeded the targeted 95%.

Table 3-4: Surveyed Customer Satisfaction

3.5.5 SAIDI

Type of service level	Consumer Oriented and Asset Performance, Efficiency and Effectiveness
Description	System Average Interruption Duration Index or SAIDI is a measure of the total duration of interruptions experienced by the average consumer connected to Centralines' network each year. SAIDI is measured in minutes. A SAIDI value of 100 means that the average customer would experience 100 minutes of interruptions per annum. SAIDI is one of two metrics used by the Commerce Commission to regulate network performance. Centralines' regulatory limit for SAIDI is currently 119 minutes per annum.
Justification for targets	In 2015/16 Centralines moved from simply targeting performance below the Commission's regulatory limit, to targeting performance within a range. The top of the selected range is the regulatory target (no incentives or penalties), while the bottom of the range is the regulatory collar (the value at which further SAIDI reduction is not incentivised). Centralines justifies this approach on the basis that the incentives regime provides a degree of guidance on the trade-off between price and quality that the Commission is seeking to establish. SAIDI in excess of the limit means that customers are receiving poorer network performance than they require. On the other hand, SAIDI performance consistently below the collar might imply that the EDB is overinvesting to deliver performance in excess of what customers require. Targets for beyond the current regulatory period have been calculated on the assumption that the quality regime does not change, and that Centralines performs at the midpoint of its range.

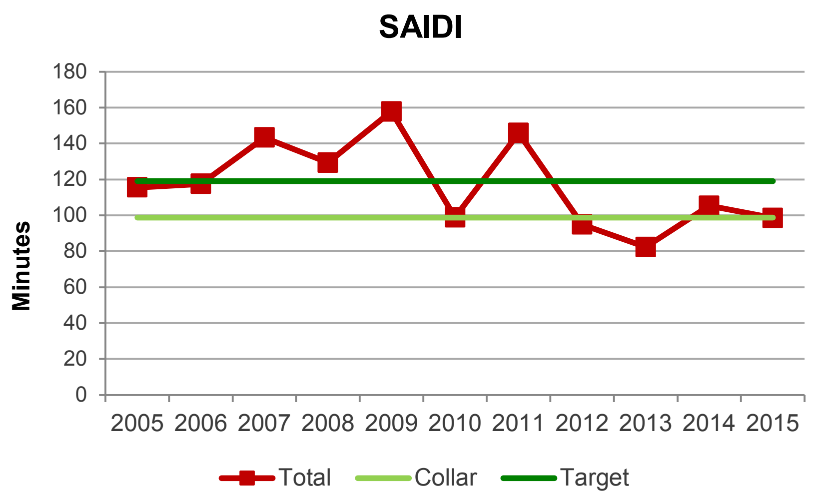
<table>
<tr><td>Historical context</td><td>The beginning of the new regulatory period in 2015/16 saw a number of changes to the DPP in relation to quality regulation. One of these changes was that the impact of planned outages is now de-weighted by 50% in relation to unplanned outages. Centralines' historical SAIFI performance has been recalculated on this basis and is presented alongside the service level targets in Figure 3-6.


Figure 3-6: Historical Context for SAIDI Service Level</td></tr>
</table>

Table 3-5: SAIDI

3.5.6 SAIFI

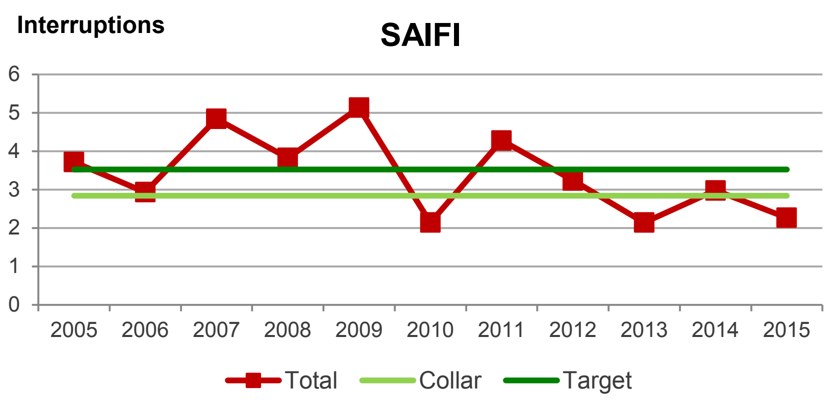
Type of service level	Consumer Oriented and Asset Performance, Efficiency and Effectiveness
Description	System Average Interruption Frequency Index or SAIFI is a measure of the number of interruptions experienced by the average consumer connected to Centralines' network each year. A SAIFI value of 2 would mean that the average consumer would experience two interruptions per annum. SAIFI is the second of the two metrics used by the Commerce Commission to regulate network performance. Centralines' regulatory limit for SAIFI is currently 3.5 interruptions per annum.
Justification for targets	In 2015/16 Centralines moved from simply targeting performance below the Commission's regulatory limit, to targeting performance within a range. The top of the selected range is the regulatory target (no incentives or penalties), while the bottom of the range is the regulatory collar (the value at which further SAIFI reduction is not incentivised). Centralines justifies this approach on the basis that the incentives regime provides a degree of guidance on the trade-off between price and quality that the Commission is seeking to establish. SAIFI in excess of the limit means that customers are receiving poorer network performance than required. On the other hand, SAIFI performance consistently below the collar might imply that the EDB is over-investing to deliver performance in excess of what customers require. Targets for beyond the current regulatory period have been calculated on the assumption that the quality regime does not change, and that Centralines performs at the midpoint of its range.
Historical context	The beginning of the new regulatory period in 2015/16 saw a number of changes to the DPP in relation to quality regulation. One of these changes was that the impact of planned outages is now de-weighted by 50% in relation to unplanned outages. Centralines' historical SAIFI performance has been recalculated on this basis and is presented alongside the service level targets in Figure 3-7.  ***Figure 3-7: Historical Context for SAIFI Service Level***

Table 3-6: SAIFI

3.5.7 Revenue per ICP

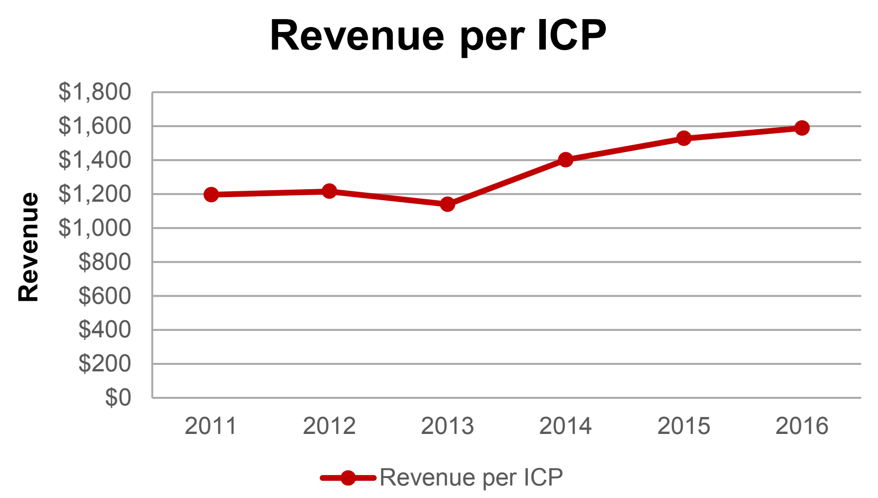
Type of service level	**Consumer Oriented and Asset Performance, Efficiency and Effectiveness**
Description	This service level provides an overall picture of the price that Centralines' customers are paying for electricity distribution services. The service level provides not only insights in terms of affordability, but also the cost-effectiveness of how assets are being managed. This measure can readily be compared across the industry making it valuable for benchmarking Centralines' performance.
Justification for targets	Centraline's long term objective is to provide lines services for an affordable price. Understanding what an affordable price is in the future will be achieved through comparison with industry peers (adjusted for variances in customer density and any pricing anomalies amongst distributors).
Historical context	Centralines' current Revenue per ICP is above the industry median unadjusted for density and any distributor pricing anomalies (noting some distributors aim not to achieve their WACC in setting prices).  *Figure 3-8: Historical Context for Revenue per ICP Service Level*

Table 3-7: Revenue per ICP

3.5.8 Restoration of Supply for Unplanned Interruptions

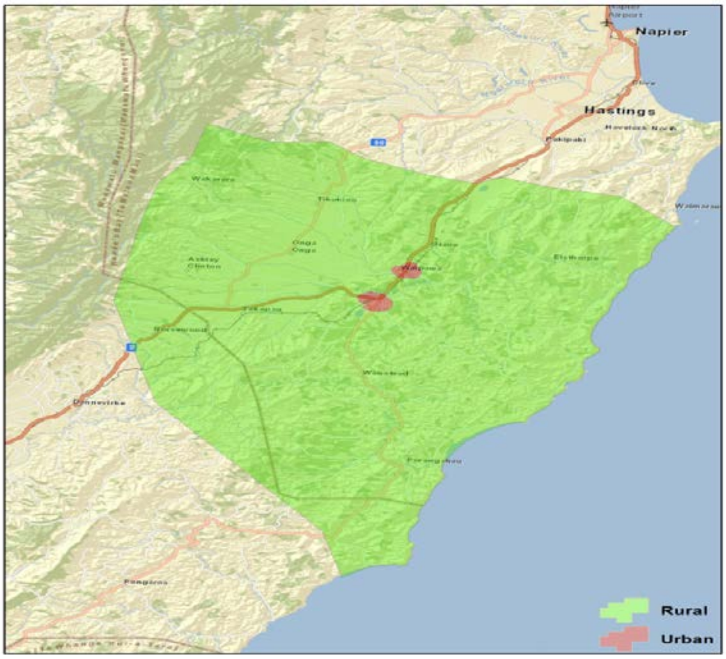
Type of service level	Consumer Oriented
Description	This service level is a measure of the speed of Centralines' response to unplanned interruptions that do occur. The service level considers the number of outages that exceed a certain duration threshold per annum. The targets for this service level distinguish between different groups of Centralines' customers based upon their proximity to urban areas. The zones are shown in Figure 3-9.  *Figure 3-9: Service Level Zones* This service level forms part of the KPI framework within Centralines' Use of System Agreements with electricity retailers.
Justification for targets	In general, Centralines expects that restoration of supply from interruptions originating within urban areas will occur more quickly than for interruptions originating in rural or remote rural areas. This is predominately due to the fact that in urban areas the network has greater interconnectivity, meaning that either remote control or manual switching can restore supply prior to repair. Other contributing factors include proximity to the Centralines' depot for attending fault personnel, and ease of fault location. Targeted values themselves were selected through a combination of negotiation with retailers, historical performance and understanding of the capability of the network, and views expressed by consumers of different types through Customer Satisfaction Surveys.

Table 3-8: Restoration of Supply for Unplanned Interruptions

3.6 Forward Work Planning Horizon

Type of service level	Asset Performance, Efficiency and Effectiveness
Description	A key means of driving performance in Centralines' contracting relationship is provision of a longer forward work planning horizon. This service level has been introduced to ensure that performance against this goal is measured and reported.
Justification for targets	The long-term target is for a three-year rolling forward work planning horizon to be provided to its contractors. This length strikes a balance that is currently believed by all parties to be optimal. This balance takes into account the efficiencies that can be gained through extending the period from the current one-year horizon, but enables Centralines to retain some flexibility to allow shorter-term innovation and as Centralines' asset information quality improves, to ensure that the best information is being used in asset management decision-making processes.
Historical context	Historically Centralines has provided its contractors with a committed forward work planning horizon for one year on an annual basis, with indicative forecasts for the remainder of the planning period.

Table 3-9: Forward Work Planning Horizon

3.6.1 Operating Expenditure per ICP

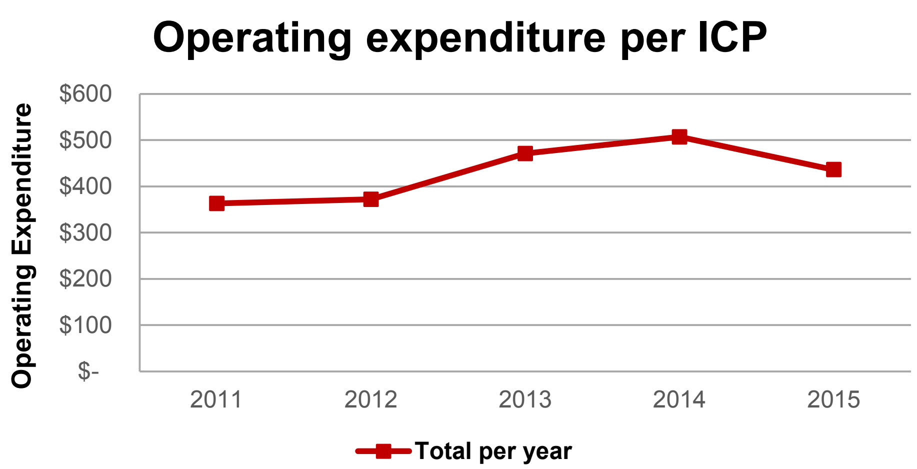
Type of Service Level	Asset Performance, Efficiency and Effectiveness
Description	In order to drive toward maximum efficiency, support fit-for-purpose asset management and to extract the best value from our data, Centralines' systems and processes have evolved as technology and changing business needs demand. Centralines' core processes continue to be tested to ensure waste is eliminated and to allow employees to perform effective value-added tasks. An indicator of financial efficiency is Cost per ICP. This indicator can be benchmarked to other NZ distributors and assessed against the industry median and average.
Justification for targets	Economic effectiveness reflects the level of operational efficiency to provide network services to customers and the overall costs (operating expenses, plus investment in network) associated with asset management. Centralines expects cost per ICP to be neutral over the short-term to allow sufficient lead-time to realise the benefits from recent investments. The medium to long term target is delivery of an improved industry position in cost efficiency. This is a reflection of Centralines' realising the investment benefits in terms of material values of avoided or deferred investment and reduced maintenance requirements.
Historical context	Over the last five years, Centralines has invested in additional activities that will produce longer-term cost efficiencies. For example the accelerated vegetation programme which should enable improved network performance. These additional activities have generated higher short-term costs reflected in Centralines'cost per ICP.  *Figure 3-10: Historical Context for Operating Expenditure per ICP Service Level*

Table 3-10: Operating Expenditure per ICP

3.6.2 Faults per 100km of Network

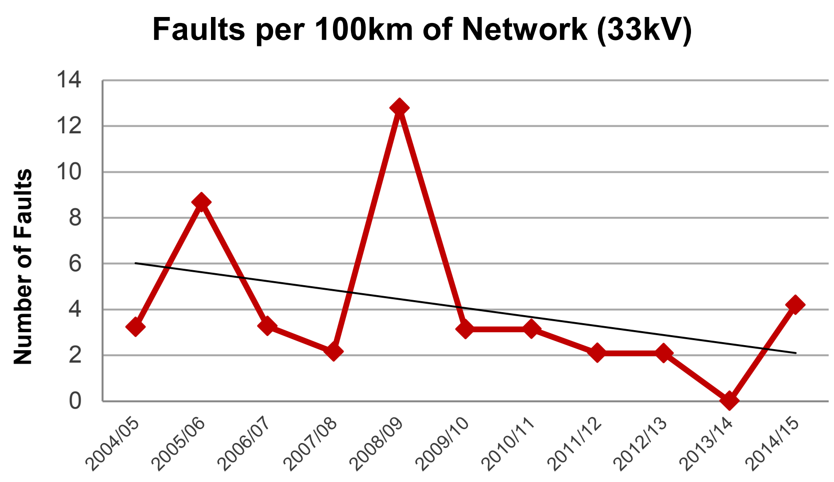
Type of service level	Asset Performance, Efficiency and Effectiveness
Description	Faults per 100km of network is a service level that provides a measure of the reliability of Centralines' networks, and therefore the quality of its asset management practices. Reducing the number of faults occurring directly improves customer experience, but also reduces wear and tear on assets and eliminates costs incurred for fault response and repair. Targets are provided for the 33kV overhead portion of the network.
Justification for targets	Faults per 100km of the 33kV network are set based upon historical performance and industry benchmarking.
Historical context	 *Figure 3-11: Historical Context for Faults per 100km of Network Service Level*

Table 3-11: Faults per 100km of Network

3.7 Determination Reference Mapping Table

Section 3 Reference	Determination Reference
3.1 Introduction to this Section 3.2 Overview of Service Levels 3.3 Service Level Planning and Development 3.4 Service Level Framework	5, 6, 7 including 7.1, 7.2
3.5 Further Detail on Service Levels	8, 9, 10

Table 3-12: Determination Reference Mapping Table

SECTION 4 **NETWORK DEVELOPMENT PLANS**

CENTRALINES
LIMITED

CONTENTS

4. NETWORK DEVELOPMENT PLANS

4.1 Introduction to this Section

Section 4: Network development plans provide an overview of how Centralines conducts network development planning and continually improves its network development programme. This section shows how the various elements of network development planning fit together to achieve Centralines' network development objectives, informed by the asset management objectives detailed in Section 2.

4.2 Overview of Network Development Planning

Network development planning is an important part of Centralines' asset management planning.

The purpose of network development planning at Centralines is to ensure ongoing network development objectives are achieved while continuing to provide efficient and reliable services to its customers. The central objective is to strike an optimal balance between risk, performance and value.

Network development planning is an important part of Centralines' asset management planning. This process is structured to ensure a set of robust network development planning outcomes is achieved. The network development planning process is repeated annually and incorporates improvement measures to ensure the best possible balance is achieved. The process is reviewed regularly, and possible improvements identified, scoped and developed. Figure 4-1 provides an outline of key elements of network development planning covered in this section. This section will be structured in line with this diagram. References to the sections for each process stage are included in the diagram. An overview of process stages are summarised in Table 4-1.

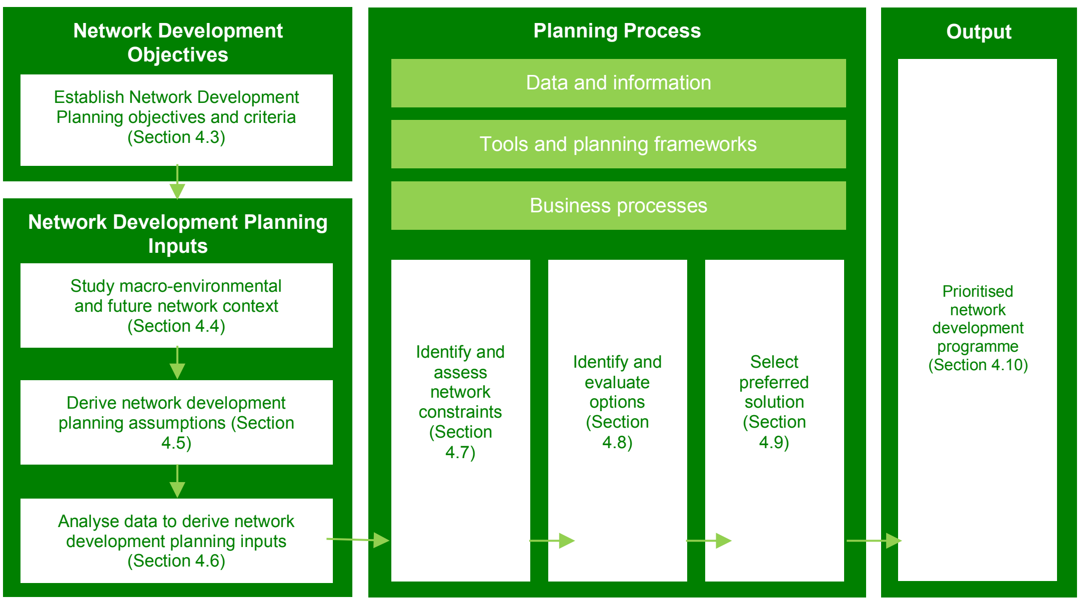


Figure 4-1: Network Development Planning Process

Process Stage	Overview
Objectives	Centralines' asset management objectives are informed directly by the organisational strategic plan and the asset management policy. These objectives are translated into the ***network development planning objectives and criteria*** to set the scene for the planning process.
Input	The three key network development planning inputs are, • ***Study macro-environmental and future network context*** – *conduct an* external landscape scan, identifying any potential impacts on network development in the future; • ***Derive network development planning assumptions*** - define the fundamental thresholds and boundaries for the future impact of uncertainties and growth, and identify the core elements of demand and capacity on the network; and • ***Analyse data to derive network development planning inputs*** - understand the network, including load demand and the capacity of the network to cater for that demand.
Planning process	Three key stages of the network development planning process are, • ***Identification, assessment and prioritisation of network constraints*** utilising decision support tools; • ***Identification and evaluation of options*** from the Solutions Toolbox to mitigate network constraints. Commonly considered solutions are traditional network options (such as pole and cable upgrades), non-network options (typically using new technology) and the option of 'doing nothing'; and • ***Selection of preferred solution*** by applying professional engineering judgement to determine the most cost-effective solution, striking an optimal balance between risk, performance and value. A combined view of the preferred solutions to address identified constraints is captured in a 'potential projects' list.
Output	Centralines sets a limit to the amount of capital available for asset management and network development investments to ensure overall financial sustainability in any given year. ***Prioritisation of projects*** from the network development planning process utilises the 'Investment Prioritisation Tool' to direct investment to optimise value. The overall project portfolio is formalised as the ***Network Development Programme***.

Table 4-1: Overview of Network Development Planning Process

4.3 Objectives - Establish Network Development Planning Objectives and Criteria

Centralines' network development objectives are informed and translated directly from the asset management objectives in Section 2. The network development objectives are to

- Meet customer driven needs;
- Maintain network security and service levels;
- Be within the band between the collar and the target of the network reliability targets;
- Meet power quality requirements; and
- Meet regulatory and legislative requirements.

These objectives are distilled into the following network development criteria:

- Network reliability;
- Power quality;
- Security of supply; and
- Network equipment ratings.

These criteria are discussed further below.

4.3.1 *Network Reliability*

Network reliability is an important indicator of the quality of the service being received by customers from their Electricity Distribution Businesses (EDBs). A large variety of indices have been developed to provide indications of network reliability, the most commonly applied of these are SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index).

For EDBs, the Commerce Commission has set regulatory limits for both SAIDI and SAIFI based on the network's performance during the last regulatory period. These limits are re-set every five years with the intent that EDBs maintain network reliability. The current limits are applicable for the 2015/2016 to 2019/2020 period.

Centralines' network is maintained within the regulatory limits by applying sound asset management practices and utilising new technologies.

4.3.2 *Power Quality*

Power quality is considered over both short and long-term planning horizons to ensure solutions to current power quality constraints are appropriate long-term solutions.

As quality of supply issues can result from both Centralines' network and customers' own installations or equipment designs, Centralines has published a Network Connection Standard on its website. This standard outlines the responsibilities of both Centralines and the customer, to ensure all connection parties receive electricity supply to appropriate quality and performance standards. The standard is also referenced in Centralines' Use of System Agreement with all retailers and in the Customer Connection Agreement with each customer.

Centralines' Quality of Supply Standard and asset design standards specify the limits of key power quality parameters on voltage regulation, voltage unbalance, harmonic distortion flicker, and voltage fluctuation. The specified limits are summarised in Table 4-2.

Power Quality	Specified Limits
Voltage regulation	230V +/- 6%
Voltage unbalance	Less than 2%
Total harmonic distortion voltage	Less than or equal to 5%
Flicker	Short term less than 1.0 Long term less than 0.8
Voltage fluctuation	Various limits specified in respective design standards

Table 4-2: Power Quality Parameters and Limits

Voltage Regulation

Centralines designs and operates the network to ensure supply voltage to customers in accordance with the regulatory limit of 230V +/-6%. Voltage regulation constraints are identified through network modelling, network monitoring using sensors, and through customer contact. When potential issues are identified, their investigation and any required resolution is treated as a matter of priority.

Voltage Unbalance

Centralines endeavours to keep voltage unbalance on all voltage levels of its network to 2%. Voltage unbalance occurs where the voltages of each phase in a system are not equal. Such issues are more commonly identified through customer contact, mainly due to unanticipated changes in customer load, installation/s and altered equipment design. When potential issues are identified, their investigation and any required resolution is treated as a matter of priority.

Harmonic Distortion

Centralines specifies 5% as the allowable level of harmonic distortion of voltages supplied to customers. Identifying and tracking the source or cause of harmonic distortion is generally very difficult and often involves investigation of one or more customers' installations, as well as network configuration. Centralines works with all affected parties, including external consultants, to identify the cause of harmonic distortion and determine the most cost-effective solution. As a last resort, if a particular customer installation is identified as the cause, Centralines reserves the right to disconnect that installation to protect other customers' installations from damage.

Flicker and Voltage Fluctuation

Occasionally, specific customer installations can cause interference due to the use of equipment such as large motors or power factor correction capacitors. This interference can arise in many forms such as flicker, voltage sags and surges, and absorption of Centralines' load control signals. To ensure this equipment does not cause problems, the Network Connection Standard provides guidelines for customers to notify Centralines before connecting this type of equipment. This allows Centralines to assist the customer by assessing whether a problem is likely to occur before significant investment decisions are made.

4.3.3 *Security of Supply*

To ensure the network meets its agreed performance targets and obligations, Centralines applies a set of security of supply criteria based on the established framework set out in Table 4-3 and Table 4-4. The framework defines the level of security for different customer load types and load sizes. The criteria are used to identify network security constraints when contingency events occur and to guide the selection of solutions to mitigate these constraints.

Centralines intends to review these criteria against the changes in its network restoration approach using smart network technologies, network demand profiles and customer expectations (as documented in customer surveys). This is to ensure these criteria remain appropriate and yet continue to meet regulatory network performance targets.

Security of Supply Restoration Times	
Class D – Single large customer	Agreed individually with customer
Class C- CBD	N-1 – 50% restored within 15 minute remainder within 45 mins N-2 – 50% restored within 60 mins remainder within 3 hours Bus fault - 50% restored within 60 mins remainder within 3 hours
Class B – Urban	N-1 – 50% restored within 45 minutes remainder within 2 hours N-2 – 50% restored within 3 hours
Class A2- Rural up to 1MVA	N-1 – 50% restored within 2 hours
Class A1 – Rural up to 500kVA	No targets

Table 4-3: Summary of Non -regulatory Planning Criteria and Standards

Substation	Target	Compliant	Comments
Waipukurau Urban	Class C	Yes	
Waipukurau Rural	Class B	Yes	Possible from back-feeding or transferring load
Waipawa Urban	Class C	Yes	
Waipawa Rural	Class B	Yes	Possible from back-feeding or transferring load
Takapau	Class A2	Yes	
Ongaonga 11kV	Class A2	Yes	Due to automation in the area
Wilder Road	Class A1	Yes	Due to automation in the area

Table 4-4: Security of Supply Classification and Compliance by Substation

4.3.4 *System Performance in Contingency Events*

Centralines accepts different levels of performance during contingency events in order to ensure that a balance is maintained between performance and cost. This is to ensure an optimal balance between customer expectation and performance targets without adverse effects on assets or the incurring of additional cost.

Criteria	Target
Voltage	Highest system voltage shall not be exceeded at any point on the network
	Zone substation 11kV bus voltages shall not be allowed to fall below 95% of rated voltage
Capacity	No individual element shall carry a sustained load beyond its design rating for the ambient conditions that apply
Reliability	Protection relays shall not be used to keep loads within operational limits
	Alternative feeds permit restoration of supply after switching has been undertaken
	Radial feeds envisage restoration time dependent on defect repair time
	Substation busbar fault is considered abnormal
Safety	All possible steps are taken to ensure the safety of people and to eliminate damage to the network equipment

Table 4-5: Summary of Contingency Event Performance Standards

4.3.5 *Network Equipment Ratings*

Centralines' network equipment is selected for its current interruption and current carrying ratings to ensure sufficient capacity exists for routine operations and under fault conditions. This is a critical requirement for the safe and efficient operation of the network. As part of the network development planning process, these ratings are regularly reviewed and assessed under normal network configuration and alternative supply arrangement. A full description of Centralines' approach to network equipment rating is detailed in Section 4.6.3.

4.4 Inputs - Study the Macro-environmental and Future Network Context

Today, Centralines provides and maintains the distribution network used to transport electricity from the national transmission grid to homes and business in the Central Hawke's Bay region. To effectively plan for the future, Centralines needs to understand the impact of changing demand and alternative supply solutions on the network. While it is impossible to predict the future, a high degree of awareness of key uncertainties is essential. Centralines' strategic scenario planning work has identified two key elements that pose the greatest uncertainty to the network – "technology advancement" and "customer savvy and engagement". The impact of these two key elements on planning the network for the future is illustrated in Figure 4-2.

Macro Environment

Improving economics of disruptive technologies, with lowering prices and increasing affordability, are enabling load reduction and customer defection.

Disruptive technologies will exponentially increase the complexity of distribution network management, from a traditional centrally-managed model, to passive operation with a high degree of distribution and complexity.

Availability of advanced technologies is enabling better utilisation of assets and the network.

Technology will enable far more interaction with, and by Centralines' customers and provide them with more choices.

Impact on Centralines

Analysis has shown that although disruptive technologies will have an impact on the amount of load carried by the distribution network, the distribution network will remain, and will play an important role in providing customers with a reliable energy source.

Improving affordability of disruptive technologies provides Centralines with an opportunity to provide Centralines' remote rural customers with more affordable supply alternatives.

Centralines needs to ensure electricity prices provide enough flexibility to avoid cross-subsidisation through an alternative pricing structure.

Centralines needs to deploy advanced technologies as alternatives to conventional solutions to achieve much greater efficiency of the network.

The network will need to be expanded where Centralines is more certain of future needs, to ensure the network remains resilient and robust in more dynamic future.

Advanced technologies will assist in integrating and managing the complexities of multi-directional flow of electricity, and likely power quality issues introduced by disruptive technologies.

Greater deployment of technologies across assets and the network will change the skills required for Centralines' workforce.

Centralines' customers will demand great service, and the availability of data and communication enhancement will assist Centralines to meet this expectation.

Figure 4-2: Macro-environmental and Future Network Impact for Centralines

4.4.1 *Electricity in Everyday Life*

In Centralines' network electricity peak demand and overall energy consumption have been stable for the last three years. Electrical goods and home appliances are more affordable and more energy-efficient. Electricity-based energy solutions are replacing some traditional fossil fuel-based solutions. This is primarily driven by local government policy and by-laws to reduce the impact on the environment[1]. Electricity usage for land-based production has intensified with changes in land use and processing strategies to produce higher value products.

Looking to the future, as technologies advance, the improving economics of disruptive technologies such as solar photovoltaic (PV) and batteries will result in load reduction and customer defection. Along with electric vehicles, these disruptive technologies will also change the network load profile. Disruptive technologies connecting to the distribution network will exponentially increase the complexity of network management, and necessitate the change from traditional centralised management to passive operation of a distributed and complex network. Technology advancement is also opening up new ways to better utilise Centralines' assets and network. Centralines' customers have more choices from a wider range of service offerings, and demand far more interaction through technology-enabled channels.

4.4.2 *Technology Innovation and Advancement*

Disruptive Technologies Network Impact and Opportunities

Solar PV is the most common choice of disruptive technology installed by Centralines' customers. The solar PV uptake on Centralines' network is less than 0.7% of its customer base. This is well within the "early adopter" stage of the innovative technology uptake scale.

In terms of distribution network impact, disruptive technologies will change the total energy use at individual installations. The aggregated impact will see flattening of the network load profile depending on the uptake rate and type of disruptive technologies. Although disruptive technologies will have an impact on the load profile, the distribution network will remain and will continue to play an important role in providing customers with reliable energy sources. Further analysis on different uptake scenarios confirmed the need for the distribution network, and also identified the increasing complexity from multi-directional electricity flow and power quality issues that disruptive technologies will introduce.

The improving economics of disruptive technologies may also provide more affordable alternatives to supply Centralines' remote rural customers. Installation of a solar PV, battery and generator modular system is a lower-cost alternative to the construction of a long feeder section over difficult terrain under the conventional approach.

Disruptive technology impacts and opportunities align with the customer service performance objective under Centralines' asset management strategies. Key aspects are covered under the

[1] For example Central Hawke's Bay District Council has mandated the removal of inefficient wood burning fire places on some properties. These are being replaced with heat pumps or more efficient wood burners.

disruptive technology and off-grid solution, and Expert Decision Support System (EDSS) initiatives outlined in Sections 4.7.2 and 4.8. Elements relating to network development planning are detailed in Section 4.6.2 load forecasting methodology and 4.8.4 solution toolbox enhancement initiatives.

Supporting Strategies and Initiatives

Advanced technology opportunities align with the cost, efficiency and asset management capability objectives under the Asset Management Strategies. Key aspects are covered under relevant initiatives outlined in Section 2.2. Elements relating to network development planning are detailed in Section 4.7.2.

4.4.3 *Customer Savvy and Engagement*

Historically, customers have enjoyed a reliable electricity supply at a given price based on their electricity consumption. This 'one size fits all' approach does not cater for *when* customers use electricity or *how much* capacity is provided. Technology innovation and advancement has transformed the way customers use electricity. Centralines' customers are becoming active participants demanding great service with an increasing range of choices and an increased level of interaction. Centralines will need to ensure the electricity pricing structure has enough flexibility to avoid cross-subsidisation. The data and communication platform will also be integral to meeting the expectations of Centralines' customers.

Supporting Strategies and Initiatives

Customer savvy and engagement align with the Customer Service Performance and Asset Management capability objectives under the Asset Management Strategies. Key aspects are covered under relevant initiatives outlined in Section 2. Elements relating to network development planning are detailed in in Section 4.8.4.

4.5 Inputs - Analyse Data to Derive Network Development Planning Assumptions

Centralines' network development planning assumptions are informed by the macro-environmental assumptions detailed in Section 4.4. Network planning assumptions are:

- Potential impact of uncertainties from distributed energy resources and technologies, and
- Expected level of customer load growth in the future.

4.5.1 *Potential Impact of Uncertainties*

Potential impacts of distributed generation resources and disruptive technologies are well recognised by EDBs in New Zealand and overseas. Distributed generation resources and technologies such as solar PV, energy storage, and electric vehicles could have a substantial impact on the network.

Centralines anticipates the material uptake within its network footprint will only occur beyond the planning period. As technologies advance, the improving economics of distributed generation resources and technologies will facilitate load reduction and customer defection, as well as changing the customer demand profile. Centralines is continuing to keep an active watch on the possible impacts of such developments by investigating the technicalities and likely impacts, and exploring opportunities from both the network and customer perspectives. Supporting policy for distributed generation and the initiative on disruptive technologies are discussed below.

4.5.2 *Distributed Generation Policy*

While the uptake of distributed generation (DG) resources is uncertain, the connection of currently available and viable technologies must be well-accommodated on the network. Centralines continues to support the objectives of customers wishing to utilise DG by ensuring any potential detrimental effects are prevented or mitigated. The regulations categorise DG into two categories - ‘10kW or less’ and ‘above 10kW’. There are different processes and requirements for each category. The Distributed Generation Policy, process information, and application form are available on Centralines’ website www.centralines.co.nz. The key principles of Centralines’ distributed generation policy are:

- DG can be connected to Centralines’ electricity distribution network on fair and equitable terms which do not discriminate between different DG schemes;
- Centralines will make the terms under which DG can be connected and operated within its electricity distribution network as clear and as straightforward as possible and will progress all applications to connect DG to its electricity distribution network as quickly as possible;
- Technical and safety standards for the DG connection and operation on Centralines’ electricity distribution network will be based on best practice and will aim to meet the needs and protect the interests of DG schemes, other customers and Centralines; and
- Centralines will comply with legislation and regulatory requirements regarding the DG connection and application on its electricity distribution network.

Centralines recognises the value of DG in a number of ways and encourages the development of DG where it will provide real benefits to both the generator and Centralines. However Centralines also recognises that DG can have undesirable effects on the network. Any new DG is modelled and analysed to ensure key policies in the connection documents are met.

4.5.3 *Disruptive Technology Initiative*

Centralines has recognised that a range of new and emerging technologies have the potential to impact how electricity is delivered to, and used by consumers. These technologies include distributed generation and solar PV in particular, energy storage, electric vehicles and ICT[2]-based home energy management. The uptake and integration of these technologies has implications for asset management planning, with the potential for enhancing efficiency and performance; however an unmanaged or unanticipated uptake could also result in inefficient investments by Centralines as well as consumers. Centralines, supported by its Management Services Provider, is building an understanding of this range of technologies by carrying out analysis, scenario development, and where opportunities are identified, targeted trials. These trials focus on the potential value for Centralines and its customers, that are available from deploying distributed generation and energy storage; firstly as an alternative solution for supplying customers on low density lines (so-called 'uneconomic' lines), and secondly as a tool to offset periodic peaks on rural feeders affected by variable irrigation loads, with the objective of maintaining voltage and deferring investment.

Centralines will deploy an off-grid solution at a remote customer site as a first evaluation of the potential for off-grid supply to be deployed as an alternative to network supply for low-density, high-cost-to-serve network areas. The system includes solar PV, lithium-ion battery storage, and diesel back-up generation. The system is specified and designed to provide a level of service as good as network supply and includes remote network monitoring and system management.

In 2016 Centralines will also deploy five residential DG and energy storage installations with a cluster of customers on a seasonally-loaded feeder (Argyll feeder). Customer voltage will be monitored to ascertain if this can be enhanced through local DG and energy storage which can be discharged during periods of heavy feeder loading and voltage sags. Although these installations are behind the meter, the battery storage can be monitored and controlled by the network through a network management system which operates using internet communications.

Centralines sees these two initiatives as important steps in developing a range of customer solutions that can support cost-effective supply to Central Hawke's Bay power consumers. By working with its Management Services Provider, Centralines is able to manage new technology projects as well as monitor emerging technologies, anticipate their impacts and incorporate this understanding into long term asset management planning.

4.5.4 *Expected Level of Customer Load Growth*

Centralines' Management Services Provider utilises its Load Forecast Tool (LFT) to forecast the expected customer load growth on the Centralines' network. This tool is described in detail in Section 4.6.2.

[2] ICT – Information and Communication Technology

4.6 Inputs - Analyse Data to Derive Network Development Planning Inputs

The three core elements of network planning inputs are:

- Network overview, topology and characteristics of the network;
- Demand (load forecasting), the collective electricity loads that customers place on the networks; and
- Capacity, the amount of load that the system is capable of delivering at all relevant points on the network.

4.6.1 *Network Overview*

Centralines owns and operates network assets across the Central Hawke's Bay region. These assets cover an area of 3,334sq km, aligning with the boundaries of the Central Hawke's Bay District Council, and serve approximately 8,475 customers. Supply is received via a single Transpower Grid Exit Point (GXP).

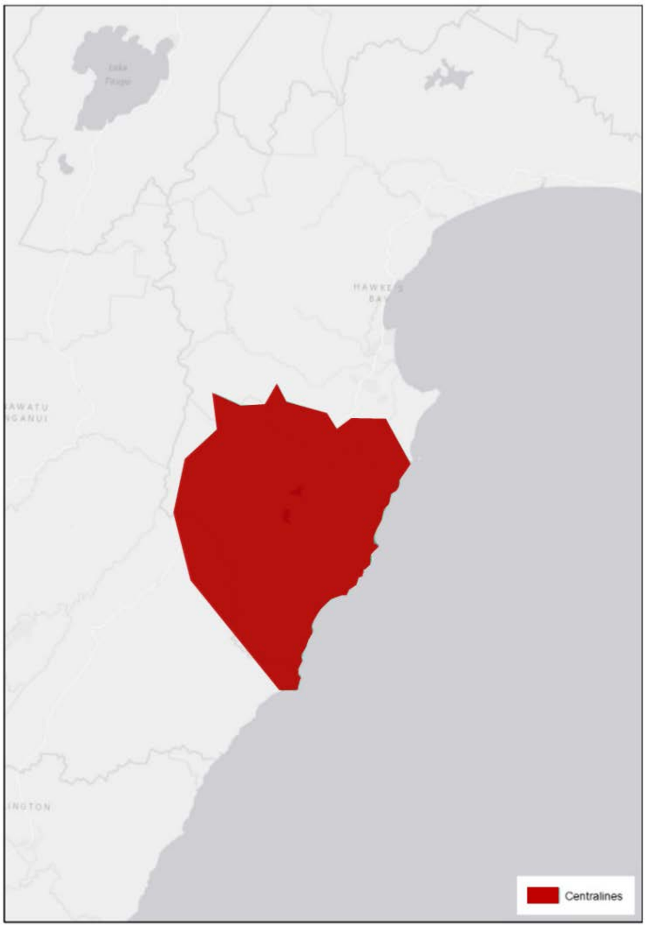


Figure 4-3: Map of the Centralines' Network

4.6.1.1 Load Characteristics

The load is a mix of agricultural, industrial, residential and commercial. As a result of the hot dry summers the system experiences a summer peak driven by irrigation load. The winter peak is lower but not significantly so.

Less than 0.5% of customers currently have distributed generation connected to the grid. At these levels it does not have a material impact on the load.

4.6.1.2 Large Customers

Large customers are those with a peak load greater than 1MVA. These customers often have unique network configurations so Centralines takes special measures to ensure compatibility with network operations. Centralines also works with these customers to ensure that maintenance is scheduled at appropriate times.

Centralines have two large customers that represent approximately a quarter of the demand on the network. These are Silver Fern Farms at Takapau and Ovation Limited at Waipukurau.

4.6.1.3 Supply Points and Embedded Generation

There is no embedded generation and the network is supplied from a single GXP at Ongaonga.

The GXP is connected by four separate overhead 110kV lines, two from Dannevirke to the south and two from Fernhill to the north. The GXP is normally supplied by the lines from Dannevirke. A single 110kV bus supplies a 20MVA and a 30 MVA transformer bank.

At the same site an 11kV supply is provided by a single Transpower-owned transformer. The supply point is the terminals of the 11kV switchgear owned by Transpower.

4.6.1.4 Peak Demand, Total Energy Delivered and Firm Capacity

Peak demand and total energy delivered is measured at the GXP. As there is only one GXP it also represents total network demand.

Supply	Peak Demand (MVA)	Total Energy Delivered (GWh)	Firm capacity winter (MVA)
Waipawa GXP	20	115	26

Table 4-6: Peak Demand and Total Energy Delivered Measured at GXP

4.6.1.5 Sub-transmission Network

Urban areas are supplied by a meshed sub-transmission network and provide a high level of security (n-1). Rural areas are supplied by a radial sub-transmission network providing an acceptable level of security (n).

Figure 4-4 provides geographical views of the sub-transmission network's schematics. Table 4-7 lists the capacity and security of the zone substations across the network.

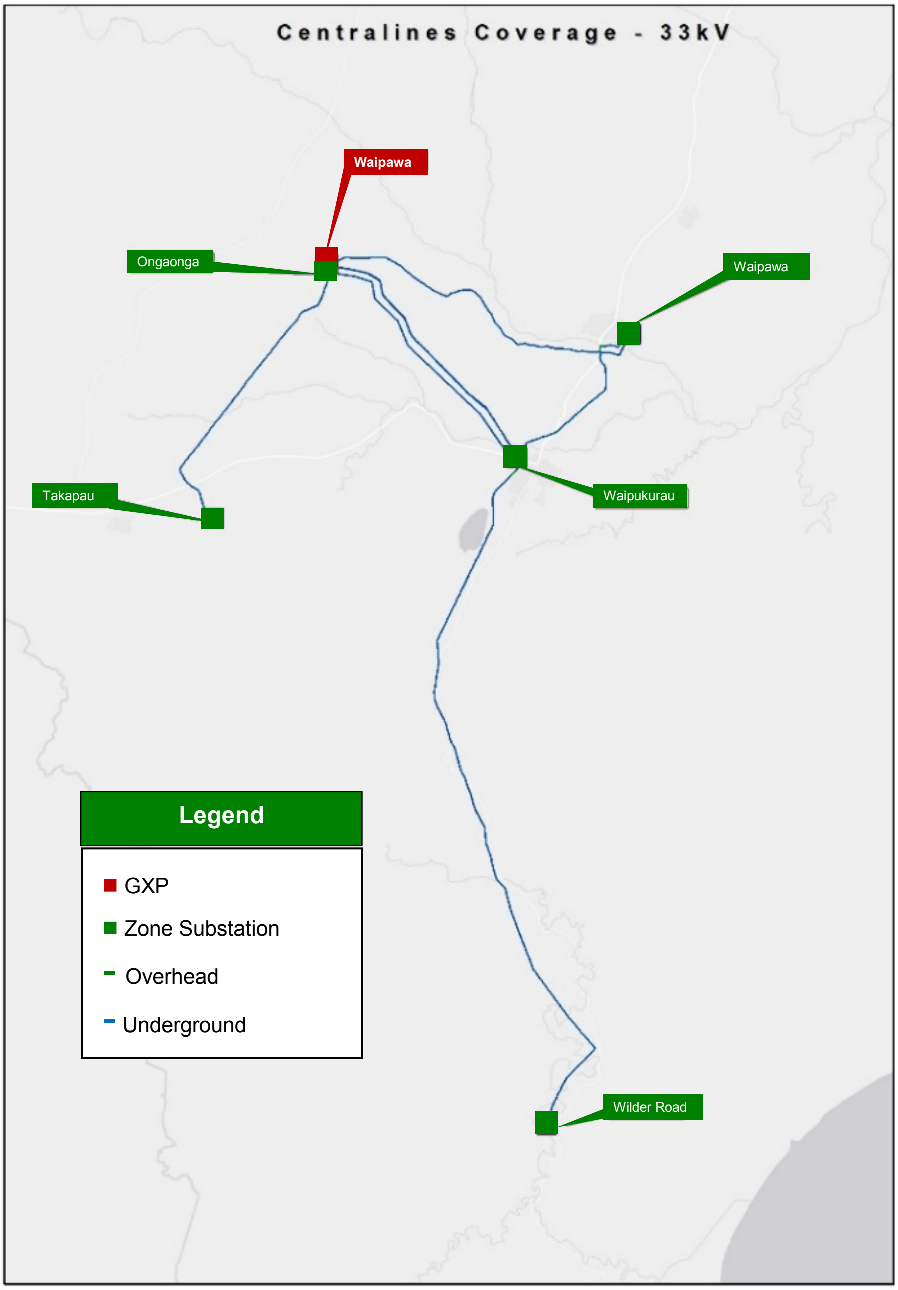


Figure 4-4: 33kV Sub-transmission and Point of Supply Network

Zone Substation	Supply Voltage	Sub–transmission Security	Installed Capacity (MVA)	Power Transformer Security
Waipukurau	33kV	n-1	15	n-1
Waipawa	33kV	n-1	15	n-1
Wilder Road	33kV	n	2	n-1
Takapau	33kV	n(1)	15	n-1

Table 4-7: Zone Substation Capacity and Security

(1) Two transformer substations, supplied by single 33kV circuits

4.6.1.6 Distribution and Low Voltage Network

Undergrounding across the distribution (11kV) and low voltage (LV) networks is completed when appropriate as part of Centralines' life cycle asset management processes. Table 4-8 details the current portion of the networks that are underground.

Network Type	Portion of the Network Undergrounded
11kV Network	2.3%
Low Voltage Network	28.4%

Table 4-8: Portion of Distribution and Low Voltage Network which is Underground

4.6.1.7 Distribution Network

The distribution networks in urban areas have a high level of interconnectivity with neighbouring 11kV networks and provide considerable flexibility during contingency events. This results in a high level of security in these areas.

The distribution networks in rural areas are supplied predominantly by overhead radial feeders with concrete poles and timber cross-arms. 11kV interconnectivity is limited and supply could be compromised during a single contingency event.

The network is relatively lightly-loaded, with the loads small and spread across a large geographical area.

Distribution transformer arrangements are discussed in Section 5.

4.6.1.8 Low Voltage Network

The LV network in the urban area has interconnectivity with adjacent distribution transformers.

However the LV network in the rural and remote rural areas is predominately radial overhead conductors with concrete poles and timber cross-arms and the transformers are sized to the connection party's requirement unless a sub-division is connected.

4.6.2 *Load Forecasting Methodology*

Centralines' load forecast is updated annually to provide a revised forecast of expected load growth. The tool forecasts future peak demand based on historic peak demand and key economic indicators to a 20-year horizon. Forecasts are made for each 11kV feeder based on simple models of the domestic, commercial and industrial sectors. They are then rolled up to zone substation and grid exit point (GXP) levels. The following diagram outlines this process at a high level. The assumptions inherent in the tool and the stages of the framework are discussed further in the remainder of Section 4.6.2.

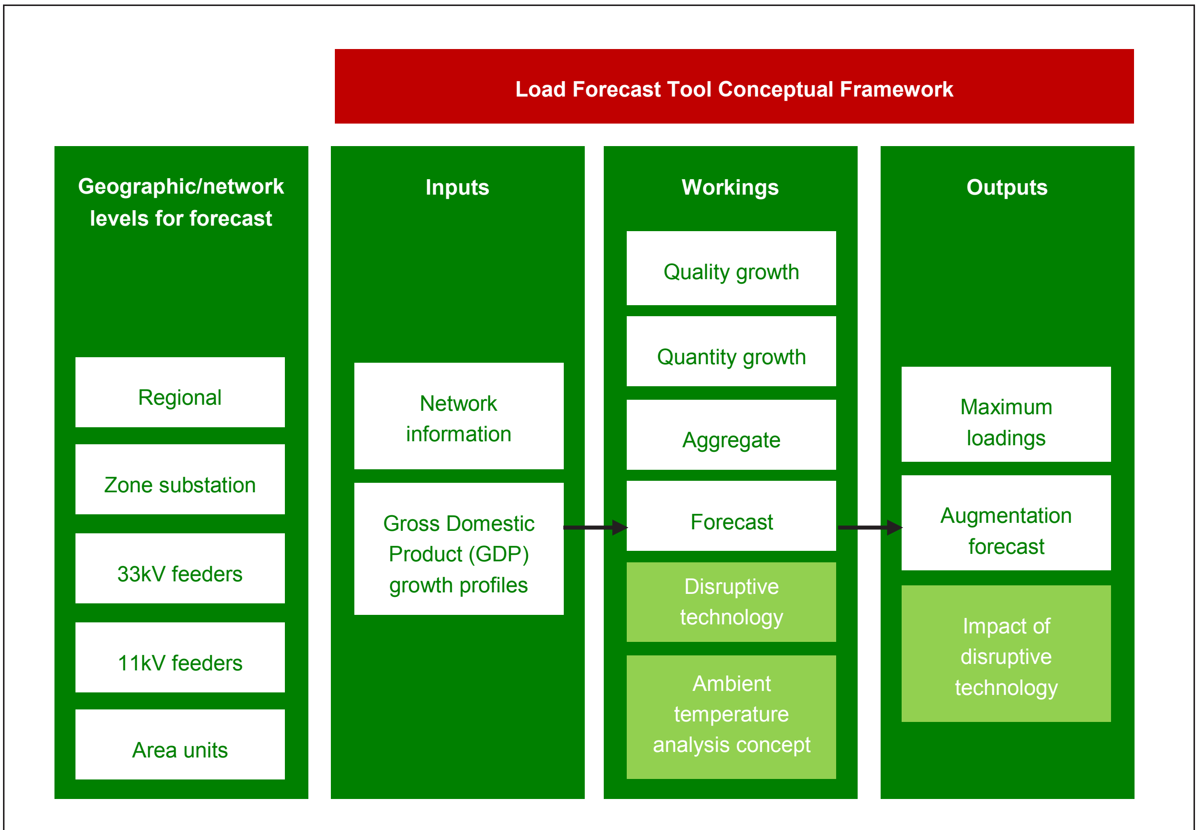


Figure 4-5: Load Forecast Tool

4.6.2.1 Load Forecasting Assumptions

In order to produce any forecasts assumptions are required. The key assumptions behind the load forecast tool are detailed below.

Load growth will grow proportionately with economic growth

Load growth is assumed to grow proportionately to economic growth, which is represented by Gross Domestic Product (GDP) as part of the independent forecasts provided by New Zealand Institute for Economic Research (NZIER) using the latest census data in 2013. This data is updated every three to five years.

Distribution generation impact is assumed to be constant

Distributed generation (DG) is incorporated within the historical peak demand values used within the tool. It is assumed that the DG impact on peak demand in the future will be similar to that in the past and no further adjustments are made. Only DGs with reliable input resources and those with multiple units are included in the load forecast too (LFT). This is because DGs using such resources as wind, solar and hydro as their fuel source are intermittent All of these, along with single generator sites have output levels that cannot be guaranteed.

When reliable DG is connected to the Centralines' network, it is considered a viable substitute for network capacity and is included in n-1 capacity calculations. When actual feeder loads are measured and updated annually in the LFT DG is captured and reviewed in terms of its reliability prior to inclusion in calculations. Additional allowance for DG is only made when significant new DG is forecast to be commissioned and there is confidence in its reliability.

Developments and large customer projects are added to the load forecast

The LFT has the flexibility to incorporate any planned substantial load growth of which Centralines is notified by councils, developers, and existing or new large customers. From experience, the loading levels notified in planning for these projects is typically accurate, though timing can vary. The projects are reviewed and updated in the LFT where necessary, after consultation with relevant parties. The LFT view will be adjusted to include or exclude these projects dependent on the project staging.

The Ruataniwha Water Storage Scheme (RWSS) is a proposed long-term sustainable water storage solution for the Tukituki Catchment; this being one of the larger catchments in Hawke's Bay. Through the construction of a dam on the upper Makaroro River, the dam would store high winter flows for irrigation use during summer when pressure on water resources in the Tukituki Catchment is the greatest, as well as generating electricity from the nominal 10MW hydroelectric power station.

The Scheme would provide pressurised water to the farm gate - an expected 20,000 - 30,000 hectares of farmland in Central Hawke's Bay. This area is divided into four irrigation zones within each of which are a group of pump stations that receive water from the canal or water conduit system and deliver, at pressure, water to the farm irrigation off-takes. There are to be forty-five pumping stations in total with a maximum demand of approximately 10MW.

As sponsor and promoter of the RWSS, the Hawke's Bay Regional Investment Company Limited (HBRIC) is targeting project approval by the 31 March 2016, with first power by mid-2018 and the Scheme commissioned by mid-2019. These dates are indicative only while the project remains in an unapproved state and as such, is not included in this Asset Management Plan.

Centralines has been working with HBRIC to develop a solution that will connect the pump stations, the hydroelectric power station and associated network argumentation to the existing Centralines' network and provide increased capacity at the Transpower Waipawa GXP at Ongaonga.

Load transfer projects are included in the LFT in the year they are expected to be completed

Load transfer projects impact the long-term projected peaks for both the feeder they are removed from and the one they are added to. These changes are incorporated into the LFT in the year in which they are expected to be completed. This information is reviewed annually during the planning cycle.

Demand-side management impact will be constant

Ripple control of specific consumer loads forms an integral part of Centralines' load management strategy and provides a network investment deferral option. The load control scheme operates at a frequency of 475Hz.

There are estimated to be around 6,000 water heaters supplied by Centralines' network. The after-diversity demand in Centralines' network is estimated to total 1.5MW at the time of the co-incident peak on a cold winter afternoon.

Centralines recognise the potential of demand-side management in achieving more benefit. A new demand-side response initiative is detailed in Section 4.8.4.

No net energy demand change for households

There are conflicting drivers affecting household load. On the one hand, increasing efficiency of devices (e.g. LED TVs and lights), and improved insulation are decreasing demand. However the increasing affordability of devices (resulting in more devices per household) and the conversion of open fires to heat pumps are also increasing demand.

Overall at this stage Centralines does not consider the net impact to be material.

Constant power factor over the forecast period

The LFT assumes a constant power factor of 0.95 although increased use of compact fluorescents and power electronic devices could create a distorted supply resulting in reduced power factor and high harmonics. Centralines will utilise the sensors installed across its network to monitor the reactive power flow (VAr) in its 11kV and LV networks, and reassess this assumption over time.

4.6.2.2 Load Forecasting Inputs

Network information

Household data, network connectivity, peak loads for the last twelve months and installed transformer capacity is extracted from various Centralines databases. This data is combined to become what is known as the *network information* in the LFT and is updated annually prior to running the tool.

Growth profiles

GDP projections and population growth forecasts for the next 20 years are the mid-point projection provided by the New Zealand Institute of Economic Research (NZIER) using the latest census data in 2013. This data is updated every three to five years.

GDP growth forecasts are further split by areas, and industrial types. Primary industry consists of agricultural activities, while manufacturing includes the manufacturing industry and construction activities. Both primary and manufacturing are grouped into the *Industrial* category for LFT processing. Residential growth forecasts are calculated from population growth projections. The industrial, commercial, and residential forecasts are combined to form the growth profile.

4.6.2.3 Load Forecasting Workings

The network information is combined with the industrial, commercial and residential growth profiles based on the current proportion of each load type for the different feeders on Centralines' network, and the proportion of the feeder in each area unit. Installed distribution transformer capacity is used as a proxy for load to determine these proportions. This results in a unique growth forecast for each 11kV feeder.

Zone substation demand forecasts are calculated by applying a diversity factor to the sum of the 11kV feeder forecasts. Similarly the GXP demand forecast is calculated by applying a diversity factor to the sum of the zone substation forecasts. It is at this stage that large customer projects and the load transfer projects are added to the load forecast.

4.6.2.4 Load Forecasting Outputs

The LFT forecast is out to a 20-year horizon for both summer and winter peaks on each feeder. The summer and winter periods are aligned with those used by Transpower (summer is from October to April and winter is from May to September). The network development planning process considers the first 10-year outlook of load forecast for planning purposes, and the 10-year-plus outlook for longer-term trend consideration.

Below are the zone substation load forecasts for the Centralines' network. The firm capacities shown are 120% times the continuous ratings. Centralines uses higher short-term ratings to maintain security levels. Also Centralines intends to use dynamic ratings to maximise the available capacities with the consequence that the rating will become variable and not a fixed given value.

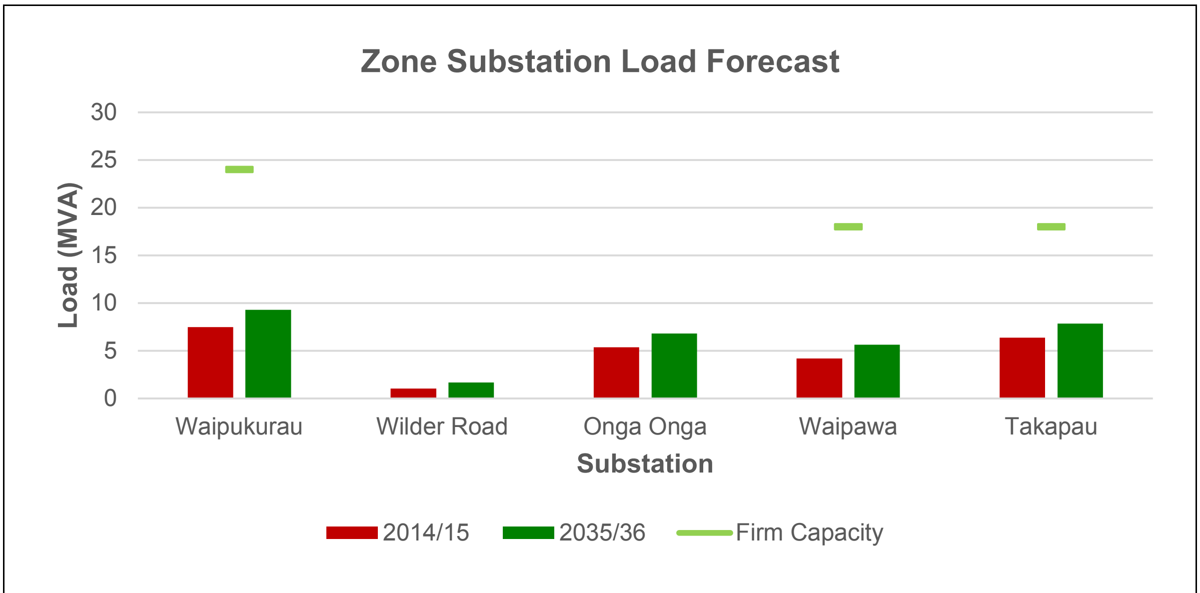


Figure 4-6: Zone Substation Load Forecast

Wilder Road and Ongaonga Zone Substations are single transformer substations. The feeders from these substations are rated as A2 for security of supply purposes. The required restoration timeframes can be completed through back feeding so these substations so do not require additional security at this time.

4.6.2.5 Load Forecasting Review Initiative

Centralines has commenced an enhancement initiative to review the load-forecasting methodology, input, workings, and output. This review will critically evaluate the current load forecast methodology, identify factors with material impact on load-forecasting such as disruptive technologies and develop an enhanced approach with supporting tools and systems. Potential impact from disruptive technologies will also be considered to determine the most appropriate way to represent and model such impact.

4.6.3 *Capacity*

Historically Centralines has utilised a conservative value of maximum continuous ratings (MCR), adjusted for average ambient summer and winter temperatures for short to medium-term planning purposes. Further refinement of capacity utilisation techniques to maximise asset utilisation by applying cyclic ratings and ultimately dynamic ratings are detailed in Section 4.6.3.2.

4.6.3.1 Capacity by Asset Type

The determination of available capacity is not only limited to the headroom available on transformers, overhead lines and underground cables but also to the other assets that support these infrastructural elements including poles, LV circuits and circuit breakers.

Table 4-9 below details the key considerations for determining network capacity across key asset types. Refer to Table 4-3 for the definitions of the load type.

Asset	Asset Level	Load Type	Design Standard Considerations	Capacity Determination Factors
Transformer	Zone Substation	A1,A2	Single transformer	Service areas it supplies – CBD, urban, Rural. Customer classification – industrial, commercial, residential. Degree of security needed. Future growth over the planning period (10 years). Requirement to provide back-up for surrounding zone substations. Timing of the load peaks - summer,
		C,B	Double transformer	

Asset	Asset Level	Load Type	Design Standard Considerations	Capacity Determination Factors
				winter.
Circuit Breakers	Zone Substation	A1,A2	Outdoor Switchgear	Future growth over the planning period (10 years). Requirement to back-feed or support a wide range of switching contingencies. Likely fault current rating. Expected duty service.
		C,B	Indoor Switchgear	
Underground Cable	33kV	C,B	500,630,800mm^2 Al XLPE	Future growth over the planning period (10 years). Requirement to back-feed or support a wide range of switching contingencies. In some cases the load duty cycle (may apply in industrial situations). De-rating effects that other cables buried nearby may have. De-rating effects of soil temperature and thermal conductivity.
	11kV	C,B	300mm^2 Al XLPE	
Overhead Lines	11kV and 33kV	C,B, A1,A2	Ground clearances based on span length, conductor size, circuits to be carried and the legal clearances required for the terrain. Design consideration such as ice loading, excessive dynamic wind loads and geothermal impact.	Future growth over the planning period (10 years). Current rating capacity required. Electrical characteristics of the load supplied, e.g. power factor, duty cycle. Tolerable voltage drop for the line. Requirement to back-feed or support a wide range of switching contingencies. Importance of reducing losses.
Poles	11kV and 33kV	C,B, A1,A2	Height requirement for ground clearances based on of span length, conductor size, circuits to be carried and the legal clearances required for the terrain. Pole-top loadings based on the size, weight and number of conductors on the pole. Permanent loading. Design consideration such as ice loading and excessive dynamic wind loads. Whether the pole has a stay or not.	Planned future circuit requirements that may be added and the voltages. Degree of security and safety factors needed based on the importance of the circuit.

Asset	Asset Level	Load Type	Design Standard Considerations	Capacity Determination Factors
			Degree of security and safety factors needed based on the importance of the circuit.	
Distribution transformer	11kV	C,B, A1,A2	Load-carrying capability and reliability required. Spares are carried for transformers with a capacity up to 1MVA.	Customer diversity. Future connections. Voltage drop, especially for rural customers. Load types to avoid quality issues (household load vs. high reactive loads). Harmonic content of the load. Voltage imbalance expected with the increase in distributed generation.
Distribution switchgear	11kV	C,B, A1,A2	Load-breaking capability, reliability and functionality.	Customer density. Automated switchgear.
LV feeder	400v OH 400v UG	C,B, A1,A2	Radial LV feeders with group breaks	Customer density. Security of supply required. Voltage drop. Capacity required. Current and expected uptake of distributed generation in the area.

Table 4-9: Capacity Determination for Network Assets

4.6.3.2 Capacity Ratings Review Initiative

Centralines will apply key learnings on dynamic ratings from its Management Services Provider's capacity review initiative, as part of the asset management planning services.

Dynamic Rating refers to the concept of making an asset rating adaptive to its environmental parameters. In particular, weather parameters are constantly changing and often cyclic in nature. Ambient temperature is an important parameter that will either cool down or heat up an asset and affects the asset's ability to carry current. Environmental information must be collected to determine the dynamic ratings for assets.

Centralines has historically used maximum continuous ratings (MCR) for short to medium-term planning purposes. In order to maximise asset utilisation Centralines intends to use the rating output of the dynamic rating algorithm for planning in the future. During cooler seasons, the dynamic ratings are almost always higher than the name plate rating which generally means the asset can be safely loaded above its name plate rating without it being overheated and damaged.

Centralines will use real-time environmental data and a dynamic rating algorithm, based on international IEC standards, to calculate different ratings in real-time and publish these on corporate systems. These ratings can be cyclic ratings, short-term emergency ratings and long-term emergency ratings. Each is used for a different purpose depending on the length of time the increased load on the asset would be expected to last. These ratings are currently available for some assets across three asset classes - 33kV overhead lines, 33kV cables and power transformers.

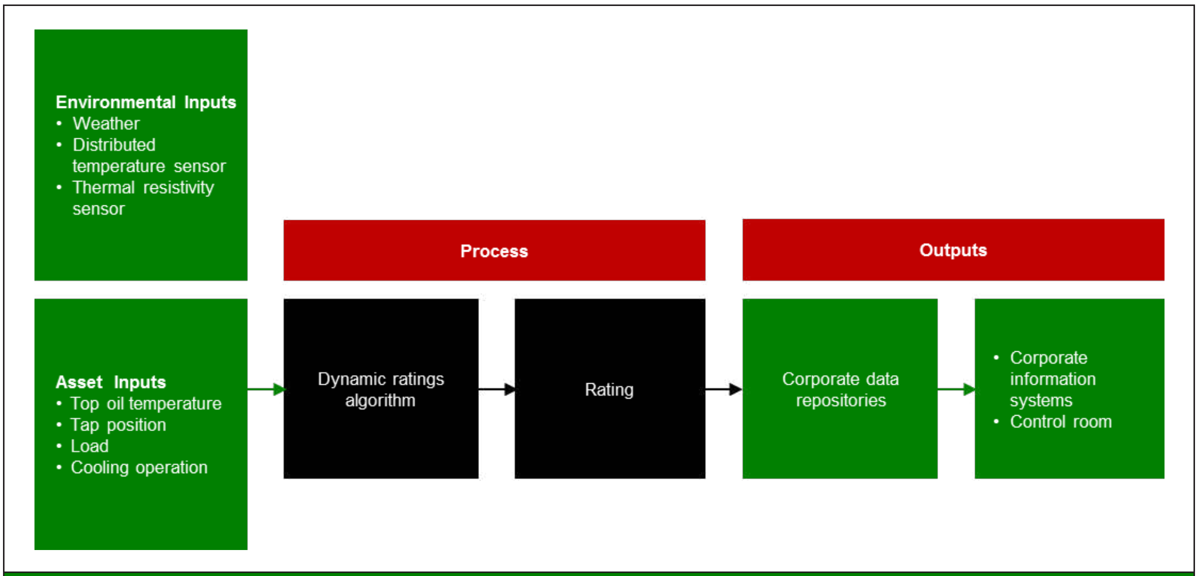


Figure 4-7: Ratings Information

4.7 Process - Identify and Assess Network Constraints

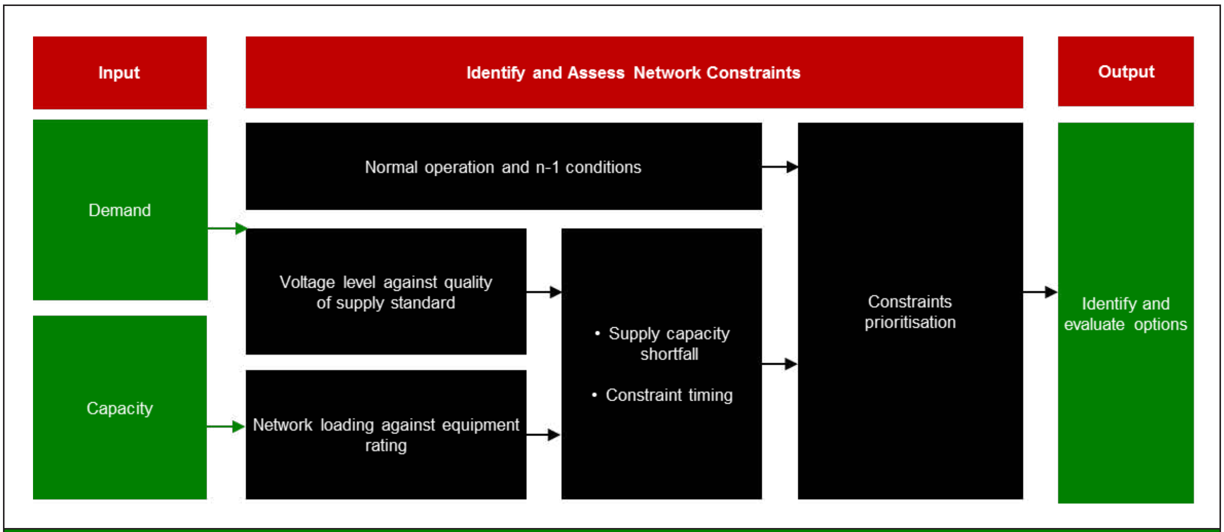


Figure 4-8: Identify and Assess Network Constraints

Network constraints occur when demand exceeds the capacity of the network under normal operating conditions or during contingency events. While the concept is straightforward, the high degree of interconnectivity and interdependence inherent to the distribution network presents a complex challenge.

Centralines identifies, assesses and prioritises all network constraints to direct investment to meet Centralines' required system growth requirements. This prioritisation process is informed by the LFT, and PowerFactory Power System Analysis Application to interpret and analyse data from various repositories as outlined in Figure 4-9: Decision Support Tools.

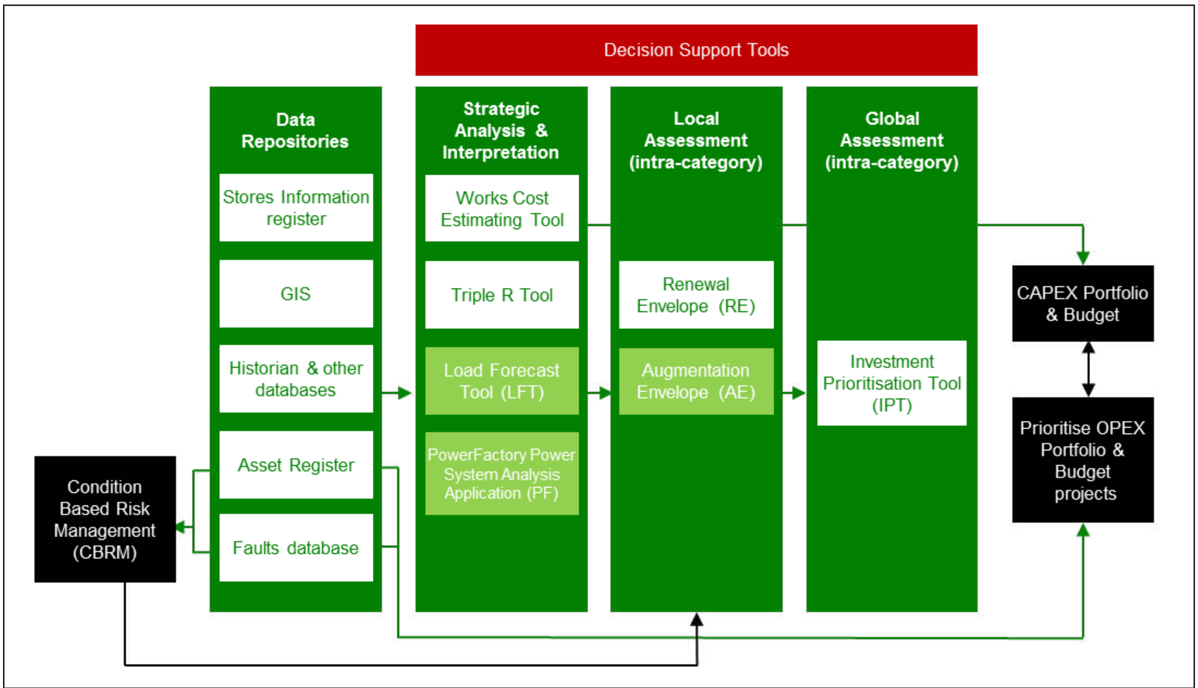


Figure 4-9: Decision Support Tools

4.7.1 *Load Forecast Tool and PowerFactory Application*

Strategic analysis and interpretation of data for network development planning is covered in the following three elements:

- Load Forecast Tool (LFT) provides a customer demand forecast across the network (11kV feeder, zone substations, and GXP) across the planning period. Refer to Section 4.6.2 for details of the LFT.
- N-1 contingency analysis assesses the back-feeding capability at 11kV feeder, 33kV feeder and zone substation levels.
- PowerFactory Power System Analysis Application, assesses and identifies complex network constraints at 11kV and 33kV feeder sections and zone substation levels. This application is also used to assess the impact of potential options on the network and to confirm whether the options address the identified constraints.

4.7.2 *Decision Support Tools Enhancement Initiative*

The decision support tool suite and associated processes require manual operation and professional engineering knowledge. This is due to the high degree of complexity involved in assessing the network. Centralines will apply key learnings from its Management Services Provider's Expert

Decision Support System (EDSS) initiative as part of the Asset Management Strategies detailed in Section 2.

4.8 Process – Identify and Evaluate Options

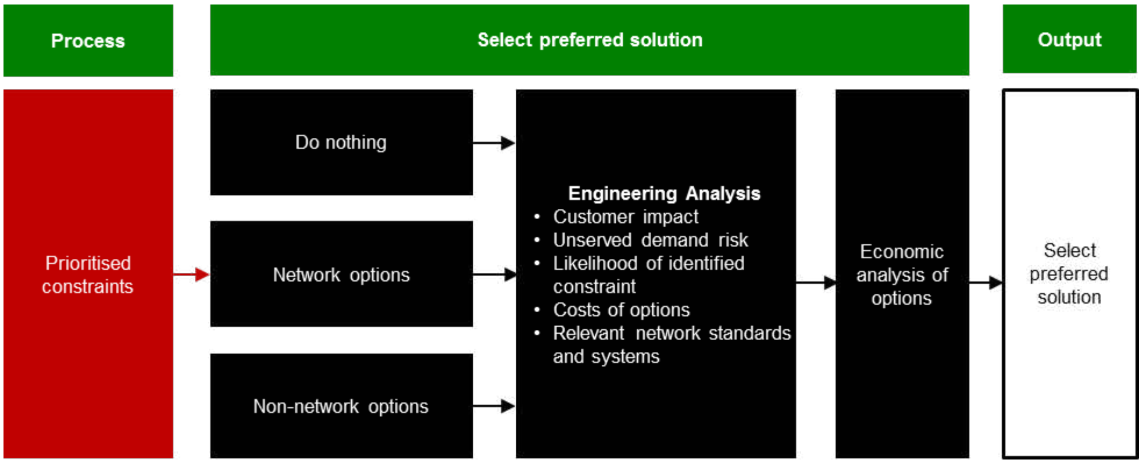


Figure 4-10: Identify and Assess Potential Options Process Stage

For any given network constraint, a range of potential solutions are selected from the Solutions Toolbox. The solutions fall into the following categories:

- Do nothing – A quantified risk-based approach that considers whether risk is manageable using existing processes and techniques;
- Network option – Traditional network reinforcement approach. Typically provides a technically sound long-term solution. These solutions may require greater initial expenditure but generally provide a high level of security and capacity;
- Non-network option – Utilising new technology, which in some cases is only applicable in the short-term. These solutions typically incur lower initial cost and provide Centralines with time to plan and optimise more complex network solutions, while deferring investment and mitigating risk.

Engineering analysis is undertaken on the potential options to evaluate the engineering merits in addressing the identified need. Economic analysis is completed on the selected options to ensure cost-effective network development. As part of the engineering analysis, network planning engineers will collaborate with asset specialists to discuss any asset renewal need in the vicinity of the constraint.

4.8.1 *Solutions Toolbox*

The available solutions in the 'solutions toolbox' to address the identified network constraints are summarised in Table 4-10, and further details are discussed in Section 4.8. Centralines is actively exploring possible expansion of the solutions toolbox using new technologies to further enhance the efficiency of the network. Initiatives resulting in solutions toolbox expansion are detailed in Section 4.8.4.

Constraint	Network Solution	Non Network Solution
Voltage	Upgrade conductor Install feeder Install voltage regulator	Reactive VAr compensation Fast transfer Network reconfiguration (existing asset) Mobile voltage regulator
Continuous current capacity	Upgrade conductor Install feeder Install transformer Establish substation	Reactive VAr compensation Fast transfer scheme Demand side management Real time monitoring Dynamic ratings (selected asset classes) Network reconfiguration (existing asset)
Fault current capacity	Asset upgrade	Decrease fault rating by: • Substation earthing compensation • Network reconfiguration
Quality of supply, e.g. dips harmonics flicker	Install feeder Install transformer	Ground fault neutraliser Network reconfiguration (existing asset) Behind-the-meter solutions
Network security	Install feeder Install transformer Establish substation Install reclosers	Fast transfer of load Reactive VAr compensation Demand side management Network reconfiguration (existing asset) Dynamic ratings (selected asset classes)
Network reliability	Install feeder Install recloser Overhead to Underground asset conversion	Network reconfiguration Fast protection Ground fault neutraliser

Table 4-10: Solutions Toolbox

4.8.2 *Network Options*

Network solutions are based on a traditional network reinforcement approach and typically provide technically sound long-term solutions. Examples are power transformer and pole and cable upgrades. To ensure traditional network solutions are designed to be as energy and economically-efficient as possible. the direct effect of heat losses and energy efficiency, voltage and reactive power optimisation, and network configuration are considered. Standardised designs are applied to specify equipment and installation details. Cost estimates are based on typical costings from engineering knowledge or, where possible, actual costing from completed works.

Standardised Designs

Where possible Centralines utilises standardised designs of assets to maximise cost efficiencies throughout the asset management lifecycle. Standardisation of design in different types of asset is summarised in Table 4-11.

Asset	Standardisation
33kV overhead lines	Standard drawings, design and construction methodologies are in place. Standard materials used include concrete Busck poles and ACSR, AAC or AAAC conductor. These are available as standard designs in Design Manager[3] for planners' cost estimates and for designers.
33kV underground cables	Standard drawings, design and construction methodologies are in place. Standard materials used include different sizes of XLPE cable. These are available as standard designs in Design Manager for planners' cost estimates and for designers.
Power transformers	Due to the value of this asset, Centralines tenders each one to ensure cost efficiency.
33kV circuit breakers	Standard drawings, design and construction methodologies are in place. The standard circuit breaker used is the Alstom GL107.
11kV circuit breakers and switchboards	Standard drawings, design and construction methodologies are in place. Standard equipment used includes Reyrolle Pacific (RPS) 11kV indoor boards and Cooper Nova reclosers for outdoors.
Zone substation buildings and equipment	Due to the value and low number of new constructions of this asset Centralines designs each one specifically for the site and the network's technical requirements.
Ripple injection plants	Standard drawings, design and construction methodologies are in place. Standard equipment used is manufactured by Landis+Gyr (L+G).
Poles	Standard drawings, design and construction methodologies are in place. Standard materials used include concrete Busck poles, used across the industry for maximum cost efficiency. These are available as standard designs in Design Manager for planners' cost estimates and for designers.
DX & LV equip	Standard drawings, design and construction methodologies are in place. Standard materials used include Busck poles, XLPE cable, ACSR, AAC, AAAC, ABC conductors. These are available as standard designs in Design Manager for planners' cost estimates and for designers.

[3] Design Manager is a software tool that contains standard designs and their estimated costs, and is integrated with Centralines Asset information databases.

Asset	Standardisation
Distribution and low voltage cable	Standard drawings, design and construction methodologies are in place. Standard material used is PVC-coated XLPE cable. These are available as standard designs in Design Manager for planner's cost estimates and for designers.
Distribution transformers	Standard drawings, design and construction methodologies are in place. Standard equipment used includes pole-mount 15-300kVA and ground-mount 30-1000kVA ETEL transformers. These are available as standard designs in Design Manager for planners' cost estimates and for designers.
Distribution switchgear – air break switches, 11kV fuses and reclosers / sectionalisers	Standard drawings, design and construction methodologies are in place. Standard equipment used includes NOVA (Cooper) reclosers, ENTEC RCSs, Schneider ABSs; S&C 11kV fuses (DDOs). These are available as standard designs in Design Manager for planners' cost estimates and for designers.
Distribution switchgear – ground-mounted switches and ring main units (RMU)	Standard drawings, design and construction methodologies are in place. Standard equipment used is the ABB Safelink RMU. These are available as standard designs in Design Manager for planners' cost estimates and for designers.
Voltage regulators	Standard drawings, design and construction methodologies are in place. Standard equipment used is the Cooper voltage regulator. These are available as standard designs in Design Manager for planners' cost estimates and for designers.
Pedestals	Standard drawings, design and construction methodologies are in place. Six different pedestals are available to cater for varied site and technical requirements. Most are available as standard designs in Design Manager for planners' cost estimates and for designers.
Sensors	Standard drawings, design and construction methodologies are in place. Many different sensors are available to cater for varied technical requirements. Most are available as standard designs in Design Manager for planners' cost estimates and for designers.

Table 4-11: Standardisation Across Assets

4.8.3 *Non-network Options*

Non-network solutions utilise new technologies to provide cost-effective alternatives to traditional network solutions. Technical aspects include reduction in system losses, no detrimental impact on fault level, improvement in asset utilisation and voltage profile. Cost estimates are based on typical costings from engineering knowledge or, where possible, actual costings from completed works.

4.8.4 *Solution Toolbox Enhancement Initiatives*

Centralines is taking a proactive approach to realise significant benefits from new technologies including potential solutions to identified constraints. This enhancement initiative is to explore, investigate and trial new demand-side response solutions to expand the non-network solutions toolbox. The key element to this initiative relates to off-grid systems.

Off-Grid Systems

Centralines recognised off-grid systems as a disruptive technology with the potential to reduce the cost to serve its remote rural customers. This is considered to be a high priority opportunity due to the increasing maturity of the technology and the potential benefits from their application on the Centralines' network. This initiative will explore and trial off-grid systems for islanded and voltage support operations, medium to large-scale energy storage systems, mobile and fixed distributed generation. Supporting management philosophy, policies and strategies will also be developed.

4.9 Process - Select Preferred Solution

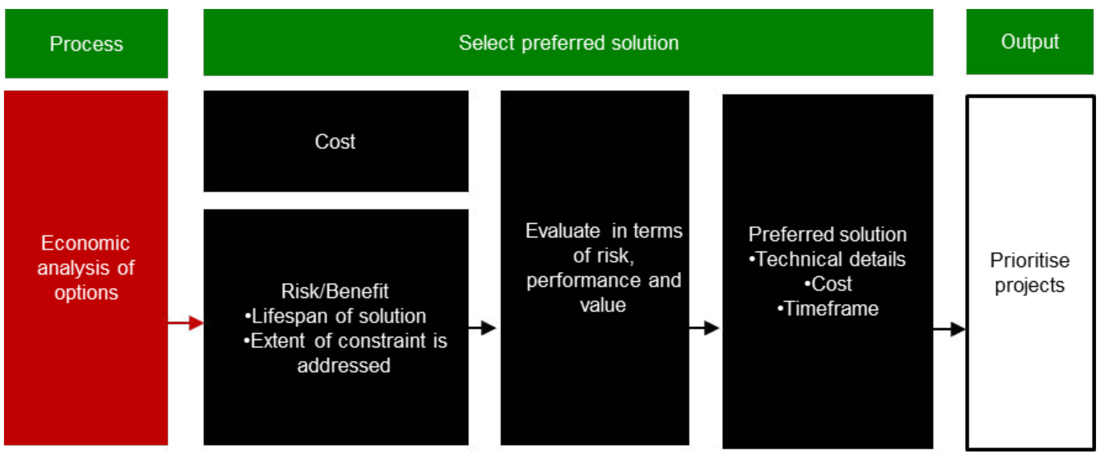


Figure 4-11: Select Preferred Solution Process Stage

Network planners apply professional engineering judgement to the identified set of options, and to the quantified costs and benefits in order to select the preferred solution. This centres on the objective of striking an optimal balance of risk, performance, and value to ensure a cost-effective selection of network development solutions. A list of potential projects provides a consolidated set of preferred solutions to address the identified constraints.

4.10 Output – Prioritise Network Development Programme

Centralines sets a limit to the amount of capital available for asset management and network development investment to ensure overall financial sustainability in any given year. Prioritisation of projects from asset management and network development planning processes is required to target investment to optimise value. Utilising the 'Investment Prioritisation Tool' (IPT), the projects are compared by applying a structured framework to determine the most optimal project portfolio which is formalised as the Network Development Programme.

The preceding network development planning process stages produce a list of potential projects which collectively address the identified constraints. The IPT is the final step within the suite of decision support tools, known as the Network Investment Toolbox (NIT). These NIT components and their integration are outlined in Figure 4-12. They add rigour and transparency to what can be a difficult decision-making process.

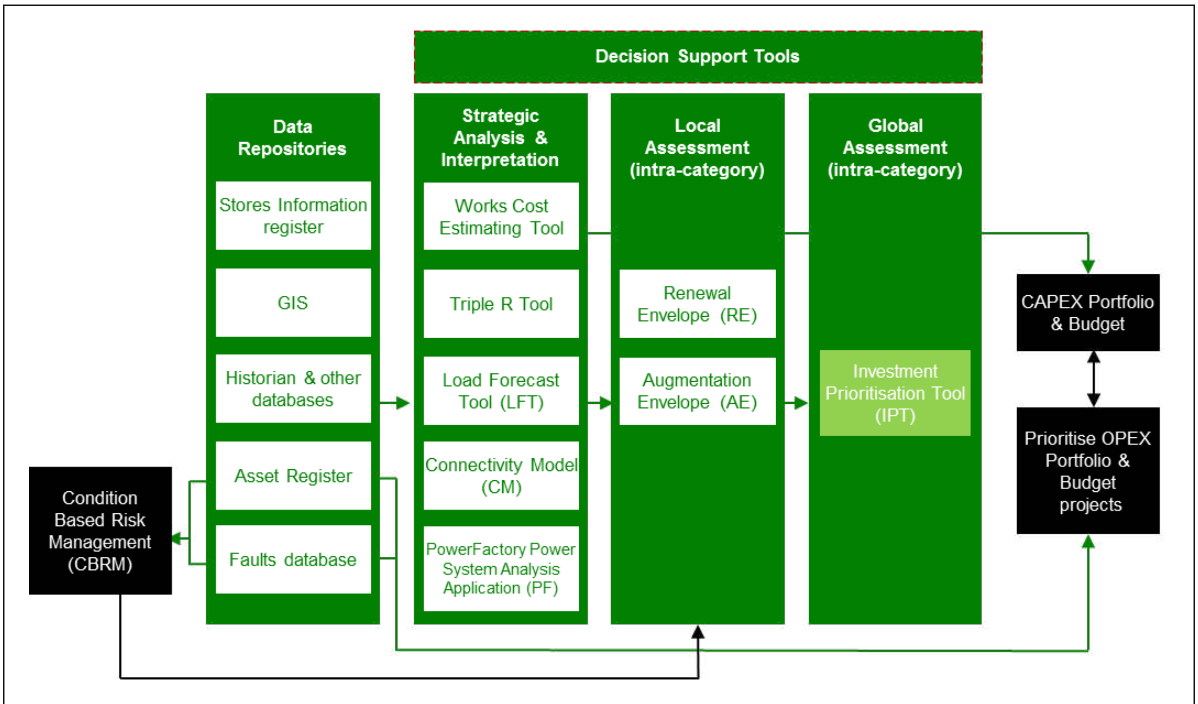


Figure 4-12: Network Investment Toolbox

Investment Prioritisation Tool (IPT)

The benefits of the IPT are:

- Alignment of the capital programme with company strategic drivers, customer needs and regulatory thresholds;
- Maximisation of long-term value creation and financial return from the capital investment programme;

- Sustainable achievement of customer service levels, network security, network reliability, power quality and safety targets;
- Enhanced efficiency of investment process (reduced demands on management time); and
- Comparison and prioritisation across different investment categories (e.g. renewal and replacement, system growth).

This tool prioritises each potential project in terms of strategic drivers, which align with Centralines' strategy. The tools, their drivers and their alignment are summarised in Table 4-12.

IPT Strategic Driver	Sub Driver	Corporate Alignment
Financial	Direct • Revenues • Customer contributions • Cost savings by design • Opex and Capex costs Indirect • Renewal of network elements • Mitigation of risks • Consequential gains/losses	Drive value for our shareholders and customers. Efficient core business.
Quality of supply	Network reliability • Direct impact • Mitigation of risk of decrease • Network security	Effective core business.
Company policies and standards	Conformance	Effective core business.
Legal and statutory	Legal and statutory	Effective core business.
Stakeholder satisfaction	Gain in stakeholder satisfaction	Drive value for our shareholders and customers. Effective core business.
Shareholder obligations	Conformance with shareholder obligations	Drive value for our shareholders and customers. Effective core business.
Strategic benefit	Strategic option value Strategic alignment	Effective core business. Efficient core business.

Table 4-12: IPT Drivers and Alignments

The IPT process and drivers will be reviewed to ensure that they align with Centralines' strategy and other Initiatives.

4.11 Output - Network Development Projects

Projects greater than $250,000 are considered material and will be discussed to a greater level of detail.

Customer-driven projects where a contract is not in place are not included, for example the Ruataniwha Water Storage Scheme.

Details of the projects for the ten-year planning period are detailed in the remainder of Section 4.11.

4.11.1 *Projects for 2016 to 2026*

A summary table describing the confirmed non-material projects for this year is included in Section 4.11.2.

#	Constraint	Category	Cost	Section
2016/17				
1	Reliability constraint on Feeder 13	System Growth	$50k	4.11.2
2	Reliability of communications constraint at Waipukurau Zone Substation	System Growth	$50k	4.11.2
3	Reliability of communications constraint at Takapau Zone Substation	Quality of Supply	$50k	4.11.2
2017/18 to 2020/21				
4	Voltage constraint on Feeder 19	System Growth	$150k	4.11.3
5	Voltage fluctuation constraint at Takapau Zone Substation	Quality of Supply	$250k	4.11.3
6	Security constraint on Feeder 1	System Growth	$30k	4.11.3
2021/22 to 2025/26				
7	Equipment reliability constraint at Waipawa Substation	Quality of Supply	$250k	4.11.4

Table 4-13: Projects for 2016/17 to 2025/26

4.11.2 *Non-material Projects for 2016/17*

#	Ref	Constraint	Constraint Description	Options	Cost	Preferred Solution
1	126135	Reliability constraint on Feeder 13	Urban customers in Mount Herbert Street are connected to a rural Feeder 13 and experience more frequent interruptions in supply than urban customers should expect due to numerous recloser operations. Service level targets for urban customers are between 1-4 interruptions per year. Feeder 13 is currently experiencing over 10 per year.	**Preferred: Network – Reconfigure the network.** Non network – Install ground fault neutraliser. Do nothing.	$50k	The preferred solution is the lowest cost solution that will resolve the constraint. It will result in the urban customers being transferred to an urban feeder that meets urban reliability criteria. A remote control switch needs to be installed to achieve this. The switch will also provide additional network information to improve the modelling tools going forward. The network solution in this instance costs less than the non-network solution.
2	125934	Reliability of communications constraint at Waipukurau Zone Substation	An issue has been identified with the communications card in the existing regulators. The card is prone to failure and no notification is sent if it does fail. This results in an inability to control the regulator using the SCADA system and means the data from the regulator would be unavailable.	**Preferred: Network – Upgrade Regulator.** Do nothing.	$50k	The preferred option is the lowest cost option that resolves the constraint. It will reduce the likelihood of communication failures by ensuring that the regulator can be controlled. This in turn improves power quality. It will also ensure that network data is available to improve the planning model. There are no non-network options that would resolve the constraint.

#	Ref	Constraint	Constraint Description	Options	Cost	Preferred Solution
3	125933	Reliability of communications constraint at Takapau Zone Substation	An issue has been identified with the communications card in the existing regulators. The card is prone to failure and no notification is sent if it does fail. This results in an inability to control the regulator using the SCADA system and means the data from the regulator would be unavailable.	**Preferred: Network – Upgrade Regulator.** Do nothing.	$50k	The preferred option is the lowest cost option that resolves the constraint. It will reduce the likelihood of communication failures by ensuring that the regulator can be controlled. This in turn improves power quality. It will also ensure that network data is available to improve the planning model. There are no non-network options that would resolve the constraint.

Table 4-14: Projects for 2016/17

4.11.3 *Projects for 2017/18 to 2020/21*

#	Constraint	Constraint Description	Options	Cost	Solution
4	Voltage constraint on Feeder 19	Through network analysis and modelling, Feeder 19 has been identified as having poor 11kV voltage regulation under contingency conditions. Feeder 19 is of particular importance as it is the only back-feeding feeder to the Wilder Road feeders should the single 33kV line to Wilder Road Substation fail.	Network - Install an 11 kV voltage regulator on the constrained feeder. **Preferred: Network – Reconfigure the network.** Network - Install capacitor banks to reduce feeder loadings. Non- network - Encourage DG. Do nothing.	$150k	This is the lowest cost option that will resolve the constraint. The solution would involve re-routing the back-feeding route through the existing 11kV voltage regulators installed at Wilder Road Substation. Easements are required to complete this solution.
5	Voltage fluctuation constraint at Takapau Zone Substation	There is inadequate protection at Takapau Zone Substation which results in voltage dips under fault conditions.	**Preferred: Network Install 33kV feeder protection relay and 33kV voltage transformers.** Do nothing.	$250k	The preferred option is the lowest cost option that resolves the constraint. It will enable fast power system fault clearance and unitised protection. There are no non-network options that would resolve the constraint.
6	Security constraint on Feeder 1	Through network analysis and modelling, Feeder 1 has been identified as having poor 11kV voltage regulation under contingency conditions. Feeder 1 is of particular importance as it is one of the main back-feeding feeders to the Takapau area should the single 33kV line to Takapau fail.	Network - Upgrade sections of the circuit. Network - Install an 11kV voltage regulator. Network - Install capacitor banks. **Preferred: Non - network – Prepare a site for a mobile voltage regulator.** Non- network - Encourage DG. Do nothing.	$30k	The preferred option is the lowest cost option that resolves the constraint. This option will mean that in a contingency event the mobile regulator will need to be moved to the site, which will mean some delay.

Table 4-15: Projects for 2017/18-to 2020/21

4.11.4 *Projects for 2021/22 to 2025/26*

All projects for 2021 to 2026 are in the initial identification stage. High level options have been identified and costs have been estimated for the option identified as preferred, however all constraints and possible solutions will be reviewed during annual planning to confirm the constraints still exist and, the timing of the constraints have not changed. More detailed investigation into the options will be undertaken closer to the planned commencement of the project.

Network development works for this period will be dependent on the energy demand growth experienced on the network. Most energy demand growth on the Centralines' network for the planning period is expected to be driven by the Ruataniwha Water Storage Scheme or other customer-driven works and are not included here.

Customers have indicated that the current level of reliability and price are appropriate and as a result it is suggested that further investment will generally be limited to relatively minor upgrades to the worst-performing feeders to ensure that customers experiencing the worst reliability are progressively upgraded to closer to average reliability.

Safety-driven upgrades are expected to remain relatively minor during the planning period, due to the relatively robust nature of the network, age profiles of the assets and the relatively high levels of investment in renewals and replacements that are discussed in Section 5.

#	Title	Constraint Description	Options	Cost
7	Equipment reliability constraint at Waipawa Substation	The existing protection CTs are insufficient for the burden at the substation. This results in increased inaccuracy and the potential for incorrect protection operation.	**Preferred: Network** Install 12 33kV transformer and feeder protection CTs. Do nothing.	$250k

Table 4-16: Projects for 2021/22 to 2025/26

4.12 Determination Reference Mapping Table

Section 4 Reference	Determination Reference
4.1 Induction	11
4.2 Overview of Network Development Planning	11, 11.6, 11.7
4.3 Objectives – Establish Network Development Planning Objectives and Criteria	11.1, 11.2
4.4 Inputs – Study Macro-environmental and Future Network Context	11.1, 11.2
4.5 Inputs – Analyse Data to Derive Network Development Planning Assumptions	11.1, 11.11
4.6 Inputs – Analyse Data to Derive Network Development Planning Inputs	4.1 including 4.1.1-4.1.4, 4.2 including 4.2.1-4.2.5, 4.3, 11.6, 11.8 including 11.8.1, 11.8.2, 11.8.4
4.7 Process – Identify and Assess Network Constraints	11.8.3,
4.8 Process – Identify and Evaluate Options	11.3, 11.4, 11.4.1, 11.4.2,11.5
4.9 Process - Select Preferred Option	11.12, 11.12.1, 11.12.2
4.10 Output – Prioritise Network Development Programme	11.7
4.11 Output – Network Development Projects	11.8.3, 11.9 including 11.9.1 to 11.9.3, 11.10, including 11.10.1 to 11.10.3, 11.12.1 to 11.12.2

Table 4-17: Determination Reference Mapping Table

SECTION 5 LIFE CYCLE ASSET MANAGEMENT

CENTRALINES LIMITED

CONTENTS

5. LIFECYCLE ASSET MANAGEMENT PLANNING

5.1 Introduction to this Section

This section provides an overview of Centralines' approach to lifecycle asset management (LCAM) planning. The section provides a description of the asset lifecycle, Centralines' asset management objectives and the approaches Centralines uses for maintaining and replacing assets to meet these objectives.

5.2 Overview of Lifecycle Asset Management Planning

5.2.1 What is LCAM Planning?

Lifecycle asset management (LCAM) planning is the structured approach that Centralines uses to manage assets in order to achieve its asset management objectives (refer Section 2 Background and Objectives).

5.2.2 Objectives of LCAM Planning

The purpose of lifecycle asset management (LCAM) planning is to ensure that assets can perform their intended functions safely, reliably, and at lowest cost, throughout their lives. To achieve this purpose, Centralines aims to reduce the cost of asset management while meeting network performance service levels, and not increasing the risk profile of our business. Centralines' LCAM objectives are to:

- ensure no assets cause health and safety risks to the public, employees or contractors;
- decrease Asset Renewal CAPEX over the planning period;
- decrease Network OPEX over the planning period; and
- meet network performance targets for SAIDI and SAIFI in line with the regulatory collar.

5.2.3 Key LCAM Constructs and Concepts

5.2.3.1 Asset Management System

The asset management system, detailed below, is the framework that Centralines uses to ensure the actions carried out with and on Centralines' assets will ultimately lead to realised value. This section of the Asset Management Plan, Lifecycle Asset Management Planning, includes components of the system highlighted in green below.

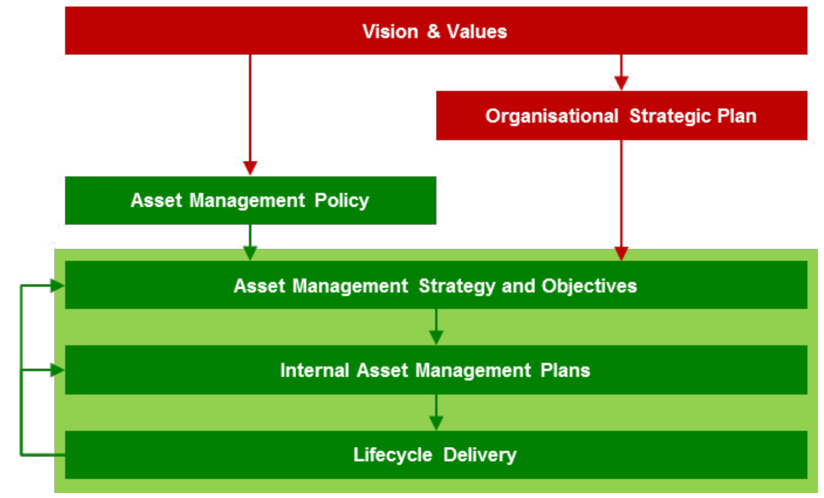


Figure 5-1: Asset Management System

5.2.3.2 Asset Lifecycle

Fundamental to the LCAM planning approach is an understanding of the asset lifecycle, depicted below in Figure 5-2.

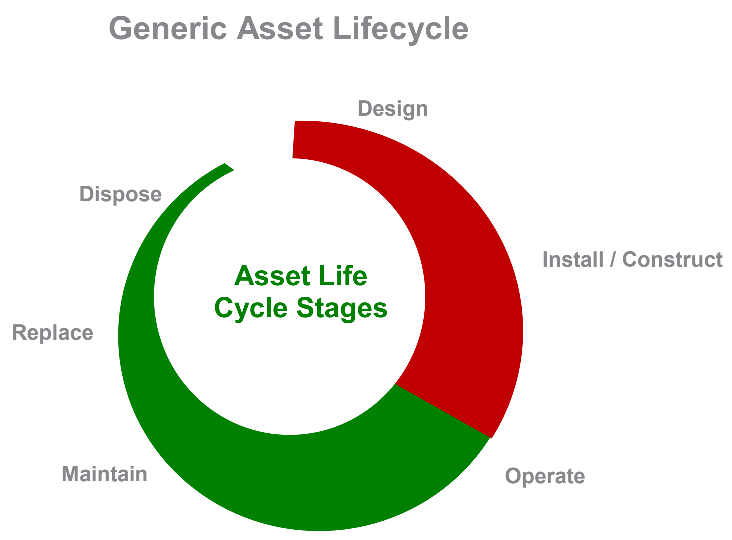


Figure 5-2: Generic Asset Lifecycle

LCAM planning at Centralines means decision-makers being aware of where an individual asset currently is in its own asset lifecycle and making decisions that are optimal across the entire life of the asset rather than just one lifecycle stage. Historically LCAM planning at Centralines has focussed primarily on the installation, maintenance and replacement of assets but Centralines is working to improve the way it makes decisions by considering all aspects of the asset lifecycle.

5.2.3.3 Asset Hierarchy

LCAM planning also means understanding the context of an individual asset within Centralines' network or hierarchy of assets. Figure 5-3 below depicts the Centralines' asset hierarchy. The model shows three conceptual levels: individual assets, connected groups of assets or asset systems, and the combination of these into an asset portfolio. Centralines acknowledges that the value that can be extracted from individual assets is limited, and that it is the interconnectivity and integration between assets that creates value. Life cycle asset management gives each level equal weighting and targets efficiencies not only within the levels, but also between them.

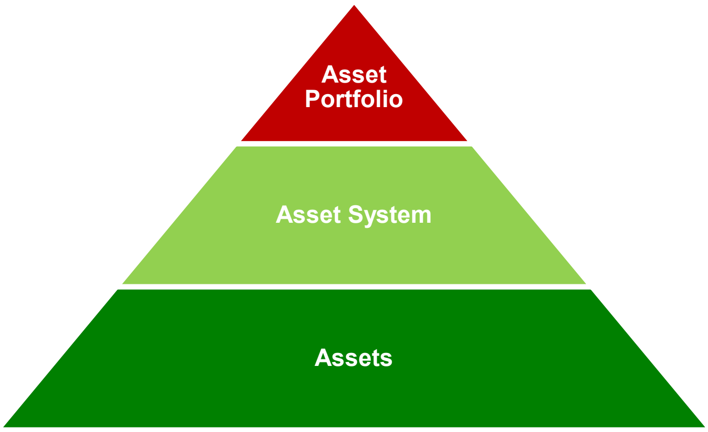


Figure 5-3: Asset Hierarchy

Centralines' approach to LCAM planning involves an understanding of the asset lifecycle and the asset hierarchy.

5.2.4 LCAM Process/Approach

The diagram and table below outline the key elements of LCAM planning in practice at Centralines. The diagram shows inputs, key processes and outputs and forms the basis for the layout of the remainder of this section. The diagram shows the importance of the asset renewal and asset maintenance processes in delivering against the LCAM objectives. These two key processes are separated out in Figure 5-4, and explained in the remainder of this section.

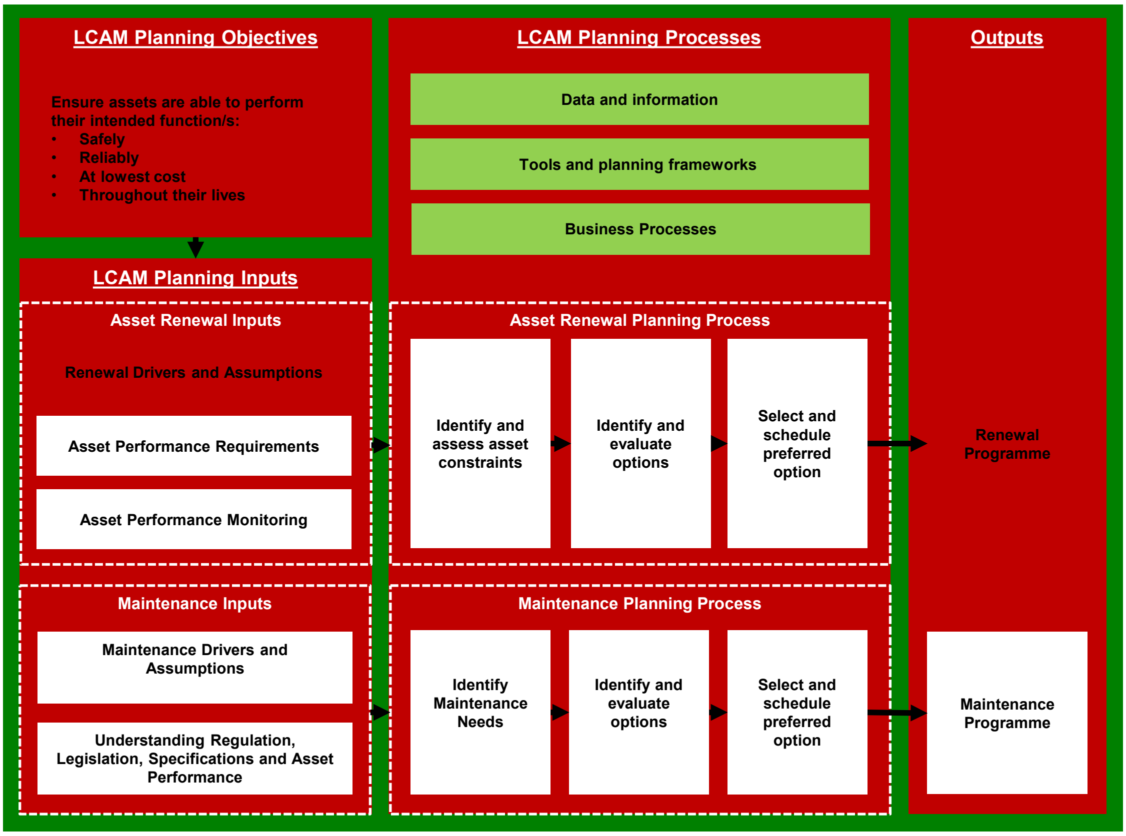


Figure 5-4: LCAM Planning Approach

Process Element	Description
LCAM Planning Objectives	LCAM objectives drive the outputs, processes and inputs described in this section. Centralines' LCAM objectives are to: • Ensure Centralines' assets do not cause health and safety risks to the public, employees or contractors or damage to property; • Decrease Asset Renewal CAPEX over the planning period; • Decrease Network OPEX over the planning period; and • Meet network performance targets for SAIDI and SAIFI in line with the regulatory collar.
LCAM Planning Inputs (Asset Renewals)	The inputs into renewal planning processes are the drivers and assumptions (influenced by objectives), the performance requirements of individual assets and the actual/monitored performance of individual assets.
LCAM Planning Inputs (Maintenance)	The inputs into maintenance planning processes are the drivers and assumptions (influenced by objectives) and the understanding of Centralines' Asset Specialists of regulations, legislation, manufacturer specifications and asset performance requirements.
LCAM Planning Processes	Centralines has extensive condition monitoring, inspection and testing regimes across the majority of its asset classes. The data and asset

Process Element	Description
(Data and Information)	information collected is made available to asset specialists in order to determine required maintenance interventions and potential renewal activities. Centralines has developed mobile applications to electronically capture some of the high volumes of data generated by field inspections. These smartphone applications allow data to be uploaded directly into Centralines' core business applications. Further development of these systems are planned in order to enhance data capture and processing capabilities.
LCAM Planning Processes (Tools and Frameworks)	Centralines uses a number of Decision Support Tools (DST) to support decision-making at various stages of an asset's lifecycle. DST are processes, algorithms and frameworks that enable effective decision making. These systems provide structure, repeatability, transparency and auditability. The key tools that Centralines uses to support maintenance and renewal planning decisions are described in the maintenance and renewal sections below.
LCAM Planning Processes (Business Processes)	Business processes are where inputs are turned into outputs. For LCAM planning, the key processes are those related to maintaining and replacing assets.
Asset Renewal Process	The asset renewal process is the process whereby Asset Specialists decide which assets to replace, when and why. Broadly the process involves identifying and prioritising constraints (based on performance gaps), evaluating mitigation options and then scheduling work to happen.
Maintenance Process	The maintenance process is the process whereby Asset Specialists decide how Centralines' assets should be maintained. Similar to renewals, the process involves identifying and prioritising maintenance needs, evaluating options and then scheduling work to happen.
Renewal Programme	The renewal programme is the combined output of the renewal planning process. It is an annually updated programme of work to replace assets over the coming 10 year period.
Maintenance Programme	The maintenance programme is the combined output of the maintenance planning process. It is an annually updated programme of work to maintain assets over the coming 10 year period.

Table 5-1: LCAM Planning Approach – Key Elements

5.3 Maintenance

5.3.1 Maintenance Overview

Maintenance at Centralines is designed and carried out to manage the natural deterioration that occurs as assets age.

5.3.2 *Maintenance Drivers*

Maintenance is targeted to ensure that Centralines' assets can support the achievement of LCAM objectives as long as practical, at lowest cost. Centralines' key maintenance drivers are explained below.

Driver	Driver Descriptions
Public, Employee and Contractor Health and Safety	Ensuring assets are fit for purpose and in a condition that allows them to be safely operated by our contractor.
	Ensuring assets are physically secure and will not cause harm or be easily accessed under normal circumstances by Centralines' customers or members of the public.
	Taking all practicable steps to ensure any asset failures do not cause harm to our customers, contractors, members of the public and environment or cause damage to third party property.
	Taking all practicable steps to ensure our assets operate as intended and designed, e.g. a recloser or circuit breaker will operate correctly in the event of a fault and safely isolate the faulted section of network.
	Ensuring maintenance policies, programmes and practices align and are consistent with Centralines' Public Safety Management System.
Legislative and Regulatory Compliance	Ensuring Centralines' maintenance planning policies and programmes meet all legislative and regulatory requirements.
	Where appropriate, ensuring Centralines' maintenance planning practices as a minimum conform to industry best practice, relevant standards and guidelines and original equipment manufacturers' (OEM) specifications.
Asset Information Gathering	Invasive and non-invasive testing, inspections and diagnostics of assets to ascertain their status and condition. This information is essential in LCAM decision making and drives much of the asset renewal programme as well as the planned and corrective maintenance programmes.
Managing Risks of In-service Failures	Ensuring assets are fit for purpose and are adequately maintained to function as intended, over their useful lives.
	Ensuring Centralines' maintenance practices keep assets functioning at a level that meets current regulatory network reliability performance targets.
	Extracting optimal value (including life extension) from Centralines' assets by timely, efficient and cost effective maintenance interventions.
	Ensuring asset testing and maintenance inspections are effective by obtaining relevant, accurate, and reliable, fit-for-purpose condition assessment data and information that can be transformed into knowledge enabling optimal asset management decision-making.

Driver	Driver Descriptions
Cost / Efficiency	Focussing on reducing costs by implementing appropriate maintenance strategies that proactively identify and address potential asset / network issues before they become faults (i.e. planned and proactive versus reactive maintenance).
	Ensuring the best decisions are made between different modes of maintenance (repair, refurbish, or replacement) by the use of sound engineering judgment, existing tools and the development and enhancement of Expert Decision Support Systems.
	Working with Centralines' service providers to identify and monitor efficiency measures and make continuous improvements to procedures, processes and practices to improve the efficiency and delivery of the maintenance programme.
Manufacturer Specifications and Recommendations	Ensuring published guidelines on the maintenance of equipment are met as a minimum to ensure best-practice.

Table 5-2: Centralines' Detailed Maintenance Drivers and Descriptions

5.3.3 Maintenance Planning Assumptions

Centralines' current maintenance strategies and plans have been developed and are being executed based on the following assumptions.

Centralines' Maintenance Planning Assumptions
Data being used in asset management decision making is fit for purpose.
No significant changes in legislative, regulatory or statutory requirements (e.g. Health and Safety) will transpire requiring major changes in focus or priorities.
Current network reliability performance targets are maintained, i.e. there is no radical change to SAIDI / SAIFI targets.

Table 5-3: Centralines' Maintenance Planning Assumptions

5.3.4 Maintenance Planning Process

Centralines' maintenance planning approach is shown and explained in Figure 5-5 and Table 5-4

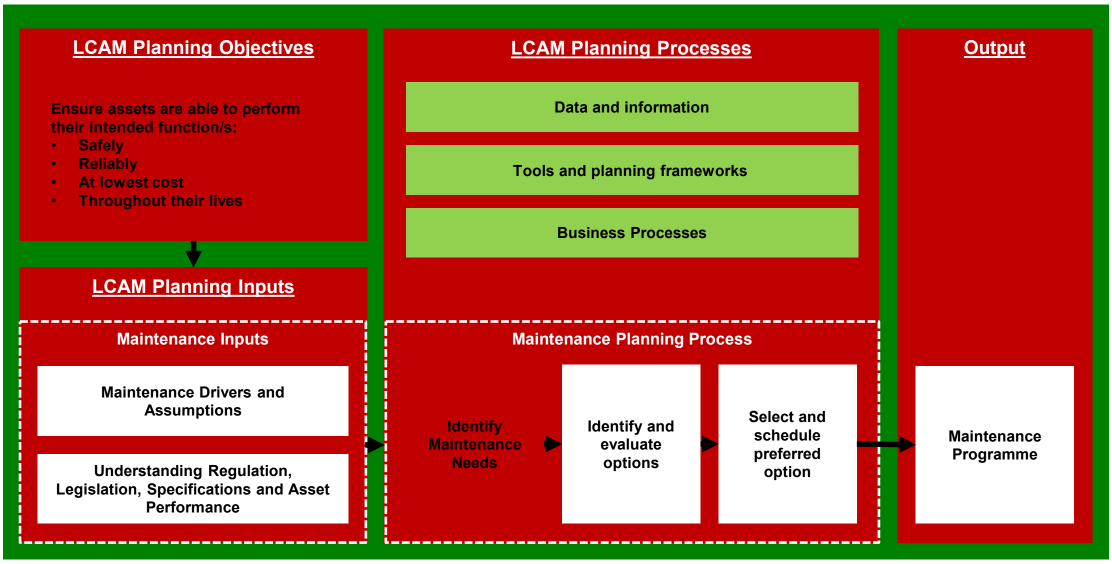


Figure 5-5: Maintenance Planning Approach

Group	Element	Description
Maintenance Inputs	Drivers and Assumptions	Maintenance drivers and assumptions are balanced qualitatively by Asset Specialists to form recommended planned maintenance activities for each asset class.
	Regulations, Legislation, Specifications and Asset Performance Expectations.	Asset Specialists review relevant regulations and legislation as well as manufacturers' specifications/recommendations for asset maintenance. The Asset Specialists weigh these requirements against the performance expectations of the assets and determine the required maintenance types and levels.
Maintenance Planning Process	Identify Maintenance Needs	Maintenance requirements are identified by Asset Specialists. The Asset Specialist for each class of asset is tasked with assessing relevant regulation and legislation and the manufacturers' specifications for recommended maintenance types/levels. These 'base' requirements are then blended with the Asset Specialists' requirements for information gathering on the asset, the assets' individual performance requirements and history.
	Identify and Evaluate Options	The types of maintenance activities performed are driven primarily by the requirements of the maintenance programme and the availability of technology/equipment and contractor resources. The Asset Specialist determines what type of maintenance will best meet the requirements and will be able to be delivered.
	Select and Schedule Preferred Option	A formal process of recommendations, challenge, review and finalisation is followed to ensure outputs are optimal and deliverable. It is during this challenge and review process that contractor resourcing and budgeting is taken into consideration.

Group	Element	Description
Maintenance Output	Maintenance Programme	The maintenance programme is the combined output of the maintenance planning process. It is an annually updated programme of work to maintain assets over the coming 10 year period. Types of maintenance included in the Maintenance Programme are described in Section 5.3.5 below.

Table 5-4: Centralines' Maintenance Planning Process

5.3.5 Maintenance Approaches

Centralines employs a combination of methods to maintain, inspect and test its portfolio of assets through its planned and reactive/corrective maintenance programmes. These include age, time, condition, reliability and risk-based approaches.

5.3.5.1 Age Based Maintenance

Asset age is gradually becoming less of a driver in determining when a maintenance intervention should occur. However age-related factors such as insulating materials in circuit breakers (e.g. oil vs vacuum or gas), cost and availability of spares and asset functionality will continue to impact on maintenance regimes and influence renewal programmes.

5.3.5.2 Time Based Maintenance

Time based maintenance is maintenance including inspections and testing conducted at a predetermined frequency or interval. This frequency is influenced by drivers such as regulatory and statutory requirements, industry guidelines and best practice, Centralines' engineering experience and original equipment manufacturers' (OEM) specifications.

5.3.5.3 Condition Based Maintenance

This maintenance occurs where it has been determined the most effective action is a maintenance intervention based on an asset's current condition. Condition based maintenance occurs through effective asset condition monitoring including inspections and testing, or as identified by other means such as Centralines' asset defect process (refer 5.3.7).

5.3.5.4 Risk Based Maintenance

Centralines is adopting Condition Based Risk Management (CBRM) which not only considers the condition of an asset but also the consequences and associated risks of that asset failing. CBRM over time will become more influential in the identification and prioritisation of maintenance and renewal programmes and tasks.

5.3.5.5 Reliability Centred Maintenance

This is maintenance that focusses on maintaining system reliability and performance. In a Centralines' context this includes the identification of failure modes through Failure Mode and Effects Analyses (FMEA) or analysis of reported defects and the subsequent identification of maintenance or potential renewal strategies to mitigate these failures.

5.3.6 Maintenance Categories

Centralines' asset specific maintenance programmes and related activities incorporating the above approaches are classified into the following categories which are aligned to determination definitions.

5.3.6.1 Service Interruption and Emergency Maintenance (Urgent Reactive Maintenance)

This is reactive maintenance undertaken in the immediate or short term in response to an unplanned event. Typically these events relate to network faults caused by asset failures, vegetation, adverse weather and third party damage etc.

Centralines generally breaks this category down into two levels of response.

1. First Response

This is categorised as the initial response to find and isolate the fault, mitigate any health and safety risks and to subsequently fully or partially restore supply if possible.

2. Second Response

This is further reactive maintenance work required beyond the scope of First Response to undertake either temporary or permanent repairs and restore supply. The above all relates to operational expenditure. A reasonable portion of second response activities will involve renewal of capital items, and as such will be carried out as capital expenditure under Asset Replacement and Renewal.

5.3.6.2 *Vegetation Management*

Vegetation Management includes the inspection, liaison and cutting activities (planned and reactive) associated with the control of vegetation for the primary purpose of compliance with the Electricity (Hazards from Trees) Regulations 2003. Centralines' vegetation control programme is determined by the outputs of a Vegetation Prioritisation Programme (VPP), the outputs of routine feeder inspection programmes, and vegetation-related defects identified on the network through any other means.

The VPP was developed to improve the efficiency and effectiveness of the vegetation programme. The tool assists with prioritising feeder sections for targeted vegetation control based on multiple drivers including customer numbers, history of vegetation related faults and current programme status. Centralines is constantly reviewing and developing its vegetation control programme in an effort to improve the efficiency of the cutting programme and to mitigate the issues created by vegetation both within and outside the powerline corridor. An example of this is the introduction of a herbicide application programme and the optimisation of the programme utilising aerial feeder inspections.

5.3.6.3 *Routine and Corrective Maintenance and Inspection (Planned/Preventative Maintenance)*

This category encompasses prescribed, budgeted maintenance tasks (maintenance baseline) carried out to an agreed schedule and typically includes routine asset maintenance and servicing, inspections, testing and condition assessments. A significant portion of this maintenance is prescribed by maintenance standards and related service codes adopted by Centralines.

This category also includes non-urgent remedial work carried out as planned activities subsequent to service interruption and emergency work or maintenance identified by Centralines' defect process, asset condition assessments, testing, inspections and field observations.

5.3.6.4 *Asset Replacement and Renewal*

Asset replacement and renewal maintenance relates to the replacement or renewal of non-capital items. This covers planned remedial work on assets including replacement of asset components and asset refurbishment. Typically this maintenance is initiated as a result of asset inspections and testing, condition assessments and defect reporting.

5.3.7 *Defect Process*

Centralines has a defect reporting standard which details the process by which identified network asset defects are reported, prioritised and remediated. All identified defects are categorised in terms of urgency based on criteria such as public and employee safety and consequences of the asset failing including potential network reliability and performance considerations.

Critical defects are those that affect operational security or are a safety hazard. These types of defects must be actioned immediately.

Urgent defects are those which must be addressed with a minimum of delay, generally no later than three months from date of reporting. These defects do not compromise safety or asset security. They may have an operational constraint, but with switching can be left out of service until the repair can be made.

Non-urgent defects are those found that do not affect the operational security of the network nor present an immediate safety hazard. These defects are generally addressed as planned work.

All defects are coded to allow subsequent analysis of reported defects, including the specific asset type and detailed cause of the defect.

5.4 Renewal

5.4.1 Renewal Overview

When deciding to replace an asset or group of assets, Centralines seeks to optimise the balance between cost, risk and performance. For Centralines this means replacing assets when they can no longer be effectively maintained. “Effectively” incorporates recognition of cost, performance, safety, and other drivers. Centralines uses a variety of tools, systems, processes and expert engineering judgement to quantify, where practical, each element of the trade-off to enable informed decisions to be made.

5.4.2 Renewal Drivers

Centralines’ renewal drivers incorporate cost, risk and performance aspects. The complexity of quantifying and combining all relevant variables is, in many cases very difficult and often not practical. In practice, Centralines’ renewal plan is regularly influenced by a combination of the drivers below:

Centralines’ Renewal Drivers
The likelihood of an in-service failure (generally based on asset condition).
The consequences and risks (staff and public safety, environmental, reputational damage etc.) associated with an in-service failure and any cost effective non-renewal mitigations that may be available.
The availability and cost of spares and skilled resources.
The benefits of increased functionality (i.e. ability to provide network or asset condition information etc.), lower maintenance costs and increased performance of modern equivalents.
The difference in cost between a planned vs. reactive asset replacement.
Synergies including both practical and economic considerations with other renewal projects which may result in the acceleration or deferral of asset renewals.
Integration synergies of asset renewal projects with other programmes of work including system growth, reliability, safety and environment and customer-driven projects.

Table 5-5: Centralines’ Renewal Drivers

5.4.3 Renewal Expenditure Modelling Assumptions

The key assumptions underlying Centralines approach to modelling renewals are tabled below.

Renewal Expenditure Modelling Assumptions
Network assets become less reliable as they age.
There is a risk:cost trade-off between replacing assets preventatively (i.e. pre-failure) and replacing assets reactively (i.e. post-failure).

Table 5-6: Renewal Expenditure Modelling Assumptions

5.4.4 Approach to Renewal Planning

To plan which assets need replacing in a given year, Centralines uses an approach of identifying age and condition based constraints on assets, evaluating options to mitigate the constraint and then selecting and scheduling the preferred option. This process is illustrated in the figure below with each element described in the table that follows.

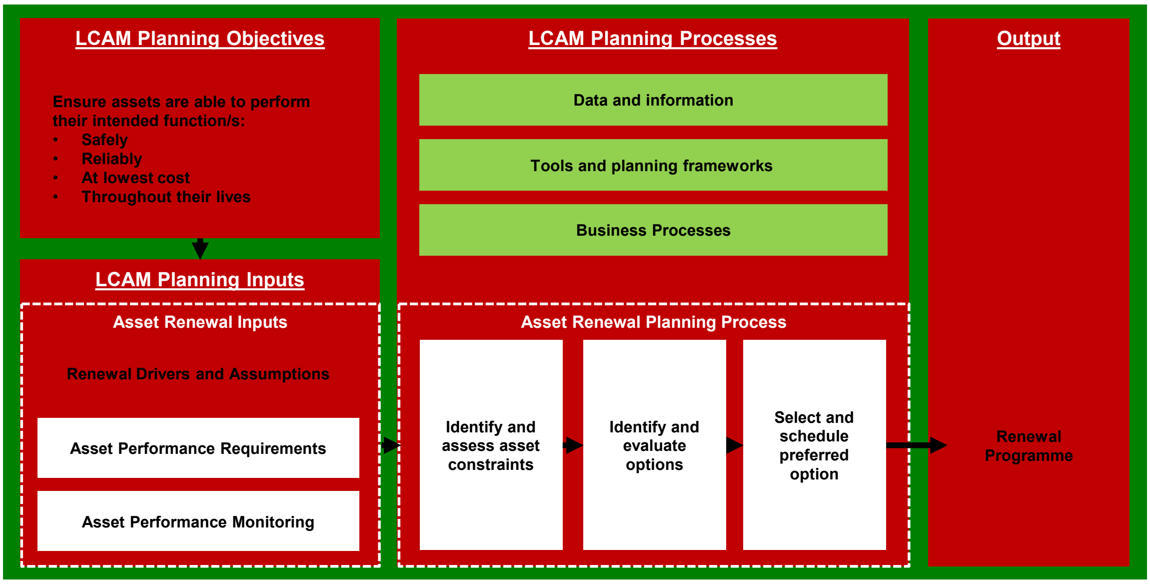


Figure 5-6: Renewal Planning Process

Group	Element	Description
Renewal Inputs	Drivers and Assumptions	Maintenance drivers and assumptions are balanced qualitatively by Centralines' Asset Specialists to form recommended planned maintenance activities for each asset class.
	Asset Performance Requirements	Asset Specialists currently use decision support tools and apply expert engineering judgement to individual assets or types of assets (asset classes) in order to achieve Centralines' LCAM objectives. Specific requirements for each type of asset are currently being documented as part of 'to be published' Fleet Strategy documents. These documents will formally translate Asset Management Objectives, and LCAM objectives into objectives and plans for individual classes (fleets) of asset.
	Asset Performance Monitoring	Information about an asset's condition is a key determinant in the need for intervention (replacement or maintenance).

Group	Element	Description
Renewal Planning Processes	Identify and Assess Asset Constraints	This process is summarised in 5.4.5 and 5.4.6 below (top-down and bottom-up planning).
	Identify and Evaluate Options	Once a constraint has been identified, solution evaluation and selection is carried out collaboratively between teams at Centralines. Asset Specialists who identify condition-based constraints engage with Network Planners to ensure proposed solutions align with long term network growth, security and quality plans. Detailed further in 5.4.7 below (Alternatives to Renewal).
	Select and Schedule Preferred Option	
Renewal Programme	Renewal Programme	The renewal programme is the combined output of the renewal planning process. It is an annually updated programme of work to replace assets over the coming 10 year period.

Table 5-7: Centralines' Renewal Planning Process

5.4.5 Top-down Planning (Renewal Envelope)

Centralines uses the Renewal Envelope (RE) as a top-down budgeting tool to determine the optimal level of renewal relative to the total asset base. In practice, Centralines uses the RE each year to set indicative asset replacement budgets, and then individual assets or groups of assets are identified to make up those budgets based on condition assessment and other drivers.

The RE looks at individual assets extracted from Centralines' GIS and calculates a benefit:cost ratio of renewal for each year on the planning horizon. Where this ratio exceeds one, the asset is flagged for renewal.

The RE is currently driven largely based on asset age however Centralines is improving its understanding of the condition of assets through process, system and technological improvements. The ultimate outcome of these improvements will be to have calculated remaining life expectancies (RLEs) for individual assets based on actual condition. In time, the Renewal Envelope will become populated with asset specific RLEs meaning that it will be able to be used for top-down budgeting as well as bottom-up renewal planning.

5.4.6 Bottom-up Planning

Individual assets and/or groups of assets are identified for renewal in current or future years based on several factors. For planned (pre-failure) renewals, asset age has historically been a key driver. Centralines is continuing to adopt more effective approaches incorporating age, condition and risk.

CBRM considers relevant asset condition information to determine the likelihood of failure and also factors in the consequences of the asset failing and the associated risks including safety and network reliability. It enables more robust decision making in relation to the identification and prioritisation of asset maintenance and renewals.

A further decision support tool called Condition Adjusted Survival Time (CAST) is currently under development to inform Lifecycle Asset Management decision making. CAST will in time supersede CBRM for applicable asset classes. CAST will use advanced algorithms to more accurately determine the remaining life expectancy of assets as well as considering the risks and consequences of asset failures. It is expected this model will be available for use on selected asset classes in 2017 and will augment current asset management decision support systems, practices, decisions and outcomes.

This outcome will also be enabled by the development and further enhancement of Expert Decision Support Systems (EDSS) underpinned by the development and execution of a fit-for-purpose data strategy.

Reactive (post-failure) renewals are budgeted for each year based on the expected in-service failure rates of assets. Those rates are informed primarily by trend analysis as well as the expected impact of planned work.

5.4.7 Alternatives to Renewal

Replacement is only one option to restoring asset performance. Other options that are evaluated include repair, refurbishment, relocation, retrofitting or de-rating assets and retaining them in service. The decision to replace, refurbish or repair an asset is now being supported by the Triple-R model. This model performs a comparative discounted cash flow analysis at the asset class level for the life cycle of each applicable solution. The key inputs for this model are:

- The cost of each solution for the asset;
- Standard life expectancy of the asset;
- Expected increase in life expectancy of the asset; and
- Annual maintenance cost of the asset.

The relocation, retrofitting or de-rating of many asset classes may be economically viable options but have not been included in the modelling to date. These options are however investigated on an *ad hoc* basis where engineering judgment suggests these modes may present an optimal solution.

5.5 Asset Lifecycle Management by Asset Category

5.5.1 General Section Overview and Format

The assets which Centralines manages throughout their lifecycle are summarised in this section. The classes of assets covered in this section are listed in the table below. These categories are consistent with the minimum requirements prescribed by the determination. Asset categories have been expanded in some instances to provide further clarity on lifecycle activities undertaken on groups of assets in each category:

Asset Class	Section Reference
Sub–transmission: 33kV Overhead Lines	5.7
Sub-transmission: 33kV Underground Cables	5.8
Zone Substation: Power Transformers	5.10
Zone Substation: 33kV Circuit Breakers	5.11
Zone Substation: 11kV Circuit Breakers and Switchboards	5.12
Zone Substation: Buildings	5.13
Zone Substation: Ripple Injection / Load Control Plants	5.14
Poles: All Voltages	5.15
Distribution and Low Voltage Overhead Lines	5.16
Distribution and Low Voltage Underground Cable	5.17
Distribution Transformers	5.18
Voltage Regulators	5.19
Overhead Distribution Switchgear	5.20
Ground Mounted Distribution Switchgear	5.21

Table 5-8: Asset Class Descriptions and Section References

Detailed information is provided on each of the above asset categories. The following table summarises the sub-sections included and describes the information provided under those sub-sections.

Sub-section Heading	Information Provided
Asset Group Category Description	Where a group of assets has been broken down, a general description of the high level category is provided.
Asset Description and Quantity	Describes at a high level each asset class, its function and voltage and provides details on the total number or length of assets included in the asset category.
Asset Condition and Performance	A high level commentary is provided on the overall condition and performance of the asset category. Any systemic issues which have led to the premature replacement of assets are identified as well as mitigations to address these issues.

<table>
<tr><th>Sub-section Heading</th><th>Information Provided</th></tr>
<tr><td>Asset Condition Assessment</td><td>
For each asset category, the relevant excerpt from Schedule 12A has been included. This provides a general asset category condition overview based on 2016 information.
The condition grade of an asset is as described in the determination and detailed in the table below.
<table>
<tr><th>Condition Grade</th><th>Condition Description</th></tr>
<tr><td>Condition Grade 1</td><td>End of serviceable life, immediate intervention required.</td></tr>
<tr><td>Condition Grade 2</td><td>Material deterioration but asset condition still within serviceable life parameters. Intervention likely to be required within three years.</td></tr>
<tr><td>Condition Grade 3</td><td>Normal deterioration requiring regular monitoring.</td></tr>
<tr><td>Condition Grade 4</td><td>Good or as new condition.</td></tr>
</table>
In addition, an assessment on the accuracy of the data used to grade the asset condition is included based on the determination descriptions in the table below.
<table>
<tr><th>Data Accuracy</th><th>Data Accuracy Description</th></tr>
<tr><td>Data Accuracy 1</td><td>Good quality data is not available for any of the assets in the category and estimates are likely to contain significant error.</td></tr>
<tr><td>Data Accuracy 2</td><td>Good quality data is available for some assets but not for others and the data provided includes estimates of uncounted assets within the category.</td></tr>
<tr><td>Data Accuracy 3</td><td>Data is available for all assets but includes a level of estimation where there is understood to be some poor quality data for some of the assets within the category.</td></tr>
<tr><td>Data Accuracy 4</td><td>Good quality data is available for all of the assets in the category.</td></tr>
</table>
</td></tr>
<tr><td>Asset Age Profiles</td><td>Asset age profile graphs based largely on 2015 disclosure information are included. These graphs identify the quantity or length of assets and their corresponding installation or manufacture dates. There may be minor differences between the disclosure information and the graphs provided. This is due to data improvements which have enhanced the accuracy of the original information.</td></tr>
</table>

Sub-section Heading	Information Provided
Maintenance Plan	Centralines' general approach to inspecting and maintaining each asset category is outlined together with a detailed description of the types of inspections, tests, and condition monitoring undertaken including the frequency. It can be assumed for all asset classes that corrective maintenance is carried out on an "as required" basis following condition monitoring, tests and inspections or as a result of Centralines' defect process.
Asset Replacement and Refurbishment	Renewal and refurbishment drivers are discussed.
Innovations	A description of any asset specific innovations that have deferred asset replacements is provided.
Controlled Documents	A table listing the relevant controlled documents for each asset class is provided in this sub-section. LCAM activities and tasks for each asset class are governed by a suite of controlled documents. These documents include design, construction and operational standards, service codes and procedures. They specify the asset specific requirements of tasks and activities that need to be undertaken throughout the lifecycle of the asset including the collection of relevant asset condition information.

Table 5-9: Asset Sub-section Headings and Information Provided

5.6 Sub–transmission: Asset Group Overview

Centralines' sub-transmission network carries electricity from Transpower's Waipawa Grid Exit Point (GXP) in Ongaonga to Centralines' zone substations. This network also provides the interconnectivity between substations utilising a combination of predominantly overhead lines and some underground cables. Centralines' standard sub-transmission voltage is 33kV. Supply is also taken at 11kV (four feeders) directly from Transpower's Waipawa GXP.

Centralines has a number of 33kV sub-transmission lines and cables installed on Transpower sites. These assets are covered by Centralines' Access and Occupation Schedule Agreement which sets out the terms and conditions associated with Centralines' assets on Transpower sites.

5.7 Sub–transmission: 33kV Overhead Lines

5.7.1 Asset Description: 33kV Overhead Lines

Centralines' sub-transmission network incorporates 94 kilometres of 33kV overhead lines. These sub-transmission lines are predominately ACSR Dog (100mm^2) conductor with some copper conductor in zone substation switch yards.

5.7.2 Asset Condition and Performance: 33kV Overhead Lines

The overhead sub-transmission system is generally reliable, and current levels of maintenance are supporting favourable network performance. The relatively dry Central Hawke's Bay environment, combined with low levels of airborne pollution provide for very low levels of natural degradation of the overhead network. The majority of the network is well insulated from the effects of coastal salt spray. No systemic issues have been identified with this asset class.

5.7.3 Asset Condition Assessment: 33kV Overhead Lines

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Sub-transmission: 33kV conductor			94.8%	5.2%	2	

Table 5-10: Asset Condition Assessment: 33kV Overhead Lines

5.7.4 Asset Age Profile: 33kV Overhead Lines

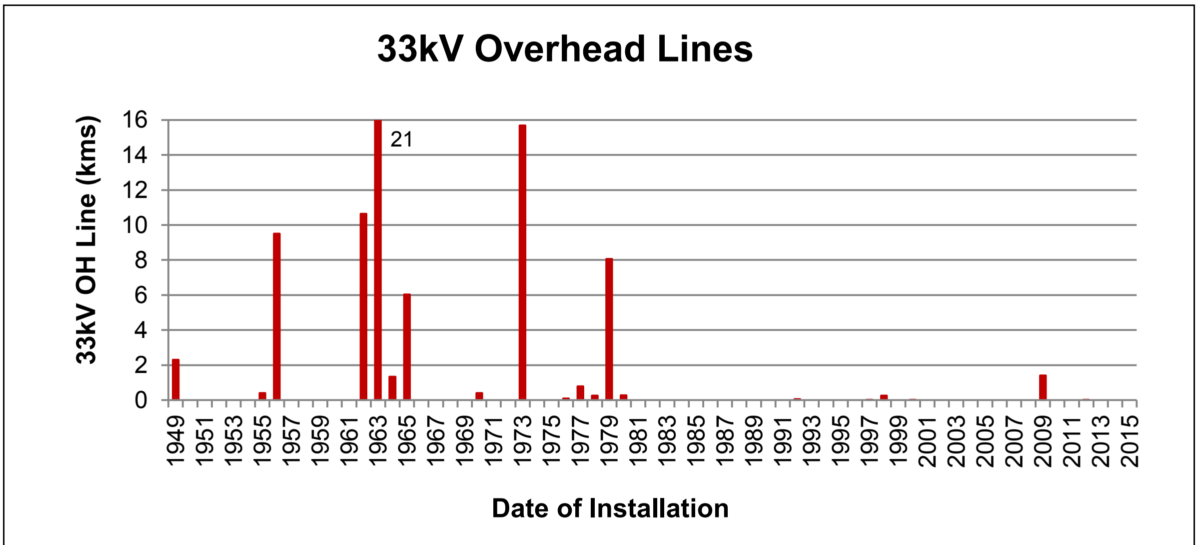


Figure 5-7: Asset Age Profile: 33kV Overhead Lines

5.7.5 Maintenance Plan: 33kV Overhead Lines

Centralines takes a proactive approach to inspecting and maintaining overhead sub-transmission lines. The following table details the maintenance undertaken on this asset class.

Condition Monitoring / Testing	Frequency
Aerial based visual inspection of all 33kV overhead lines.	Annually
Centralines' feeder surveys cover all overhead network assets and are a combination of aerial and ground based visual inspections depending on access and terrain.	5 year cycle

Table 5-11: Maintenance Plan: 33kV Overhead Lines

5.7.6 Asset Replacement and Refurbishment: 33kV Overhead Lines

33kV line renewals are primarily based on known asset condition. Current non-invasive technologies and methods to cost effectively and accurately determine the condition of overhead conductors are inconclusive and still evolving. Centralines will continue to work with the industry to develop and adopt best practice in this area. Current replacement and refurbishment drivers are outlined below.

Replacement / Refurbishment Drivers
• Asset condition based primarily on feeder inspection data. • Conductor type, design, age and criticality. • Historical conductor performance records and trend analysis. • Results of specially commissioned laboratory conductor analysis. • Specific asset location and environmental considerations. • Condition Based Risk Management (CBRM) to be introduced in future to inform and assist in the identification and prioritisation of sub-transmission conductor replacement programmes.

Table 5-12: Asset Replacement and Refurbishment Drivers: 33kV Overhead Lines

5.7.7 Controlled Documents: 33kV Overhead Lines

Controlled Document Reference	Controlled Document Description
NK1003	Vegetation Control Guidelines
NK3002	Line Design Loadings Standard
NK3019	Overhead Line Conductor and Fittings Standard
NK3022	Network Fusing Standard
NK3024	Overhead Line Standard Assemblies
NK3025	Overhead Line Design Standard
NK3030	Design Requirements for Public Safety
NK3041	Earth Manual – Standard Earths
NK5011	Inspection and Testing of Standard and SWER Earths
NK5020	Feeder Survey Condition Monitoring Standard
NK5080	Thermo-Vision Inspection Standard
NK5115	Re-Sagging Conductor Standard
NK5119	Basic Distribution Line Maintenance Standard
OS1004	Switching Instructions – Preparations and Approval
OS1006	Live Line Work Operational Practices
OS1014	Commissioning and Livening of Equipment Standard
OS1015	Defect Reporting Standard
SC5081	Service Code -Transmission Line Thermo-Vision Inspection
SOP-112	SOP - Testing Corrosion on Conductors

Table 5-13: Controlled Documents: 33kV Overhead Lines

5.8 Sub-transmission: 33kV Underground Cables

5.8.1 Asset Description: 33kV Underground Cables

The sub-transmission cable network consists of 1.76 kilometres of cross-linked polyethylene (XLPE) insulated, aluminium underground cable located at Transpower's Waipawa GXP; at the connection between the 33kV overhead network and the 33kV switchgear for feeder nine at the Waipawa Zone Substation; and at the railway crossing at Waipukurau on the Wilder Road 33kV circuit. Sizes range from 35mm² to 400mm² and include both single and three core cable.

5.8.2 Asset Condition and Performance: 33kV Underground Cables

Centralines' sub-transmission underground cable is in good condition and no systemic issues have been identified.

5.8.3 Asset Condition Assessment: 33kV Underground Cables

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Sub-transmission: 33kV XLPE cable			5%	95%	2	

Table 5-14: Asset Condition Assessment: 33kV Underground Cables

5.8.4 Age Profile: 33kV Underground Cables

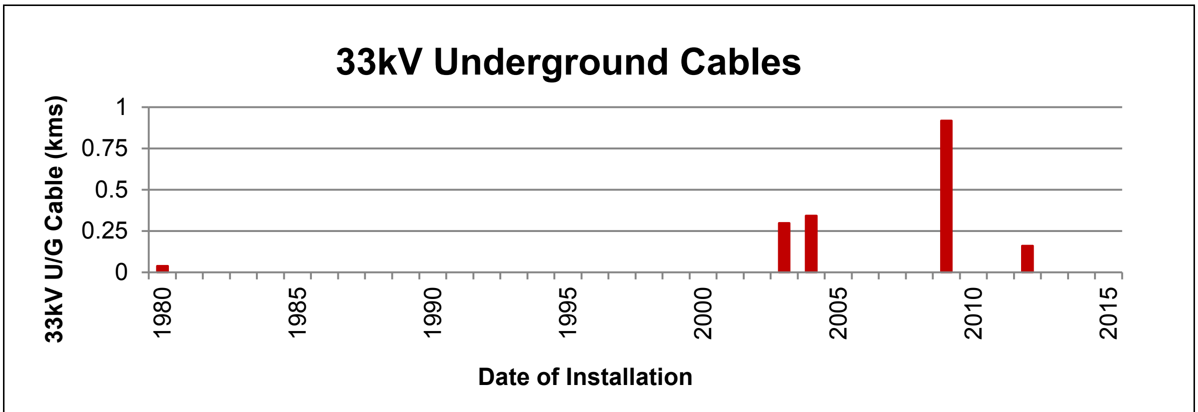


Figure 5-8: Asset Age Profile: 33kV Underground Cables

5.8.5 Maintenance Plan: 33kV Underground Cables

The following table details the maintenance undertaken on 33kV cables.

Condition Monitoring / Testing	Frequency
Visual inspections, corona detection, thermo scanning and non-invasive partial discharge testing of 33kV cable terminations within Zone Substations.	Annually
Aerial based visual inspection of all above ground 33kV cabling including pole cable risers and terminations.	Annually
Visual inspection of accessible, above ground cabling including pole cable risers as part of overhead line feeder surveys.	5 year cycle
No diagnostic cable testing is currently undertaken on 33kV underground cables. It is planned to develop and introduce a testing regime in 2017.	

Table 5-15: Maintenance Plan: 33kV Underground Cables

5.8.6 Asset Replacement and Refurbishment: 33kV Underground Cables

Due to the 33kV sub-transmission cable on the Centralines' network being reasonably new and in good condition, no cable replacements are planned in the current AMP planning period. Any future 33kV cable renewals will be based on the following drivers.

Replacement / Refurbishment Drivers
• Cable type, design, age and criticality. • Historical cable performance records and trend analysis. • Asset condition based on diagnostic test results and inspection data. • Condition Based Risk Management (CBRM) to be introduced in future to inform and assist in the identification and prioritisation of sub-transmission cable replacement programmes.

Table 5-16: Asset Replacement and Refurbishment Drivers: 33kV Underground Cables

5.8.7 Controlled Documents: 33kV Underground Cables

Controlled Document Reference	Controlled Document Description
NK3001	Underground Design Standard
NK3022	Network Fusing Standard
NK3023	Underground Cable Specifications and Standards
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3041	Earthing Manual – Standard Earths
NK4001	Underground Construction Standard
NK4015	Underground Cable Installation
NK4020	Cable Testing Standard
NK5011	Inspection and Testing of Standard and SWER Earths
NK5020	Feeder Survey Condition Monitoring Standard
NK6103	Material Specification – Polymeric Insulated HV Cable
NK8001	Current Ratings of Cables
OS1004	Switching Instructions – Preparations and Approval
OS1014	Commissioning and Livening of Equipment Standard
OS1015	Defect Reporting Standard
OS1016	Close Approach Consent Process
SC4022	Service Code – Cable Insulation Resistance Test
SC4023	Service Code – Cable Sheath Test
SC4024	Service Code – Cable VLF Test
SC4025	Service Code – Cable Tan Delta Test
SC4026	Service Code – New Cable Acceptance Test
SC4027	Service Code – Testing New Cables
SC4028	Service Code – Condition Monitoring In-Service Cables
SOP-101	SOP – Identifying HV Cables prior to Spiking

Table 5-17: Controlled Documents: 33kV Underground Cables

5.9 Zone Substations: Asset Group Overview

Zone substations encompass a range of network assets including buildings, power transformers, 33kV and 11kV switchgear, load control plant and associated control, protection and communications equipment. The key function of a zone substation is to house the required network assets to convert sub-transmission voltage (33kV) to distribution voltage (11kV), allowing the safe and efficient distribution of electricity to Centralines' customers. Centralines has four zone substations situated at Waipukurau, Waipawa, Takapau and Wilder Road as well as an 11kV switching station (four pole mounted reclosers and two ring main units) outside Transpower's Waipawa GXP.

5.10 Zone Substation: Power Transformers

5.10.1 Asset Description: Zone Substation Power Transformers

Power transformers convert the 33kV sub-transmission voltage to 11kV which is more suitable for network distribution. They are filled with mineral insulating oil which provides both insulation and cooling for the transformer. Transformer cooling is enhanced by cooling fans fitted to radiators and some transformers also have oil pumps to more effectively circulate the oil to increase the transformer's rating. All Centralines' substations, apart from Wilder Road, incorporate bunded transformer foundations to mitigate failures which may result in significant oil spills. There is a project included in this year's plan to install a transformer bund at Wilder Road.

Substation power transformers typically include an automatic on-load tap changer which maintains the output voltage within defined limits. Most of the older tap changers operate in a separate oil filled compartment within the transformer. As the tap changer operates to keep the output voltage constant, the contacts arc in the oil and therefore the oil and the contacts require frequent maintenance. Modern transformers are supplied with vacuum insulated tap changers which are virtually maintenance free.

Centralines has a total of seven three phase power transformers. The two power transformers installed at each of the Waipukurau, Waipawa and Takapau zone substations are all rated at 7.5MVA, with a single 2MVA transformer installed at the Wilder Road site.

5.10.2 Asset Condition and Performance: Zone Substation Power Transformers

Centralines' fleet of power transformers are relatively modern or have been fully refurbished. Both transformers at Waipukurau were manufactured in 2007; the transformers at Takapau were manufactured in 1977 and were fully refurbished in 2009; the Waipawa transformers were manufactured in 1965 and were fully refurbished in 2010 and the Wilder Road unit was manufactured and installed in 1994.

Effective condition monitoring, maintenance and load management practices over the years have ensured they all remain in good condition and are providing reliable performance.

5.10.3 Asset Condition Assessment: Zone Substation Power Transformers

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Zone Substation: Power Transformers			57%	43%	3	

Table 5-18: Asset Condition Assessment: Zone Substation Power Transformers

5.10.4 Asset Age Profile: Zone Substation Power Transformers

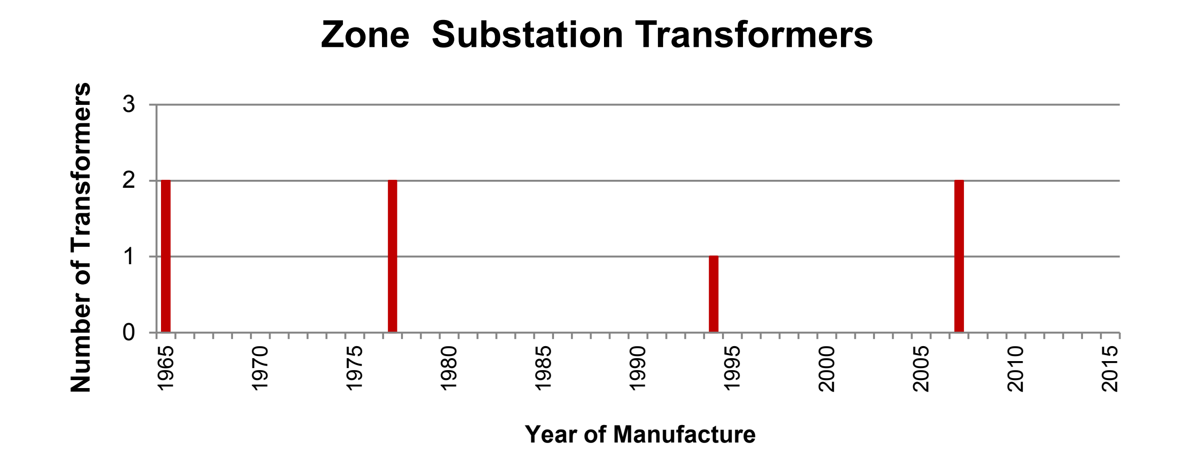


Figure 5-9: Asset Age Profile: Zone Substation Power Transformers

5.10.5 Maintenance Plan: Zone Substation Power Transformers

Due to the criticality of these assets, Centralines employs a range of inspection, testing, condition monitoring and maintenance programmes to ensure this asset fleet continues to perform reliably.

It is planned to adopt further diagnostic transformer testing in 2017. This will include dielectric frequency response testing which measures the amount of moisture in transformer winding paper insulation. If not remedied, high moisture levels can reduce the dielectric strength or accelerate the aging of the cellulose and lead to eventual failure. In addition, dynamic resistance testing of selected tap changers will be carried out to test for abnormal or high resistance connections.

Oil samples are taken from each transformer annually for analysis. Dissolved Gas Analysis (DGA) testing is providing information on any build-up of dissolved gasses. Furan Analysis is planned to be introduced to enable an estimation of the degree of polymerisation (DP) of insulation paper in Centralines' transformers.

The following maintenance activities are currently undertaken on power transformers.

Condition Monitoring / Testing	Frequency
Detailed visual inspection looking for oil leaks or any unusual noises or vibration etc. This inspection also includes minor maintenance work including silica gel checks, tap changer operational checks and counts. This maintenance occurs weekly at the three major substations and monthly at Wilder Road.	Weekly
Preventative maintenance on power transformers and associated protective devices (Buchholz relays and temperature sensors) including insulation resistance and dielectric frequency response testing.	2 year cycle
Preventive maintenance is undertaken on all tap changers with frequency dependent on the make, type, age, switching insulation medium and OEM specifications. Turns ratio testing post maintenance.	2-10 year cycle
Detailed DGA and oil condition tests including moisture, acidity and dielectric breakdown is undertaken at least annually. More frequent sampling can be carried out subject to any suspected fault within a specific transformer.	As required but at least annually
Furan Analysis to estimate degree of polymerisation (DP) of paper insulation.	2 year cycle
Inspection of transformer and conductor terminations using thermo-vision, and corona cameras and partial discharge sensing technology.	Annually

Table 5-19: Maintenance Plan: Zone Substation Power Transformers

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5.10.6 Asset Replacement and Refurbishment: Zone Substation Power Transformers

Given the age profile and based on the current condition of the Centralines' power transformers, there are no planned replacements in the current AMP planning period. Current and future replacement and refurbishment drivers are outlined below.

Replacement / Refurbishment Drivers
• Transformer age, criticality and asset condition based on diagnostic test results and inspection data. • DGA oil results and outputs of Furan Analysis. • Historical transformer performance records and trend analysis. • DP test results. • The Condition Based Risk Management (CBRM) model to be introduced in future to inform and assist in the identification and prioritisation of transformer replacement programmes.

Table 5-20: Asset Replacement and Refurbishment Drivers: Zone Substation Power Transformers

5.10.7 Controlled Documents: Zone Substation Power Transformers

Controlled Document Reference	Controlled Document Description
NK3030	Design Requirements for Public Safety
NK3050	Zone Substation General Specifications Standard
NK4011	Substation Equipment Installation Standard
NK4013	Pre-Commissioning of Substation Assets Standard
NK4020	Cable Testing Standard
NK5012	Station Level 1 Inspections
NK5013	Station Level 2 Inspections
NK5035	Station Outdoor Instrument Transformer Maintenance Standard
NK5042	Power Transformer Maintenance Standard
NK5043	Insulating Oil Maintenance Standard
OS1013	Station Entry Procedure
OS1014	Commissioning and Livening of Equipment
OS1015	Defect Reporting Standard
SC2020	Service Code - Transformer Service and Diagnostic Test
SC2021	Service Code - Standard Tap Changer Service
SC2022	Service Code - Special Tap Changer Service
SC2023	Service Code - Transformer Winding Insulation Test
SC2024	Service Code - Transformer Cable Insulation Test
SC2025	Service Code - Transformer DGA and Insulating Oil Test
SC2050	Service Code - Dielectric Breakdown Oil Test
SC2051	Service Code - Acidity Test

Controlled Document Reference	Controlled Document Description
SC2052	Service Code - Dissolved Gas Analysis
SC2070	Service Code - Instrument Transformer Service Check Sheet
SOP-10	SOP – Establishing a Permit Area in a Zone Substation

Table 5-21: Controlled Documents: Zone Substation Power Transformers

5.11 Zone Substations: 33kV Circuit Breakers

5.11.1 Asset Description: 33kV Circuit Breakers

Circuit breakers are automatically operated electrical switches. They are designed to interrupt electrical power circuits thus protecting upstream and downstream electrical assets from damage as a result of a shorted or overloaded circuit. Additionally they ensure the safety of the public and utility employees and provide electrical discrimination on the network reducing the outage impact of faults.

Their basic function is to interrupt power by an initiated control command or automatically by protective sensing devices that detect abnormal or fault conditions. They are designed to interrupt circuits repeatedly and safely both under normal load and fault conditions. A circuit breaker can be reset manually or automatically (and remotely) to resume normal operation after a fault and they can be programmed to auto-reclose under certain circumstances.

Centralines has standardised on 33kV circuit breakers that use sulphur hexafluoride (SF_6) gas as the contact arc quenching medium. Centralines has ten in service sub-transmission outdoor 33kV circuit breakers, all of which use SF_6 gas as the arc suppressing insulating medium.

5.11.2 Asset Condition and Performance: 33kV Circuit Breakers

Centralines' modern fleet of outdoor 33kV circuit breakers are in good condition with no systemic issues being identified.

5.11.3 Asset Condition Assessment: 33kV Circuit Breakers

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Zone substation: 33kV Outdoor CBs				100%	4	

Table 5-22: Asset Condition Assessment: 33kV Circuit Breakers

5.11.4 Asset Age Profile: 33kV Circuit Breakers

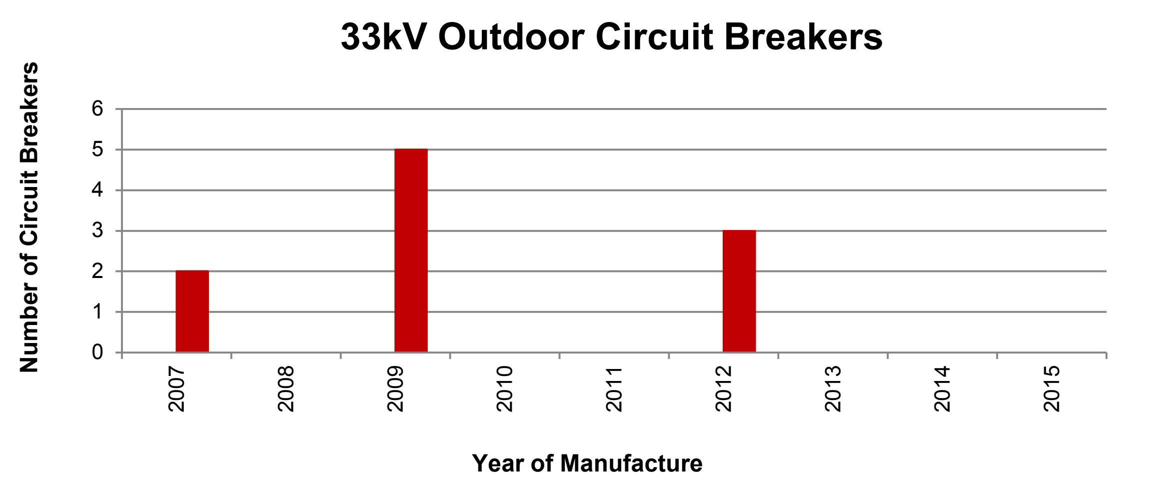

Figure 5-10: Asset Age Profile: 33kV Circuit Breakers

5.11.5 Maintenance Plan: 33kV Circuit Breakers

To ensure reliability, 33kV circuit breakers are subject to a cyclic maintenance programme based on OEM recommendations, industry practice and Centralines' own engineering judgement and operational experience.

The following table outlines Centralines' current maintenance programme for 33kV circuit breakers.

Condition Monitoring / Testing	Frequency
Visual inspection of all 33kV substation circuit breakers including operational counter checks and any required minor maintenance.	Weekly
Routine inspection, testing and servicing including diagnostic tests and functional operational checks. These encompass cleaning, Ductor™ testing, insulation resistance, circuit breaker timing tests and checking the contact erosion indicators.	Every 3 years
Thermo-vision, corona and partial discharge testing of circuit breakers.	Annually

Table 5-23: Asset Replacement and Refurbishment Drivers: 33kV Circuit Breakers

5.11.6 Asset Replacement and Refurbishment: 33kV Circuit Breakers

Due to the age and condition of this asset fleet, there are no scheduled replacements for the current AMP planning period. Future replacement and refurbishment drivers are outlined below.

Replacement / Refurbishment Drivers
• Circuit breaker, design, insulating medium, age, condition and criticality. • Historical circuit breaker performance records and trend analysis. • Diagnostic circuit breaker testing. • Health and safety and environmental considerations. • The Condition Based Risk Management (CBRM) model will be introduced in future to inform and assist in the identification and prioritisation of replacement programmes.

Table 5-24: Asset Replacement and Refurbishment Drivers: 33kV Circuit Breakers

5.11.7 Controlled Documents: 33kV Circuit Breakers

Controlled Document Reference	Controlled Document Description
NK3001	Underground Design Standard
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3041	Earthing Manual – Standard Earths
NK3050	Zone Substation General Specifications Standard
NK4011	Substation Equipment Installation Standard
NK4013	Pre-Commissioning of Substation Assets Standard
NK4020	Cable Testing Standard
NK5012	Station Level 1 Inspections
NK5013	Station Level 2 Inspections
NK5043	Outdoor Circuit Breaker Maintenance Standard
NK5070	Sulphur Hexafluoride (SF_6) Use and Handling Procedures
OS1013	Station Entry Procedure
OS1015	Defect Reporting Standard
SC2010	Service Code - Outdoor Circuit Breaker Minor Service
SC2013	Service Code - Outdoor SF_6 Circuit Breaker Service

Controlled Document Reference	Controlled Document Description
SOP-10	Establishing a Permit Area in a Zone Substation
SOP-33	SOP - Areva GL107 Outdoor Circuit Breaker

Table 5-25: Controlled Documents: 33kV Circuit Breakers

5.12 Zone Substation: 11kV Circuit Breakers and Switchboards

5.12.1 Asset Description: 11kV Circuit Breakers and Switchboards

Refer to the asset description for 33kV circuit breakers for details of the function of this asset class.

Centralines has a total of 27 indoor, ground mounted, 11kV circuit breakers installed in zone substations. In addition there are two pole mounted outdoor units installed at the Wilder Road site and four further pole mounted units outside Transpower's Waipawa GXP which are effectively classified as substation circuit breakers. These circuit breakers use either oil or a vacuum as the contact breaking medium.

5.12.2 Asset Condition and Performance: 11kV Circuit Breakers and Switchboards

Centralines' fleet of 11kV substation circuit breakers is generally in good condition. The main condition and performance issues being experienced relate to the deterioration and wear of contacts and mechanical mechanisms and the ongoing requirement for oil treatment in older units.

There are no current systemic issues that have been identified with this asset class. However it is acknowledged that older indoor oil circuit breakers are maintenance intensive, have lower fault current ratings and present elevated risks due to the oil and lack of arc flash containment and protection.

Operationally the circuit breakers have been loaded well below their capacity limits and are maintained under a comprehensive maintenance programme. This has ensured ongoing, reliable performance.

5.12.3 Asset Condition Assessment: 11kV Circuit Breakers and Switchboards

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Zone-substation: 11kV Ground Mounted CBs			67%	33%	3	
Zone-substation: 11kV Pole Mounted CBs				100%	3	

Table 5-26: Asset Condition Assessment: 11kV Circuit Breakers and Switchboards

5.12.4 Asset Age Profile: 11kV Circuit Breakers and Switchboards

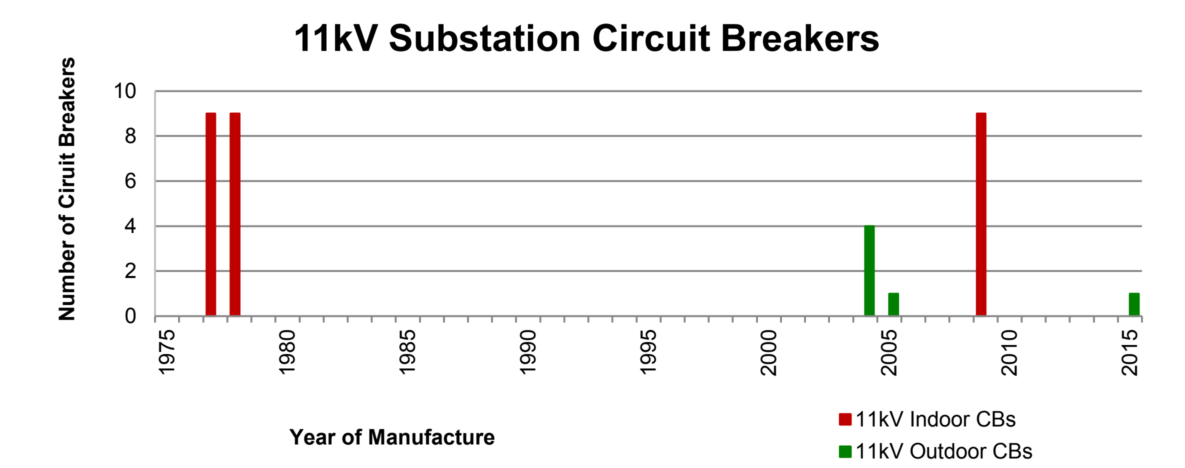

Figure 5-11: Asset Age Profile: 11kV Circuit Breakers and Switchboards

5.12.5 Maintenance Plan: 11kV Circuit Breakers and Switchboards

To ensure reliability, 11kV circuit breakers and switchboards are subject to a cyclic maintenance programme based primarily on the breaking medium (oil or vacuum), OEM recommendations, industry practice and Centralines' own engineering judgement and operational experience. The number of fault operations for oil-insulated circuit breakers and the location and criticality of the circuit breaker also influence maintenance practices.

Oil circuit breakers require more intensive maintenance than vacuum insulated circuit breakers because insulating oil in circuit breakers is at risk of contamination from carbon deposits as a result of breaking fault currents and from moisture ingress.

The following table outlines Centralines' current maintenance programme for 11kV circuit breakers.

Condition Monitoring / Testing	Frequency
Visual condition assessment and asset inspection of all substation circuit breakers including operational counter checks and minor maintenance.	Weekly
Routine inspection, testing and servicing including diagnostic tests and functional operational checks. These encompass cleaning, Ductor™ testing, insulation resistance and circuit breaker timing tests and oil voltage breakdown tests. Vacuum – including checking the contact erosion indicators. Oil – including oil testing and invasive maintenance to inspect the condition of contacts. Oil – fault service.	 Every 3 years Every 2 years After every fault operation
Thermo-vision, corona and partial discharge inspection of outdoor circuit breakers.	Annually
Non-invasive partial discharge testing of indoor circuit breakers.	1 - 2 year cycle depending on previous test results.

Table 5-27: Maintenance Plan: 11kV Circuit Breakers and Switchboards

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5.12.6 Asset Replacement and Refurbishment: 11kV Circuit Breakers and Switchboards

Circuit breakers are critical assets and must be replaced if there is an unacceptable risk of an in-service failure due to any factors including deterioration in asset condition. Due to the good condition of Centralines' 11kV circuit breakers, no circuit breaker replacements are currently planned during the AMP planning period. Current replacement and refurbishment drivers are outlined below.

Replacement / Refurbishment Drivers
• Circuit breaker design, age, insulating medium, condition and criticality. • Historical circuit breaker performance records and trend analysis. • Health and safety considerations. • Current and future maintenance requirements. • Protection considerations. • Availability of spare parts. • Diagnostic circuit breaker testing. • Functionality. • Synergies with other asset replacement or augmentation projects. • Specific circuit breaker location and environmental considerations. • The Condition Based Risk Management (CBRM) model will be introduced in future to inform and assist in the identification and prioritisation of replacement programmes.

Table 5-28: Asset Replacement and Refurbishment Drivers: 11kV Circuit Breakers and Switchboards

5.12.7 Controlled Documents: 11kV Circuit Breakers and Switchboards

Controlled Document Reference	Controlled Document Description
NK3001	Underground Design Standard
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3041	Earthing Manual – Standard Earths
NK3050	Zone Substation General Specifications Standard
NK4011	Substation Equipment Installation Standard
NK4013	Pre-Commissioning of Substation Assets Standard
NK4020	Cable Testing Standard
NK5012	Station Level 1 Inspections
NK5013	Station Level 2 Inspections
NK5038	Metalclad Switchgear Maintenance Standard
NK5043	Insulating Oil Maintenance Standard
OS1013	Station Entry Procedure
OS1015	Defect Reporting Standard
SC2000	Metalclad Switchgear - Minor Service of Oil Circuit Breakers
SC2001	Metalclad Switchgear - Oil Circuit Breaker Service
SC2002	Metalclad Switchgear - Oil Circuit Breaker Fault Service
SC2004	Metalclad Switchgear - Vacuum Circuit Breaker Service
SC2050	Service Code - Dielectric Breakdown Voltage Test
SC2051	Service Code – Acidity Test
SC2052	Service Code – Dissolved Gas Analysis
SOP-10	SOP – Establishing a Permit Area in a Zone Substation
SOP-21	SOP – AEI/GEC BVP Oil Indoor Circuit Breaker
SOP-25	SOP – Reyrolle Pacific ROS LMVP Indoor Circuit Breaker

Table 5-29: Controlled Documents: 11kV Circuit Breakers and Switchgear

5.13 Zone Substation: Buildings

5.13.1 Asset Description: Zone Substation Buildings

Zone substation "buildings" include grounds and buildings utilised to securely house the range of electrical and non-electrical equipment required for a fully functional zone substation. Centralines has four zone substations situated at Waipukurau, Waipawa, Takapau and Wilder Road and with the exception of Wilder Road, all have buildings.

5.13.2 Asset Condition and Performance: Zone Substation Buildings

Following the Canterbury earthquakes and the learnings from this event, a substation building seismic strengthening programme has been developed and all substation buildings on the Centralines' network will be strengthened to building importance level four of the new building standard. This category relates to structures with special post disaster recovery functions. Work will start on this programme in the 2016/17 financial year commencing with the Waipukurau substation.

5.13.3 Asset Condition Assessment: Zone Substation Buildings

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Zone substation buildings up to 66kV			33%	67%	2	

Table 5-30: Asset Condition Assessment: Zone Substation Buildings

5.13.4 Asset Age Profile: Zone Substation Buildings

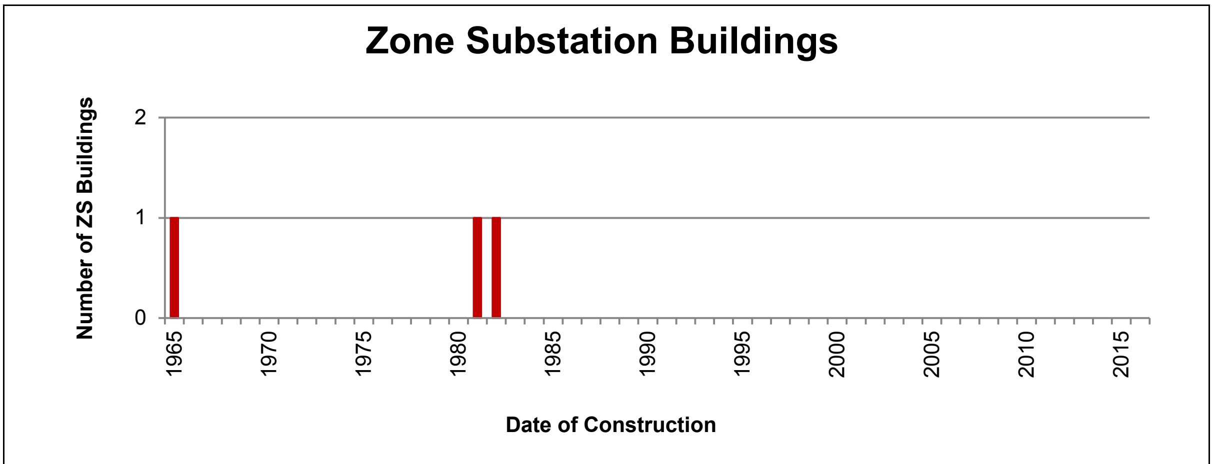

Figure 5-12: Asset Age Profile: Zone Substation Buildings

5.13.5 Maintenance Plan: Zone Substation Buildings

Buildings, fences and grounds are regularly inspected to ensure they remain in good condition in order to maintain site security and asset integrity. Centralines' maintenance standards provide detailed requirements for substation inspections including buildings and other asset condition monitoring and inspections as described in other sections. Regular maintenance is undertaken to ensure the integrity of Centralines' substation buildings.

It is planned over the next five-years to upgrade zone substation security. This will include the installation of electric locks controlled by Centralines' personal access cards and codes. This will provide real time information to Unison Control Room operators on the personnel accessing substations. The upgrade would also include a new standard substation lock and security system.

Condition Monitoring / Testing	Frequency
A security and detailed visual inspection including any required minor maintenance and housekeeping is completed weekly at all substations (except Wilder Road which is done monthly) to ensure the integrity and security of the substation.	Weekly

Table 5-31: Maintenance Plan: Zone Substation Buildings

5.13.6 Asset Replacement and Refurbishment: Zone Substation Buildings

There are no substation building replacements scheduled during the current AMP planning period. As discussed a seismic strengthening programme will commence in the 2016/17 financial year. Current replacement drivers are tabled below.

Replacement / Refurbishment Drivers
• Seismic considerations. • Building code requirements. • Age, condition and criticality. • Health and safety considerations. • Current and future maintenance requirements.

Table 5-32: Asset Replacement and Refurbishment Drivers: Zone Substation Buildings

5.13.7 Controlled Documents: Zone Substation Buildings

Controlled Document Reference	Controlled Document Description
NK1011	Asset Change and As-Built Drawing Documentation Standard
NK1402	Substation Draughting and Records Guidelines
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3050	Zone Substation General Specification Standard
NK4001	Underground Construction Standard
NK5012	Station Level 1 Inspections
NK5013	Station Level 2 Inspections
NK5014	Substation Grounds Maintenance Standard
NK5023	Substation Control Indication and Alarm Testing Standard
NK5028	Substations Communications Equipment Maintenance Standard
OS1013	Station Entry Procedures
SC4010	Service Code - Substation Control Indication and Alarm Test
SC5500	Service Code – General Communications Equipment Inspection
SC5502	Service Code - Station VHF SCADA Equipment Inspection

Table 5-33: Controlled Documents: Zone Substation Buildings

5.14 Zone Substation: Ripple Injection / Load Control Plants

5.14.1 Asset Description: Ripple Injection / Load Control Plants

A load control ripple injection plant is used within the network to provide load control and management functions for various types of equipment. Load management allows utilities to reduce demand for electricity during peak times, which can in turn defer asset capacity upgrades. Equipment controlled includes customer hot water and heating systems, Council owned street lighting and security and under-veranda lighting. Centralines has one ripple injection plant operating on its network.

This plant injects a high frequency signal which is superimposed over the high voltage network. This signal can be received by specially tuned relays in the low voltage network to provide specific control activities. The plant consists of a solid state 400 volt frequency generator, high voltage coupling equipment consisting of voltage transformers and capacitors to tune and inject the frequency signal into the network, and control and signal equipment that provides the controls and functions for the signals. Across its network foot print, Centralines injects a frequency of 475 hertz onto the 33kV network.

Centralines own a number of network load control ripple relay receivers which predominantly control hot water pilot and street lighting. Centralines however does not own ripple control receivers on customer switchboards and therefore has limited ability to control their installation and maintenance.

5.14.2 Asset Condition and Performance: Ripple Injection/Load Control Plants

The plant was installed new in 2012/13 and is being regularly maintained. Its condition and performance are excellent.

5.14.3 Asset Condition Assessment: Ripple Injection/Load Control Plants

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Load Control Plant				100%	4	

Table 5-34: Asset Condition Assessment: Ripple Injection/Load Control Plants

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5.14.4 Asset Age Profile: Ripple Injection/Load Control Plants

Centralines has only one ripple injection plant which is located at the Waipukurau zone substation. The plant was purchased from the retailer Meridian in 2011/12 and subsequently replaced in 2012/13.

5.14.5 Maintenance Plan: Ripple Injection/Load Control Plant

Centralines' ripple plant is subject to weekly and annual maintenance regimes. Routine inspection of the load control plant is scheduled in conjunction with weekly zone substation maintenance. Annual maintenance is sub-contracted to Landis+Gyr.

Load control relays in the field are subject to reactive maintenance only. Current ripple plant maintenance is outlined in table below.

Condition Monitoring	Frequency
A security and functional check of the ripple plant is undertaken as part of weekly substation inspections.	Weekly
Centralines' ripple plant is maintained annually as part of the Landis+Gyr maintenance contract and includes general maintenance and signal strength and capacitor testing.	Annually

Table 5-35: Maintenance Plan: Ripple Injection/Load Control Plant

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5.14.6 Asset Replacement and Refurbishment: Ripple Injection/Load Control Plant

Due to this asset being reasonably new, there is no plan to replace it during the current AMP planning period. Future replacement drivers for and influences on ripple injection and load control plan are outlined below.

Replacement / Refurbishment Drivers
• Asset condition based primarily on inspections and factoring in asset age, criticality, capacity and functionality. • Historical performance. • Availability of spare parts. • Equipment obsolescence.

Table 5-36: Asset Replacement and Refurbishment Drivers: Ripple Injection/Load Control Plant

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5.14.7 Controlled Documents: Ripple Injection/Load Control Plant

Controlled Document Reference	Controlled Document Description
NK3021	Hot Water, Street Light and Ripple Control Systems Standard
NK3030	Design Requirements for Public Safety
NK5024	Ripple Plant Inspection and Maintenance Standard
OS1014	Commissioning and Livening of Equipment
OS1015	Defect Reporting Standard
SC4040	Service Code – Ripple Station Inspection Check Sheet Level 2
SC4041	Service Code - Master Station FPR Maintenance
SC4042	Service Code - Ripple Plant Maintenance

Table 5-37: Controlled Documents: Ripple Control / Load Control Plant

5.15 Poles: All Voltages

5.15.1 Asset Description: Poles

Poles are physical structures used to keep overhead electrical conductors and ancillary equipment a safe distance from each other and from the ground. They are typically made of wood or concrete with a relatively small number manufactured from steel and composite materials. Poles are available in a range of sizes and strengths to cater for site specific requirements factoring in variables such as terrain, required electrical clearances and the mechanical load (weight, angle and tensions) of conductors and ancillary equipment they need to support.

Centralines has standardised on Busck concrete poles for use on its network. Centralines has approximately 18,000 network poles which are predominantly concrete.

Pole Type	Number
Wood	319
Concrete	17,454

Table 5-38: Pole Types and Numbers

5.15.2 Asset Condition and Performance: Poles

Concrete poles continue to perform extremely well in the relatively dry Central Hawke's Bay environment. There are very few in-service failures and very low levels of required replacements. The performance of the concrete poles confirms Centralines' view that the average standard life for poles and conductors is 65 years, given the mechanical and electrical loading and environmental conditions within the Centralines' network.

Systemic Issues	Mitigation
There have been some recent issues of concrete spalling on poles in coastal areas. This occurs when salt corrodes internal metal reinforcing causing the surrounding concrete to break away.	There is no mitigation for spalling and poles are replaced once it is identified and prior to the structural integrity of the pole being compromised.

Table 5-39: Systemic Issues and Mitigations: Poles

5.15.3 Asset Condition Assessment: Poles

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Poles: Concrete and steel structures		0.5%	66.5%	33%	2	0.5%
Poles: Wooden		18%	76%	6%	3	23%

Table 5-40: Asset Condition Assessment: Poles

5.15.4 Age Profile: Poles

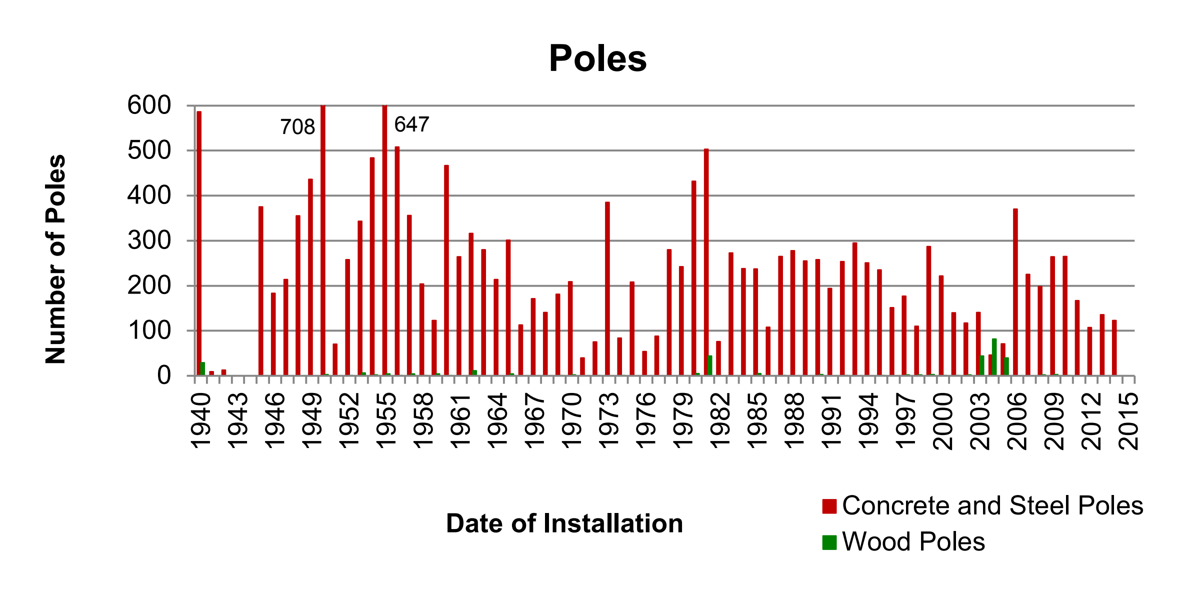

Figure 5-13: Age Profile: Poles

5.15.5 Maintenance Plan: Poles

Safety risks posed to the public and employees by pole failures are recognised by Centralines as significant and therefore pole assets are proactively inspected at regular intervals and their condition assessed.

Condition Monitoring / Testing	Frequency
Visual aerial inspection of 33kV poles.	Annually
Feeder Surveys cover all overhead network assets including all poles and are a combination of aerial and ground-based visual inspections subject to accessibility.	5 year cycle

Table 5-41: Maintenance Plan: Poles

5.15.6 Asset Replacement and Refurbishment: Poles

Poles are replaced when their structural integrity is irrevocably compromised usually due to condition. Reactive replacements of poles are also required as a result of damage from storms, vegetation, motor vehicles etc. Current pole replacement drivers and influences are outlined below.

Replacement / Refurbishment Drivers
• Asset age, condition and criticality. • Failures as a result of external damage, e.g. storms, trees, vehicles etc. • Defects identified by visual inspections. • Conductor upgrades or replacements that necessitate higher pole top loadings and therefore new poles.

Table 5-42: Asset Replacement and Refurbishment Drivers: Poles

5.15.7 Controlled Documents: Poles

Controlled Document Reference	Controlled Document Description
NK1011	Asset Change and As-Built Drawing Documentation
NK3005	Pole Blocking Calculator and Summary Sheet
NK3030	Design Requirements for Public Safety
NK5020	Feeder Survey Condition Monitoring Standard
NK5100	Re-stabilising In-Line Poles
NK5112	Installation of RFD Pole Nails into Wood Poles Standard
NK5119	Basic Distribution Line Maintenance Standard
NK6005	Crossarms Materials Standard

Controlled Document Reference	Controlled Document Description
NK6006	Poles Standard
SOP-65	SOP – Refurbishment of Aged Wooden Pole Tops
SOP-108	SOP - Nailing of Defective Poles

Table 5-43: Controlled Documents: Poles

5.16 Distribution and Low Voltage Overhead Lines

5.16.1 Asset Description: Distribution and Low Voltage Overhead Lines

Centralines has 1,386 kilometres of 11kV distribution lines and 324 kilometres of low voltage lines operating on the network. Centralines' overhead network includes Copper, ACSR, AAC and galvanised steel conductor, ranging in size from No.8 ($9mm^2$) to Dingo ($160mm^2$).

5.16.2 Asset Condition and Performance: Distribution and Low Voltage Overhead Lines

The ACSR and AAC conductors are generally in good condition. Some of the older smaller copper and galvanised steel conductors are approaching end-of-life. The system is generally reliable, and current levels of maintenance are supporting satisfactory performance levels. No systemic issues have been identified in regard to overhead lines.

5.16.3 Asset Condition Assessment: Distribution and Low Voltage Overhead Lines

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Distribution OH Open Wire Conductor		0.5%	95%	4.5%	2	1%
LV OH Conductor		0.5%	89.5%	10%	2	0.5%

Table 5-44: Asset Condition Assessment: Distribution and Low Voltage Lines

5.16.4 Asset Age Profile: Distribution and Low Voltage Overhead Lines

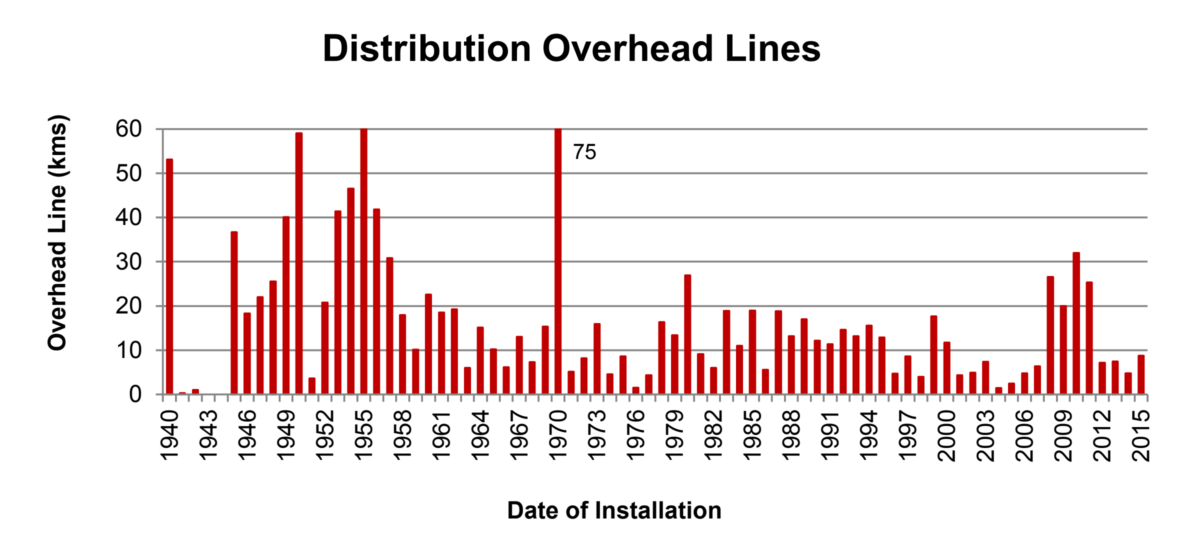

Figure 5-14: Asset Age Profile: Distribution Overhead Lines

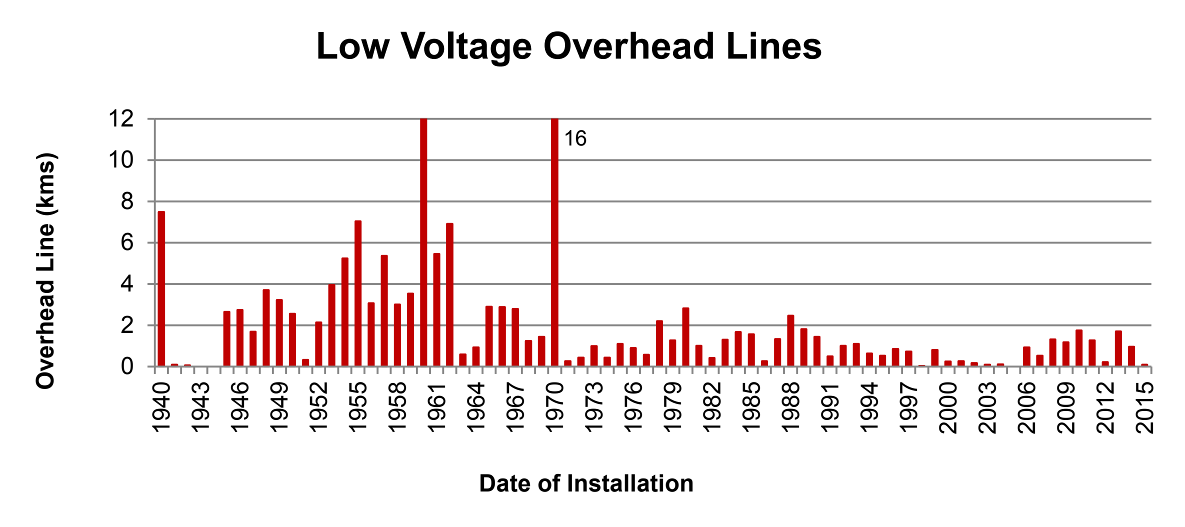

Figure 5-15: Asset Age Profile: Low Voltage Overhead Lines

5.16.5 Maintenance Plan: Distribution and Low Voltage Overhead Lines

The inspection and maintenance of Centralines' distribution and low voltage lines is governed by the Feeder Survey and Condition Monitoring Standard. Maintenance is scheduled based on inspection results. The following table outlines Centralines' current maintenance programme for this asset class.

Condition Monitoring / Testing	Frequency
Centralines' feeder surveys cover all overhead network assets and are a combination of aerial and ground based visual inspections depending on access and terrain.	5 year cycle

Table 5-45: Maintenance Plan: Distribution and Low Voltage Overhead Lines

5.16.6 Asset Replacement and Refurbishment: Distribution and Low Voltage Overhead Lines

Distribution and low voltage line renewals are primarily based on known asset condition. Current non-invasive technologies and methods to cost effectively and accurately determine the condition of overhead conductors are inconclusive and reasonably immature. Centralines will continue to work with the industry to develop and adopt best practice in this area. Current replacement drivers and influences are outlined below.

Replacement / Refurbishment Drivers
• Conductor type, design, composition, age and criticality. • Historical conductor performance records and trend analysis. • Asset condition based primarily on feeder inspection data. • Upgrades resulting from system growth initiatives. • Results of specially commissioned laboratory analysis. • Specific conductor location and environmental considerations i.e. coastal areas. • The Condition Based Risk Management (CBRM) model will be introduced in future to inform and assist in the identification and prioritisation of future conductor replacement programmes.

Table 5-46: Asset Replacement and Refurbishment Drivers: Distribution and Low Voltage Overhead Lines

5.16.7 Controlled Documents: Distribution and Low Voltage Overhead Lines

Controlled Document Reference	Controlled Document Description
NK1003	Vegetation Control Guidelines
NK3002	Line Design Loadings Standard
NK3019	Overhead Line Conductor and Fittings Standard
NK3022	Network Fusing Standard
NK3024	Overhead Line Standard Assemblies

Controlled Document Reference	Controlled Document Description
NK3025	Overhead Line Design Standard
NK3030	Design Requirements for Public Safety
NK3041	Earthing Manual – Standard Earths
NK4022	Manufactured LV Aerial Bundled Conductor Construction Standard
NK5011	Inspection and Testing of Standard and SWER Earths
NK5020	Feeder Survey Condition Monitoring Standard
NK5080	Thermo-Vision Inspection Standard
NK5115	Re-Sagging Conductor Standard
NK5119	Basic Distribution Line Maintenance Standard
OS1004	Switching Instructions – Preparations and Approval
OS1006	Live Line Work Operational Practices
OS1014	Commissioning and Livening of Equipment Standard
OS1015	Defect Reporting Standard
SOP-112	SOP - Testing Corrosion on Conductors

Table 5-47: Controlled Documents – Distribution and Low Voltage Overhead Lines

5.17 Distribution and Low Voltage Underground Cable

5.17.1 Asset Description: Distribution and Low Voltage Underground Cable

The 11kV distribution network consists of 27 kilometres of both XLPE and PILC cable. Both aluminium and copper conductors are used and are either single or three core. Conductors range in size from approximately 16 mm² to 400mm².

The low voltage network consists of 111 kilometres of cable including distribution mains, street lighting and hot water load bearing conductors and streetlight and hot water control cabling. The conductors are aluminium or copper, in single, three and four core configurations. Cable sizes vary from 4mm² to 240mm².

5.17.2 Asset Condition and Performance: Distribution and Low Voltage Underground Cable

The condition of the distribution cabling is generally good with very few defects and in-service failures in recent years.

5.17.3 Asset Condition Assessment: Distribution and Low Voltage Underground Cable

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Distribution UG XLPE and PVC			5%	95%	2	
Distribution UG PILC				100%	2	
LV UG Cable			27%	73%	2	
LV UG Streetlight Circuits			27%	73%	2	

Table 5-48: Asset Condition Assessment: Distribution and Low Voltage Underground Cable

5.17.4 Asset Age Profile: Distribution and Low Voltage Underground Cable

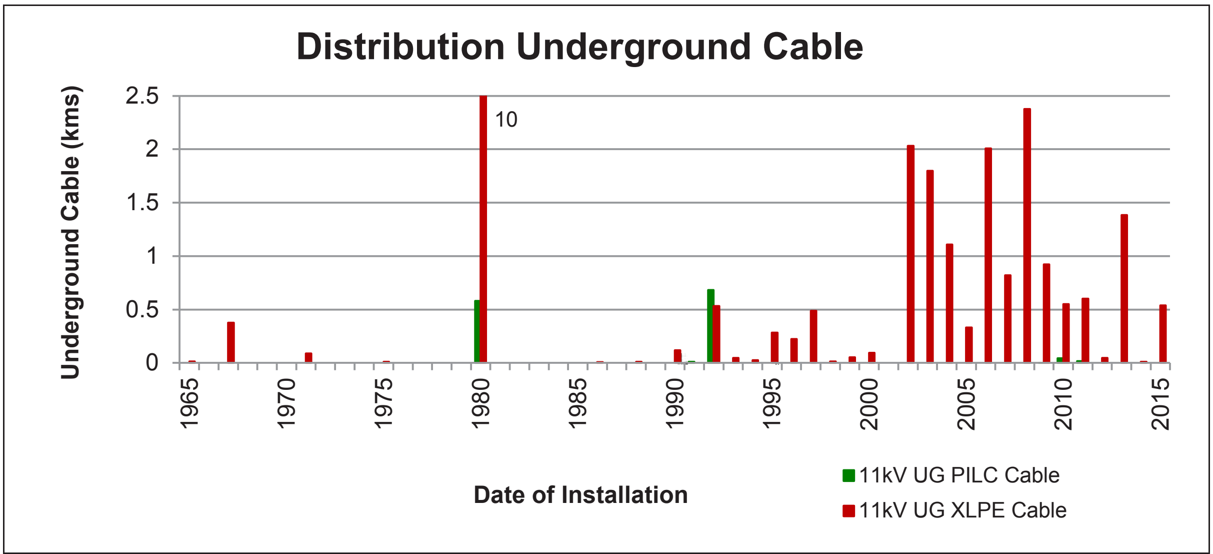

Figure 5-16: Asset Age Profile: Distribution Underground Cable

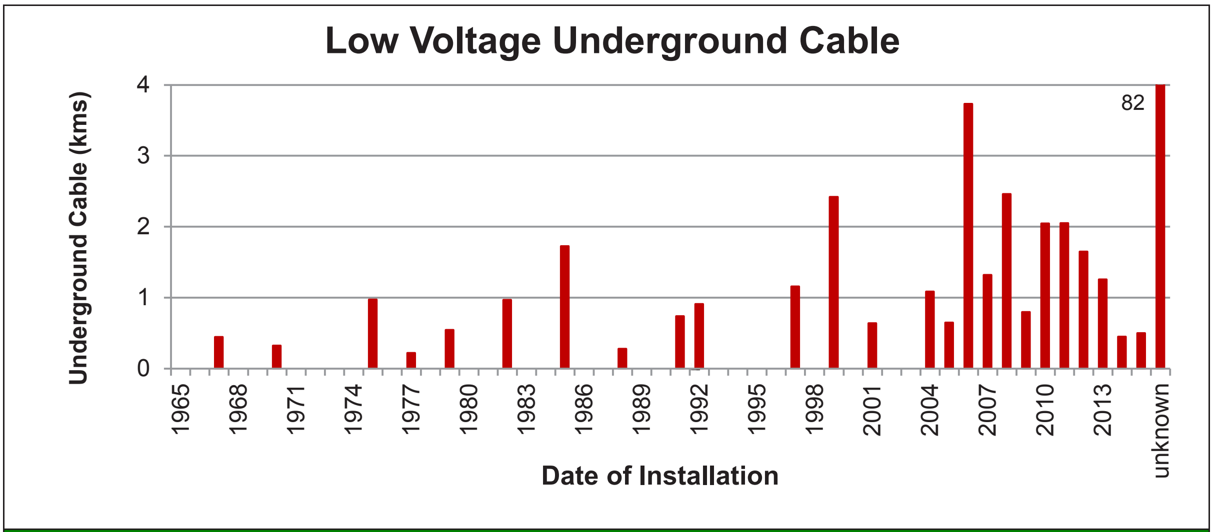

Figure 5-17: Asset Age Profile: Low Voltage Underground Cable

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5.17.5 Maintenance Plan: Distribution and Low Voltage Underground Cable

Cable inspections are performed as part of the GMI (Ground-mount Inspection) programme and the Feeder Survey programme. This is limited to exposed cable, terminations and connections. Diagnostic cable testing is currently only undertaken as a result of a network fault and on substation incoming 11kV cables during transformer maintenance. Any maintenance requirements identified by inspections are managed by the defect process.

Condition Monitoring / Testing	Frequency
Distribution Cable	
Exposed cable, terminations and connections are inspected as part of the ground-mounted distribution equipment inspection.	Annually
Exposed cable, terminations and connections are inspected as part of the overhead feeder survey and condition monitoring inspections.	5 year cycle
Diagnostic testing is undertaken as a result of any network incidents or faults and on 11kV incomer cables during transformer maintenance.	As required
Low Voltage Cabling	
Exposed cable, terminations and connections are inspected as part of the ground-mounted distribution equipment inspection.	Annually
Exposed cable, terminations and connections are inspected as part of the overhead feeder survey and condition monitoring inspections.	5 year cycle
No proactive low voltage testing is currently undertaken.	

Table 5-49: Maintenance Plan: Distribution and Low Voltage Underground Cable

5.17.6 *Asset Replacement and Refurbishment: Distribution and Low Voltage Underground Cable*

Replacement of distribution and low voltage cable is largely condition-based but consideration is always given to future network development before any condition-based renewal project proceeds. Current replacement drivers and influences are outlined below.

Replacement / Refurbishment Drivers
• Cable type, design, composition, age and criticality. • Historical cable performance records and trend analysis. • Results of diagnostic cable testing. • Cable failures. • Results of specially commissioned laboratory cable analysis. • Defects identified by visual inspections. • Specific cable location and environmental considerations. • The Condition Based Risk Management (CBRM) model will be introduced in future to inform and assist in the identification and prioritisation of future cable maintenance and replacement programmes.

Table 5-50: Asset Replacement and Refurbishment Drivers: Distribution Cable and Low Voltage Cable

5.17.7 Controlled Documents: Distribution and Low Voltage Cables

Controlled Document Reference	Controlled Document Description
NK3001	Underground Design Standard
NK3022	Network Fusing Standard
NK3023	Underground Cable Specifications and Standards
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3041	Earthing Manual – Standard Earths
NK4001	Underground Construction Standard
NK4015	Underground Cable Installation Standard
NK4017	Service Mains Underground Conversions Construction Standard
NK4020	Cable Testing Standard
NK5011	Inspection and Testing of Standard and SWER Earths
NK5020	Feeder Survey Condition Monitoring Standard
NK6103	Material Specification – Polymeric Insulated HV Cable
NK6105	Material Specification – Low Voltage Power Cables
NK8001	Current Ratings of Cables Standard
OS1004	Switching Instructions – Preparations and Approval
OS1014	Commissioning and Livening of Equipment Standard
OS1015	Defect Reporting Standard
SC4022	Service Code – Cable Insulation Resistance Test
SC4023	Service Code – Cable Sheath Test
SC4024	Service Code – Cable VLF Test
SC4025	Service Code – Cable Tan Delta Test
SC4026	Service Code – New Cable Acceptance Test
SC4027	Service Code – Testing New Cables
SC4028	Service Code – Condition Monitoring In-Service Cables
SOP-101	SOP – Identifying Cables prior to Spiking

Table 5-51: Controlled Documents: Distribution and Low Voltage Cables

5.18 Distribution Transformers

5.18.1 Asset Description: Distribution Transformers

Distribution transformers are used to convert the 11kV distribution voltage to the lower voltage level of 415/230 volts which is suitable for use by the customer. These transformers are installed across the entire network and are either pole or ground mounted. Transformer size is determined by the number of customers connected or their estimated after-diversity load. They range from small pole-mounted 5kVA single phase transformers up to large ground mounted 750kVA three phase units.

The Centralines' network incorporates 2,114 pole mounted and 160 ground mounted distribution transformers.

5.18.2 Asset Condition and Performance: Distribution Transformers

Centralines' fleet of distribution transformers are in good condition and are providing a satisfactory level of performance.

Systemic Issues	Mitigation
In highly corrosive areas including coastal zones, rust in cooling fins has resulted in oil leaks. Rust can also impact the integrity and security of transformers if not detected and treated promptly.	Any rust is proactively remediated when found. Extra zinc coating is being applied to units in highly corrosive environments.

Table 5-52: Systemic Issues and Mitigations: Distribution Transformers

5.18.3 Asset Condition Assessment: Distribution Transformers

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Transformers: Ground Mounted		1%	20%	79%		1%
Transformers: Pole Mounted		1%	69%	30%		1.5%

Table 5-53: Asset Condition Assessment: Distribution Transformers

5.18.4 Asset Age Profile: Distribution Transformers

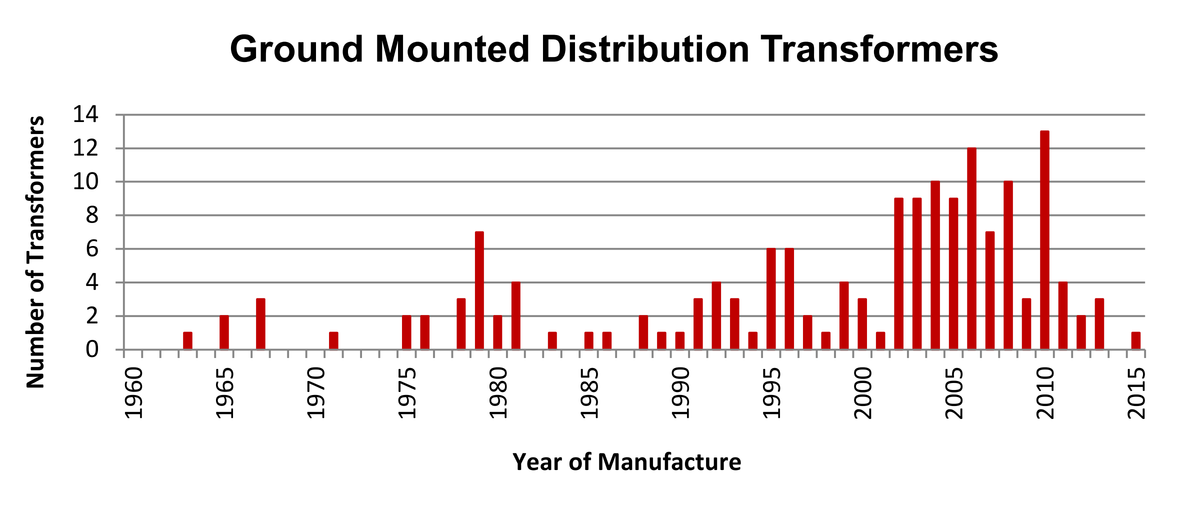

Figure 5-18: Asset Age Profile: Ground Mounted Distribution Transformers

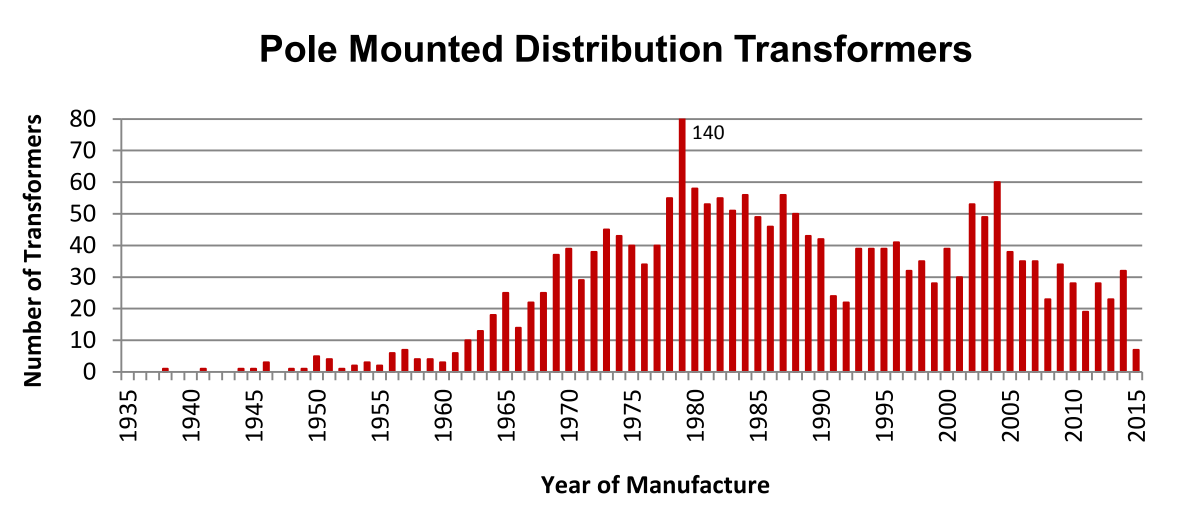

Figure 5-19: Asset Age Profile: Pole Mounted Distribution Transformers

5.18.5 Maintenance Plan: Distribution Transformers

Centralines has programmes in place to inspect its fleet of distribution transformers. Corrective maintenance is carried out on an "as required" basis following condition-monitoring inspections or as a result of issues identified by the defect process.

Condition Monitoring / Testing: Ground Mounted Transformers	Frequency
All ground mounted transformers are visually inspected as part of Centralines' ground mounted, distribution equipment inspections (GMIs).	Annually
Inspection and testing of all distribution transformer earthing including an earth site inspection and an earth resistance test. In addition a visual inspection of all associated assets is undertaken while on site.	5 year cycle
A basic oil insulation test to measure dielectric (breakdown voltage) and moisture is carried out on all transformers on all large industrial sites.	5 year cycle

Table 5-54: Maintenance Plan: Ground Mounted Distribution Transformers

Condition Monitoring / Testing: Pole Mounted Transformers	Frequency
A visual inspection of all pole mounted transformers is undertaken as part of Centralines' feeder surveys which cover all overhead network assets and are a combination of aerial and ground based inspections depending on access and terrain.	5 year cycle
Inspection and testing of all distribution transformer earthing including an earth site inspection and an earth resistance test. In addition a visual inspection of all associated assets is undertaken while on site.	5 year cycle
The above inspections are conducted independently which means each transformer is visually inspected at least twice within in a 5 year period.	

Table 5-55: Maintenance Plan: Ground Mounted Distribution Transformers

5.18.6 *Asset Replacement and Refurbishment: Distribution Transformers*

A number of distribution transformers are proactively replaced each year due to condition assessments and testing from the various inspection programmes. Additionally some reactive replacements are undertaken as a result of in-service failures due to third party damage, lightning, storms and age etc.

The CBRM model will be introduced in future to better inform and assist in the identification and prioritisation of future pole and ground mounted transformer replacement programmes. Current replacement drivers are outlined below.

Replacement /Refurbishment Drivers
• Asset condition based primarily on GMI inspections for ground mounted units and feeder inspection data for pole mounted units and factoring in asset age, criticality and any available oil test results for ground mounted transformers. • Replacements resulting from system growth or customer-driven upgrades and as a result of synergies with other renewal projects. • In service transformer failures resulting from lightning, damage by third parties, other faults etc.

Table 5-56: Replacement and Refurbishment Drivers: Distribution Transformers

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5.18.7 Controlled Documents: Distribution Transformers

Controlled Document Reference	Controlled Document Description
NK3001	Underground Design Standard
NK3019	Overhead Line Conductor and Fittings Standard
NK3022	Network Fusing Standard
NK3025	Overhead Line Design Standard
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3041	Earthing Manual – Standard Earths
NK4001	Underground Construction Standard
NK4014	Ground-Mounted Equipment – General Requirements Standard
NK4015	Underground Cable Installation Standard
NK4020	Cable Testing Standard
NK4021	Pre-Commissioning of Distribution Assets Construction Standard
NK5011	Inspection and Testing of Standard and SWER Earths
NK5017	Ground-Mounted Distribution Equipment Inspection Standard
NK5020	Feeder Survey Condition Monitoring Standard
NK5043	Insulating Oil Maintenance Standard
NK6003	Concrete Manufactured Products Standard
OS1014	Commissioning and Livening of Equipment Standard
OS1015	Defect Reporting Standard
SC2050	Service Code – Dielectric Breakdown Voltage Test
SC2051	Service Code – Acidity Test
SC2052	Service Code – Dissolved Gas Analysis

Controlled Document Reference	Controlled Document Description
SOP-39	SOP - Changing Taps in Distribution Transformers
SOP-50	SOP - Operating NX Fuses
SOP-56	SOP - Overhead Distribution Transformer Meter – Installation and Isolation

Table 5-57: Controlled Documents: Distribution Transformers

5.19 Voltage Regulators

5.19.1 Asset Description: Voltage Regulators

Voltage regulators are electrical equipment designed to automatically maintain compliant voltages to customers irrespective of how much power is being drawn from the line. Typically they are installed at a substation or on long distribution lines. The output voltage is constantly monitored and the units automatically change tap settings in order to maintain the output voltage within an acceptable range. Centralines has four, three phase voltage regulators (twelve regulators) installed permanently on the network plus an additional two phase mobile regulator which is deployed as required across the network.

5.19.2 Asset Condition and Performance: Voltage Regulators

Centralines' fleet of voltage regulators are in good condition and are performing reliably with no systemic issues identified.

5.19.3 Asset Condition Assessment: Voltage Regulators

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Voltage Regulators			14%	86%	3	

Table 5-58: Asset Condition Assessment: Voltage Regulators

5.19.4 Asset Age Profile: Voltage Regulators

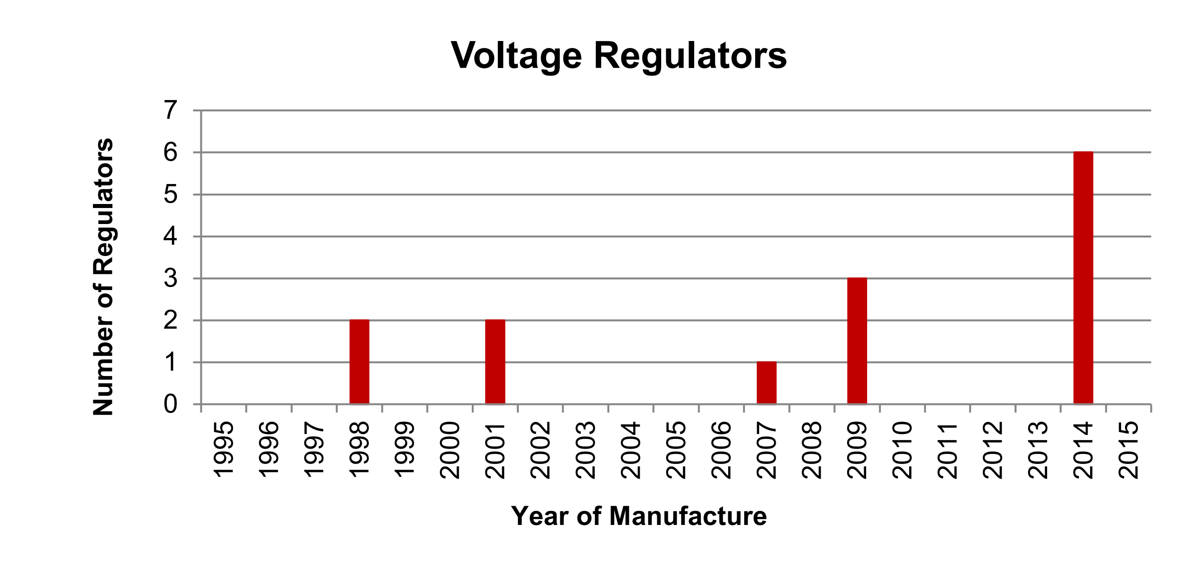

Figure 5-20: Asset Age Profile: Voltage Regulators

5.19.5 Maintenance Plan: Voltage Regulators

Regulators perform a critical operational function on the Centralines' network. To ensure reliable performance, Centralines has a tailored inspection and maintenance programme in place for this asset class. The following table defines current inspection and maintenance activities.

Condition Monitoring / Testing	Frequency
A visual inspection of all regulators is undertaken as part of Centralines' feeder surveys which cover all overhead network assets and are a combination of aerial and ground based inspections depending on access and terrain.	5 year cycle
Inspection and testing of all regulators' earthing including an earth site inspection and an earth resistance test. In addition a visual inspection of all associated assets is undertaken while on site.	5 year cycle
Visual inspections to ensure the integrity and security of the site in addition to battery and operational checks to confirm the equipment is operating correctly.	Quarterly
Centralines plans to adopt tap changer activity signature analysis (TASA) oil testing for its fleet of regulators. This provides a one to four rating of the oil condition. The score attained will dictate required maintenance activities.	A minimum of a 2 yearly cycle after 10 years of operation. Tests will be carried out as part of the inspections above.

Table 5-59: Maintenance Plan: Voltage Regulators

5.19.6 Asset Replacement and Refurbishment: Voltage Regulators

Due to the age profile and good condition of this asset fleet, there are no planned regulator replacements during the current AMP planning period. Future replacement drivers are outlined below.

Replacement / Refurbishment Drivers
• Asset condition based primarily on inspections and factoring in asset age, criticality capacity and functionality. • TASA oil test results. • Historical performance. • Availability of spare parts.

Table 5-60: Asset Replacement and Refurbishment Drivers: Voltage Regulators

5.19.7 Controlled Documents: Voltage Regulators

Controlled Document Reference	Controlled Document Description
NK3019	Overhead Line Conductor and Fittings Standard
NK4021	Pre-Commissioning of Distribution Assets Construction Standard
NK5015	Voltage Regulator Inspection Standard
NK5020	Feeder Survey Condition Monitoring Standard
NK5043	Insulating Oil Maintenance Standard
NK5075	Voltage Regulator Maintenance Standard
OS1015	Defect Reporting Standard
SC2301	Service Code – Inspections Regulators

Table 5-61: Controlled Documents: Voltage Regulators

5.20 Overhead Distribution Switchgear

5.20.1 Asset Description: Overhead Distribution Switchgear

Overhead distribution switchgear includes all electrical switching equipment on the medium voltage overhead network. This switchgear is used to protect, isolate and connect sections of the network for operational purposes.

5.20.2 Asset Description: Air Break Switches / Disconnectors

Air break switches (ABSs) or disconnectors are manually operated switches used for connecting or disconnecting different sections of 11kV or 33kV circuits. All phases of the switch are mechanically linked so that they operate together. Early model ABSs were primarily intended for no-load switching, but modern switches have flicker arc horns and/or load break attachments to allow limited on load switching capability. There are a small number of predominantly 33kV disconnectors installed in zone substations to enable the isolation of equipment. Centralines has 459 air break switches on its network.

5.20.3 Asset Description: Isolation / Fuse Links

Single phase isolation / fuse links are used on the overhead network to provide isolation and or fusing functionality at specific points on the network. These links are manually operated with a “hot stick” and can be either solid links or incorporate fuse elements. Centralines has approximately 2,728 links on its network, predominantly of the expulsion drop-out fuse type.

5.20.4 Asset Description: Reclosers

Reclosers are automatically operated electrical switches installed on the overhead network. They are designed to interrupt electrical power circuits thus protecting upstream and downstream electrical assets from damage as a result of a shorted or overloaded circuit. Additionally they ensure the safety of the public and utility employees and provide electrical discrimination on the network reducing the outage impacts of faults.

Their basic function is to interrupt power by an initiated control command or automatically by protective sensing devices that detect abnormal or fault conditions. They are designed to interrupt circuits repeatedly and safely both under normal load and fault conditions.

A recloser can be reset manually or automatically (and remotely) to resume normal operation after a fault and they can be programmed to auto-reclose under certain circumstances until they lock out if the fault remains after a predetermined number of operations. Centralines has 17 reclosers on its network.

5.20.5 Asset Description: Sectionalisers / Load Break Switches

Sectionalisers are similar to reclosers in operation but they are not designed to open immediately a fault is detected. Sectionalisers can be remotely operated and are able to switch load. Modern reclosers provide a wealth of network data including voltages, currents, and fault passage information.

Sectionalisers can be programmed to operate autonomously with a recloser and other sectionalisers to isolate a faulty section of line. This allows the recloser to auto reclose limiting the impact of the fault. Centralines has 34 sectionalisers on its network.

5.20.6 Asset Condition and Performance: Overhead Distribution Switchgear

Overall the condition of Centralines' overhead distribution switchgear is good with few in-service failures.

5.20.7 Asset Condition Assessment: Overhead Distribution Switchgear

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
Pole Mounted 11kV Switches and Fuses		1%	47%	52%	2	2%
Reclosers and Sectionalisers		2%	45%	52%	3	6%

Table 5-62: Asset Condition Assessment: Overhead Distribution Switchgear

5.20.8 Asset Age Profile: Overhead Distribution Switchgear

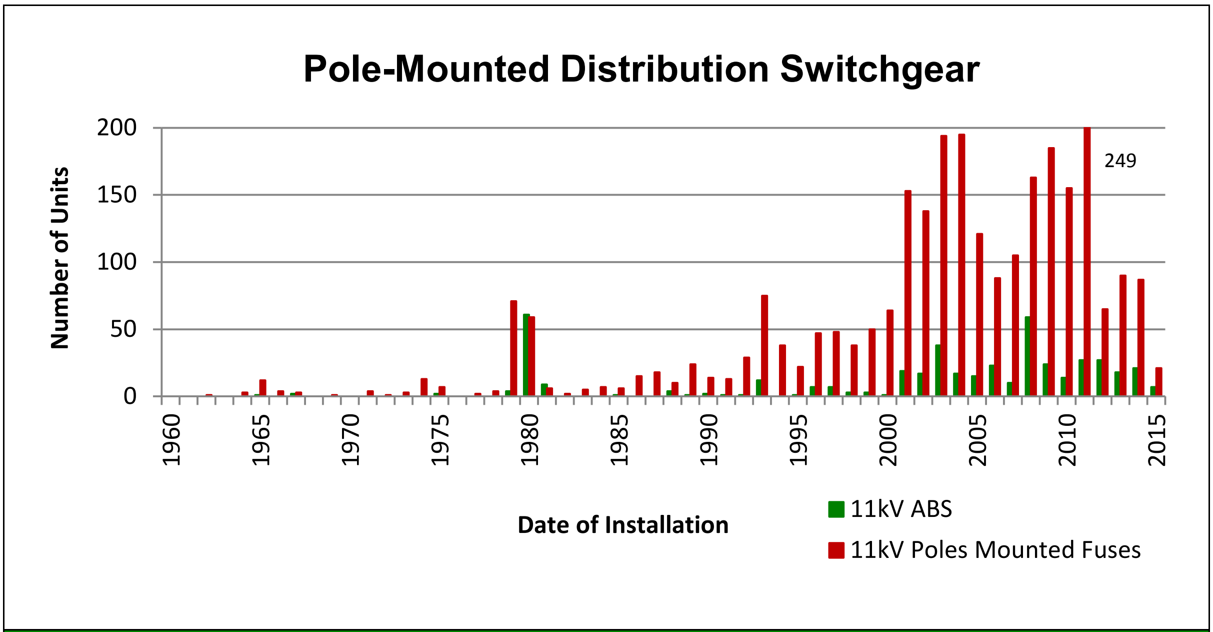

Figure 5-21: Asset Age Profile: Pole Mounted Distribution Switchgear

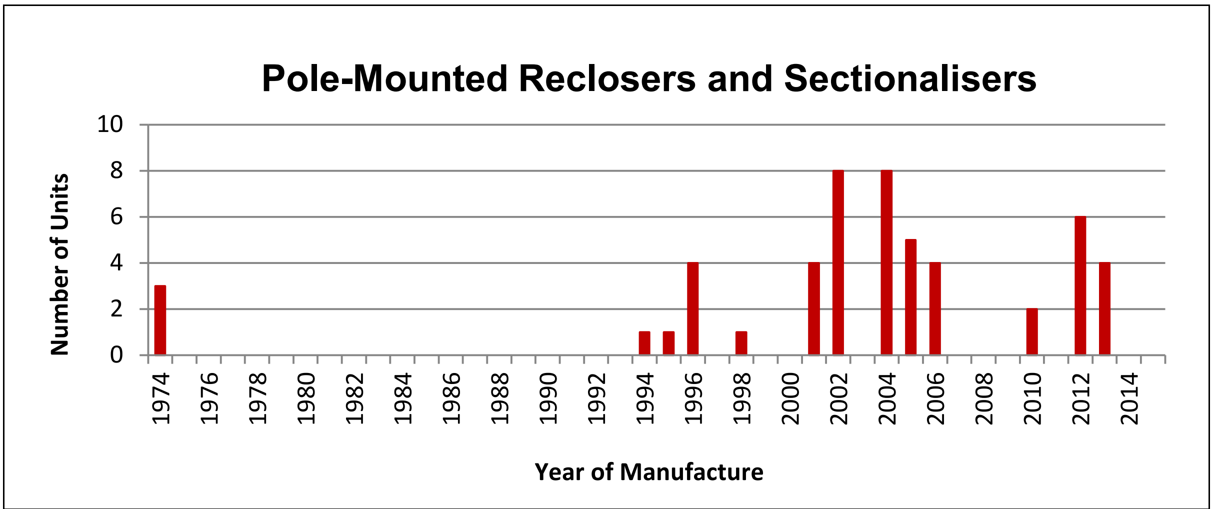

Figure 5-22: Age Profile: Pole Mounted Reclosers and Sectionalisers

5.20.9 Maintenance Plan: Overhead Distribution Switchgear

The following maintenance activities are undertaken on overhead distribution switchgear.

Condition Monitoring / Testing	Frequency
Centralines' feeder surveys cover all overhead network assets including overhead distribution switchgear and are a combination of aerial and ground based visual inspections depending on access and terrain.	5 year cycle
Inspection and testing of all 11kV earthing installations include an earth site inspection and an earth resistance test. In addition a visual inspection of all associated assets is undertaken while on site.	5 year cycle
In addition to the above, reclosers and sectionalisers are subject to an inspection and operational testing programme.	Annually with quarterly battery checks
Zone substation disconnectors (ABSs) have been included in this section. The following inspections and maintenance are specific to these switches:	
Detailed visual inspection of all switch yard equipment. Included is a check of all insulators to ensure they are in good condition and free of audible discharges or signs of tracking etc.	Weekly
Thermovision, corona and partial discharge inspection.	Annually
Complete shutdown with both visual and physical inspection of flexible connections, steel work, bolts and earthing. Contacts, terminations and insulators are all inspected and cleaned. The switches are opened and closed to ensure correct operation and alignment of all moving parts.	10 year cycle

Table 5-63: Maintenance Plan: Overhead Distribution Switchgear

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5.20.10 Asset Replacement and Refurbishment: Overhead Distribution Switchgear

Current replacement and refurbishment drivers are essentially the same for all overhead distribution switchgear. These are outlined below.

Replacement / Refurbishment Drivers
• Asset condition based primarily on feeder inspection data, asset specific inspections and testing, factoring in asset age, functionality, capacity and criticality. • In service failures resulting from corrosion, lightning damage and other faults etc. • Upgrades resulting from system growth, power quality or customer projects. • Issues identified through the defect process. • Availability of spares.

Table 5-64: Asset Replacement and Refurbishment: Overhead Distribution Switchgear

5.20.11 Controlled Documents: Overhead Distribution Switchgear

Controlled Document Reference	Controlled Document Description
NK1011	Asset Change and As-Built Drawing Documentation Procedure
NK3019	Overhead Line Construction Standard
NK3022	Network Fusing Standard
NK3025	Overhead Line Design Standard
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3041	Earthing Manual – Standard Earths
NK4021	Pre-Commissioning of Distribution Assets construction Standard
NK5011	Inspection and Testing of Standard and SWER Earths
NK5016	Line Recloser Inspections Standard
NK5020	Feeder Survey Condition Monitoring Standard
NK5034	Line Recloser Maintenance Standard
NK5036	Disconnector ABS and Earth Maintenance Standard
OS1014	Commissioning and Livening Equipment Standard
OS1015	Defect Reporting Standard
SC2030	Service Code - Disconnector and Earth Switch Service
SC2031	Service Code – Disconnector with Arc Control Service
SOP-004	SOP - Operating 11kV Fuse Cut Outs
SOP-005	SOP - Operating an Air Break Switch
SOP-006	SOP - Working beyond Sectos and Entec 11kV Switches
SOP-007	SOP - Operating Entec Switches
SOP-16	SOP - McGraw Edison Recloser
SOP-17	SOP - Cooper Nova Recloser
SOP-18	SOP – Nu Lec Recloser
SOP-40	SOP – Operating NX Arc Strangler Fuses

Table 5-65: Controlled Documents: Overhead Distribution Switchgear

5.21 Ground Mounted Distribution Switchgear

5.21.1 Asset Description: Ground Mounted Distribution Switchgear

This switchgear is used to protect, isolate and connect sections of the 11kV network for operational purposes. A ring main unit (RMU) is an 11kV ground-mounted bank of switches and / or fused switches. An RMU typically includes a combination of up to four switches including a maximum of two fused switches. They can also encompass additional oil insulated switches or fused switch units which are joined via a busbar to each other.

RMUs are designed to mechanically operate all three phases simultaneously. Most include earth switches which allow individual switches to be earthed. Centralines' older RMUs have switch contacts immersed in insulating oil to assist with arc suppression on opening. Centralines has currently standardised on ABB Safelink arc-rated switches with SF_6 insulation. Centralines has 22 ring main units on its network.

5.21.2 Asset Condition and Performance: Ground Mounted Distribution Switchgear

Centralines' fleet of ground mounted distribution switchgear is in good condition and performing reliably. No systemic issues have been identified.

5.21.3 Asset Condition Assessment: Ground Mounted Distribution Switchgear

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Data Accuracy	% of Asset forecast to be replaced in next 5 years
11kV Ring Main Units			20%	80%	3	

Table 5-66: Asset Condition Assessment: Ground Mounted Distribution Switchgear

5.21.4 Asset Age Profile: Ground Mounted Distribution Switchgear

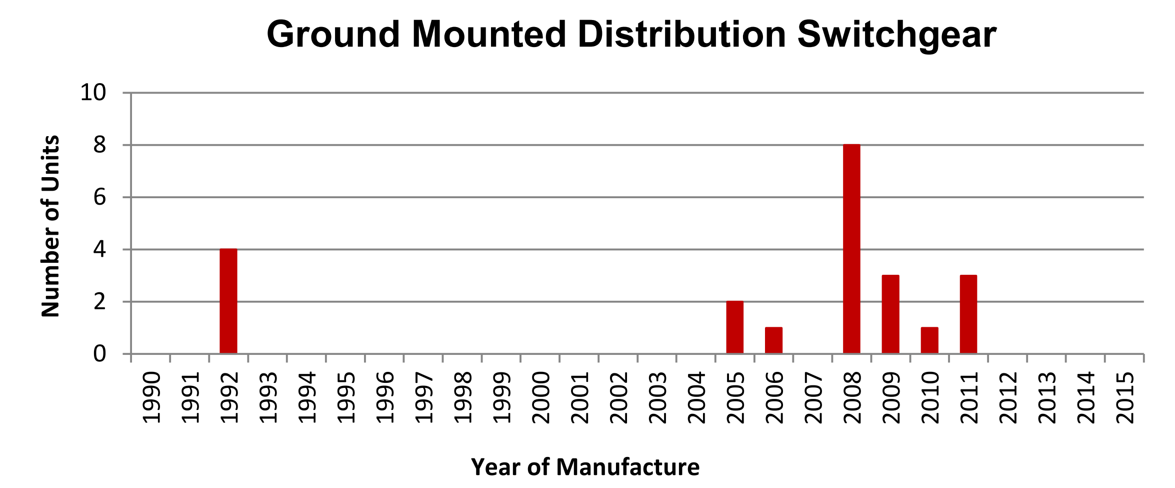

Figure 5-23: Asset Age Profile: Ground Mounted Distribution Switchgear

5.21.5 Maintenance Plan: Ground Mounted Distribution Switchgear

Centralines takes a proactive approach to inspecting and maintaining ground mounted distribution switchgear. The following table details the maintenance undertaken on this asset class.

Condition Monitoring / Testing	Frequency
All ground mounted distribution switchgear is visually inspected as part of Centralines' ground mounted, distribution equipment inspections (GMIs). These inspections include close visual examination and from this year will utilise partial discharge, corona and infrared sensing technologies to assist in the detection of potential defects and faults.	Annually
Inspection and testing of all ground mounted distribution switchgear earthing includes an earth site inspection and an earth resistance test. In addition a visual inspection of all associated assets is undertaken while on site.	5 year cycle

Table 5-67: Maintenance Plan: Ground Mounted Distribution Switchgear

5.21.6 Asset Replacement and Refurbishment: Ground Mounted Distribution Switchgear

Due to the good condition and age profile of this asset class no renewals are planned during the AMP planning period. Current and future replacement and refurbishment drivers are outlined below:

Replacement / Refurbishment Drivers
• Switch design, insulating medium, age, condition and criticality. • Historical switch performance records and trend analysis. • Results of diagnostic testing and visual inspections. • Health and safety considerations. • Current and future maintenance requirements. • Availability of spare parts. • Specific switch location and environmental considerations. • Manufacturer recommendations. • The Condition Based Risk Management (CBRM) model will be introduced in future to inform and assist in the identification and prioritisation of maintenance and replacement programmes.

Table 5-68: Asset Replacement and Refurbishment Drivers: Ground Mounted Distribution Switchgear

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5.21.7 Controlled Documents: Ground Mounted Distribution Switchgear

Controlled Document Reference	Controlled Document Description
NK1011	Asset Change and As-Built Drawing Documentation Procedure
NK3001	Underground Design Standard
NK3014	11kV Ring Main Switches Standard
NK3022	Network Fusing Standard
NK3023	Underground Cable Specifications and Standards
NK3030	Design Requirements for Public Safety
NK3040	Earthing – Engineering Principles
NK3041	Earthing Manual – Standard Earths
NK4001	Underground Construction Standard
NK4014	Ground Mounted Equipment – General Requirements Standard
NK4015	Underground Cable Installation Standard
NK4020	Cable Testing Standard
NK4021	Pre-Commissioning of Distribution Assets Construction Standard
NK5011	Inspection and Testing of Standard and SWER Earths
NK5017	Ground Mounted Distribution Equipment Inspection Standard
NK5038	Metalclad Switchgear Maintenance Standard
NK5043	Insulating Oil Maintenance Standard

Controlled Document Reference	Controlled Document Description
NK5070	Sulphur Hexafluoride (SF_6) Use and Handling Standard
NK6003	Concrete Manufactured Products Standard
OS1014	Commissioning and Livening Equipment Standard
OS1015	Defect Reporting Standard
SC2050	Service Code – Dielectric Breakdown Voltage Test
SC2051	Service Code – Acidity Test
SC2052	Service Code – Dissolved Gas Analysis
SOP-09	SOP – Operating SafeLink12kV RMS
SOP-11	SOP – Small Dimension (SD) Ring Main Switches

Table 5-69: Controlled Documents: Ground Mounted Distribution Switchgear

5.22 Overview of Secondary Assets

This section provides descriptions and high level summaries of lifecycle asset management related information on Centralines' portfolio of secondary assets.

Information is provided on the asset categories detailed in the table below.

Asset Class	Section Reference
Network Communications	5.23
Supervisory Control and Data Acquisition (SCADA)	5.24
Protection Relays	5.25
Zone Substation: Secondary Assets	5.26
Low Voltage Pedestals	5.27

Table 5-70: Asset Class Descriptions and Section References

5.23 Network Communications

5.23.1 Fibre Network (Primary Communication Network)

The primary or backbone medium for Centralines' electricity network communications is a carrier grade fibre optic cable network. This network is mixture of leased and Centralines-owned circuits. The network links the Centralines' head office in Waipukurau, the Waipukurau and Waipawa Zone

Substations, Transpower's Waipawa GXP and Unison's 24/7 Control Room in Hastings from which the Centralines' network is controlled.

The fibre link between Hastings and Waipukurau includes circuits leased from two service providers in the section between Hastings and Ongaonga and the Centralines owned fibre between Ongaonga and Waipukurau. Redundancy for this communication network is by way of an alternative, leased communication link. In a contingency event the Centralines' network can also be controlled from the Centralines' Waipukurau offices.

The fibre network between Centralines' Peel Street head office and the Waipawa and Waipukurau Zone Substations and the Waipawa GXP are all radial feeds and there is currently no redundancy. A break in any of these fibres would result in communications being lost and would require field staff to be despatched to the zone substations to manually operate equipment.

Service and traffic separation across the SCADA network (via the fibre network) is maintained through the use of industry recognised protocols in order to prioritise data and maintain system security.

The fibre network enables a range of network related functionality including:

- SCADA (Supervisory Control and Data Acquisition) which allows Centralines' entire electrical network to be monitored and operated from Unison's head office in Hastings.
- The monitoring and enabling of a 33kV sub-transmission ring circuit, differential protection scheme.
- Engineering access to Intelligent Electronic Devices (IEDs) and other equipment installed in substations including protection relays which can be interrogated remotely, including the downloading of fault logs to assist with post-fault analysis.

5.23.2 VHF Radio Communications

VHF is used for the transmission of voice communication between Unison's Operational Control Centre in Hastings to and between Centralines' field staff. Two VHF data channels are also utilised for SCADA functions to control the Wilder Road substation, pole mounted reclosers, load break switches and some regulators.

5.24 Supervisory Control and Data Acquisition (SCADA)

Supervisory Control and Data Acquisition (SCADA) is a generic term that covers the system used to monitor and control network operations, obtain system information, and create historical records of events. Unison Networks Limited under its Management Services Agreement with Centralines Limited is tasked with operating the Centralines' network.

Unison has recently replaced its legacy RealFlex SCADA system with an integrated Advanced Distribution Management System (ADMS) developed and supplied by Schneider Electric.

The ADMS is a software platform that provides SCADA functionality across the distribution network and includes outage management, call and dispatch, automated fault location, isolation and service restoration (self-healing) capability as well as integrated network reliability reporting. It also provides mobile crew management and network visibility to the workforce.

Additional modules within the ADMS enable network optimisation and analysis providing Unison with the ability to optimise the state of the Centralines' network by identifying the optimal configuration which will reduce the number of losses and ensure effective asset utilisation.

The ADMS incorporates a training simulator that is used to test Unison's systems and processes during simulated crisis events and to train new and existing operators to maintain required competency standards.

Historically, 17 different applications in the Control Room were used to manage network operations. These functions have now been merged into the one integrated platform.

Unison uses the previously described communication platforms for the ADMS to communicate with Remote Terminal Units (RTUs) located in substations and field equipment on the Centralines' network. The RTUs provide the communication interface that allows for central control commands to be conveyed to appropriate equipment and for network data to be returned.

5.25 Protection Relays

5.25.1 Asset Description: Protection Relays

A protection relay is a device designed to trip a circuit breaker when a fault is detected. The first protection relays were electro-mechanical devices, relying on coils operating on moving parts to provide detection of abnormal operating conditions such as transformer differential, over-current, earth fault and over and under voltage, and frequency.

Modern numeric relays are far superior to these early electromechanical relays. They operate extremely quickly, offer increased functionality and provide detailed information on faults that can be remotely downloaded.

Centralines has standardised on SEL manufactured protection relays due to their high quality, reliability, ten year warranty period and after sales technical and training services. Standardising on one manufacturer also has some advantages for field technicians who only have to be familiar with one product range which speeds up and simplifies relay configuration, testing and commissioning and the downloading and interpretation of power system fault logs.

5.25.2 Asset Condition and Performance: Protection Relays

Centralines' relay protection assets have been performing reliably. A fibre enabled 33kV ring circuit differential protection scheme has been installed between the Waipawa and Waipukurau Zone Substations and Transpower's Waipawa GXP. In addition transformer differential schemes have been implemented at Waipawa and Waipukurau Zone Substations.

Centralines via its substation fibre communication network currently has engineering access to approximately 22 protection relays across its network. This allows protection engineers to remotely download and analyse power system events to gain an understanding of the nature and magnitude of any event.

5.25.3 Maintenance Plan: Protection Relays

Protection relays are regularly checked as part of Centralines' weekly substation maintenance regime. Operational checks are carried out every 10 years.

5.25.4 Fast Protection Benefits: Protection Relays

There are many benefits to the protection upgrades that have been undertaken at Centralines. Some of these benefits are outlined below:

- Health and safety outcomes have improved. Fast protection reduces the risk and potential consequences to employees and the public resulting from network faults.
- Network reliability and security has improved due to unitised protection that reduces fault propagation, eliminates cascade tripping and mitigates loss of discrimination which sometimes occurs due to the slow operation of protection systems.
- Fast protection reduces the potential damage to network equipment as fault durations are significantly reduced.
- The quality of supply to Centralines' customers has been enhanced as fast operating protection significantly reduces voltage dips on Centralines' network.
- Remote engineering access is possible. This allows the remote interrogation of relays to analyse power system faults.
- Numeric relays enable SCADA serialisation which eliminates discreet hard copper connections between equipment.

5.26 Zone Substation: Secondary Assets

In addition to the main zone substation asset classes covered earlier in this section, there are also secondary assets within a zone substation that provide other critical functions. The following table provides a high level overview of these assets.

Asset	Asset Description	Maintenance
Voltage Transformers	Voltage transformers (VTs) are used to transform high voltages to lower voltages that can be more safely used for protection, control, indication and metering. VTs may be located on both outdoor and indoor equipment and be either single phase or three phase units.	Visual inspection included in weekly substation inspections. Annual thermo vision, corona, and partial discharge inspections. Six yearly service including a clean, lubrication of moving parts, visual inspection, insulating oil maintenance, insulation test, and a check of all LV/HV and earth connections and holding down arrangements.

Asset	Asset Description	Maintenance
Current Transformers	Current transformers (CTs) are used to transform high currents to lower levels that can be used for protection, control, indication and metering. Outdoor CTs are generally stand-alone, single phase oil insulated units and usually form part of a circuit breaker. Indoor CTs are generally single phase, solid insulation and located on each phase of a circuit breaker.	Visual inspection included in weekly substation inspections. Annual thermo vision, corona, and partial discharge inspections. Six yearly service including a clean, visual inspection, insulation test (HT-E only), and a check of all LV/HV and earth connections and holding down arrangements.
Outdoor Structures	These consist of overhead support structures and conductive busbars constructed of either copper or aluminium. These busbars allow switchgear and power transformers to be connected together. Typically these structures incorporate disconnectors to provide isolation for maintenance.	Visual inspection included in weekly substation inspections. Annual thermo vision, corona, and partial discharge inspections.
Direct Current (DC) Systems	DC systems at zone substations are used to provide an independent stand-alone power supply that can function if the main AC supply fails. The general arrangement is to have battery banks on continuous charge connected to critical control, protection and communication equipment.	Visual inspection included in weekly substation inspections. 5 yearly substation replacement.
Substation Earthing Systems	Because of the high voltages and currents encountered in zone substations, earthing systems are designed at the time of construction to ensure the safety of personnel and equipment. The earthing systems generally comprise bare copper cables laid in the ground in a grid formation. All substation equipment is bonded to these earth grids and the earth grids in turn are connected to earthing rods that are driven deep into the ground.	Visual inspection included in weekly substation inspections. Annual thermo vision, corona, and partial discharge inspections. Substation earthing systems are independently tested every 5 years.
Oil Containment Systems	New substations are designed to include a bunded transformer foundation and oil containment system. Centralines has a programme to install bundling and oil containment systems at all older substation sites where they currently do not exist.	Visual inspection included in weekly substation inspections.

Table 5-71: Zone Substation: Secondary Asset Descriptions and Maintenance

5.27 Low Voltage Pedestals

5.27.1 Asset Description: Low Voltage Pedestals

Pedestals are enclosures for the termination of buried cables and the mounting of fuses, control relays and other electrical equipment. Typically low voltage pedestals are the isolation/demarcation point between the distribution network and the customer's service main. They are also used as group breaks to enable back feeding capability on the low voltage network. Centralines has approximately 1,179 low voltage pedestals installed on its network.

5.27.2 Asset Condition and Performance: Low Voltage Pedestals

Pedestals are ubiquitous assets that form part of the urban landscape. As such they suffer from motor vehicle damage, vandalism and occasionally unauthorised access.

Ultra violet (UV) degradation, corrosion, burnt up fuses, voltage tracking and moisture build-up are all issues that impact on this asset class. Recent innovations to defer replacement have included painting fibreglass pedestals to reduce UV damage and prolong the assets' lives. The introduction of new PVC pedestals with replaceable covers has reduced the need to replace the entire asset when the cover alone is damaged.

5.27.3 Maintenance and Replacement Plan: Low Voltage Pedestals

Most pedestal maintenance and replacement is reactive and in response to faults, condition assessments, network upgrades and reported defects.

Pedestals are included in the five-yearly safety inspection programme for low voltage ground mounted assets. These inspections have a public safety emphasis and focus on asset security and guarding against unauthorised public access. Any minor repairs are carried out at the time by asset inspectors and other defects are logged for follow-up action.

5.28 Centralines' Assets installed on Bulk Electricity Supply Points

5.28.1 Transpower GXPs

Centralines has a number of assets installed at Transpower GXP sites. These assets include 33kV sub-transmission and 11kV distribution lines and cables as well as communications equipment and protection relays. These assets are covered by Centralines' Access and Occupation Schedule Agreement which sets out the terms and conditions associated with Centralines' assets on Transpower sites.

5.29 Centralines' Owned Generators

5.29.1 Mobile Generation

Centralines owns a 50kVA mobile generator which is used to temporarily maintain or restore supply to Centralines' customers during both planned and unplanned outages. An external contractor is engaged to maintain this generator.

5.30 Other Generation Plant

5.30.1 Centralines' Peel Street Head Office

Centralines owns a 60kVA on-site diesel generator that maintains supply to its Waipukurau Peel Street office. This generator ensures continuity of supply to Centralines' head office complex enabling business continuity when normal supply is lost to the site. Centralines engages an external contractor to maintain this generator.

5.31 Asset Maintenance Expenditure Projections

Centralines' maintenance expenditure projection for the AMP planning period is presented by asset category in the table below.

Asset Category	Asset Maintenance Expenditure Projections ($000)									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Overhead Lines	708	708	708	708	708	708	708	708	708	708
Underground Cables	27	27	27	27	27	27	27	27	27	27
Circuit Breakers	5	5	5	5	5	5	5	5	5	5
Zone Substation Buildings and Equipment	42	42	42	42	42	42	42	42	42	42
Power Transformers	38	38	38	38	38	38	38	38	38	38
Distribution Transformers and Regulators	45	45	45	45	45	45	45	45	45	45
Distribution Switchgear	24	24	24	24	24	24	24	24	24	24
Vegetation	512	462	412	362	362	362	362	362	362	362
SCADA and Communications	22	22	22	22	22	22	22	22	22	22
TOTAL	**1,423**	**1,373**	**1,323**	**1,273**	**1,273**	**1,273**	**1,273**	**1,273**	**1,273**	**1,273**

Table 5-72: Asset Maintenance Expenditure Projections for AMP Planning Period

5.32 Asset Renewal Expenditure Projections

Asset Category	Asset Renewal Expenditure Projections ($000)									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
11kV GM CBs								450	450	
11kV PM Reclosers and Sectionalisers			90	45	45	45				90
11kV PM Switches and Fuses	25	35	35	35	35	35	35	35	35	35
Concrete Poles	225	225	225	225	225	225	225	225	225	225
Distribution OH Open Wire Conductor	87	110	95	115	190	115	115	115	115	115
Distribution UG XLPE or PVC	15	15	15	15	15	15	15	15	15	15
LV OH Conductor	25	25	25	25	25	25	25	25	25	25
LV UG Cable	20	20	20	20	20	20	20	20	20	20
OH/UG Consumer Service Connections	10	10	10	10	10	10	10	10	10	10
Pole Mounted Transformers	30	30	30	30	30	30	30	30	30	30
SCADA and Communications	10	10	10	10	10	10	10	10	10	10
Sub transmission 33kV Conductor	150	150	150	150						
Wood Poles	205	205	205	205	205	205	205	205	205	205

Table 5-73: Asset Renewal Expenditure Projections for AMP Planning Period

5.33 Renewal Project List 2016-2017

Asset Category	Project Description	Project Budget ($000)
Distribution Substations, Transformers and Switchgear	Replace TX B4/16 with a Pole Mounted 200kVA Unit.	42
Zone Substation	Install New 33kV Ripple CB At Waipukurau Zone Substation	120
Distribution and LV Lines	Replace Corroded No. 8 GS Steel Conductor in Awahiwi Road	30
Distribution and LV Lines	Replacement of No. 8 GS 11kV Conductor Settlement Road	22
Distribution and LV Lines	Feeder 3 Capex Work Initiated from Feeder Inspection	30
Distribution and LV Lines	Feeder 4 Capex Work Initiated from Feeder Inspection	72
Distribution and LV Lines	Feeder 91 Capex Work Initiated from Feeder Inspection	71
Distribution and LV Lines	Feeder 19 Capex Work Initiated from Feeder Inspection	100
Distribution Substations, Transformers and Switchgear	Replace PT C4/6 with a 200kVA Pad Mount Unit	45
Distribution and LV Lines	Wilder Road Feeder Renewal	150

Table 5-74: Renewal Project List 2016-2017

5.34 Renewal Project List 2017/18 to 2020/21

Renewal Project List 2017/18 to 2020/21		
Financial Year	**Asset Category**	**Project Description**
2017/18	Sub-transmission Lines	Wilder Road, 33kV Line Refurbishment, Stage 6
2017/18	Distribution and LV Lines	Replace Mainline 11kV Copper Conductor Adjacent to Primary School Between Poles 907753 and 908434
2018/19	Sub-transmission Lines	Wilder Road, 33kV Line Refurbishment, Stage 7
2018/19	Distribution and LV Lines	Replace Mainline 11kV Copper Conductor Between Poles 920823 and 904844
2018/19	Distribution and LV Lines	Replace Mainline 11kV Copper Conductor Between Poles 905404 and 905438
2019/20	Sub-transmission Lines	Wilder Road, 33kV Line Refurbishment, Stage 8
2019/20	Distribution and LV Lines	Replace Mainline 11kV Copper Conductor Between Poles 904909 and 904913
2019/20	Distribution and LV Lines	Replace Mainline 11kV Copper Conductor Between Poles 918561 and 90628
2020/21	Distribution and LV Lines	Replace Mainline 11kV Copper Conductor Between Poles 905486 and 905840

Table 5-75: Renewal Project List 2017-2021

5.35 Renewal Project List 2021/22 to 2025/26

Renewal Project List 2021/22 to 2025/26		
Financial Year	**Asset Category**	**Project Description**
2023/24	11kV Circuit Breakers	Replace 11kV Oil Filled CBs and protection relays at the Waipawa ZS. Note: Proposed Project to Span 2 Financial Years
2024/25	11kV Circuit Breakers	Replace 11kV Oil Filled CBs and protection relays at the Waipawa ZS

Table 5-76: Renewal Project List 2021-2026

5.36 Determination Reference Mapping Table

Section 5 Reference	Determination Reference
5.1 Introduction to this Section 5.2 Overview of Lifecycle Asset Management	12
5.3 Maintenance	12.1, 12.2
5.4 Renewal	12.3, including 12.3.1 and 12.3.2
5.5 Asset Lifecycle Management by Asset Category 5.6 Sub-transmission: Overview 5.7 Sub–transmission: 33kV Overhead Lines 5.8 Sub–transmission: 33kV Underground Cables 5.9 Zone Substations: Overview 5.10 Zone Substation: Power Transformers 5.11 Zone Substations: 33kV Circuit Breakers 5.12 Zone Substation: 11kV Circuit Breakers and Switchboards 5.13 Zone Substation: Buildings 5.14 Zone Substation: Ripple Injection / Load Control Plants 5.15 Poles: All Voltages 5.16 Distribution and Low Voltage Overhead Lines 5.17 Distribution and Low Voltage Underground Cable 5.18 Distribution Transformers 5.19 Voltage Regulators 5.20 Overhead Distribution Switchgear 5.21 Ground Mounted Distribution Switchgear	4.4, including 4.4.1, 4.4.2, 4.4.3 and 4.4.4 12.4, including 12.2.1 and 12.2.2 12.3, including 12.3.1 and 12.3.2
5.22 Overview of Secondary Assets 5.23 Network Communications 5.24 Supervisory Control and Data Acquisition (SCADA) 5.25 Protection Relays 5.26 Substation Secondary Assets 5.27 Low Voltage Pedestals	4.4 including 4.4.1, 4.4.2, 4.4.3 and 4.4.4 12.2, including 12.2.1 and 12.2.2 12.3, including 12.3.1 and 12.3.2
5.28 Centralines' Assets Installed on Bulk Electricity Supply Sites	4.5.2
5.29 Centralines' Owned Generators 5.30 Other Generation Plant	4.5.2, 4.5.3, 12.2 and 12.3 4.5.4, 12.2 and 12.3
5.31 Asset Maintenance Expenditure Projections	12.2.3

Section 5 Reference	Determination Reference
5.32 Asset Renewal Expenditure Projections	12.3
5.33 Renewal Project List 2016-2017 5.34 Renewal Project List 2017/18 to 2020/21 5.35 Renewal Project List 2021/22 to 2025/26	12.3.3 12.3.4 12.3.5

Table 5-77: Determination Reference Mapping Table

SECTION 6 NON-NETWORK DEVELOPMENT MAINTENANCE & RENEWAL

CENTRALINES
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6. NON-NETWORK DEVELOPMENT MAINTENANCE & RENEWAL

6.1 Introduction to Section

This section summarises and outlines the lifecycle activities of material non-network assets including policies covering the development, maintenance and renewal of these assets. An overview is included of material capital expenditure and maintenance, and renewal projects proposed for the next five years.

Centralines has two categories of material non-network assets, viz. Property and Vehicles. Each category is detailed separately below.

Centralines does not own any material Information Technology (IT) assets. Operational information systems are provided by Unison Networks Limited (UNL), under the provisions of the Management Services Agreement (MSA).

6.2 Property

For the purposes of the Asset Management Plan, property assets exclude substations as these are classified as Network Assets.

6.2.1 Description of Assets

Centralines owns a depot in Peel Street, Waipukurau, and a separate storage yard in Couglan Road, Waipukurau.

6.2.2 Development, Maintenance and Renewal Policies

The development, renewal and maintenance of property assets are on an “as required” basis. There is an ongoing strategic review of property requirements which identifies any changes that may be necessary to ensure the continued efficient operation of Centralines.

Maintenance contracts are in place for scheduled and reactive maintenance activities on grounds and buildings including air conditioning units, fire alarms and security systems, to ensure Centralines remains compliant with Building Warrant of Fitness requirements.

6.2.3 Material Capital Expenditure Projects Planned for the Next Five Years

The following table details a proposed capital project.

Project	Description
Earthquake Strengthening	Assessments are being carried out on the Centralines' buildings. A decision on any required mitigations will be made once this assessment has been completed.

Table 6-1: Material Capital Expenditure Projects Planned for the Next Five Years

6.2.4 Material Maintenance Activities Planned For the Next Five Years

Routine property maintenance is planned and budgeted on an annual basis. No material maintenance activities are currently planned.

6.3 Vehicles

6.3.1 Description and Quantity of Vehicle Assets

For the purposes of the Asset Management Plan, vehicle assets are divided into three classes. The number of vehicles owned by Centralines is detailed in Table 6-2.

Category	Description	Number
Heavy	All vehicles over 3.5 tonne excluding excavators, trailers and generators.	8 vehicles
Light	All vehicles under 3.5 tonne excluding excavators, trailers and generators.	14 vehicles
Other	Excavators, trailers and generators etc.	17 assets

Table 6-2: Description and Quantity of Vehicles

6.3.2 *Renewal Policy*

Centralines has a Motor Vehicle Policy which details renewal criteria as outlined in Table 6-3.

Vehicle Type	Replacement Criteria
Heavy	10 years or 300,000km
Light Commercial (Utes and Vans)	5 years or 150,000km
Light	3 years or 80,000km
Other	Specific to equipment type

Table 6-3: Vehicle Type and Replacement Criteria

6.3.3 *Material Capital Expenditure Projects Planned for the Next Five Years*

Centralines has an annual motor vehicle replacement plan based on the Motor Vehicle Policy.

6.3.4 *Material Maintenance Activities Planned for the Next Five Years*

Maintenance plans for all vehicles are as per the manufacturer's recommendation.

6.4 Determination Reference Mapping Table

Section 6 Reference	Determination Reference
6.1 Introduction to Section	13
6.2 Property 6.3 Vehicles	13 including 13.1-13.4

Table 6-4: Determination Reference Mapping Table

SECTION 7 RISK MANAGEMENT

CENTRALINES LIMITED

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7. RISK MANAGEMENT

7.1 Introduction

Risk management is an integral part of Centralines' overall business philosophy and as such plays a fundamental role in Centralines' asset management process.

Risk at Centralines is defined as 'the effect of uncertainty upon objectives' both positive and negative. Centralines' Risk Management Policy and processes provide a disciplined, structured and systematic approach to identifying, prioritising, managing and reporting on the effects of uncertainty on objectives (including network requirements). Management of reported uncertainties may include initiatives that range from strategic to operational in nature, with all initiatives working to protect or enhance stakeholder value. Centralines' Risk Management Policy embodies the principles of the risk management process as detailed in the international standard AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.

Risk management has become increasingly important within asset management at Centralines, not only to ensure operational risks to assets are effectively identified and managed but also, given the changing dynamic of the industry, that strategic risks to assets are effectively identified and managed through commercially sound solutions for all stakeholders.

7.2 Risk Management Governance Structure, Roles and Responsibilities

Oversight and responsibility of Risk Management at Centralines is supported by a clear governance structure and clearly defined and assigned risk roles and responsibilities.

7.2.1 Board Audit and Risk Committee

The Centralines' Board maintains overall responsibility for risk management, including setting the mandate, appetite and tolerances for acceptable expectations of risk. The Board delegates to its Audit and Risk Committee (ARC) the responsibility to closely scrutinise and oversee the application and output of Centralines' Risk Management Policy.

7.2.2 Risk Owners

The Centralines' risk owners are responsible for:

- monitoring and managing risks;
- escalating risks of material significance;
- managing the progress of control remediation activities; and
- promoting a risk-aware culture.

7.2.3 All Employees

All Centralines' employees are responsible for the management of risks. Their responsibilities include:

- Considering risk as part of any decision-making process and part of their day-to-day activities;
- Carrying out all mitigation activities as agreed; and
- Taking immediate action to report and escalate identified incidents or near-misses across any risk class that could have the potential to result in any loss (both quantitative and or qualitative).

7.2.4 Risk Manager

Centralines' Management Services Provider is Unison Networks Limited and Unison's Risk Manager is responsible for developing, coordinating and implementing strategic risk maturity practices.

Unison's Risk Manager updates the Enterprise Risk Register and prepares the relevant risk reports for Centralines' Senior Management and the ARC. In addition, the Risk Manager tracks and reports to the ARC progress in all control remediation activities that impact on the enterprise risks.

7.3 Risk Management Overarching Process

Figure 7-1 below sets out the risk management process adopted by Centralines, as recommended in standard AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.

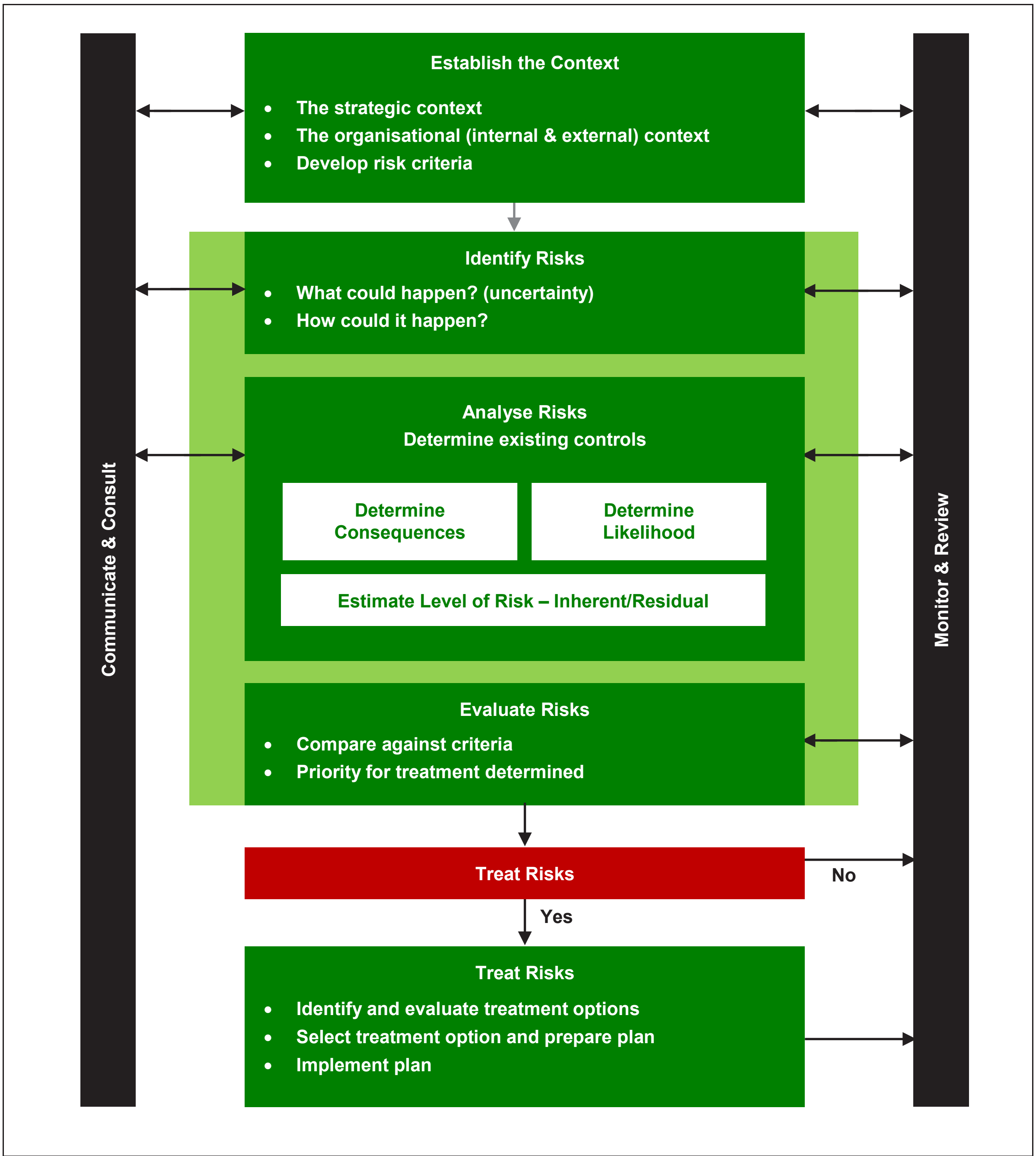


Figure 7-1: The Risk Management Process

7.3.1 Establish the Context

Figure 7-1 outlines the first step in the risk management process is to “Establish Context”. This is effected in two ways:

- External environment – trends and changes outside the direct control of the organisation, e.g. technology, economic, legislation / regulation, commercial, natural hazards, geo-political etc.
- Internal environment – changes within Centralines, e.g. strategy, structure, process etc.

7.3.2 Identify Risks

Once the environmental context within which Centralines operates, is understood, the next step is to identify new risks, or reconfirm any previously identified risks. As risk is defined as “the effect of uncertainty upon objectives”, the business objectives are clearly articulated. Causes and any areas of uncertainty that may impact on the achievement of those objectives are considered. With event causes and areas of uncertainty understood the specific business risks are identified and the risk context defined.

7.3.3 Analyse Risks

With business risk confirmed, the next step is to analyse the likelihood of the risk occurring and the consequences to the business should the risk occur. The context of the likelihood scale is set and approved by the Board. Likewise the consequence scale is also set and approved by the Board.

The risk is then analysed in two states - *‘inherent’* prior to the application of controls and *‘residual’* after current controls are applied. The difference between the inherent and the residual states is the strength of the design of collective controls and how effectively each of these controls is operating.

Figure 7-2 below illustrates Centralines’ heat map which is used to plot the overall inherent and residual risk ratings using the likelihood and consequence assessment.

		Consequence				
		Negligible	Minor	Moderate	Major	Catastrophic
Likelihood	Almost Certain	Low	Medium	High	Extreme	Extreme
	Probable	Low	Medium	High	Extreme	Extreme
	Likely	Low	Medium	High	High	Extreme
	Possible	Insignificant	Low	Medium	High	Extreme
	Rare	Insignificant	Low	Medium	Medium	High

Figure 7-2: Heat Map

7.3.4 *Evaluate Risk*

Once risks are analysed evaluation of the risk is required to determine whether the risk rating is acceptable or whether the risk requires treatment. For those risks needing treatment a broad order of priority is established. Defining whether a risk needs treating is determined in the context of risk appetite, the desired state of the risk and the risk-versus-reward trade-off.

Figure 7-3 below outlines questions that are consider when determining whether to treat a risk.

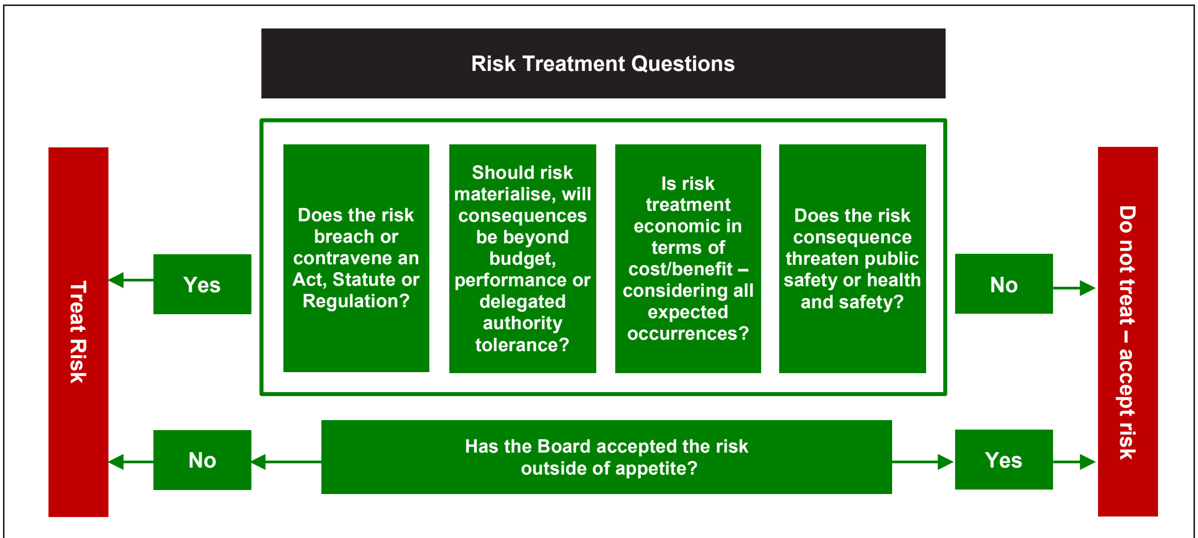


Figure 7-3: Risk Treatment Questions

7.3.5 Treatment

For those risks evaluated as *'requiring treatment'* a risk treatment plan is prepared to reduce the likelihood of the risk occurring and / or the consequence should the risk occur. The treatment plans clearly state the specific remediation activities, timeframes and priorities.

7.3.6 Monitor and Review

The risk process at Centralines is structured and iterative. There is a central risk function that oversees and monitors the application of the Board-approved Risk Policy and processes.

7.4 Health and Safety Risk Management

Given the nature of the industry, both public and workplace Health and Safety practices are taken seriously. There is a separate risk team that continually assesses and reviews this risk for Centralines.

Centralines has in place several systemised management practices to work towards its goal of Zero Harm to staff, third party contractors and the Public.

The workplace health and safety system is monitored biennially against the Accident Compensation Commission's (ACC) Workplace Safety Management Practices (WSMP) Programme of which Centralines is at the tertiary level. This process ensures policies, procedures, etc. are in place and being followed. Centralines' Management Services Provider supports this paper-based system audit by regularly carrying out both internal and external field-based audits of all contractors engaged to work on Centralines' behalf.

Monthly Board reporting collates all incidents, accidents and near-miss events to ensure the Centralines' Board is fully informed of workplace health and safety performance and current initiatives to allow continual improvement within this core value area of the company.

Public safety is also an area of vital importance to Centralines and accordingly we have in place a Public Safety Management System (PSMS) compliant with NZS 7901:2014 Electricity and Gas Industries – Safety Management Systems for public safety. During 2015 Centralines underwent a re-validation audit and achieved recertification to this standard. Board reporting on public safety issues follows the same format and structure as the workplace health and safety reporting mentioned above.

7.5 Legislative Compliance Programme

Centralines is required to comply with many Regulations and legislative requirements. To ensure employees are aware of specific requirements, Centralines operates a 6-monthly Legislative Compliance Programme (LCP). Specific obligations are reviewed by an external law firm to ensure that new obligations are included, and changes to existing obligations are updated. Each obligation is assigned an 'owner' and the obligation owner is required to assess the level of compliance against the Company's operational processes. Areas of non-compliance or partial compliance are required to have remediation plans completed. These plans are then tracked until full implementation. A summary of the responses and remediation plans are reported on a 6-monthly basis to the Centralines' ARC.

7.6 Network Risk Identification

High Impact-Low Probability (HILP) network-related risks have the potential to significantly impact on public safety and the reliability and security of Centralines' network.

Centralines' operational risk is included with Centralines' Management Services Provider's (Unison's) operational risk register and has a representative on Unison's Networks and Operations Operational Risk Sub-committee.

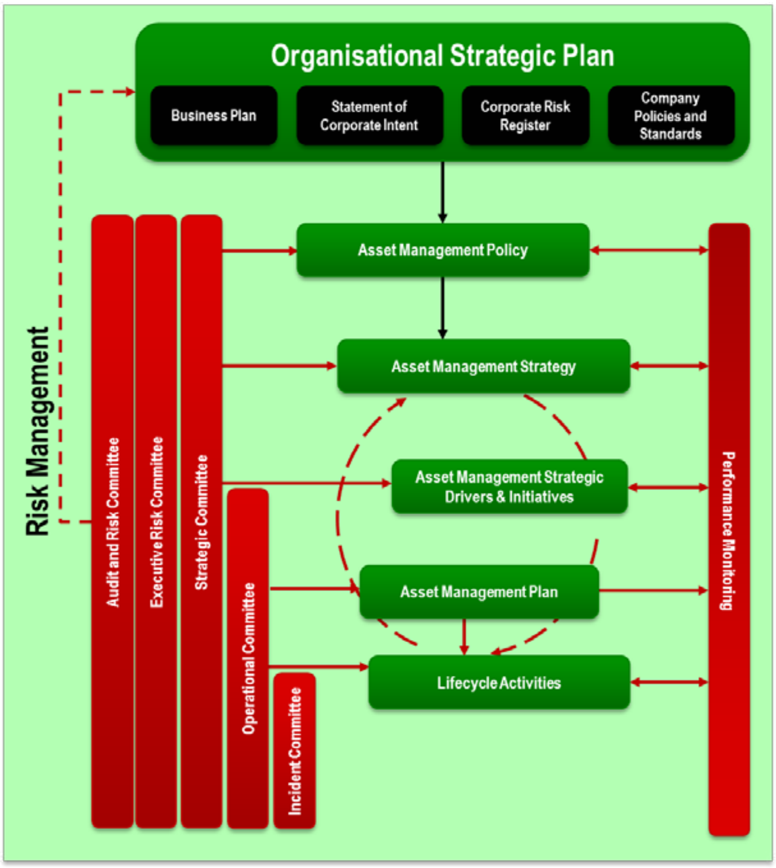


Figure 7-4: Committee Structures

The Operational Risk Sub-committee meets quarterly to assess and review network operational risks. SWIFT[1], and Cause and Effect methodologies are employed to identify and assess network risks.

Centralines report their monthly network incidents to Unison's Networks and Operations Incident Sub-Committee and also advises what actions have been taken.

In addition to the above committees, a risk identification and assessment process has been developed. This process is evidence-based and its objective is to ensure network operational risks are controlled to '*As Low As Reasonably Practical'* (ALARP). Utilising the cause and effect methodology, detailed descriptions of identified risks covering Centralines' network assets (spanning their entire lifecycle) have been collated into individual sheets. Controls for these identified risks have been developed, documented and implemented. To ensure these controls remain current and appropriate, both an annual internal and independent external audit is undertaken. The external audit is integrated into the annual PSMS audit and certification process.

7.6.1 Network Resilience to HILP Events

7.6.1.1 *GXP Substations*

Transpower who own and operate New Zealand's transmission network, have exclusive responsibility for Grid Exit Points (GXPs). Any event, however, that leads to a GXP outage has the potential to impact significantly on the supply of electricity to Centralines' customers.

Centralines' Management Services Provider has quarterly relationship meetings with Transpower where security and quality of supply issues are discussed. Any outage of supply to a GXP is investigated to identify the root cause and corrective measures agreed, to reduce the likelihood of, or impact from, future GXP outages.

7.6.1.2 *Zone Substations*

Part of Centralines' security criteria (refer Section 4.3.3) includes mitigating options for the loss of supply from a zone substation or zone substations.

Due to differing levels of zone substation security, substations supplying critical load areas, such as CBDs and major customers have a higher level of redundancy than substations that supply remote rural areas, with multiple sub-transmission supply options and good 11kV interconnectivity to ensure sufficient capacity from neighbouring substations. A detailed operational management plan exists for each of the Centralines' zone substations.

The only zone substation in the Centralines' network where this is not achieved currently is the Takapau Zone Substation which is considered a critical site as it supplies a large industrial customer. There are plans to install a second sub-transmission supply to this substation but it is dependent on the requirements of the industrial customer.

[1] SWIFT Analysis - Structured What If Technique

A review of the structural integrity of Centralines' zone substation buildings has been undertaken and seismic strengthening of, and remedial work to, the zone substation buildings is planned for the upcoming planning period.

7.6.2 Natural Hazards

7.6.2.1 *Greater Hawke's Bay Region*

Greater Hawke's Bay is one of the most seismically active regions in New Zealand. Its location above the subduction boundary between the Pacific and Australian plates results in many earthquakes. Since written records began in 1840, there have been 16 earthquakes with a magnitude greater than M6.0. Of these, five have caused significant damage to buildings with one resulting in fatalities.

Consequently, the following factors add to the vulnerability of the electricity network:

- Ground-shaking amplification due to underlying geology;
- Surface faulting;
- Liquefaction and lateral spread;
- Landslide and slope instability; and
- Tsunami.

There is a significant risk of inundation from either a near-source or distal-sourced tsunami that would impact Centralines' coastal network. Due to the nature of a tsunami and the possible level of inundation, mitigating action plans focus on reducing potential risks to employees and the public through evacuation of staff and the making safe of electrical equipment.

As the Central Hawke's Bay Region is reasonably distant from any active volcano, the most serious threat is from a Taupo-style eruption originating from the Taupo Volcanic Zone. Ash from this type of eruption can fall in significant thicknesses at large distances from the active vent.

Other natural hazards events that the Central Hawke's Bay experiences include:

- Major storm events;
- Flooding;
- Major snow storms;
- Wind storms;
- Rural fire; and
- Landslips.

7.7 Emergency Response and Contingency Plans

7.7.1 Lifeline Obligations Overview

As a **lifeline utility**, Centralines has certain obligations under the Civil Defence and Emergency Management Act 2002 (the Act). These obligations are set out in section 60 of the Act. Every lifeline utility must:

- ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency;

- make available to the Director in writing, on request, its plan for functioning during and after an emergency;
- participate in the development of the national civil defence emergency management strategy and civil defence emergency management plans;
- provide, free of charge, any technical advice to any Civil Defence Emergency Management Group or the Director that may be reasonably required by that Group or the Director;
- ensure that any information that is disclosed to the lifeline utility is used by the lifeline utility, or disclosed to another person, only for the purposes of this Act.

Centralines is responsible for notifying the CDEM Group Coordinator of the status of the network following any disaster (such as major storms, flooding, snow storms, earthquakes etc.) and throughout any declared or non-declared emergency in the region.

As part of its Civil Defence and Emergency Management (CDEM) obligations Centralines participates as required in Regional Lifeline Group meetings as well as regional Civil Defence exercises. During 2015 Centralines participated in a Tier-3 CDEM simulation exercise which was based on a M7 earthquake in the Tutira region. The exercise was the largest Civil Defence exercise held in New Zealand for that year.

7.7.2 Business Continuity Management

Business Continuity Management is a process that identifies potential threats to the organisation as well as the impacts of those threats on business operations. It provides a framework for building organisational resilience and includes response capability to safeguard the interests of Centralines' key stakeholders, reputation, brand and value-creating activities.

During the 2015 financial year a comprehensive organisational resilience review was completed by Centralines' Management Services Provider, Unison Networks Limited. As a result of this review Centralines has a number of initiatives underway that will build on our current levels of organisational resilience. A summary of these initiatives includes:

- Containerised data centre located outside Centralines' Management Services Provider's main administration building to enable accessibility in an event where there is denial of access to the main administration building. The containerised data centre will also be placed on base isolators adding increased resilience in the event of significant seismic shaking and liquefaction.
- Purpose-built hot-site for the Centralines' Management Services Provider's Alternate Operations Centre, crisis management team and business critical recovery functions. The hot-site will be strategically located in Havelock North where there is a lower risk of liquefaction, tsunami and flood hazards than their current Eastbourne Street, Hastings arrangement. The hot site will include n-1 fibre capability and will be built to 100% of Importance Level 4 under the new building standard.
- An upgraded Disaster Recovery (DR) container located at the hot-site in Havelock North.

The physical attributes that provide an organisationally resilient system are underpinned by a number of continuity plans which Centralines' Management Services Provider has put in place to guide an effective and efficient response and recovery, should an event materialise.

These plans are detailed in Figure 7-5.

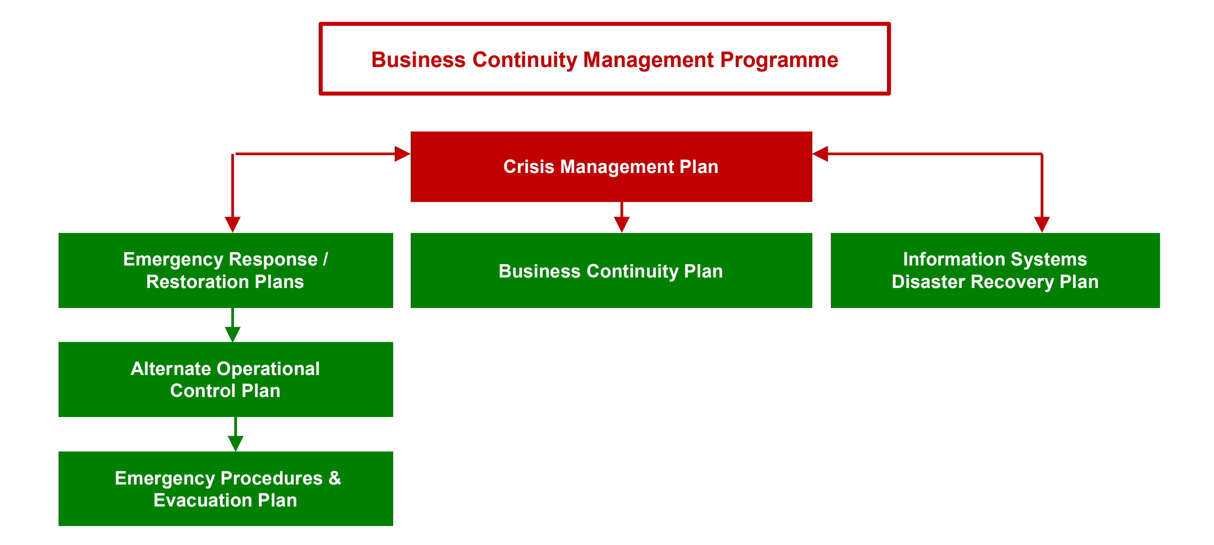


Figure 7-5: Centralines' Business Continuity Management Programme

7.7.2.1 *Crisis Management Plan*

The Crisis Management Plan is a key document in the Business Continuity Management Programme and provides Centralines with a framework to effectively manage any crisis event. It is focused on time-limited, problem-solving interventions to respond to crisis situations and to facilitate the restoration of core services. The success of the plan is dependent on clearly assigned and understood roles, responsibilities and delegations, as well as escalation procedures and coordinated response activities.

7.7.2.2 *Emergency Response Plan*

The Emergency Response Plan ensures Centralines is prepared for, responds to and recovers from any emergency event which causes, or has the potential to cause, a major disruption to the distribution of electricity in the network area. The plan covers mechanisms for triggering the emergency response plan (event escalation levels), management processes for coordinating response/restoration actions and meeting Civil Defence Emergency Management Group Plan requirements. The plan also includes Health and Safety principles governing all actions, the availability of standby resources, and communications with all interested parties.

7.7.2.3 *Emergency Restoration Plans*

The loss of the GXP or a Zone Substation is regarded as an event of significance for which restoration of supply is pre-planned.

The GXP has its own emergency restoration plan consisting of a switching procedure available for the System Control Operator in the event of a total loss of supply to that specific site.

Centralines' Zone Substations are monitored by Unison's Control Centre. Loss of supply can be restored remotely by the Control Centre or locally by Centralines' personnel. Centralines has in place an after-hours roster for twenty-four hour response.

7.7.2.4 *Alternative Operational Control Plan*

Centralines' Management Services Provider's Alternate Operational Control Plan identifies the location and layout of the Alternate Operational Control Centre, provides a checklist of actions to be followed by Control Room staff when operations are transferred and identifies tasks required to close down the alternate site upon resumption of operations at the Omahu Road Control Room.

7.7.2.5 *Emergency Procedures and Evacuation Plan*

The Emergency Procedures and Evacuation Plan details how Centralines' staff and any visitors to the premises will make their way to safety as quickly as possible. The plan covers the roles and responsibilities of building wardens and staff during an emergency, escape routes and assembly areas.

7.7.2.6 *Business Continuity Plan*

The Business Continuity Plan documents Centralines' key processes and the support tasks and roles which provide continuity to those processes. This ensures Centralines is able to respond to, recover from, and resume business-as-usual operations as quickly as practical following a significant event.

7.7.2.7 *Information Systems Disaster Recovery Plan*

Unison's Information Management Systems Disaster Recovery Plan is designed to meet the needs of Centralines' Crisis Management and Emergency Response Plans and includes a prioritised and time-bound schedule of critical system resumption objectives which are based on key business processes.

7.7.2.8 *Centralines' Insurance Programme*

The role of Centralines' Insurance Programme is to provide a financial recovery capability in the event of a significant loss. Policy coverage is included for significant risks, which should they occur, would have a major impact on the Company's ability to continue to operate as a going concern. The programme is assessed for suitability on an on-going basis and is renewed annually.

7.8 Determination Reference Mapping Table

Section 7 Reference	Determination Reference
7.1 Introduction 7.2 Risk Management Governance Structure, Roles and Responsibilities 7.3 Risk Management Overarching Process 7.4 Health and Safety Risk Management 7.5 Legislative Compliance Programme	14
7.6 Network Risk Identification	14.1, 14.2
7.7 Emergency Response and Contingency Plans	14.3, 14.4

Table 7-1: Determination Reference Mapping Table

SECTION 8 EVALUATION OF PERFORMANCE

CENTRALINES LIMITED

CONTENTS

8. EVALUATION OF PERFORMANCE

8.1 Introduction to this Section

Section 8: Evaluation of Performance provides information to enable stakeholders to understand how well Centralines is performing as an asset management organisation. The key performance dimensions covered are: physical and financial progress against the plans set out in the last disclosed AMP, performance against service level targets, and assessment under the Asset Management Maturity Assessment Tool.

8.2 Review of Progress Against Plan

In this section Centralines' performance in delivering the plans set out in the AMP disclosed in March 2013 is reviewed in terms of physical progress (commissioning of works) and financial progress (cost performance). This evaluation is undertaken for the 2013/14, 2014/15 and 2015/16 financial years, for both capital and maintenance programmes.

8.2.1 Physical Progress of Planned Network Development Projects – 2013/14

2013/14 Planned Projects	Status at Feb 2016	Comments
Install voltage regulator to improve the 11kV voltage	Completed	
Project 1053 – Rearrangement of Reclosers/ Sectionalisers to improve reliability on Feeder	Completed	
Project 1100 – Install Entec switches programmed as Sectionalisers to improve reliability on Feeder 19	Completed	
Install automated Safelink switches to improve security of supply at Ongaonga Zone Substation	Completed	Alternate more cost-effective solution implemented.
Installation of Fault Passage Indicators (FPIs) to assist with the quick location of feeder faults on Feeders 45 and 46, as well as enabling the Control Room Operators to monitor feeder loads when back-feeding is required	Completed	
Upgrade transformer foundation and bunding at Wilder Road Substation to accommodate a second transformer	Deferred	Project re-prioritised. Now scheduled for 2018/19.
Install automated switches at the Takapau Substation to remotely isolate faulted equipment	Cancelled	No current justification for project.
Establish automation and communication for the Paget Road 11kV Regulator	Completed	

Table 8-1: Physical Progress of Planned Network Development Projects – 2013/14

8.2.2 Physical Progress of Planned Renewal Projects – 2013/14

2013/14 Planned Projects	Status as at Feb 2016	Comments
Preventative replacement of condemned poles and hardware, and the installation of additional stay-wires where required	Completed	Ongoing project.
Replacement of aged Long Range Road Voltage Regulator	Completed	
Feeder 1 (11kV) Pole Feeder Preventative Maintenance	Completed	
Feeder 2 (11kV) – Pole Feeder Preventative Maintenance	Completed	
Feeder 4 (11kV) – Pole Feeder Preventative Maintenance	Completed	
Feeder 74 (11kV) – Pole Feeder Preventative Maintenance	Completed	
Feeder 75 (11kV) – Pole Feeder Preventative Maintenance	Completed	
Feeder 76 (11kV) – Pole Feeder Preventative Maintenance	Completed	
Feeder 78 (11kV) – Pole Feeder Preventative Maintenance	Completed	
Feeder 91 (11kV) – Pole Feeder Preventative Maintenance	Completed	
Undergrounding of the aging 400V overhead network in Hill Street and Goodger Street	Completed	

Table 8-2: Physical Progress of Planned Renewal Projects – 2013/14

8.2.3 Physical Progress of Planned Renewal Projects – 2014/15 to 2017/18

2014/15 to 2017/18 Planned Projects	Status as at Feb 2016	Comments
Pole replacement, 11kV conductor and hardware upgrade and 400V OHUG Abbotsford Road	On Hold	Pending confirmation of the Ruataniwha Water Storage Scheme (RWSS).
Pole replacement, 11kV conductor and hardware upgrade and 400V OHUG Marlborough/River Terrace	Completed	
Pole replacement and 11kV conductor and hardware upgrade Long Range Road	Cancelled	Not required based on updated condition assessment information.

2014/15 to 2017/18 Planned Projects	Status as at Feb 2016	Comments
Pole replacement and 11kV conductor and hardware upgrade Farm Road	Deferred	Insufficient project justification currently for project to proceed.
Undergrounding of 400V and streetlight circuits Acklin Street/Harris Street/Coughlan Road	Cancelled	No current justification for project.
Pole replacement, 11kV and LV conductor and hardware upgrade and undergrounding of the lines between Poles 904816 and 904818 Church Street/Waverley Street	Cancelled	No current justification for project.
Takapau Substation – Removal of 11kV Overhead Structure	In Progress	
Upgrade the existing Ferret conductor to Dog conductor on feeder 1 (11kV feeder) between poles 910181 and 910219	Completed	
Progressive replacement of aged No 8 Steel/Copper conductors on spur lines	Completed	Sections of conductor to be managed as separate projects and prioritised based on condition.
Waipawa Substation 11kV Circuit Breaker Replacement	Deferred	Based on updated asset condition information, project is now scheduled for 2023 to 2025.
Takapau Substation 11kV Circuit Breaker Replacement	Cancelled	No current justification for project.
Pole Feeder Maintenance – 33kV Feeders	Ongoing	
Pole Feeder Maintenance – 11kV Feeders	Ongoing	
Wilder Road 33kV Feeder Upgrade (Phases 3 to 5 of 5)	Work-in-Progress	
Progressive replacement of 2-pole transformer structures with ground-mounted transformers	Ongoing	Replacements based on condition and criticality.
Progressive replacement of aged 11kV Reclosers	Ongoing	Replacements based on condition and criticality.
Progressive replacement of aged 11kV ABSs	Ongoing	Replacements based on condition and criticality.

Table 8-3: Physical Progress of Planned Renewal Projects – 2014/15 to 2017/18

8.2.2 Financial Progress 2013/14

Spend Category	Forecasted Expenditure from 2012/13 AMP ($'000s)	Actual Expenditure ($'000s)	Variance %	Explanation of variances (+/-10%)
Consumer Connection	255	392	54%	Higher demand for Customer Connection Contributions than anticipated.
System Growth	245	131	-47%	Changed scope due to pending RWSS decision and the impact this would have on the network.
Asset Replacement and Renewal	1,609	1,285	-20%	Assets in good condition and no requirement to spend entire budget.
Asset Relocations	122		-100%	Lower demand from Councils and other customers.
Reliability, Safety and Environment	530	216	-59%	Robust state of network resulted in good performance and less than anticipated spend on reliability, safety and environment.
Network Capex	2,761	2,024	-27%	Combination of scope changes and maintenance on feeders after pole testing being less than anticipated.
Maintenance Category	**Forecasted Expenditure from 2012/13 AMP ($'000s)**	**Actual Expenditure ($'000s)**	**Variance %**	**Explanation of variances (+/-10%)**
Service Interruptions and Emergencies	270	318	18%	Higher than average storm events resulted in an increased reactive spend.
Vegetation Management	775	767	-1%	
Routine and Corrective Maintenance and Inspections	202	115	-43%	Less substation maintenance and distribution transformer refurbishment required than planned.
Asset Replacement and Renewal	1,175	981	-17%	Efficiencies in work programme and methodology resulted in significant savings.
Network Maintenance	2,422	2,181	-10%	Healthy state of the network resulted in savings on planned maintenance.

Table 8-4: Financial Progress Opex and Capex 2013/14

8.2.3 *Financial Progress 2014/15*

Spend Category	Forecasted Expenditure from 2012/13 AMP ($'000s)	Actual Expenditure ($'000s)	Variance %	Explanation of variances (+/-10%)
Consumer Connection	260	469	80%	Higher than anticipated demand for customer contribution connections.
System Growth	229	474	107%	Scope change to feeder re-conductor projects resulted in reduced budget.
Asset Replacement and Renewal	1,561	981	-37%	Assets in good condition and no requirement to spend entire budget.
Asset Relocations	125	118	-6%	
Reliability, Safety and Environment	468	183	-61%	Robust state of network resulted in good performance and less than anticipated spend on reliability, safety and environment.
Network Capex	2,643	2,225	-16%	Efficiencies in work programme and less than anticipated spend in unplanned CAPEX.
Maintenance Category	**Forecasted Expenditure from 2012/13 AMP ($'000s)**	**Actual Expenditure ($'000s)**	**Variance %**	**Explanation of variances (+/-10%)**
Service Interruptions and Emergencies	276	304	10%	Persistent high winds in October and November contributed to this overspend.
Vegetation Management	791	740	-6%	
Routine and Corrective Maintenance and Inspections	206	145	-30%	Asset Inspector took ill resulting in underspent budget.
Asset Replacement and Renewal	503	467	-7%	
Network Maintenance	1,776	1,656	-7%	

Table 8-5: Financial Progress Opex and Capex 2014/15

8.2.4 Financial Progress 2015/16

Spend Category	Forecasted Expenditure from 2012/13 AMP ($'000s)	Actual Expenditure ($'000s)	Variance %	Explanation of Variances (+/- 10%)
Consumer Connection	265	370	40%	High demand for customer connections experienced throughout the year.
System Growth	207	267	29%	More conductor upgrades than anticipated were required.
Asset Replacement and Renewal	2,038	1,169	-43%	Lower than anticipated corrective action required on planned MAPT work on 33kV network.
Asset Relocations	127	62	-51%	Low demand throughout the year.
Reliability, Safety and Environment	265		-100%	Few network faults, few vegetation faults, good weather, robust condition of Centralines' network.
Network Capex	2,902	2,150	-36%	
Maintenance Category	**Forecasted Expenditure from 2012/13 AMP ($'000s)**	**Actual Expenditure ($'000s)**	**Variance %**	**Explanation of variances (+/- 10%)**
Service Interruptions and Emergencies	281	269	-4%	
Vegetation Management	488	520	7%	
Routine and Corrective Maintenance and Inspections	210	183	-13%	The new asset inspection strategy implemented showed savings.
Asset Replacement and Renewal	513	395	-23%	Under-utilised "Unscheduled OPEX Defects" budget due to low fault rate during financial year.
Network Maintenance	1,492	1,367	-8%	

Table 8-6: Financial Progress Opex and Capex 2015/16

8.3 Review of Service Level Performance

As mentioned in Section 3, the Service Level framework changed for the 2015/16 financial year, corresponding to the start of the new regulatory period and implementation of new Asset Management objectives. Therefore 2013/14 and 2014/15 were assessed under the old framework while 2015/16 was assessed under the new framework.

8.3.1 Service Level Performance 2013/14

Service Level	Unit/ Type	Target 2013/14 (from 2013 AMP)	Actual 2013/14
SAIDI	Minutes	≤ 197.5	163
SAIFI	Interruptions	< 4.22	3.32
Total Cost per ICP	$	< $521	$507
Capacity Utilisation	%	≥ 24.7%	20%
Loss Ratio	%	≤ 8.0%	7.9%
Network Load Factor	%	≥ 65%	66%
Faults per 100km	33kV	< 6.7	0
Customer Satisfaction with Delivery of Customer Services	%	≥ 95%	97%

Table 8-7: Service Level Performance 2013/14

8.3.2 Service Level Performance 2014/15

Service Level	Unit/ Type	Target 2014/15 (from 2013 AMP)	Actual 2014/15
SAIDI	Minutes	≤ 197.5	141.4
SAIFI	Interruptions	< 4.22	2.4
Total Cost per ICP	$	< $453	$436
Capacity Utilisation	%	≥ 24.7%	20%
Loss Ratio	%	≤ 8.0%	8.0%

Service Level	Unit/ Type	Target 2014/15 (from 2013 AMP)	Actual 2014/15
Network Load Factor	%	≥ 65%	63%
Faults per 100km	33kV	< 6.7	4.18
Customer Satisfaction with Delivery of Customer Services	%	≥ 95%	97%

Table 8-8: Service Level Performance 2014/15

8.3.3 Service Level Performance 2015/16

Table 8-9 shows current service level framework with targets as per Section 3 and actuals/forecasts for 2015/16 where available for year-end.

Asset Management Objective	Service Level	Unit/Type	Target 2015/16	Forecast 2015/16
Health and Safety Performance	Accidents causing harm to a member of the public	Number of accidents	0	0
	Serious harm or lost-time injury to employees or contractors	Number of injuries	0	0
	Injuries to employees or contractors requiring medical treatment	Number of injuries	< 2	0
Customer Service Performance	Surveyed customer satisfaction with delivery of customer works	%	> 95%	> 95%
	SAIDI	Minutes	98.80 – 119.07	71.38
	SAIFI	Interruptions	2.84 – 3.52	1.4
	Revenue per ICP	$ (nominal)	$1,588	$1,588
	Restoration of Supply for unplanned interruptions	Urban	≤ 20 events ≥ 3 hours	< 20
		Rural	≤ 10 events ≥ 6 hours	< 10
		Remote rural	≤ 5 events ≥ 12 hours	< 5

Asset Management Objective	Service Level	Unit/Type	Target 2015/16	Forecast 2015/16
Cost and Efficiency Performance	Forward work planning horizon at a project level provided to contracting services providers	Years	≥ 1	1 year
	Operating expenditure per ICP (nominal)	$ (nominal)	< $444	$403
	Faults per 100km of network	33kV Overhead	< 8.5	< 8.5

Table 8-9: Service Level Performance 2015/16

8.4 Performance against Asset Management Objectives

Table 8-10 represents historical performance against the measures defined to deliver the asset management objectives in Section 3. The 2015/16 forecasted results are an estimate only based on performance as at the end of January 2016.

Asset Management Objective	Service Level	Unit/Type	2012/13	2013/14	2014/15	2015/16 (estimate)	Current Target (2016/17)
Health and Safety Performance	Accidents causing harm to a member of the public	Number of accidents	0	1	0	0	0
	Serious harm or lost-time injury to employees or contractors	Number of injuries	1	0	1	0	0
	Injuries to employees requiring medical treatment	Number of injuries	1	3	2	0	<2
Customer Service Performance	Surveyed Customer Satisfaction with delivery of customer works	%	100%	97%	97%	> 95%	> 95%
	SAIDI	Minutes	82.4	105.3	98.6	68.78	98.80 – 119.07
	SAIFI	Interruptions	2.14	2.98	2.26	1.36	2.84 – 3.52

Asset Management Objective	Service Level	Unit/Type	2012/13	2013/14	2014/15	2015/16 (estimate)	Current Target (2016/17)
	Revenue per ICP	$ (nominal)	$1,139	$1,402	$1,527	$1,588	$1,690
	Restoration of supply for unplanned interruptions	Urban					20
		Rural					10
		Remote rural					5
Cost and Efficiency Performance	Forward work planning horizon at a project level provided to contracting services providers					1 Year	≥2 years rolling
	Operating expenditure per ICP	$	$471	$507	$436	$403	<$447
	Faults per 100km of network	33kV Overhead	2.09	0	4.19	< 8.5	< 8.5

Table 8-10: Service Level Performance against Asset Management Objectives

8.5 Health and Safety Performance

Health and Safety Performance: Achieve an injury-free workplace by creating a culture where each person truly believes that "safety first" is a core value, and that working safely is part of all employees' everyday activities.

Health and safety is a key outcome for Centralines, both by ensuring that providing its services causes no public harm, and by ensuring its employees and contractors are healthy and safe when carrying out their work.

Centralines aims to comply with all relevant Legislation, Standards and Codes of Practice and has established procedures to ensure its health and safety policies are followed. Centralines understands that health and safety is a risk that will always be present and continues to endorse training and awareness initiatives throughout its business and communities.

8.5.1 Public Safety

Ensuring the safety of consumers and the public is a key factor in Centralines' philosophy of managing and maintaining its network assets. Safety is a core component of network planning and all field crews will prepare a mandatory health and safety management plan before commencing work.

Unfortunately there has been one accident causing significant damage to public property. Refer Figure 3.3 in Section 3.

11 February 2014 – A Centralines' vegetation worker was felling trees in close proximity to a shed when he overcut the scarf and felled the tree onto the shed by mistake.

Any incident involving members of the public or damage to their property resulting from Centralines' assets is investigated as a high priority. This accident was investigated, reviewed and reported both internally and externally and notified to Energy Safety. This reporting is also reviewed by the Centralines' Management and Board members.

8.5.2 Public Safety Management Systems

The Electricity Amendment Act 2006 established new requirements for the electricity sector in terms of public safety. EDBs must now develop, implement and maintain a Public Safety Management System (PSMS) to ensure their network will not pose a significant risk of serious harm to members of the public or significant damage to property owned by persons other than the EDB. See Section 7 for details.

The objective of the PSMS is to ensure that the electricity industry takes responsibility for the safety and integrity of its assets – designing for safety and managing assets so that the potential for, and consequences of, their failure will be minimised.

The three-yearly PSMS full system audit for Centralines was conducted by TELARC on 30-31 March 2015. This audit differs from the annual surveillance audit in that the entire system is reviewed to ensure it meets the requirements of the relevant New Zealand Standard (NZS 7901).

Two system Partial Achievements (PAs) have been recorded that must be addressed before the next surveillance audit in March 2016:

- PA1 is in relation to defining the point of "As Low As Reasonably Practical" (ALARP) numerically as a level of risk in the risk assessment procedure (Low Risk).
- PA2 is in relation to the records of the asset inspections that must be loaded into Activa ASAP (Moderate Risk).

The 2016 audit was recently completed and Centralines' PSMS was assessed as fully compliant.

8.5.3 Health and Safety Management System

Centralines aims is to achieve 'best' and 'leading' health and safety practices through an effective systematic health and safety management system which is not only continuously improved, but is just as importantly, straight-forward to use. Centralines' current health and safety management system is accredited to ACC Workplace Safety Management Programme tertiary accreditation level. Over the next three years Centralines is working towards an internationally recognised AS/NZS 4801 Standard accreditation.

Centralines is committed to ensuring that additional development work is undertaken on its health and safety management system to ensure that it meets the requirements of the new Health and Safety at Work Act 2015 and the accompanying Regulations which will come into force on 4 April 2016.

8.5.4 Employee Safety

The safety and wellbeing of our employees continues to be a critical business process and a core company value embraced by Centralines. Management's focus continues to be in establishing an effective safety culture through safe mind-sets, practices and attitudes, with a focus on learning from what goes right in expected and unexpected conditions, rather than only learning from incidents or injuries.

Centralines won the ACC Workplace Safety Award, ahead of five other finalists at the Westpac Hawke's Bay Chamber of Commerce Business Awards on 5 December 2014.

The ACC Workplace Safety Award recognises and celebrates organisations who are leading the way in managing hazards and preventing accidents in their workplace.

8.5.4.1 Employee Safety Performance

Centralines aims to achieve Zero Harm and record no lost-time injuries but were unsuccessful over this time period. Refer Figure 3-4 in Section 3. However, compared to our industry peers, Centralines' health and safety record is well above the average.

Lost Time Injury – 15 March 2013 - A network contractor worker was driving a vehicle on Clareinch Road when he lost control and left the road, rolling the vehicle.

Lost Time Injury – 1 April 2014 – Centralines' vegetation worker put his back out while operating a chainsaw.

Centralines' MTI performance can be seen in Figure 3-5 in Section 3.

As in the public safety accidents section above, any lost time injury or medical treatment is investigated fully by management to understand the root cause, and any contributing factors in order to apply mitigating actions and refer learnings back to the organisation. The above injuries were investigated and the main contributing factor was determined to be human error.

Despite not maintaining the record of Zero LTIs in 2014/15, there was just one reported injury requiring time off work, and this was not a serious harm incident. Centralines' employees operate in a challenging and often dangerous environment and the favourable results we continue to see in this area are evidence of the safety-focussed culture at Centralines.

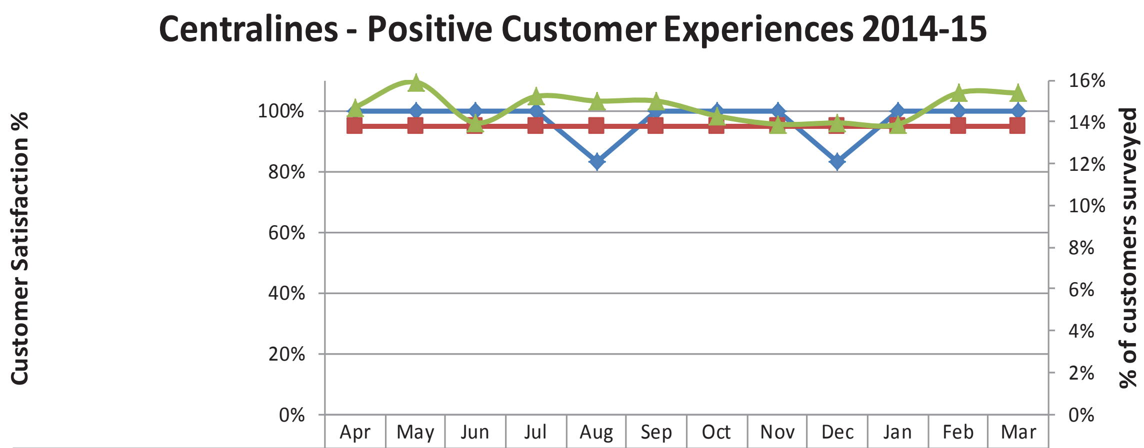
8.6 Customer Service Performance

Customer Service Performance: Deliver customer service excellence through provision of a reliable and resilient network at a reasonable price.

As mentioned in Section 3 Centralines uses a number of measures to understand customer satisfaction with the services it provides – from reliability indices SAIDI and SAIFI, to restoration of supply standards, through to customer satisfaction and experience.

8.6.1 Customer Satisfaction with Delivery of Customer Works

Every customer contact is seen as an opportunity for Centralines to enhance the relationship with our customers. To this end, following the completion of customer-requested capital works, or non-regulatory works, Centralines has adopted a sample-based approach to gaining an understanding of perceptions of our performance, using a short customer survey conducted over the telephone. This is monitored by graphing the results and reviewing monthly to facilitate timely identification of any issues and opportunities for improvements.



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
% positive experiences	100%	100%	100%	100%	83%	100%	100%	100%	83%	100%	100%	100%
% positive experiences target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Survey %	15%	16%	14%	15%	15%	15%	14%	14%	14%	14%	15%	15%

Figure 8-1: Customer Satisfaction Performance 2014/15

The results for the 2014/15 year are shown in Figure 8-1 above and report a 97% satisfaction level with a sampling rate average of 15%, which is considered a reliable indicator of customer satisfaction.

8.6.2 Network Reliability

Network reliability is measured by the quantity and duration of interruptions to the supply of electricity to our customers. Centralines' goal is to ensure that reliability performance meets both our regulatory requirements and our customers' expectations.

The evaluation of Centralines' reliability performance is against the Commerce Commission's Electricity Distribution Information Disclosure Determination 2012. These measures are:

- SAIDI, system average interruption duration index, which measures the average number of minutes per annum that a consumer is without electricity.
- SAIFI, system average interruption frequency index, which measures the average number of times per annum that a consumer is without electricity.

Both the SAIDI and SAIFI measures consider planned and unplanned interruptions of a duration longer than one minute on our sub-transmission and high voltage distribution system. Low voltage interruptions and those that originate in Transpower's transmission system are not included.

There is a public expectation that the electrical network will be reliable and cost effective. There is a high dependency on electricity for commercial enterprises, farming, communications and lighting and signal control systems. There is also a high dependency upon the electrical network for home heating.

In the last full year (2014/15) the average duration and frequency of outages experienced by our customers were well below regulatory limits and Centralines' Statement of Corporate Intent targets. Refer Figures 3-7 and 3-8 in Section 3.

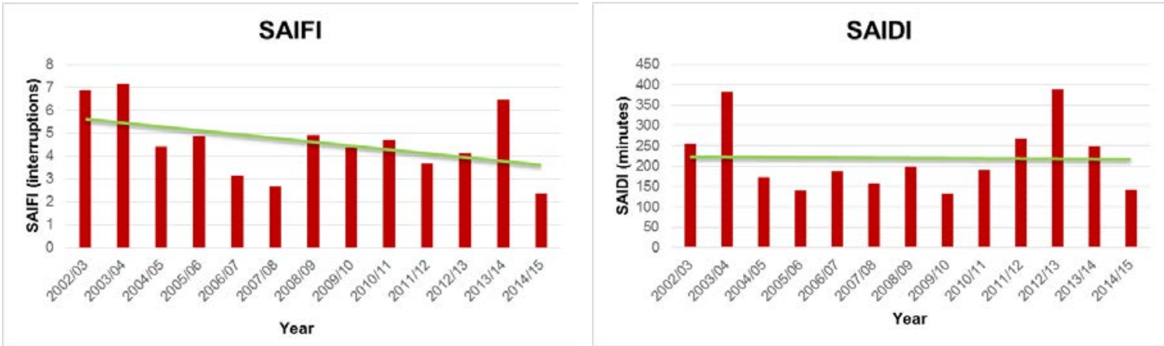


Figure 8-2: SAIDI and SAIFI Performance

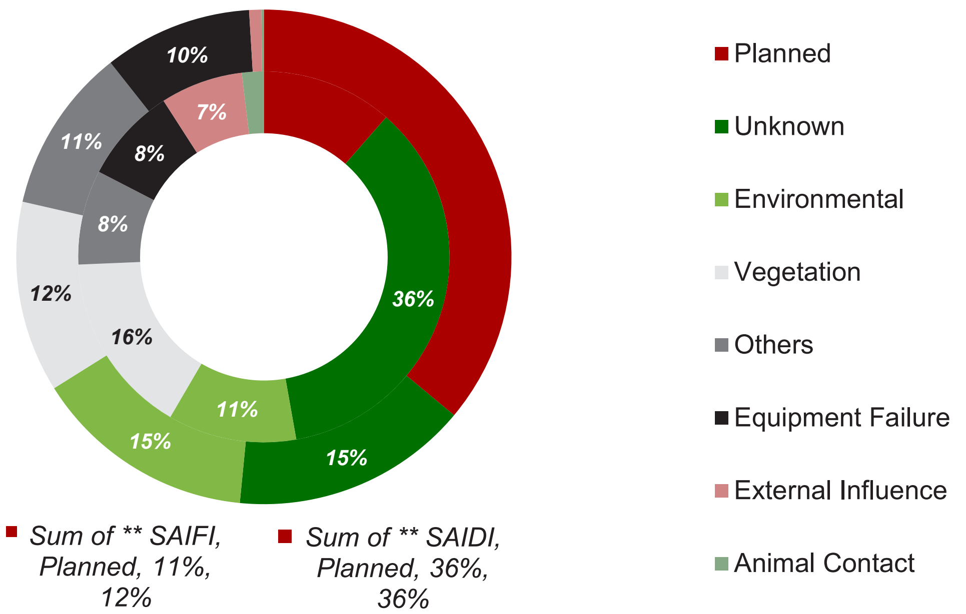


Figure 8-3: SAIDI and SAIFI Causes for 2014/15

Whilst planned outages are unavoidable, Centralines aims to limit the impact on our customers by ensuring that advance notifications of outages are provided to customers and ongoing communication on duration is available.

8.6.3 Revenue per ICP

Centralines' overall prices link directly to costs, so overall costs (operating expenses, plus investment in network) determine the reasonableness of prices. Asset Management excellence is intended to ensure that Centralines' costs, and therefore prices, are efficient over the longer term.

In respect to Fair Price, although not a perfect measure, this can be benchmarked by reference to our revenue per ICP being consistent with or below the revenue per ICP average (adjusted for ICP/km and pricing anomalies) for New Zealand distributors.

Centralines' revenue per ICP (seen in Figure 3.8 in Section 3) is higher than the median across the industry. This reflects Centralines' maintenance investment in recent years, in particular around vegetation management. However on a density-based evaluation of revenue per ICP, Centralines compares favourably with its industry peers. Centralines' objective is to continue to look for efficiencies especially through its maintenance programme to ensure costs continue to be controlled and to subsequently ensure normalised revenue per ICP trends towards industry median levels.

Centralines is participating in the ENA's Distribution Pricing Working Group. The aim of this group is to facilitate the development of network pricing arrangements that meet businesses' needs (e.g., revenue certainty, cost reflectivity) whilst achieving a degree of consistency across the industry. A key focus of this group will be to coordinate the ENAs efforts to obtain meaningful change in the Low Fixed Charge Regulations. This would see a better (fairer) allocation of the fixed costs of Centralines' network to consumers, where currently some residential users make very little contribution to costs.

8.6.4 Restoration of Supply

Restoration and repair time is an outcome of multiple factors; information to the Control Room, availability of contracting staff, skills of staff, locating the fault, network configuration, complexity of fault and weather conditions.

Customer consultation has told us that if a power failure does occur, then restoration of power is an important concern. Consequently our consumer-focused measure is the percentage of unplanned interruptions restored within three hours for urban customers, six hours for remote customers and 12 hours for remote rural locations.

Centralines' engages its field staff to provide adequate response to any event on the network. Reasonable response times to effect a repair have been established and agreed in a contract between the parties.

Dependent on fault location and time of day, travel time can be a significant factor especially for the rural and remote rural events. “Car vs. pole” incidents involving the Police may restrict access to the site for several hours while they complete their investigation, which significantly delays the repair and restoration effort.

Centralines plans to monitor performance in restoration from 2016/17 onwards.

8.7 Cost and Efficiency Performance

Cost and Efficiency Performance: Improve the efficiency and effectiveness of asset management practices through innovative network and energy solutions.

Being an essential service, with a network to manage and risks to off-set, cost is an inevitable component of Centralines' business. Centralines strives to deliver an efficient service and to deliver a service at a reasonable cost to its customers.

8.7.1 Forward Work Planning Horizon at a Project Level provided to Contracting Services Providers

A significant amount of time and effort (and cost) is consumed annually for the planning and budgeting of the Programme of Work. The detailed Programme of Work has historically been produced as a one-year plan only but it is now recognised by process owners that this may generate a degree of inefficiency.

As noted in Section 2 of the AMP, Centralines operates a mixed model consisting of retaining some capability in-house (field-staff), but outsourcing Management Services and some capital works to third parties through competitive tenders.

As detailed in Section 9, Centralines will move to providing a three-year rolling programme of work to its contractors on the premise that it will bring about efficiency gains through:

- Identification of project synergies to minimise customer interruptions and increase contractor efficiency;
- Improved visibility for the contractor on where recruitment or attrition will need to be applied;
- Improved visibility of contractor capacity to enable forward planning for sub-contracting requirements which may produce refinements in rates and costs;
- Improved financial benefits which include better debt and cost forecasting, the ability to organise exchange hedging for large material procurements, revenue and cost implications, as well as analysis of regulatory variations; and
- The ability to respond fast and be agile.

8.7.2 Business Efficiency Performance

Centralines' AMP is driven by the Business and Network Strategies, as well as known compliance and risk requirements as detailed in Section 2.

In order to drive toward maximum efficiency, supporting best practice in asset management and to extract the best value from our data, Centralines' systems and processes have evolved as technology and changing business needs demand. Centralines' core processes continue to be tested to ensure waste is eliminated and to allow our employees to perform value-added tasks.

Cost per ICP is a key result indicator of efficiency. Centralines has consciously invested in activities that will produce longer-term cost efficiencies, e.g. the maintenance investment in recent years, in particular around vegetation management. However on a density-based evaluation of revenue per ICP Centralines compares favourably to its industry peers.

As seen in Section 3 Centralines expects cost per ICP to be neutral over the coming period/s as these initiatives reduce operating expenditure and maintenance requirements.

8.7.3 Faults per 100km of Network

Faults per 100km is a metric that describes the number of faults[1] on Centralines' 11kV and 33kV assets in proportion to their system length. This provides a value that enables comparison across years and between EDBs for performance benchmarking. This differs from SAIDI and SAIFI as it is focussed on the network rather than the customer. This is disclosed to the Commerce Commission but is not considered for quality regulation.

Faults per 100km is useful for gaining an insight into underlying network performance but does not provide information about the cost of that performance.

Section 3.6.2 shows Centralines' faults per 100km for the last ten years and the positive linear trend.

8.7.4 Works Programme Performance

Centralines' capital and maintenance programme aims to achieve the following outcomes:

- Investment decisions are optimised and are based on appropriate trade-offs between capital and operational expenditure, risk, and reliability;
- Centralines leverages its experience to ensure the appropriate decisions are made on planning, constructing, maintaining and ultimately operating the network;
- Preventive and corrective maintenance decisions are made using tools and procedures. These procedures are balanced between operational expenditure, asset condition, and reliability; and
- Optimising the performance of Centralines' primary contractors and subcontractors to deliver to time, quality and budget.

Being an essential service, with a network to manage, and risks to off-set, expenditure is an inevitable component to Centralines' business. However, the Company strives to deliver an effective and efficient programme to achieve the above outcomes.

All planned work scheduled for completion for 2013/14 and 2014/15 disclosure years were completed as a result of this, although some projects were deferred or cancelled as a result of further investigation during the planning processes as detailed in Section 8.2.

Centralines is satisfied that through the combination of in-house field staff capability and the use of external contractors to undertake the balance of capital expenditure work, sufficient resources exist or are available to ensure planned works are completed.

[1] Faults in this context refers to any unplanned interruptions greater or equal to 60 seconds in duration

8.7.4.1 Capital Works Expenditure

The 2014/15 financial year saw the completion of several large projects including the undergrounding of Marlborough, Herbert and Peel Streets' overhead assets, and the re-conductoring of a portion of Feeder 1 along SH50 and Feeder 3.

8.7.5 Maintenance Works Programme Performance

The performance of the maintenance programme is listed below by category.

8.7.5.1 Service Interruptions and Emergencies

As mentioned in the Network Reliability section, the network performance was overall, very strong in 2014/15. The year started adversely with ex-tropical cyclone Ita in April, high winds on October and the remnants of ex-tropical Cyclone Pam in March. The costs to react and repair the network were less than anticipated. This containment is partially from a smarter network with self-healing capabilities and a contractor experienced in resolving faults.

8.7.5.2 Vegetation Management

The category of Vegetation Management includes planned inspection, liaison and cutting activities driven by Centralines' Vegetation Prioritisation Programme (VPP). The primary purpose of Centralines' vegetation programme has been to maintain compliance with the Electricity (Hazards from Trees) Regulations 2003. These Regulations cover vegetation within the immediate electricity line corridor. The performance and expenditure was delivered to plan each year.

8.7.5.3 Routine and Corrective Maintenance

This category comprises three types of work:

(1) Routine Maintenance - activities scheduled according to manufacturers' recommendations; time-based cycles, best industry practice and established Centralines' specific criteria.
(2) Corrective Maintenance - Non-urgent remedial work carried out as planned activities subsequent to the immediate or short-term action carried out reactively in response to an unplanned event or system failure.
(3) Inspections - This covers a broad range of inspection, testing and condition monitoring programmes. These programmes ensure the safety, reliability and serviceability of Centralines' assets and inform the planning of maintenance and renewal activities.

This programme has been under budget each year, for different reasons. See Tables 8.4 - 8.6 for explanations of the variance.

8.7.5.4 Asset Replacement and Renewal

Asset Replacement and Renewal expenses ended slightly favourable to budget. Less overhead line maintenance was required and capital expenditure reduced planned expenditure on pole maintenance as a result of a robust asset inspection programme.

8.8 Asset Management Capability

Asset Management Capability: Continually improve asset management capability by innovating and drawing upon emerging good practice.

The Asset Management Strategy is a container for Centralines' Asset Management Objectives, as well as the documents that record Centralines' strategies for achieving the objectives. The objectives are aligned to the outcomes desired from the Organisational Strategic Plan and tested for consistency with the Asset Management Policy. Centralines has commenced upgrading this element of the AMS to an ISO 55001:2014-aligned Strategic Asset Management Plan. Asset Management Strategy and Objectives are subject to ongoing review from the top-down as the Organisational Strategic Plan changes, and from the bottom-up as the asset changes and the organisation's asset management planning and lifecycle delivery capabilities improve.

Centralines is committed to improving its asset management capabilities and has a number of asset management strategies in place to achieve this. They are however outlined in disparate documents with different business owners. While they are developed carefully within individual asset management functions, it has been recognised that they are not yet sufficiently integrated for Centralines to meet its asset management aspirations.

In 2016/17 a key initiative is to establish a formalised framework for strategic asset management planning and to develop a comprehensive and integrated Strategic Asset Management Plan (SAMP) that meets the requirements of ISO 55001:2014.

8.9 Evaluation of Asset Management Maturity

8.9.1 Background

In 2012, the Commerce Commission included an Asset Management Maturity Assessment Tool (AMMAT) as part of the information that Electricity Distribution Businesses (EDBs) are required to disclose in their annual information disclosures. The AMMAT consists of a self-assessment questionnaire containing 31 questions and accompanying guidance notes. The maturity assessment questions are designed to cover the full range of asset management system components and activities while having regard to information that is already disclosed in AMPs.

Figure 8-4 taken from the Institute of Asset Managements (IAMs) PAS55 Assessment Methodology Guidance Notes, details the maturity scales on which the AMMAT scoring is based.

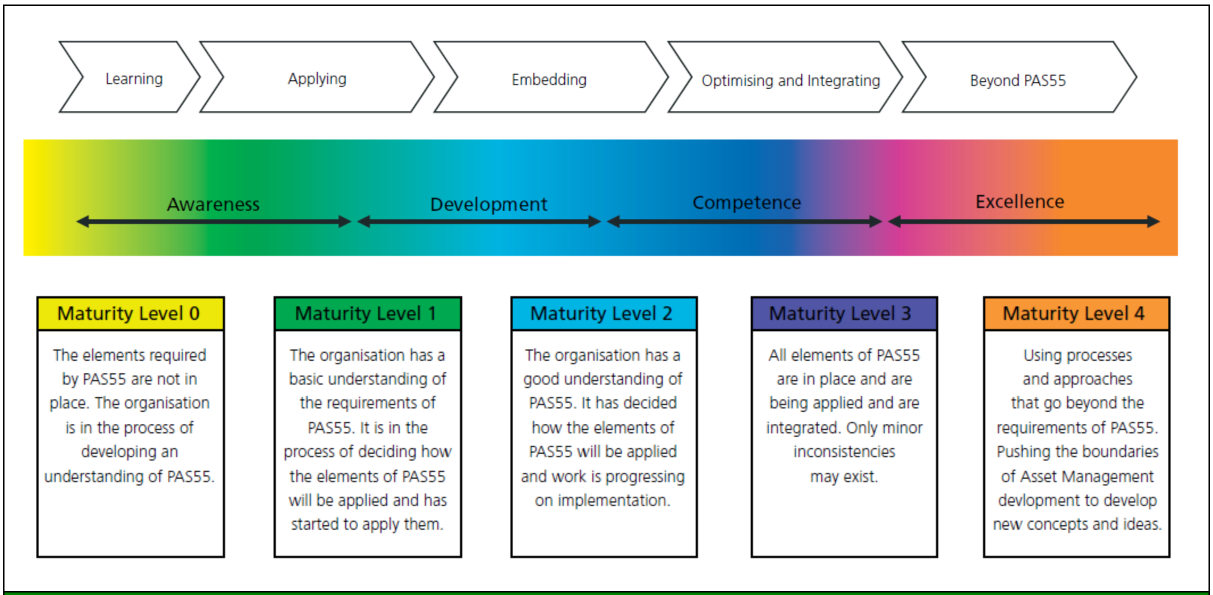


Figure 8-4: PAS55 Maturity Levels

Centralines' AMMAT disclosure in previous AMPs has been self-assessed. The assessors used were employees actively involved in asset management and familiar with International Asset Management standards and Covaris Pty Ltd (a Sydney-based Asset Management Consultancy). Covaris were tasked with assessing Unison's asset management capabilities and performance against internationally recognised standards (PAS 55 and ISO 55001) and to then use outputs of this assessment to provide input into the Centralines' AMMAT schedule where applicable. It should be noted there is not always a direct correlation between the Unison and Centralines' AMMAT scoring as not all aspects of the Unison's AMMAT can be applied directly to Centralines.

8.9.2 2016 AMMAT Results

Figure 8-5: 2016 Centralines' AMMAT Results

These individual AMMAT questions including Centralines' scores can be grouped into six main capability areas. These grouped capability areas including a rounded score for each area is provided in Table 8-11.

Capability Area	2016 Score	Question Number	Asset Management Capability Sub-area
Asset Strategy and Delivery	2	10	Asset Management Strategy Alignment
		11	Asset Management Strategy – Asset Life Cycle
		26	Asset Management Plan
		33	Contingency Planning
		69	Lifecycle Management of Risks

Capability Area	2016 Score	Question Number	Asset Management Capability Sub-area
		91	Corrective and Preventative Action
		109	Asset Maintenance and In-service Support
Documentation, Controls and Review	2	45	Outsourcing
		59	Asset Management System Documentation
		82	Legal / Regulatory / Statutory Compliance
		88	Asset Creation & Refurbishment
		95	Performance and Condition Monitoring
		105	Auditing
		113	Continuous Improvement
Systems, Integration and Information Management	2	31	Issue of Work from the Asset Management Plan
		62	Effectiveness of Asset Information Systems
		63	Currency of Asset Information
		64	Asset Information System Relevance
Communication and Participation	3	3	Asset Management Policy
		27	Communicating the Asset Management Plan
		42	Asset Management Awareness and Leadership
		53	Communication of Asset Management Information
Structure, Capability and Authority	3	29	Responsibilities to Act on the Asset Management Plan
		37	Management Delivering Asset Management
		99	Defect Investigation
		115	Advance Technology and Practices
Competency and Training	2	40	Resourcing Asset Management
		48	Development of Human Resources in Asset Management
		49	Competency Development in Asset Management
		50	Training
		79	Risk Based Improvement of Teams

Table 8-11: AMMAT Scoring per Asset Management Capability Area

Centralines is committed to continually improving its Asset Management capabilities in all areas. It is believed Unison's planned Asset Management improvement initiatives will target and address many of the deficiencies outlined above.

8.10 Determination Reference Mapping Table

Section 8 Reference	Determination Reference
8.1 Introduction to Section	15
8.2 Review of Progress Against Plan	15.1, 15.4
8.3 Review of Service Level Performance 8.4 Performance Against Asset Management Objectives 8.5 Health and Safety Performance 8.6 Customer Service Performance 8.7 Cost and Efficiency Performance 8.8 Asset Management Capability	15.2, 15.4
8.9 Evaluation of Asset Management Maturity	15.3, 15.4

Table 8-12: Determination Reference Mapping Table

SECTION 9 **CAPABILITY TO DELIVER**

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9. CAPABILITY TO DELIVER

The Asset Management Plan (AMP) is compiled to ensure that Centralines can build, maintain and operate the network in the most efficient and effective manner possible, while delivering sustainable, reliable services to customers.

The following section outlines how Centralines ensures the AMP is realistic and objectives are achievable. The organisational structure, processes for authorisation and business capability also support how the AMP is delivered.

9.1 Achieving the Objectives of the Plan

The requirements for the AMP state that it must describe the processes used by the EDB to ensure that:

- The AMP is realistic and the objectives set out in the plan can be achieved;
- The organisation structure and the processes for authorisation and business capabilities will support the implementation of the AMP plans.

Centralines interprets these requirements as having an explanation of how we ensure that the Plan is reasonable (i.e. is efficient and effective at building, maintaining and operating networks that are neither gold-plated, nor inadequate, to sustainably deliver reliable services to consumers) and that Centralines has business processes and capabilities to actually deliver the Plan.

As noted in Section 2 of the AMP, Centralines operates a mixed model consisting of retaining some capability in-house (field-staff), but outsourcing Management Services and some capital works to third parties through competitive tenders.

9.1.1 Ensuring the Plan is Realistic

The main contributing factors that ensure the AMP is realistic and objectives are achieved are as follows:

- The quality of the needs assessments (e.g. demand growth forecasts, which give rise to network reinforcement requirements);
- Life cycle asset management planning;
- Business processes and systems to support achievement of the plan;
- Resource availability both in-house and external;
- Need for out-sourcing specialised functions;
- Commercial or legal arrangements (e.g. easements) required to facilitate work being carried out.

9.1.2 Needs Assessments

Section 4 of the Plan details Centralines' approach to determining the long-term network planning requirements, in the context of load growth requirements, quality and reliability standards. Needs assessments are carried out by Centralines' Management Service Provider. While drawing on external sources of information (e.g. growth forecasts, developer, Council information) to develop load projections.

A detailed project list is developed for the coming financial year, with projects that do not meet identified thresholds prioritised for future years. They are re-evaluated during the annual asset planning cycle, or if circumstances change during the current year (e.g. where large new customer loads not previously known trigger investments or forecast loads not materialising).

Inevitably, there is uncertainty about future demands put on the network, which results in the Plan being developed under conditions of uncertainty.

By utilising sound forecasting techniques, rigorous models to establish asset management responses (repair, refurbish, replace) and allowing for intra-year flexibility in projects undertaken, Centralines considers that a reasonable approach to establishing its maintenance and investment plans has been established.

The Centralines' network is characterised by low volume and demand growth, so much of the Centralines' investment and maintenance programme is driven by compliance and age/condition-related considerations. Additionally, the network architecture is relatively straight-forward, reflecting the low density nature of the network.

9.1.3 Life Cycle Asset Management Planning

Centralines' approach to life cycle asset management planning is detailed in Section 5. The future adoption of a condition-based, risk management approach to inform maintenance and renewal programmes will add further rigour and accuracy to the planning process going forward. This approach in conjunction with the Centralines' Management Services Provider's existing decision support tools provides structure to ensure the plan is realistic, achievable and aligns with Centralines' objectives.

9.1.4 Contracting Arrangements

Centralines has a Management Services Agreement with Unison Networks Limited (UNL) to provide a broad suite of Management Services, including leadership, management, operational control of the network, commercial, financial, regulatory compliance and management of the development and maintenance of the network.

Using decision support tools (outlined in Sections 4 and 5), a 12-month investment (capital and maintenance) plan is developed by Centralines' Management Services Provider's asset specialists and network planners which is supplied to Centralines. Centralines analyse the plan against resource availability and phase the work to smooth out any peaks and troughs that may be experienced. Throughout the year, Centralines have the flexibility to re-prioritise the timing of individual projects to meet resource and network requirements.

Centralines retains in-house capability to carry out field-work, in conjunction with the ability to manage competitive tendering for any works not undertaken internally. The majority of work is carried out internally.

This resulted in the completion of all planned work scheduled for the 2013/14 and 2014/15 disclosure years.

Centralines is satisfied that through the combination of in-house field staff capability and the use of external contractors to undertake the balance of capital expenditure work, sufficient resources exist or are available to ensure planned works are completed.

In addition, under emergency conditions provision exists with external contractors to complement in-house restoration efforts.

9.2 Organisation Structure, Processes for Authorisation and Business Capabilities

9.2.1 Organisation Structure

The following organisation structure is employed by Centralines. The relatively simple structure reflects that a significant number of services are outsourced to Centralines' Management Services Provider:

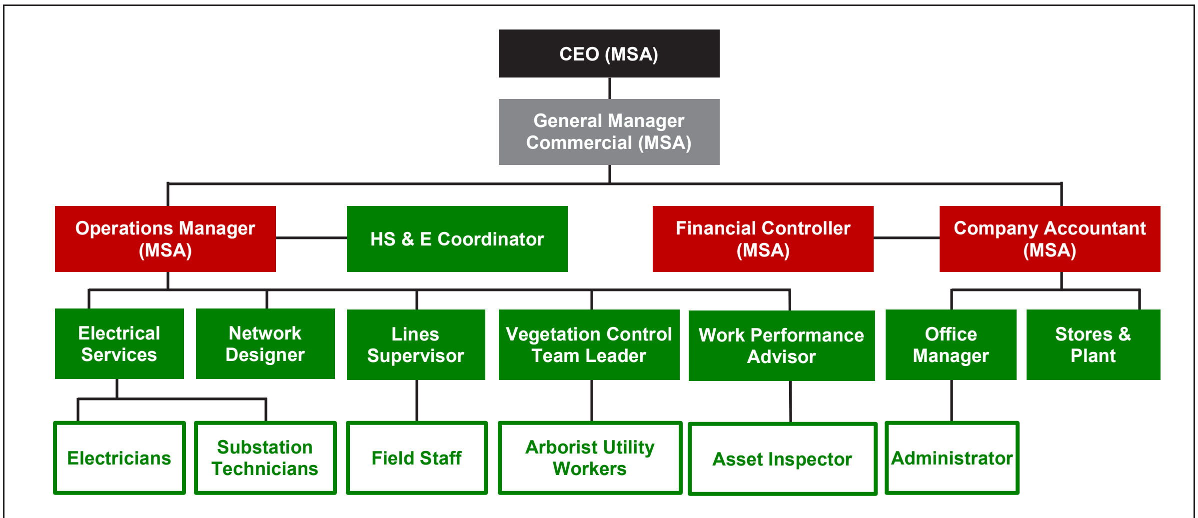

Figure 9-1: Centralines' Organisation Structure

9.3 Processes for Authorisation

Various levels of financial authorisation exist in Centralines. The Centralines' Delegations Policy is in place which outlines the level of delegated financial authority from the Board to named roles within Centralines and Centralines' Management Services Provider. Centralines' financial system coupled with controls and audits ensure that the process for authorisation is adhered to, or should the case arise, detect where non-compliance occurs.

The Centralines' Board approves the overall Centralines' Business Plan, including the Asset Management Plan, which sets out capital and operating expenditure forecasts.

Should an individual approval be required over the highest level of delegation, a business case is prepared and submitted to the Board for approval.

When there are variations to agreed works contracts, a variation process is followed to authorise changes due to unforeseen circumstances.

9.4 Business Capabilities

As a small regional network, Centralines seeks to ensure that there is an efficient and effective business structure in place which ensures that community ownership of the network is not compromised by its small scale.

As stated previously, Centralines seeks to strike a balance between out-sourcing specialised functions that would be otherwise unaffordable or provided inefficiently internally, with maintaining an internal capability to ensure resources remain in the region to provide field services.

Out-sourcing risks are managed through the method of contracting and exit arrangements, which would provide for an orderly transition in the event that Centralines wished to change their management services provider.

Figure 9-2 illustrates the business process that Centralines uses to deliver its asset management activities. Each of these activities can be mapped to a required business capability.

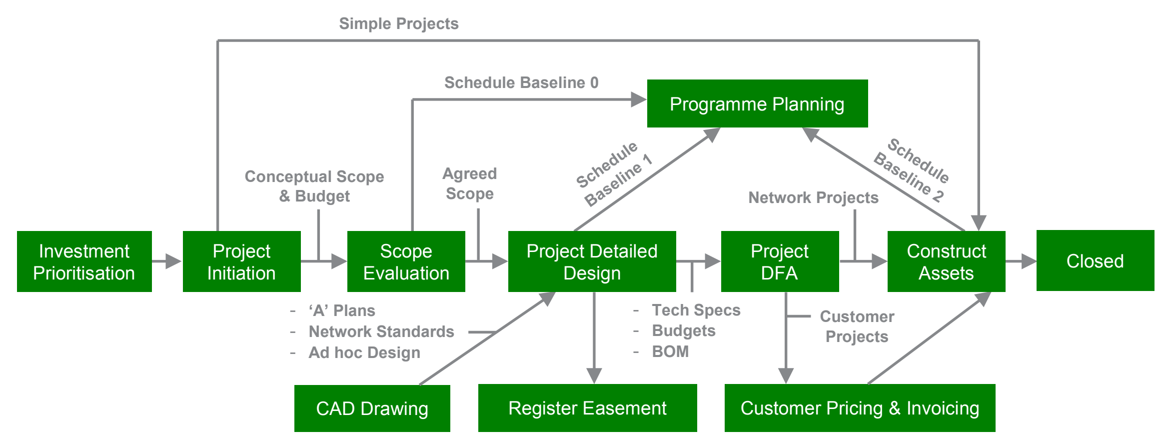

Figure 9-2: Asset Management Business Process

Centralines maintains field services (all customer works, network maintenance activities and the majority of network capital expenditure works) in-house. All other services are provided by Centralines' Management Services Provider.

9.5 Determination Reference Mapping Table

Section 9 Reference	Determination Reference
9.1 Capability to Deliver	16.1
9.2 Organisation Structure, Process for Authorisation and Business Capabilities 9.3 Processes for Authorisation 9.4 Business Capabilities	16.2

Table 9-1: Determination Reference Mapping Table

SECTION 10 **SCHEDULES**

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11a: Report on Forecast Capital Expenditure

This schedule requires a breakdown of forecast expenditure on assets for the current disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms. Also required is a forecast of the value of commissioned assets (i.e., the value of RAB additions)

EDBs must provide explanatory comment on the difference between constant price and nominal dollar forecasts of expenditure on assets in Schedule 14a (Mandatory Explanatory Notes).

This information is not part of audited disclosure information.

11a(i): Expenditure on Assets Forecast

		Current Year	*CY+1*	*CY+2*
	for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**
		$000 (in nominal dollars)		
	Consumer connection	370	300	311
	System growth	267	10	259
	Asset replacement and renewal	1,169	802	864
	Asset relocations	63	110	114
	Reliability, safety and environment:			
	Quality of supply	280	150	109
	Legislative and regulatory	-	55	57
	Other reliability, safety and environment	-	285	197
	Total reliability, safety and environment	**280**	**490**	**362**
	Expenditure on network assets	**2,149**	**1,712**	**1,910**
	Non-network assets	179	124	285
	Expenditure on assets	**2,328**	**1,836**	**2,195**
plus	Cost of financing	-	-	-
less	Value of capital contributions	300	265	273
plus	Value of vested assets	-	-	-
	Capital expenditure forecast	**2,028**	**1,571**	**1,922**
	Value of commissioned assets			
		$000 (in constant prices)		
	Consumer connection	370	296	300
	System growth	267	10	250
	Asset replacement and renewal	1,169	790	835
	Asset relocations	63	108	110
	Reliability, safety and environment:			
	Quality of supply	280	148	105
	Legislative and regulatory	-	54	55
	Other reliability, safety and environment	-	281	190
	Total reliability, safety and environment	**280**	**483**	**350**
	Expenditure on network assets	**2,149**	**1,687**	**1,845**
	Non-network assets	179	122	275
	Expenditure on assets	**2,328**	**1,808**	**2,120**
Subcomponents of expenditure on assets (where known)				
	Energy efficiency and demand side management, reduction of energy losses			
	Overhead to underground conversion	-	50	50
	Research and development			

CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26
317	323	330	336	343	350	357	364
137	377	385	392	400	408	297	303
961	953	890	824	789	1,329	1,356	946
116	118	121	123	126	128	131	133
106	54	55	56	57	58	59	61
58	22	22	22	23	-	-	-
201	178	113	101	103	105	77	127
364	**253**	**190**	**179**	**183**	**163**	**137**	**188**
1,896	**2,025**	**1,914**	**1,855**	**1,840**	**2,378**	**2,277**	**1,935**
285	522	467	364	303	613	589	164
2,181	**2,547**	**2,381**	**2,219**	**2,143**	**2,992**	**2,866**	**2,099**
-	-	-	-	-	-	-	-
281	290	299	207	317	326	335	335
-	-	-	-	-	-	-	-
1,900	**2,257**	**2,082**	**2,012**	**1,826**	**2,666**	**2,531**	**1,764**
300	300	300	300	300	300	300	300
130	350	350	350	350	350	250	250
910	885	810	735	690	1,140	1,140	780
110	110	110	110	110	110	110	110
100	50	50	50	50	50	50	50
55	20	20	20	20	-	-	-
190	165	103	90	90	90	65	105
345	**235**	**173**	**160**	**160**	**140**	**115**	**155**
1,795	**1,880**	**1,743**	**1,610**	**2,060**	**2,040**	**1,555**	**815**
270	485	425	325	265	526	495	135
2,065	**2,365**	**2,168**	**1,935**	**2,325**	**2,566**	**2,050**	**950**
50	50	50	50	50	50	50	50

	Current Year	CY+1	CY+2
for year ended	31 Mar 16	31 Mar 17	31 Mar 18
Difference between nominal and constant price forecasts	$000		
Consumer connection	-	4	11
System growth	-	0	9
Asset replacement and renewal	-	12	29
Asset relocations	-	2	4
Reliability, safety and environment:			
Quality of supply	-	2	4
Legislative and regulatory	-	1	2
Other reliability, safety and environment	-	4	7
Total reliability, safety and environment	**-**	**7**	**12**
Expenditure on network assets	**-**	**25**	**65**
Non-network assets	-	2	10
Expenditure on assets	**-**	**27**	**75**

11a(ii): Consumer Connection

	Current Year	CY+1	CY+2
for year ended	31 Mar 16	31 Mar 17	31 Mar 18
Consumer types defined by EDB*	$000 (in constant prices)		
As requested by customers	-	296	300
Consumer connection expenditure	**370**	**296**	**300**
less Capital contributions funding consumer connection	**-**	-	**-**
Consumer connection less capital contributions	**370**	**296**	**300**

11a(iii): System Growth

	Current Year	CY+1	CY+2
Sub-transmission		-	-
Zone substations		-	-
Distribution and LV lines		-	-
Distribution and LV cables		-	150
Distribution substations and transformers		-	-
Distribution switchgear		-	-
Other network assets		10	100
System growth expenditure	**267**	**10**	**250**
less Capital contributions funding system growth			
System growth less capital contributions	**267**	**10**	**250**

11a(iv): Asset Replacement and Renewal

	Current Year	CY+1	CY+2
Sub-transmission		148	150
Zone substations		-	-
Distribution and LV lines		534	565
Distribution and LV cables		34	35
Distribution substations and transformers		30	30
Distribution switchgear		25	35
Other network assets		20	20
Asset replacement and renewal expenditure	**1,169**	**790**	**835**
less Capital contributions funding asset replacement and renewal			
Asset replacement and renewal less capital contributions	**1,169**	**790**	**835**

CY+3 31 Mar 19	CY+4 31 Mar 20	CY+5 31 Mar 21	CY+6 31 Mar 22	CY+7 31 Mar 23	CY+8 31 Mar 24	CY+9 31 Mar 25	CY+10 31 Mar 26
17	23	30	36	43	50	57	64
7	27	35	42	50	58	47	53
51	68	80	89	99	189	216	166
6	8	11	13	16	18	21	23
6	4	5	6	7	8	9	11
3	2	2	2	3	-	-	-
11	13	10	11	13	15	12	22
19	**18**	**17**	**19**	**23**	**23**	**22**	**33**
101	**145**	**172**	**245**	**(220)**	**338**	**722**	**1,120**
15	37	42	39	38	87	94	29
116	**182**	**214**	**284**	**(182)**	**426**	**816**	**1,149**

CY+3 31 Mar 19	CY+4 31 Mar 20	CY+5 31 Mar 21
300	300	300

300	**300**	**300**
-	**-**	**-**
300	**300**	**300**

-	-	-
-	-	-
-	-	250
-	-	-
-	-	-
30	250	-
100	100	100
130	**350**	**350**
130	**350**	**350**

150	150	-
-	-	-
550	570	645
35	35	35
30	30	30
125	80	80
20	20	20
910	**885**	**810**
910	**885**	**810**

11a(v):Asset Relocations

	Current Year CY	CY+1	CY+2
for year end	31 Mar 16	31 Mar 17	31 Mar 18
*Project or programme**	$000 (in constant prices)		
Transit	-	39	40
Councils	-	49	50
Other Customers	-	20	20
All other asset relocations projects or programmes	-		
Asset relocations expenditure	**63**	**108**	**110**
less Capital contributions funding asset relocations			
Asset relocations less capital contributions	**63**	**108**	**110**

11a(vi):Quality of Supply

*Project or programme**			
	-	-	-
	-	-	-
	-	-	-
	-	-	-
All other quality of supply projects or programmes	280	148	105
Quality of supply expenditure	**280**	**148**	**105**
less Capital contributions funding quality of supply			
Quality of supply less capital contributions	**280**	**148**	**105**

11a(vii): Legislative and Regulatory

*Project or programme**			
Seismic strengthening of Substations	-	54	55
Working at Heights	-	-	-
All other legislative and regulatory projects or programmes			
Legislative and regulatory expenditure	**-**	**54**	**55**
less Capital contributions funding legislative and regulatory			
Legislative and regulatory less capital contributions	**-**	**54**	**55**

11a(viii): Other Reliability, Safety and Environment

*Project or programme**			
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
All other reliability, safety and environment projects or programmes	-	281	190
Other reliability, safety and environment expenditure	**-**	**281**	**190**
less Capital contributions funding other reliability, safety and environment			
Other reliability, safety and environment less capital contributions	**-**	**281**	**190**

	CY+3 31 Mar 19	*CY+4* 31 Mar 20	*CY+5* 31 Mar 21
	40	40	40
	50	50	50
	20	20	20
	110	**110**	**110**
	110	**110**	**110**
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	100	50	50
	100	**50**	**50**
	100	**50**	**50**
	55	-	-
	-	20	20
	55	**20**	**20**
	55	**20**	**20**
	-	-	-
	-	**-**	**-**
	-	**-**	**-**
	-	**-**	**-**
	-	**-**	**-**
	190	165	103
	190	**165**	**103**
	190	**165**	**103**

11a(ix): Non-Network Assets

		Current Year	CY+1	CY+2
Routine expenditure	*for year end*	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**
Project or programme*		**$000 (in constant prices)**		
Motor Vehicles		131	72	225
Plant, Equipment and Tools		43	32	35
Information Technology		-	-	-
Office Furniture		5	18	15
Land and Buildings		-	-	-
All other routine expenditure projects or programmes				
Routine expenditure		**179**	**122**	**275**
Atypical expenditure				
Project or programme*				
		-	-	-
		-	-	-
		-	-	-
All other atypical projects or programmes				
Atypical expenditure		**-**	**-**	**-**
Non-network assets expenditure		**179**	**122**	**275**

CY+3	CY+4	CY+5
31 Mar 19	31 Mar 20	31 Mar 21
215	430	370
40	40	40
-	-	-
15	15	15
-	-	-
270	**485**	**425**
-	-	-
-	-	-
-	-	-
-	**-**	**-**
270	**485**	**425**

11b: Report on Forecast Operational Expenditure

This schedule requires a breakdown of forecast operational expenditure for the disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms.

EDBs must provide explanatory comment on the difference between constant price and nominal dollar operational expenditure forecasts in Schedule 14a (Mandatory Explanatory Notes).

This information is not part of audited disclosure information.

	Current Year	*CY+1*	*CY+2*
for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**
Operational Expenditure Forecast	**$000 (in nominal dollars)**		
Service interruptions and emergencies	269	258	267
Vegetation management	520	512	478
Routine and corrective maintenance and inspection	183	188	194
Asset replacement and renewal	395	465	482
Network Opex	**1,367**	**1,423**	**1,421**
System operations and network support	250	255	269
Business support	1,766	2,123	2,239
Non-network opex	**2,016**	**2,378**	**2,507**
Operational expenditure	**3,383**	**3,801**	**3,929**
	$000 (in constant prices)		
Service interruptions and emergencies	269	254	258
Vegetation management	520	504	462
Routine and corrective maintenance and inspection	183	185	188
Asset replacement and renewal	395	458	465
Network Opex	**1,367**	**1,402**	**1,373**
System operations and network support	250	251	260
Business support	1,766	2,092	2,162
Non-network opex	**2,016**	**2,343**	**2,422**
Operational expenditure	**3,383**	**3,745**	**3,795**
Subcomponents of operational expenditure (where known)			
Energy efficiency and demand side anagement, reduction of energy losses			
Direct billing*	-	-	-
Research and Development			
Insurance			
**** Direct billing expenditure by suppliers that direct bill the majority of their consumers***			
Difference between nominal and real forecasts	**$000**		
Service interruptions and emergencies	-	4	9
Vegetation management	-	8	16
Routine and corrective maintenance and inspection	-	3	7
Asset replacement and renewal	-	7	16
Network Opex	**-**	**21**	**48**
System operations and network support	-	4	9
Business support	-	31	76
Non-network opex	**-**	**35**	**85**
Operational expenditure	**-**	**56**	**134**

CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26
272	278	283	289	295	301	307	313
435	390	398	406	414	422	431	439
198	202	206	210	214	219	223	228
491	501	511	521	532	542	553	564
1,397	**1,371**	**1,398**	**1,426**	**1,455**	**1,484**	**1,514**	**1,544**
282	297	312	328	344	362	380	399
2,351	2,470	2,595	2,727	2,864	3,010	3,162	3,320
2,634	**2,767**	**2,907**	**3,055**	**3,209**	**3,372**	**3,542**	**3,719**
4,031	**4,138**	**4,306**	**4,481**	**4,664**	**4,856**	**5,055**	**5,263**
258	258	258	258	258	258	258	258
412	362	362	362	362	362	362	362
188	188	188	188	188	188	188	188
465	465	465	465	465	465	465	465
1,323	**1,273**	**1,273**	**1,273**	**1,273**	**1,273**	**1,273**	**1,273**
267	275	284	292	301	310	319	329
2,227	2,294	2,362	2,434	2,506	2,582	2,659	2,737
2,494	**2,569**	**2,646**	**2,726**	**2,807**	**2,892**	**2,978**	**3,066**
3,817	**3,842**	**3,919**	**3,999**	**4,080**	**4,165**	**4,251**	**4,339**
-	-	-	-	-	-	-	-
14	20	25	31	37	43	49	55
23	28	36	44	52	60	69	77
11	14	19	23	27	31	36	40
26	36	46	56	67	77	88	99
74	**98**	**126**	**154**	**182**	**211**	**241**	**271**
15	21	28	35	43	51	60	70
125	177	233	294	358	428	503	583
140	**198**	**261**	**329**	**402**	**480**	**564**	**653**
214	**296**	**387**	**482**	**584**	**691**	**804**	**924**

12a: Report on Asset Condition

This schedule requires a breakdown of asset condition by asset class as at the start of the forecast year. The data accuracy assessment relates to the percentage values disclosed in the asset condition columns. Also required is a forecast of the percentage of units to be replaced in the next 5 years. All information should be consistent with the information provided in the AMP and the expenditure on assets forecast in Schedule 11a. All units relating to cable and line assets, that are expressed in km, refer to circuit lengths.

Voltage	Asset category	Asset class	Units
All	Overhead Line	Concrete poles / steel structure	No.
All	Overhead Line	Wood poles	No.
All	Overhead Line	Other pole types	No.
HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km
HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km
HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km
HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km
HV	Subtransmission Cable	Subtransmission UG up to 66kV (Gas pressurised)	km
HV	Subtransmission Cable	Subtransmission UG up to 66kV (PILC)	km
HV	Subtransmission Cable	Subtransmission UG 110kV+ (XLPE)	km
HV	Subtransmission Cable	Subtransmission UG 110kV+ (Oil pressurised)	km
HV	Subtransmission Cable	Subtransmission UG 110kV+ (Gas Pressurised)	km
HV	Subtransmission Cable	Subtransmission UG 110kV+ (PILC)	km
HV	Subtransmission Cable	Subtransmission submarine cable	km
HV	Zone substation Buildings	Zone substations up to 66kV	No.
HV	Zone substation Buildings	Zone substations 110kV+	No.
HV	Zone substation switchgear	22/33kV CB (Indoor)	No.
HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.
HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.
HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.
HV	Zone substation switchgear	33kV RMU	No.
HV	Zone substation switchgear	50/66/110kV CB (Indoor)	No.
HV	Zone substation switchgear	50/66/110kV CB (Outdoor)	No.
HV	Zone substation switchgear	3.3/6.6/11/22kV CB (ground mounted)	No.
HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.
HV	Zone substation Transformer	Zone Substation Transformers	No.
HV	Distribution Line	Distribution OH Open Wire Conductor	km
HV	Distribution Line	Distribution OH Aerial Cable Conductor	km
HV	Distribution Line	SWER conductor	km
HV	Distribution Cable	Distribution UG XLPE or PVC	km
HV	Distribution Cable	Distribution UG PILC	km
HV	Distribution Cable	Distribution Submarine Cable	km
HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.
HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.
HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.
HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.
HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.
HV	Distribution Transformer	Pole Mounted Transformer	No.
HV	Distribution Transformer	Ground Mounted Transformer	No.
HV	Distribution Transformer	Voltage regulators	No.
HV	Distribution Substations	Ground Mounted Substation Housing	No.
LV	LV Line	LV OH Conductor	km
LV	LV Cable	LV UG Cable	km
LV	LV Streetlighting	LV OH/UG Streetlight circuit	km
LV	Connections	OH/UG consumer service connections	No.
All	Protection	Protection relays (electromechanical, solid state and numeric)	No.
All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot
All	Capacitor Banks	Capacitors including controls	No.
All	Load Control	Centralised plant	Lot
All	Load Control	Relays	No.
All	Civils	Cable Tunnels	km

	Asset condition at start of planning period (percentage of units by grade)						
	Grade 1	Grade 2	Grade 3	Grade 4	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
	-	0.50%	66.50%	33.00%	-	2	0.50%
		18.00%	76.00%	6.00%	-	3	23.00%
	-	-	-	-	-	N/A	-
	-	-	94.80%	5.20%	-	2	-
	-	-	-	-	-	N/A	-
	-	-	5.00%	95.00%	-	2	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	33.00%	67.00%	-	2	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-		100.00%	-	4	-
	-	-	-	-	-	N/A	-
	-	-	45.00%	55.00%	-	2	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	67.00%	33.00%	-	3	-
	-	-		100.00%	-	3	-
	-	-	57.00%	43.00%	-	3	-
		0.50%	95.00%	4.50%	-	2	1.00%
	-	-	-	-	-	N/A	-
	-	-	-	-	-	N/A	-
	-	-	5.00%	95.00%	-	2	-
	-	-	-	100.00%	-	2	-
	-	-	-	-	-	N/A	-
	-	3.00%	45.00%	52.00%	-	3	5.88%
	-	-	-	-	-	N/A	-
		1.00%	47.00%	52.00%	-	2	2.18%
	-	-	-	-	-	N/A	-
	-	-	20.00%	80.00%	-	3	-
		1.00%	69.00%	30.00%	-	3	1.50%
		1.00%	20.00%	79.00%	-	3	1.00%
	-		14.00%	86.00%	-	3	-
	-	-	-	100.00%	-	2	-
		0.50%	89.50%	10.00%	-	2	0.50%
	-		27.00%	73.00%	-	2	-
	-		27.00%	73.00%	-	2	-
	0.15%	-	-	99.85%	-	2	-
	-	-	33.33%	66.67%	-	2	-
	-	-	-	100.00%	-	2	-
	-	-	-	100.00%	-	4	-
	-	-	-	100.00%	-	4	-
	-	-	100.00%	-	-	1	-
	-	-	-	-	-	N/A	-

12b: Report on Forecast Capacity

This schedule requires a breakdown of current and forecast capacity and utilisation for each zone substation and current distribution transformer capacity. The data provided should be consistent with the information provided in the AMP. Information provided in this table should relate to the operation of the network in its normal steady state configuration.

12b(i): System Growth - Zone Substations

Existing Zone Substations	Current Peak Load (MVA)	Installed Firm Capacity (MVA)	Security of Supply Classification (type)	Transfer Capacity (MVA)	Utilisation of Installed Firm Capacity %
Waipukurau	9.8	18.0	CBD/Inustrial/Residential/Rural		54%
Waipawa	5.2	18.0	CBD/Inustrial/Residential/Rural		29%
Takapau	7.7	18.0	CBD/Inustrial/Residential/Rural		43%
OngaOnga	6.3	12.0	Remote/Rural		53%
Wilder Road	1.0	2.4	Remote/Rural		43%

[1] *Extend forecast capacity table as necessary to disclose all capacity by each zone substation*

12b(ii): Transformer Capacity

	(MVA)
Distribution transformer capacity (EDB owned)	88
Distribution transformer capacity (Non-EDB owned)	10
Total distribution transformer capacity	**98**
Zone substation transformer capacity	**47**

Installed Firm Capacity +5 years (MVA)	Utilisation of Installed Firm Capacity + 5yrs %	Installed Firm Capacity Constraint +5 years (cause)	Explanation
22.5	43%	No constraint within +5 years	
22.5	23%	No constraint within +5 years	
22.5	34%	No constraint within +5 years	
15.0	42%	No constraint within +5 years	
3.0	35%	No constraint within +5 years	

12c: Report on Forecast Network Demand

This schedule requires a forecast of new connections (by consumer type), peak demand and energy volumes for the disclosure year and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumptions used in developing the expenditure forecasts in Schedule 11a and Schedule 11b and the capacity and utilisation forecasts in Schedule 12b.

12c(i): Consumer Connections

Number of ICPs connected in year by consumer type

	Current Year	CY+1
for year ended	31 Mar 16	31 Mar 17
*Consumer types defined by EDB**	Number of connections	
Small Customers	8303	8323
Medium Customers	175	176
Large Customers	2	2
Connections total	**8,480**	**8,501**
**include additional rows if needed*		
Distributed generation		
Number of connections		
Installed connection capacity of distributed generation (MVA)		

12c(ii) System Demand

Maximum coincident system demand (MW) for year ended	Number of connections	
GXP demand	20	20
plus Distributed generation output at HV and above		
Maximum coincident system demand	**20**	**20**
less Net transfers to (from) other EDBs at HV and above	-	-
Demand on system for supply to consumers' connection points	**20**	**20**
Electricity volumes carried (GWh)		
Electricity supplied from GXPs	112	112
less Electricity exports to GXPs		
plus Electricity supplied from distributed generation		
less Net electricity supplied to (from) other EDBs		
Electricity entering system for supply to ICPs	**112**	**112**
less Total energy delivered to ICPs	103	103
Losses	**9**	**9**
Load factor	**64%**	**64%**
Loss ratio	**8.0%**	**8.0%**

CY+2 31 Mar 18	*CY+3* 31 Mar 19	*CY+4* 31 Mar 20	*CY+5* 31 Mar 21
Number of connections			
8343	8363	8383	8403
177	178	179	180
2	2	2	2
8,522	**8,543**	**8,564**	**8,585**
Number of connections			
21	21	21	22
21	**21**	**21**	**22**
-	**-**	**-**	**-**
21	**21**	**21**	**22**
112	113	113	113
112	**113**	**113**	**113**
103	104	104	104
9	**9**	**9**	**9**
61%	**61%**	**61%**	**59%**
8.0%	**8.0%**	**8.0%**	**8.0%**

12d: Report Forecast Interruptions and Duration

This schedule requires a forecast of SAIFI and SAIDI for disclosure and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumed impact of planned and unplanned SAIFI and SAIDI on the expenditures forecast provided in Schedule 11a and Schedule 11b.

	Current Year	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**
SAIDI						
Class B (planned interruptions on the network)	54.5	64.5	64.5	64.5	64.5	64.5
Class C (unplanned interruptions on the network)	27.2	86.8	86.8	86.8	86.8	86.8
SAIFI						
Class B (planned interruptions on the network)	0.31	0.39	0.39	0.39	0.39	0.39
Class C (unplanned interruptions on the network)	1.28	3.32	3.32	3.32	3.32	3.32

13: Report on Asset Management Maturity

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices.

Question No.	Function	Question	Score	Evidence—Summary	Maturity Level 0
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	2	Centralines, under the management of Unison has adopted its Asset Management Policy. The Asset Management Policy has been approved by Unison top management but has limited circulation within Centralines.	The organisation does not have a documented asset management policy.
10	Asset management strategy	What has the organisation done to ensure that its asset management strategy is consistent with other appropriate organisational policies and strategies, and the needs of stakeholders?	2	Centralines is in the process of implementing the strategies developed at Unison as appropriate for Centralines. Some of the linkages between the long-term asset management strategy and other organisational policies, strategies and stakeholder requirements are defined. The work is fairly well advanced but still incomplete.	The organisation has not considered the need to ensure that its asset management strategy is appropriately aligned with the organisation's other organisational policies and strategies or with stakeholder requirements. OR The organisation does not have an asset management strategy.
11	Asset management strategy	In what way does the organisation's asset management strategy take account of the lifecycle of the assets, asset types and asset systems over which the organisation has stewardship?	2	As part of the Management Services Agreement with Unison, Centralines will be implementing the strategies introduced at Unison at a level appropriate to Centralines. The long-term asset management strategy takes account of the lifecycle of some, but not all, of its assets, asset types and asset systems.	The organisation has not considered the need to ensure that its asset management strategy is produced with due regard to the lifecycle of the assets, asset types or asset systems that it manages. OR The organisation does not have an asset management strategy.
26	Asset management plan(s)	How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	2	A strategic driver roadmap (Lifecycle Framework) is in place to establish and document asset management plan(s) across the life cycle activities of assets and asset systems at Centralines. This strategy commences at Unison and will include the documentation of plans for assets and asset systems at Centralines.	The organisation does not have an identifiable asset management plan(s) covering asset systems and critical assets.

	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
	The organisation has an asset management policy, but it has not been authorised by top management, or it is not influencing the management of the assets.	The organisation has an asset management policy, which has been authorised by top management, but it has had limited circulation. It may be in use to influence development of strategy and planning but its effect is limited.	The asset management policy is authorised by top management, is widely and effectively communicated to all relevant employees and stakeholders, and used to make these persons aware of their asset related obligations.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The need to align the asset management strategy with other organisational policies and strategies as well as stakeholder requirements is understood and work has started to identify the linkages or to incorporate them in the drafting of asset management strategy.	Some of the linkages between the long-term asset management strategy and other organisational policies, strategies and stakeholder requirements are defined but the work is fairly well advanced but still incomplete.	All linkages are in place and evidence is available to demonstrate that, where appropriate, the organisation's asset management strategy is consistent with its other organisational policies and strategies. The organisation has also identified and considered the requirements of relevant stakeholders.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The need is understood, and the organisation is drafting its asset management strategy to address the lifecycle of its assets, asset types and asset systems.	The long-term asset management strategy takes account of the lifecycle of some, but not all, of its assets, asset types and asset systems.	The asset management strategy takes account of the lifecycle of all of its assets, asset types and asset systems.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation has asset management plan(s) but they are not aligned with the asset management strategy and objectives and do not take into consideration the full asset life cycle (including asset creation, acquisition, enhancement, utilisation, maintenance decommissioning and disposal).	The organisation is in the process of putting in place comprehensive, documented asset management plan(s) that cover all life cycle activities, clearly aligned to asset management objectives and the asset management strategy.	Asset management plan(s) are established, documented, implemented and maintained for asset systems and critical assets to achieve the asset management strategy and asset management objectives across all life cycle phases.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

Question No.	Function	Question	Score	Evidence—Summary	Maturity Level 0
27	Asset management plan(s)	How has the organisation communicated its plan(s) to all relevant parties to a level of detail appropriate to the receiver's role in their delivery?	2	The asset management plans at Centralines are communicated to its internal contractor responsible for the delivery of the plans through its Enterprise Asset Management System and other supporting software systems.	The organisation does not have plan(s) or their distribution is limited to the authors.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	3	Centralines has appriopriate documentation in place defining the responsibility for delivery of Capital and Maintenance Plans	The organisation has not documented responsibilities for delivery of asset plan actions.
31	Asset management plan(s)	What has the organisation done to ensure that appropriate arrangements are made available for the efficient and cost effective implementation of the plan(s)? (Note this is about resources and enabling support)	3	A number of tools have been developed to prioritise and schedule works, which then leads to resource requirement assessments, including gaps to be filled to meet the planned programme of works.	The organisation has not considered the arrangements needed for the effective implementation of plan(s).
33	Contingency planning	What plan(s) and procedure(s) does the organisation have for identifying and responding to incidents and emergency situations and ensuring continuity of critical asset management activities?	3	Unison Management has in place a number of documented processes and procedures in its controlled documents system, which detail roles and responsbilities in emergencies and crises, including escalation points. Unison is undertaking a review and redevelopment of its business continutiy management capability (including Centralines), including assessments of DR capability requirements for critical business processes (e.g., information availability, applications, disaster recovery sites).	The organisation has not considered the need to establish plan(s) and procedure(s) to identify and respond to incidents and emergency situations.
37	Structure, authority and responsibilities	What has the organisation done to appoint member(s) of its management team to be responsible for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s)?	3	Centralines has a Management Services Agreement with Unison. The Centralines' Operations Manager and Unison General Manager Commercial are responsible to ensure that assets deliver the requirements of the asset management strategy, objectives and plans. Further support is provided through Unison's Networks and Operations Team lead by the General Manager who is a member of the Executive Management Team.	Top management has not considered the need to appoint a person or persons to ensure that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s).

	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
	The plan(s) are communicated to some of those responsible for delivery of the plan(s). OR Communicated to those responsible for delivery is either irregular or ad-hoc.	The plan(s) are communicated to most of those responsible for delivery but there are weaknesses in identifying relevant parties resulting in incomplete or inappropriate communication. The organisation recognises improvement is needed as is working towards resolution.	The plan(s) are communicated to all relevant employees, stakeholders and contracted service providers to a level of detail appropriate to their participation or business interests in the delivery of the plan(s) and there is confirmation that they are being used effectively.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	Asset management plan(s) inconsistently document responsibilities for delivery of plan actions and activities and/or responsibilities and authorities for implementation inadequate and/or delegation level inadequate to ensure effective delivery and/or contain misalignments with organisational accountability.	Asset management plan(s) consistently document responsibilities for the delivery of actions but responsibility/ authority levels are inappropriate/ inadequate, and/ or there are misalignments within the organisation.	Asset management plan(s) consistently document responsibilities for the delivery actions and there is adequate detail to enable delivery of actions. Designated responsibility and authority for achievement of asset plan actions is appropriate.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation recognises the need to ensure appropriate arrangements are in place for implementation of asset management plan(s) and is in the process of determining an appropriate approach for achieving this.	The organisation has arrangements in place for the implementation of asset management plan(s) but the arrangements are not yet adequately efficient and/or effective. The organisation is working to resolve existing weaknesses.	The organisation's arrangements fully cover all the requirements for the efficient and cost effective implementation of asset management plan(s) and realistically address the resources and timescales required, and any changes needed to functional policies, standards, processes and the asset management information system.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation has some ad-hoc arrangements to deal with incidents and emergency situations, but these have been developed on a reactive basis in response to specific events that have occurred in the past.	Most credible incidents and emergency situations are identified. Either appropriate plan(s) and procedure(s) are incomplete for critical activities or they are inadequate. Training/ external alignment may be incomplete.	Appropriate emergency plan(s) and procedure(s) are in place to respond to credible incidents and manage continuity of critical asset management activities consistent with policies and asset management objectives. Training and external agency alignment is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	Top management understands the need to appoint a person or persons to ensure that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s).	Top management has appointed an appropriate people to ensure the assets deliver the requirements of the asset management strategy, objectives and plan(s) but their areas of responsibility are not fully defined and/or they have insufficient delegated authority to fully execute their responsibilities.	The appointed person or persons have full responsibility for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

Question No.	Function	Question	Score	Evidence—Summary	Maturity Level 0
40	Structure, authority and responsibilities	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	2	Centralines uses a basic scheduling tool to evaluate and plan works over time, which links to resource availability and requirements. When work is out sourced to Unison contracting a software-based scheduling tool is used to evaluate and plan works over time, which links to resource availability and requirements. The tool enables an evaluation of resource gaps, so that priorities can be reevaluated or additional resources sought.	The organisation's top management has not considered the resources required to deliver asset management.
42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	3	The importance of meeting asset management requirements is communicated to select parts of the organisation, and there has been significant cross-team collaboration on a service delivery optimisation project in 2012/13 to improve the effectiveness of service delivery, across a wide variety of processes, this has been driven by top management.	The organisation's top management has not considered the need to communicate the importance of meeting asset management requirements.
45	Outsourcing of asset management activities	Where the organisation has outsourced some of its asset management activities, how has it ensured that appropriate controls are in place to ensure the compliant delivery of its organisational strategic plan, and its asset management policy and strategy?	3	The majority of network projects are executed by Centralines' staff. Centralines "outsources" some network projects to Unison Contracting and Scanpower. Regular auditing of work takes place, and there is close collaboration over scheduling of works in order to deliver the planned programme.	The organisation has not considered the need to put controls in place.
48	Training, awareness and competence	How does the organisation develop plan(s) for the human resources required to undertake asset management activities - including the development and delivery of asset management strategy, process(es), objectives and plan(s)?	3	Centralines identifies by type of resource the requirements to meet the planned programme of works. Skill gaps are identified, including over the longer term, which enables Centralines to address through succession planning, recruitment and/or sub-contracting.	The organisation has not recognised the need for assessing human resources requirements to develop and implement its asset management system.

	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
	The organisations top management understands the need for sufficient resources but there are no effective mechanisms in place to ensure this is the case.	A process exists for determining what resources are required for its asset management activities and in most cases these are available but in some instances resources remain insufficient.	An effective process exists for determining the resources needed for asset management and sufficient resources are available. It can be demonstrated that resources are matched to asset management requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisations top management understands the need to communicate the importance of meeting its asset management requirements but does not do so.	Top management communicates the importance of meeting its asset management requirements but only to parts of the organisation.	Top management communicates the importance of meeting its asset management requirements to all relevant parts of the organisation.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation controls its outsourced activities on an ad-hoc basis, with little regard for ensuring for the compliant delivery of the organisational strategic plan and/or its asset management policy and strategy.	Controls systematically considered but currently only provide for the compliant delivery of some, but not all, aspects of the organisational strategic plan and/or its asset management policy and strategy. Gaps exist.	Evidence exists to demonstrate that outsourced activities are appropriately controlled to provide for the compliant delivery of the organisational strategic plan, asset management policy and strategy, and that these controls are integrated into the asset management system	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation has recognised the need to assess its human resources requirements and to develop a plan(s). There is limited recognition of the need to align these with the development and implementation of its asset management system.	The organisation has developed a strategic approach to aligning competencies and human resources to the asset management system including the asset management plan but the work is incomplete or has not been consistently implemented.	The organisation can demonstrate that plan(s) are in place and effective in matching competencies and capabilities to the asset management system including the plan for both internal and contracted activities. Plans are reviewed integral to asset management system process(es).	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

Question No.	Function	Question	Score	Evidence—Summary	Maturity Level 0	
49	Training, awareness and competence	How does the organisation identify competency requirements and then plan, provide and record the training necessary to achieve the competencies?	3	Centralines uses a “Network Competency Standard” (SD0001) to identify competencies required for task specific functions carried out by staff and contractors engaged to work on the assets. The standard is reviewed regularly with inputs from the SM-EI’s and information from other NZ EDBs. The employer is to submit a declaration that the individual staff member has recieved full training and is fully competent in the tasks they will be required to undertake.	The organisation does not have any means in place to identify competency requirements.	
50	Training, awareness and competence	How does the organisation ensure that persons under its direct control undertaking asset management related activities have an appropriate level of competence in terms of education, training or experience?	3	Centralines uses a software package called “Vault” to track competencies and training/re-training requirements.	The organisation has not recognised the need to assess the competence of person(s) undertaking asset management related activities.	
53	Communica-tion, partic-ipation and consultation	How does the organisation ensure that pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers?	2	Given the small size of the business, communication at Centralines is effective at all levels of the organisation.	The organisation has not recognised the need to formally communicate any asset management information.	
59	Asset Management System documentation	What documentation has the organisation established to describe the main elements of its asset management system and interactions between them?	2	The main elements of the Asset Management System are documented in the Asset Management Policy, the regulatory Asset Management Plan, Standards and reviewed at prescribed intervals. Gaps still exist.	The organisation has not established documentation that describes the main elements of the asset management system.	
62	Information management	What has the organisation done to determine what its asset management information system(s) should contain in order to support its asset management system?	2	There is ongoing analysis based on requirements from key users that lead to projects for significant or minor change. In each case a change request is created to initiate the change. Currently this is as a result of identified requirement rather than a holistic approach to Asset Management requirements.	The organisation has not considered what asset management information is required.	

	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
	The organisation has recognised the need to identify competency requirements and then plan, provide and record the training necessary to achieve the competencies.	The organisation is the process of identifying competency requirements aligned to the asset management plan(s) and then plan, provide and record appropriate training. It is incomplete or inconsistently applied.	Competency requirements are in place and aligned with asset management plan(s). Plans are in place and effective in providing the training necessary to achieve the competencies. A structured means of recording the competencies achieved is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	Competency of staff undertaking asset management related activities is not managed or assessed in a structured way, other than formal requirements for legal compliance and safety management.	The organisation is in the process of putting in place a means for assessing the competence of person(s) involved in asset management activities including contractors. There are gaps and inconsistencies.	Competency requirements are identified and assessed for all persons carrying out asset management related activities - internal and contracted. Requirements are reviewed and staff reassessed at appropriate intervals aligned to asset management requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	There is evidence that the pertinent asset management information to be shared along with those to share it with is being determined.	The organisation has determined pertinent information and relevant parties. Some effective two way communication is in place but as yet not all relevant parties are clear on their roles and responsibilities with respect to asset management information.	Two way communication is in place between all relevant parties, ensuring that information is effectively communicated to match the requirements of asset management strategy, plan(s) and process(es). Pertinent asset information requirements are regularly reviewed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation is aware of the need to put documentation in place and is in the process of determining how to document the main elements of its asset management system.	The organisation in the process of documenting its asset management system and has documentation in place that describes some, but not all, of the main elements of its asset management system and their interaction.	The organisation has established documentation that comprehensively describes all the main elements of its asset management system and the interactions between them. The documentation is kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation is aware of the need to determine in a structured manner what its asset information system should contain in order to support its asset management system and is in the process of deciding how to do this.	The organisation has developed a structured process to determine what its asset information system should contain in order to support its asset management system and has commenced implementation of the process.	The organisation has determined what its asset information system should contain in order to support its asset management system. The requirements relate to the whole life cycle and cover information originating from both internal and external sources.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

Question No.	Function	Question	Score	Evidence—Summary	Maturity Level 0	
63	Information management	How does the organisation maintain its asset management information system(s) and ensure that the data held within it (them) is of the requisite quality and accuracy and is consistent?	2	Controls are in place to ensure that complete and consistent data is maintained in systems such as the GIS. These are applied and regularly maintained. Data quality issues exist.	There are no formal controls in place or controls are extremely limited in scope and/or effectiveness.	
64	Information management	How has the organisation's ensured its asset management information system is relevant to its needs?	2	The organisation has developed and is implementing a process to ensure its asset management information system is relevant to its needs. Gaps between what the information system provides and the organisations needs have been identified and action is being taken to close them.	The organisation has not considered the need to determine the relevance of its management information system. At present there are major gaps between what the information system provides and the organisations needs.	
69	Risk management process(es)	How has the organisation documented process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle?	2	Centralines in consultation with Unison is in the process of documenting the identification and assessment of asset related risk across the asset lifecycle but it is incomplete or there are inconsistencies between approaches and a lack of integration.	The organisation has not considered the need to document process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle.	
79	Use and maintenance of asset risk information	How does the organisation ensure that the results of risk assessments provide input into the identification of adequate resources and training and competency needs?	2	The organisation addresses risk management at Strategic, Tactical and Operational levels. Centralines maintains a risk register where risks, appropriate actions to eliminate or mitigate risks, and follow up dates are logged. Inconsistencies do exist and will be addressed through the Lifecycle Asset Management Framework project initiated at Unison.	The organisation has not considered the need to conduct risk assessments.	
82	Legal and other requirements	What procedure does the organisation have to identify and provide access to its legal, regulatory, statutory and other asset management requirements, and how is requirements incorporated into the asset management system?	3	Centralines has in place a comprehensive legal compliance programme that uses a questionaire that is filled out six-monthly to establish compliance with all applicable legislation and regulations. The content is reviewed at each six-monthly review or updated when we are aware of changes in applicable regulations/legislations.	The organisation has not considered the need to identify its legal, regulatory, statutory and other asset management requirements.	

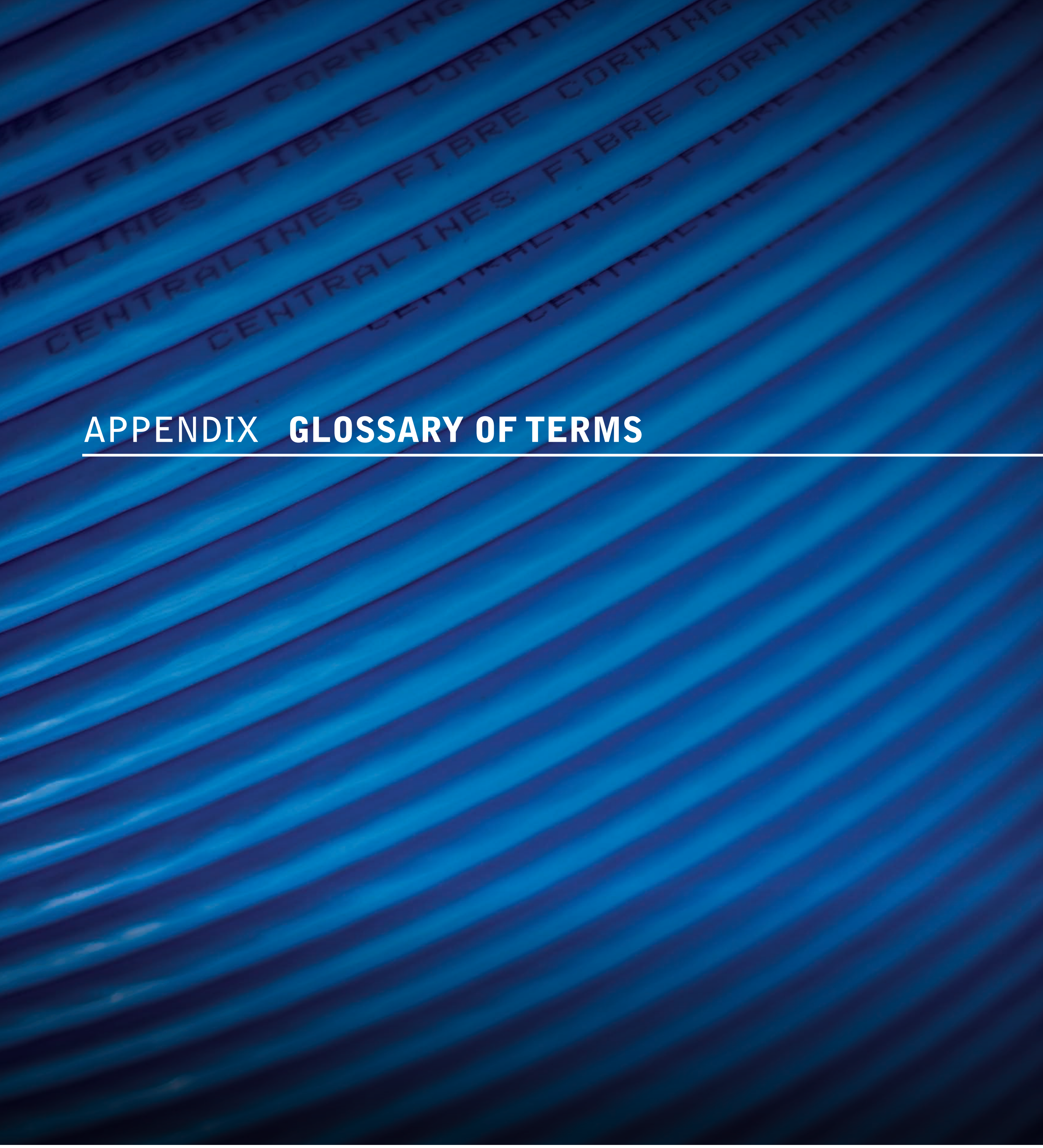
	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
	The organisation is aware of the need for effective controls and is in the process of developing an appropriate control process(es).	The organisation has developed a controls that will ensure the data held is of the requisite quality and accuracy and is consistent and is in the process of implementing them.	The organisation has effective controls in place that ensure the data held is of the requisite quality and accuracy and is consistent. The controls are regularly reviewed and improved where necessary.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation is aware of the need to document the management of asset related risk across the asset lifecycle. The organisation has plan(s) to formally document all relevant process(es) and procedure(s) or has already commenced this activity.	The organisation is in the process of documenting the identification and assessment of asset related risk across the asset lifecycle but it is incomplete or there are inconsistencies between approaches and a lack of integration.	Identification and assessment of asset related risk across the asset lifecycle is fully documented. The organisation can demonstrate that appropriate documented mechanisms are integrated across life cycle phases and are being consistently applied.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation is aware of the need to consider the results of risk assessments and effects of risk control measures to provide input into reviews of resources, training and competency needs. Current input is typically ad-hoc and reactive.	The organisation is in the process ensuring that outputs of risk assessment are included in developing requirements for resources and training. The implementation is incomplete and there are gaps and inconsistencies.	Outputs from risk assessments are consistently and systematically used as inputs to develop resources, training and competency requirements. Examples and evidence is available.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation identifies some its legal, regulatory, statutory and other asset management requirements, but this is done in an ad-hoc manner in the absence of a procedure.	The organisation has procedure(s) to identify its legal, regulatory, statutory and other asset management requirements, but the information is not kept up to date, inadequate or inconsistently managed.	Evidence exists to demonstrate that the organisation's legal, regulatory, statutory and other asset management requirements are identified and kept up to date. Systematic mechanisms for identifying relevant legal and statutory requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation identifies some its legal, regulatory, statutory and other asset management requirements, but this is done in an ad-hoc manner in the absence of a procedure.	The organisation has procedure(s) to identify its legal, regulatory, statutory and other asset management requirements, but the information is not kept up to date, inadequate or inconsistently managed.	Evidence exists to demonstrate that the organisation's legal, regulatory, statutory and other asset management requirements are identified and kept up to date. Systematic mechanisms for identifying relevant legal and statutory requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

Question No.	Function	Question	Score	Evidence—Summary	Maturity Level 0	
88	Life Cycle Activities	How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities?	3	These processes and procedures are addressed through the work being undertaken in the Lifecycle asset managememt framework project initiated at Unison.	The organisation does not have process(es) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	
91	Life Cycle Activities	How does the organisation ensure that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance (and inspection) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance?	2	Unison is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process for confirming the process(es)/procedure(s) are effective and if necessary carrying out modifications. These improvements will be implemented at Centralines on completion of the project at Unison.	The organisation does not have process(es)/ procedure(s) in place to control or manage the implementation of asset management plan(s) during this life cycle phase.	
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	2	A number of initiatives are underway at Unison in the areas of development of dynamic rating capability, advanced data processing algorithms, condition monitoring and diagnosis, failure forecasting and remaining life assessment. The outputs of this work will also be implemented on the Centralines' Network.	The organisation has not considered how to monitor the performance and condition of its assets.	
99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated?	3	Unison personel responsible for the management of Centralines, routinely conduct inspections and investigations following any significant asset failures. Non-conformances are documented and reworks actioned and reaudited. Centralines has policies and procedures in place which assign responsibilites for managing emergency or crisis situations.	The organisation has not considered the need to define the appropriate responsibilities and the authorities.	

	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning but currently do not have these in place (note: procedure(s) may exist but they are inconsistent/ incomplete).	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning. Gaps and inconsistencies are being addressed.	Effective process(es) and procedure(s) are in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during this life cycle phase but currently do not have these in place and/or there is no mechanism for confirming they are effective and where needed modifying them.	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process for confirming the process(es)/procedure(s) are effective and if necessary carrying out modifications.	The organisation has in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process, which is itself regularly reviewed to ensure it is effective, for confirming the process(es)/ procedure(s) are effective and if necessary carrying out modifications.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation recognises the need for monitoring asset performance but has not developed a coherent approach. Measures are incomplete, predominantly reactive and lagging. There is no linkage to asset management objectives.	The organisation is developing coherent asset performance monitoring linked to asset management objectives. Reactive and proactive measures are in place. Use is being made of leading indicators and analysis. Gaps and inconsistencies remain.	Consistent asset performance monitoring linked to asset management objectives is in place and universally used including reactive and proactive measures. Data quality management and review process are appropriate. Evidence of leading indicators and analysis.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation understands the requirements and is in the process of determining how to define them.	The organisation are in the process of defining the responsibilities and authorities with evidence. Alternatively there are some gaps or inconsistencies in the identified responsibilities/authorities.	The organisation have defined the appropriate responsibilities and authorities and evidence is available to show that these are applied across the business and kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

Question No.	Function	Question	Score	Evidence—Summary	Maturity Level 0	
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	3	The organisation can demonstrate that its audit procedure(s) cover all the appropriate asset-related activities and the associated reporting of audit results. Audits are to an appropriate level of detail and consistently managed.	The organisation has not recognised the need to establish procedure(s) for the audit of its asset management system.	
109	Corrective & Preventative action	How does the organisation instigate appropriate corrective and/or preventive actions to eliminate or prevent the causes of identified poor performance and non conformance?	3	Managers inspect works and work-sites for both quality and health and safety-related requirements. Audit reports are produced, with non-conformances identified, with reworks required. Where required alerts are communicated widely to address any trends or reinforce required procedures.	The organisation does not recognise the need to have systematic approaches to instigating corrective or preventive actions.	
113	Continual Improvement	How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle?	3	Centralines recognises 3 competing drivers as the cornerstones of asset management. These are Long-Term Value, Asset Performance and Risk Management. Continual Improvement initiatives will be implemented in collaboration with the work done by Unison in this area.	The organisation does not consider continual improvement of these factors to be a requirement, or has not considered the issue.	
115	Continual Improvement	How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation?	3	Under the management of Unison, Centralines has access to a Technology Information Portal which is a suppository for capturing information on new technologies, products and best industry practices. If it is deemed worth progressing it is then subjected to a detailed new technology and product evaluation process. Unison has also formed strong relationships with other EDBs both nationally and internationally some of which have been formalised to allow the sharing of IP around technologies.	The organisation makes no attempt to seek knowledge about new asset management related technology or practices.	

	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
	The organisation understands the need for audit procedure(s) and is determining the appropriate scope, frequency and methodology(s).	The organisation is establishing its audit procedure(s) but they do not yet cover all the appropriate asset-related activities.	The organisation can demonstrate that its audit procedure(s) cover all the appropriate asset-related activities and the associated reporting of audit results. Audits are to an appropriate level of detail and consistently managed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation recognises the need to have systematic approaches to instigating corrective or preventive actions. There is ad-hoc implementation for corrective actions to address failures of assets but not the asset management system.	The need is recognized for systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit. It is only partially or inconsistently in place.	Mechanisms are consistently in place and effective for the systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	A Continual Improvement ethos is recognised as beneficial, however it has just been started, and or covers partially the asset drivers.	Continuous improvement process(es) are set out and include consideration of cost risk, performance and condition for assets managed across the whole life cycle but it is not yet being systematically applied.	There is evidence to show that continuous improvement process(es) which include consideration of cost risk, performance and condition for assets managed across the whole life cycle are being systematically applied.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
	The organisation is inward looking, however it recognises that asset management is not sector specific and other sectors have developed good practice and new ideas that could apply. Ad-hoc approach.	The organisation has initiated asset management communication within sector to share and, or identify 'new' to sector asset management practices and seeks to evaluate them.	The organisation actively engages internally and externally with other asset management practitioners, professional bodies and relevant conferences. Actively investigates and evaluates new practices and evolves its asset management activities using appropriate developments.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.



APPENDIX **GLOSSARY OF TERMS**

CENTRALINES
LIMITED

A. GLOSSARY OF TERMS

A	Amperes	**CDEM**	Civil Defence Emergency Management
AAAC	All Aluminium Alloy Conductor	**CorMon**	Corrosion Monitoring
AAC	All Aluminium Conductor	**CPI**	Consumer Price Index
ABB	Supplier	**CRM**	Customer Relationship Management
ABC	Aerial Bundled Cable	**CT**	Current Transformer
ABS	Air Break Switch	**DC**	Direct Current
AC	Alternating Current	**DDO**	Dominion Drop Out
ACC	Accident Compensation Corporation	**Deuar**	Deuar Mechanical Partial Load Deflection Testing
ACSR	Aluminium Conductor Steel Reinforced	**DFA**	Delegated Financial Authority
ACTIVA	Software Package	**DG**	Distributed Generation
ADMS	Advanced Distribution Management System	**DGA**	Dissolved Gas Analysis
AE	Augmentation Envelope	**DNP-3**	Distributed Network Protocol
AEI	Associated Electrical Industries	**DPP**	Commerce Commission's Default Price Path
AMMAT	Asset Management Maturity Assessment Tool	**DR**	Disaster Recovery
AMP	Asset Management Plan	**EAMS**	Enterprise Asset Management System
AMS	Asset Management System	**EAMS**	Enterprise Architect
AOC	Alternative Operations Centre	**EDB**	Electricity Distribution Business
ARC	Audit and Risk Committee	**EDSS**	Expert Decision Support System
ASEA	Merged with Brown Boveri to create ABB	**ENTEC**	Supplier
BCP	Business Continuity Planning	**ERC**	Executive Risk Committee
CAD	Computer Aided Design	**EVA**	Ethylene Vinyl Acetate
CAPEX	Capital Expenditure	**FAIDI**	Feeder Average Interruption Frequency Index
CB	Circuit Breaker	**FAIFI**	Feeder Average Interruption Duration Index
CBD	Central Business District	**FRS-3**	Financial Reporting Standards
GEC	The General Electric Company	**LCAM**	Life Cycle Asset Management
GIS	Geo-spatial Information System	**LCP**	Legislative Compliance Programme
GMI	Annual Invasive Inspection	**LED**	Light Emitting Diode
GPS	Global Positioning System	**LFT**	Load Forecast Tool
GSP	Great Safety Performance	**LMVP**	Model of Reyrolle Pacific Switchgear
GWh	Giga Watt-hours	**LTOS**	Live Tank Oil Sampling
GXP	Grid Exit Point	**LV**	Low Voltage
H&S	Health and Safety	**m**	Million
H_2S	Hydrogen Sulphide	**MAGTECH**	Supplier
HBPCT	Hawke's Bay Power Consumers' Trust	**MCR**	Maximum Continuous Rating
HILP	High Impact Low Probability	**MD**	Maximum Demand
HP	Hewlett Packard	**MDS**	Master Data Services
HR	Human Relations	**MED**	Major Event Day

APPENDIX GLOSSARY OF TERMS

HV	High Voltage	**MIND**	Mineral Insulated Non Draining
ICP	Installation Control Point	**MPT40**	Deuar Mechanical Partial Load Deflection Testing
IMG	Information Management Group	**MRP**	Mighty River Power
IMP	Insulator Pollution Monitoring	**MV**	Medium Voltage
IP	Internet Protocol	**MVA**	Mega Volt-Amps
IPT	Investment Prioritisation Tool	**MW**	Megawatt
IT	Information Technology	**NIT**	Network Investment Toolbox
k	Thousand	**NPS**	Net Promoter Score
kV	Kilovolt	**NPV**	Net Present Value
kVA	1000 volt amps	**NZ**	New Zealand
kVAr	Reactive power	**NZIER**	New Zealand Institute for Economic Research
L&G	Landis & Gyr	**OH**	Overhead
OHUG	overhead to underground	**SAP**	Software Package
OPEX	Operational Expenditure	**SCADA**	Supervisory Control and Data Acquisition
PA	Partial Achievement	**SCI**	Statement of Corporate Intent
PD	Partial Discharge	**SF6**	Sulphur Hexafluoride
Peanut	Vacuum Capacitor Switch	**SH**	State Highway
PILC	paper insulated, lead covered	**SI**	Serviceablity Index
PLC	Programmable Logic Controller	**SO_2**	Sulphur Dioxide
POS	Point of Supply	**Stn**	Station
PSMS	Public Safety Management System	**SWER**	Single Wire Earth Return
PV	Solar Photovoltaic	**TCP**	Transmission Control Protocol
PVC	Polyvinyl Chloride	**TEC**	Technical Evaluation Committee
R:P	Reactive to Preventative Cost	**TELARCC**	Supplier
RC	Replacement Cost	**Triple-R**	Repair, Refurbish, Replace
RCS	Remote Controlled Switch	**UCSL**	Unison Contracting Services Limited
RE	Renewal Envelope	**UG**	Underground
REG D	A Eberle Voltage regulating relay	**UHF**	Ultra-High Frequency
RLE	Residual Life Expectancy	**UNISAFE**	A model of ABB switchgear
RMS	Ring Main Switchgear	**UNL**	Unison Networks Limited
RMU	Ring Main Unit	**Var**	Volt Ampere Reactive
RPS	Reyrolle Pacific	**VHF**	Very High Frequency
RTU	Remote Terminal Unit	**VoIP**	Voice over Internet Protocol
S/S	Substation	**VPT**	Vegetation Prioritisation Tool
SAIDI	System Average Interruption Duration Index	**VRR**	Voltage Regulating Relay
SAIFI	System Average Interruption Frequency Index	**VT**	Voltage Transformer
SAMP	Strategic Asset Management Plan		
SAN	Storage Area Network		

CENTRALINES
LIMITED

CERTIFICATION FOR YEAR-BEGINNING DISCLOSURES

Pursuant to Schedule 17

We, Jon Edmond Nichols and Nicholas Matthew Story, being directors of Centralines Limited certify that, having made all reasonable enquiry, to the best of our knowledge:

a) The following attached information of Centralines Limited prepared for the purposes of clauses 2.4.1, 2.6.1, 2.6.3, 2.6.6 and 2.7.2 of the Electricity Distribution Information Disclosure Determination 2012 in all material respects complies with that determination.

b) The prospective financial or non-financial information included in the attached information has been measured on a basis consistent with regulatory requirements or recognised industry standards.

c) the forecasts in Schedules 11a, 11b, 12a, 12b, 12c and 12d are based on objective and reasonable assumptions which both align with Centralines Limited's corporate vision and strategy and are documented in retained records.

Director — Date: 23 March 2016

Director — Date: 23 March 2016

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